

**BEFORE THE NATIONAL GREEN TRIBUNAL**

**SOUTHERN ZONE, CHENNAI**

**Original Application No. 14 of 2025 (SZ)**

**In the matter of:**

Tribunal on its own motion SUO MOTU based  
on the news item in NDTV.com dt.05.12.2024  
titled "Sea of Toxic after dam discharge surplus water"

Versus

Tamil Nadu Pollution Control Board  
Through its Member Secretary, Chennai and Ors.  
...Respondent(s)

**ANNEXURES FILED BY THE 7<sup>TH</sup> RESPONDENT- THE ADDITIONAL CHIEF  
SECRETARY TO GOVERNMENT , WATER RESOURCE DEPARTMENT,  
GOVERNMENT OF TAMIL NADU.**

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ADDITIONAL TYPESET

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(**Note:** The page numbers are at the top centre of every page)



Through

Dr. D. Shanmuganathan

Standing Counsel for Government of Tamil Nadu

National Green Tribunal

Southern Zone, Chennai

**DATE: 14.07.2025**



**WATER RESOURCES DEPARTMENT**

D.O Letter No.42/C.Spl.1/2023.2, dated 20.04.2023

Dear Tmt. Vandita Sharma,

Vanakkam!

You may be aware that the Inter State river Pennaiyar, which originates in the Nandi hill in Karnataka, after traversing about 112 km in the State, flows to Tamil Nadu, crossing the Karnataka - Tamil Nadu border near Kodiyalam anicut. The first dam across Pennaiyar river in Tamil Nadu is Kelavarapalli dam, about 8 km downstream from the Inter State border. This dam feeds about 8000 acres, apart from meeting the drinking water requirements of the people and livestock in Tamil Nadu.

I am now constrained to bring to your attention that the media have widely reported that the Pennaiyar water from Karnataka flowing into Kelavarapalli dam is heavily polluted as evident from the foul smell and formation of foam on the water surface. This has anguished the people of Tamil Nadu, who depend on the Pennaiyar waters for their livelihood. This is not the first time such incident occurs. When such an incident occurred in 2020, the National Green Tribunal, Southern Zone registered a suomotu case (O.A. No. 111 of 2020) based on news paper reports and constituted a Joint Committee for monitoring the issue. This Application was disposed off on 13.07.2022 with specific directions to the Bangalore Water Supply and Sewerage Board (BWSSB), and Bruhat Bangaluru Mahanagara Palike (BBMP) to see that no untreated sewage or effluent are being discharged into any of the drains which ultimately reaches the lakes or other water bodies, so as to protect the Thenpenai river from pollution.

In this connection, I would like to recall that the State of Tamil Nadu had already raised the issue of pollution of Pennaiyar waters caused by Karnataka by letting in untreated sewage and trade effluents generated from Bangalore City and its surroundings. A Suit (O. S. No. 2 of 2015) filed by the State of Tamil Nadu in this regard, is pending in the Hon'ble Supreme Court. I would like to bring to your notice that in the Written Submissions filed by Karnataka in March, 2019 in the above Suit, it was stated that Sewage Treatment Plants (STPs) of a total capacity of about 630 MLD was progressing at that time, which might have been completed by now. In that event, this problem should not have resurfaced.

-2-

I, therefore, request you to instruct BWSSB, BBMP and other instrumentalities to ensure that untreated sewage and effluents are not let into Pennaiyar river and its tributaries, and Karnataka State Pollution Control Board (KSPCB) to monitor the water quality of Pennaiyar river. I expect your early response in this regard.

*with regards,*

Yours sincerely,

*V.rai AP*  
21/04/2023

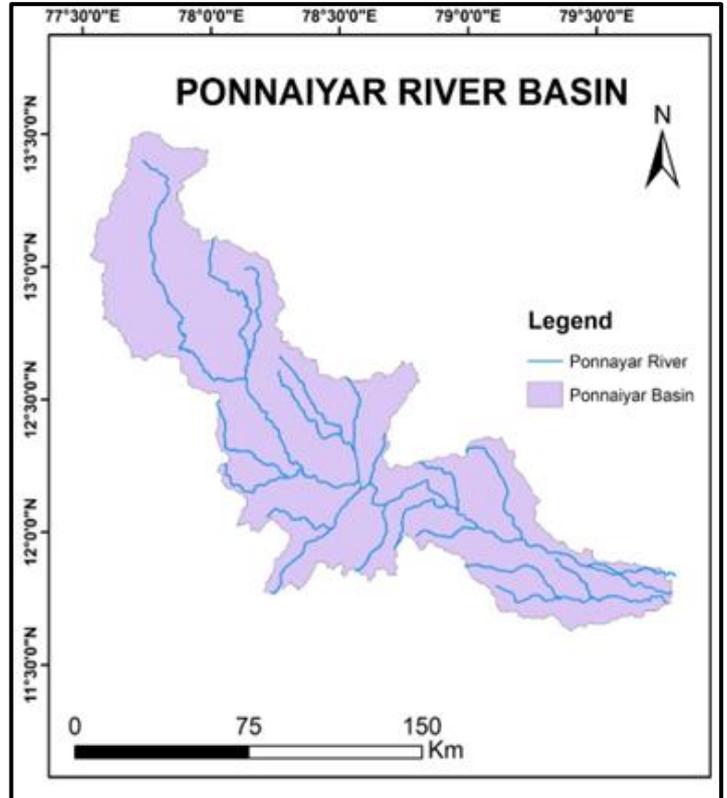
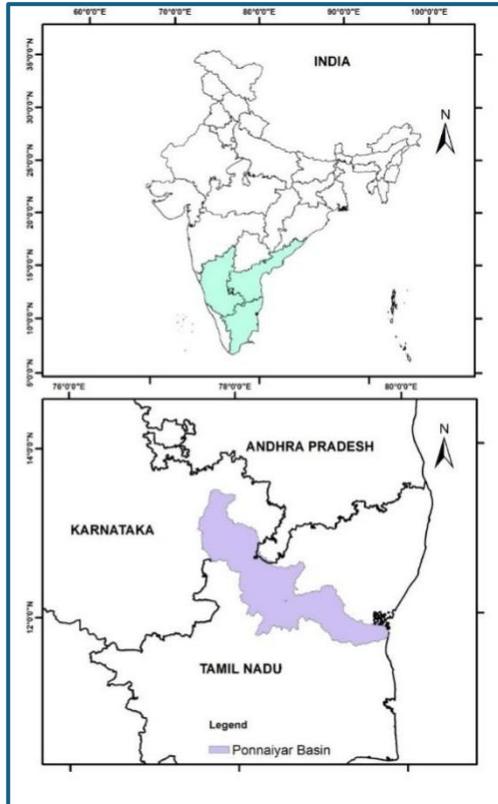
To

Tmt. Vandita Sharma, I.A.S.,  
Chief Secretary to Government of Karnataka,  
Room No.320, 3rd Floor,  
Vidhana Soudha,  
Bengaluru - 560 001.



भारत सरकार/ Govt. of India  
 जल शक्ति मंत्रालय/ Ministry of Jal Shakti  
 जल संसाधन विभाग, नदी विकास और गंगा कायाकल्प  
 Department of Water Resources, River Development and Ganga Rejuvenation  
 केंद्रीय जल आयोग / Central Water Commission

## पोन्नैयार नदी पर जल गुणवत्ता की अध्ययन Water Quality Study on Ponnaiyar River



Ministry of Jal Shakti  
 Central Water Commission  
 Cauvery & Southern Rivers Organisation  
 Coimbatore

**August 2024**

## **Executive Summary**

Ministry of Jal Shakti, Govt of India, in accordance with the direction of Hon'ble Supreme Court of India, constituted "Negotiation Committee on Ponnaiyar River Basin" under the Chairmanship of Chairman, CWC. The Negotiation Committee Comprises of representatives from the party states of Tamil Nadu, Karnataka, Andhra Pradesh, U.T of Puducherry and from various Central Ministries & Departments. One of the issues being discussed by the Negotiation Committee is the water quality of the Ponnaiyar River.

Shri Kushvinder Vohra, Chairman, CWC, Ministry of Jal Shakti, Government of India & Chairman of the Negotiation Committee visited the Ponnaiyar River Basin along with other Members during 8<sup>th</sup> to 10<sup>th</sup> June-2024. During the visit, Chairman and Other Committee Members proposed to check the Water Quality at all vulnerable points all along the Ponnaiyar river.

Accordingly, by conducting field visits, 17 points have been identified along the Ponnaiyar river and Water Quality samples were collected on 1<sup>st</sup> July-2024. On the date Sample collection, at 5 places the river is dry and hence WQ samples could be collected only at 12 locations. The Water Quality Samples of these 12 locations were tested for 41 Parameters (Physical-5, Chemical-15, Biological/Bacteriological-5, Trace & Toxic metals-9 & Pesticides-7) and the results are samples are compared with the BIS 10500:2012 and CPCB standards for "Designated Best Use".

Water samples collected from locations downstream of Hoskote Lake and up to the Kelavarapalli Reservoir showed concentrations beyond acceptable limits for most parameters. Notably, Ammonia, DO, BOD, Coliforms, Iron and Lead, indicating significant domestic and industrial waste discharge into the river.

Downstream of the Kelavarapalli Reservoir, water quality generally improved for most parameters, although Sodium, Silicate, Magnesium, Carbonate, Chloride, and Fluoride remained elevated. Pesticide levels

were lower at most sampling locations, except for Beta-BHC, Aldrin, Dieldrin, at few locations, and Alpha -BHC at all stations.

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## 1. Introduction

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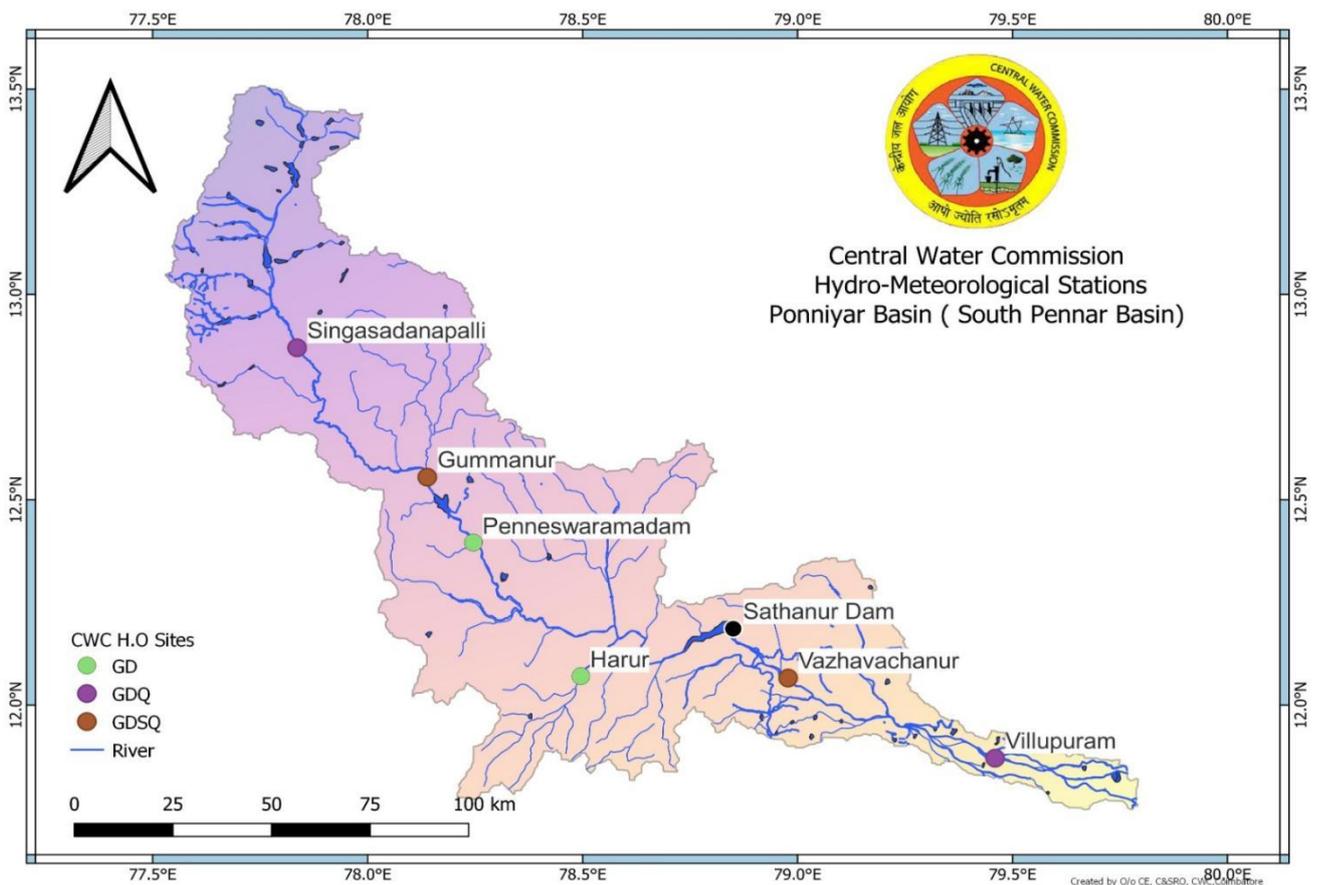
Water quality monitoring is one of the most important components in environmental management of aquatic ecosystems. Monitoring of water quality provides water managers with the necessary information for sustainable water resources management and provides insight into complex dynamic environmental processes, as reliable, consistent, and appropriate information is necessary to understand the water resources. Due to the direct or indirect activities from natural and anthropogenic sources, water quality on earth's surface such as of lakes, rivers, canals and groundwater etc. are getting deteriorated day by day. In comparison to groundwater, the surface water gets polluted more easily as it is open to atmosphere and for which its quality monitoring is also a major concern.

Presently, Central Water Commission (CWC) is monitoring river water quality at its **657** key hydrological observation stations covering all the important river basins of India. Also, water quality samples are being collected from **125** water quality sampling stations.

At present, CWC is maintaining a three-tier laboratory system for analysis of the physio-chemical parameters of the water. The Level-I laboratories are located at 295 field water quality monitoring stations on major rivers of India where physical parameters such as temperature, colour, odour, specific conductivity, total dissolved solids, pH and dissolved oxygen of river water are observed. There are 18 Level-II laboratories located at selected division offices throughout India to analyses 25 no. of physio-chemical and bacteriological parameters of water. 5 Level-III laboratories are functioning at Varanasi, Delhi, Hyderabad, Coimbatore and Guwahati where 41 parameters including heavy metals / toxic parameters and pesticides are analysed.

## 2. Ponnaiyar Basin

The Ponnaiyar River (also called as Dakshina Pinakini/ Thenpennai in the states it is flowing) rises near Hongashenhalli village at an elevation of about 900 m. above mean sea level (MSL) in the Kolar district of Karnataka (KA). From its origin, the river Ponnaiyar generally flows in the Southern direction for a length of 79 kms through Kolar and Bangalore districts of Karnataka before entering the Krishnagiri district of Tamil Nadu (TN) and then flows to various districts of Tamil Nadu and finally reaches the Bay of Bengal. The Ponnaiyar drains an area of 16,019 Sq. Kms. The details of the Hydro-metrological stations in the basin are given in **Fig-1**.

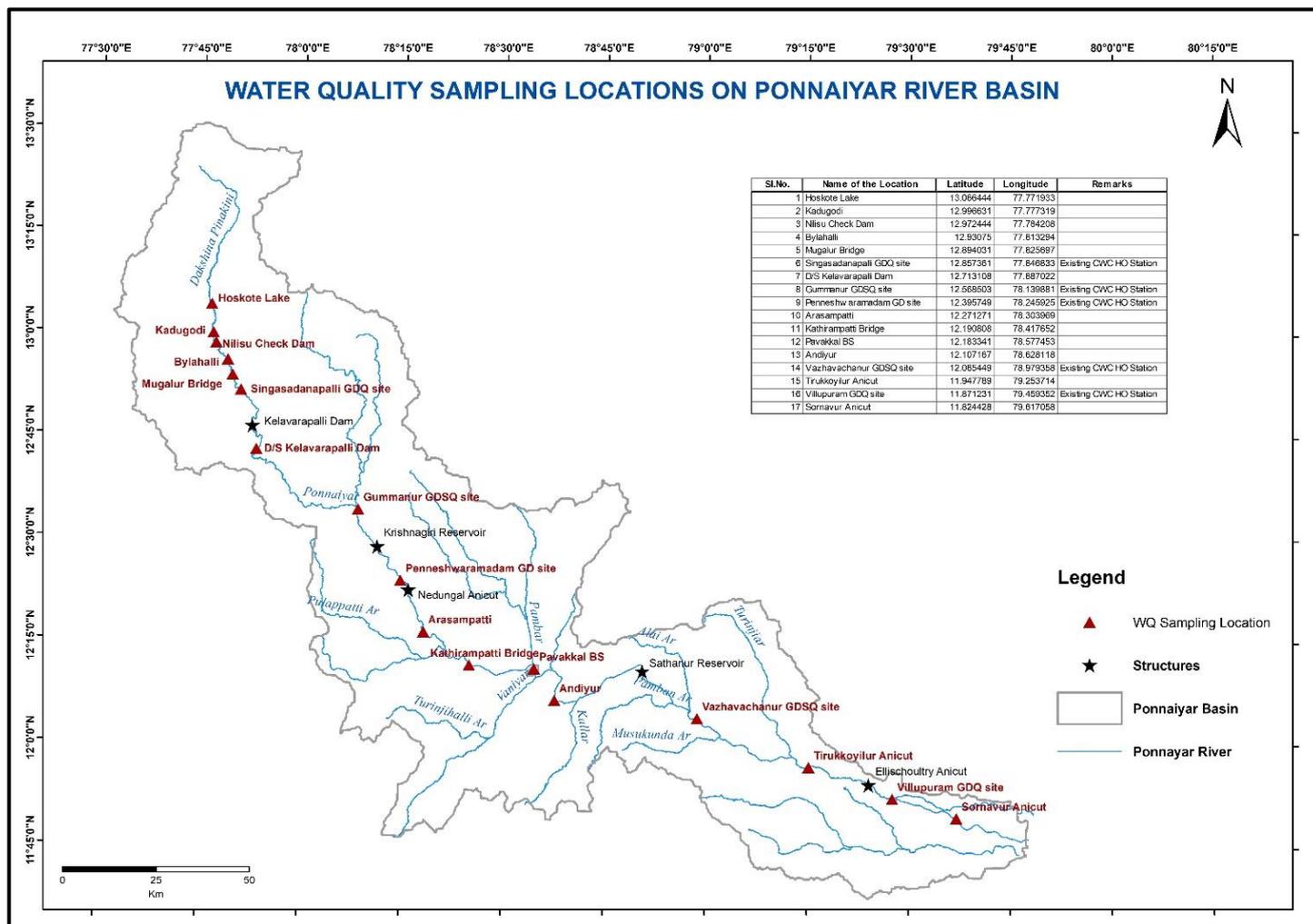


*Fig 1. Ponnaiyar Basin map contains the Hydrometeorological Stations*

CWC water quality stations on this river are situated at Singasadanapalli, Gummanur, Vazhavachanur and Villupuram (Fig 1)

The Central Water Commission is monitoring the quality of river water in the Ponnaiyar basin since 1978. *This study contains analysis of water quality data at 17 sampling locations including the 4 CWC WQ stations- Singasadanapalli, Gummanur, Vazhavachanur and Villupuram- located on main Ponnaiyar river and the same are depicted in the layout map (Fig 2).*

For the analysis of river water samples in the Ponnaiyar Basin, Lower Cauvery Water Quality Laboratory (LCWQL), Level-III at Coimbatore (NABL accredited) and East Flowing Rivers Water Quality Laboratory (EFRWQL), Level-II at Chennai (NABL accredited) is being maintained by the Central Water Commission.



*Fig 2. Sampling Locations on Ponnaiyar Basin for special study.*

## 2.1 Scope of study:

Bangalore, Krishnagiri, Tiruvannamalai, and Cuddalore are the important cities on the banks of Ponnaiyar river. This is the second longest river in Tamil Nadu, with a length of 497km, after the river Cauvery. Chandapura, Anekal, Hosur, Bagalur and Chengam are the major industrial settlements on its banks. The river is severely polluted by industrial waste as it flows through major industrial areas in the eastern suburbs of Bangalore, Industrial parks of Hosur and Chengam. Singasadanapalli station is the first water quality station in Tamilnadu being tested for water quality. Singasadanapalli site receives severely polluted water from the nearby city Bangalore in KA state and the same is passed on to Gummanur station (industrial clusters like organised and unorganised are situated on the banks, but the release of pollutants from these industries needs to be verified). The main source of pollution may be the Dyeing industries, untreated domestic waste and industrial waste. This source of pollution is mentioned in the CPCB report where a joint committee of two states (KA & TN) authorities has verified causes of pollution.

The Chairman of CWC has directed to study the effect of pollution on Ponnaiyar river, for which 17 sampling locations for water quality study were identified. The stretch initiates from Hoskote Lake of Bengaluru and ends at Sornavur Anicut at Villupuram of Tamil Nadu before entering Bay of Bengal. On July 1<sup>ST</sup> of 2024 the water samples have been collected from the identified sampling locations and analysed at CWC laboratories situated in Coimbatore and Chennai of Tamil Nadu.

### 3. Water Quality Monitoring

#### Water Quality Sampling points on Ponnaiyar River Basin:

Along the stretch of Ponnaiyar river the following points were selected for study purpose.

S. No.	Name of the Location	District	State	Latitude (N)	Longitude (E)
1	Hoskote Lake	Bangalore	Karnataka	13.066444	77.771933
2	Kadugodi	Bangalore	Karnataka	12.996631	77.777319
3	Nilisu Check Dam	Bangalore	Karnataka	12.972444	77.784208
4	Bylahalli	Bangalore	Karnataka	12.93075	77.813294
5	Mugalur Bridge	Krishnagiri	Tamil Nadu	12.894031	77.825697
6	Singasadanapalli GDQ Site	Krishnagiri	Tamil Nadu	12.857361	77.846833
7	D/S Kelavarapalli Dam	Krishnagiri	Tamil Nadu	12.713108	77.887022
8	Gummanur GDSQ site	Krishnagiri	Tamil Nadu	12.568503	78.139881
9	Penneshwaramadam GD Site	Krishnagiri	Tamil Nadu	12.395749	78.245925
10	Arasampatti	Dharmapuri	Tamil Nadu	12.271271	78.303969
11	Kathirampatti Bridge	Dharmapuri	Tamil Nadu	12.190808	78.417652
12	Pavakkal BS	Krishnagiri	Tamil Nadu	12.183341	78.577453
13	Andiyur	Krishnagiri	Tamil Nadu	12.107167	78.628118
14	Vazhavachanur GDSQ Site	Thiruvannamalai	Tamil Nadu	12.065449	78.979358
15	Tirukkoyilur Anicut	Kallakurchi	Tamil Nadu	11.947789	79.253714
16	Villupuram GDQ site	Villupuram	Tamil Nadu	11.871231	79.459352
17	Sornavur Anicut	Villupuram	Tamil Nadu	11.824428	79.617058

*Table-1: Sampling points on Ponnaiyar River\**

**Details of Water Quality Sampling collection on Ponnaiyar River Basin:**

S. No.	Name of the Location	Latitude (N)	Longitude (E)	Status of WQ Sample collection on 1st July-2024
1	Hoskote Lake	13.066444	77.771933	Collected
2	Kadugodi	12.996631	77.777319	Collected
3	Nilisu Check Dam	12.972444	77.784208	Collected
4	Bylahalli	12.93075	77.813294	Collected
5	Mugalur Bridge	12.894031	77.825697	Collected
6	Singasadanapalli GDQ Site	12.857361	77.846833	Collected
7	D/S Kelavarapalli Dam	12.713108	77.887022	Collected
8	Gummanur GDSQ site	12.568503	78.139881	Collected
9	Penneshwaramadam GD Site	12.395749	78.245925	Collected
10	Arasampatti	12.271271	78.303969	Collected
11	Kathirampatti Bridge	12.190808	78.417652	River Dry Not Collected
12	Pavakkal BS	12.183341	78.577453	Collected.
13	Andiyur	12.107167	78.628118	Collected
14	Vazhavachanur GDSQ Site	12.065449	78.979358	River Dry Not Collected
15	Tirukkoyilur Anicut	11.947789	79.253714	River Dry Not Collected
16	Villupuram GDQ site	11.871231	79.459352	River Dry Not Collected
17	Sornavur Anicut	11.824428	79.617058	River Dry Not Collected

*Table-2: Status of samples collected from the proposed sampling points*

Out of 17 proposed Locations, WQ Samples collected at 12 locations and at 5 locations, River is Dry on July 1<sup>st</sup> of 2024.





*Fig 3. Water Sample collection at (a) & (b) – Mugalur Bridge, (c) & (d) Nilisu Check Dam and (e) Andiyur, Krishnagiri.*



*Fig 4. Analysis at LCWQL, Coimbatore.*

## 4. Water Quality Standards

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The physico-chemical parameters like pH, electrical conductance, Chloride, Fluoride, Nitrate, Sulphate, Boron, Total hardness, Dissolved Oxygen and Bio-chemical Oxygen demand are main constituents defining the quality of river water. Presence of these parameters in river water samples beyond the acceptable limit is considered as polluted river water quality. CPCB has identified water quality requirements in terms of a few chemical characteristics, known as primary water quality criteria (**Table-3**).

Further, Bureau of Indian Standards (BIS) known as Indian Standard Institute (ISI) vide its document BIS 10500:2012 has recommended water quality standards for drinking water (**Table-4**).

Designated Best Use	Class	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	1.Total Coliforms Organism MPN/100 ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6 mg/L or more 4. Biochemical Oxygen Demand 5 days at 20 °C, 2 mg/L or less
Outdoor bathing (Organised)	B	1.Total Coliforms Organism MPN/100 ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5 mg/l or more 4. Biochemical Oxygen Demand 5 days 20 °C, 3 mg/L or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100ml shall be 5000 or less 2. pH between 6 and 9 3. Dissolved Oxygen 4 mg/L or more 4. Biochemical Oxygen Demand 5 days 20 °C, 3mg/L or less
Propagation of Wildlife and Fisheries	D	1. pH between 6.5 and 8.5 2. Dissolved Oxygen 4 mg/l or more 3. Free Ammonia (as N) 1.2 mg/L or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1. pH between 6.0 and 8.5 2. Electrical Conductivity at 25 °C micro mhos/cm, maximum 2250 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2 mg/L
	Below-E	Not meeting any of the A, B, C, D & E criteria

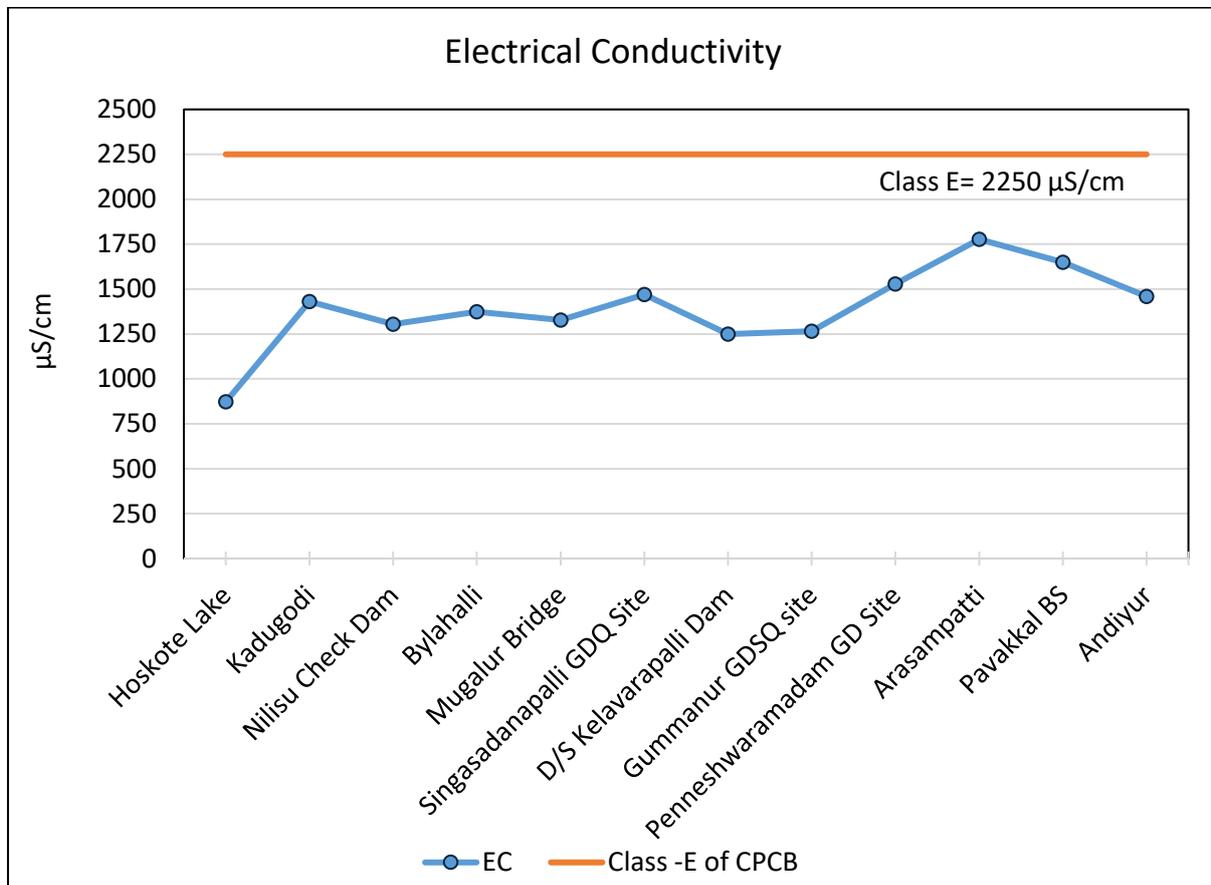
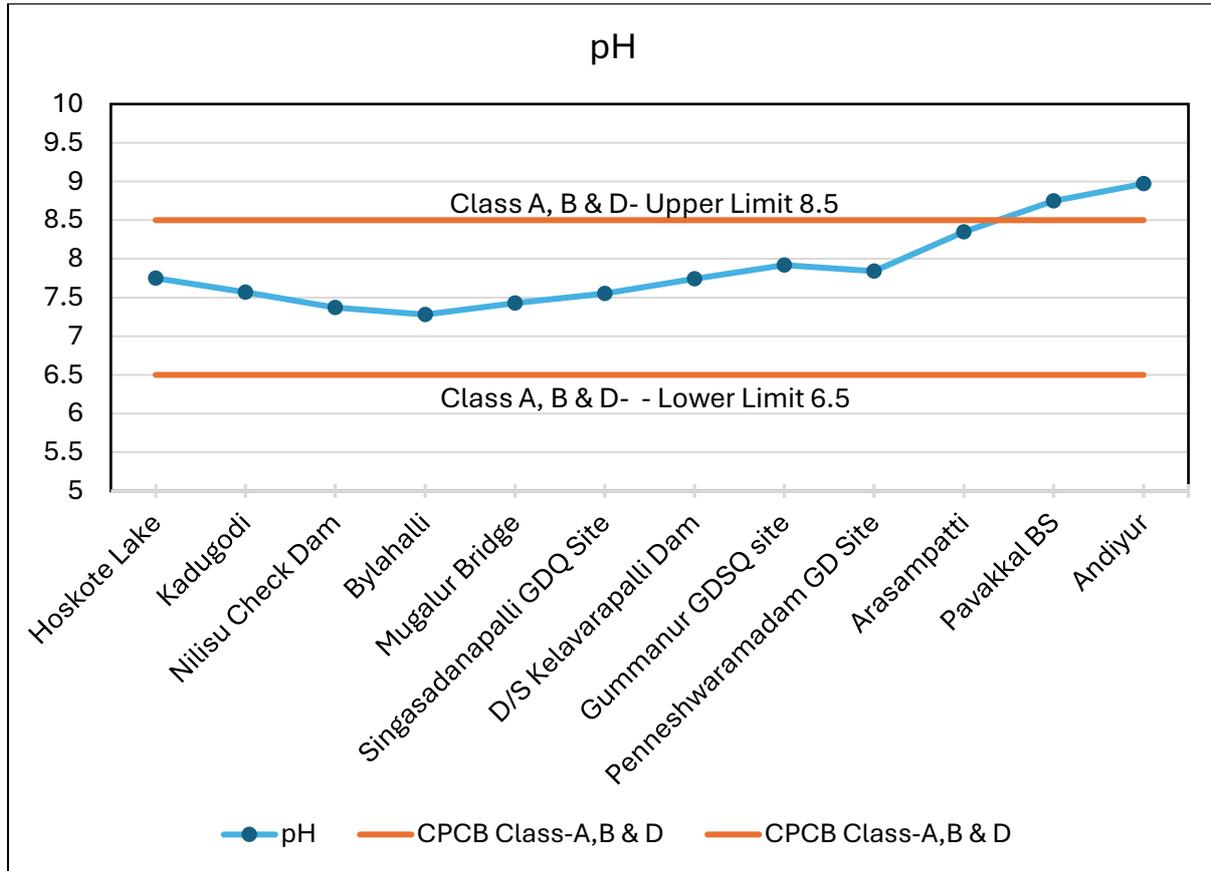
*Table 3: Designated Best Uses of Water by CPCB*

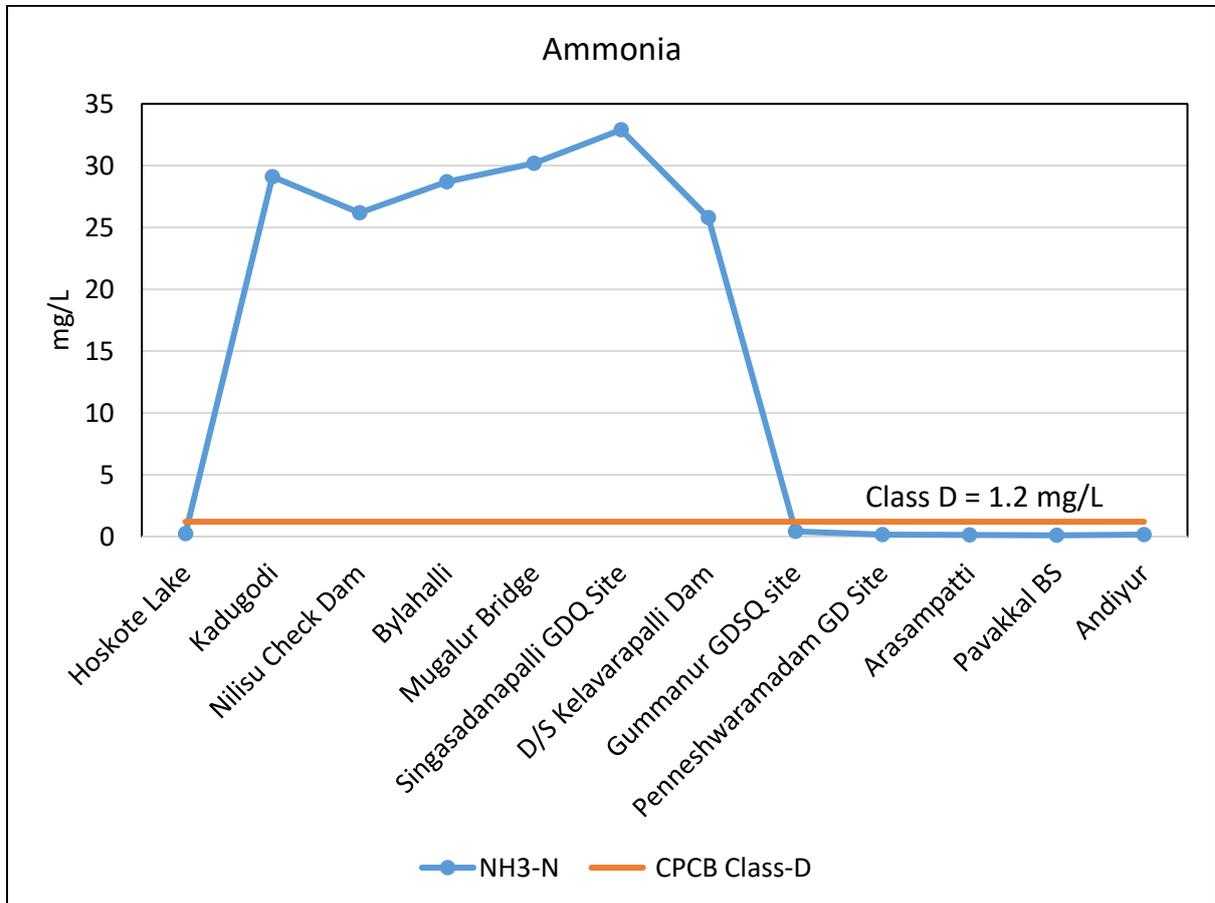
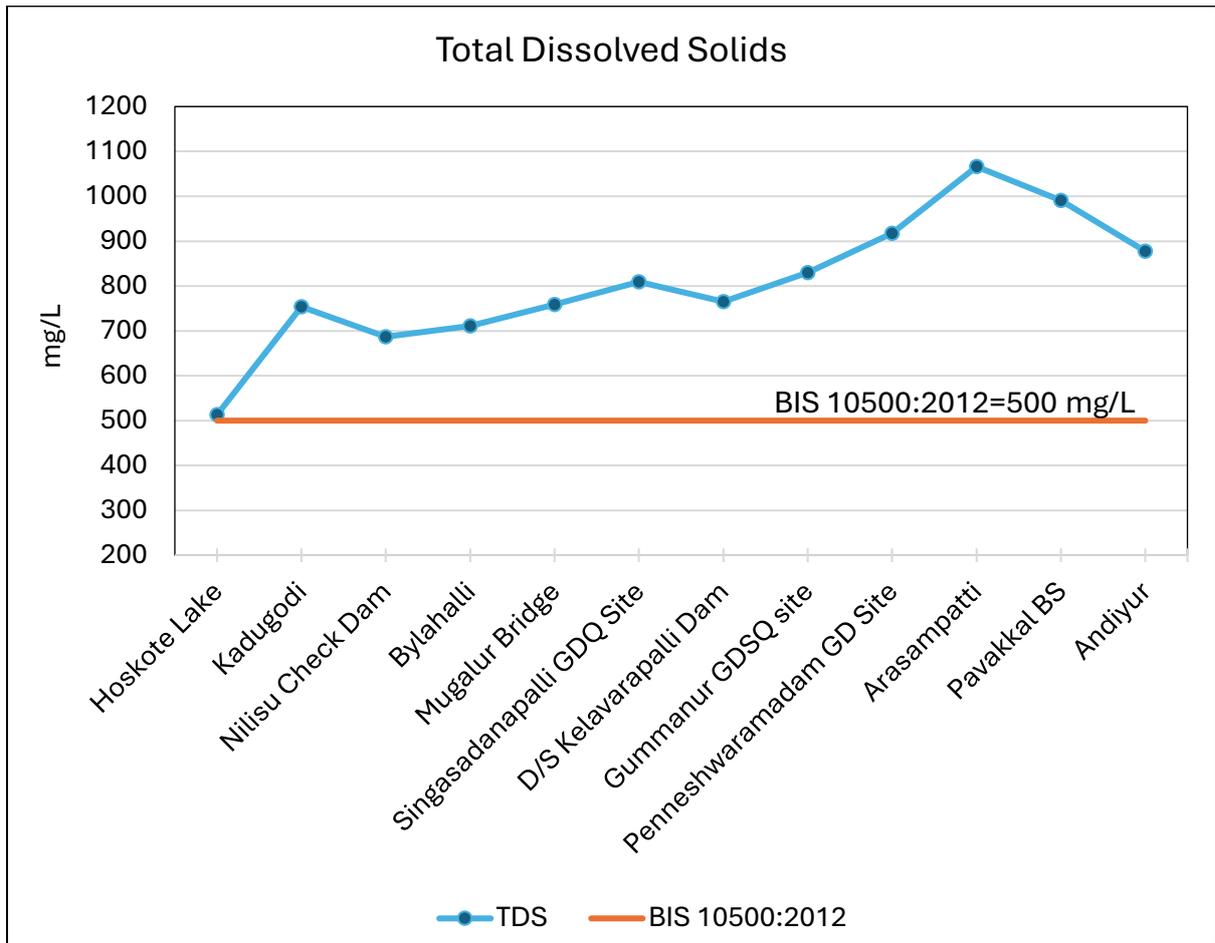
S.No.	Characteristic	Requirement (Acceptable Limit)	Permissible limit in the absence of alternate source
<b>Essential Characteristics</b>			
1	Colour, Hazen units	5	15
2	Odour	Agreeable	Agreeable
3	Taste	Agreeable	Agreeable
4	Turbidity NTU	1	5
5	pH Value	6.5-8.5	No relaxation
6	Total Hardness (as CaCO <sub>3</sub> ) mg/L	200	600
7	Iron (as Fe), mg/L	1.0	No relaxation
8	Chloride (as Cl), mg/L	250	1000
9	Residual free chlorine, mg/L	0.2	1.0
<b>Desirable Characteristics</b>			
10	Total Dissolved solids, mg/L	500	2000
11	Calcium (as Ca) mg/L	75	200
12	Magnesium (as Mg) mg/L	30	100
13	Copper (as Cu), /L	0.05	1.5
14	Manganese (as Mn) mg/L	0.1	0.3
15	Sulphates (as SO <sub>4</sub> ), mg/L	200	400
16	Nitrate (as NO <sub>3</sub> ) mg/L	45	No relaxation
17	Fluorides (as F), mg/L	1	1.5
18	Ammonia (as total ammonia-N) mg/L	0.5	No relaxation
19	Mercury (as Hg), mg/L	0.001	No relaxation
20	Cadmium (as Cd), mg/L	0.003	No relaxation
21	Selenium (as Se), mg/L	0.01	No relaxation
22	Total Arsenic (as As), mg/L	0.01	No relaxation
23	Cyanides (as CN), mg/L	0.05	No relaxation
24	Lead (as Pb), mg/L	0.01	No relaxation
25	Zinc (as Zn), mg/L	5	15
26	Total Chromium (as Cr), mg/L	0.05	No relaxation
27	Total Alkalinity mg/L	200	600
28	Aluminum (as Al) mg/L	0.03	0.2
29	Boron mg/L	0.5	1.0
30	Mineral oil, mg/L	0.5	
31	Poly Nuclear Aromatic Hydrocarbons mg/L	0.0001	No relaxation
32	Anionic detergents	0.2	1
33	Total Coliform	Shall not be detected in any 100mL of sample	
36	Phenolic Compounds, mg/L	0.001	0.002

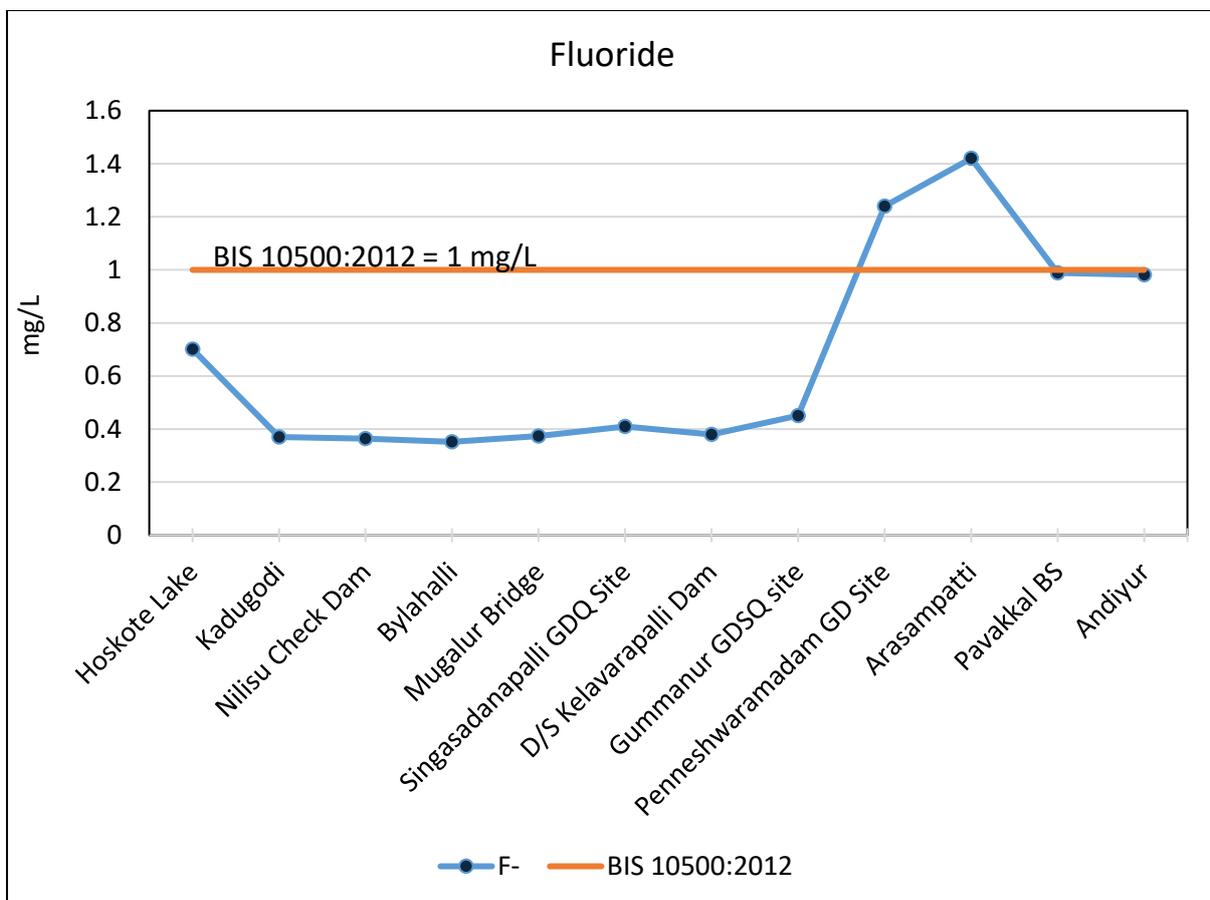
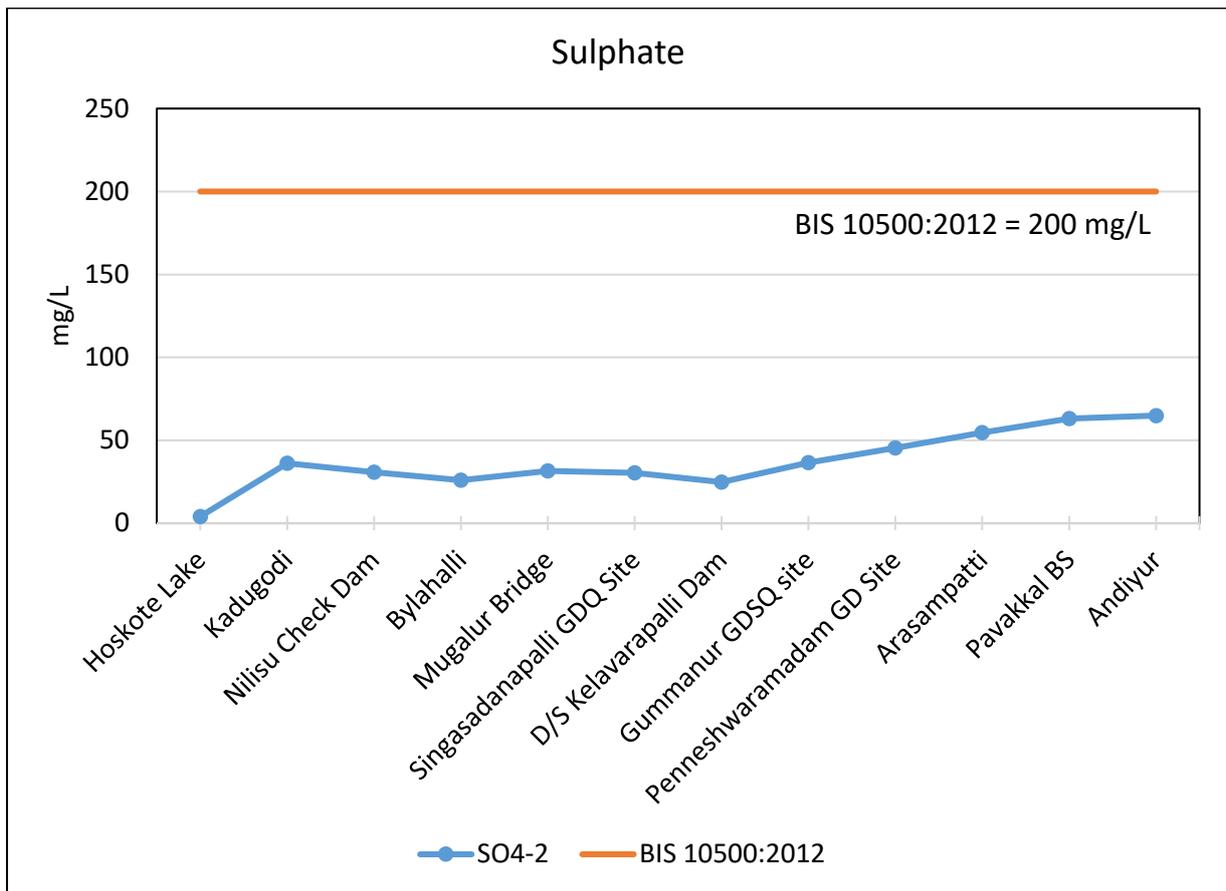
**Table 4: Drinking Water Quality Standards, BIS:10500, 2012\***

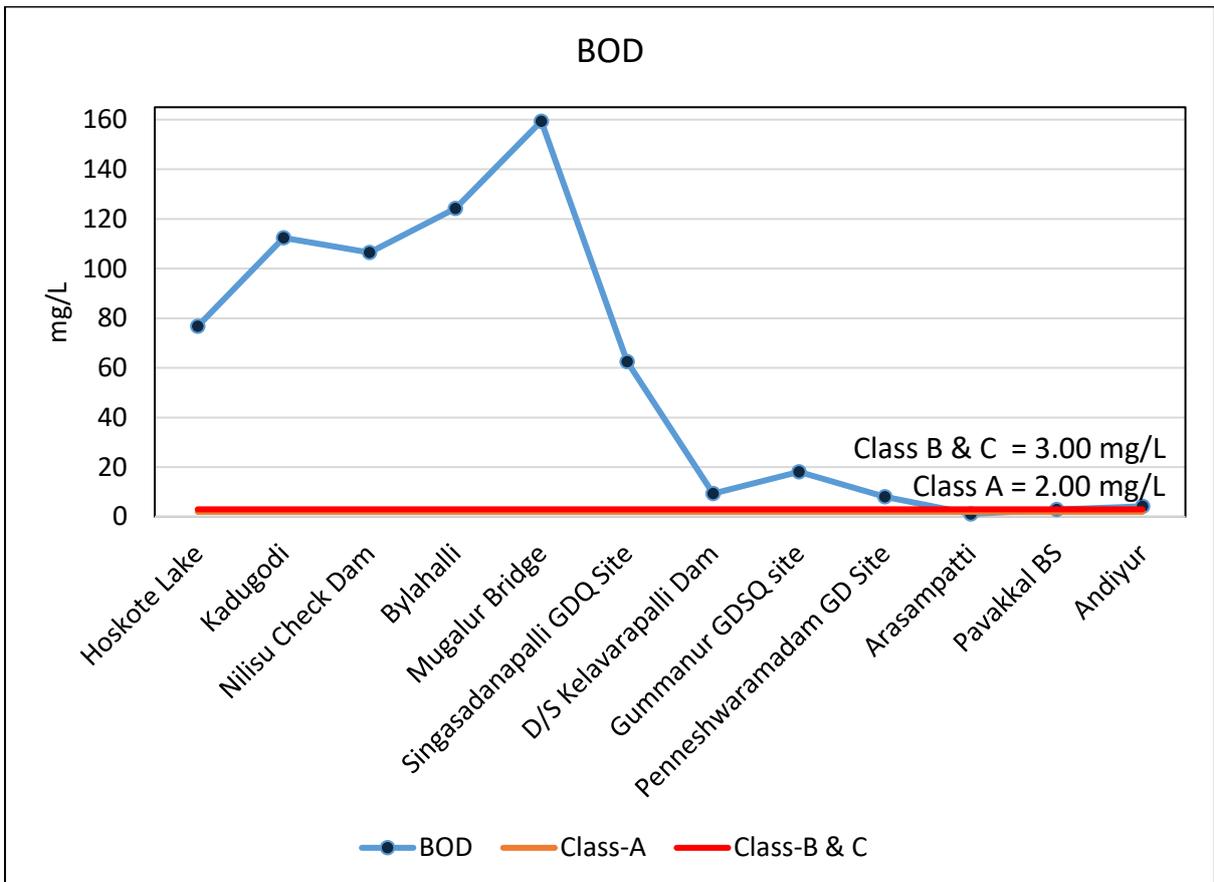
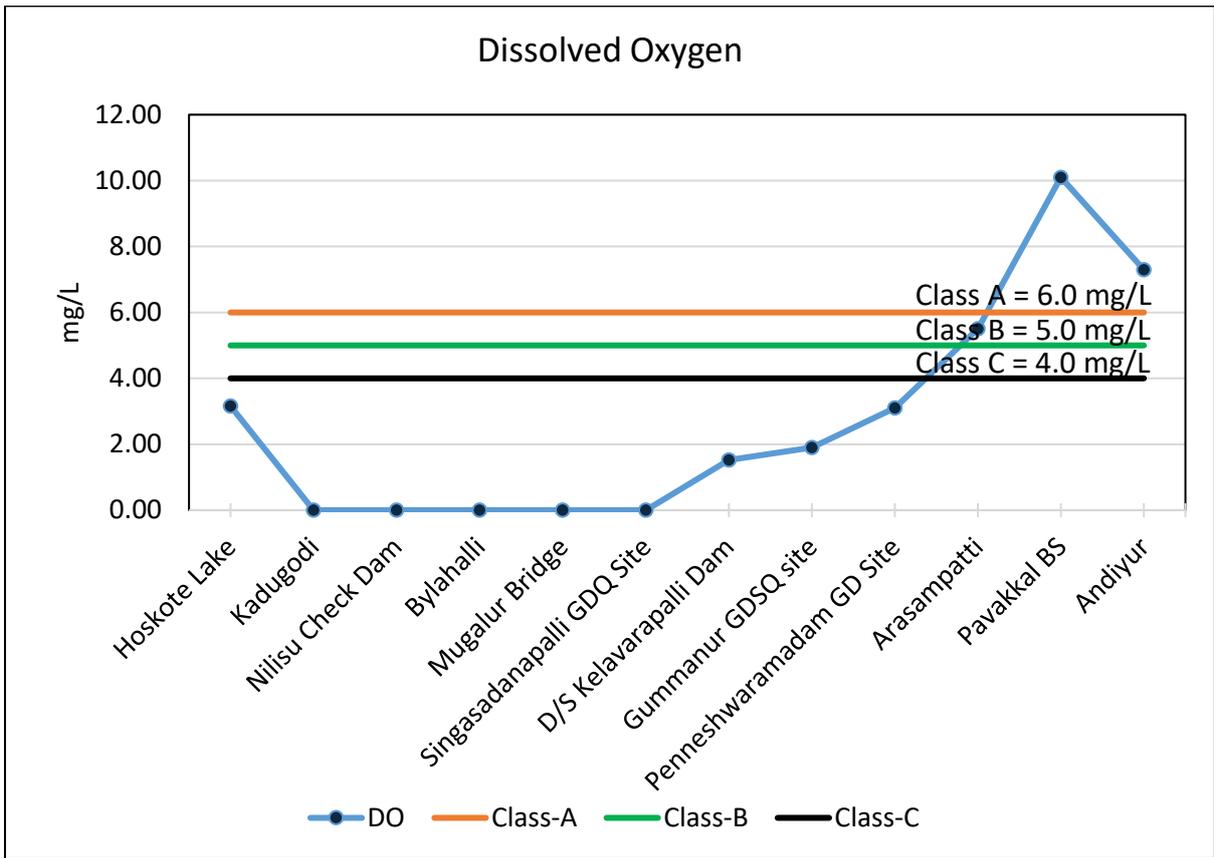
**\*Limits have been given for specific parameters only as per Drinking Water Quality Standards, BIS:10500, 2012.**

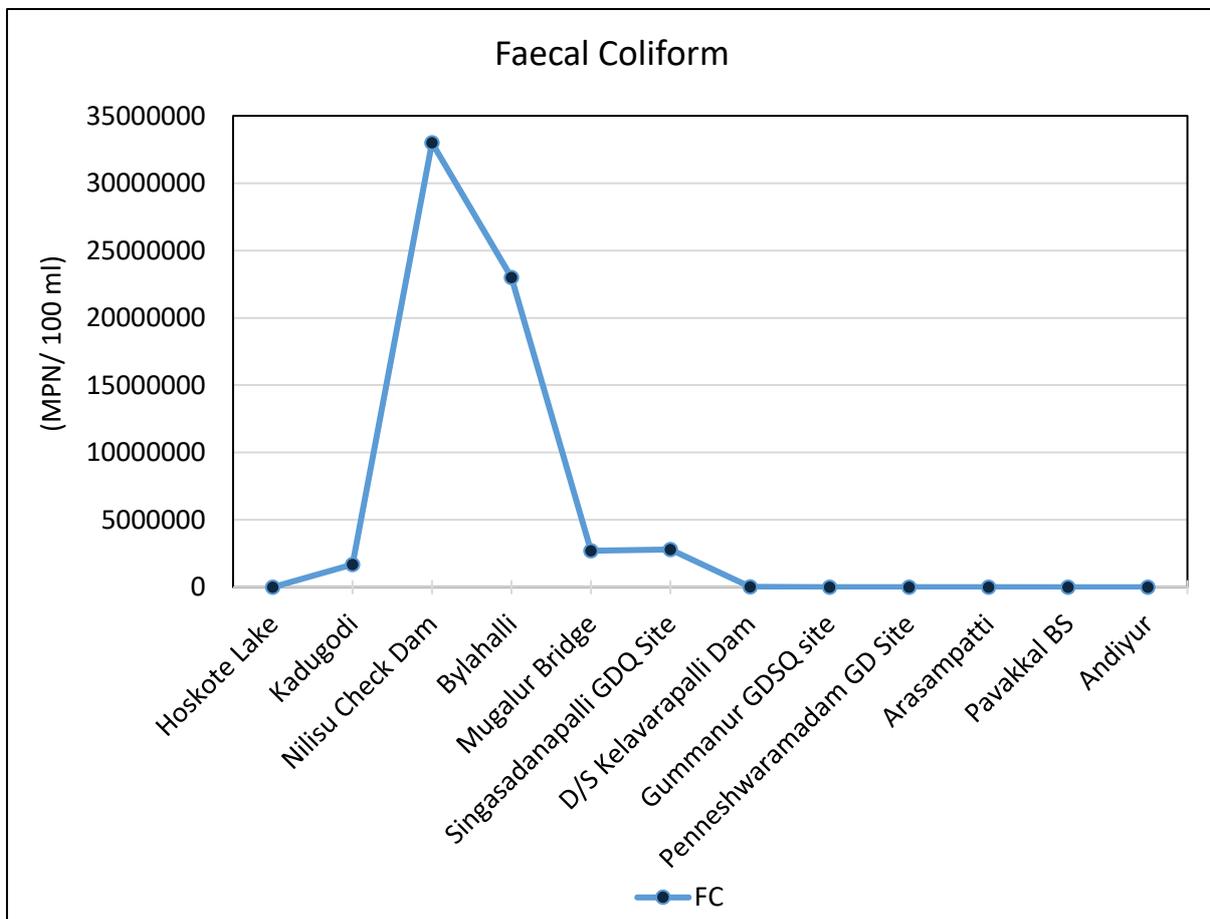
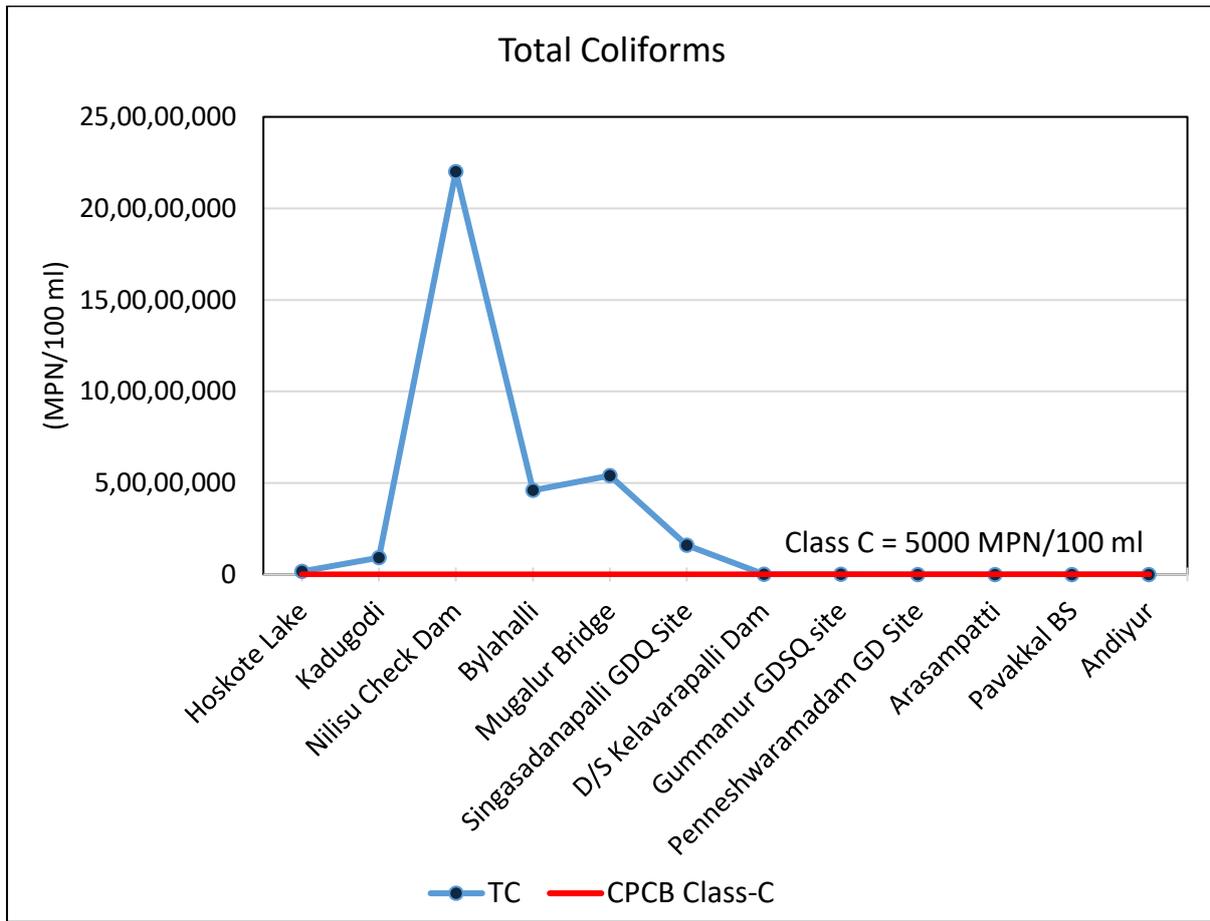
### 4.1 Parameter Trends along the stretch of Ponnaiyar:

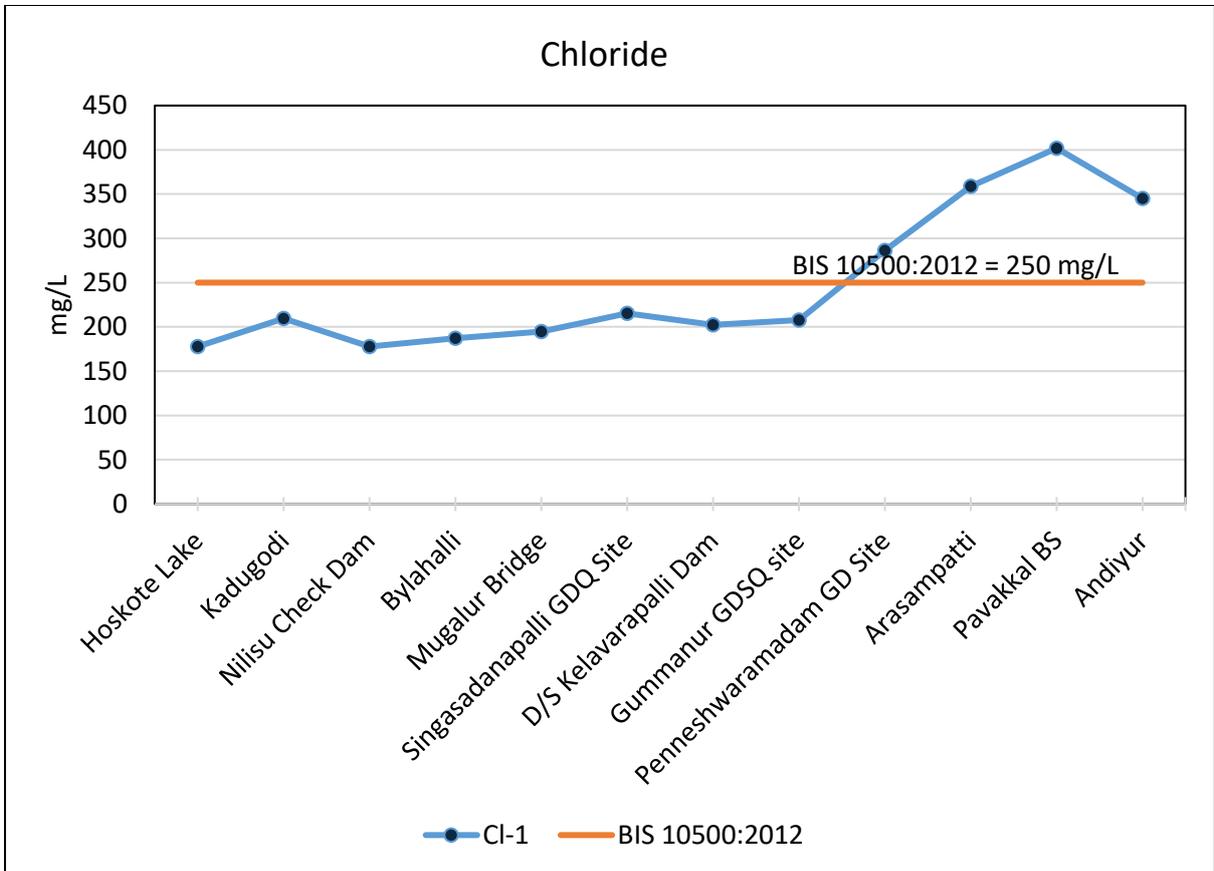
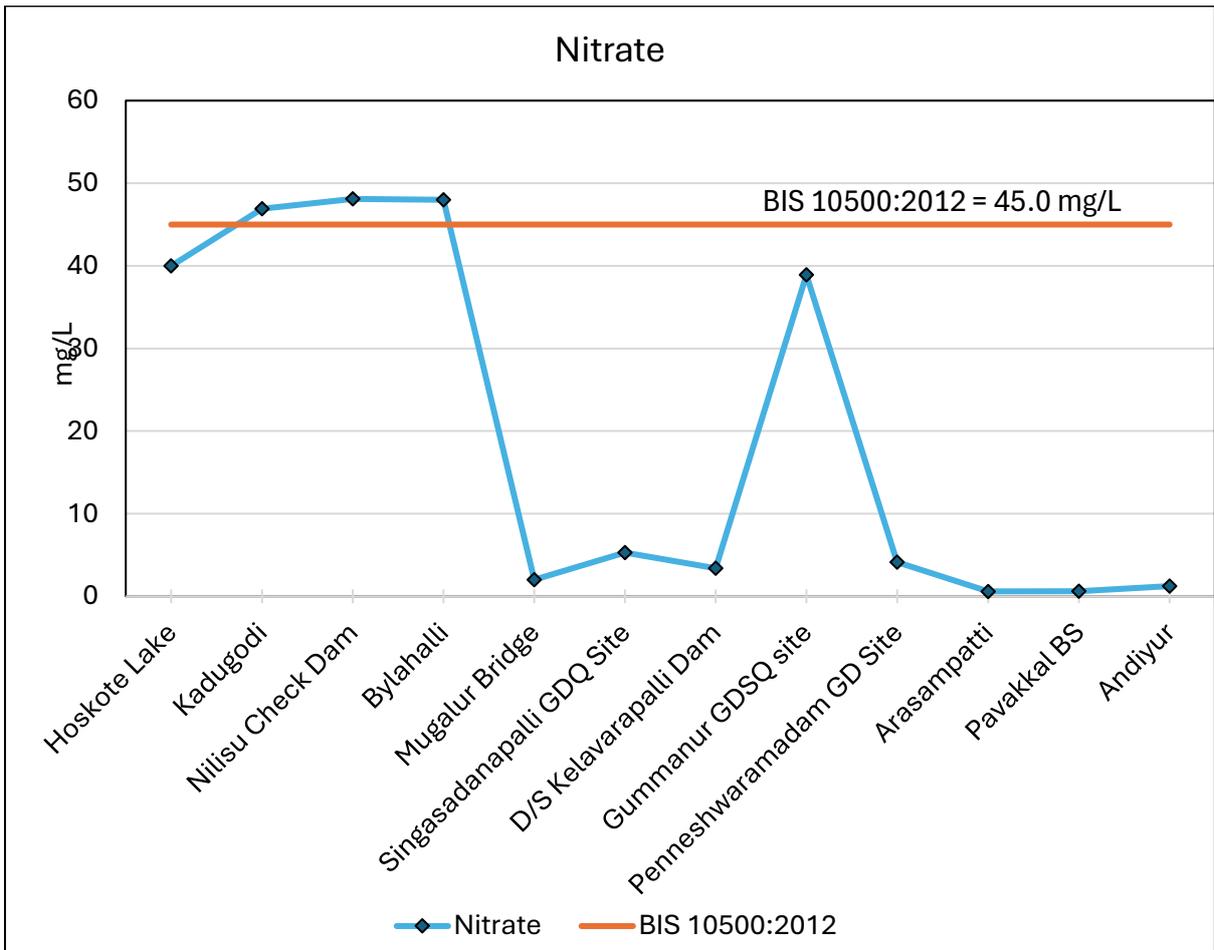


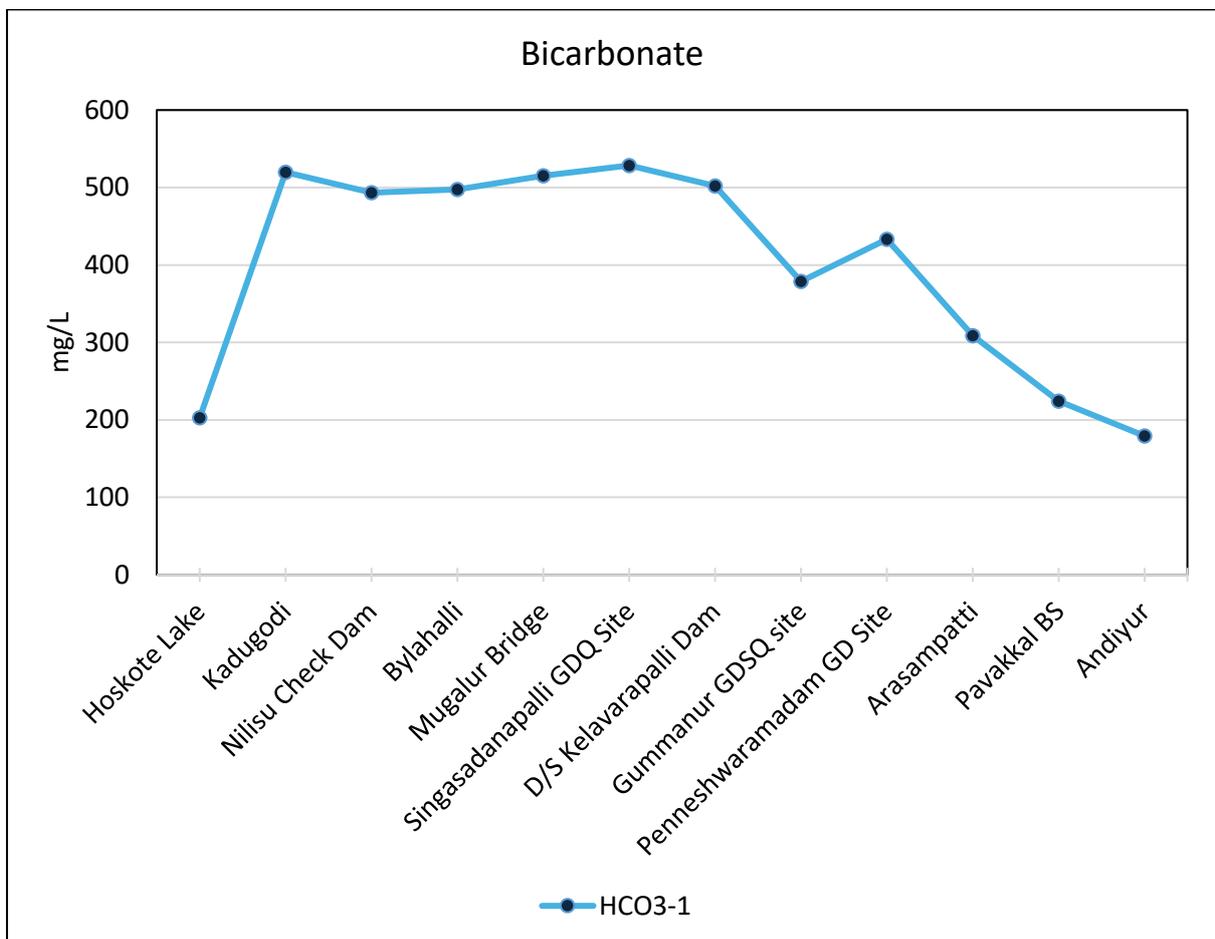
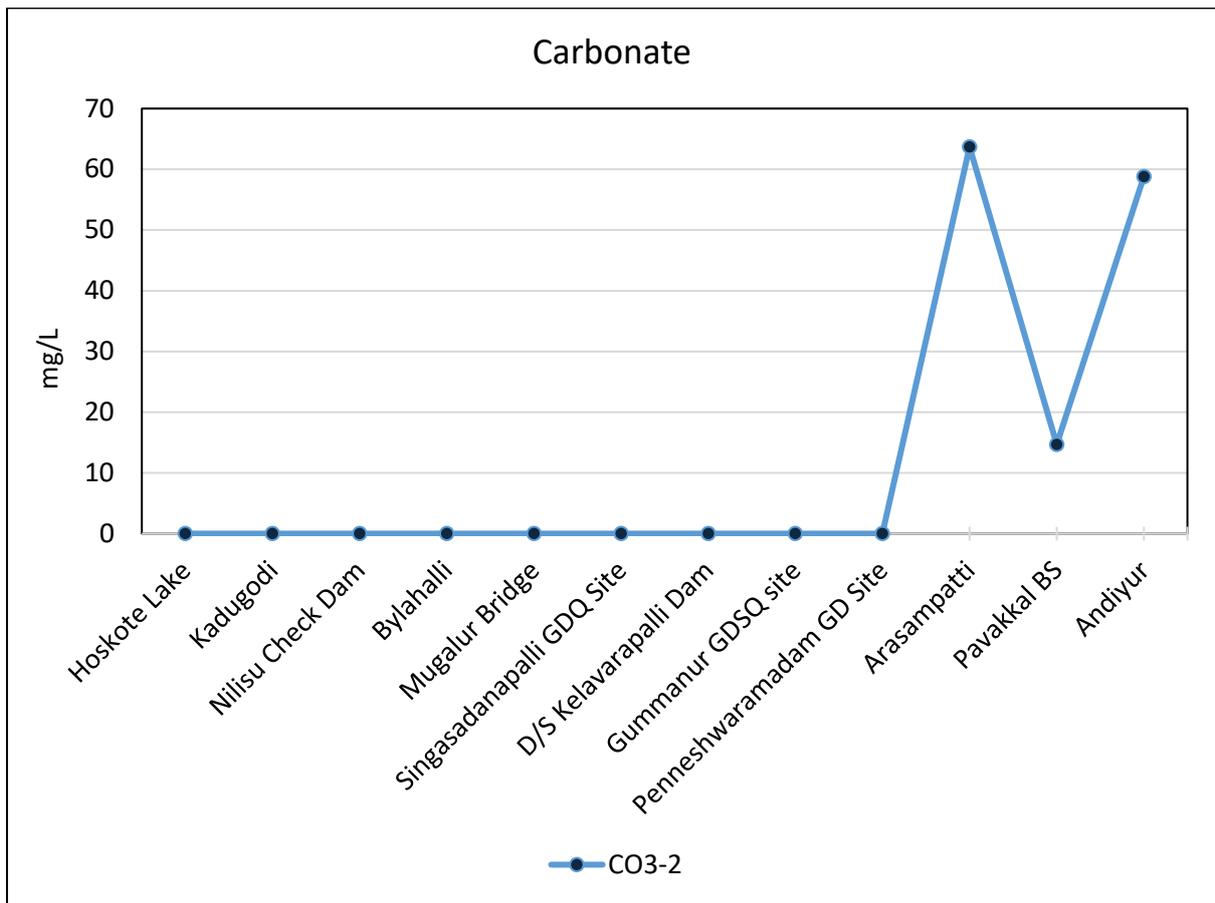


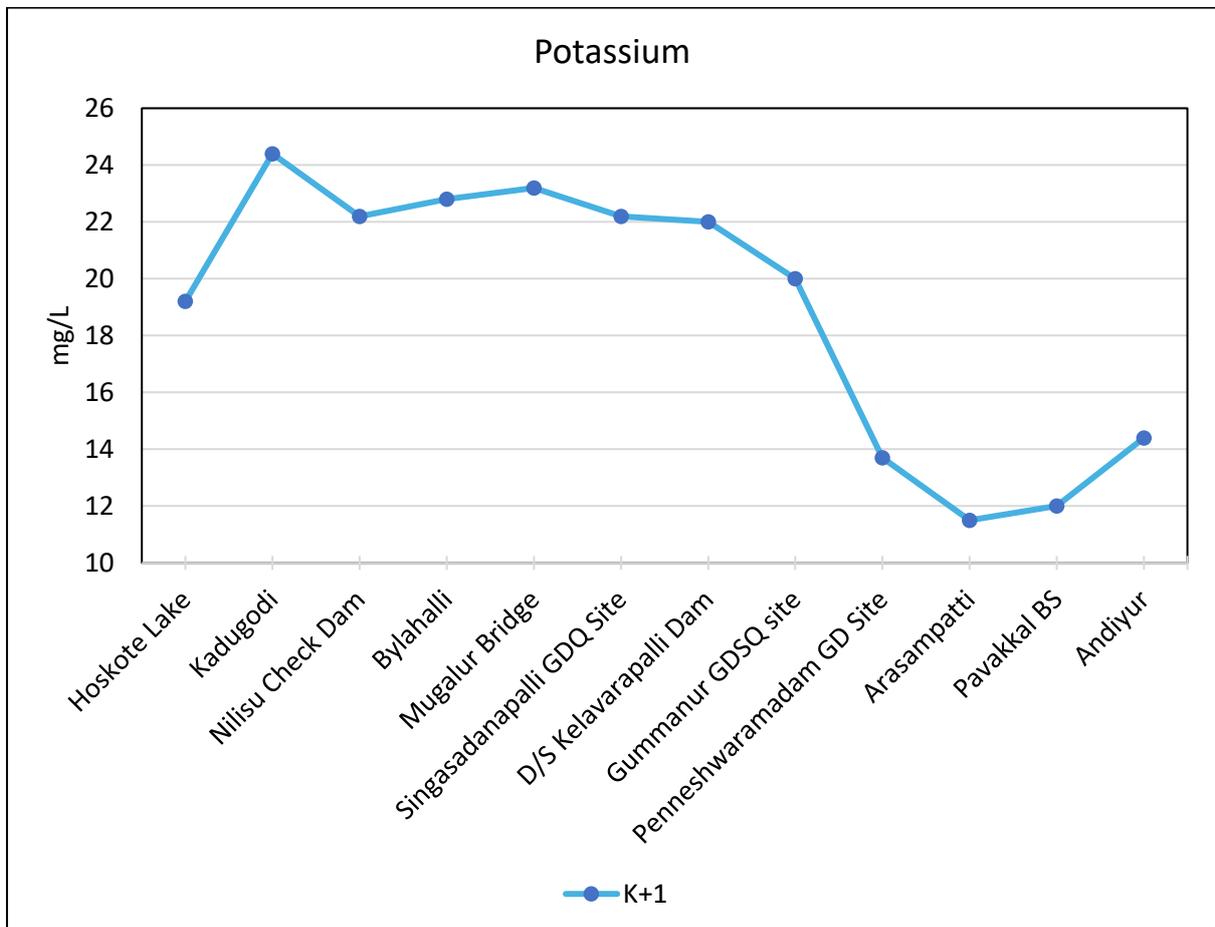
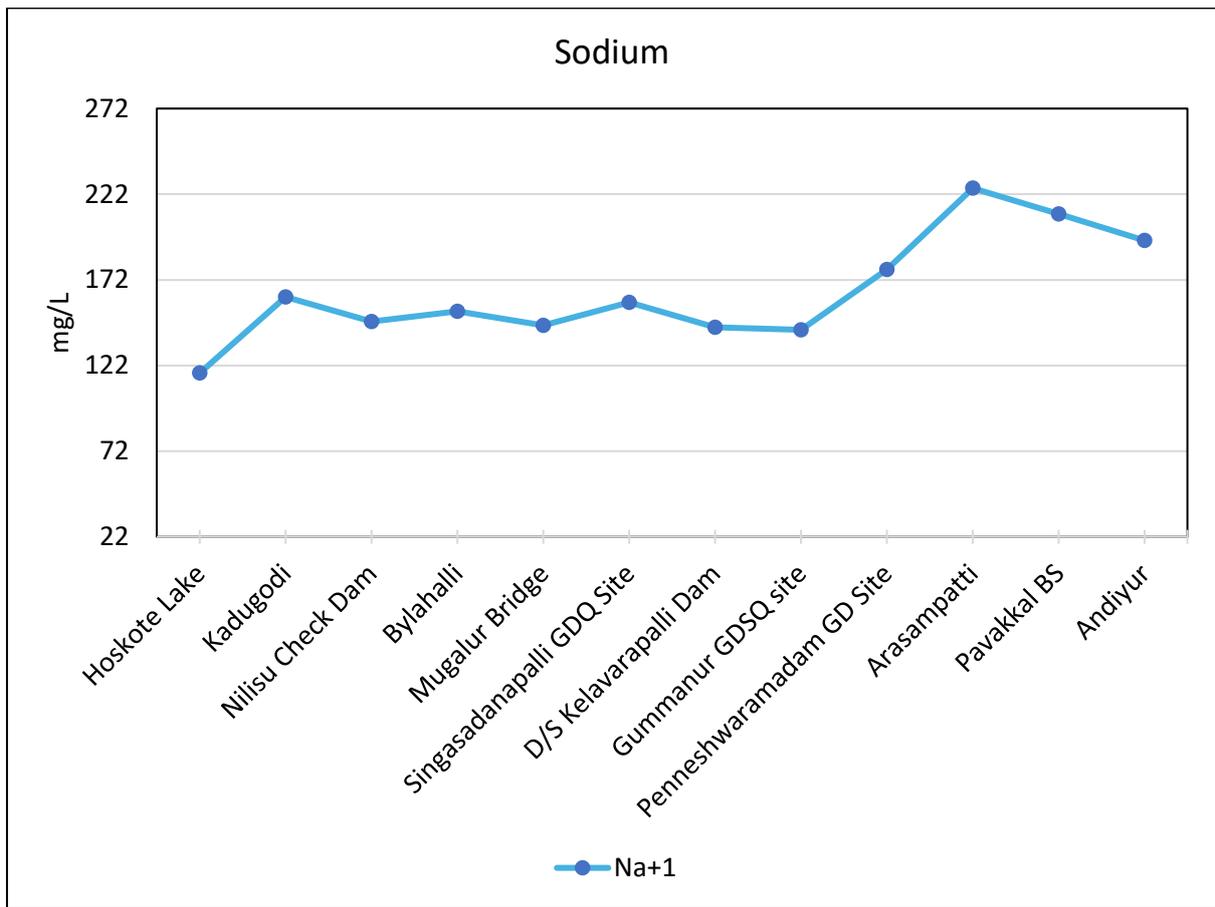


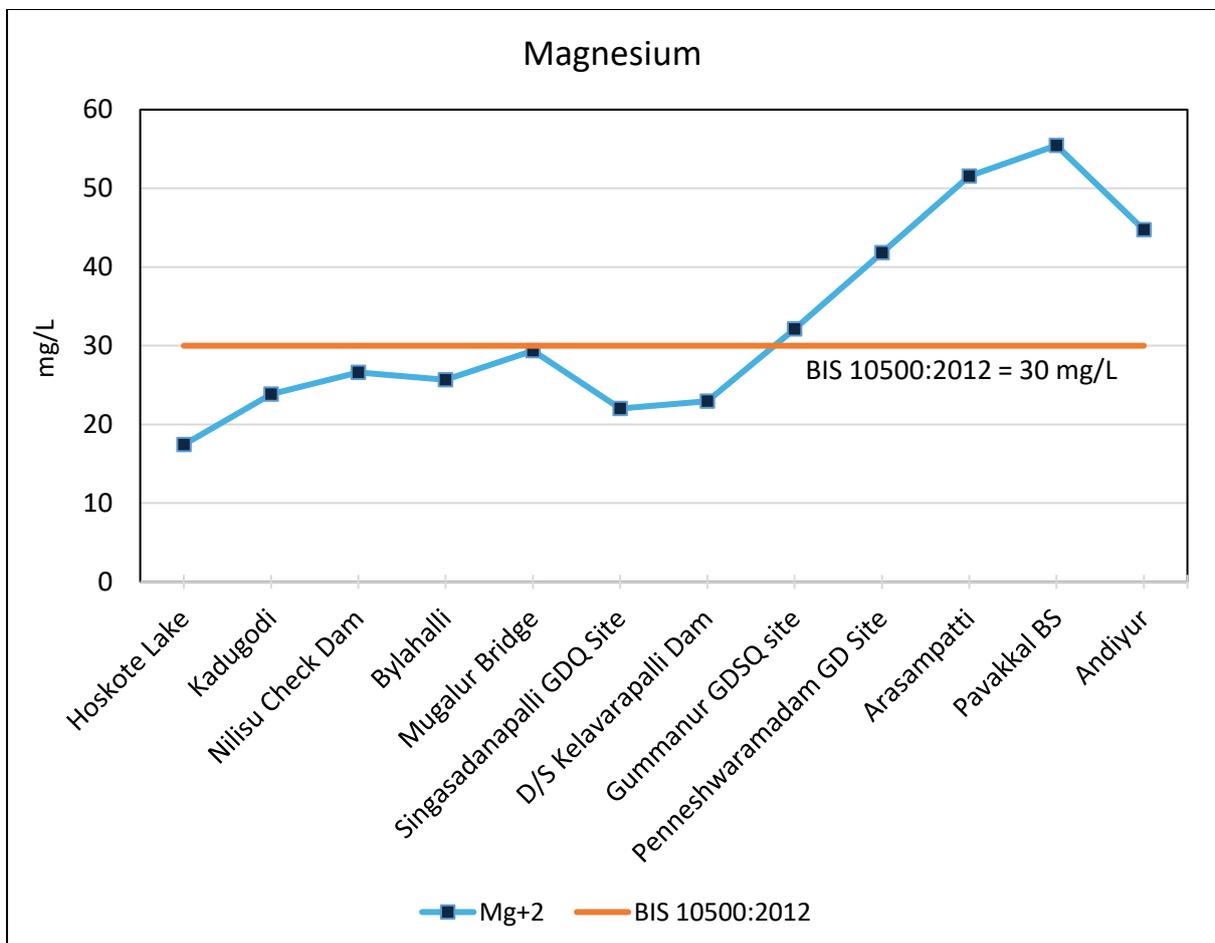
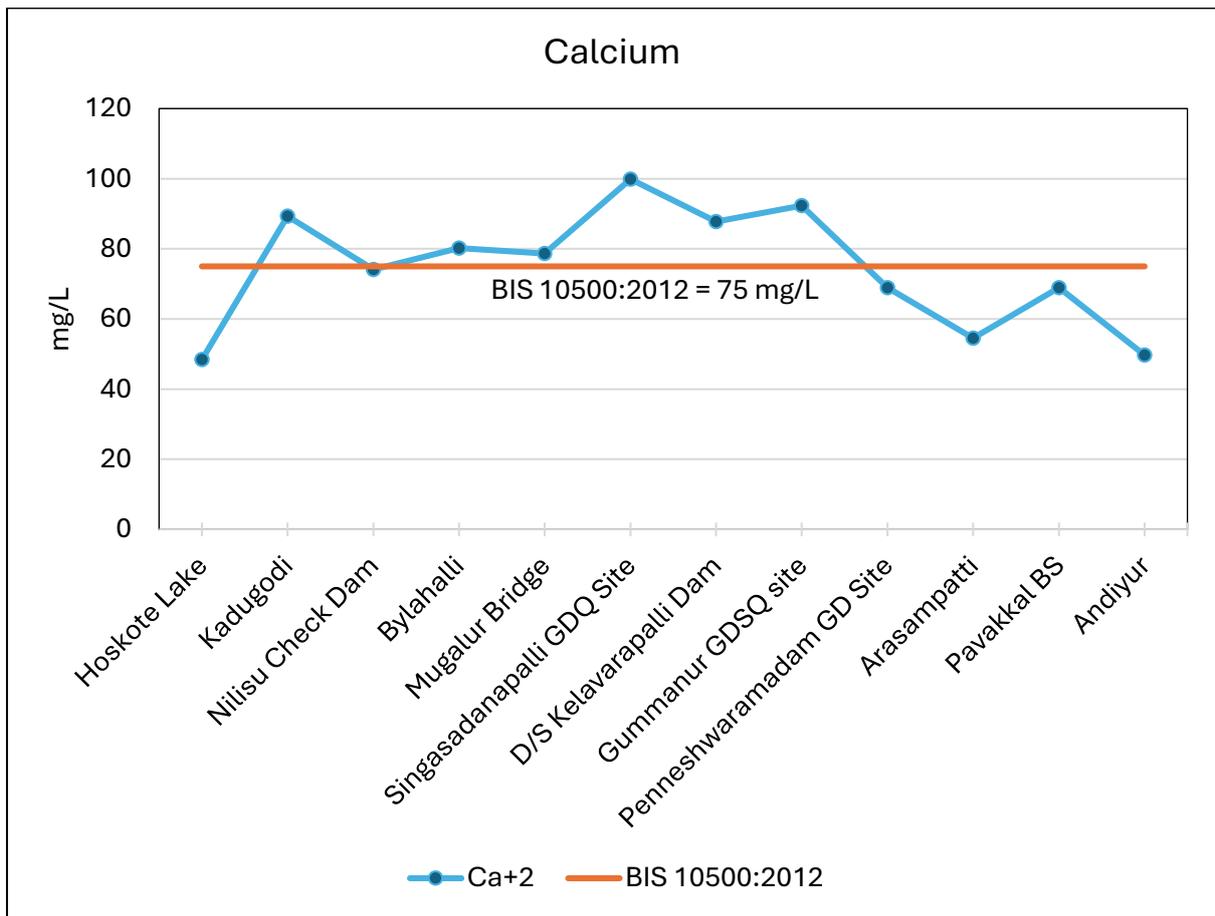


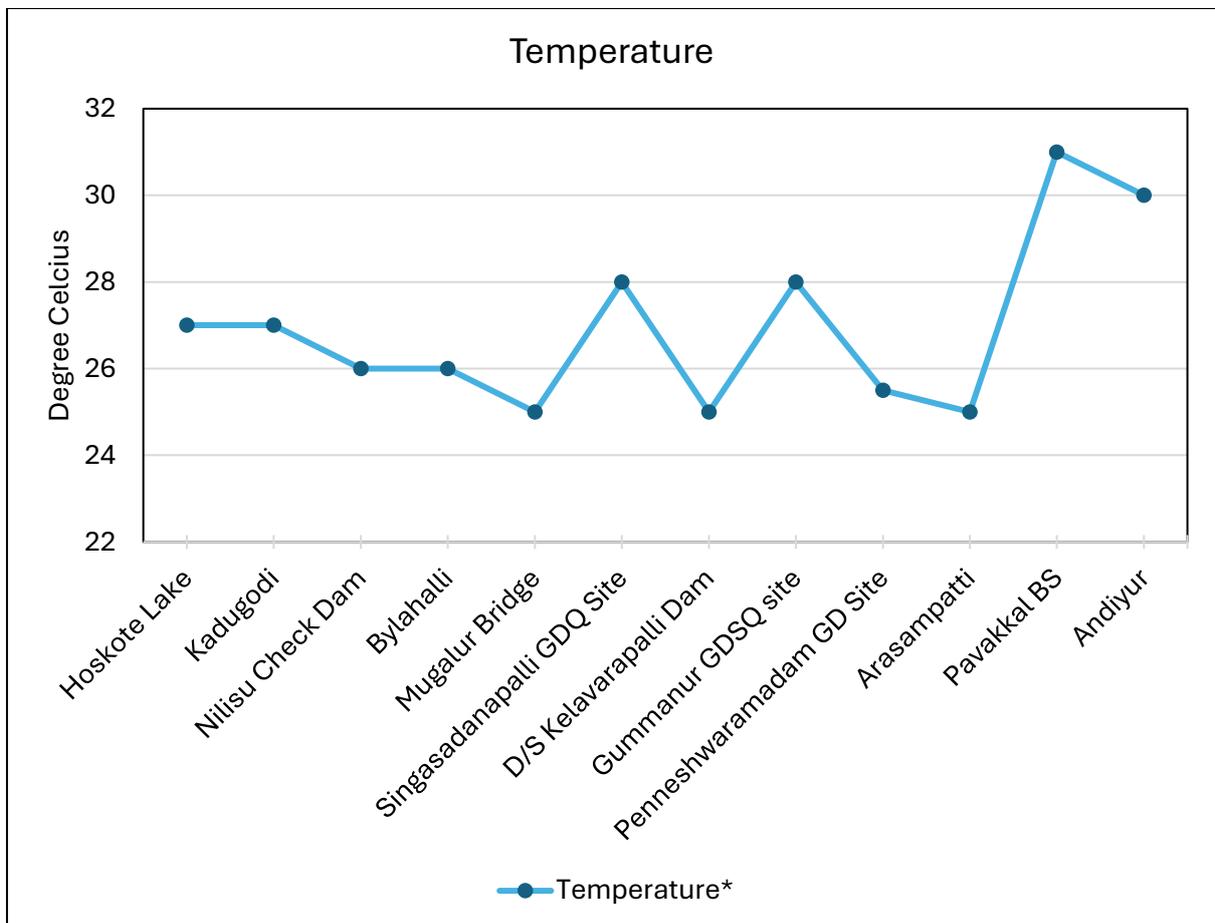
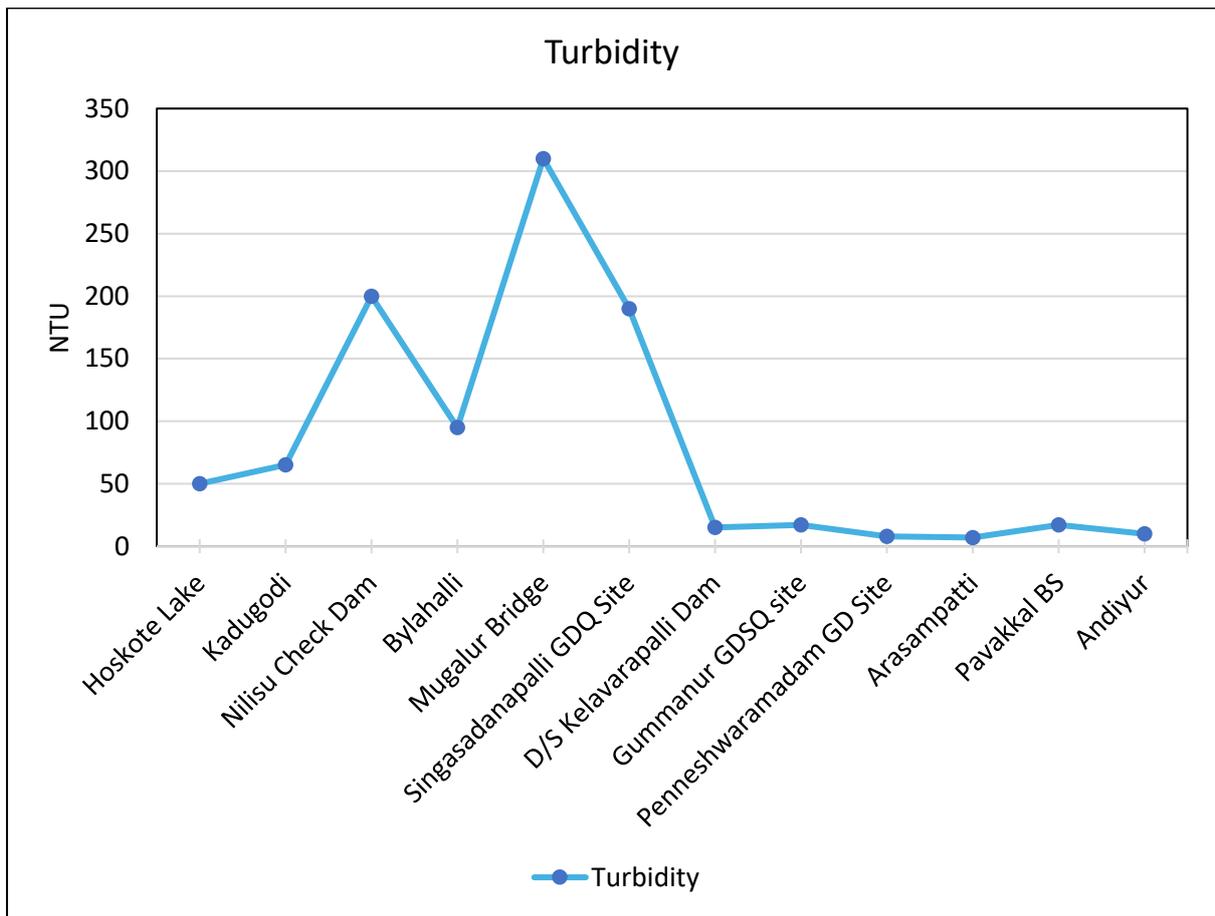


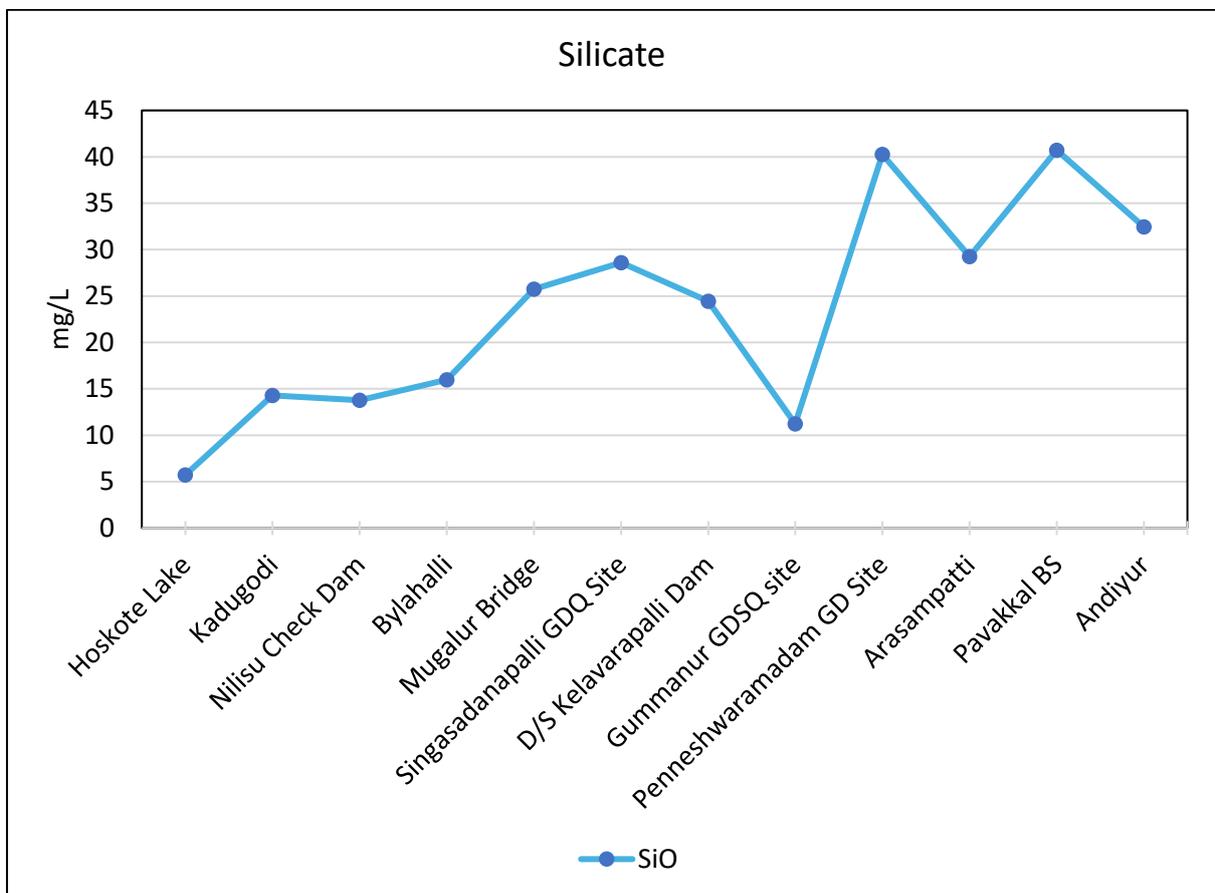
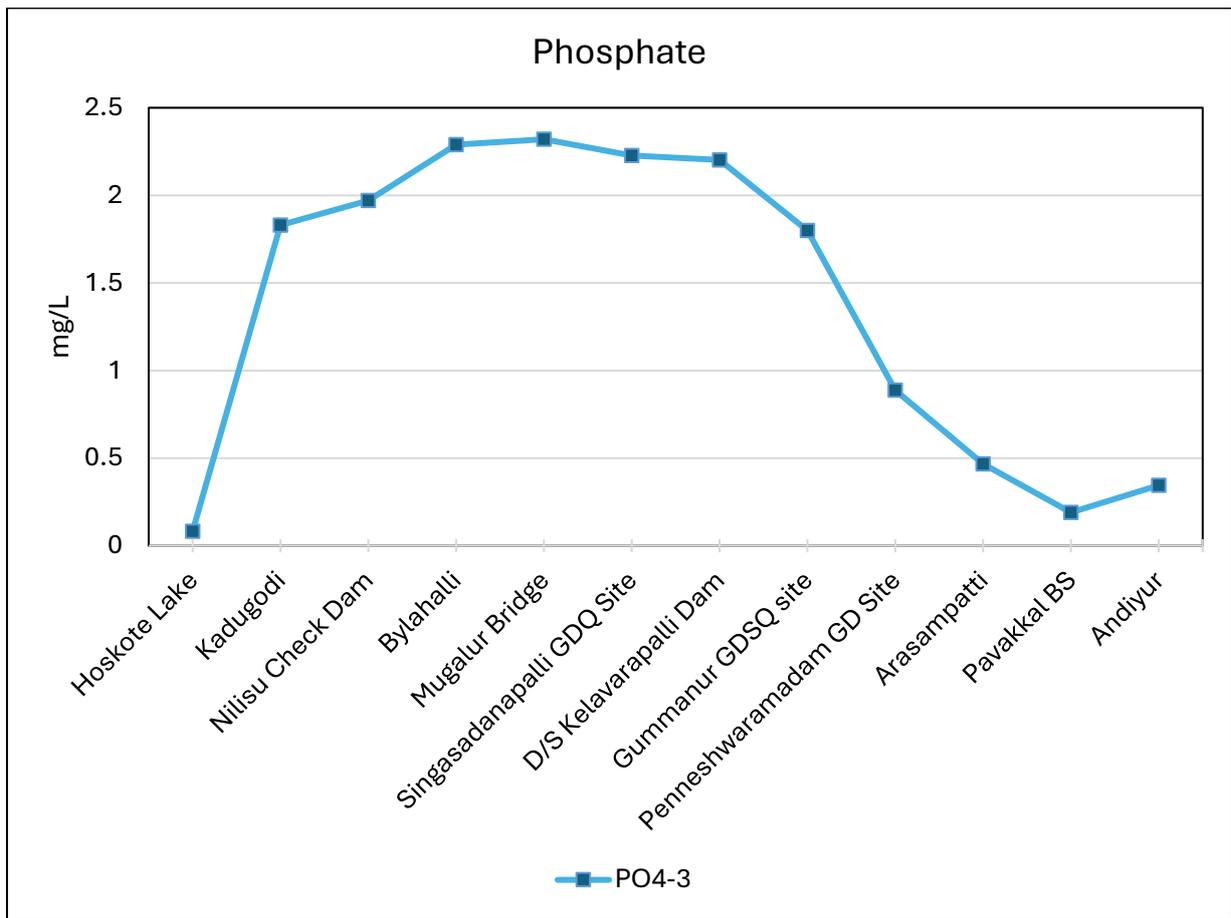


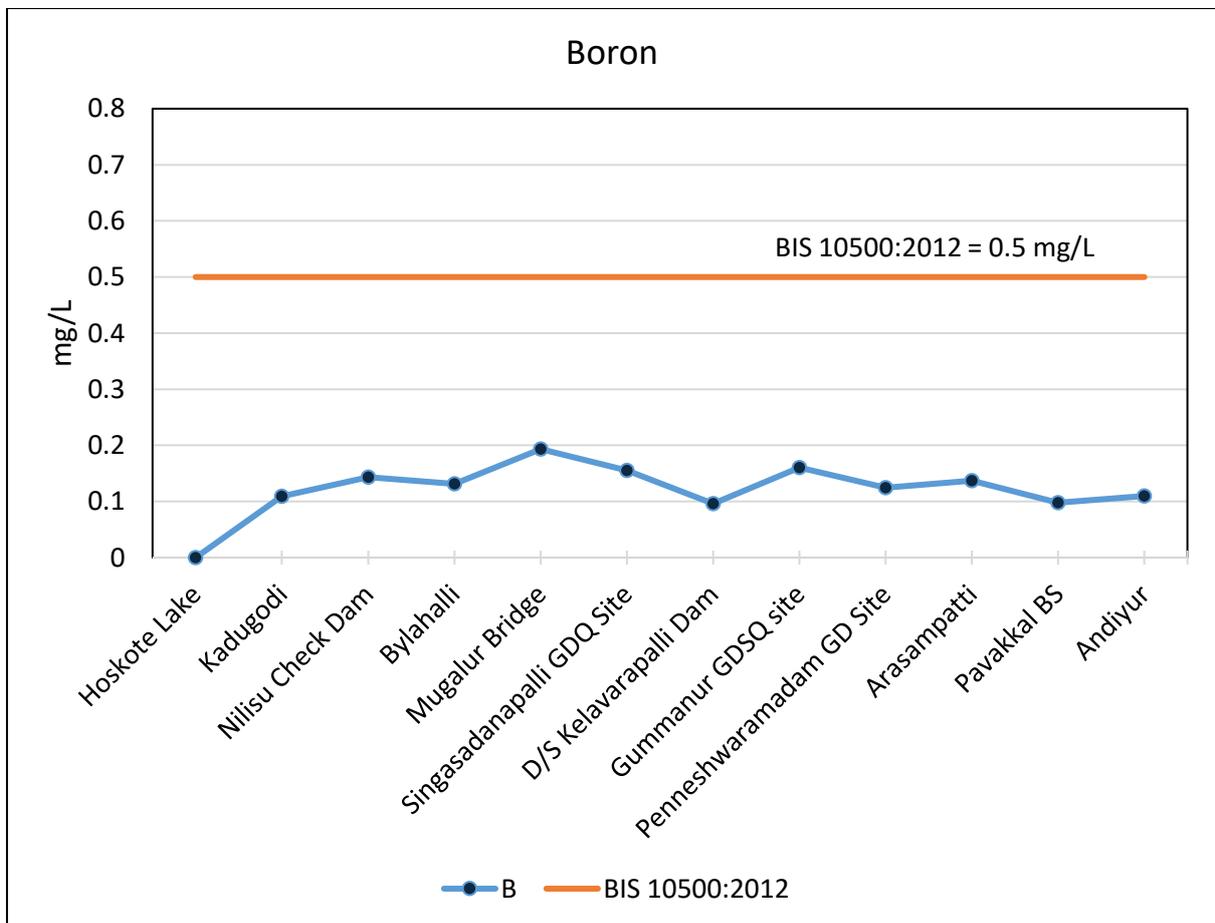
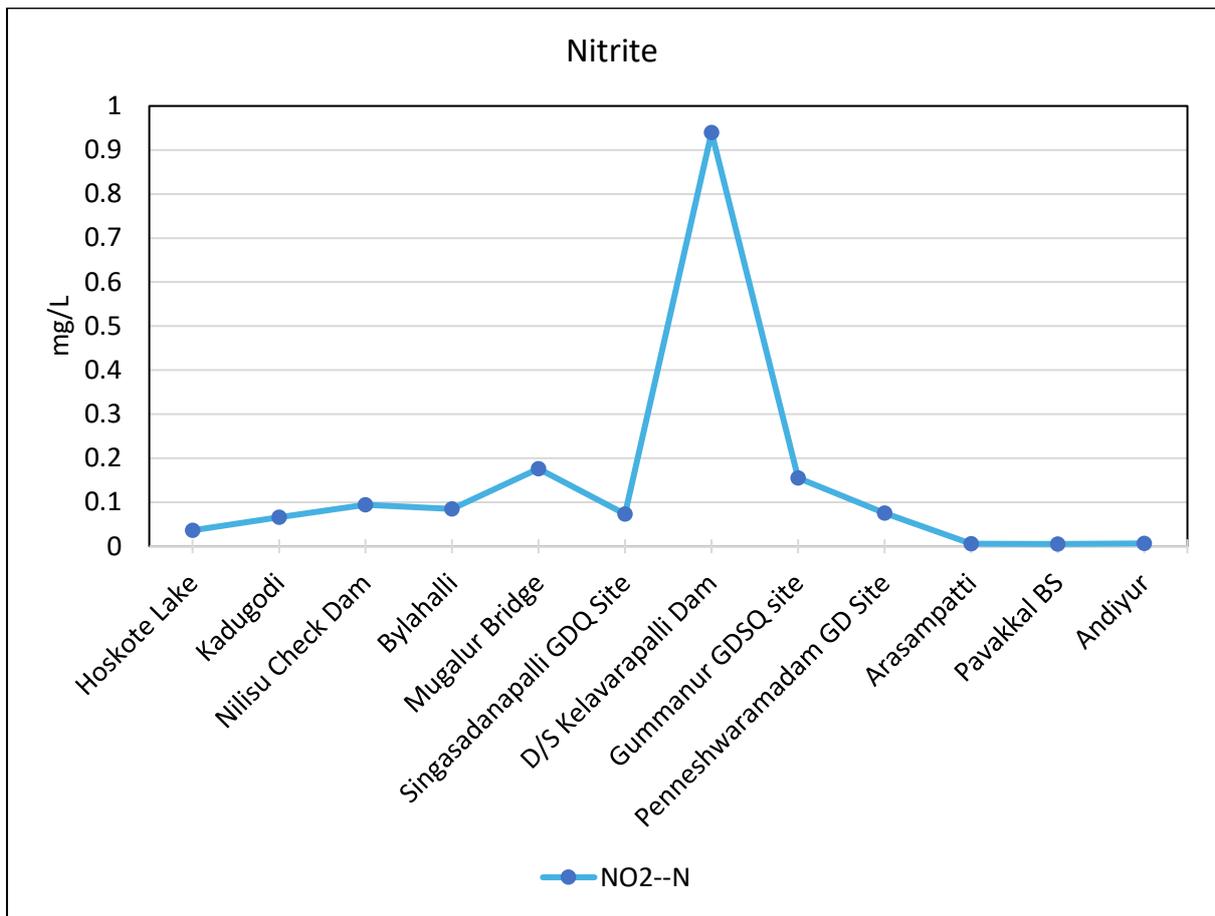


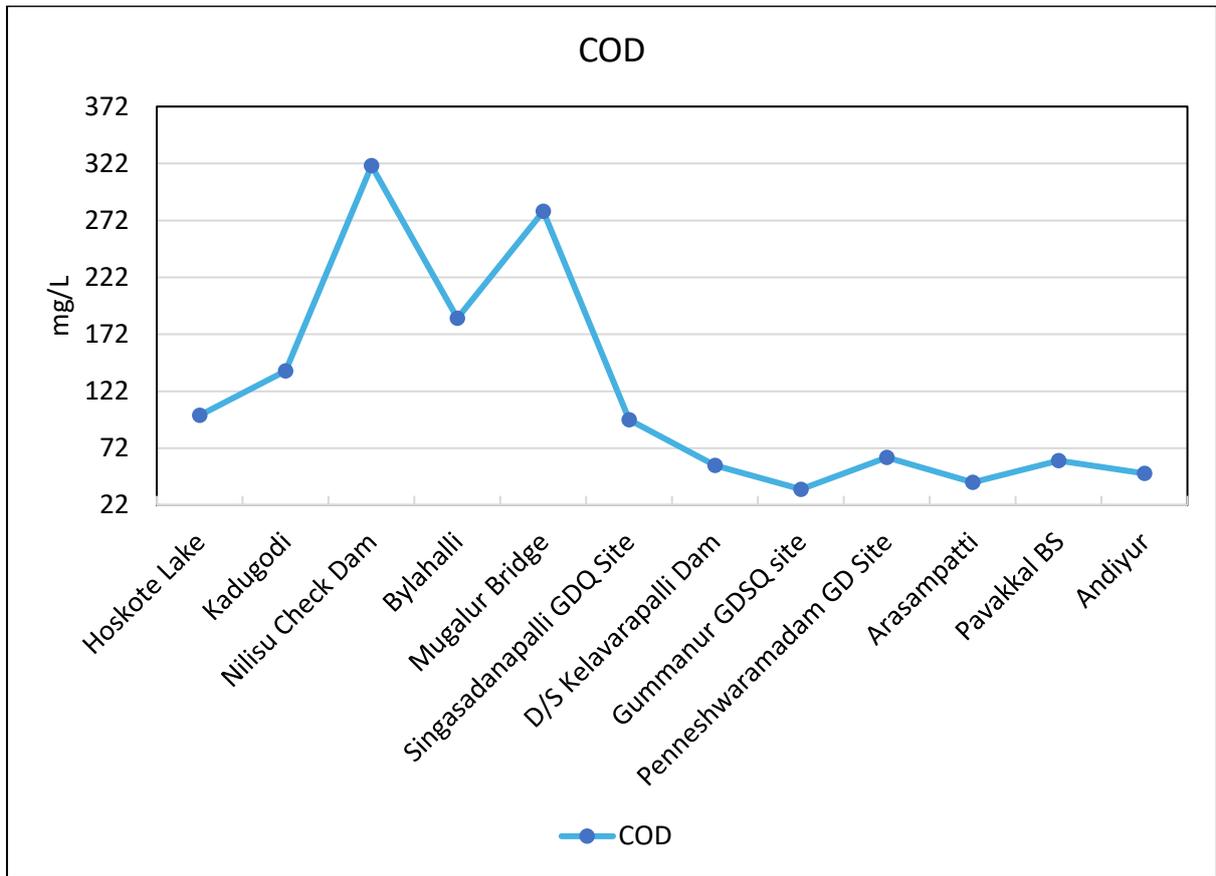








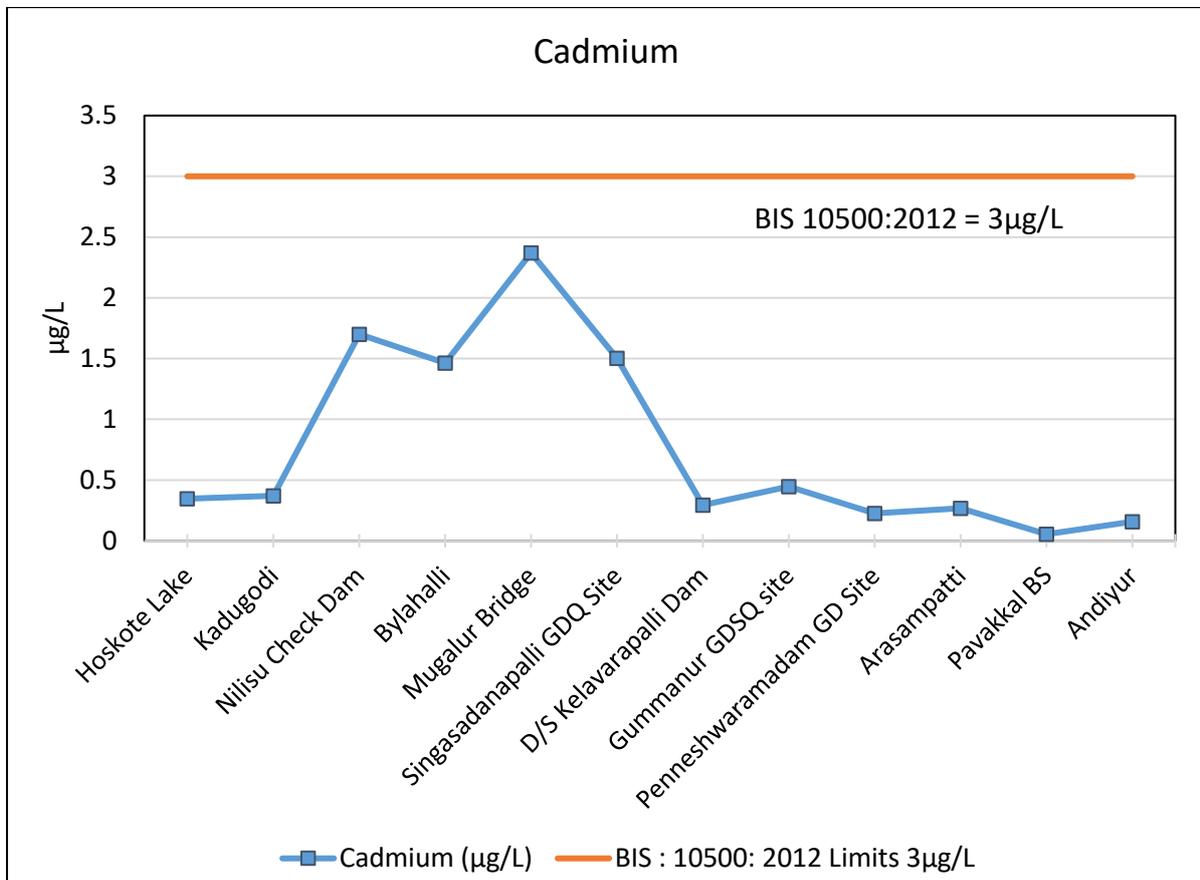
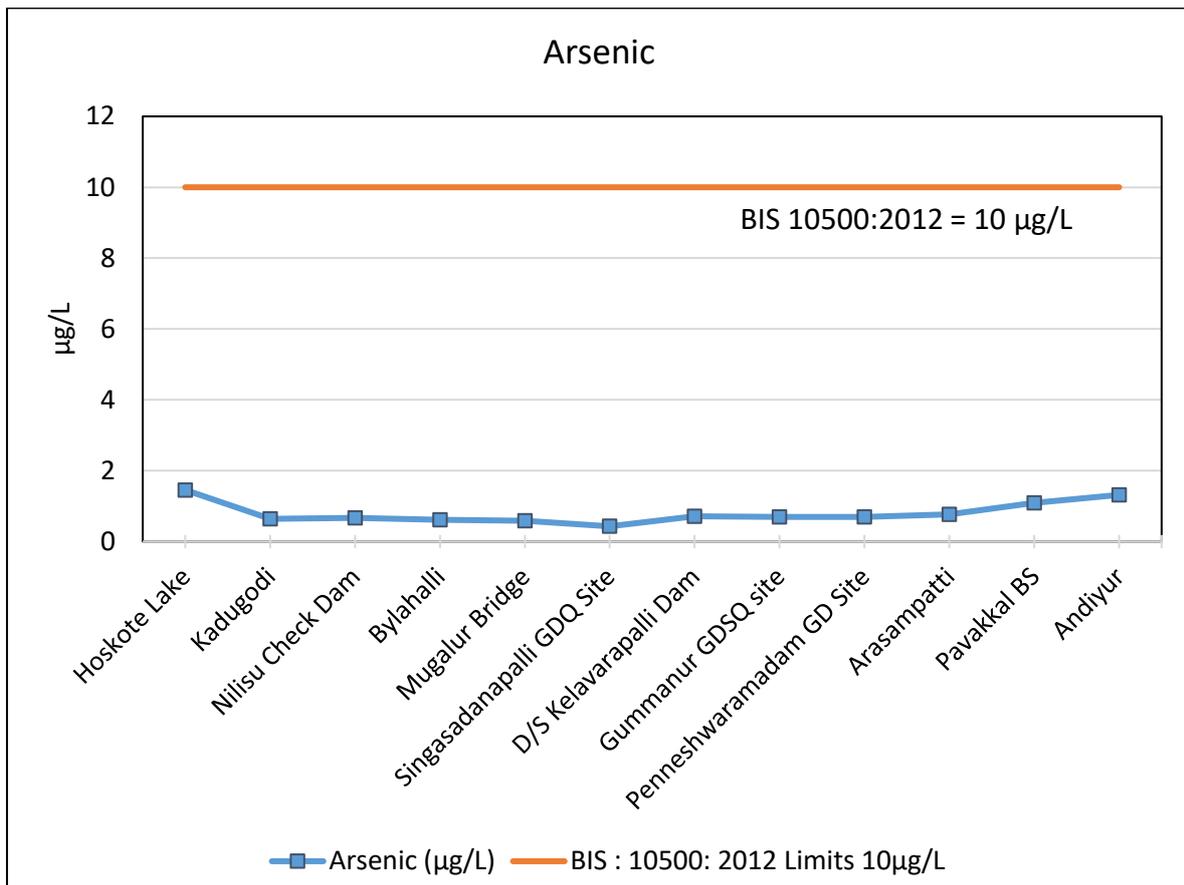


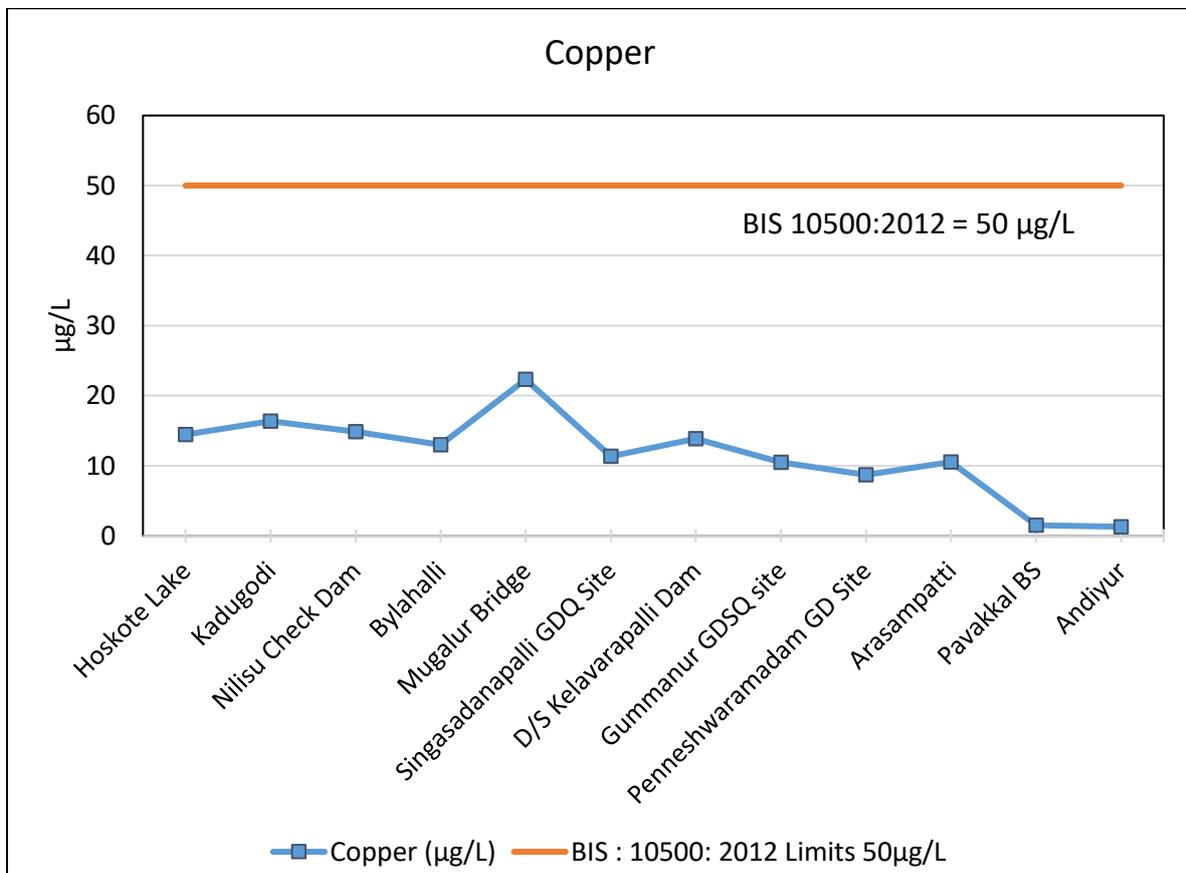
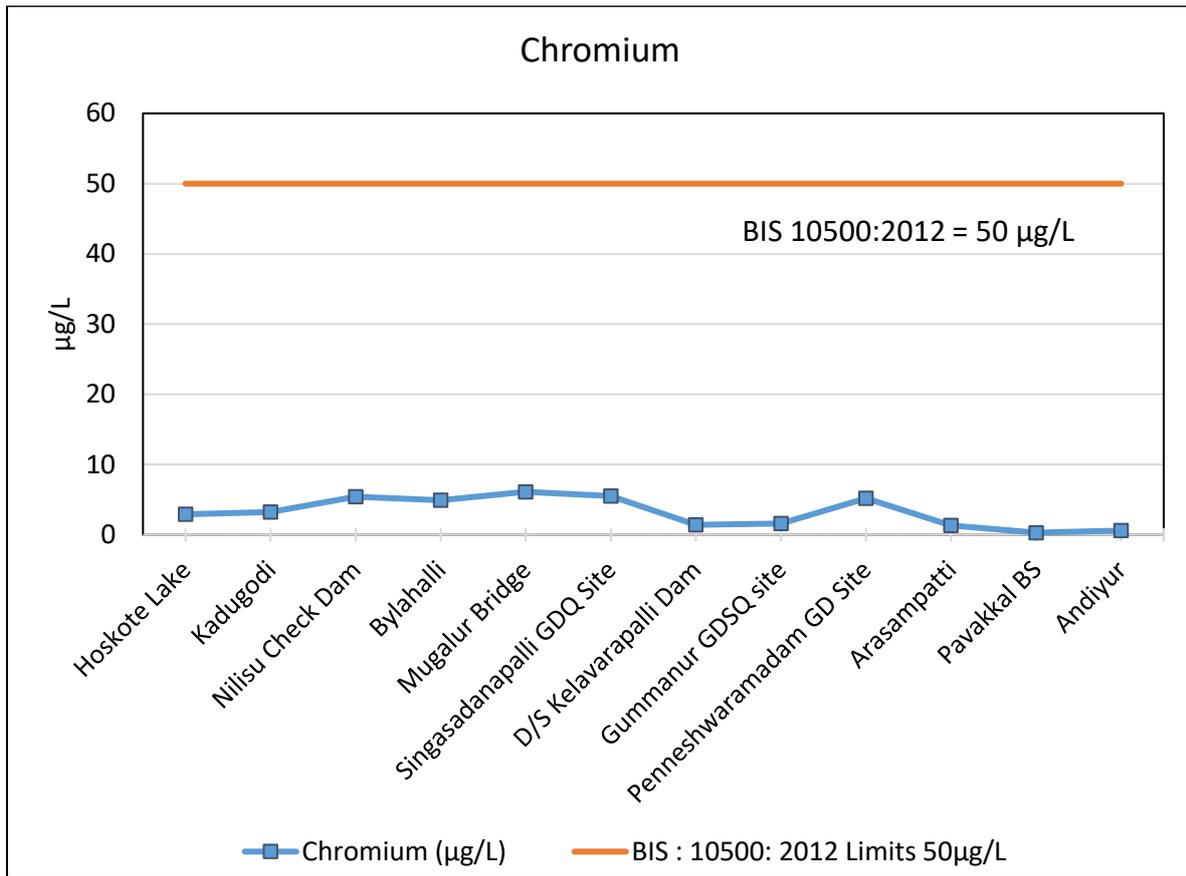


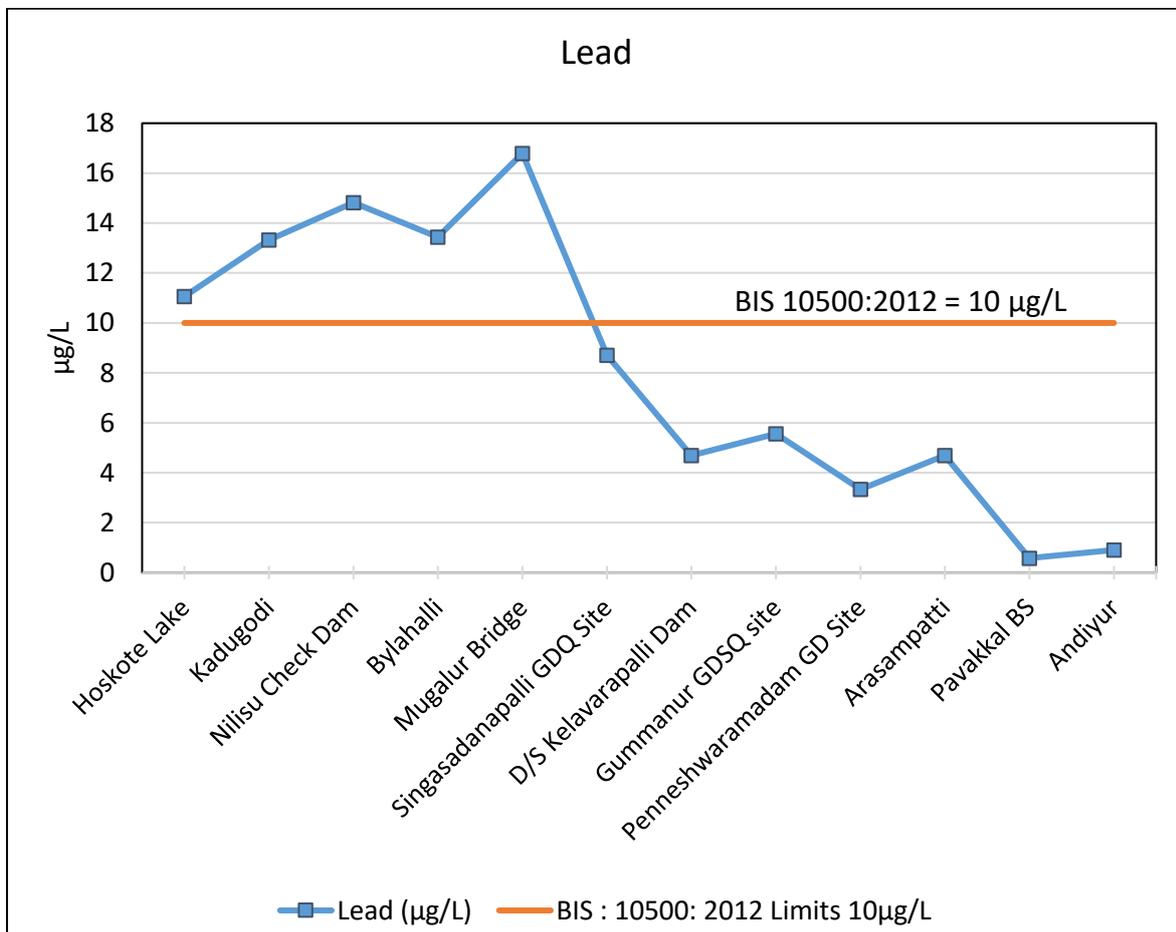
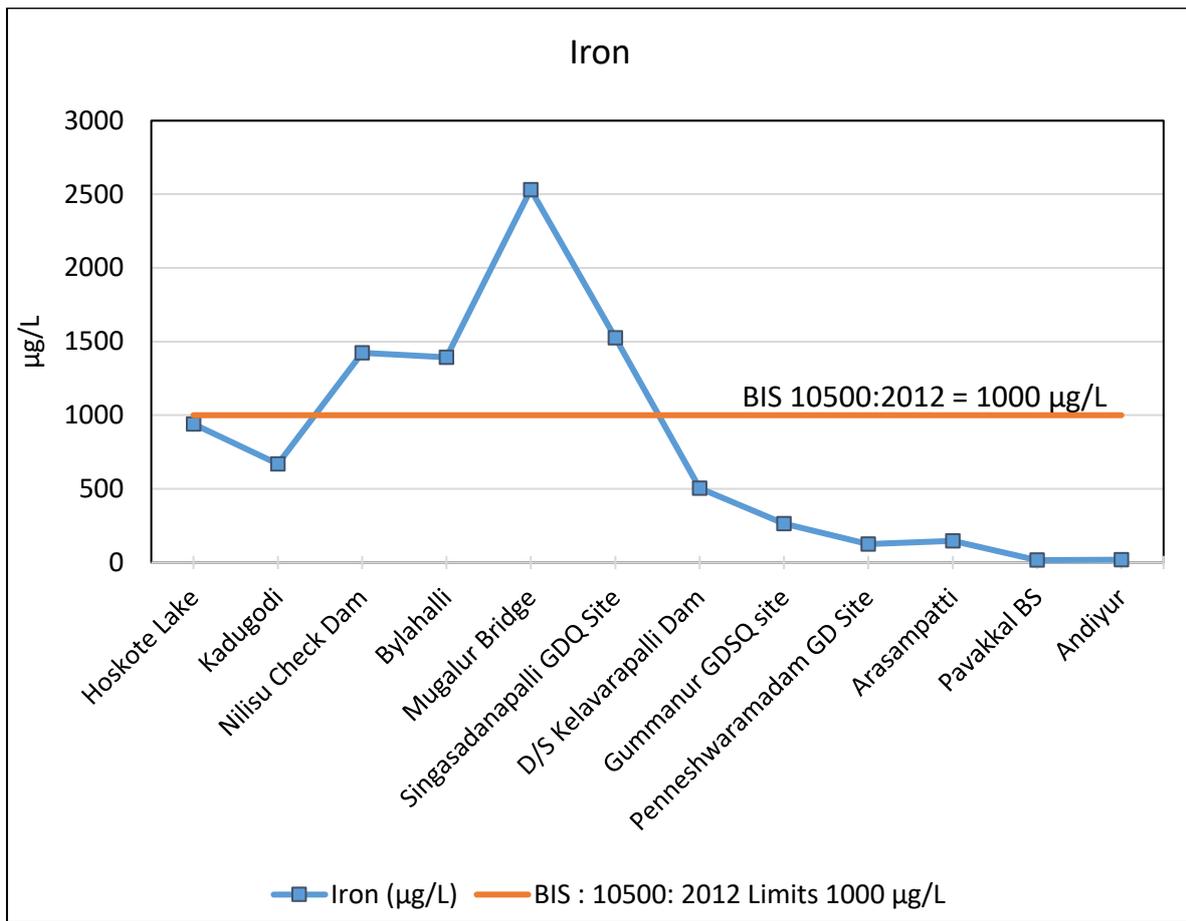
**Trace & Toxic Metals (Heavy Metals):**

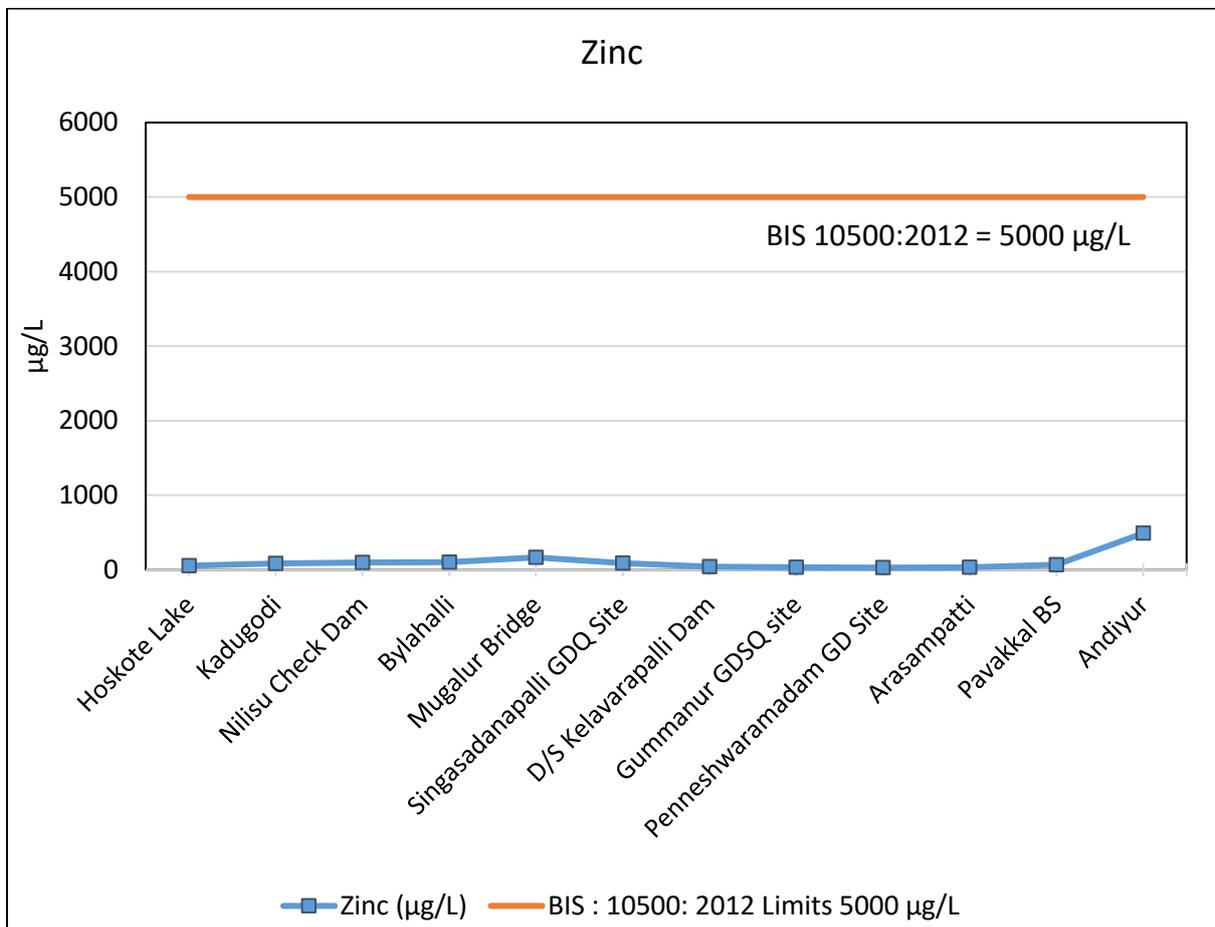
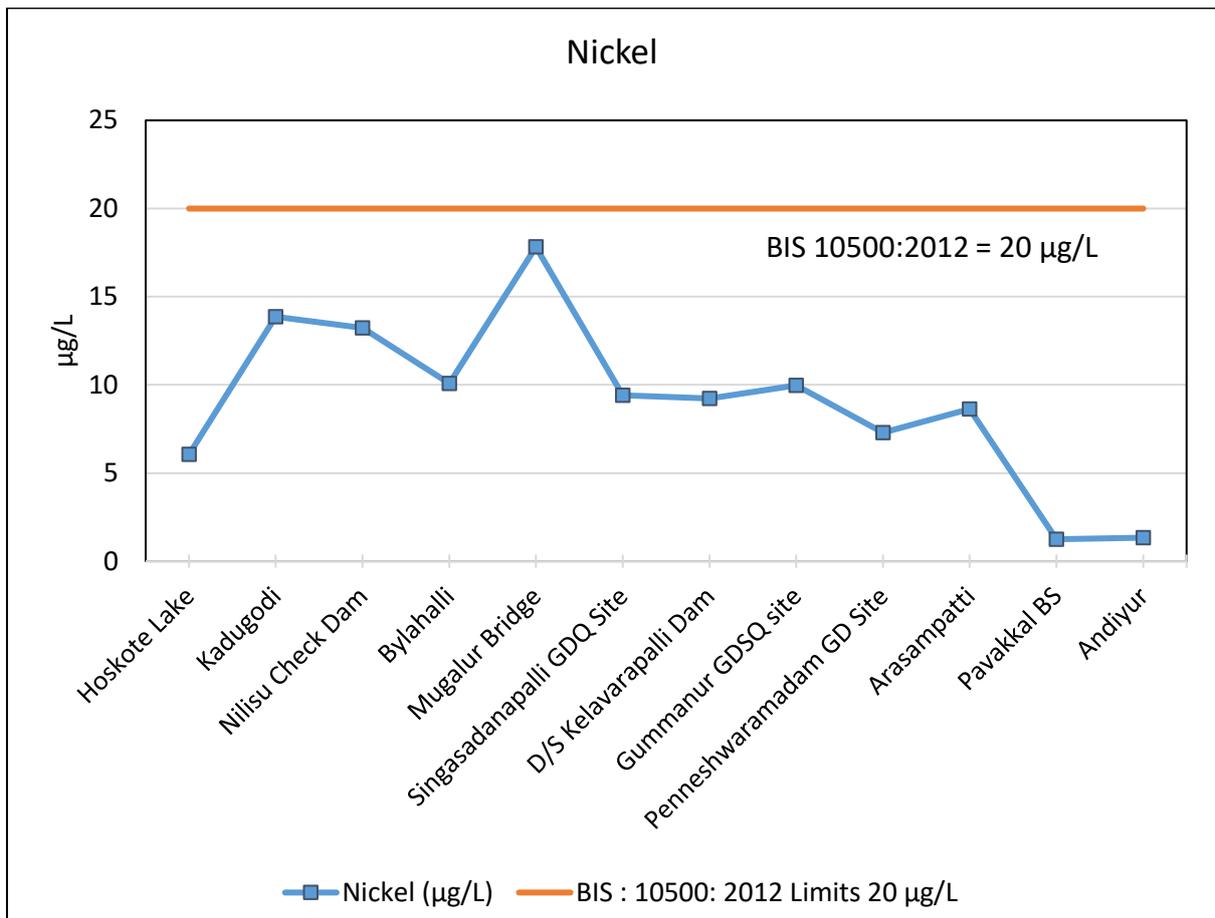
The presence of heavy metals in water has become a serious worldwide environmental issue that threatens both human health and aquatic ecosystems. Urbanization, climate change, and industrialization are contributing factors to the increase in heavy metal contamination in aquatic environments. Heavy metal ions are toxic, potentially carcinogenic, and can bioaccumulate in biological systems.

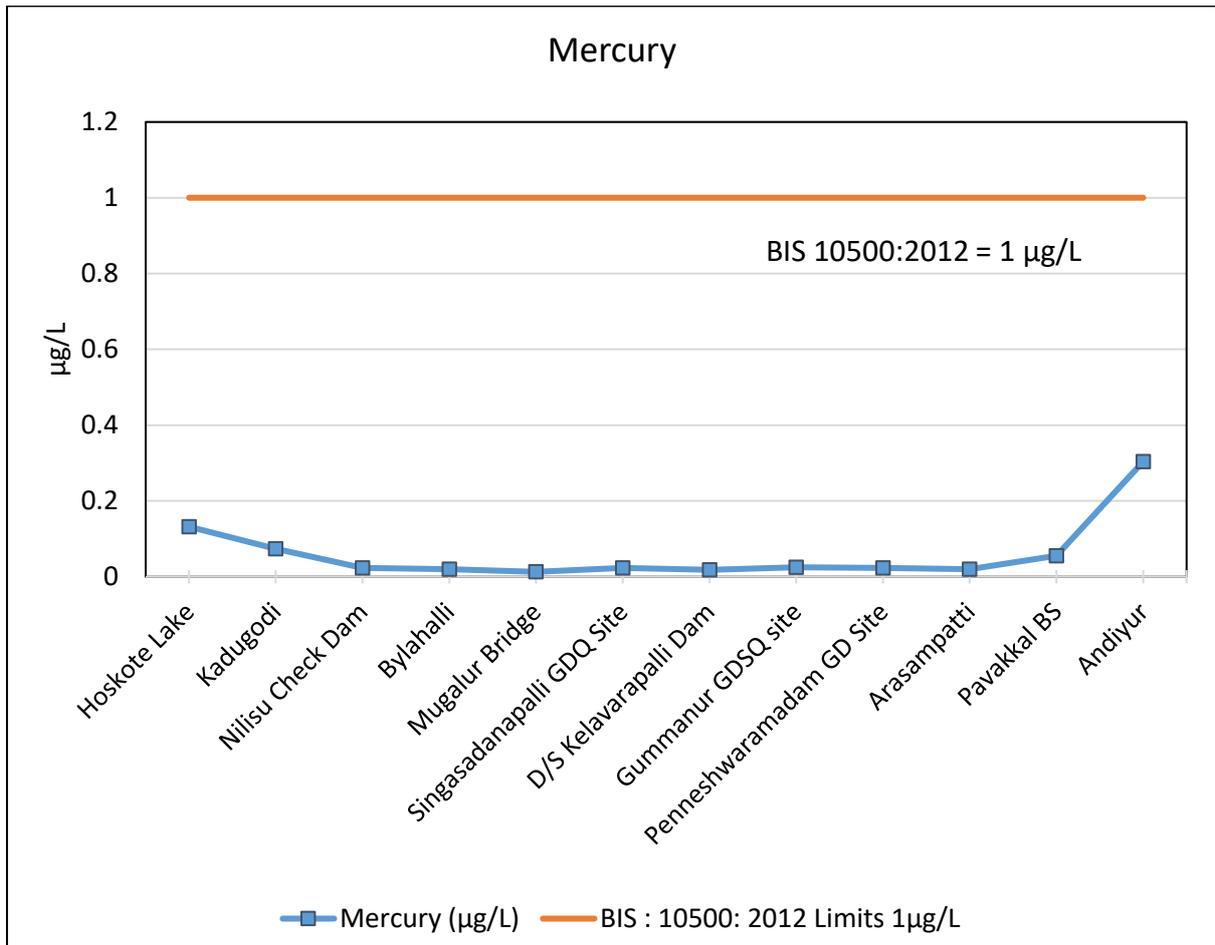
Although these metals are present at much lower concentrations in water compared to major ions, some, such as copper (Cu) and zinc (Zn), are necessary in trace amounts for biological functions. However, heavy metal contamination remains a significant concern due to its toxicity and potential threat to human health and the environment. **Among the metals studied, all were found to be within the acceptable limits of BIS 10500:2012 for river water samples, except for iron and lead.**











## Pesticides

Twelve (12) water samples from the Ponnaiyar River were collected and extracted at LCWQL, Coimbatore, and EFRWQL, Chennai. The samples were then sent to the National River Water Quality Laboratory (NRWQL), New Delhi, for analysis using **Gas Chromatography Mass Spectrometry (GC-MS)**.

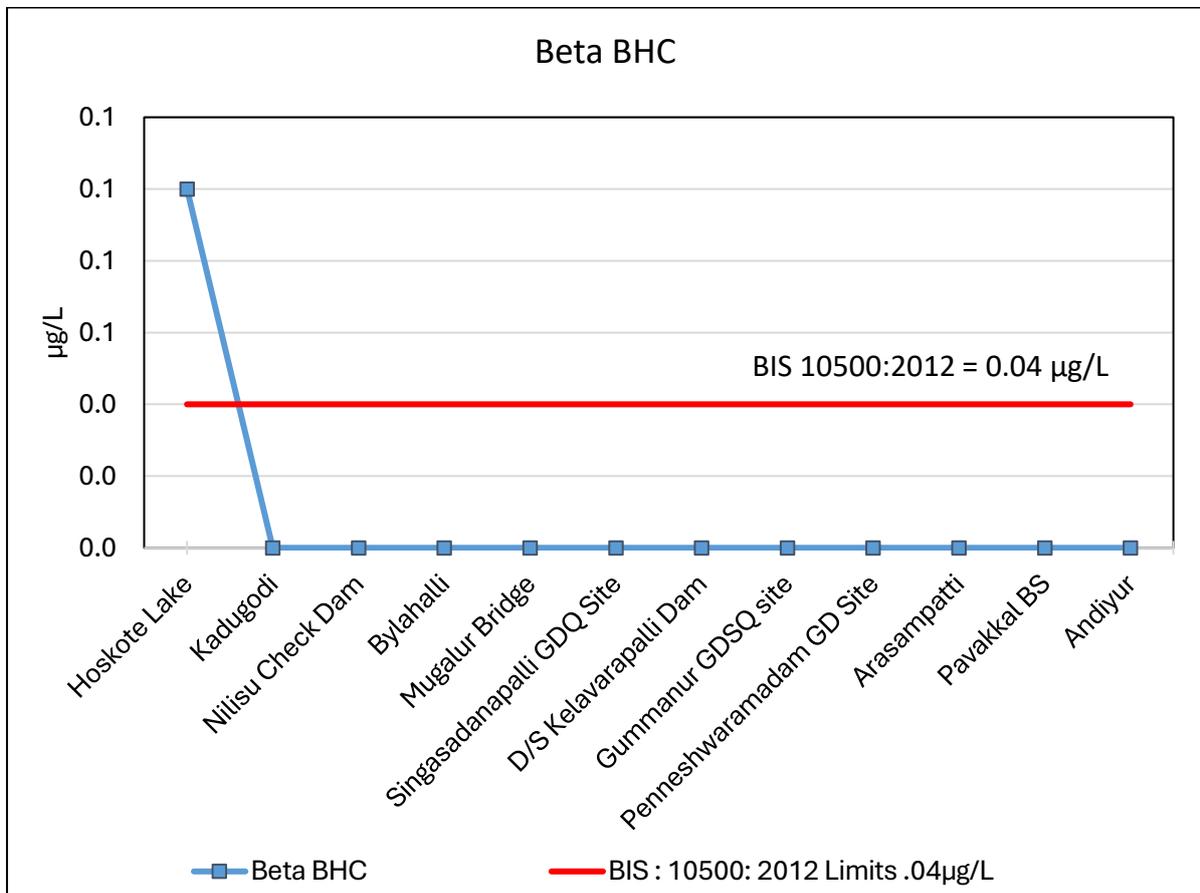
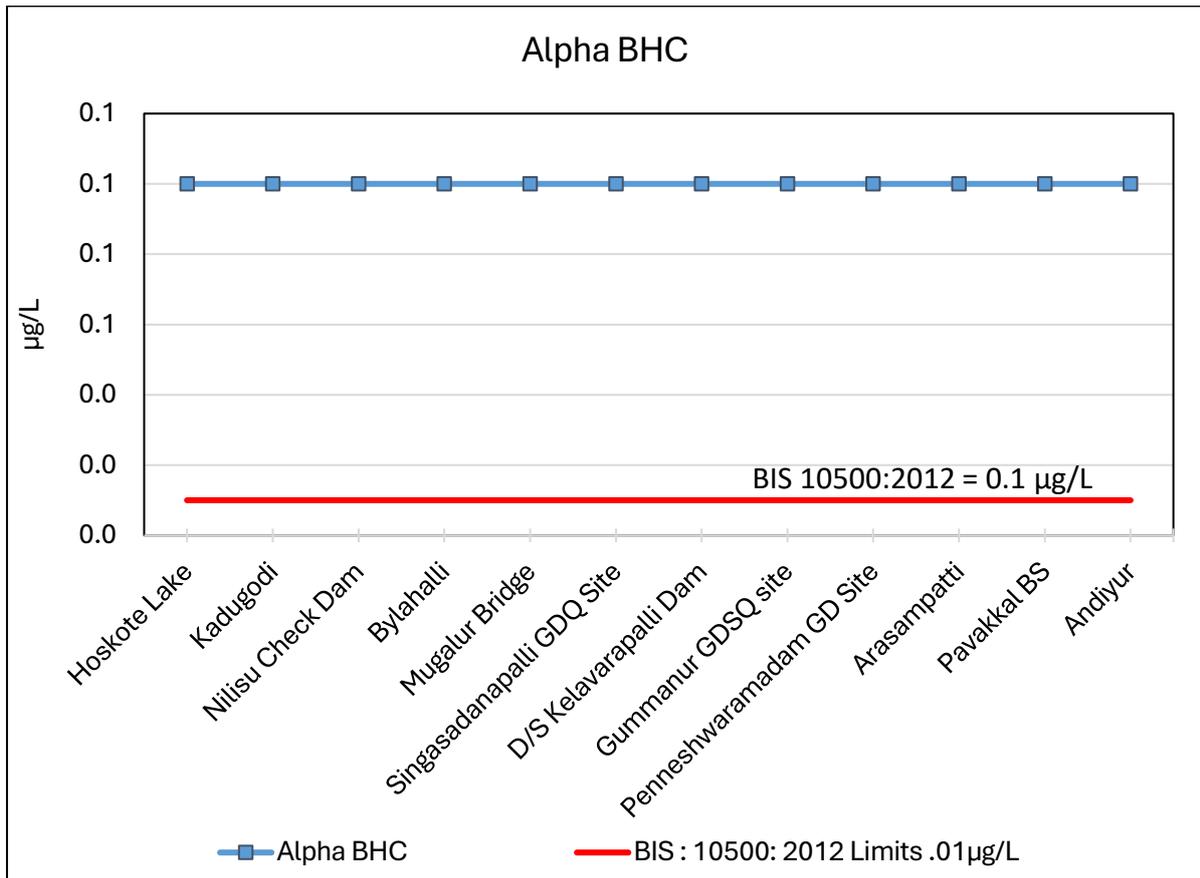
According to the results presented, no significant peaks for pesticide constituents were detected in comparison with BIS standards specified below **Table-5** except for Aldrin specifically at Bylahalli, Mugalur bridge, Singasadanapalli & at Arasampatti; Dieldrin at the Nilsu check dam & Bylahalli, Beta-BHC at Hoskote Lake which suggests trace quantities of pesticides may be present. Additionally, Alpha BHC were found to be exceeding at all the stations of the Ponnaiyar River.

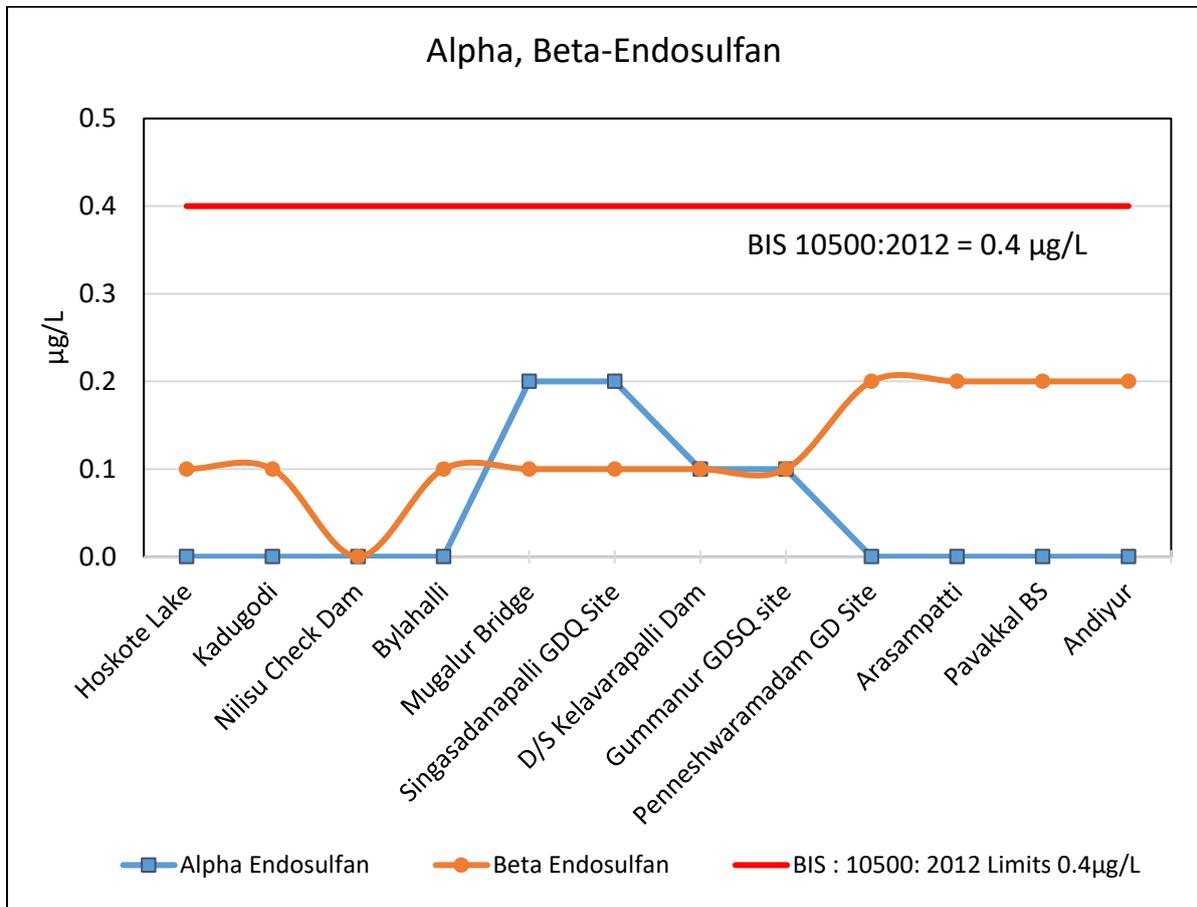
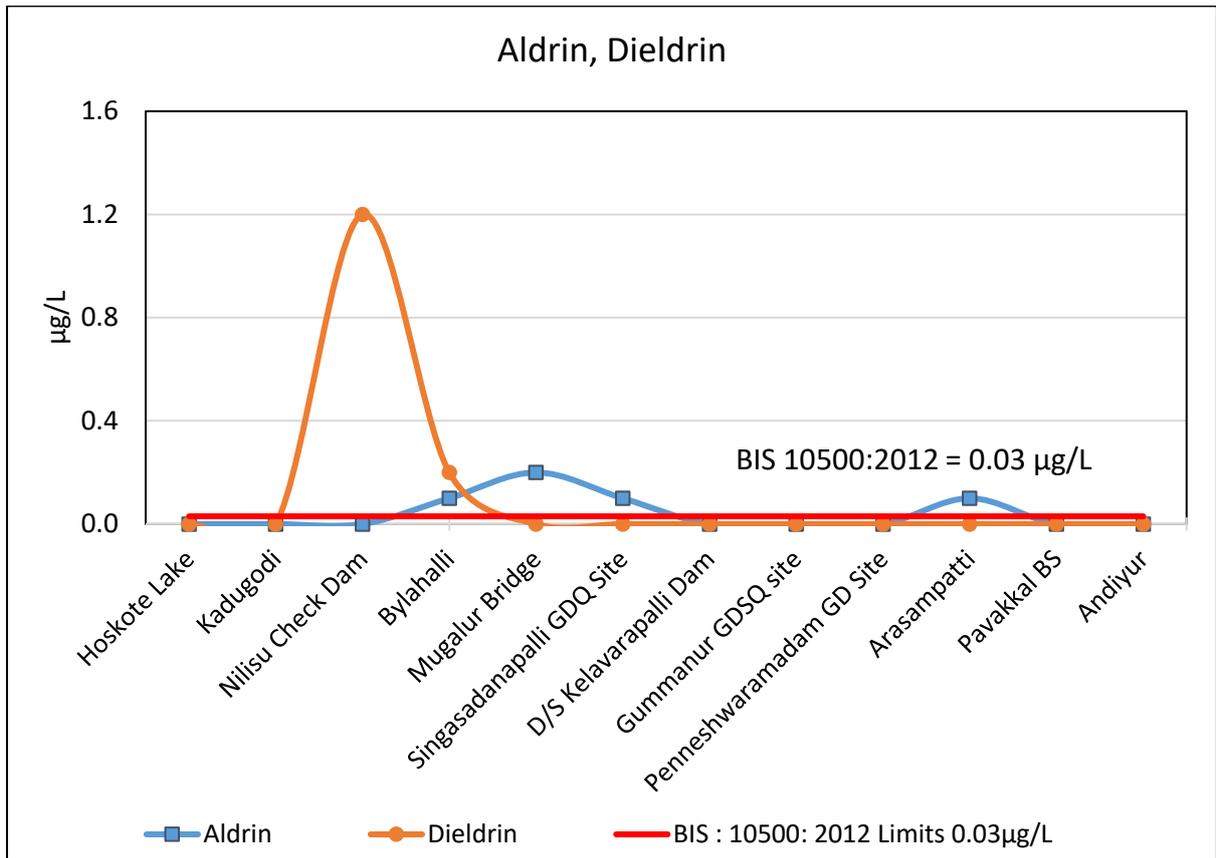
The analysis of pesticide concentrations in the river water samples showed that overall pesticide levels are negligible in general.

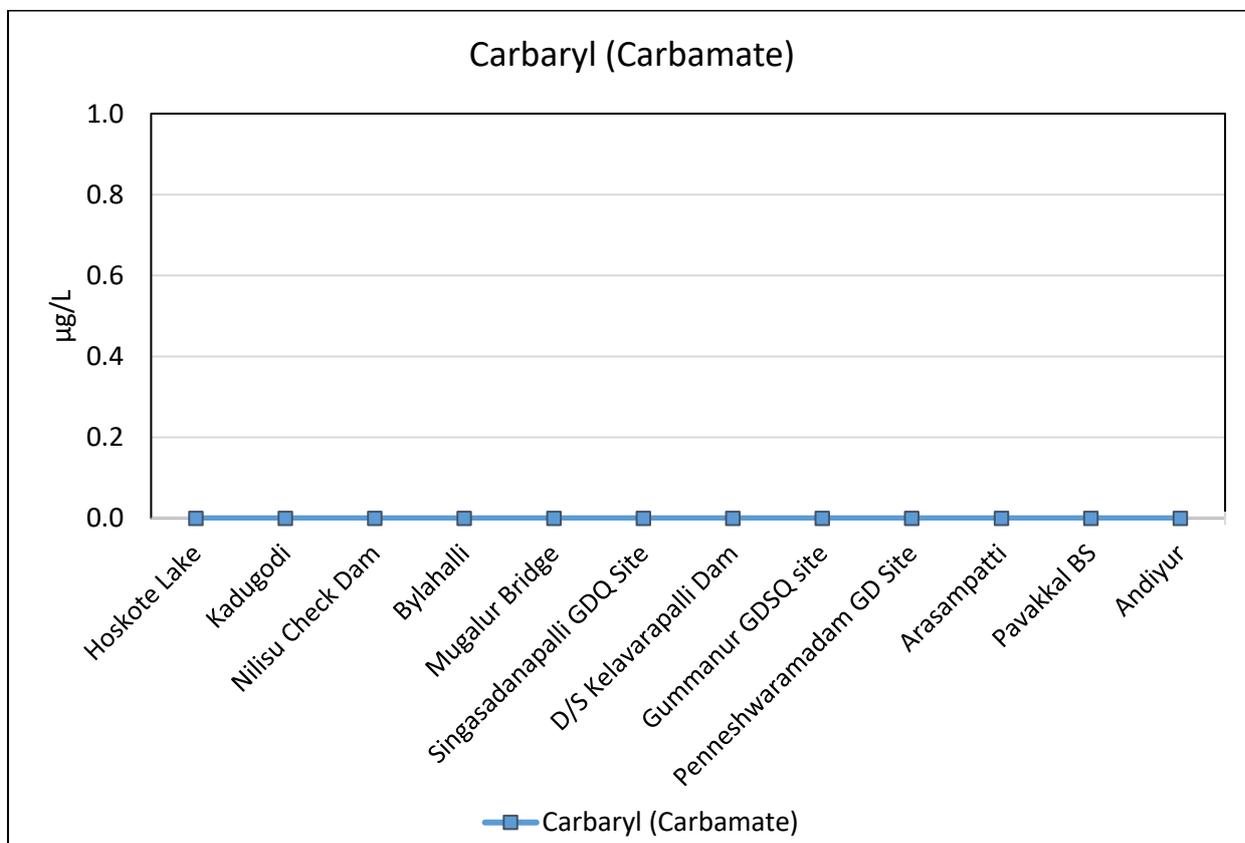
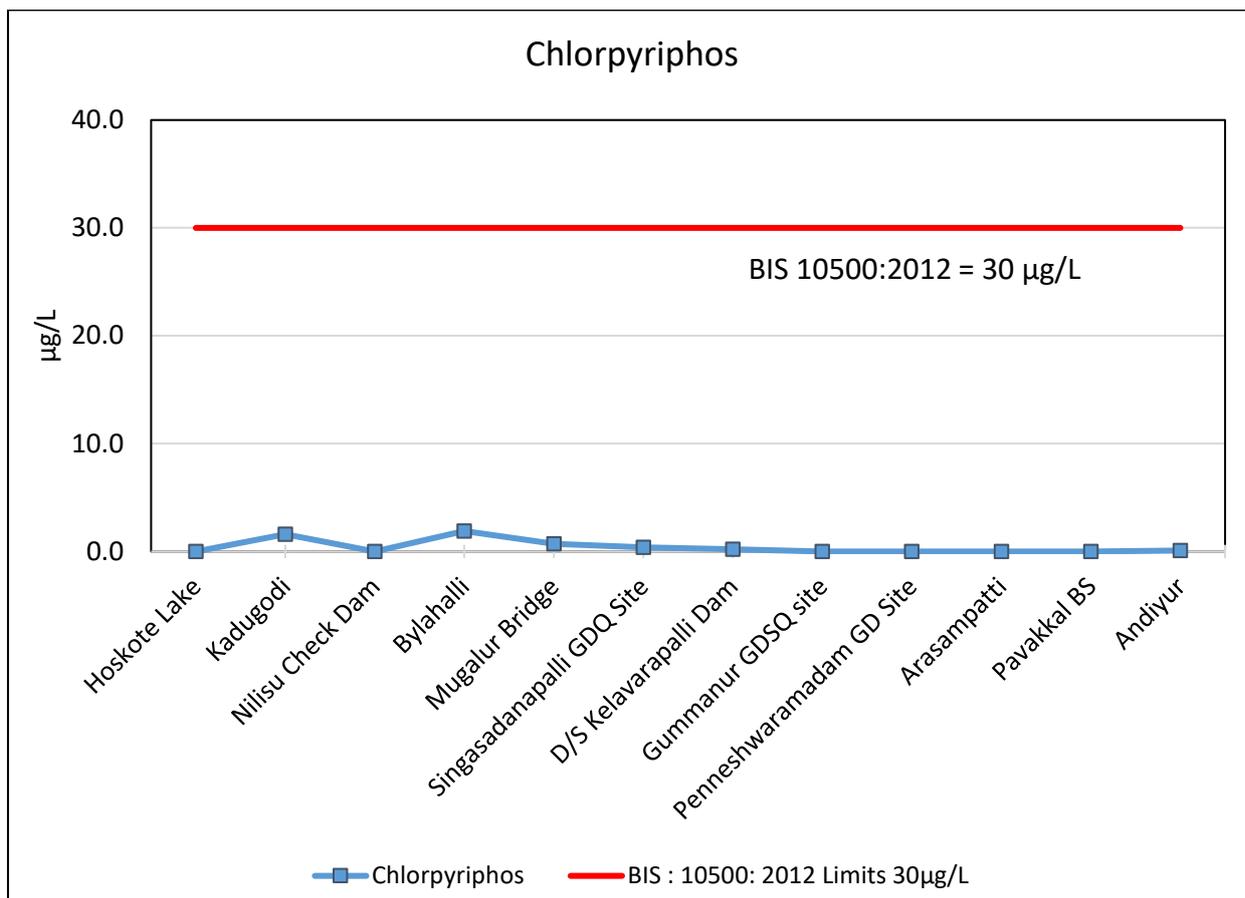
Trends were observed, and parameters with BIS limits were compared.

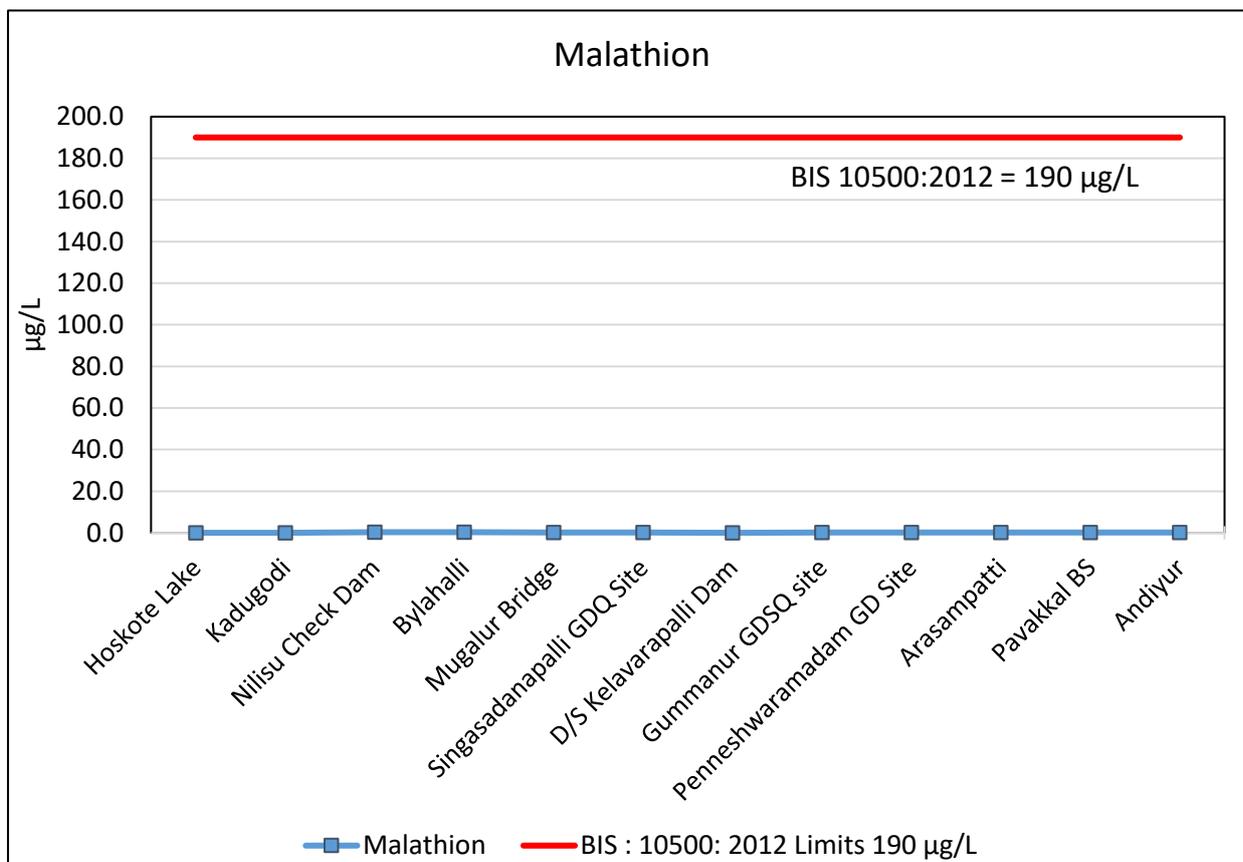
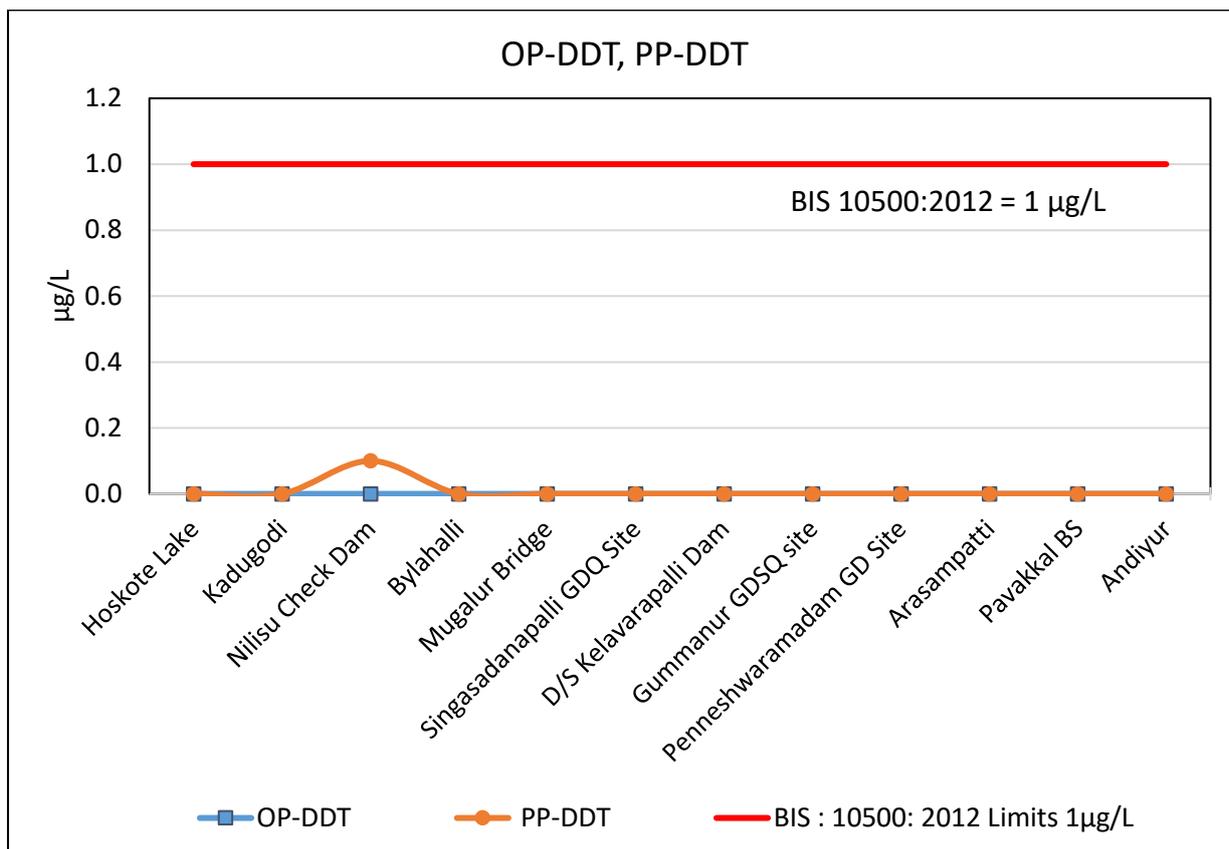
S. No	Pesticide	Limit (µg/L)
1	Alpha HCH	0.01
2	Beta HCH	0.04
3	Gama HCH (Lindane)	2
4	DDT ( <i>o, p</i> and <i>p, p</i> – Isomers of DDT, DDE and DDD)	1
5	Chlorpyrifos	30
6	Endosulfan (alpha, beta)	0.4
7	Malathion	190
8	Methyl parathion	0.3
9	Aldrin/ Dieldrin	0.03
	<i>NOTE — Test methods are for guidance and reference for testing laboratory. In case of two methods, USEPA method shall be the reference method.</i>	

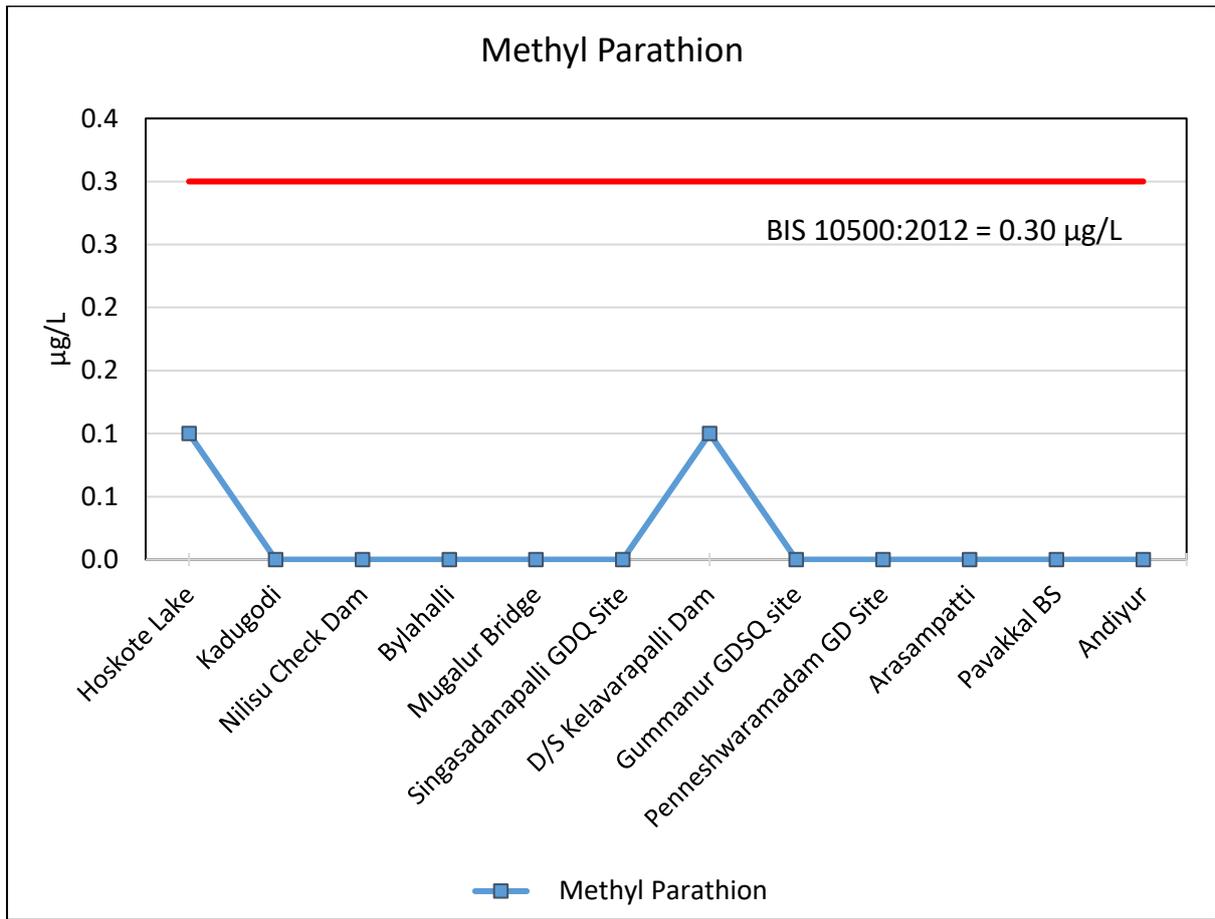
Table 5: Pesticide Residue Limits - IS 10500: 2012











## 5. Inferences/Observations:

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Water samples were collected and analysed at 12 various locations in the Ponnaiyar River Basin, covering Karnataka and Tamil Nadu. The analysis of these samples for 41 parameters (Physical-5, Chemical-15, Biological/Bacteriological-5, Trace & Toxic-9, and Pesticides-7) revealed the following:

- **Dissolved Oxygen (DO):** The DO levels were found to be below the acceptable limit from the area after Hoskote Lake up to Singasadanapalli, indicating very poor water quality. DO values are gradually improving downstream of Kelavarapalli Reservoir but remain outside the CPCB classification limits until Penneshwaramadam. The three locations after Penneshwaramadam are within acceptable limits, indicating that downstream locations are less polluted.
- **Biochemical Oxygen Demand (BOD):** For 10 out of 12 samples (from Hoskote Lake to Arasampatti), BOD values exceeded the limits for Class A, B, and C. Of the remaining two samples (Pavakkal BS & Andiyur), one was within the limits for Class A, B, and C, and the other was within the limits for Class B and C. These two samples were from downstream locations.
- **Total Dissolved Solids (TDS):** TDS is beyond the acceptable limits at all the locations and showing increasing trend towards the downstream locations.
- **Coliform Bacteria:** At 9 upstream locations (from Hoskote Lake upto Penneshwaramadam), Total Coliform levels were found to be

beyond acceptable limits, indicating contamination from improperly treated sewage discharge into the river. Only three samples from downstream locations (Arasampatti, Pavakkal BS & Andiyur) met the CPCB Class-C limit for Total Coliform.

- **Trace and Toxic Metals:** Analysis revealed that only Iron and Lead exceeded the acceptable limits of BIS 10500:2012. Iron levels exceeded limits from Nilisu check dam to Singasadanapalli GDQ site, while Lead levels exceeded limits from Hoskote lake to Mugalur Bridge.
- **Pesticides:** Pesticide concentration for Alpha-BHC is beyond the acceptable limits for all the stations. The concentration of Beta-BHC is beyond the acceptable limit only at Hoskote Lake and within limits for all other stations. Aldrin concentrations is beyond the limits at Bylahalli, Mugalur bridge, Singasadanapalli & at Arasampatti. Dieldrin concentration is beyond the limits at Nilisu Check Dam and Bylahalli. Apart from the above, all other pesticide concentrations are low at all the remaining sampling stations.
- **Upstream Contamination:** Water samples collected from locations after Hoskote Lake up to Kelavarapalli Reservoir were found to exceed acceptable limits for most parameters. High concentrations of Ammonia, DO, BOD, Coliforms, Iron and Lead suggest the discharge of domestic waste into the river.
- **Downstream Water Quality:** Water quality from downstream of Kelavarapalli Reservoir was close to acceptable limits for many parameters, except for pH, Magnesium, Chloride, and Fluoride.

Parameters such as Carbonate, Silica, and Sodium showed an upward trend but lack specified limits for comparison with BIS/CPCB standards.

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<b>Annexure I: Water Quality Test Results</b>																											
S.No.	Name of the Location	Temperature*	pH	EC	TDS	Turbidity	Ca <sup>+2</sup>	Mg <sup>+2</sup>	Na <sup>+1</sup>	K <sup>+1</sup>	CO <sub>3</sub> <sup>-2</sup>	HCO <sub>3</sub> <sup>-1</sup>	Cl <sup>-1</sup>	SO <sub>4</sub> <sup>-2</sup>	F <sup>-</sup>	PO <sub>4</sub> <sup>-3</sup>	Nitrate	NO <sub>2</sub> <sup>-N</sup>	B	SiO <sub>4</sub> <sup>4-</sup>	NH <sub>3</sub> -N	DO	BOD	COD	TC	FC	
				µs/cm	mg/L	NTU	mg/L																			MPN/100mL	
1	Hoskote Lake	27	7.75	872	513.0	50	48.42	17.4	117.6	19.2	0.00	202.59	177.83	4.08	0.70	0.08	40.00	0.04	0.109	5.73	0.23	3.2	76.79	101	1600000	17000	
2	Kadugodi	27	7.57	1430	754.0	65	89.28	23.9	162.0	24.4	0.00	519.70	209.66	36.15	0.37	1.83	46.90	0.07	0.143	14.29	29.10	0.0	112.32	140	9200000	1700000	
3	Nilisu Check Dam	26	7.37	1304	687.0	200	74.14	26.6	147.6	22.2	0.00	493.27	177.83	30.84	0.36	1.97	48.10	0.09	0.131	13.78	26.20	0.0	106.40	320	22000000	33000000	
4	Bylahalli	26	7.28	1374	711.0	95	80.20	25.7	153.6	22.8	0.00	497.67	187.19	25.94	0.35	2.29	48.00	0.09	0.193	15.97	28.70	0.0	124.17	186	46000000	23000000	
5	Mugalur Bridge	25	7.43	1328	759.0	310	78.69	29.4	145.4	23.2	0.00	515.29	194.68	31.45	0.37	2.32	2.00	0.18	0.155	25.75	30.20	0.0	159.37	280	54000000	2700000	
6	Singasadanapalli GDQ Site	28	7.55	1469	809.0	190	99.87	22.0	158.8	22.2	0.00	528.50	215.27	30.43	0.41	2.23	5.30	0.07	0.096	28.60	32.90	0.0	62.49	97	16000000	2800000	
7	D/S Kelavarapalli Dam	25	7.74	1249	765.0	15	87.76	22.9	144.4	22.0	0.00	502.08	202.17	24.71	0.38	2.20	3.40	0.94	0.160	24.45	25.80	1.5	9.31	57	92000	22000	
8	Gummanur GDSQ site	28	7.92	1265	830.0	17	92.30	32.1	142.8	20.0	0.00	378.76	207.78	36.56	0.45	1.80	38.90	0.16	0.124	11.23	0.41	1.9	18.05	36	54000	780	
9	Penneshwaramadam GD Site	25.5	7.84	1528	917.6	8	68.94	41.8	178.0	13.7	0.00	433.22	286.19	45.46	1.24	0.89	4.14	0.08	0.137	40.26	0.17	3.1	8.03	64	9200	200	
10	Arasampatti	25	8.35	1777	1066.0	7	54.51	51.6	225.5	11.5	63.67	308.73	358.71	54.71	1.42	0.47	0.59	0.01	0.098	29.26	0.14	5.5	1.15	42	1100	170	
12	Pavakkal BS	31	8.75	1650	991.0	17	68.94	55.4	210.5	12.0	14.69	224.08	401.84	63.02	0.99	0.19	0.60	0.01	0.110	40.72	0.10	10.1	2.87	61	790	110	
13	Andiyur	30	8.97	1459	877.4	10	49.70	44.7	195.0	14.4	58.78	179.27	344.99	64.90	0.98	0.35	1.22	0.01	0.075	32.46	0.16	7.3	4.21	50	700	110	

## Annexure I: Water Quality Test Results

S.No	Ponnaiyar River	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Nickel	Zinc	Mercury
		µg/L								
	Name of Sampling site	Water Quality Standards ( BIS : 10500; 2012 )								
		10	3	50	50	300	10	20	5000	1
1	Hoskote Lake	1.458	0.346	2.925	14.449	940.946	11.06	6.063	52.353	0.132
2	Kadugodi	0.639	0.37	3.267	16.368	668.919	13.324	13.87	85.874	0.074
3	Nilisu Check Dam	0.671	1.699	5.425	14.861	1423.027	14.819	13.229	98.447	0.023
4	Bylahalli	0.612	1.464	4.932	12.998	1392.956	13.439	10.08	101.409	0.02
5	Mugalur Bridge	0.593	2.37	6.126	22.314	2531.961	16.789	17.821	165.64	0.013
6	Singasadanapalli GDQ Site	0.432	1.503	5.515	11.355	1524.812	8.704	9.412	87.938	0.023
7	D/S Kelavarapalli Dam	0.717	0.294	1.441	13.843	504.466	4.697	9.227	43.033	0.018
8	Gummanur GDSQ site	0.694	0.446	1.614	10.49	264.04	5.558	9.969	31.699	0.025
9	Penneshwaramadam GD Site	0.699	0.226	5.186	8.703	126.015	3.338	7.287	28.321	0.023
10	Arasampatti	0.768	0.268	1.344	10.54	147.671	4.697	8.623	34.041	0.02
11	Pavakkal BS	1.094	0.054	0.315	1.484	15.885	0.579	1.246	66.094	0.055
12	Andiyur	1.315	0.156	0.633	1.295	19.073	0.912	1.339	489.251	0.304
	Max	1.458	2.37	6.126	22.314	2531.961	16.789	17.821	489.251	0.304
	Min	0.432	0.054	0.315	1.295	15.885	0.579	1.246	28.321	0.013
	Avg	0.808	0.766	3.227	11.558	796.648	8.160	9.014	107.008	0.061

## Annexure I: Water Quality Test Results

Sl.No.	Name of Site	Alpha BHC,	Beta BHC	OP-DDT,	PP-DDT	Alpha Endosulphan	Beta Endosulphan	Aldrin,	Dieldrin,	Carbaryl (Carbamate),	Malathian,	Methyl Parathian,	Chloropyriphos
	BIS 10500:2012	0.01	0.04	1	1	0.4	0.4	0.03	0.03	No limit	190	0.3	30
		Units: µg/L											
1	Hoskote Lake	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
2	Kadugodi	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.6
3	Nilisu Check Dam	0.1	0.0	0.0	0.1	0.0	0.0	0.0	1.2	0.0	0.3	0.0	0.0
4	Bylahalli	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.3	0.0	1.9
5	Mugalur Bridge	0.1	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.1	0.0	0.7
6	Singasadanapalli GDQ Site	0.1	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.4
7	D/S Kelavarapalli Dam	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2
8	Gummanur GDSQ site	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0
9	Penneshwaramadam GD Site	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
10	Arasampatti	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.0
11	Pavakkal BS	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
12	Andiyur	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1