International Journal of Scientific Research and Engineering Development-– Volume 8 Issue 2, Mar-Apr 2025
Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

UNNAT BHARAT ABHIYAN SURVEY ON ASSESSMENT OF WATER QUALITY IN MAYYANAD AND PARAKKULAM REGION IN KOLLAM, KERALA

Salman Salim[1] Areena Sidhik[2] Muhammad Shahan S[3] Ajmal M Sajeev[4]
[123](Department of Civil Engineering, AKM Polytechnic College, Kollam)
Email : salmansalimics@gmail.com
[4](Lecturer & UBA Coordinator, Department of Civil Engineering, AKM Polytechnic College, Kollam)
Email : ajmalsajeev95@gmail.com

1.1 ABSTRACT

Water is more important in shaping the land and regulation of the climate. It is one of the most important compounds that pro-Foundly influence life. The quality of water is usually described according to its physical, chemical and biological characteristics. Rapid industrialization and indiscriminate use of chemical fertilizers and pesticides in agriculture are causing heavy varied level of pollution in aquatic environment leading to deterioration of water quality and depletion of aquatic biota. Due to use of contaminated water, human population suffers from water-borne diseases. It is therefore necessary to check the water quality status. The objective of this assessment was to determine physical, chemical and biological status of water near Mayyanad and Parakkulam region.

1.2 UNNAT BHARAT ABHIYAN

As foreseen by Gandhi Ji in his seminal work, 'Hind Swaraj', the western developmental paradigm, based on centralized technologies and urbanization, has given rise to serious problems like increasing inequity (leading to crime and violence), and climate change due to rapid ecological degradation. To ameliorate these problems, it is necessary to promote development of rural areas in tune with Gandhian vision of self-sufficient 'village republics', based on local resources and using decentralized, eco-friendly technologies so that the basic needs of food, clothing, shelter, sanitation, health care, energy, livelihood, transportation, and education are locally met. This should be the vision of holistic development of villages. Presently, 70% of the population in India lives in rural areas engaged in agrarian economy with agriculture and allied sector employing 51% of the total work-force but accounting for only 17% of the country's GDP. There are huge developmental disconnects between the rural and urban sectors such as inequity in health, education, incomes and basic amenities as well as employment opportunities - all causing great discontent and large-scale migration to urban areas. The imperatives of sustainable development which are being felt more and more acutely all over the world also demand eco-friendly development of the villages and creation of appropriate employment opportunities locally. Increasing urbanization is neither sustainable nor desirable. So far, our professional higher education institutions have largely been oriented to cater to the mainstream industrial sector and, barring a few exceptions, have hardly contributed directly to the development of the rural sector. Unnat Bhārat Abhiyān (UBA) is a much needed and highly challenging initiative in this direction. Unnat Bharat Abhiyan is inspired by the vision of transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India.

1.2.1 HISTORY

The conceptualization of Unnat Bharat Abhiyan started with the initiative of a group of dedicated faculty members of Indian Institute of Technology (IIT) Delhi working for long in the area of rural development and appropriate technology. The concept was nurtured through wide consultation with the representatives

of a number of technical institutions, Rural Technology Action Group (RuTAG) coordinators, voluntary organizations and government agencies, actively involved in rural development work, during a National workshop held at IIT Delhi in September, 2014. The workshop was sponsored by Council for Advancement of People's Action and Rural Technology (CAPART), Ministry of Rural Development, Govt. of India. The program was formally launched by the Ministry of Education (MoE) (formerly Ministry Human Resource Development (MHRD)) in presence of The President of India on 11th November, 2014.

1.2.2 VISION

Unnat Bharat Abhiyan is inspired by the vision of transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India.

1.2.3 MISSION

The Mission of Unnat Bharat Abhiyan is to enable higher educational institutions to work with the people of rural India in identifying development challenges and evolving appropriate solutions for accelerating sustainable growth. It also aims to create a virtuous cycle between society and an inclusive academic system by providing knowledge and practices for emerging professions and to upgrade the capabilities of both the public and the private sectors in responding to the development needs of rural India.

1.2.4 GOALS

- To build an understanding of the development agenda within institutes of Higher Education and an institutional capacity and training relevant to national needs, especially those of rural India.
- To re-emphasize the need for field work, stake-holder interactions and design for societal objectives as the basis of higher education.
- To stress on rigorous reporting and useful outputs as central to developing new professions.
- To provide rural India and regional agencies with access to the professional resources of the institutes of higher education, especially those that have acquired academic excellence in the field of science, engineering and technology, and management.
- To improve development outcomes as a consequence of this research. To develop new professions and new processes to sustain and absorb the outcomes of research.
- To foster a new dialogue within the larger community on science, society and the environment and to develop a sense of dignity and collective destiny.

1.3 OBJECTIVES

- To determine the bacteriological and physiochemical characteristics of water samples.
- To suggest suitable remedies for the problems causing water qualities.

LITERATURE REVIEW

- Assessment of water quality of river Gomati at Jaunpur (2014) : However, no single parameter has been found to be of a consistent value in all the standard systems. This is mainly because of diversity of interests which have guided the underlining of these standards such as interests for uses, needs, availability, standard of living, economic conditions and costs, quality of available water and so on. Despite all these drawbacks, these standards have been found useful in determining water quality. Also, statistical analyses including analysis of variance (ANOVA) and correlation coefficient have been accomplished in order to find out the relevance of various parameters amongst one another.

- Assessment of water quality in selected drinking water resources of rajgarh sadulpur tehsil of churu rajasthan (2014) : The parameters investigated were color, odours, Turbidity, pH, calcium hardness ,Total hardness, magnesium hardness, Nitrate, chloride Iron, alkalinity,Flouride in the ground water and presence of residual chloride in surface reservoirs, conductivity and coliforms number in ground water as well as surface reservoir. Some tube well & open wells contain standard quality of water as resources of drinking water and where as some surface reservoirs, show high contamination with coliform.

- Assessment of Water Quality of Valapattanam River at Kannur Kerala and toxicity Effect of Plywood Effluent on Fresh Water Fish Cyprinus Carpio (2021) : The present study on title was based on the following premises.

  The factors for which the study was made and the factors that were tested in the study were,

  1. To select the area and study the characteristics of the selected stations.

  2. To characterize the water at different stations to detect pollution level.

  3. To carry out toxicological study to find out the level of the effect of pollution involves,

     a. Evolving 96 hours LC50 (Median lethal tolerance limit) of plywood effluent on the selected fish, Cyprinus carpio.
     b.
     c. Impact of sublethal concentrations of plywood effluent at short and long term exposure on
        i. Changes in the level of biochemicals

        ii. Alterations in the haematological parameters

        iii. Analysis of enzyme level

        iv. Genotoxicological level in fishes

        v. Histopathological studies in fishes

  With the above objectives the study was carried out adopting the following methods

  The findings of the present study are Physico chemical analysis of Valapattanam river at different sampling stations revealed the alkaline nature of pH, presence of high levels of TDS, BOD, COD
  and depleted levels of DO as compared to the tolerance limits prescribed by

- Development and assessment of water quality index using prediction models for river chittar tamilnadu (2021) : The surface water quality is very sensitive and critical issue in many countries. River Chittar was regularly monitored for two years (September of 2018 to August 2020) every month by season wise. At this present work River Chittar was examined for drinking and irrigational purposes. The drinking water quality was assigned by water quality index. The river loses its drinking quality when it reaches upstream (nearby urban areas). The main cause for declining from its

excellence was due to anthropogenic activities. If the same range of parameter concentration prevail for certain years, then the overall quality of the river will get suppressed and a District loss its nourishment

- Assessment of water quality and ecosystem services of Rudrasagar Lake a Ramsar site in south West Tripura state (2021) : Wetlands are transitional zones between terrestrial and aquatic systems that remain saturated due to high groundwater or surface water during a part or all through the year (Junket al., 2013; Nath and Lal, 2017). India has about 757.06 thousand wetlands, with a total area of 15.3 million hectares, accounting for nearly 4.7% of the country's total geographical area(Space Application Centre, 2011). Forty-two of these wetlands have been designated as Ramsar sites or wetlands of international importance (MoEF&CC, 2020). One of these forty-two wetlands is the Rudrasagar lake (Tripura). However, this wetland is degrading gradually due various anthropogenic threats.The present study aims at understanding the interactive influence of water quality, biodiversity and ecosystem valuation in Rudrasagar lake of Tripura, a Ramsar site of India which was not investigated enough by researchers. Rudrasagar lake was investigated for the period of 2016 to 2018.

METHODOLOGY

3.1 STUDY AREA

Mayyanad is located in the south western suburbs of Kollam district, Kollam city about 10 kilometres south of the city centre and 6 kilometres north of Paravur Town. Mayyanad is situated on the banks of the Paravur Lake and has an Arabian Sea coastline noted for its fishing. Parakkulam is a village in Kollam district in the south west Indian state of Kerala. The factors responsible for groundwater contamination can emerge from lack of sanitation, unsafe pit latrines, domestic waste dumps, and proximity of wells to latrines, waste dumps and cattle sheds. Rising of water table during rainy season can further aggravate the chances of well water contamination. Though the state authorities have initiated certain action programmes in tackling water contamination and water shortage, but they have been only partially successful.

From this study, we found that;

- People in these panchayats use septic latrines.
- well water is contaminated with coliforms and faecal coliforms
- Wells surveyed did not have water tight casing or lining but were mostly protected by platforms and net covering.
- pH of well water is not at the desirable limit.

3.1.1 UESTIONNAIRE SURVEY

A survey was conducted in the village offices from the corresponding regions. Following table shows the data collected from the survey.

3.1.1.1 PARAKKULAM

a. BASIC INFORMATION

Name of the village	Thrikkovilvattom (Parakkulam)
Gram panchayat	Thrikkovilvattom
Number of wards	23

Block	Mukhathala
District	Kollam
State	Kerala
Lok Sabha or Constituency	Kundara assembly / Kollam lok sabha
Distance from District HQ	12 km
Area of the village (Acre)	4600
Arable land agriculture area (Acre)	--
Forest area	No
Housing / Abadi area	3800 acre
Area under water bodies	No

Table 3.1

b. VILLAGE INFRASTRUCTURE AND BASIC AMENITIES.

VILLAGE INFRASTRUCTURE / BASIC AMENITIES / SERVICES	**NOS.**
Primary Schools (Govt.)	2
Primary Schools (Private)	9
Middle Schools (Private)	3
Secondary Schools (Private)	2
Collages (Private)	6
Banks or ATM	5
Primary health centres	1
Civil hospital	4
Jen Aushadhi Yojana Kendra	1
Post office	2
Gas agencies	1
Anganwadi kendra	53

Veterinary care centre	1
Electricity office	1

Table 3.2

c. VILLAGE CONNCECTIVITY (ROADS)

Distance of the village from the nearest highway/major district road (in km)	0.5
Is the village connected to the above by a pacca road?	Yes
If yes, details of the approach road/ connecting road i. Length of the road (in km) ii. Year of construction iii. Scheme under which constructed iv. Present status (complete/ incomplete)	 1.3 2020 PWD Completed
Length of internal roads (inside village/ hamlets)	Pacca :- 1.6 km Total :- 1.6 km
What is the mode of transport available?	Shared auto, Bus
Frequency of the available mode of transport	Frequent

Table 3.3

d. LAND, FOREST & HORTICULTURAL PROFILE

Type of forest (Reserved/ Protected / Open)	Nil
Community forest (acre)	Nil
Government Forest (acre)	Nil
Main forest trees and shrub species	Nil
Energy plantation (if Yes, which species and area)	Nil

Table 3.4

e. COMMON VILLAGE ELECTRICITY REQUIREMENTS.

S. NO	COMMUNITY PLACE	ELECTRICAL APPLIANCES	WORKING DURATION/ DAY
1	Panchayat Office	1 (4), 2 (2), 3 (1)	1 (8), 2 (4), 3 (5)
2	Dispensary	1 (4), 10 (2)	1 (8), 10 (8)
3	Community Halls	1 (15), 2 (10), 6 (1)	1 (6), 2 (6), 6 (2)

4	Street Lighting	1 (10)	1 (10)
5	Dharmashala	1 (3), 2 (2)	1 (3), 2 (2)
6	Training cum Production centres	1 (5), 2 (5), 6 (1), 4 (1)	1 (5), 2 (5), 6 (1), 4 (1)

Table 3.5

- **Electrical Appliances :** 1- CFL / LED Bulb / Tube Light (20W), 2- Fan (70W), 3- Desert Cooler (150W), 4- TV (150W), 5- Refrigerator (220W), 6- Music system (100W), 7- Electric Motor Pump (750W), 8- Heater (1000W), 9- Electric Iron (1000W), 10- Air Conditioner.

3.1.1.2 MAYYANAD

a. BASIC INFORMATION

Name of the village	Mayyanad village
Gram panchayat	Mayyanad grama panchayath
Number of wards	23
Block	Mukhathala
District	Kollam
State	Kerala
Lok Sabha or Constituency	Kollam
Distance from District HQ	17km
Area of the village (Acre)	4200
Arable land agriculture area (Acre)	---
Forest area	No
Housing / Abadi area	60% of total area of village
Area under water bodies	40% of total area of village

Table 3.6

b. VILLAGE INFRASTRUCTURE AND BASIC AMENITIES.

VILLAGE INFRASTRUCTURE / BASIC AMENITIES / SERVICES	NOS.
Primary Schools (Govt.)	2
Primary Schools (Private)	5
Middle Schools (Govt.)	1
Secondary Schools (Private)	1
Secondary Schools (Govt.)	1
ITI, Diploma Institutes	1
Collages (Private)	0
Banks or ATM	4

Primary health centres	1
Civil hospital	1
Jen Aushadhi Yojana Kendra	2
Post office	5
Gas agencies	0
Anganwadi kendra	47
Veterinary care centre	1
Electricity office	3

Table 3.7

c. VILLAGE CONNCECTIVITY (ROADS)

Distance of the village from the nearest highway/major district road (in km)	2
Is the village connected to the above by a pacca road?	No
If yes, details of the approach road/ connecting road v. Length of the road (in km) vi. Year of construction vii. Scheme under which constructed viii. Present status (complete/ incomplete)	
Length of internal roads (inside village/ hamlets)	
What is the mode of transport available?	Bus, Shared auto, Jeep
Frequency of the available mode of transport	Frequent

Table 3.8

d. LAND, FOREST & HORTICULTURAL PROFILE

Type of forest (Reserved/ Protected / Open)	Nil
Community forest (acre)	Nil
Government Forest (acre)	Nil
Main forest trees and shrub species	Nil
Energy plantation (if Yes, which species and area)	Nil

Table 3.9

e. COMMON VILLAGE ELECTRICITY REQUIREMENTS.

S. NO	COMMUNITY PLACE	ELECTRICAL APPLIANCES	WORKING DURATION/ DAY
1	Panchayat Office	1 (4), 2 (2), 3 (1)	1 (8), 2 (4), 3 (5)
2	Dispensary	1 (4), 10 (2)	1 (8), 10 (8)
3	Community Halls	1 (15), 2 (10), 6 (1)	1 (6), 2 (6), 6 (2)
4	Street Lighting	1 (10)	1 (10)

5	Dharmashala	1 (3), 2 (2)	1 (3), 2 (2)
6	Training cum Production centres	1 (5), 2 (5), 6 (1), 4 (1)	1 (5), 2 (5), 6 (1), 4 (1)

Table 3.10

- **Electrical Appliances :** 1- CFL / LED Bulb / Tube Light (20W), 2- Fan (70W), 3- Desert Cooler (150W), 4- TV (150W), 5- Refrigerator (220W), 6- Music system (100W), 7- Electric Motor Pump (750W), 8- Heater (1000W), 9- Electric Iron (1000W), 10- Air Conditioner.

3.2 SAMPLING

- Sterilized bottle was used for sampling.
- The water samples are collected with minimum air contact.
- Bottles were labelled with necessary details.
- Samples were tested within 24 hours of sampling.

Fig 3.1

3.3 TESTS TO BE CARRIED OUT

i. PHYSICAL TEST

a. Total Dissolved Solids
b. Turbidity
c. pH value

ii. CHEMICAL TEST

a. Acidity
b. Total Alkalinity
c. Chloride Content

iii. BIOLOGICAL TEST

a. Total Coliform
b. E- coli

1. PHYSICAL TEST.

i. Total Dissolved Solids

Total Dissolved Solids (TDS) are all the good and bad elements in your drinking water. A well-mixed sample is filtered through a standard glass fiber filter, and the filtrate is evaporated to dryness in a weighed dish and dried to constant weight at 179-181°C. The increase in dish weight represents the total dissolved solids.A well-mixed sample is filtered through a weighed standard glass fiber filter and the residue retained on the filter is dried to a constant weight at 103-105° C. The increase in weight of the filter represents the total suspended solids. If the suspended material clogs the filter and prolongs filtration, the difference between the total solids and total dissolved solids may provide an estimate of the total suspended solids. Maximum acceptable limit of TDS present in the water as per IS 10500-2012 is 500mg/L.

ii. Turbidity

Turbidity is the measure of relative clarity of a liquid. When light is passed through a sample having suspended particles, some of the light is scattered by the particles. The scattering of the light, or absorption of light is generally proportional to the turbidity. The turbidity of the sample is thus measured from the amount of light scattered by the sample taking a reference with standard turbidity suspension. Maximum acceptable limit of turbidity as per IS 10500-2012 is 1 NTU

iii. pH Value

The pH is a negative logarithm of the reciprocal of hydrogen ion concentration. The pH scale is used to express the degree of acidity or alkalinity with the middle value (pH) corresponds to the exact neutrality at 25°C. The pH value represents the instantaneous hydrogen ion activity ie, electrode system which is the most accurate method and free of interference. The pH paper is specially prepared one which will show the variation in pH with different color changes. Thus this method is suitable firmly rough estimation. Maximum acceptable limit of pH value as per IS 10500-2012 is 6.5 to 8.5.

2. CHEMICAL TEST

i. Acidity

Acidity of water is its quantitative capacity to react with a strong base to designated pH. Strong mineral acids, weak acids such as carbonic acids and acetic acid and hydrolyzing salt such as ferric acid and aluminum sulphates may contribute to the measured acidity according to the method of determination. Hydrogen ions present in sample as a result of dissociation or hydrolysis of solutes is neutralized by titration with standard alkali. The acidity thus depends on end point pH or indicator used. Dissolved CO2 is usually the major acidic component of unpolluted surface water. As the colour change of phenolphthalein indicator is close to pH 8.3, this value is generally accepted as a standard end point for titration of total acidity including CO2 and mineral acids. Mineral acids are measured by titration to a pH of about 4.5 using methyl orange as indicator.

ii. Total Alkalinity

Alkalinity of water is its quantitative capacity to neutralize strong acid to designated pH. The measured value may vary with the end point pH used in the determination. Alkalinity is important in treatments of natural waters and waste waters. The normal forms of alkalinity are carbonates, bicarbonates and hydroxides. Alkalinity is taken as an indication of concentration of these constituents. The values may also include contributions from borstes, phosphates and

silicates. Raw domestic wastewaters have alkalinity slightly greater than that of water supplied. In anaerobic digesters the supernatant has alkalinities in the ranges 2000-4000 mg/l of CaCO3 for samples whose initial pH is above 8.3, the titration should be conducted until phenolphthalein indicator turns from pink to colourless. The second step of titration is conducted with the aid of methyl orange to a pH of about 4.5. When the pH is less than 8.3, a single titration is made using methyl orange as the indicator. At pH 8.3 all the hydroxide alkalinity will be neutralized and all carbonates converted to bicarbonates. This alkalinity is shown as phenolphthalein alkalinity. If the titration of a sample that originally contained both carbonate and hydroxide alkalinity is continued beyond the phenolphthalein end point, the carbonates react with the acid and are converted to carbonic acid. The reaction will be completed when the pH is lowered to about 4.5. Hydroxyl ions, present in a sample as a result of dissociation or hydrolysis of solutes are neutralized by titration with a standard acid. Thus the alkalinity depends on the end point pH used. The end point pH maybe 4.5 to 5.1 for total alkalinity and 8.3 for phenolphthalein alkalinity.

iii. Chloride Content

If water containing chlorides is titrated with silver nitrate solution, chlorides are precipitated as white silver chloride. Potassium chromate is used as indicator, which supplies chromate ions. As the concentration of chloride ions approaches extinction, silver ion concentration increases to a level at which reddish brown precipitate of silver chromate is formed indicating the end point.

3. BIOLOGICAL TEST

i. Total Coliform

Coliform bacteria are found in the soil. In water that has been influenced by surface water and in human or animal waste. Fecal coliforms are the group of total coliforms that are considered to be present specifically in the gut and feces of warm-blooded animals. They are commonly used indicator of sanitary quality of food and water.

ii. E-Coli

E-coli also known Escherichia coli are bacteria found in the environment, foods, and intestines of people and animals. These are a large and diverse group of bacteria. Most strains of E-coli are harmless, others can make you sick. It can cause diarrhea, urinary tract infections, respiratory illness, pneumonia and other illness.

RESULTS AND DISCUSSION

4.1. PHYSICAL TEST

TOTAL DISSOLVED SOLIDS

- Preperation of a solution of known weight of sample.
- Separation of desired component.
- Weighing the isolated component.
- Computation of amount of particular component in the sample from observed weight of the isolated component.

PARAKKULAM

SAMPLE NO:	RESULT (mg/L)
1	142
2	113.9
3	141.1
4	52.31
5	142.1
6	141.5
7	147.4
8	61.14
9	213.9
10	81.82

Table 4.1

MAYYANAD

SAMPLE NO:	RESULT (mg/L)
1	51.70
2	65.79
3	69.84
4	58.24
5	48.71
6	66.13
7	63.14
8	55.45
9	40.12
10	56.27

Table 4.2

TURBIDITY

- Switch on the power supply and check the battery of the turbidimeter.
- Set the instrument at 100 on the scale with a 40NTU standard suspension. (in this case each division will be equal to 0.4 NTU)
- Shake thoroughly to eliminate air bubbles.
- Take sample in the sample tube and put the sample in the chamber and find scale value.
- Dilute the sample with turbidity free water and again read turbidity.

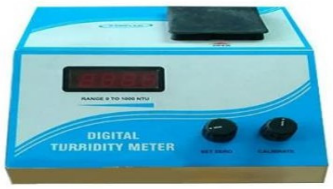

Fig 4.1

PARAKKULAM

SAMPLE NO:	RESULT (NTU)
1	<0.1
2	<0.1
3	0.43
4	1.49
5	<0.1
6	6.65
7	0.43
8	0.18
9	0.14
10	<0.1

Table 4.3

MAYYANAD

SAMPLE NO:	RESULT (NTU)
1	0.52
2	1.01
3	0.51
4	0.60
5	0.67
6	0.25
7	<0.1
8	<0.1
9	1.24
10	1.53

Table 4.4

PH VALUE

- Turn on the device.
- Take sample in the beaker
- Dip pH meter rod on the sample.
- pH of sample is displayed on pH meter.

Fig 4.2

PARAKKULAM

SAMPLE NO:	RESULT
1	4.201
2	4.801
3	5.912
4	5.713
5	6.243
6	6.661
7	5.271
8	5.823
9	4.303
10	4.498

Table 4.5

MAYYANAD

SAMPLE NO:	RESULT
1	5.133
2	5.302
3	4.953
4	5.521
5	5.503
6	5.325
7	5.851
8	5.644
9	5.533
10	6.361

Table 4.6

4.2. CHEMICAL TEST

ACIDITY

- Add 1or 2 drops of phenolphthalein indicator to the sample, if it is changed to pink colour it indicates alkalinity.
- Take 20 ml of sample pipetted out in flask and 0.02N NaOH in burette.
- Add methyl orange in sample and titrate it.

- The end point colour changes from orange red to yellow.
- Add phenolphthalein indicator and titrate against NaOH.
- The end point colour changes to faint pink.

PARAKKULAM

SAMPLE NO:	RESULT (mg/L)
1	20.20
2	14.43
3	18.28
4	6.73
5	24.05
6	10.58
7	13.47
8	10.58
9	17.32
10	8.66

Table 4.7

MAYYANAD

SAMPLE NO:	RESULT (mg/L)
1	20.20
2	19.24
3	32.71
4	12.51
5	13.47
6	27.89
7	23.09
8	19.24
9	15.39
10	10.58

Table 4.8

TOTAL ALKALINITY

- Add 1 or 2 drops of phenolphthalein indicator in 20 ml sample and it changes to pink colour.
- In this sample titrate it with 0.02N strong acid in burette.
- At its end point colour disappars.
- Add 2 drops methyl orange indicator to the sample and titrate it.
- At the end point the colour turns to yellow.

PARAKKULAM

SAMPLE NO:	RESULT (mg/L)

1	<5
2	<5
3	16.66
4	<5
5	27.08
6	49.99
7	<5
8	6.25
9	<5
10	<5

Table 4.9

MAYYANAD

SAMPLE NO:	RESULT (mg/L)
1	<5
2	<5
3	<5
4	<5
5	<5
6	<5
7	8.33
8	<5
9	<5
10	10.42

Table 4.10

CHLORIDE CONTENT

- Take 20 ml of Nacl to the conical flask and silver nitrate in the burette.
- Add few drops of K_2CrO_4 indicator and titrate it with silver nitrate.
- End point was reddish yellow.
- Titrate the water sample to the standard silver nitrate. K_2CrO_4 as indicator.
- Colour changes to reddish yellow. End point was noted.

PARAKKULAM

SAMPLE NO:	RESULT (mg/L)
1	38.82
2	27.17
3	34.94
4	13.59

5	29.12
6	21.35
7	44.64
8	19.41
9	44.64
10	19.41

Table 4.11

MAYYANAD

SAMPLE NO:	RESULT (mg/L)
1	15.53
2	19.41
3	19.41
4	17.47
5	15.53
6	36.88
7	15.53
8	17.47
9	13.59
10	17.47

Table 4.12

4.3. BIOLOGICAL TEST

TOTAL COLIFORM & E-COLI

- Take broth medium in multiple fermentation tube to 3 or more decimal dilutions of the sample in tubes.
- Incubated at specific temperature for 24 to 48 hours.
- After the above process check whether it contain E-coli or not.

TOTAL COLIFORM (PARAKKULAM)

SAMPLE NO	RESULT
1	PRESENT
2	PRESENT
3	PRESENT
4	PRESENT
5	PRESENT
6	PRESENT

7	PRESENT
8	PRESENT
9	PRESENT
10	PRESENT

Table 4.13TOTAL COLIFORM (MAYYANAD)

SAMPLE NO:	RESULT (mg/L)
1	PRESENT
2	PRESENT
3	PRESENT
4	PRESENT
5	PRESENT
6	PRESENT
7	PRESENT
8	PRESENT
9	PRESENT
10	PRESENT

Table 4.14

E-COLI (PARAKKULAM)

SAMPLE NO:	RESULT
1	ABSENT
2	PRESENT
3	PRESENT
4	PRESENT
5	ABSENT
6	PRESENT
7	PRESENT
8	PRESENT
9	PRESENT
10	ABSENT

Table 4.15

E-COLI (MAYYANAD)

SAMPLE NO:	RESULT (mg/L)
1	PRESENT
2	PRESENT
3	ABSENT
4	PRESENT
5	ABSENT
6	ABSENT
7	PRESENT
8	ABSENT
9	PRESENT
10	ABSENT

Table 4.16

4.4. DISCUSSION

The investigation shows that :

For all samples, Total dissolved solids are within the allowable limit in both regions. Turbidity of sample no. 4&6 in Parakkulam region and sample no. 2,9 & 10 in Mayyanad region are not at the allowable limit. pH of sample no. 6 in Parakkulam region is within the allowable limit. The rest of samples in both region shows acidic nature.

Acidity of all samples in both regions is not at the allowable limit. Total alkalinity of all samples in both regions are within the allowable limit. Chloride content of all samples in both regions are within the allowable limits.

Total coliform is present for all samples in both regions. E-coli is present in sample no. 2,3,4,6,7,8, &9 in Parakkulam and 1,2,4,7, & 9 in Mayyanad.

CONCLUSION AND REMEDIES

Why is water so important? Because 60 percent of our body weight is made up of water. Our bodies use water in all the cells, organs, tissues, to help regulate body temperature and maintain other bodily functions. Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio. Absent, inadequate, or inappropriately managed water and sanitation services expose individuals to preventable health risks.

The main source of water in these regions are well water source. The investigation shows that, the water in the Mayyanad and Parakkulam regions cannot be considered for drinking purpose, because of the presence of E- coli and Total coliform bacteria's, Low pH, Acidity content etc.

Turbidity in water can be reduced by Coagulation. In large-scale water treatment processes, conventional coagulants include metal salts such as ferric sulfate, aluminum sulfate and ferric chloride are used.

pH value of water samples shows acidic in nature (Low pH). It can be neutralized by using a neutralizing filter containing calcite or ground limestone (calcium carbonate) or magnesia (magnesium oxide) to raise the pH.

Presence of E-coli and Total coliform in water can be treated using chlorine, ultraviolet treatment system or ozone, all of which act to kill or inactivate E-coli. Systems using surface water sources are required to disinfect to ensure that all bacterial contamination is inactivated, such as E-coli.

REFERENCE:

1. Bhatt, J. P. and Maharaj, K. P. (2010). A macroinvertebrate based on new biotic index to monitor river water quality, Current Science, Vol.99, No.2, 196-203.
2. Alam, M. and Pathak, J.K. (2010). Rapid assessment of water quality index of Ramganga River, Western Uttar Pradesh (India) Using a computer programme. Nature and Science, 8(11):1-8.
3. Bhardwaj, Vikram., Singh, Dhruv Sen and Singh, A. K. (2010). Water quality of the Chhoti Gandak River using principal component analysis, Ganga Plain, India, J. Earth Syst. Sci. 119, No. 1, February 2010, pp. 117–127
4. Amarnath, D., Shailender, M., Kishor, B., Udayaranjan, T. J., Chakravarty, M. S., and Kumar, N. (2011). Study On Distribution And Diversity Of Phytoplankton In Relation To Hydrography In Bhavanapadu Creek, Srikakulam District, South India, International Refereed Journal of Engineering and Science (IRJES). Volume 2, Issue 4(April 2013), PP.32-38
5. Ashish, K. (2012). Water Quality of River Kosi and Rajera System at Rampur (India): Impact Assessment, J. Chemistry. pp.4.
6. Chandra, S., Singh, A. and Tomar, P. K. (2012). Assessment of Water Quality Values in Porur Lake Chennai, Hussain Sagar Hyderabad, and Vihar Lake Mumbai, India, Chem. Sci. Trans., 1(3), pp. 508-515.
7. Bellingham, K. Stevens. (2012). Water monitoring systems: 205-209
8. Bhat, S. A. and Pandit, A. K. (2014). Surface Water Quality Assessment of Wular Lake, A Ramsar Site in Kashmir Himalaya, using discriminant analysis and WQI, J. Ecosys.
9. Bordoloi, Rimen (2014). A Comparative Study Of Aquatic Macrophytes And Its Primary Productivity In The Closed And Open Type Wetlands Of Upper Reaches Of The Brahmaputra River Basin. J.Bio.Innov 3(2),pp:103-116.
10. Chandra, S., Kumari, D. and Tiwary, C. B. (2014). Ecology and cost-limited restoration of Daha River for fish productivity, Poll. Res. Vol 33, Issue 02, pp. 337-340.
11. Adhishwar, A. K. and Choudhary, S. K. (2014). Assessment of primary productivity of phytoplankton of Gogabil Lake Wetland, Katihar, Bihar, India. Poll Res. 33(2): 465-467.
12. Agrawal, Nivedita, Choubey, Parasmani and Pandey, Jai Prakash. (2014). Water Quality Assessment of Baba Ghat of Bihar River Rewa (M.P.) India, International Journal of Scientific and Research Publications, Volume 4
13. Karbassi, A. R. and Pazoki, M. (2015). Environmental Qualitative assessment of rivers sediments. Global J. Env. Sci. Manag. 1(2), 109-116.
14. Kumar, B. N. and Choudhary, S. K. (2016) Water Quality and Phytoplankton of River Gandak, Bihar (India), Poll Res. 35 (1) : 167-176
15. Adhishwar, A. K. (2016). Limnology and phytodiversity of Gogabil Lake- A wetland of national importance in Katihar district of Bihar. PhD thesis, T. M. Bhagalpur University, Bhagalpur-812007

