



**GOVERNMENT OF MAHARASHTRA
WATER RESOURCES DEPARTMENT**

**HYDROLOGY PROJECT (SW)
Executive Engineer, Hydrology Project Division, Nagpur**



WATER QUALITY LAB LEVEL-II, NAGPUR

ANNUAL REPORT YEAR 2013-2014

**Executive Engineer
Hydrology Project Division, Nagpur**

PREFACE

Water is a major constituent of all living beings. Water is available in two basic forms i.e. Surface water and Ground Water.

This report includes water quality data in Godavari Basin & Tapi Basin for the period of June 2013 to May 2014 by the agency M/s. KNK Associates Nagpur. as awarded a contract towards Providing Trained and experienced personnel to Operate & Maintained the Water Quality Lab Level-II, Nagpur as per prescribed procedures for the month June-2012 to May-2015+. The data has been interpreted to know the affected locations.

It is an event of great pleasure to hand over this precise report on analysis of water samples in WQ Laboratory Level . II at Nagpur which is established in Jal Vidnyan Bhavan. It is also a matter of pride to state that this Laboratory is the first in Hydrology Project (SW) to be accredited with ISO 9001:2008 for implementation of Quality Management System (QMS).

This booklet attempts to briefly describe an over view and general conclusion based on the basis of water quality data of water samples collected from selected locations for defined frequencies for the reported period.

It is expected that this booklet will provide an idea in brief about Water Quality Lab. Level -II at Nagpur. Our efforts can always be updated through valuable suggestions.

(J.D.Tale)
Executive Engineer
Hydrology Project Division
Nagpur. (Maharashtra)

Annual Report

ing through Water Quality Lab Level-
II Nagpur for the Year 2013- 2014

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CHAPTER – I

EXECUTIVE SUMMARY

CHAPTER-1

EXECUTIVE SUMMARY

Annual Report On Water Quality Monitoring through Water Quality Lab Level-II, Nagpur for the Year 2013-2014

1.1 Preamble:

The water quality monitoring in the area of surface water is performed in order to determine the quality of water. Various parameters are analyzed in the laboratory and 6 parameters are tested at field level. All these tasks recorded are utilized for preparing the Annual Report by performing some specific exercise. This data is considered in order to specify the quality of water at each location. This also helps to determine the pollution level or concentration in each source of water at each station.

1.2 Water Quality Monitoring - Objectives

Observations of analysis of physical & chemical parameters as per Uniform Protocol for Water Quality Monitoring 2005+ for each location followed by Operation and Maintenance of Water Quality Laboratory Level-II, Nagpur as per Standard Guidelines and mandates including collection, transportation and analysis of samples, data entry in SWDES Software and preparation of the said Annual Report as per specific guidelines issued by Superintending Engineer, Hydrology Project Circle(Collection), Nashik,

1.3 Water Quality Monitoring - Scope

The Annual Report is prepared for the year 2013-2014. The Table below shows the number of sample analyzed during the reported period. In order to study water quality status station wise, all locations covered under this lab during the year 2013-2014 are considered.

SAMPLES ANALYSED DURING THE REPORTING PERIOD

Sr. No.	Year	Ground Sample		Baseline Sample		Dam (Reservoir) Sample		Total
		First Round	Second Round	First Round	Second Round	First Round	Second Round	
1	2013-2014	9	91	13	39	4	44	200
Total Samples analyzed during reporting period 200 Nos.								

Seasonal averages of all analyzed parameters are calculated for study of seasonal water quality trend at each location.

1.4 Methodology:

Analysis of Physical and Chemical parameters is done in the laboratory on the basis of Standard Analytical Methods, Instrument Operating Instructions, HIS Manuals, and APHA, 21st Edition 2005.

Data analyzed further validated with prescribed method as per Water Quality Manuals to verify various Ratios manually and is entered in SWDES Software for Water Quality Data Entry. Further the data is sent to State Data Center for further dissemination to user end.

Furthermore to get an idea of about data generated for the period it is decided and instructed to analyze the generated data for the said period in the form of Annual report with the help of various tools in SWDES Software to find out critical parameters and critical locations in the jurisdiction of this Lab.

Results and Observations

River Chandrabhaga

The water quality of river chandrabhaga was monitored at station Daryapur. The river Chandrabhaga at Daryapur is grossly polluted. High BOD and COD values are observed during all seasons and particularly during peak summers. This is an indicator of high organic pollution in the riverbody. The high organic contents in the water has resulted in the depletion of DO level below a alarming concentration of 4 ppm; The very low DO during in the water is insufficient for the survival of the aquatic life. The conditions are tending to become anaerobic. The high concentration of colliform bacteria of both faecal and non faecal origin was found very high. This is a strong indicator of urban pollution and discharge of city sewage in the waterbody

River Kanhan

The River water quality of River Kanhan is Monitored at two Locations vize, Temburdoh & Mathani. The water quality data reveals that the quality of the water of the River is deteriorating at station Mathani. The colliform bacteria in the water are found in high concentration compared to the specified limits at all stations. In respect to the organic load, the water quality is found to be poor, which can be seen from the higher values of BOD. pH of the water is within the limits of the BIS and CPCB.

River Mun

The water quality of River Mun is Monitored at two Locations Kawatha & Taklikhetri.

The water in the riverbody is also saline in nature. High organic pollution is observed at station Taklikhetri which is indicated by high values of BOD and COD. The bacterial pollution at all stations is high enough to make unsafe for drinking purpose without any conventional treatment.

River Wainganga

Wainganga is monitored at four locations viz. Deori, Kardha, Wadgaon, and WagholiBulti. Data reveals that, the water Quality of the River does not meet the criteria for class-A waterbody. The BOD at station wadsa and also WagholiBulti are found more than 3 mg/L during most of the year. It shows A higher degree of organic pollution is observed at station Wadsa and WagholiBulti with respect to other Locations and is evidenced by the indicated values of BOD. Concentration of Colliform bacteria is high in all seasons at three Locations, Deori, Kardha and Wadsa and it makes the water unsafe for drinking purpose. The DO Values at all stations lies above 6 mg/L. The Alkalinity of Location Kardha shows slightly higher than 200 mg/L as compared to other Locations.

River Wardha

The water quality of River Wardha is Monitored at Four Locations vize, Drugwada, WarudBagaji, SoitDindora & Dhaba. The water quality of River Wardha does not meet the required quality criteria. The Water quality trend shows a high organic pollution at station Dhaba. BOD of Dhaba is found to be more than 2 mg/L during all seasons and is quit high with respect the limit for class-A waterbody 2 mg/L.

The DO of Dhaba found slightly Lower than Normal Limit in all seasons. The BOD at other stations except Drugwada is also found more than 2 mg/L. An increasing trend is found in the BOD at Dhaba when annual average values for last three years are compared. The insufficient DO in the Water body can result in anoxic conditions in the waterbody and can harm the flora and fauna in the region seriously. The alkalinity of The Water is slightly above a BIS (IS 10500: 1993) drinking water standard (desirable) of 200 mg/L at all stations except Drugwada. Also the concentration of colliform bacteria is high at all stations during all seasons and very high during rainy season at stations Dindora and Dhaba.

River Penganga

Penganga is Monitored at Two Locations vize, Kolgaon and Chikgaon. Penganga shows moderate pollution. The BOD is found more than 2 mg/L at all stations during all seasons. Colliform bacterial density at all stations is higher than the specified standard during all seasons. Alkalinity of the Water is found more than a limit of 200 mg/l specified by BIS The above factors prevents the use of water for drinking without any conventional treatment.

WATER QUALITY OF RESERVOIRS

The Water Quality of Four reservoirs (Dams) namely PENCH, Upperwardha, Katepurna and Chapdoh which are used as a source of drinking water is monitored by the water quality Lab Level-II, Nagpur. The BOD of all reservoirs is slightly above the specified limit of 2 mg/L, and at chapdoh it is found slightly higher than at others. Higher values are obtained during summer and may be due to the increase in floral activities during summer. Colliform bacteria are found to be crossing the limit of IS 10500 for drinking water at all stations but it is within the CPCB limits at many instances.

1.6 Conclusion

It is observed that, these rivers are polluted to varying extent.

The increasing urbanization and industrialization in the area is affecting the quality of the water to a great extent. The physicochemical as well as bacteriological water quality of these river systems is not satisfactory and this can further deteriorate in the nearby future.

The BOD and COD loading in the waterbody is an evidence of the anthropogenic activities in the catchment of the rivers, which is adversely influencing the water quality.

Biological parameters in all locations contain higher bacterial count is due to the discharge of sewage, drainage waste in to the water sources. The habit of open defecation is a common site on the bank of rivers that consequently floods into the river causing deterioration of the quality of the water. Even increase in human activities discharge bacteria of various type in to the water, which increase the number of count in the water.

1.7 Recommendations/Remedial Measures:

- Domestic effluents may be treated and disinfected before discharging.
- Effluents from the non-point sources may be identified. These are required to be collected and treated.
- Use of water of such polluted locations may be useful for tolerant crops and is recommended based on special study.
- Use of direct source water is to be avoided.
- Bathing at such location should be restricted.

1.8 Suggestions:

- Create mass awareness in general public regarding surface and ground water quality aspects.
- Educating people about the importance of conservation and restoration of existing sources of water.
- Water quality Annual Report shall be publicly published every year.



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CHAPTER – II

INTRODUCTION

CHAPTER-2

INTRODUCTION

1.0 Water is an essential for human life and the presence of reliable source of water is vital factor for the establishment of a community. Apart from its life supporting ability, water also has a potential for spreading ill health and diseases. Thus availability and importance of safe drinking water was realised and practiced thousands of years ago by man. Hence, water quality monitoring becomes a fundamental tool for river basin planning and management. The effective monitoring and management of water quality to safeguard the precious natural riverine system is a challenge for the scientific and engineering communities alike.

2.0 Water Quality Network Layout

The water quality monitoring of River Godavari and its tributaries and River Tapi and its tributaries flowing through Vidarbha is being carried out by Water Resources Division Nagpur under Hydrology Project since 2001.

In Godavari Basin Water Quality is monitored by Water Resources Division Nagpur at 17 stations and in Tapi Basin at 5 Stations on various rivers flowing through Vidarbha. Also the water quality of 4 reservoirs, which are used as a source of drinking water, is also being monitored by this Division. The stations are classified as baseline, trend and flux stations based on the frequency of sampling and location of stations. Details of Basin and Sub basins in the region are given in **Table 1**.

Of 17 Water Quality stations on tributaries of Godavari, 12 are base line stations and 5 are trend stations.

Where as in Tapi Basin 1 is baseline station and 4 are trend stations.

Fig 1 shows Network of Water Quality Monitoring stations of various types in the jurisdiction of Water quality lab level-II under Hydrology Project Division, Nagpur.

3.0 Network Design of river basin

The network design comprises of monitoring stations which are classified as Baseline, Trend, & Flux Stations. Brief description of each type of stations is given below.

picture of Natural background Condition of a particular
Baseline stations are positioned in unpolluted areas
significant. Frequency of Sampling is generally one Sample in
three months.

Trend Station: Trend stations are located on Main River and tributaries where the flow increases by 20%. In case of confluence, Trend Stations are located both on Tributary and main stream of the river before and after confluence. Frequency of sampling is generally 12 times in a year if the area is less than 1 lakh Sq. Km or 24 times in a year if the area is more than 1 lakh Sq. Km.

Flux Station: The flux stations are located on immediately upstream of Major River when it is about to cross the state border. These are meant to monitor the total flux of pollutants carried away by the stream.

In the present network there are **13 Baseline and 9 Trend stations**. List is given in

Table 2.

Table 1: Details of the Basin

Sr. No.	Major Basin	Independent River	Tributary	Sub-Tributary
1.	Godavari	Godavari	Wainganga	Pench Kanhana
			Wardha	
			Penganga	Pus
			Indravati	Bandiya
			Pranhita	
2.	Tapi	Tapi	Purna	Mun Wan Chandrabhaga

Table 2:
Under Jurisdiction of Water Quality Lab level-II, Nagpur

NO.	STATION	DISTRICT	TAHASIL	NAME OF RIVER
Baseline Stations				
1	Deori	Gondia	Gondia	Wainganga
2.	KamthiKhairi	Nagpur	Parshioni	Pench
3.	Tembhurdoh	Nagpur	Saoner	Kanhan
4.	Wadsachinch	Chandrapur	Wadsa	Wainganga
5.	Wagholibuti	Gadchiroli	Gadchiroli	Wainganga
6.	Petta	Gadchiroli	Ettapalli	Bandia
7.	Damrencha	Gadchiroli	Aheri	Indravati
8.	Mathani	Nagpur	Mouda	Kanhan
9	Kardha	Bhandara	Bhandara	Wainganga
10	Drugwada	Wardha	Ashti	Wardha
11	Saiphall	Yeotmal	Ghatanji	Penganga
12	Khariya	Amravati	Dharni	Tapi
13	Mahagaon	Gadchiroli	Ettapalli	Pranhita
Trend Stations				
14.	Dhaba	Chandrapur	Gondpipri	Wardha
15.	WarudBagaji	Amravati	Tiwasa	Wardha
16.	Anantwadi	Yeotmal	Mahagaon	Pus
17.	Kolgaon	Yeotmal	Wuni	Penganga
18.	Soitdindora	Chandrapur	Warora	Wardha
19.	Warkhed	Akola	Telhara	Wan
20.	Daryapur	Amravati	Daryapur	Chandrabhaga
21.	Kawatha	Akola	Balapur	Mun
22.	TakliKhetri	Akola	Patur	Mun
Reservoirs				
23.	Katepurna	Akola	Barshitakli	Katepurna
24.	Upper Wardha	Amravati	Morshi	Wardha
25.	Pench	Nagpur	Parshioni	Pench
26	Chapdoh	Yeotmal	Arni	Waghadi

1) Within Lab AQC:

Within Lab AQC conducted in December – 2013.

Samples (Sample A and Sample B) are analysed during the period 01-12-2013 to 28-12-2013.

The overall performance of the Lab stands **100%**.

2) Inter Lab AQC:

i) Not participated in this period.

3) Intra Lab AQC:

Not conducted in this period

Annual Report for the Period of 2013-2014

Water Quality Laboratory Level II at Nagpur

Salient Features :-

1. General Structure of Laboratory:

1) Sampling Locations as per Water Quality Network covered in this Lab:-26

2) Monthly sample collection: - 26 samples / 13 Samples.

3) Frequency of sampling: - **Trend: .** Monthly

Baseline Samples : Once in Three Months

Dam samples:. Monthly

4) Govt. staff related to Laboratory: -

1. Mr.J.D.Tale., Executive Engineer
2. Mr.A.K.Hinge, AE-I.
3. Mr. M.M.Dange (AE-II. & Govt. Analyst)

5) Lab operating Agency: - KNK Associates, Nagpur.

a) Indoor Work . 1.Mr. Tanveer A. Ansari. (Chief Analyst)

2. Mr. Rubina R. Khan. (Analyst)

3.Miss. Pradnya T. Bondre (Analyst)

4. Mr. Gaurave S. Ghayer (Lab. Assistant)

b) Outdoor Work . 1. Mr. V. H. Hande (Field Chemist)

2. Mr. J.S.Tale (Field Chemist)

Maintenance of water Quality Laboratory Level-II, Nagpur

for sampling and transporting the sample from selected Water Quality network sampling points as per schedule of sampling during the said period.

The Surface Water sampling includes:

- a) Field determination as per standard guideline.
- b) Field parameters to be tested on site & entry to be taken on ID form.
- c) Sample to be transported to laboratory within prescribed time limit.

2.1 Indoor Work:

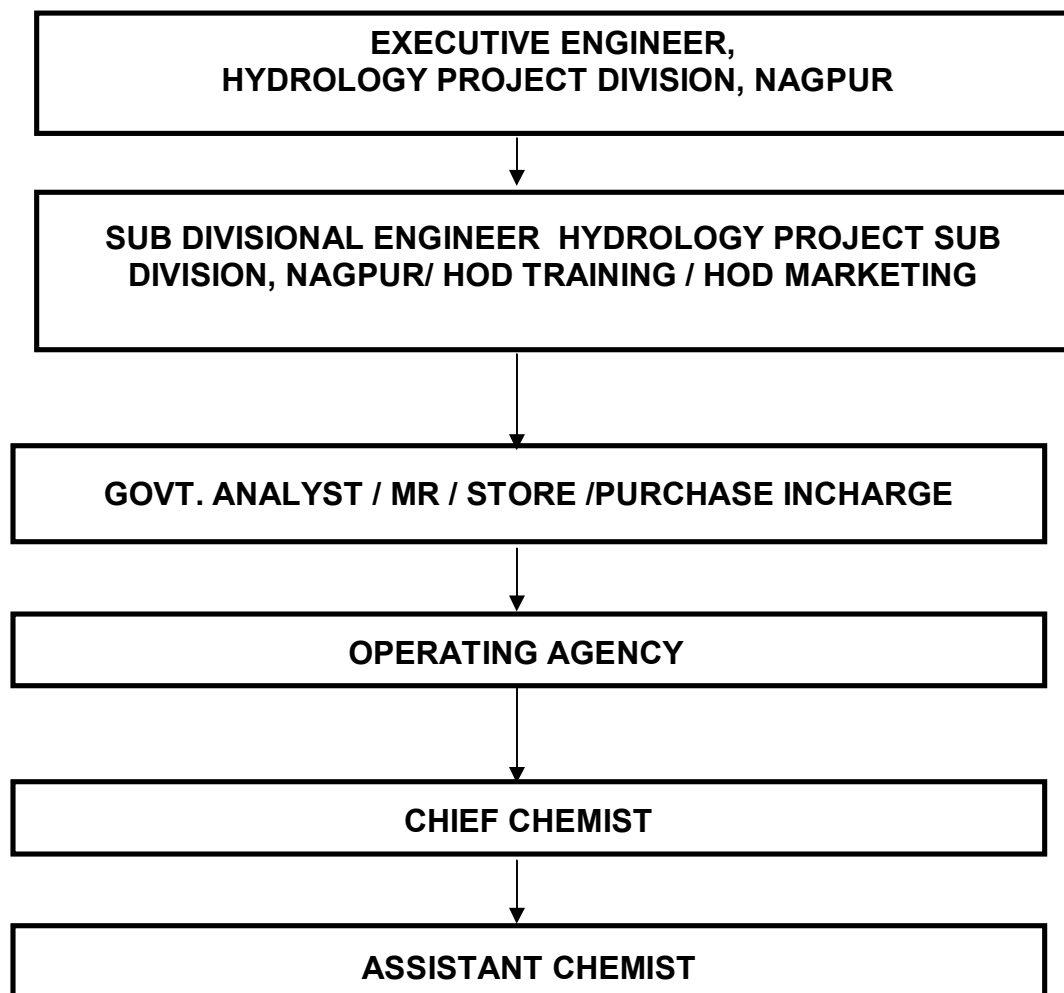
- Day to Day Operation and Maintenance of Water Quality Laboratory Level II.
- The work includes analysis of water samples as per the test procedures.
- Operating the instruments as per specified instruction manual.
- Entry of data in SWDES Software.
- Participating in Analytical Quality Control Exercise (AQC) round.
i) Within Laboratory AQC ii) Intra Laboratory AQC iii) AQC by CPCB
- The Laboratory staff employed;
 - 1) Chief Chemist: 1 No.
 - 2) Sr. Research Officers: 1 No.
 - 3) Research Assistant: 1 No.
 - 4) Lab. Assistant: 1 No.
- The Indoor work also includes keeping data record.
- Log book of Lab equipment
- Preparation of monthly sampling Schedule.
- Keeping sampling record, instruments operation, Laboratory Management, demonstration
- Training to Departmental staff as and when required.

Information to visitors & Customer Satisfaction. Work is carried out as per flow chart.

PROJECT DIVISION, NAGPUR

WATER QUALITY LAB, LEVEL – II NAGPUR

ORGANISATION CHART



**Location covered under the jurisdiction of
Quality Lab Level-II, Nagpur**

Sr. No.	Name of Station	Name of River	Frequency of sampling	No. Of Samples in 2013-2014
Baseline Samples				
1	Deori	Wainganga	Once in three months	4
2.	KamthiKhairi	Pench	Once in three months	4
3.	Tembhurdoh	Kanhan	Once in three months	4
4.	Wadsachinch	Wainganga	Once in three months	4
5.	Wagholibuti	Wainganga	Once in three months	4
6.	Petta	Bandia	Once in three months	4
7.	Damrencha	Indravati	Once in three months	4
8.	Mathani	Kanhan	Once in three months	4
9	Kardha	Wainganga	Once in three months	4
10	Drugwada	Wardha	Once in three months	4
11	Saiphall	Penganga	Once in three months	4
12	Khariya	Tapi	Once in three months	4
13	Mahagaon	Pranhita	Once in three months	4



Name of River			Frequency of sampling	No. Of Samples in 2013-2014
Trend Samples				
14.	Dhaba	Wardha	Monthly	12
15.	WarudBagaji	Wardha	Monthly	12
16.	Anantwadi	Pus	Monthly	11
17.	Kolgaon	Penganga	Monthly	12
18.	Soitdindora	Wardha	Monthly	12
19.	Warkhed	Wan	Monthly	10
20.	Daryapur	Chandrabhaga	Monthly	10
21.	Kawatha	Mun	Monthly	10
22.	TakliKhetri	Mun	Monthly	11
Reservoir Samples				
23.	Katepurna	Katepurna	Monthly	12
24.	Upper Wardha	Wardha	Monthly	12
25.	Pench	Pench	Monthly	12
26.	Chapdoh	Waghadi	Monthly	12

Total No. of Samples collected and analyzed during Reported Period
(June-2013 to May-2014) – 200 Nos.



Following Water Quality Parameter at W.Q. Lab Level-II Nagpur

Trend Samples

Sr. No.	First Round (Once in a year)	Second Round (Rest of the year)
	Parameters	Parameters
1	Colour	Colour
2	Odour	Odour
3	Temperature	Temperature
4	pH	pH
5	Electrical Conductivity	Electrical Conductivity
6	Dissolved Oxygen	Dissolved Oxygen
7	Turbidity	Turbidity
8	Total Dissolved Solids	Total Solids
9	Total Solids	Total Dissolved Solids
10	Suspended Solids	Suspended Solids
11	NH ₃ -N	NH ₃ -N
12	NO ₂	NO ₂
13	NO ₃	NO ₃
14	Total Phosphorus	Total Phosphorus
15	Biochemical Oxygen Demand (BOD)	Biochemical Oxygen Demand (BOD)
16	Chemical Oxygen Demand (COD)	Chemical Oxygen Demand (COD)
17	Alkalinity	Alkalinity
18	Potassium	Potassium
19	Sodium	Sodium
20	Total Hardness	Total Hardness
21	Calcium	Calcium
22	Magnesium	Magnesium
23	Chlorides	Chlorides
24 & 25	CO ₃ , HCO ₃	CO ₃ , HCO ₃
26	Total Colliforms	Total coliforms
27	Fecal coliforms	Feacal Colliforms
28	Fluoride	
29	Boron	

Showing Water Quality Parameter at W.Q. Lab Level-II Nagpur

Baseline Samples

Sr. No.	First Round (Once in a year)	Second Round (Rest of the year)
	Parameters	Parameters
1	Colour	Colour
2	Odour	Odour
3	Temperature	Temperature
4	pH	pH
5	Electrical Conductivity	Electrical Conductivity
6	Dissolved Oxygen	Dissolved Oxygen
7	Turbidity	Total Solids
8	Total Dissolved Solids	Total Dissolved Solids
9	Total Solids	Suspended Solids
10	Suspended Solids	NO ₂
11	NH ₃ -N	NO ₃
12	NO ₂	Total Phosphorus
13	NO ₃	Biochemical Oxygen Demand (BOD)
14	Total Phosphorus	Chemical Oxygen Demand (COD)
15	Biochemical Oxygen Demand (BOD)	Alkalinity
16	Chemical Oxygen Demand (COD)	Potassium
17	Alkalinity	Sodium
18	Potassium	Total Hardness
19	Sodium	Calcium
20	Total Hardness	Magnesium
21	Calcium	Chlorides
22	Magnesium	Total coliforms
23	Chlorides	Faecal Colliforms
24 & 25	CO ₃ , HCO ₃	CO ₃ , HCO ₃
26	Total Colliforms	
27	Fecal coliforms	
28	Fluoride	
29	Boron	

Showing Water Quality Parameter at W.Q. Lab Level-II Nagpur

Dam Samples

Sr. No.	First Round (Once in a year)	Second Round (Rest of the year)
	Parameters	Parameters
1	Colour	Colour
2	Odour	Odour
3	Temperature	Temperature
4	pH	pH
5	Electrical Conductivity	Electrical Conductivity
6	Dissolved Oxygen	Dissolved Oxygen
7	Turbidity	Total Solids
8	Total Dissolved Solids	Total Dissolved Solids
9	Total Solids	Suspended Solids
10	Suspended Solids	NO ₂
11	NH ₃ -N	NO ₃
12	NO ₂	Total Phosphorus
13	NO ₃	Biochemical Oxygen Demand (BOD)
14	Total Phosphorus	Chemical Oxygen Demand (COD)
15	Biochemical Oxygen Demand (BOD)	Alkalinity
16	Chemical Oxygen Demand (COD)	Potassium
17	Alkalinity	Sodium
18	Potassium	Total Hardness
19	Sodium	Calcium
20	Total Hardness	Magnesium
21	Calcium	Chlorides
22	Magnesium	Total coliforms
23	Chlorides	Faecal Colliforms
24 & 25	CO ₃ , HCO ₃	CO ₃ , HCO ₃
26	Total Colliforms	Total Kjeldahl nitrogen
27	Fecal coliforms	Chlorophyll – A
28	Fluoride	
29	Boron	
30	Total Kjeldahl nitrogen	
31	Chlorophyll – A	



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CHAPTER – III METHODOLOGY

This laboratory covers Surface Water component which covers Godavari & Tapi Basins and some selected reservoirs.

3.1 Rivers

Water is life and rivers are lifelines. Fortunately almost the entire country is criss-crossed by rivers. Geographical area of the state is divided in five river basins viz. Godavari, Tapi, Narmada, Krishna and west flowing rivers in Konkan region.

3.2 Water Quality Monitoring - Objectives

Observations of analysis of physical & chemical parameters as per Uniform Protocol for Water Quality Monitoring Order 2005+ for each location followed by Operation and Maintenance of Water Quality Laboratory Level-II, Nagpur as per Standard Guidelines and mandates including collection, transportation and analysis of samples, data entry in SWDES Software and preparation of the said Annual Report as per specific guidelines issued by Superintending Engineer, Hydrology Project Circle(Collection), Nashik.

3.3 Methodology:

Analysis of Physical and Chemical parameters is done in the laboratory on the basis of Standard Analytical Methods, Instrument Operating Instructions, HIS Manuals, and APHA, 21st Ed., 2005.

Data analyzed further validated with prescribed method as per Water Quality Manuals to verify various Ratios manually and is entered in SWDES Software for Water Quality Data Entry. Further the data is sent to State Data Center for further dissemination to user end.

Furthermore to get an idea of about data generated for the period it is decided and instructed to analyzed the generated data for the said period in the form of Annual report with the help of various tools in SWDES Software to find out critical parameters and critical locations in the jurisdiction of this Lab.

3.4 Flow Chart

The work of analysis of sample is being monitored on the basis of flow chart generated in the lab as per standard guidelines and analysis of sample is performed as per guidelines of world bank with HIS manuals and APHA, 21 st Ed, 2005 as a standard procedures for analysis of samples.

ANALYSIS OF HP (REGULAR) WATER SAMPLES



Sampling Source with the help of Depth Sampler

Treatment: D.O. Fixing, Preservation of MPN Sample, Colour, Odour Temp, pH, Ec, tested on field, and fill up ID form.

At Laboratory: Inward the Sample, Giving the Sr. No. to the sample noted into sample entry register

ID form entry taken into SWEDS Software

Tests are carried out in lab as per Standard Procedures. These tests are : Microbiological test, Chlorophyll-a, Temp, pH, D.O., B.O.D, Ammonia, Nitrate, Nitrite TDS, TSS, C.O.D., Turbidity, Alkalinity, Carbonate & Bicarbonate, Chloride, Fluoride, Boron, Iron, Sodium, Potassium, Total Hardness, Phosphorous, Calcium etc.

Observations & calculations of all Analyzed Parameters are entered in the Data Sheet

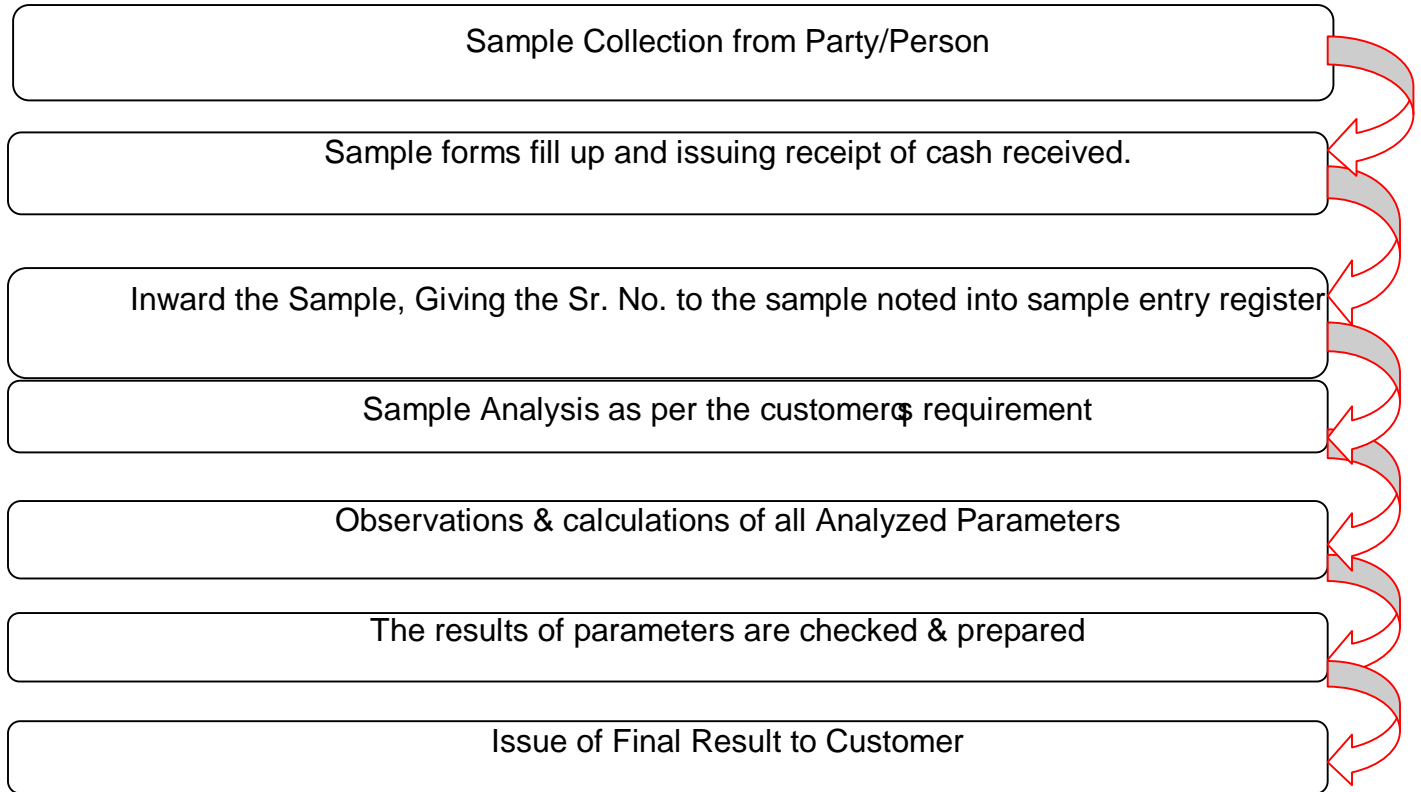
The results of parameters are checked & validated

After Validation Check, all the data is entered in to Data Record and Validation Register

This data is finally entered in to SWEDS Software

Data sent to Executive Engineer, HDP Division, Nashik for further action

OF ANALYSIS OF PRIVATE (regular) WATER SAMPLE



of Water Quality samples the following parameters
ized during the Period 2013-2014

ers and the methodology used for the analysis.

Sr. No.	Parameters	Methodology
1	Determination of Alkalinity Phenolphthalein	Standard. Methods, APHA 21 st Edition.
2	Determination of Alkalinity Total	Standard. Methods, APHA 21 st Edition.
3	Determination of Aluminium	Standard. Methods, APHA 21 st Edition
4	Determination of Bicarbonates	Standard. Methods, APHA 21 st Edition
5	Determination of Biochemical Oxygen Demand	Standard. Methods, APHA 21 st Edition
6	Determination of Boron	Standard. Methods, APHA 21 st Edition
7	Determination of Calcium	Standard. Methods, APHA 21 st Edition
8	Determination of Carbonates	Standard. Methods, APHA 21 st Edition
9	Determination of Chemical Oxygen Demand	Standard. Methods, APHA 21 st Edition
10	Determination of Chlorides	Standard. Methods, APHA 21 st Edition
11	Determination of Chlorophyll . A	Standard. Methods, APHA 21 st Edition
12	Determination of Faecal Coliforms (MPN)	Standard. Methods, APHA 21 st Edition
13	Determination of Total Coliforms (MPN)	Standard. Methods, APHA 21 st Edition
14	Determination of Colour	Standard. Methods, APHA 21 st Edition
15	Determination of Dissolved Oxygen	Standard. Methods, APHA 21 st Edition
16	Determination of Conductivity	Standard. Methods, APHA 21 st Edition
17	Determination of Fluorides	Standard. Methods, APHA 21 st Edition
18	Determination of Hardness	Standard. Methods, APHA 21 st Edition
19	Determination of Iron	Standard. Methods, APHA 21 st Edition
20	Determination of Magnesium	Standard. Methods, APHA 21 st Edition
21	Determination of Manganese	Standard. Methods, APHA 21 st Edition
22	Determination of Ammonia Nitrogen	Standard. Methods, APHA 21 st Edition
23	Determination of Nitrates	Standard. Methods, APHA 21 st Edition
24	Determination of Nitrite	Standard. Methods, APHA 21 st Edition



	Parameters	Methodology
25	Determination of Organic Nitrogen	Standard. Methods, APHA 21 st Edition
26	Determination of Total Oxidised Nitrogen	Standard. Methods, APHA 21 st Edition
27	Determination of Odour	Standard. Methods, APHA 21 st Edition
28	Determination of pH	Standard. Methods, APHA 21 st Edition
29	Determination of Ortho Phosphates	Standard. Methods, APHA 21 st Edition
30	Determination of Total Phosphates	Standard. Methods, APHA 21 st Edition
31	Determination of Potassium	Standard. Methods, APHA 21 st Edition
32	Determination of Silica	Standard. Methods, APHA 21 st Edition
33	Determination of Sodium	Standard. Methods, APHA 21 st Edition
34	Determination of Suspended Solids- TSS	Standard. Methods, APHA 21 st Edition
35	Determination of Total Solids- TS	Standard. Methods, APHA 21 st Edition
36	Determination of Dissolved Solids- TDS	Standard. Methods, APHA 21 st Edition
37	Determination of Sulphates	Standard. Methods, APHA 21 st Edition
38	Determination of Temperature	Standard. Methods, APHA 21 st Edition
39	Determination of Turbidity	Standard. Methods, APHA 21 st Edition
42	Determination of Free Carbon dioxide	Standard. Methods, APHA 21 st Edition
41	Determination of Phenols	Standard. Methods, APHA 21 st Edition
42	Determination of Chlorine , Residual	Standard. Methods, APHA 21 st Edition
43	Determination of Permanganate Value/ Oxygen Absorbed/ Tidy's Test	Standard. Methods, APHA 21 st Edition
44	Determination of Oil & Grease	Standard. Methods, APHA 21 st Edition
45	Determination of Acidity	Standard. Methods, APHA 21 st Edition
46	Analysis Results (Expression)	Standard. Methods, APHA 21 st Edition
47	Data Record and Validation	Standard. Methods, APHA 21 st Edition
48	Waste Disposal	HP Approved



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CHAPTER – IV

RESULT & OBSERVATIONS

4.1 RESULTS AND OBSERVATIONS

The water quality monitoring in the area of surface water is performed in order to determine the quality of water. Various parameters are analyzed in the laboratory and 6 parameters are tested at field level. All these tasks recorded are utilized for preparing the Annual Report by performing some specific exercise. This data is considered in order to specify the quality of water at each location. This also helps to determine the pollution level or concentration in each source of water at each station.

4.2 Water Quality status- Station wise Exercise

In order to study water quality status station wise, all locations covered under this lab during the year 2013-2014 are considered. Seasonal averages of all analyzed parameters are calculated for study of seasonal water quality trend at each location.

4.3 Objectives

Observations of all physical & chemical parameters are analysed for each location individually & interpretation of data is done to identify seasonal trend. Also critical parameters are identified at every location, including finding out the probable causes behind it at every location and every parameter.



& Graphs (2013-2014)

R RIVER FOR WAINGANGA FOR 2013-2014

Station: Deori					
Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.0	8.2	8.3
2	EC	µmhos/cm	318.5	276.0	348.0
3	DO	mg/L	6.5	7.2	7.2
4	BOD	mg/L	3.7	3.1	2.8
5	COD	mg/L	13.5	12.0	8.0
6	TDS	mg/L	194.0	164.0	202.0
7	Alkalinity	mg/L as CaCO ₃	156.0	140.0	168.0
8	Chloride	mg/L	26.0	10.0	21.0
9	Calcium (as Ca)	mg/L	34.4	36.0	34.4
10	Magnesium (as Mg)	mg/L	12.4	12.6	14.6
11	Total colliforms	MPN/100 ml	445.0	14.0	33.0
12	Faecal colliforms	MPN/100 ml	144.0	4.0	8.0
Station: Kardha					
Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.1	8.2	8.2
2	EC	µmhos/cm	352.5	341.0	299.0
3	DO	mg/L	6.4	7.0	7.1
4	BOD	mg/L	3.9	3.0	2.9
5	COD	mg/L	14.5	10.0	9.0
6	TDS	mg/L	211.0	194.0	176.0
7	Alkalinity	mg/L as CaCO ₃	176.0	164.0	148.0
8	Chloride	mg/L	26.0	12.0	14.0
9	Calcium (as Ca)	mg/L	36.0	40.0	31.2
10	Magnesium (as Mg)	mg/L	11.9	12.2	13.1
11	Total colliforms	MPN/100 ml	545.0	12.0	22.0
12	Faecal colliforms	MPN/100 ml	165.0	5.0	5.0

Station: Wadsachinch					
No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.3	8.1
2	EC	µmhos/cm	301.0	351.0	324.0
3	DO	mg/L	6.4	7.2	6.7
4	BOD	mg/L	4.1	3.0	3.2
5	COD	mg/L	14.0	11.0	12.0
6	TDS	mg/L	181.0	206.0	196.0
7	Alkalinity	mg/L as CaCO ₃	146.0	176.0	176.0
8	Chloride	mg/L	17.0	15.0	22.0
9	Calcium (as Ca)	mg/L	38.4	40.8	28.8
10	Magnesium (as Mg)	mg/L	10.2	14.1	16.0
11	Total coliforms	MPN/100 ml	345.0	9.0	27.0
12	Faecal coliforms	MPN/100 ml	169.0	0.0	11.0

Station: WagholiButti					
Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.4	8.4	8.5
2	EC	µmhos/cm	294.0	311.0	332.0
3	DO	mg/L	6.5	7.0	7.0
4	BOD	mg/L	3.8	3.2	3.0
5	COD	mg/L	11.5	11.0	11.0
6	TDS	mg/L	185.0	186.0	202.0
7	Alkalinity	mg/L as CaCO ₃	150.0	152.0	184.0
8	Chloride	mg/L	11.0	16.0	19.0
9	Calcium (as Ca)	mg/L	42.8	36.8	29.6
10	Magnesium (as Mg)	mg/L	11.2	14.1	13.6
11	Total coliforms	MPN/100 ml	790.0	14.0	17.0
12	Faecal coliforms	MPN/100 ml	380.0	5.0	8.0



FOR RIVER FOR KANHAN FOR 2013-2014

Station: Temburdoh

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.3	8.3	8.2
2	EC	µmhos/cm	412.0	403.0	465.0
3	DO	mg/L	6.3	6.9	7.1
4	BOD	mg/L	3.7	3.0	3.1
5	COD	mg/L	15.0	12.0	10.0
6	TDS	mg/L	294.0	232.0	270.0
7	Alkalinity	mg/L as CaCO ₃	242.0	188.0	240.0
8	Chloride	mg/L	20.5	16.0	19.0
9	Calcium (as Ca)	mg/L	61.2	49.6	45.6
10	Magnesium (as Mg)	mg/L	11.7	20.4	20.9
11	Total coliforms	MPN/100 ml	181.5	22.0	70.0
12	Faecal coliforms	MPN/100 ml	69.0	7.0	22.0

Station: Mathani

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.5	8.2
2	EC	µmhos/cm	544.0	429.0	547.0
3	DO	mg/L	6.0	7.3	6.8
4	BOD	mg/L	4.5	2.7	3.2
5	COD	mg/L	16.5	8.0	11.0
6	TDS	mg/L	333.0	246.0	316.0
7	Alkalinity	mg/L as CaCO ₃	266.0	204.0	240.0
8	Chloride	mg/L	42.5	22.0	43.0
9	Calcium (as Ca)	mg/L	62.0	46.4	48.0
10	Magnesium (as Mg)	mg/L	19.9	16.5	26.2
11	Total coliforms	MPN/100 ml	480.0	40.0	17.0
12	Faecal coliforms	MPN/100 ml	185.0	11.0	5.0



RIVER FOR KAMPTIKHAIRI FOR 2013-2014

Station: Kamptikhairi

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.3	8.3	7.9
2	EC	µmhos/cm	385.0	477.0	449.0
3	DO	mg/L	6.5	7.0	7.3
4	BOD	mg/L	3.7	2.8	2.9
5	COD	mg/L	14.0	10.0	8.0
6	TDS	mg/L	233.0	280.0	260.0
7	Alkalinity	mg/L as CaCO ₃	196.0	252.0	236.0
8	Chloride	mg/L	19.5	15.0	11.0
9	Calcium (as Ca)	mg/L	50.4	52.0	49.6
10	Magnesium (as Mg)	mg/L	8.7	19.9	20.4
11	Total coliforms	MPN/100 ml	257.5	17.0	40.0
12	Faecal coliforms	MPN/100 ml	95.0	5.0	11.0

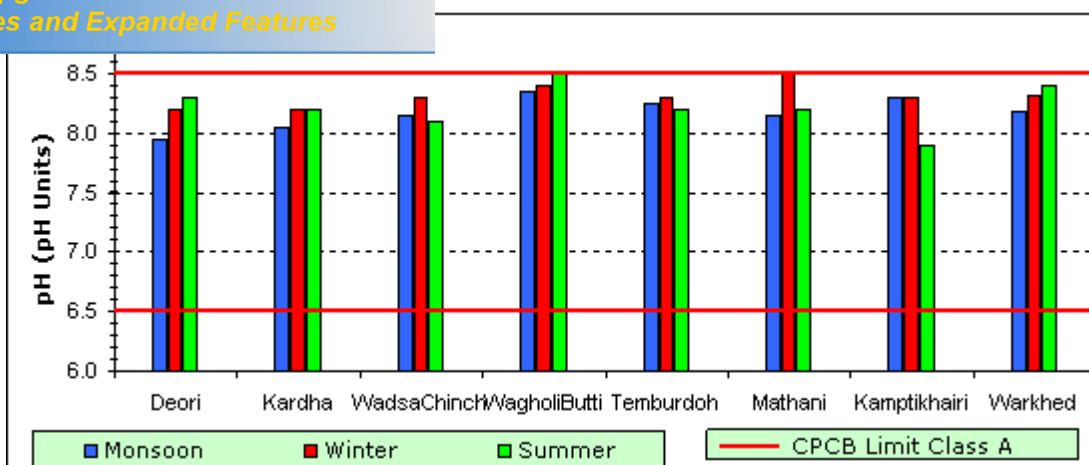
DATA ABSTRACT FOR RIVER WAN FOR 2013-2014

Station: Warkhed

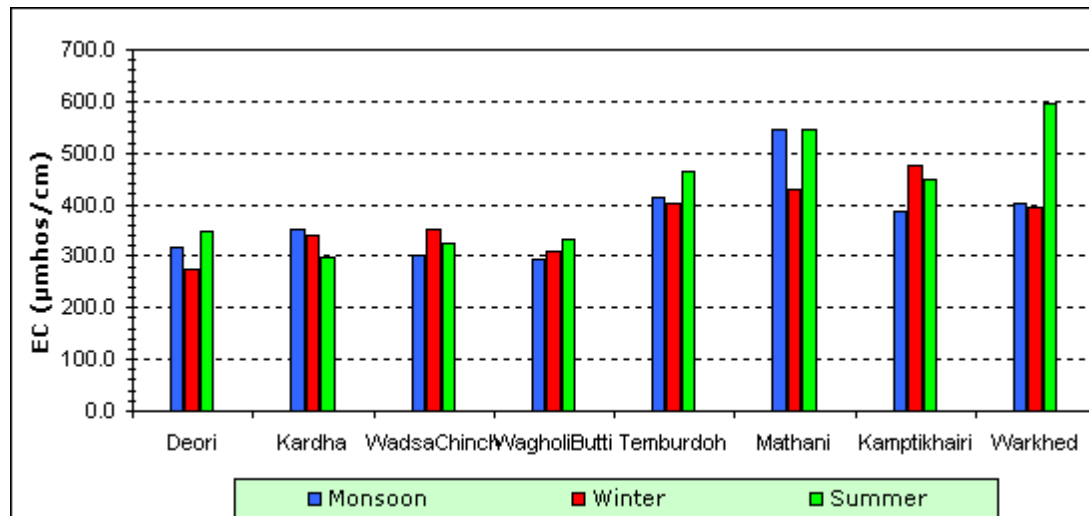
Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.3	8.4
2	EC	µmhos/cm	400.5	393.0	594.0
3	DO	mg/L	6.7	6.9	6.6
4	BOD	mg/L	3.3	3.3	3.6
5	COD	mg/L	12.0	11.0	13.0
6	TDS	mg/L	244.0	233.6	348.0
7	Alkalinity	mg/L as CaCO ₃	186.0	206.4	264.0
8	Chloride	mg/L	29.0	20.8	46.0
9	Calcium (as Ca)	mg/L	48.0	38.4	48.0
10	Magnesium (as Mg)	mg/L	14.9	22.7	33.1
11	Total coliforms	MPN/100 ml	982.5	34.8	21.0
12	Faecal coliforms	MPN/100 ml	542.5	13.4	7.0



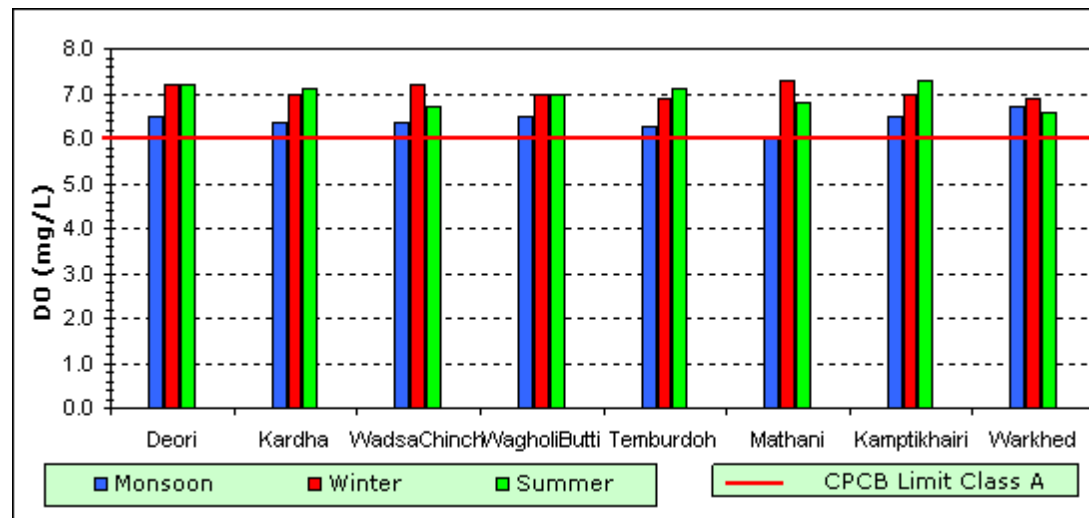
Variation in pH for the year 2013-2014



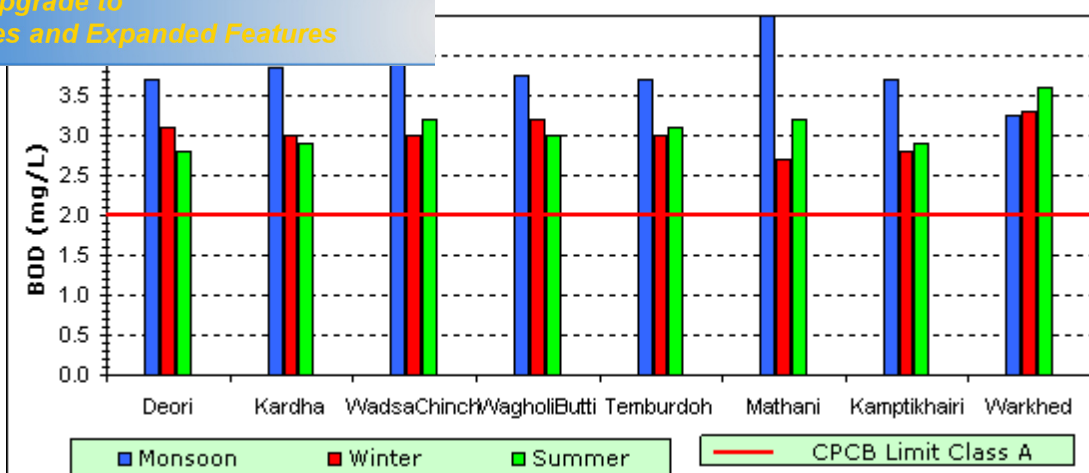
Graph Showing Variation in EC for the year 2013-2014



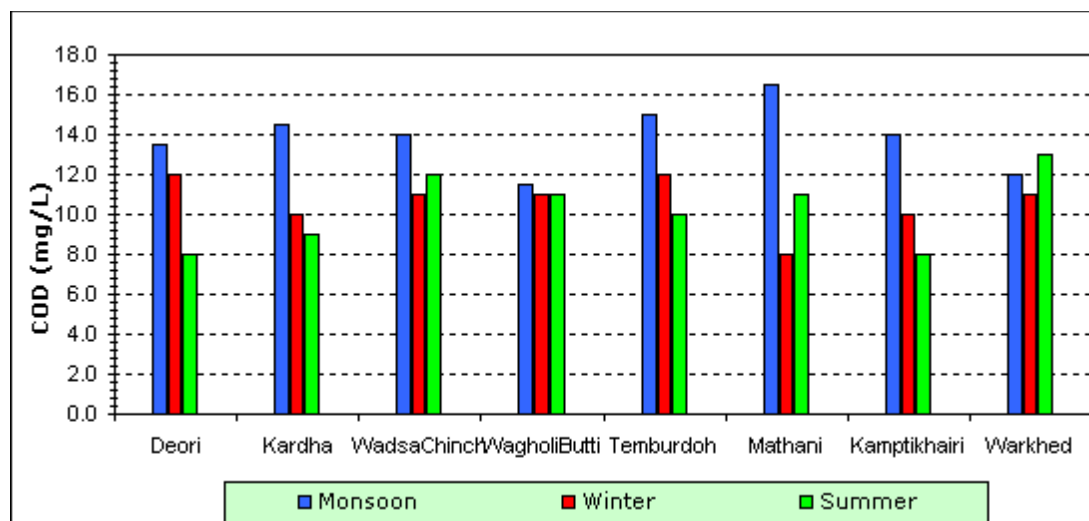
Graph Showing Variation in Dissolved Oxygen for the year 2013-2014



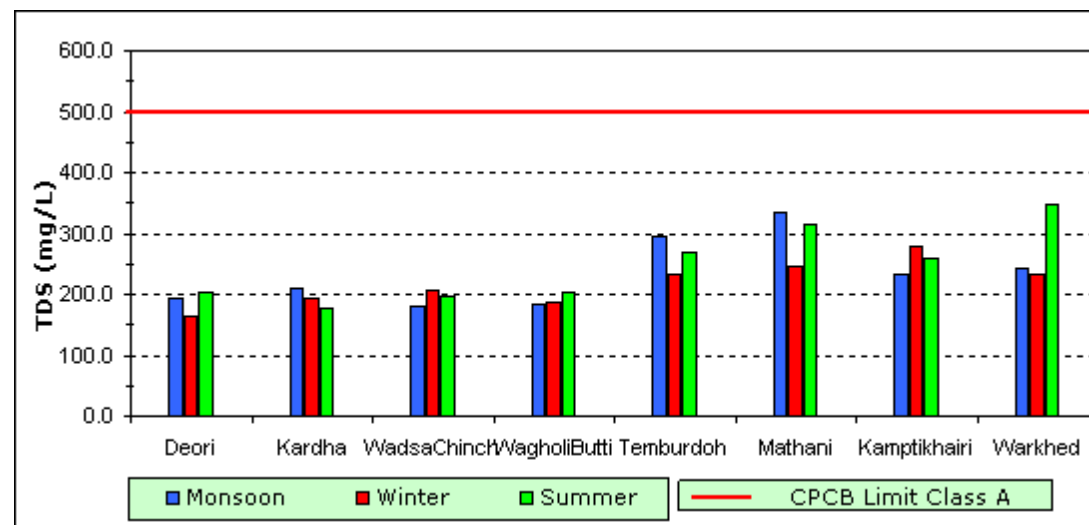
Graph Showing Variation in BOD for the year 2013-2014



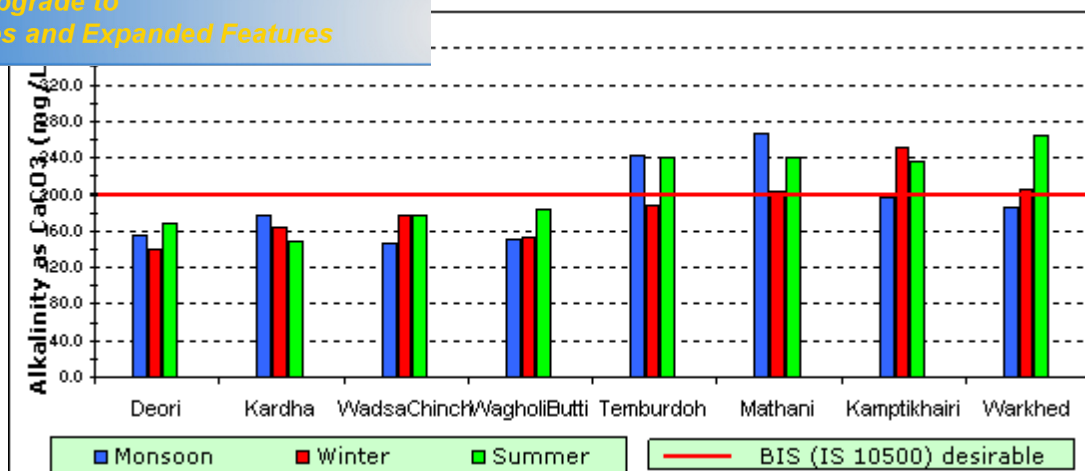
Graph Showing Variation in COD for the year 2013-2014



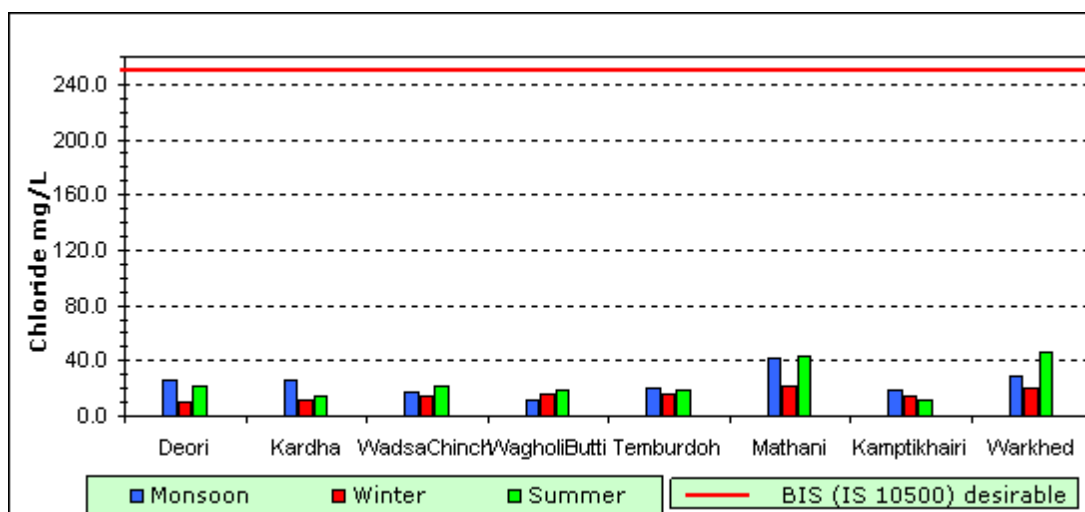
Graph Showing Variation in TDS for the year 2013-2014



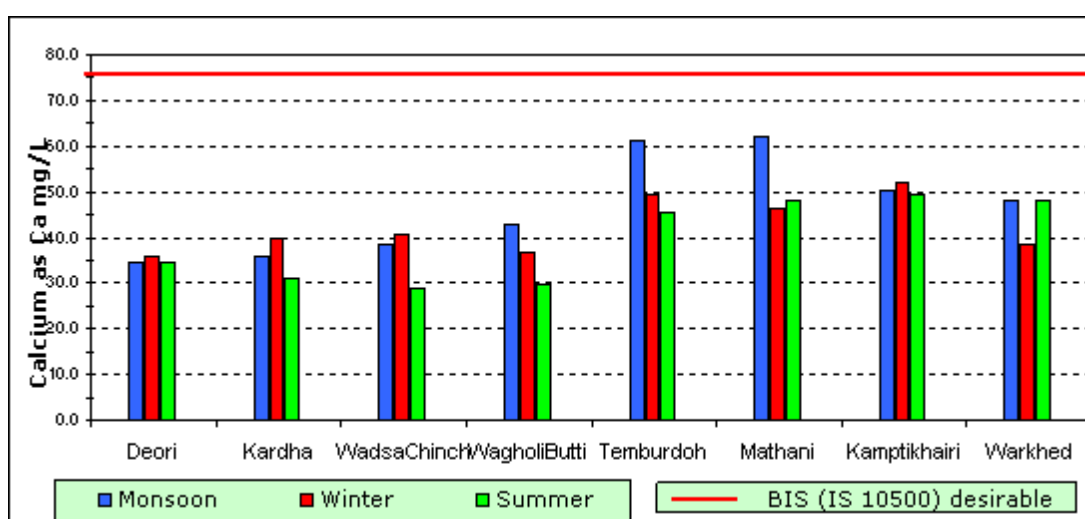
tion in Alkalinity for the year 2013-2014



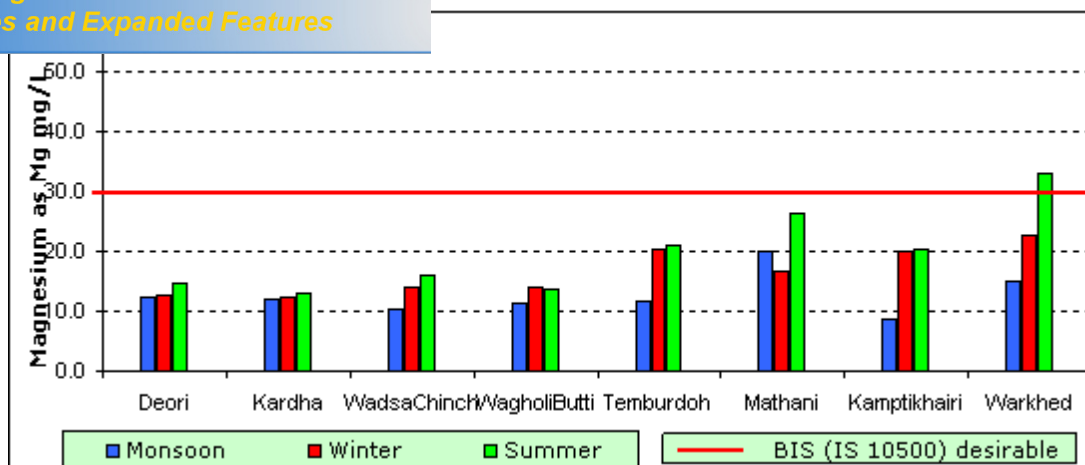
Graph Showing Variation in Chloride for the year 2013-2014



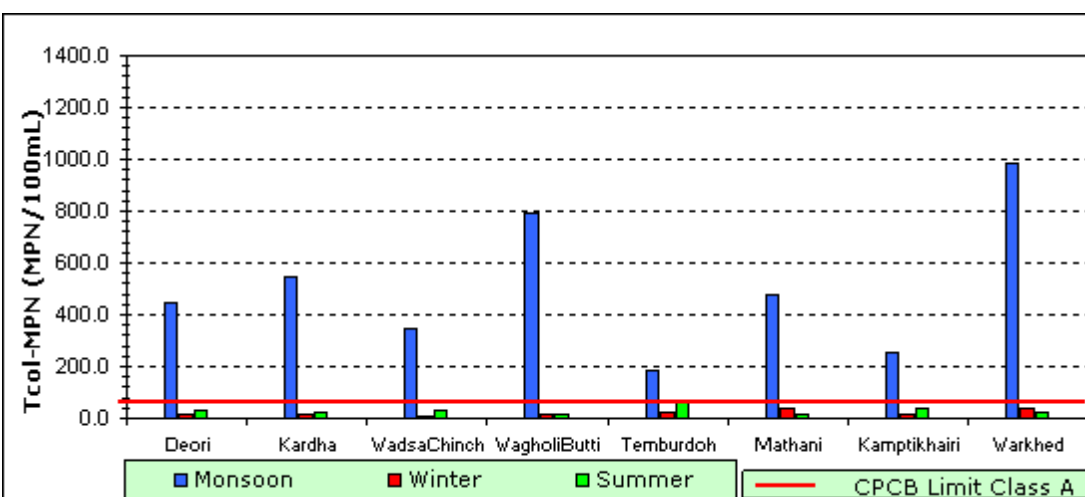
Graph Showing Variation in Calcium as Ca for the year 2013-2014



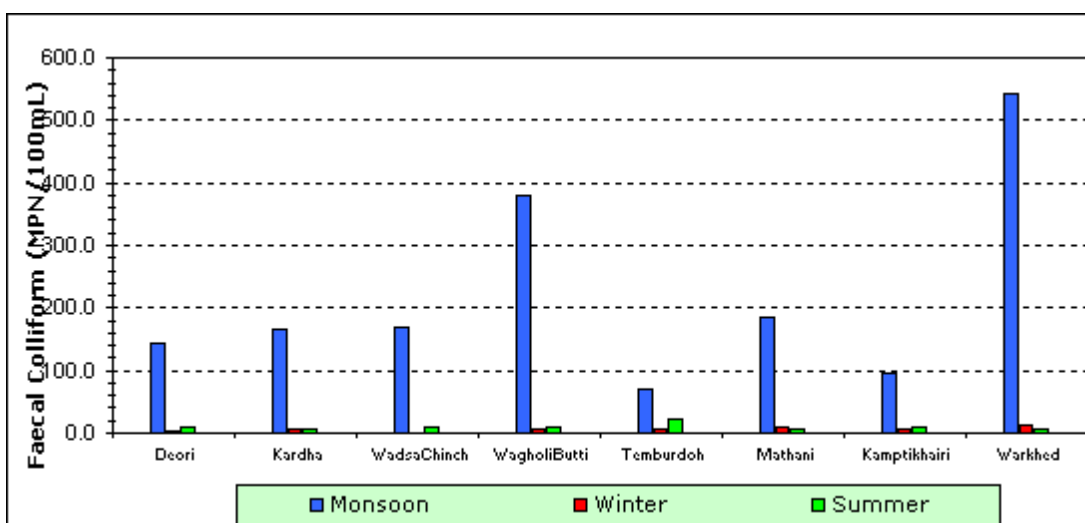
in Magnesium as Mg for the year 2013-2014



Graph Showing Variation in Total Colliforms for the year 2013-2014



Graph Showing Variation in Faecal Colliforms for the year 2013-2014





ACT FOR RIVER MUN FOR 2013-2014

Station: Kawatha

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.3	8.5
2	EC	µmhos/cm	384.0	422.0	492.0
3	DO	mg/L	6.8	7.1	6.4
4	BOD	mg/L	3.4	3.0	3.8
5	COD	mg/L	11.8	10.2	13.0
6	TDS	mg/L	232.5	258.0	306.0
7	Alkalinity	mg/L as CaCO ₃	188.0	220.8	232.0
8	Chloride	mg/L	24.0	24.0	34.0
9	Calcium (as Ca)	mg/L	50.8	47.5	53.6
10	Magnesium (as Mg)	mg/L	14.8	21.6	18.0
11	Total coliforms	MPN/100 ml	877.5	111.2	170.0
12	Faecal coliforms	MPN/100 ml	395.0	39.8	49.0

Station: Taklikhetri

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.3	8.5
2	EC	µmhos/cm	452.3	451.4	489.0
3	DO	mg/L	6.7	7.0	6.9
4	BOD	mg/L	3.1	3.1	3.3
5	COD	mg/L	11.0	10.4	13.5
6	TDS	mg/L	278.5	278.8	291.0
7	Alkalinity	mg/L as CaCO ₃	213.0	227.2	220.0
8	Chloride	mg/L	31.3	30.8	40.0
9	Calcium (as Ca)	mg/L	56.0	48.3	44.8
10	Magnesium (as Mg)	mg/L	16.2	23.1	28.2
11	Total coliforms	MPN/100 ml	1117.5	38.0	12.0
12	Faecal coliforms	MPN/100 ml	437.0	17.8	3.5



DATA ABSTRACT FOR RIVER CHANDRABHAGA FOR 2013-2014

Station: Daryapur

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.3	8.4
2	EC	µmhos/cm	561.0	486.4	542.0
3	DO	mg/L	6.3	6.9	6.6
4	BOD	mg/L	3.3	3.3	3.8
5	COD	mg/L	11.5	11.0	14.0
6	TDS	mg/L	332.5	290.8	330.0
7	Alkalinity	mg/L as CaCO ₃	248.0	235.2	252.0
8	Chloride	mg/L	38.5	29.8	35.0
9	Calcium (as Ca)	mg/L	62.8	56.0	57.6
10	Magnesium (as Mg)	mg/L	16.2	19.5	22.8
11	Total coliforms	MPN/100 ml	2292.5	157.8	170.0
12	Faecal coliforms	MPN/100 ml	760.0	72.0	70.0

DATA ABSTRACT FOR RIVER TAPI FOR 2013-2014

Station: Kharia

Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.2	8.1
2	EC	µmhos/cm	631.0	634.0	427.0
3	DO	mg/L	6.1	7.0	7.3
4	BOD	mg/L	4.2	2.8	2.9
5	COD	mg/L	13.5	10.0	9.0
6	TDS	mg/L	371.0	374.0	256.0
7	Alkalinity	mg/L as CaCO ₃	254.0	320.0	216.0
8	Chloride	mg/L	62.0	52.0	26.0
9	Calcium (as Ca)	mg/L	53.2	64.0	44.8
10	Magnesium (as Mg)	mg/L	24.3	31.6	17.5
11	Total coliforms	MPN/100 ml	995.0	12.0	110.0
12	Faecal coliforms	MPN/100 ml	360.0	5.0	17.0



FOR RIVER PENGANGA FOR 2013-2014

Station: KolgaonGod

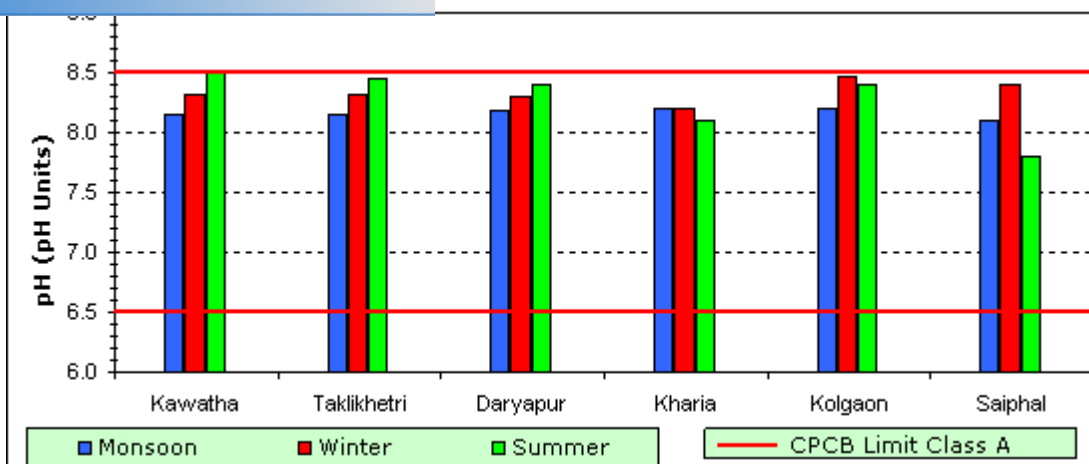
Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.2	8.5	8.4
2	EC	µmhos/cm	458.5	500.4	454.0
3	DO	mg/L	6.7	7.0	6.6
4	BOD	mg/L	3.5	2.8	3.9
5	COD	mg/L	13.5	9.0	13.7
6	TDS	mg/L	271.5	298.4	272.0
7	Alkalinity	mg/L as CaCO ₃	217.0	252.8	220.0
8	Chloride	mg/L	29.0	30.2	32.0
9	Calcium (as Ca)	mg/L	52.8	59.2	52.0
10	Magnesium (as Mg)	mg/L	17.6	20.9	22.5
11	Total coliforms	MPN/100 ml	1292.5	112.2	60.0
12	Faecal coliforms	MPN/100 ml	480.0	38.6	21.0

Station: Saiphal

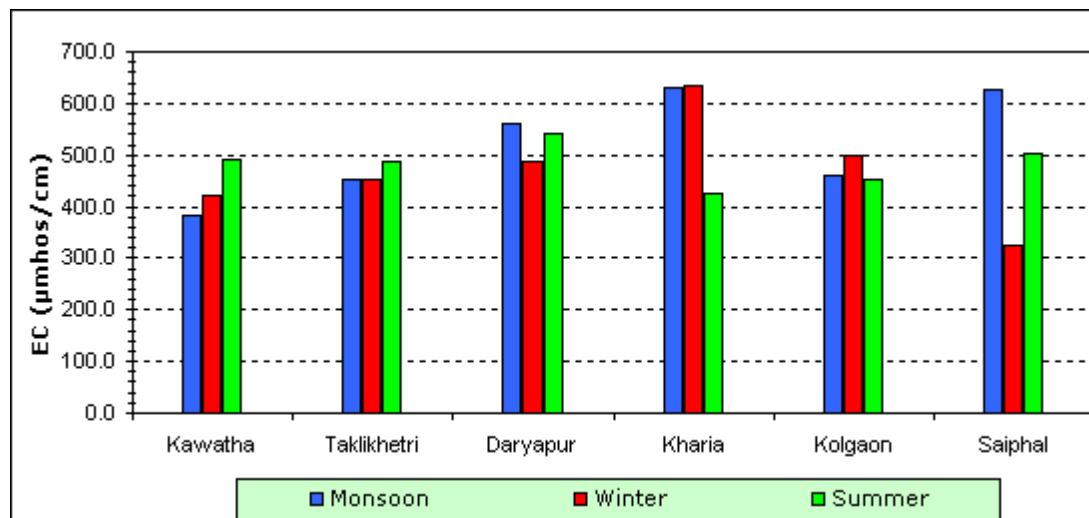
Sr. No.	Parameter	Unit	Season		
			Monsoon	Winter	Summer
			Mean	Mean	Mean
1	pH	-	8.1	8.4	7.8
2	EC	µmhos/cm	627.5	325.0	503.0
3	DO	mg/L	6.2	7.4	6.6
4	BOD	mg/L	4.0	2.8	3.5
5	COD	mg/L	12.5	9.0	13.0
6	TDS	mg/L	385.0	192.0	294.0
7	Alkalinity	mg/L as CaCO ₃	282.0	160.0	200.0
8	Chloride	mg/L	52.5	13.0	49.0
9	Calcium (as Ca)	mg/L	60.4	42.4	49.6
10	Magnesium (as Mg)	mg/L	20.2	12.2	16.5
11	Total coliforms	MPN/100 ml	900.0	21.0	79.0
12	Faecal coliforms	MPN/100 ml	360.0	7.0	23.0



variation in pH for the year 2013-2014



Graph Showing Variation in EC for the year 2013-2014



Graph Showing Variation in Dissolved Oxygen for the year 2013-2014

