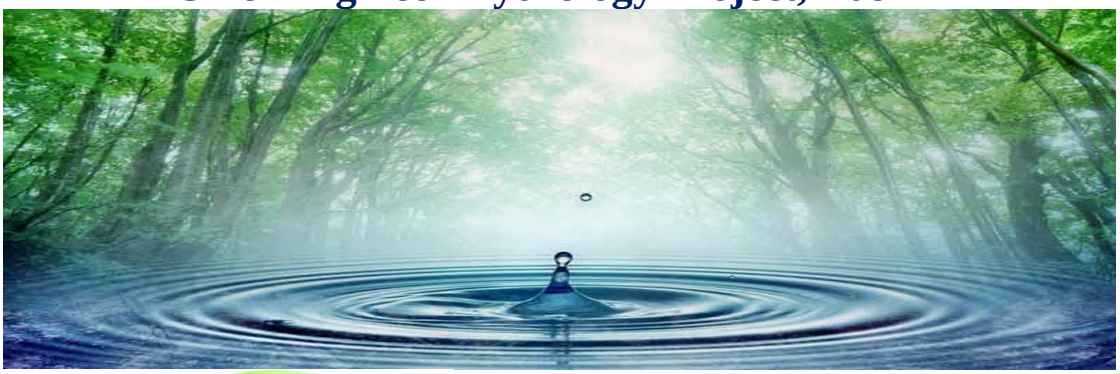
सत्यमेव जयते

GOVERNMENT OF MAHARASHTRA
WATER RESOURSE DEPARTMENT

HYDROLOGY PROJECT (SW)
Chief Engineer Hydrology Project, Nashik



Water quality Lab Level-II, Kolhapur

ANNUAL REPORT
2013-2014

Superintending Engineer
Data Collection, Planning & Hydrology Circle, Nashik

PREFACE

Well equipped (level-II) grade water quality laboratory at Kolhapur, is set up under technical assistance of World-Bank aided Hydrology Project, for monitoring the surface water quality of Krishna basin and west flowing rivers of Konkan region (in Ratanagiri & Sindhudurg district) in Maharashtra state.

The present annual report is prepared for the water - year 01/06/2013 to 31/05/2014 with the consideration of monsoon season from June to September and non-monsoon from October to May.

This report includes water quality data in Krishna Basin and Part of Konkan (west flowing rivers) for the period of June 2013 to May 2014. The data has been interpreted to known the affected locations.

This report 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 define frequencies for the reported period.

Govt. Analyst	*Assistant Executive Engineer*	*Executive Engineer*
WQ Lab level - II	*HP Sub- Division*	*Hydrology Project Division*
HP Sub-Division Kolhapur	*Kolhapur*	*Pune - 1*

Annual Report

On Water Quality Monitoring through Water Quality Lab Level-II, Kolhapur for the Year 2013 - 14

I N D E X

Annual Report

On Water Quality Monitoring through Water Quality Lab Level-II, Kolhapur for the Year 2013 - 14

ANN E X U R E

CHAPTER - I

Executive Summery

Chapter - 1

Executive Summery

Annual Report

On Water Quality Monitoring through Water Quality Lab Level-II, Kolhapur for the Year 2013- 14

1.1 Preamble:

Water is the most vital resources for life. With the increasing population & changing life patterns, consumption of water has increased many folds particularly for domestic, agriculture, & industrial consumption. "The negative change in physical, chemical & biological properties of natural water due to addition of pollutants causing adverse effect on aquatic life, & other living being, including man is known as water pollution."

The water quality monitoring in the area of surface water is performed in order to determine the quality of water. There are 26 stations comes under Kolhapur Level – II, from Kolhapur, Sangli, Satara, Ratnagiri & Sindhudurga district. For each station 29 parameters are analyzed in the laboratory and 6 parameters are tested at field level. All these records store monthly in SWDES and used for preparing the annual report. These data are considered in order to specify the quality of water at each location. This also helps to identify concentration of water pollution in each source of water at each station.

1.2 Water Quality Monitoring – Objectives

The main objectives of surface water quality monitoring in Maharashtra state is to collect the comprehensive data on the status of present health of important water resources i.e. rivers & reservoirs so as:

1) To establish Base Line water quality.
2) To detect the trends in water quality changes.
3) To provide warning of potentially deleterious changes.
4) Surveillance of available resources for drinking and/or irrigation use.

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, Kolhapur as per Standard Guidelines and mandates including collection, transportation and analysis of samples , data entry in SWDES Software. Preparation of the Annual Report as per specific guidelines issued by Superintending Engineer, Hydrology Project Circle (Collection), Nashik,

1.3 Water Quality Monitoring

The Annual Report is prepared for the year 2013 - 14 in combined. 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- 14 are considered.

TABLE SHOWING SAMPLES ANALYSED DURING THE REPORTING PERIOD

Sr. No.	Year	Baseline Sample	Flux Sample	Trend Sample	Dam Sample	Total
1	2013 - 14	16	12	141	12	181

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, Water Quality Manuals, CPCB Guidelines and APHA, 21st Ed., 2005.

Every month after analysis of sample data is collected, validated & entry is carried out in rough data sheet. This finally validated data is entered in SWDES software & then send it to the Data Storage Center, Nashik by mail for storage as per instructions of water quality manual.

1.5 Result and Observation:

After observing all this data it is clear that most of the physical parameters are within tolerance limit.

Most of the chemical parameters are also within tolerance limits.

Bacteriological parameters like Total Coliform and Faecal Colifroms are also exceeding the limits.

1.6 Conclusion

Biological parameter in all locations contain higher bacterial count is due to the discharge of sewage, drainage waste in to the water sources. Even human activities also increase number of various types of bacteria in the water, which increase the number of count in the water.

1.7 Recommendations/Remedial Measures:

- Domestic effluents should be treated and disinfected before discharging.
- Effluents from the non-point sources should be identified. These are required to be collected and treated.
- Use of water of such polluted locations may be useful for salt tolerance crop and is recommended based on special study.
- Use of direct source of water should 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.
- Water quality Annual Report shall be publicly published every year.

CHAPTER - II

Introduction

Chapter - 2

Introduction

2.1 General

To check the pollution load & water safety for different uses there is need to regularly monitor water quality by using laboratory analysis method. The tests includes physico-chemical parameters & biological parameters.

The water quality monitoring in the area of surface water is performed in order to determine the quality of water. There are 26 stations come under Kolhapur lab Level – II, from Kolhapur, Sangli, Satara, Ratnagiri & Sindhudurga district. For each station 29 parameters are analyzed in the laboratory and 6 parameters are tested at field level. All these records store monthly in SWDES and used for preparing the annual report. These data are considered in order to specify the quality of water at each location. This also helps to identify concentration of water pollution in each source of water at each station.

2.2 Water Quality Monitoring - Objectives

The main objectives of surface water quality monitoring in Maharashtra state is to collect the comprehensive data on the status of present health of important water resources i.e. rivers & reservoirs so as:

1) To establish Base Line water quality.
2) To detect the trends in water quality changes.
3) To provide warning of potentially deleterious changes.
4) Surveillance of available resources for drinking and/or irrigation use.

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, Kolhapur 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.

2.3 Water Quality Monitoring – Scope

- Seasonal averages of all analyzed parameters are calculated for study of seasonal water quality trend at each location.
- Used analysed data for preparation of annual report or study purpose.
- Find out major pollutants in river water at each station.
- Identify remedial measures for water quality.

2.4 Other activities

Other than working of regular Water Quality Monitoring for Water Quality lab level II at Kolhapur, we also analysed water sample of Government, Semi Government, and Private sector.

Apart from HP sample drinking water, industrial effluent bore water, lake water, and irrigation water analysis is carried out in lab. Most of the students are also approach for analysis of water for study purpose.

During the year 2013 - 14 many clients approached to the laboratory. Are as follows -

1) Kolhapur Irrigation Division
2) Menon Rings,MIDC Kolhapur.
3) Aadhar nursing home, Kolhapur
4) Shivaji University Students, Kolhapur.
5) Dudhaganga Canal Division.
6) Podar Education Trust, Kolhapur.
7) Ichalkaranji Nagarparishad, STP Sample.
8) Women's College of Pharmacy peth vadgaon, Kolhapur
9) Hotel Panchwati, Kolhapur

The revenue collected during the reported period is as follows.

Sr. No	Year	Amount
1.	2013 - 2014	1,65,445/-

2.5 Extra activity

Water Quality Lab Level – II @ Kolhapur is achieved 90% marks in AQC December - 2014.

SALIENT FEATURES OF WATER QUALITY LABORATORY, AT RAJARAM TANK, KOLHAPUR.

Address	:	Hydrology Project Sub-Division, Kolhapur Water Quality Lab Level- II. At Rajaram Tank, Opp. Shivaji University, Sarnobat wadi Road Kolhapur – 416 004.
Latitude	:	16^0 42' 41''
Longitude	:	74^0 17' 00''
Year of Establishment	:	1st - February-2003.
No. of Baseline Sample locations	:	4 Nos.
No. of Flux locations	:	2 Nos.
No. of Trend Sample locations	:	19 Nos.
No. of Reservoir locations	:	1 No.
No. of Parameters Analysed	:	34 Nos.
Staff Position	:	Work of Operation & Maintenance of Lab. on annual contract basis.
Government officer/ staff related to the laboratory	:	1. Er. S.D. Raval Executive Engineer 2. Er. S. C. Mane. Assistant Engineer – I 3. Er. M.T. Chougule. Govt. Analyst Sectional Engineer
Agency Staff related to the laboratory	:	M/S Swara Consultancy. 1. Mrs. V.J.Yadav Chief Chemist. 2. Miss. T.S.Chougale Senior Research. Assistant.

		3. Miss. M.S.Chougale. Chemist. 4. Mr. P.B.Patil Field Chemist.

Scope of Work: Operation and Maintenance of water Quality Laboratory Level - II, Kolhapur

Outdoor Work :

Collection of surface water 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.

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

The Laboratory staff employed;

1) Chief Chemist: 1 No.
2) Sr. Research Officers: 1 No.
3) Research Assistant: 2 Nos.
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.

Hydrology Project Circle (Collection), Nashik

Water Quality Lab, Level – II, Kolhapur

Organisation Chart

SUPRINTENDING ENGINEER,
HYDROLOGY PROJECT CIRCLE (DATA COLLECTION & PLANNING) NASHIK

EXECUTIVE ENGINEER,
H.P.DIVISION, PUNE

ASST. EXECUTIVE ENGINEER H. P. SUB DIVISION, KOLHAPUR

GOVT. ANALYST

OPERATING AGENCY

CHIEF CHEMIST

ASSISTANT CHEMIST

Table showing No. of Location Covered under the jurisdiction of Water Quality Lab Level-II, Kolhapur.

Sr. no	Station	Name of River	Frequency of sampling	No. Of Samples 2013 - 14
KOLHAPUR DISTRICT				
1.	Radhanagari I	Bhogawati	Monthly	12
SANGLI DISTRICT				
1.	Mhaisal	Krishna	Monthly	08
2.	Shigaon	Warana	Monthly	08
SATARA DISTRICT				
1.	Ambwade	Yerala	Monthly	04
2.	Bhuinj	Krishna	Monthly	08
3.	Parli	Urmodi	Monthly	04
4.	Rasati	Koyana	Monthly	08
5.	Shivade	Krishna	Monthly	08
SOLAPUR DISTICT				
1.	Devikavathe	Bhima	Monthly	05
RATNAGIRI DISTRICT				
1.	Anjanari	Kajavi	Monthly	07
2.	Barewadi	Bav	Monthly	04
3.	Chatav	Jagbudi	Monthly	06
4.	Kumbharkhani	Gad	Monthly	06
5.	Latwan	Bharaja	Monthly	04
6.	Pastewadi	Kajavi	Monthly	06
7.	Pawarwadi	Bhambedi	Monthly	08
8.	Raipatan	Arjuna	Monthly	08
SINDHUDURGA DISTRICT				
1.	Araye	Achara	Monthly	07
2.	Banda	Terekhol	Monthly	08
3.	Baparde	Local Nala	Monthly	06
4.	Belane	Gad	Monthly	08
5.	Ghonsari-L	Devghar	Monthly	08
6.	Kerawade	Karli	Monthly	07
7.	Kudal	Bhansari	Monthly	08
8.	Shirshingi	Terekhol	Monthly	07
9.	Shivdav	Gad	Monthly	08

Total No. of Samples collected and analyzed during Reported Period (i.e. June 2013 to May 2014) = 181

CHAPTER - III

Methodology

Chapter - 3

Methodology

3.1 General:

Water, is the most essential element to life on earth, for survival of all living organisms. Water on earth is present in two forms i.e. fresh water & marine water. 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.

In the last century the water sources increasingly polluted due to industrilization, urbnization & population explision.

3.2 Aim and Objective

The Hydrology Project goals & main objectives of water quality monitoring in Krishna basin & West Flowing River Tapi from Konkan region are -

- Establish base line quality
- Observe the trend in water quality over a period of time
- To create public awareness as regards water pollution & its prevention.
- Surveillance over pollution through to water quality.

3.3 Monitoring Frequency

Previously the frequency of sample collection for Baseline Stations was once in a month and that of trend stations was twice in a month.

There has been change in the frequency of sample collection from August 2003 given below.

Base Line : Once in a month (June to September)

Trend stations : Once in a month

Flux stations : Once in month

Reservoirs : Fortnightly

3.4 Sampling Details

The water samples were collected stations from the main flowing stream of river at depth of 30 cm from the surface. The samples thus collected were transported to the laboratory within 48 hours from the time of collection.

The samples collected in this lab from Kolhapur, Sangli, Satara, Ratnagiri, Sindhudurga, and Solapur district.

3.5 Methodology

Analysis of Physical and Chemical parameters is done in the laboratory on the basis of Standard Analytical Methods, Instrument Operating Instructions, 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.

The Annual Report is prepared for the year 2013 - 14 in combined. 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.

TABLE SHOWING SAMPLES ANALYSED DURING THE REPORTING PERIOD

Sr. No.	Year	Baseline Sample	Flux Sample	Trend Sample	Dam Sample	Total
1.	2013 - 14	16	12	141	12	181
Total Samples analyzed during reporting period						**181**

3.6 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 performs as per guidelines of world bank with APHA ,21 st Ed, 2005 as a standard procedures for analysis of samples.

As well refers BIS standards IS:10500 and other relevant BIS standards for analysis of various samples received from users for various purposed like Drinking, Irrigation, Ice preparation, Bathing (Swimming Tank),Construction, study and various Research & Development Activities.

FLOW CHART OF ANALYSIS OF HP WATER SAMPLE

Sample Collection from 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 Protocols. These tests are: Microbiological test, Chlorophyll-Temp, pH, EC, 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, and 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

Methodology For the analysis of Water Quality samples the following parameters were analyzed during the Period 2013 - 14

Table showing List of parameters and the methodology used for the analysis.

Sr. No	Parameters	Methodology
1.	Colour	APHA, 21st Ed., 2005, 2120-B, 2-2
2.	Odour	IS 3025 (Part 5): 1983, Reaffirmed 2006
3.	Temperature	APHA, 21st Ed., 2005, 2550-B, 2-61
4.	pH	APHA, 21st Ed., 2005, 4500-H^+- B, 4-90
5.	Electric Conductivity	APHA, 21st Ed., 2005, 2510- B, 2-47
6.	Dissolved Oxygen	IS 3025 (Part 38): 1989, Reaffirmed 2003
7.	Turbidity	APHA, 21st Ed., 2005, 2130-B, 2-9
8.	Total Solids	IS 3025 (Part 15): 1984, Reaffirmed 2003, Amds.1
9.	Dissolved Solids	IS 3025 (Part 16): 1984, Reaffirmed 2006, Ed.2.1 (1999-12)
10.	Suspended Solids	IS 3025 (Part 17): 1984, Reaffirmed 2006, Amds.1
11.	NH_3-N	APHA, 21st Ed., 2005, 4500-NH_3 F, 4-110
12.	NO_2^-	APHA, 21st Ed., 2005, 4500-NO_2-B, 4-118
13.	NO_3^-	APHA,21st Ed., 2005, 4500-NO_3, B -4 -120
14.	Total Phosphorous	APHA, 21st Ed., 2005, 4500 P, E, 4-153
15.	Biochemical Oxygen Demand	IS 3025 (Part 44): 1993, Reaffirmed 2003, Amds.1
16.	Chemical Oxygen Demand	APHA, 21st Ed., 2005, 5220-B, 5-15
17.	Potassium K^+	IS 3025 (Part 45): 1993, Reaffirmed 2003, Amds.1
18.	Sodium Na^+	IS 3025 (Part 45):1993, Reaffirmed 2003, Amds.1
19.	Calcium Ca^{++}	APHA, 21st Ed., 2005, 3500-B, 3-65
20.	Magnesium Mg^{++}	APHA, 21st Ed., 2005, 3500-Mg, B, 3-84
21.	Iron (as Fe)	APHA, 21st Ed., 2005, 3111-B, 3-17
22.	Carbonate CO_3	APHA, 21st Ed., 2005, 2320-B, 2-27, 5 -1 & 4500-CO_2-D, 4-34
23.	Bi-Carbonate H CO_3	APHA, 21st Ed., 2005, 2320-B, 2-27, 5 -3 & 4500-CO_2-D, 4-34
24.	Chloride Cl	APHA, 21st Ed., 2005, 4500-Cl, B, 4-70
25.	Fluoride F	APHA, 21st Ed., 2005, 4500-F^-, D, 4-85
26.	Boron B	APHA, 21st Ed., 2005, 4500-B-C, 4-23

27.	Total Coliforms	APHA, 21st Ed., 2005, 9221-B, 9-49
28.	Faecal Coliforms	APHA, 21st Ed., 2005, 9221-E, 9-56
29.	Alkalinity	IS 3025 (Part 23): 1986, Reaffirmed 2003, Amds.1

Annual Report

On Water Quality Monitoring through Water Quality Lab Level –II ,

Kolhapur for the Year 2013 – 14

TABLE SHOWING SAMPLES ANALYSED DURING THE REPORTING PERIOD

Sr. No.	Year	Baseline Sample	Flux Sample	Trend Sample	Dam Sample	Total
1.	2013 - 14	16	12	141	12	181
Total Samples analyzed during reporting period						181

CHAPTER - IV

Result & Observation

Chapter - 4
Result & Observation

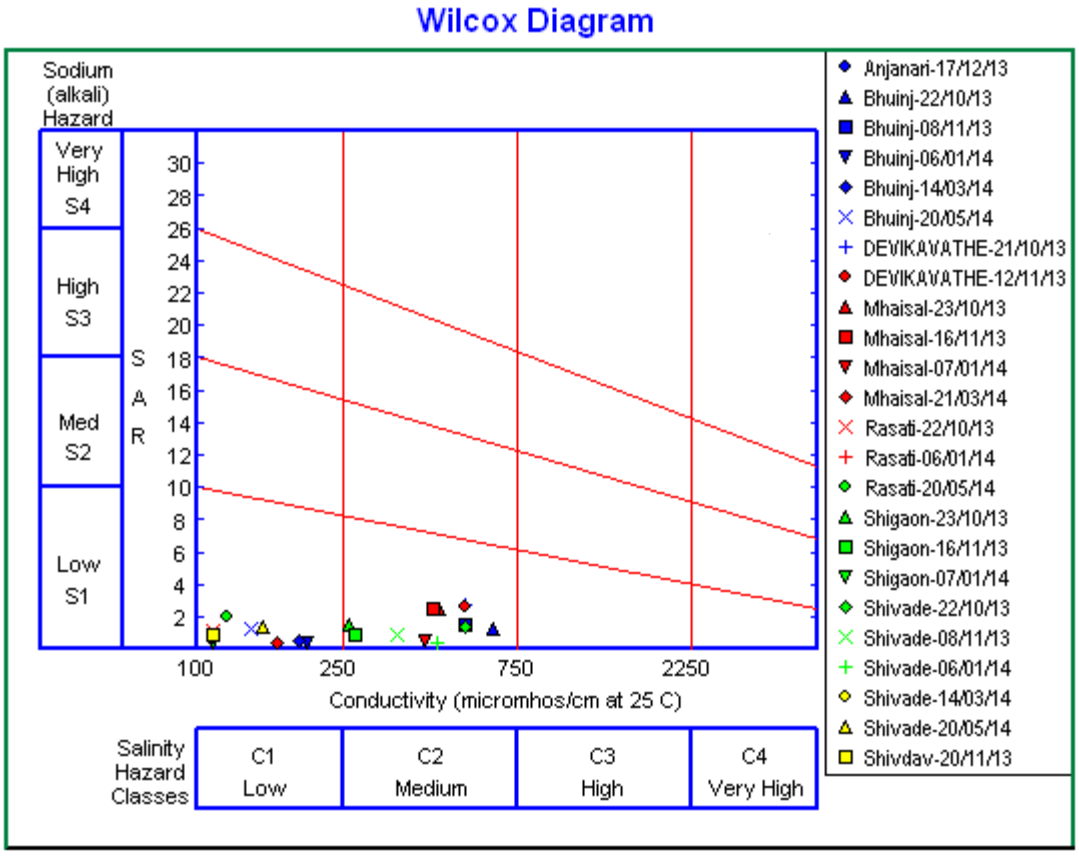


Table 1 -Classification of location on the basis of Wilcox technique Towards use of water for irrigation purpose

Sr. No.	Name of Location	Year	Class as per Wilcox technique	Recommendation
I. Krishna River				
1.	Bhuinj	2013- 14	C1 & S1	Water is good for Irrigation purpose.
2.	Mhaisal	2013- 14	C1 & S1	Water is good for Irrigation purpose.
3.	Shivade	2013- 14	C1 & S1	Water is good for Irrigation purpose.
II. Urmodi River				
1.	Parli	2013- 14	S1	Unable to classify because of inadequate data
III. Koyana River				
1.	Rasati	2013- 14	C1 & S1	Water is good for Irrigation purpose.
IV. Warana River				
1.	Shigaon	2013- 14	C2 & S1	Water is suitable for Irrigation purpose.
V Bhima River				
1.	Devikavate	2013- 14	C2 & S1	Water is suitable for Irrigation purpose.
VI Yrala River				
1	Ambawade	2013- 14	S1	Unable to classify because of inadequate data

Sr. No.	Name of Location	Year	Class as per Wilcox Technique	Recommendation
VII. West Flowing River (WFR)Konkan				
1.	Araye	2013- 14	S1	Unable to classify because of inadequate data
2.	Anjanari	2013- 14	C1 & S1	Water is good for Irrigation purpose.
3.	Banda	2013- 14	S1	Unable to classify because of inadequate data
4.	Baparde	2013- 14	S1	Unable to classify because of inadequate data

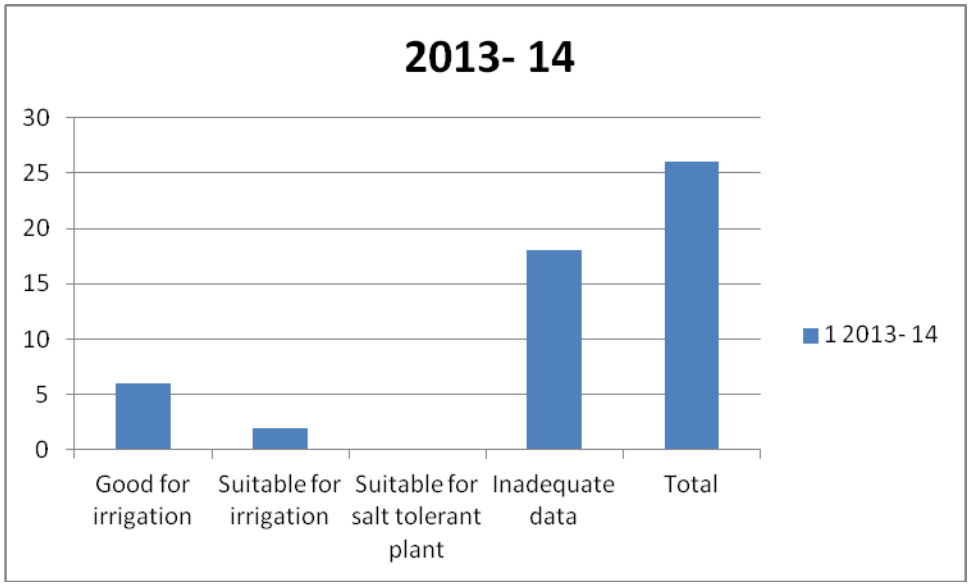
5.	Barewadi	2013- 14	S1	Unable to classify because of inadequate data
6.	Belane	2013- 14	S1	Unable to classify because of inadequate data
7.	Chatav	2013- 14	S1	Unable to classify because of inadequate data
8.	Ghonsari – L	2013- 14	S1	Unable to classify because of inadequate data
9.	Kerwade	2013- 14	S1	Unable to classify because of inadequate data
10.	Kudal	2013- 14	S1	Unable to classify because of inadequate data
11.	Kumbharkhani	2013- 14	S1	Unable to classify because of inadequate data
12.	Latwan	2013- 14	S1	Unable to classify because of inadequate data
13.	Pastewadi	2013- 14	S1	Unable to classify because of inadequate data
14.	Pawarwadi	2013- 14	S1	Unable to classify because of inadequate data
15.	Raipatan	2013- 14	S1	Unable to classify because of inadequate data
16.	Shirshingi	2013- 14	S1	Unable to classify because of inadequate data
17.	Shivdav	2013- 14	C1 & S1	Water is good for Irrigation purpose.
VIII. Dam location				
1.	Radhanagari	2013- 14	S1	Unable to classify because of inadequate data

Table 2 - Observation on the basis of classification of location

Sr. No.	River	Year	Observation
1.	Krishna River	2013- 14	Along the Krishna river there are 3 locations & as per above classification (table – 1) it shows that Bhuinj, Mhaisal, & shivade having Water is good for Irrigation purpose.
2.	Urmodi River	2013- 14	Only one location comes under river Urmodi that is Parali. As per above classification (table - 1) There water sample unable to classify because of inadequate data
3.	Koyana River	2013- 14	Along the Koyana river there is 1 location namely Rasati. There water sample is good for Irrigation purpose.
4.	Warana River	2013- 14	There is only one location such as Shigaon. There water is suitable for Irrigation purpose..
5.	West Flowing River Konkan	2013- 14	Along Waste flowing river there are 17 locations and as per above (table - 1) classification out of 17 it shows that 15 stations i.e Araye, Baparde, Barewadi, Chatav, Ghonsari – (L). Kudal, Kumbharkhani, Pawarwadi, Raipatan, Banda, Belane, Kerwade, Latwan Pastewadi, Shirshingi & there water is unable to classify because of inadequate data & For Anjanari & Shivdav Water is good for Irrigation purpose.
6.	Dam Location	2013- 14	1 locations goes under dam i. e. Radhanagari and as per above (Table - 1) classification it shows that there water is unable for classification because of inadequate data.

Table 3 - Abstract for classification of water towards Irrigation purpose

Sr. No.	Year	Good for irrigation	Suitable for irrigation	Suitable for salt tolerant plant	Inadequate data	Total
1.	2013- 14	06	02	0	18	26



Data Abstract For 2013 – 14

Table – 1 **KOLHAPUR DISTRICT**

Parameter	Unit	Season								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Radhanagari										
DO	mg/L	7.4	8.2	7.8	6.3	7.4	6.85	7.4	8.1	7.75
BOD	mg/L	1	1.1	1.05	1	1.1	1.05	1	1.2	1.1
COD	mg/L	7	8	7.5	7	8	7.5	7	8	7.5
Total coliforms	MPN/100 ml	17	26	21.5	6	24	15	12	20	16
Total Dissolved Solids	mg/L	8	30	19	20	32	26	16	24	20

Table – 2 **SANGLI DISTRICT**

Parameter	Unit	Season								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Shigaon										
DO	mg/L	7	7.8	7.4	8	8.3	8.15	–	–	–
BOD	mg/L	1.1	1.4	1.25	1.1	1.1	1.1	–	–	–
COD	mg/L	7	9	8	9	10	9.5	–	–	–
Total coliforms	MPN/100 ml	580	9000	4790	390	1200	795	630	700	665
Total Dissolved Solids	mg/L	78	136	107	178	184	181	–	–	–
Station : Mhaisal										
DO	mg/L	6.9	7.6	7.25	8	8.3	8.15	–	–	–
BOD	mg/L	1	1.5	1.25	1.3	1.4	1.35	–	–	–
COD	mg/L	9	10	9.5	8	8	8	–	–	–
Total coliforms	MPN/100 ml	840	3500	2170	1000	1500	1250	630	1100	865
Total Dissolved Solids	mg/L	120	152	136	250	322	286	–	–	–

Table – 3		SATARA DISTRICT								
Parameter	Unit	Season								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station: Bhuinj										
DO	mg/L	6.7	7.1	6.9	7.6	8.5	8.05	–	–	–
BOD	mg/L	1	1.1	1.05	1	1.2	1.1	–	–	–
COD	mg/L	8	10	9	9	9	9	–	–	–
Total coliforms	MPN/100 ml	1200	2800	2000	2100	9000	5550	940	**2100**	1520
Total Dissolved Solids	mg/L	290	332	311	360	520	440	–	–	–
Station: Parli										
DO	mg/L	6.6	7.7	7.15	–	–	–	–	–	–
BOD	mg/L	1	1.2	1.1	–	–	–	–	–	–
COD	mg/L	8	9	8.5	–	–	–	–	–	–
Total coliforms	MPN/100 ml	330	3500	1915	–	–	–	–	–	–
Total Dissolved Solids	mg/L	66	202	134	–	–	–	–	–	–
Station: Shivade										
DO	mg/L	7.1	7.5	7.3	7.6	8	7.8	–	–	–
BOD	mg/L	1	1.3	1.15	1.1	1.2	1.15	–	–	–
COD	mg/L	8	10	9	9	9	9	–	–	–
Total coliforms	MPN/100 ml	840	2200	1520	1500	9000	5250	1500	2800	2150
Total Dissolved Solids	mg/L	122	290	206	200	426	313	–	–	–
Station : Rasati										
DO	mg/L	6.8	7.6	7.2	7.3	7.5	7.4	–	–	–
BOD	mg/L	1	1.2	1.1	1.2	1.3	1.25	–	–	–
COD	mg/L	8	9	8.5	8	9	8.5	–	–	–
Total coliforms	MPN/100 ml	580	2400	1490	470	5400	2935	460	700	580
Total Dissolved Solids	mg/L	30	76	53	40	40	40	–	–	–

Station : Ambawade										
DO	mg/L	8.8	8.8	8.8	–	–	–	–	–	–
BOD	mg/L	1.2	1.2	1.2	–	–	–	–	–	–
COD	mg/L	10	10	10	–	–	–	–	–	–
Total coliforms	MPN/100 ml	470	470	470	–	–	–	–	–	–
Total Dissolved Solids	mg/L	580	580	580	–	–	–	–	–	–

Table – 4 **RATNAGIRI DISTRICT**

Parameter	Unit	Season								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Latwan										
DO	mg/L	7.4	8.2	7.8	–	–	–	–	–	–
BOD	mg/L	1.1	1.1	1.1	–	–	–	–	–	–
COD	mg/L	8	10	9	–	–	–	–	–	–
Total coliforms	MPN/100 ml	3500	9200	6350	–	–	–	–	–	–
Total Dissolved Solids	mg/L	18	56	37	–	–	–	–	–	–
Station : Chatav										
DO	mg/L	7.4	8	7.7	7.8	8.3	8.05	–	–	–
BOD	mg/L	1	1.1	1.05	1.1	1.2	1.15	–	–	–
COD	mg/L	8	10	9	7	9	8	–	–	–
Total coliforms	MPN/100 ml	1700	9000	5350	2200	5400	3800	–	–	–
Total Dissolved Solids	mg/L	16	22	19	28	60	44	–	–	–
Station : Kumbharkhani										
DO	mg/L	7.2	8.8	8	7.3	7.8	7.55	7.2	7.8	7.5
BOD	mg/L	1	1.2	1.1	1	1.1	1.05	1	1	1
COD	mg/L	8	10	9	8	8	8	8	8	8
Total colliforms	MPN/100 ml	2200	16000	9100	840	3500	2170	1100	1200	1150
Total Dissolved Solids	mg/L	18	60	39	32	64	48	44	50	47

Station : Pastewadi										
DO	mg/L	7.3	8.2	7.75	7.2	8	7.6	–	–	–
BOD	mg/L	1	1.2	1.1	1	1.1	1.05	–	–	–
COD	mg/L	7	9	8	7	9	8	–	–	–
Total coliforms	MPN/100 ml	1700	5400	3550	1100	2200	1650	–	–	–
Total Dissolved Solids	mg/L	26	38	32	40	70	55	–	–	–
Station : Raipatan										
DO	mg/L	7.1	8	7.55	7.8	8.5	8.15	7.6	8	7.8
BOD	mg/L	1	1.1	1.05	1	1.2	1.1	1	1.2	1.1
COD	mg/L	8	9	8.5	8	9	8.5	8	9	8.5
Total coliforms	MPN/100 ml	1100	16000	8550	1300	2800	2050	940	1400	1170
Total Dissolved Solids	mg/L	26	58	42	30	70	50	28	38	33
Station : Pawarwadi										
DO	mg/L	7.7	8.1	7.9	7.8	8.2	8	7.8	8	7.9
BOD	mg/L	1.1	1.2	1.15	1.2	1.2	1.2	1.2	1.2	1.2
COD	mg/L	7	8	7.5	9	10	9.5	8	10	9
Total coliforms	MPN/100 ml	1400	16000	8700	1700	2200	1950	1100	1700	1400
Total Dissolved Solids	mg/L	18	58	38	22	68	45	24	44	34
Station : Anjanari										
DO	mg/L	7.2	8.1	7.65	6.9	7.8	7.35	7.2	7.8	7.5
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1.2	1.1
COD	mg/L	7	9	8	7	8	7.5	8	9	8.5
Total coliforms	MPN/100 ml	1700	9200	5450	940	9000	4970	700	940	820
Total Dissolved Solids	mg/L	24	42	33	54	80	67	54	80	67

Station : Barewadi										
DO	mg/L	7.2	8.5	7.85	–	–	–	–	–	–
BOD	mg/L	1.1	1.2	1.15	–	–	–	–	–	–
COD	mg/L	8	9	8.5	–	–	–	–	–	–
Total coliforms	MPN/100 ml	1700	16000	8850	–	–	–	–	–	–
Total Dissolved Solids	mg/L	8	52	30	–	–	–	–	–	–

Table – 5 **SINDHUDURGA DISTRICT**

Parameter	Unit	Season								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Shirshingi										
DO	mg/L	7.3	8.2	7.75	6.5	7.8	7.15	7.6	8.2	7.9
BOD	mg/L	1	1.1	1.05	1	1	1	1	1.2	1.1
COD	mg/L	7	10	8.5	9	10	9.5	8	9	8.5
Total coliforms	MPN/100 ml	2100	9200	5650	1100	2800	1950	1100	1400	1250
Total Dissolved Solids	mg/L	24	52	38	46	80	63	46	68	57
Station : Kerwade										
DO	mg/L	7.1	7.9	7.5	7.2	7.8	7.5	7.4	7.8	7.6
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1	1
COD	mg/L	7	9	8	8	9	8.5	8	8	8
Total coliforms	MPN/100 ml	2200	5400	3800	1400	1600	1500	1400	1500	1450
Total Dissolved Solids	mg/L	16	38	27	26	66	46	30	62	46
Station : Shivdav										
DO	mg/L	7.3	7.8	7.55	6.6	7.8	7.2	7.8	8.3	8.05
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1.2	1.1
COD	mg/L	8	10	9	7	9	8	8	8	8
Total coliforms	MPN/100 ml	2200	5400	3800	2100	9000	5550	1100	2100	1600
Total Dissolved Solids	mg/L	22	48	35	50	66	58	50	88	69

Station : Ghonsari- L										
DO	mg/L	7.2	8	7.6	7.2	7.8	7.5	7.8	7.8	7.8
BOD	mg/L	1	1.1	1.05	1	1.2	1.1	1	1.2	1.1
COD	mg/L	7	9	8	7	8	7.5	8	9	8.5
Total coliforms	MPN/100 ml	2200	5400	3800	940	9000	4970	700	2100	1400
Total Dissolved Solids	mg/L	22	30	26	24	40	32	24	26	25
Station : Banda										
DO	mg/L	7.2	8.1	7.65	6.7	8	7.35	7.4	8.3	7.85
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1.2	1.1
COD	mg/L	7	10	8.5	8	9	8.5	8	9	8.5
Total coliforms	MPN/100 ml	2800	16000	9400	1700	5400	3550	700	1700	1200
Total Dissolved Solids	mg/L	24	42	33	44	60	52	36	80	58
Station : Kudal										
DO	mg/L	7.1	8.3	7.7	7	7.8	7.4	7.4	8	7.7
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1.2	1.1
COD	mg/L	7	9	8	8	9	8.5	8	9	8.5
Total coliforms	MPN/100 ml	3500	16000	9750	2200	3500	2850	1700	2100	1900
Total Dissolved Solids	mg/L	22	44	33	36	60	48	22	56	39
Station : Belane										
DO	mg/L	7.3	8	7.65	7.2	8	7.6	7.2	7.8	7.5
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1	1
COD	mg/L	7	9	8	8	9	8.5	8	9	8.5
Total coliforms	MPN/100 ml	5400	16000	10700	2200	9000	5600	1100	2200	1650
Total Dissolved Solids	mg/L	22	36	29	50	68	59	52	104	78

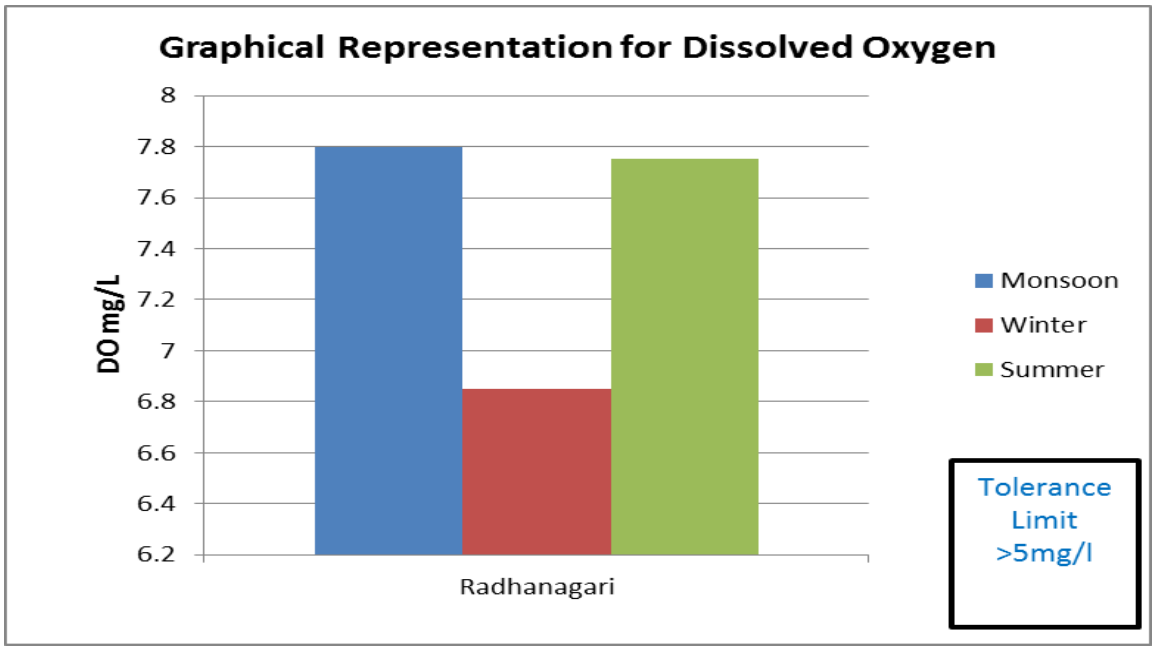
Station : Araye										
DO	mg/L	7.4	8	7.7	5.4	8	6.7	7.2	7.6	7.4
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1.2	1.1
COD	mg/L	7	9	8	7	10	8.5	8	9	8.5
Total coliforms	MPN/100 ml	1100	2400	1750	2800	16000	9400	2100	2800	2450
Total Dissolved Solids	mg/L	10	30	20	14	30	22	16	26	21
Station : Baparde										
DO	mg/L	7	8.3	7.65	7	7.8	7.4	7.8	7.8	7.8
BOD	mg/L	1	1.2	1.1	1	1.2	1.1	1	1	1
COD	mg/L	7	10	8.5	7	10	8.5	8	9	8.5
Total coliforms	MPN/100 ml	390	2800	1595	2200	2400	2300	2200	2200	2200
Total Dissolved Solids	mg/L	8	48	28	20	30	25	28	30	29

Table – 6		**SOLAPUR DISTRICT**								
Parameter	**Unit**	**Season**								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Devikavate										
DO	mg/L	7.5	8.8	8.15	8.7	9.2	8.95	–	–	–
BOD	mg/L	1.2	1.4	1.3	1.2	1.3	1.25	–	–	–
COD	mg/L	9	12	10.5	7	9	8	–	–	–
Total coliforms	MPN/100 ml	33	630	331.5	220	940	580	–	–	–
Total Dissolved Solids	mg/L	570	990	780	404	472	438	–	–	–

PART I: RESULT OBTAINED DURING 2013-2014

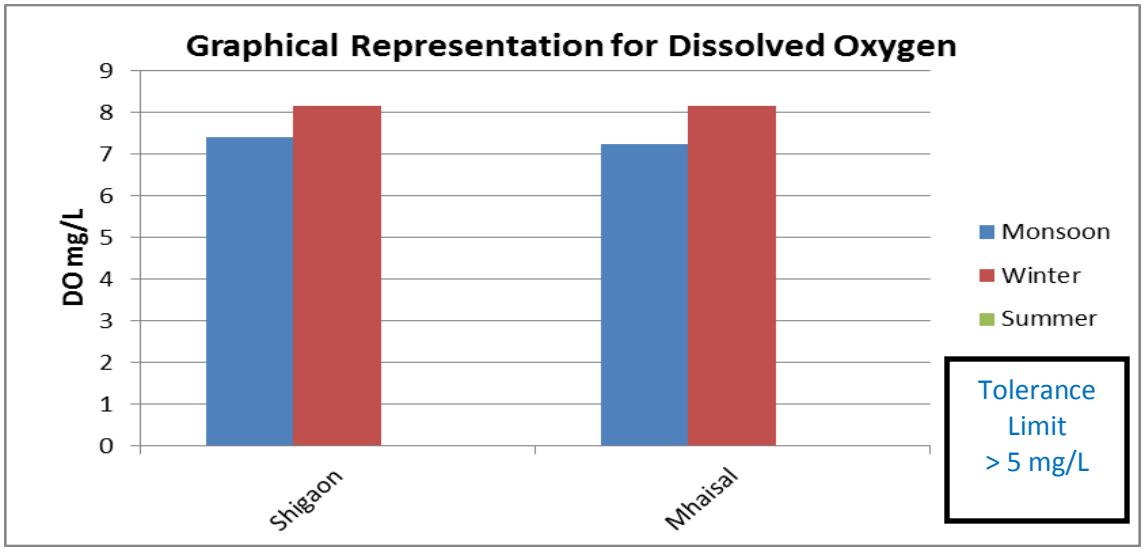
A) Dissolved Oxygen

1) Kolhapur District



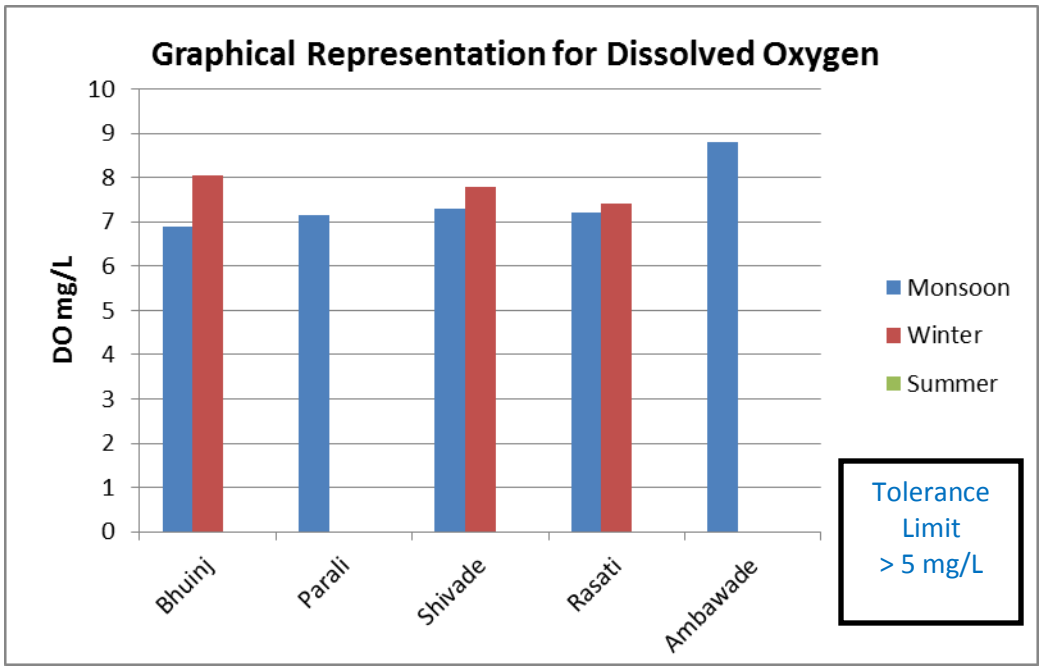
From the above graph it is observed that DO level of Radhanagari is within tolerance limit during all the seasons.

2) Sangli District



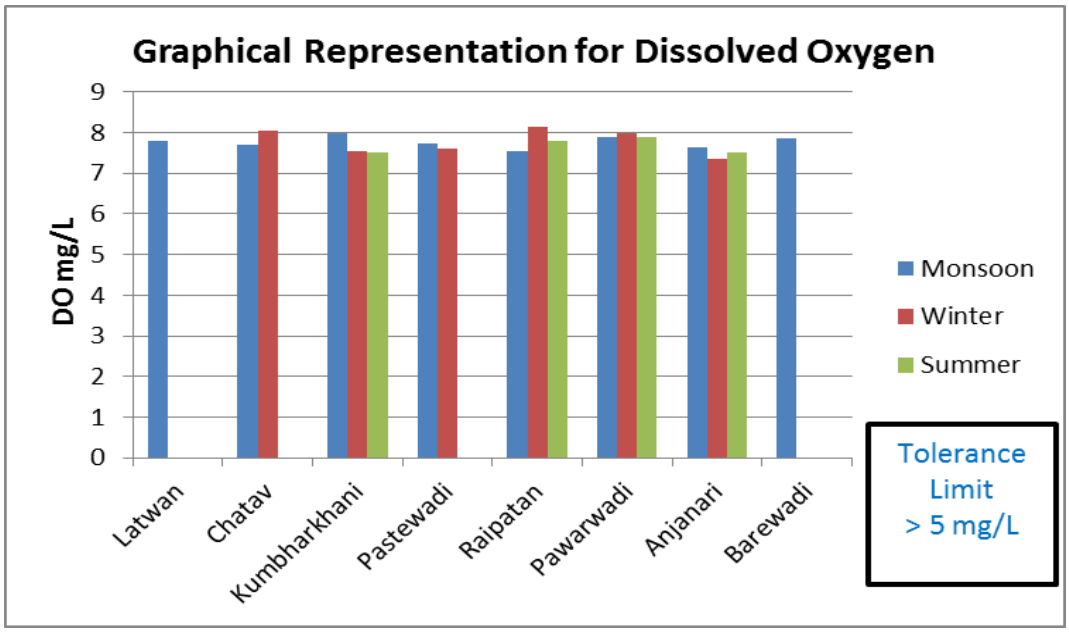
From the above graph it is observed that DO level of all the stations is within limit.

3) Satara District



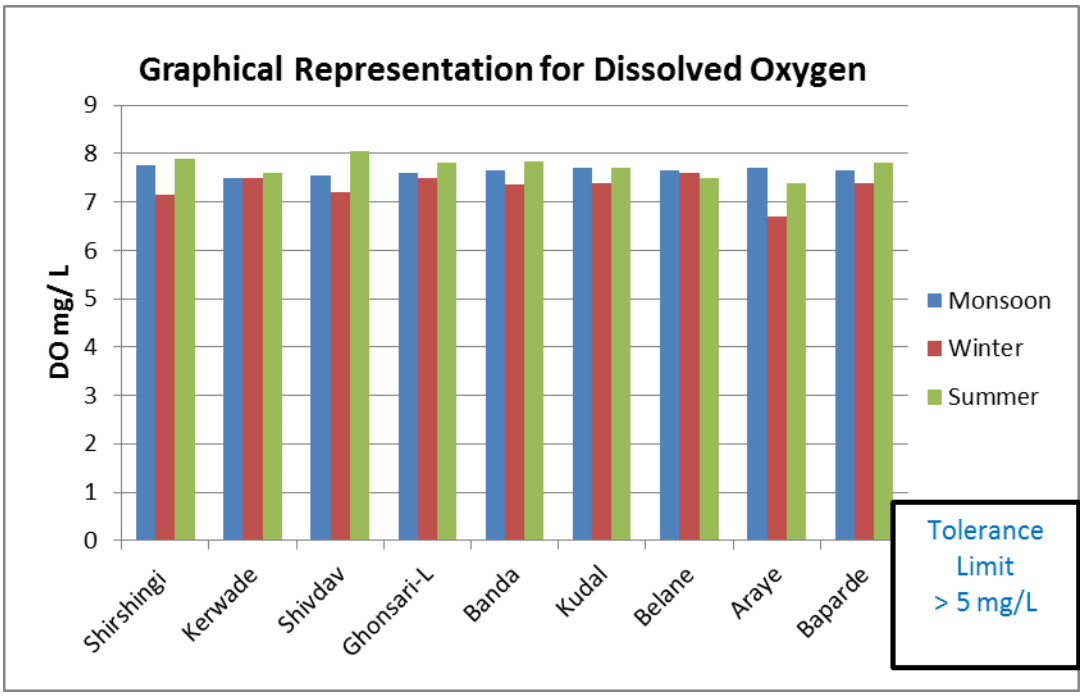
From the above graph it is observed that DO level of all the stations is within limit.

4) Ratnagiri District



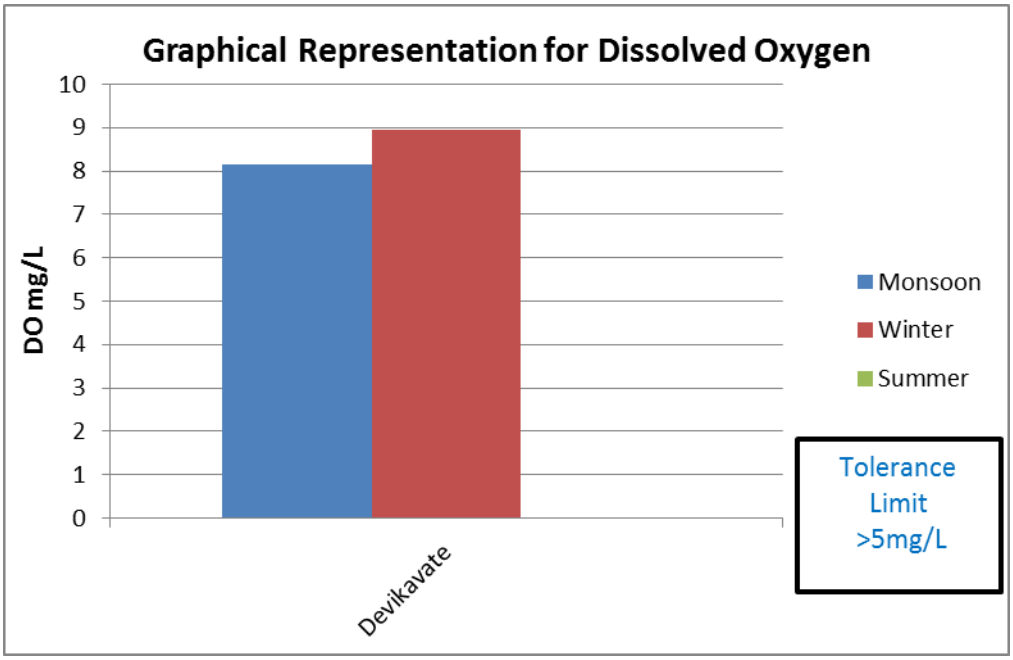
From the above graph it is observed that DO level of all the stations is within limit.

5) Sindhudurga District



From the above graph it is observed that DO level of all the stations is within limit.

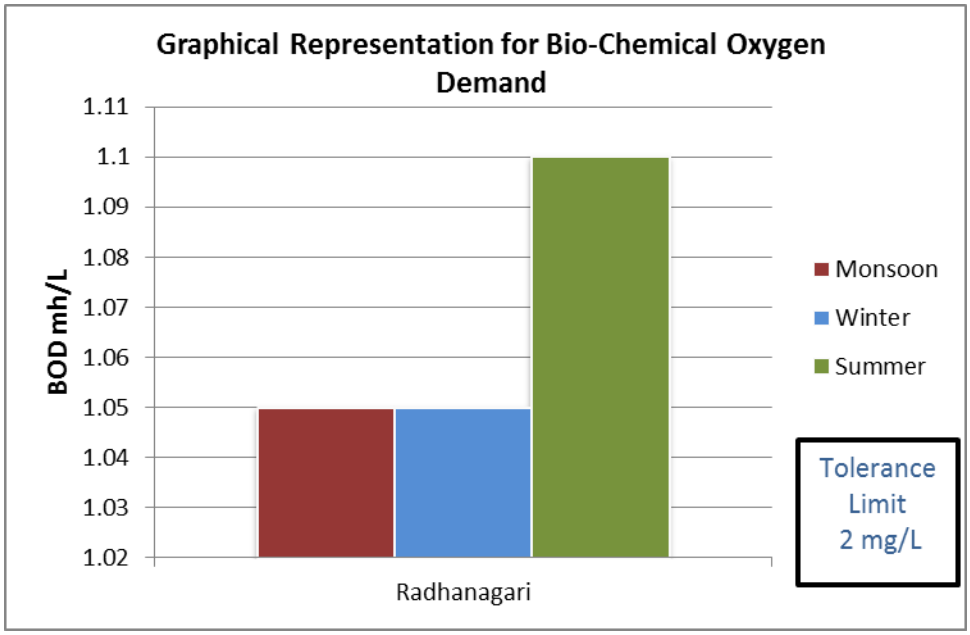
6) Solapur District



From the above graph it is observed that DO level of Devikavathe stations is exceed the limit during monsoon & winter.

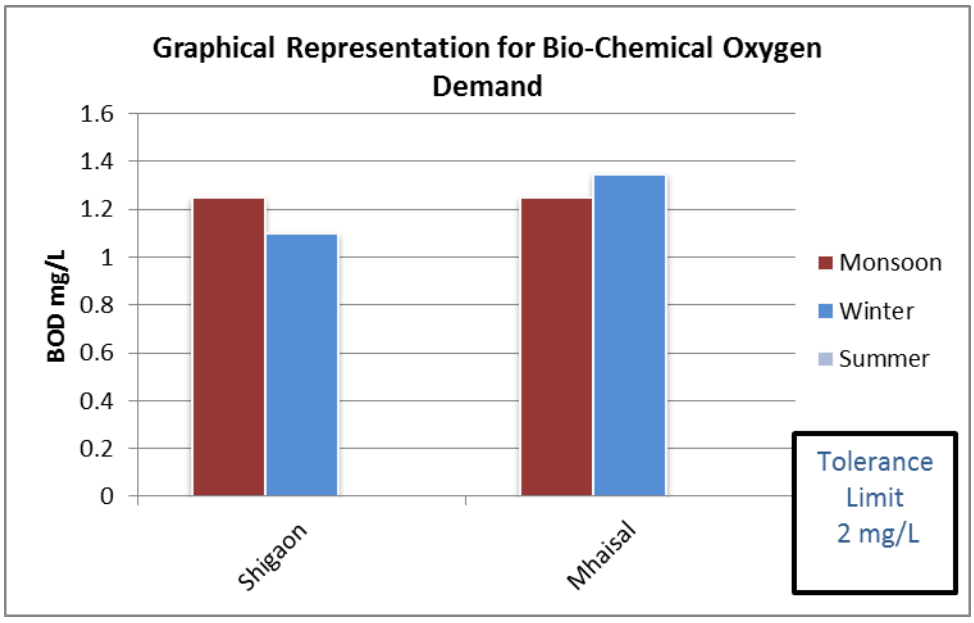
B) Bio-Chemical Oxygen Demand

1) Kolhapur District



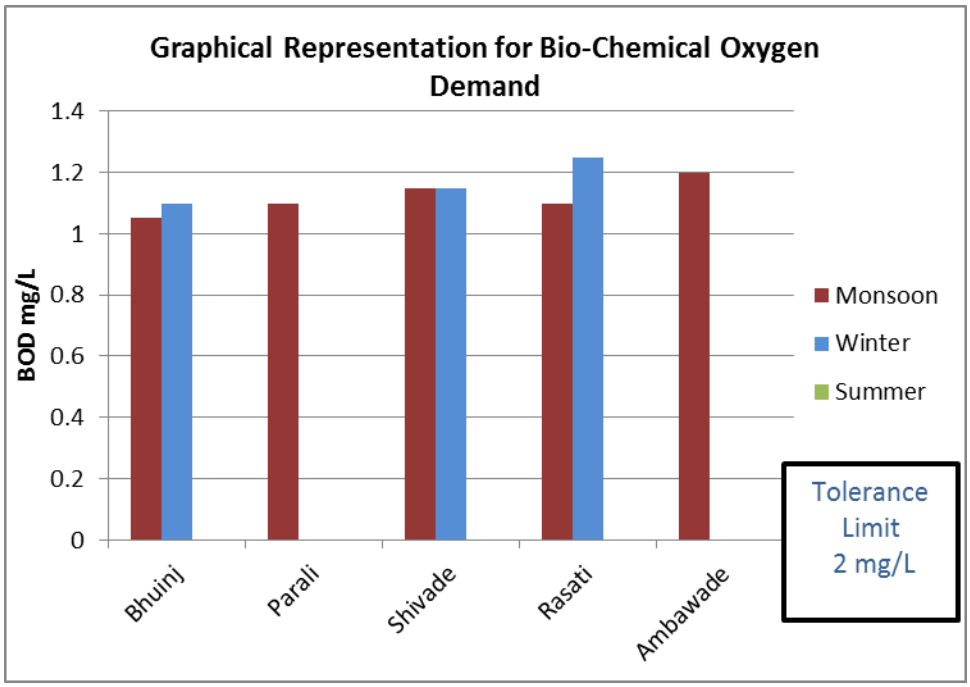
From the above graph it is observed that BOD level of Radhanagari station is within limit.

2) Sangli District



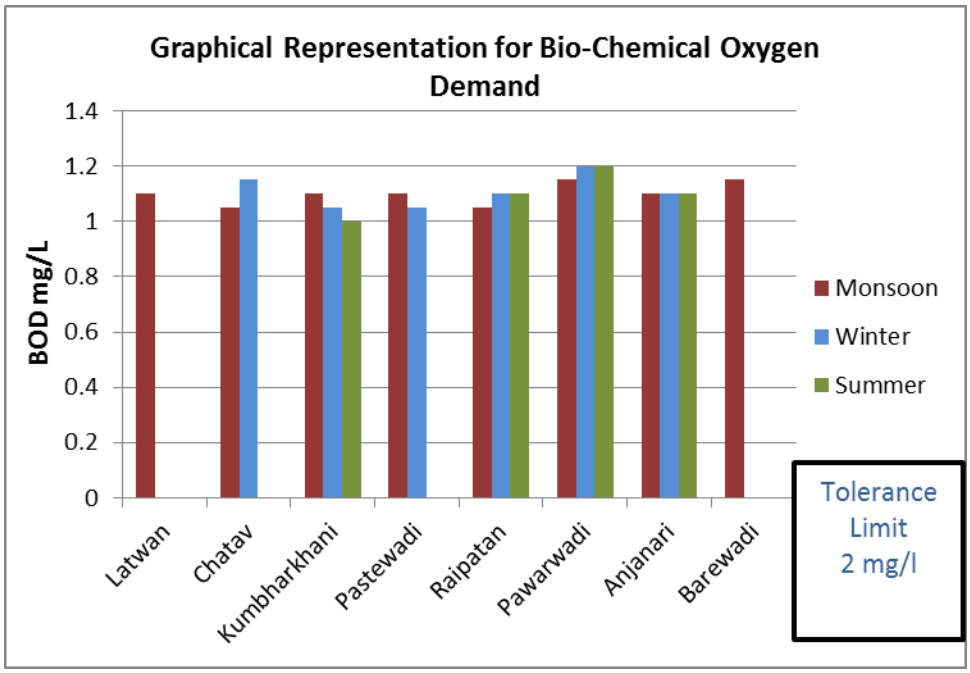
From the above graph it is observed that BOD level is within desirable limit for all the stations.

3) Satara District



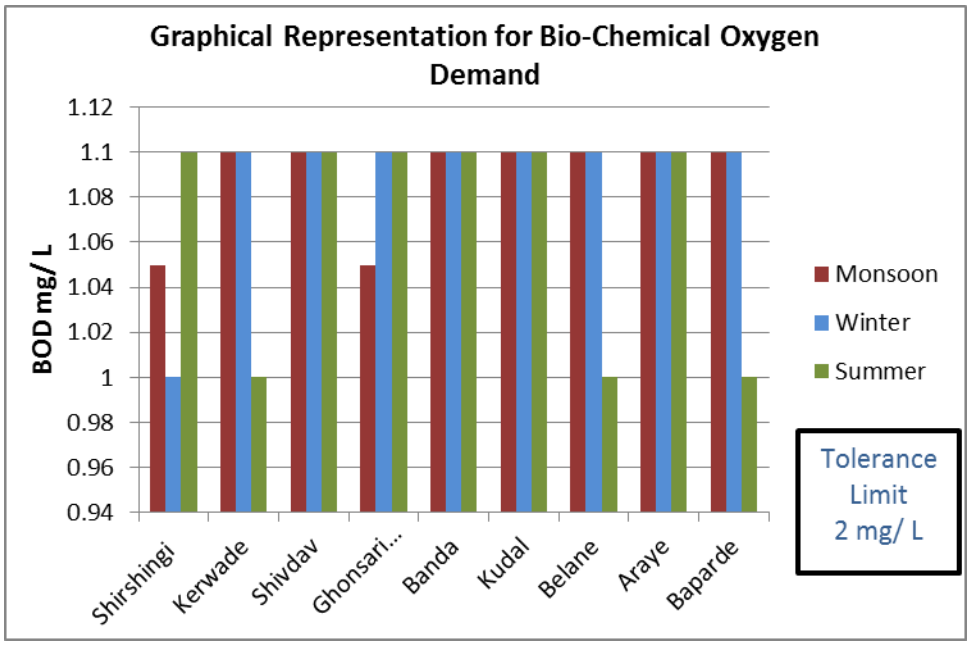
From the above graph it is observed that BOD level is within desirable limit for all the stations.

4) Ratnagiri District



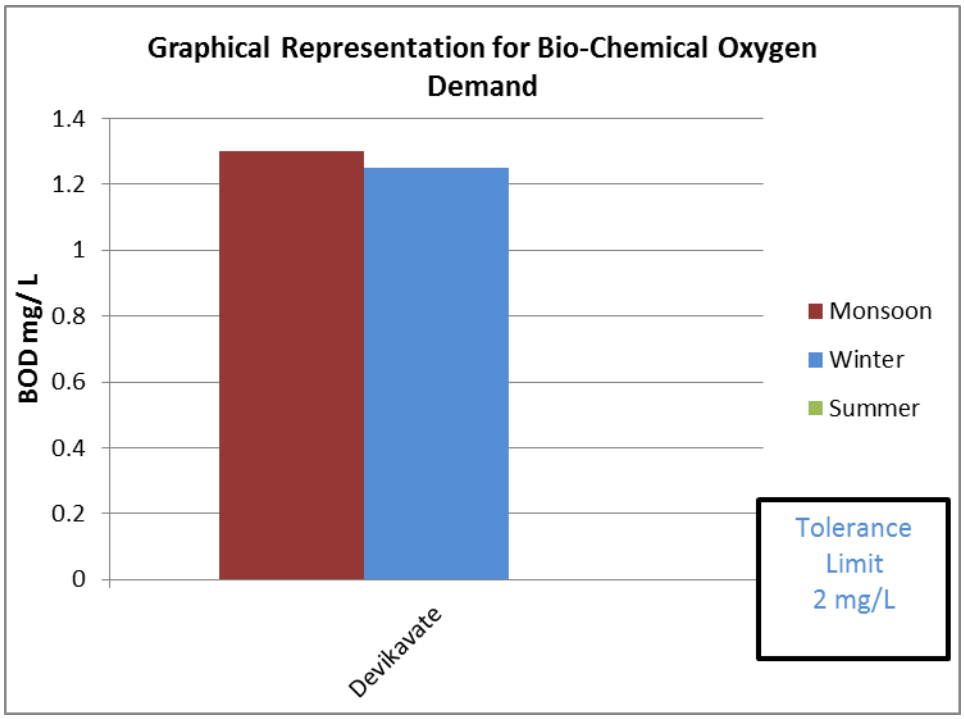
From the above graph it is observed that BOD level is within desirable limit for all the stations.

5) Sindhudurga District



From the above graph it is observed that BOD level is within desirable limit for all the stations.

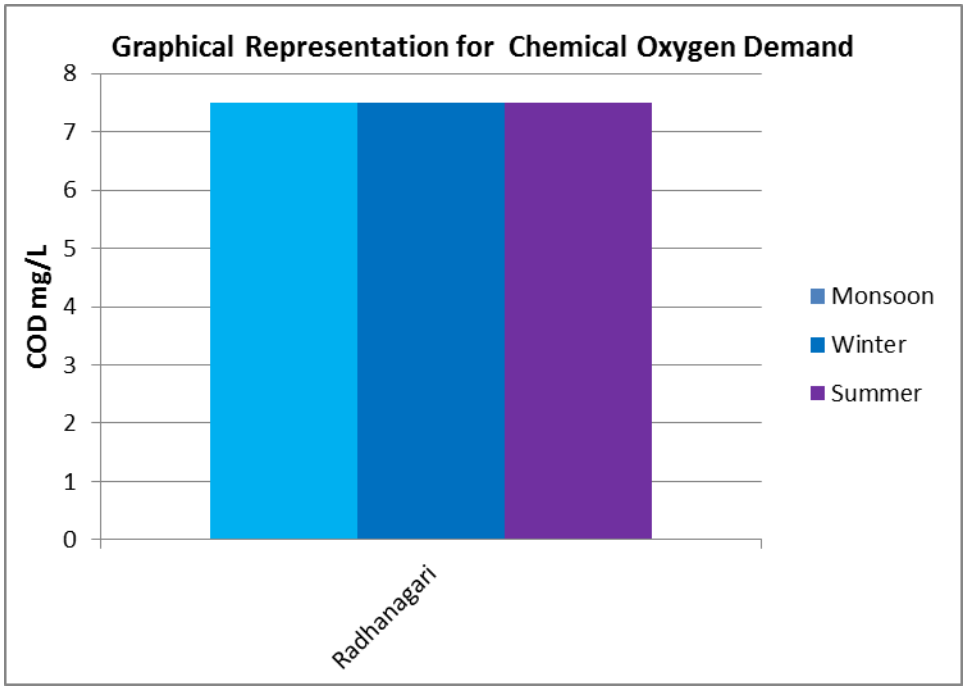
6) Solapur District



From the above graph it is observed that BOD level is within desirable limit for all the stations.

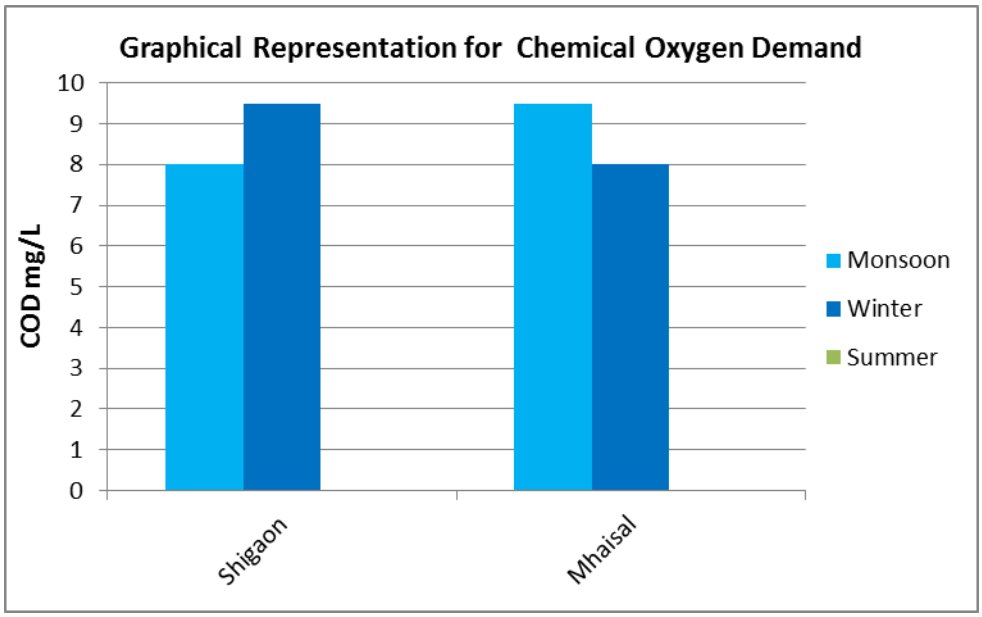
C) Chemical Oxygen Demand

1) Kolhapur District



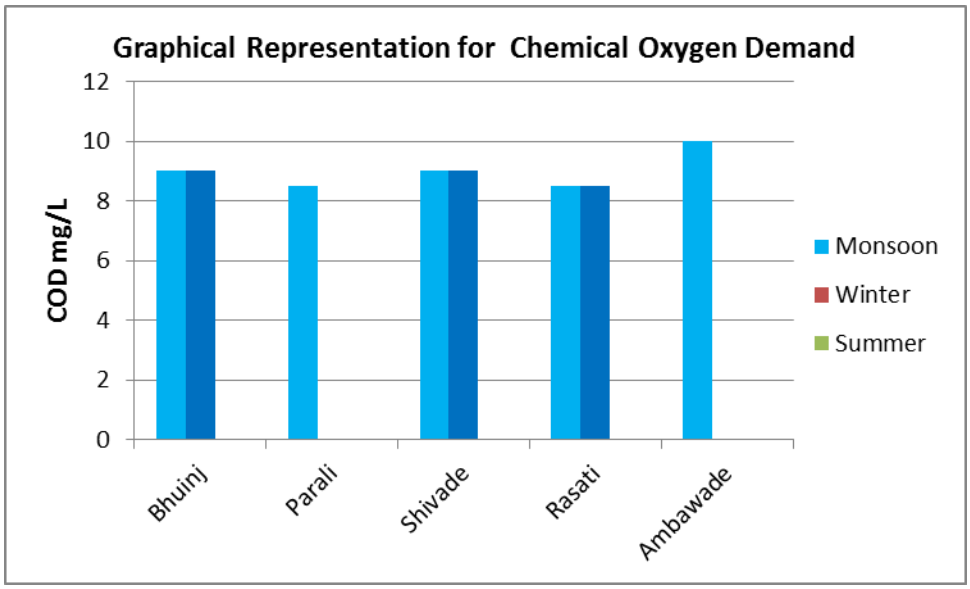
From the above graph it is observed that Radhanagari station shows COD level between 7 to 8 mg/L.

2) Sangli District



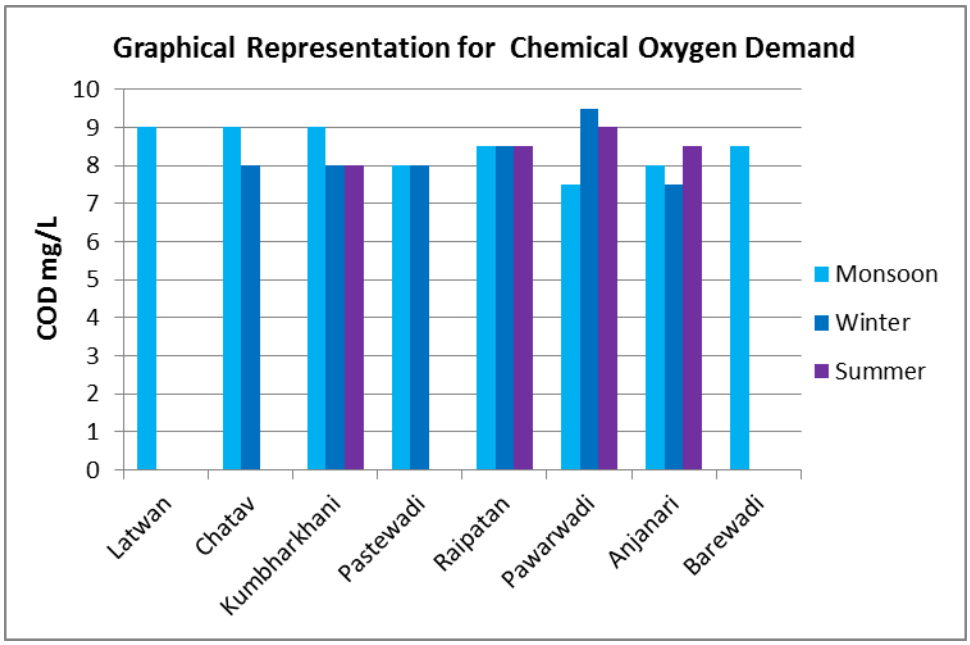
From the above graph it is observed that COD level of all station shows high during all season.

3) Satara District



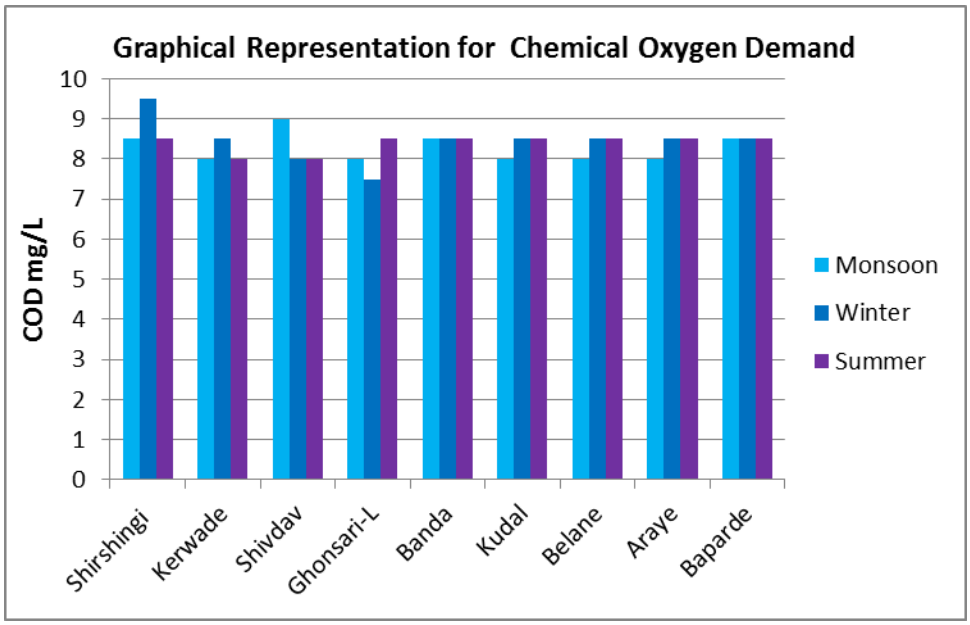
From the above graph it is observed that COD level of all station shows high during all seasons.

4) Ratnagiri District



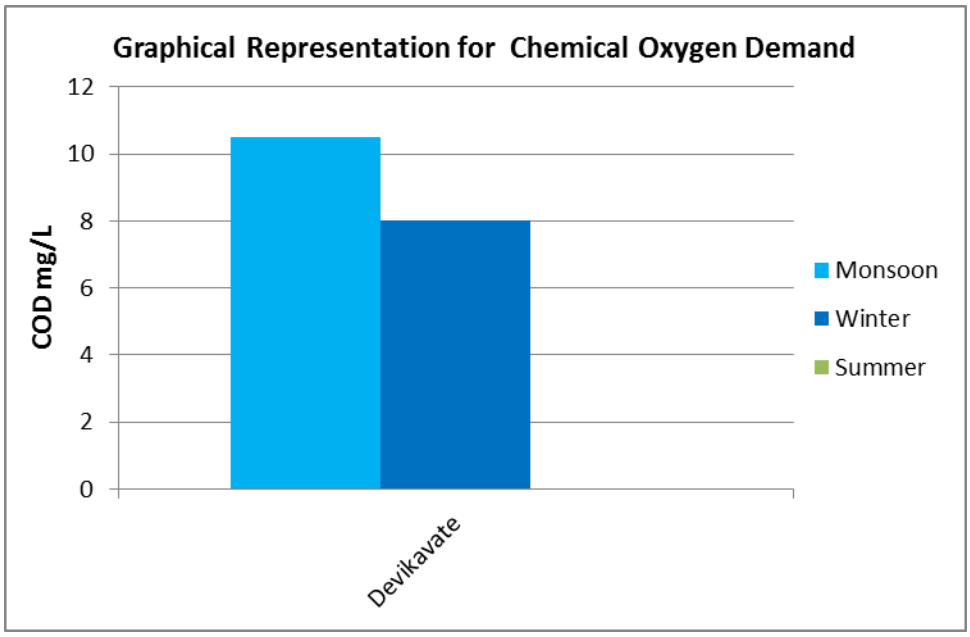
From the above graph it is observed that COD level of all station shows high during all seasons.

5) Sindhudurga District



From the above graph it is observed that COD level of all station shows high during all seasons.

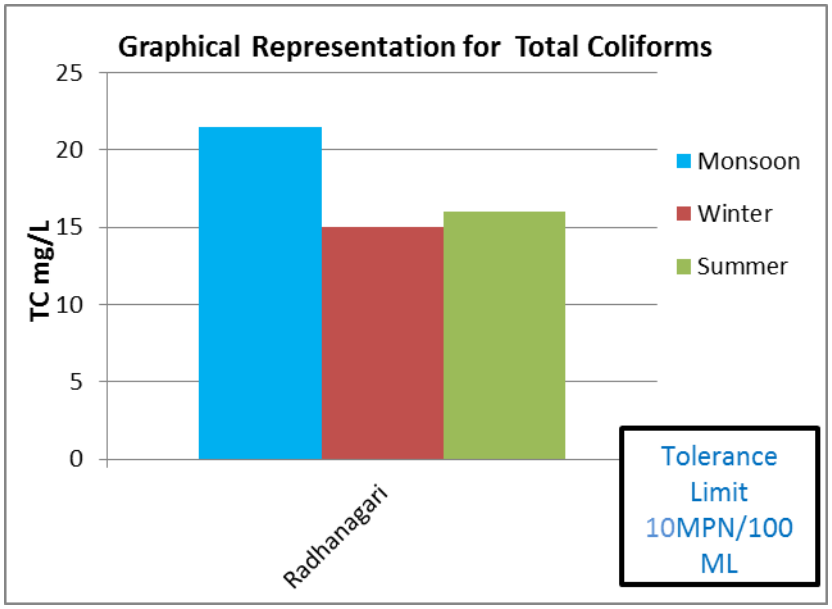
6) Solapur District



From the above graph it is observed that COD level of all station shows high during all seasons.

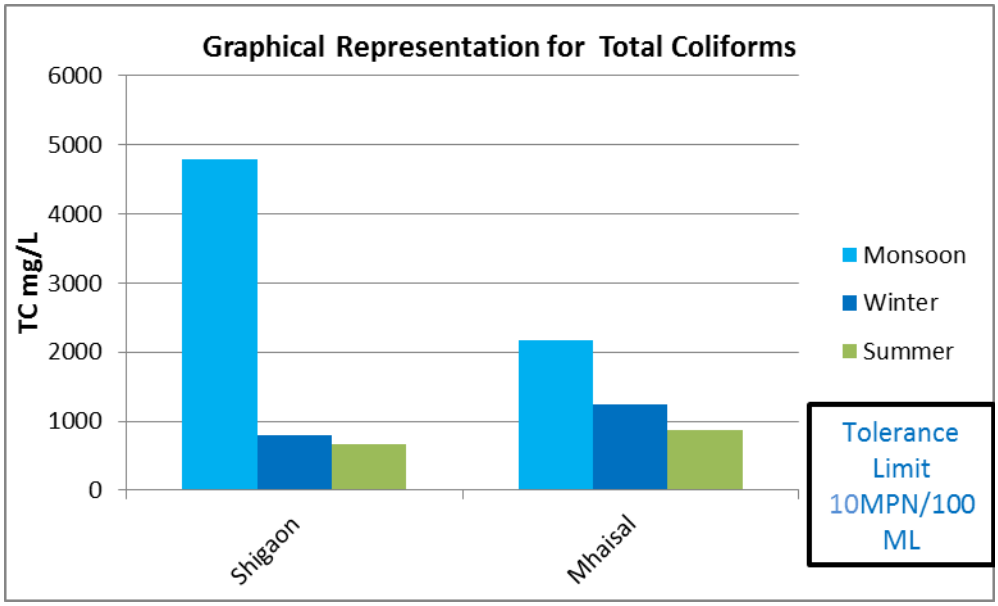
D) Total Coliforms (TC)

1) Kolhapur District



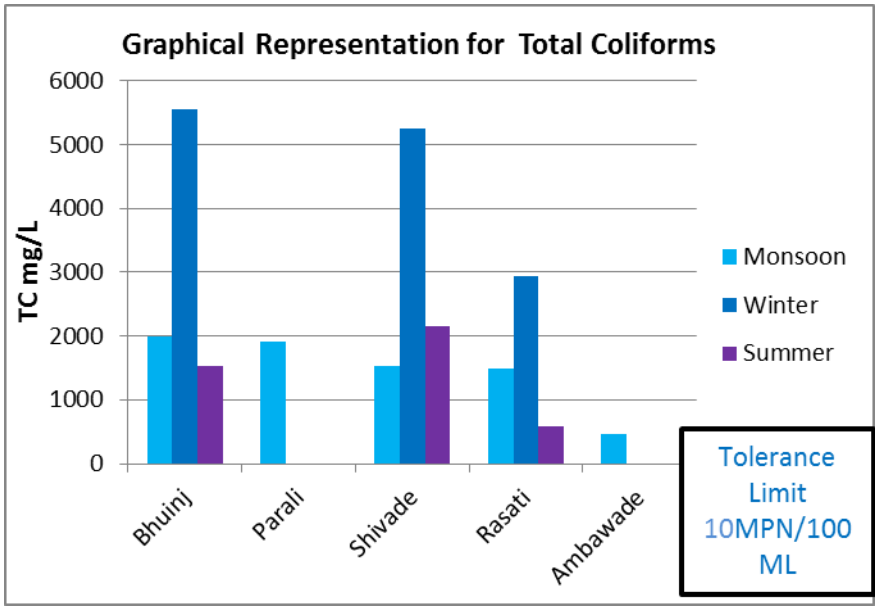
From the above graph it is observed that Radhanagari station shows high bacterial count i.e. above the tolerance limit during all seasons.

2) Sangli District



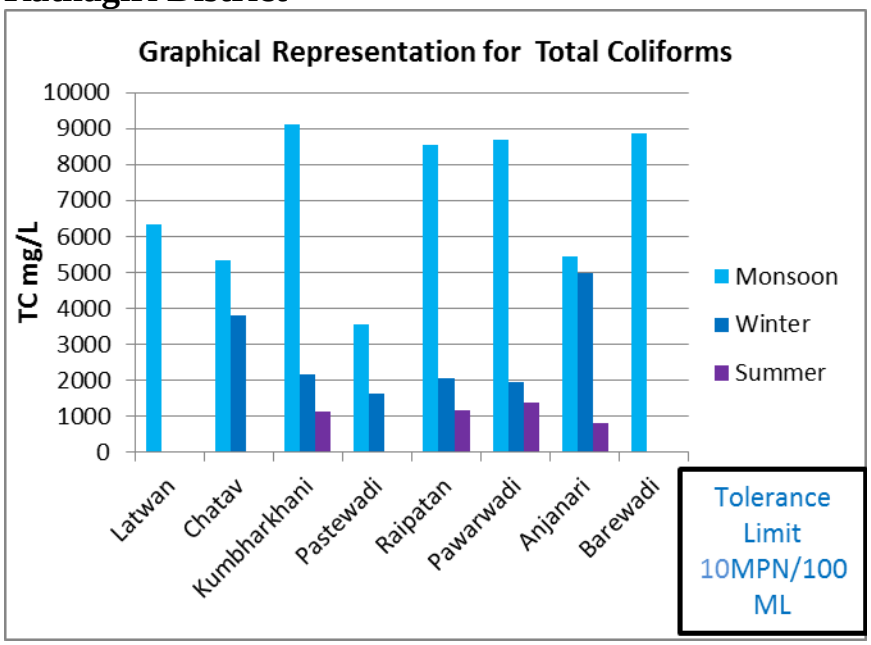
From the above graph it is observed that, Total coliform count of all station is high than tolerance limit during all seasons.

3) Satara District



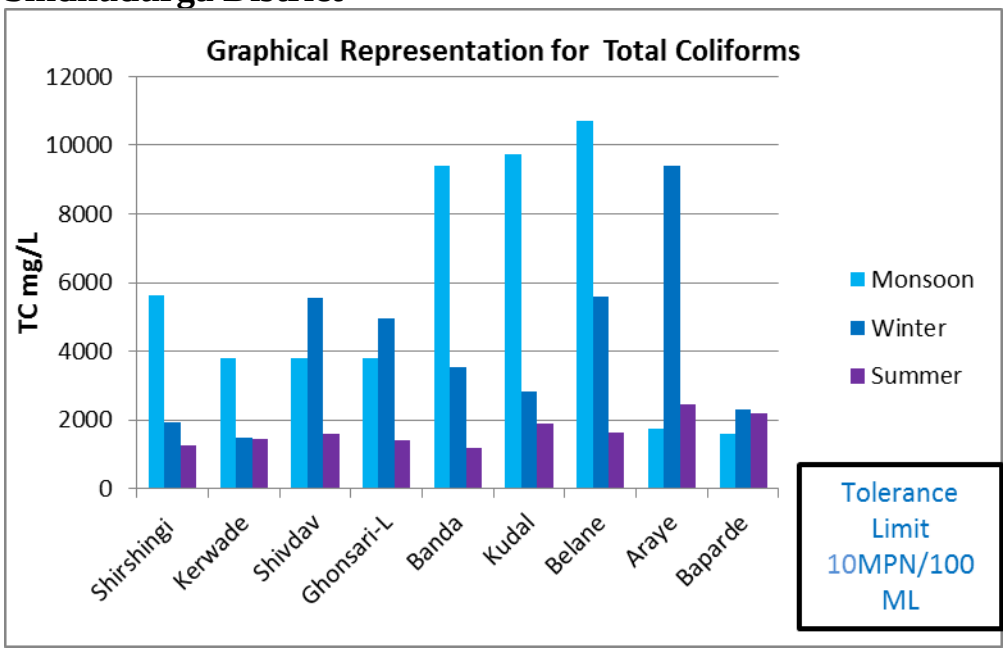
From the above graph it is observed that, Total coliform count of all station is high than tolerance limit during all seasons.

4) Ratnagiri District



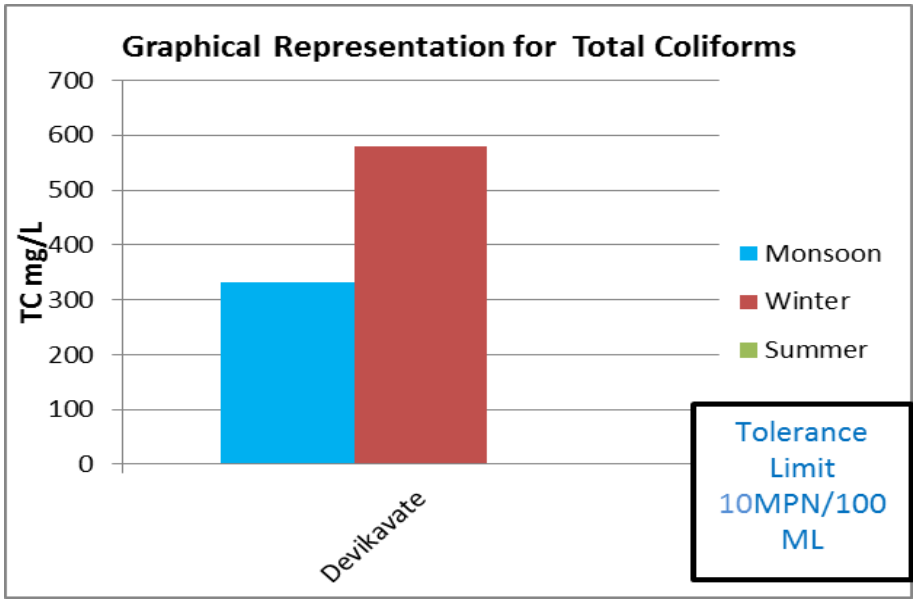
From the above graph it is observed that, Total coliform count of all station is high than tolerance limit during all seasons.

5) Sindhudurga District



From the above graph it is observed that, Total coliform count of all station is high than tolerance limit during all seasons.

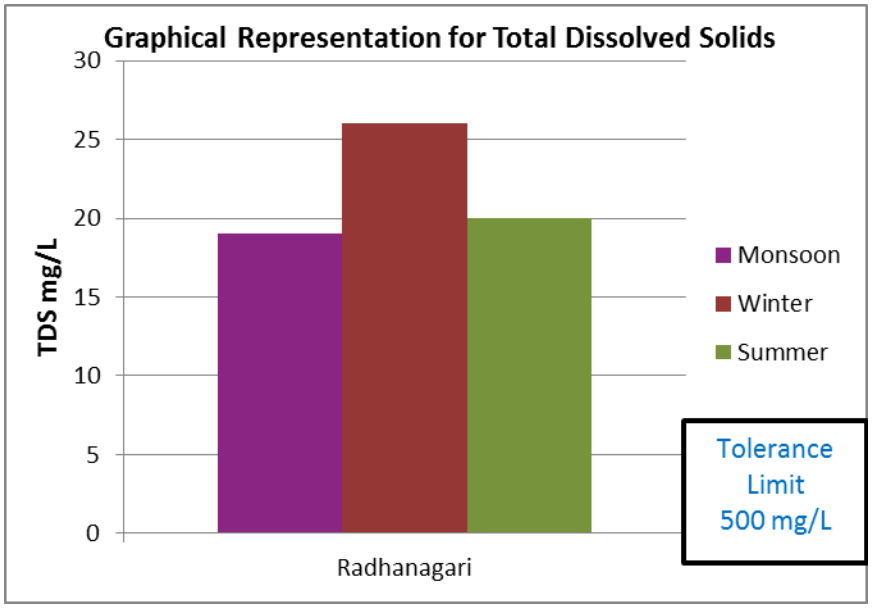
6) Solapur District



From the above graph it is observed that, Total coliform count of all station is high than tolerance limit during all seasons.

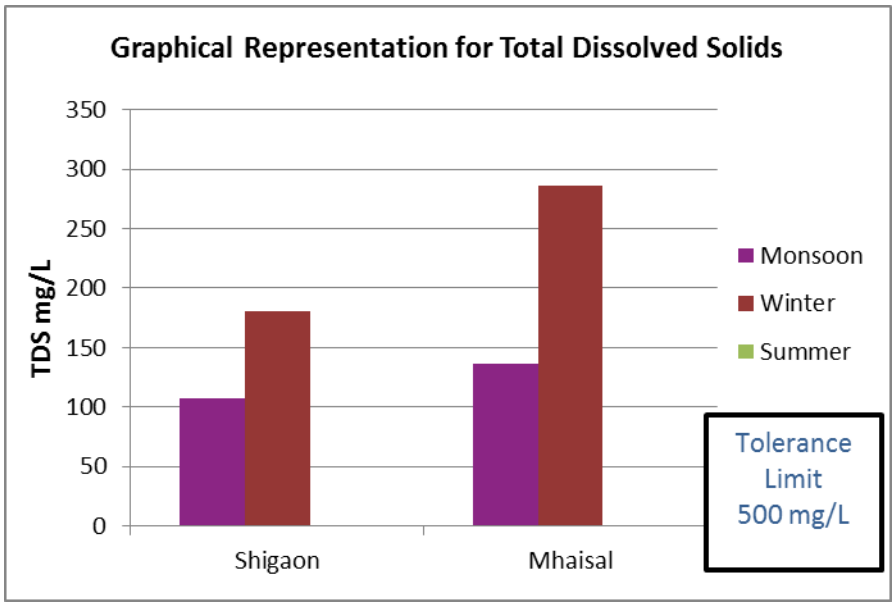
F) Total Dissolved Solids (TDS)

1) Kolhapur District



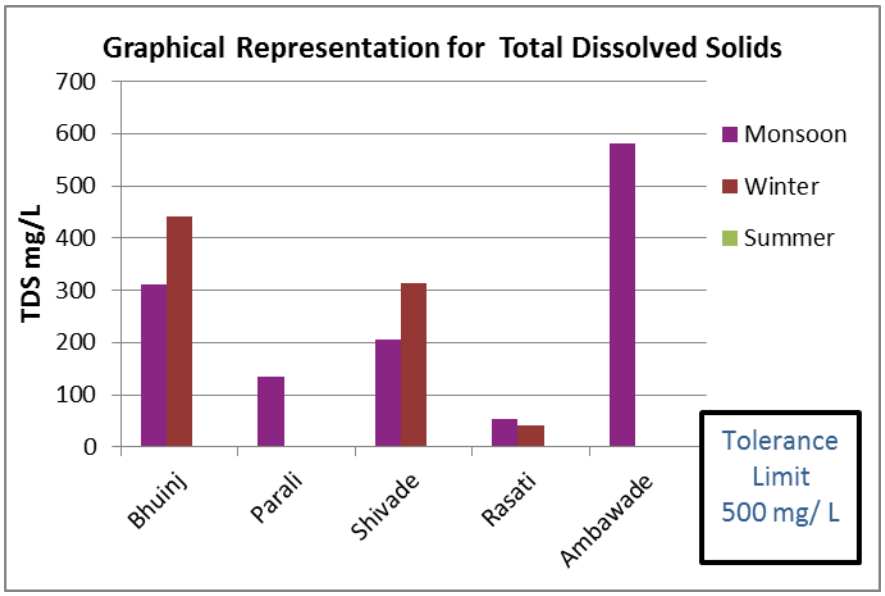
From the above graph it is observed that, TDS level of Radhanagari station is within desirable limit during all seasons.

2) Sangli District



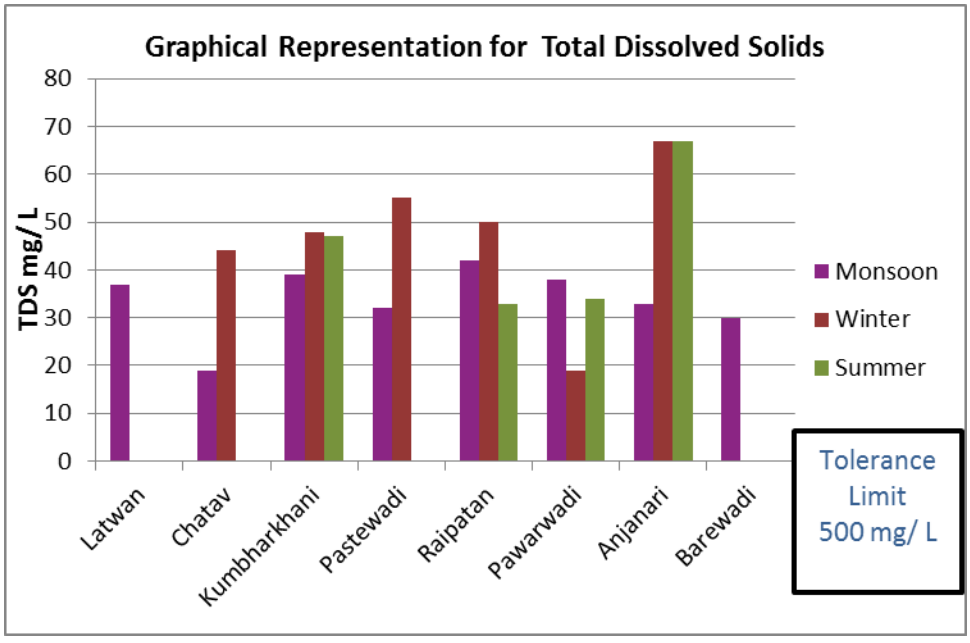
From the above graph it is observed that, TDS level of all the station is within desirable limit during all the seasons.

3) Satara District



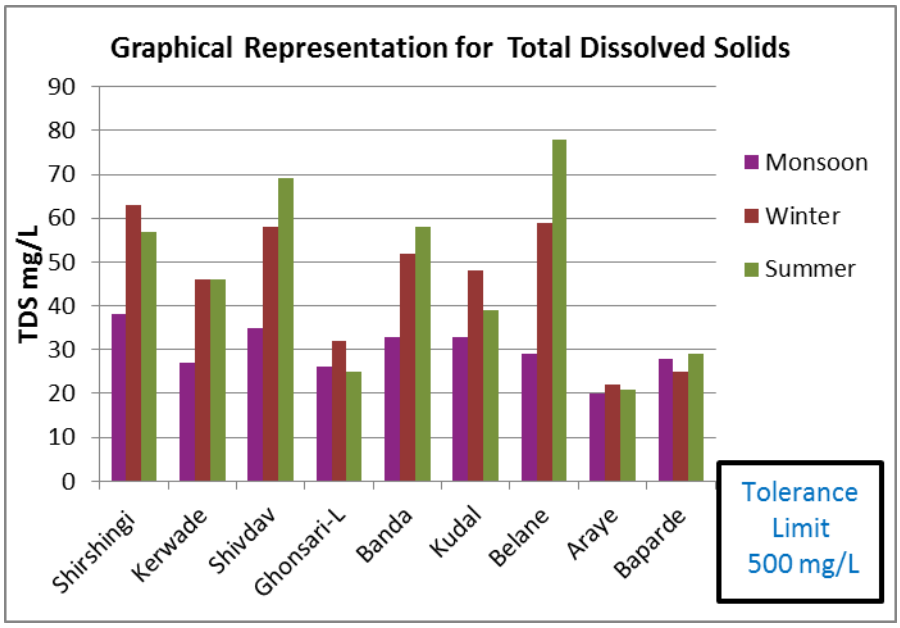
From the above graph it is observed that, TDS level of all the station is within desirable limit during all the seasons.

4) Ratnagiri District



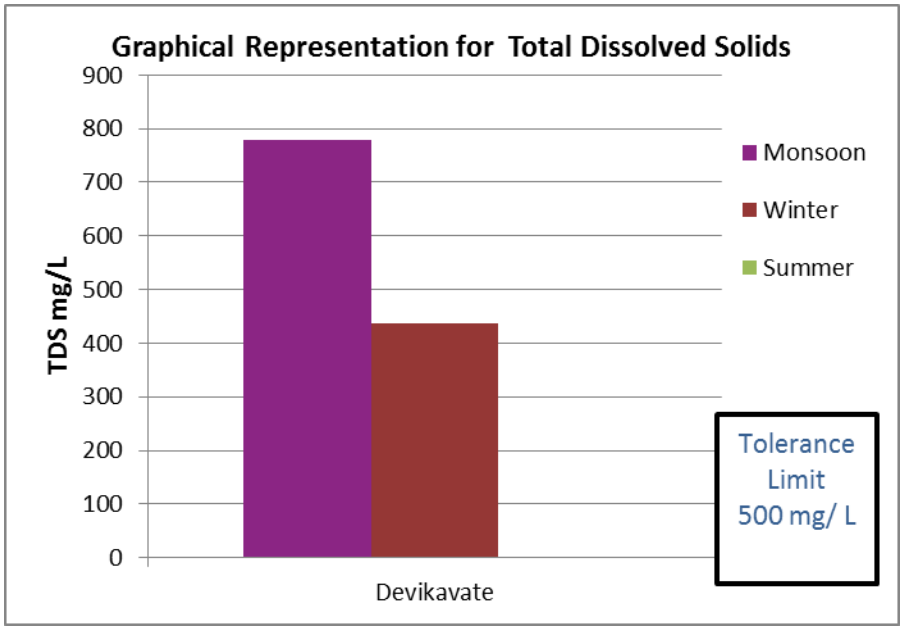
From the above graph it is observed that, TDS level of all the station is within desirable limit during all the seasons.

5) Sindhudurga District



From the above graph it is observed that, TDS level of all the station is within desirable limit during all the seasons.

6) Solapur District



From the above graph it is observed that, TDS level of all the station is within desirable limit during all the seasons.

CHAPTER – V

Conclusion

Chapter - 5

CONCLUSION

Conclusion For 2013 – 14

Many water quality parameters are used to reflect the impact of various impurities on selected water uses, as well as to quantify the extend of such impact of. Such water quality parameters may be either physical, chemical or biological.

From the previous chapter we concluded that, bacterial count of Ratnagiri district is very high than other stations during all season. This is an indicator of high organic pollution in the river body. Due to the human activity & release of industrial effluent in a river basins, it is very serious problem which dealing with this sites.

The Concentration of coliform bacteria of both faecal & non- faecal origin was found very high. This is a strong indicator of both urban pollution & discharge of city sewage in the water body.

Thus the water is not suitable for drinking purposes without any conventional treatment & disinfection.

REMEDIAL MEASURS

- For Industrial effluent & sewage water give treatment before discharge into river body.
- Use of such water for salt tolerance crop is recommended based on special study.
- Avoid human activities like cattle washing, bathing etc. in river basins.
- Awareness in local people about river water pollution.
- Classification of source may be as per use of water for irrigation based on Sodium Absorption Ratio, Percent Sodium, and Residual Sodium Carbonate.

CHAPTER – VI

Other Activities

Chapter - 6

Other Activities

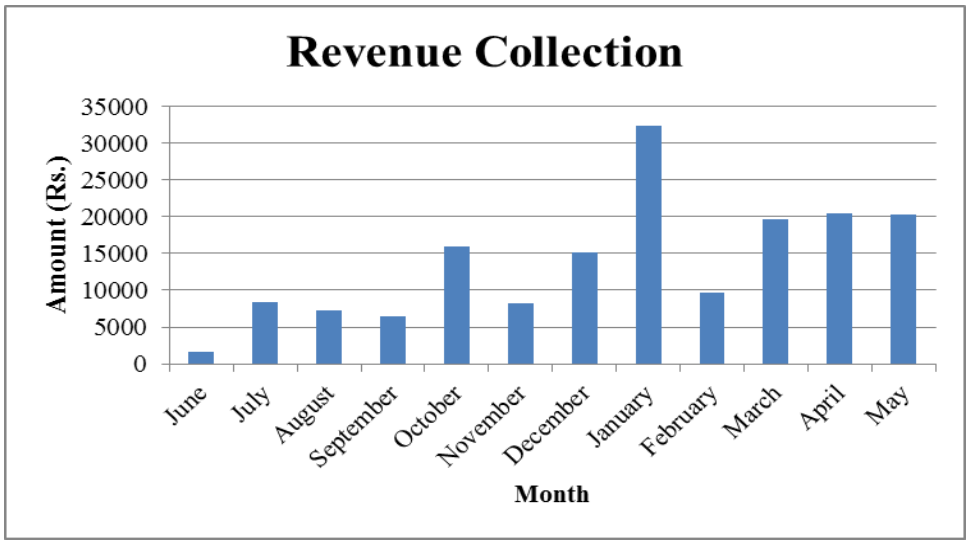
6.1 REVENUE GENERATION TO GOVERNMENT OF MAHARASHTRA

Apart from monitoring of water quality network for Water Quality lab level II at Kolhapur, the infrastructure facility is made available to the users from various Government, Non-Government, as well as individuals.

The revenue collected in this lab during the water year 2012-2013 is as follows.

Sr. No	Month	Amount
1.	June	1580
2.	July	8315
3.	August	7218
4.	September	6436
5.	October	16001
6.	November	8154
7.	December	15126
8.	January	32326
9.	February	9735
10.	March	19740
11.	April	20470
12.	May	20344
	Total Amount	**1,65,445/-**

Graphical Representation for Revenue Collection



CHAPTER – VII

Annexure

List Of Cilent 2013-2014

Sr. No.	Name Of Client	Purpose
1.	Ichalkaranji Nagarparishad (STP)	Industrial Purpose
2.	Kolhapur Irrigation Division, Kolhapur	Irrigation Purpose
3.	Mr. Dhananjay Shamraov Narvekar, Kolhapur	Drinking Purpose
4.	Mr. Sambhaji Patil. Kerale	Drinking Purpose
5.	Prof. Ravindr Maruti Garud Ichalkaraji	Study Purpose
6.	Aadhar Nursing Home Kolhapur	Drinking Purpose
7.	Mr. Aditay Kebudkar, Shivaji Uni. Kolhapur	Study Purpose
8.	Kolhapur Irrigation Division, Kolhapur	Irrigation Purpose
9.	Miss. Monica J. Bhosale Shivaji University, Kolhapur	Study Purpose
10.	Gram Pani Poshan Arogay va Swachata Samiti Vadgaon.	Drinking Purpose
11.	Caspro Metal Industries MIDC Shiroli, Kolhapur	Drinking Purpose
12.	Dudhaganga Canal Dv. No. 1, Kolhapur	Drinking & Irrigation Purpose
13.	Patankar Hospitality Pvt. Ltd. Kolhapur	Industrial Purpose
14.	Hotel Tourist Kolhapur	Industrial Purpose
15.	Mr. Mahesh Kolhal Shivaji University Kolhapur	Study Purpose
16.	Mr. Rushikesh S. Patil Shivaji University Kolhapur	Study Purpose
17.	Mr. Rohit D. Wanave Shivaji University Kolhapur	Study Purpose
18.	Mr. Chetan Magdum Kolhapur	Drinking Purpose
19.	Mr. Namdev A. Mirajkar Karnataka	Industrial Purpose
20.	Podar International School Kolhapur	Drinking Purpose

Quality Policy

We at Water Quality Lab – Level II are committed to provide services for all interested parties as per their need & expectations to achieve total customer satisfaction.

This shall be achieved through continual improvement in all process and service quality with the help of implementation of QMS as per the ISO 9001 : 2008

(Er. S.D. Raval)
Executive Engineer
Hydrology Project Division,
Pune

Management ensures that the Quality Policy:

a) Is appropriate to the purpose of the organization,
b) Includes a commitment to comply with requirements and continually improve the effectiveness of the Quality Management System,
c) Provides a framework for establishing and reviewing Quality Objectives,
d) Is communicated through display and understood within the organization, and
e) Is reviewed in each MRM for continuing suitability.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD South Asia

CERTIFICATE

The Certification Body
of TÜV SÜD South Asia Private Limited

certifies that

Water Quality Lab.Level-II
Opp. Shivaji University, Near Rajaram Tank,
Kolhapur - 416 006, INDIA

has established
and applies a Quality Management System for

Services for Water Testing & River Water Monitoring for Water Quality

An audit was performed, Report No. **20055703**
Proof has been furnished that the requirements according to
ISO 9001 : 2008
are fulfilled. The certificate is **Valid until 2015-09-21**
Subject to successful completion of the **Annual Audit before 2015-06-06**
The present status of this Certificate can be obtained on www.tuv-sud.in
Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the certification body

Certificate Registration No. **99 100 11168**

Mumbai

Effective Date: 2014-05-15

Certification Body
of TÜV SÜD South Asia Private Limited
Member of TÜV SÜD Group

TÜV SÜD ISO 9001 NABCB QM011

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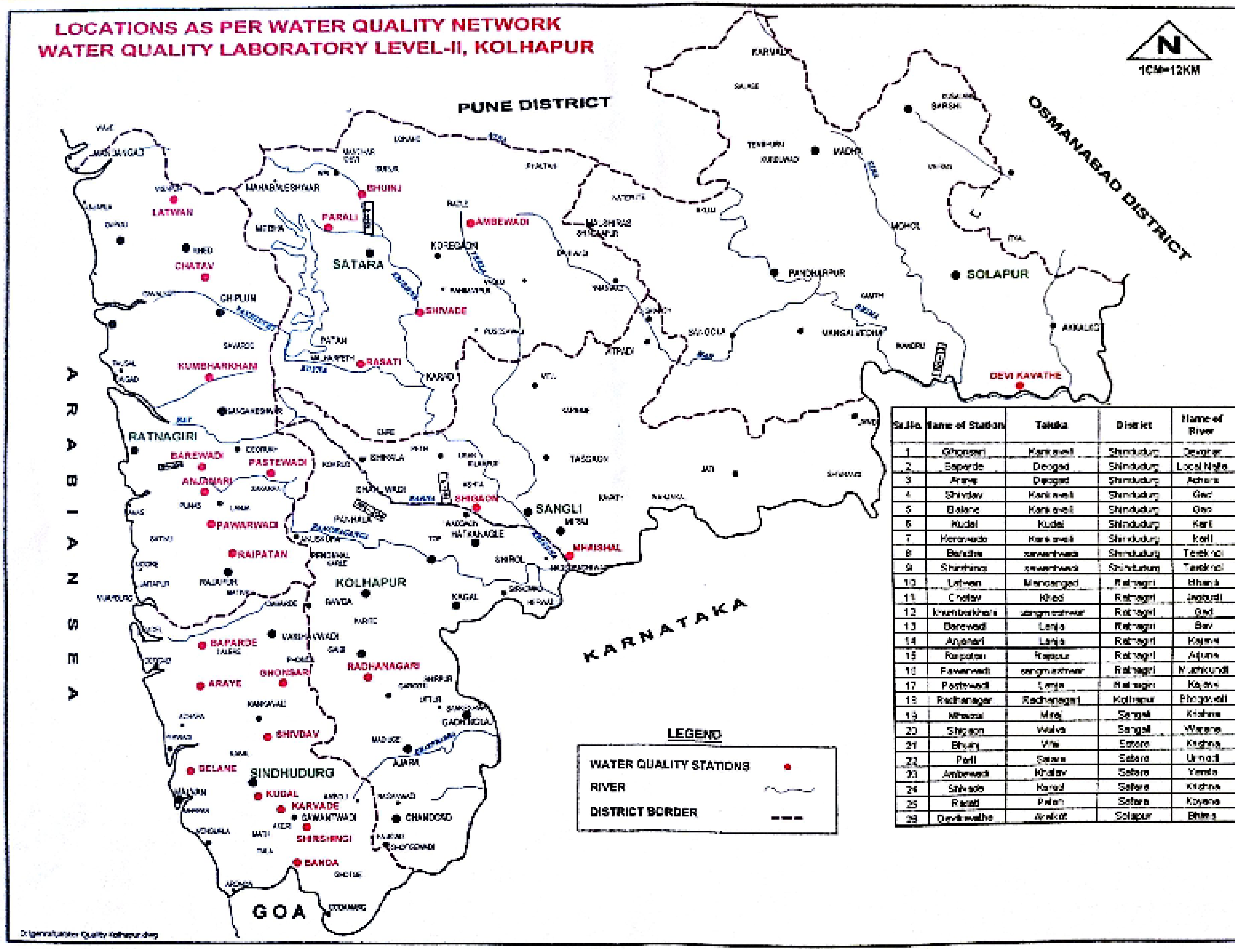

Sr.No.	Name of Station	Taluka	District	Name of River
1	Ghonsari	Kankavli	Shindudurg	Devgad
2	Baparde	Deogad	Shindudurg	Local Nalla
3	Araye	Deogad	Shindudurg	Achara
4	Shivdav	Kankavli	Shindudurg	Gad
5	Belane	Kankavli	Shindudurg	Gad
6	Kudal	Kudal	Shindudurg	Karli
7	Karvade	Kankavli	Shindudurg	Karli
8	Bandha	sawantwadi	Shindudurg	Terekhol
9	Shirshingi	sawantwadi	Shindudurg	Terekhol
10	Latwan	Mandangad	Ratnagiri	Bharja
11	Chatav	Khed	Ratnagiri	Jagbudi
12	Khumbharkhani	sangmeshwar	Ratnagiri	Gad
13	Barewadi	Lanja	Ratnagiri	Bav
14	Anjanari	Lanja	Ratnagiri	Kajavi
15	Raipatan	Rajapur	Ratnagiri	Arjuna
16	Pawarwadi	sangmeshwar	Ratnagiri	Muchkundi
17	Pastewadi	Lanja	Ratnagiri	Kajavi
18	Radhanagar	Radhanagari	Kolhapur	Bhogawati
19	Mhaisal	Miraj	Sangali	Krishna
20	Shigaon	Walva	Sangali	Warana
21	Bhuinj	Wai	Satara	Krishna
22	Parli	Satara	Satara	Urmodi
23	Ambewadi	Khatav	Satara	Yerala
24	Shivade	Karad	Satara	Krishna
25	Rasati	Patan	Satara	Koyana
26	Devikawathe	Akkalkot	Solapur	Bhima