PREFACE

"**Water**" is a prime natural resource and is considered as a precious national asset. It 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 Surface Water quality data in West Flowing Rivers South of Tapi Basin for the period of June 2013 to May 2014. The Independent rivers Damanganga, Vaitarna, Ulhas & Patalganga are included in this report. This report has been prepared by the agency M/s. E Solution Services, Nashik as the agency was awarded the contract for Operation and Maintenance of Water Quality Lab Level-II, Kalwa (Thane) for the said period. The data has been interpreted to know the affected locations.

Therefore it is a great pleasure to handing over this precise report on analysis of water samples carried out at WQ Laboratory Level – II at Kalwa (Thane).

The report attempts to briefly describe an over view and general conclusion based on the basis of water quality data of water samples collected from sampling locations as per approved network and as per defined frequencies for the reported period.

It is expected that this report will provide an idea in brief about Water Quality Laboratory Level-II at Kalwa (Thane). Our efforts can always be updated through valuable suggestions.

(S. L. Shete)
Sub Divisional Officer
Hydrology Project Sub Division
Kalwa (Thane)

(S.C. Bodhekar)
Executive Engineer
Hydrology Project Division
Kalwa (Thane)

I N D E X

CHAPTER 1
EXECUTIVE SUMMERY

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 location.

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, Kalwa (Thane) 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, Data Collection, Planning & Hydrology Circle, Nashik.

1.3 Water Quality Monitoring – Scope

The Annual Report is prepared for the period June 2013 to May 2014 of the water year 2013-2014. The Table below shows the number of samples analyzed during the reported period. In order to study water quality status location wise, all locations covered under this lab during the year 2013-14 are considered.

Table 1 Samples Analyzed during the reporting period

S. No.	Year	Trend Samples	Baseline Samples	Dam (Reservoir) Samples	Total
1	2013-14	84	0	36	**120**
Total Samples analyzed during reporting period					**120**

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, 21stEdition 2005.

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

Furthermore to get an idea about the 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.

1.5 Results and Observations:

After observing all this data it is clear that most of the chemical parameters are also within tolerance limits, except following parameters.

- All the physical parameters are within the acceptable limit as per IS 10500 drinking water quality standard at all location in all seasons except TDS at Made location in summer and winter season.
- All the chemical parameters are within the acceptable limit as per IS 10500 drinking water quality standard at all location in all seasons except Total Hardness, Calcium, Magnesium, Chloride and Boron at Made location in summer and winter location.
- Total Coliforms exceeding the acceptable limit as per IS 10500 drinking water quality standard at all location in all season. Due to discharge of sewage effluent into the water body.
- From the observations at Mande location, almost all parameters are exceeding the desired limit which indicates that at the upstream of this location there are a considerable source of pollution. i.e. non point source which is to be find out for further desired study.

1.6 Conclusion

From the results, 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 water body is an evidence of the anthropogenic activities in the catchments 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 locations should be restricted.

1.8 Suggestions:

- Awareness in community through local bodies, NGO's, Educational institutes.
- Water literacy shall be increased.
- All disciplines can come together for water awareness campaigning.
- Annual Report shall be published regularly.
- Lean flow in river shall be maintained.

CHAPTER 2
INTRODUCTION

2.1General

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 are recorded are utilized for preparing the Annual Report by performing some specific exercise. These data are 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.

2.2 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, Kalwa (Thane) 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

In order to study water quality status station wise, all locations covered under this lab during the period June 2013 to May 2014 are considered.

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

2.4 Other activities

Apart from monitoring of water quality network for Water Quality lab level II at Kalwa (Thane), the infrastructure facility is made available to the users from various Government, Non Government, Private sector as well as individuals.

The facility has been availed by users with testing of sample towards drinking purpose, construction purpose.

Since the laboratory has been established recently, the clients that have approached are very few and are mostly individuals. Efforts are being carried out to attract more clients such as Municipal Corporations, Industries, and Institutions etc.

During the period June 2013 to May 2014, some clients approached to the laboratory.

Total revenue of Rs. 20270/- has been generated during this period.

2.5 Salient Features :

1. General Structure of Laboratory:

1) Sampling Locations as per Water Quality Network covered in this Lab:-16

2) Monthly sample collection: June to October- 16 samples

November to May- 6 samples

3) Frequency of sampling: **Trend** – Monthly

Dam samples – Monthly

4) Govt. staff related to Laboratory:

Smt.S.C. Bodhekar Executive Engineer

Mr. S.L.Shete Sub Divisional Engineer

Mr. S.S.Dhavan (AE-II. & Govt. Analyst)

Mrs. S. S. Dhavan (C.E.A)

5) Lab operating Agency: E Solution Services

Agency staff related to Laboratory:

a) Indoor Work

1. Mrs. Vaishali Chunchuwar(Research Assistant)
2. Miss. Ranjana Kadu (Sr. Research Officer)
3. Miss. Megha Jaipurkar (Research Assistant)
4. Mr. Sanchit Kakade(Research Assistant)
5. Mr. Rahul (Lab. Assistant)

2. Scope of Work:

Operation and Maintenance of water Quality Laboratory Level-II, Kalwa(Thane)

Outdoor Work - Surface water 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.

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.

The Laboratory staff employed;

1. Chief Chemist: 1No.

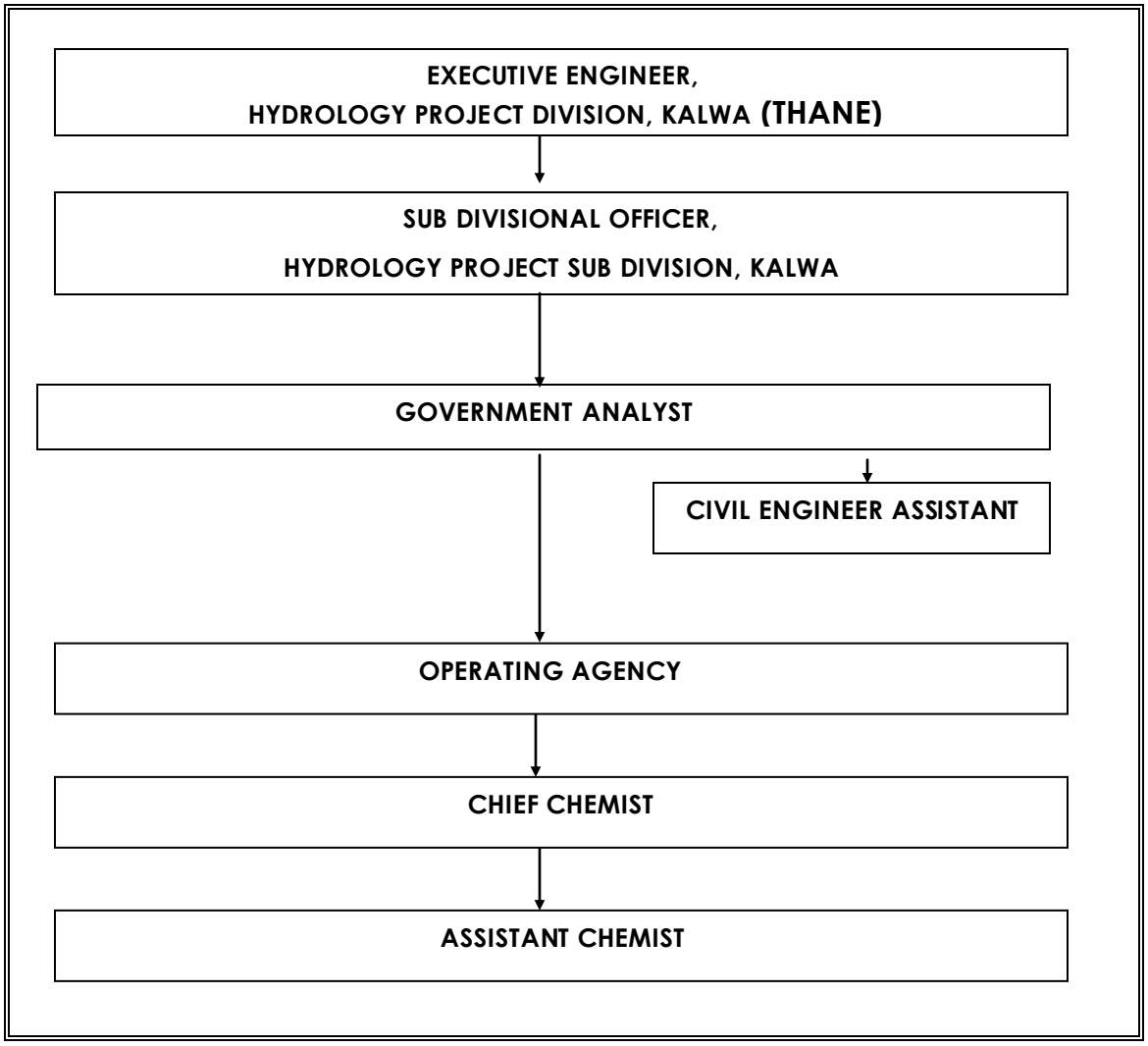
2. Sr. Research Officers: 1Nos.

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.

ORGANISATION CHART



CHAPTER 3
METHODOLOGY

3.1 General

This laboratory is for Surface Water analysis and the area covered during the period June 2013 to May 2014 is Damanganga, Vaitarna, Ulhas & Patalganga Rivers 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, Kalwa (Thane) 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 Datacenter 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 period June 2013 to May 2014 of the water year 2013-14. The Table below shows the number of samples analyzed during the reported period. In order to study water quality status location wise, all locations covered under this lab during the period June 2013 to may 2014 are considered.

Table 2Samples analyzed during the reporting period

S. No.	Year	Trend Samples	Baseline Samples	Dam (Reservoir) Samples	Total
1	2013-14	84	0	36	**120**
Total Samples analyzed during reporting period					**120**

The details of location wise samples analyzed are as below:

S. N.	Name of Station	Name of River	Jun 13	July 13	Aug. 13	Sept. 13	Oct. 13	Nov. 13	Dec. 13	Jan. 14	Feb. 14	Mar. 14	Apr. 14	May 14	Total
	Damanganga Sub-Basin														
1.	Khadkhad	Domihira	1	1	1	1	1	1	1	1	1	1	1	1	12
2.	Khadadi	Lendi	1	1	1	1	1								5
3.	Shindyachapada	Dhamni	0	1	1	1	1								4
	Vaitarna Sub-Basin														
1.	Waghivali	Galoba Nala	1	1	1	1	1								5
2.	Alman	Vaitrana	1	1	1	1	1								5
3.	Chinchara	Surya	1	1	0	1	1								4
4.	Kasa	Surya	1	1	1	1	1								5
5.	Surya Dam	Surya	1	1	1	1	1	1	1	1	1	1	1	1	12
	Ulhas Sub-Basin														
1.	Kambe	Ulhas	1	1	1	1	1	1	1	1	1	1	1	1	12
2.	Mande	Kalu	1	1	1	1	1	1	1	1	1	1	1	1	12
3.	Khapri	Kalu	1	1	1	1	1								5
4.	Bhatsa Dam	Bhatsa	1	1	1	1	1	1	1	1	1	1	1	1	12
	Patalganga Sub-Basin														
1	Hetawane Dam	Bhogeshwari	1	1	1	1	1	1	1	1	1	1	1	1	12
	Savitri Sub-Basin														
1	Bridge at Kal	Kal	1	1	1	1	1								5
2.	Kangule	Savitri	1	1	1	1	1								5
3.	Birwadi	Kal	1	1	1	1	1								5
TOTAL			15	16	15	16	16	6	6	6	6	6	6	6	120

a. **3.4 Flow Chart**

b. 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,21st Ed, 2005 as a standard procedures for analysis of samples.

FLOW CHART OF ANALYSIS OF HP WATER SAMPLES

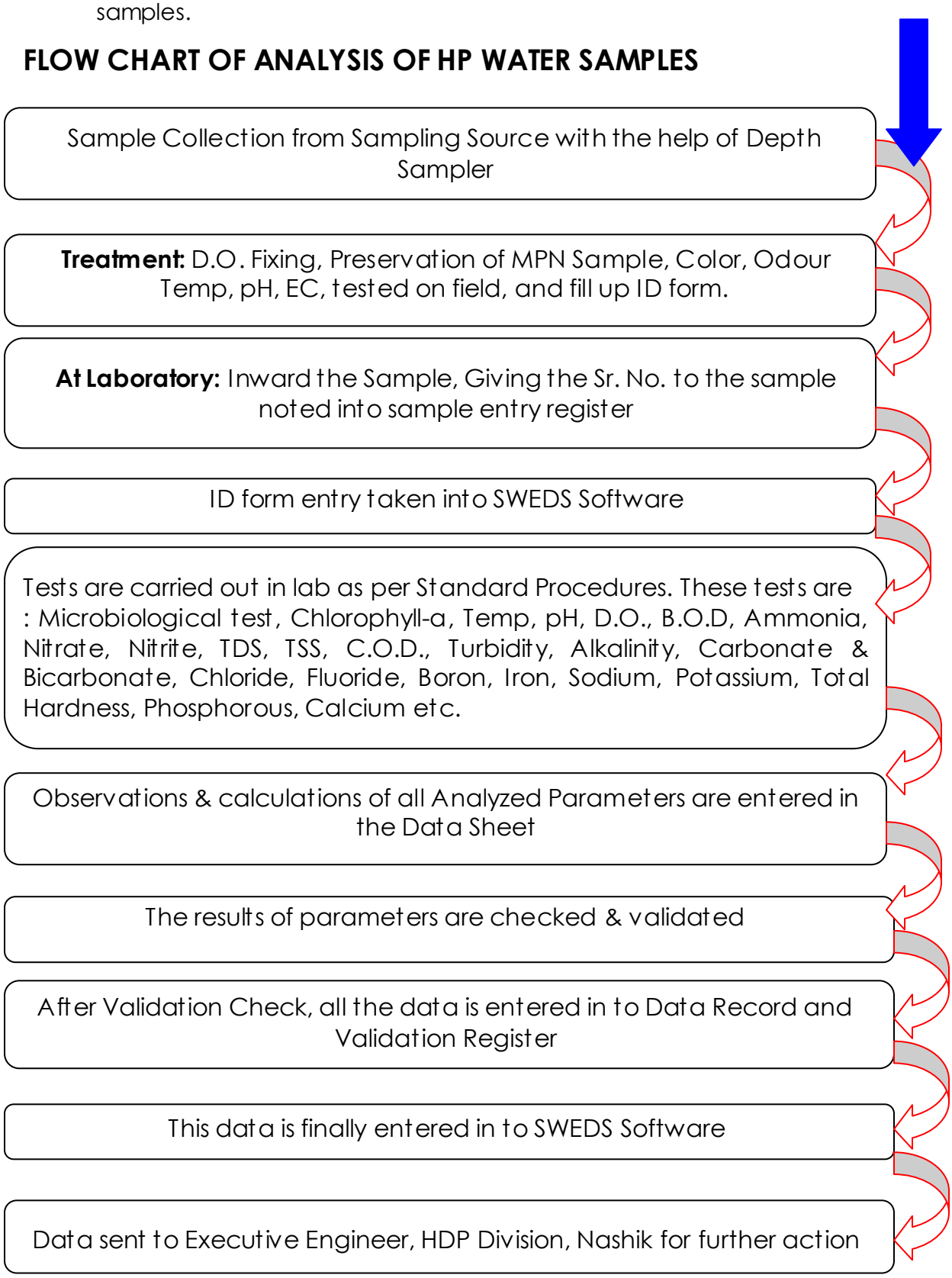


Table 3 List of parameters and the methodology used for the analysis.

S. 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.	Total 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.	Nitrite	APHA, 21st Ed., 2005, 4500-NO_2-B, 4-118
13.	Nitrate	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	IS 3025 (Part 45): 1993, Reaffirmed 2003, Amds.1
18.	Sodium	IS 3025 (Part 45):1993, Reaffirmed 2003, Amds.1
19.	Calcium	APHA, 21st Ed., 2005, 3500-B, 3-65
20.	Magnesium	APHA, 21st Ed., 2005, 3500-Mg, B, 3-84
21.	Iron	APHA, 21st Ed., 2005, 3111-B, 3-17
22.	Carbonate	APHA, 21st Ed., 2005, 2320-B, 2-27, 5 -1 & 4500-CO_2-D, 4-34
23.	Bicarbonate	APHA, 21st Ed., 2005, 2320-B, 2-27, 5 -3 & 4500-CO_2-D, 4-34
24.	Chloride	APHA, 21st Ed., 2005, 4500-Cl, B, 4-70
25.	Fluoride	APHA, 21st Ed., 2005, 4500-F^-, D, 4-85
26.	Boron	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

Table 4 No. of Location covered under the jurisdiction of Water Quality Lab Level-II, Kalwa (Thane) during the period June 2013 to May 2014

Sr. No.	Name of Station	Name of River	Frequency of sampling
Trend Samples			
1.	Khadkhad	Domihira	Monthly
2.	Kambe	Ulhas	Monthly
3.	Mande	Kalu	Monthly
4.	Waghivali	GalobaNala	Monthly
5.	Alman	Vaitrana	Monthly
6.	Kasa	Surya	Monthly
7.	Chinchara	Surya	Monthly
8.	Khapri	Kalu	Monthly
9.	Bridge at Kal	Kal	Monthly
10.	Kangule	Savitri	Monthly
11.	Birwadi	Kal	Monthly
12.	Khadadi	Lendi	Monthly
13.	Shindyachapada	Dhamni	Monthly
Reservoir Samples			
1.	Bhatsa Dam	Bhatsa	Fortnightly
2.	Surya Dam	Surya	Fortnightly
3.	Hetawane Dam	Bhogeshwari	Fortnightly

Table 5 Limits as per Drinking Water Standard IS 10500:2012

S. No.	Parameters	IS 10500:2012 Requirement (Acceptable Limit)	Units
1.	Colour	Max 5	Hazen Unit
2.	Odour	Agreeable	-
3.	Temperature	-	^{0}C
4.	Turbidity	1	NTU
5.	Total Suspended Solids	-	mg/L
6.	Total Dissolved Solids	500	mg/L
7.	pH value	6.5-8.5	
8.	Electrical Conductivity	-	µmho/ cm
9.	Biochemical Oxygen Demand (3 days, 27°C)	-	mg/L
10.	Chemical Oxygen Demand	-	mg/L
11.	Alkalinity (as $CaCO_3$)	200	mg/L
12.	Carbonates (as $CaCO_3$)	-	mg/L
13.	Bicarbonates (as $CaCO_3$)	-	mg/L
14.	Total Hardness(as $CaCO_3$)	200	mg/L
15.	Calcium (as Ca)	75	mg/L
16.	Magnesium (as Mg)	30	mg/L
17.	Chloride (as Cl)	250	mg/L
18.	Fluoride (as F)	1	mg/L
19.	Nitrate (as NO_3)	45	mg/L
20.	Nitrite (as NO_2)	-	mg/L

S. No.	Parameters	IS 10500:2012 Requirement (Acceptable Limit)	Units
21.	Total Phosphate (as P)	-	mg/L
22.	Sodium (as Na)	-	mg/L
23.	Potassium (as K)	-	mg/L
24.	Boron (as B)	0.5	mg/L
25.	Total Coliforms	Not detectable	MPN/ 100 ml

Table 6 CPCB Water Quality Criteria

Designated best use	Quality Class	Primary Water Quality Criteria
Drinking water source without conventional treatment but with chlorination	A	➢ Total coliform organisms (MPN/100 ml) shall be 50 or less ➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 6 mg/l or more, and ➢ Biochemical Oxygen Demand 2 mg/l or less
Outdoor bathing (organized)	B	➢ Total coliform organisms(MPN/100 ml) shall be 500 or less ➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 5 mg/l or more, and ➢ Biochemical Oxygen Demand 3 mg/l or less
Drinking water source with conventional treatment	C	➢ Total coliform organisms(MPN/100 ml) shall be 5000 or less ➢ pH between 6 and 9 ➢ Dissolved Oxygen 4 mg/l or more, and ➢ Biochemical Oxygen Demand 3 mg/l or less
Propagation of wildlife and fisheries	D	➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 4 mg/l or more, and ➢ Free ammonia (as N) 1.2 mg/l or less
Irrigation, industrial cooling, and controlled disposal	E	➢ pH between 6.0 and 8.5 ➢ Electrical conductivity less than 2250 micro mhos/cm, ➢ Sodium Absorption Ratio less than 26, ➢ and Boron less than 2 mg/l.
	Below E	➢ Not Meeting A, B, C, D & E Criteria

Table 7 Classification as per Wilcox Technique

S. No.	Parameter	Class	Range	Remark
1.	Electrical Conductivity	C1	<250	Good For Most Soils & Crops
		C2	250-750	Some Leaching For Sensitive Crop
		C3	750-2250	Tolerant Crops & Leaching
		C4	>2250	Only For Permeable Soils And Tolerant Crops
2.	SAR (Sodium Absorption Ratio)	S1	0-10	Excellent
		S2	10-18	Good
		S3	18-26	Fair
		S4	>26	Poor

Table 8 ICAR Standard for Irrigation Water

S. No.	Parameter	limit	Unit
1.	pH	6.5-8.5	-
2.	Electrical Conductivity	2250	
3.	Total Dissolved Solids	2100	mg/L
4.	Chloride	600	mg/L
5.	Sulphate	1000	mg/L
6.	Boron	2	mg/L
7.	% Sodium	60	%
8.	SAR (Sodium Absorbance Ratio)	26	-

CHAPTER 4

RESULTS AND OBSERVATIONS

4.1 Results and Conclusions

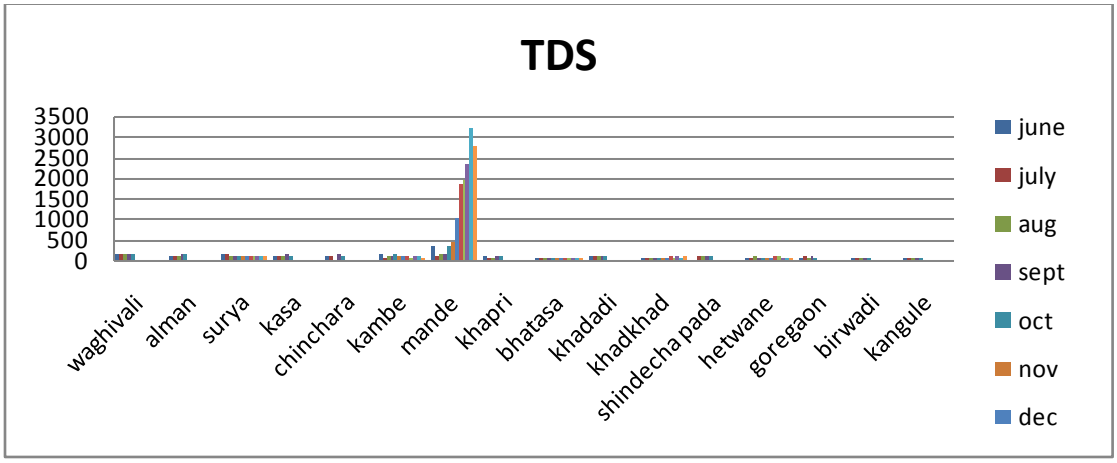
The water quality monitoring in the area of surface water is performed in order to determine the quality of water. Various parameters are analyzed in the laboratory and 6 parameters are tested at field level. All these tasks recorded are utilized for preparing the Annual Report by performing some specific 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 Critical parameters Identified

After observing all this data it is clear that most of the physical and chemical parameters are within acceptable limit of IS 10500 drinking water standard and CPCB Water Quality Criteria except at Mande location. Bacteriological parameters like Total Coliform and Fecal Colifroms are also exceeding the acceptable limit of IS 10500 drinking water standard at all locations.

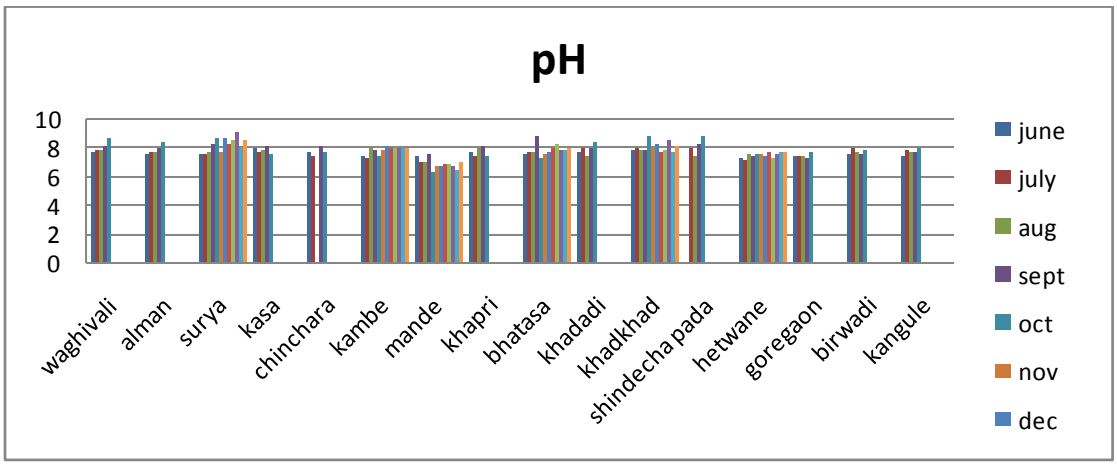
The obtained results are compared with acceptable limit of IS 10500 drinking Water Standard and CPCB Water Quality Criteria (A) as follows:

1. Total Dissolved Solids:



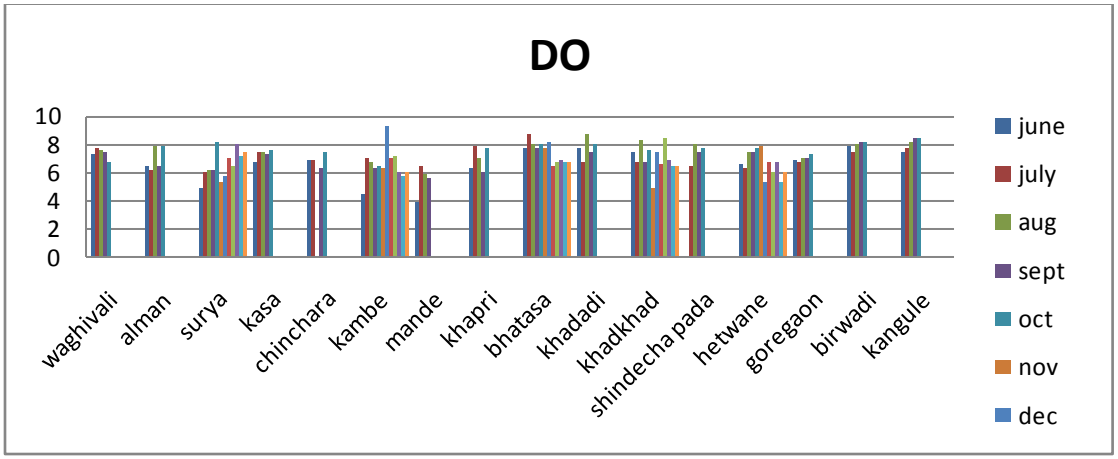
From the above graphical representation, it can be observed that the result of TDS exceeding the acceptable limit as per IS 10500 of Drinking Water Standard at Mande in summer and monsoon season and remaining all location showed results are within the limit at all location in all season.

2. pH:



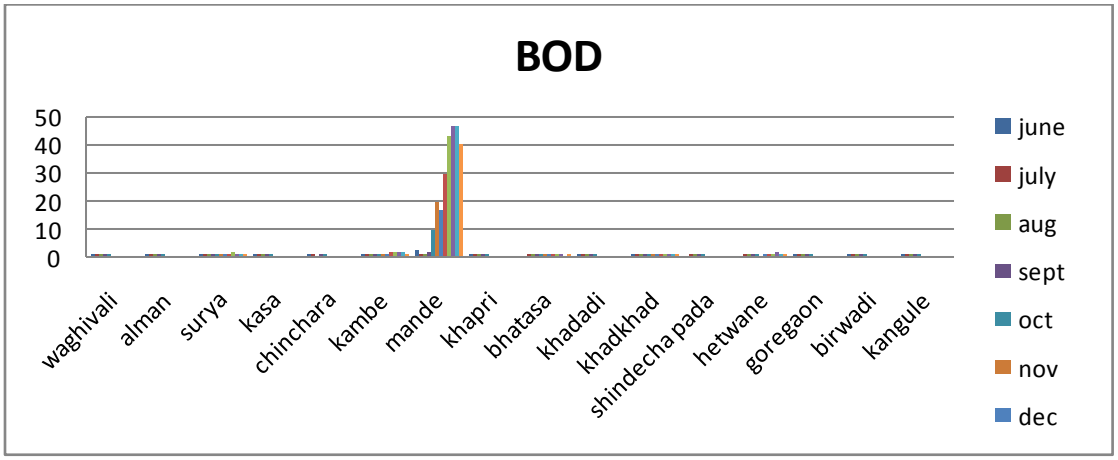
From the above graphical representation, it can be observed that the result of pH is within the acceptable limit as per IS 10500 of Drinking Water Standard at all location in all season.

3. Dissolved Oxygen:



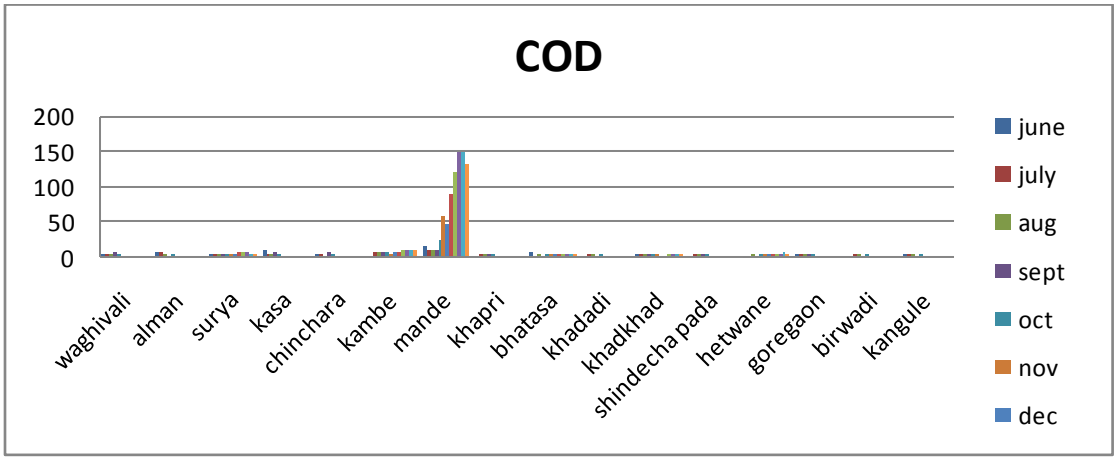
From the above graphical representation, it can be observed that the result of DO above the required limit as per the CPCB water quality criteria except Mande location in all season and Kambe in Summer season showed below the required limit of DO.

4. Biochemical Oxygen Demand:



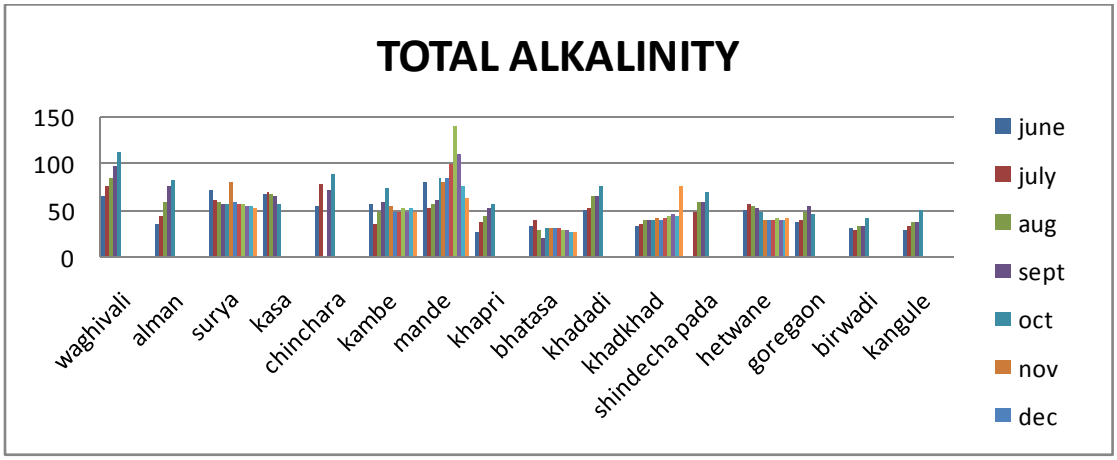
From the above graphical representation, it can be observed that the result of BOD exceeding the limit as per CPCB Water Quality Criteria class A at Mande in all season and remaining all location showed results are within the limit at all location in all season.

5. Chemical Oxygen Demand:



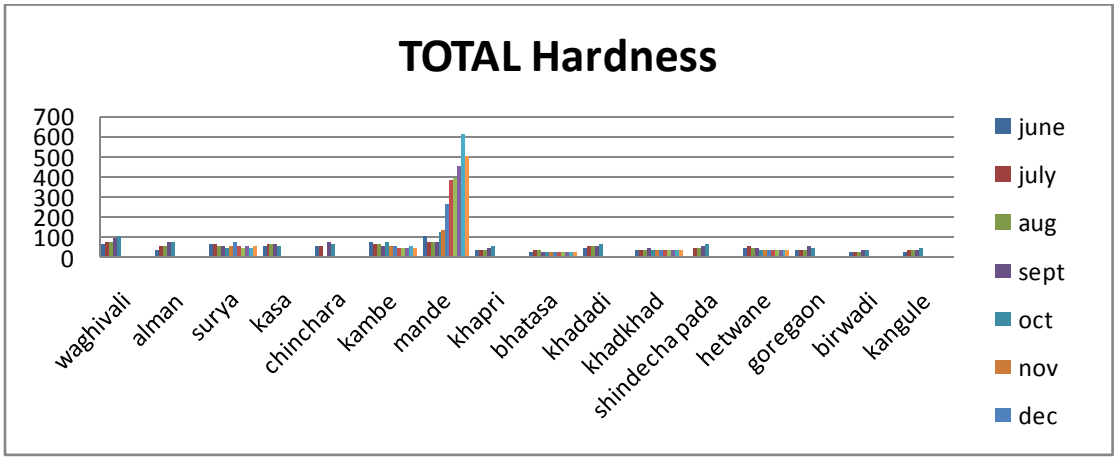
From the above graphical representation, it can be observed that the result of COD is higher at Mande location in all season as compared to other locations.

6. Total Alkalinity:



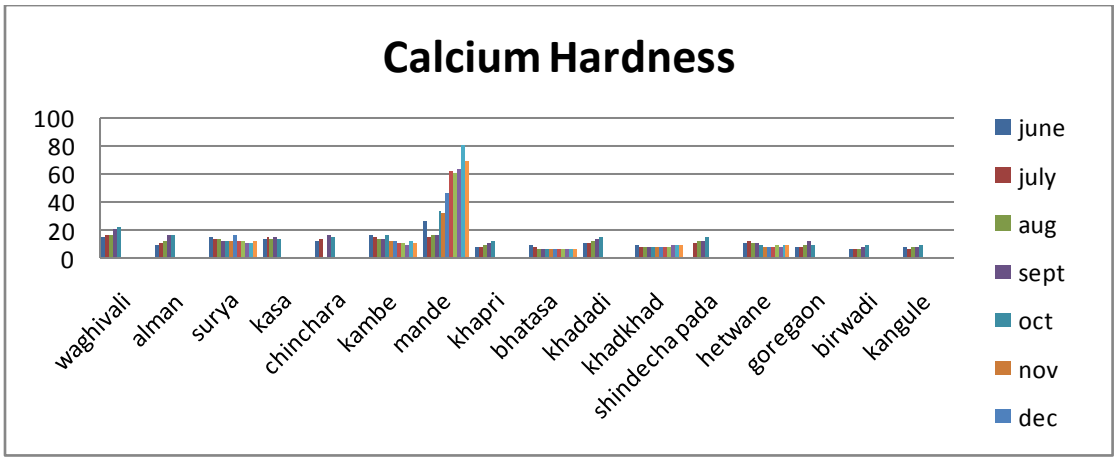
From the above graphical representation, it can be observed that the result of Total alkalinity is within the acceptable limit as per IS 10500 of Drinking Water Standard at all locations in all season.

7. Total Hardness:



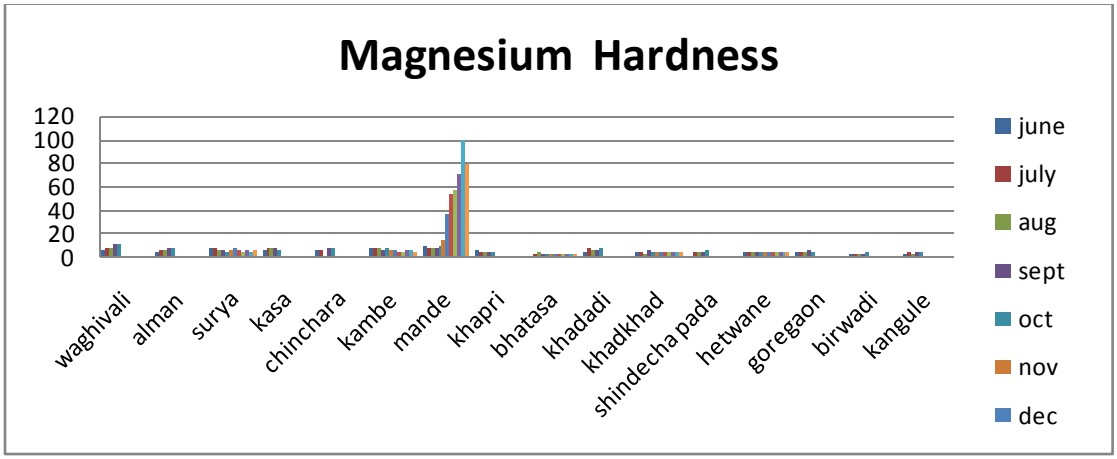
From the above graphical representation, it can be observed that the result of Total Hardness is exceeding the acceptable limit as per IS 10500 of Drinking Water Standard at Mande in summer and winter season and remaining all location showed results are within the limit at all location in all season.

8. Calcium:



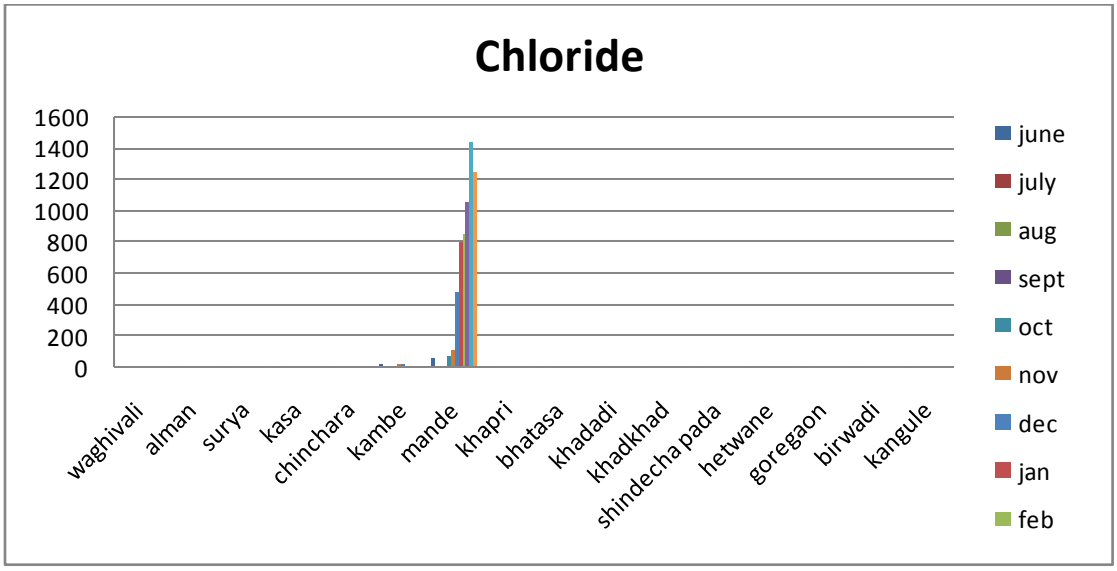
From the above graphical representation, it can be observed that the result of Calcium exceeding the acceptable limit as per IS 10500 of Drinking Water Standard at Mande in summer season and remaining all location showed results are within the limit at all location in all season.

9. Magnesium:



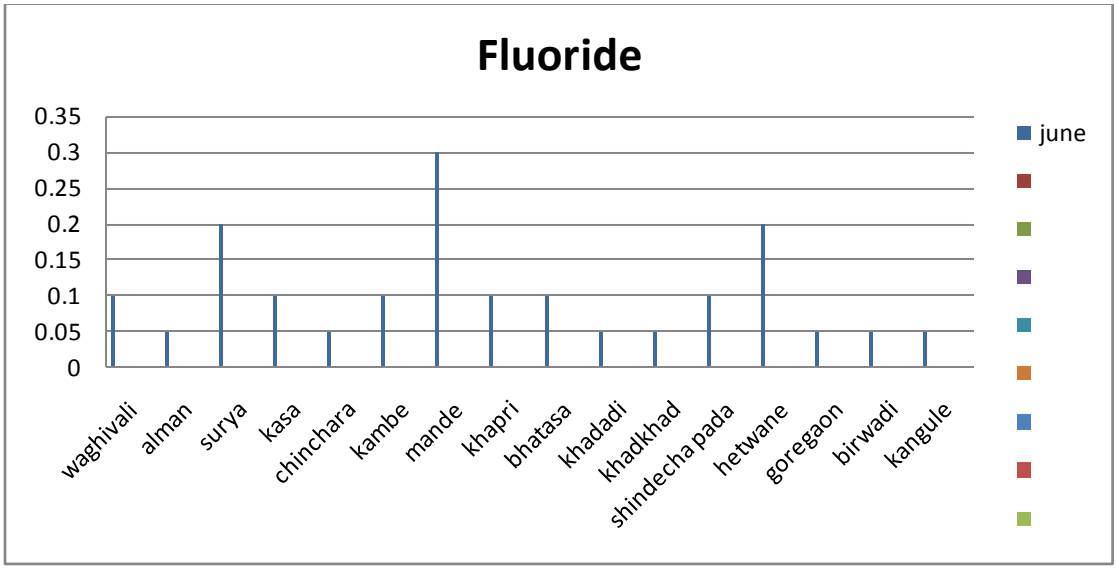
From the above graphical representation, it can be observed that the result of Magnesium exceeding the acceptable limit as per IS 10500 of Drinking Water Standard at Mande in summer season and remaining all location showed results are within the limit at all location in all season.

10. Chloride:



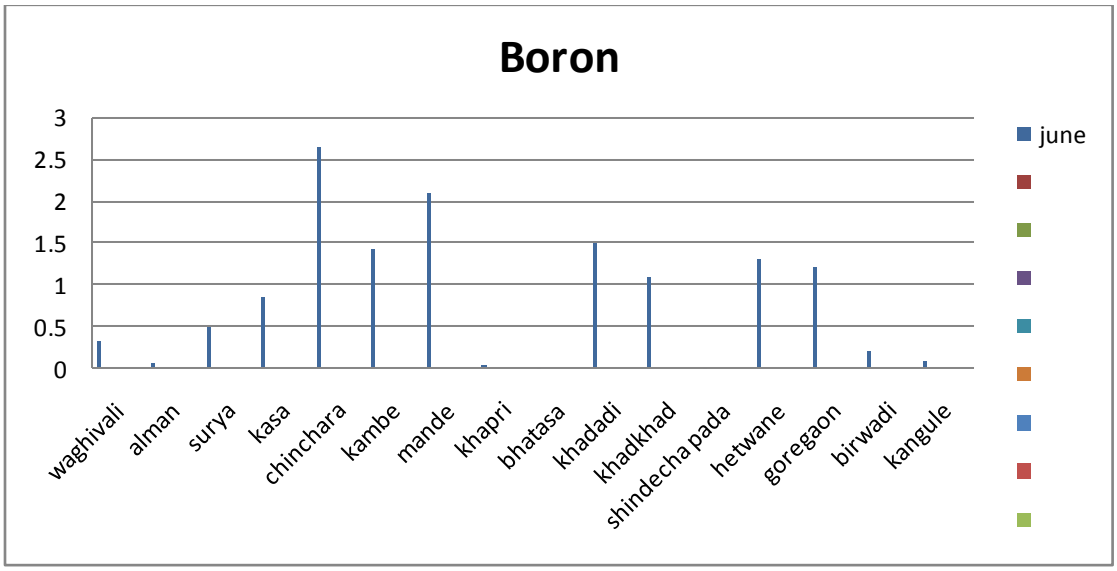
From the above graphical representation, it can be observed that the result of Chloride exceeding the acceptable limit as per IS 10500 of Drinking Water Standard at Mande in summer and winter season and remaining all location showed results are within the limit at all location in all season.

11. Fluoride:



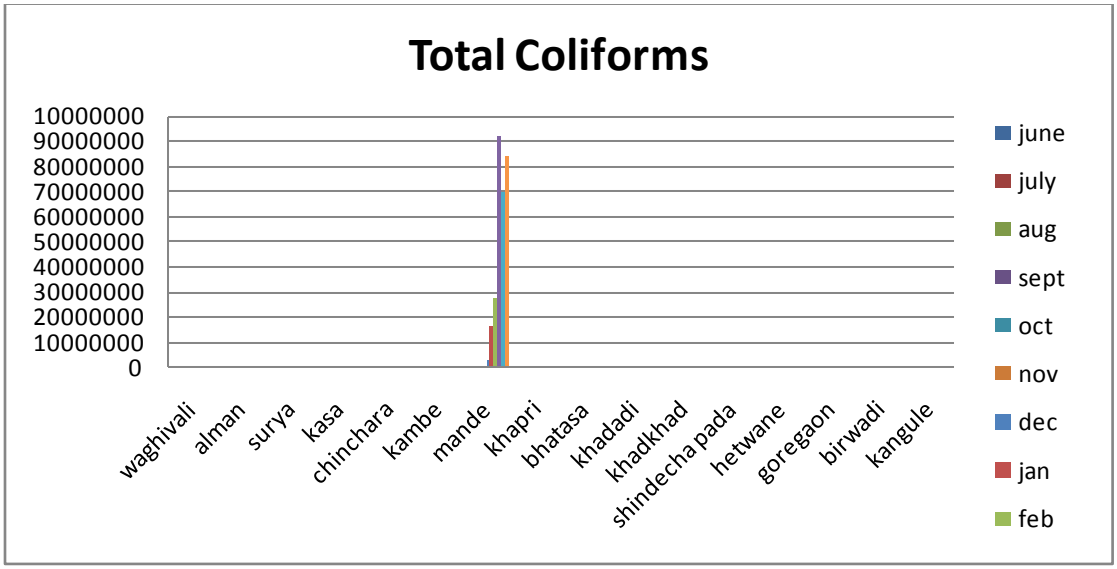
From the above graphical representation, it can be observed that the result of Fluoride within the acceptable limit as per IS 10500 of Drinking Water Standard at all location in all season.

12. Boron:



From the above graphical representation, it can be observed that the result of Boron exceeding the acceptable limit as per IS 10500 of Drinking Water Standard at Kambe, Mande, Kasa, Chinchara in summer season and Khadkhad, Mande, Chinchara, Kal Bridge, Khadadi and Hatwane dam at monsoon season and remaining all location showed results are within the limit at all location in all season.

13. Total Coliforms:



From the above graphical representation, it can be observed that the result of Total Coliforms are exceeding acceptable limit as per IS 10500 of Drinking Water Standard at all location in all season.

* data sheet attached separately in excel format

4.3 Water Quality classification for Irrigation purpose

The obtained result of river water classify on the basis of Wilcox technique considering the alkali hazards and salinity hazards the obtained results are tabulate

Table 9 Classification of location on the basis of Wilcox technique towards use of water for irrigation purpose

S. No.	Name of Location	Classification As per Wilcox Technique	Remarks
I. Damanganga Sub-Basin			
1	Khadkhad	C1 & S1	A
2	Khadadi	C1 & S1	A
3	Shindyachapada	C1 & S1	A
II. Vaiterna Sub-Basin			
1	Waghivali	C1 & S1	A
2	Alman	C1 & S1	A
3	Chinchara	C1 & S1	A
4	Kasa	C1 & S1	A
5	Surya	C1 & S1	A
III. Ulhas Sub-Basin			
1	Khapri	C1 & S1	A
2	Mande	C4 & S1	C
3	Kambe	C1 & S1	A
4	Bhatsa	C1 & S1	A
IV. Patalganga Sub-Basin			
1	Hetawane	C1 & S1	A
V. Savitri Sub-Basin			
1	Goregaon	C1 & S1	A
2	Kangule	C1 & S1	A
3	Birwadi	C1 & S1	A

Note: A: Water is Good for Irrigation Purpose.

B: Water is Suitable for Irrigation Purpose.

C: Water is suitable for Salt Tolerant Plant.

D: Inadequate data and no flow in the river

Table 10 Observation on the basis of various disciplines criteria

		Quality class and suitability of water as per….	
S. No.	**River**	**ICAR Standard**	**IS 10500**
1.	Damanganga	Suitable for irrigation.	Critical parameters: Coliforms
2.	Vaiterna	Suitable for irrigation.	Critical parameters: Coliforms
3.	Ulhas	Suitable for irrigation except Mande	Critical location Mande At other locations Critical parameter: Coliforms
4.	Patalganga	Suitable for irrigation.	Critical parameters: Coliforms
6.	Savitri	Suitable for irrigation.	Critical parameters: Coliforms

Table 11 Abstract for classification of water towards Irrigation purpose

S. No.	Good for Irrigation (A)	Suitable for Irrigation (B)	Suitable for Salt Tolerant Plant (C)	Inadequate Data (D)	Total
1	15	-	1	-	16

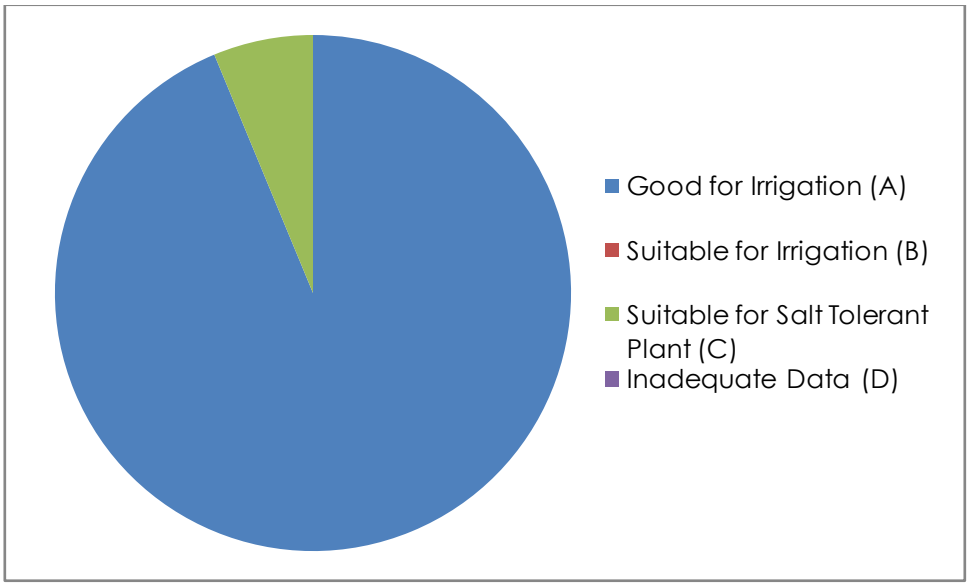


Figure 1 Pie chart for classification of water towards irrigation purpose

Chapter 5
CONCLUSION

The results were obtained from analysis are compared with the various standard on the basis of usage of water. For the drinking purpose the water compared with the IS 10500 drinking water standard and CPCB water quality criteria and for irrigation purpose the results are compared with ICAR standard and classify as per the Wilcox technique and the conclusions are:

- All the physical parameters are within the acceptable limit as per IS 10500 drinking water quality standard at all location in all seasons except TDS at Made location in summer and winter season.
- All the chemical parameters are within the acceptable limit as per IS 10500 drinking water quality standard at all location in all seasons except Total Hardness, Calcium, Magnesium, Chloride and Boron at Made location in summer and winter location.
- Boron exceeding the acceptable limit as per IS 10500 drinking water quality standard in summer and monsoon at Khadkhad, Kambe, Mande, ChincharaKhadadi.
- Total Coliforms exceeding the acceptable limit as per IS 10500 drinking water quality standard at all location in all season. Due to discharge of sewage effluent into the water body.
- The water analysis results compared the CPCB water quality criteria except Mande location all chemical parameters are within the limit.
- The water analysis results compared the CPCB water quality criteria all locations showed exceeding the limit of bacteriological parameters.
- The location Mande identified as critical polluted. Mande locations showed exceeding the almost all parameters. It may be point source of discharge of domestic and industrial effluent.
- Water analysis results are compared with the ICAR standard all locations are suitable for irrigation purpose except Made location.

- As per Wilcox technique water classify as good for irrigation at all location except Mande location.
- Mande classify as suitable for salt tolerant plant as per Wilcox technique.

REMEDIAL MESAURES:

- Use of such water for salt tolerance crop is recommended based on special study.
- Before letting out to the down stream reservoir such source of water to be taken into consideration for the specific use.
- Classification of source may be as per use of water for irrigation based on Sodium Absorption Ratio, Percent Sodium, and Residual Sodium Carbonate.
- Effluent from non point sources to be treated before discharging into the river.
- Use of direct source of water to be avoided.
    - Bathing at such location should be restricted.

OTHER ACTIVITIES

6.1 REVENUE GENERATION TO GOVERNMENT OF MAHARASHTRA

Apart from monitoring of water quality network for Water Quality lab level II at Kalwa (Thane), the infrastructure facility is made available to the users from various Government, Non Government, Private sector as well as individuals.

The facility is availed by many users with testing of sample towards drinking purpose, STP purpose.

During the period June 2013 to May 2014, some clients approached to the laboratory.

Total revenue of Rs. 20270/- has been generated during this period.

Photographs