



GOVERNMENT OF PUDUCHERRY

PUDUCHERRY POLLUTION CONTROL COMMITTEE

ENVIS HUB NEWSLETTER

**STATUS OF WATER QUALITY IN THE U.T OF
PUDUCHERRY FOR THE YEAR 2021**



JAN TO MAR, 2022

VOLUME XIII-I

SPONSORED BY

**Ministry of Environment, Forest & Climate Change
Government of India
New Delhi**



Introduction

U.T of Puducherry consists of the four former colonies of French India namely Puducherry, Karaikal, Yanam and Mahe. Puducherry and Karaikal regions are located in south- eastern Coromandel Coast of India, surrounded by Tamil Nadu state. Yanam surrounded by Andhra Pradesh state is located farther north along the eastern coast in the delta region of the River Godavari and Mahe is located on the western Malabar Coast surrounded by Kerala state. The Union Territory of Puducherry comprises an area of 492 Sq. Kms.

National Water Quality Monitoring Programme

Central Pollution Control Board (CPCB) in collaboration with State Pollution Control Boards (SPCBs) in the States and Pollution Control Committees (PCCs) in Union Territories had established a National Water Quality Monitoring Network (NWMP) in order to assess the status of water quality and to facilitate for prevention and control of pollution in water bodies.

Monitoring Network: Present water quality monitoring network under NWMP comprises 4111 stations on surface and groundwater in 28 States and 8 Union Territories. Monitoring is carried out with a frequency on monthly, quarterly, half yearly and yearly basis. Year-wise growth of monitoring network is given in Figure 1.

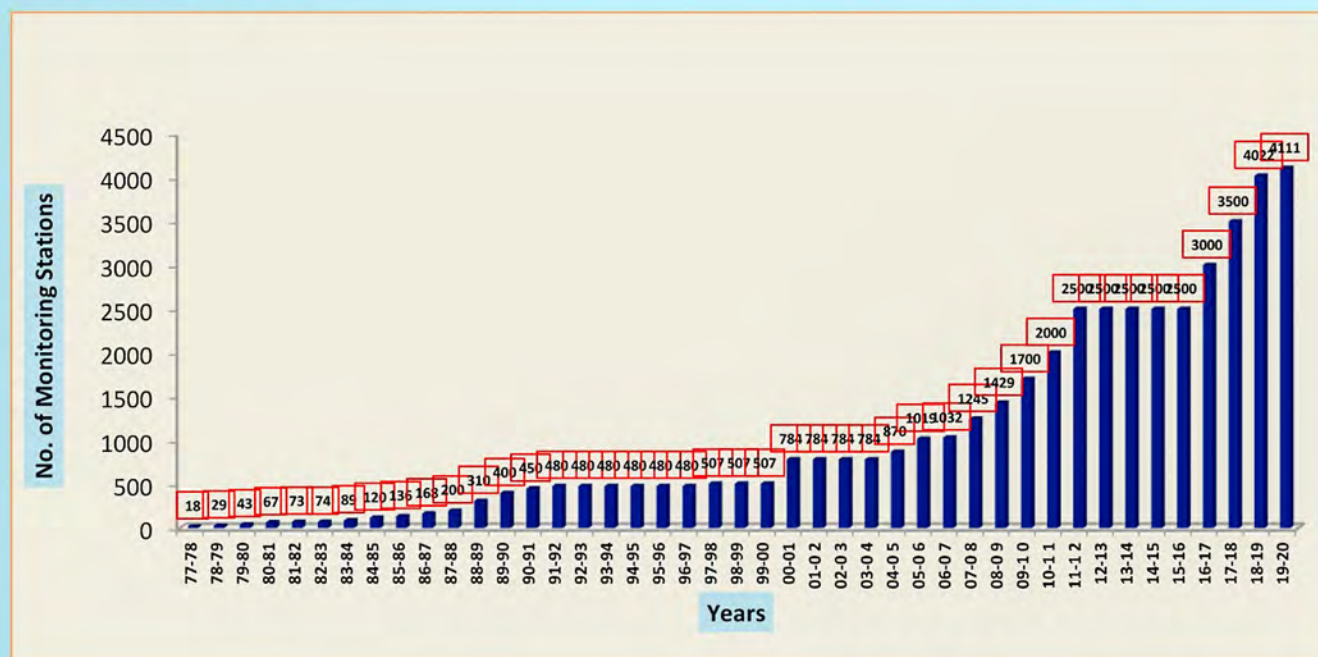


Figure 1. Year-Wise Growth of Monitoring Network



Parameters Monitored: Water samples are analysed for 9 core, 19 general parameters, 9 trace metals and set of pesticides as per the Guidelines on Water Quality Monitoring, 2017 issued by the Ministry of Environment, Forest and Climate Change (MoEF&CC). Analysed water quality parameters are compared with the designated best use water quality criteria recommended by CPCB or primary water quality criteria for outdoor bathing notified under Environment (Protection) Rules, 1986 or BIS Drinking Water Specifications i.e. IS:10500-2012 or water quality standards for coastal water depending on the use of water bodies.

Achievement of Monitoring Programme: Water quality data is used for identification of polluted water bodies, identification of pollution sources in cities for formulation of River Action Plans including interception, diversion and treatment of municipal wastewater, waste management and stricter surveillance of industrial pollution sources. Water quality data is also used for dissemination of information i.e., to reply Parliament Questions, Public Queries, for filing replies in Supreme Court, High Courts and in NGT, sharing of information with Non-Governmental Organisation, Students, and Researchers.

Status of Water Quality in the U.T. of Puducherry

Department of Science, Technology & Environment / Puducherry Pollution Control Committee has been monitoring Water quality periodically at 31 locations with financial assistance from Central Pollution Control Board under National Water Quality Monitoring Programme (NWMP). Monitoring is done on quarterly basis in surface water bodies and during premonsoon (September – October) and post monsoon (January – February) in the case of ground water in Puducherry and Karaikal regions. In Mahe and Yanam regions, the monitoring is done yearly.

Objectives of Water Quality Monitoring:

The water quality monitoring is performed with the following main objectives:

- To understand the nature and extent of pollution control and measures required.
- To evaluate the extent of pollution control required and effectiveness of pollution control measures already in existence.
- To assess water quality trends over a period of time.
- To assess assimilative capacity of a water body thereby reducing cost on pollution control.
- To understand the environmental fate of different pollutants.
- To assess the fitness of water for different uses.



Water Quality Monitoring Stations in U.T. of Puducherry

U. T of Puducherry has 31 Stations under NWMP. The details of water body wise and frequency wise no. of monitoring stations are shown in the figures below

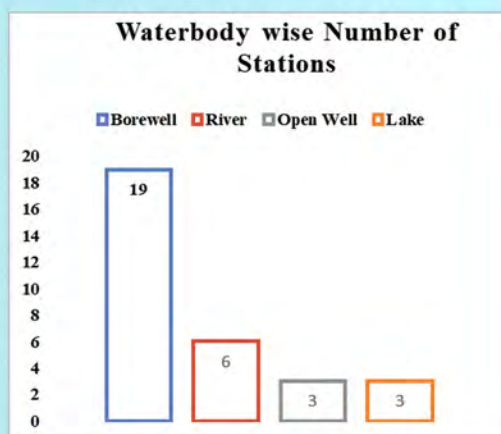


Figure 2.0

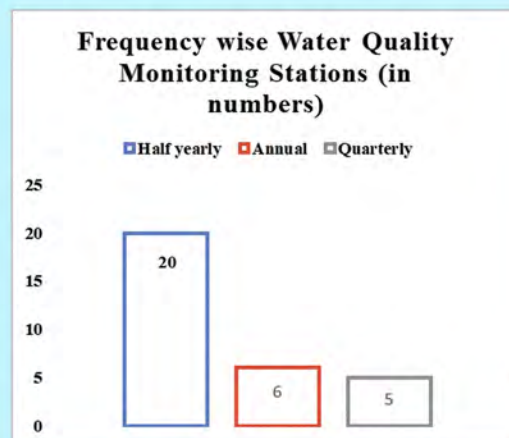


Figure 2.1

Location Map of Water Quality Monitoring Stations

Sl.No	Location
1.	Ousteri Lake
2.	Kanagan Lake
3.	Bahour Lake
4.	Chunnambar River
5.	Chetty Koil, Mission Street
6.	Krishna Nagar
7.	Thengaihittu
8.	Muthirappalayam
9.	Pondicherry University
10.	Katterikuppam
11.	Kurumbapet
12.	Mettupalayam
13.	Uruvaiyar
14.	Maruthi School
15.	Echankadu
16.	Near by Lake, Bahour
17.	Chevalier Sellane Government Higher secondary school, Kalapet
18.	Dhanderar Kulam, Sedarapet
19.	Kothapurinatham, Thiruvandarkoil
20.	Thirukkanur
21.	Madukarai
22.	Panithittu

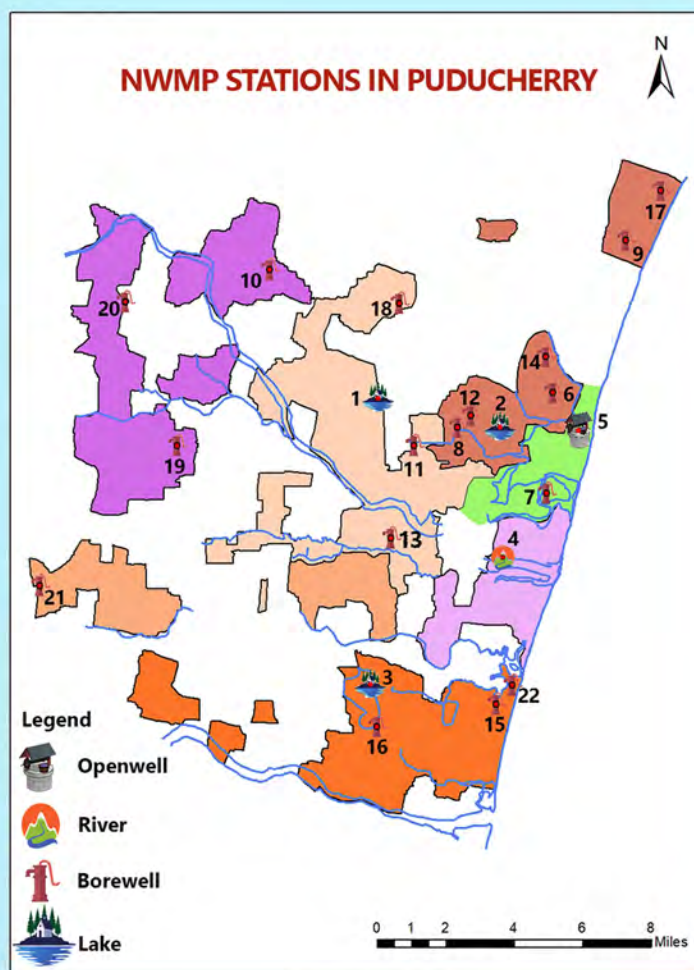


Figure 3.0

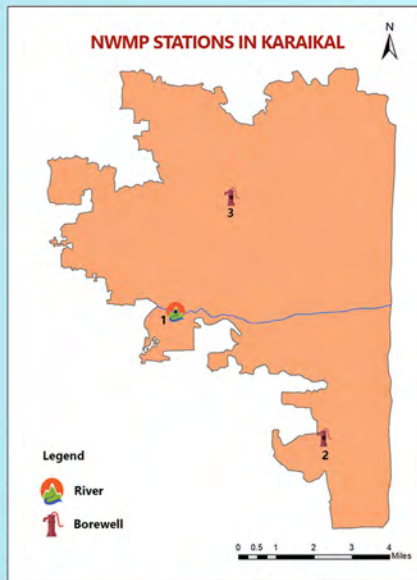


Figure 4.0

Sl.No	Location
1.	Arasalar
2.	T.R Pattinam
3.	Vadamattam

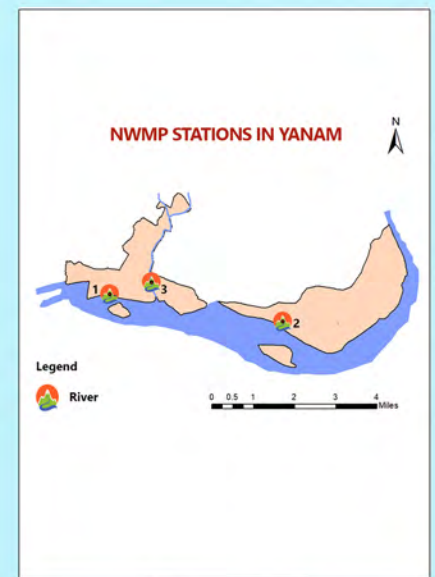


Figure 5.0

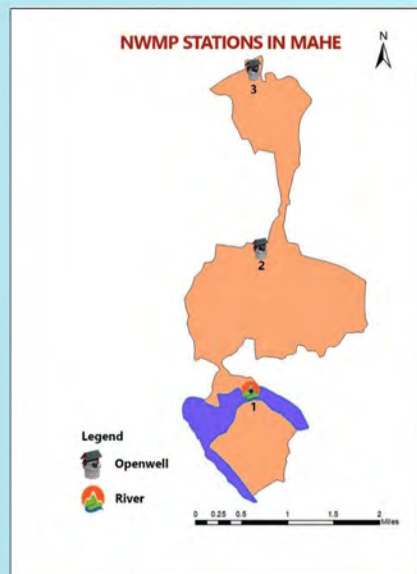
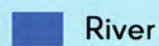


Figure 6.0

Sl.No	Location
1.	Mahe River
2.	Pallur
3.	Panthakkal

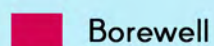
Color Code:



River



Open Well



Borewell



Lake

Surface Water Quality (2021) – Puducherry and Karaikal

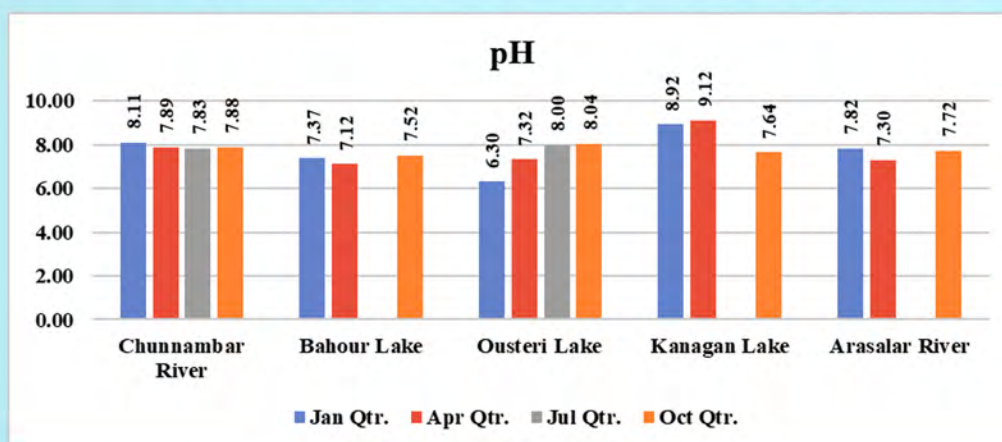


Figure 7.0 pH

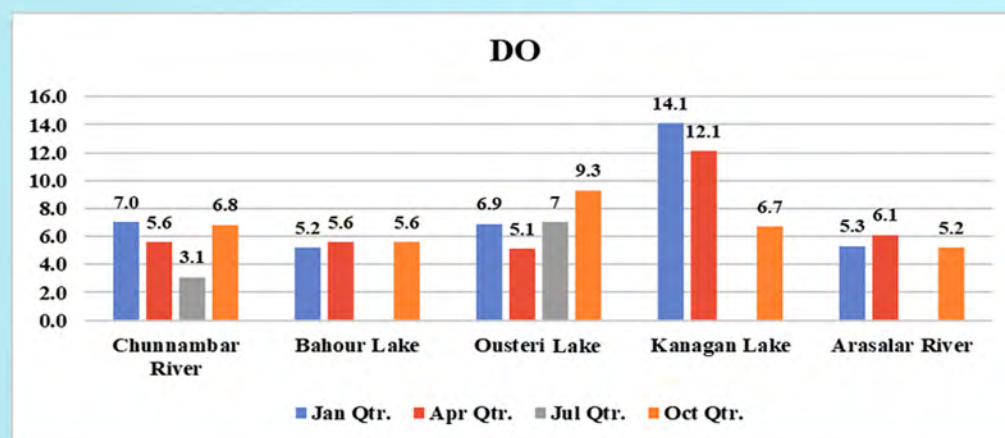


Figure 7.1 DO (mg/l)

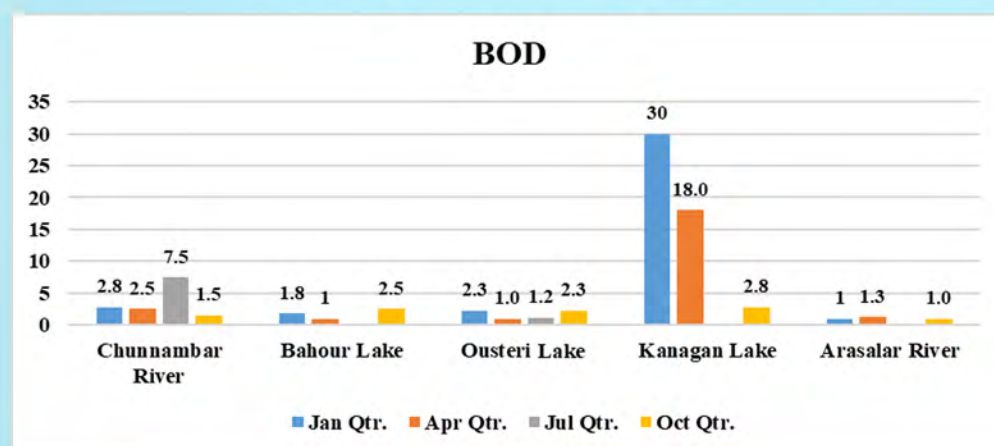


Figure 7.2 BOD (mg/l)

Note: As per the primary water quality criteria for bathing water of class B, pH, should be 6.5 – 8.5, DO 5 mg/l or more and BOD should be 3 mg/l or less. In Bahour Lake, Kanagan Lake and Arasalar River during July quarter 2021 water sampling was not done due to non availability of water.

Ground Water Quality – Puducherry and Karaikal

Comparative Study - Post and Pre-Monsoon of 2021

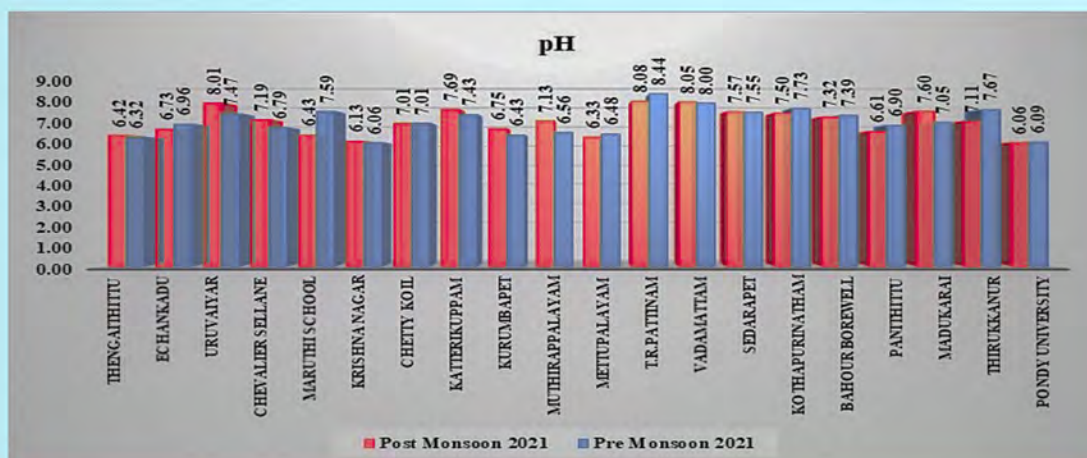


Figure 8.0 pH

Note: Permissible Limit - 6.5 to 8.5

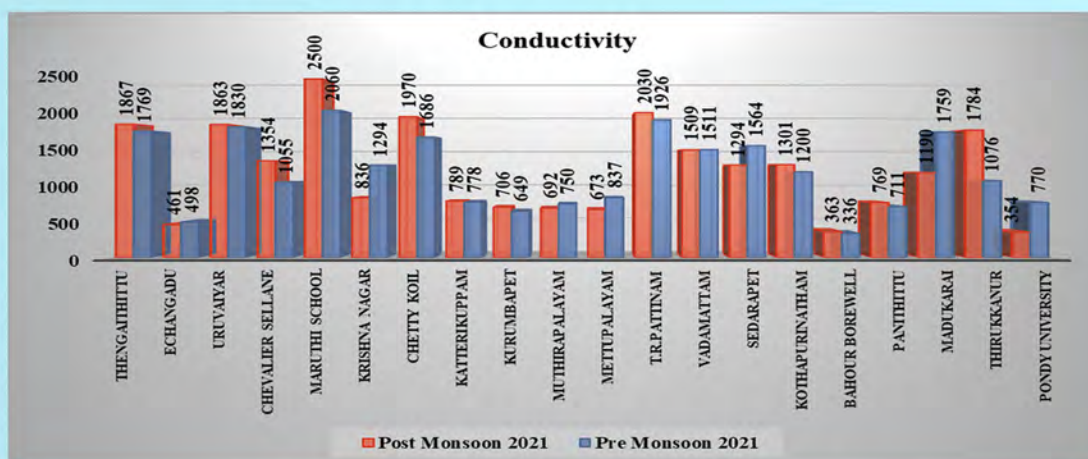


Figure 8.1 Conductivity ($\mu\text{mho/cm}$)

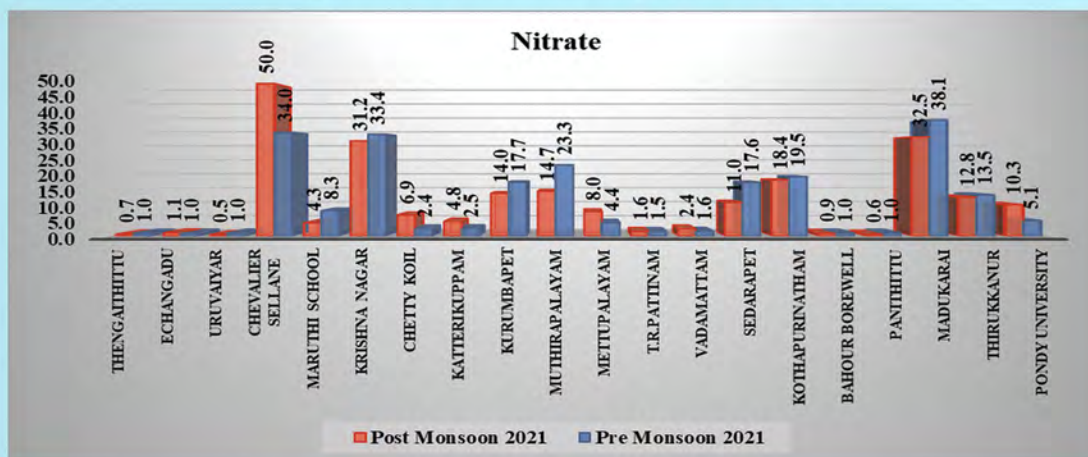


Figure 8.2 Nitrate (mg/l)

Note: Permissible Limit – 45 (mg/l)

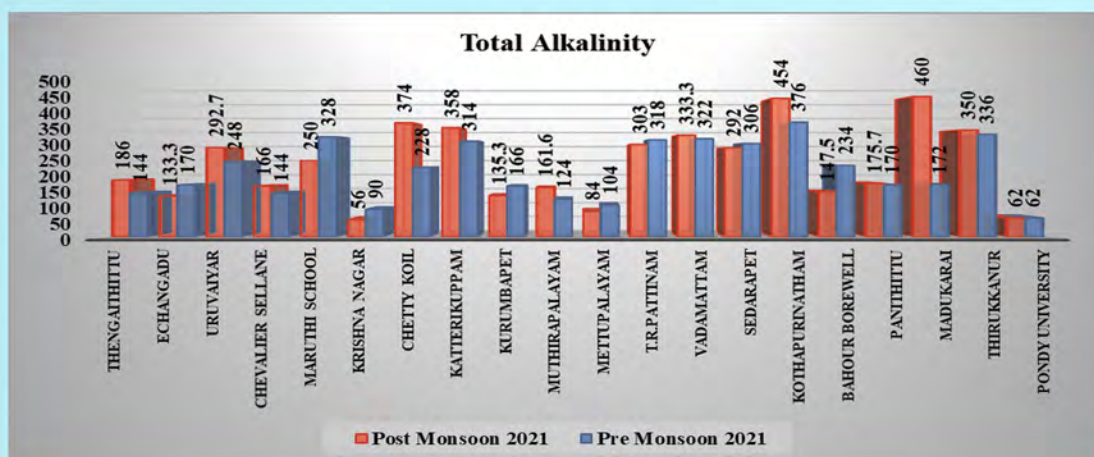


Figure 8.3 Total Alkalinity (mg/l)

Note: Permissible Limit– 600(mg/l)

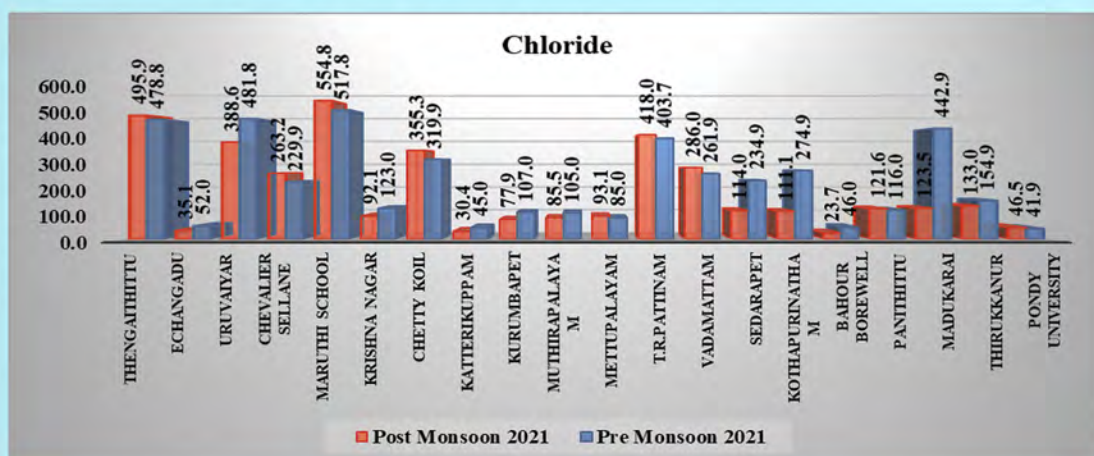


Figure 8.4 Chloride (mg/l)

Note: Permissible Limit–1000(mg/l)

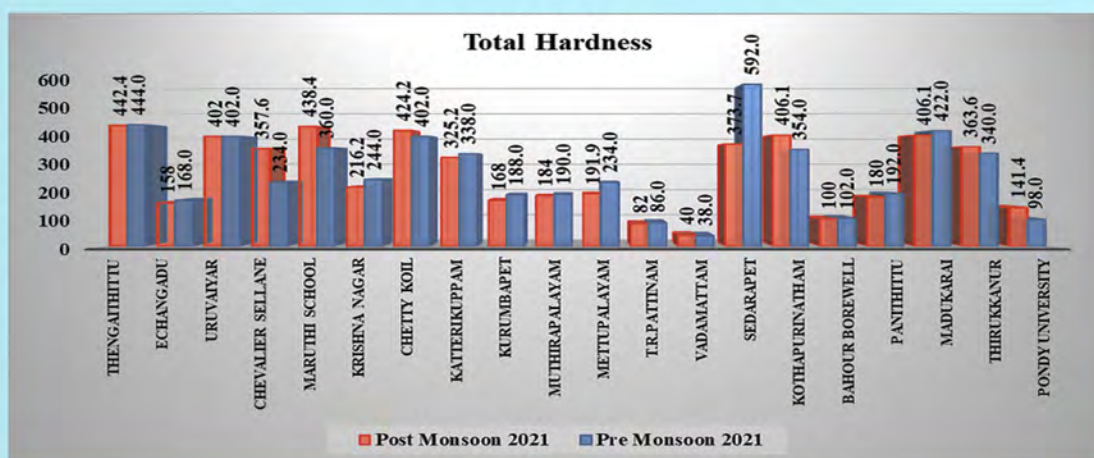


Figure 8.5 Total Hardness (mg/l)

Note: Permissible Limit–600(mg/l)

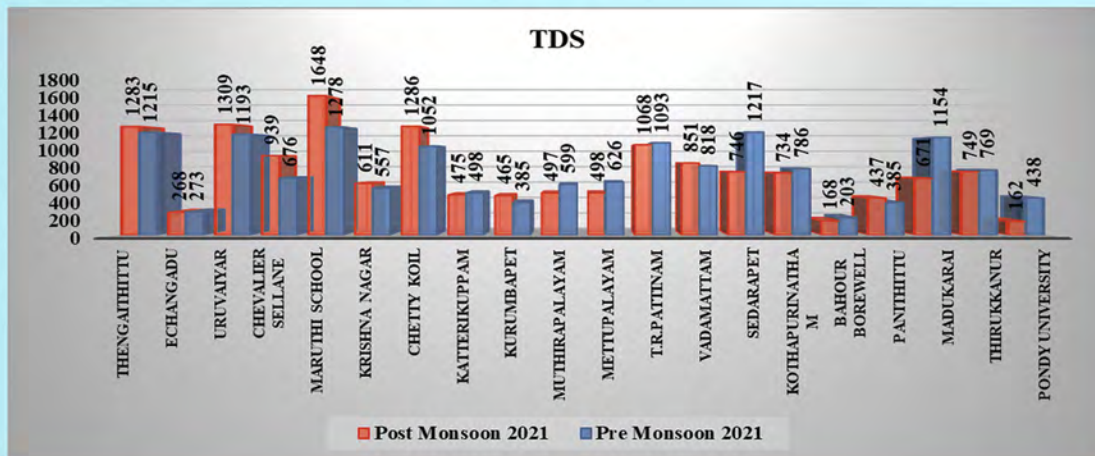


Figure 8.6 TDS (mg/l)

Note: Permissible Limit– 2000(mg/l)

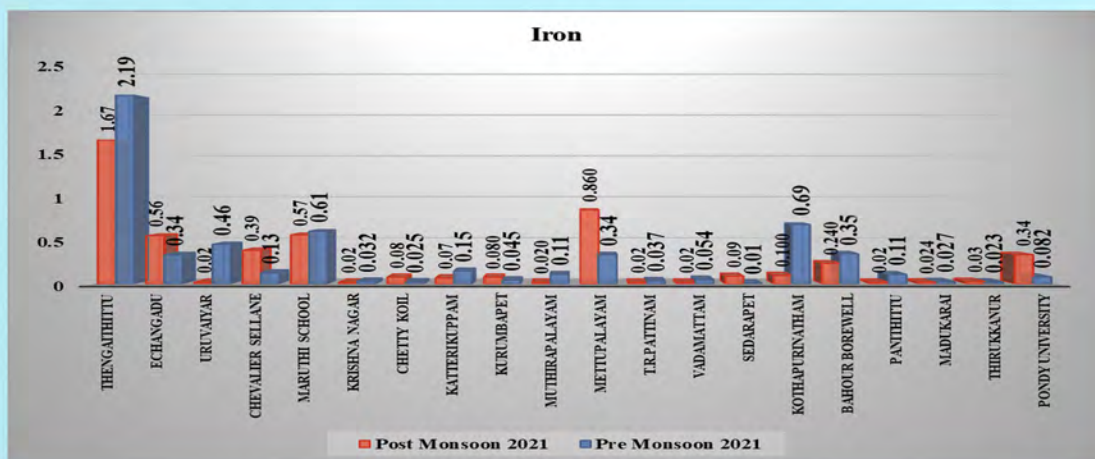


Figure 8.7 Iron (mg/l)

Note: Permissible Limit– 0.3 (mg/l)

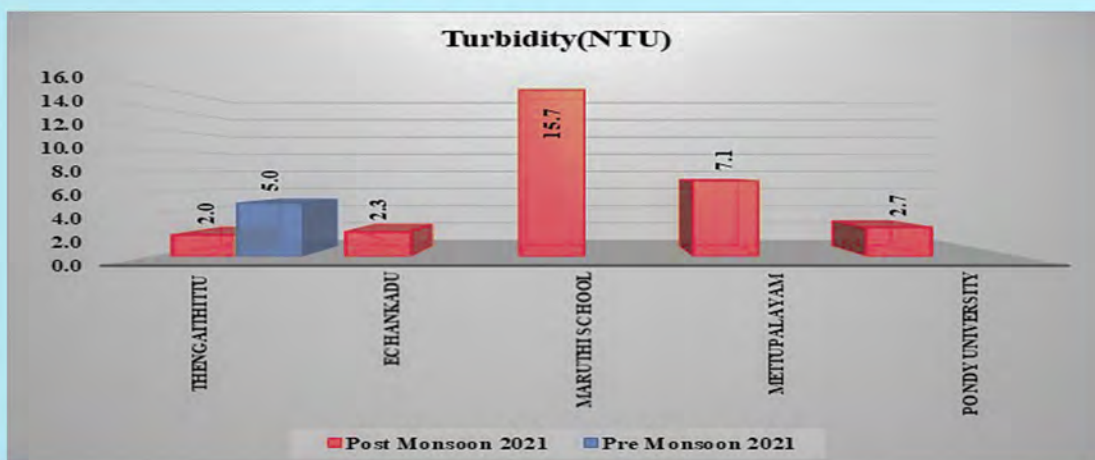


Figure 8.8 Turbidity (NTU)

Note: Permissible Limit– 5 (NTU).

In all other location turbidity is Below detection limit (BDL).

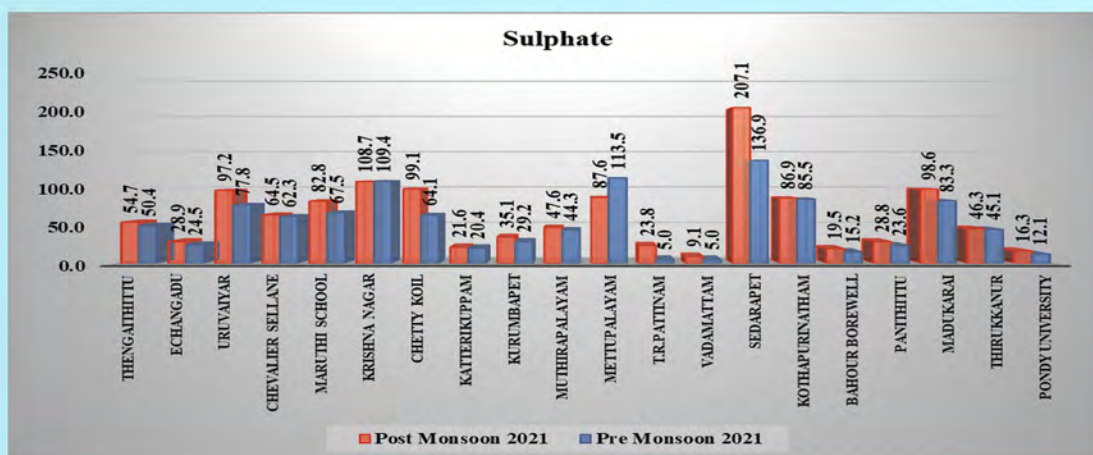


Figure 8.9 Sulphate (mg/l)

Note: Permissible Limit– 400 (mg/l)

Pesticides viz., Alpha BHC, Beta BHC, Gamma BHC, OP DDT, PP DDT, PP DDE , PP DDD, Alpha Endosulphan, Beta Endosulphan, Dieldrin, Carbaryl (Carbamate), 2,4-D, Aldrin, Malathion, Methyl Parathion, Chloropyriphos, Isoproturon, Alachlor, Atrazine, Monochrotophos, Ethion, Phorate, Butachlor, Heptachlor and Chlorandane are Below Detectable Limit in all the locations and trace metals viz., Copper, Cadmium, Lead, Total Chromium, Zinc, Arsenic, Mercury, Nickel are also Below Detectable Limit in all the locations. The concentration of iron in some of the ground water sample is slightly higher than the permissible limit of 0.3 $\mu\text{g/L}$. Pesticides are expressed in $\mu\text{g/L}$ and trace metals in mg/L.



Figure 9.0 Water Sampling by the Laboratory staff

Water Quality in Yanam Region 2021

Sl.No.	Parameters	Gautami - Godavari River Near Adavipolam	Coringa River (Tidal Lock)	Gautami - Godavari River Near Balayogi Bridge
1.	Latitude	16° 42' 52.54 " N	16° 43' 48.6 " N	16° 43' 30.25 " N
2	Longitude	82 ° 15' 41.53 " E	82 ° 13' 2.6 " E	82 ° 12' 21.46 " E
3.	Dt. of Sampling	21.12.2021	21.12.2021	21.12.2021
4.	Time	12 Noon	10.40 A.M	10.00 A.M
5.	Temperature °C	26.5	27.0	27.0
6.	DO mg/l	6.8	5.5	6.1
7.	pH	7.97	7.85	7.92
8.	Conductivity µmho/cm	24900	23500	20800
9.	BOD mg/l	25.0	20.0	2.0
10.	Nitrate - N mg/l	BDL (DL - 0.3)		
11.	Nitrate mg/l	0.177	0.261	0.252
12.	Nitrite - N mg/l	BDL (DL - 0.02)		
13.	Turbidity NTU	1.1	1.8	1.1
14.	Total Alkalinity mg/l	210	186.0	198.0
15.	Bi-Carbonate as HCO_3^- mg/l	246.4	224.5	231.8
16.	P. Alkalinity mg/l	8.0	BDL (DI - 5.0)	8.0
17.	Carbonate as CO_3^{2-} mg/l	4.8	BDL (DI - 3.0)	4.8
18.	Chloride mg/l	10973.9	10470.5	9866.4
19.	COD mg/l	380.0	280.0	148.0
20.	Total Hardness mg/l	2653.2	2593.8	2316.6
21.	Calcium Hardness mg/l	1722.6	1673.1	1603.8
22.	Calcium as Ca^{++} mg/l	689.0	669.24	641.52

Sl.No.	Parameters	Gautami - Godavari River Near Adavipolam	Coringa River (Tidal Lock)	Gautami - Godavari River Near Balayogi Bridge
23.	Magnesium Hardness mg/l	930.6	920.7	712.8
24.	Magnesium as Mg++ mg/l	226.1	223.73	173.2
25.	Sulphate mg/l	976.10	857.75	767.92
26.	Orthophosphate mg/l	0.10	0.12	0.13
27.	TDS mg/l	16233	15511	13995
28.	TSS mg/l	BDL (DL - 10)		
29.	FDS / TFS mg/l	13536	12978	11720
30.	Ammonia - N mg/l	BDL (DL - 0.4)		
31.	Sodium mg/l	4390.0	4382.0	3961.0
32.	Potassium mg/l	172.10	168.70	169.10
33.	Hexavalent Chromium mg/l	BDL		
34.	% Sodium	76.79	77.15	77.21
35.	SAR	37.0	37.3	35.7
36.	Arsenic mg/l	BDI (DL - 0.00049)		
37.	Cadmium mg/l	BDI (DL - 0.00042)		
38.	Copper mg/l	0.252	0.265	0.181
39.	Lead mg/l	BDI (DL - 0.00031)		
40.	Total Chormium mg/l	BDI (DL - 0.00056)		
41.	Mercury mg/l	BDI (DL - 0.00052)		
42.	Nickel mg/l	BDI (DL - 0.00054)		
43.	Zinc mg/l	BDL (DI 0.1)		0.183
44.	Manganese as Mn mg/l	BDI (DL - 0.00043)		
45.	Iron mg/l	0.29	0.37	0.65

Water Quality in Mahe Region 2021

Sl.No.	Parameters	Pallur (Open Well)	Pandakkal (open Well)	Mahe River
1.	Latitude	11° 43' 58.06 " N	11° 45' 40.24 " N	11° 42' 36.88 " N
2	Longitude	75° 32' 16.95 " E	75 ° 32' 13.02 " E	75° 32' 11.22 " E
3.	Dt. of Sampling	23.11.2021	23.11.2021	23.11.2021
4.	Time	10.20 A.M	10.45 A.M	11.15 A.M
5.	Temperature °C	28.0	29.0	29.0
6.	DO mg/l	-	-	6.3
7.	pH	5.31	5.02	6.88
8.	Conductivity µmho/cm	289	83	8370
9.	BOD mg/l	BDL (DL -1)		
10.	Nitrate - N mg/l	BDL (DL - 0.3)		
11.	Nitrate mg/l	0.027	0.004	0.013
12.	Nitrite - N mg/l	BDL (DL - 0.02)		
13.	Turbidity NTU	BDL (DL - 1)		
14.	Total Alkalinity mg/l	27	22	51
15.	Bi-Carbonate as HCO_3^- mg/l	33.48	26.3	62.17
16.	P. Alkalinity mg/l	BDL		
17.	Carbonate as CO_3^{2-} mg/l	BDL (DL - 3.0)		
18.	Chloride mg/l	51.6	18.9	2729.7
19.	COD mg/l	BDL (DL - 5.0)		
20.	Total Hardness mg/l	70.0	20.0	864.0
21.	Calcium Hardness mg/l	52.0	12.0	568.0
22.	Calcium as Ca^{++} mg/l	20.8	4.8	227.2

Sl.No.	Parameters	Pallur (Open Well)	Pandakkal (open Well)	Mahe River
23.	Magnesium Hardness (mg/l)	18.0	8.0	296.0
24.	Magnesium as Mg++ (mg/l)	4.4	1.9	71.9
25.	Sulphate (mg/l)	22.31	6.52	340.34
26.	Orthophosphate (mg/l)	BDL (DL - 0.05)		
27.	TDS (mg/l)	190.0	51.0	5374.0
28.	TSS (mg/l)	BDL (DL - 10)		
29.	FDS / TFS (mg/l)	36.0	13.0	4004.0
30.	Ammonia - N (mg/l)	BDL (DL - 0.4)		
31.	Sodium (mg/l)	24.74	5.64	1368.0
32.	Potassium (mg/l)	6.42	BDL (DL - 1.0)	52.10
33.	Hexavalent Chromium (mg/l)	BDL		
34.	% Sodium	40.67	36.79	76.09
35.	SAR	1.3	0.5	20.2
36.	Arsenic (mg/l)	BDL (DL - 0.005)		
37.	Cadmium (mg/l)	BDL (DL - 0.001)		
38.	Copper (mg/l)	BDL (DL - 0.01)		
39.	Lead (mg/l)	BDL (DL - 0.005)		
40.	Total Chormium (mg/l)	BDL (DL - 0.01)		
41.	Mercury (mg/l)	BDL (DL - 0.0005)		
42.	Nickel (mg/l)	BDL (DL - 0.01)		
43.	Zinc (mg/l)	0.030	0.021	0.014
44.	Iron (mg/l)	0.25	0.22	0.57

Note: BDL - Below detection limit, DL - Detection limit.

Status of Water Quality

Surface Water:

During January and April quarter, the value of pH at Kanagan Lake is 8.92 and 9.12 respectively and in Ousteri Lake during January quarter, the value of pH is 6.30 which are not meeting the primary water quality criteria of 6.5 – 8.5 for bathing water of Class B. The pH of other surface water bodies are meeting the criteria.

The value of Dissolved Oxygen (DO) at Chunnambar River is 3.1 mg/l during July quarter which is not meeting the primary Water Quality Criteria of ≥ 5 mg/l. In other quarters and in all other locations in Puducherry and in Arasalar River, Karaikal, DO is meeting the criteria. In the surface water bodies of Yanam and Mahe region, the values are in the ranges of 5.5 – 6.8 mg/l.

The concentration of Biological Oxygen Demand (BOD) at Chunnambar River (7.5 mg/l) during July quarter and in Kanagan Lake during January (30 mg/l) and April quarter (18 mg/l) are not meeting the Primary Water Quality Criteria of ≤ 3 mg/l. During other quarters in Chunnambar River and in Kanagan Lake during October quarter, BOD is in the ranges of 1.5 – 2.8 mg/l. In Yanam region, at Coringa river (tidal Lock) and Gautami – Godavari River near Adavipolam, BOD of 20 mg/l and 25 mg/l respectively are not meeting the standard. In Mahe River, Mahe region, BOD is meeting the Primary Water Quality Criteria.

The primary cause of Oxygen depletion in the water body is due to excessive algae and phytoplankton growth driven by high levels of Phosphorus and Nitrogen. During the night hours, these photosynthetic organisms consume oxygen through respiration when engaged in active photosynthesis.

An increase in BOD level indicates excessive concentration of biodegradable organic matter in water which may be due to sewage disposal and high consumption of Oxygen by heterotrophic organisms.

Ground Water:

In some of the borewells viz., Thengaithittu, Maruthi School, Krishna Nagar, Kurumbapet, Mettupalayam and Pondicherry University in either of the season, pH is not within the range of 6.5–8.5. pH varies between 6.08 and 6.47 which is close to neutral in those locations. This may be due to nature of the soil and geological formation.



In Chevalier School, Nitrate level of 50.0 mg/l in postmonsoon season is higher than the permissible limit of 45 mg/l. During premonsoon Nitrate in Chevalier School is 34 mg/l. In Krishna Nagar and Madukarai during postmonsoon and premonsoon, the Nitrate level is 31.2 mg/l, 33.4 mg/l and 32.5 mg/l, 38.9 mg/l respectively. Though the Nitrate concentration is within the permissible limit, compared to other monitoring stations, it is found to be slightly higher. Sources of nitrate may include municipal and industrial waste water, septic tanks, sewage disposal systems and improper disposal of municipal solid waste.

The concentration of iron in some of the ground water samples from Maruthi school, Kothapurinatham, Eachangadu, Thengaithitu, Mettupalayam, Uruvaiyar, Chevalier School, Bahour and from Pondicherry university are slightly higher than the permissible limit of 0.3 mg/l. The source of Iron in the ground water may be due to the natural occurrence of Iron Oxide in geological condition in Puducherry region.

In Mettupalayam and Maruthi school during postmonsoon, the turbidity level is 7.1 NTU and 15.7 NTU respectively which is not meeting the permissible limit of 5 NTU which may be due to sediments especially clay and silt.

In Mahe region at Pandakkal open well and in Pallur open well, the value of pH is 5.02 and 5.3 respectively.

Puducherry ENVIS Hub Environment Events

Release of Value Added Knowledge Products

Smt. Smitha. R, I.A.S., Chairperson, Puducherry Pollution Control Committee (PPCC) released Monthly and Yearly Science Calendar, 2022 on 05.01.2022 prepared by Puducherry Envis Hub. This calendar will emphasis on the importance of highlighted days in the respective month for carrying out necessary Environment, Science and Technology related activities/ celebration / events.



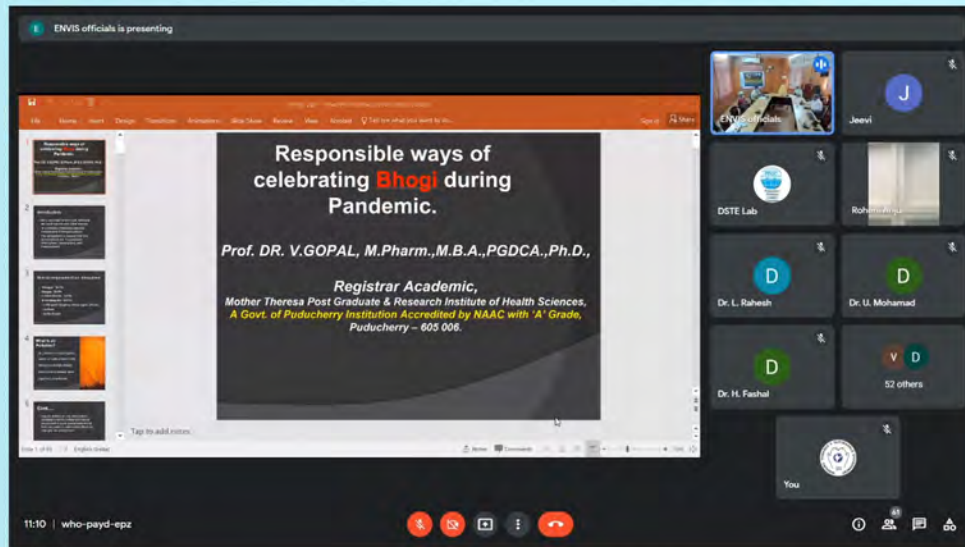
Monthly

Yearly

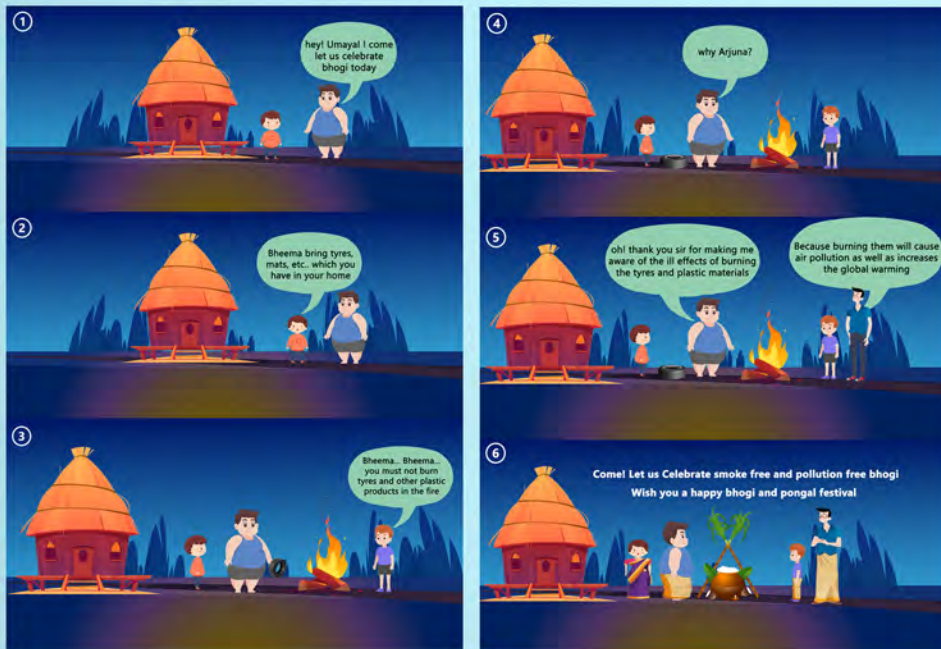
Can be accessed at : <https://dste.py.gov.in/Envispy/science%20calendar.html>

Celebration of Bhogi Awareness, 2022

Dr. V. Gopal, Principal, College of Pharmacy & HOD, Department of Pharmacognosy, Mother Theresa Post Graduate and Research Institute of Health Science, Puducherry delivered expert talk on 'Responsible way of Celebrating Bhogi during Pandemic' on the eve of Bhogi Festival held on 12.01.2022. He highlighted the eco-friendly ways to celebrate smokeless Bhogi. Public and students participated in this event.



Awareness Posters & Pamphlets



Can be accessed at: <https://dste.py.gov.in/Envispdy/Poster.html>



World Wetlands Day, 2022

Dr. M. Bubesh Guptha, Founder Director, Universal Eco Foundation, Puducherry delivered outdoor talk at Ousteri Lake on "Save Wetlands, Save Future".



Drawing Competition on the theme 'Wetland Conservation' on 01.02.2021 at Ousteri lake, Puducherry. Best drawings were selected and the respective artists were awarded with prize and certificate. Participation certificate were given to all the participants.



Elocution Competition on the theme 'Wetlands Action for people and nature' on 01.02.2021 at Ousteri lake, Puducherry. Best astounding speeches were selected and the respective students were awarded with prize and certificate.



National Deworming Day, 2022

Dr. N. Sridhar, Parataxonomist, Puducherry ENVIS Hub delivered a lecture on 'Helminths' on 10.02.2022 at Indira Gandhi College of Arts and Science, Puducherry.



Quiz Competition was conducted for the College students of Indira Gandhi College of Arts and Science, Puducherry. Prizes and certificates were distributed to winners and the participants.



Vigyan Sarvatre Pujiyate – ‘Science & Technology Festival’ from 22.02.2022 to 28.02.2022.

ENVIS Hub of Puducherry Pollution Control Committee participated in the Vigyan Sarvatre Pujiyate – ‘Science & Technology Festival’ organized by the Department of Science, Technology and Environment and Puducherry Council for Science and Technology by displaying a stall at the Science Expo from 22.02.2022 to 28.02.2022 to highlight the activities of the Puducherry ENVIS Team conducted at Dr. Abdul Kalam Science Centre and Planetarium, Puducherry.

Puducherry ENVIS publications viz., Calendars, Books, Posters etc., were distributed to the public during the said occasion apart from interacting with students, teachers, faculties etc., for their suggestions/views. Puducherry ENVIS Hub team was also part of the various competitions held during the ‘Science & Technology festival’.



Visit of Hon'ble Lieutenant Governor and Chief Minister of Puducherry



Visit of Chief Secretary Govt. of Puducherry

International Day of Forest & World Water Day, 2022

Puducherry ENVIS Hub organized bird watching program at Kazhuveli Bird Sanctuary, Tamilnadu on the occasion of International Day of Forest & World Water Day in order to inculcate the young minds about the need of the wetlands and the dependent ecosystem, role of the wetlands for better protecting and managing groundwater.



Organized Elocution (English & Tamil) and Drawing Competitions on the theme of ‘Water Conservation’ on 22.03.2022 for the college students. Prizes and certificates were distributed to the winners and the participants.



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