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GOVERNMENT OF MAHARASHTRA
WATER RESOURCES DEPARTMENT

HYDROLOGY PROJECT (SW)

ANNUAL REPORT

WATER QUALITY LABORATORY LEVEL-II PUNE
YEAR 2012

SUPERINTENDING ENGINEER
DATA COLLECTION, PLANNING & HYDROLOGY CIRCLE,
NASHIK

EXECUTIVE ENGINEER,
HYDROLOGY PROJECT DIVISION, PUNE-1

PREFACE

Water quality has become an important issue for policy makers in the Government both at the Central and the State level. Water is for sure the only common and global issue that interests all the living bodies of the world including humans, flora and fauna. Without water, survival is not possible. The two components of water are namely quality and quantity. As the amount of usable water differs from country to country, place to place, season to season, water shortage is experienced in some countries. It is well known that water resources are not equally distributed according to population densities among the countries. Water resources are polluted especially through human induced activities. Another portion of water is lost during transmission due to lack of efficient and proper infrastructure. Thus, pollution of water resources leads to serious sanitary problems. 1/5th of the world's population that accounts to approximately 1.1 billion people is under the risk of water related diseases, and moreover each year many people die as they do not have safe drinking water. The main reason of this fact is lack of adequate infrastructure rather than water scarcity.

This report includes water quality data about Rivers Krishna, Bhima and its Tributaries in Maharashtra for the period of June 2011 to May 2012 analyzed by the agency M/s. Mahabal Enviro Engineers Pvt. Ltd. and reviewed by Water Resources Department. The contract towards Operation and Maintenance of Water Quality Lab Level-II, Pune for the said period is awarded to above agency. 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 analyzed at WQ Laboratory Level – II at Pune which is under Hydrology Project Sub-Division, Pune.

This Annual Report attempts to briefly describe an overview and general conclusion based on the basis of water quality data of water samples collected from selected locations for predefined frequencies for the reported period. This report also provides an idea in brief about Water Quality Lab. Level - II at Pune. Our efforts can always be updated through valuable suggestions.

Sub-Divisional Engineer
Hydrology Project Sub-Division
Pune-06

Executive Engineer
Hydrology Project Division
Pune-01

Annual Report on
Water Quality Monitoring through Water Quality Lab Level-II, Pune for the Year 2011- 2012

I N D E X

Chapter I

EXECUTIVE SUMMARY

CHAPTER-1

EXECUTIVE SUMMERY

Annual Report on
Water Quality Monitoring through Water Quality Lab Level-II, Pune

1.1 Preamble:

Water is 'life'. It is one of the fundamental needs on the globe. Water is probably the only natural resource to touch all aspects of human civilization from agricultural and industrial development to cultural and religious values embedded in society.

The total water amount on the earth is about 1.35 billion cubic kilometers. About 97.1 % has been locked into oceans as saltwater. Ice sheets and glaciers have arrested 2.1 %. Only 0.2 % is the fresh water present on the earth, which can be used by human for variety of purposes. Remaining 0.6 % is in underground form. But unfortunately it has been getting polluted day by day due to different anthropogenic activities. So it is burning need, to conserve the water and prevent it from every type of pollution. There should be proper water quality investigation and management. This could be possible by continuous Water Quality Monitoring.

1.2 Water Quality Monitoring –

The main objectives of Hydrology Project for water quality monitoring in Krishna and Bhima Basin are -

1) Establish Trend stations.
2) Observe the trend in water quality over a period of time.
3) To create public awareness as regards to water pollution and its prevention.
4) Surveillance over pollution through water testing.

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, Pune as per Standard Guidelines and mandates including collection, transportation and analysis of samples, data entry in SWDES Software and preparation of the 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 year 2011-12. 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 are considered.

TABLE SHOWING SAMPLES ANALYSED DURING THE REPORTING PERIOD

Sr. No.	Year	Trend Sample (First Round)	Trend Sample (Balance Round)	Dam Sample (First Round)	Dam Sample (Balance Round)	Total
1	2011-12	9	51	4	44	108
Total Samples analyzed during reporting period						**108**

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 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 Hydro meteorological Data Processing Division, Nashik for further dissemination to user end.

Furthermore to get an idea 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.

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, except following parameters.

i) DO ii) BOD iii)COD

Bacteriological parameter like Total Coli form is also exceeding the limits.

From the observations at Khamgaon and Daund location, almost all parameters are crossing the desired limit which indicates that at the upstream of this location there are a considerable source of pollution.

1.6 Conclusion

Observing all the factors it can be concluded that, analyzed results from some locations have shown increase in value of Biological Oxygen Demand and Total Coli form. The value of Biological Oxygen Demand is very high, even exceeding beyond desired limit is due to the presence of organic matter, which also reduces oxygen content in the water. Water having excess Biological Oxygen Demand is not fit for human activities or consumption.

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

It is observed with reference to Wilcox diagram generated through SWDES software for the data of said period; mostly all of the locations belong to Class C_2 and S_1. This indicates that the water flowing along these locations is mostly suitable for irrigation purpose. For drinking purpose, it should be treated before use.

But with respect to parameters, locations like Khamgaon and Daund are critical for certain parameters like Biological Oxygen Demand, Chemical Oxygen Demand and Total Coli forms. In the point of consideration for above location water is not suitable for irrigation and Drinking purpose.

1.7 Recommendations/Remedial Measures:

- The most effective approach for cleaning up contaminated surface water is to prevent further discharges from contaminated sources and enable natural biological, chemical, and physical processes to break down the existing contamination. In some surface water bodies where natural processes are not enough to break down the contaminants, other cleanup approaches such as mixing and aeration may be required to further promote natural cleanup.
- There are many effective ways to conserve water in and around your home.

1.8 Suggestions:

- Water quality Annual Report shall be publicly published every year.
- Reduce, Refuse, Reuse, and Recycle Materials whenever possible.
- Farmers may be encouraged to use advanced irrigation system like drip irrigation in order to conserve water and prevent erosion of top soil.

Poem on Water

Life Started From Water
Nature Flourishes With Water
Seasons Caused By Water
Development Progresses With Water
Energy Formed Of Water
Health Depends On Water
Religion Imbibes Water
History Made Of Water
Trade Rides On Water
Bio-Diversity Needs Water
Water Sustains Life
It Brings Prosperity and Happiness

Chapter II
INTRODUCTION

CHAPTER-2

INTRODUCTION

2.1 General:

The quantity of inland water resources in Maharashtra is about 3.39 lakh ha, which accounts for only 4.93% of the total inland water resource in the country. However, the state houses 9% of the country's population (Census - 2011). This indicates that the per capita water availability in the state is lower than the national average. All the rivers & canals in Maharashtra have a total length of 16000 km. The following table shows Origin, Length and Catchment Area of Major & Minor Rivers in Maharashtra.

Major and Minor rivers originating in Maharashtra

Major Rivers	Origin of Rivers	Length (km)	Total Catchment Area (km2)
Godavari	Nashik	1,465	312,812
Krishna	Mahabaleshwar	1,401	258,948
Tapi	Jalgaon	724	65,145
Minor Rivers	**Origin of Rivers**	**Length (km)**	**Total Catchment Area (km2)**
Vaitarna	Nashik	171	3,637
Damanganga	Nashik	143	2,357
Ulhas	Raigad	145	3,864
Savitri	Raigad	99	2,899
Sastri	Ratnagiri	64	2,174
Vashishthi	Ratnagiri	48	2,239

Source: *State of Environment Report, 2007 by MPCB compiled from Maharashtra state Development report, 2005*

Krishna River:

The Krishna river rises from a place with an elevation of 1337m north of Mahabaleshwar. The Tungabhadra river is principal tributary of Krishna river, which is formed by Tunga river and Bhadra river that start off in western ghat. Other tributaries of Krishna river includes Bhima, Koyna, Ghataprabha, Malaprabha, Yerla, Warna, Musi and Dudhganga river. Krishna Basin extends over in three states ecologically; this is one of the disastrous rivers in the world, in that it causes heavy soil erosion during the monsoon season. It flows fast and furious, often reaching depths of over 75 feet (23 m). Ironically, there is a saying in Marathi (language of Maharashtra) "santh vaahate Krishnamaai" which means "quiet flows Krishna". This term is also used to describe how a person should be, as quiet as Krishna. But, in reality, Krishna causes a high degree of erosion between June and August. During this time, Krishna takes fertile soil from Maharashtra, Karnataka and western Andhra Pradesh towards the delta region.

2.2 Water Quality Network Layout

Water Quality of Rivers Krishna, Bhima and its tributaries is being monitored by Central Water Commission, Water Resources Division of Maharashtra and Andhra Pradesh and the Central Pollution Control Board through the respective State Pollution Control Boards.

The water quality monitoring of River Bhima and its tributaries is being carried out by Hydrology Project sub-division Pune under Hydrology Project Division.

In Bhima Basin Water Quality is monitored by Hydrology Project Division Pune at 12 stations on various rivers flowing through Western Maharashtra. 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 location, station types and rivers under Hydrology Project, Pune are given in Table 1(Page No-12).

Out of 16 Water Quality stations on tributaries of Bhima, 11 are trend stations, 1 Flux station and 4 are of Dam Location. Fig 1(page no. 47) shows Network of Water Quality Monitoring stations of various types in the jurisdiction of water quality lab level-II under Hydrology Project sub-division, Pune.

2.2 Water Quality Monitoring - Objectives

The main objectives of Hydrology Project for water quality monitoring in Krishna and Bhima Basin are -

1) Establish Trend stations.
2) Observe the trend in water quality over a period of time.
3) To create public awareness as regards to water pollution and its prevention.
4) Surveillance over pollution through water testing.

Observations of analysis of physical & chemical parameters as per "Uniform Protocol for Water Quality Monitoring 2001" for each location followed by Operation and Maintenance of Water Quality Laboratory Level-II, Pune 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.

2.3 Water Quality Monitoring - Scope

The Annual Report is prepared for the year 2011-12. 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 2011-12 are considered.

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

Sr. No.	Year	Trend Sample (First Round)	Trend Sample (Balance Round)	Dam Sample (First Round)	Dam Sample (Balance Round)	Total
1	2011-12	9	51	4	44	108
Total Samples analyzed during reporting period						**108**

2.4 Other activities

During the year 2011-12 many clients approached the laboratory. The clients availed the facility of the laboratory are as below;

1) Lunkad Skylounge Co. Hos. Society Ltd, Kalyani Nagar, Pune.
2) Marksmen Equipments (I) Pvt. Ltd., Wagholi.
3) Kasarsai Dam Division, Pune.
4) M/s Sukhakarta food products Pvt. Ltd., Pune.
5) Bharatiya Jain Sanghatana, WERC Pune.

REVENUE GENERATED DURING THE REPORTING PERIOD

Sr. No.	Year	Amount Received
1.	2011-2012	3,03,029

2.5 Extended Scope of Laboratory

Under Hydrology Project(SW) Maharashtra Water Quality Monitoring is being carried out with prescribed W.Q. Network with 6 Level-II and 38 Level-I Labs followed by 170 sampling locations spread all over the State. Second Surveillance audit of ISO 9001:2008 was successfully completed in July 2011.

AQC Exercise organized by CPCB – This lab participated in 28th AQC Exercise organized by CPCB during the reported period and Water Quality Lab Level II secured 86.4 % score and will also participate in 29th forthcoming exercise for up gradation and finding of errors.

Visits: Many visitors from various sectors visited the lab and appreciated the efforts taken by this lab.

The infrastructure facility is also made available to all institutional organization for visit and study purposes and the generated data of Water Quality is also made available to the users who are HDUG member of Hydrology Project.

SALIENT FEATURES OF LABORATORY:

Latitude	:	N-18^0 33' 30"
Longitude	:	E- 73^0 53' 42"
Rivers	:	1. Ghod 2. Pavana 3. Indrayani 4. Mutha 5. Nira 6. Ambi 7. Sina 8. Mula 9. Bhima 10. Mula-Mutha
Year of Establishment	:	September 1999
No. of Flux Sample locations	:	1 Nos.
No. of Baseline Sample locations	:	0 Nos.
No. of Trend Sample Locations	:	11 Nos.
No. of Reservoir Locations	:	4 Nos.
No. of Parameters Analyzed	:	31 Nos.
Staff Position	:	Work of Operation & Maintenance of Lab. on annual contract basis.
Government staff related to the laboratory	:	1. Shri. A. A. Dabhade Executive Engineer 2. Shri. A.D. Gumaste Sub Divisional Engineer 3. Mrs. S.K. Kasar Govt. Analyst
Lab. Operating Agency	:	M/S Mahabal Enviro Engg Pvt. Ltd.
Staff working in the laboratory	:	1. Mayuri Waghmare Key person 2. Sheetal Kale Chief Chemist 3. Nilesh Yewale Field Chemist 4. Sandhya Gade Microbiologist 5. Gautam Dhone Lab Attendant

DATA COLLECTION, PLANNING and HYDROLOGY CIRCLE NASHIK

WATER QUALITY LAB, LEVEL – II PUNE

ORGANISATION CHART

SUPERINTENDING ENGINEER,
DATA COLLECTION, PLANNING AND HYDROLOGY CIRCLE, NASHIK

EXECUTIVE ENGINEER,
HYDROLOGY PROJECT DIVISION, PUNE

SUB-DIVISIONAL ENGINEER,
HYDROLOGY PROJECT SUBDIVISION. PUNE / MR

GOVT. ANALYST / ASST.MR

OPERATING AGENCY

CHIEF CHEMIST

ASSISTANT CHEMIST

Table - 1

List of sampling locations under jurisdiction of Water Quality lab level II -@ Pune 2011-2012

Sr. No.	NAME OF STATION	DISTRICT	TAHASIL	NAME OF RIVER
Trend Station				
1	Ambegaon	Pune	Junner	Ghod
2.	Ambeghar	Pune	Bhor	Nira
3.	Chaskaman	Pune	Rajgurunagar	Bhima
4.	Daund	Pune	Daund	Bhima
5.	Kasti	Ahmadnagar	Shrigonda	Ghod
6.	Khamgaon	Pune	Daund	Mula-Mutha
7.	Narsinhpur	Pune	Indapur	Bhima
8.	Nimgaon-Gangurde	Ahmadnagar	Karjat	Sina
9.	Paud	Pune	Mulshi	Mula
10.	Rakshewadi	Pune	Shirur	Bhima
11.	Sarati	Solapur	Malshirus	Nira
Flux station				
12.	Devikavathe	Solapur	Akkalkot	Bhima
Reservoirs				
13.	Khadakwasla Dam	Pune	Haveli	Mutha
14.	Panshet Dam	Pune	Maval	Ambi
15.	Pavana Dam	Pune	Maval	Pavana
16.	Ujjani Dam	Pune	Indapur	Bhima

Chapter III
METHODOLOGY

CHAPTER–3

METHODOLOGY

3.1 General:

This laboratory covers Surface Water component which covers Rivers and Reservoir Locations in Krishna and Bhima basins in Maharashtra.

3.2 Rivers

Krishna river rises at Mahabaleswar near the Jor village in the extreme north of Wai taluka, district satara, Maharashtra in the west and meets the Bay of Bengal at Hamasaladeevi (near Avanigadda) in Andhra Pradesh, on the east coast. It also flows through the state of Karnataka. The delta of this river is one of the most fertile regions in India and was the home to ancient Satavahana. Vijayawada is the largest city on the River Krishna. Sangli is the largest city on the river Krishna in Maharashtra state.

3.3 Water Quality Monitoring - Objectives

Observations of analysis of physical and chemical parameters as per "Uniform Protocol for Water Quality Monitoring 2001" for each location followed by Operation and Maintenance of Water Quality Laboratory Level-II, Pune 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 and Hydrology Circle, 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 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.

The Table below shows the number of sample analyzed during the year 2011-12. In order to study water quality status station wise, all locations covered under this lab during the year 2011-2012 are considered.

TABLE SHOWING SAMPLES ANALYSED DURING THE REPORTING PERIOD

Sr. No.	Year	Trend Sample (First Round)	Trend Sample (Balance Round)	Dam Sample (First Round)	Dam Sample (Balance Round)	Total
1	2011-12	9	51	4	44	108
Total Samples analyzed during reporting period						**108**

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

As well refers HP Manuals for analysis of various samples received from users for various purposed like Domestic use, Drinking, Irrigation etc.

FLOW CHART OF ANALYSIS OF HP WATER SAMPLE

Sample Collection from Water Quality Stations.

Treatment: D.O. Fixing, Preservation of sample for required parameters, 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

Tests are carried out in lab as per Protocols. These tests are: Microbiological test, Chlorophyll-a, pH, D.O., B.O.D, Ammonia, Nitrate, TDS, TSS, C.O.D., Turbidity, Alkalinity, Chloride, Boron, Sodium, Total Hardness, Phosphorous, etc.

Observations & calculations of all Analyzed Parameters are entered in the calculation 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 into SWEDS Software

Data sent to Executive Engineer Hydro metrological Data Processing Division, Nashik for further action

Methodology For the analysis of Water Quality samples the following parameters were analyzed during the Period 2011 – 2012

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	HP WQ Analysis Operating Manual,4-64
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	APHA, 21st Ed., 2005, 4500-O C,4-138
7.	Turbidity	APHA, 21st Ed., 2005, 2130-B, 2-9
8.	Total Solids	APHA, 21st Ed., 2005, 2540 B,2-56
9.	Dissolved Solids	APHA, 21st Ed., 2005, 2540 C,2-57
10.	Suspended Solids	APHA, 21st Ed., 2005, 2540 D,2-58
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	HP WQ Analysis Operating Manual,4-10

16.	Chemical Oxygen Demand	APHA, 21st Ed., 2005, 5220-B, 5-15
17.	Potassium K^+	APHA, 21st Ed., 2005, 3500- K, 3-88
18.	Sodium Na^+	APHA, 21st Ed., 2005, 3500- Na, 3-98
19.	Calcium Ca^{++}	APHA, 21st Ed., 2005, 3500-B, 3-65
20.	Magnesium Mg^{++}	APHA, 21st Ed., 2005, 3500-Mg, B, 3-84
21.	Total Hardness	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	APHA, 21st Ed., 2005, 2320, 2-27
30.	Total Kjeldahl Nitrogen	APHA, 21st Ed., 2005, 4500 N Org B,4-131
31.	Chlorophyll	APHA, 21st Ed., 2005, 10200 H,10-18

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Total Samples analyzed during reporting period						**108**

Chapter IV
RESULT & OBSERVATIONS

CHAPTER – 4

RESULTS AND OBSERVATIONS

4.1 General

For drawing up and implementing any water quality management plan, water quality monitoring is essential in identification of water bodies or their part(s) in need of restoration and also nature and magnitude of pollution control required. It also helps in prioritization of pollution control efforts and evaluating trends and effectiveness of such efforts.

In the present data yearbook, the assessment of physicochemical and bacteriological water quality of various rivers for different seasons shows a varying level of pollution in the water bodies. The water quality of various rivers monitored does not maintain the sanctity and 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 riverine systems is not satisfactory and this can further deteriorate in the nearby future.

The presence of coliform bacteria in higher concentration in water especially during rainy season indicates the lack of sanitation facilities in the region. 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. 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. The increased human activities can cause to an increase in pollution load to the river system. This in turn may lead to the further deterioration of the quality of water.

The human influence, apart from affecting the water quality, can accelerate eutrophication of the reservoirs which would be cultural or artificial eutrophication rather than the natural. Following the current trend, the reservoir may go to the entropic status in nearby future.

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 and 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- Stations wise Exercise

In order to study water quality status station wise, all locations covered under this lab during the year 2011-2012 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 and chemical parameters analyzed for each location individually and interpretation of data to identify seasonal trend. Also critical parameters are identified at every location, including finding out causes behind it at every location and every parameter.

4.4 Critical parameters Identified:

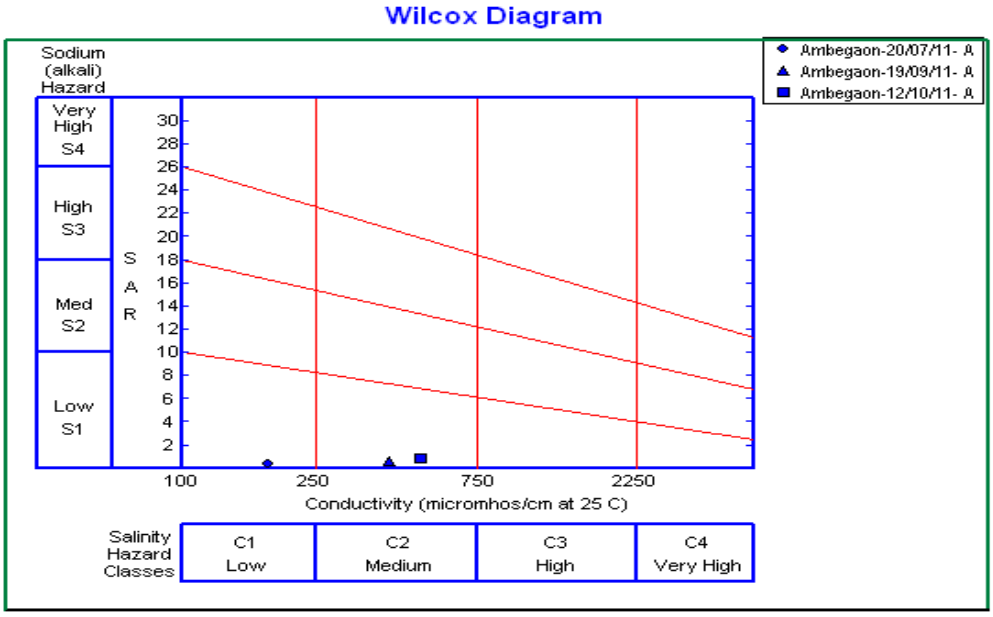
After observing all this data it is clear that most of the physical parameters are within tolerance limit except at few locations, like Daund, Khamgaon and Rakshewadi, etc.

At some stations most of the chemical parameters are also within tolerance limits, except following parameters.

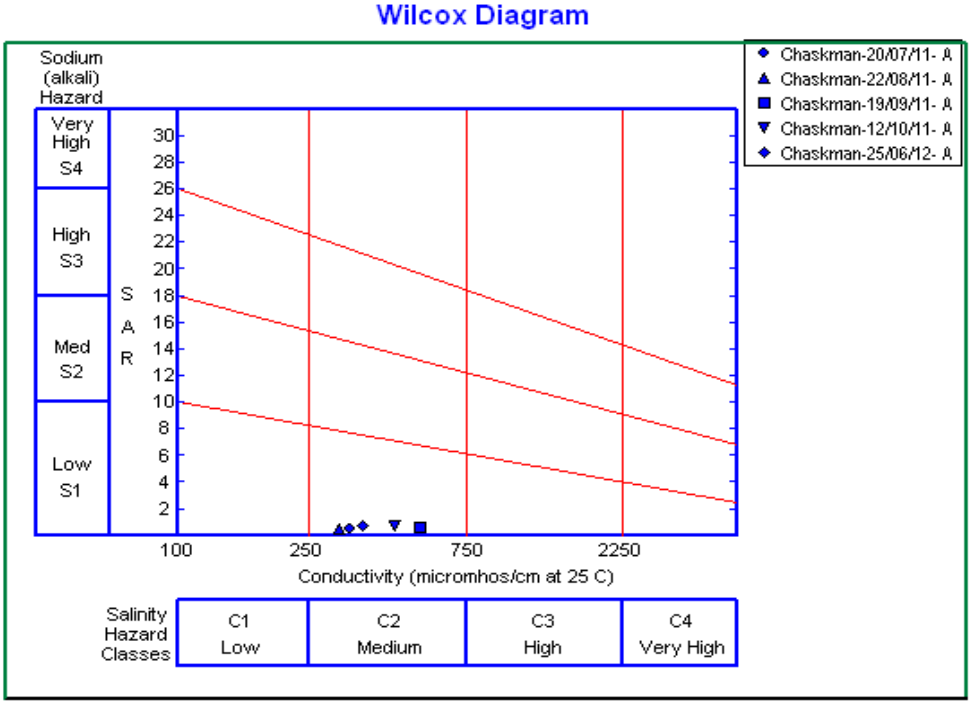
i) DO ii) BOD iii)COD

Bacteriological parameter like Total Coliform is also exceeding the limits.

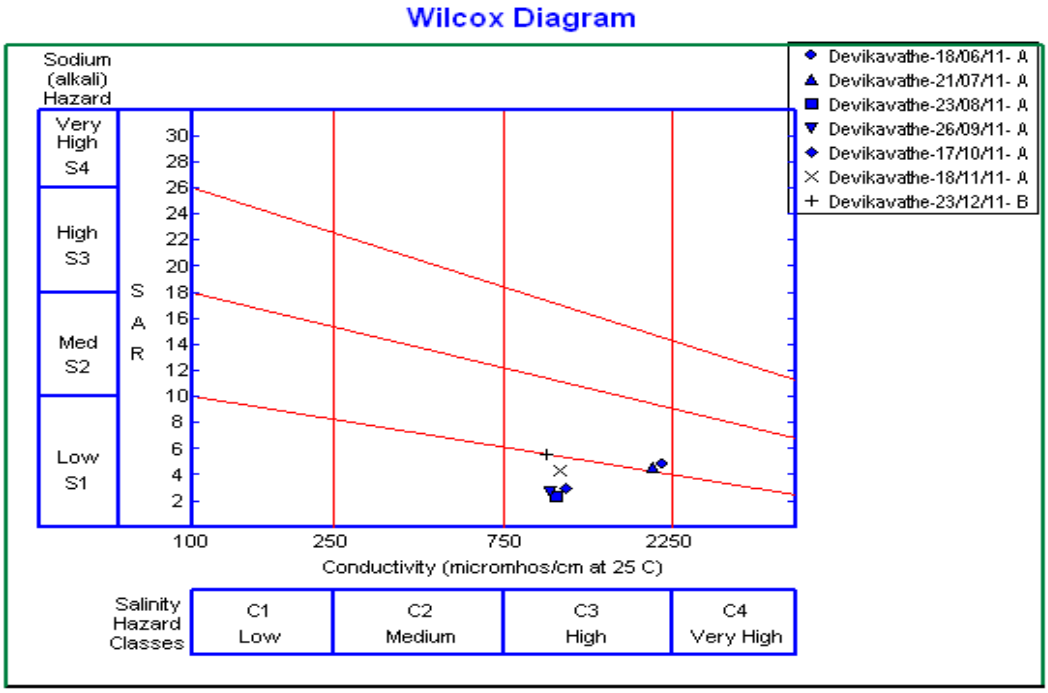
Classification of location on the basis of Wilcox technique for the use of water for irrigation purpose



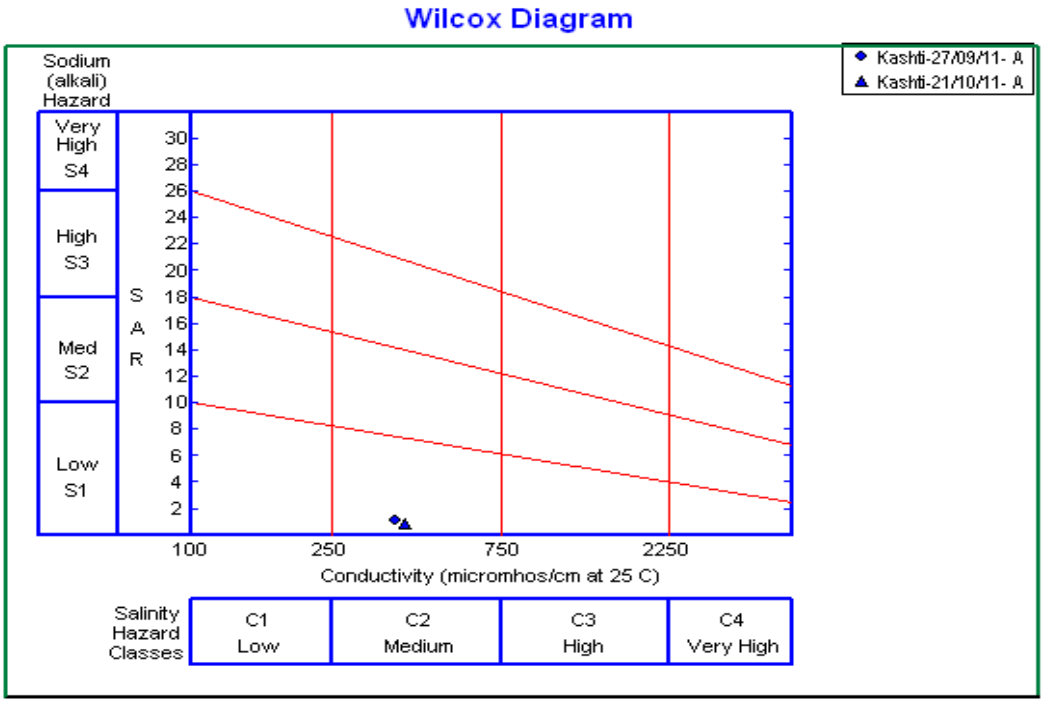
Wilcox diagram for Ambegaon



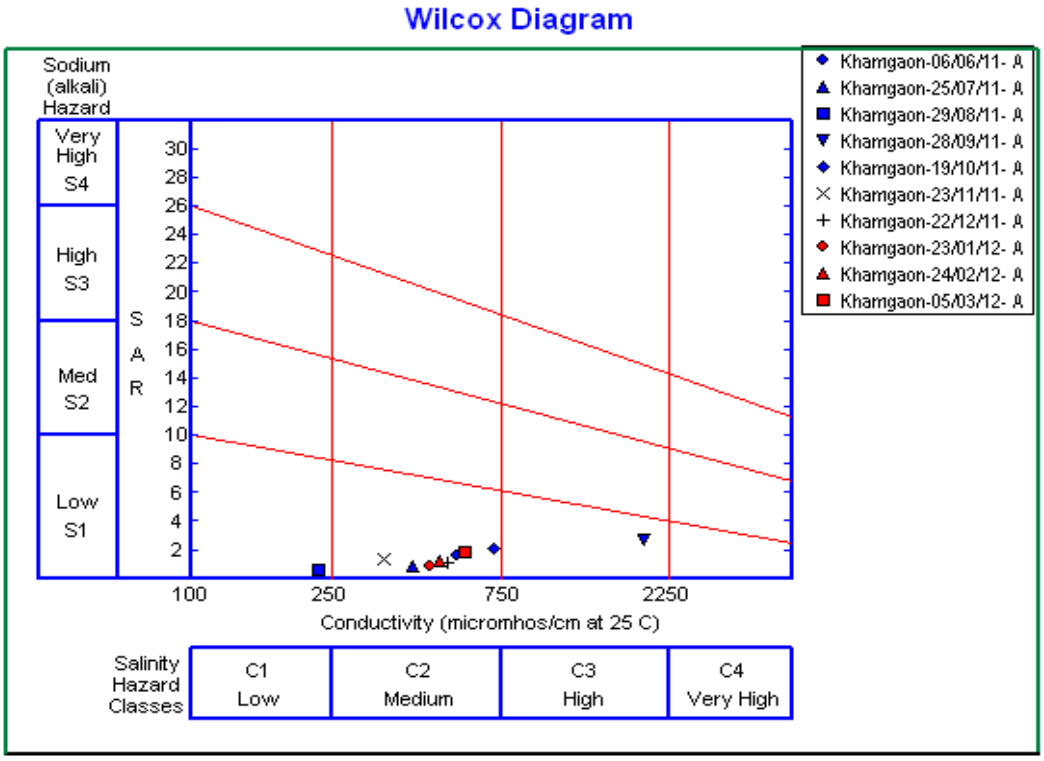
Wilcox diagram for Chaskaman



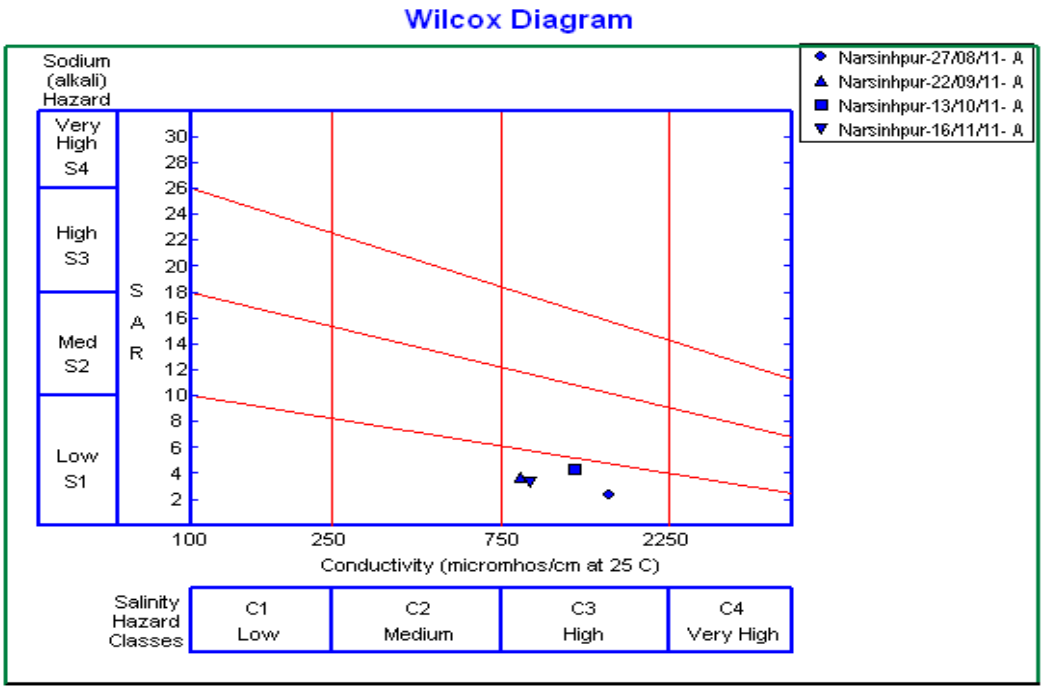
Wilcox diagram for Devikavthe.



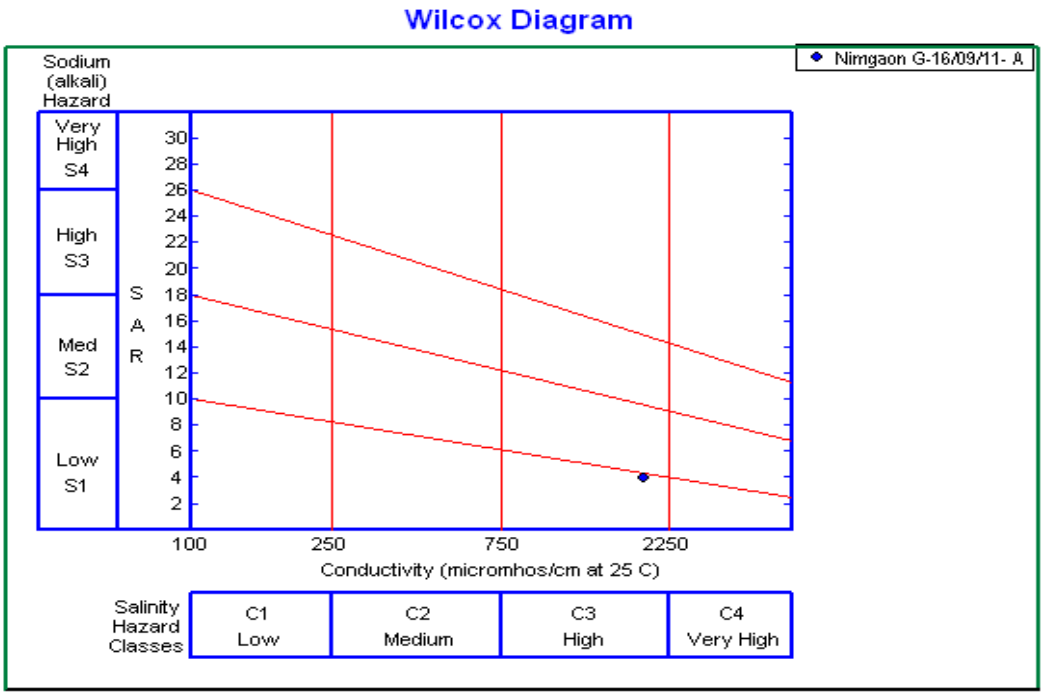
Wilcox diagram for Kashti



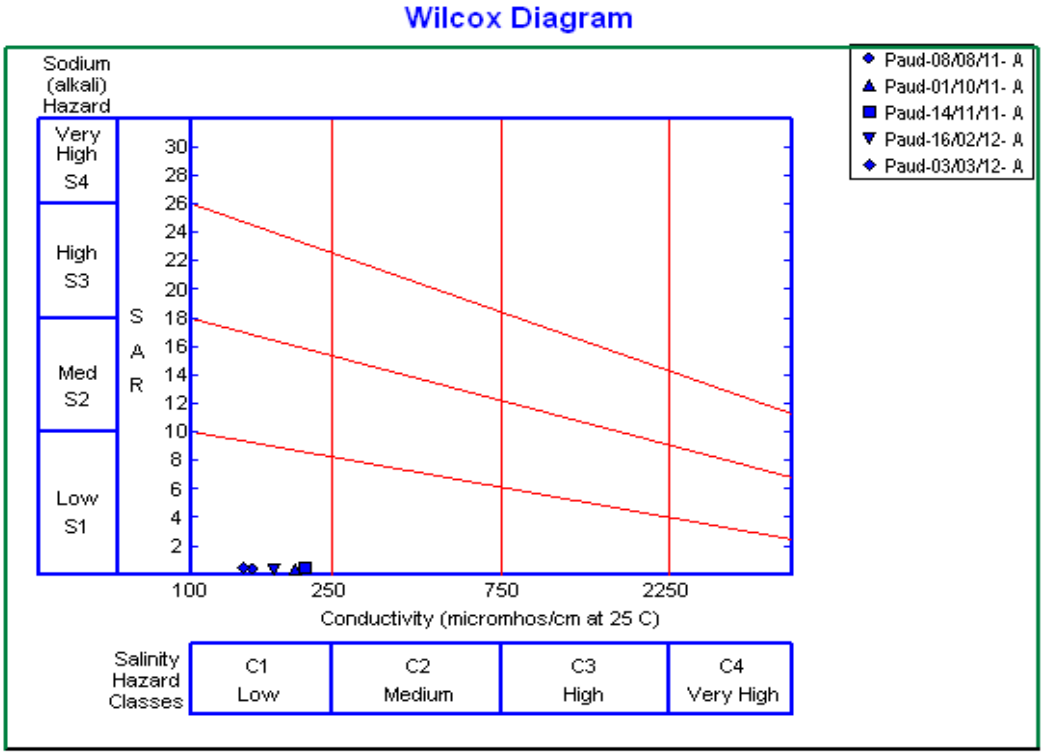
Wilcox diagram for Khamgaon



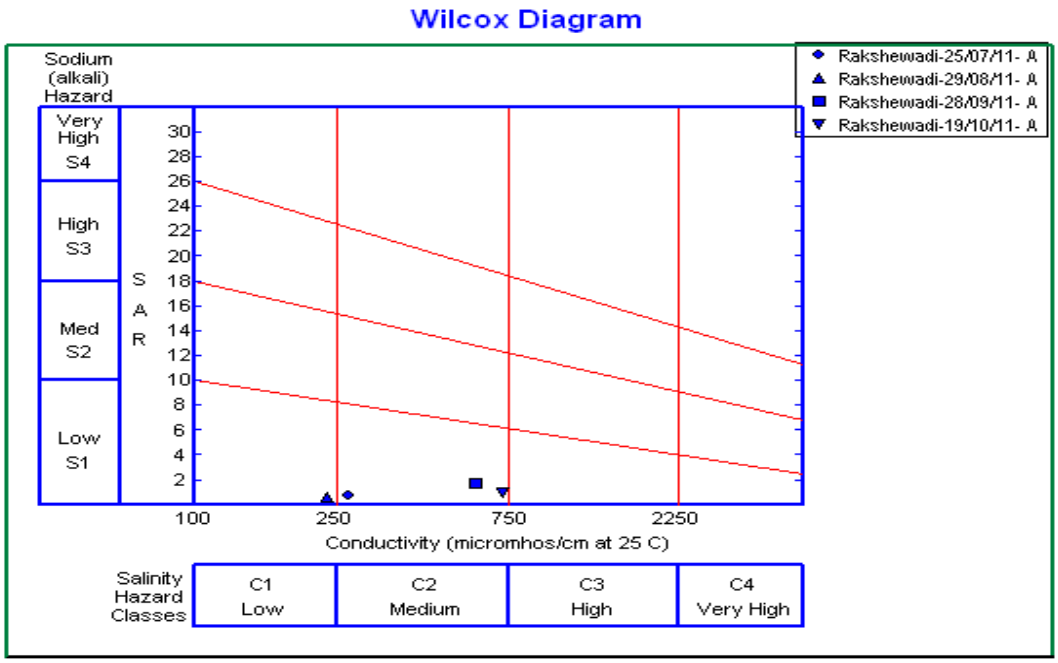
Wilcox diagram for Narsinhpur



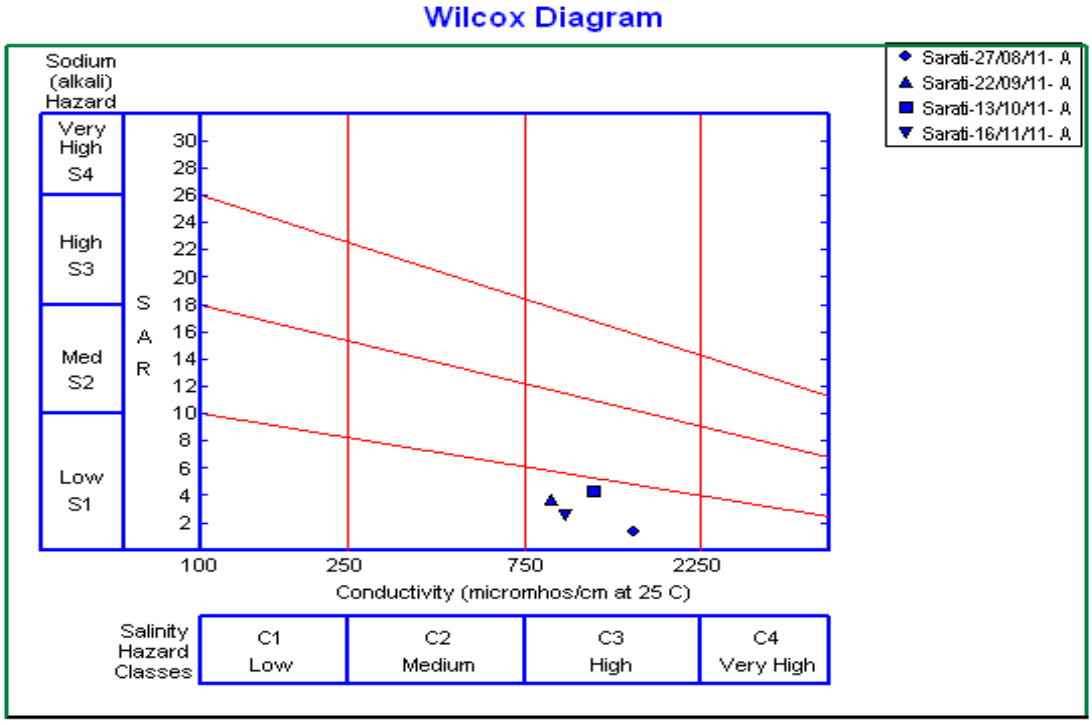
Wilcox diagram for Nimgaon



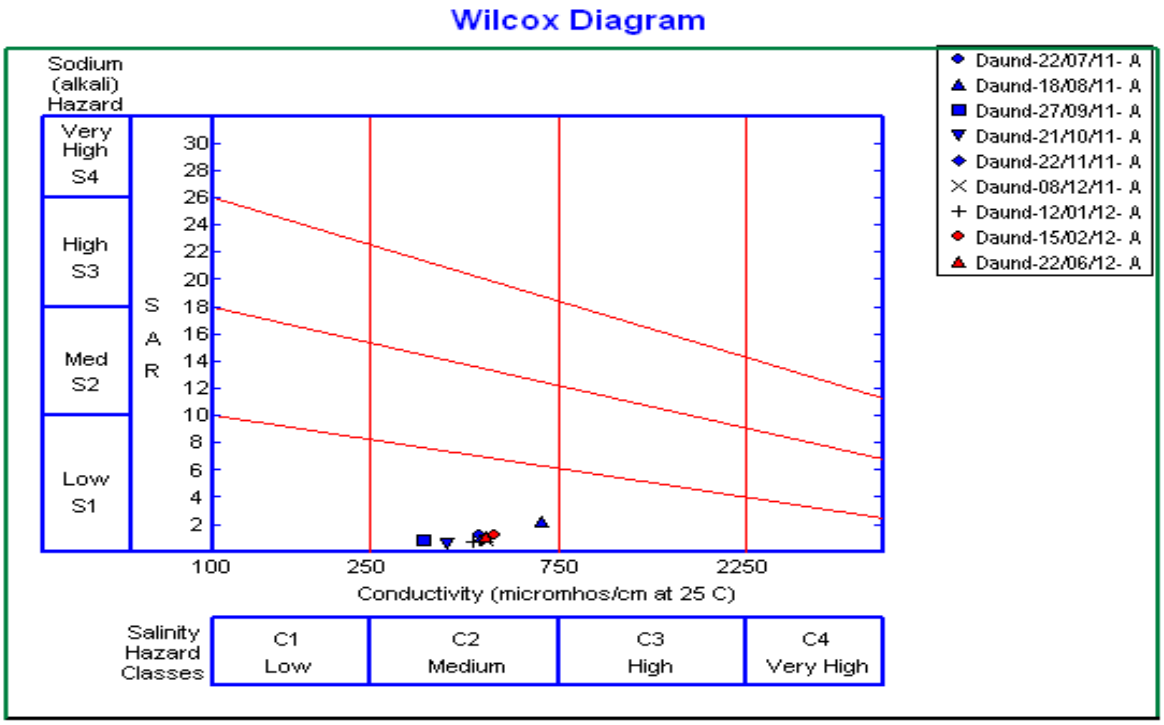
Wilcox diagram for Paud



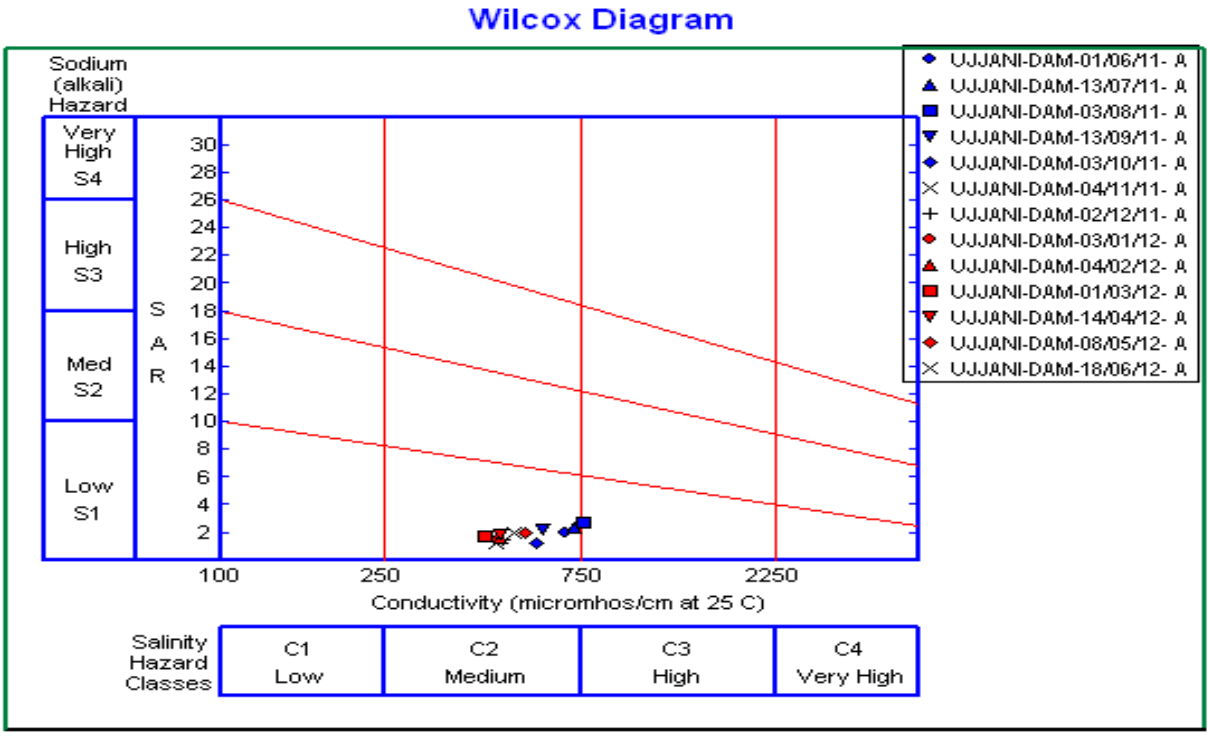
Wilcox diagram for Rakshewadi



Wilcox diagram for Sarati



Wilcox diagram for Daund



Wilcox diagram for Ujjani Dam

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

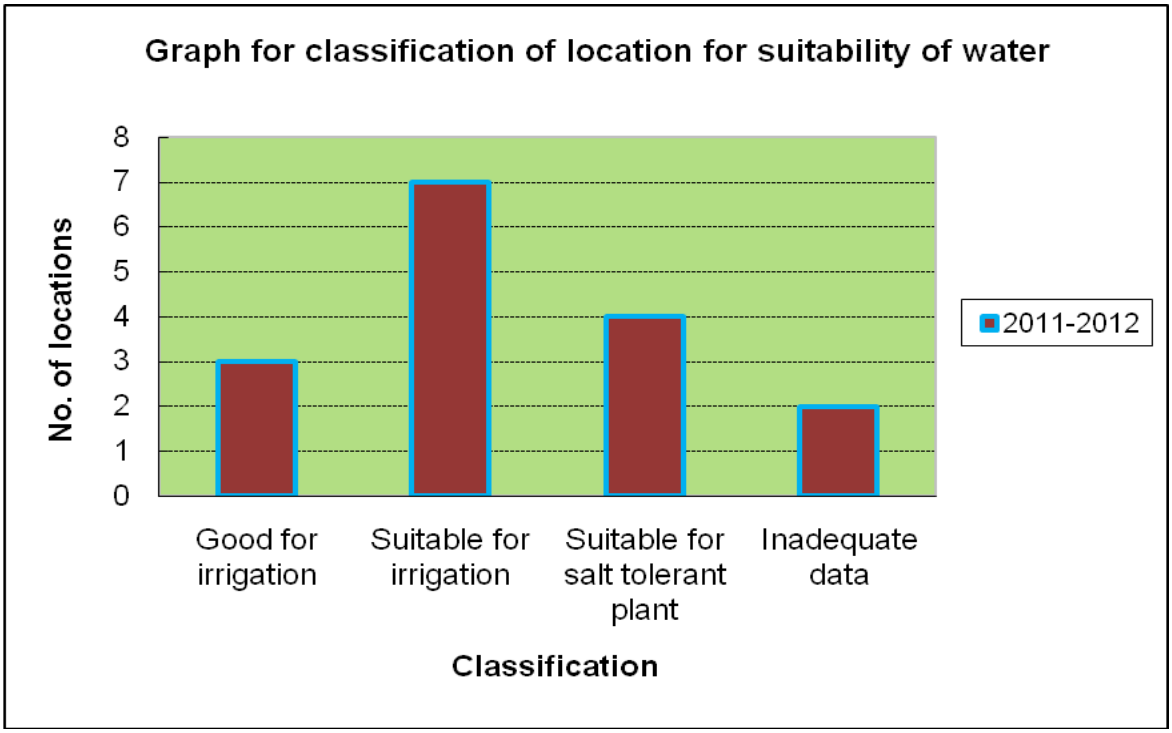
I. Trend Stations

Sr. No.	Name of Location	Year	Class as per Wilcox technique	Recommendation
Bhima River				
1	Daund	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.
2	Devikavathe	2011-2012	S1 & C3	Water can be used for salt tolerant plant.
3	Narsinhpur	2011-2012	S1 & C3	Water can be used for salt tolerant plant.
4	Rakshewadi	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.
5	Chaskaman	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.
Nira River				
1	Ambeghar	2011-2012	S1 & C1	Water is suitable for Irrigation with most crops on most soil.
2	Sarati	2011-2012	S1 & C3	Water can be used for salt tolerant plant.
Ghod River				
1	Ambegaon	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.
2	Kashti	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.
Sina River				
1	Nimgaon	2011-2012	S1 & C3	Water can be used for salt tolerant plant.
Mula- Mutha River				
1	Khamgaon	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.
Mula River				
1	Paud	2011-2012	S1 & C1	Water is suitable for Irrigation with most crops on most soil.
II. Dam Locations				
1	Khadkwasala	2011-2012	S1	Unable to classify because of inadequate data.
2	Panshet	2011-2012	S1	Unable to classify because of inadequate data.
3	Pavana	2011-2012	S1 & C1	Water is suitable for Irrigation with most crops on most soil.
4	Ujjani	2011-2012	S1 & C2	Water is suitable for Irrigation purpose.

Sr. No.	River	Year	Observations
1	Bhima	2011-2012	Along Bhima River there are 5 Locations. Above (ref. table) classification, shows that out of 5 locations, 2 locations namely Narsinhpur, Devikavthe water can be used for salt tolerant plant. Remaining 3 locations Daund, Chaskaman & Rakshewadi water is suitable for irrigation purpose without any treatment.
2	Nira	2011-2012	Along Nira River there are 2 Locations. Above (ref. Table) classification shows that at 1 location i.e. Sarati, water is suitable for salt tolerant plant. Remaining 1 location i.e. Ambeghar, water is suitable for Irrigation with most crops on most soil
3	Ghod	2011-2012	Along Ghod River there are 2 Locations. Above (ref. table) classification shows that at both locations i.e. Ambegaon and Kashti water is suitable for irrigation purpose without any treatment.
4	Sina	2011-2012	Along Sina River there is 1 Location. Above (ref. table) classification shows that at Nimgaon Gangurde water is suitable for salt tolerant plant.
5	Mula-Mutha	2011-2012	Along Mula-Mutha River there is 1 Location. Above (ref. table) classification shows that at Khamgaon water is suitable for irrigation purpose without any treatment.
6	Mula	2011-2012	Along Mula River there is1 Location. Above (ref. table) classification shows that at Paud water is suitable for Irrigation with most crops on most soil.
7	Dam Locations	2011-2012	4 location falls under dam category. Above (ref. table) classification shows that out of 4 locations, at Ujjani dam water is suitable for irrigation purpose. At Khadakwasla and Pavana dam water is suitable for Irrigation with most crops on most soil and at Panshet dam unable to classify because of inadequate data.

Abstract for classification of water for Irrigation purpose

Sr. No.	Year	Good for irrigation	Suitable for irrigation	Suitable for salt tolerant plant	Inadequate data	Total
1.	2011-2012	3	7	4	2	16



Data Abstract for Pune Sub-division for 2011-12										
Parameter	**Unit**	**Season**								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Ambeghar										
DO	mg/L	6.8	7.4	7.1	7.2	8.2	7.7	7.1	7.6	7.35
BOD	mg/L	2.6	3.8	3.2	1.2	3.1	2.15	2.0	2.7	2.35
COD	mg/L	11.2	14.4	12.8	6.4	14.4	10.4	15.2	18.4	16.8
Total colliforms	MPN/100 ml	7000	92000	49500	14000	54000	34000	22000	54000	38000
Station : Paud										
DO	mg/L	6.4	7.2	6.8	4.5	7.2	5.85	7.4	7.6	7.5
BOD	mg/L	1.8	2.5	2.15	1.0	2.3	1.65	1.2	2.0	1.6
COD	mg/L	13.6	14.4	14.0	8.0	14.4	11.2	10.2	16.0	13.1
Total colliforms	MPN/100 ml	5400	35000	20200	70000	110000	90000	70000	140000	105000
Station : Khadkawasla										
DO	mg/L	7.0	7.4	7.2	7.6	8.4	8.0	7.0	7.8	7.4
BOD	mg/L	1.0	1.2	1.1	0.8	1.6	1.2	1.0	1.4	1.2
COD	mg/L	7.2	8.8	8.0	6.4	9.6	8.0	7.2	9.6	8.4
Total colliforms	MPN/100 ml	2200	92000	47100	7900	22000	14950	7000	54000	30500
Station : Panshet										
DO	mg/L	7.0	7.3	7.15	7.2	8.0	7.6	7.2	7.6	7.4
BOD	mg/L	1.0	1.3	1.15	1.0	1.6	1.3	1.0	1.2	1.1
COD	mg/L	6.4	9.6	8.0	7.2	9.6	8.4	7.2	8.8	8.0
Total colliforms	MPN/100 ml	2200	9400	5800						
Station : Pavana										
DO	mg/L	6.4	7.2	6.8	7.4	7.8	7.6	7.4	8.0	7.7
BOD	mg/L	1.1	1.2	1.15	1.2	1.4	1.3	1.0	1.4	1.2
COD	mg/L	7.2	8.8	8.0	8.0	9.6	8.8	8.8	9.6	9.2
Total colliforms	MPN/100 ml	2800	28000	15400	4600	17000	10800	1300	3300	2300

Data Abstract for Shirur Sub-division for 2011-12										
Parameter	**Unit**	**Season**								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Ambegaon										
DO	mg/L	7.0	7.0	7.0	-	6.4		-	-	-
BOD	mg/L	1.6	2.6	2.1		3.0		-	-	-
COD	mg/L	13.6	16.0	14.8		16.8		-	-	-
Total colliforms	MPN/100 ml	54000	70000	62000				-	-	-
Station : Chaskaman										
DO	mg/L	6.6	8.2	7.4		6.4		-	-	-
BOD	mg/L	2.2	2.8	2.5		2.2		-	-	-
COD	mg/L	14.4	17.6	16.0		16.8		-	-	-
Total colliforms	MPN/100 ml	17000	130000	73500		54000		-	-	-
Station : Khamgaon										
DO	mg/L	5.6	7.6	6.6	6.8	7.8	7.3	7.8	7.8	7.8
BOD	mg/L	2.8	6.8	4.8	3.8	6.0	4.9	5.6	6.5	6.05
COD	mg/L	14.4	38	26.2	16.0	40.0	28.0	51.2	52.8	52.0
Total colliforms	MPN/100 ml	17000	92000	54500	2600	220000	111300	49000	140000	94500
Station : Rakshewadi										
DO	mg/L	5.6	7.0	6.3		6.4	-	-	-	-
BOD	mg/L	3.3	4.6	3.95		5.0	-	-	-	-
COD	mg/L	18.4	22.0	20.2		22.8	-	-	-	-
Total colliforms	MPN/100 ml	17000	350000	183500		14000	-	-	-	-

Data Abstract for Shirur Sub-division for 2011-12										
Parameter	**Unit**	**Season**								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Daund										
DO	mg/L	4.4	4.6	4.5	7.2	7.8	7.5		7.8	
BOD	mg/L	4.3	10.0	7.15	2.4	6.0	4.2		2.8	
COD	mg/L	19.2	32.8	26.0	12.8	31.2	22.0		17.6	
Total colliforms	MPN/100 ml	2300	540000	271150	92000	17000	131000		26000	

Station : Kashti										
DO	mg/L		7.4			7.0	-	-	-	-
BOD	mg/L		4.5			4.0	-	-	-	-
COD	mg/L		16.0			15.2	-	-	-	-
Total colliforms	MPN/100 ml		170			54000	-	-	-	-

Data Abstract for Solapur Sub-division for 2011-12										
Parameter	**Unit**	**Season**								
		Monsoon			Winter			Summer		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Station : Ujjani										
DO	mg/L	5.2	6.8	6.0	3.4	7.4	5.4	7.0	7.8	7.4
BOD	mg/L	4.0	6.0	5.0	4.4	5.6	5.0	5.2	7.0	6.1
COD	mg/L	16.8	22.4	19.6	20.0	54.4	37.2	24.8	28.8	26.8
Total colliforms	MPN/100 ml	3300	17000	10150	4600	11000	7800	14000	22000	18000

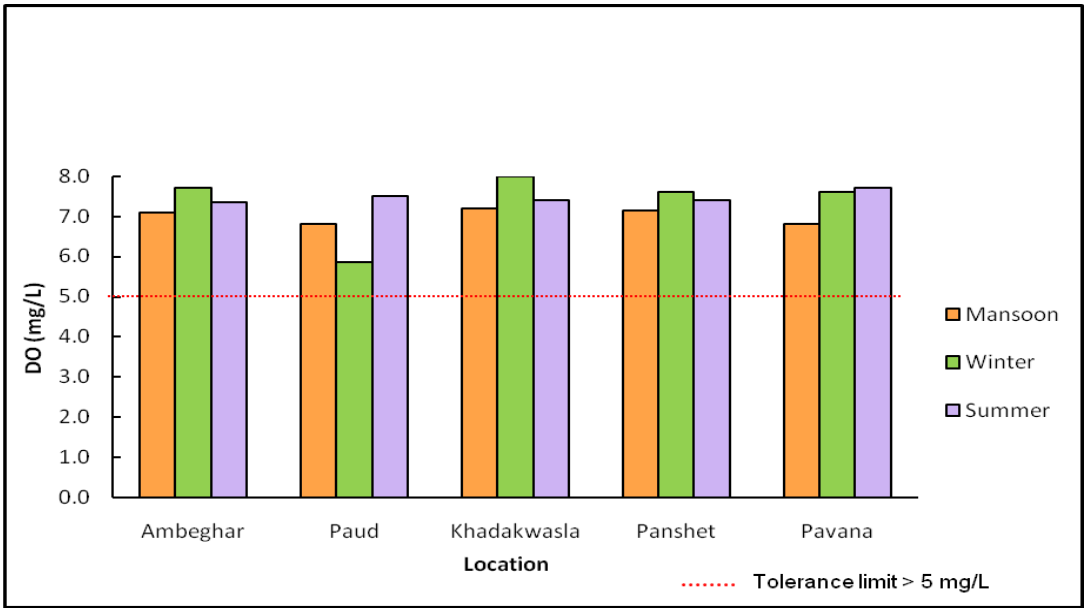
Station : Narsinhpur										
DO	mg/L	6.8	7.0	6.9	6.0	8.4	7.2	-	-	-
BOD	mg/L	4.6	5.0	4.8	5.2	5.9	5.55	-	-	-
COD	mg/L	18.4	19.2	18.8	22.8	30.0	26.4	-	-	-
Total colliforms	MPN/100 ml	17000	22000	19500	28000	220000	124000	-	-	-

Station : Sarati										
DO	mg/L	7.0	7.2	7.1	6.0	8.2	7.1	-	-	-
BOD	mg/L	3.6	4.8	4.2	3.5	4.0	3.75	-	-	-
COD	mg/L	15.2	22.8	19.0	18.4	19.2	18.8	-	-	-
Total colliforms	MPN/100 ml	21000	35000	28000	23000	28000	25500	-	-	-

RESULT OBTAINED DURING 2011-2012

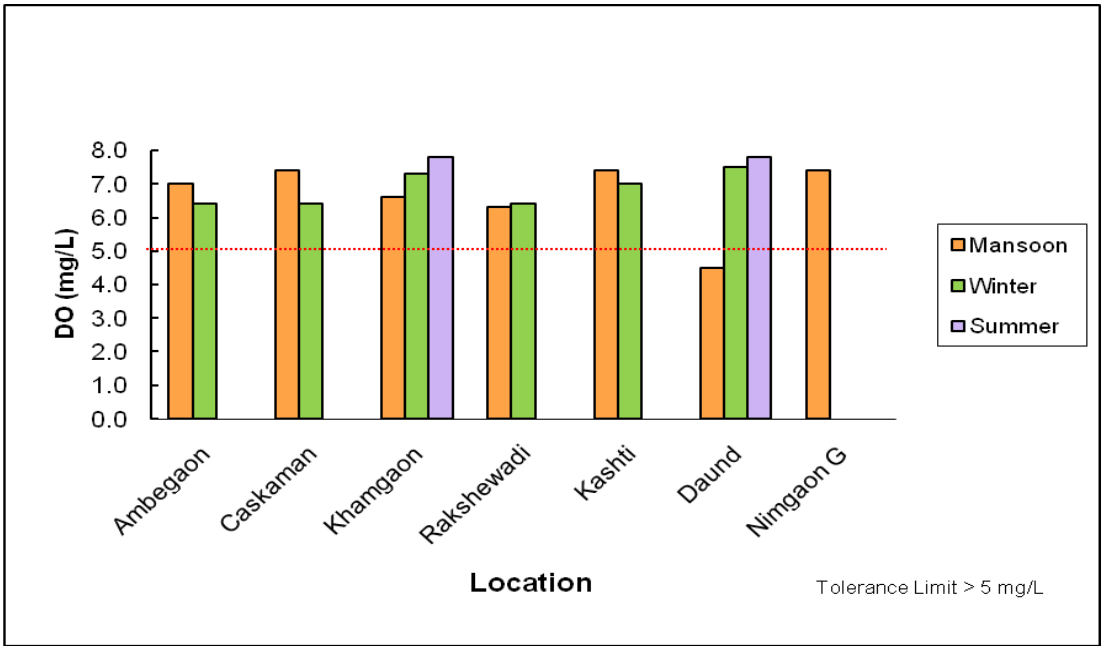
I. Graphical Representation of Dissolved Oxygen:

1. Dissolved Oxygen for Stations under Pune Sub-Division:



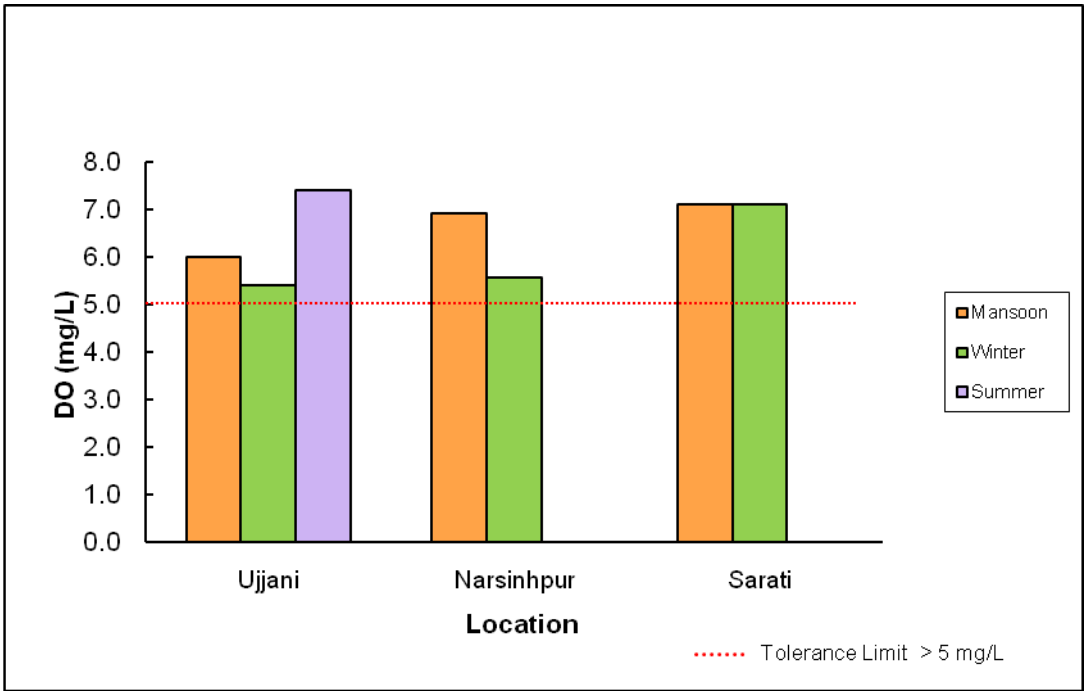
From the above graph, it is being observed that at all stations value of Dissolved Oxygen is within limit.

2. Dissolved Oxygen for Stations under Shirur Sub-Division



From the above graph it is observed that the values of Dissolved Oxygen are within limit at all stations during all seasons except Daund in mansoon.

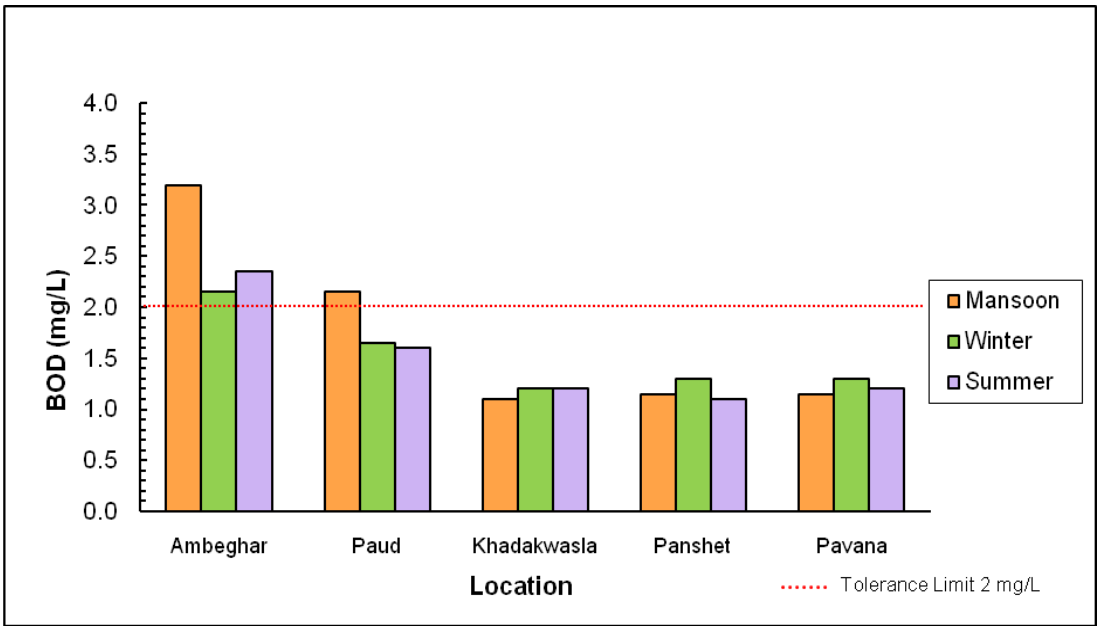
3. Dissolved Oxygen for Stations under Solapur Sub-Division:



It is observed from graph that during at all sites during all seasons the values are within desirable limit.

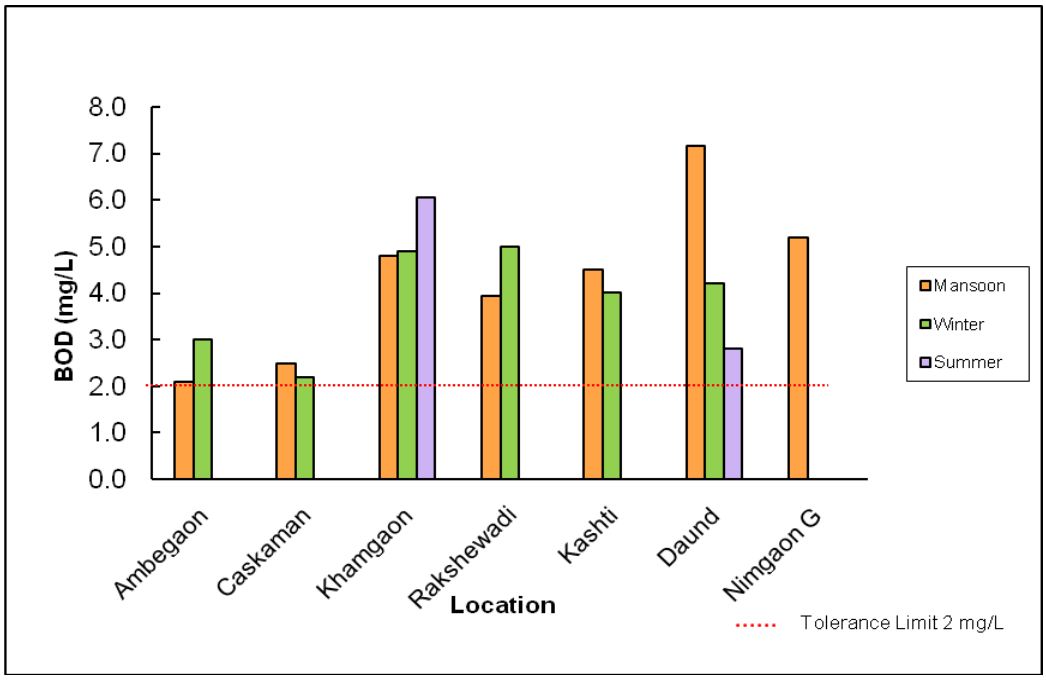
II. Graphical Representation of Biochemical Oxygen Demand:

1. Biochemical Oxygen Demand for Stations under Pune Sub-Division:



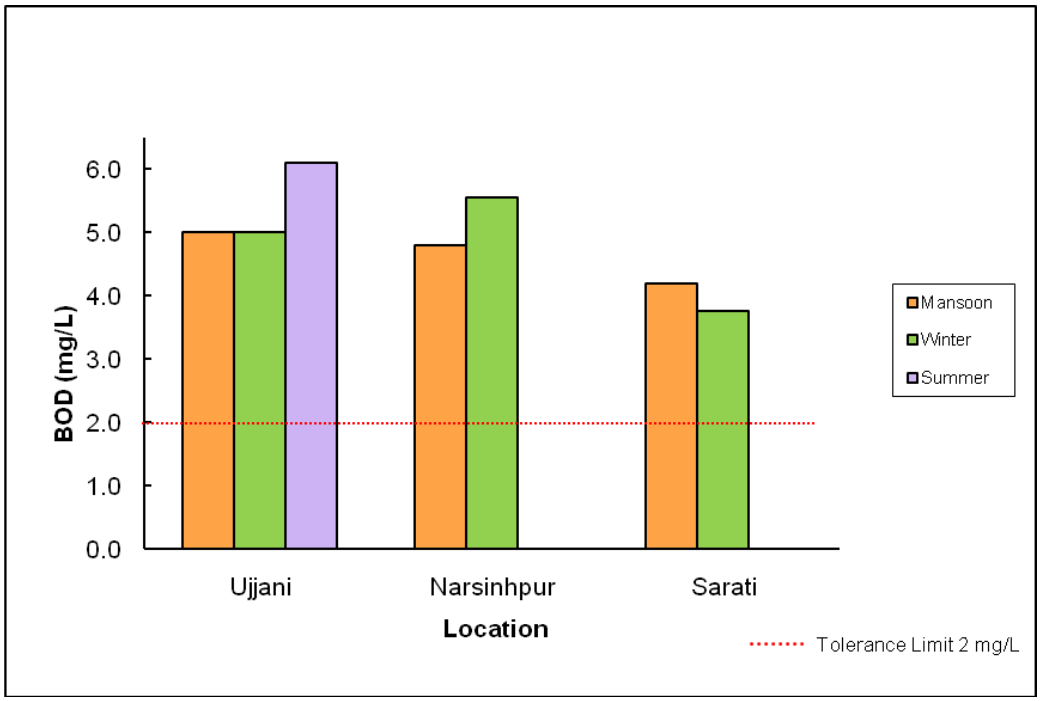
From the above graph it can be observe that, at Ambeghar the values are exceeding the prescribed limit.

2. Biochemical Oxygen Demand for Stations under Shirur Sub-Division:



It is observed that at all location values of B.O.D. are above the limit, especially during summer at Khamgaon and during monsoon at Daund.

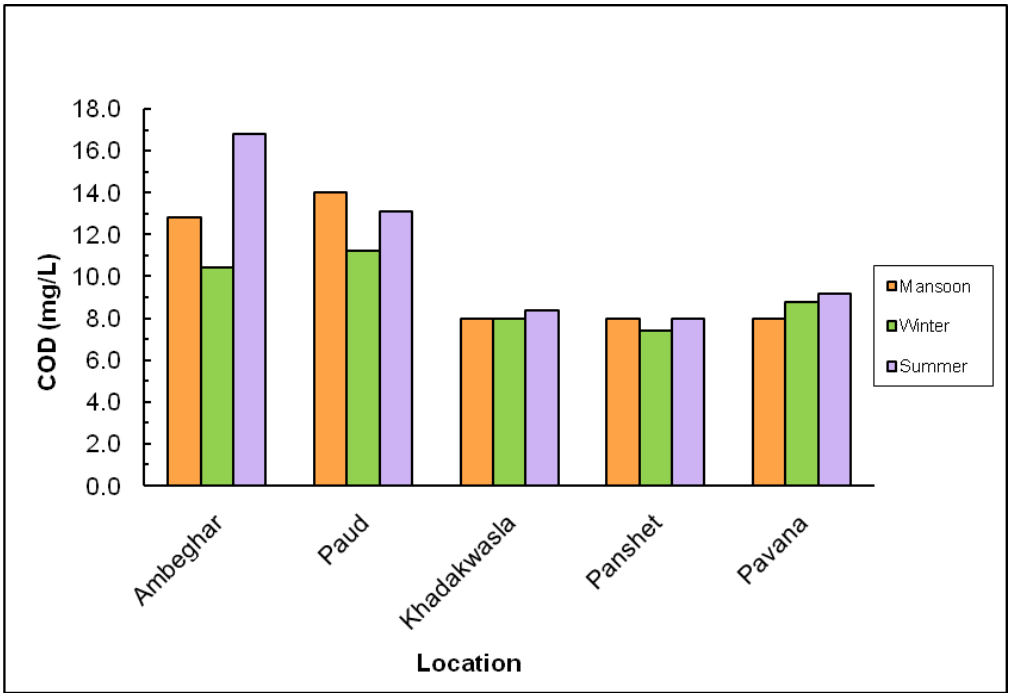
3. Biochemical Oxygen Demand for Stations under Solapur Sub-Division:



From the above graphical representation, it is observed that at all stations the values are above tolerance limit.

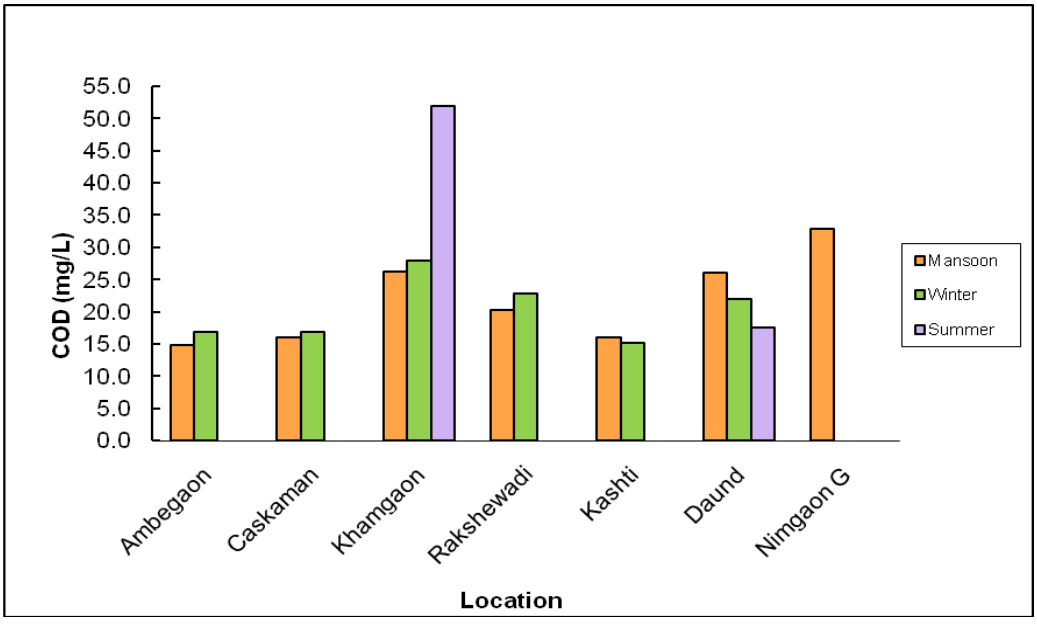
III. Graphical Representation of Chemical Oxygen Demand:

1. Chemical Oxygen Demand for Stations under Pune Sub-Division:



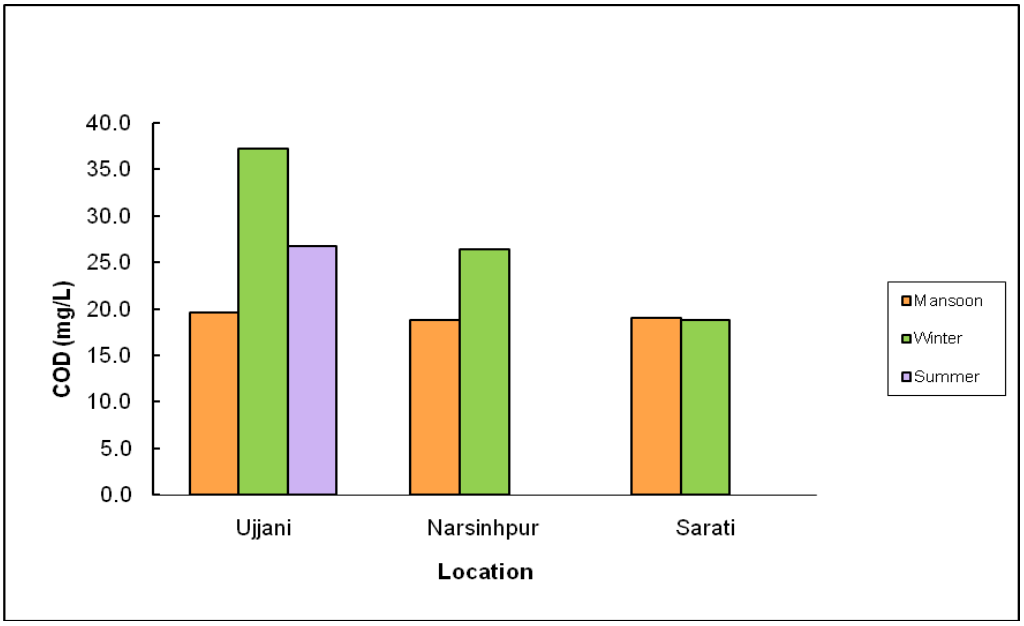
From the above graph it is observed that the value of COD at Ambeghar is highest during summer season.

2. Chemical Oxygen Demand for Stations under Shirur Sub-Division :



From the above graph, it can be observed that the COD are much higher side at Khamgaon especially during summer.

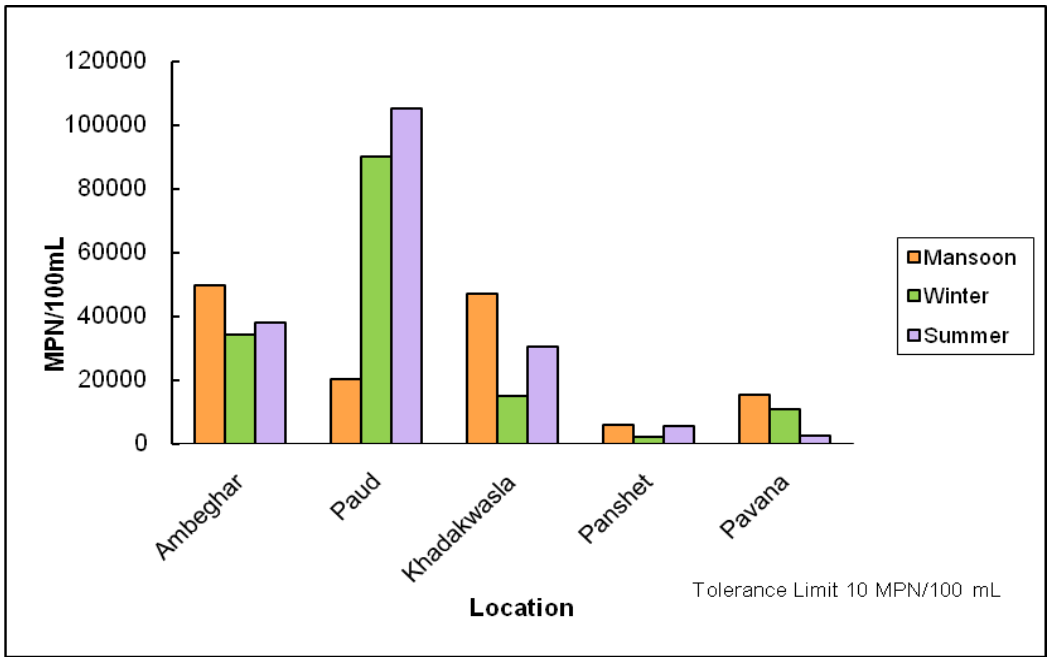
3. Chemical Oxygen Demand for Stations under Solapur Sub-Division:



From the above graph, it can be observed that at every location during all the season, the value of COD is higher. It is much higher at Ujjani during winter.

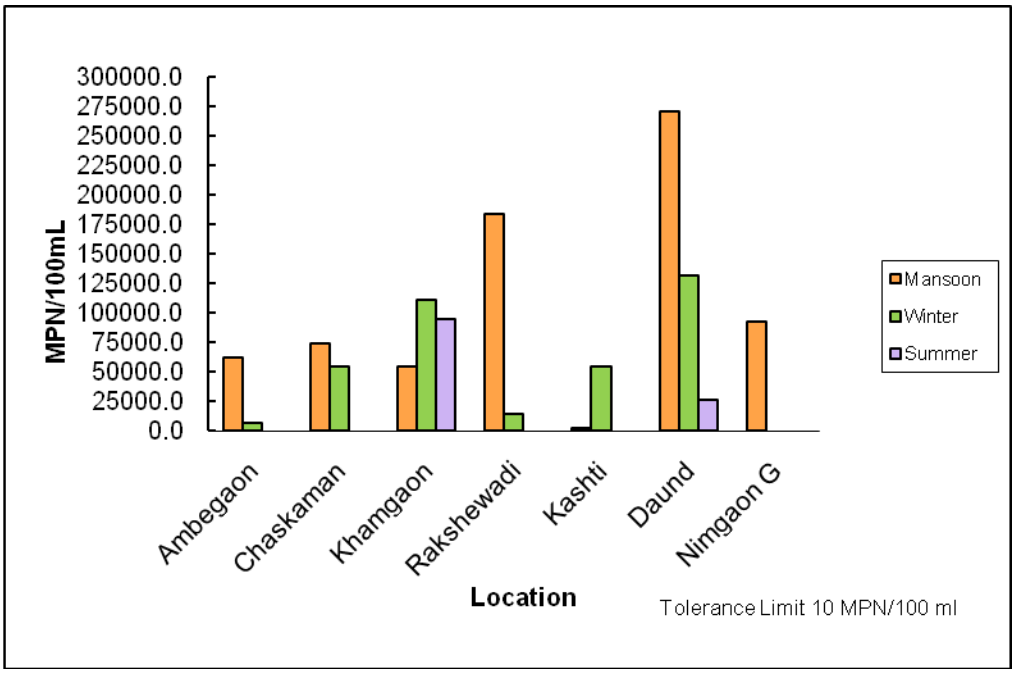
IV. Graphical Representation of Total Coliforms:

1. Total Coliform for Stations under Pune Sub-Division:



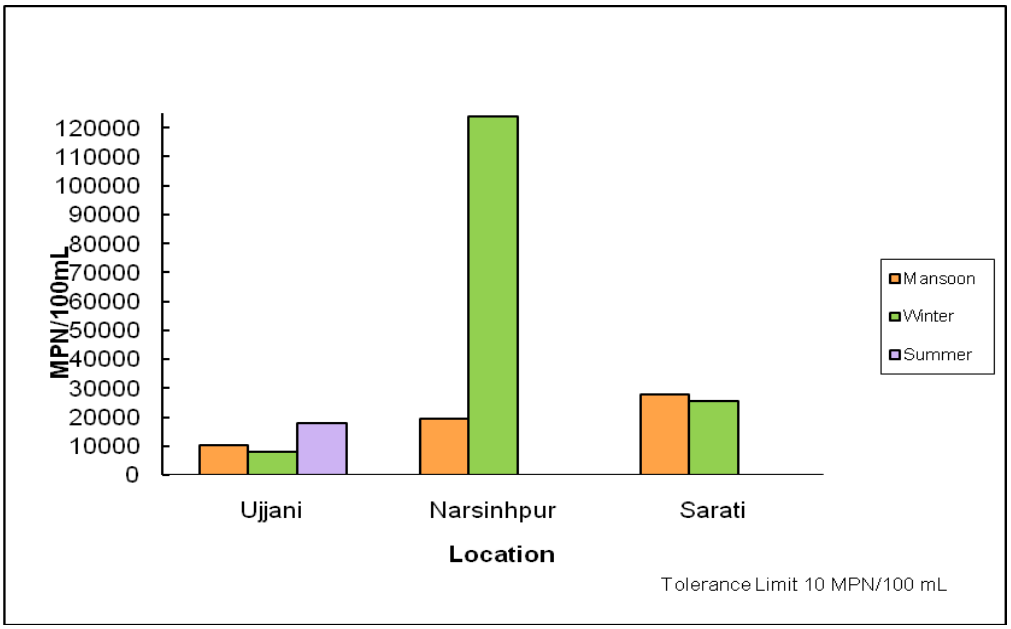
From the above graph it is observed that the values of Total Coli form are highest at Paud in all season.

2. Total Coliform for Stations under Shirur Sub-Division:



From the above graph it is observed that the value of Total Coli form at each location during all the season is high than the prescribed limit especially at Daund and Rakshewadi.

3. Total Coliform for Stations under Solapur Sub-Division:



From the above graph it is observed that the value of Total Coliform at each location during all the season is higher than the prescribed limit. It is highest at Narsinhpur in winter.

Chapter V
CONCLUSION

CHAPTER - 5

CONCLUSION

5.1 Conclusion

Observing all the factors it can be concluded that, analysis results from all the locations have shown increase in value of Biological Oxygen Demand and Total Coli form as compare to previous year. The value of Biological Oxygen Demand is very high, even exceeding beyond desired limit is due to the presence of organic matter, which also reduces oxygen content in the water. Water having excess Biological Oxygen Demand is not fit for human activities or consumption.

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

From the observation at Daund and Khamgaon location almost all parameters are crossing the desired limit which indicates that at the upstream of this location there are a considerable source of pollution. Hence, it can be concluded that water from all these sources is not suitable for drinking purpose and so it requires treatment before its usage.

5.2 REMEDIAL MESAURES:

- Domestic effluents may be treated before discharging.
- Effluents from the non-point sources may be identified. These are required to be collected and treated.
- The artificial recharge of ground water through integrated watershed management programme and rainwater harvesting will help to improve the ground water quality in the area where the problem exists.
- Farmers in the catchment area shall be educated against use of extensive amount of pesticides and chemical fertilizers. They shall be encouraged to use organic manure.
- Farmers may be encouraged to use advanced irrigation system like drip irrigation in order to conserve water and prevent erosion of top soil.

CHAPTER VI
OTHER ACTIVITIES

CHAPTER-6

OTHER ACTIVITIES

6.1 REVENUE GENERATION TO GOVERNMENT OF MAHARASHTRA

During the year 2011-2012 many clients approached the laboratory. The clients availed the facility of the laboratory are as below;

1) Lunkad Skylounge Co. Hos. Society Ltd, Kalyani Nagar, Pune
2) Marksmen Equipments (I) Pvt. Ltd., Wagholi.
3) Kasarsai Dam Division, Pune
4) M/s Sukhakarta food products Pvt. Ltd., Pune
5) Bharatiya Jain Sanghatana, WERC Pune
6) M/s. Swami Foods Pvt. Ltd., Pune
7) Microchem Laboratory Pvt. Ltd. Pune
8) Lonavala Municipal Corporation
9) Central water Commission Pune
10) Technogreen Environmental Solutions Pune

6.2 REVENUE GENERATED DURING THE PERIOD

Sr. No.	Year	Amount Received
1.	2011-2012	3,03,029

6.3 ISO Certification:

Second Surveillance audit of ISO 9001:2008 was successfully completed in July 2011.

CHAPTER VII
ANNEXURE

Annual Report on

Water Quality Monitoring through Water Quality Lab Level-II, Pune for the Year 2011- 2012

ANNEXURE

List of Client 2011-2012

Sr. No.	Name of Client	Purpose of Analysis
1	Central Water Commission Upper Krishna Division Khadakwasla	Drinking Purpose
2	Mahabal Enviro Engg. Pvt. Ltd.	Waste Water & Drinking Water
3	M/s Swami Foods Pvt. Ltd, Pune	Waste Water & Drinking Water
4	Bharatiya Jain Sanghatana, WERC, Pune	Drinking Purpose
5	Minor Irrigation Division, Raigad	Drinking Purpose
6	Lonavala Municipal Council	Domestic Effluent
7	Microchem Lab Pvt. Ltd	Drinking Purpose
8	Mr. Shaikh, Pune	Drinking Purpose
9	Mr. Arun Kumar Deedwania, Pune	Drinking Purpose
10	Mr. Dhawale	Drinking Purpose
11	Kasarsai Dam Division, Pune	Drinking Purpose
12	Midgule Mohan , Kanhur Mesai, Pune	Drinking Purpose
13	Lunkad Skylounge Co. Hos. Society Ltd, Kalyani Nagar,Pune	Drinking Purpose
14	State Bank Staff,Rajgad Hos. Soc, Pune	Drinking Purpose
15	M/s Sukhakarta food products pvt. Ltd. Pune	Drinking Purpose
16	Mr. Tapse, Dhanori, Pune	Drinking Purpose
17	Marksmen Equipments (I) Pvt. Ltd. Wagholi, Pune	Drinking Purpose
18	Technogreen Environmental Solutions, Pune	Domestic & Industrial Effluent
19	Goodwill Samruddhi Co-operative Housing Soc. Vishrantwadi pune	Drinking Purpose
20	Narmada Heights Co-op. Hsg. Soc. Ltd. Kothrud	Drinking Purpose

QUALITY POLICY

We at water Quality lab – level 2, Pune are committed to provide water testing services to customers as well as all interested parties as per their needs & expectations to achieve their total satisfaction.

This shall be achieved through

- Continual improvement in all process
- By effective implementation of QMS as per the ISO 9001:2008
- By over all development in all employee's

DATE: 01st August, 2009

Er. A. S. Mehtre

Executive Engineer

Hydrology Project Division, Pune

Management of WQPL ensure 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.

Indian Register Quality Systems

(A Department of Indian Register of Shipping)
52A, Adi Shankaracharya Marg, Opp. Powai Lake, Powai, Mumbai - 400 072. India.
ACCREDITED BY THE RvA

MGMT. SYS.
RvA C 071

Certificate Of Approval

This is to certify that the Quality Management System of

Water Quality Laboratory Level II

Bungalow No. 2, Near Yerwada Post Office, Yerwada,
Pune – 411 006

has been found to conform
to the requirements of the Standard:

ISO 9001 : 2008

with respect to the following scope:

Water Testing and River Water Monitoring
for Water Quality

This approval is subject to continued satisfactory maintenance of the Quality Management System of the Organisation to the above Standard which will be monitored by IRQS.

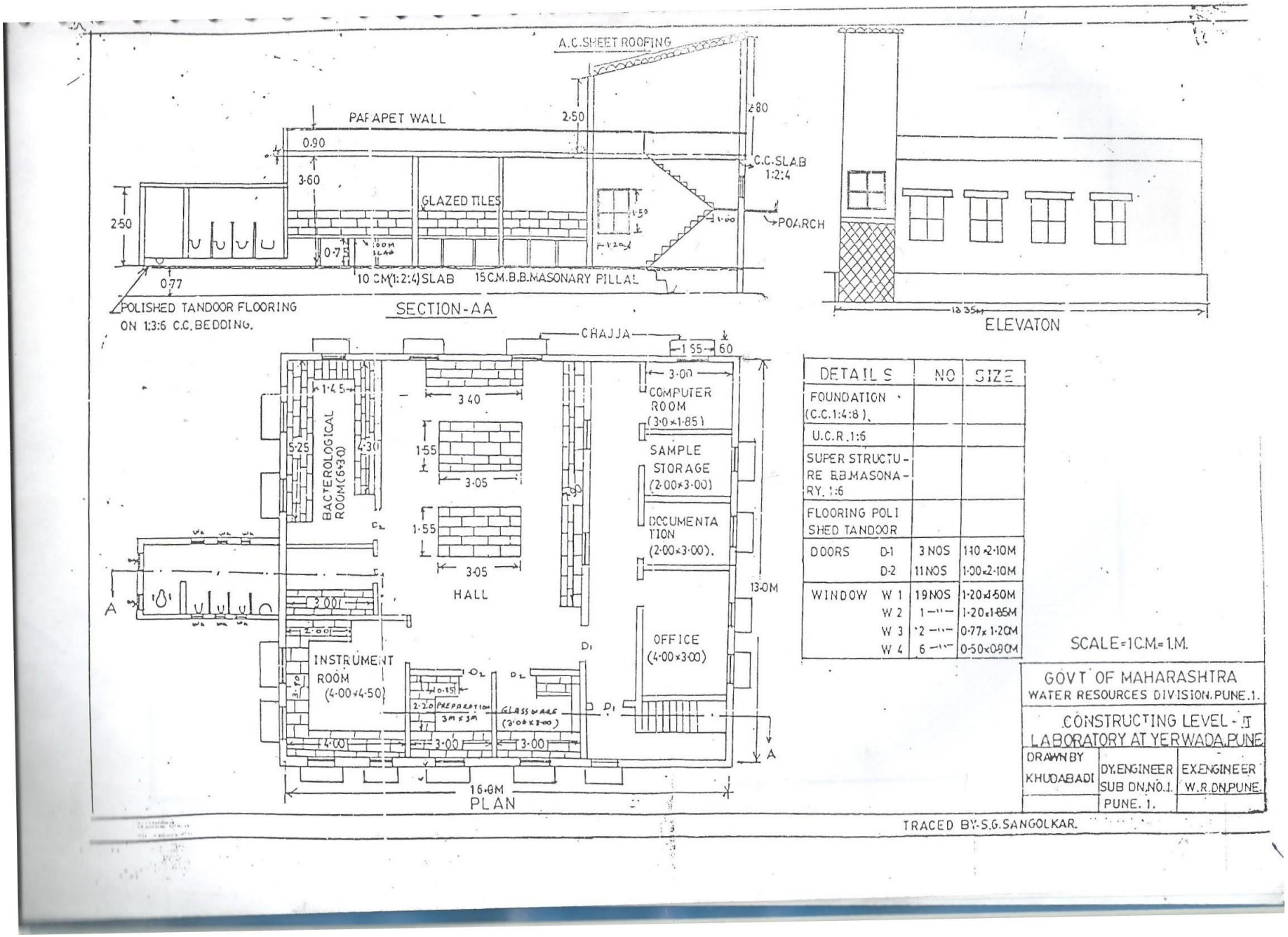
Certificate No.: ***IRQS/1010072*** issued at Mumbai on: *9th February 2010*

Original Approval Date : *9th February 2010*
Current Certificate Expiry: ***8th February 2013***

S. Kumar
Managing Director

The use of the Accreditation Mark indicates accreditation with respect to activities covered by the certificate with accreditation no. C 071

Conditions overleaf



DETAILS		NO	SIZE
FOUNDATION (C.C.1:4:8).			
U.C.R.1:6			
SUPER STRUCTURE B.B.MASONARY. 1:6			
FLOORING POLISHED TANDOOR			
DOORS	D-1	3 NOS	1·10×2·10M
	D-2	11 NOS	1·00×2·10M
WINDOW	W 1	19 NOS	1·20×1·50M
	W 2	1 —"—	1·20×1·85M
	W 3	2 —"—	0·77×1·20M
	W 4	6 —"—	0·50×0·90M

SCALE=1C.M.=1M.

GOVT OF MAHARASHTRA
WATER RESOURCES DIVISION, PUNE.1.

CONSTRUCTING LEVEL - II
LABORATORY AT YERWADA, PUNE

DRAWN BY	DY.ENGINEER	EX.ENGINEER
KHUDABADI	SUB DN.NO.1. PUNE. 1.	W.R.DN.PUNE.

TRACED BY-S.G.SANGOLKAR.

PHOTOGRAPHS

Visit by Executive Engineer, Hydrology Project Division Pune

Visit by Executive Engineer, Hydrology Project Division Pune

Second Surveillance Audit on 04/07/2011 by IRQS

Jurisdiction Map of Laboratory