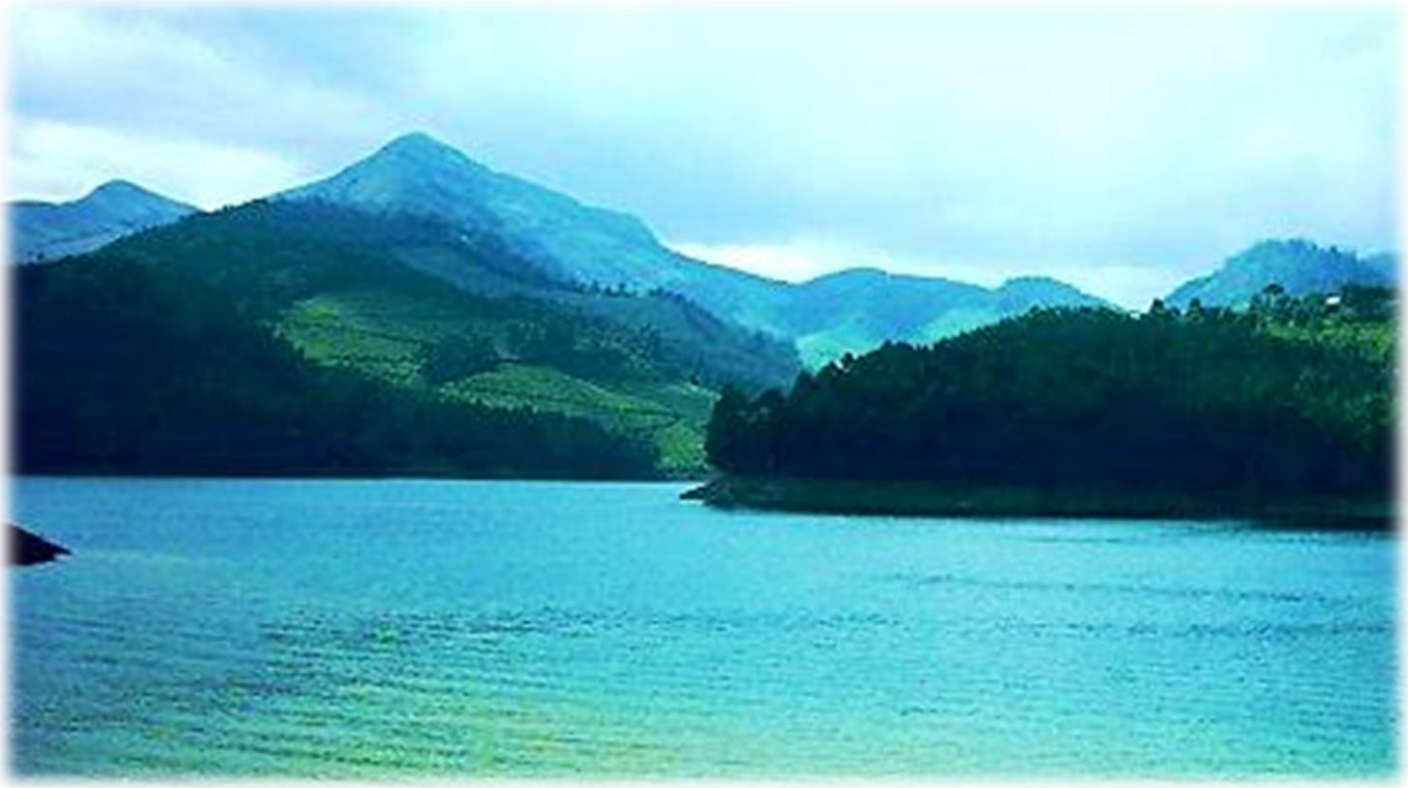
Water Quality Status of Maharashtra



2013-14

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

The Energy & Resources Institute

Water Quality Status of Maharashtra 2013-14

(Compilation of Water Quality Data Recorded by MPCB)

May 2014

Prepared by

राजीव कुमार मित्तल भाप्रसे
सदस्य सचिव
Rajeev Kumar Mital IAS
MEMBER SECRETARY

महाराष्ट्र प्रदूषण नियंत्रण मंडळ
MAHARASHTRA POLLUTION CONTROL BOARD

Preface

Water Quality Monitoring is one of important function of State Pollution Control Board. It helps in evaluating the nature & extent of water contamination, assess the water quality trends, evaluate the success of pollution control measures taken & prioritization of efforts to be initiated. Maharashtra Pollution Control Board is monitoring water quality under National Water Monitoring Programme (NWMP) and State Water Monitoring Programme (SWMP) at various locations as per the Uniform Monitoring Protocol of Central Pollution Control Board / MoEF, New Delhi.

This document contains compilation & statistical analysis of Water Quality Monitoring data observed at 250 monitoring stations during the period 2013 to 2014. Also National Sanitation Foundation, USA's formula has been used to calculate Water Quality Index (WQI) to depict the water quality in a easy to understand the general public at large. The WQI is also used to compare with the water quality of last 3 years.

Also presents a comparison for the trend in water quality index for the inter-basin analysis for the past two years along with the trend for intra-basin analysis for the past seven years. The Godavari Middle and Tapi Middle basin have shown slight improvement in terms of water quality, however the water bodies at Bhima upper sub basin (Krishna Basin) and water bodies near the coast line along Mumbai and Tarapur stretch (Thane district) need immediate action. Spatial maps have been generated in GIS platform to present the status of water quality at a glance. I trust findings of this report will help all concerned departments to prepare suitable action plans for improvement of water quality.

This report is prepared by The Energy and Resources Institute (TERI), Western Regional Centre and I appreciate the efforts of *Dr. Anjali Parasnis, Associate Director and Mr. Prathmesh Chourey, Associate fellow* - TERI in preparing the report. Contribution of *Shri Bharat Nimbarte, Joint Director-WPC and Ms.Yamini Chachad, Junior Scientific Officer* are appreciated for their inputs in the report.

Date: June 5, 2014

(Rajeev Kumar Mital, IAS)
Member Secretary

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Abbreviations

BIS	Bureau of Indian Standards
BOD	Biochemical Oxygen Demand
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
CWC	Central Water Commission
DO	Dissolved Oxygen
FC	Fecal Coliform
GEMS	Global Environment Monitoring System
GIS	Geographical Information System
GSDA	Groundwater Surveys & Development Agency
MINARS	Monitoring of Indian National Aquatic Resources System
MoEF	Ministry of Environment and Forests
MPCB	Maharashtra Pollution Control Board
NSFWQI	National Sanitation Foundation Water Quality Index
NWMP	National Water Monitoring Program
pH	Power of Hydrogen
RO	Regional Office
SD	Standards Deviation
Shp	Shape files
SPCBs	State Pollution Control Boards
SW	Surface Water
WHO	World Health Organisation
WQMS	Water Quality Monitoring Stations
YAP	Yamuna Action Plan

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Executive Summary

Water pollution is one of the major and most critical issues in India, as almost 70 per cent of the surface water resources and various groundwater reserves are contaminated by biological, toxic, organic and inorganic pollutants[1]. As per CPCB (Central Pollution Control Board), the largest source of water pollution in India is the release of industrial effluents and untreated sewage from urban centres and organic runoffs from agricultural fields. The effects of water pollution are not only devastating to humans but also to the fragile aquatic and riparian ecosystems constituting the biosphere of plants, animals, fish, and birds.

In Maharashtra, of the 5 river basin systems, 55% of the required water is sourced from the four river basins namely, Krishna, Godavari, Tapi and Narmada, which lie to the east of the Western Ghats, while, 45% of state's water resources emanate from Western Ghats and are famously known as west flowing rivers. Given the pressures from urbanization and industrialization there is a dire need to monitor and regulate water pollution in Maharashtra.

MPCB, being the state nodal agency under CPCB, monitors and documents data for water quality under two programs of NWMP (National Water Quality Monitoring Program) titled GEMS (Global Environment Monitoring System) and MINARS (Monitoring of Indian National Aquatic Resources) under these there are a total of 250 WQMS (Water Quality Monitoring Stations), the highest among all states and Union Territories in India. Out of these stations, 156 are on rivers, 34 on sea/creeks, 10 on drains and 50 for ground water.

The WQI (Water Quality Index) for the water quality has been calculated using the formula developed by NSF (National Sanitation Foundation) and modified by CPCB (Central Pollution Control Board). The monthly observations for surface water quality and half yearly observations for groundwater have been used to calculate the WQI with the following categories. However this index does not include COD (Chemical Oxygen Demand) as a parameter.

WQI	Quality classification	Remarks	Colour code
Surface Water Quality			
63 - 100	Good to Excellent	Non Polluted	
50 - 63	Medium to Good	Non Polluted	
38 - 50	Bad	Polluted	
38 and less	Bad to Very Bad	Heavily Polluted	
Ground Water Quality			
<50	Excellent	Non Polluted	
50-100	Good water	Non Polluted	
100-200	Poor Water	Polluted	
200-300	Very Very Poor	Polluted	
>300	Water Unsuitable for drinking	Heavily Polluted	

[1] M.N. Murty and Surender Kumar, *Water Pollution in India An Economic Appraisal*, India Infrastructure Report 2011, pps- 285-298. IDFC

Surface Water Quality

The impact of urbanization and industrialization is clearly visible on water resources in Maharashtra since majority of the rivers which were recorded to be polluted were along the western region of Maharashtra. A total of 17 WQMS located in the Bhima upper- sub basin and the West flowing river basin, recorded a high level of pollution in the peak summer and winter months. These basins have the most urbanised regions of the state including Mumbai Metropolitan Region, Thane, Pune and so on.

The WQMS (2786) representing a nallah near Tarapur MIDC was recorded to be heavily polluted throughout the year. Similarly the, nallahs at Thane (Rabodi, Colour Chem, Sandoz), were also recorded to be highly polluted, with WQI in between through-out the year. These nallahs lie close to the coastline and could severely affect the water quality and the aquatic life associated with the same. It is highly desired to adopt appropriate treatment facilities for industrial and domestic waste water in these two areas.

The WQMS representing surface water quality for Bhima, Mula, Mutha, Nira and Pawna rivers in the Bhima Upper-sub basin also recorded heavy pollution loads throughout the year. The Pawna river was recorded to be heavily polluted in the villages of Pimprigaon, Kasarwadi and Sagavigaon of Haveli taluka, Pune district. These areas need further investigation and an appropriate action plan to substantially control the water pollution.

The Purna river in the Tapi basin and Wardha, Weinganga, Kanhan, Godavari and Darna rivers in the Godavari basin recorded good water quality almost throughout the year and were recorded to be non- polluted.

Inter-basin analysis

Upon analysing the inter-basin performance (Figure No. 1) for the quality of surface water in Maharashtra, one may note that The Bhima-upper sub-basin has the most severely polluted river basin in the whole state. Almost half of the observations across all the monitoring stations recorded the quality of water as 'Bad' or 'Bad to Very Bad'. In this sub-basin mere 10 to 15percent of the observations recorded the quality of water in the category 'Good to Excellent'. The Basin comprises of Indryani, Mutha, Bhima and Pawna rivers which are severely affected with domestic sewage discharge since high annual average FC (Fecal Coliform) levels recorded in the rivers of this basin were in range of 200-350 MPN (Most Probable Number). As compared to Bhima upper sub basin, the Krishna upper basin was relatively less polluted, and recorded about 50percent of the observations in the 'Good to Excellent' category. The water quality along the rivers Venna, Umodi, Krishna and Koyna was recorded to be majorly in the category 'Medium to Good'.

The Tapi upper sub basin which comprises of Purna Pedhi and Tapi rivers was also found to be polluted along certain stretches. Mere 20percent of the all the observations recorded water quality in the category of 'Good to Excellent', while more than 10percent of the observations across all the locations in this basin recorded water quality to be in the category 'Bad to Very Bad'. The Tapi Middle sub basin was found to be less polluted relatively, and more than 90percent of the observations across all the monitoring stations in this basin recorded water quality to be 'Good to Excellent'.

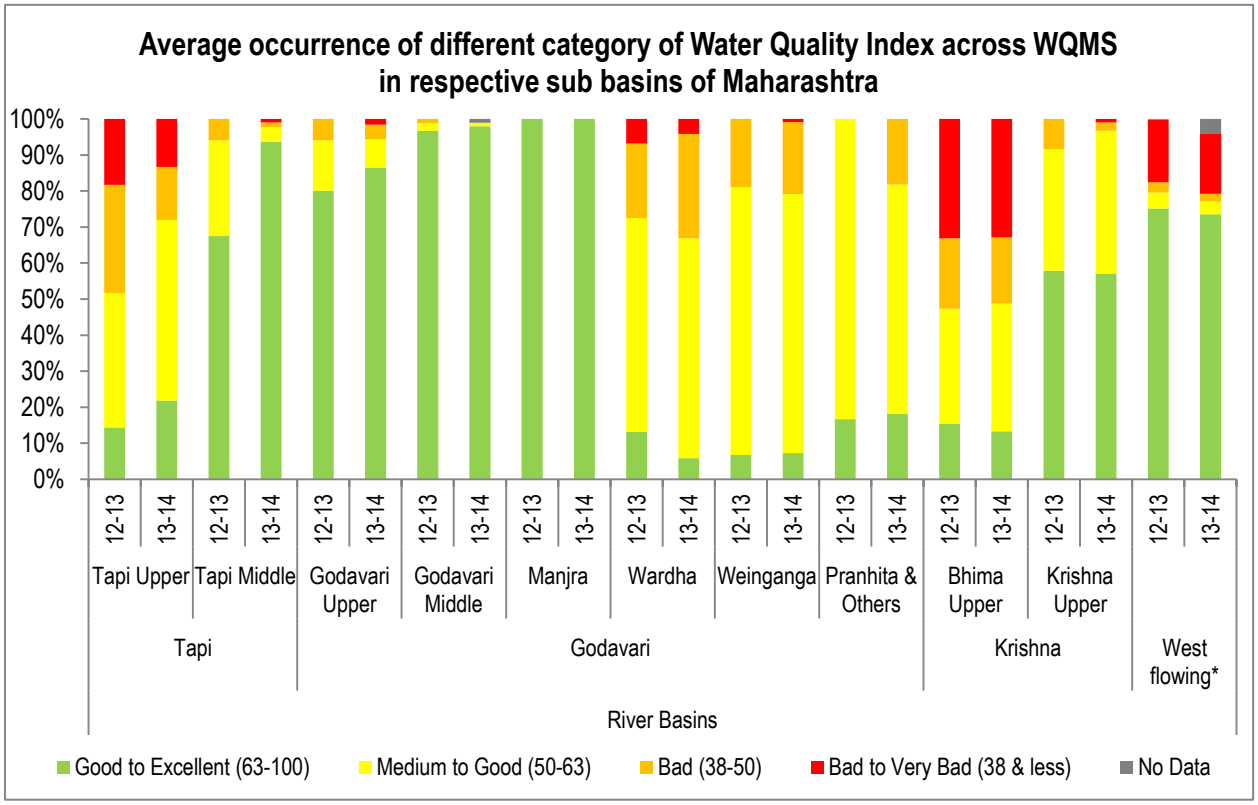


Figure No. 1: Average occurrence of different category of Water Quality Index across WQMS in respective sub basins of Maharashtra

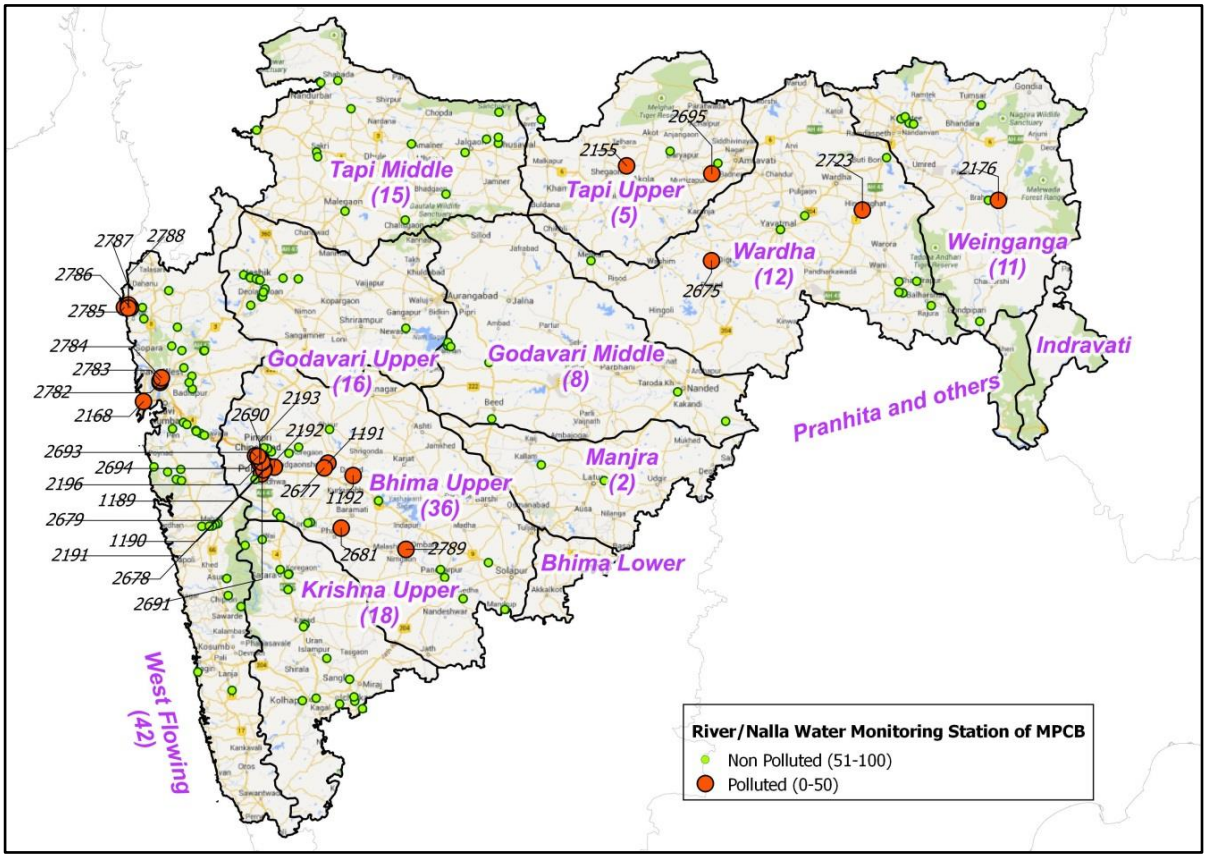
Note: The above comparison is based on the WQI recorded at a monitoring station and the average number of times the WQI was of a certain category at all the WQMS in that basin.

** West Flowing river basin also include the water monitoring done at Nallas of Rabodi, Colourchem, Sandoz and MIDC Tarapur*

In the Godavari Basin, the Wardha, Weinganga and Pranhita sub basins recorded quality of water in the category of 'Medium' and 'Bad' for almost 85percent of the observations. The rivers in these basins include Kanhan, Weinganga, Penganga and Wardha. In this basin too, the reason for pollution could be attributed to release of domestic sewage, since the average FC levels recorded were too high (60 to 100 MPN) across the all the monitoring stations. While the Godavari Upper, Middle and Manjra sub basins were recorded to be less polluted.

The monitoring stations along the West flowing rivers monitor the water quality for rivers like Patalganga, Kundalika, Bhatsa, Ulhas Kalu, Vashishti, Amba, Surya, Savitri and so on. The Nallas in Thane city as well as Tarapur industrial area were the most polluted in this basin. This patch has major industrial areas like TTC (Trans Thane Creek), Taloja, Tarapur, Dombivali, Ambernath and so on. Also this is one of the most urbanized areas in the state. Release of untreated sewage is also high from these cities and the FC levels recorded by the WQMS representing these areas exceeded the annual average of 200 MPN. While the over monitoring stations in this basin had observations in the category 'Good to Excellent' the rivers like Ulhas and Mithi which lie near the cities recorded high levels of pollution.

A spatial representation of the most polluted locations throughout the year has been presented in Map No. 1 and the corresponding details of the WQMS have been enlisted in Table No. 1. However, a trend across each basin and a station wise trend for the water quality recorded during 2013-14 have been presented in the report to pin point the most affected and polluted patches of rivers in the state.



Map No. 1: Spatial representation surface WQMS which recorded WQI as polluted for most of the year 2013-14

Table No. 1: Details of WQMS which recorded WQI as most polluted in 2013-14

Station Code	Monitoring Locations/ Stretch of River	Basins	RO
1189	Bhima river at Pune (Mutha river) at U/s of Vithalwadi near Sankar Mandir.	Krishna	Pune
1190	Bhima river at D/s of Bundgarden; Pune.	Krishna	Pune
1191	Bhima river after confluence with Mula-Mutha at Pargaon near Vasant Bandara.	Krishna	Pune
1192	Bhima river at Daund near Mahadev temple.	Krishna	Pune
2155	Purna River at D/s of confluence of Morna Purna at Andhura village	Tapi	Amravati
2168	Mithi River at near bridge	Coastal	Mumbai
2176	Wainganga River at D/s of Gaurav Paper Mills Near Jackwell	Godavari	Chandrapur
2191	Mutha River at Sangam Bridge Near Ganpathi Ghat	Krishna	Pune
2192	Mula-Mutha River at Mundhwa Bridge	Krishna	Pune
2193	Mula River at Aundh Bridge -Aundgaon	Krishna	Pune
2196	Pawana River at Sangavigaon; Pune	Krishna	Pune
2675	Morna River at D/s. of Railway Bridge	Godavari	Amravati
2677	Mula-Mutha River at D/s of Theur; Pune	Krishna	Pune
2678	Mutha River near Veer Savarkar Bhavan	Krishna	Pune
2679	Mutha River at Deccan Bridge; Pune	Krishna	Pune
2681	Nira River at Sangavi	Krishna	Pune
2690	Pawana River at Kasarwadi Pune	Krishna	Pune
2691	Pawana River at Dapodi Bridge at Pawana-Mulla Sangan Pune	Krishna	Pune
2693	Pawana River at Chinchwadgaon; Pune	Krishna	Pune
2694	Pawana River at Pimprigaon; Pune	Krishna	Pune
2695	Pedhi River near Road Bridge at Dadhi-Pedhi village	Tapi	Amravati
2723	Wena River at D/s. of Mohata Mills; near Bridge on HW Road	Godavari	Nagpur
2782	Rabodi Nalla	Coastal	Thane
2783	Colour Chem Nalla	Coastal	Thane
2784	Sandoz Nalla	Coastal	Thane
2785	BPT Navapur	Coastal	Thane
2786	Tarapur MIDC Nalla; near sump No.1	Coastal	Thane
2787	Tarapur MIDC Nalla	Coastal	Thane
2788	Tarapur MIDC Nalla near sump-III	Coastal	Thane
2789	Nalla at D/s of Alkai Mandir; Solapur	Krishna	Pune

Saline (Sea and Creek) Water Quality

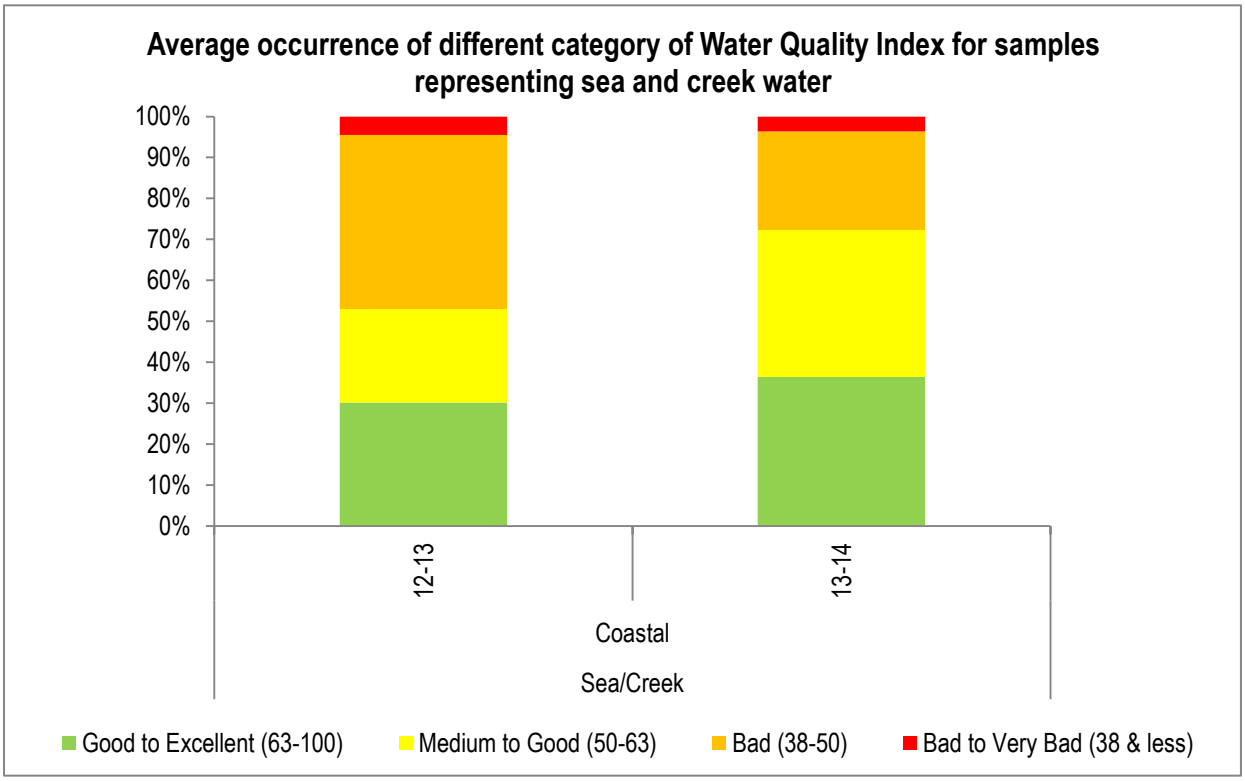


Figure No. 2: Average occurrence of different category of Water Quality Index for samples representing sea and creek water

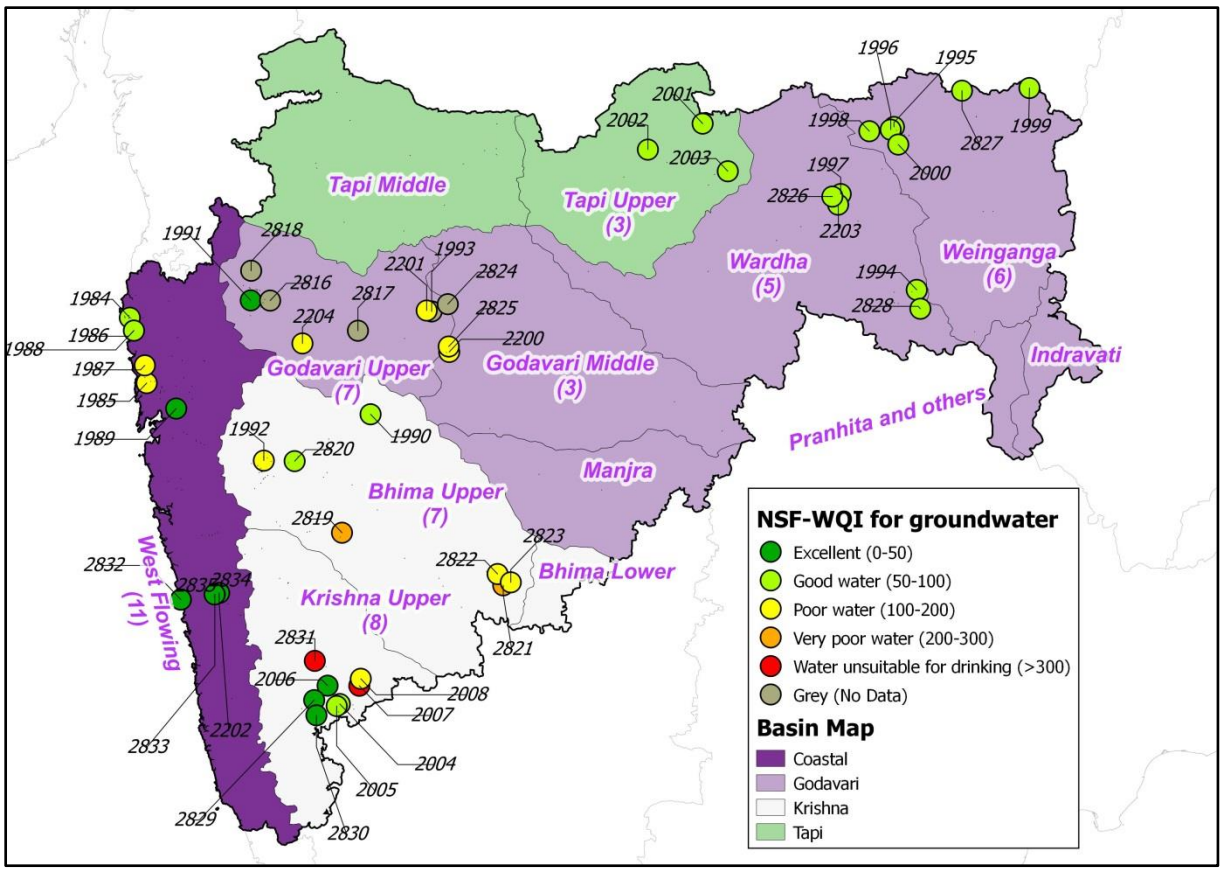
Consistently over the period of the last two years mere 30percent of the observations across all the monitoring stations on the coastline were seen to be in the category 'Good to Excellent' while majority of the time 'Moderate' quality of water was recorded. The sea coast along Thane district and Mumbai was consistently recorded to be polluted and the quality of water was in the 'Bad' category throughout the year.

In the year 2013-14 saline water quality was monitored at around 34 locations across the 720km long coastline of the state In terms of the monitoring done for sea and creek water along the coastline of the state, a majority of the WQMS are located in Mumbai (8), Mumbai Suburban (2) and Thane (18) districts. The Raigad and Ratnagiri districts have 2 and 4 WQMS respectively while there is no WQMS in the Sindhudurg district. The saline water along the coast of Mumbai was monitored and recorded to be polluted. Sea water at Worli sea face and the beaches of Versova, Juhu, Charni road (Girgaum) was consistently recorded to be polluted throughout the year and the WQI at these locations was in the range of 'Bad to Medium'. The same scenario was also observed for the saline water monitoring in Thane where the water quality was in the range of bad to medium. This could be attributed to release of semi-treated sewage directly into the sea and creek water in Mumbai and Thane. Appropriate infrastructure needs to be set up to treat sewage water at the earliest. This shall directly help in reducing the pollution levels along the coastal water in these districts.

Saline water monitoring at places like Ganpatipule, Madvigaon and Mirkarwada in the Ratnagiri taluka (Ratnagiri district), recorded good water quality throughout the year, indicating that the water at these locations was non-polluted.

Groundwater Quality

MPCB, monitors the ground water quality at around 50 ground water monitoring stations with a frequency of twice a year for parameters like pH, Nitrate, TDS (Total Dissolved Solids), Hardness, Fluoride, microbial content, Sulphates and so on. On an average the pH levels of the groundwater samples were recorded in the range of 7.5 to 8.5. Groundwater in Aurangabad region was recorded as the most alkaline with pH values exceeding 8.5 at Wahegaon and Katpur villages of Paithan taluka. Nitrite and Fluoride levels were also in the higher range in the regions of Aurangabad, Pune Solapur and Kolhapur.



Map No. 2: Spatial representation for average ground WQI recorded in 2013-14

Introduction

Water Pollution

Contamination of water or alteration of the physical, chemical or biological properties of water through the discharge of various kinds of wastes into water, directly or indirectly, rendering the water harmful for public health, health of animals, plants, aquatic organisms and so on has been termed as Water Pollution. It is one of the major and most critical issues in India, as almost 70 per cent of its surface water resources and many of its groundwater reserves are contaminated by biological, toxic, organic and inorganic pollutants.[2]

Water pollution can come from a number of different sources. If the pollution comes from a single source, such as an oil spill, it is called point-source pollution. If the pollution comes from many sources, it is called nonpoint-source pollution. As per CPCB[3] (Central Pollution Control Board), the largest source of water pollution in India is release of untreated sewage from urban centres, the release of industrial effluents and organic runoffs from agricultural fields. The major water pollutants are chemical, biological, or physical materials that degrade water quality. Based on the set of hazards they present pollutants can be classed into eight categories: Petroleum Products, Pesticides and Herbicides, Heavy Metals, Hazardous Wastes, Excess Organic Matter, Sediment, Infectious organisms, Thermal Pollution.

When toxic substances enter lakes, streams, rivers, oceans, and other water bodies, they get dissolved or lie suspended in water or get deposited on the bed. This results in the pollution of water whereby the quality of the water deteriorates, affecting aquatic ecosystems. Further the pollutants can also seep down and affect the groundwater deposits and aquifers. Varying on the concentration of pollutants, chemical and biochemical parameters the water may not be suitable for a desired application like drinking, recreation, agriculture, industrial applications, irrigation and so on.

The effects of water pollution are not only devastating to humans but also to animals, fish, and birds. The consumption of polluted water may lead to not only poisoning of humans, animals, birds food animals, but also disturbs the fragile aquatic and riparian ecosystem. Also dumping solid waste and release of sewage leaves a strong stench in the vicinity and diminishes the aesthetic quality of rivers, lakes, creeks, sea, beaches and so on.

Water Pollution Act

Given the impacts of water pollution, which is majorly attributed to various anthropogenic activities, regulating water pollution and monitoring the water quality levels becomes very essential. Realising the gravity of the issue, Ministry of Environment and Forests (MoEF), Government of India, under a policy decision enacted The Water (Prevention and Control of Pollution) Act in 1974. to provide prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. Under the Act, MoEF established and delegated the powers and functions under the act to Central Pollution

[2] M.N. Murty and Surender Kumar, *Water Pollution in India An Economic Appraisal*, India Infrastructure Report 2011, pps- 285-298. IDFC

[3] Central Pollution Control Board, *Status Of Sewage Treatment Plants In Ganga Basin*

Control Board (CPCB). Further, The Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide for the levy and collection of a cess/tax on water consumed by persons operating and carrying out certain types of industrial activities.

National Water Quality Monitoring Program

CPCB, Along with its nodal agencies, the SPCBs (State Pollution Control Boards), is responsible for implementation of legislations relating to prevention and control of environmental pollution pertaining to air and water. Presently the inland water quality-monitoring network is operated under a three-tier programme i.e. Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic Resources System (MINARS) and Yamuna Action Plan (YAP).

GEMS

CPCB has been identified as the Government of India's agency to serve as a focal point for carrying out water quality monitoring under the United Nation's, Global Environment Monitoring System (GEMS) Water Programme under of World Health Organisation (WHO). The GEMS programme is dedicated to provide water quality data and information of the highest integrity, accessibility and interoperability.

MINARS

A national programme titled Monitoring of Indian National Aquatic Resources (MINARS) was started in 1984, with a total of 113 stations spread over 10 river basins. The present network comprises of 870 stations on rivers, lentic water bodies and subsurface water. Water samples are being analysed for 28 parameters consisting of physico-chemical and bacteriological parameters for ambient water samples apart from field observations[4].

Monitoring Network

CPCB has established a network of monitoring stations across the country. The present network comprises of 2500 stations in 28 States and 6 Union Territories spread over the country[5]. The monitoring network covers 445 Rivers, 154 Lakes, 12 Tanks, 78 Ponds, 41 Creeks/Seawater, 25 Canals, 45 Drains, 10 Water Treatment Plant (Raw Water) and 807 Wells. Among the 2500 stations, 1275 are on rivers, 190 on lakes, 45 on drains, 41 on canals, 12 on tanks, 41 on creeks/seawater, 79 on ponds, 10 Water Treatment Plant (Raw Water) and 807 are groundwater stations.

[4] Bharadwaj RM, *Water Quality Monitoring In India- Achievements And Constraints*, IWG-Env, International Work Session on Water Statistics, Vienna, June 20-22 2005

[5] Central Pollution Control Board 2011-12, *National Water Monitoring Programme*

Water Quality Monitoring in Maharashtra

Water resources of a state consist of surface and under surface water as well as any other aquifers or drainage running through the state. The geographical area of Maharashtra state is 3.07lakh sq.km with the annual precipitation ranging from 400-6000 mm during the period of monsoon months. The estimated average-annual availability of water resources is estimated to be around 164 km^3 of surface water and 20.5 km^3 of subsurface water.

In Maharashtra, of the 5 river basin systems, 55% of the dependable water yield is available in the four river basins namely, Krishna, Godavari, Tapi and Narmada, which lie on the east of the Western Ghats and 45% of state's water resources emanate from Western Ghats, famously known as west flowing rivers. These are majorly seasonal rivers and drain into the Arabian Sea. Maharashtra state has a rich source of water however as a result of increase in the population and pollution in the state's river basins and sub basins, competition for water supply & conflict among different usage of water has emerged and is growing. Given the pressures from urbanization and industrialization there is a dire need to monitor and regulate water pollution in Maharashtra.

Maharashtra tops the list of Indian states and union territories in terms of infrastructure available for monitoring water quality (Figure No. 3). The state had 557 stationary drinking water quality testing laboratories as on January 31, 2014, about one-fourth of the total such stationary testing laboratories available in the entire country, data from the Ministry of Drinking Water and Sanitation showed.[6] In Maharashtra, water quality is monitored by various agencies namely Hydrology Project (SW), Groundwater Surveys & Development Agency (GSDA), Central Pollution Control Board (CPCB), Maharashtra Pollution Control Board (MPCB), Central Water Commission (CWC), Central Ground Water Board (CGWB) as per provisions made by "Water Quality Assessment Authority" constituted under sub sections (1) and (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986).

Monitoring network in Maharashtra – GEMS and MINARS

MPCB, being the state nodal agency under CPCB, monitors and documents data for water quality under two programs of NWMP titled GEMS and MINARS under which there are a total of 250 monitoring stations out of which, 156 are on rivers, 34 on sea/creeks, 10 on drains and 50 for ground water (Figure No. 3). Depending on the water resources in a region and the necessity identified for pollution monitoring, various stations have been commissioned under each RO (Regional Office) of MPCB. A summary of the stations under each RO is presented in Annex - I. These monitoring programs analyse the water samples for 9 core parameters and 19 general parameters (Table No. 2). The monitoring agencies have also analysed the trace metals at few locations. In Maharashtra the monitoring is done approx. 200 times on monthly basis in surface waters comprising of Rivers, lakes, tanks, ponds, creeks/sea water, canals & drains and 50 times on a half yearly basis in case of ground water[7].Also the breakup of the WQMS representing different the type of water bodies in 2013-14 is presented in Figure No. 4.

[6] Central Pollution Control Board 2011-12, *National Water Monitoring Programme*
[7] CPCB 2010, *Status of Water Quality in India*,

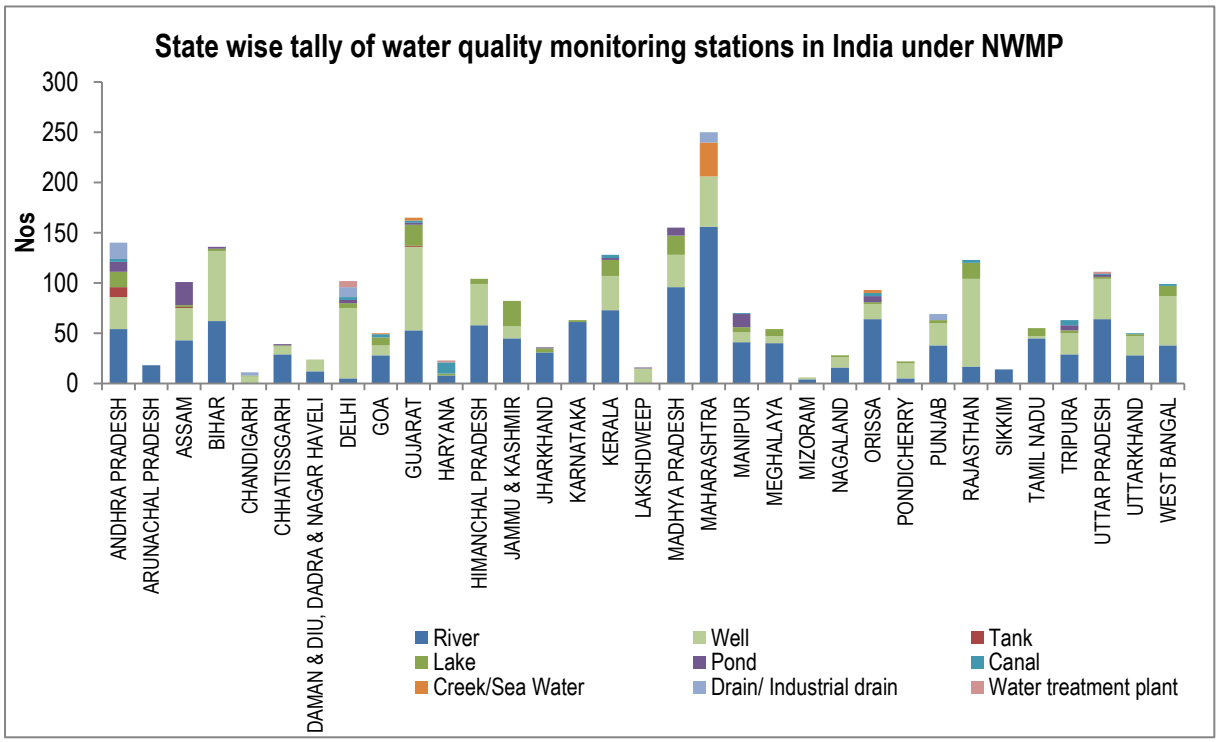


Figure No. 3: State wise tally of water quality monitoring stations in India under NWMP (2011-12)

Data Source: CPCB, 2012[8]

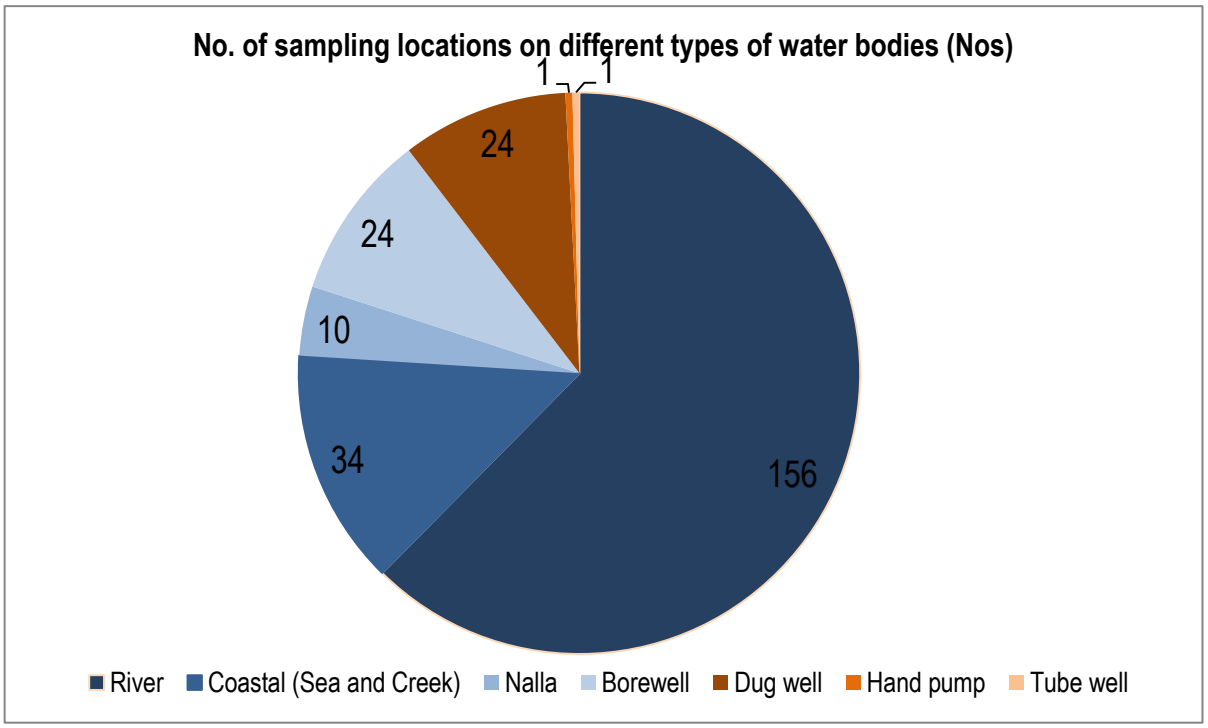


Figure No. 4: Number of sampling locations of MPCB on different types of water bodies

[8] Central Pollution Control Board 2011-12, *National Water Monitoring Programme*

Table No. 2: List of parameters tested and analyzed by MPCB

Sr No	Field Observations	Core Parameters	General Parameters	Trace Metals
1.	Weather	Temperature	Turbidity	Cadmium
2.	Depth of Water Body	Dissolved Oxygen	Phenophthalein alkalinity	Copper
3.	Human activities	pH	Total Alkalinity	Lead
4.	Floating Matter (Visible Effluent discharge)	Conductivity	Chlorides	Chromium total
5.	Color	BOD	COD	Nickel
6.	Odour	Nitrate	Total Kjeldahl-N	Zinc
7.		Nitrite	Ammonia-N	Iron
8.		Fecal Coliform	Hardness as $CaCO_3$	
9.		Total coliform	Calcium $CaCO_3$	
10.			Magnesium $CaCO_3$	
11.			Sulphate	
12.			Sodium	
13.			Total dissolved solids	
14.			Total fixed solids	
15.			Total suspended solids	
16.			Phosphate	
17.			Boron	
18.			Potassium	
19.			Fluoride	

Methodology

In order to interpret the data sets recorded by the WQMS across the state in the most comprehensive and illustrative manner, basin wise analysis was developed for evaluating the surface water quality. Saline (Sea and Creek) water and ground water quality has been analysed separately. Further to present the multiple variables (pH, BOD, FC, DO) into one single value Water quality Index was calculated for surface (fresh and saline) and ground water. To present the data in a spatial format GIS (Geographical Information System) maps were generated.

Spatial Maps

Sub - basin level maps

Of the 5 major river basin systems Krishna, Godavari, Tapi and Narmada, West Flowing rivers, Narmada basin comprises of just 0.5%[9] of the total area. Hence, it was included in the Tapi basin for ease and convenience, while the remaining WQMS were divided into the remaining four basins. Since the basins are huge and have many WQMS within them, the sub basin level map was generated as per data and demarcation published by CGWB[10] (Central Ground Water Board), Ministry of Water Resources Government of India. The imageries, for the basins of Tapi, Krishna and Godavari, were downloaded, geo-referenced and digitized on GIS platform to generate shape (.shp) files.

MPCB Regional Office (RO) maps

Maps depicting the jurisdiction of the regional offices of MPCB, superimposed with district boundaries have been generated as part of this report. The peak season water quality index for the stations in each RO have been compiled for the necessary action by the respective RO's of MPCB.

Organizing and presentation of the data sets

The data sets for water quality parameters in soft copy were shared by MPCB for the years 2008 to 2012 for the parameters like temperature, dissolved oxygen, pH, conductivity, BOD, COD, Fecal Coliform and so on. The data sets were organised in spread sheets for further analysis and illustrative presentation. Stock graphs have been generated to depict the minimum, maximum, 25th and 75th percentile values along with the mean values observed for parameters namely pH, BOD, DO and FC. The standard deviation (SD) values were calculated and have been presented along with the data sets.

[9] Maharashtra Water Resources Regulatory Authority, http://www.mwrra.org/introduction.php?link=wr
[10] Central Ground Water Board, http://cgwb.gov.in/watershed/list-ws.html

Water Quality Index

A water quality index provides a single number (like a grade) that expresses overall water quality of a certain water sample (location and time specific) on several water quality parameters.

The objective of developing an index is to simplify the complex water quality parametric data into comprehensive information for easy understanding. A water index based on some very important parameters provides a simple indicator of water quality and a general idea on the possible problems with the water in the region.

In 1970, the National Sanitation Foundation developed the Water Quality Index (NSFWQI), a standardized method for comparing the water quality of various water bodies. NSFWQI is one of the most respected and utilized water quality index in the United States. Nine water quality parameters selected for calculating the index included

- Dissolved Oxygen (DO)
- Faecal Coliform (FC)
- pH
- Biochemical Oxygen Demand (BOD) (5-day)
- Temperature change (from 1 mile upstream)
- Total phosphate
- Nitrate
- Turbidity
- Total Solids

The expression for calculation the NSFWQI is expressed as;

$$\text{NSFWQI} = \sum_{i=1}^{p} \text{WiIi}$$

Where;

Ii= sub index for i^{th} water quality parameter

Wi= weight (in terms of importance) associated with water quality parameter

P= number of water quality parameters

WQI for surface water

Given the parameters monitored in India under the NWMP and to maintain the uniformity while comparing the WQI across the nation, the NSF WQI has been modified and relative weights been assigned by CPCB. The modified weights and the equation for the sub-indices as per CPCB are given in Table No. 3 and the equations used to determine the sub index values are given in Table No. 4.

Table No. 3: Original and modified weights for computation of WQI based on DO, FC, pH and BOD

Parameters	Original Weights from NSF WQI	Modified Weights by CPCB
Dissolved Oxygen (DO)	0.17	0.31
Fecal Coliform (FC)	0.15	0.28
pH	0.12	0.22
BOD	0.1	0.19
Total	0.54	1

Table No. 4: Sub index equation used to calculate NSF WQI for DO, FC, pH and BOD

Water Quality Parameters (units)	Range Applicable	Equation
Dissolved Oxygen (DO) (% Saturation)	0-40	0.18 + 0.66 X % Saturation DO
	40-100	(-13.55) + 1.17 X % Saturation DO
	100-140	163.34 - 0.62 X % Saturation DO
Fecal Coliform (FC) (counts/100 ml)	1 - 10^3	97.2 - 26.6 X log FC
	10^3 - 10^5	42.33 - 7.75 X log FC
	>10^5	2
pH	02 - 05	16.1 + 7.35 X (pH)
	05 - 7.3	(-142.67) + 33.5 X (pH)
	7.3 - 10	316.96 - 29.85 X (pH)
	10 – 12	96.17 - 8.0 X (pH)
	<2, >12	0
BOD (mg/l)	0 – 10	96.67 - 7 X (BOD)
	10 – 30	38.9 - 1.23 X (BOD
	>30	2

Upon determining the Water Quality Index, the water quality is described for easy understanding and interpretation. The description used in the report for classifying and the describing the water quality is presented in Table No. 5.

Table No. 5: Water Quality Classification and Best Designated use

WQI	Quality classification	Class by CPCB	Class by MPCB	Remarks	Colour code used in the report
63 - 100	Good to Excellent	A	A-I	Non Polluted	
50 - 63	Medium to Good	B	Not Prescribed	Non Polluted	
38 - 50	Bad	C	A-II	Polluted	
38 and less	Bad to Very Bad	D, E	A-III, A-IV	Heavily Polluted	

WQI for groundwater

MPCB monitors ground water quality for parameters like pH, total hardness, Calcium, Magnesium, Chloride, total dissolved solids, Fluoride, Manganese, Nitrate, Sulphates and so on once in six months. Based on the stringency of the parameters and its relative importance in the overall quality of water for drinking purposes each parameter has been assigned specific weightage[11]. The relative weights of the same have been determined (Table No. 6) for the parameters monitored and recorded by MPCB for the water samples monitored in the year 2011-12.

Table No. 6: Relative Weight of chemical parameters used for calculating WQI for Ground water

Chemical Parameters	Indian Standards for Drinking Water Quality[12]		Weight (Wi)			
	Acceptable Limit	Permissible Limits	Weight	Relative Weight	Weight w/o Iron, Manganese and Bicarbonate	Relative Weight w/o Iron, Manganese and Bicarbonate
pH	6.5-8.5	No relaxation	4	0.09756	4	0.13333
Total Hardness (TH)	300	600	2	0.04878	2	0.06667
Calcium	75	200	2	0.04878	2	0.06667
Magnesium	30	No relaxation	2	0.04878	2	0.06667
Bicarbonate	244	732	3	0.07317	-	-
Chloride	250	1000	3	0.07317	3	0.10000
Total Dissolved Solids (TDS)	500	2000	4	0.09756	4	0.13333
Fluoride	1	1.5	4	0.09756	4	0.13333
Manganese	0.1	0.3	4	0.09756	-	-
Nitrate	45	No relaxation	5	0.12195	5	0.16667
Iron	0.3	No relaxation	4	0.09756	-	-
Sulphate	200	400	4	0.09756	4	0.13333
			41	**1**	**30**	**1**

Source: BIS 10500 and CPCB 2001

The relative weight is then computed from the following equation

[11] C. R. Ramakrishnaiah, *Assessment of Water Quality Index for the Groundwater* , E-Journal of Chemistry, 2009, 6(2), 523-530; ISSN: 0973-4945

[12] Bureau of Indian Standards, *Draft Indian Standard Drinking Water – Specification*; Second Revision of IS 10500, ICS No. 13.060.20

$$Wi = \frac{wi}{\sum_{i=1}^{n} wi}$$

Where;

Wi= the relative weight

wi= the weight of each parameter

n= number of parameters

In the next step a quality rating scale (qi) for each parameter is assigned by dividing its concentration in each water sample by its respective standard according to the guidelines published by BIS (Bureau of Indian Standards) and the result thus obtained is multiplied by 100

$$qi = (Ci/Si) \times 100$$

where

qi = quality rating

Ci = the concentration of each chemical parameter in each water sample in mg/L

Si = the Indian drinking water standard for each chemical parameter in mg/L according to the guidelines of the BIS 10500, (2004-2005).

Based on the absolute value of the index determined from the calculations, water quality is classified as presented below in Table No. 7.

Table No. 7: Groundwater classification based on the Water Quality Index

WQI Value	Water Quality	Colour code used in this report
<50	Excellent	
50-100	Good water	
100-200	Poor Water	
200-300	Very Very Poor water	
>300	Water Unsuitable for drinking	

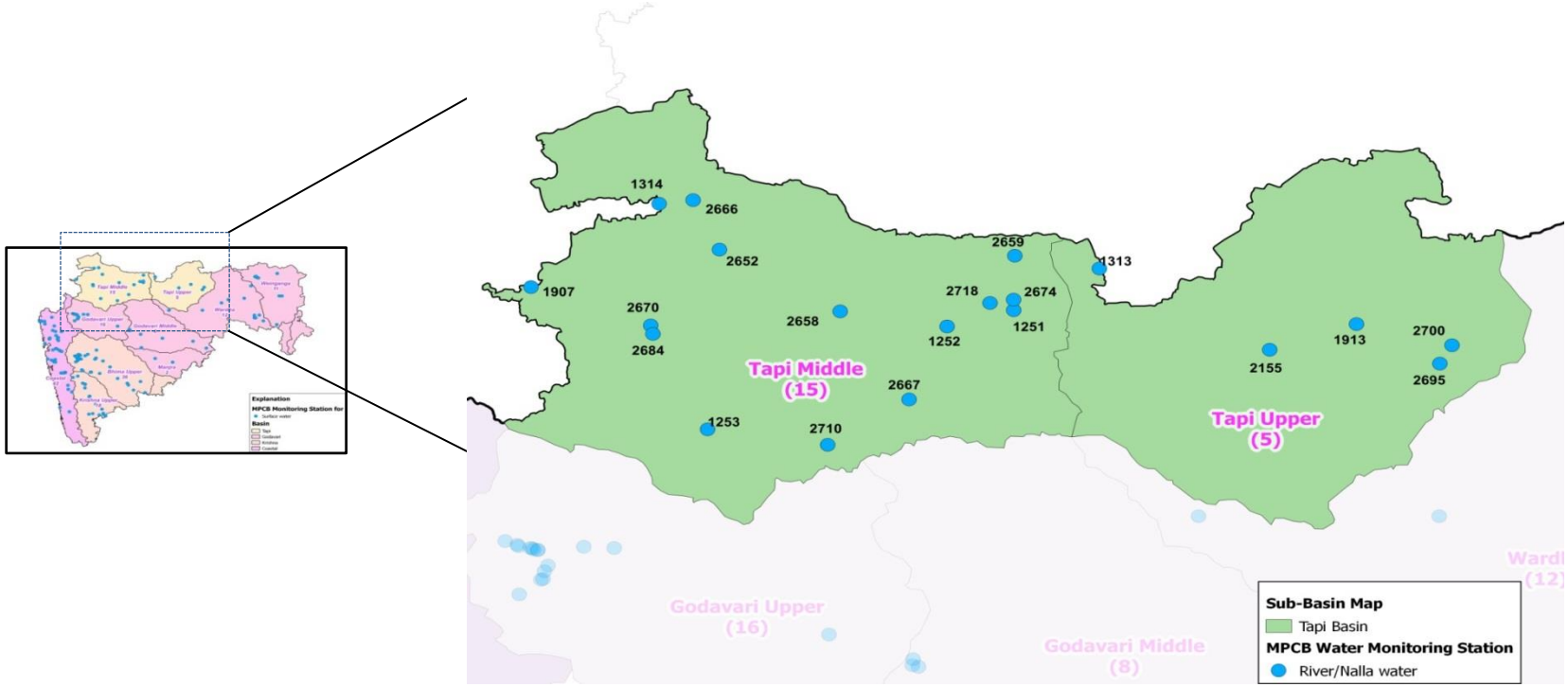
Surface Water Quality

Surface water comprises of rivers, lakes, reservoirs, seas, wetlands and so on. Maharashtra state receives good rainfall in monsoon which replenishes the surface water resources. The surface water sources form the major source of water supply in the state. However given the pressure from urbanization and industrialization these resources are under tremendous stress owing to a dual cause, demand for water supply and release of pollutants in the water. Moreover the ever increasing population creates more demand for water supply while at the same time it also generates sewage which is often released in the water bodies, untreated causing severe contamination and pollution.

Owing to this dual pressure, regular vigilance is required to regulate water pollution. Towards this MPCB has installed 200 surface water quality monitoring stations on rivers (59), sea (16), creeks (19), and nallas (10). Water quality is monitored per month across all the stations. The spatial presence of the stations is presented in the respective section for each basin.

The following section presents the illustrations of the parameters pH, DO, BOD and FC recorded across the 200 stations of MPCB in a lucid format. Further, basin wise water quality index is presented in this section for the basins of Krishna, Godvari, Tapi and West flowing rivers.

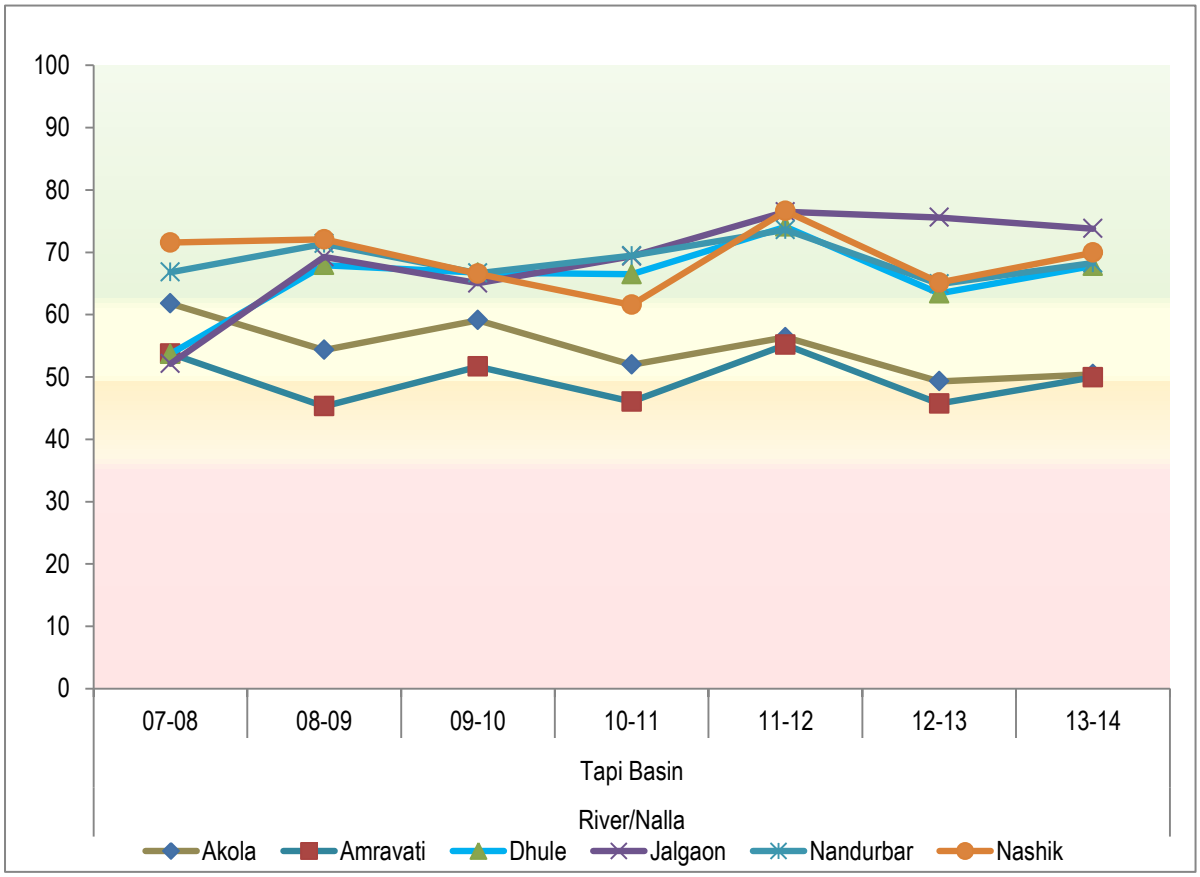
Tapi Basin



Map No. 3: Network of surface water quality monitoring stations in Tapi Basin

In Maharashtra the Tapi Basin could be divided into two sub-basins Tapi Upper and Tapi Middle. There are a total of 20 surface water monitoring stations (5 on upper and 15 on middle) in Tapi river basin in Maharashtra. A list of the station and the codes has been provided below in Table No. 8

Tapi Basin (Intra Basin analysis)



WQI	Category	Class by CPCB	Remarks
63-100	Good to Excellent	A	Non polluted
50-63	Medium to Good	B	Non polluted
38-50	Bad	C	Polluted
38 & less	Bad to Very Bad	D, E	Heavily polluted

Figure No. 5: Trend of annual average WQI across districts of Tapi basin

Note:

This graph considers the average WQI for all the monitoring stations in that particular district and hence may include some bias. This graph is only for an overview and monitoring station wise data maybe analyzed to pin point the most affected and polluted patches of rivers in that district.

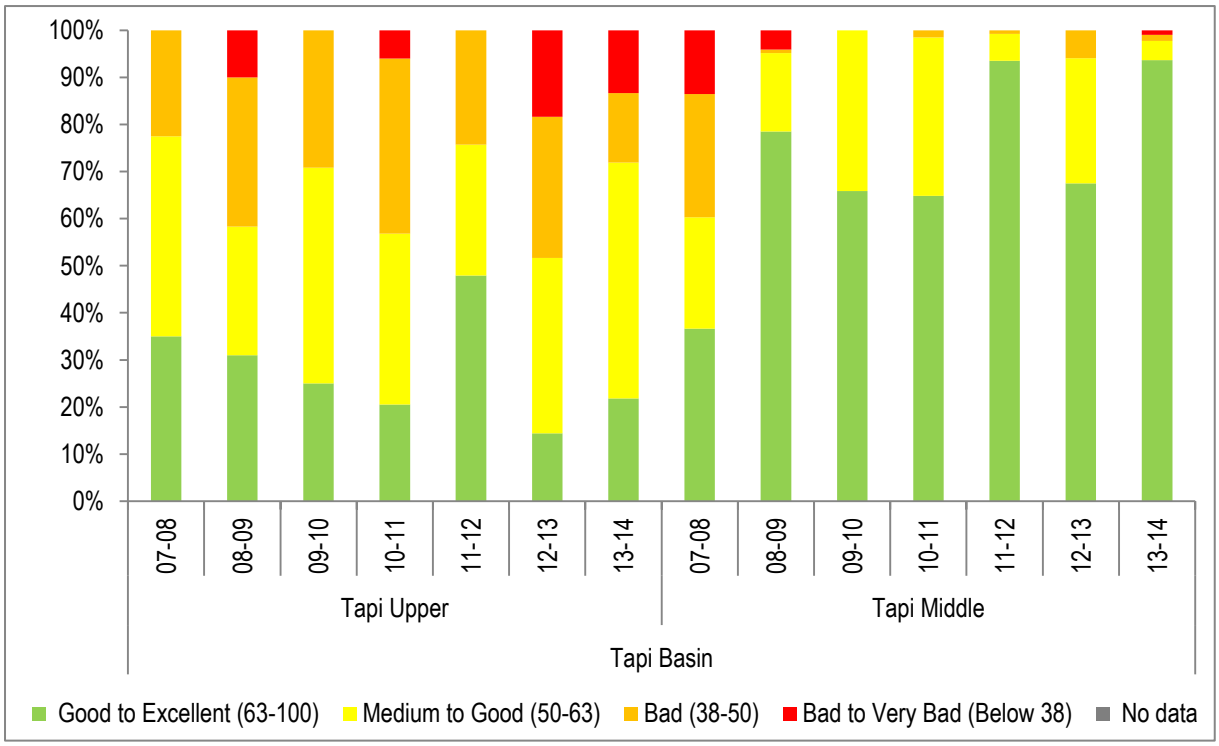
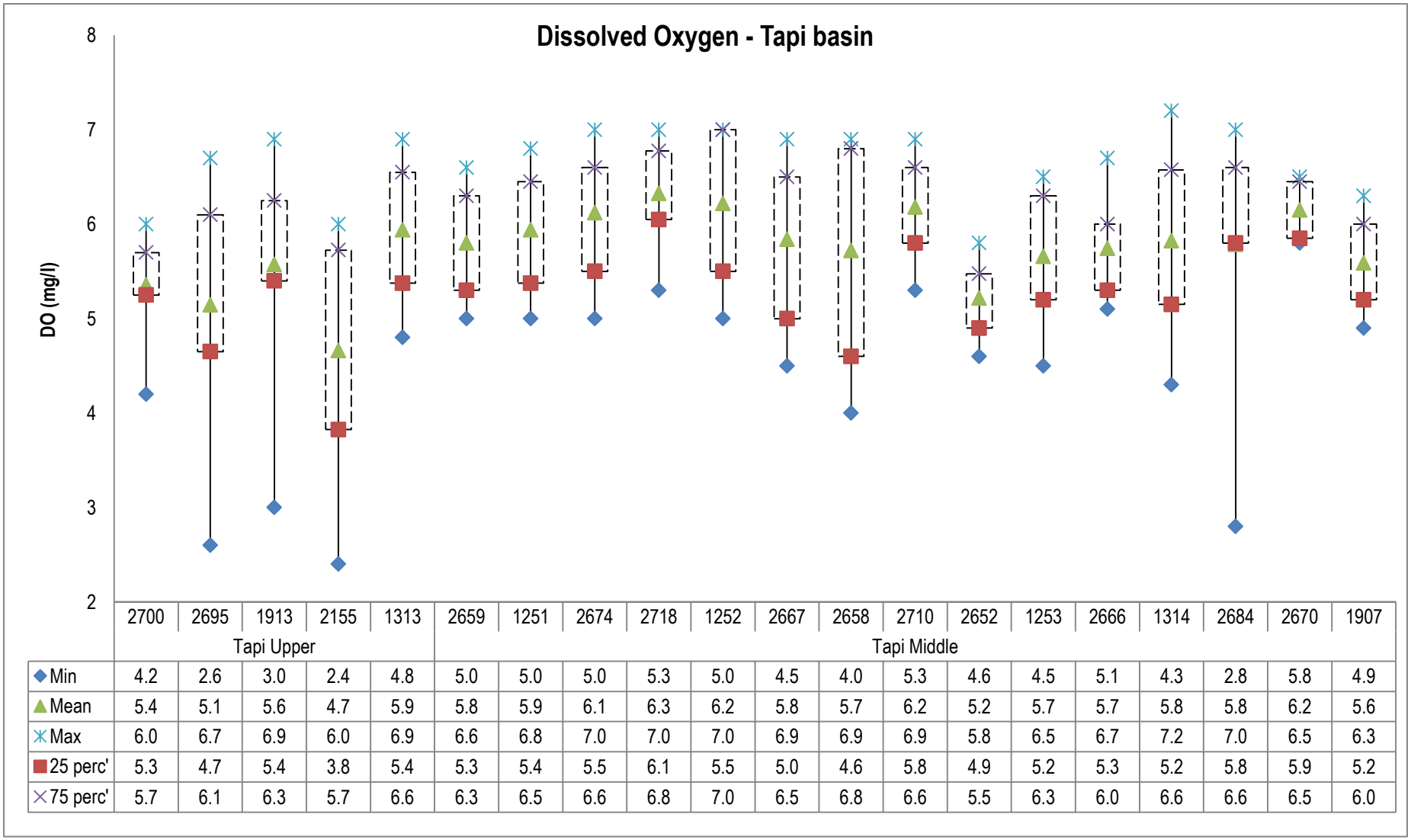


Figure No. 6: Trend of average occurrence for different category of WQI in Tapi basin

The Intra basin performance of Tapi Basin across six districts of the state are depicted in Figure No. 5 and the average annual occurrence of different category of Water Quality Index across all WQMS is depicted in theFigure No. 6.

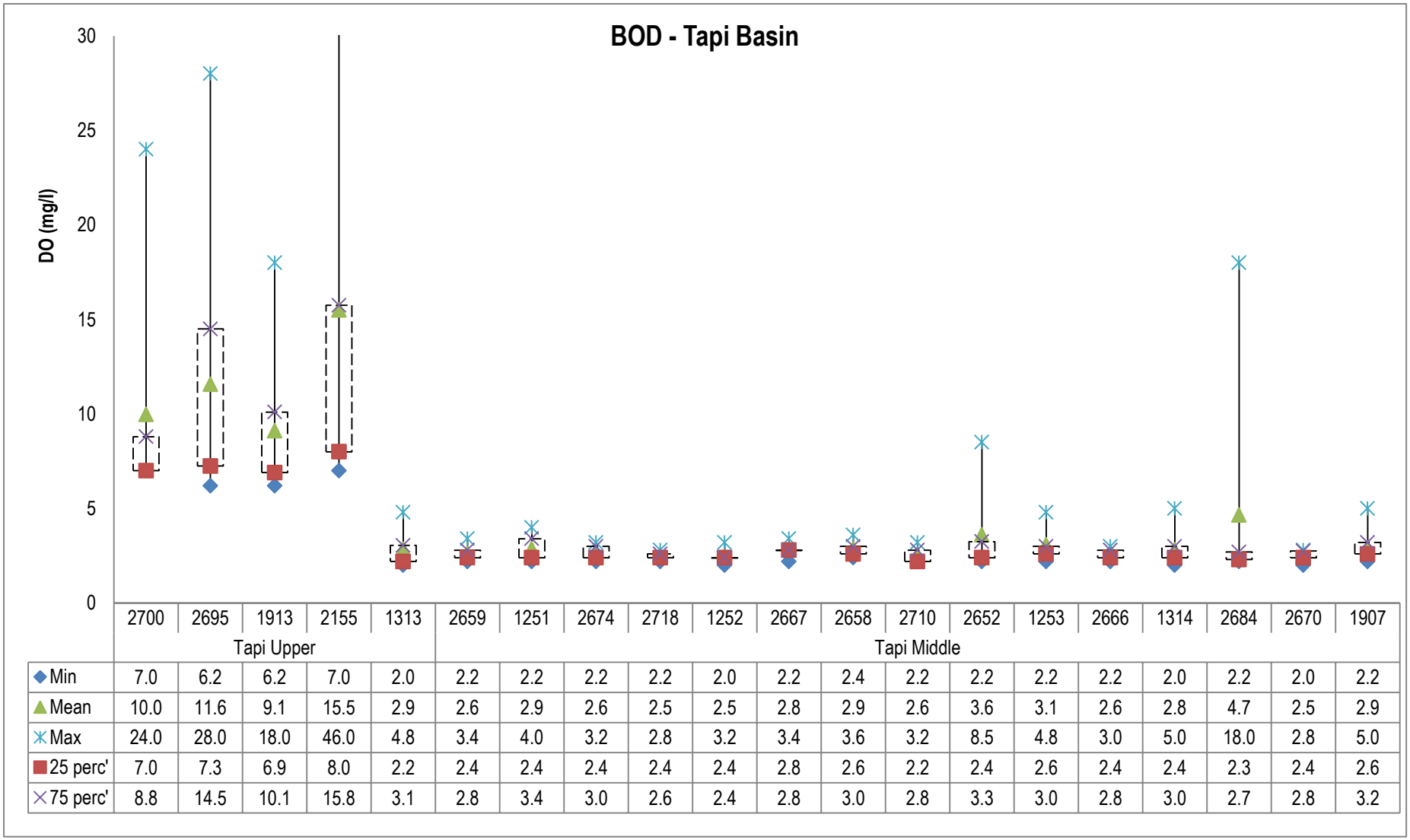
The results showed that among Six districts, namely Akola, Amravati, Dhule, Jalgaon, Nandurbar and Nashik, the annual average WQI of 2 of Amravati and 2 of Akola were consistently in Bad to Medium category (i.e. WQI in range of 38-63) from 07-08 till 13-14. Whereas, Dhule (5 WQMS), Jalgaon (8 WQMS), Nandurbar (2 WQMS) and Nashik (1 WQMS) were Good to Excellent (i.e. WQI in range of 63-100). The results showed that average WQI across Akola districts showed more or less downward trend and in rest of the districts no trend was seen.

Figure No. 6 shows average annual occurrence of WQI across 5 WQM stations of Tapi Upper and 15 WQMS of Tapi Middle for 7 years starting from 2007. Intra Sub basins results for Tapi Basin showed that the occurrence of Good to Excellent category of WQI in Tapi Middle sub basins is twice times that of the Bhima Upper, indicating that more likely occurrence of Good to Excellent category. Hence the overall preview of Tapi Middle sub basin is better when compared to Tapi Upper.



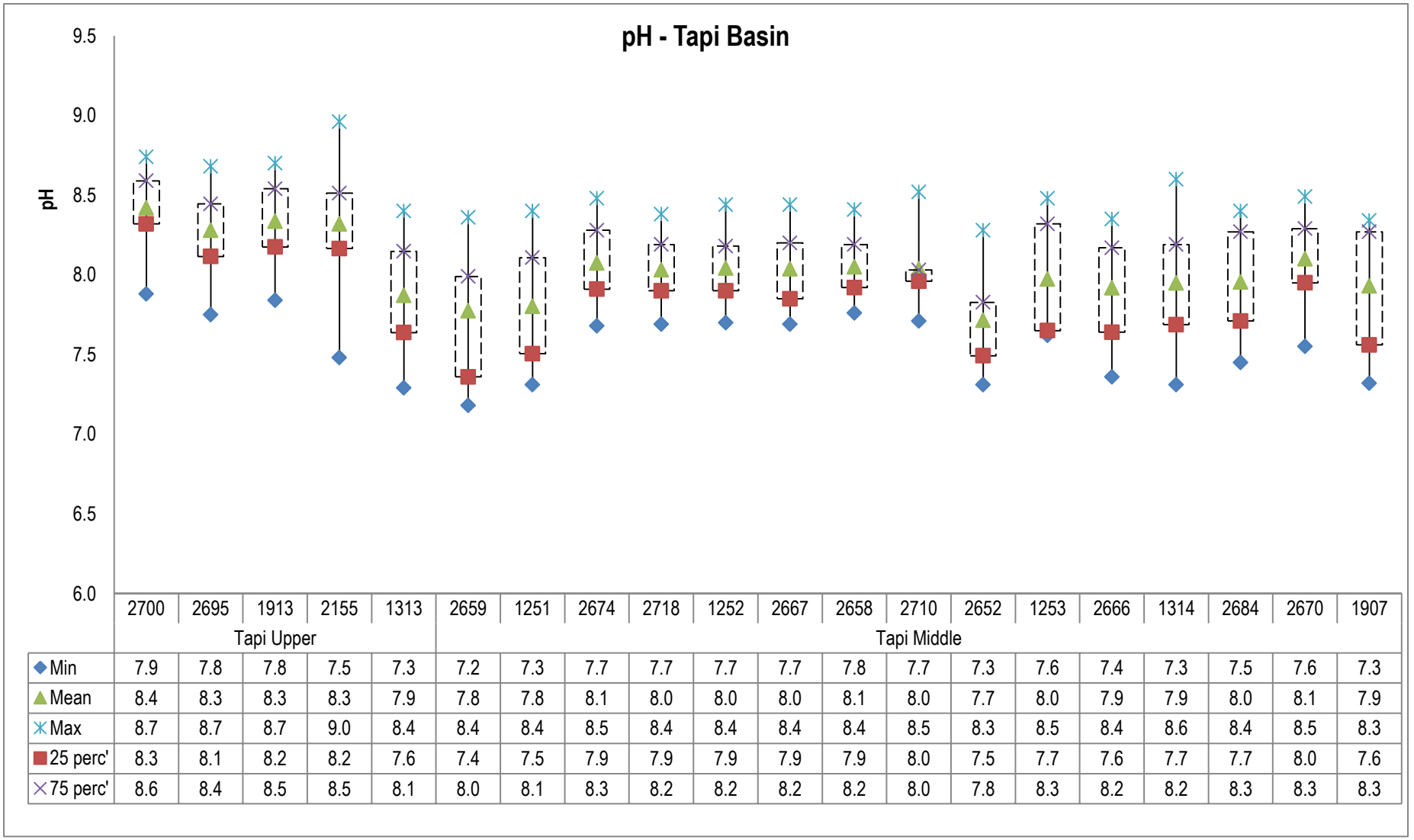
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
	Tapi Upper					Tapi Middle														
Min	4.2	2.6	3.0	2.4	4.8	5.0	5.0	5.0	5.3	5.0	4.5	4.0	5.3	4.6	4.5	5.1	4.3	2.8	5.8	4.9
Mean	5.4	5.1	5.6	4.7	5.9	5.8	5.9	6.1	6.3	6.2	5.8	5.7	6.2	5.2	5.7	5.7	5.8	5.8	6.2	5.6
Max	6.0	6.7	6.9	6.0	6.9	6.6	6.8	7.0	7.0	7.0	6.9	6.9	6.9	5.8	6.5	6.7	7.2	7.0	6.5	6.3
25 perc'	5.3	4.7	5.4	3.8	5.4	5.3	5.4	5.5	6.1	5.5	5.0	4.6	5.8	4.9	5.2	5.3	5.2	5.8	5.9	5.2
75 perc'	5.7	6.1	6.3	5.7	6.6	6.3	6.5	6.6	6.8	7.0	6.5	6.8	6.6	5.5	6.3	6.0	6.6	6.6	6.5	6.0

Figure No. 7: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Tapi basin



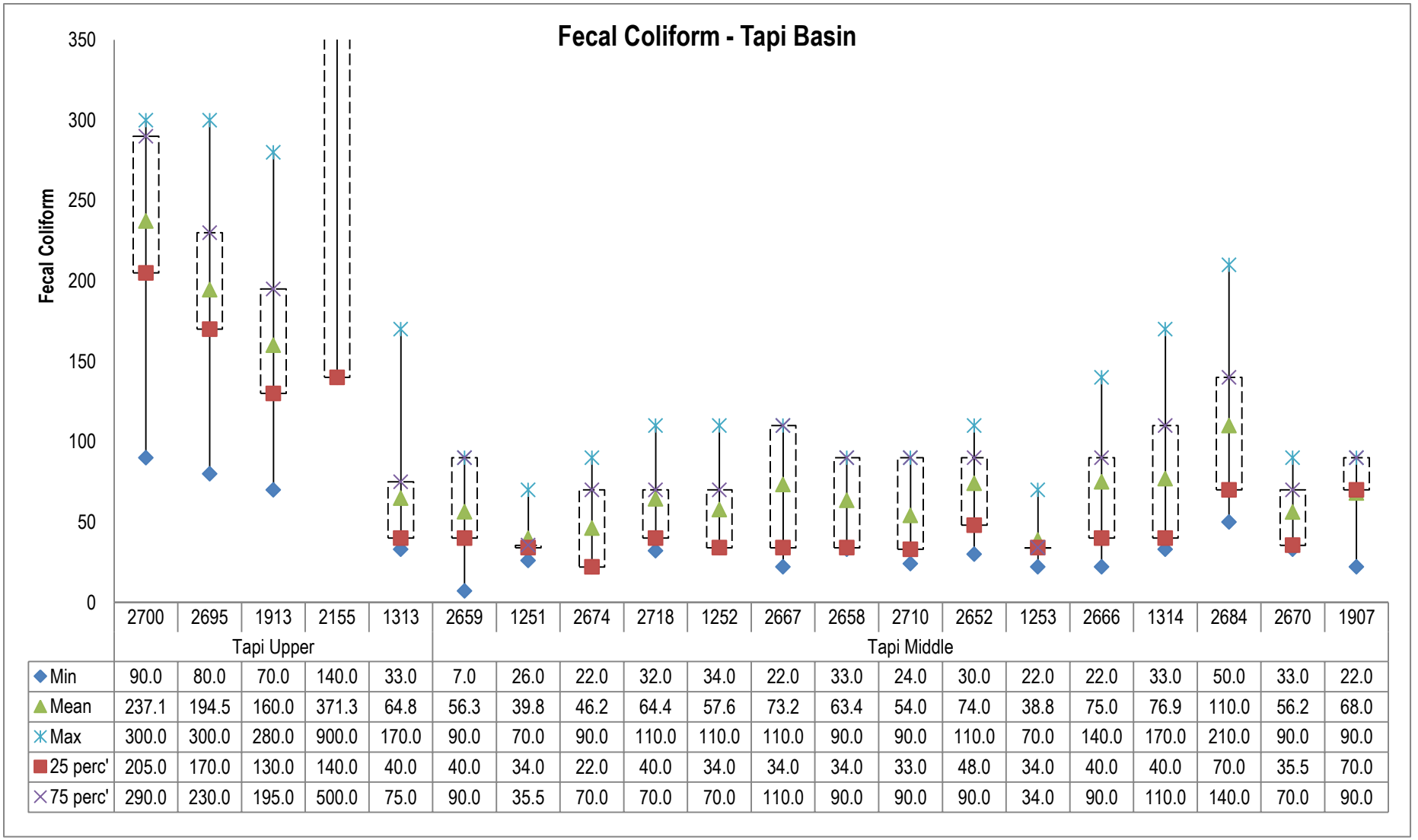
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
	Tapi Upper					Tapi Middle														
◆ Min	7.0	6.2	6.2	7.0	2.0	2.2	2.2	2.2	2.2	2.0	2.2	2.4	2.2	2.2	2.2	2.2	2.0	2.2	2.0	2.2
▲ Mean	10.0	11.6	9.1	15.5	2.9	2.6	2.9	2.6	2.5	2.5	2.8	2.9	2.6	3.6	3.1	2.6	2.8	4.7	2.5	2.9
✳ Max	24.0	28.0	18.0	46.0	4.8	3.4	4.0	3.2	2.8	3.2	3.4	3.6	3.2	8.5	4.8	3.0	5.0	18.0	2.8	5.0
■ 25 perc'	7.0	7.3	6.9	8.0	2.2	2.4	2.4	2.4	2.4	2.4	2.8	2.6	2.2	2.4	2.6	2.4	2.4	2.3	2.4	2.6
× 75 perc'	8.8	14.5	10.1	15.8	3.1	2.8	3.4	3.0	2.6	2.4	2.8	3.0	2.8	3.3	3.0	2.8	3.0	2.7	2.8	3.2

Figure No. 8: Trend of BOD levels recorded at WQMS at Tapi basin



	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
	Tapi Upper					Tapi Middle														
Min	7.9	7.8	7.8	7.5	7.3	7.2	7.3	7.7	7.7	7.7	7.7	7.8	7.7	7.3	7.6	7.4	7.3	7.5	7.6	7.3
Mean	8.4	8.3	8.3	8.3	7.9	7.8	7.8	8.1	8.0	8.0	8.0	8.1	8.0	7.7	8.0	7.9	7.9	8.0	8.1	7.9
Max	8.7	8.7	8.7	9.0	8.4	8.4	8.4	8.5	8.4	8.4	8.4	8.4	8.5	8.3	8.5	8.4	8.6	8.4	8.5	8.3
25 perc'	8.3	8.1	8.2	8.2	7.6	7.4	7.5	7.9	7.9	7.9	7.9	7.9	8.0	7.5	7.7	7.6	7.7	7.7	8.0	7.6
75 perc'	8.6	8.4	8.5	8.5	8.1	8.0	8.1	8.3	8.2	8.2	8.2	8.2	8.0	7.8	8.3	8.2	8.2	8.3	8.3	8.3

Figure No. 9: Trend of pH levels recorded at WQMS at Tapi basin



	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
	Tapi Upper					Tapi Middle														
Min	90.0	80.0	70.0	140.0	33.0	7.0	26.0	22.0	32.0	34.0	22.0	33.0	24.0	30.0	22.0	22.0	33.0	50.0	33.0	22.0
Mean	237.1	194.5	160.0	371.3	64.8	56.3	39.8	46.2	64.4	57.6	73.2	63.4	54.0	74.0	38.8	75.0	76.9	110.0	56.2	68.0
Max	300.0	300.0	280.0	900.0	170.0	90.0	70.0	90.0	110.0	110.0	110.0	90.0	90.0	110.0	70.0	140.0	170.0	210.0	90.0	90.0
25 perc'	205.0	170.0	130.0	140.0	40.0	40.0	34.0	22.0	40.0	34.0	34.0	34.0	33.0	48.0	34.0	40.0	40.0	70.0	35.5	70.0
75 perc'	290.0	230.0	195.0	500.0	75.0	90.0	35.5	70.0	70.0	70.0	110.0	90.0	90.0	90.0	34.0	90.0	110.0	140.0	70.0	90.0

Figure No. 10: Trend of Fecal Coliform levels recorded at WQMS at Tapi basin

Water Quality Index for WQMS in Tapi Basin

Apr	NA	NA	NA	49	44	46	64	58	48	60	NA	NA	72	83	74	72	NA	NA	68	83	71	NA	NA	NA	NA	74	83	NA	NA	NA	NA	83	NA	NA	NA	76	NA	NA	NA	NA	NA	NA	NA	NA	76	NA	NA	75	72	61	NA	NA	NA	71	75	NA
May	NA	NA	NA	NA	45	42	54	55	58	42	NA	NA	73	80	81	NA	NA	NA	70	78	77	NA	NA	NA	NA	68	82	NA	NA	NA	NA	NA	NA	NA	NA	73	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	75	72	70	NA	NA	NA	71	NA	NA
Jun	NA	NA	NA	NA	44	59	46	58	61	NA	NA	NA	68	80	78	NA	NA	NA	NA	83	78	NA	NA	55	NA	64	81	NA	NA	NA	NA	NA	NA	NA	NA	69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	66	75	72	NA	NA	NA	NA	NA	NA
Jul	NA	NA	55	50	63	55	53	37	54	49	36	52	81	54	64	NA	47	67	88	65	71	NA	NA	NA	NA	79	87	NA	NA	NA	NA	NA	NA	NA	NA	82	NA	NA	82	51	NA	NA	NA	NA	78	47	67	81	49	75	NA	NA	NA	NA	53	59
Aug	62	57	51	55	54	60	46	33	55	60	55	49	85	84	77	82	76	74	85	81	76	86	76	82	74	86	81	77	86	79	85	NA	80	85	76	85	NA	67	85	75	NA	82	NA	NA	89	55	70	81	57	71	86	NA	71	86	44	69
Sep	57	42	50	48	47	55	66	55	53	63	42	34	76	78	74	62	67	65	68	75	75	67	75	76	72	78	71	74	85	78	84	NA	75	82	73	77	67	69	60	61	52	77	63	73	63	61	68	79	67	70	70	76	67	75	69	68
Oct	66	49	55	69	52	59	68	61	65	72	47	57	69	NA	67	78	NA	75	60	69	72	87	67	83	47	72	64	68	79	66	76	NA	66	NA	71	75	66	65	70	62	60	NA	68	66	77	78	68	85	75	71	74	74	64	78	75	63
Nov	64	32	55	55	37	54	57	48	61	67	34	56	76	77	78	71	62	70	80	74	80	79	82	65	78	72	76	79	79	80	77	NA	81	78	83	76	61	73	76	54	64	NA	NA	76	67	66	65	51	NA	61	74	55	75	78	68	68
Dec	NA	NA	53	68	43	52	67	52	61	59	57	47	77	62	68	78	NA	66	73	69	70	75	72	78	72	75	NA	71	68	68	77	NA	63	76	76	72	64	NA	79	62	NA	71	NA	NA	76	64	66	76	59	68	61	72	68	56	64	64
Jan	NA	NA	35	41	34	28	51	44	32	66	NA	28	81	91	74	76	NA	68	76	81	72	77	NA	78	NA	70	NA	NA	71	NA	77	NA	NA	77	NA	76	NA	38	71	NA	70	NA	NA	71	79	NA	69	76	62	69	75	NA	72	71	NA	68
Feb	NA	NA	NA	46	38	35	53	51	48	42	NA	40	83	62	75	78	NA	72	84	65	76	85	NA	82	NA	86	NA	NA	82	NA	84	NA	NA	83	NA	74	NA	72	78	NA	71	NA	NA	63	49	NA	70	76	57	71	78	NA	NA	77	NA	71
Mar	NA	NA	NA	44	51	NA	42	65	NA	50	NA	NA	71	61	80	NA	NA	74	71	76	78	71	NA	73	NA	70	NA	NA	76	NA	72	NA	NA	70	NA	66	NA	67	70	NA	75	NA	NA	NA	NA	NA	74	66	77	71	68	NA	NA	68	NA	73
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	13-14	11-12	13-14	11-12	12-13	13-14	11-12	13-14	11-12	12-13	13-14	11-12	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2700			2695			1913			2155			1313			2659			1251			2674		2718		1252			2667		2658			2710		2684			2652			1253			2666			1314			2670			1907		
	Tapi Upper															Tapi Middle																																								

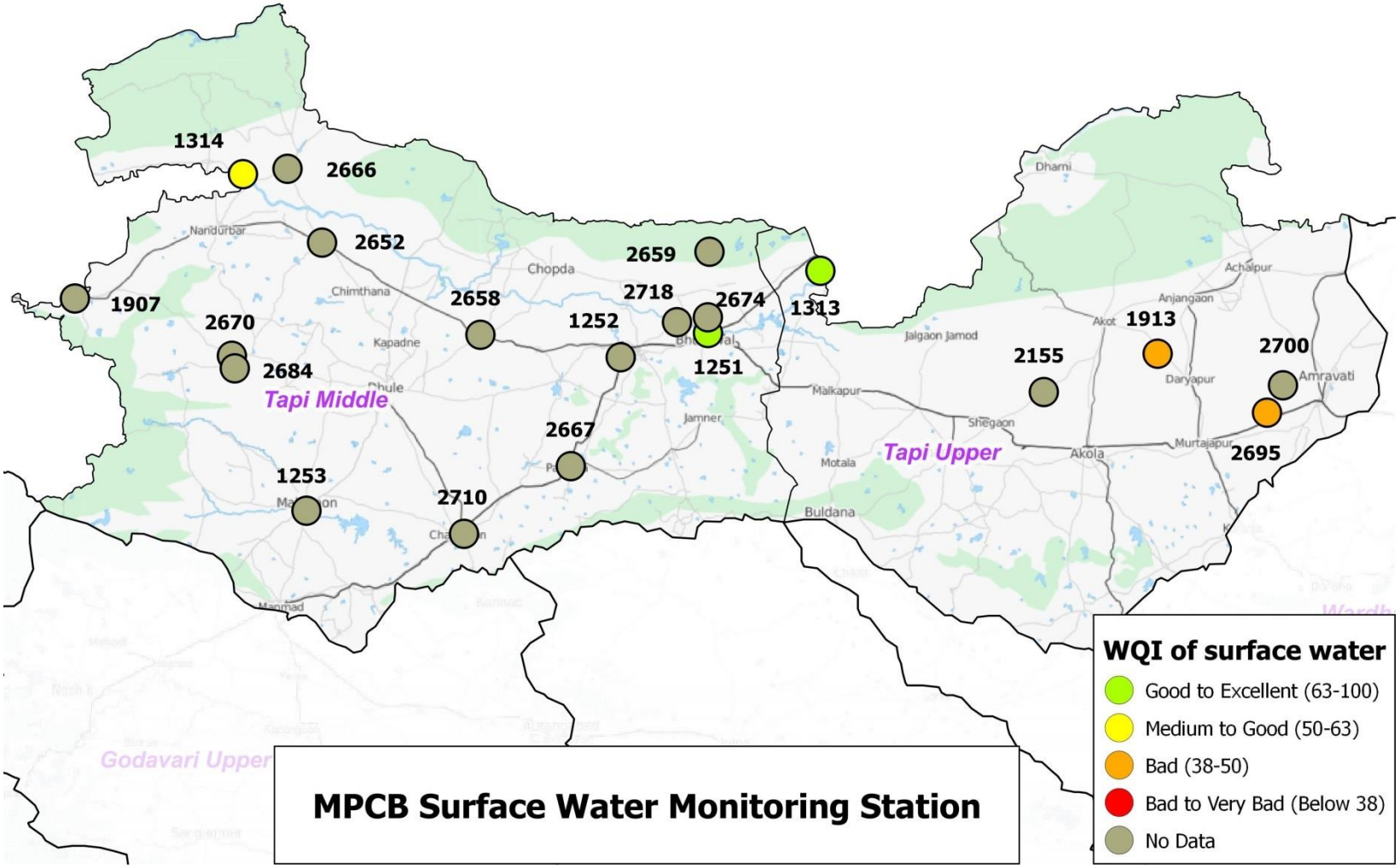
Legend

- Good to Excellent
- Medium to Good
- Bad
- Bad to Very Bad
- No Data

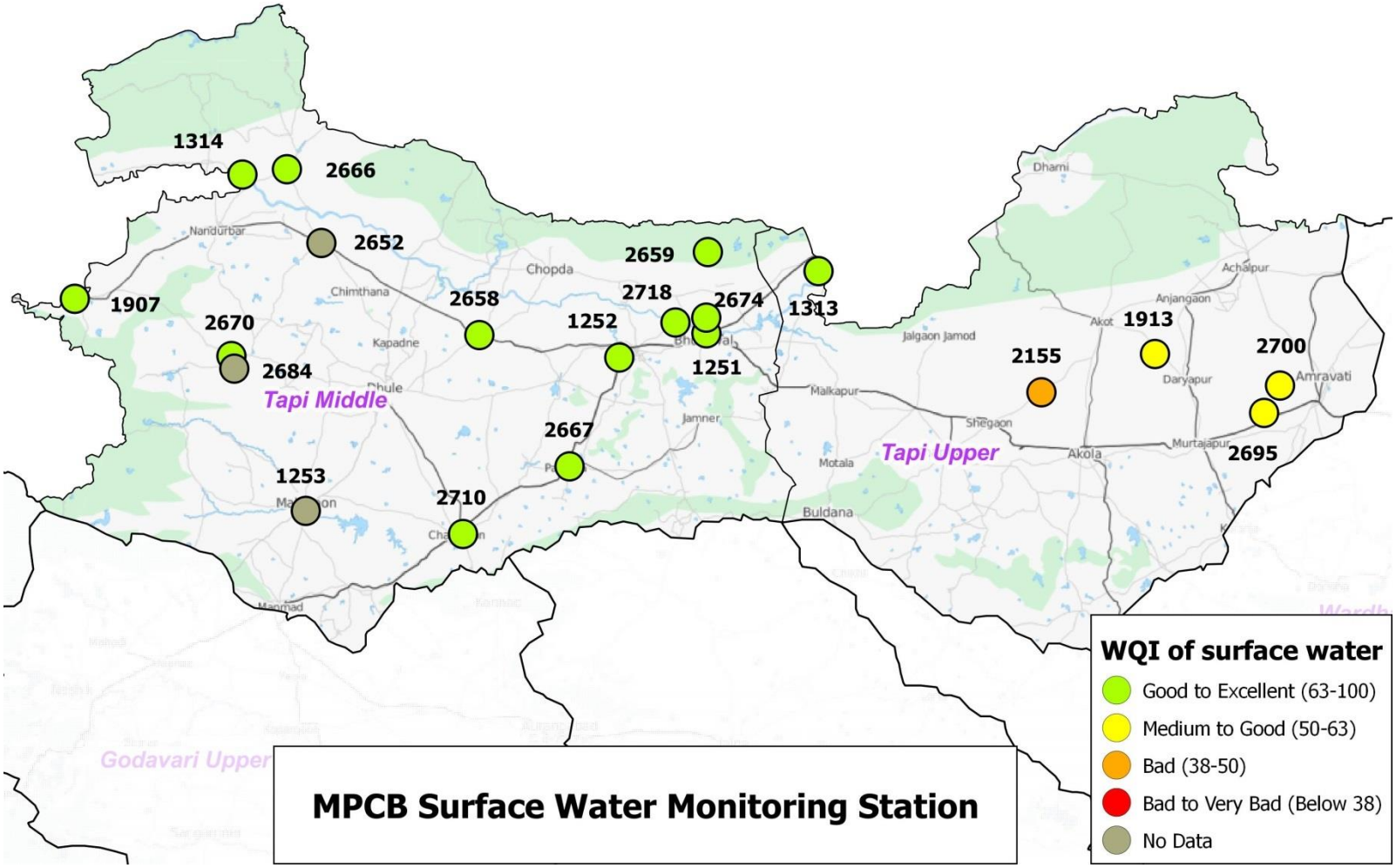
Table No. 8: Surface water quality monitoring stations in Tapi river basin

Station Code	River	Name of the Station	Village	Taluka	District
2700	Purna	Purna River near Achalpur-Amravati Road Bridge, Asegaon	Asegaon	Chandur bazaar	Amravati
2695	Pedhi	Pedhi river near road bridge at Dadhi- Pedhi village.	Asegaon	Chandur Bazar	Amravati
1913	Purna	Purna river at Dhupeshwar at U/s of Malkapur water works.	Malkapur	Akola	Akola
2155	Purna	Purna river at D/s of confluence of Morna and Purna, at Andura village.	Andura	Balapur	Akola
1313	Tapi	Tapi river at Ajnad Village	Ajnad	Raver	Jalgaon
2659	Burai	Burai river before confluece to Tapi river at Mukudas village	Mukudas	Dhule	Dhule
1251	Tapi	Tapi river at U/s of Bhusawal	Bhusawal Railway Colony	Bhusawal	Jalgaon
2674	Mor	Mor river at Padalashe village.	Padalashe	Jalgaon	Jalgaon
2718	Waghur	Waghur river at Sakegaon before confluence with Tapi river.	Sakegaon	Jalgaon	Jalgaon
1252	Girna	Girna river at Jalgaon at intake of Girna pump huose.	Girna pump house area	Jalgaon	Jalgaon
2667	Hiwara	Hiwara river at D/s of Pachora	Pachora	Jalgaon	Jalgaon
2658	Bori	Bori river at D/s of Amalner	Amalner	Jalgaon	Jalgaon
2710	Titur	Titur river at D/s of Chalisgaon	Chalisgaon	Jalgaon	Jalgaon
2684	Panzara	Panzare river near Panzarakan SSK Ltd.	Panzare	Dhule	Dhule
2652	Amravati	Amaravati river at D/s of Dondaicha	Dondaicha	Dhule	Dhule
1253	Girna	Girna river at Malegaon at Malegaon road bridge.	Malegaon	Malegaon	Nashik
2666	Gomai	Gomai river at D/s of Shahada	Shahada	Dhule	Dhule
1314	Tapi	Tapi river at Ubad Village near Gujrat border.	Ubad	Shahada	Nandurbar
2670	Kan	Kan river at Sakri water works	Sakri	Dhule	Dhule
1907	Rangavali	Rangavali river at D/s of Navapur near Rangavali bridge.	Navapur	Navapur	Nandurbar

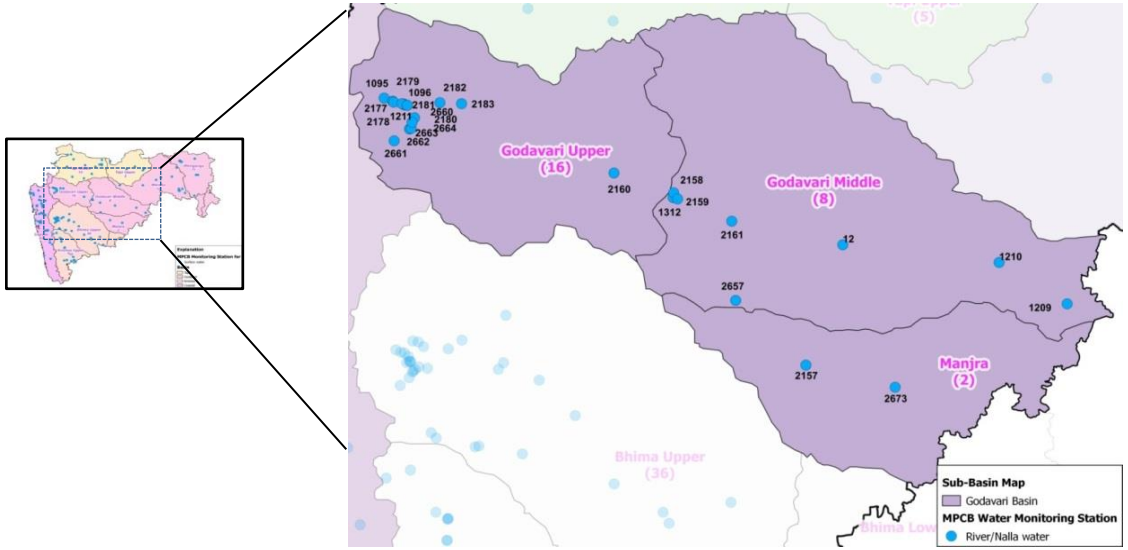
Spatial map of Surface WQI at Tapi Basin (April-2013)



Spatial map of Surface WQI at Tapi Basin (December-2013)



Godavari Basin (1 of 2): Godavari upper, Godavari Middle and Manjra Sub basin

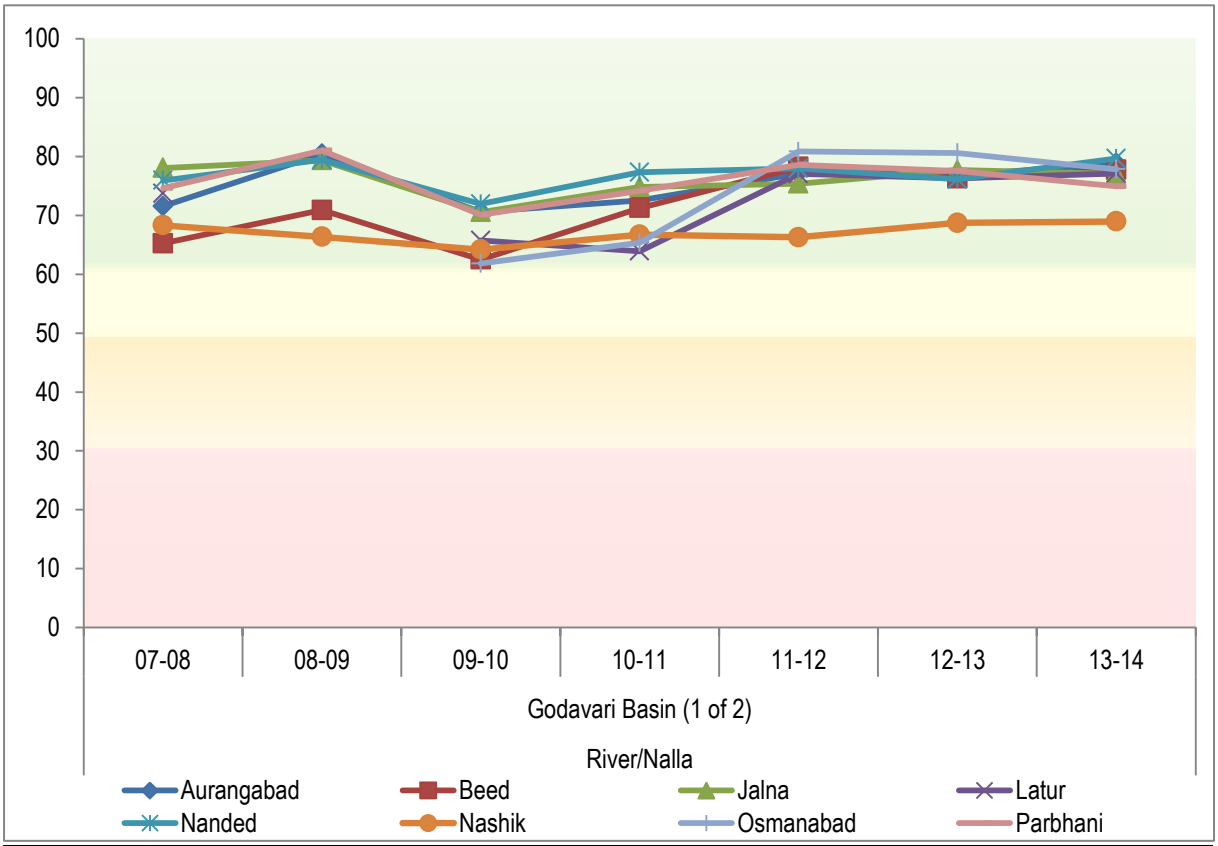


Map No. 4: Network of surface water quality monitoring stations in Godavari basin 1 of 2 Godavari upper, Godavari Middle and Manjra Sub basin

The Godavari river basin passes through six states (third largest basin in India) and drains about 10% of the total geographical area of the country[13]. Approximately 50 percent of the catchment area comes under Maharashtra. In Maharashtra the Godavari Basin could be divided into six sub-basins Godavari Upper, Godavari Middle, Manjra, Wardha, Weinganga, Indravati and Pranhita. In this report for the ease of analysis the sub-basins have been categorized into two, Godavari 1 Basin covering Upper, middle and Manjra sub-basin and Godavari 2 basin covering Wardha, Weinganga, Indravati and Pranhita. In basin 1 there are a total of 26 surface water monitoring stations (16 on upper, 8 on middle and 2 on Manjra). A list of the station and the codes has been provided below in Table No. 10. In basin 2 there are a total of 26 surface water monitoring stations (12 on Wardha, 8 on middle and 2 on Manjra). A list of stations and codes has been provided below in Table No. 11.

[13] http://www.kgbo-cwc.ap.nic.in/About%20Basins/About%20Godavari%20Basin.pdf

Godavari Basin (1 of 2) (Intra Basin analysis)



WQI	Category	Class by CPCB	Remarks
63-100	Good to Excellent	A	Non polluted
50-63	Medium to Good	B	Non polluted
38-50	Bad	C	Polluted
38 & less	Bad to Very Bad	D, E	Heavily polluted

Figure No. 11: Trend of annual average WQI across districts of Godavari basin (1 of 2)

Note:

This graph considers the average WQI for all the monitoring stations in that particular district and hence may include some bias. This graph is only for an overview and monitoring station wise data maybe analyzed to pin point the most affected and polluted patches of rivers in that district.

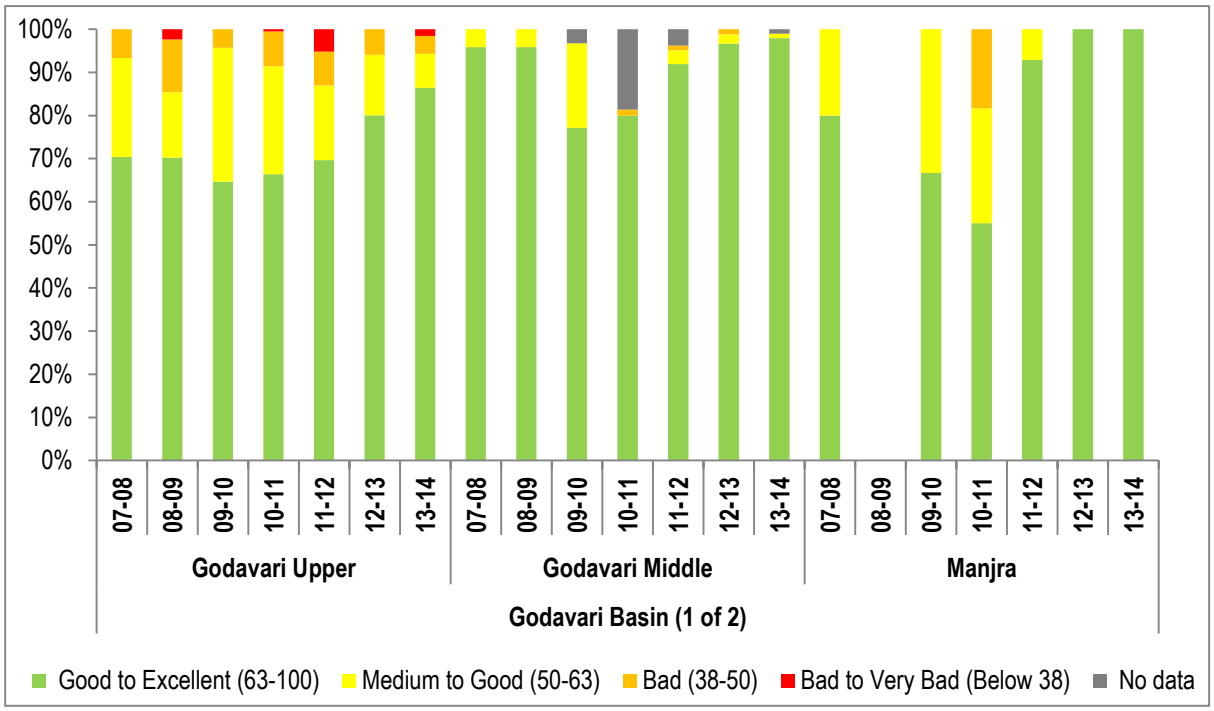
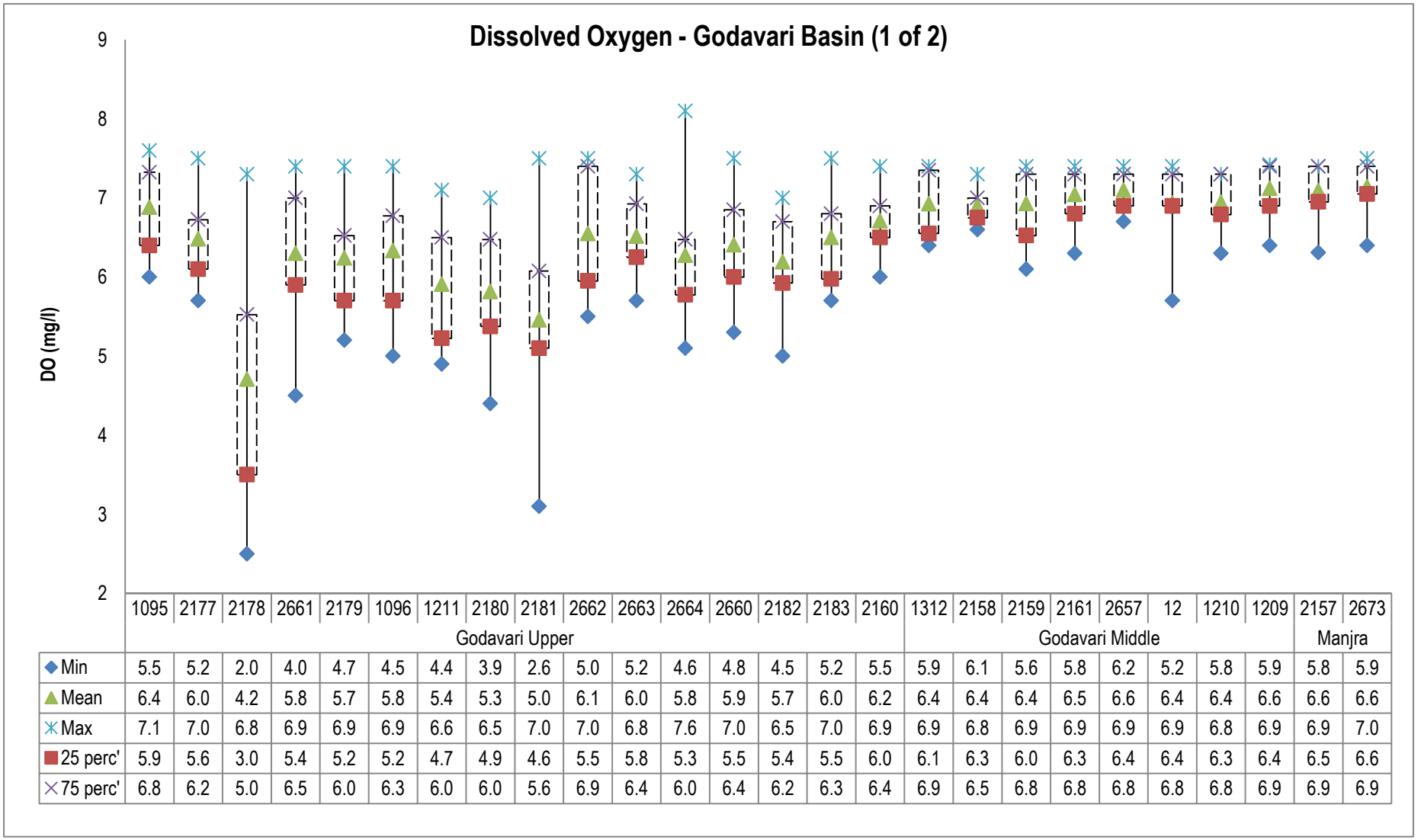


Figure No. 12: Trend of average occurrence for different category of WQI in Godavari basin (1 of 2)

The Intra basin performance of Godavari (1 of 2) across eight districts of the state is depicted in Figure No. 11 and the average occurrence of different category of WQI across all WQMS is depicted in Figure No. 12.

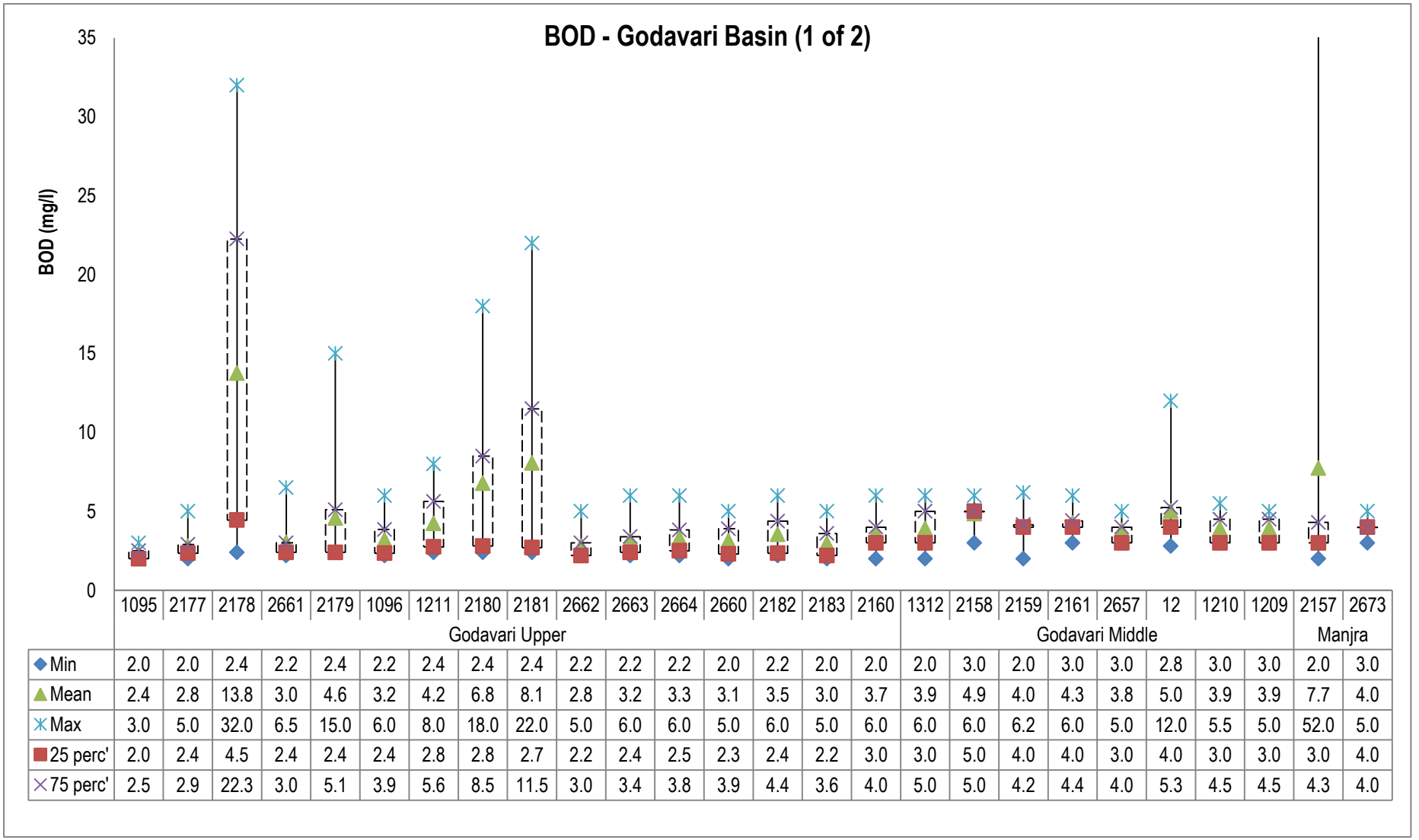
The results showed that among eight districts, namely Aurangabad, Beed, Jalna, Latur, Nanded, Nashik, Osmanabad and Parbhani, the annual average WQI of all the districts were in Good to medium category (i.e. WQI in range of 63-100) from 07-08 till 13-14.. The results showed that average WQI across eight districts showed consistent values with no trends.

Figure No. 12 shows average annual occurrence of WQI across 8 WQM stations of Godavari Upper, 16 WQMS of Godavari Middle and 2 WQMS of Manjra sub basins for 7 years starting from 2007. Intra Sub basins results for Godavari (1 of 2) Basin showed that the occurrence of Good to Excellent category of WQI in Godavari Middle sub basins were higher than that of the Godavari Upper and Manjra, indicating that more likely occurrence of Good to Excellent category. Hence the overall preview of Godavari Middle sub basin is better when compared to other two sub basins.



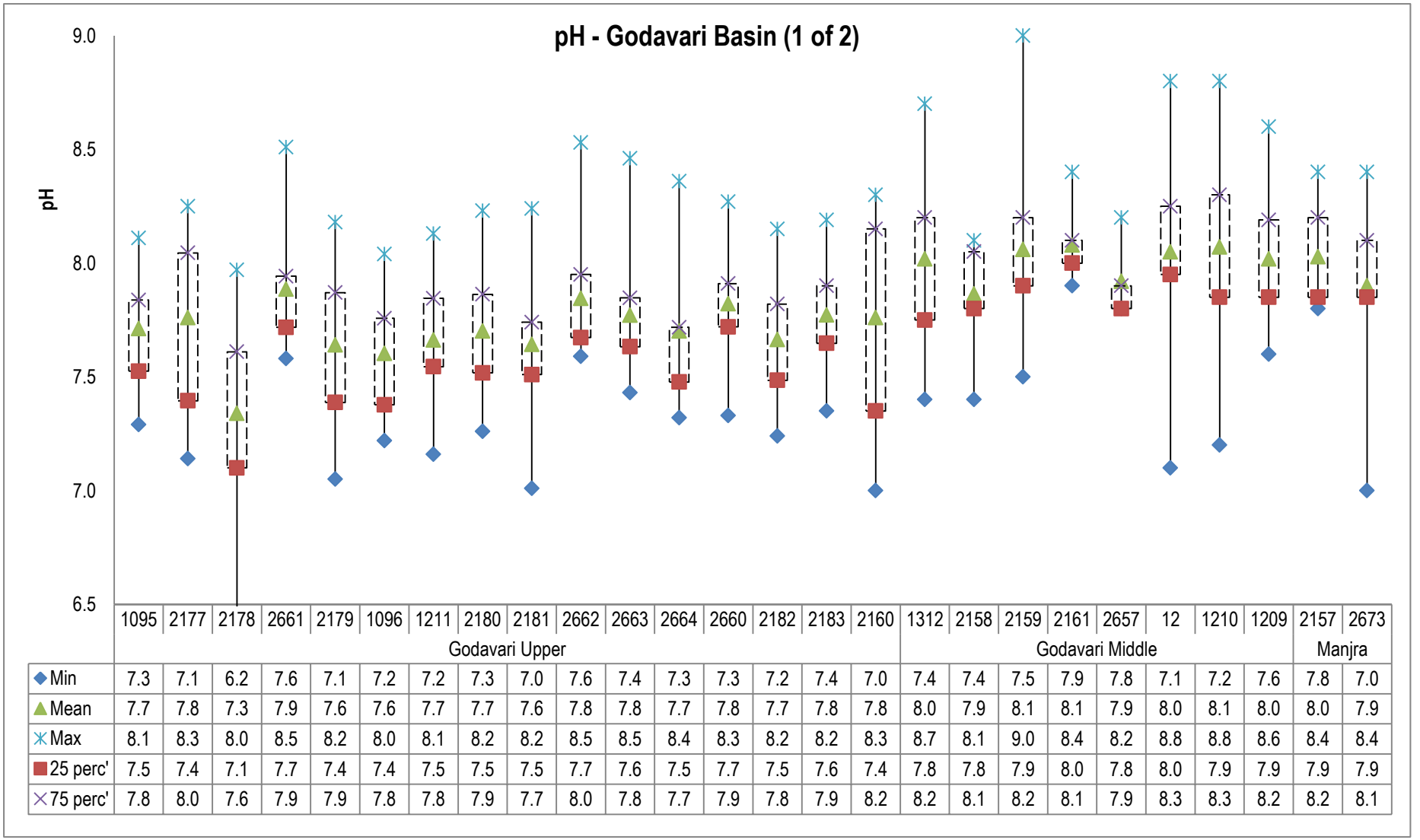
	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																Godavari Middle								Manjra	
Min	5.5	5.2	2.0	4.0	4.7	4.5	4.4	3.9	2.6	5.0	5.2	4.6	4.8	4.5	5.2	5.5	5.9	6.1	5.6	5.8	6.2	5.2	5.8	5.9	5.8	5.9
Mean	6.4	6.0	4.2	5.8	5.7	5.8	5.4	5.3	5.0	6.1	6.0	5.8	5.9	5.7	6.0	6.2	6.4	6.4	6.4	6.5	6.6	6.4	6.4	6.6	6.6	6.6
Max	7.1	7.0	6.8	6.9	6.9	6.9	6.6	6.5	7.0	7.0	6.8	7.6	7.0	6.5	7.0	6.9	6.9	6.8	6.9	6.9	6.9	6.9	6.8	6.9	6.9	7.0
25 perc'	5.9	5.6	3.0	5.4	5.2	5.2	4.7	4.9	4.6	5.5	5.8	5.3	5.5	5.4	5.5	6.0	6.1	6.3	6.0	6.3	6.4	6.4	6.3	6.4	6.5	6.6
75 perc'	6.8	6.2	5.0	6.5	6.0	6.3	6.0	6.0	5.6	6.9	6.4	6.0	6.4	6.2	6.3	6.4	6.9	6.5	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9

Figure No. 13: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Godavari Basin (1 of 2)



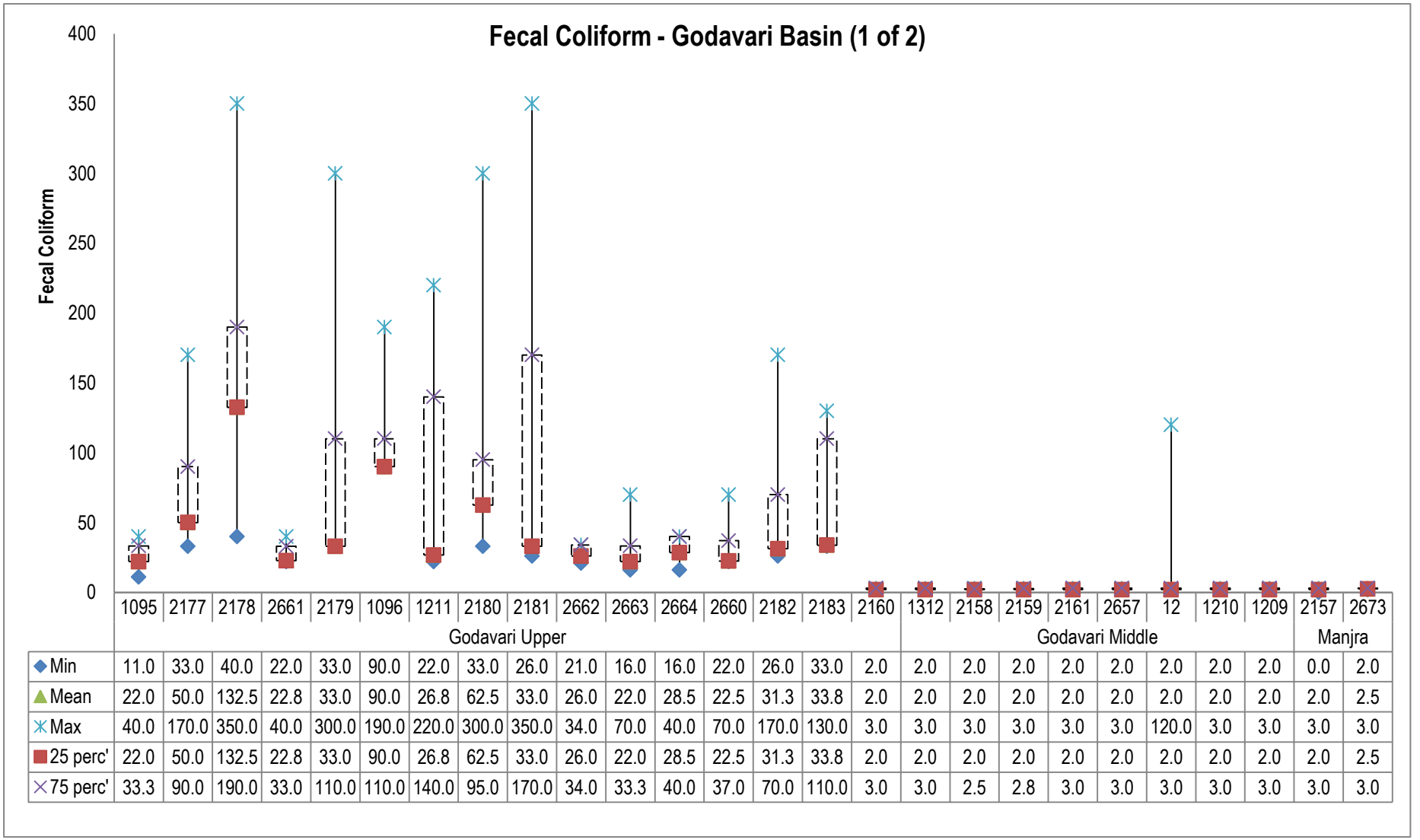
	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																Godavari Middle								Manjra	
Min	2.0	2.0	2.4	2.2	2.4	2.2	2.4	2.4	2.4	2.2	2.2	2.2	2.0	2.2	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.8	3.0	3.0	2.0	3.0
Mean	2.4	2.8	13.8	3.0	4.6	3.2	4.2	6.8	8.1	2.8	3.2	3.3	3.1	3.5	3.0	3.7	3.9	4.9	4.0	4.3	3.8	5.0	3.9	3.9	7.7	4.0
Max	3.0	5.0	32.0	6.5	15.0	6.0	8.0	18.0	22.0	5.0	6.0	6.0	5.0	6.0	5.0	6.0	6.0	6.0	6.2	6.0	5.0	12.0	5.5	5.0	52.0	5.0
25 perc'	2.0	2.4	4.5	2.4	2.4	2.4	2.8	2.8	2.7	2.2	2.4	2.5	2.3	2.4	2.2	3.0	3.0	5.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	4.0
75 perc'	2.5	2.9	22.3	3.0	5.1	3.9	5.6	8.5	11.5	3.0	3.4	3.8	3.9	4.4	3.6	4.0	5.0	5.0	4.2	4.4	4.0	5.3	4.5	4.5	4.3	4.0

Figure No. 14: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Godavari Basin (1 of 2)



	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																Godavari Middle								Manjra	
Min	7.3	7.1	6.2	7.6	7.1	7.2	7.2	7.3	7.0	7.6	7.4	7.3	7.3	7.2	7.4	7.0	7.4	7.4	7.5	7.9	7.8	7.1	7.2	7.6	7.8	7.0
Mean	7.7	7.8	7.3	7.9	7.6	7.6	7.7	7.7	7.6	7.8	7.8	7.7	7.8	7.7	7.8	7.8	8.0	7.9	8.1	8.1	7.9	8.0	8.1	8.0	8.0	7.9
Max	8.1	8.3	8.0	8.5	8.2	8.0	8.1	8.2	8.2	8.5	8.5	8.4	8.3	8.2	8.2	8.3	8.7	8.1	9.0	8.4	8.2	8.8	8.8	8.6	8.4	8.4
25 perc'	7.5	7.4	7.1	7.7	7.4	7.4	7.5	7.5	7.5	7.7	7.6	7.5	7.7	7.5	7.6	7.4	7.8	7.8	7.9	8.0	7.8	8.0	7.9	7.9	7.9	7.9
75 perc'	7.8	8.0	7.6	7.9	7.9	7.8	7.8	7.9	7.7	8.0	7.8	7.7	7.9	7.8	7.9	8.2	8.2	8.1	8.2	8.1	7.9	8.3	8.3	8.2	8.2	8.1

Figure No. 15: Trend of pH levels recorded at WQMS at Godavari Basin (1 of 2)



	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																Godavari Middle								Manjra	
◆ Min	11.0	33.0	40.0	22.0	33.0	90.0	22.0	33.0	26.0	21.0	16.0	16.0	22.0	26.0	33.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
▲ Mean	22.0	50.0	132.5	22.8	33.0	90.0	26.8	62.5	33.0	26.0	22.0	28.5	22.5	31.3	33.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5
✳ Max	40.0	170.0	350.0	40.0	300.0	190.0	220.0	300.0	350.0	34.0	70.0	40.0	70.0	170.0	130.0	3.0	3.0	3.0	3.0	3.0	3.0	120.0	3.0	3.0	3.0	3.0
■ 25 perc'	22.0	50.0	132.5	22.8	33.0	90.0	26.8	62.5	33.0	26.0	22.0	28.5	22.5	31.3	33.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5
× 75 perc'	33.3	90.0	190.0	33.0	110.0	110.0	140.0	95.0	170.0	34.0	33.3	40.0	37.0	70.0	110.0	3.0	3.0	2.5	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Figure No. 16: Trend of Fecal Coliform levels recorded at WQMS at Godavari Basin (1 of 2)

Water Quality Index for WQMS in Godavari Basin (1 of 2): Sub-Basin - Godavari Upper

Apr	65	78	76	64	70	64	33	64	65	80	75	76	59	70	66	59	69	64	37	66	57	45	68	50	80	76	78	53	74	75	81	77	69	69	79	69	77	77	63	80	76	65	58	86	NA	38	70	59
May	72	81	78	66	68	68	45	43	57	75	80	79	58	68	58	59	68	74	53	65	53	57	71	56	79	76	79	79	79	68	83	76	68	70	76	71	66	74	76	77	81	74	79	78	78	59	74	67
Jun	NA	78	76	67	73	74	46	NA	66	77	78	77	67	65	72	52	74	71	56	68	71	59	69	71	74	74	77	74	76	79	74	77	79	68	74	NA	63	72	75	78	72	75	72	74	80	58	73	72
Jul	80	78	81	54	81	68	42	42	33	74	85	52	70	75	72	52	50	71	37	41	71	35	40	63	71	78	60	74	80	67	72	77	63	66	59	68	73	69	69	75	43	70	76	86	83	60	76	64
Aug	79	80	82	58	76	76	64	51	40	82	77	77	52	60	72	58	67	75	47	53	72	53	41	66	73	78	79	77	78	75	82	78	79	70	76	77	66	76	74	78	74	74	88	78	78	53	64	69
Sep	83	81	75	83	67	69	70	52	35	85	77	68	65	62	53	80	70	65	72	58	43	70	54	36	85	81	71	82	77	73	85	72	68	84	73	72	80	65	63	80	72	70	NA	77	83	82	59	59
Oct	80	81	74	72	73	70	35	54	45	68	84	70	65	69	70	73	67	65	48	71	45	37	53	42	74	83	71	76	83	76	75	77	69	69	70	68	56	67	58	69	NA	68	76	70	75	45	70	65
Nov	80	59	83	75	69	77	65	54	40	65	55	79	42	58	76	75	60	77	55	40	75	43	41	75	72	72	80	79	70	80	77	69	83	77	NA	78	49	70	77	73	71	79	NA	81	74	65	45	77
Dec	72	78	73	61	66	70	53	53	67	77	75	69	50	64	68	59	65	71	48	55	64	48	42	64	73	78	73	75	77	73	70	72	75	77	71	70	59	58	73	74	73	68	77	77	81	54	52	67
Jan	79	77	71	63	64	72	32	59	41	71	63	70	41	71	69	51	68	70	42	69	66	33	67	66	72	69	70	75	70	73	76	69	73	73	76	72	51	70	69	68	73	68	74	77	83	54	67	65
Feb	80	77	74	68	71	74	60	69	69	71	NA	73	66	69	73	61	60	72	71	75	70	75	72	70	75	78	73	75	78	74	77	65	71	76	79	74	77	NA	77	79	NA	76	76	77	81	70	58	70
Mar	75	79	77	63	66	75	32	51	54	80	79	73	74	68	70	66	74	71	74	55	71	74	54	68	76	82	75	79	72	72	76	77	74	80	65	73	81	75	76	79	78	75	77	78	NA	74	70	69
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	1095			2177			2178			2661			2179			1096			2180			2181			2662			2663			2664			2660			2182			2183			2160			1211		
	Godavari Upper																																															

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 9: Surface water quality monitoring stations in Godavari Basin (1 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
1095	Godavari	Godavari river at U/s of Gangapur Dam	Gangapur	Nashik	Nashik
2177	Godavari	Godavari river near Someshwar Temple	Someshwar	Nashik	Nashik
2178	Chikhali nalla	Chikhali nalla meets Godavari river.	Chikhali	Nashik	Nashik
2661	Darna	Darna river at Aswali (Darna Dam)	Aswali	Igatpuri	Nashik
2179	Godavari	Godavari river at Hanuman Ghat	Nashik city	Nashik	Nashik
1096	Godavari	Godavari river at Ramkund	Panchavati	Nashik	Nashik
2180	Godavari	Godavari river at Tapovan	Tapovan	Nashik	Nashik
2181	Godavari	Godavari river at Kapila-Godavari confluence point	Tapovan	Nashik	Nashik
2662	Darna	Darna river at M.E.S. site Pumping station.	Bhagur	Nashik	Nashik
2663	Darna	Darna river at Bhagur pumping station near Pandhurli bridge	Bhagur	Nashik	Nashik
2664	Darna	Darna river at Sansari.	Sansari	Nashik	Nashik
2660	Darna	Darna river at Chehedi water works(pumping station)	Chehedi	Nashik	Nashik
2182	Godavari	Godavari river at Saikheda village	Saikheda	Niphad	Nashik
2183	Godavari	Godavari river at Nandur- Madhameshwar Dam.	Nandur	Niphad	Nashik
2160	Godavari	Godavari river at U/s of Aurangabad Reservoir, Kaigaon Tokka	Kaigaon	Gangapur	Aurangabad
1211	Godavari	Godavari river at Nashik D/s near Amardham	Gadgebaba Maharaj Nagar	Nashik	Nashik

Water Quality Index for WQMS in Godavari Basin (1 of 2): Sub-Basin - Godavari Middle and Manjra

Apr	77	85	74	82	82	83	75	86	NA	72	86	NA	76	84	NA	66	84	72	58	84	78	70	NA	57	80	79	79	80	NA	NA
May	84	85	79	82	85	78	75	84	75	70	86	76	64	87	NA	72	87	73	69	86	75	NA	85	72	83	80	80	NA	NA	NA
Jun	78	71	80	77	74	75	69	73	71	77	75	80	72	72	NA	70	74	85	60	67	85	NA	65	82	73	83	65	NA	NA	NA
Jul	79	72	82	80	72	82	71	43	84	NA	88	NA	NA	NA	NA	76	82	76	79	78	80	NA	80	66	80	82	81	NA	NA	NA
Aug	86	71	77	NA	71	78	NA	61	80	76	NA	77	79	NA	NA	83	80	78	79	78	81	83	82	80	87	79	77	86	77	73
Sep	82	77	77	80	NA	78	80	NA	82	82	66	77	75	74	78	88	68	80	89	65	79	NA	78	81	80	80	79	80	82	74
Oct	76	70	78	79	71	74	76	72	78	80	63	74	83	64	75	80	71	79	79	66	81	77	74	80	84	79	75	75	72	74
Nov	78	80	77	78	80	73	79	78	74	41	78	75	80	78	NA	83	62	81	77	68	79	82	76	78	79	81	78	62	82	82
Dec	81	76	77	79	80	82	61	76	81	83	80	75	86	NA	77	80	77	81	80	81	79	76	77	72	83	80	82	78	71	82
Jan	81	84	83	79	84	80	76	71	81	84	77	81	84	NA	83	84	81	86	85	77	82	NA	68	76	79	77	83	79	74	81
Feb	79	81	83	78	81	78	70	75	81	83	82	79	81	NA	76	83	78	81	86	80	80	82	82	79	83	80	77	NA	NA	74
Mar	77	80	NA	80	79	NA	NA	79	NA	82	72	NA	81	NA	NA	84	78	NA	81	78	NA	80	86	NA	80	87	NA	NA	NA	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	1312			2158			2159			2161			2657			1210			1209			12			2157			2673		
	Godavari Middle																								Manjra					

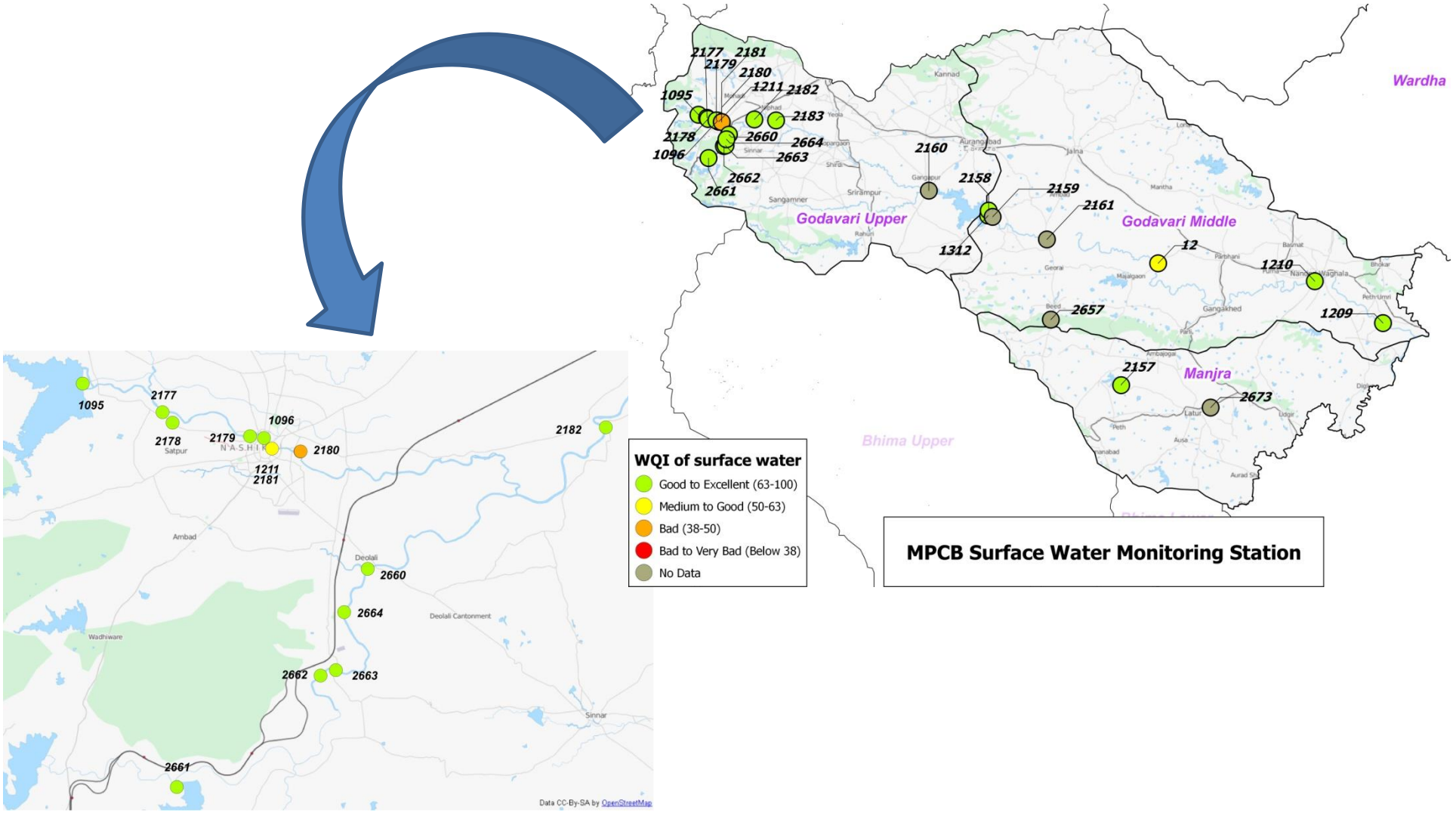
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

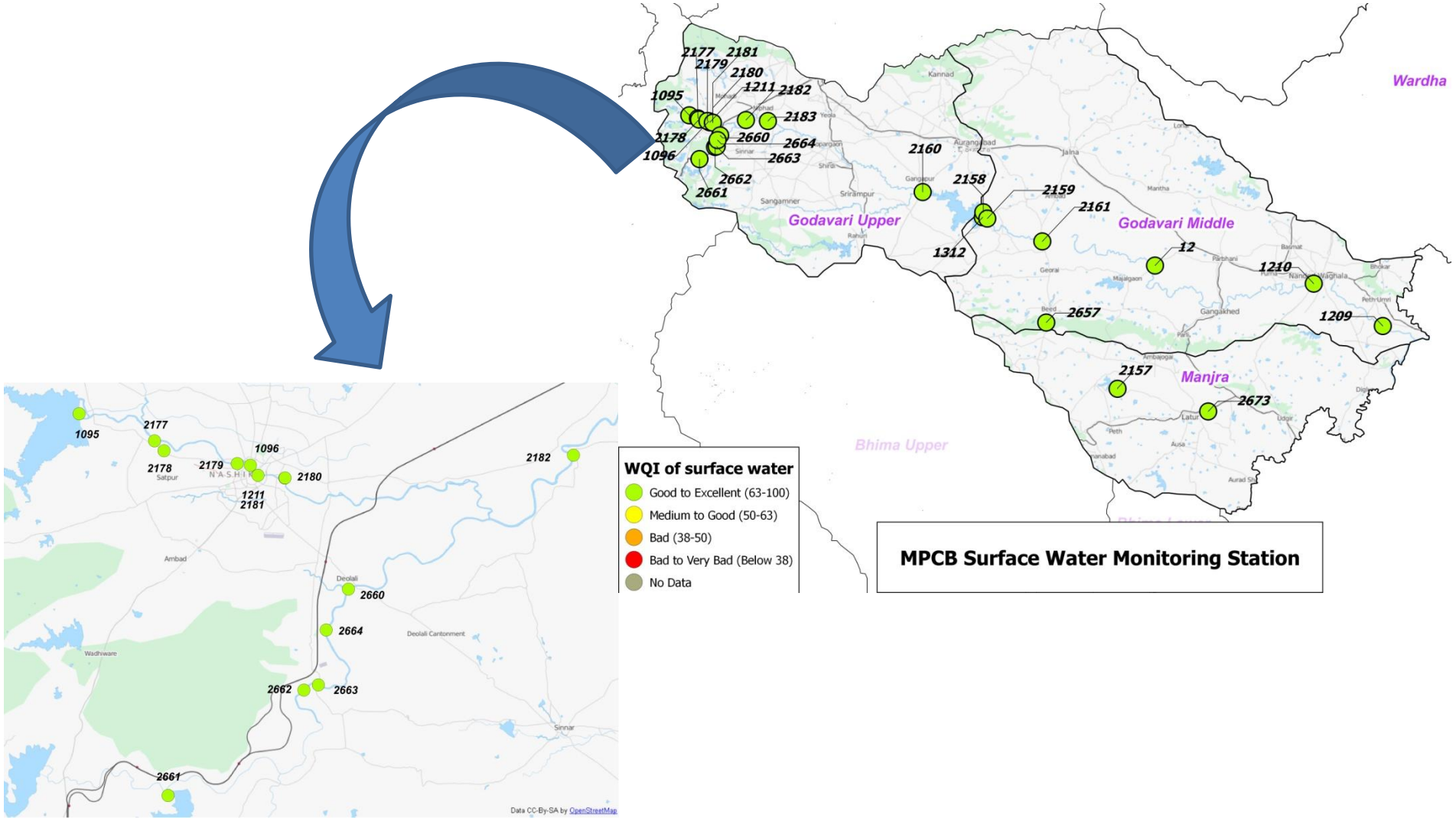
Table No. 10: Surface water quality monitoring stations in Godavari Basin (1 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
1312	Godavari	Godavari river at Jaikwadi Dam, Paithan.	Paithan	Paithan	Aurangabad
2158	Godavari	Godavari river at U/s of Paithan at Paithan intake pump house..	Jayakwadi	Paithan	Aurangabad
2159	Godavari	Godavari river at D/s of Paithan at Pathegaon bridge.	Pathegaon	Paithan	Aurangabad
2161	Godavari	Godavari river at Jalna Intake water pump house, Shahabad.	Shahabad	Ambad	Jalna
2657	Bindusara	Bindusara river at Beed, near intake water pump house at Dam.	Paligaon	Beed	Beed
1210	Godavari	Godavari river at Nanded near Intake water pump house.	Vishnupuri	Nanded	Nanded
1209	Godavari	Godavari river at Raher	Raher	Nayagaon	Nanded
12	Godavari	Godavari river at Dhalegaon	Dhalegaon	Pathari	Parbhani
2673	Manjra	Manjra river at D/s of Latur, near Latur- Nanded bridge.	Bhatkheda	Latur	Latur
2157	Godavari	Godavari river at Latur water intake near Pump house.	Dhamegaon	Kalumb	Osmanabad

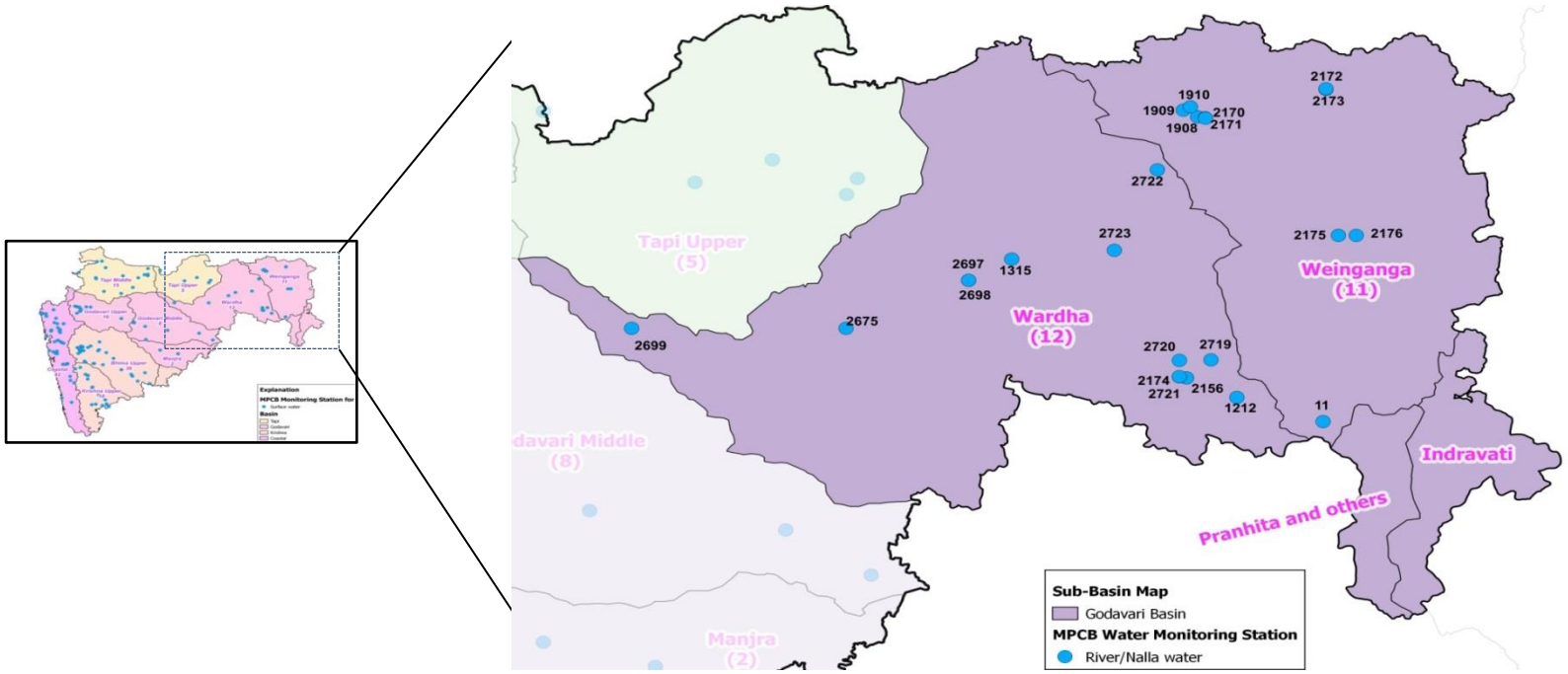
Spatial map of Surface WQI at Godavari Basin (1 of 2) (April 2013)



Spatial map of Surface WQI at Godavari Basin (1 of 2) (December 2013)

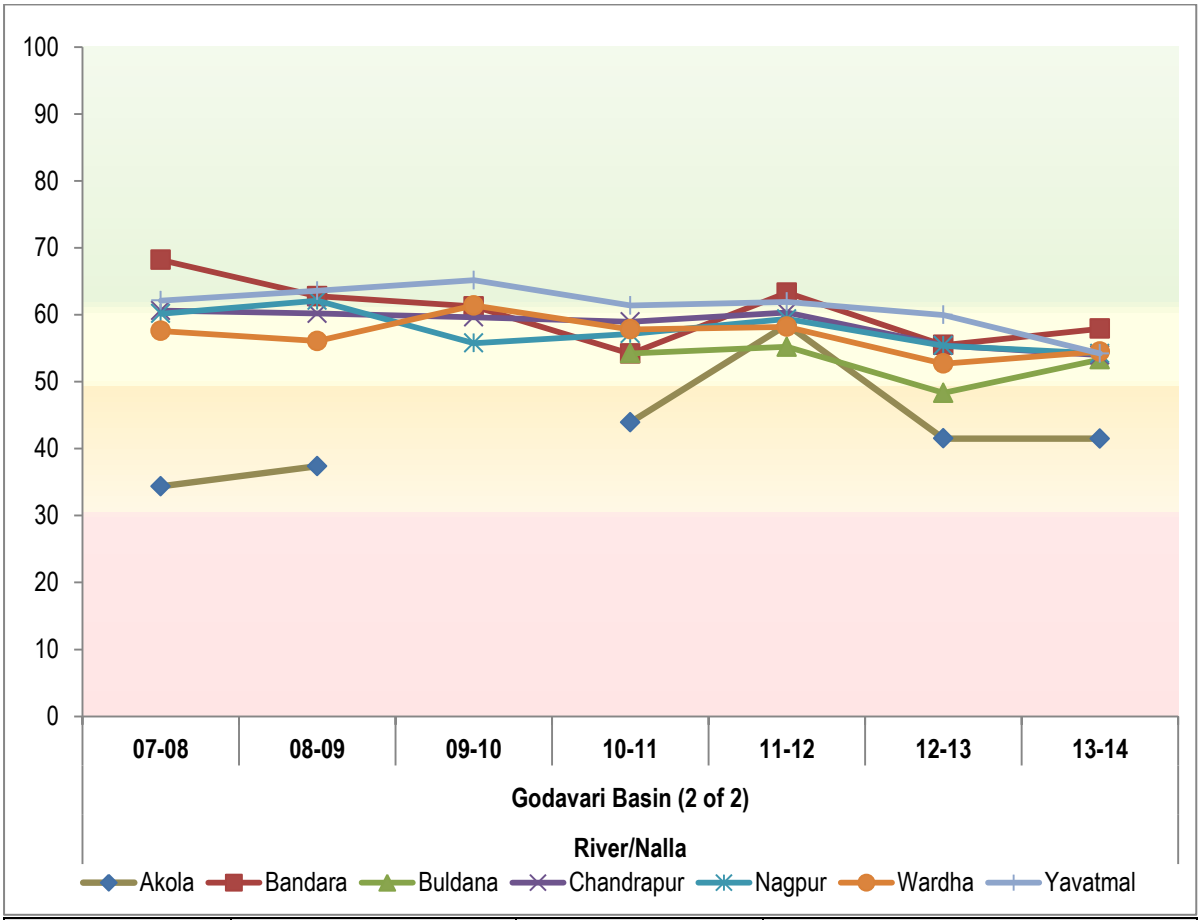


Godavari Basin (2 of 2): Wardha, Weinganga and Pranhita Sub basin



Map No. 5: Network of surface water quality monitoring stations in Godavari basin 2 of 2: Wardh, Weinganga and Pranhita Sub basin

Godavari Basin (2 of 2) (Intra Basin analysis)



WQI	Category	Class by CPCB	Remarks
63-100	Good to Excellent	A	Non polluted
50-63	Medium to Good	B	Non polluted
38-50	Bad	C	Polluted
38 & less	Bad to Very Bad	D, E	Heavily polluted

Figure No. 17: Trend of annual average WQI across districts of Godavari basin (2 of 2)

Note:

This graph considers the average WQI for all the monitoring stations in that particular district and hence may include some bias. This graph is only for an overview and monitoring station wise data maybe analyzed to pin point the most affected and polluted patches of rivers in that district.

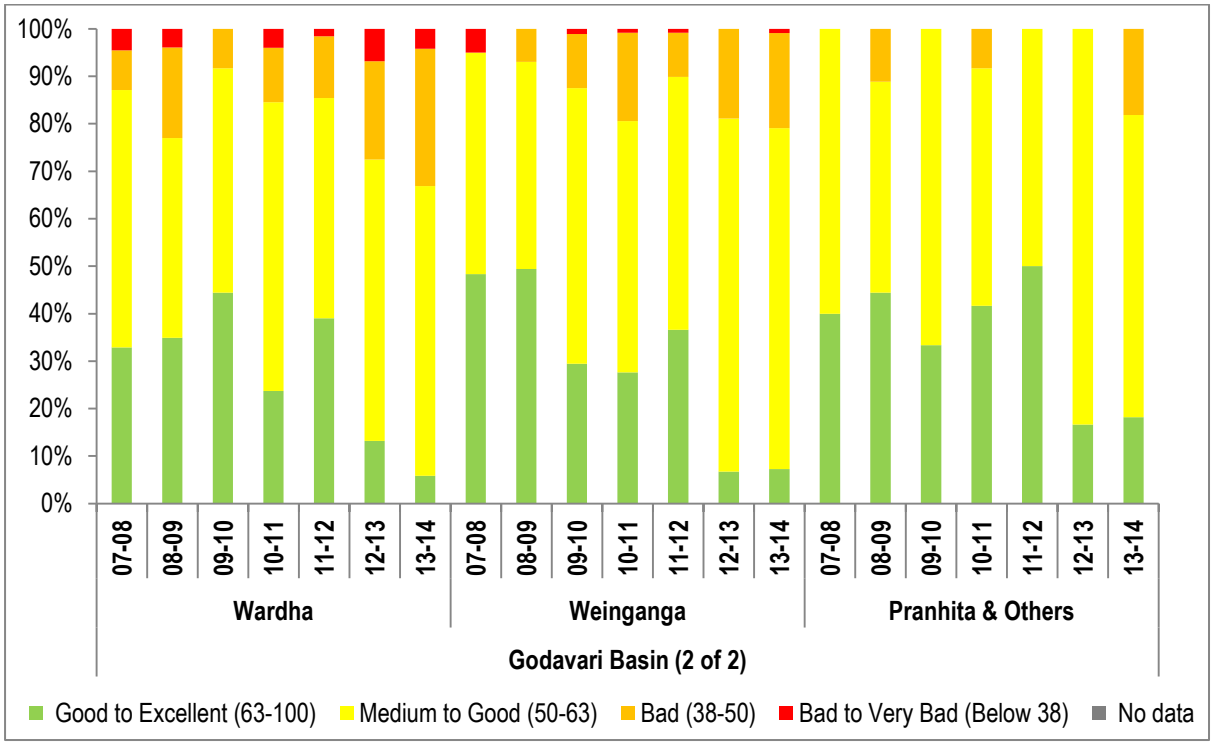
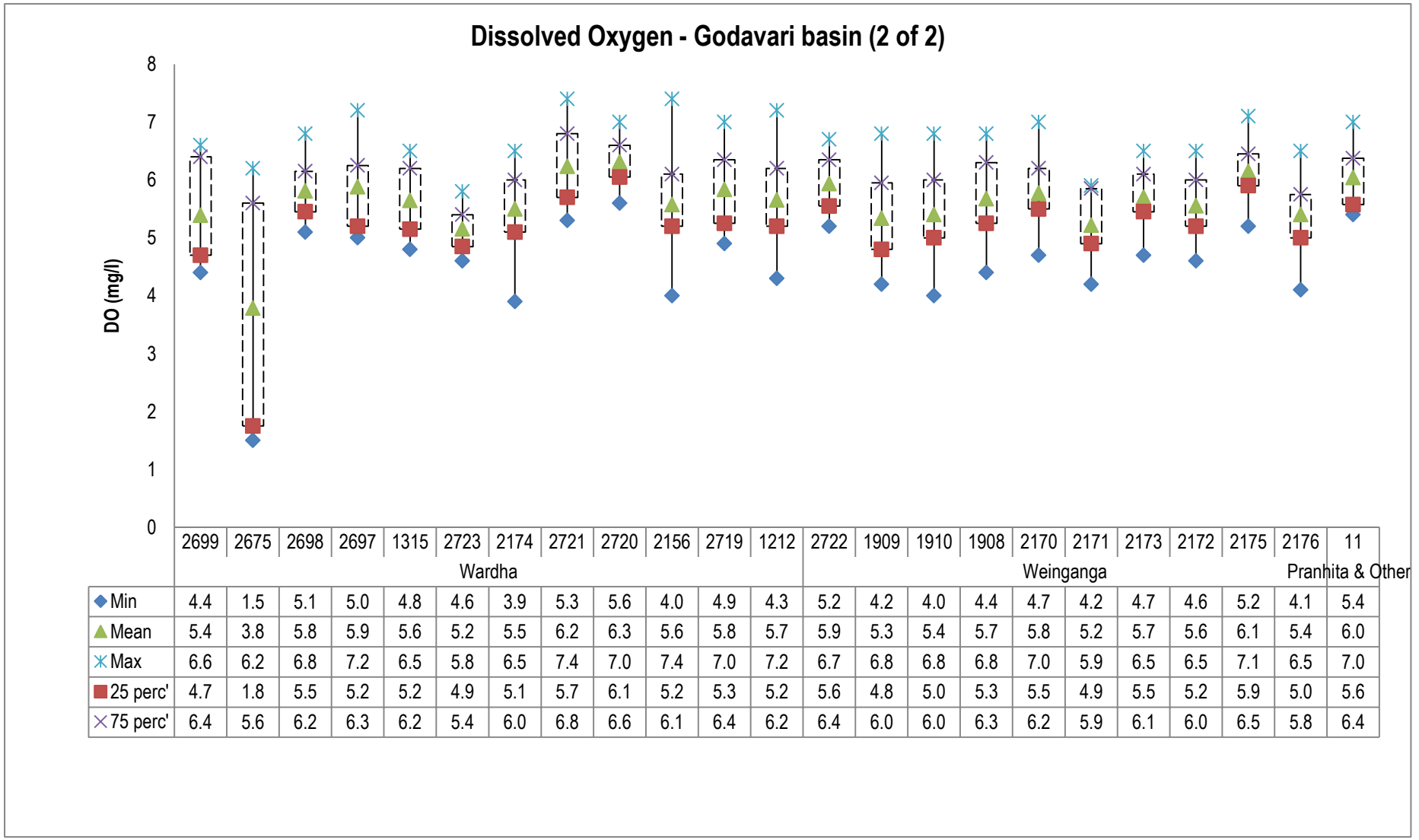


Figure No. 18: Trend of average occurrence for different category of WQI in Godavari basin (2 of 2)

The Intra basin performance of Godavari (2 of 2) Basin across seven districts of the state are depicted in the Figure No. 17 and the average annual occurrence of different category of Water Quality Index across all WQMS is depicted in the Figure No. 18.

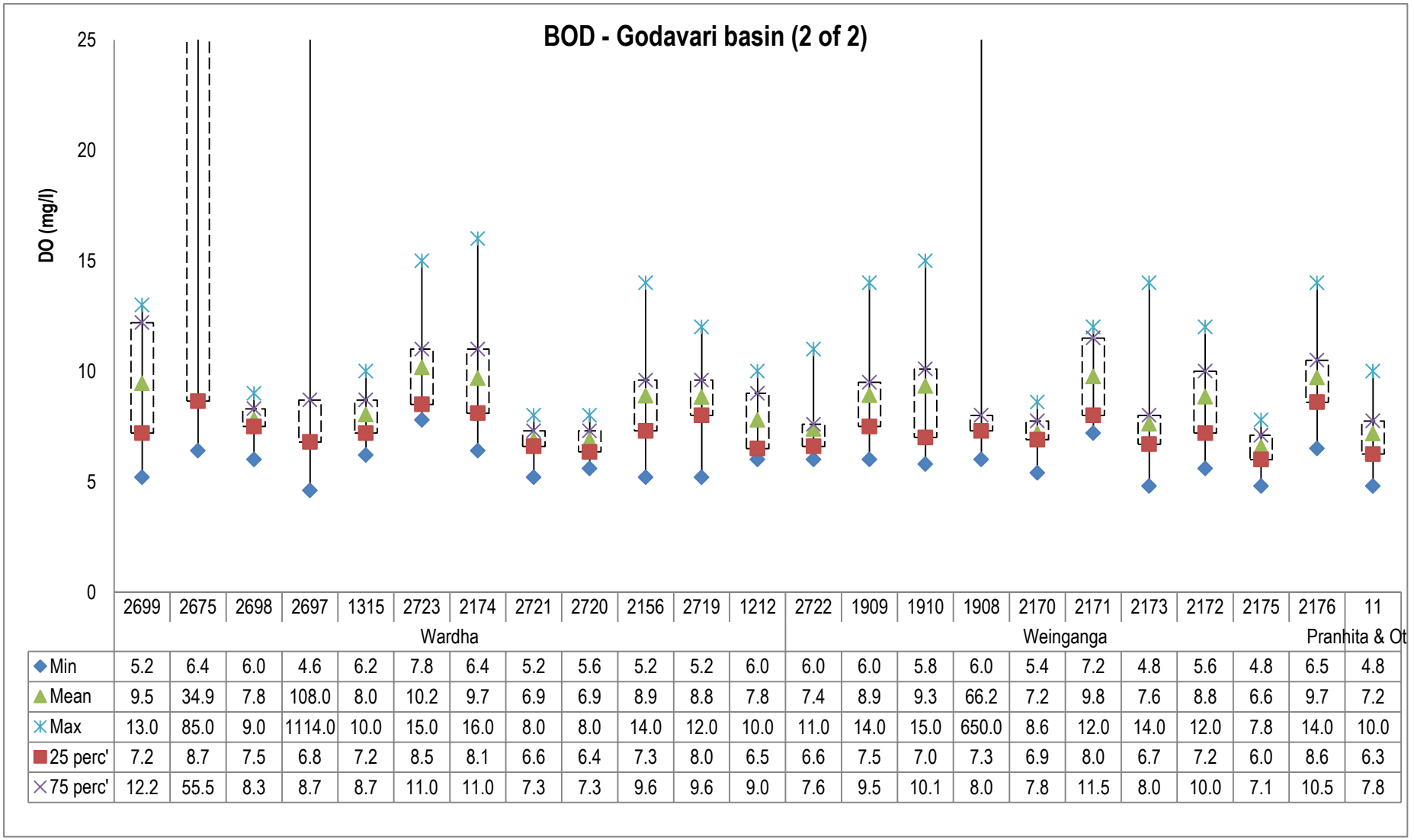
The results showed that among seven districts, namely Akola, Bandara, Buldhana, Chandrapur, Nagpur, Wardha and Yavatmal, the annual average WQI of all the districts except Akola were Medium to Good (i.e. WQI in range of 50-63). The results showed that average WQI across districts showed slight downward trend towards.

Figure No. 18 shows average annual occurrence of WQI across 12 WQM stations of Wardha, 10 WQMS of Weinganga and 1 WQMS of Pranhita sub basins for 7 years starting from 2007. Intra Sub basins results for Godavari (2 of 2) Basin showed that the occurrence of 'Good to Excellent' and 'Medium to Good' categories of WQI were almost similar but the 'Bad' and 'Bad to Very Bad' categories were seen more in Wardha sub basins, indicating that more likely occurrence of 'Bad' and 'Bad to Very Bad' category. Hence the overall preview of Weinganga and Pranhita sub basin is better when compared to Wardha sub basin.



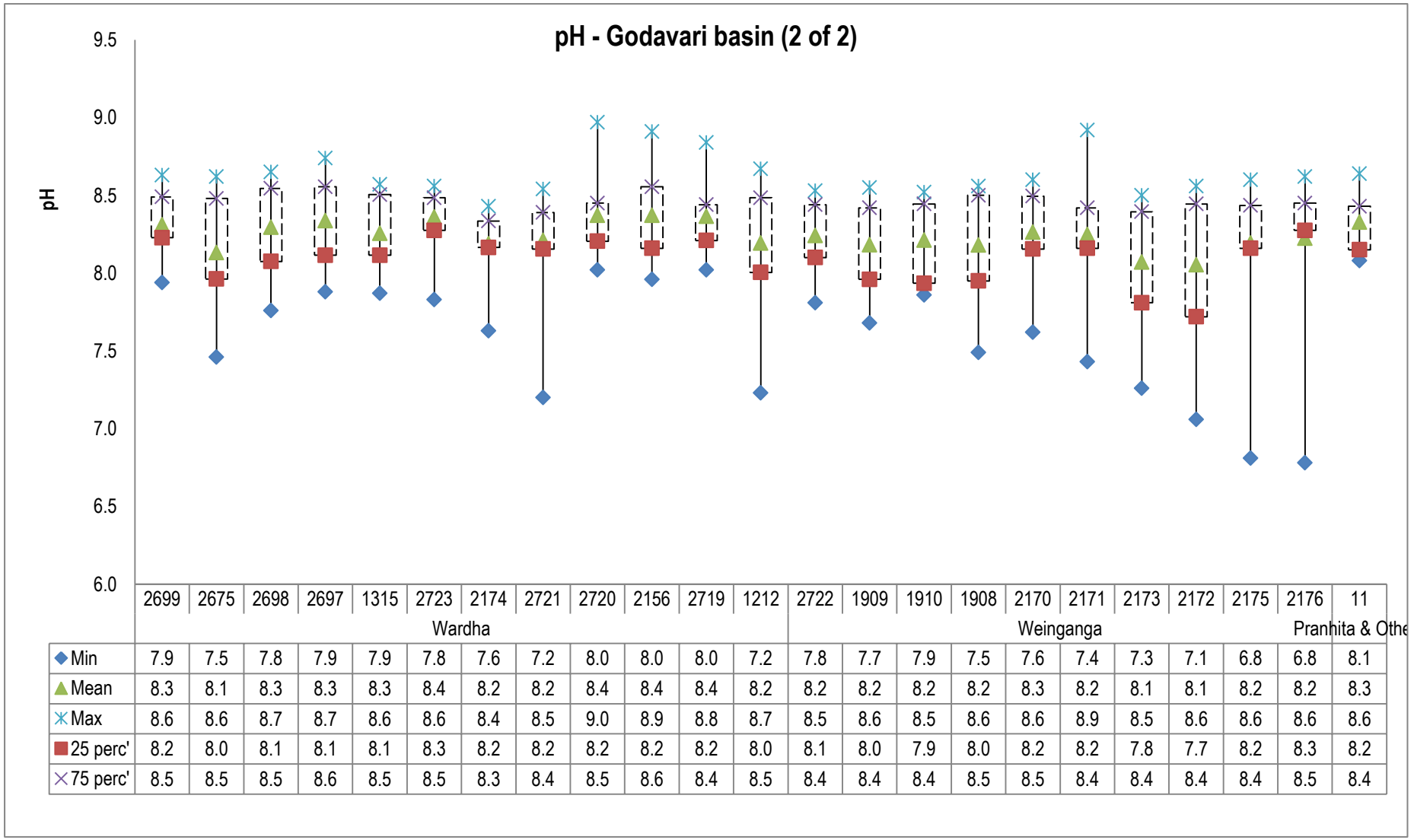
	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga									Pranhita & Other	
Min	4.4	1.5	5.1	5.0	4.8	4.6	3.9	5.3	5.6	4.0	4.9	4.3	5.2	4.2	4.0	4.4	4.7	4.2	4.7	4.6	5.2	4.1	5.4
Mean	5.4	3.8	5.8	5.9	5.6	5.2	5.5	6.2	6.3	5.6	5.8	5.7	5.9	5.3	5.4	5.7	5.8	5.2	5.7	5.6	6.1	5.4	6.0
Max	6.6	6.2	6.8	7.2	6.5	5.8	6.5	7.4	7.0	7.4	7.0	7.2	6.7	6.8	6.8	6.8	7.0	5.9	6.5	6.5	7.1	6.5	7.0
25 perc'	4.7	1.8	5.5	5.2	5.2	4.9	5.1	5.7	6.1	5.2	5.3	5.2	5.6	4.8	5.0	5.3	5.5	4.9	5.5	5.2	5.9	5.0	5.6
75 perc'	6.4	5.6	6.2	6.3	6.2	5.4	6.0	6.8	6.6	6.1	6.4	6.2	6.4	6.0	6.0	6.3	6.2	5.9	6.1	6.0	6.5	5.8	6.4

Figure No. 19: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Godavari basin-(2 of 2)



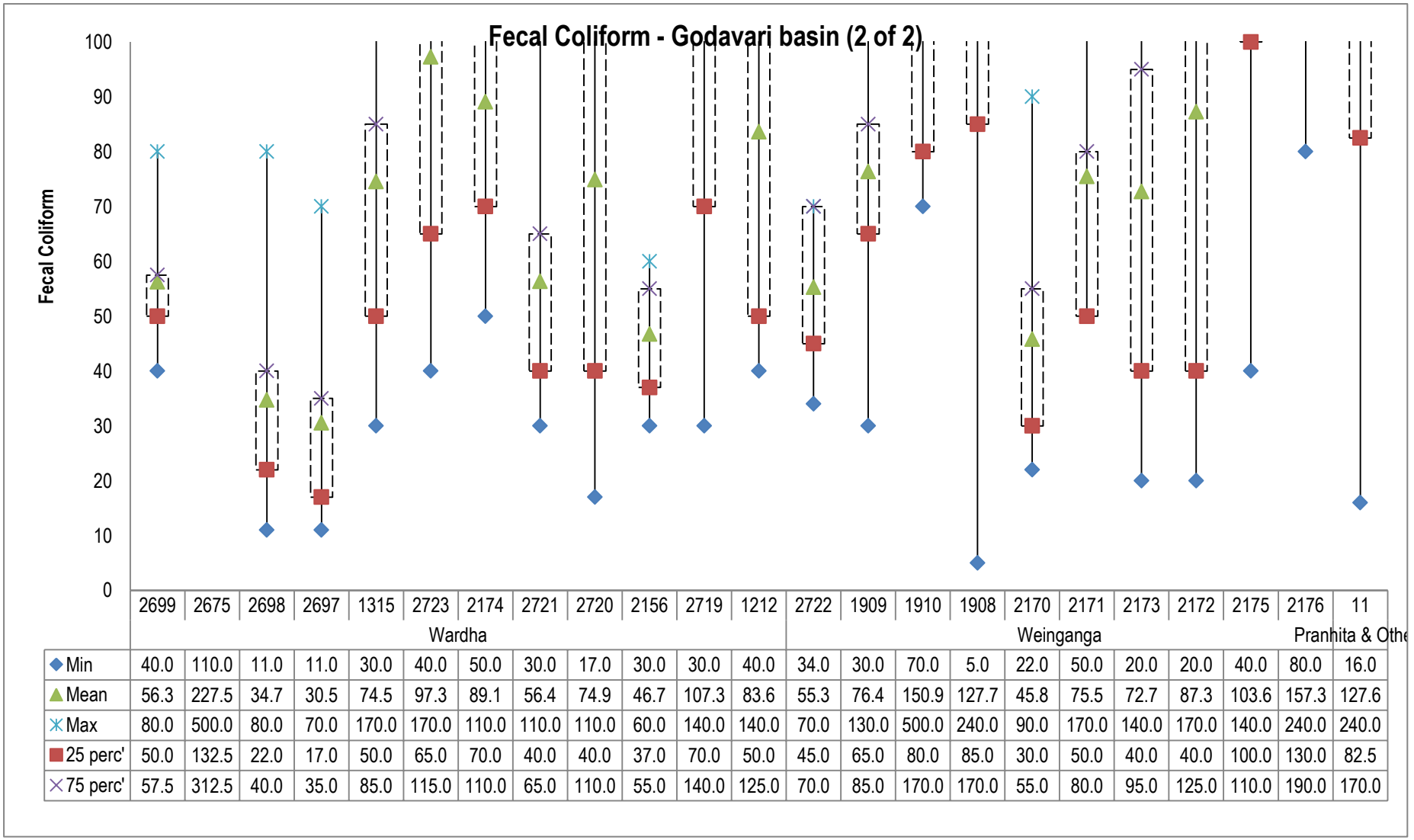
	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga										Pranhita & Ot
◆Min	5.2	6.4	6.0	4.6	6.2	7.8	6.4	5.2	5.6	5.2	5.2	6.0	6.0	6.0	5.8	6.0	5.4	7.2	4.8	5.6	4.8	6.5	4.8
▲Mean	9.5	34.9	7.8	108.0	8.0	10.2	9.7	6.9	6.9	8.9	8.8	7.8	7.4	8.9	9.3	66.2	7.2	9.8	7.6	8.8	6.6	9.7	7.2
✳Max	13.0	85.0	9.0	1114.0	10.0	15.0	16.0	8.0	8.0	14.0	12.0	10.0	11.0	14.0	15.0	650.0	8.6	12.0	14.0	12.0	7.8	14.0	10.0
■25 perc'	7.2	8.7	7.5	6.8	7.2	8.5	8.1	6.6	6.4	7.3	8.0	6.5	6.6	7.5	7.0	7.3	6.9	8.0	6.7	7.2	6.0	8.6	6.3
×75 perc'	12.2	55.5	8.3	8.7	8.7	11.0	11.0	7.3	7.3	9.6	9.6	9.0	7.6	9.5	10.1	8.0	7.8	11.5	8.0	10.0	7.1	10.5	7.8

Figure No. 20: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Godavari basin-(2 of 2)



	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga										Pranhita & Othe
Min	7.9	7.5	7.8	7.9	7.9	7.8	7.6	7.2	8.0	8.0	8.0	7.2	7.8	7.7	7.9	7.5	7.6	7.4	7.3	7.1	6.8	6.8	8.1
Mean	8.3	8.1	8.3	8.3	8.3	8.4	8.2	8.2	8.4	8.4	8.4	8.2	8.2	8.2	8.2	8.2	8.3	8.2	8.1	8.1	8.2	8.2	8.3
Max	8.6	8.6	8.7	8.7	8.6	8.6	8.4	8.5	9.0	8.9	8.8	8.7	8.5	8.6	8.5	8.6	8.6	8.9	8.5	8.6	8.6	8.6	8.6
25 perc'	8.2	8.0	8.1	8.1	8.1	8.3	8.2	8.2	8.2	8.2	8.2	8.0	8.1	8.0	7.9	8.0	8.2	8.2	7.8	7.7	8.2	8.3	8.2
75 perc'	8.5	8.5	8.5	8.6	8.5	8.5	8.3	8.4	8.5	8.6	8.4	8.5	8.4	8.4	8.4	8.5	8.5	8.4	8.4	8.4	8.4	8.5	8.4

Figure No. 21: Trend of pH levels recorded at WQMS at Godavari basin-(2 of 2)



	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga										Pranhita & Othe
Min	40.0	110.0	11.0	11.0	30.0	40.0	50.0	30.0	17.0	30.0	30.0	40.0	34.0	30.0	70.0	5.0	22.0	50.0	20.0	20.0	40.0	80.0	16.0
Mean	56.3	227.5	34.7	30.5	74.5	97.3	89.1	56.4	74.9	46.7	107.3	83.6	55.3	76.4	150.9	127.7	45.8	75.5	72.7	87.3	103.6	157.3	127.6
Max	80.0	500.0	80.0	70.0	170.0	170.0	110.0	110.0	110.0	60.0	140.0	140.0	70.0	130.0	500.0	240.0	90.0	170.0	140.0	170.0	140.0	240.0	240.0
25 perc'	50.0	132.5	22.0	17.0	50.0	65.0	70.0	40.0	40.0	37.0	70.0	50.0	45.0	65.0	80.0	85.0	30.0	50.0	40.0	40.0	100.0	130.0	82.5
75 perc'	57.5	312.5	40.0	35.0	85.0	115.0	110.0	65.0	110.0	55.0	140.0	125.0	70.0	85.0	170.0	170.0	55.0	80.0	95.0	125.0	110.0	190.0	170.0

Figure No. 22: Trend of Fecal Coliform levels recorded at WQMS at Godavari basin-2of 2

Water Quality Index for WQMS at Godavari Basin (2 of 2): Sub-basin- Wardha

Apr	56	NA	NA	NA	NA	NA	49	75	51	71	62	59	62	50	49	54	45	51	69	61	59	66	58	43	70	57	62	67	59	44	66	49	57	63	67	57
May	NA	NA	NA	NA	NA	NA	72	50	52	69	50	52	NA	37	51	NA	54	49	72	57	55	63	53	51	62	50	52	55	56	48	54	53	44	70	53	50
Jun	NA	NA	NA	NA	NA	NA	63	60	53	50	54	55	NA	55	48	NA	58	50	54	55	58	50	39	53	40	57	62	46	61	56	25	52	57	59	45	57
Jul	54	NA	50	NA	NA	31	57	62	55	56	71	56	56	43	57	59	53	49	62	70	59	57	63	48	53	71	56	51	67	56	53	65	46	48	62	56
Aug	57	58	56	56	47	44	60	57	43	59	66	53	66	47	59	49	45	46	57	66	57	50	61	51	61	63	59	55	61	56	61	59	53	59	55	48
Sep	64	56	42	61	45	49	71	68	56	71	64	56	60	48	56	57	54	48	72	50	55	66	52	49	69	63	57	66	57	40	66	61	41	65	59	46
Oct	66	58	68	70	57	61	74	59	67	75	63	62	66	55	62	68	57	58	65	64	62	65	57	56	74	55	62	71	59	68	69	49	62	77	52	51
Nov	66	43	64	48	27	32	65	65	64	71	58	62	62	58	62	58	42	53	67	57	63	62	46	57	68	41	60	60	59	61	64	35	51	58	54	55
Dec	64	43	49	58	32	57	64	55	57	70	63	51	64	51	57	59	51	50	68	65	57	64	57	48	73	58	54	62	64	53	67	54	47	68	61	55
Jan	44	33	46	NA	NA	27	60	59	49	58	51	53	63	51	47	62	50	45	63	56	58	55	53	50	48	59	57	53	43	43	40	46	46	57	55	52
Feb	42	NA	52	NA	NA	30	58	62	59	60	63	50	49	46	56	42	54	44	61	63	54	41	53	50	50	64	54	52	60	48	52	44	59	58	53	64
Mar	38	NA	NA	NA	NA	NA	63	57	NA	65	59	NA	42	54	NA	38	47	NA	60	60	NA	55	53	NA	63	69	NA	61	62	NA	51	55	NA	64	35	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2699			2675			2697			2698			1315			2723			2721			2174			2720			2156			2719			1212		
	Wardha																																				

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 11: Surface water quality monitoring stations in Godavari Basin (2 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
2699	Penganga	Penganga river at Mehkar- Buldana road bridge.	Mehkar	Mehkar	Buldana
2675	Morna	Morna river at D/s of Railway bridge.	Akola	Akola	Akola
2697	Penganga	Penganga river near water supply scheme of Umarkhed M.C.	Belkhed	Umarkhed	Yavatmal
2698	Penganga	Penganga river D/s of Isapur Dam	Isapur	Pusad	Yavatmal
1315	Wardha	Wardha river at PulgaonRailway Bridge	Pulgaon	wardha	Wardha
2723	Wena	Wena river at D/s of Mohata Mills, near bridge on Hinganghat-Wadner road	Hinganghat	Hinganghat	Wardha
2721	Wardha	Wardha river at U/s of ACC Ltd, Ghuggus near WCL pump house	Ghuggus	Chandrapur	Chandrapur
2174	Wardha	Wardha river at D/s of ACC Ltd, Ghugus near WCL pump house	Ghuggus	Chandrapur	Chandrapur
2720	Wardha	Wardha river at U/s of Erai river at Hadasti near Arun Engg. works	Hadasti	Chandrapur	Chandrapur
2156	Wardha	Wardha river at confluence point of Penganga & Wardha.	Jugad	Wani	Yavatmal
2719	Wardha	Wardha river at D/s of Erai river at Hadasti near Arun Engg. Works	Hadasti	Chandrapur	Chandrapur
1212	Wardha	Wardha river at Rajura bridge	Rajura	Chandrapur	Chandrapur

Water Quality Index for WQMS at Godavari Basin (2 of 2): Sub-basin – Weinganga and Pranhita

Apr	53	60	50	70	57	59	63	56	52	65	58	48	72	56	54	62	40	54	74	53	45	68	58	61	65	51	59	62	43	47	68	74	NA
May	NA	46	46	NA	58	54	NA	46	53	57	NA	58	62	60	60	55	NA	55	71	57	60	NA	52	58	58	52	53	52	45	48	67	60	44
Jun	NA	59	53	NA	55	62	NA	57	43	64	58	55	62	59	59	57	59	49	NA	61	60	NA	51	58	64	58	56	55	55	49	56	62	53
Jul	56	61	56	59	70	57	61	62	50	66	64	56	55	63	59	55	59	51	74	63	61	63	39	54	57	67	56	51	57	49	61	69	55
Aug	70	53	62	63	60	59	63	52	53	63	58	55	57	57	56	55	52	51	57	54	63	69	47	59	49	60	56	47	56	47	55	50	56
Sep	60	63	52	65	50	58	61	67	46	57	53	60	63	56	58	59	NA	40	62	53	60	59	48	51	70	49	53	66	42	45	65	58	58
Oct	74	58	61	71	58	66	72	49	59	63	52	50	66	65	71	67	61	57	67	69	58	66	63	66	68	57	67	68	52	60	76	59	65
Nov	51	52	54	65	53	64	62	42	55	61	56	56	64	61	65	60	56	57	65	61	63	65	57	54	63	57	59	60	39	51	62	57	54
Dec	66	52	49	61	59	61	75	51	54	60	56	59	61	59	64	59	54	56	73	59	65	67	52	57	69	62	54	NA	50	49	66	61	55
Jan	60	58	43	60	57	51	66	54	49	47	49	51	64	59	51	57	47	45	63	59	57	61	51	50	59	44	54	56	41	44	55	56	44
Feb	56	54	55	48	56	58	45	61	59	56	61	59	56	55	56	51	51	51	50	54	61	42	47	53	57	56	59	47	48	37	59	55	61
Mar	50	53	NA	49	59	NA	50	53	NA	57	59	NA	43	43	NA	35	39	NA	58	67	NA	53	56	NA	62	60	NA	57	48	NA	69	61	73
FY	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**
	1909			**2722**			**1910**			**1908**			**2170**			**2171**			**2173**			**2172**			**2175**			**2176**			**11**		
	Weinganga																														**Pranhita & Others**		

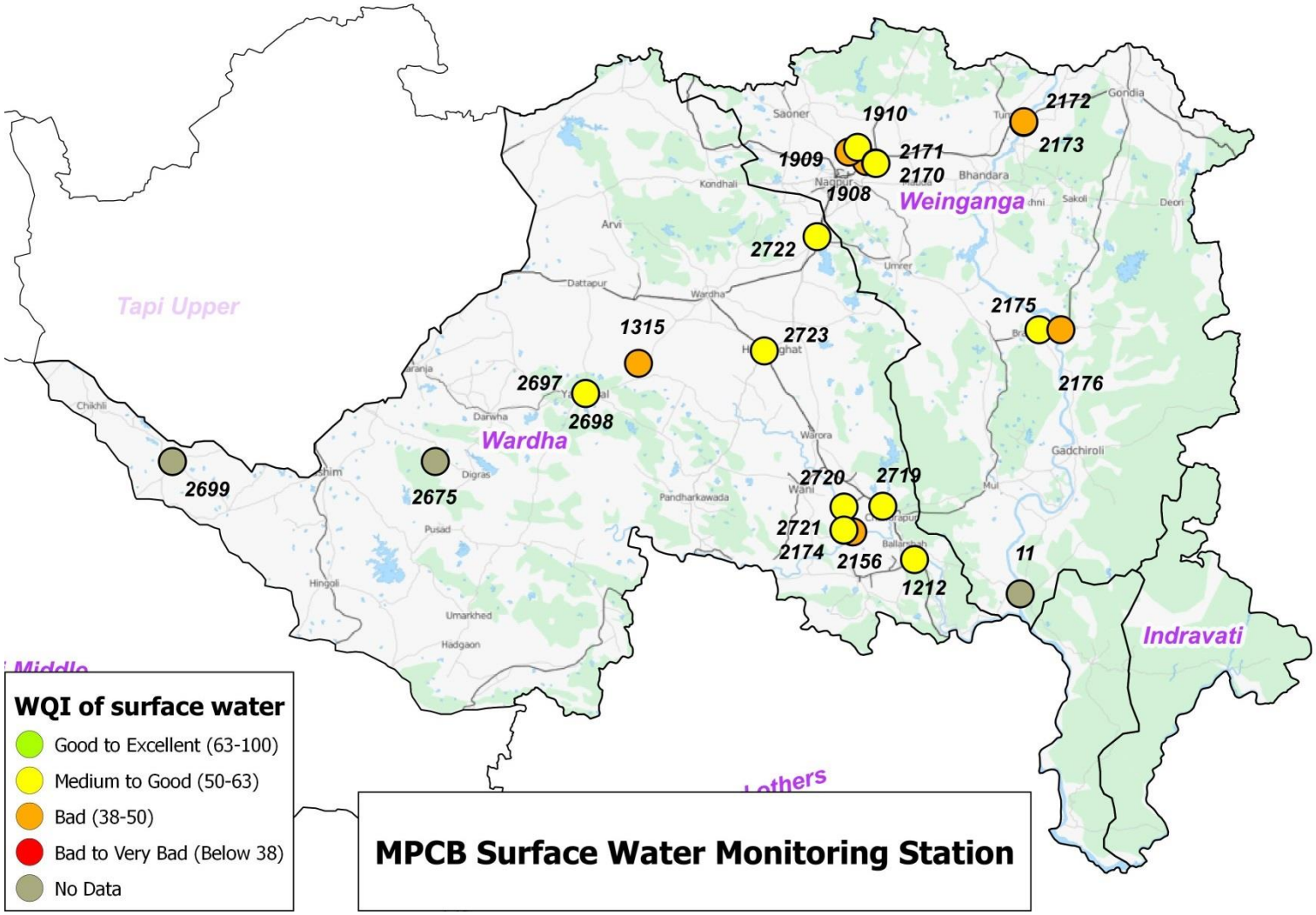
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

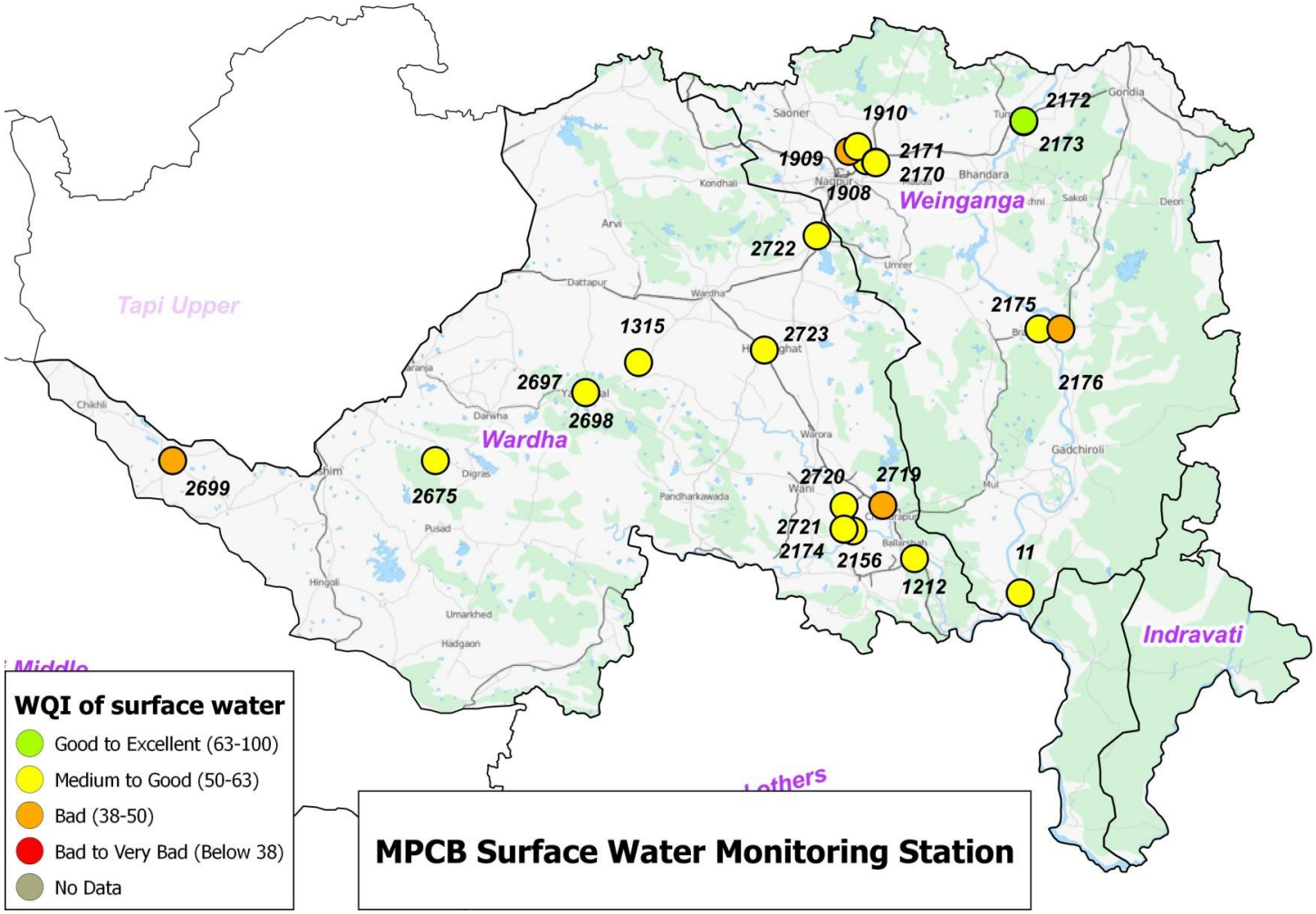
Table No. 12: Surface water quality monitoring stations in Godavari Basin (2 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
1909	Kanhan	Village- Agargaon, Taluka- Kuhi, District- Nagpur	Agargaon	Kuhi	Nagpur
2722	Wena	Wena river at U/s of Mohata Mills,	Hinganghat	Hinganghat	Wardha
1910	Wainganga	Wainganga river after confluence with Kanhan river	Ambhora	Kuhi	Nagpur
1908	Kolar	Kolar river before confluence with Kanhan river at Waregaon Bridge.	Waregaon	Kamptee	Nagpur
2170	Kanhan	Kanhan river at U/s of M/s Vidarbha Paper Mills	Sinora	Parseoni	Nagpur
2171	Kanhan	Kanhan river at D/s of M/s Vidarbha Paper Mills	Sinora	Parseoni	Nagpur
2173	Wainganga	Wainganga at U/s of Ellora Paper Mills	Tumsar	Tumsar	Bandara
2172	Wainganga	Wainganga at D/s of Ellora Paper Mills	Tumsar	Tumsar	Bandara
2175	Wainganga	Wainganga at U/s of Gaurav Paper Mills, near jackwell.	Bramhpuri	Chandrapur	Chandrapur
2176	Wainganga	Wainganga at D/s of Gaurav Paper Mills, near jack well.	Bramhpuri	Chandrapur	Chandrapur
11	Wainganga	Wainganga river at Ashti	Ashti	Gondpipri	Chandrapur

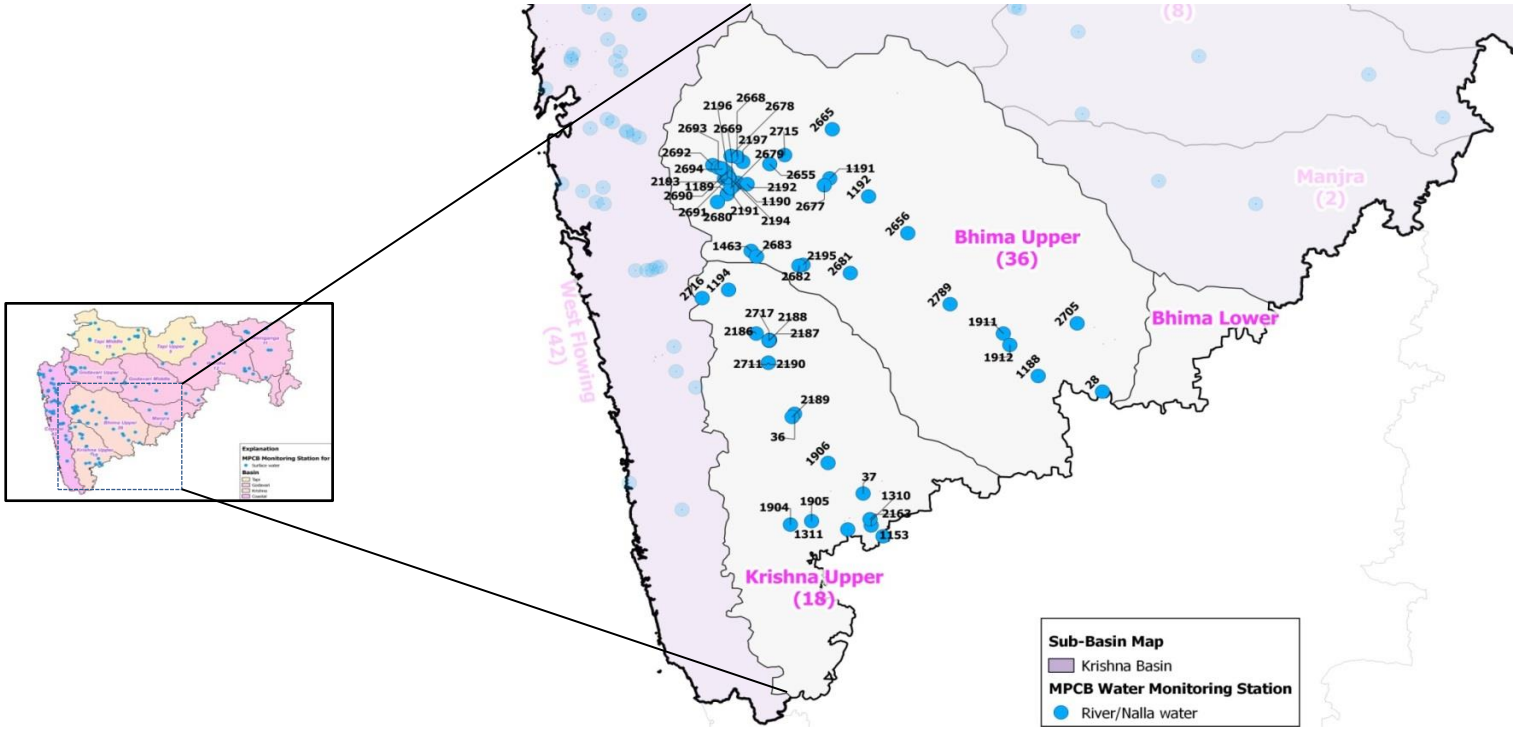
Spatial map of Surface WQI in Godavari Basin (2 of 2) (April 2013)



Spatial map of Surface WQI in Godavari Basin (2 of 2) (December 2013)



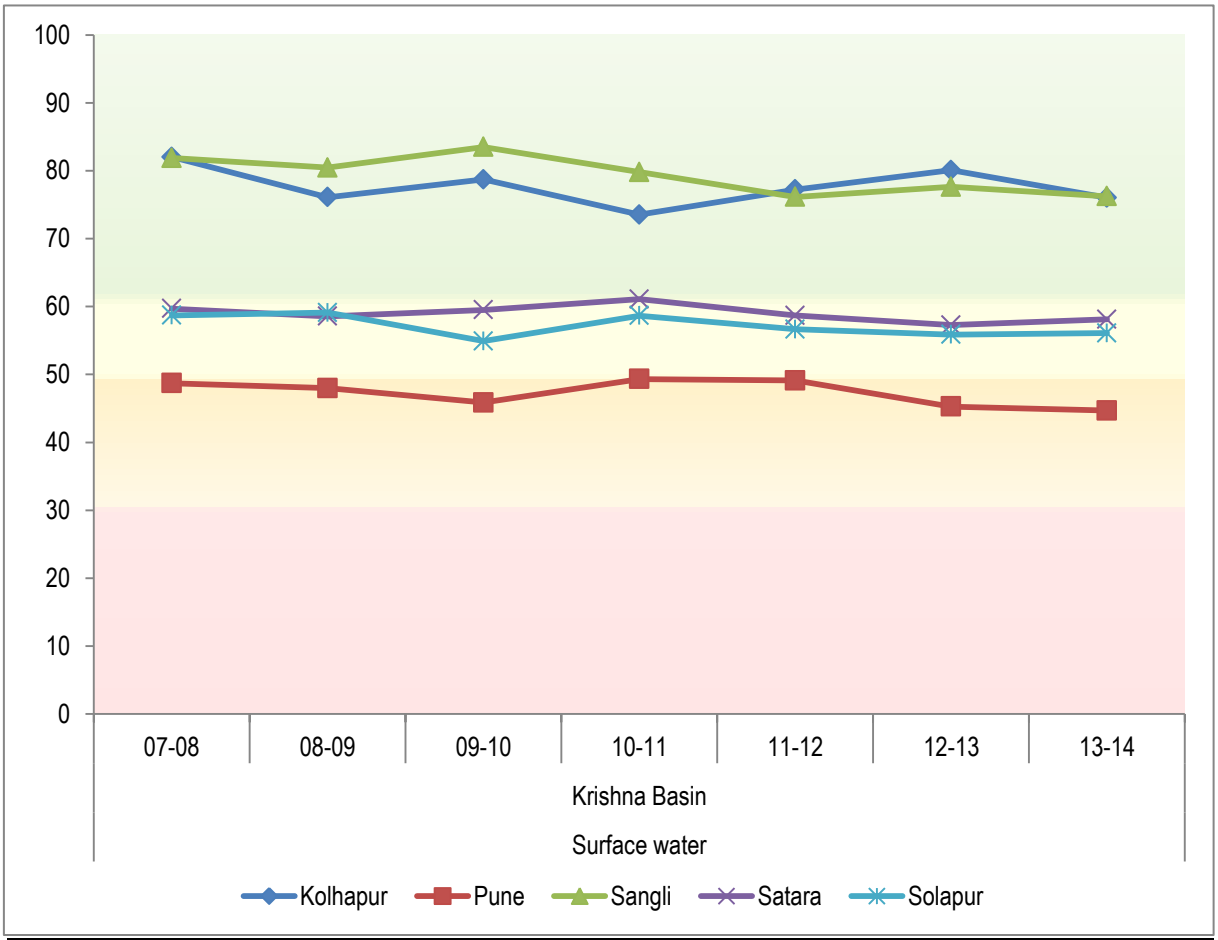
Krishna Basin



Map No. 6: Network of surface water quality monitoring stations in Bhima upper sub basin; Krishna Basin 1of 2

In Maharashtra the Krishna Basin could be divided into three sub-basins Bhima Upper and Lower basin and Krishna Upper. There are a total of 54 (36 on Bhima upper and 18 on Krishna upper) surface water monitoring stations in the Krishna river basin in Maharashtra. There is no monitoring station on Bhima lower sub-basin.

Krishna Basin (Intra Basin analysis)



WQI	Category	Class by CPCB	Remarks
63-100	Good to Excellent	A	Non polluted
50-63	Medium to Good	B	Non polluted
38-50	Bad	C	Polluted
38 & less	Bad to Very Bad	D, E	Heavily polluted

Figure No. 23: Trend of annual average WQI across districts of Krishna basin

Note:

This graph considers the average WQI for all the monitoring stations in that particular district and hence may include some bias. This graph is only for an overview and monitoring station wise data maybe analyzed to pin point the most affected and polluted patches of rivers in that district.

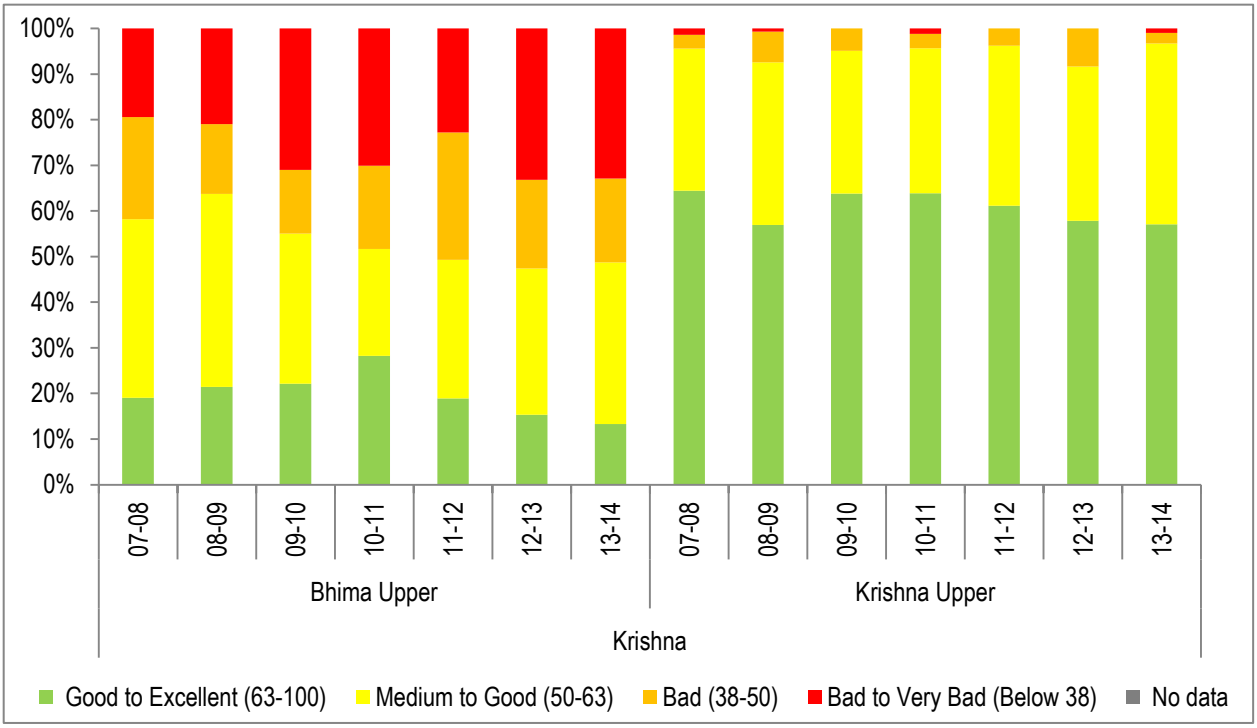
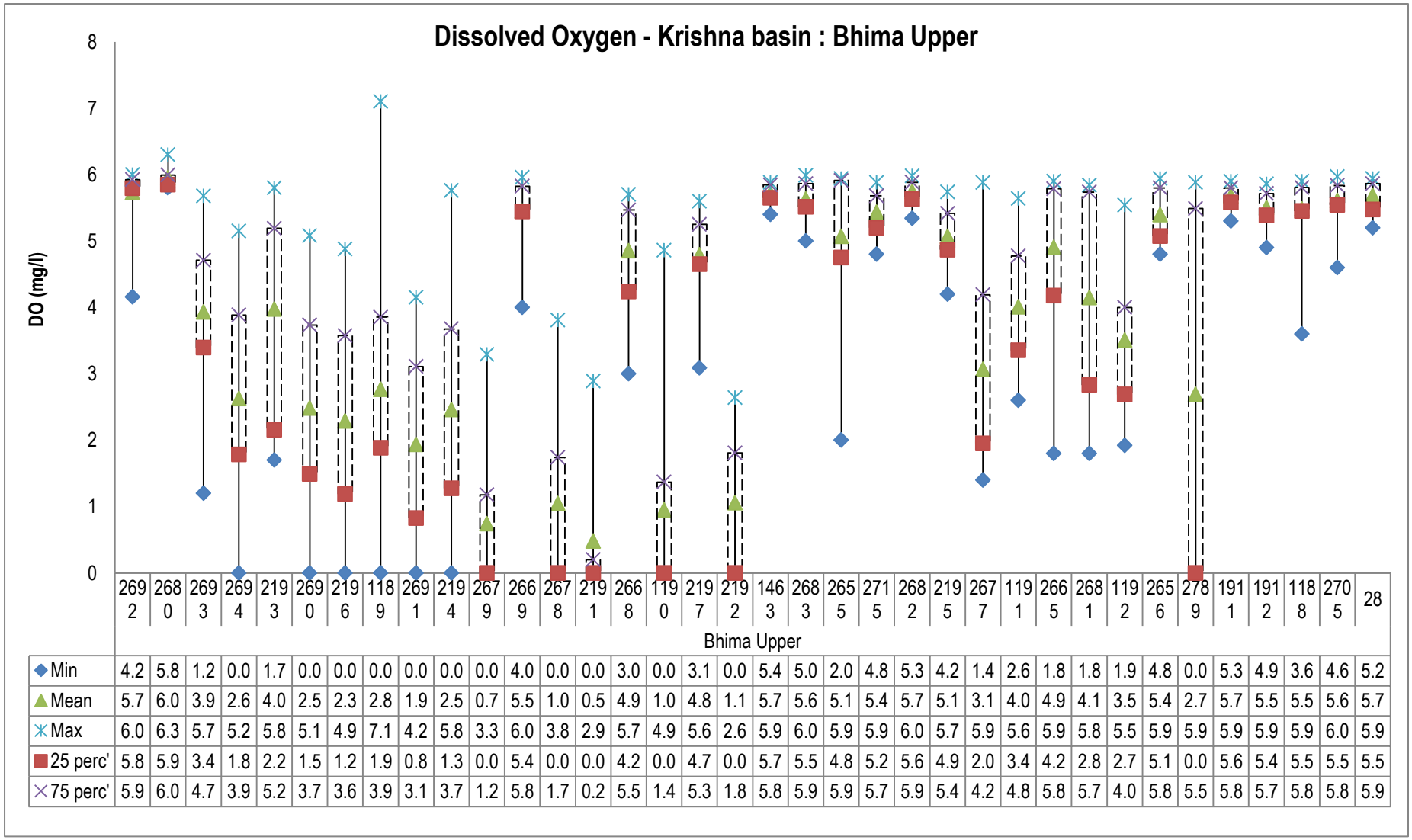


Figure No. 24 : Trend of average occurrence for different category of WQI in Krishna basin

The Intra basin performance of Krishna Basin across five districts of the state are depicted in the Figure No. 23 and the average annual occurrence of different category of Water Quality Index across all WQMS is depicted in the Figure No. 24.

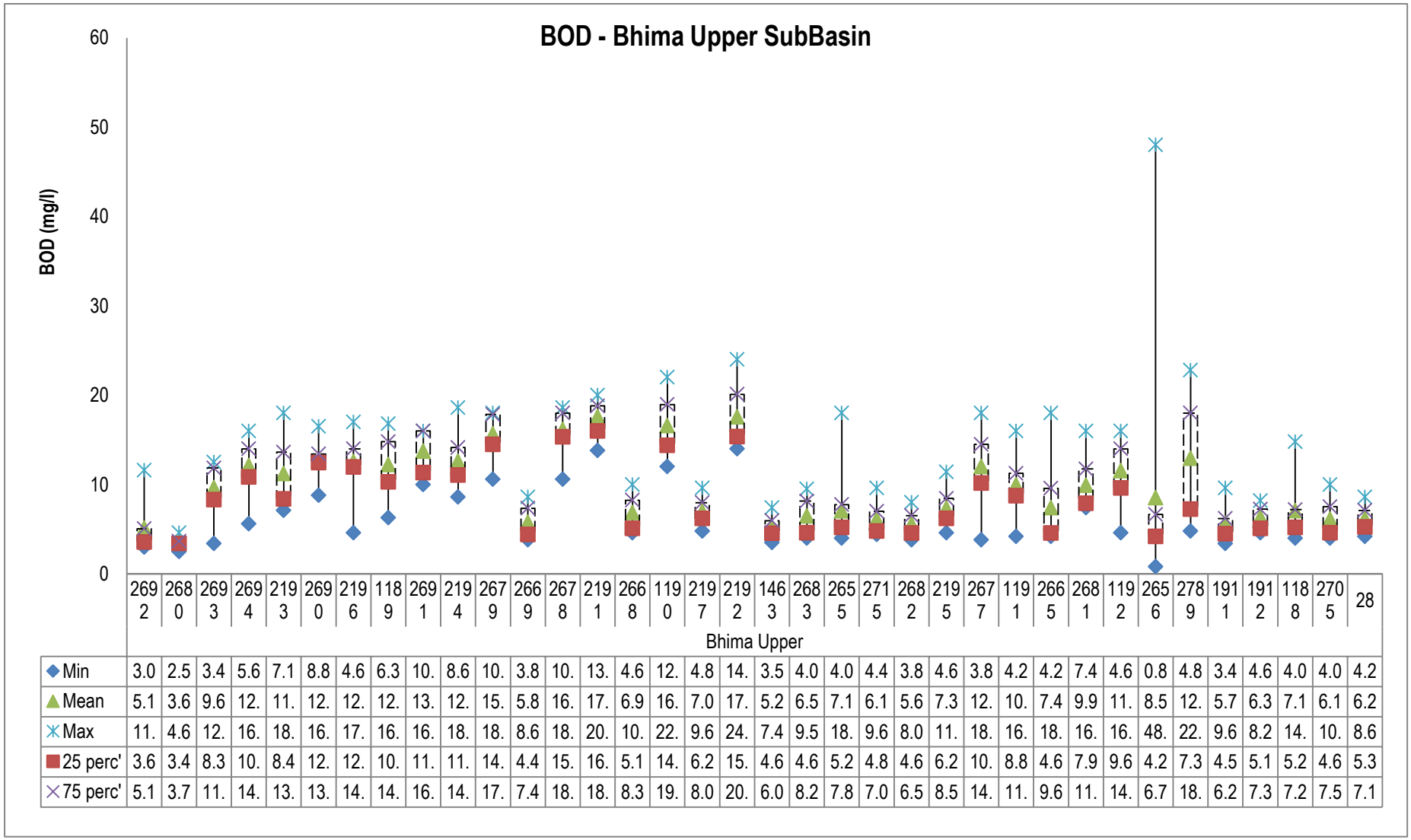
The results showed that among five districts, namely Kolhapur, Pune, Sangli, Satara and Solapur, the annual average WQI of 28 WQMS of Pune were consistently in Bad category (i.e. WQI in range of 38-50) from 07-08 till 13-14. Whereas, Satara (12 WQMS) and Solapur (6 WQMS) were Medium to Good (i.e. WQI in range of 50-63) and Kolhapur (6 WQMS) and Sangli (2 WQMS) were Good to Excellent category (i.e. WQI in range of 63-100). The average WQI across various districts showed more or less consistent values.

Figure No. 24 shows average annual occurrence of WQI across 36 WQM stations of Bhima Upper and 18 WQMS of Krishna Upper for 7 years starting from 2007. Intra Sub basins results for Krishna Basin showed that the occurrence of Good to Excellent category of WQI in Krishna Upper sub basins is three times that of the Bhima Upper, indicating that more likely occurrence of Good to Excellent category. Hence the overall preview of Krishna Upper is better when compared to Bhima Upper.



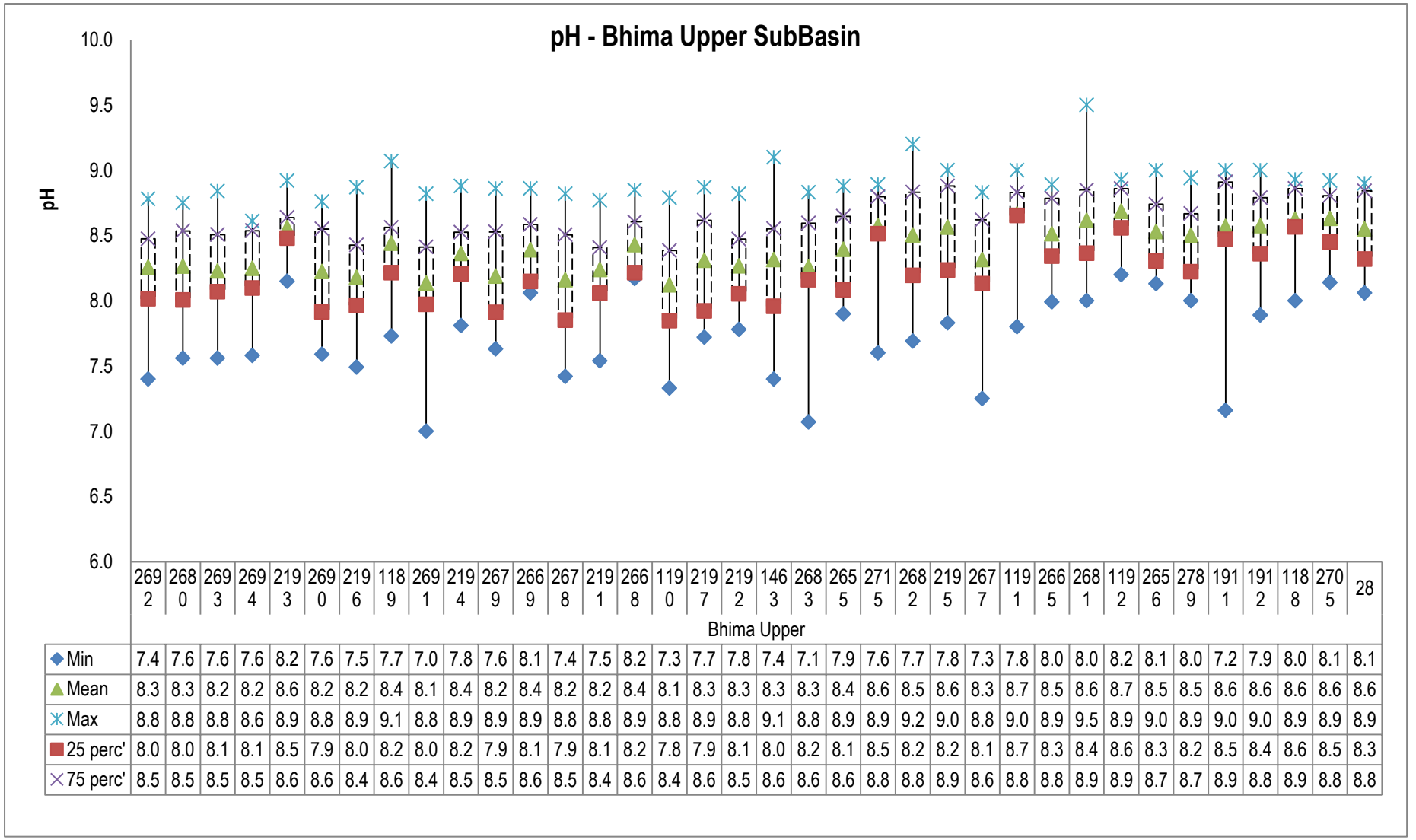
	2692	2680	2693	2694	21913	26900	21916	11889	26911	21914	26779	26669	26678	21911	26668	11900	21917	21912	14633	26833	26655	27155	26822	21915	26677	11911	26665	26681	11912	26656	27889	19111	19112	11888	27055	28
Min	4.2	5.8	1.2	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	3.0	0.0	3.1	0.0	5.4	5.0	2.0	4.8	5.3	4.2	1.4	2.6	1.8	1.8	1.9	4.8	0.0	5.3	4.9	3.6	4.6	5.2
Mean	5.7	6.0	3.9	2.6	4.0	2.5	2.3	2.8	1.9	2.5	0.7	5.5	1.0	0.5	4.9	1.0	4.8	1.1	5.7	5.6	5.1	5.4	5.7	5.1	3.1	4.0	4.9	4.1	3.5	5.4	2.7	5.7	5.5	5.5	5.6	5.7
Max	6.0	6.3	5.7	5.2	5.8	5.1	4.9	7.1	4.2	5.8	3.3	6.0	3.8	2.9	5.7	4.9	5.6	2.6	5.9	6.0	5.9	5.9	6.0	5.7	5.9	5.6	5.9	5.8	5.5	5.9	5.9	5.9	5.9	5.9	6.0	5.9
25 perc'	5.8	5.9	3.4	1.8	2.2	1.5	1.2	1.9	0.8	1.3	0.0	5.4	0.0	0.0	4.2	0.0	4.7	0.0	5.7	5.5	4.8	5.2	5.6	4.9	2.0	3.4	4.2	2.8	2.7	5.1	0.0	5.6	5.4	5.5	5.5	5.5
75 perc'	5.9	6.0	4.7	3.9	5.2	3.7	3.6	3.9	3.1	3.7	1.2	5.8	1.7	0.2	5.5	1.4	5.3	1.8	5.8	5.9	5.9	5.7	5.9	5.4	4.2	4.8	5.8	5.7	4.0	5.8	5.5	5.8	5.7	5.8	5.8	5.9

Figure No. 25: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



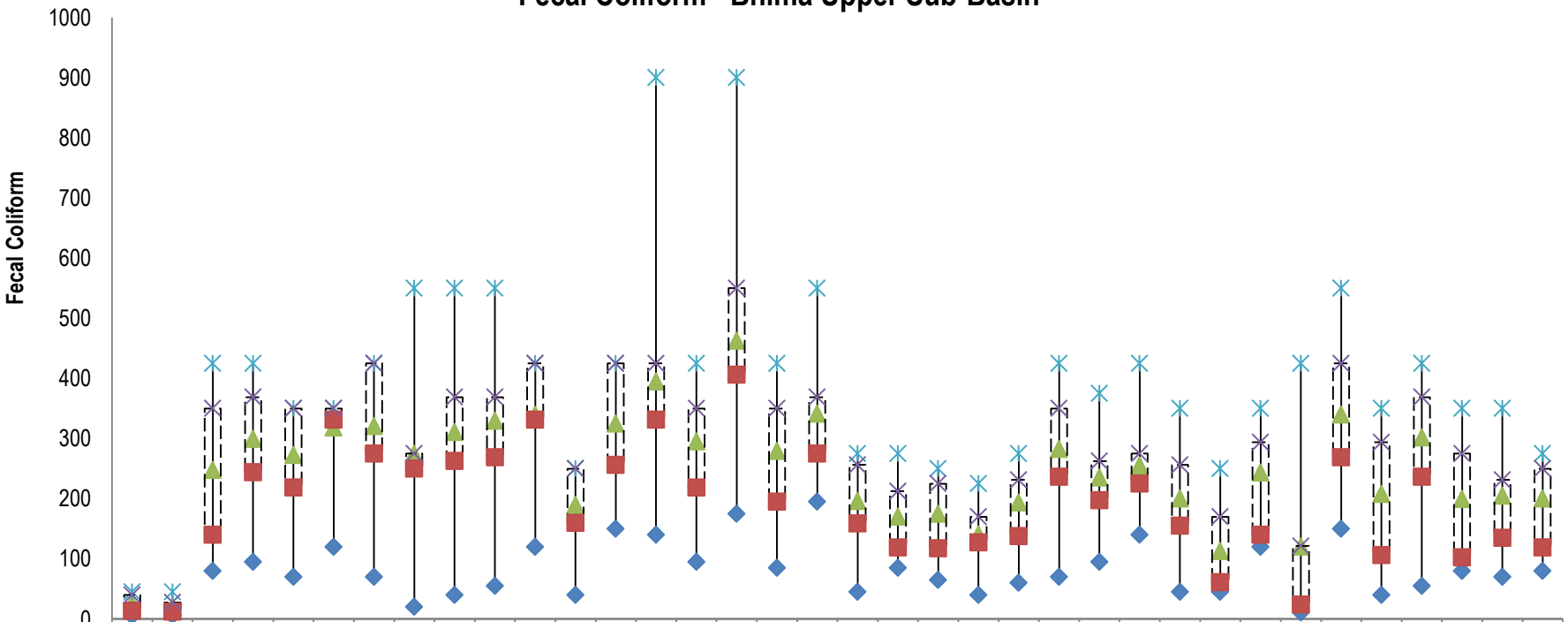
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
	Bhima Upper																																				
Min	3.0	2.5	3.4	5.6	7.1	8.8	4.6	6.3	10.	8.6	10.	3.8	10.	13.	4.6	12.	4.8	14.	3.5	4.0	4.0	4.4	3.8	4.6	3.8	4.2	4.2	7.4	4.6	0.8	4.8	3.4	4.6	4.0	4.0	4.2
Mean	5.1	3.6	9.6	12.	11.	12.	12.	12.	13.	12.	15.	5.8	16.	17.	6.9	16.	7.0	17.	5.2	6.5	7.1	6.1	5.6	7.3	12.	10.	7.4	9.9	11.	8.5	12.	5.7	6.3	7.1	6.1	6.2
Max	11.	4.6	12.	16.	18.	16.	17.	16.	16.	18.	18.	8.6	18.	20.	10.	22.	9.6	24.	7.4	9.5	18.	9.6	8.0	11.	18.	16.	18.	16.	16.	48.	22.	9.6	8.2	14.	10.	8.6
25 perc'	3.6	3.4	8.3	10.	8.4	12.	12.	10.	11.	11.	14.	4.4	15.	16.	5.1	14.	6.2	15.	4.6	4.6	5.2	4.8	4.6	6.2	10.	8.8	4.6	7.9	9.6	4.2	7.3	4.5	5.1	5.2	4.6	5.3
75 perc'	5.1	3.7	11.	14.	13.	13.	14.	14.	16.	14.	17.	7.4	18.	18.	8.3	19.	8.0	20.	6.0	8.2	7.8	7.0	6.5	8.5	14.	11.	9.6	11.	14.	6.7	18.	6.2	7.3	7.2	7.5	7.1

Figure No. 26: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



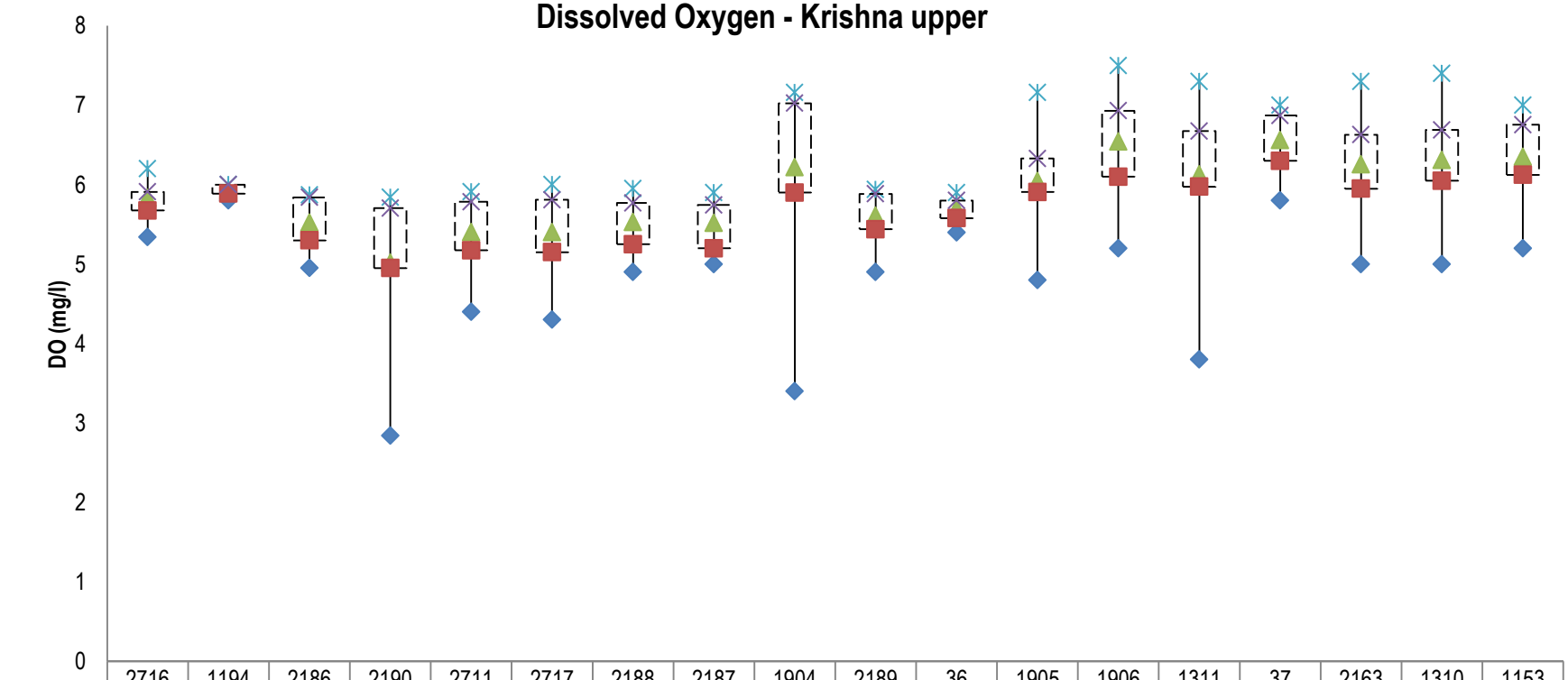
	Bhima Upper																																
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
Min	7.4	7.6	7.6	7.6	8.2	7.6	7.5	7.7	7.0	7.8	7.6	8.1	7.4	7.5	8.2	7.3	7.7	7.8	7.4	7.1	7.9	7.6	7.7	7.8	7.3	7.8	8.0	8.0	8.2	8.1	8.0	7.2	7.9	8.0	8.1	8.1
Mean	8.3	8.3	8.2	8.2	8.6	8.2	8.2	8.4	8.1	8.4	8.2	8.4	8.2	8.2	8.4	8.1	8.3	8.3	8.3	8.3	8.4	8.6	8.5	8.6	8.3	8.7	8.5	8.6	8.7	8.5	8.5	8.6	8.6	8.6	8.6	8.6
Max	8.8	8.8	8.8	8.6	8.9	8.8	8.9	9.1	8.8	8.9	8.9	8.9	8.8	8.8	8.9	8.8	8.9	8.8	9.1	8.8	8.9	8.9	9.2	9.0	8.8	9.0	8.9	9.5	8.9	9.0	8.9	9.0	9.0	8.9	8.9	8.9
25 perc'	8.0	8.0	8.1	8.1	8.5	7.9	8.0	8.2	8.0	8.2	7.9	8.1	7.9	8.1	8.2	7.8	7.9	8.1	8.0	8.2	8.1	8.5	8.2	8.2	8.1	8.7	8.3	8.4	8.6	8.3	8.2	8.5	8.4	8.6	8.5	8.3
75 perc'	8.5	8.5	8.5	8.5	8.6	8.6	8.4	8.6	8.4	8.5	8.5	8.6	8.5	8.4	8.6	8.4	8.6	8.5	8.6	8.6	8.6	8.8	8.8	8.9	8.6	8.8	8.8	8.9	8.9	8.7	8.7	8.9	8.8	8.9	8.8	8.8

Figure No. 27: Trend of pH levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



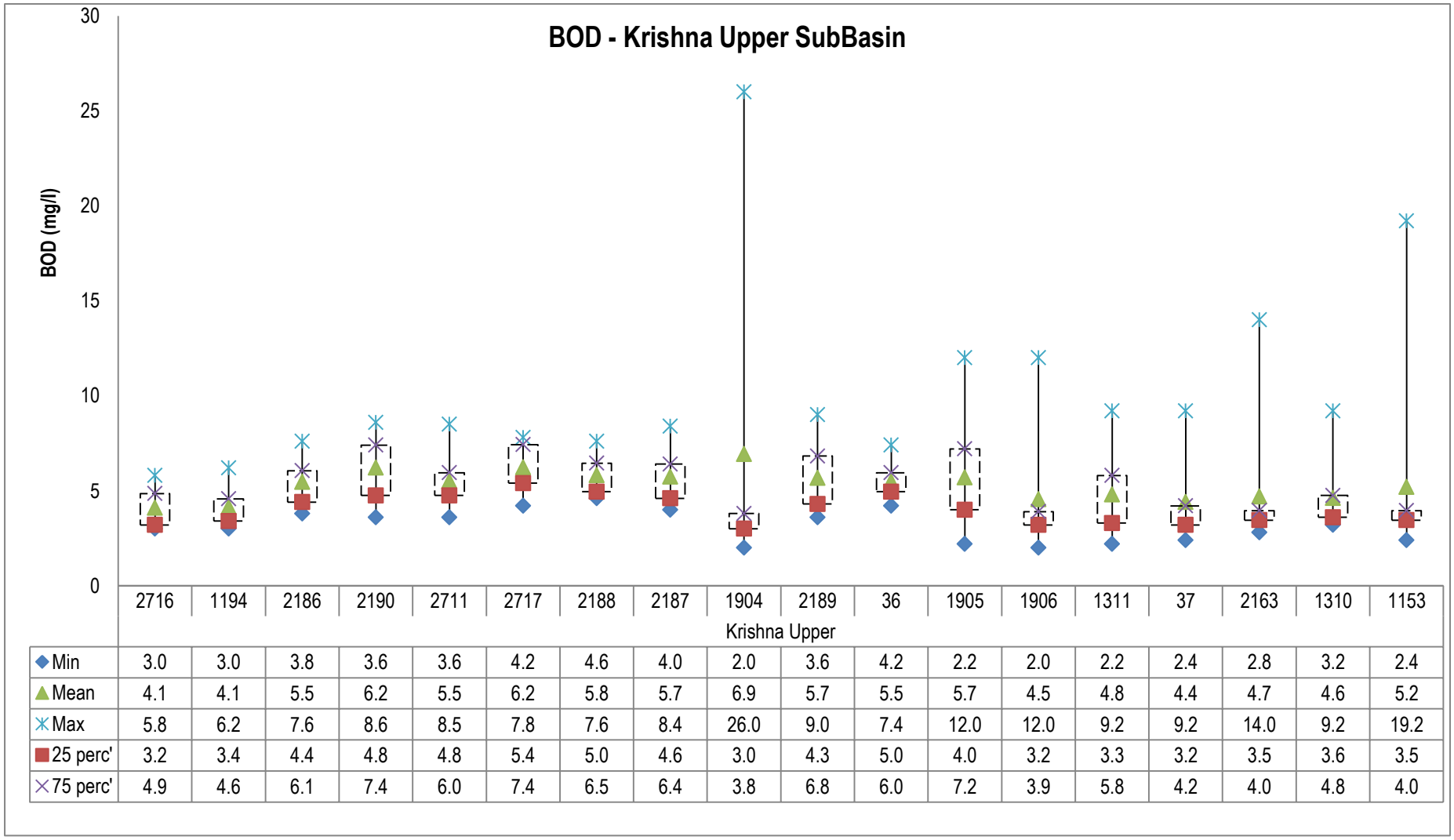
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
Min	5.0	6.0	80.	95.	70.	120	70.	20.	40.	55.	120	40.	150	140	95.	175	85.	195	45.	85.	65.	40.	60.	70.	95.	140	45.	45.	120	11.	150	40.	55.	80.	70.	80.
Mean	25.	20.	247	299	272	318	320	274	310	329	339	189	324	395	295	462	279	341	195	170	174	140	193	282	235	255	200	112	243	120	339	207	301	199	205	200
Max	45.	45.	425	425	350	350	425	550	550	550	425	250	425	900	425	900	425	550	275	275	250	225	275	425	375	425	350	250	350	425	550	350	425	350	350	275
25 perc'	13.	12.	140	243	218	331	275	250	262	268	331	160	256	331	218	406	195	275	158	118	117	127	137	236	197	225	155	61.	140	23.	268	106	236	102	135	118
75 perc'	40.	27.	350	368	350	350	425	275	368	368	425	250	425	425	350	550	350	368	256	212	225	170	231	350	262	275	256	170	293	121	425	293	368	275	231	250

Figure No. 28: Trend of Fecal Coliform levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



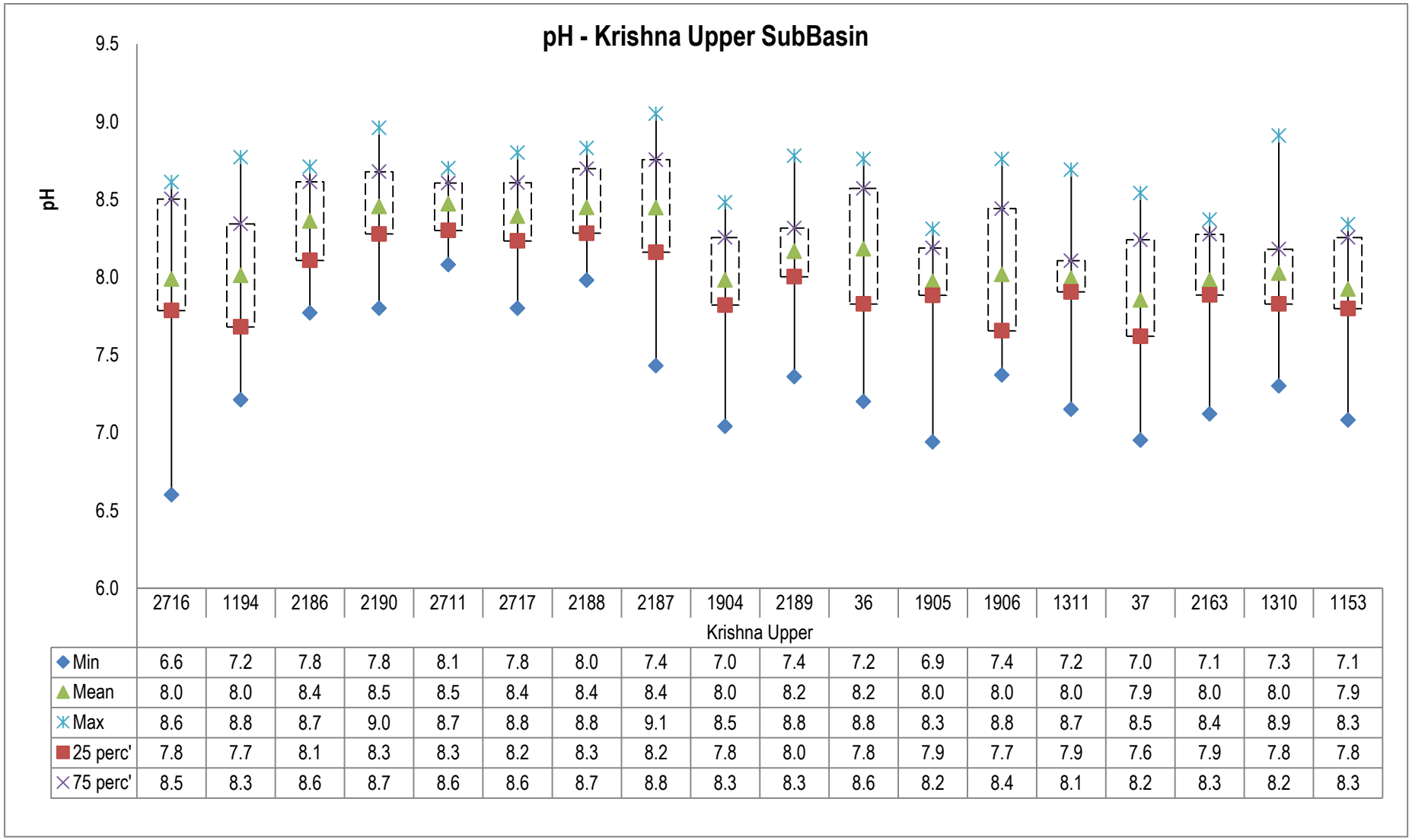
	2716	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
	Krishna Upper																	
Min	5.3	5.8	5.0	2.8	4.4	4.3	4.9	5.0	3.4	4.9	5.4	4.8	5.2	3.8	5.8	5.0	5.0	5.2
Mean	5.8	5.9	5.5	5.0	5.4	5.4	5.5	5.5	6.2	5.6	5.7	6.0	6.5	6.1	6.6	6.3	6.3	6.4
Max	6.2	6.0	5.9	5.8	5.9	6.0	6.0	5.9	7.2	5.9	5.9	7.2	7.5	7.3	7.0	7.3	7.4	7.0
25 perc'	5.7	5.9	5.3	5.0	5.2	5.2	5.3	5.2	5.9	5.4	5.6	5.9	6.1	6.0	6.3	6.0	6.1	6.1
75 perc'	5.9	6.0	5.8	5.7	5.8	5.8	5.8	5.7	7.0	5.9	5.8	6.3	6.9	6.7	6.9	6.6	6.7	6.8

Figure No. 29: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Krishna upper sub basin - Krishna basin 2 of 2



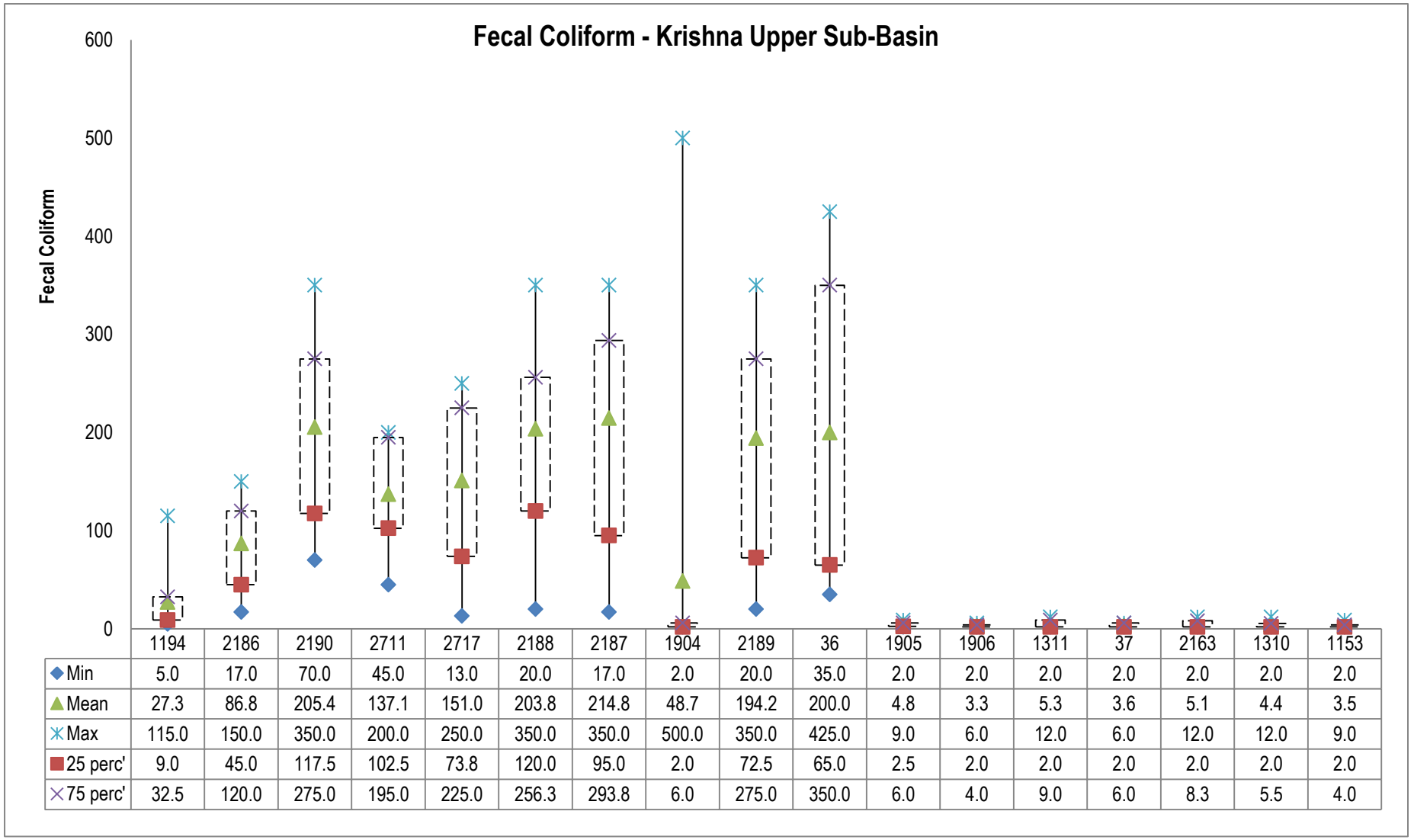
	2716	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
	Krishna Upper																	
Min	3.0	3.0	3.8	3.6	3.6	4.2	4.6	4.0	2.0	3.6	4.2	2.2	2.0	2.2	2.4	2.8	3.2	2.4
Mean	4.1	4.1	5.5	6.2	5.5	6.2	5.8	5.7	6.9	5.7	5.5	5.7	4.5	4.8	4.4	4.7	4.6	5.2
Max	5.8	6.2	7.6	8.6	8.5	7.8	7.6	8.4	26.0	9.0	7.4	12.0	12.0	9.2	9.2	14.0	9.2	19.2
25 perc'	3.2	3.4	4.4	4.8	4.8	5.4	5.0	4.6	3.0	4.3	5.0	4.0	3.2	3.3	3.2	3.5	3.6	3.5
75 perc'	4.9	4.6	6.1	7.4	6.0	7.4	6.5	6.4	3.8	6.8	6.0	7.2	3.9	5.8	4.2	4.0	4.8	4.0

Figure No. 30: Trend of Biological Oxygen Demand (B) levels recorded at WQMS at Krishna upper sub basin - Krishna basin 2 of 2



	2716	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
	Krishna Upper																	
Min	6.6	7.2	7.8	7.8	8.1	7.8	8.0	7.4	7.0	7.4	7.2	6.9	7.4	7.2	7.0	7.1	7.3	7.1
Mean	8.0	8.0	8.4	8.5	8.5	8.4	8.4	8.4	8.0	8.2	8.2	8.0	8.0	8.0	7.9	8.0	8.0	7.9
Max	8.6	8.8	8.7	9.0	8.7	8.8	8.8	9.1	8.5	8.8	8.8	8.3	8.8	8.7	8.5	8.4	8.9	8.3
25 perc'	7.8	7.7	8.1	8.3	8.3	8.2	8.3	8.2	7.8	8.0	7.8	7.9	7.7	7.9	7.6	7.9	7.8	7.8
75 perc'	8.5	8.3	8.6	8.7	8.6	8.6	8.7	8.8	8.3	8.3	8.6	8.2	8.4	8.1	8.2	8.3	8.2	8.3

Figure No. 31: Trend of pH levels recorded at WQMS at Krishna upper sub basin - Krishna basin 2 of 2



	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
Min	5.0	17.0	70.0	45.0	13.0	20.0	17.0	2.0	20.0	35.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mean	27.3	86.8	205.4	137.1	151.0	203.8	214.8	48.7	194.2	200.0	4.8	3.3	5.3	3.6	5.1	4.4	3.5
Max	115.0	150.0	350.0	200.0	250.0	350.0	350.0	500.0	350.0	425.0	9.0	6.0	12.0	6.0	12.0	12.0	9.0
25 perc'	9.0	45.0	117.5	102.5	73.8	120.0	95.0	2.0	72.5	65.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0
75 perc'	32.5	120.0	275.0	195.0	225.0	256.3	293.8	6.0	275.0	350.0	6.0	4.0	9.0	6.0	8.3	5.5	4.0

Figure No. 32: Trend of Fecal Coliform levels recorded at WQMS at Krishna upper sub basin - Krishna basin 2 of 2

Water Quality Index for WQMS at Krishna Basin (1 of 2): Sub-basin - Bhima upper (1 of 3)

Apr	59	NA	56	75	65	80	77	69	69	53	40	54	35	32	38	NA	46	31	41	31	36	39	29	34	33	40	41	44	32	36	NA	37	30	NA	31	28
May	67	52	NA	69	76	74	77	NA	69	48	44	40	39	33	35	54	36	32	42	31	37	42	35	38	49	34	28	39	32	38	39	31	27	NA	31	28
Jun	57	58	NA	75	68	71	81	69	69	52	40	41	37	31	31	45	38	29	41	32	30	37	36	31	53	35	28	41	45	30	40	35	28	NA	33	22
Jul	NA	NA	NA	73	74	65	76	70	67	36	48	60	30	39	52	48	37	52	36	38	45	40	38	53	53	41	38	33	37	39	37	32	32	NA	33	31
Aug	NA	NA	59	75	74	53	77	71	68	58	53	41	35	47	41	NA	51	50	39	45	39	38	31	39	55	39	48	39	39	38	46	44	33	NA	32	33
Sep	NA	NA	59	71	70	63	72	69	65	60	40	47	38	32	34	58	57	44	44	35	34	47	31	32	56	33	33	44	34	32	48	31	41	NA	30	25
Oct	47	60	54	73	72	64	72	75	65	48	53	44	38	38	38	40	45	51	36	37	37	33	38	35	41	36	36	38	37	34	35	31	43	NA	31	30
Nov	49	NA	54	71	67	68	70	66	67	41	53	43	34	31	40	46	49	46	34	31	40	36	28	35	38	31	32	37	27	33	32	31	44	NA	25	30
Dec	50	55	45	75	71	52	74	70	75	40	48	45	36	30	44	42	43	48	38	34	47	38	33	46	43	36	44	35	30	38	36	32	54	NA	28	38
Jan	43	NA	60	78	74	72	70	71	66	42	48	34	32	41	34	46	57	33	32	38	34	35	34	37	40	36	33	33	29	31	48	56	31	NA	31	28
Feb	41	63	NA	74	67	67	74	74	75	34	35	42	31	40	30	35	58	45	30	30	28	31	30	29	54	51	33	35	34	28	34	40	32	NA	43	30
Mar	56	NA	53	71	73	68	73	76	74	40	37	51	33	32	28	51	43	42	32	31	25	51	30	26	37	35	55	53	30	29	37	30	32	33	29	27
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2715			2692			2680			2693			2694			2193			2690			2196			1189			2691			2194			2679		
Bhima Upper Sub-Basin																																				

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 13: Surface water quality monitoring stations in Krishna Basin (1 of 2): Sub basin Bhima upper (1 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2715	Vel river	Vel river at Shikrapur, Pune	Shikrapur	Shirur	Pune
2692	Pawana river	Pawana river at Ravet Weir, Pune..	Ravet	Haweli	Pune
2680	Mutha river	Mutha river at Khadakvasla Dam, Pune.	Kadakvasla	Haweli	Pune
2693	Pawana river	Pawana river at Chinchwadgaon, Pune.	Chinchwadgaon	Haweli	Pune
2694	Pawana river	Pawana river at Pimpri gaon, Pune.	Pimprigaon	Haweli	Pune
2193	Mula river	Mula river at Aundh bridge, Aundgaon.	Aundhgaon	Haweli	Pune
2690	Pawana river	Pawana river at Kasarwadi, Pune.	Kasarwadi	Haweli	Pune
2196	Pawana river	Pawana river at Sangavi gaon, Pune.	Sangavigaon	Haweli	Pune
1189	Bhima river	Bhima river at Pune (Mutha river) at U/s of Vithalwadi near Sankar Mandir.	Vithalwadi	Haweli	Pune
2691	Pawana river	Pawana river at Dapodi bridge, at Pawana- Mulla Sangam,Pune.	Dapodi	Haweli	Pune
2194	Mula river	Mula river at Harrison bridge near Mula- Pawana sangam.	Bopodi	Haweli	Pune
2679	Mutha river	Mutha river at Deccan bridge, Pune.	Deccan	Pune	Pune

Water Quality Index for WQMS at Krishna Basin (1 of 2): Sub-basin - Bhima upper (2 of 3)

Apr	55	51	62	37	32	26	NA	30	25	54	45	56	39	36	25	53	54	57	NA	38	29	NA	62	57	61	56	63	60	41	29	56	58	58	28	54	48
May	42	NA	61	38	26	31	35	NA	26	38	NA	60	41	30	31	53	NA	60	69	33	28	48	67	63	63	56	60	70	48	57	57	64	62	36	49	54
Jun	69	52	58	41	33	23	37	30	22	63	37	49	38	29	22	66	NA	40	40	32	26	74	57	67	59	57	65	67	46	60	71	57	66	55	48	60
Jul	NA	49	62	32	30	30	34	29	23	59	44	60	51	31	26	60	50	57	50	32	29	74	64	59	62	56	62	57	53	62	65	62	63	62	58	59
Aug	61	58	59	64	35	29	35	37	27	59	52	57	43	44	27	65	53	52	44	44	31	69	66	62	60	58	55	64	35	63	65	59	60	61	59	56
Sep	63	67	57	44	31	31	43	32	27	59	61	51	49	33	25	61	64	50	53	35	23	64	65	58	58	60	50	68	54	62	60	58	53	56	51	44
Oct	57	62	59	33	32	36	35	30	30	47	57	57	33	32	29	55	49	54	33	35	28	56	59	56	59	55	48	59	51	56	64	61	54	53	58	51
Nov	57	55	57	37	28	30	29	31	30	42	52	51	34	32	33	51	50	49	32	30	33	63	62	56	59	63	56	45	62	53	59	60	58	55	54	52
Dec	54	46	64	31	28	43	33	27	36	40	41	46	37	25	47	49	49	44	37	25	34	64	56	64	57	60	63	51	45	61	61	47	55	49	46	45
Jan	42	62	48	32	30	27	32	33	27	38	56	38	35	36	27	39	41	52	35	34	27	51	62	64	64	62	62	55	32	41	60	64	63	50	37	54
Feb	35	45	51	29	36	29	32	32	29	39	38	44	34	39	32	35	46	52	34	35	28	53	64	59	59	66	53	36	49	50	51	59	60	43	42	50
Mar	49	62	48	33	28	32	32	29	25	45	58	42	32	28	28	50	52	50	37	28	29	65	68	65	71	68	51	51	37	48	62	63	57	51	43	47
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2669			2678			2191			2668			1190			2197			2192			1463			2683			2655			2682			2195		
Bhima Upper Sub basin																																				

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 14: Surface water quality monitoring stations in Krishna Basin (1 of 2): Sub basin Bhima upper (2 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2669	Indrayani river	Indrayani river at U/s of Moshigaon, Pune	Moshigaon	Haweli	Pune
2678	Mutha river	Mutha river near Veer Savarkar Bhavan, Pune	Pune M.C	Pune	Pune
2191	Mutha river	Mutha river at Sangam bridge near Ganapathy ghat	Shivaji Nagar	Pune	Pune
2668	Indrayani river	Indrayani river at D/s of Moshi village.	Moshi	Haveli	Pune
1190	Bhima river	Bhima river at D/s of Bundgarden, Pune.	Yerwada	Haweli	Pune
2197	Indrayani river	Indrayani river at D/s of Alandigaon, Pune	Alandigaon	Haweli	Pune
2192	Mula-Mutha river	Mula - Mutha river at Mundhawa bridge.	Mundhawa	Haweli	Pune
1463	Nira river	Nira river at Sarola bridge	Sarola	Bhor	Pune
2683	Nira river	Nira river at Shirwal, Satara.	Shindewadi, Shirwal	Khandala	Satara
2655	Bhima river	Bhima river at Koregaon near Koregaon bridge, Pune	Koregaon	Shirur	Pune
2682	Nira river	Nira river at U/s of Jubilant Organosis, Pune.	Nira(Datta ghat)	Baramati	Pune
2195	Nira river	Nira river at D/s of Jubilant Organosis, Pune.	Nimbut	Baramati	Pune

Water Quality Index for WQMS at Krishna Basin (1 of 2): Sub-basin - Bhima upper (3 of 3)

Apr	35	36	32	48	47	31	43	66	28	37	38	27	45	49	31	65	56	57	42	23	23	55	72	64	55	64	61	70	61	40	61	59	67	38	58	55
May	39	31	38	40	40	37	57	64	39	52	45	29	50	35	34	67	46	57	39	32	35	69	56	72	66	48	68	69	68	72	60	52	70	59	58	66
Jun	43	36	28	38	42	30	42	NA	57	53	37	41	47	38	29	69	50	53	37	37	22	69	61	60	61	51	58	60	67	64	65	59	66	55	58	62
Jul	47	35	64	67	46	60	61	NA	65	38	52	39	NA	48	58	74	56	64	31	35	30	NA	63	61	68	57	60	71	65	64	NA	57	65	66	61	67
Aug	46	47	48	66	52	39	64	NA	62	50	53	57	64	59	37	74	62	54	38	60	64	71	67	57	65	59	57	70	61	60	63	46	65	57	59	61
Sep	NA	40	42	58	57	49	61	63	55	55	63	51	60	62	36	72	65	59	49	34	60	62	64	64	59	60	59	NA	60	NA	57	62	60	51	64	60
Oct	48	44	34	58	47	41	49	67	55	50	59	53	50	55	30	72	63	65	56	44	52	68	61	49	57	55	52	63	50	56	52	50	57	50	51	51
Nov	44	32	43	48	47	42	53	NA	56	58	57	56	49	45	37	62	54	61	53	56	57	57	64	60	51	60	57	50	62	60	55	60	57	53	56	54
Dec	38	36	40	47	43	59	56	58	51	44	51	56	49	48	40	55	56	68	45	32	62	65	61	70	55	56	65	48	65	65	55	56	53	59	57	59
Jan	47	32	31	41	57	43	57	60	59	38	53	36	54	51	39	52	66	48	37	56	25	61	64	59	54	42	55	49	25	51	57	NA	51	58	58	57
Feb	31	36	35	48	47	33	49	63	42	40	55	47	55	43	45	56	66	65	27	63	26	66	64	56	64	60	53	64	65	54	59	63	52	57	63	57
Mar	40	31	34	42	36	43	46	47	44	50	44	48	48	35	49	55	66	62	32	45	27	70	64	59	58	57	54	65	60	58	69	56	57	57	48	56
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2677			1191			2665			2681			1192			2656			2789			1911			1912			1188			2705			28		
Bhima Upper Sub-Basin																																				

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 15: Surface water quality monitoring stations in Krishna Basin (1 of 2): Sub basin Bhima upper (3 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2677	Mula-Mutha river	Mula-Mutha river at D/s of Theur, Pune	Theur	Haweli	Pune
1191	Bhima river	Bhima river after confluence with Mula-Mutha at Pargaon near Vasant Bandara.	Pargaon	Daund	Pune
2665	Ghod river	Ghod river at Shirur, Pune.	Shirur	Shirur	Pune
2681	Nira river	Nira river at Sangavi	Sangavi	Phaltan	Satara
1192	Bhima river	Bhima river at Daund near Mahadev temple.	Daund	Daund	Pune
2656	Bhima river	Bhima river- Backwater of Ujani Dam near raw water pump house.	Kumbargaon	Indapur	Pune
2789	Nalla	Nalla at D/s of Aklai Mandir, Solapur	Aklai	Malshiras	Solapur
1911	Chandrabhaga river	Chandrabhaga river at U/s of Pandharpur town.	Gursale	Pandarpur	Solapur
1912	Chandrabhaga river	Chandrabhaga river at D/s of Pandharpur town near Vishnupant Mandir.	Gopalpur	Pandarpur	Solapur
1188	Bhima river	Bhima river at Narsingpur near Sangam bridge after confluence with Nira rive	Narsingpur	Malshiros	Solapur
2705	Sina river	Sina river near Laboti toll naka, Solapur	Laboti	Mohal	Solapur
28	Bhima river	Bhima river at Takali near Karnataka border.	Takali	South Solapur	Solapur

Water Quality Index for WQMS at Krishna Basin (2of 2): Sub-Basin - Krishna upper (1 of 2)

Apr	54	61	72	69	65	76	50	52	62	66	53	57	59	49	49	61	54	59	50	51	53	47	48	56	80	77	83
May	68	62	74	69	66	72	60	48	63	64	46	49	61	51	59	60	46	67	56	48	58	57	51	62	NA	79	83
Jun	72	66	75	64	71	71	62	58	61	55	47	38	67	60	60	68	55	55	62	54	63	65	50	57	80	81	88
Jul	67	64	66	74	65	69	66	52	56	69	48	60	72	53	63	NA	50	47	64	50	51	64	53	59	64	83	77
Aug	72	73	66	75	76	65	61	54	61	67	53	52	61	64	57	64	54	54	61	56	53	63	54	56	80	84	84
Sep	66	64	64	68	70	64	60	59	54	58	51	55	62	54	57	59	52	55	58	60	52	54	48	51	86	84	84
Oct	71	63	61	66	67	59	58	56	51	57	54	54	64	49	55	39	48	55	60	59	56	55	61	55	84	85	34
Nov	63	66	65	70	71	72	51	60	62	55	54	58	55	54	59	55	53	56	50	59	54	56	56	55	82	81	72
Dec	65	68	77	74	68	75	57	58	66	55	51	59	59	52	64	54	55	60	50	55	59	58	50	61	75	79	84
Jan	65	66	66	70	69	72	54	58	59	57	52	52	52	59	48	52	55	53	53	56	62	61	57	59	69	77	75
Feb	54	69	65	68	69	74	48	63	59	53	56	51	49	61	57	50	55	59	48	55	56	53	60	48	79	85	57
Mar	61	69	60	67	70	70	54	64	59	51	50	55	56	47	57	55	45	53	51	58	53	56	66	51	81	86	NA
FY	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**
	2716			**1194**			**2186**			**2190**			**2711**			**2717**			**2188**			**2187**			**1904**		

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 16: Surface water quality monitoring stations in Krishna Basin (2of 2): Sub Basin Krishna upper (1 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
2716	Venna river	Venna river at Mahabaleshwar..	Mahabaleshwar	Mahabaleshwar	Satara
1194	Krishna river	Krishna river at Dhom Dam	Wai	Mahabaleshwar	Satara
2186	Venna river	Venna river at Varye, Satara	Varye	Satara	Satara
2190	Krishna river	Krishna river at Wai, Satara..	Wai	Wai	Satara
2711	Urmodi river	Urmodi river at Nagthane, Satara.	Nagthane	Satara	Satara
2717	Venna river	Venna river at Mahuli, Satara	Mahuli	Satara	Satara
2188	Krishna river	Krishna river at Krishna- Venna sangam, Mahuli.	Mahuli	Mahuli	Satara
2187	Krishna river	Krishna river at Kshetra Mahuli, Satara.	Kshetra Mahuli	Mahuli	Satara
1904	Panchganga river	Panchaganga river at U/s of Kolhapur town near Balinga Pumping station.	Balinga	Karvir	Kolhapur

Water Quality Index for WQMS at Krishna Basin (2of 2): Sub-Basin - Krishna upper (2 of 2)

Apr	64	60	59	59	56	69	84	74	77	77	77	79	83	76	79	78	71	76	77	61	82	76	76	79	54	90	77
May	58	56	66	65	56	66	87	73	82	71	81	83	86	77	81	69	81	81	87	86	86	84	80	87	86	84	86
Jun	58	56	68	60	62	57	77	87	71	69	81	81	73	88	84	66	80	79	79	83	83	75	78	81	81	82	89
Jul	67	56	69	70	58	60	64	72	67	NA	76	65	74	50	68	NA	78	69	64	77	79	78	86	78	67	87	81
Aug	61	61	59	64	61	56	76	85	72	81	80	77	82	80	77	84	84	77	80	85	78	84	79	84	83	82	82
Sep	56	64	55	56	58	53	84	85	85	86	64	81	84	83	88	84	84	79	85	85	84	87	82	83	88	87	82
Oct	56	59	57	68	54	55	62	85	NA	87	79	82	83	82	81	90	79	79	77	83	NA	72	83	NA	NA	75	NA
Nov	49	59	61	47	49	62	82	75	65	66	77	74	81	80	58	69	79	NA	81	80	73	64	73	68	67	76	73
Dec	62	60	64	51	59	67	75	83	79	83	75	78	77	75	77	78	76	NA	79	82	77	74	82	74	76	85	78
Jan	54	64	53	53	61	59	64	77	71	69	76	79	62	73	71	63	65	78	57	75	71	72	74	72	65	66	73
Feb	61	63	54	53	60	64	78	82	64	76	78	62	64	79	66	76	79	68	82	85	63	85	90	67	83	82	60
Mar	57	63	51	56	63	56	83	78	NA	78	79	NA	82	78	NA	76	83	NA	86	85	NA	81	83	NA	84	82	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2189			36			1905			1906			1311			37			2163			1310			1153		

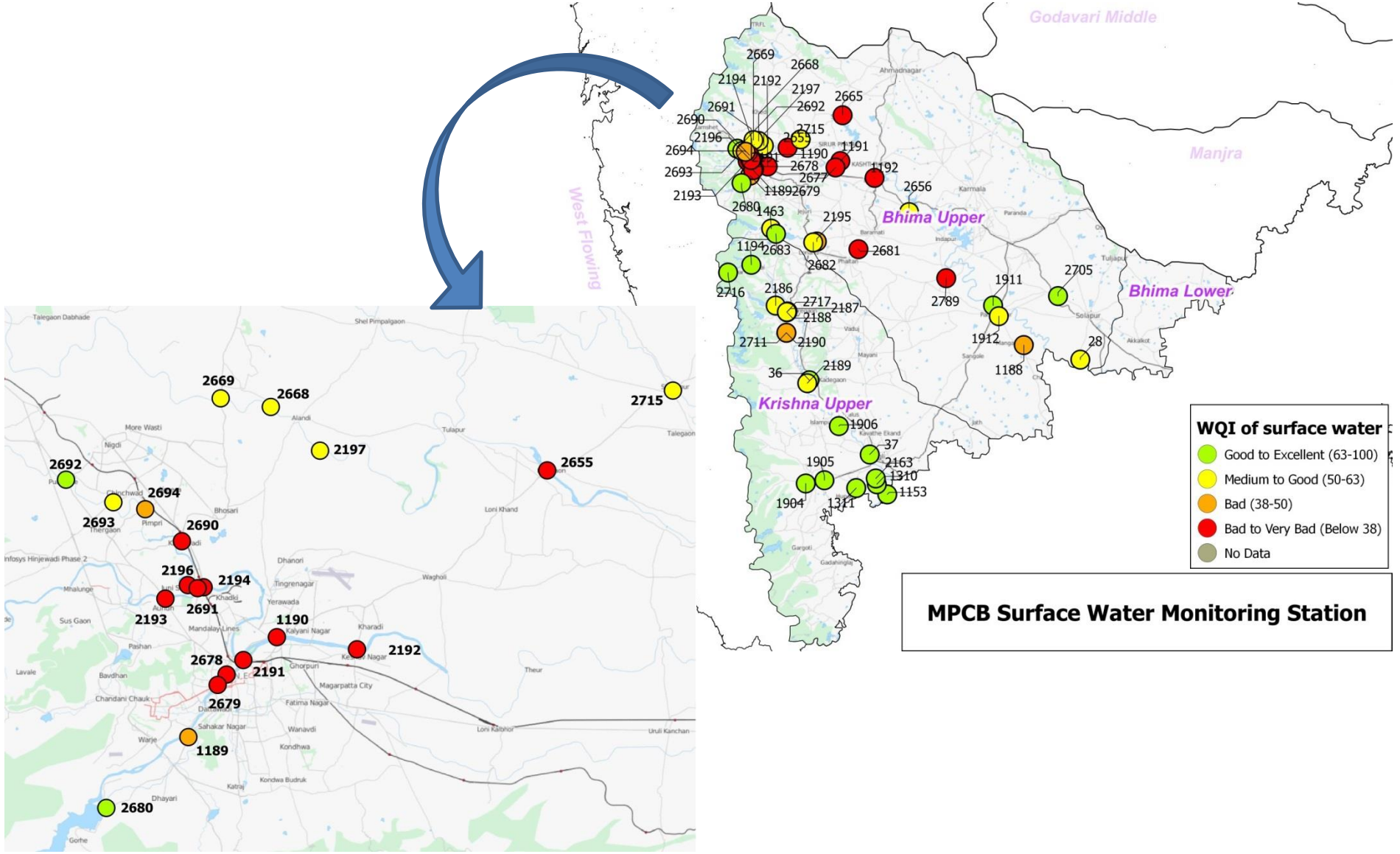
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

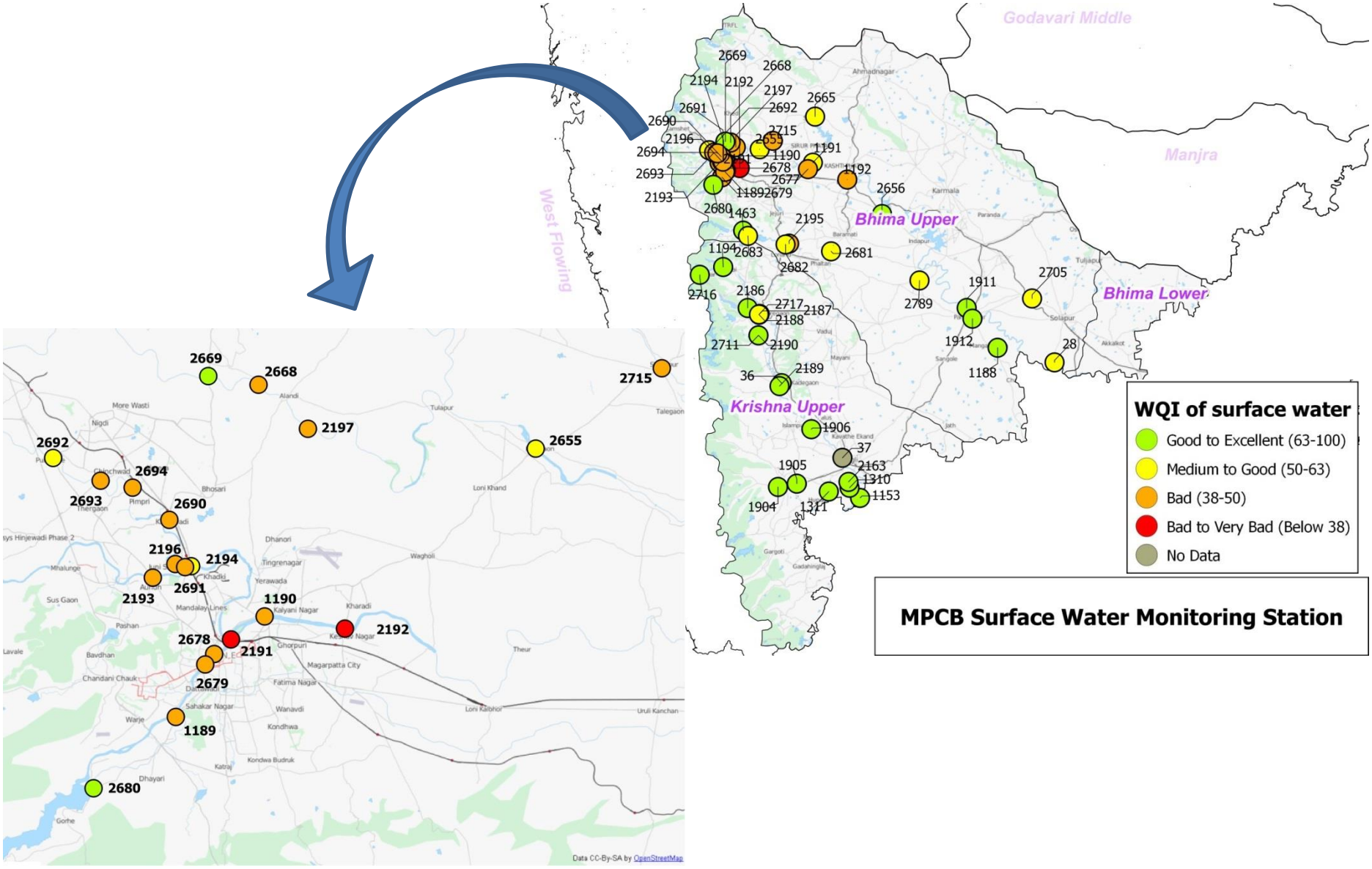
Table No. 17: Surface water quality monitoring stations in Krishna Basin (2of 2): Sub Basin Krishna upper (2 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
2189	Koyna river	Koyna river at Karad.	Karad	Karad	Satara
36	Krishna river	Krishna river at Krishna bridge, Karad(Krishna river at NH-4 bridge, Karad.)	Karad	Karad	Satara
1905	Panchaganga river	Panchaganga river at D/s of Kolhapur town at Gandhi nagar near NH-4 bridge and MIDC intake well.	Uchegaon	Kolhapur	Kolhapur
1906	Krishna river	Krishna river at Walwa, D/s of Islampur near Vithal Temple.	Walwa	Walwa	Sangli
1311	Panchganga river	Panchaganga river at Ichalkaranji near MIDC intake well.	Shiradhwad (Ichalkaranji ghat)	Hatkanangale	Kolhapur
37	Krishna river	Krishna river at Maighat, Sangli	Gawali gally	Miraj	Sangli
2163	Panchganga river	Panchganga River at Shirol near Shirol intake well	Shirol	Shirol	Kolhapur
1310	Krishna river	Krishna river at Kurundwad near Santaji Ghorpade Ghat.	Narshingwadi, Kurundwad	Shirol	Kolhapur
1153	Krishna river	Krishna river at Rajapur Weir	Rajapur	Shirol	Kolhapur

Spatial map of Surface WQI at Krishna Basin (April 2013)

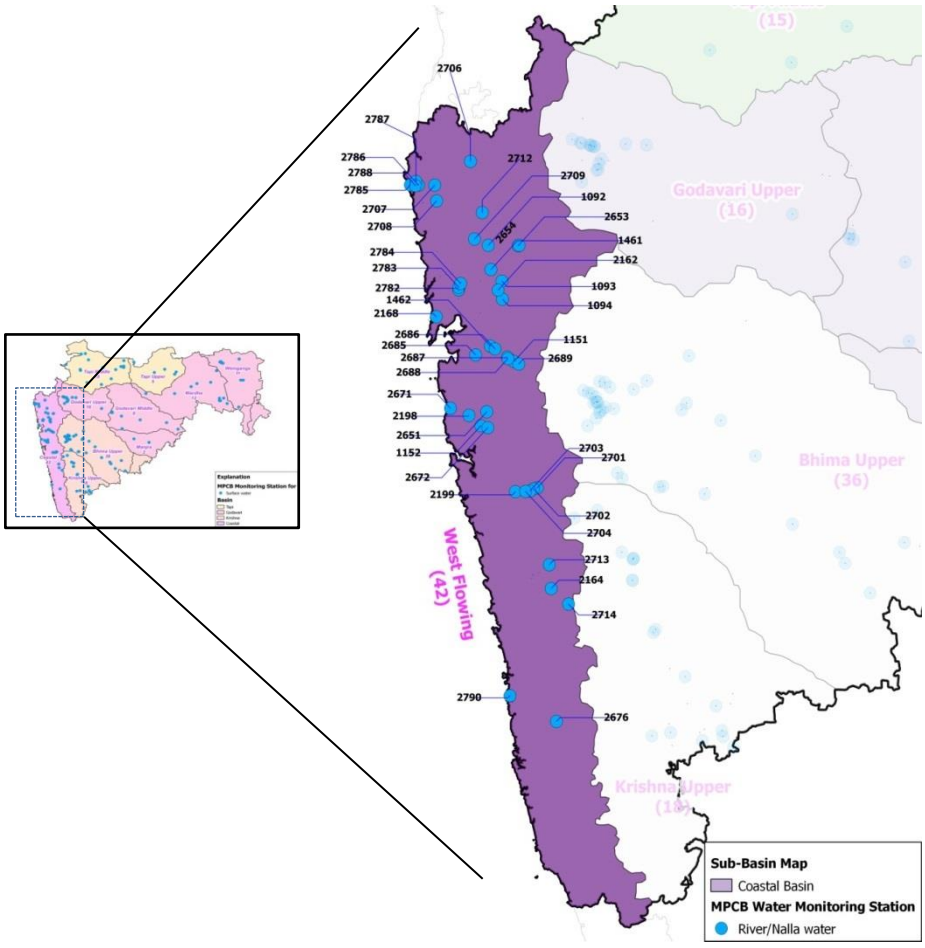


Spatial map of Surface WQI at Krishna Basin (December 2013)



West Flowing Rivers

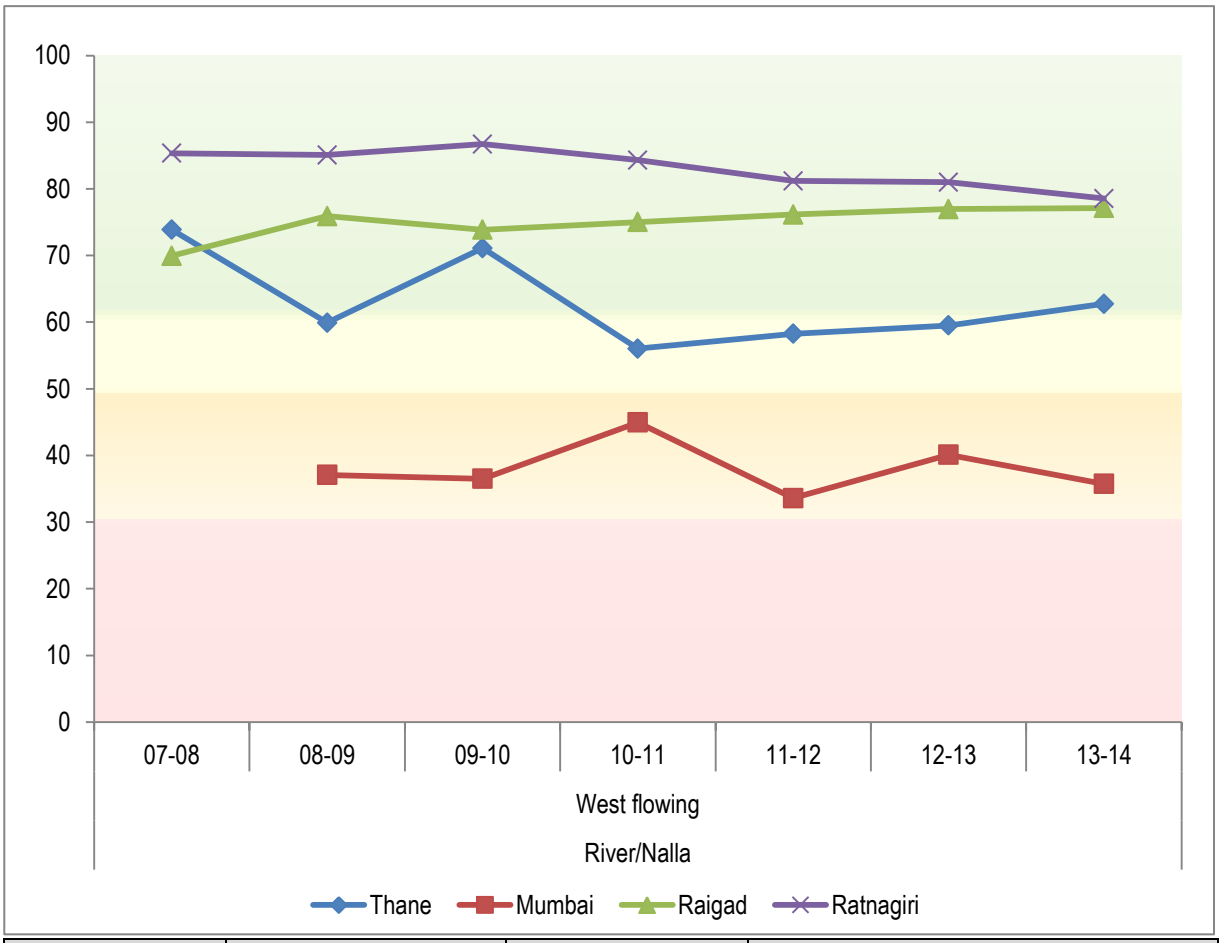
Maharashtra has many westwards flowing rivers originating from the Western Ghats like Damanganga, Surya, Vaitarna, Ulhas, Savitri, Kundalika, Patalganga, Vashisti, Shastri, Karli, Terekhol and so on[14]. These rivers are an important source of drinking water, agricultural applications and industrial purposes and are known to contribute about 44.54% of the yield at 75% dependability of Maharashtra. Rivers like Vaitarna, Patalganga, Ulhas, Balganga and so on with tributaries such as Tansa, Bhasta and Barvi are used as sources of drinking water. While rivers like Ulhas, Patalganga, Panvel, Bhogeshwari and Amba & few other tributaries like Vashishthi and Kundalika lie very close to industrial areas and are thus prone to water pollution due to release of industrial effluents. The monitoring network set up on the west flowing rivers is presented in **Map No. 7**.



Map No. 7: Network of surface water quality monitoring stations for west flowing rivers

[14] http://sandrp.in/rivers/Rivers_of_Maharashtra_Dec_2011.PDF

West Flowing River Basin (Intra Basin analysis)



WQI	Category	Class by CPCB	Remarks
63-100	Good to Excellent	A	Non polluted
50-63	Medium to Good	B	Non polluted
38-50	Bad	C	Polluted
38 & less	Bad to Very Bad	D, E	Heavily polluted

Figure No. 33: Trend of annual average WQI across districts of West Flowing river basin

Note:

This graph considers the average WQI for all the monitoring stations in that particular district and hence may include some bias. This graph is only for an overview and monitoring station wise data maybe analyzed to pin point the most affected and polluted patches of rivers in that district.

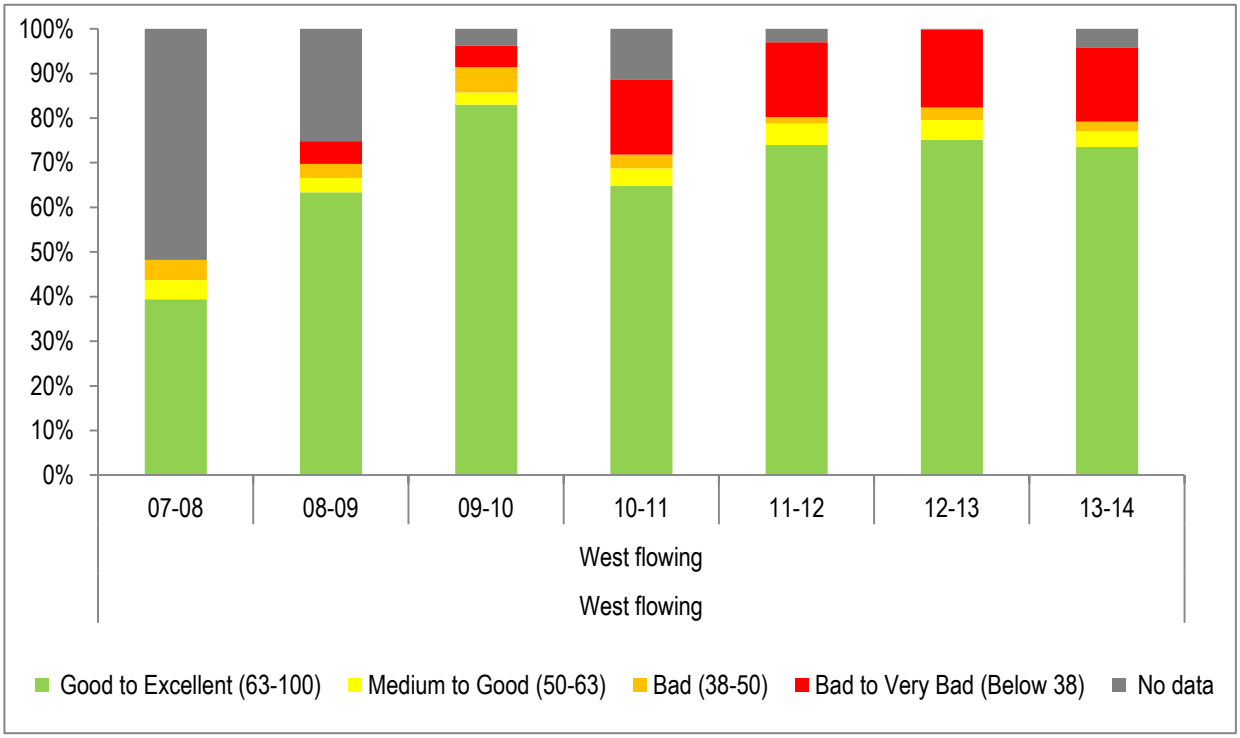
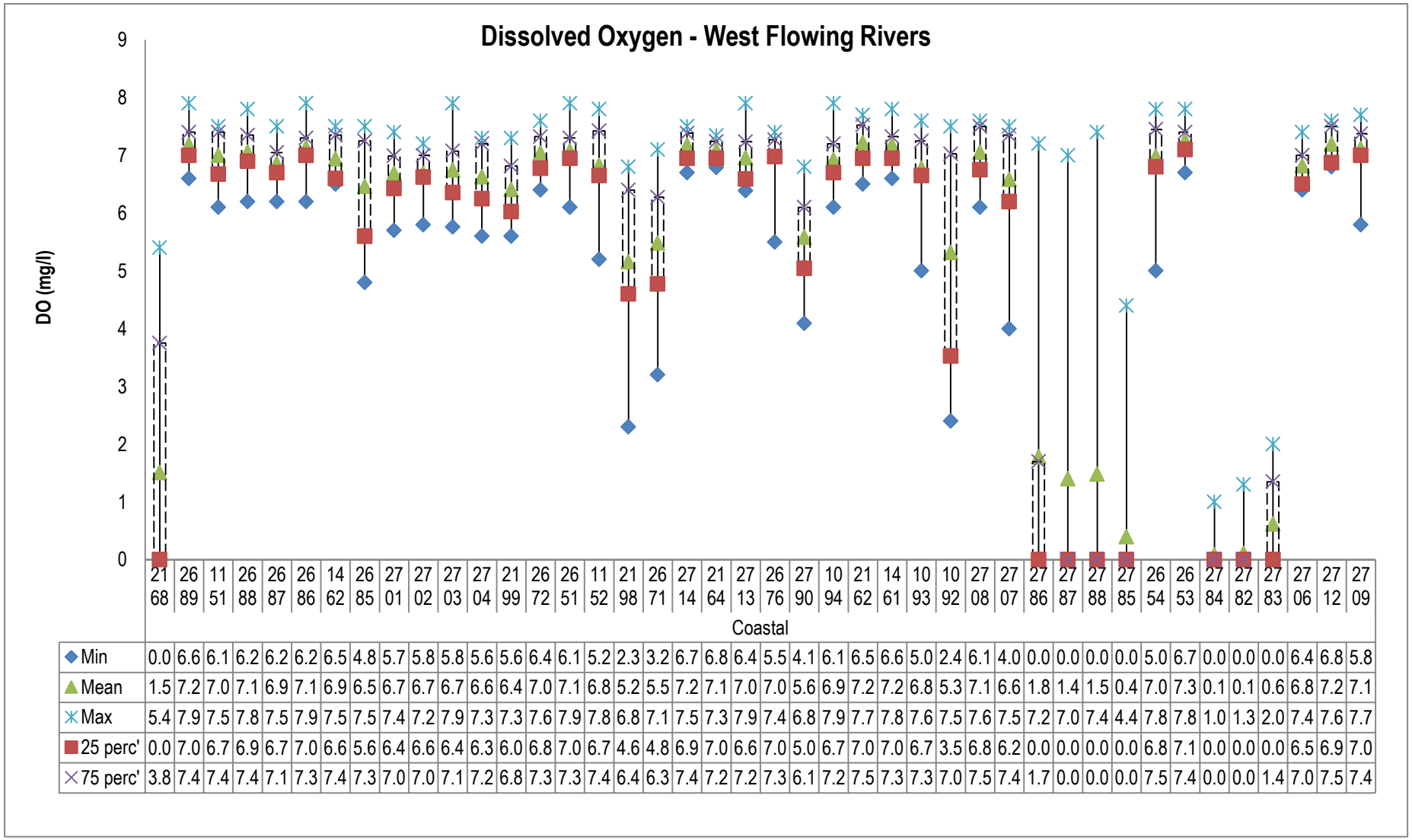


Figure No. 34: Trend of average occurrence for different category of WQI in West Flowing River basin

The Intra basin performance of Coastal Basin for west flowing river and nalla across four districts of the state are depicted in the Figure No. 33 and the average annual occurrence of different category of Water Quality Index across all WQMS is depicted in the Figure No. 34.

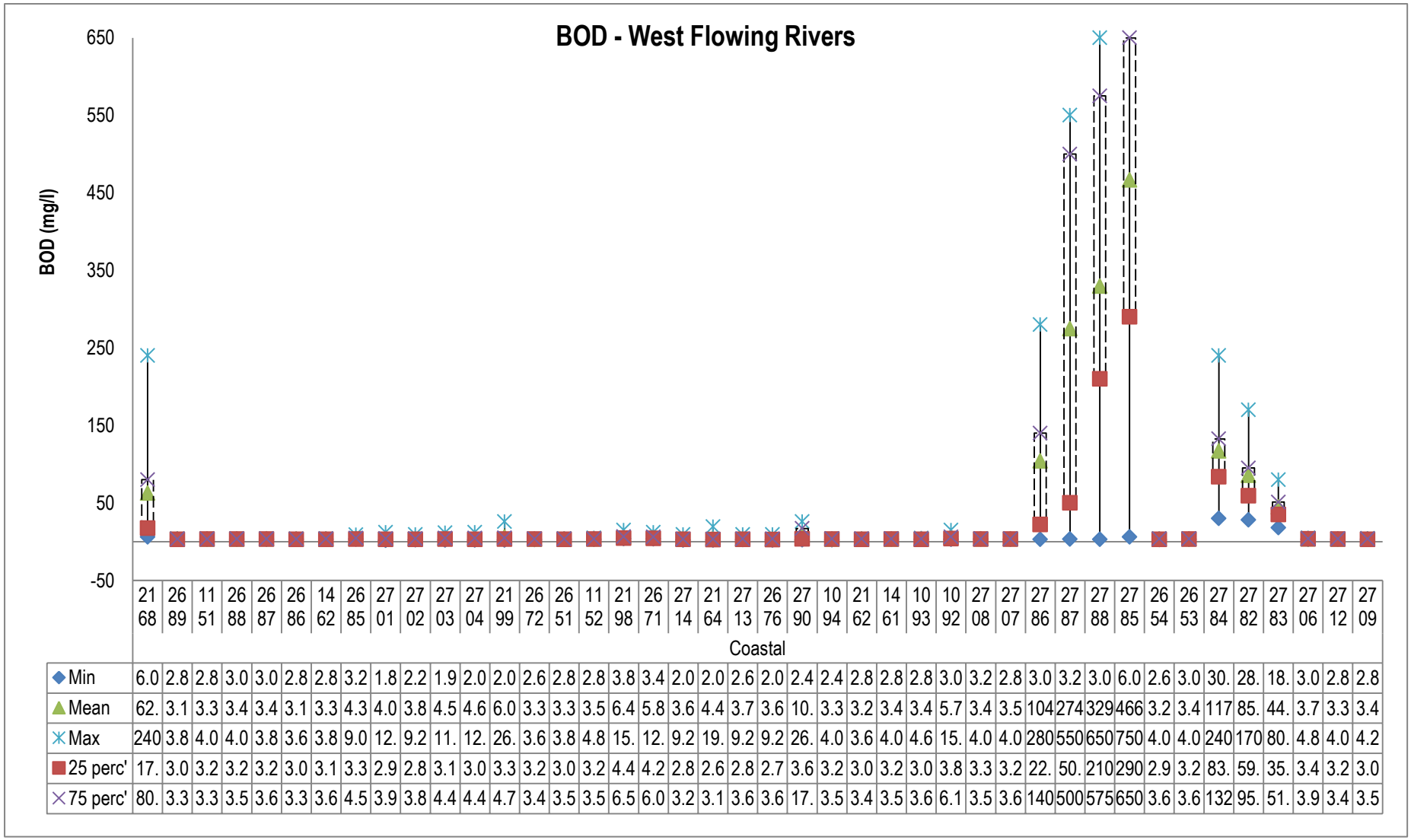
The results showed that among four districts, namely Thane, Mumbai, Raigad and Ratnagiri, the annual average WQI of Mumbai (1 WQMS) were consistently in Bad to Medium category (i.e. WQI in range of 38-63) from 07-08 till 13-14. Whereas, Raigad (17 WQMS), and Ratnagiri (5 WQMS) were in Good to Excellent (i.e. WQI in range of 63-100). Thane with 19 WQMS were in Medium to good category in most of the years. The results showed that average WQI across Thane districts showed upward trend in recent years and in rest of the districts no trend was seen.

Figure No. 34 shows average annual occurrence of WQI across 42 WQM stations of coastal basin for west flowing rivers and nallas for 7 years starting from 2007. The results for West flowing showed that the occurrence of Good to Excellent category of WQI has increased over the years across all the WQMS. Hence the overall preview of the basin is satisfactory.



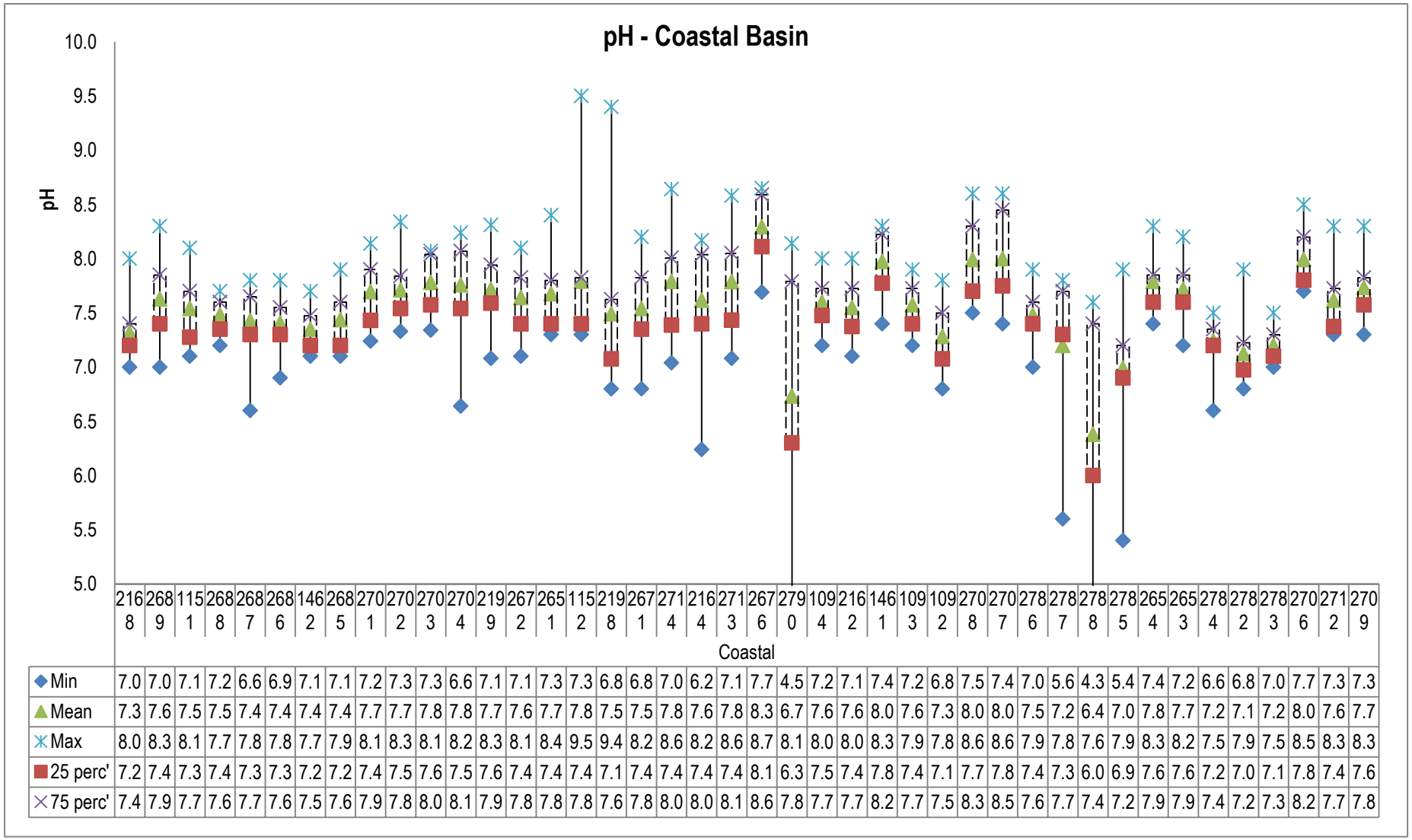
	2168	2689	1151	2688	2687	2686	1462	2685	2701	2702	2703	2704	2199	2672	2651	1152	2198	2671	2714	2164	2713	2676	2790	1094	2162	1461	1093	1092	2708	2707	2786	2787	2788	2785	2654	2653	2784	2782	2783	2706	2712	2709
Min	0.0	6.6	6.1	6.2	6.2	6.2	6.5	4.8	5.7	5.8	5.8	5.6	5.6	6.4	6.1	5.2	2.3	3.2	6.7	6.8	6.4	5.5	4.1	6.1	6.5	6.6	5.0	2.4	6.1	4.0	0.0	0.0	0.0	0.0	5.0	6.7	0.0	0.0	0.0	6.4	6.8	5.8
Mean	1.5	7.2	7.0	7.1	6.9	7.1	6.9	6.5	6.7	6.7	6.7	6.6	6.4	7.0	7.1	6.8	5.2	5.5	7.2	7.1	7.0	7.0	5.6	6.9	7.2	7.2	6.8	5.3	7.1	6.6	1.8	1.4	1.5	0.4	7.0	7.3	0.1	0.1	0.6	6.8	7.2	7.1
Max	5.4	7.9	7.5	7.8	7.5	7.9	7.5	7.5	7.4	7.2	7.9	7.3	7.3	7.6	7.9	7.8	6.8	7.1	7.5	7.3	7.9	7.4	6.8	7.9	7.7	7.8	7.6	7.5	7.6	7.5	7.2	7.0	7.4	4.4	7.8	7.8	1.0	1.3	2.0	7.4	7.6	7.7
25 perc'	0.0	7.0	6.7	6.9	6.7	7.0	6.6	5.6	6.4	6.6	6.4	6.3	6.0	6.8	7.0	6.7	4.6	4.8	6.9	7.0	6.6	7.0	5.0	6.7	7.0	7.0	6.7	3.5	6.8	6.2	0.0	0.0	0.0	0.0	6.8	7.1	0.0	0.0	0.0	6.5	6.9	7.0
75 perc'	3.8	7.4	7.4	7.4	7.1	7.3	7.4	7.3	7.0	7.0	7.1	7.2	6.8	7.3	7.3	7.4	6.4	6.3	7.4	7.2	7.2	7.3	6.1	7.2	7.5	7.3	7.3	7.0	7.5	7.4	1.7	0.0	0.0	0.0	7.5	7.4	0.0	0.0	1.4	7.0	7.5	7.4

Figure No. 35: Trend of Dissolved Oxygen (DO) levels recorded monitoring west flowing rivers



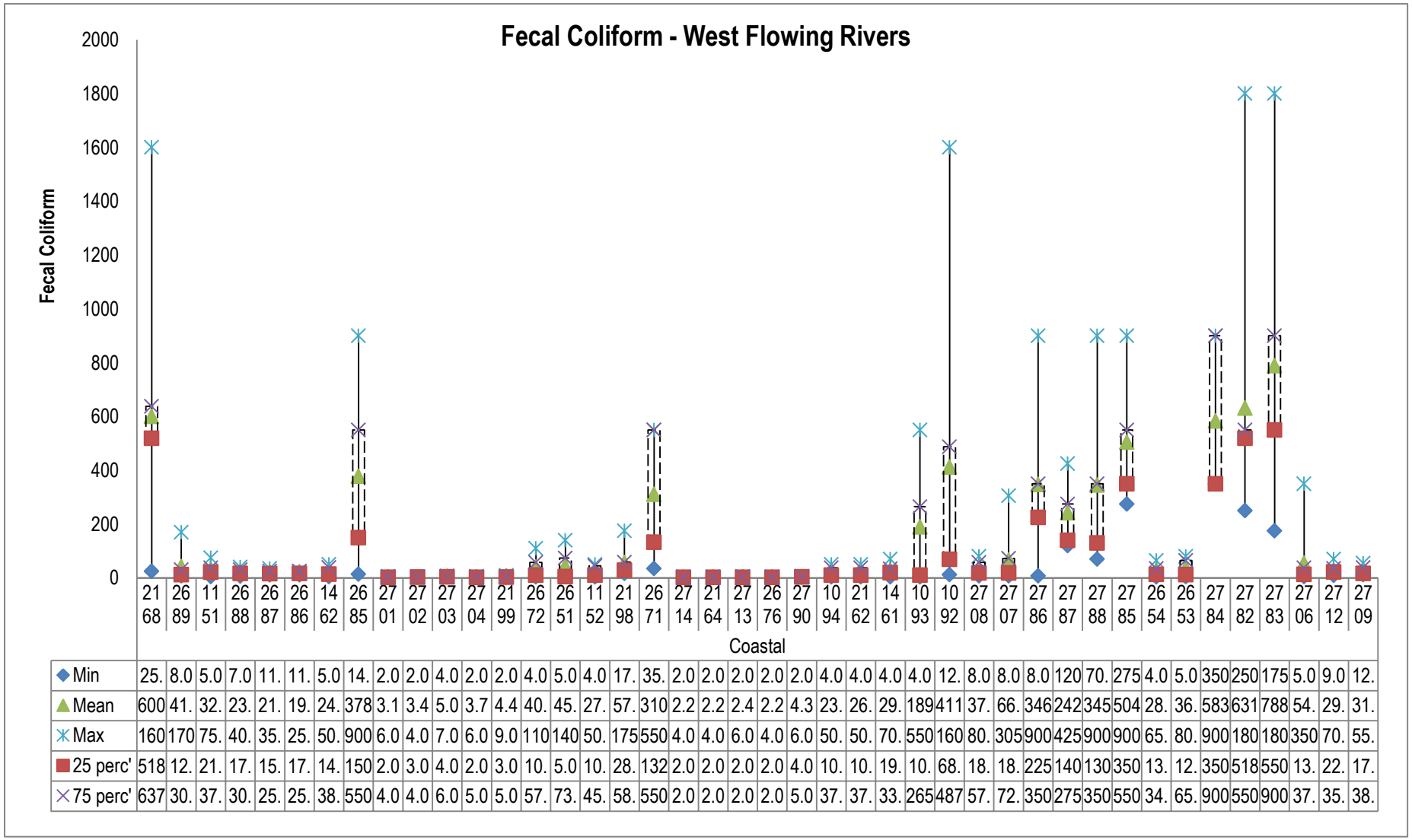
	2168	2689	1151	2688	2687	2686	1462	2685	2701	2702	2703	2704	2199	2672	2651	1152	2198	2671	2714	2164	2713	2676	2790	1094	2162	1461	1093	1092	2708	2707	2786	2787	2788	2785	2654	2653	2784	2782	2783	2706	2712	2709
Min	6.0	2.8	2.8	3.0	3.0	2.8	2.8	3.2	1.8	2.2	1.9	2.0	2.0	2.6	2.8	2.8	3.8	3.4	2.0	2.0	2.6	2.0	2.4	2.4	2.8	2.8	2.8	3.0	3.2	2.8	3.0	3.2	3.0	6.0	2.6	3.0	30.	28.	18.	3.0	2.8	2.8
Mean	62.	3.1	3.3	3.4	3.4	3.1	3.3	4.3	4.0	3.8	4.5	4.6	6.0	3.3	3.3	3.5	6.4	5.8	3.6	4.4	3.7	3.6	10.	3.3	3.2	3.4	3.4	5.7	3.4	3.5	104	274	329	466	3.2	3.4	117	85.	44.	3.7	3.3	3.4
Max	240	3.8	4.0	4.0	3.8	3.6	3.8	9.0	12.	9.2	11.	12.	26.	3.6	3.8	4.8	15.	12.	9.2	19.	9.2	9.2	26.	4.0	3.6	4.0	4.6	15.	4.0	4.0	280	550	650	750	4.0	4.0	240	170	80.	4.8	4.0	4.2
25 perc'	17.	3.0	3.2	3.2	3.2	3.0	3.1	3.3	2.9	2.8	3.1	3.0	3.3	3.2	3.0	3.2	4.4	4.2	2.8	2.6	2.8	2.7	3.6	3.2	3.0	3.2	3.0	3.8	3.3	3.2	22.	50.	210	290	2.9	3.2	83.	59.	35.	3.4	3.2	3.0
75 perc'	80.	3.3	3.3	3.5	3.6	3.3	3.6	4.5	3.9	3.8	4.4	4.4	4.7	3.4	3.5	3.5	6.5	6.0	3.2	3.1	3.6	3.6	17.	3.5	3.4	3.5	3.6	6.1	3.5	3.6	140	500	575	650	3.6	3.6	132	95.	51.	3.9	3.4	3.5

Figure No. 36: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at west flowing rivers (coastal basin)



	2168	2689	1151	2688	2687	2686	1462	2685	2701	2702	2703	2704	2199	2672	2651	1152	2198	2671	2714	2164	2713	2676	2790	1094	2162	1461	1093	1092	2708	2707	2786	2787	2788	2785	2654	2653	2784	2782	2783	2706	2712	2709
Min	7.0	7.0	7.1	7.2	6.6	6.9	7.1	7.1	7.2	7.3	7.3	6.6	7.1	7.1	7.3	7.3	6.8	6.8	7.0	6.2	7.1	7.7	4.5	7.2	7.1	7.4	7.2	6.8	7.5	7.4	7.0	5.6	4.3	5.4	7.4	7.2	6.6	6.8	7.0	7.7	7.3	7.3
Mean	7.3	7.6	7.5	7.5	7.4	7.4	7.4	7.4	7.7	7.7	7.8	7.8	7.7	7.6	7.7	7.8	7.5	7.5	7.8	7.6	7.8	8.3	6.7	7.6	7.6	8.0	7.6	7.3	8.0	8.0	7.5	7.2	6.4	7.0	7.8	7.7	7.2	7.1	7.2	8.0	7.6	7.7
Max	8.0	8.3	8.1	7.7	7.8	7.8	7.7	7.9	8.1	8.3	8.1	8.2	8.3	8.1	8.4	9.5	9.4	8.2	8.6	8.2	8.6	8.7	8.1	8.0	8.0	8.3	7.9	7.8	8.6	8.6	7.9	7.8	7.6	7.9	8.3	8.2	7.5	7.9	7.5	8.5	8.3	8.3
25 perc'	7.2	7.4	7.3	7.4	7.3	7.3	7.2	7.2	7.4	7.5	7.6	7.5	7.6	7.4	7.4	7.4	7.1	7.4	7.4	7.4	7.4	8.1	6.3	7.5	7.4	7.8	7.4	7.1	7.7	7.8	7.4	7.3	6.0	6.9	7.6	7.6	7.2	7.0	7.1	7.8	7.4	7.6
75 perc'	7.4	7.9	7.7	7.6	7.7	7.6	7.5	7.6	7.9	7.8	8.0	8.1	7.9	7.8	7.8	7.8	7.6	7.8	8.0	8.0	8.1	8.6	7.8	7.7	7.7	8.2	7.7	7.5	8.3	8.5	7.6	7.7	7.4	7.2	7.9	7.9	7.4	7.2	7.3	8.2	7.7	7.8

Figure No. 37: Trend of pH levels recorded at WQMS at west flowing rivers (coastal basin)



	2168	2689	1151	2688	2687	2686	1462	2685	2701	2702	2703	2704	2199	2672	2651	1152	2198	2671	2714	2164	2713	2676	2790	1094	2162	1461	1093	1092	2708	2707	2786	2787	2788	2785	2654	2653	2784	2782	2783	2706	2712	2709
Min	25.	8.0	5.0	7.0	11.	11.	5.0	14.	2.0	2.0	4.0	2.0	2.0	4.0	5.0	4.0	17.	35.	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0	12.	8.0	8.0	8.0	120	70.	275	4.0	5.0	350	250	175	5.0	9.0	12.
Mean	600	41.	32.	23.	21.	19.	24.	378	3.1	3.4	5.0	3.7	4.4	40.	45.	27.	57.	310	2.2	2.2	2.4	2.2	4.3	23.	26.	29.	189	411	37.	66.	346	242	345	504	28.	36.	583	631	788	54.	29.	31.
Max	160	170	75.	40.	35.	25.	50.	900	6.0	4.0	7.0	6.0	9.0	110	140	50.	175	550	4.0	4.0	6.0	4.0	6.0	50.	50.	70.	550	160	80.	305	900	425	900	900	65.	80.	900	180	180	350	70.	55.
25 perc'	518	12.	21.	17.	15.	17.	14.	150	2.0	3.0	4.0	2.0	3.0	10.	5.0	10.	28.	132	2.0	2.0	2.0	2.0	4.0	10.	10.	19.	10.	68.	18.	18.	225	140	130	350	13.	12.	350	518	550	13.	22.	17.
75 perc'	637	30.	37.	30.	25.	25.	38.	550	4.0	4.0	6.0	5.0	5.0	57.	73.	45.	58.	550	2.0	2.0	2.0	2.0	5.0	37.	37.	33.	265	487	57.	72.	350	275	350	550	34.	65.	900	550	900	37.	35.	38.

Figure No. 38: Trend of Fecal Coliform levels recorded at WQMS in west flowing rivers (coastal basin)

Water Quality Index of WQMS on West Flowing Rivers (1 of 3)

Apr	76	73	76	77	66	79	73	69	72	77	77	78	78	77	82	80	42	62	58	75	77	60	76	78	57	76	80	25	NA	29	29	24	27	36	23	31	72	NA	71	74	77	70
May	NA	72	79	NA	63	78	NA	79	64	NA	81	77	NA	78	77	58	40	41	NA	69	79	NA	76	79	NA	73	82	NA	26	27	NA	25	27	NA	27	25	73	80	75	72	77	74
Jun	77	78	80	78	76	83	NA	75	77	NA	73	81	NA	73	81	NA	48	50	NA	77	78	64	71	83	68	69	82	NA	25	27	NA	26	25	NA	37	35	NA	76	76	NA	78	75
Jul	78	83	NA	79	77	NA	72	83	76	75	79	78	74	83	83	74	66	81	NA	76	78	71	74	81	74	80	71	27	37	28	33	30	26	31	37	NA	NA	NA	82	NA	65	81
Aug	78	74	67	68	76	77	75	73	71	78	76	75	NA	78	78	68	77	72	NA	74	76	76	56	81	69	82	77	34	27	27	25	23	24	35	28	30	77	75	75	74	77	75
Sep	NA	81	72	81	82	76	75	NA	75	79	76	78	79	76	78	77	87	70	NA	79	73	79	83	74	81	71	71	60	44	25	50	42	27	52	58	27	74	79	77	75	81	69
Oct	78	80	78	73	79	74	73	80	72	78	83	77	77	81	78	NA	82	73	NA	80	79	84	77	78	75	82	74	26	29	25	26	33	31	26	35	31	NA	77	70	76	NA	73
Nov	71	83	85	75	84	83	79	77	84	76	79	79	76	86	84	77	74	84	NA	71	81	76	77	80	79	79	81	25	30	27	26	25	24	28	32	28	NA	84	80	72	82	82
Dec	77	74	78	76	80	83	79	84	83	77	81	87	81	83	83	73	65	60	NA	79	84	75	77	85	73	81	83	27	28	23	29	27	26	34	29	28	73	79	85	73	75	67
Jan	76	75	83	77	76	80	73	79	75	75	79	81	77	77	84	53	48	55	NA	67	77	75	74	82	73	75	83	26	29	27	26	29	27	27	29	27	75	79	80	67	79	78
Feb	78	83	85	78	82	86	74	81	85	79	79	85	77	79	86	44	42	67	NA	80	86	82	84	85	77	83	86	26	27	28	26	27	23	25	36	27	78	76	80	78	76	77
Mar	78	80	84	75	81	84	NA	79	83	73	78	83	82	82	82	56	54	68	NA	80	83	83	83	85	84	82	81	26	28	28	26	29	25	27	29	26	NA	79	NA	73	NA	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
		2654			2653			1093			1094			2162			1092			1461			2712			2709			2784			2782			2783			2708			2707	
West Flowing Rivers																																										

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 18: Surface water quality monitoring stations on West flowing rivers (1 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2654	Bhatsa river	Bhatsa river at U/s of Liberty Oil Mills	Satne	Shahapur	Thane
2653	Bhatsa river	Bhatsa river at D/s of Liberty Oil Mills	Satne	Shahapur	Thane
1093	Ulhas river	Ulhas river at U/s of NRC Bund,	Mohane	Kalyan	Thane
1094	Ulhas river	Ulhas river at U/s of Badlapur water works	Kulgaon	Ambernath	Thane
2162	Ulhas river	Ulhas River at Jambhul water works	Jambhul	Ambernath	Thane
1092	Kalu river	Kalu river at Atale village	Atale	Kalyan	Thane
1461	Bhatsa river	Bhatsa river at D/s of Pise Dam	Pise	Bhiwandi	Thane
2712	Vaitarna river	Vaitarna river near Road bridge	Gandhare	Wada	Thane
2709	Tansa river	Tansa River near Road bridge	Dakewali	Wada	Thane
2784	Sandoz nalla	Sandoz Nalla	Sandozbaug	Thane	Thane
2782	Rabodi nalla	Rabodi Nalla	Rabodi	Thane	Thane
2783	Colour Chemnalla	Colour Chem Nalla	Majiwada	Thane	Thane
2708	Surya river	Surya river at intake of Vasai- Virar water scheme	Masvan	Palghar	Thane
2707	Surya river	Surya river at MIDC Pumping station on Boisar-	Garvashet	Palghar	Thane

Water Quality Index of WQMS on West Flowing Rivers (2 of 3)

	2786			2787			2788			2785			2706			2168			2701			2702			2703			2704			2689			2199			1151			2688		
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
Apr	17	23	84	26	NA	77	NA	NA	81	NA	NA	22	80	77	73	NA	NA	25	65	84	88	73	80	86	75	82	79	72	62	80	NA	NA	78	NA	87	81	NA	NA	80	NA	NA	79
May	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	21	24	75	76	75	NA	47	25	84	82	85	79	80	79	75	83	83	77	79	84	70	74	NA	75	83	79	70	83	77	77	78	80
Jun	NA	NA	NA	NA	23	NA	NA	NA	NA	NA	24	26	NA	69	75	NA	33	62	86	83	78	NA	80	85	NA	86	62	NA	83	66	NA	79	80	32	83	76	68	80	78	65	78	81
Jul	23	26	25	30	26	25	12	24	24	25	18	25	75	57	80	33	54	33	87	88	80	84	88	80	81	90	77	86	87	79	74	80	78	86	88	77	78	85	80	79	80	81
Aug	20	NA	31	25	25	25	23	33	19	22	23	25	74	75	73	37	59	56	82	87	83	76	88	81	83	86	81	88	89	85	77	84	83	87	86	88	78	87	83	78	81	81
Sep	22	42	28	25	29	31	24	24	19	29	29	28	73	79	71	53	55	46	86	78	91	89	84	87	88	80	85	86	83	87	77	83	80	85	86	88	82	83	77	76	76	77
Oct	26	18	27	49	15	17	16	11	24	17	16	15	81	73	73	25	60	46	88	83	NA	88	80	NA	87	82	NA	83	86	NA	77	88	79	88	82	NA	76	NA	80	73	83	81
Nov	25	18	NA	61	20	NA	NA	11	NA	29	22	26	75	NA	81	48	27	27	79	NA	NA	89	NA	NA	84	83	NA	80	86	NA	80	71	84	67	78	NA	78	74	81	79	72	84
Dec	26	26	NA	61	22	NA	NA	NA	NA	23	21	27	74	80	84	28	24	25	83	78	NA	70	78	NA	74	74	NA	83	67	NA	76	82	79	81	75	NA	83	82	79	84	85	83
Jan	20	24	NA	71	39	NA	NA	NA	NA	22	18	55	79	80	79	27	25	27	81	82	NA	53	84	NA	76	67	NA	68	68	NA	72	82	80	68	71	NA	67	79	77	71	81	82
Feb	27	40	NA	NA	19	NA	NA	NA	NA	24	26	25	72	73	75	26	28	28	83	64	71	74	74	72	72	81	74	75	78	73	76	81	85	NA	78	62	78	81	87	83	85	85
Mar	24	NA	NA	NA	NA	NA	NA	NA	NA	23	24	NA	62	77	NA	24	29	27	86	80	NA	85	87	NA	86	82	NA	81	80	NA	NA	77	83	89	80	NA	NA	78	87	NA	76	NA

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 19: Surface water quality monitoring stations on West flowing rivers (2 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2786	Tarapur MIDC nalla	Tarapur MIDC Nalla, near sump No.I	MIDC Tarapur	Palghar	Thane
2787	Tarapur MIDC nalla	Tarapur MIDC Nalla, near sump No.II	MIDC Tarapur	Palghar	Thane
2788	Tarapur MIDC nalla	Tarapur MIDC Nalla, near sump No.III	MIDC Tarapur	Palghar	Thane
2785	BPT Navapur	BPT, Navapur	Navapur	Palghar	Thane
2706	Surya river	Surya river at U/s of Surya Dam	Dhamni	Vikramgad	Thane
2168	Mithi river	Mithi River near Road bridge	Mahim	Bandra	Mumbai
2701	Savitri	Savitri river jackwell at Upsa Kendre	Nangalwadi	Mahad	Raigad
2702	Savitri	Savitri river at Shedav Dov	Shedav Dov	Mahad	Raigad
2703	Savitri	Savitri river at Dadli road bridge	Dadli	Mahad	Raigad
2704	Savitri	Savitri river at Muthavali Village	Muthavali	Mahad	Raigad
2689	Patalganga	Patalganga river at Gagangiri Maharaj Temple	Khopoli	Khalapur	Raigad
2199	Savitri	Savitri river at Ovale Village	Ovale	Mahad	Raigad
1151	Patalganga	Patalganga river at Shilphata bridge	Khopoli	Khalapur	Raigad
2688	Patalganga	Patalganga river at Savroli bridge	Savroli	Khalapur	Raigad

Water Quality Index of WQMS on West Flowing Rivers (3 of 3)

Apr	78	NA	78	77	71	79	73	NA	78	72	75	74	77	73	77	80	70	71	64	55	65	71	52	42	49	52	72	NA	87	90	84	86	82	83	90	84	81	87	89	79	81	48
May	77	78	79	80	81	85	70	82	80	NA	75	78	NA	79	78	NA	74	65	NA	67	51	NA	77	43	58	53	42	88	80	92	NA	81	83	84	80	93	82	79	91	73	77	54
Jun	84	73	83	84	83	82	74	84	79	76	71	78	76	78	81	76	73	76	71	60	74	73	78	66	69	43	62	NA	87	83	83	81	88	NA	85	84	NA	84	78	89	88	NA
Jul	77	83	81	79	82	81	75	81	82	73	75	81	73	70	75	70	74	71	74	82	75	59	76	74	62	71	74	82	84	85	NA	87	74	68	84	89	76	82	80	80	79	NA
Aug	79	NA	83	81	23	82	81	83	84	72	NA	77	NA	NA	75	72	84	76	80	NA	73	64	82	59	72	60	69	86	82	85	86	79	85	80	76	80	77	78	84	88	NA	NA
Sep	78	82	79	80	81	80	82	77	79	81	81	76	74	81	69	77	84	78	78	71	75	77	80	78	67	69	75	87	82	79	91	80	76	85	76	82	82	78	78	86	NA	NA
Oct	78	83	79	79	82	83	77	NA	NA	75	87	78	75	84	73	74	85	74	78	69	73	73	83	73	53	71	47	NA	86	NA	89	86	79	NA	86	NA	NA	85	NA	NA	NA	76
Nov	84	70	78	80	78	85	84	72	82	78	81	82	78	82	80	78	84	81	82	62	84	77	83	48	49	75	44	82	86	80	78	79	79	86	83	81	82	84	79	NA	61	73
Dec	84	75	82	80	78	85	83	82	85	82	83	83	83	75	86	78	75	87	72	NA	83	72	76	74	52	55	65	81	82	75	76	86	76	80	80	81	80	71	80	70	73	81
Jan	65	81	79	67	81	84	76	65	84	81	82	81	78	77	83	73	76	82	58	82	68	79	79	67	66	39	63	73	80	77	79	73	79	74	83	78	74	76	76	80	70	69
Feb	82	81	80	79	85	84	79	85	87	75	84	80	77	81	86	78	78	84	79	27	68	81	80	60	54	76	67	83	88	74	88	61	65	83	86	68	81	85	76	81	76	53
Mar	NA	NA	NA	NA	79	NA	NA	80	NA	NA	77	78	75	72	85	79	75	80	NA	29	NA	80	72	74	60	38	64	83	91	NA	84	86	NA	85	90	NA	81	88	NA	67	54	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2687			**2686**			**1462**			**2672**			**2651**			**1152**			**2685**			**2198**			**2671**			**2714**			**2676**			**2164**			**2713**			**2790**		

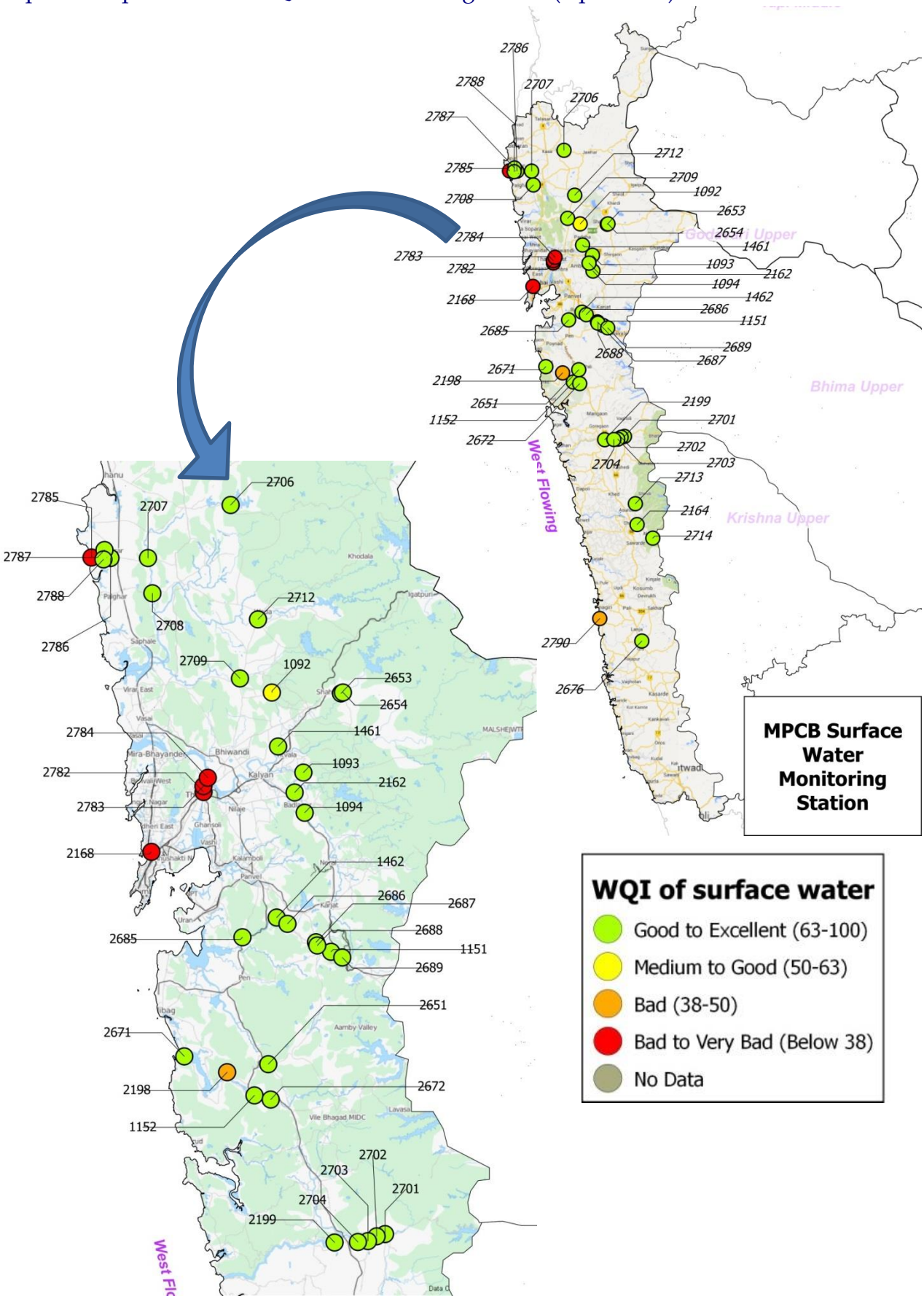
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

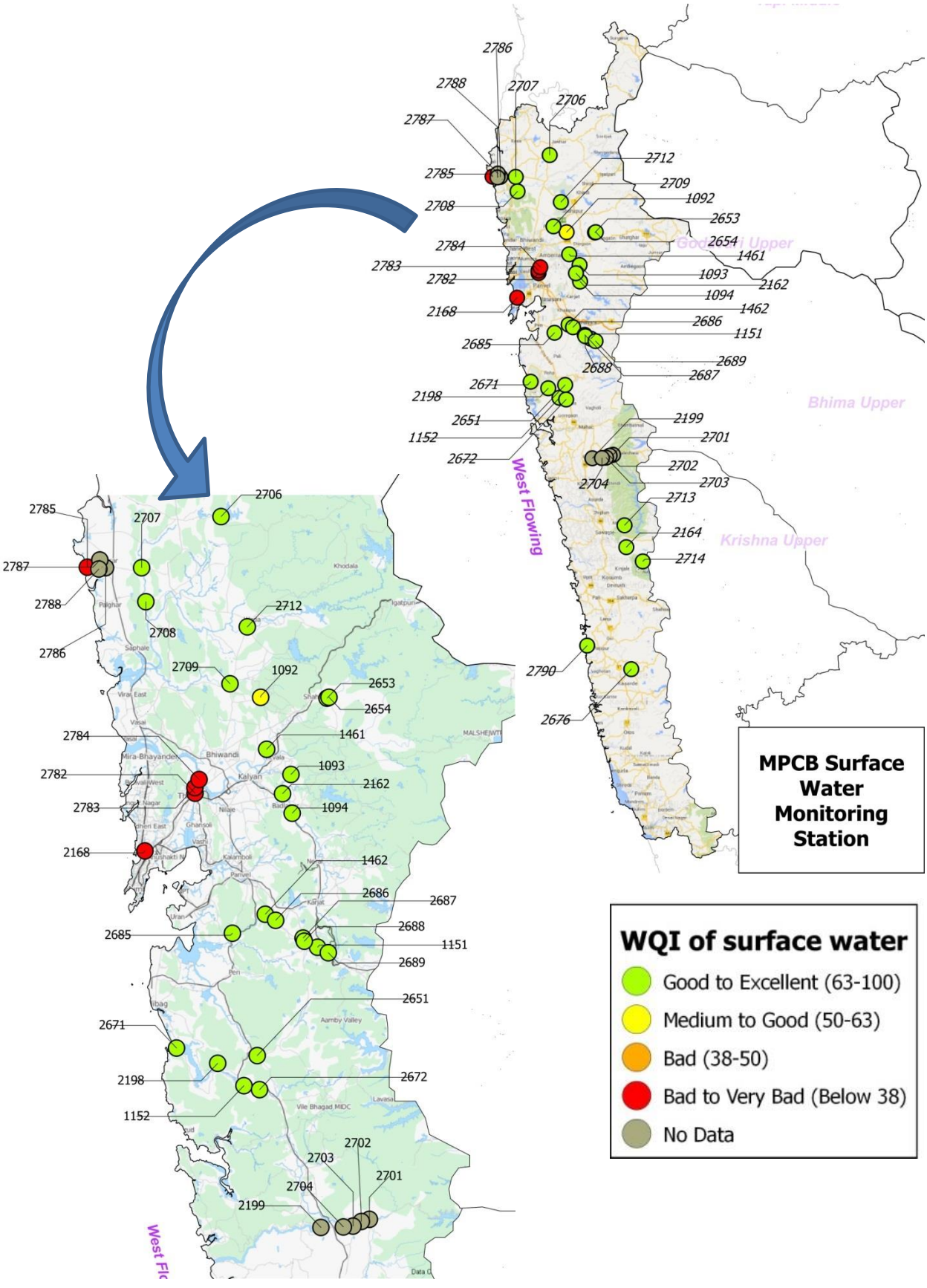
Table No 1: Surface water quality monitoring stations on West flowing rivers (3 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2687	Patalganga	Patalganga river at Khalapur Pumping Station	Khalapur	Khalapur	Raigad
2686	Patalganga	Patalganga river at Vyal Pump House	Vyal	Khalapur	Raigad
1462	Patalganga	Patalganga near intake of MIDC water works(Turade w/w)	Turade	Khalapur	Raigad
2672	Kundalika	Kundalika river at Dhatav Jackwell	Dhatav	Roha	Raigad
2651	Amba	Amba river at D/s of Waken bridge	Waken Phata	Roha	Raigad
1152	Kundalika	Kundalika river at Roha bridge	Roha	Roha	Raigad
2685	Patalganga	Patalganga river at D/s of Kharpada bridge.	Kharpada	Khalapur	Raigad
2198	Kundalika	Kundalika river at Are Khurd (saline zone)	Are Khurd	Roha	Raigad
2671	Kundalik	Kundalika river near Salav bridge (saline zone)	Salav	Roha	Raigad
2714	Vashishti	Vashisti river at U/s of Pophali near Konphansawane bridge.	Pophali	Chiplun	Ratnagiri
2676	Muchkundi	Muchkundi river at Waked, Ratnagiri, near M/s Asahi Maharashtra Glass Ltd	Waked	Lanja	Ratnagiri
2164	Vashishti	Vashisti river at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt. Ltd.	Kherdi	Chiplun	Ratnagiri
2713	Vashishti	Vashisti river at D/s of Three M Paper Mills near Chiplun water intake jackwell.	Kherdi	Chiplun	Ratnagiri
2790	Pimpal-Paneri nalla	Pimpal-Paneri nalla at Ratnagiri near Finolex Industries.	Yahganigaon	Ratnagiri	Ratnagiri

Spatial map of Surface WQI of West Flowing Rivers (April 2013)



Spatial map of Surface WQI of West Flowing Rivers (December 2013)



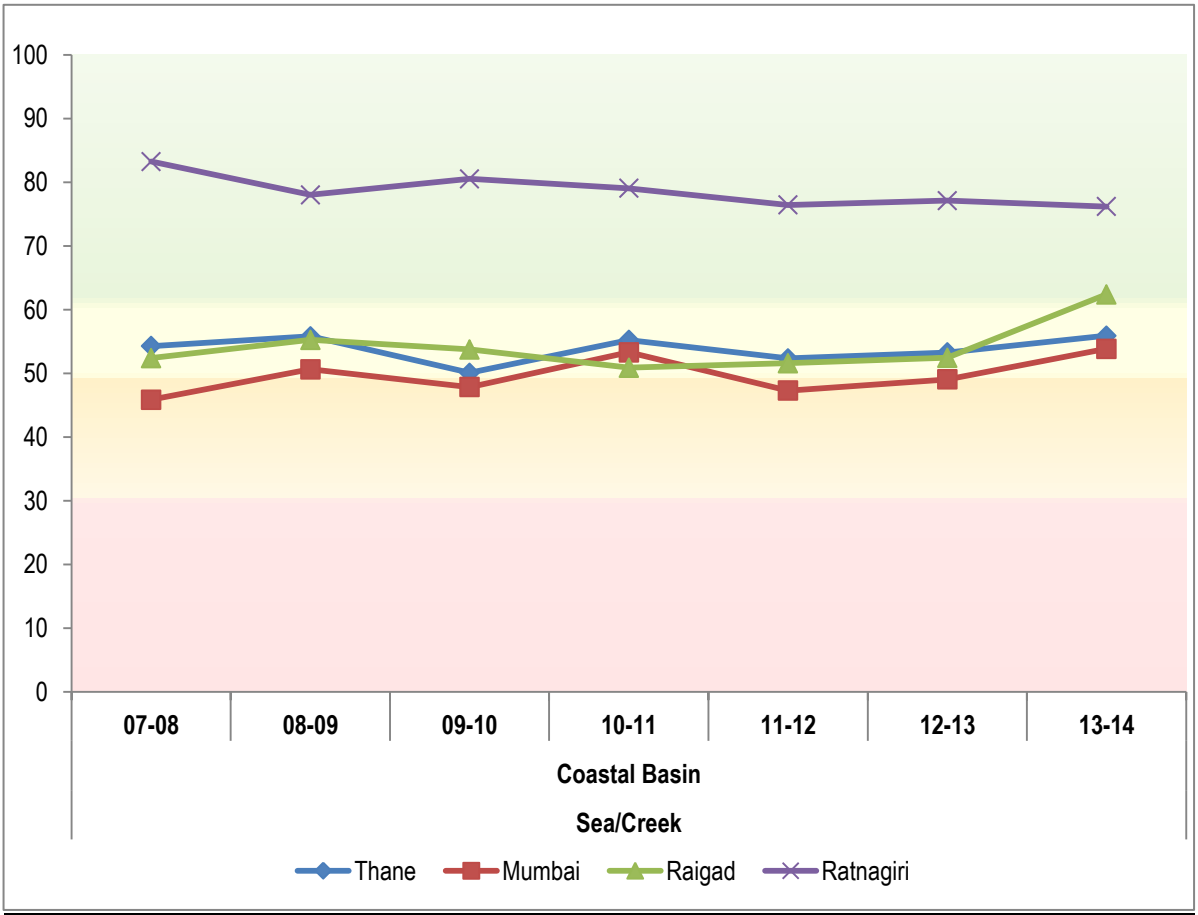
Saline (Sea and Creek) Water Quality

Being a coastal state Maharashtra is bestowed with a huge coast line of about 720 kms. Thane, Mumbai, Raigad, Ratnagiri and Sindhudurg districts are all located along the coastal front in Maharashtra. These districts are blessed with beaches, mangroves, migratory birds, corals and a lot of unique marine biodiversity. These areas are not only stress busters for general public but also cater to the sector of tourism in the state. These patches are also significant for various livelihood opportunities since they support occupations like fishing and salt production in the state.

Given the fact that water pollution on the coastal front shall directly impact the marine ecosystem and through consumption of fish and salt it poses a potential threat to humans, it is of significant importance to monitor sea water quality.

MPCB has 34 monitoring stations along the sensitive and pollution prone areas of coastline of the state. Regular monitoring is conducted at these monitoring stations. The following section presents the DO, FC, pH and BOD data recorded at the sea and creek WQMS in illustrative manner.

Coastal Basin (Sea/Creek water sample)



WQI	Category	Class by CPCB	Remarks
63-100	Good to Excellent	A	Non polluted
50-63	Medium to Good	B	Non polluted
38-50	Bad	C	Polluted
38 & less	Bad to Very Bad	D, E	Heavily polluted

Figure No. 39: Trend of annual average WQI across districts of Coastal Basin

Note:

This graph considers the average WQI for all the monitoring stations in that particular district and hence may include some bias. This graph is only for an overview and monitoring station wise data maybe analyzed to pin point the most affected and polluted patches of rivers bodies in that district.

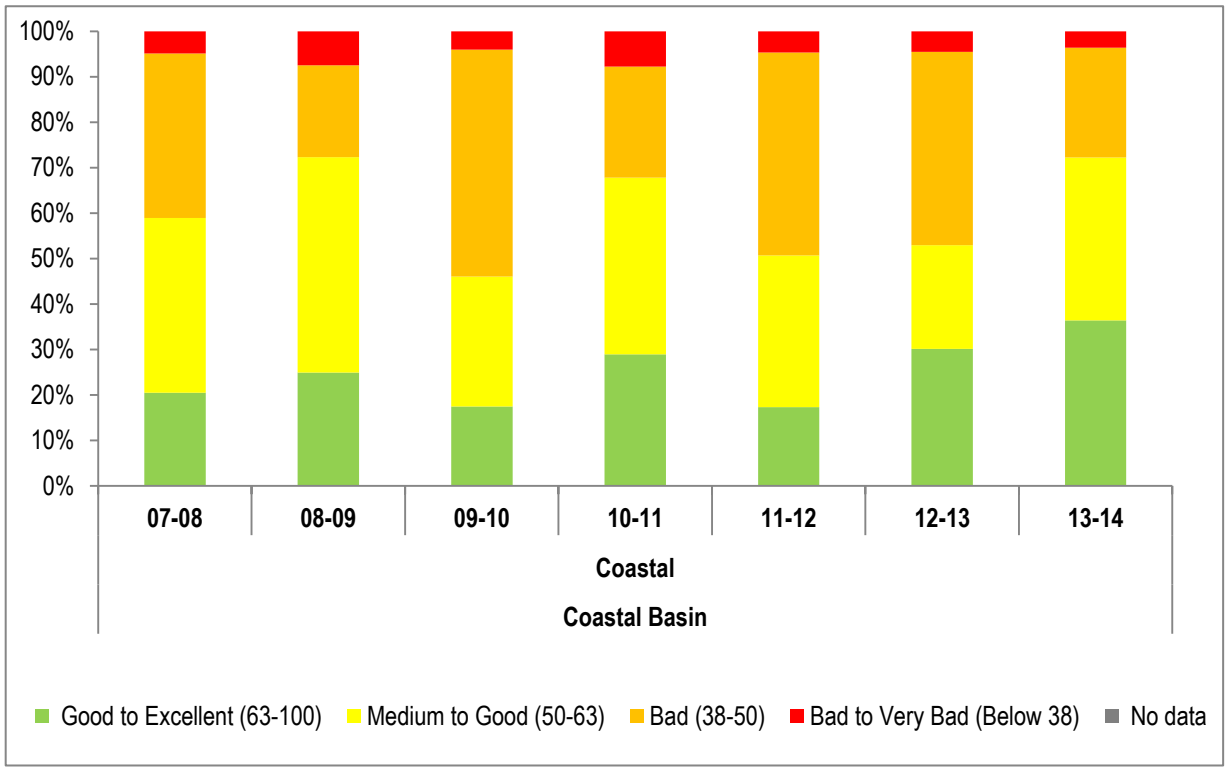
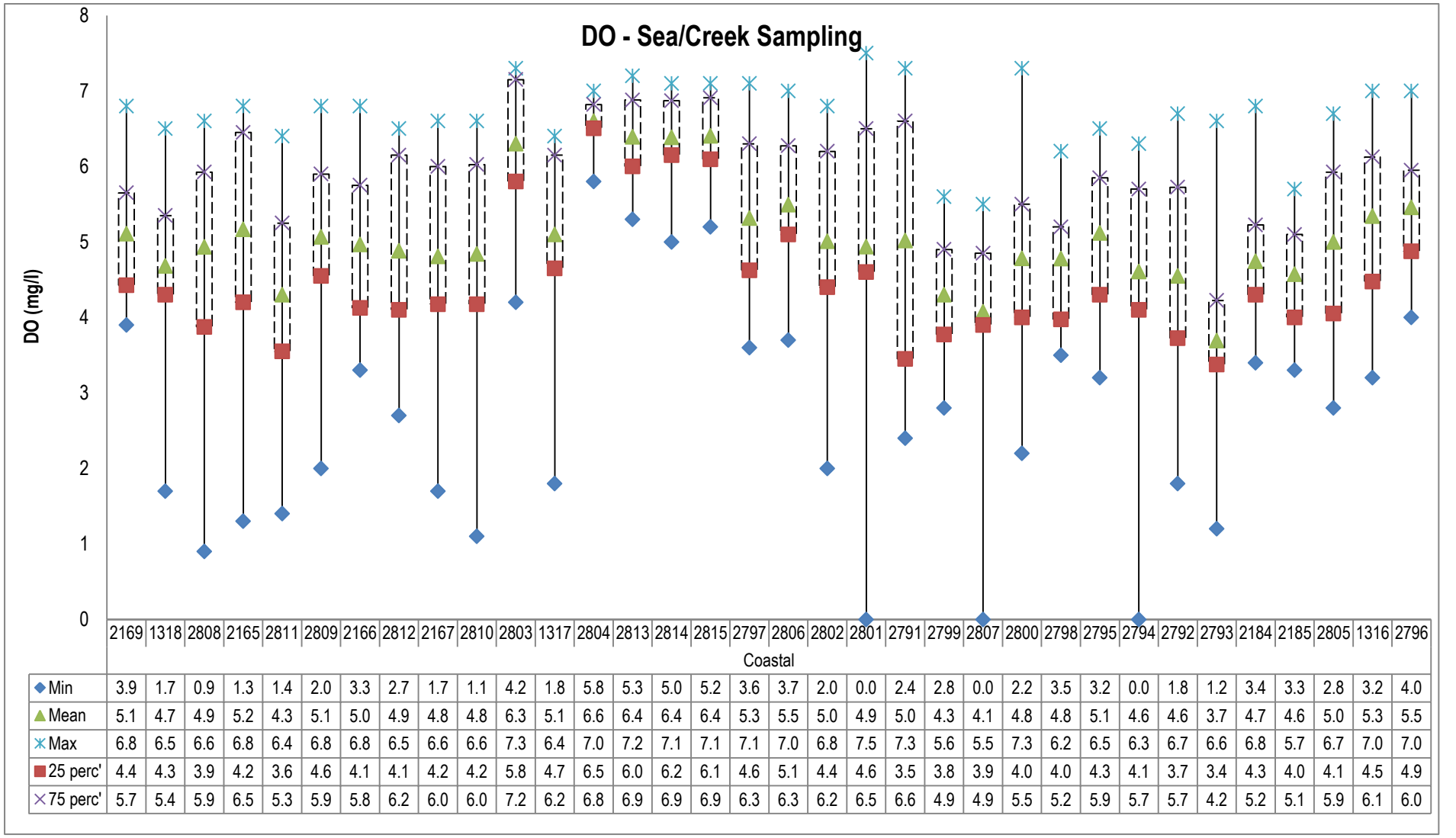


Figure No. 40: Trend of average occurrence for different category of WQI Coastal Basin

The Intra basin performance of Coastal Basin for sea and creeks across four districts of the state are depicted in the Figure No. 39 and the average annual occurrence of different category of Water Quality Index across all WQMS is depicted in Figure No. 40.

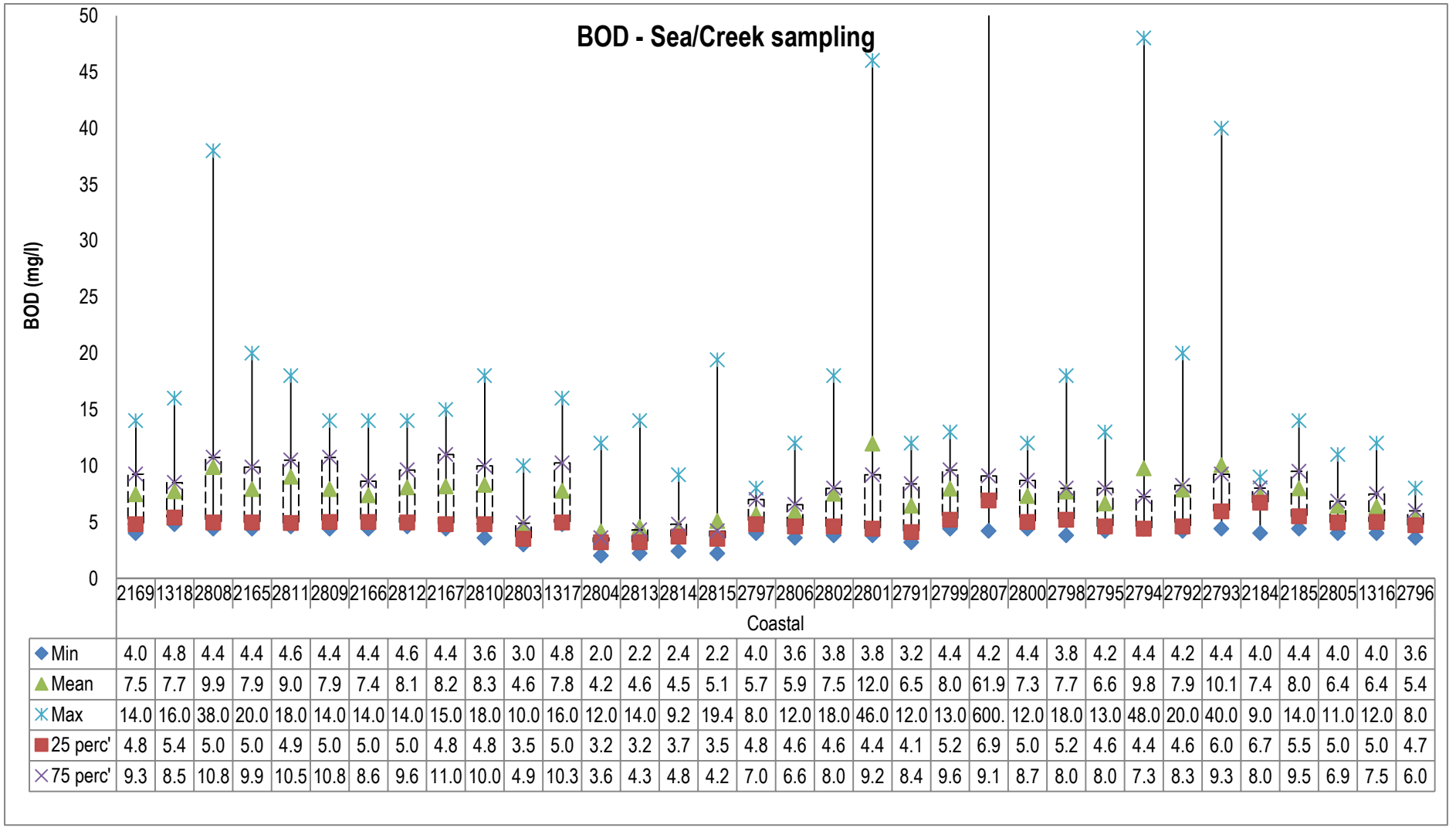
The results showed that among four districts, namely Thane, Mumbai, Raigad and Ratnagiri, the annual average WQI of Ratnagiri (4 WQMS) were consistently in Good to Excellent (i.e. WQI in range of 63-100) from 07-08 till 13-14. Whereas, Raigad (2 WQMS), Thane (18 WQMS) and Ratnagiri (4 WQMS) were in Bad to Medium category (i.e. WQI in range of 38-63). The average WQI across Thane, Mumbai and Raigad districts showed upward trend in recent years and in Ratnagiri districts showed downward trend.

Figure No. 40 shows average annual occurrence of WQI across 34 WQM stations of coastal basin of sea and creek water sample for 7 years starting from 2007. The results showed that the occurrence of Good to Excellent category of WQI has increased over the years across all the WQMS but is less than the occurrence of 'Bad' and 'Bad to Very Bad' category of WQI.



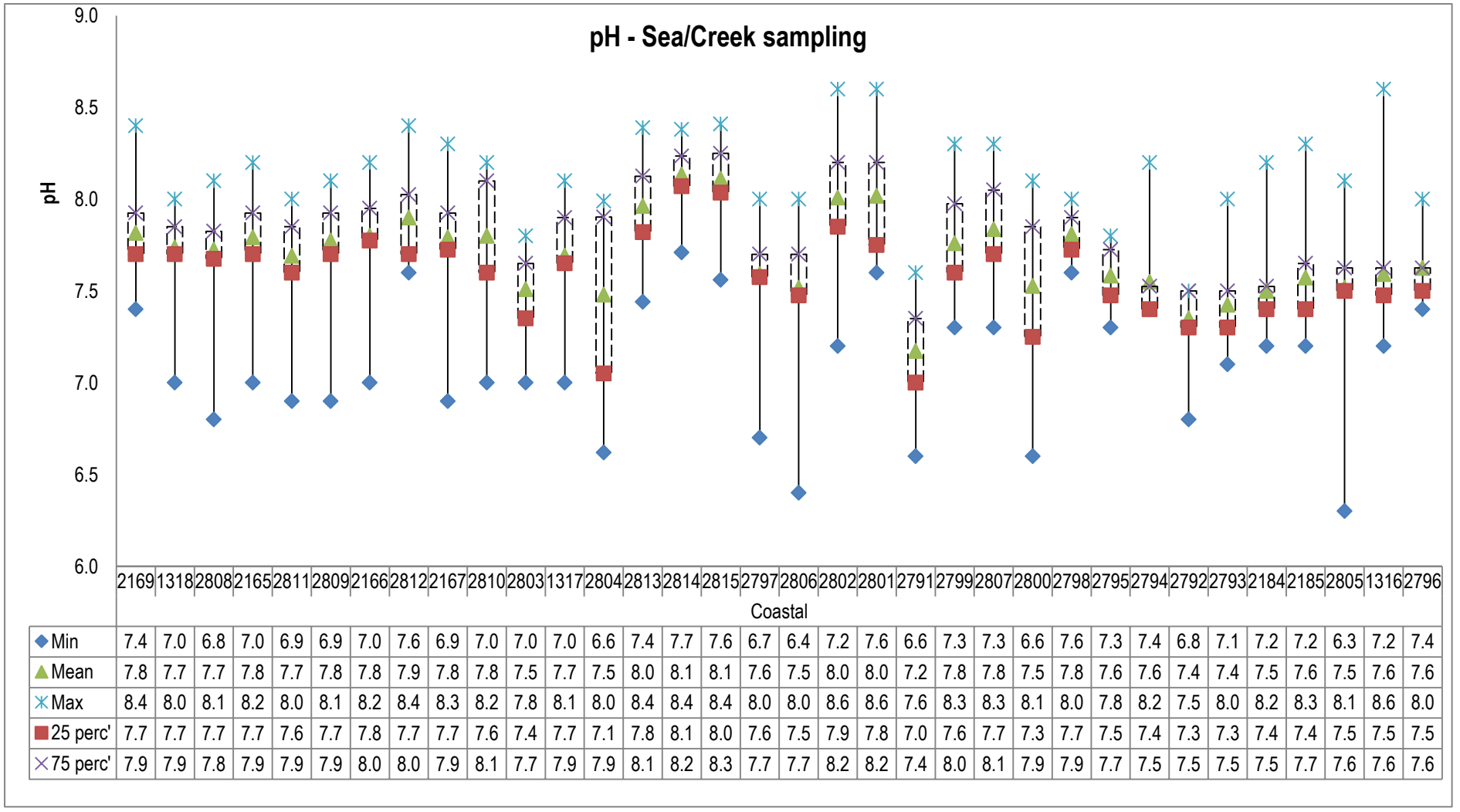
	2169	1318	2808	2165	2811	2809	2166	2812	2167	2810	2803	1317	2804	2813	2814	2815	2797	2806	2802	2801	2791	2799	2807	2800	2798	2795	2794	2792	2793	2184	2185	2805	1316	2796
Min	3.9	1.7	0.9	1.3	1.4	2.0	3.3	2.7	1.7	1.1	4.2	1.8	5.8	5.3	5.0	5.2	3.6	3.7	2.0	0.0	2.4	2.8	0.0	2.2	3.5	3.2	0.0	1.8	1.2	3.4	3.3	2.8	3.2	4.0
Mean	5.1	4.7	4.9	5.2	4.3	5.1	5.0	4.9	4.8	4.8	6.3	5.1	6.6	6.4	6.4	6.4	5.3	5.5	5.0	4.9	5.0	4.3	4.1	4.8	4.8	5.1	4.6	4.6	3.7	4.7	4.6	5.0	5.3	5.5
Max	6.8	6.5	6.6	6.8	6.4	6.8	6.8	6.5	6.6	6.6	7.3	6.4	7.0	7.2	7.1	7.1	7.1	7.0	6.8	7.5	7.3	5.6	5.5	7.3	6.2	6.5	6.3	6.7	6.6	6.8	5.7	6.7	7.0	7.0
25 perc'	4.4	4.3	3.9	4.2	3.6	4.6	4.1	4.1	4.2	4.2	5.8	4.7	6.5	6.0	6.2	6.1	4.6	5.1	4.4	4.6	3.5	3.8	3.9	4.0	4.0	4.3	4.1	3.7	3.4	4.3	4.0	4.1	4.5	4.9
75 perc'	5.7	5.4	5.9	6.5	5.3	5.9	5.8	6.2	6.0	6.0	7.2	6.2	6.8	6.9	6.9	6.9	6.3	6.3	6.2	6.5	6.6	4.9	4.9	5.5	5.2	5.9	5.7	5.7	4.2	5.2	5.1	5.9	6.1	6.0

Figure No. 41: Trend of Dissolved Oxygen (DO) levels recorded at WQMS monitoring sea and creek water



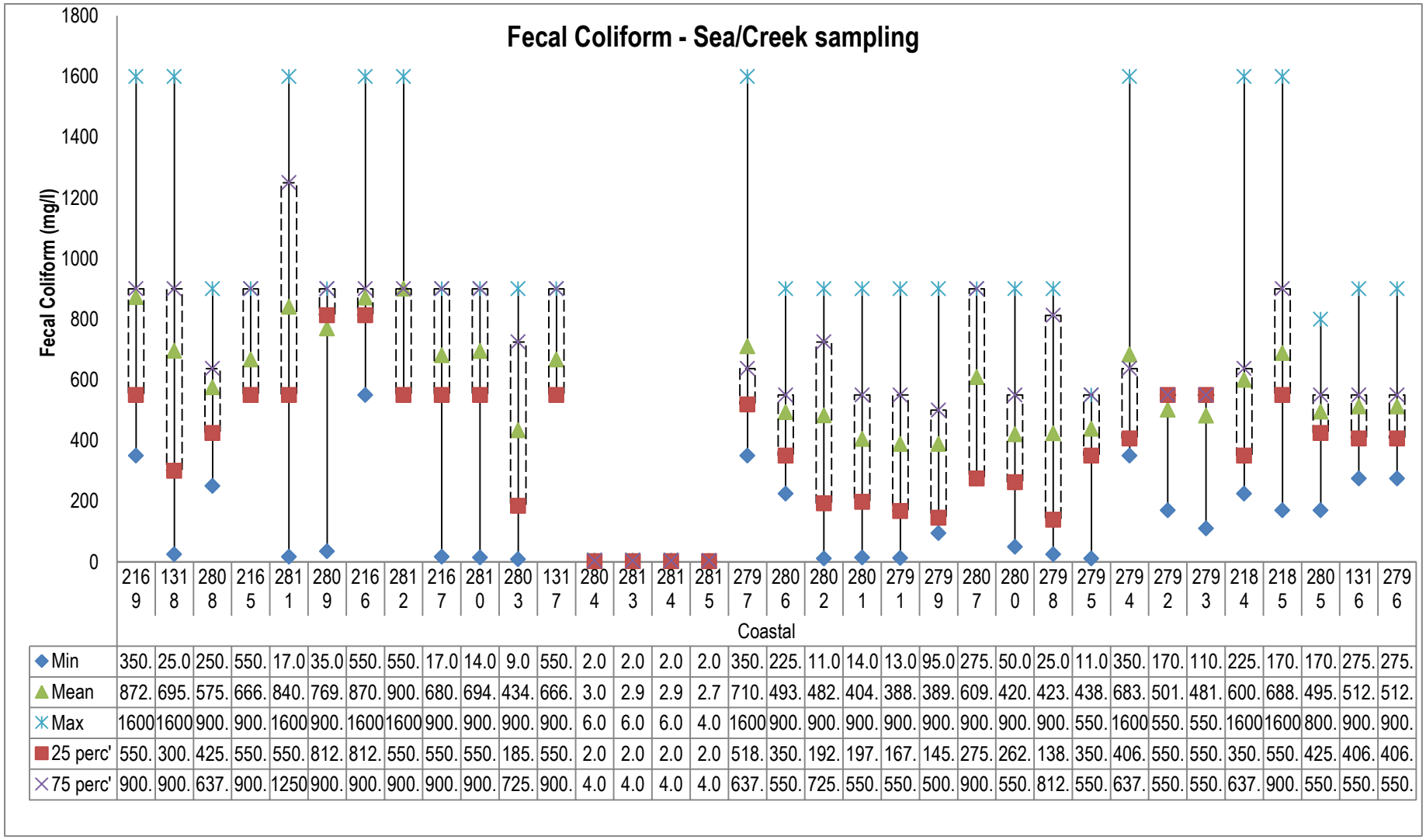
	2169	1318	2808	2165	2811	2809	2166	2812	2167	2810	2803	1317	2804	2813	2814	2815	2797	2806	2802	2801	2791	2799	2807	2800	2798	2795	2794	2792	2793	2184	2185	2805	1316	2796
Min	4.0	4.8	4.4	4.4	4.6	4.4	4.4	4.6	4.4	3.6	3.0	4.8	2.0	2.2	2.4	2.2	4.0	3.6	3.8	3.8	3.2	4.4	4.2	4.4	3.8	4.2	4.4	4.2	4.4	4.0	4.4	4.0	4.0	3.6
Mean	7.5	7.7	9.9	7.9	9.0	7.9	7.4	8.1	8.2	8.3	4.6	7.8	4.2	4.6	4.5	5.1	5.7	5.9	7.5	12.0	6.5	8.0	61.9	7.3	7.7	6.6	9.8	7.9	10.1	7.4	8.0	6.4	6.4	5.4
Max	14.0	16.0	38.0	20.0	18.0	14.0	14.0	14.0	15.0	18.0	10.0	16.0	12.0	14.0	9.2	19.4	8.0	12.0	18.0	46.0	12.0	13.0	600.	12.0	18.0	13.0	48.0	20.0	40.0	9.0	14.0	11.0	12.0	8.0
25 perc'	4.8	5.4	5.0	5.0	4.9	5.0	5.0	5.0	4.8	4.8	3.5	5.0	3.2	3.2	3.7	3.5	4.8	4.6	4.6	4.4	4.1	5.2	6.9	5.0	5.2	4.6	4.4	4.6	6.0	6.7	5.5	5.0	5.0	4.7
75 perc'	9.3	8.5	10.8	9.9	10.5	10.8	8.6	9.6	11.0	10.0	4.9	10.3	3.6	4.3	4.8	4.2	7.0	6.6	8.0	9.2	8.4	9.6	9.1	8.7	8.0	8.0	7.3	8.3	9.3	8.0	9.5	6.9	7.5	6.0

Figure No. 42: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS monitoring sea and creek water



	2169	1318	2808	2165	2811	2809	2166	2812	2167	2810	2803	1317	2804	2813	2814	2815	2797	2806	2802	2801	2791	2799	2807	2800	2798	2795	2794	2792	2793	2184	2185	2805	1316	2796
Min	7.4	7.0	6.8	7.0	6.9	6.9	7.0	7.6	6.9	7.0	7.0	7.0	6.6	7.4	7.7	7.6	6.7	6.4	7.2	7.6	6.6	7.3	7.3	6.6	7.6	7.3	7.4	6.8	7.1	7.2	7.2	6.3	7.2	7.4
Mean	7.8	7.7	7.7	7.8	7.7	7.8	7.8	7.9	7.8	7.8	7.5	7.7	7.5	8.0	8.1	8.1	7.6	7.5	8.0	8.0	7.2	7.8	7.8	7.5	7.8	7.6	7.6	7.4	7.4	7.5	7.6	7.5	7.6	7.6
Max	8.4	8.0	8.1	8.2	8.0	8.1	8.2	8.4	8.3	8.2	7.8	8.1	8.0	8.4	8.4	8.4	8.0	8.0	8.6	8.6	7.6	8.3	8.3	8.1	8.0	7.8	8.2	7.5	8.0	8.2	8.3	8.1	8.6	8.0
25 perc'	7.7	7.7	7.7	7.7	7.6	7.7	7.8	7.7	7.7	7.6	7.4	7.7	7.1	7.8	8.1	8.0	7.6	7.5	7.9	7.8	7.0	7.6	7.7	7.3	7.7	7.5	7.4	7.3	7.3	7.4	7.4	7.5	7.5	7.5
75 perc'	7.9	7.9	7.8	7.9	7.9	7.9	8.0	8.0	7.9	8.1	7.7	7.9	7.9	8.1	8.2	8.3	7.7	7.7	8.2	8.2	7.4	8.0	8.1	7.9	7.9	7.7	7.5	7.5	7.5	7.5	7.7	7.6	7.6	7.6

Figure No. 43: Trend of pH levels recorded at WQMS monitoring sea and creek water



	2169	1318	2808	2165	2811	2809	2166	2812	2167	2810	2803	1317	2804	2813	2814	2815	2797	2806	2802	2801	2791	2799	2807	2800	2798	2795	2794	2792	2793	2184	2185	2805	1316	2796
Min	350.	25.0	250.	550.	17.0	35.0	550.	550.	17.0	14.0	9.0	550.	2.0	2.0	2.0	2.0	350.	225.	11.0	14.0	13.0	95.0	275.	50.0	25.0	11.0	350.	170.	110.	225.	170.	170.	275.	275.
Mean	872.	695.	575.	666.	840.	769.	870.	900.	680.	694.	434.	666.	3.0	2.9	2.9	2.7	710.	493.	482.	404.	388.	389.	609.	420.	423.	438.	683.	501.	481.	600.	688.	495.	512.	512.
Max	1600	1600	900.	900.	1600	900.	1600	1600	900.	900.	900.	900.	6.0	6.0	6.0	4.0	1600	900.	900.	900.	900.	900.	900.	900.	900.	550.	1600	550.	550.	1600	1600	800.	900.	900.
25 perc'	550.	300.	425.	550.	550.	812.	812.	550.	550.	550.	185.	550.	2.0	2.0	2.0	2.0	518.	350.	192.	197.	167.	145.	275.	262.	138.	350.	406.	550.	550.	350.	550.	425.	406.	406.
75 perc'	900.	900.	637.	900.	1250	900.	900.	900.	900.	900.	725.	900.	4.0	4.0	4.0	4.0	637.	550.	725.	550.	550.	500.	900.	550.	812.	550.	637.	550.	550.	637.	900.	550.	550.	550.

Figure No. 44: Trend of Fecal Coliforms levels recorded at WQMS monitoring sea and creek water

Water quality Index for WQMS monitoring Sea and Creek water (1 of 3)

Apr	NA	37	32	NA	49	25	NA	NA	59	NA	38	61	NA	51	63	57	50	63	55	56	59	NA	52	57	NA	46	62	49	41	48	48	49	62
May	NA	48	58	NA	44	64	NA	47	53	NA	50	52	NA	43	47	NA	48	56	NA	42	57	NA	41	52	NA	49	38	NA	44	46	NA	48	57
Jun	NA	52	31	NA	57	23	NA	44	62	NA	44	58	NA	40	40	NA	47	59	NA	40	47	NA	51	60	43	46	64	NA	NA	63	46	48	58
Jul	56	76	69	58	75	70	44	53	NA	45	44	63	48	65	65	45	58	66	49	51	60	51	53	64	60	58	66	56	51	65	49	58	69
Aug	66	59	55	67	55	57	64	60	51	NA	40	49	74	64	69	61	70	67	64	64	68	32	67	67	66	69	68	72	72	66	68	67	69
Sep	45	66	66	49	69	64	48	64	54	47	63	49	61	77	57	47	47	55	43	72	55	30	79	50	52	67	40	57	75	51	62	79	52
Oct	52	73	48	51	76	66	53	55	53	52	55	53	56	50	47	57	58	49	50	58	42	49	69	45	53	68	51	60	62	47	47	65	57
Nov	48	69	53	39	73	50	48	52	42	47	55	42	49	60	47	53	56	45	44	60	45	53	66	51	57	69	50	60	69	48	58	68	46
Dec	49	47	64	54	45	65	61	47	64	49	49	48	47	48	52	54	52	56	46	46	54	46	46	61	52	44	65	53	53	65	55	45	62
Jan	53	41	77	56	41	55	51	63	59	33	33	23	56	63	60	46	41	NA	56	42	61	50	42	60	50	34	62	48	45	70	47	46	55
Feb	57	42	75	42	44	77	42	43	33	52	44	44	37	53	72	38	43	48	41	45	52	55	42	64	61	41	63	56	45	69	49	44	62
Mar	56	45	NA	66	41	NA	44	43	NA	52	39	NA	65	39	NA	35	39	NA	51	46	66	53	45	62	61	43	60	57	48	67	59	38	68
FY	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**
	2802			**2801**			**2799**			**2807**			**2800**			**2798**			**2805**			**2797**			**1316**			**2795**			**2796**		

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 20: Surface water quality monitoring stations monitoring Sea and Creek water (1 of 3)

Station Code	Sea/Creek	Name of the Station	Village	Taluka	District
2802	Dahanu creek	Dahanu creek at Dahanu Fort	Danugaon	Dahanu	Thane
2801	Savta creek	Savta creek	Savta	Dahanu	Thane
2799	Dandi creek	Dandi creek	Dandi	Palghar	Thane
2807	Navapur sea	Navapur sea	Navapur	Palghar	Thane
2800	Sarwali creek	Sarwali creek	Sarwali	Palghar	Thane
2798	Kharekuran Murbe creek	Kharekuran Murbhe creek	Kharekuran	Palghar	Thane
2805	Arnala sea	Arnala Sea	Arnala	Vasai	Thane
2797	Bhayander creek	Bhayander Creek at D/s of Railway bridge at Jasal park choupathy.	Navghar	Bhayander	Thane
1316	Bassein creek	Bassein creek at Vasai Fort, Thane	Bassein	Vasai	Thane
2795	Ulhas creek	Ulhas Creek at Gaimukh at Nagla Bunder on Ghod Buder road.	Nagla	Thane	Thane
2796	Ulhas creek	Ulhas Creek at Versova bridge	Versova	Vasai	Thane

Water quality Index for WQMS monitoring Sea and Creek water (2 of 3)

Apr	61	45	64	NA	43	50	51	51	59	48	51	49	46	26	35	48	49	62	50	46	65	43	41	62	42	47	38	NA	36	64	NA	49	56
May	NA	39	56	NA	24	NA	NA	46	44	NA	47	34	NA	32	31	25	49	50	NA	43	48	NA	49	49	NA	46	50	36	45	54	NA	44	56
Jun	NA	48	53	NA	39	39	NA	56	26	NA	47	35	NA	43	57	NA	46	56	NA	55	56	35	28	64	NA	38	62	NA	46	41	NA	46	40
Jul	44	56	65	64	65	72	53	55	66	43	62	63	30	47	58	52	70	61	44	75	61	43	53	61	43	52	49	43	NA	67	48	51	64
Aug	49	74	69	72	65	73	70	67	64	62	52	68	58	52	67	42	65	57	61	65	54	44	55	49	44	54	48	50	60	51	48	60	47
Sep	44	78	56	81	82	69	62	81	56	60	81	55	56	69	47	62	69	49	48	71	51	40	37	42	40	50	40	50	60	45	45	60	42
Oct	45	55	52	76	80	71	50	66	46	63	66	53	60	54	44	48	72	53	51	61	49	45	57	48	40	61	48	47	57	NA	48	55	45
Nov	48	66	45	75	67	83	56	83	53	59	69	50	61	52	53	52	58	57	48	70	49	44	58	43	42	58	42	53	66	42	49	63	40
Dec	47	40	59	44	30	55	56	52	60	46	49	63	52	50	54	49	47	65	48	51	47	43	41	60	40	42	60	49	49	54	43	48	NA
Jan	53	39	59	47	43	45	50	47	59	55	50	66	35	46	58	56	47	52	56	51	52	55	48	66	52	42	64	38	NA	64	57	37	62
Feb	45	43	63	NA	40	64	53	45	69	46	43	66	49	46	42	NA	46	46	48	47	41	53	42	67	55	42	66	59	43	57	60	44	65
Mar	63	44	64	43	52	47	65	45	65	32	46	68	56	47	55	52	42	57	64	42	NA	47	43	50	50	42	61	NA	43	56	46	42	42
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2806			2791			2794			2792			2793			2184			2185			2169			2812			1318			2811		

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

Table No. 21: Surface water quality monitoring stations monitoring Sea and Creek water (2 of 3)

Station Code	Sea/Creek	Name of the Station	Village	Taluka	District
2806	Uttan sea	Uttan Sea at Bhayander.	Uttan	Bhayander	Thane
2791	Ulhas creek	Ulhas Creek at Reti Bunder at D/s of Kalyan- Bhiwandi bridge	Kalyan	Kalyan	Thane
2794	Ulhas creek	Ulhas Creek at Kolshet Reti Bunder	Kolshet	Thane	Thane
2792	Ulhas creek	Ulhas Creek at Mumbra Reti Bunder	Mumbra	Thane	Thane
2793	Thane creek	Thane Creek at Kalwa Road bridge	Kalwa	Thane	Thane
2184	Vashi creek	Vashi Creek at Airoli bridge	Airoli	Thane	Thane
2185	Vashi creek	Vashi Creek at Vashi bridge	Vashi	Thane	Thane
2169	Sea	Sea Water at Versova beach	Versova	Andheri	Mumbai Suburban
2812	Sea	Sea Water at Juhu beach	Juhugaon	Santacruz	Mumbai Suburban
1318	Mahim creek	Mahim creek at Mahim Bay	Mahim	Bandra	Mumbai City
2811	Sea	Sea water at Shivaji Park(Dadar Choupathy)	Dadar	Dadar	Mumbai City

Water quality Index for WQMS monitoring Sea and Creek water (3 of 3)

Apr	46	48	40	NA	45	71	63	51	57	36	48	54	NA	50	67	45	45	59	47	47	59	48	46	64	NA	78	86	76	82	77	76	83	75	75	70	75
May	38	40	60	NA	41	54	NA	37	58	37	44	58	NA	38	60	39	47	59	NA	41	51	38	36	59	NA	83	85	75	78	78	NA	72	75	77	67	79
Jun	NA	44	42	NA	47	39	NA	48	41	NA	44	47	NA	49	27	NA	38	32	NA	42	79	NA	49	35	NA	82	80	71	79	82	83	75	79	89	74	80
Jul	47	52	61	NA	40	62	49	39	63	50	54	65	49	51	62	49	53	66	54	83	76	50	51	66	NA	84	76	60	68	81	58	81	74	67	79	75
Aug	57	56	46	NA	60	49	55	63	49	57	48	53	53	62	52	51	59	53	60	82	69	53	56	55	NA	75	78	85	83	74	90	80	74	88	74	81
Sep	45	66	45	NA	59	44	46	NA	49	42	55	42	42	67	43	41	56	43	61	70	71	39	64	41	NA	82	84	90	76	77	87	76	77	89	62	82
Oct	47	54	49	48	56	47	47	64	46	49	54	44	50	63	46	50	NA	46	62	78	69	47	53	48	NA	84	NA	NA	76	85	NA	NA	82	NA	75	79
Nov	45	66	42	NA	64	42	42	52	42	47	65	41	45	51	41	48	67	43	52	64	83	49	65	46	NA	84	75	66	72	75	66	73	76	66	74	72
Dec	48	58	63	NA	48	63	47	NA	63	45	45	58	47	51	64	43	47	67	69	42	76	46	49	60	NA	82	78	85	76	74	74	75	73	83	77	77
Jan	55	38	58	58	40	66	48	39	60	47	38	63	54	37	65	41	39	66	39	62	70	59	41	66	75	76	77	71	75	73	63	73	76	69	73	75
Feb	47	42	64	49	43	67	53	44	66	NA	44	62	46	49	62	53	44	66	47	26	67	58	45	63	81	81	65	67	81	59	63	74	60	70	76	57
Mar	47	42	66	49	43	48	57	44	61	50	45	63	53	42	66	45	45	64	NA	26	NA	53	40	61	90	89	NA	84	79	NA	82	78	NA	85	77	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2167			2810			2809			2166			2808			2165			2803			1317			2804			2813			2814			2815		

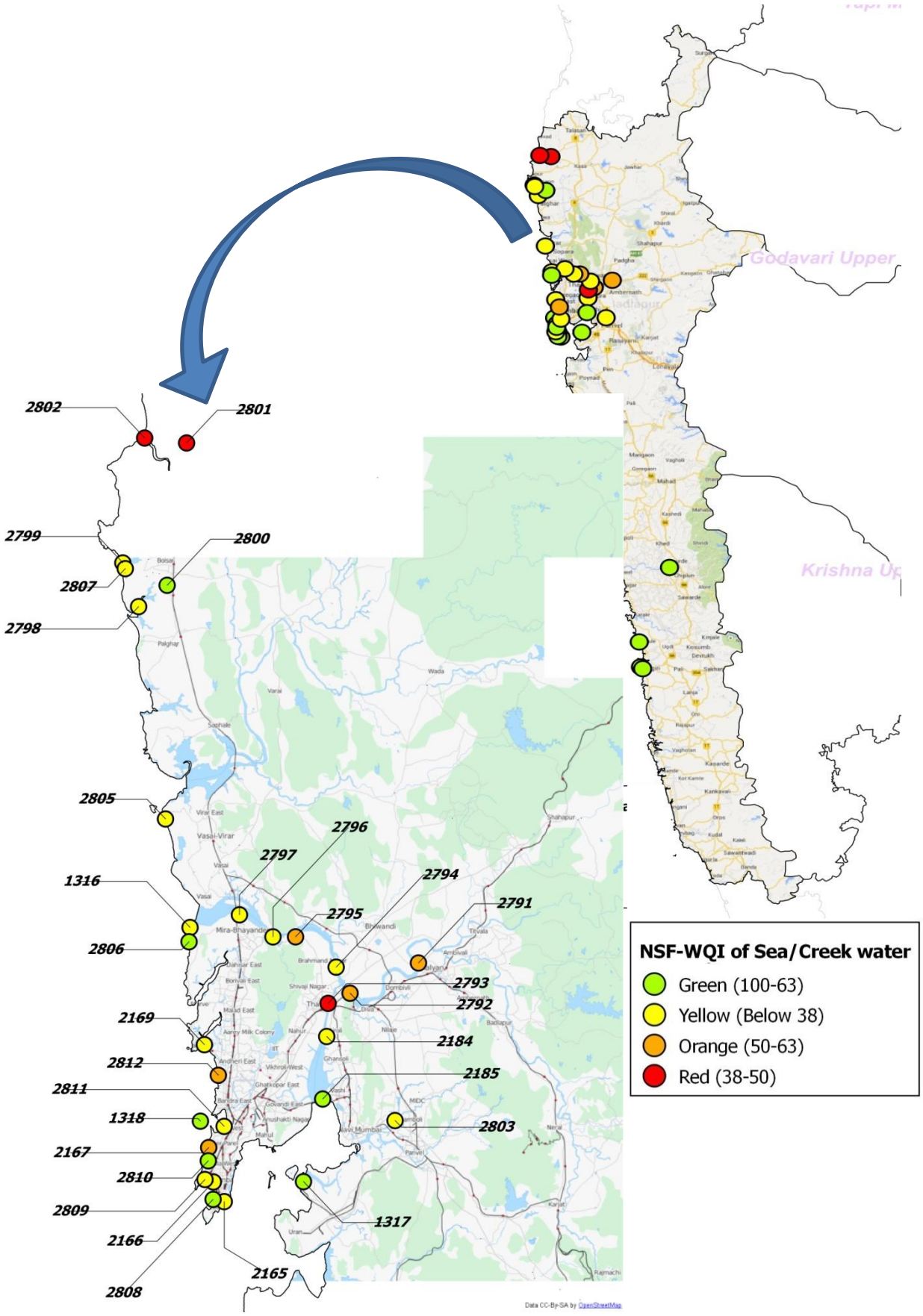
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data

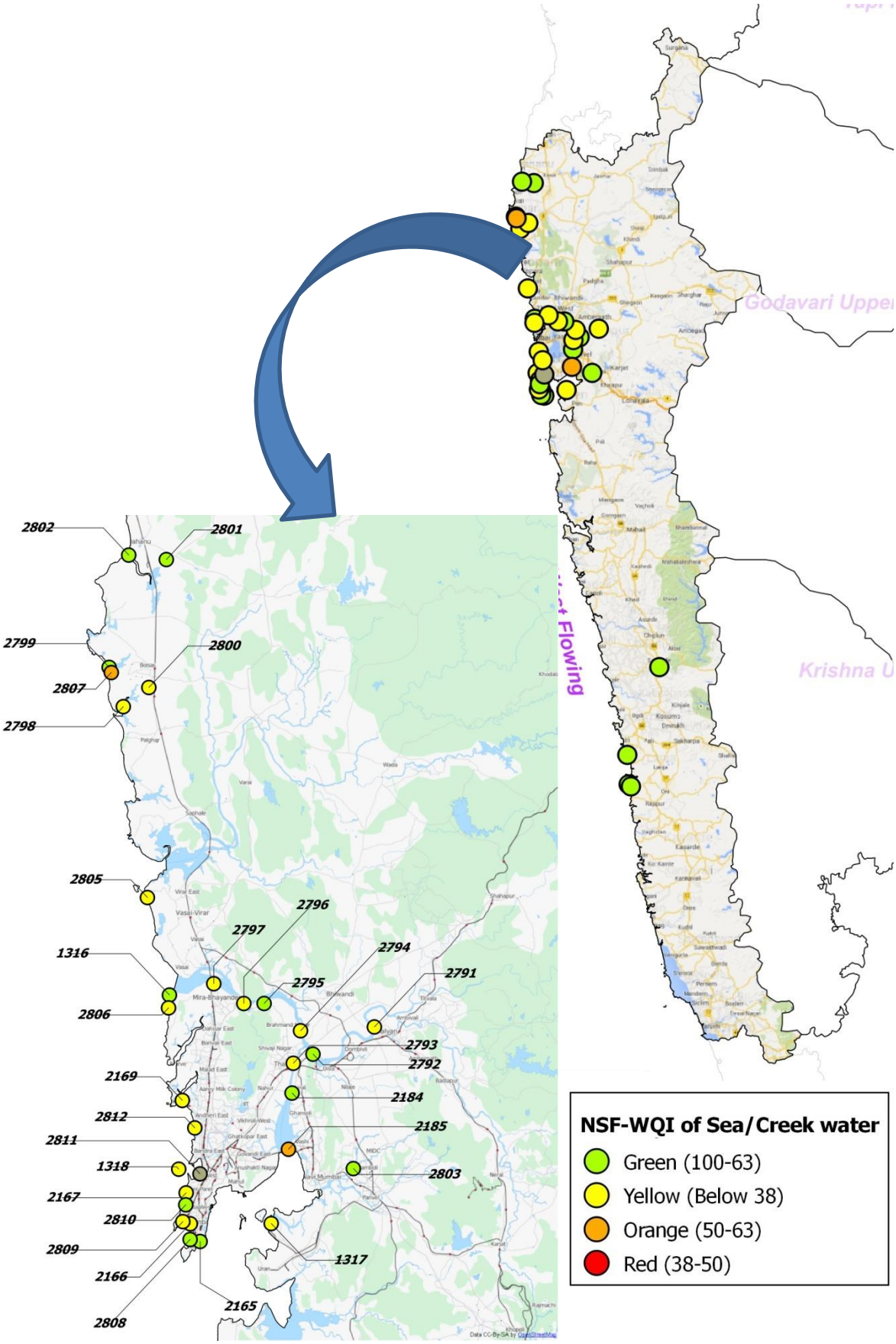
Table No. 22: Surface water quality monitoring stations monitoring Sea and Creek water (2 of 3)

Station Code	Sea/Creek	Name of the Station	Village	Taluka	District
2167	Sea	Sea water at Worli Seaface	Worli	Worli	Mumbai City
2810	Sea	Sea water at Haji Ali	Worli	Worli	Mumbai City
2809	Sea	Sea water at Malabar Hill	Walkeshwar	Mumbai	Mumbai City
2166	Sea	Sea water at Charni Road Choupathy	Girgaon	Mumbai	Mumbai City
2808	Sea	Sea water at Nariman Point	Colaba	Colaba	Mumbai City
2165	Sea	Sea water at Gateway of Maharashtra	Colaba	Colaba	Mumbai City
2803	Panvel creek	Panvel Creek at Kopra bridge	Kopra	Panvel	Raigad
1317	Thane creek	Thane creek at Elephanta Island	Gharapuri, Elephanta Island	Uran	Raigad
2804	Karambavane creek	Karambavane creek at Chiplun.	Karambavane	Chiplun	Ratnagiri
2813	Sea	Sea Water at Ganapathipule.	Ganapatipule	Ratnagiri	Ratnagiri
2814	Sea	Sea water at Bhagwati Bunder, Ratnagiri near Ultra Tech Cement Jetty.	Mirkarwada	Ratnagiri	Ratnagiri
2815	Madvi sea	Madvi sea water at Ratnagiri near Jodhale Maruti Temple.	Madvigaon	Ratnagiri	Ratnagiri

Spatial map of WQI for Sea and Creek Water (April 2013)



Spatial map of WQI for Sea and Creek Water (December 2013)



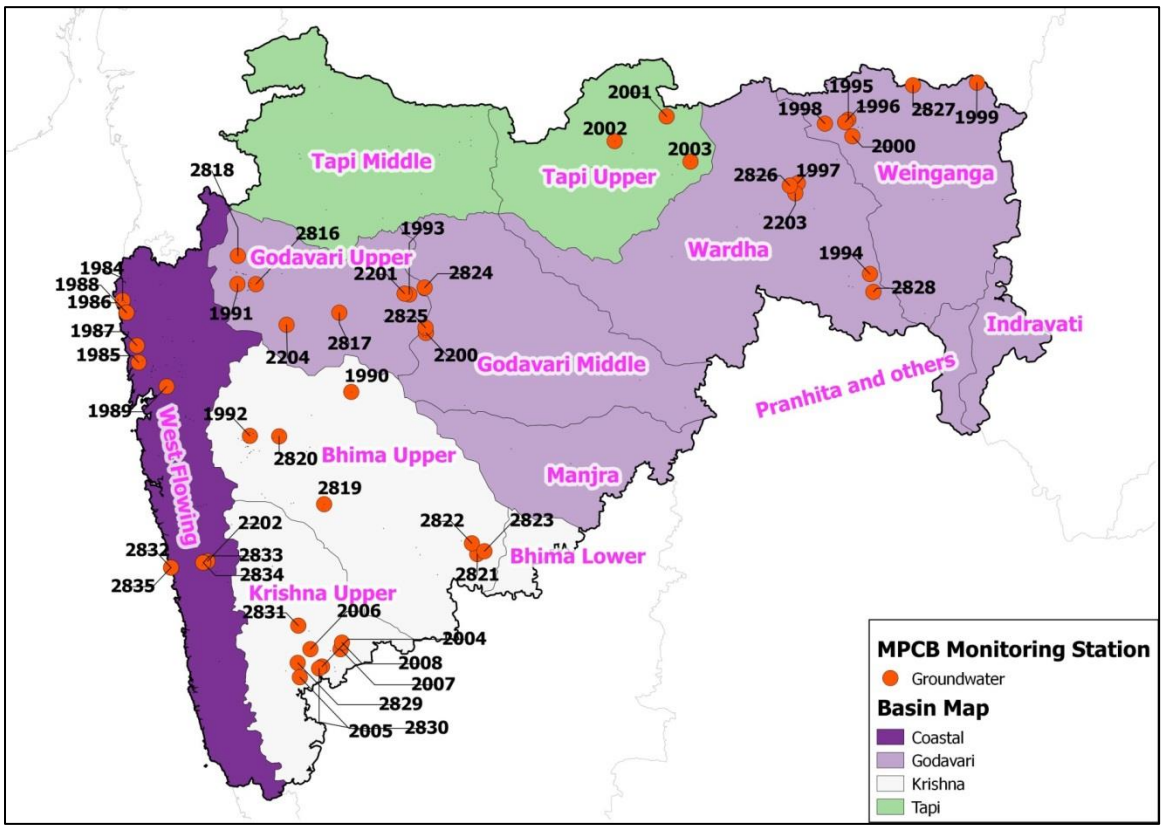
Groundwater Quality

Groundwater comprises of water located beneath the earth's surface in soil pore spaces and aquifers which form due to formation of cracks in the rocks. Groundwater is recharged from rain and surface water and is a unique and at times the only source for water supply in regions where centralized water supply is not available.

The geographical area of Maharashtra state is 308 lakh ha and its cultivable area is 225 lakh ha. Out of this, 40% of the area is drought prone[15]. Given such a large area of the state being drought prone dependence on groundwater is very high for agricultural and domestic use. Hence monitoring of groundwater is very essential.

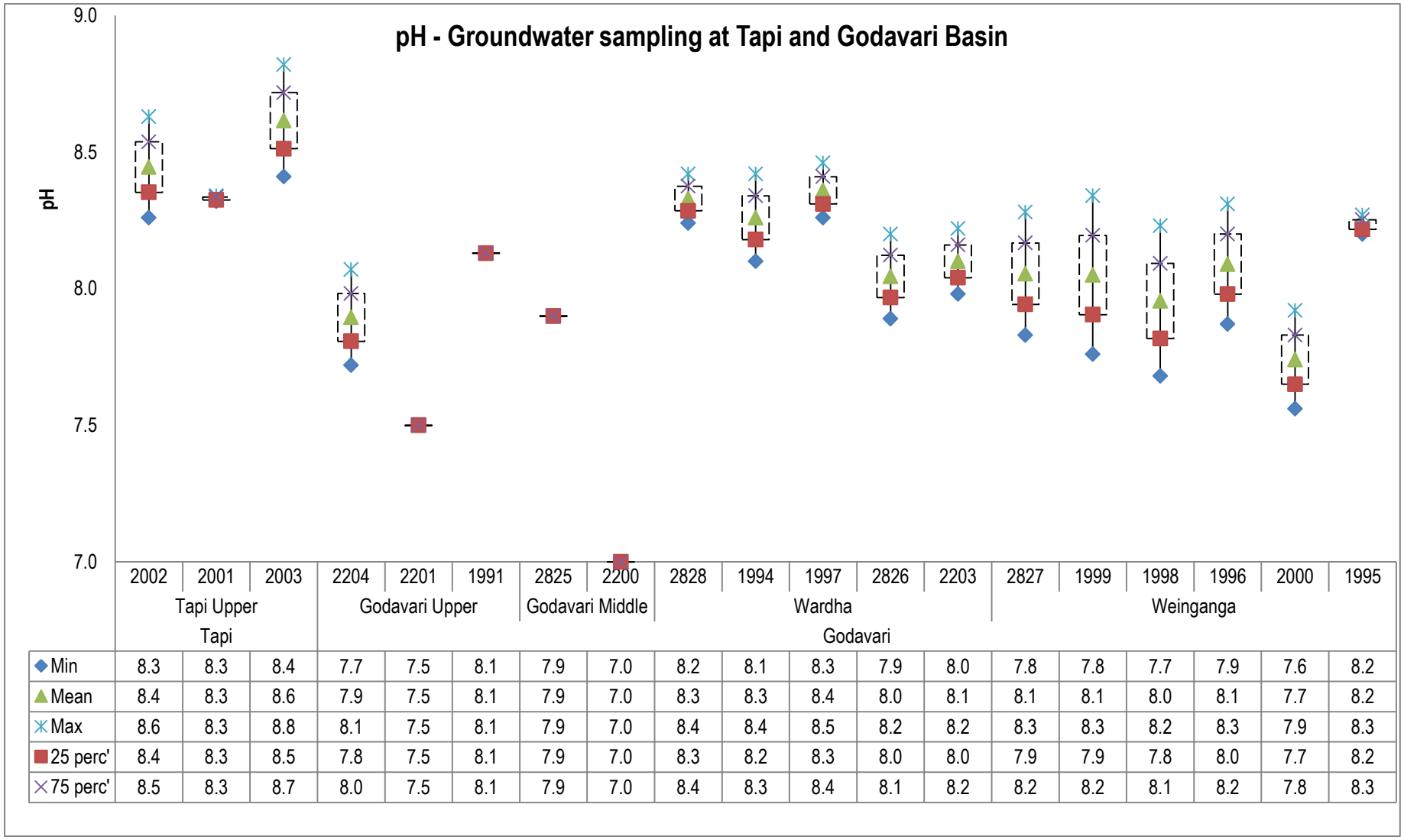
In Maharashtra CGWB (Central Ground Water Board), GSDA (Groundwater Survey and Development Agency) and MPCB, monitor the ground water quality across various districts of the state. MPCB has 50 ground water monitoring stations which monitor water quality twice a year for parameters like pH, Nitrate, TDS, Hardness, Fluoride, microbial content, Sulphates and so on.

The network of the monitoring stations is spatially presented in Map No. 8 and the parametric values for the pH, Nitrate, Flouride and hardness in terms of $CaCO_3$ is presented in the following section. The illustrations have been clubbed basin wise for convenience in presentation.



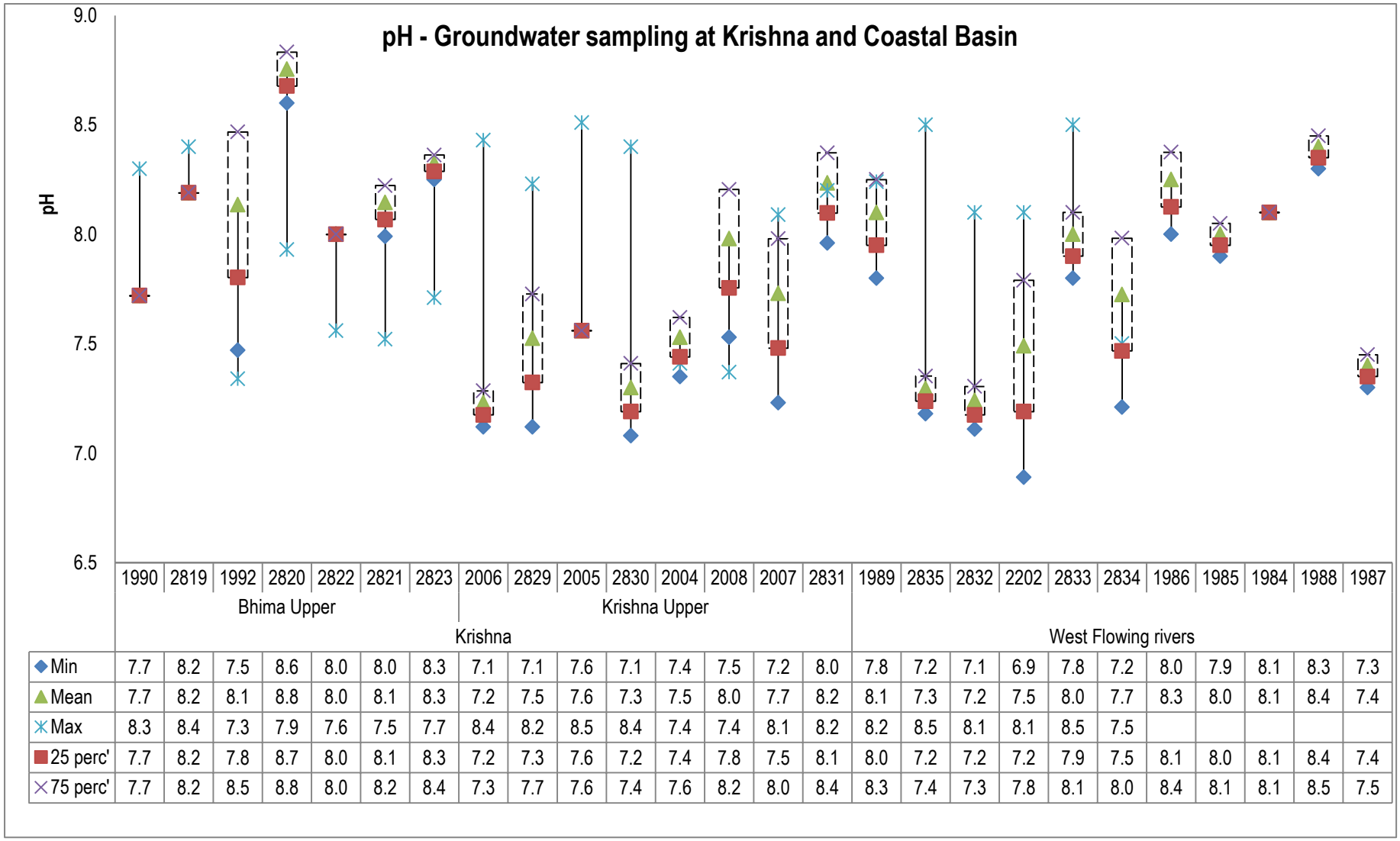
Map No. 8: Network of Groundwater quality monitoring stations monitored by MPCB in Maharashtra

[15] Maharashtra Water Resources Regulatory Authority, http://www.mwrra.org/introduction.php?link=wr



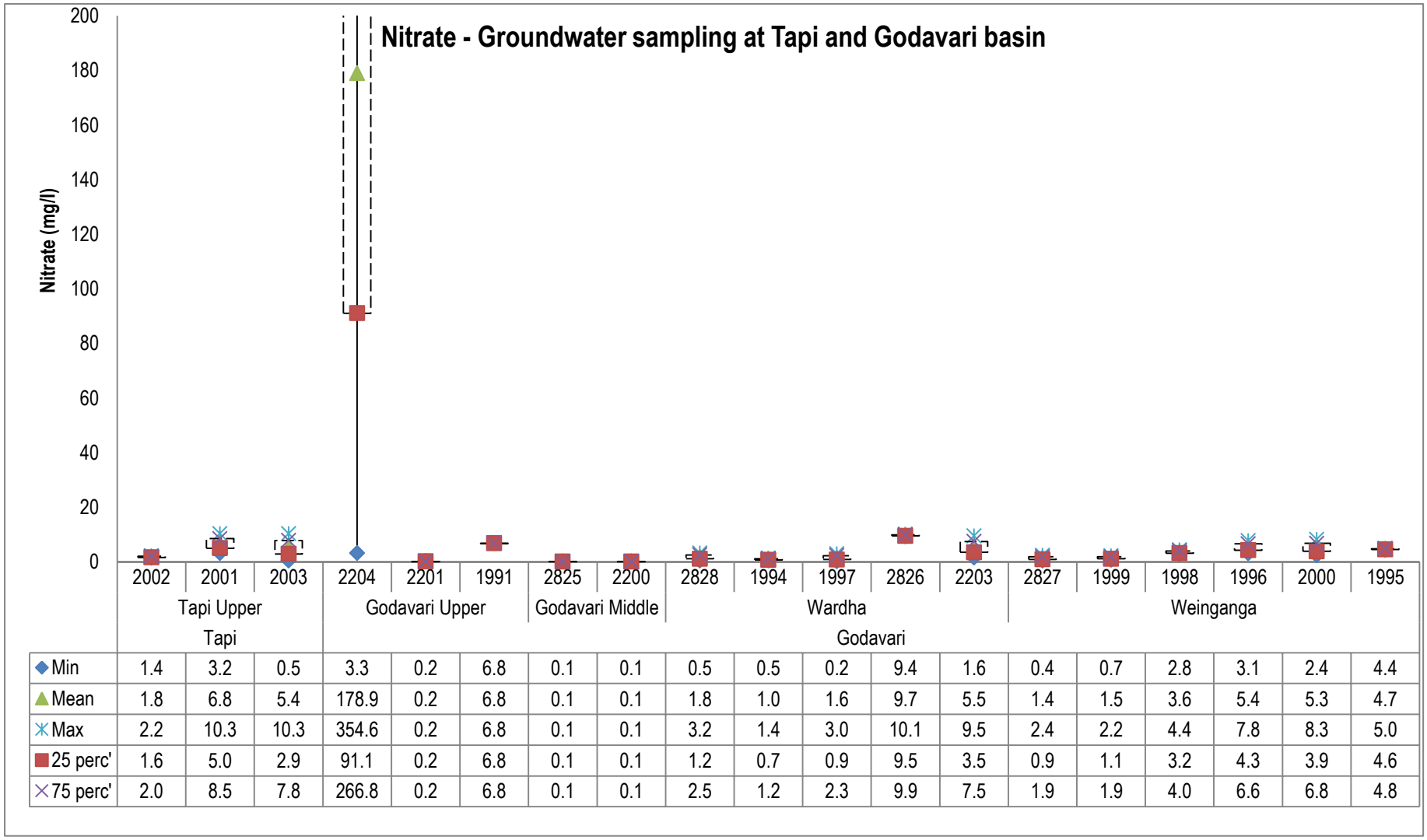
	2002	2001	2003	2204	2201	1991	2825	2200	2828	1994	1997	2826	2203	2827	1999	1998	1996	2000	1995
	Tapi Upper			Godavari Upper			Godavari Middle		Wardha					Weinganga					
	Tapi			Godavari															
Min	8.3	8.3	8.4	7.7	7.5	8.1	7.9	7.0	8.2	8.1	8.3	7.9	8.0	7.8	7.8	7.7	7.9	7.6	8.2
Mean	8.4	8.3	8.6	7.9	7.5	8.1	7.9	7.0	8.3	8.3	8.4	8.0	8.1	8.1	8.1	8.0	8.1	7.7	8.2
Max	8.6	8.3	8.8	8.1	7.5	8.1	7.9	7.0	8.4	8.4	8.5	8.2	8.2	8.3	8.3	8.2	8.3	7.9	8.3
25 perc'	8.4	8.3	8.5	7.8	7.5	8.1	7.9	7.0	8.3	8.2	8.3	8.0	8.0	7.9	7.9	7.8	8.0	7.7	8.2
75 perc'	8.5	8.3	8.7	8.0	7.5	8.1	7.9	7.0	8.4	8.3	8.4	8.1	8.2	8.2	8.2	8.1	8.2	7.8	8.3

Figure No. 45: Parametric values of pH recorded at WQMS monitoring groundwater in Tapi and Godavari basin



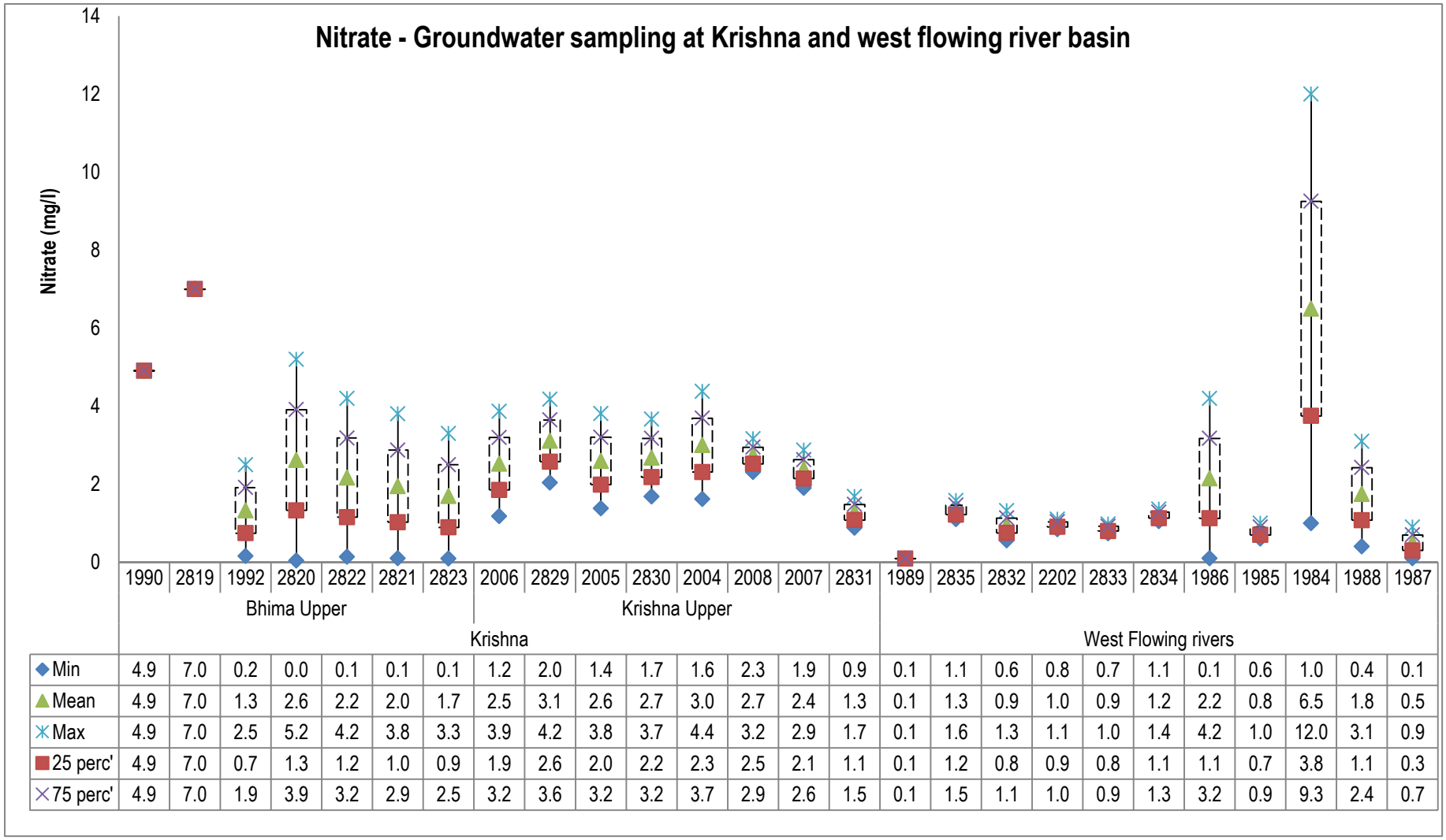
	1990	2819	1992	2820	2822	2821	2823	2006	2829	2005	2830	2004	2008	2007	2831	1989	2835	2832	2202	2833	2834	1986	1985	1984	1988	1987
	Bhima Upper							Krishna Upper								West Flowing rivers										
	Krishna																									
Min	7.7	8.2	7.5	8.6	8.0	8.0	8.3	7.1	7.1	7.6	7.1	7.4	7.5	7.2	8.0	7.8	7.2	7.1	6.9	7.8	7.2	8.0	7.9	8.1	8.3	7.3
Mean	7.7	8.2	8.1	8.8	8.0	8.1	8.3	7.2	7.5	7.6	7.3	7.5	8.0	7.7	8.2	8.1	7.3	7.2	7.5	8.0	7.7	8.3	8.0	8.1	8.4	7.4
Max	8.3	8.4	7.3	7.9	7.6	7.5	7.7	8.4	8.2	8.5	8.4	7.4	7.4	8.1	8.2	8.2	8.5	8.1	8.1	8.5	7.5					
25 perc'	7.7	8.2	7.8	8.7	8.0	8.1	8.3	7.2	7.3	7.6	7.2	7.4	7.8	7.5	8.1	8.0	7.2	7.2	7.2	7.9	7.5	8.1	8.0	8.1	8.4	7.4
75 perc'	7.7	8.2	8.5	8.8	8.0	8.2	8.4	7.3	7.7	7.6	7.4	7.6	8.2	8.0	8.4	8.3	7.4	7.3	7.8	8.1	8.0	8.4	8.1	8.1	8.5	7.5

Figure No. 46: Parametric values of pH recorded at WQMS monitoring groundwater in Krishna and west flowing river basin



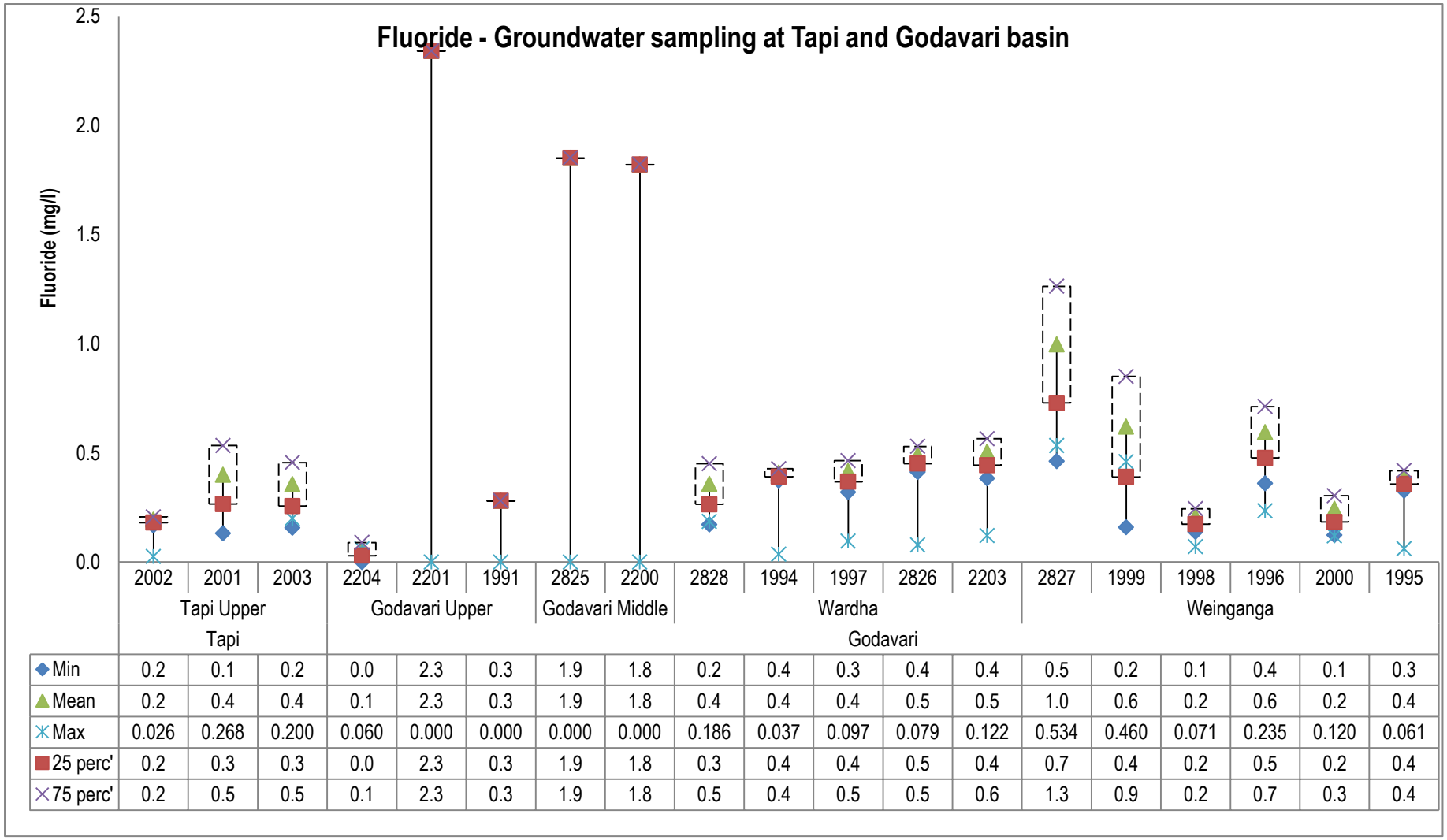
	2002	2001	2003	2204	2201	1991	2825	2200	2828	1994	1997	2826	2203	2827	1999	1998	1996	2000	1995
	Tapi Upper Tapi			Godavari Upper			Godavari Middle		Wardha Godavari					Weinganga					
Min	1.4	3.2	0.5	3.3	0.2	6.8	0.1	0.1	0.5	0.5	0.2	9.4	1.6	0.4	0.7	2.8	3.1	2.4	4.4
Mean	1.8	6.8	5.4	178.9	0.2	6.8	0.1	0.1	1.8	1.0	1.6	9.7	5.5	1.4	1.5	3.6	5.4	5.3	4.7
Max	2.2	10.3	10.3	354.6	0.2	6.8	0.1	0.1	3.2	1.4	3.0	10.1	9.5	2.4	2.2	4.4	7.8	8.3	5.0
25 perc'	1.6	5.0	2.9	91.1	0.2	6.8	0.1	0.1	1.2	0.7	0.9	9.5	3.5	0.9	1.1	3.2	4.3	3.9	4.6
75 perc'	2.0	8.5	7.8	266.8	0.2	6.8	0.1	0.1	2.5	1.2	2.3	9.9	7.5	1.9	1.9	4.0	6.6	6.8	4.8

Figure No. 47: Parametric values of Nitrate recorded at WQMS monitoring groundwater in Tapi and Godavari basin



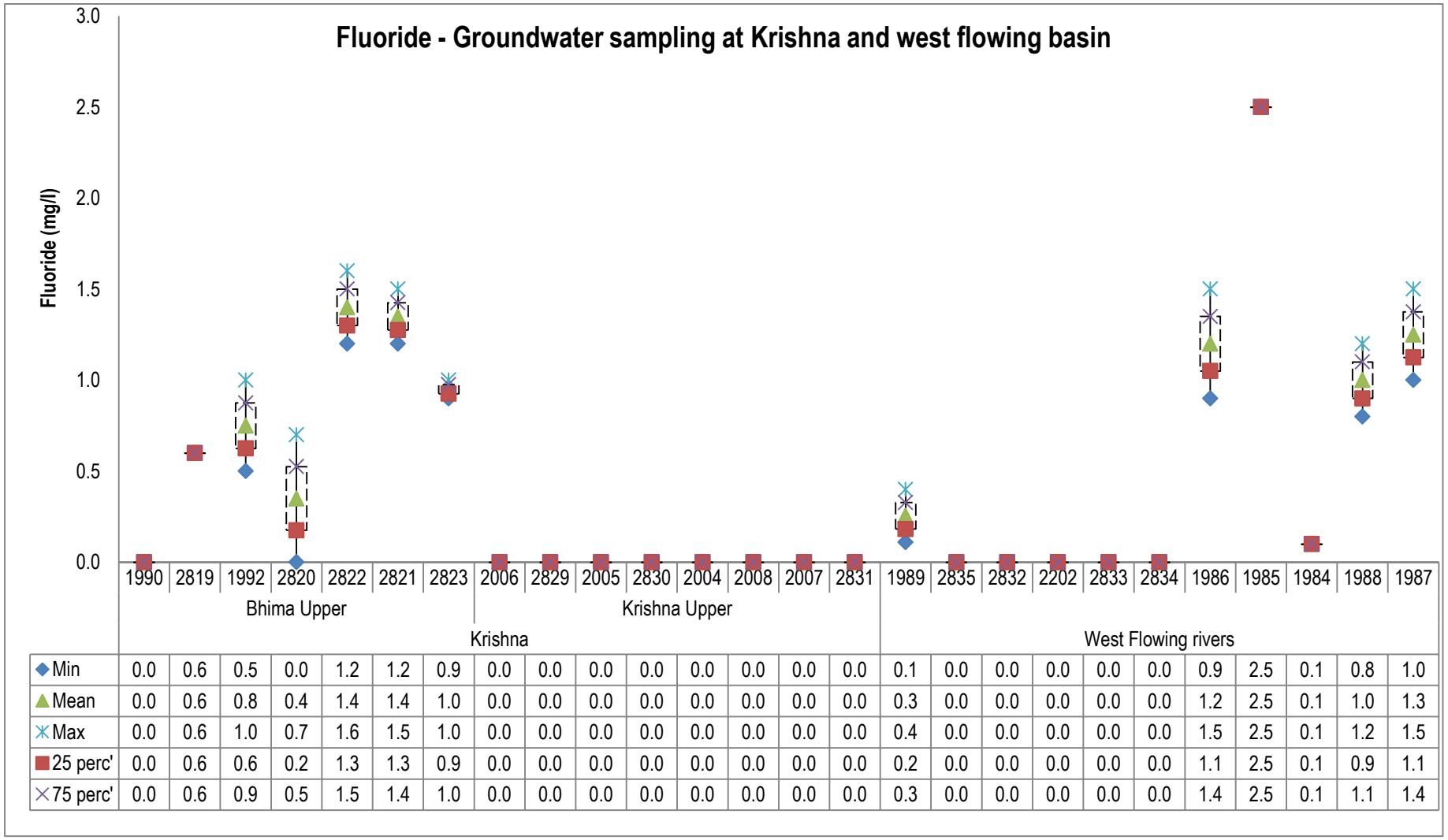
	1990	2819	1992	2820	2822	2821	2823	2006	2829	2005	2830	2004	2008	2007	2831	1989	2835	2832	2202	2833	2834	1986	1985	1984	1988	1987
Min	4.9	7.0	0.2	0.0	0.1	0.1	0.1	1.2	2.0	1.4	1.7	1.6	2.3	1.9	0.9	0.1	1.1	0.6	0.8	0.7	1.1	0.1	0.6	1.0	0.4	0.1
Mean	4.9	7.0	1.3	2.6	2.2	2.0	1.7	2.5	3.1	2.6	2.7	3.0	2.7	2.4	1.3	0.1	1.3	0.9	1.0	0.9	1.2	2.2	0.8	6.5	1.8	0.5
Max	4.9	7.0	2.5	5.2	4.2	3.8	3.3	3.9	4.2	3.8	3.7	4.4	3.2	2.9	1.7	0.1	1.6	1.3	1.1	1.0	1.4	4.2	1.0	12.0	3.1	0.9
25 perc'	4.9	7.0	0.7	1.3	1.2	1.0	0.9	1.9	2.6	2.0	2.2	2.3	2.5	2.1	1.1	0.1	1.2	0.8	0.9	0.8	1.1	1.1	0.7	3.8	1.1	0.3
75 perc'	4.9	7.0	1.9	3.9	3.2	2.9	2.5	3.2	3.6	3.2	3.2	3.7	2.9	2.6	1.5	0.1	1.5	1.1	1.0	0.9	1.3	3.2	0.9	9.3	2.4	0.7

Figure No. 48: Parametric values of Nitrate recorded at WQMS monitoring groundwater in Krishna and west flowing river basin



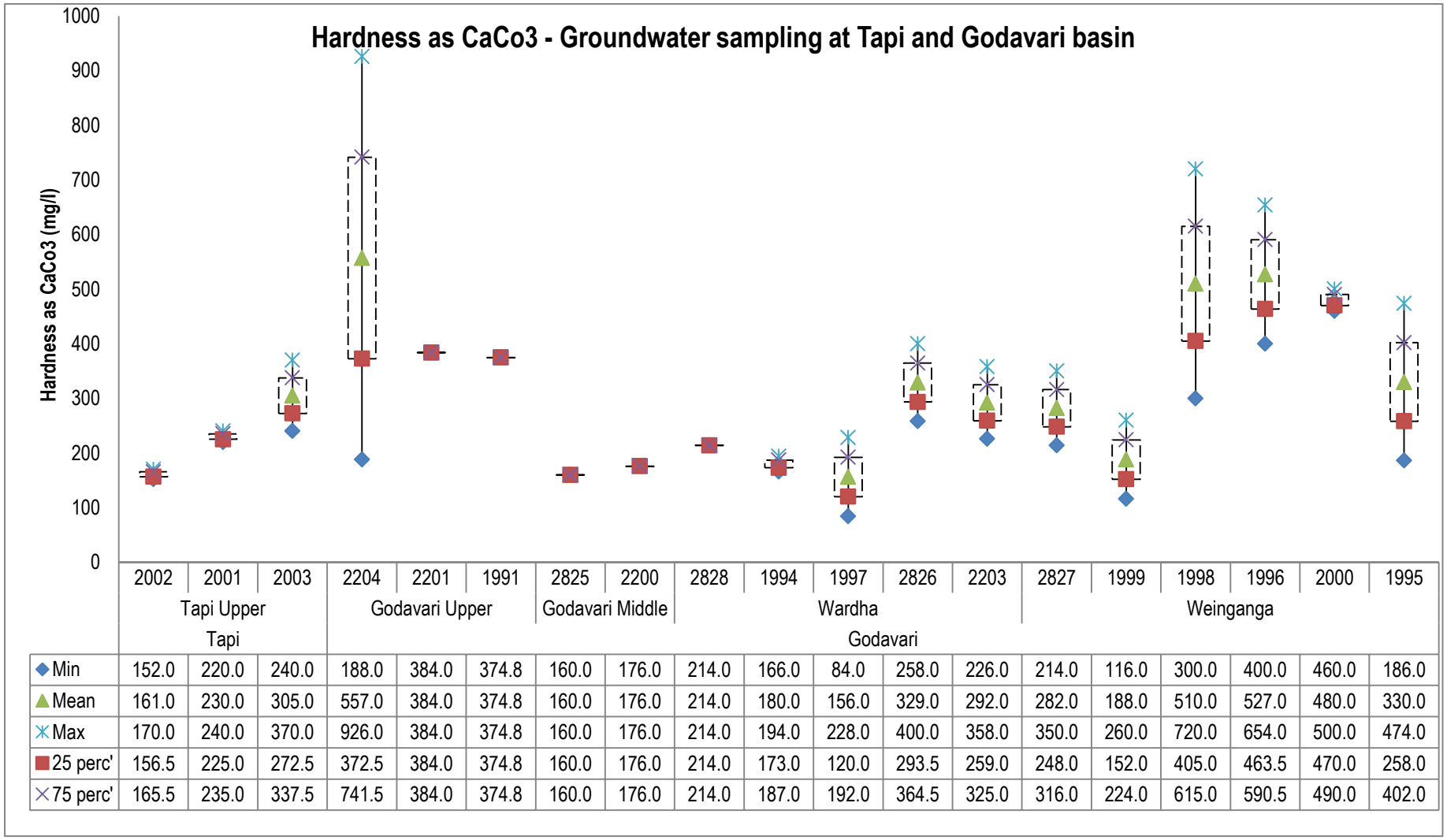
	2002	2001	2003	2204	2201	1991	2825	2200	2828	1994	1997	2826	2203	2827	1999	1998	1996	2000	1995
	Tapi Upper Tapi			Godavari Upper			Godavari Middle		Wardha					Weinganga					
	Godavari																		
Min	0.2	0.1	0.2	0.0	2.3	0.3	1.9	1.8	0.2	0.4	0.3	0.4	0.4	0.5	0.2	0.1	0.4	0.1	0.3
Mean	0.2	0.4	0.4	0.1	2.3	0.3	1.9	1.8	0.4	0.4	0.4	0.5	0.5	1.0	0.6	0.2	0.6	0.2	0.4
Max	0.026	0.268	0.200	0.060	0.000	0.000	0.000	0.000	0.186	0.037	0.097	0.079	0.122	0.534	0.460	0.071	0.235	0.120	0.061
25 perc'	0.2	0.3	0.3	0.0	2.3	0.3	1.9	1.8	0.3	0.4	0.4	0.5	0.4	0.7	0.4	0.2	0.5	0.2	0.4
75 perc'	0.2	0.5	0.5	0.1	2.3	0.3	1.9	1.8	0.5	0.4	0.5	0.5	0.6	1.3	0.9	0.2	0.7	0.3	0.4

Figure No. 49: Parametric values of Fluoride recorded at WQMS monitoring groundwater in Tapi and Godavari basin



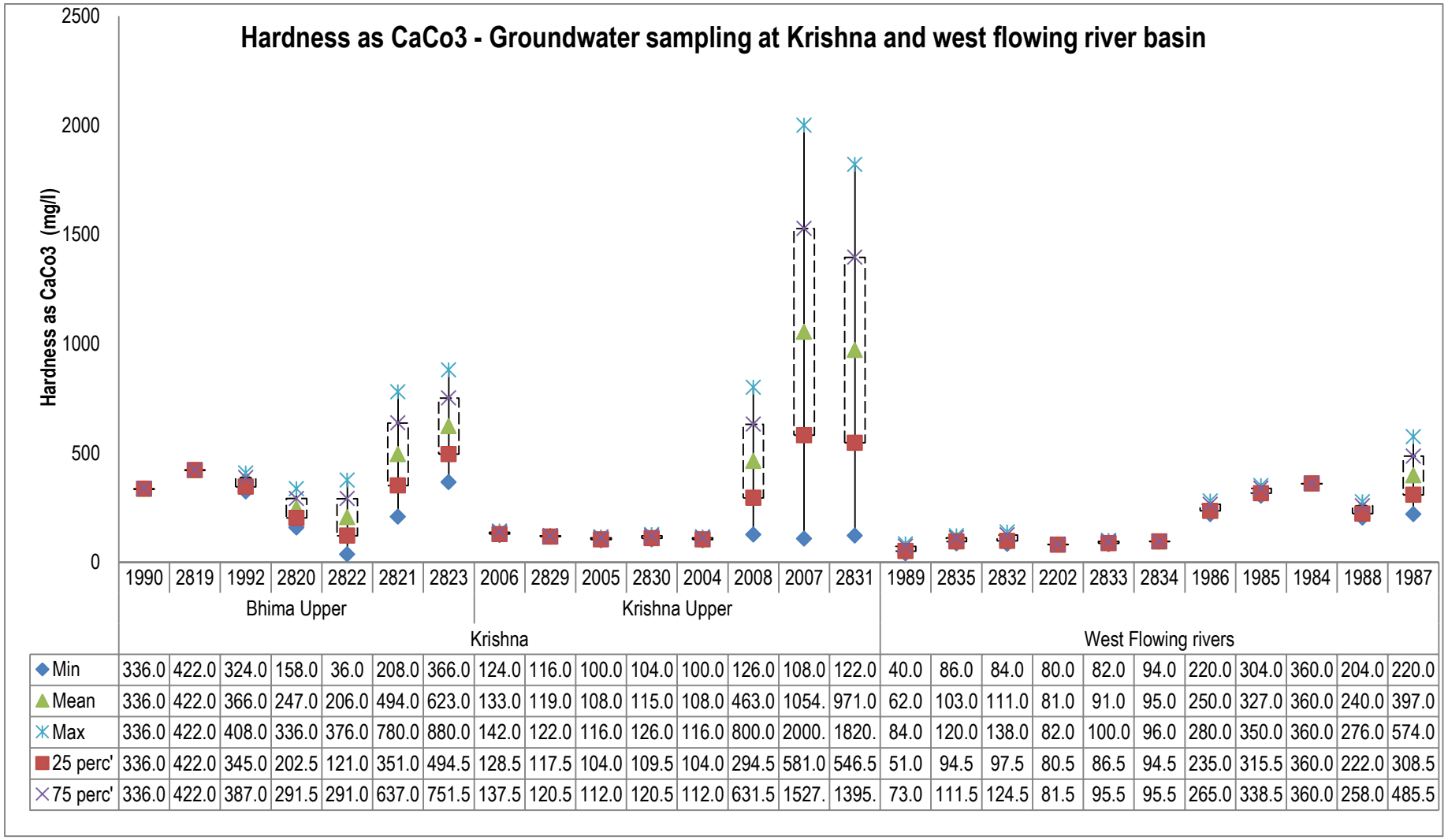
	1990	2819	1992	2820	2822	2821	2823	2006	2829	2005	2830	2004	2008	2007	2831	1989	2835	2832	2202	2833	2834	1986	1985	1984	1988	1987
Min	0.0	0.6	0.5	0.0	1.2	1.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.9	2.5	0.1	0.8	1.0
Mean	0.0	0.6	0.8	0.4	1.4	1.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.2	2.5	0.1	1.0	1.3
Max	0.0	0.6	1.0	0.7	1.6	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	1.5	2.5	0.1	1.2	1.5
25 perc'	0.0	0.6	0.6	0.2	1.3	1.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.1	2.5	0.1	0.9	1.1
75 perc'	0.0	0.6	0.9	0.5	1.5	1.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.4	2.5	0.1	1.1	1.4

Figure No. 50: Parametric values of Fluoride recorded at WQMS monitoring groundwater in Krishna and west flowing basin



	2002	2001	2003	2204	2201	1991	2825	2200	2828	1994	1997	2826	2203	2827	1999	1998	1996	2000	1995
	Tapi Upper Tapi			Godavari Upper			Godavari Middle		Wardha Godavari					Weinganga					
Min	152.0	220.0	240.0	188.0	384.0	374.8	160.0	176.0	214.0	166.0	84.0	258.0	226.0	214.0	116.0	300.0	400.0	460.0	186.0
Mean	161.0	230.0	305.0	557.0	384.0	374.8	160.0	176.0	214.0	180.0	156.0	329.0	292.0	282.0	188.0	510.0	527.0	480.0	330.0
Max	170.0	240.0	370.0	926.0	384.0	374.8	160.0	176.0	214.0	194.0	228.0	400.0	358.0	350.0	260.0	720.0	654.0	500.0	474.0
25 perc'	156.5	225.0	272.5	372.5	384.0	374.8	160.0	176.0	214.0	173.0	120.0	293.5	259.0	248.0	152.0	405.0	463.5	470.0	258.0
75 perc'	165.5	235.0	337.5	741.5	384.0	374.8	160.0	176.0	214.0	187.0	192.0	364.5	325.0	316.0	224.0	615.0	590.5	490.0	402.0

Figure No. 51: Parametric values of Hardness at $CaCO_3$ recorded at WQMS monitoring groundwater in Tapi and Godavari basin



	1990	2819	1992	2820	2822	2821	2823	2006	2829	2005	2830	2004	2008	2007	2831	1989	2835	2832	2202	2833	2834	1986	1985	1984	1988	1987
Min	336.0	422.0	324.0	158.0	36.0	208.0	366.0	124.0	116.0	100.0	104.0	100.0	126.0	108.0	122.0	40.0	86.0	84.0	80.0	82.0	94.0	220.0	304.0	360.0	204.0	220.0
Mean	336.0	422.0	366.0	247.0	206.0	494.0	623.0	133.0	119.0	108.0	115.0	108.0	463.0	1054.	971.0	62.0	103.0	111.0	81.0	91.0	95.0	250.0	327.0	360.0	240.0	397.0
Max	336.0	422.0	408.0	336.0	376.0	780.0	880.0	142.0	122.0	116.0	126.0	116.0	800.0	2000.	1820.	84.0	120.0	138.0	82.0	100.0	96.0	280.0	350.0	360.0	276.0	574.0
25 perc'	336.0	422.0	345.0	202.5	121.0	351.0	494.5	128.5	117.5	104.0	109.5	104.0	294.5	581.0	546.5	51.0	94.5	97.5	80.5	86.5	94.5	235.0	315.5	360.0	222.0	308.5
75 perc'	336.0	422.0	387.0	291.5	291.0	637.0	751.5	137.5	120.5	112.0	120.5	112.0	631.5	1527.	1395.	73.0	111.5	124.5	81.5	95.5	95.5	265.0	338.5	360.0	258.0	485.5

Figure No. 52: Parametric values of Hardness at $CaCO_3$ recorded at WQMS monitoring groundwater in Krishna and west flowing river basin

Water Quality Index for ground water in Tapi basin and Godavari basin (1 of 3)

Apr	73	32	89	82	75	56	38	64	61	66	15	NA	222	NA	257	181	NA	187	140	63	37	50	102	49	56	96
May	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	272	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oct	65	89	34	30	NA	50	66	40	89	62	NA	78	80	49	430	NA	179	232	NA	71	NA	59	15	NA	79	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	11-12	12-13	11-12	12-13	13-14	11-12	12-13
	2002			**2001**			**2003**			**2817**		**2204**			**2201**			**1993**		**2818**		**1991**			**2816**	
	Tapi Upper									**Godavari Upper**																

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 23: Ground water quality monitoring stations in Tapi basin and Godavari basin (1 of 3)

Station ID	Location of the Station	Village	Taluka	District
2002	Bore well Opp. Gajanan Maharaj Temple at Anjangaon road.	Anjangaon	Akot	Akola
2001	Tube well at water treatment plant of.Achalpur M.C, near Post Office.	Paratwada	Achalpur	Amravati
2003	Dug well at Plot No- 4, Street No. 49-C, at Nehru Bal Udyan Azad Maidan,	Yavatmal	Yavatmal	Yavatmal
2824	Dug well at Naregaon.	Naregaon	Aurangabad	Aurangabad
2817	Bore well at Chitali near Wagh vasthi.	Chitali	Rahata	Ahmadnagar
2204	Dug well at Gunjalwadi, Sangamner near Primary Health Care Center.	Gunjalwadi	Sangamner	Ahmadnagar
2201	Dug well at Ranjangaon.	Ranjangaon	Gangapur	Aurangabad
1993	Dug well at Pandarpur	Pandharpur	Gangapur	Aurangabad
2818	Bore well at M/s Spectron Ethers, Rasegaon near Siddeshwar Mahadev Mandir.	Rasegaon	Dindori	Nashik
1991	Bore well at MSW Site, Pathardi	Pathardi	Nashik	Nashik
2816	Dug well of Mr. Sampat Walunj, near M/s Mahajeet Clayton.	Shinde village	Nashik	Nashik

Water Quality Index for ground water in Tapi Basin and Godavari basin (2 of 3)

Apr	112	231	578	NA	727	781	NA	55	37	61	55	105	59	85	32	111	51	35	97	61	44	77
Oct	NA	562	NA	173	599	NA	147	NA	36	43	89	69	57	62	111	77	47	30	62	47	31	37
FY	**11-12**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**
	2824	**2825**			**2200**			**2828**			**1994**			**1997**			**2826**			**2203**		
	Godavari Middle							**Wardha**														

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 24: Ground water quality monitoring stations in Tapi basin and Godavari basin (2 of 3)

Station ID	Location of the Station	Village	Taluka	District
2824	Dug well at Naregaon.	Naregaon	Aurangabad	Aurangabad
2825	Bore well at Wahegaon, near Zilla Parishet School.	Wahegaon	Paithan	Aurangabad
2200	Bore well at Katpur, near Z.P School.	Katpur	Paithan	Aurangabad
2828	Dug well near Jilla Parishet Primary school, Visapur.	Visapur	Ballarpur	Chandrapur
1994	Dug well at TPS-Durgapur	Durgapur	Chandrapur	Chandrapur
1997	Bore well near Primary Health Centre.	Raipur	Hingna	Nagpur
2826	Dug well near Railway station, Cotton Market.	Wardha	Wardha	Wardha
2203	Hand Pump in the premises of Zilla Parishad Primary School.	Bhugaon	Wardha	Wardha

Water Quality Index for ground water in Tapi Basin and Godavari basin (3 of 3)

Apr	56	44	73	46	38	68	128	43	63	115	57	81	96	57	88	93	63	71
Oct	28	54	77	NA	42	76	58	41	103	124	69	102	69	72	78	66	48	49
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	2827			1999			1998			1996			2000			1995		
	Weinganga																	

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 25: Ground water quality monitoring stations in Tapi basin and Godavari basin (3 of 3)

Station ID	Location of the Station	Village	Taluka	District
2827	Bore well Near Railway crossing at Dongri Buzurg.	Dongri-Buzurg	Tumsar	Bandara
1999	Bore well Near Gram Panchayat office.	Changera	Gondia	Gondia
1998	Gram Panchayat Dug well near Gram Panchayat Office.	Brahmni	Kalmeshwar	Nagpur
1996	Gram Panchayath Dug well, Near Jagadamba G M S Mandir Sahakari Sanstha	Koradi	Kamptee	Nagpur
2000	Dug well near Sarode Kirana Store.	Bhandewadi	Nagpur	Nagpur
1995	Gram Panchayath Dug well , Near Balaji Gajbhiye House,	Khaperkheda	Saoner	Nagpur

Water Quality Index for ground water in Krishna Basin (1 of 2)

Apr	NA	92	NA	244	413	NA	68	164	95	45	NA	57	NA	448	67	NA	220	263	NA	490	248
May	NA	NA	NA	NA	NA	NA	NA	NA	NA	67	103	NA	NA	NA	NA	172	NA	NA	242	NA	NA
Jun	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	101	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jul	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aug	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sep	NA	NA	NA	NA	NA	NA	NA	NA	NA	109	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oct	72	NA	98	850	543	205	104	NA	130	162	71	111	222	169	210	151	31	165	279	158	129
Nov	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dec	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Feb	NA	NA	NA	NA	NA	NA	NA	NA	NA	139	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mar	NA	NA	NA	NA	NA	NA	NA	NA	NA	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FY	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**
	1990			**2819**			**1992**			**2820**			**2822**			**2821**			**2823**		
	Bhima Upper																				

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 26: Ground water quality monitoring stations in Krishna Basin (1 of 2)

Station ID	Location of the Station	Village	Taluka	District
1990	Bore well at BMW Site , Burudgaon	Burudgaon	Ahmednagar	Ahmadnagar
2819	Dug well owned by Shri Deshmukh.	Malegaon	Baramati	Pune
1992	Dug well at MSW Site, Pimpri-Chinchwad.	Moshi	Haveli	Pune
2820	Dug well owned by Shri Shivaji Baban Darekar	Sanaswadi	Shirur	Pune
2822	Bore well near Chincholi.	Chincholi	Mohol	Solapur
2821	Bore well at Bale railway station premises	Dahegaon	North Solapur	Solapur
2823	Bore well at Shete Vasti, near old Tuljapur road.	Shete vasthi, Tuljapur Naka	Solapur	Solapur

Water Quality Index for ground water in Krishna Basin (2 of 2)

Apr	124	24	29	58	30	29	76	144	34	100	27	32	91	148	62	256	201	268	333	257	946	227	333	887
Oct	127	69	46	71	53	53	89	102	115	97	33	40	97	134	134	149	222	84	124	315	160	114	42	33
FY	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**	**11-12**	**12-13**	**13-14**
	2006			**2829**			**2005**			**2830**			**2004**			**2008**			**2007**			**2831**		
	Krishna Upper																							

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 27: Ground water quality monitoring stations in Krishna Basin (2 of 2)

Station ID	Location of the Station	Village	Taluka	District
2006	Bore well at MIDC, Shiroli.	Shinoli	Chandgad	Kolhapur
2829	Bore well at MIDC Shiroli nearM/s Pratibha Enterprises.	Shiroli	Hatkanangale	Kolhapur
2005	Bore well at Khanjirenagar.	Khanjirenagar	Hatkanangale	Kolhapur
2830	Bore well at MIDC Gokul-Shirgaon.	Gokul-Shirgaon	Karvir	Kolhapur
2004	Bore well at Parvati Industrial Estate.	Yadrav	Shirol	Kolhapur
2007	Bore well at Savali, near Gram Panchayat office.	Savali	Miraj	Sangli
2831	Dug well at Sakharali, near MIDC Islampur near Krishna Milk Industry.	Sakharali	Walwa	Sangli

Water Quality Index for ground water in the West Flowing river Basin

Apr	NA	26	78	218	213	218	NA	53	NA	79	25	60	107	170	150	NA	NA	11	15	29	23	16	28	25	NA	94	18	124	28	21	47	78	21
Oct	72	NA	94	79	140	143	161	NA	93	73	NA	106	91	94	92	67	139	26	25	14	27	25	18	25	22	31	26	30	23	31	32	23	32
Mar	NA	NA	NA	NA	NA	NA	NA	NA	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FY	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14	11-12	12-13	13-14
	1986			**1985**			**1984**			**1988**			**1987**			**1989**			**2835**			**2832**			**2202**			**2833**			**2834**		
	West Flowing River Basin																																

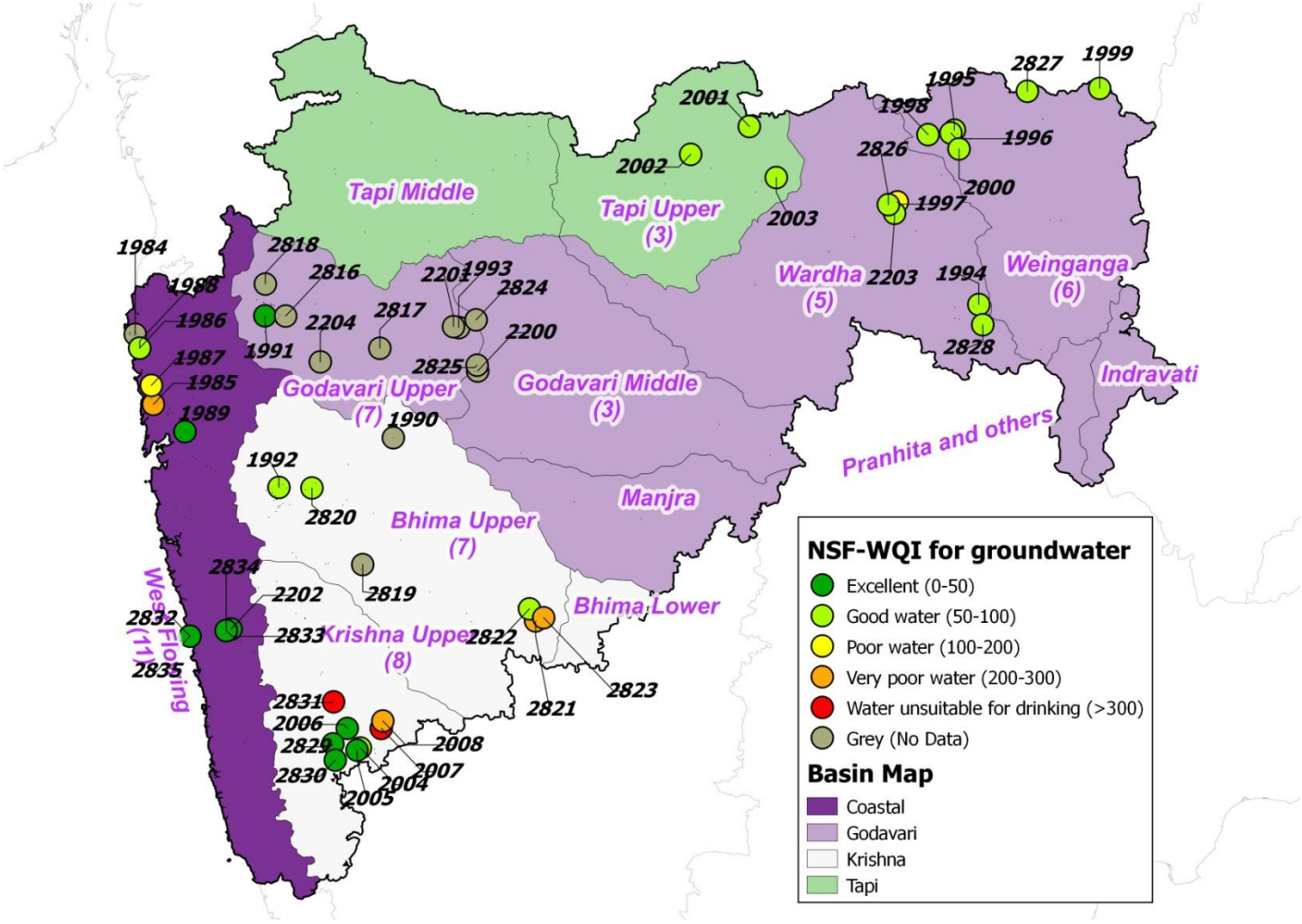
Legend

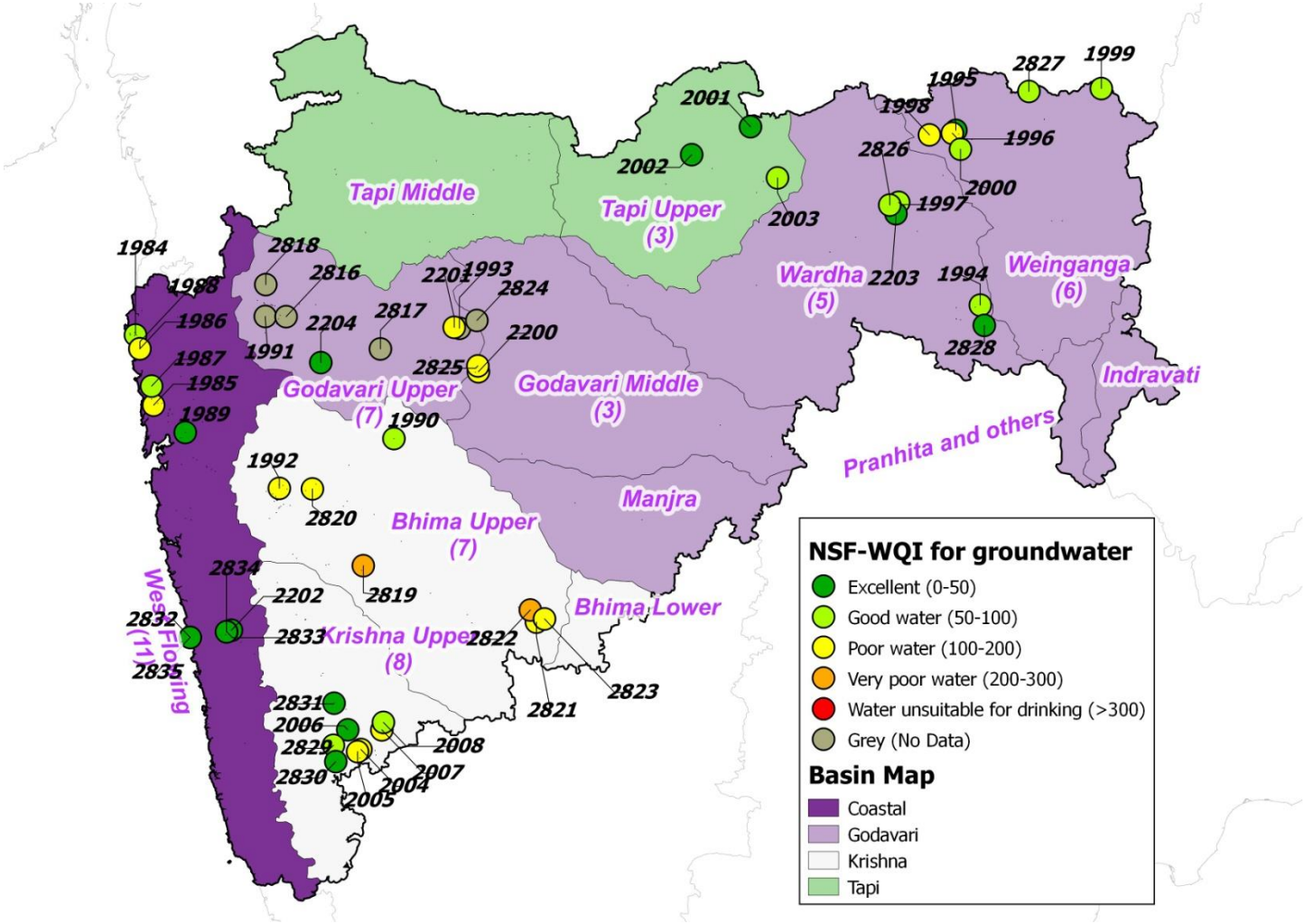
Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 28: Ground water quality monitoring stations in West Flowing river basin

Station ID	Location of the Station	Village	Taluka	District
1986	Bore well at Motapada	Motapada	Dahanu	Thane
1985	Dug well at 5 -Star Industrial estate	Kashimira	Mira-Bhayander	Thane
1984	Bore well at M/s Tata Iron &Steel Co.Ltd, S-76, (Indl.Estate,Tarapur)	MIDC Tarapur,	Palghar	Thane
1988	Bore well at Gharatwadi	Aliyali	Palghar	Thane
1987	Bore well at Vasai	Gokhiware	Vasai	Thane
1989	Bore well at MWML Site at Taloja	Karawla- Taloja	Panvel	Raigad
2835	Dug well No. 2, Gram Panchayat, Brahmanwadi- Anjanwel.	Anjanwel	Guhagar	Ratnagiri
2832	Dug well No.1 at Brahmanwadi-Anjanwel,owned by Shri. Vaidya.	Anjanwel	Guhagar	Ratnagiri
2202	Dug well at Ghane Kunt, near Awashi, owned by Shri.Rajendra Amre.	Ghane Kunt	Khed	Ratnagiri
2833	Dug well No.-1 at Group Gram Panchayat at Arketwadi, near Masjid	Arketwadi	Khed	Ratnagiri
2834	Dug well No.2 at Arketwadi.	Arketwadi	Khed	Ratnagiri

Spatial map for Ground WQI in Maharashtra 2012-13




Tapi Middle
Tapi Upper (3)
Wardha (5)
Weinganga (6)
Indravati
Pranhita and others
Godavari Upper (7)
Godavari Middle (3)
Manjra
Bhima Upper (7)
Bhima Lower
Krishna Upper (8)
West Flowing (11)
1984
1988
1986
1987
1985
1989
1991
2818
2816
2204
2817
2201
1993
2824
2200
2825
1990
1992
2820
2819
2834
2202
2832
2833
2835
2822
2821
2823
2831
2006
2829
2830
2008
2007
2004
2005
2001
2002
2003
2827
1999
1995
1998
1996
2826
2000
1997
2203
1994
2828
NSF-WQI for groundwater
Excellent (0-50)
Good water (50-100)
Poor water (100-200)
Very poor water (200-300)
Water unsuitable for drinking (>300)
Grey (No Data)
Basin Map
Coastal
Godavari
Krishna
Tapi

Conclusion

Industrialization and urbanization are the two major factors influencing the quality of water resources in Maharashtra. The surface water in vicinity of the urban areas was found to be most polluted.

Bhima upper sub-basin of Krishna Basin was recorded to be the most polluted among the four basins in Maharashtra in terms of surface water quality. Bhima, Mula, Mutha, Nira and Pawna rivers in the Bhima Upper-sub basin also recorded heavy pollution loads throughout the year. The Pawna river was recorded to be heavily polluted near the villages of Pimprigaon, Kasarwadi and Sagavigaon of Haveli taluka of Pune district. Similarly, the, nallahs at Thane (Rabodi, Colour Chem, Sandoz), were also recorded to be highly polluted through-out the year. These nallahs lie close to the coastline and could severely affect the water quality and the associated aquatic ecosystem.

Many of the major and rapidly growing cities like Vasai-Virar, Kalyan Dombivali, Mira-Bhayander lie in the MMR (Mumbai Metropolitan Region), along the Ulhas river, Vasai and Thane creek. The release of semi-treated domestic waste water is one of the major reasons for polluted rivers. To tackle this issue it is highly desired to have appropriate waste water treatment facilities to treat domestic and industrial waste water. Scientific and state of art sewage treatment facilities should be installed by major A class cities like Mumbai, Pune, Thane, and so on in the state.

In Maharashtra MPCB monitors groundwater quality at 50 WQMS, however given the fact that 40% of the state is drought prone it is evident that ground water reserves being banked upon to meet the demand. Hence more stations for groundwater quality should be installed especially in the Marathwada and Vidharba region.

Annex I – RO wise summary of WQI in 2013-14

The Maharashtra State government in 1981 adopted the Water (Prevention and Control of Pollution) Act 1974 and under this MPCB (Maharashtra Pollution Control Board) was established in the year 1981.

The main functions of MPCB are:

- To plan a comprehensive program for the prevention, control or abatement of pollution and secure executions thereof,
- To collect and disseminate information relating to pollution and the prevention, control or abatement thereof,
- To inspect sewage or trade effluent treatment and disposal facilities, and air pollution control systems and to review plans, specification or any other data relating to the treatment plants, disposal systems and air pollution control systems in connection with the consent granted,
- Supporting and encouraging the developments in the fields of pollution control, waste recycle reuse, eco-friendly practices etc.
- To educate and guide the entrepreneurs in improving environment by suggesting appropriate pollution control technologies and techniques
- To create public awareness about clean and healthy environment and attending the public complaints regarding pollution.

Being a highly industrialized, populated and urbanized state, Maharashtra has numerous sources which lead to water pollution, which have deteriorated the water quality of many river, seas, creeks, drains ground water and so on. Release of sewage, industrial waste water, and dumping of solid waste are the three major causes of water pollution.

Hence, to keep a constant vigilance MPCB has established 12 RO (Regional Offices) across the state to check and regulate the pollution levels with necessary control measures. MPCB implements a range of environmental legislation in the state and functions under the administrative control of Environment Department, Government of Maharashtra.

The following section presents the RO wise highlights on the status of the water quality monitoring network for the year 2011-12 and presents the gist of the water quality index for the respective stations for months of May and December.

RO – Amravati

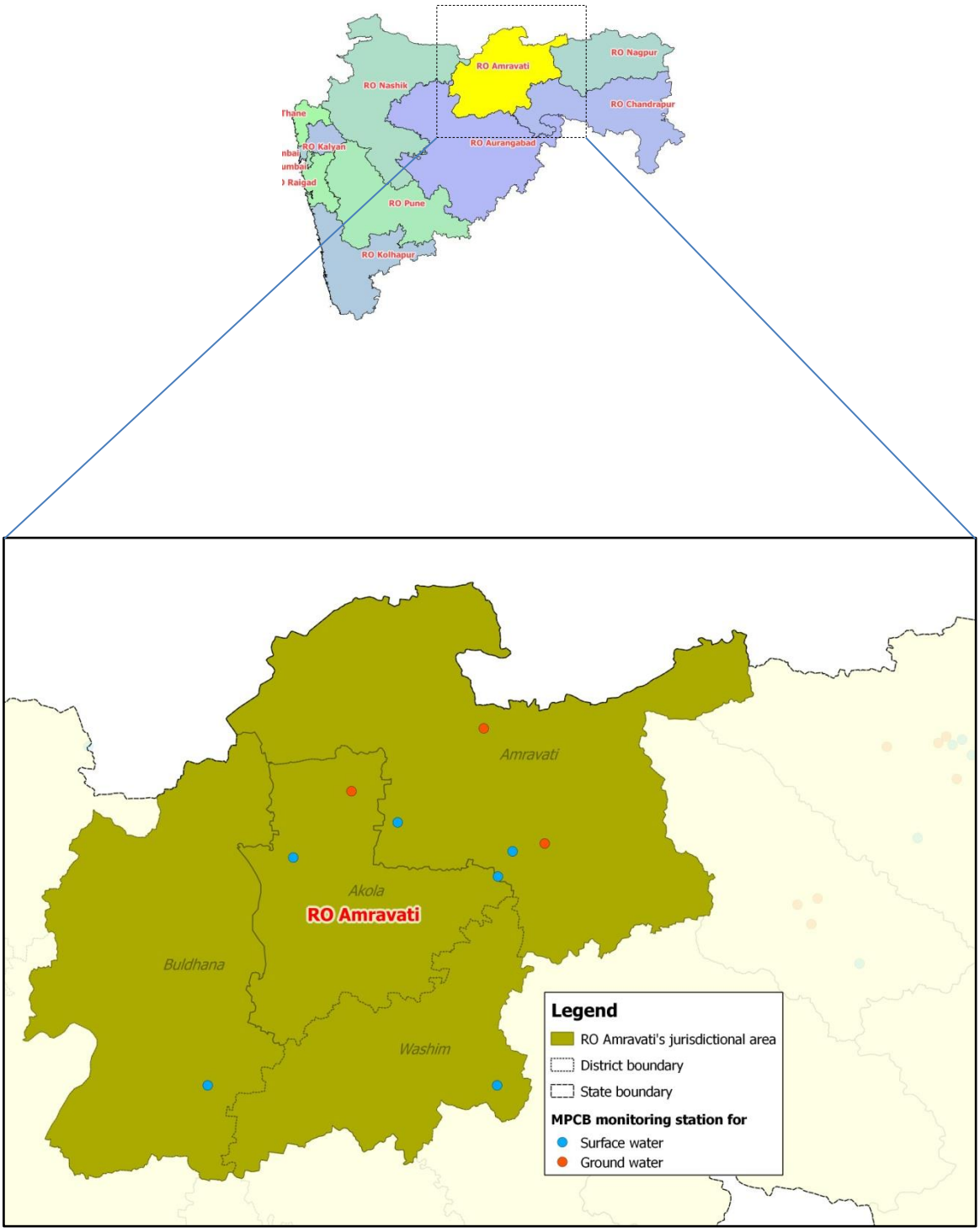

RO Amravati
RO Nagpur
RO Nashik
RO Chandrapur
RO Kalyan
RO Aurangabad
RO Pune
RO Kolhapur
Amravati
Akola
RO Amravati
Buldhana
Washim
Legend
RO Amravati's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No. 29: Water quality Index for surface and ground water monitoring at Amravati-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	1913	Purna river at Dhupeshwar at U/s of Malkapur water works.	Akola	Akola	Malkapur	48	61	54
	2155	Purna river at D/s of confluence of Morna and Purna, at Andura village.	Akola	Balapur	Andura	NA	47	45
	2675	Morna river at D/s of Railway bridge.	Akola	Akola	Akola	NA	57	41
	2695	Pedhi river near road bridge at Dadhi- Pedhi village.	Amravati	Chandur Bazar	Asegaon	46	52	49
	2699	Penganga river at Mehkar- Buldana road bridge.	Buldana	Mehkar	Mehkar	NA	49	53
	2700	Purna River near Achalpur-Amravati Road Bridge, Asegaon	Amravati	Chandur bazaar	Asegaon	NA	53	51
Groundwater	2001	Tube well at water treatment plant of M.C.Achalpur near Post Office.	Amravati	Achalpur	Paratwada	56	50	53
	2002	Bore well Opp. Gajanan Maharaj Temple at Anjangaon road.	Akola	Akot	Anjangaon	89	34	62
	2003	Dug well at Plot No- 4, Street No. 49-C, at Nehru Bal Udyan Azad Maidan, owned by Yavatmal M.C.	Yavatmal	Yavatmal	Nehru Bal Udyan Azad Maidan	61	89	75

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Aurangabad

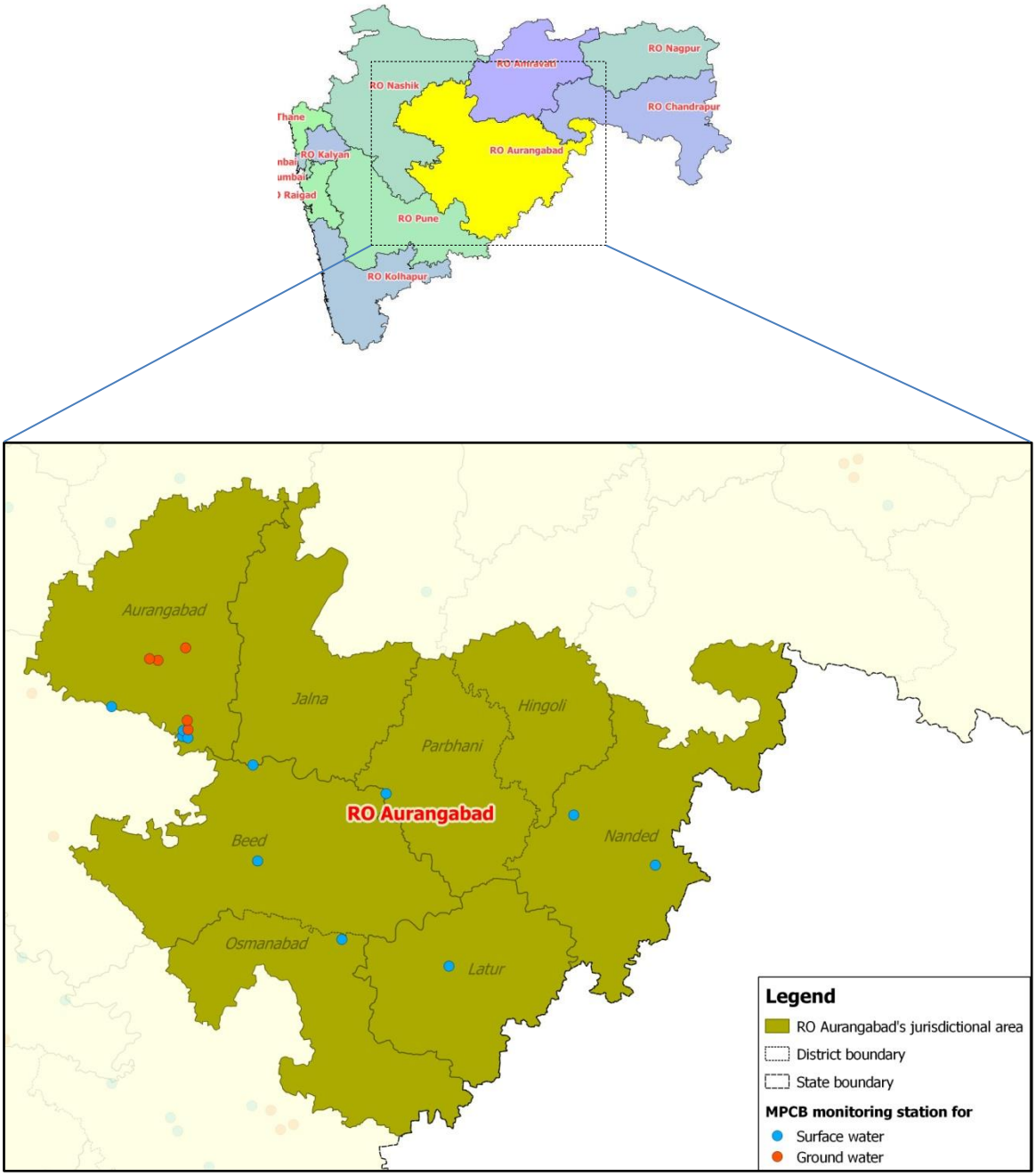


Table No. 30: Water quality Index for surface and ground water monitoring at Aurangabad-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	12	Godavari river at Dhalegaon	Parbhani	Pathari	Dhalegaon	57	72	75
	1209	Godavari river at Raher	Nanded	Nayagaon	Raher	78	79	80
	1210	Godavari river at Nanded near Intake water pump house.	Nanded	Nanded	Vishnupuri	72	81	79
	1312	Godavari river at Jaikwadi Dam, Paithan.	Aurangabad	Paithan	Paithan	74	77	79
	2157	Godavari river at Latur water intake near Pump house.	Osmanabad	Kalumb	Dhamegaon	79	82	78
	2158	Godavari river at U/s of Paithan at Paithan intake pump house..	Aurangabad	Paithan	Jayakwadi	83	82	78
	2159	Godavari river at D/s of Paithan at Pathegaon bridge.	Aurangabad	Paithan	Pathegaon	NA	81	79
	2160	Godavari river at U/s of Aurangabad Reservoir, Kaigaon Tokka near Kaigaon bridge.	Aurangabad	Gangapur	Kaigaon	NA	81	80
	2161	Godavari river at Jalna Intake water pump house, Shahabad.	Jalna	Ambad	Shahabad	NA	75	77
	2657	Bindusara river at Beed, near intake water pump house at Dam.	Beed	Beed	Paligaon	NA	77	78
	2673	Manjra river at D/s of Latur, near Latur- Nanded bridge..	Latur	Latur	Bhatkheda	NA	82	77
Groundwater	2200	Bore well at Katpur, near Z.PSchool.	Aurangabad	Paithan	Katpur	NA	147	147
	2201	Dug well at Ranjangaon	Aurangabad	Gangapur	Ranjangaon	NA	179	179
	2825	Bore well at Wahegaon, near Zilla Parishet School	Aurangabad	Paithan	Wahegaon	NA	173	173

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Chandrapur

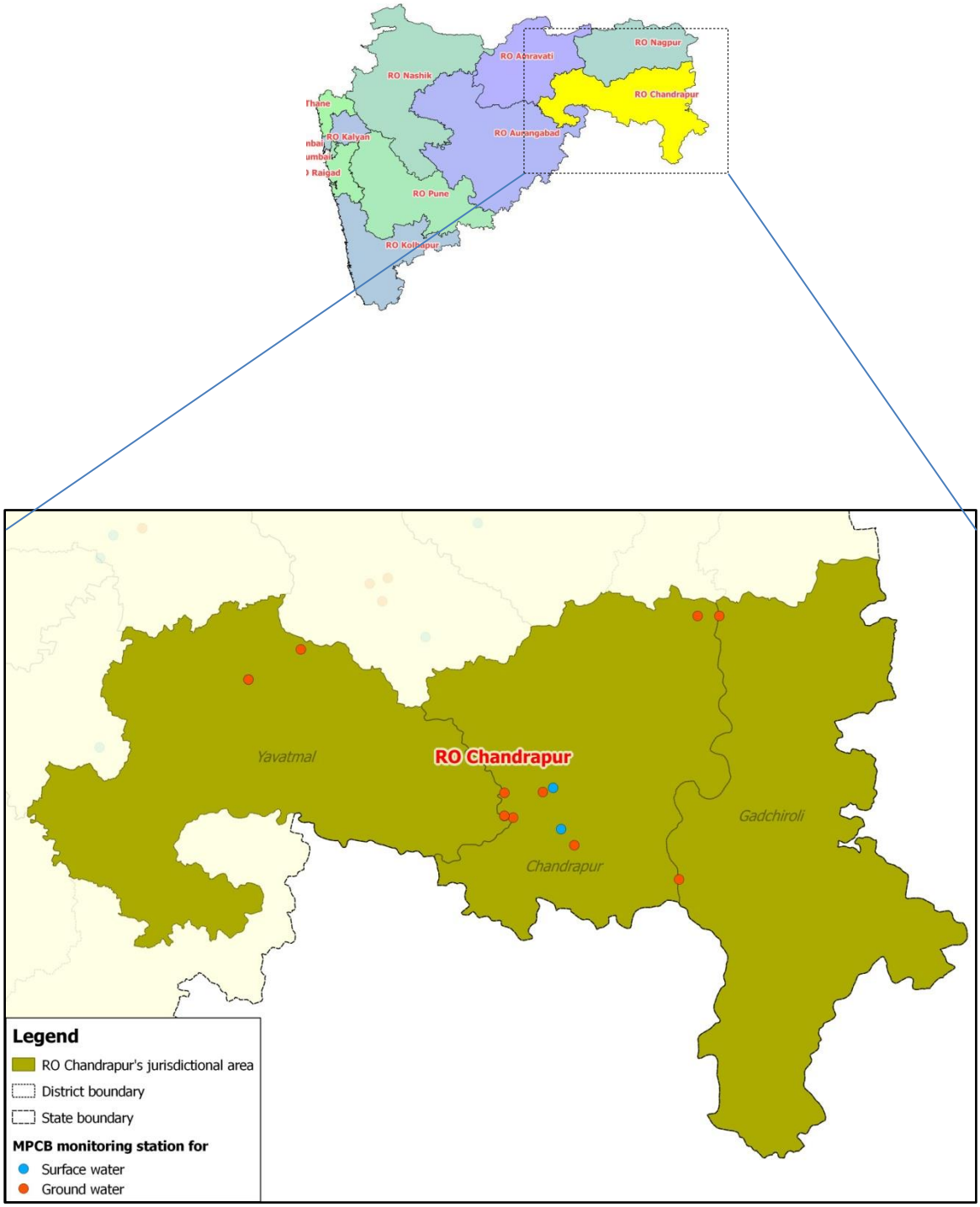


Table No. 31: Water quality Index for surface and ground water monitoring at Chandrapur-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	11	Wainganga river at Ashti	Chandrapur	Gondpipri	Ashti	NA	55	56
	1212	Wardha river at Rajura bridge	Chandrapur	Chandrapur	Rajura	57	55	54
	1315	Wardha river at PulgaonRailway Bridge	Wardha	wardha	Pulgaon	49	57	55
	2156	Wardha river at confluence point of Penganga & Wardha.	Yavatmal	Wani	Jugad	44	53	52
	2174	Wardha river at D/s of ACC Ltd, Ghugus near WCL pump house	Chandrapur	Chandrapur	Ghuggus	43	48	51
	2175	Wainganga at U/s of Gaurav Paper Mills, near jackwell.	Chandrapur	Chandrapur	Bramhpuri	59	54	57
	2176	Wainganga at D/s of Gaurav Paper Mills, near jack well.	Chandrapur	Chandrapur	Bramhpuri	47	49	48
	2697	Penganga river near water supply scheme of Umarkhed M.C.	Yavatmal	Umarkhed	Belkhed	51	57	55
	2698	Penganga river D/s of Isapur Dam	Yavatmal	Pusad	Isapur	59	51	55
	2719	Wardha river at D/s of Erai river at Hadasti near Arun Engg. Works	Chandrapur	Chandrapur	Hadasti	57	47	51
	2720	Wardha river at U/s of Erai river at Hadasti near Arun Engg. works	Chandrapur	Chandrapur	Hadasti	62	54	58
	2721	Wardha river at U/s of ACC Ltd, Ghuggus near WCL pump house	Chandrapur	Chandrapur	Ghuggus	59	57	58
Groundwater	1994	Dug well At TPS Durgapur near Naseeb Kirana & general Store.	Chandrapur	Chandrapur	Durgapur	59	57	58
	2828	Dug well near Zilla Parishet Primary school, At Visapur	Chandrapur	Ballarpur	Visapur	61	43	52

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Kalyan

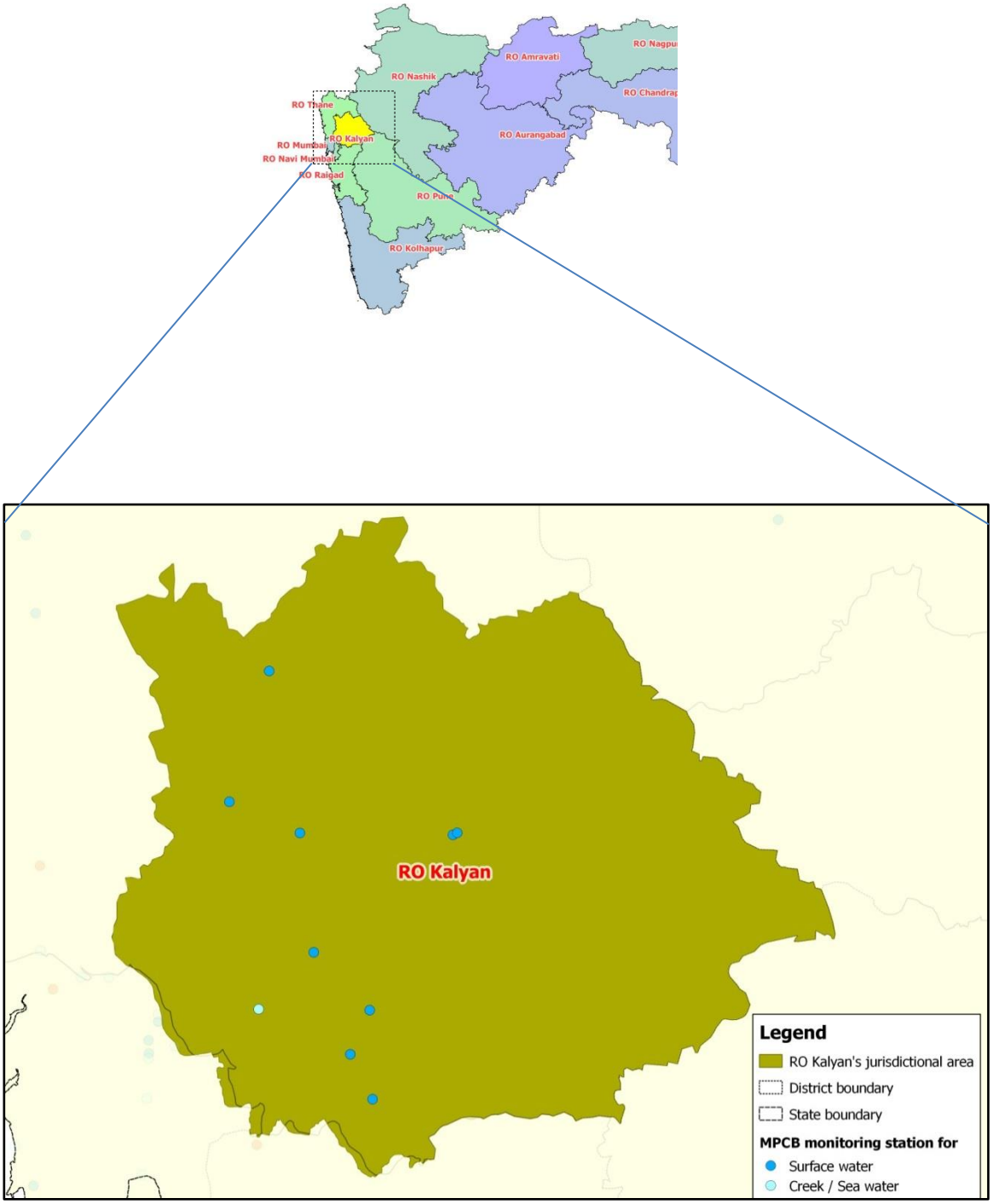

RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Thane
RO Kalyan
RO Aurangabad
RO Mumbai
RO Navi Mumbai
RO Raigad
RO Pune
RO Kolhapur
RO Kalyan
Legend
RO Kalyan's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water

Table No. 32: Water quality Index for surface and ground water monitoring at Kalyan-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	1092	Kalu river at Atale village	Thane	Kalyan	Atale	62	60	65
	1093	Ulhas river at U/s of NRC Bund,	Thane	Kalyan	Mohane	72	83	76
	1094	Ulhas river at U/s of Badlapur water works,	Thane	Ambernath	Kulgaon	78	87	80
	1461	Bhatsa river at D/s of Pise Dam	Thane	Bhiwandi	Pise	77	84	79
	2162	Ulhas River at Jambhul water works	Thane	Ambernath	Jambhul	82	83	81
	2653	Bhatsa river at D/s of Liberty Oil Mills	Thane	Shahapur	Satne	79	83	80
	2654	Bhatsa river at U/s of Liberty Oil Mills	Thane	Shahapur	Satne	76	78	79
	2709	Tansa River near Road bridge	Thane	Wada	Dakewali	80	83	79
	2712	Vaitarna river near Road bridge	Thane	Wada	Gandhare	78	85	81
Creek/sea	2791	Ulhas Creek at Reti Bunder at D/s of Kalyan-Bhiwandi bridge	Thane	Kalyan	Kalyan	50	55	61

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Kolhapur

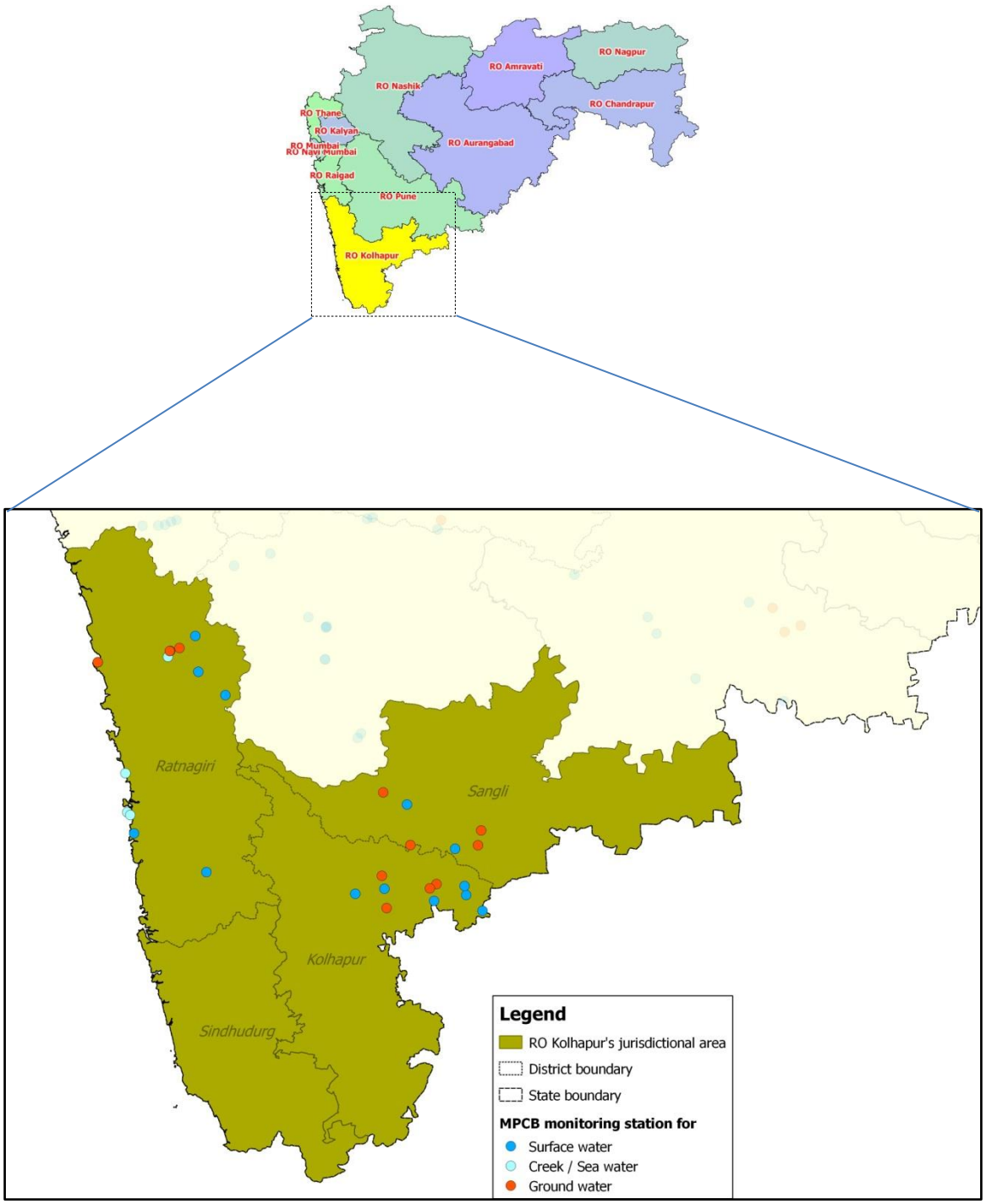

RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Thane
RO Kalyan
RO Mumbai
RO Navi Mumbai
RO Aurangabad
RO Raigad
RO Pune
RO Kolhapur
Ratnagiri
Sangli
Kolhapur
Sindhudurg
Legend
RO Kolhapur's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water
Ground water

Table No. 33: Water quality Index for surface and ground water monitoring at Kolhapur-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	37	Krishna river at Maighat, Sangli	Sangli	Miraj	Gawali gally	76	NA	76
	1153	Krishna river at Rajapur Weir	Kolhapur	Shirol	Rajapur	77	78	78
	1310	Krishna river at Kurundwad near Santaji Ghorpade Ghat.	Kolhapur	Shirol	Narshingwadi, Kurundwad	79	74	77
	1311	Panchaganga river at Ichalkaranji near MIDC intake well.	Kolhapur	Hatkanangale	Shiradhwad (Ichalkaranji ghat)	79	77	75
	1904	Panchaganga river at U/s of Kolhapur town near Balinga Pumping station.	Kolhapur	Karvir	Balinga	83	84	75
	1905	Panchaganga river at D/s of Kolhapur town at Gandhi nagar near NH-4 bridge and MIDC intake well.	Kolhapur	Kolhapur	Uchegaon	77	79	73
	1906	Krishna river at Walwa, D/s of Islampur near Vithal Temple.	Sangli	Walwa	Walwa	79	78	76
	2163	Panchganga River at Shirol near Shirol intake well	Kolhapur	Shirol	Shirol	82	77	78
	2164	Vashisti river at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt. Ltd..	Ratnagiri	Chiplun	Kherdi	84	81	82
	2676	Muchkundi river at Waked, Ratnagiri, near M/s Asahi Maharashtra Glass Ltd	Ratnagiri	Lanja	Waked	82	76	79
	2713	Vashisti river at D/s of Three M Paper Mills near Chiplun water intake jackwell.	Ratnagiri	Chiplun	Kherdi	89	80	81
	2714	Vashisti river at U/s of Pophali near Konphansawane bridge.	Ratnagiri	Chiplun	Pophali	90	75	82
	2790	Pimpal-Paneri nalla at Ratnagiri near Finolex Industries.	Ratnagiri	Ratnagiri	Yahganigaon	48	81	65

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
Creek/sea	2804	Karambavane creek at Chiplun.	Ratnagiri	Chiplun	Karambavane	86	78	79
	2813	Sea Water at Ganapathipule.	Ratnagiri	Ratnagiri	Ganapatipule	77	74	76
	2814	Sea water at Bhagwati Bunder, Ratnagiri near Ultra Tech Cement Jetty.	Ratnagiri	Ratnagiri	Mirkarwada	75	73	75
	2815	Madvi sea water at Ratnagiri near Jodhale Maruti Temple.	Ratnagiri	Ratnagiri	Madvigaon	75	77	76
Groundwater	2004	Bore well at Parvati Industrial Estate, Yadrav, Kolhapur	Kolhapur	Shirol	Yadrav	62	134	98
	2005	Bore well at Khanjirenagar, Kolhapur	Kolhapur	Hatkanan gale	Khanjirenagar	34	115	75
	2006	Bore well at Shinoli near M/s Aqua Alloy Steel.	Kolhapur	Chandgad	Shinoli	29	46	37
	2007	Bore well at Savali, near Gram Panchayat office.	Sangli	Miraj	Savali	946	160	553
	2008	Dug well at Sambarwadi, owned by Shri. Kishan Hali Rajput.	Sangli	Miraj	Sambarwadi	268	84	176
	2202	Dug well at Ghane Kunt, near Awashi, owned by Shri.Rajendra Amre.	Ratnagiri	Khed	Ghane Kunt	18	26	22
	2829	Bore well at MIDC Shiroli near M/s Pratibha Enterprises.	Kolhapur	Hatkanan gale	Shiroli	29	53	41
	2830	Bore well at MIDC Gokul-Shirgaon.	Kolhapur	Karvir	Gokul-Shirgaon	32	40	36
	2831	Dug well at Sakharali, near MIDC Islampur near Krishna Milk Industry.	Sangli	Walwa	Sakharali	887	33	460

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	2832	Dug well No. 1 at Brahmanwadi-Anjanwel, owned by Shri. Vaidya.	Ratnagiri	Guhagar	Anjanwel	25	25	25
	2833	Dug well-No.-1 owned by Group Gram Panchayat Arketwadi, near Masjid .	Ratnagiri	Khed	Arketwadi	21	31	26
	2834	Dug well No.2 at Arketwadi	Ratnagiri	Khed	Arketwadi	21	32	26
	2835	Dug well No. 2, owned by Group Gram Panchayat, Brahmanwadi- Anjanwel	Ratnagiri	Guhagar	Anjanwel	23	27	25

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Mumbai

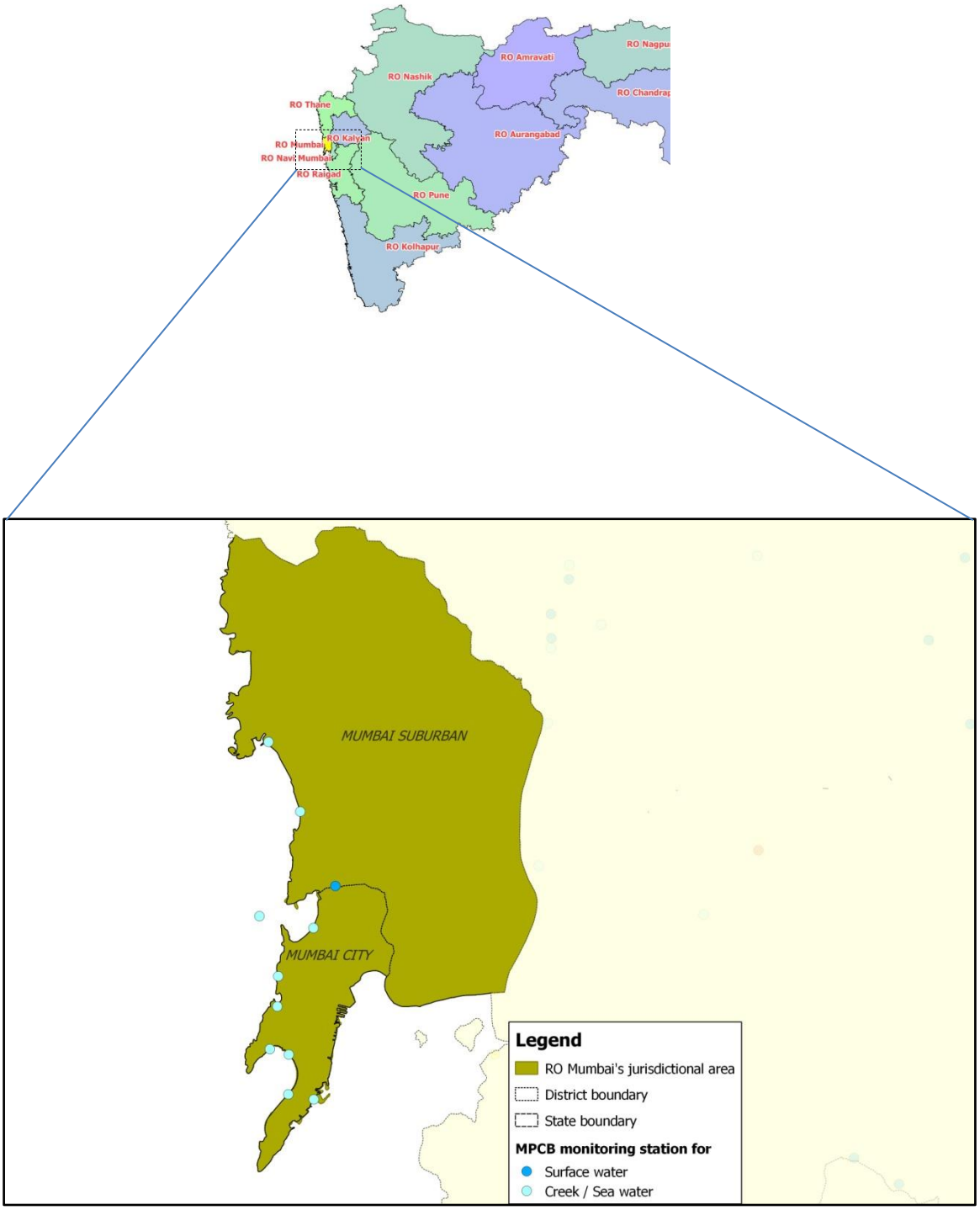

RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Thane
RO Kalyan
RO Aurangabad
RO Mumbai
RO Navi Mumbai
RO Raigad
RO Pune
RO Kolhapur
MUMBAI SUBURBAN
MUMBAI CITY
Legend
RO Mumbai's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water

Table No. 34: Water quality Index for surface and ground water monitoring at Mumbai-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/ Nalla	2168	Mithi River near Road bridge	Mumbai	Bandra	Mahim	25	25	36
Creek/sea	1318	Mahim creek at Mahim Bay	Mumbai	Bandra	Mahim	64	54	54
	2165	Sea water at Gateway of Maharashtra	Mumbai	Colaba	Colaba	59	67	55
	2166	Sea water at Charni Road Choupathy	Mumbai	Mumbai	Girgaon	54	58	54
	2167	Sea water at Worli Seaface	Mumbai	Worli	Worli	40	63	53
	2169	Sea Water at Versova beach	Mumbai	Andheri	Versova	62	60	55
	2808	Sea water at Nariman Point	Mumbai	Colaba	Colaba	67	64	54
	2809	Sea water at Malabar Hill	Mumbai	Mumbai	Walkeshwar	57	63	55
	2810	Sea water at Haji Ali	Mumbai	Worli	Worli	71	63	54
	2811	Sea water at Shivaji Park(Dadar Choupathy)	Mumbai	Dadar	Dadar	56	NA	51
	2812	Sea Water at Juhu beach	Mumbai	Santacruz	Juhugaon	38	60	52

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Nagpur

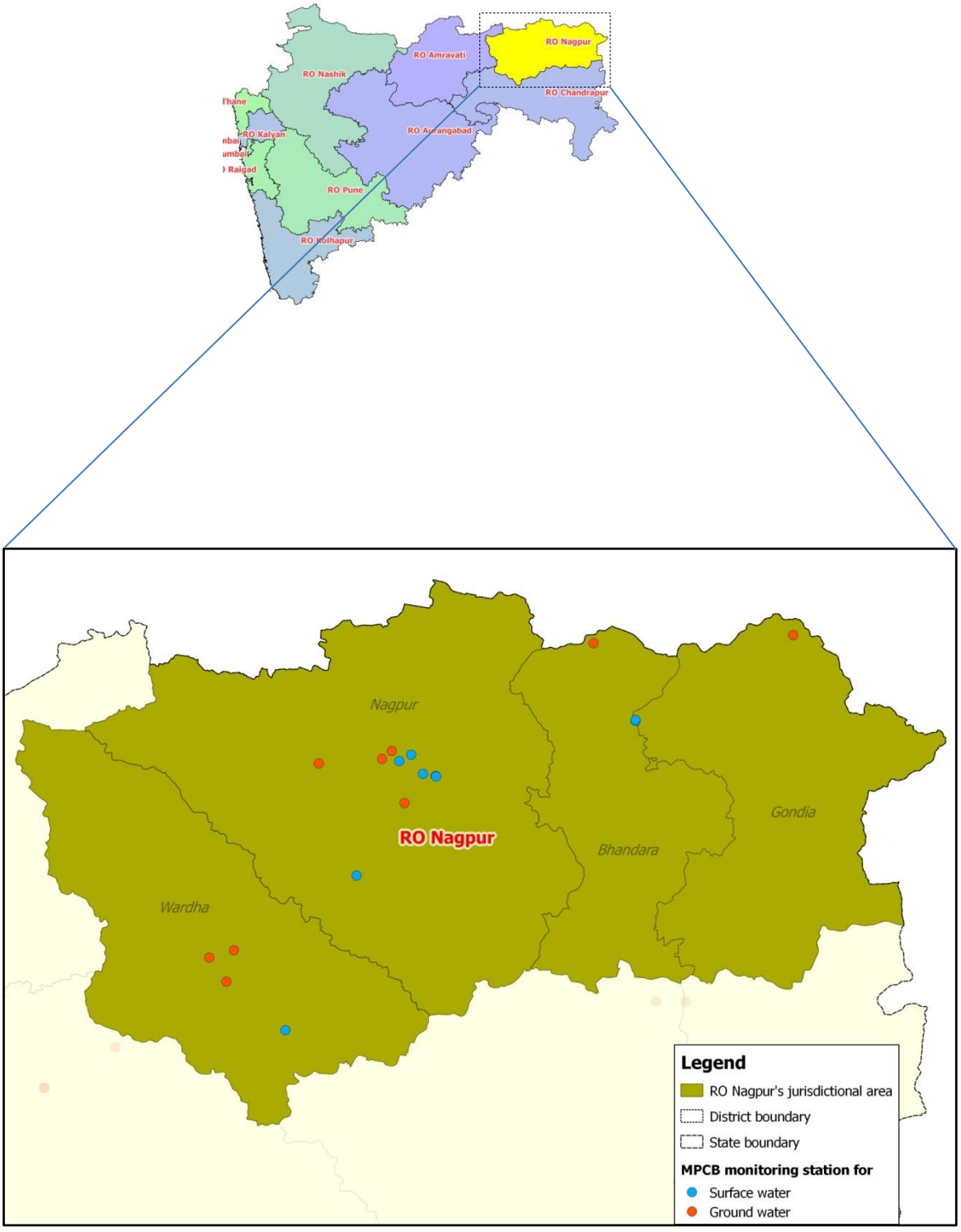

RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Aurangabad
RO Kalyan
RO Pune
RO Kolhapur
Nagpur
RO Nagpur
Bhandara
Gondia
Wardha
Legend
RO Nagpur's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

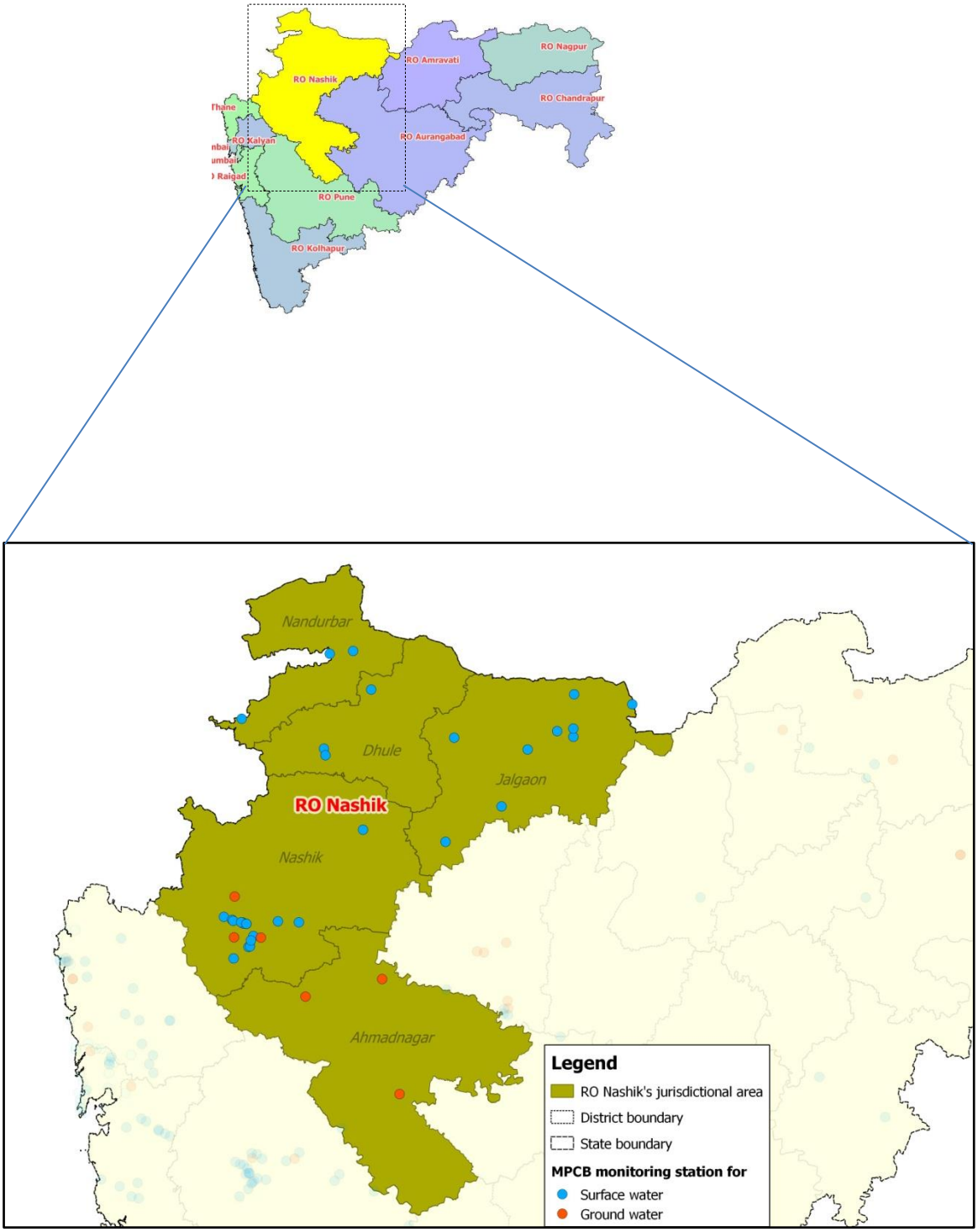
Table No. 35: Water quality Index for surface and ground water monitoring at Nagpur-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	1908	Kolar river before confluence with Kanhan river at Waregaon Bridge.	Nagpur	Kamptee	Waregaon	48	59	55
	1909	Village- Agargaon, Taluka- Kuhi, District- Nagpur	Nagpur	Kuhi	Agargaon	50	49	53
	1910	Wainganga river after confluence with Kanhan river	Nagpur	Kuhi	Ambhora	52	54	52
	2170	Kanhan river at U/s of M/s Vidarbha Paper Mills	Nagpur	Parseoni	Sinora	54	64	59
	2171	Kanhan river at D/s of M/s Vidarbha Paper Mills	Nagpur	Parseoni	Sinora	54	56	52
	2172	Wainganga at D/s of Ellora Paper Mills	Bandara	Tumsar	Tumsar	61	57	56
	2173	Wainganga at U/s of Ellora Paper Mills	Bandara	Tumsar	Tumsar	45	65	59
	2722	Wena river at U/s of Mohata Mills, near Railway bridge on Wadha-Chandrapur railway line.	Wardha	Hinganghat	Hinganghat	59	61	59
	2723	Wena river at D/s of Mohata Mills, near bridge on Hinganghat-Wadner road	Wardha	Hinganghat	Hinganghat	51	50	50
Groundwater	1995	Gram Panchayath Dug well , Near Balaji Gajbhiye House, Khaperkheda	Nagpur	Saoner	Khaperkheda (Ward No.4)	71	49	60
	1996	Gram Panchayath Dug well , Near Jagadamba G M S Mandir Sahakari Sanstha	Nagpur	Kamptee	Koradi	81	102	92
	1997	Bore well near Primary Health Centre, Raipur(Hingna)	Nagpur	Hingna	Raipur	111	77	94

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	1998	Gram Panchayat Dug well near Gram Panchayat Office, Brahmni	Nagpur	Kalmeshwar	Brahmni	63	103	83
	1999	Bore well Near Gram Panchayat,Changera.	Gondia	Gondia	Changera	68	76	72
	2000	Dug well near Sarode Kirana Store, Bhandewadi, Nagpur	Nagpur	Nagpur	Bhandewadi	88	78	83
	2203	Hand pump in the premises of Zilla Parishad Primary School	Wardha	wardha	Bhugaon	77	37	57
	2826	Dug well near Railway station & Cotton market	Wardha	wardha	Wardha	97	62	79
	2827	Bore well Near Railway crossing at Dongri Buzurg.	Bandara	Tumsar	Dongri-Buzurg	73	77	75

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Nashik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RO Amravati
RO Nashik
RO Chandrapur
RO Kalyan
RO Aurangabad
RO Pune
RO Kolhapur
Nandurbar
Dhule
Jalgaon
RO Nashik
Nashik
Ahmadnagar
Legend
RO Nashik's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No. 36: Water quality Index for surface and ground water monitoring at Nashik-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	1095	Godavari river at U/s of Gangapur Dam	Nashik	Nashik	Gangapur	76	73	77
	1096	Godavari river at Ramkund	Nashik	Nashik	Panchavati	64	71	70
	1211	Godavari river at Nashik D/s near Amardham	Nashik	Nashik	Gadgebaba Maharaj Nagar	59	67	67
	1251	Tapi river at U/s of Bhusawal	Jalgaon	Bhusawal	Bhusawal Railway Colony	71	70	75
	1252	Girna river at Jalgaon at intake of Girna pump huose.	Jalgaon	Jalgaon	Girna pump house area	NA	71	74
	1253	Girna river at Malegaon at Malegaon road bridge.	Nashik	Malegaon	Malegaon	NA	NA	70
	1313	Tapi river at Ajnad Village	Jalgaon	Raver	Ajnad	74	68	74
	1314	Tapi river at Ubad Village near Gujrat border.	Nandurbar	Shahada	Ubad	61	68	69
	1907	Rangavali river at D/s of Navapur near Rangavali bridge.	Nandurbar	Navapur	Navapur	NA	64	67
	2177	Godavari river near Someshwar Temple	Nashik	Nashik	Someshwar	64	70	71
	2178	Chikhali nalla meets Godavari river.	Nashik	Nashik	Chikhali	65	67	51
	2179	Godavari river at Hanuman Ghat	Nashik	Nashik	Nashik city	66	68	68
	2180	Godavari river at Tapovan	Nashik	Nashik	Tapovan	57	64	63
	2181	Godavari river at Kapila-Godavari confluence point	Nashik	Nashik	Tapovan	50	64	61
	2182	Godavari river at Saikheda village	Nashik	Niphad	Saikheda	63	73	71
	2183	Godavari river at Nandur- Madhameshwar Dam.	Nashik	Niphad	Nandur	65	68	72
	2652	Amaravati river at D/s of Dondaicha	Dhule	Dhule	Dondaicha	NA	NA	65
	2658	Bori river at D/s of Amalner	Jalgaon	Jalgaon	Amalner	NA	63	73
	2659	Burai river before confluece to Tapi river at Mukudas village	Dhule	Dhule	Mukudas	NA	66	70

	2660	Darna river at Chehedi water works(pumping station)	Nashik	Nashik	Chehedi	69	70	72
	2661	Darna river at Aswali (Darna Dam)	Nashik	Igatpuri	Aswali	76	69	72
	2662	Darna river at M.E.S. site Pumping station.	Nashik	Nashik	Bhagur	78	73	74
	2663	Darna river at Bhagur pumping station near Pandhurli bridge	Nashik	Nashik	Bhagur	75	73	74
	2664	Darna river at Sansari.	Nashik	Nashik	Sansari	69	75	72
	2666	Gomai river at D/s of Shahada	Dhule	Dhule	Shahada	NA	66	69
	2667	Hiwara river at D/s of Pachora	Jalgaon	Jalgaon	Pachora	NA	68	74
	2670	Kan river at Sakri water works	Dhule	Dhule	Sakri	NA	68	70
	2674	Mor river at Padalashe village.	Jalgaon	Jalgaon	Padalashe	NA	72	74
	2684	Panzare river near Panzarakan SSK Ltd.	Dhule	Dhule	Panzare	NA	NA	64
	2710	Titur river at D/s of Chalisgaon	Jalgaon	Jalgaon	Chalisgaon	NA	76	76
	2718	Waghur river at Sakegaon before confluence with Tapi river.	Jalgaon	Jalgaon	Sakegaon	NA	72	69
Groundwater	1990	Bore well at BMW Site , Burudgaon	Ahmadnagar	Ahmednagar	Burudgaon	NA	98	98
	1991	Bore well at MSW Site, Pathardi, Nashik	Nashik	Nashik	Pathardi	49	NA	49
	2204	Dug well at Gunjalwadi, Sangamner near Primary Health Care Center.	Ahmadnagar	Sangamner	Gunjalwadi	NA	49	161

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Navi Mumbai

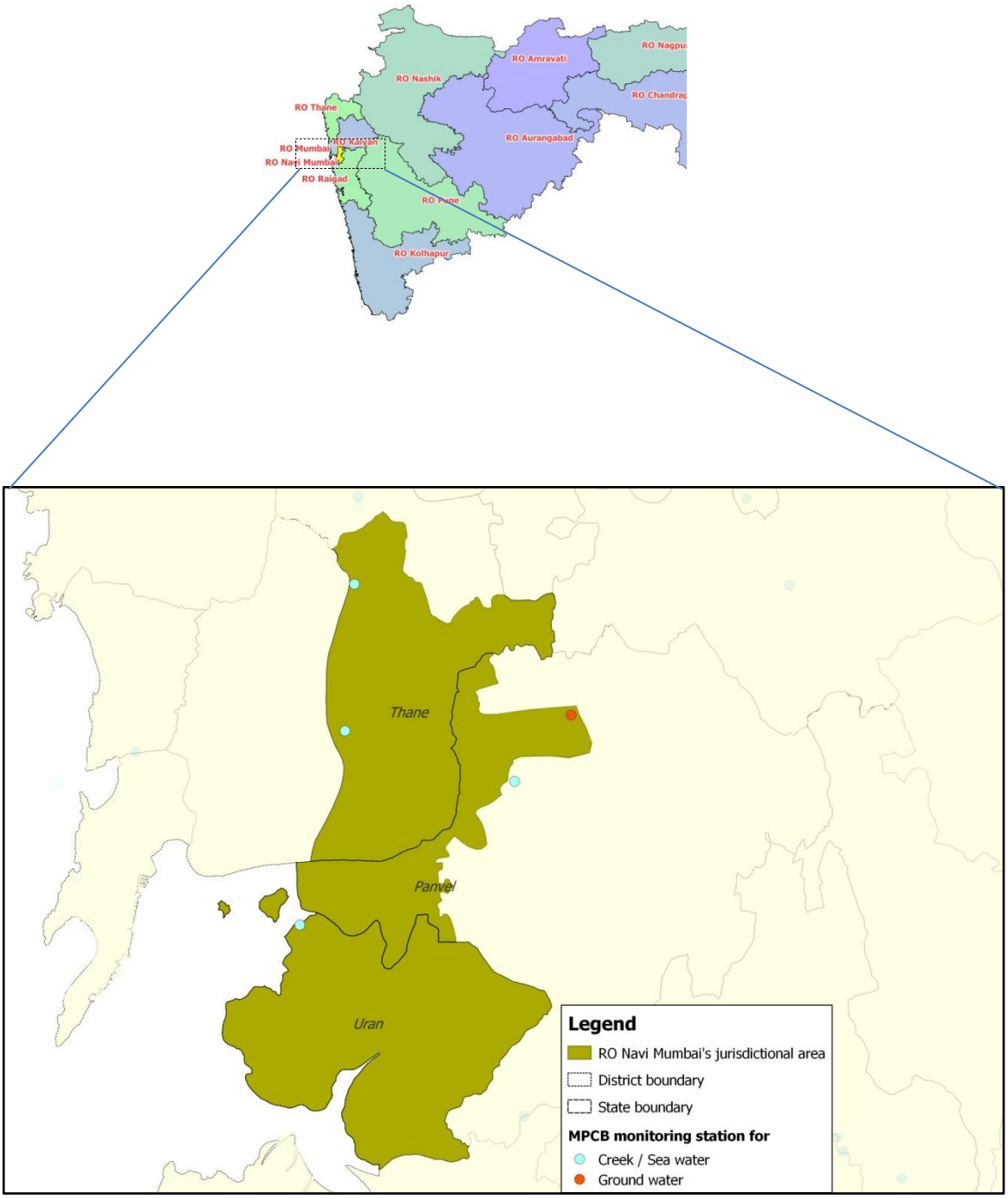

Table No. 37: Water quality Index for surface and ground water monitoring at Navi Mumbai-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
Creek/sea	1317	Thane creek at Elephanta Island	Raigad	Uran	Gharapuri, Elephanta Island	64	60	55
	2184	Vashi Creek at Airoli bridge	Thane	Thane	Airoli	62	65	55
	2185	Vashi Creek at Vashi bridge	Thane	Thane	Vashi	65	47	52

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Pune

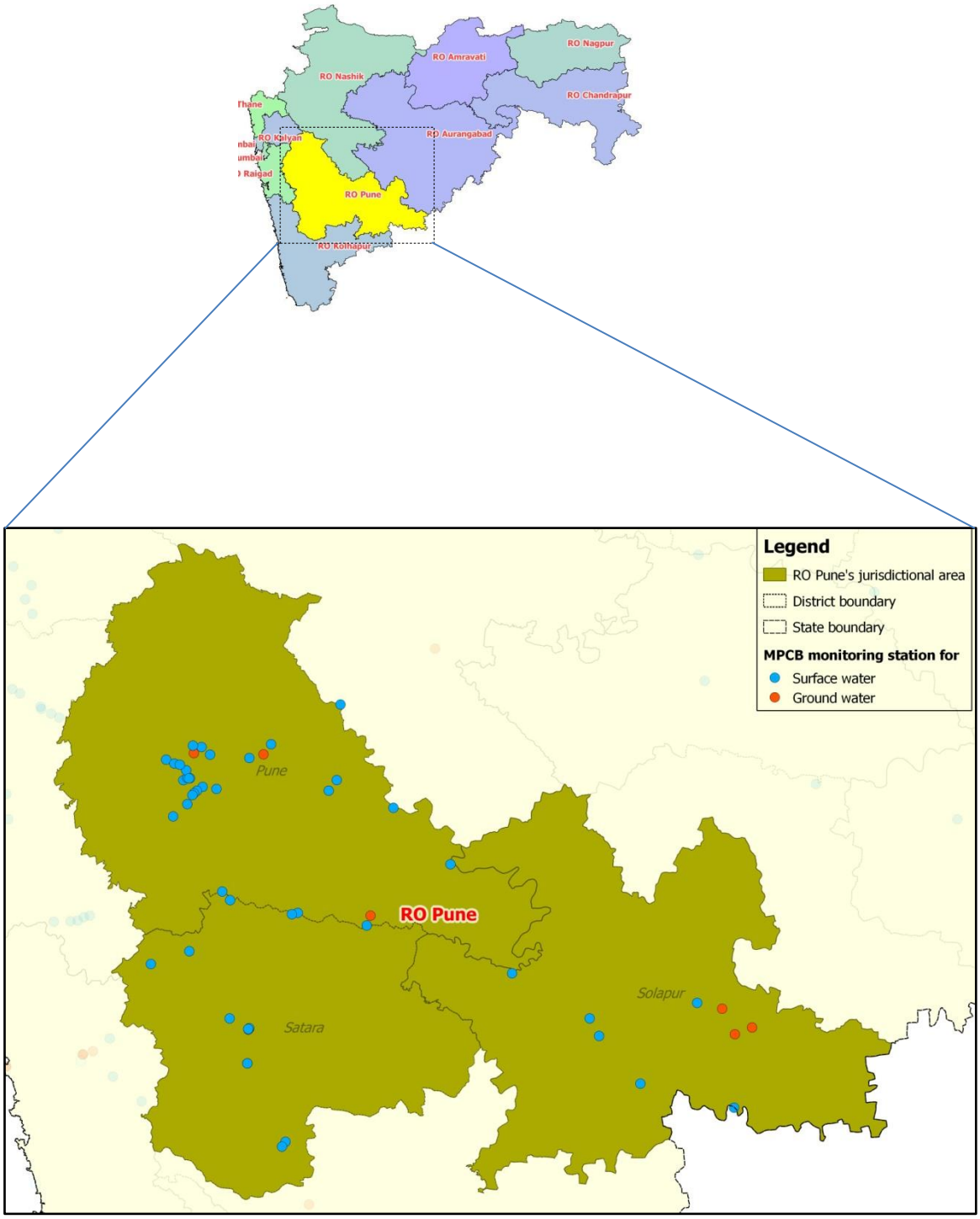
RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Aurangabad
RO Kalyan
RO Pune
RO Kolhapur
Legend
RO Pune's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water
Pune
RO Pune
Satara
Solapur

Table No. 38: Water quality Index for surface and ground water monitoring at Pune-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	28	Bhima river at Takali near Karnataka border.	Solapur	South Solapur	Takali	55	59	59
	36	Krishna river at Krishna bridge, Karad(Krishna river at NH-4 bridge, Karad.)	Satara	Karad	Karad	69	67	60
	1188	Bhima river at Narsingpur near Sangam bridge after confluence with Nira rive	Solapur	Malshiros	Narsingpur	40	65	59
	1189	Bhima river at Pune (Mutha river) at U/s of Vithalwadi near Sankar Mandir.	Pune	Haweli	Vithalwadi	41	44	37
	1190	Bhima river at D/s of Bundgarden, Pune.	Pune	Haweli	Yerwada	25	47	30
	1191	Bhima river after confluence with Mula-Mutha at Pargaon near Vasant Bandara.	Pune	Daund	Pargaon	31	59	42
	1192	Bhima river at Daund near Mahadev temple.	Pune	Daund	Daund	31	40	39
	1194	Krishna river at Dhom Dam	Satara	Mahabaleshwar	Wai	76	75	70
	1463	Nira river at Sarola bridge	Pune	Bhor	Sarola	57	64	61
	1911	Chandrabhaga river at U/s of Pandharpur town.	Solapur	Pandarpur	Gursale	64	70	61
	1912	Chandrabhaga river at D/s of Pandharpur town near Vishnupant Mandir.	Solapur	Pandarpur	Gopalpur	61	65	58
	2186	Venna river at Varye, Satara	Satara	Satara	Varye	62	66	59
	2187	Krishna river at Kshetra Mahuli, Satara.	Satara	Mahuli	Kshetra Mahuli	56	61	56

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	2188	Krishna river at Krishna- Venna sangam, Mahuli.	Satara	Mahuli	Mahuli	53	59	56
	2189	Koyna river at Karad.	Satara	Karad	Karad	59	64	60
	2190	Krishna river at Wai, Satara..	Satara	Wai	Wai	57	59	53
	2191	Mutha river at Sangam bridge near Ganapathy ghat..	Pune	Pune	Shivaji Nagar	25	36	27
	2192	Mula - Mutha river at Mundhawa bridge.	Pune	Haweli	Mundhawa	29	34	29
	2193	Mula river at Aundh bridge ,Aundgaon.	Pune	Haweli	Aundhgaon	31	48	42
	2194	Mula river at Harrison bridge near Mula- Pawana sangam.	Pune	Haweli	Bopodi	30	54	36
	2195	Nira river at D/s of Jubilant Organosis, Pune.	Pune	Baramati	Nimbut	48	45	52
	2196	Pawana river at Sangavi gaon, Pune.	Pune	Haweli	Sangavigaon	34	46	36
	2197	Indrayani river at D/s of Alandigaon, Pune	Pune	Haweli	Alandigaon	57	44	51
	2655	Bhima river at Koregaon near Koregaon bridge, Pune	Pune	Shirur	Koregaon	29	61	54
	2656	Bhima river- Backwater of Ujani Dam near raw water pump house..	Pune	Indapur	Kumbargaon	57	68	59
	2665	Ghod river at Shirur, Pune.	Pune	Shirur	Shirur	28	51	51
	2668	Indrayani river at D/s of Moshi village.	Pune	Haveli	Moshi	56	46	51

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	2669	Indrayani river at U/s of Moshigaon, Pune	Pune	Haweli	Moshigaon	62	64	57
	2677	Mula-Mutha river at D/s of Theur, Pune	Pune	Haweli	Theur	32	40	39
	2678	Mutha river near Veer Savarkar Bhavan, Pune..	Pune	Pune	Pune M.C	26	43	30
	2679	Mutha river at Deccan bridge, Pune.	Pune	Pune	Deccan	28	38	29
	2680	Mutha river at Khadakvasla Dam, Pune.	Pune	Haweli	Kadakvasla	69	75	69
	2681	Nira river at Sangavi	Satara	Phaltan	Sangavi	27	56	45
	2682	Nira river at U/s of Jubilant Organosis, Pune.	Pune	Baramati	Nira(Datta ghat)	58	55	59
	2683	Nira river at Shirwal, Satara.	Satara	Khandala	Shindewadi, Shirwal	63	63	57
	2690	Pawana river at Kasarwadi, Pune.	Pune	Haweli	Kasarwadi	36	47	36
	2691	Pawana river at Dapodi bridge, at Pawana- Mulla Sangam,Pune.	Pune	Haweli	Dapodi	36	38	34
	2692	Pawana river at Ravet Weir, Pune..	Pune	Haweli	Ravet	80	52	66
	2693	Pawana river at Chinchwadgaon, Pune.	Pune	Haweli	Chinchwadgaon	54	45	45
	2694	Pawana river at Pimpri gaon, Pune.	Pune	Haweli	Pimprigaon	38	44	37
	2705	Sina river near Laboti toll naka, Solapur	Solapur	Mohal	Laboti	67	53	60

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	2711	Urmodi river at Nagthane, Satara.	Satara	Satara	Nagthane	49	64	57
	2715	Vel river at Shikrapur, Pune	Pune	Shirur	Shikrapur	56	45	55
	2716	Venna river at Mahabaleshwar..	Satara	Mahabaleshwar	Mahabaleshwar	72	77	68
	2717	Venna river at Mahuli, Satara	Satara	Satara	Mahuli	59	60	56
	2789	Nalla at D/s of Aklai Mandir, Solapur	Solapur	Malshiras	Aklai	23	62	40
Groundwater	1992	Dug well at MSW Site,owned by Shri.Dattu Kondiba Borate at Borate Vasthi.	Pune	Haveli	Moshi	95	130	113
	2819	Dug well owned by Shri Deshmukh	Pune	Baramati	Malegaon	NA	205	205
	2820	Dug well owned by Shri Shivaji Baban Darekar	Pune	Shirur	Sanaswadi	57	111	84
	2821	Bore well at Bale railway station premises owned by Shri. Digambar Joshi.	Solapur	North Solapur	Dahegaon	263	165	214
	2822	Bore well near Chincholi MIDC	Solapur	Mohol	Chincholi	67	210	138
	2823	Bore well at Shete Vasti, near old Tuljapur road	Solapur	Solapur	Shete vasthi, Tuljapur Naka	248	129	189

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Raigad

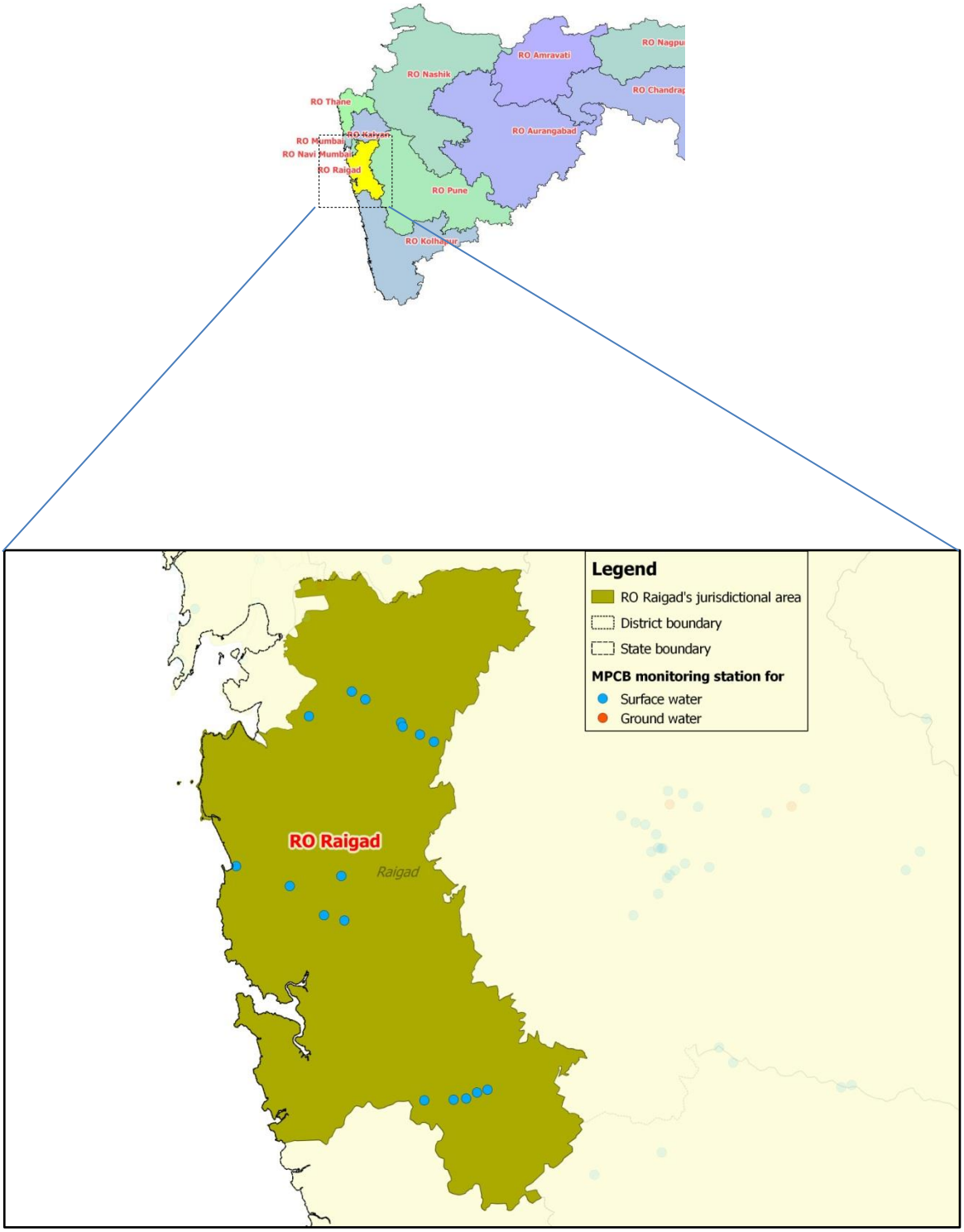
RO Amravati
RO Nashik
RO Thane
RO Aurangabad
RO Pune
RO Raigad
Legend
RO Raigad's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water
RO Raigad
Raigad

Table No. 39: Water quality Index for surface and ground water monitoring at Raigad-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	1151	Patalganga river at Shilphata bridge	Raigad	Khalapur	Khopoli	80	79	81
	1152	Kundalika river at Roha bridge	Raigad	Roha	Roha	71	87	77
	1462	Patalganga near intake of MIDC water works(Turade w/w)	Raigad	Khalapur	Turade	78	85	82
	2198	Kundalika river at Are Khurd (saline zone)	Raigad	Roha	Are Khurd	42	74	63
	2199	Savitri river at Ovale Village	Raigad	Mahad	Ovale	81	NA	79
	2651	Amba river at D/s of Waken bridge	Raigad	Roha	Waken Phata	77	86	79
	2671	Kundalika river near Salav bridge (saline zone)	Raigad	Roha	Salav	72	65	62
	2672	Kundalika river at Dhatav Jackwell	Raigad	Roha	Dhatav	74	83	79
	2685	Patalganga river at D/s of Kharpada bridge.	Raigad	Khalapur	Kharpada	65	83	72
	2686	Patalganga river at Vyal Pump House	Raigad	Khalapur	Vyal	79	85	83
	2687	Patalganga river at Khalapur Pumping Station	Raigad	Khalapur	Khalapur	78	82	80
	2688	Patalganga river at Savroli bridge	Raigad	Khalapur	Savroli	79	83	81
	2689	Patalganga river at Gagangiri Maharaj Temple	Raigad	Khalapur	Khopoli	78	79	81
	2701	Savitri river jackwell at Upsa Kendre	Raigad	Mahad	Nangalwadi	88	NA	82
	2702	Savitri river at Shedav Dov	Raigad	Mahad	Shedav Dov	86	NA	82
	2703	Savitri river at Dadli road bridge	Raigad	Mahad	Dadli	79	NA	77
	2704	Savitri river at Muthavali Village	Raigad	Mahad	Muthavali	80	NA	79

Creek /sea	2803	Panvel Creek at Kopra bridge	Raigad	Panvel	Kopra	59	76	70
Groundwater	1989	Bore well at MWML Site at Taloja	Raigad	Panvel	Karawla-Taloja	11	26	18

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

RO – Thane

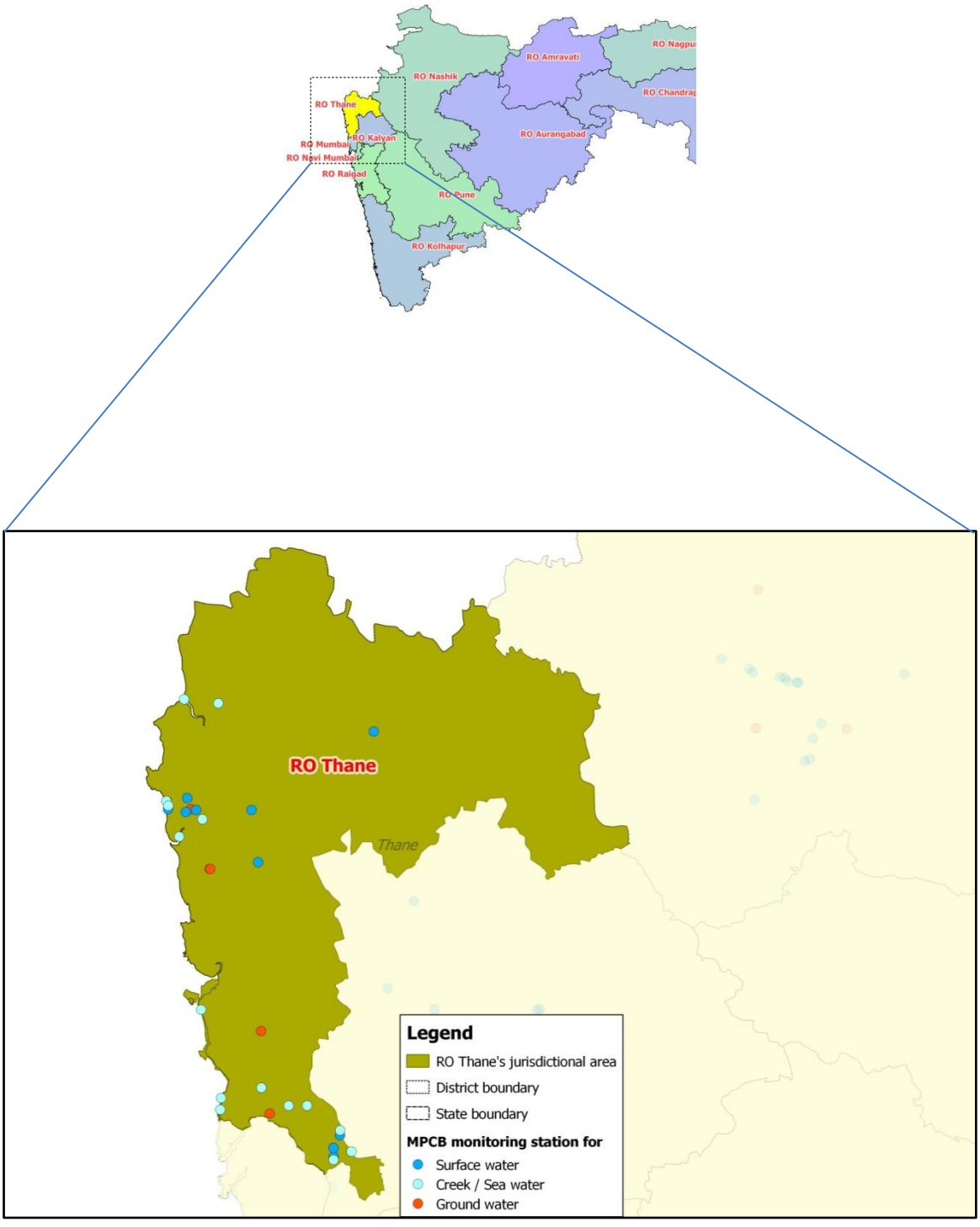
RO Amravati
RO Nashik
RO Thane
RO Kalyan
RO Mumbai
RO Navi Mumbai
RO Raigad
RO Aurangabad
RO Pune
RO Kolhapur
RO Thane
Thane
Legend
RO Thane's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water
Ground water

Table No. 40: Water quality Index for surface and ground water monitoring at Thane-RO – 2013-14

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
River/Nalla	2706	Surya river at U/s of Surya Dam	Thane	Vikramgad	Dhamni	73	84	76
	2707	Surya river at MIDC Pumping station on Boisar- Chillarphata road)	Thane	Palghar	Garvashet	70	67	75
	2708	Surya river at intake of Vasai- Virar water scheme	Thane	Palghar	Masvan	71	85	77
	2782	Rabodi Nalla	Thane	Thane	Rabodi	27	26	26
	2783	Colour Chem Nalla	Thane	Thane	Majiwada	31	28	29
	2784	Sandoz Nalla	Thane	Thane	Sandozbaug	29	23	27
	2785	BPT, Navapur	Thane	Palghar	Navapur	22	27	27
	2786	Tarapur MIDC Nalla, near sump No.I	Thane	Palghar	MIDC Tarapur	84	NA	39
	2787	Tarapur MIDC Nalla, near sump No.II	Thane	Palghar	MIDC Tarapur	77	NA	35
	2788	Tarapur MIDC Nalla, near sump No.III	Thane	Palghar	MIDC Tarapur	81	NA	33
Creek/sea	1316	Bassein creek at Vasai Fort, Thane	Thane	Vasai	Bassein	62	65	57
	2792	Ulhas Creek at Mumbra Reti Bunder	Thane	Thane	Mumbra	49	63	56
	2793	Thane Creek at Kalwa Road bridge	Thane	Thane	Kalwa	35	54	50

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	2794	Ulhas Creek at Kolshet Reti Bunder	Thane	Thane	Kolshet	59	60	56
	2795	Ulhas Creek at Gaimukh at Nagla Bunder on Ghod Buder road.	Thane	Thane	Nagla	48	65	59
	2796	Ulhas Creek at Versova bridge	Thane	Vasai	Versova	62	62	60
	2797	Bhayander Creek at D/s of Railway bridge at Jasal park choupathy.	Thane	Bhayander	Navghar	57	61	58
	2798	Kharekuran Murbhe creek	Thane	Palghar	Kharekuran	63	56	56
	2799	Dandi creek	Thane	Palghar	Dandi	59	64	53
	2800	Sarwali creek	Thane	Palghar	Sarwali	63	52	56
	2801	Savta creek	Thane	Dahanu	Savta	25	65	56
	2802	Dahanu creek at Dahanu Fort	Thane	Dahanu	Danugaon	32	64	57
	2805	Arnala Sea	Thane	Vasai	Arnala	59	54	55
	2806	Uttan Sea at Bhayander.	Thane	Bhayander	Uttan	64	59	59
	2807	Navapur sea	Thane	Palghar	Navapur	61	48	49
Ground water	1984	Bore well at M/s Tata Iron & Steel Co. Ltd, S-76	Thane	Palghar	MIDCTarapur, Industrial Estate, Tarapur	NA	93	84

Type	Station ID	Station name	District	Taluka	Village	Apr	Dec/Oct	Yearly Average
	1985	Dug well at 5 Star Industrial Estate	Thane	Mira-Bhayander	Kashimira	218	143	181
	1986	Bore well at Motapada	Thane	Dahanu	Motapada	78	94	86
	1987	Bore well at Vasai	Thane	Vasai	Gokhiware	150	92	121
	1988	Bore well at Gharatwadi, Palghar	Thane	Palghar	Aliyali	60	106	83

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	No Data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Annex II – Data Sets of Water Quality Monitored in 2013-14

Soft Copy of the Data sets on a CD

Annex III – Status of Sewage Treatment in Municipal Corporation and Council in Maharashtra

Status of Sewage Treatment in Municipal Corporations in Maharashtra as on 15 February 2014						
	Municipal Corporation	Effluent Generated MLD)	Effluent treated (MLD)	Treatment (%)	Disposal	Technology used
1	Ahmednagar Corporation	60	0	0.00	Open Nalla	-
2	Akola Corporation	48	0	0.00	Morna River	
3	Amravati Corporation	64	33.5	52.34	Amba Nalla to Pedhi River	ASP
4	Aurangabad Corporation	107	9	8.41	Sukhna River Dr. Salim ali Lake Kham River	ASP, SBR
5	Bhiwandi-Nizampur Corporation	84	17	20.24	Kamavari Creek	
6	Chandrapur Corporation	30	30	100.00	Erai River	
7	Dhule Corporation	48	0	0.00	Panzara river	oxidation pond

Status of Sewage Treatment in Municipal Corporations in Maharashtra as on 15 February 2014						
8	Jalgaon Corporation	48	0	0.00	Nalla to Girna River	
9	Kalyan-Dombivli Corporation	200	30	15.00	Ulhas creek	Primary Clarifier
10	Kolhapur Corporation	96	43.5	45.31	Panchaganga river	Primary, Trickling Filter, SBR
11	Latur Corporation	24	0	0.00	Local Nalla to Manjara River	-
12	Malegaon Corporation	28	0	0.00	Mausam Local to River Girna	
13	Mira-Bhayander Corporation	93	3.5	3.76	Creek	Primary,
14	Municipal Corporation of Grater Mumbai	2671	2028	75.93	Marine outfall Malad Creek Thane Creek Gorai Creek	Aerated Lagoons

Status of Sewage Treatment in Municipal Corporations in Maharashtra as on 15 February 2014

	Municipal Corporation	Effluent Generated (MLD)	Effluent treated (MLD)	Treatment (%)	Disposal	Technology used
15	Nagpur Corporation	345	85	24.64	Nag River	Primary Clarifier
16	Nanded-Waghala Corporation	48	0	0.00	Local Nalla to Godavari River	Anaerobic Lagoons, Facultative Tank
17	Nashik Corporation	280	200	71.43	Godavari River, Darna River	UASB Reactor & ASP
18	Navi Mumbai Corporation	280	230	82.14	Creek	SBR
19	Parbhani Corporation	10	0	0.00	Godavari River	-
20	Pimpri-Chinchwad Corporation	277.8	123.1	44.31	Pawana River	SBR
21	Pune Corporation	744	567	76.21	Mutha River, Mula River Ram River	ASP, SBR
22	Sanghli-Miraj Kupwad Corporation	52.5	36	68.57	Krishna River	Primary + Oxidation Pond
23	Solapur Corporation	80	55	68.75	Nalla to Seena River	ASP, SBR
24	Thane Corporation	350	120	34.29	Thane creek	SBR
25	Ulhasnagar Corporation	90	28	31.11	Waldhuni river	Primary Clarifier
26	Vasai Virar Region Corporation	112	0	0.00	-	-
	Total	**6210.3**	**3638.6**	**58.58%**		

Status of Sewage Treatment in A Class Municipal Council in Maharashtra as on 15 February 2014					
	A Class Municipal Council	Effluent Generated (MLD)	Effluent treated (MLD)	Treatment (%)	Disposal
1	Achalpur	8.8	0	0.00	River Sapan River
2	Ambernath	43	28	65.12	Local nalla to Waldhuni River
3	Barshi	6.7	0	0.00	Nalla to Sina River
4	Beed	11	0	0.00	Loacl nalla to Bindusara River
5	Bhusaval	30	0	0.00	Nalla to Tapi River
6	Gondia	18.28	0	0.00	Local Nalla to River Pangoli
7	Ichalkaranji	40	14	35.00	Krishna River
8	Jalana	18.5	0	0.00	Local nalla to Kundalika River
9	Panvel	10	0	0.00	Saline zone of Gad River
10	Satara	12.8	0	0.00	Krishna River Venna River
11	Wardha	15	0	0.00	Local Nalla to River Wardha
12	Yavatmaal	8.69	0	0.00	Nalla to Jamwadi Lake
	Total	**222.77**	**42**	**18.34**	

Annex IV – Details of River Action Plan

Sr. No.	Name of the River	Date of Submission to Env. Department, GoM.
1	Bhima, Mula and Mutha, Pune	16.09.2010
2	Panchaganga River, Kolhapur	11.08.2011
3	Upper Godavari River, Nashik	20.05.2012
4	Tapi Purna River, Amravati	16.05.2012
5	Nag River, Nagpur	---
6	Irai –Zarpat- Nag	03.08.2012
7	Krishna River,	03.01.2013

Annex V – Status of Actions by MPCB on Local Bodies

Sr. No.	Municipal Corporation	Date	Particulars
1	Municipal Corporation of Grater Mumbai	30/04/2011 28/06/2012 11/12/2013 29/10/2013 13/01/2014	SCN issued to MCGM vide letter for improvement of Malad STP SCN issued by RO Mumbai on Directions issued to MCGM vide letter DO letter issued by Member Secretary Directions to MCGM vide letter
2	Pune Corporation	14/09/2009 & 01/03/2013 26/09/2013 29/10/2013	PD issued to PMC vide letter dt. Direction issued by Member Secretary DO letter issued by Member Secretary
3	Nagpur Corporation	17.06.2009 09.11.2009 09.11.2009 09.11.2009 06.09.2011 16.11.2011	1. Direction U/s 5 EP Act No MPCB/RO(HQ) /B-3794/124 dtd 17/06/2009. 2. MPC/NRO/Dir-119/3192 dtd 09/11/2009. 3. MPC/NRO/Dir-120 /1393 dtd 9/11/2009. 4. MPC/NRO/Dir-121 /3194 dtd 9/11/2009. 5. BO/P & L Div./ B-5705 dtd. 06/09/11 . 6. BO/P & L Div./ B-6441 dtd16/11/2011. * Board also obtain BG of Rs. 2 carore for provided STP & ETP to Slaughter House.
4	Pimpri-Chinchwad Corporation	26/9/2013 29/10/2013	Direction issued to PCMC DO letter issued by Member Secretary
5	Nashik Corporation	12/3/2013 25.02.2013	Direction issued by Member secretory The PIL bearing Writ petition no – 176 of 2012, dt. 25/02/2013 at bench of Hon. High Court, Mumbai which is in progress

Sr. No.	Municipal Corporation	Date	Particulars
6	Vasai Virar Region Corporation	---	Prosecution was filed against the erstwhile four Municipal Councils for non provision of STP's. Now, Vasai -Virar City Municiapl Corporation has been formed by incorporation of all those four Municipal Councils. Case against erstwhile municipal councils pending at Hon'ble Court at Thane and presently the corporation has proposed 7 no. STP's
7	Latur Corporation	10.12.2009	Non Valid Consnet and Non STP
8	Parbhani Corporation	27.02.2009 17.12.2008	Show cause notice issued vide No. MPCB /ROA/SC/418/09 dtd. 27/02/2009. Warning notice issued vide no. MPCB/SROP/ 2174/08 dtd. 17/12/2008.
9	Chandrapur Corporation		Direction issued under CEPI
10	Solapur Corporation	20.10.2011	PD issued.
11	Bhiwandi-Nizampur Corporation	31.08.2009 20.08.2010	1) Consent refused by the Board on 31/08/2009 vide letter No. MPC/P&L/B-5791 dated 31/08/2009. Refused for not providing adequate STP. 2) Conditional direction U/s. 33 A of Water (P&CP) and Act 1974 and Air Act, U/s. 31 (A) of Air (P&CP) 1981 issued by the Board on dated 20/08/2010.
12	Akola Corporation	11.07.2012 08.07.2005	SCN for non compliance PD issued
13	Kolhapur Corporation	24/04/2012 21/11/2012 12/03/2013	Procecution Notice issued to KMC under section 43,44 PD issued to KMC Directions issued to KMC

Sr. No.	Municipal Corporation	Date	Particulars
		12/06/2013	Directions issued to KMC
14	Amravati Corporation	14.02.2011 27.09.2011	Proposed Direction issued vide letter no.B-990 dtd. 14/2/2011. Conditional direction issued by Board vide letter no. BO/ P&L division/B-5284 dtd. 27/9/2011.
15	Ulhasnagar Corporation	23/05/2011 30/09/2011	Conditional direction issued Bank Gurantee of Rs.5/- Lacs Conditional directions issued

Annex VI – List of Pending Written Petitions

List of Writ Petition /PIL pending before the Hon'ble High Court of Judicature Mumbai Bench			
Sr. No.	Name of the Parties	PIL No.	Subject matter
1	Nicholas Almedia V/s State of Maharashtra	PIlLNo. 17/2011	RRZ Policy & CETPs
2	Rajesh Pandit V/s State of Maharashtra	Writ Petition No. 176/2012	Reg. Godavari Pollution.
3	M/s Bharatiya Kisan Sangh V/s State of Maharashtra	WP No. 1863/2013	Pollution of Pawana River.
4	Jayshree S. Dange V/s MPCB	PIL No. 207/2010	Reg. Pollution of Pawana River.
5.	Dattatraya Hari Mane vs State of Maharashtra and Ors. alongwith Kisan Murlidhar Kalyankar vs State of Maharashtra and Ors. alongwith Prajasattak Samajik Sanstha vs State of Maharashtra & Ors.	PIL No.183/2012 alongwith PIL No.15/2010 alongwith PIL No.28/2010	Regd.pollution of Panchganga river.

List of Writ Petition /PIL pending before the Hon'ble High Court of Judicature Nagpur Bench			
Sr. No.	Name of the Parties	WP/PIL No.	Subject matter
1.	Shri Prakash Jadhav v/s State of Maharashtra and Ors.	Writ Petition No.3366/2008	River Pollution in Vidarbha region.
2.	Court on its own Motion vs State of Maharashtra and Ors.;	PIL No.39/2013	River pollution outside the limits of NMC and within Vidarbha region.

Applications pending National Green Tribunal, WZ, Pune regd. River Pollution Matters before NGT Pune			
Sr.No.	Name of the Parties	Application/Appeal No.	Subject matter
1.	Lalita Shinde vs Trimbak Municipal Council & Ors.	Application No.48/2013	Godavari river pollution
2.	Vanshakti & Anr. vs MPCB and Ors.	Application No.37/2013	Regd. pollution of Ulhas river
3.	Jalbiradari v/s Govt.of Maharashtra and Ors.	Appeal No.8/2013	Regd. encroachment on the banks of Mithi river and causing pollution thereof.

Annex VII – Polluted River stretches in Maharashtra as per CPCB, 2010

Maharashtra Pollution Control Board is monitoring river water quality in Maharashtra under National Water Quality Programme (NWMP). The water quality data generated through NWMP is analysed for Biochemical Oxygen Demand parameter & the locations exceeding the water quality criteria are identified as polluted locations by CPCB. Ref: CPCB letter no.A-14011/1/2010- MON 83 dated 04.10.2010.

Polluted River Stretches in Maharashtra Priority I: (BOD>30mg/I and BOD exceeding 6mg/l on all occasion)			
River	Polluted Stretch	Source/Town	Monitoring Locations
Bhima	Vithalwadi to Takli	Pune Sewage	Pune D/S of Bundgarder
		Daunt Sewage	Pune U/S Vithalwadi
			Pargaon (after Confluence with Mule Martha)
Godavari	Nashik D/s to Paithan	Nashik Sewage	Nashik D/S
			Jayakwadi Dam, Raher
			U/S of Gangapur Dam Nashik
			U/s of Paithan Jayakwadi
			D/s of Paithan Pathegaon
			Near Someshwar Temple
			Hanuman Ghat, Nashik
			Nashik D/S
			Panchavati at Ramkund
			Kapila Godavari, Cont Point Tapovan
			Saikheda
			Tapovan
Mula & Mutha	D/s Pune City	City Sewage of Pune	Mula-Mutha River at Mundhawa Bridge
			Mula at Aunth Bridge
			Mula Harrison Bridge
			Mutha at Sangam Bridge
Pawana	Pune Sangavi Gaon	Pune Sewage	Pune Sangavi Gaon
Indrayani	Alandi to Confluence with Bhima	Pune Sewage	Alandi Gaon
Koyna	Karad D/s	Karad Sewage	Karad
Mithi	Mumbai Stretch	Mumbai	Mithi River
Kundalika	Are Khurd	Roha Sewage	Are Khurd
			Kundalika at Roha City

Polluted River Stretches in Maharashtra Priority II: (BOD between 20 & 30 mg/l)			
River	Polluted Stretch	Source/Town	Monitoring Locations
Tapi	M P Border to Bhusaval	Bhisaval Sewage	Ajnand Village
			Uphad Village
			Bhusaval U/s
Girna	Malegaon to Jalgaon	Malegaon Sewage	Malegaon (Manmad)
		Jalgaon Sewage	Jalgaon
Nira	D/s of Jubilant Organosis, Pune	Industrial Wastewater	D/s of Jubilant Organosis, Pune

Polluted River Stretches in Maharashtra Priority III: (BOD between 10 & 20 mg/l)			
River	Polluted Stretch	Source/Town	Monitoring Locations
Weinganga	D/s Ashti	Municipal Sewage of Ashti Gaon	at Ashti
			After confluence of Kanhan
			D/s of Ellora Paper Mill
			U/s of Ellora Paper Mill
			U/s of Gaurav Paper Mills, Jackwell
			D/s of Gaurav Paper Mills, Jackwell
Wardha	Along Rajura Village	Paper Mills Waste	Rajura Bridge
			D/s of ACC Ghugus
			At Confluence point of Panganga and Wardha at Jaud
Bhima	Narsinghpur D/s	Nira Discharge	Narsinghpue (D/s after confl with R Nira)
Krishna	Dhomdam to Kolhapur	Sewage and Industrial Waste from Karad and Sangli	Krishna Bridge, Karad
			At Kshetra Mahuli
			Krishna Vennasangam at Mahuli
			At Wai
			Mohabaleshwar Dhom Dam Near Koyna Dam
Purna	Andura Village		D/s of Confl of Morna & Purna Andura Village
			Purna At Dhupeshwar
Nira	Along Pulgaon	Pulgaon Cotton Mill	Pulgaon Cotton Mill Wardha
			Sarole Bldg on Pune Bangalore Highway
Chandrabhaga	Along Pandharpur Town	Sewage of Pandharpur Town	D/s of Pandharpur Town
			U/s of Pandharpur Town
Venna River	Varye Satara		Satara D/s

Polluted River Stretches in Maharashtra Priority IV: (BOD between 6-10 mg/l)			
River	Polluted Stretch	Source/Town	Monitoring Locations
Kanhan	D/s Nagpur	Industrial and Domestic Waste of Nagpur	D/s of Nagpur
			U/s of M/s Vidharbha Paper Mills, Sinora
			U/s of M/s Vidharbha Paper Mills, Sinora
Kolar	Along Kamptee	Municipal Waste Water	Before Confluence to Kanhan at Kamptee
Ulhas	Mohane	Industrial and Domestic runoff Ulhasnagar	U/s of Nrc bund at Mohane
			Jhambul Water Works
Panchganga	Kolhapur	Industrial and Municipal Sewage of Kolhapur	D/s of Kolhapur Town
Patalganga	Khopoli to Esturaine Region	Industrial and Municipal Sewage of Khopoli, rasayani and Paundh	Shilphata
			Near Intake of Mide W/W
Rangavali	Along Navapur	Sewage of Navapur	D/s of Navapur

Polluted River Stretches in Maharashtra Priority V: (BOD between 3 & 6 mg/l)		
River	Polluted Stretch	Monitoring Location
Ulhas	Along Badlapur	U/s of Badlapur
Bhatsa	Along Pise Village	D/s of Pise Dam Nr Pise Village (Ulhas)

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Maharashtra Pollution Control Board
Kalpataru Point, 3rd and 4th floor,
Opp. Cine Planet, Sion Circle,
Mumbai - 400 022
Telephone : +91 22 24020781 / 24014701
Fax : +91 22 24024068
Website : http://mpcb.gov.in/

The Energy and Resources Institute
Western Regional Centre,
318, Raheja Arcade, Sector-11,
Belapur CBD,
Navi Mumbai - 400614
Telephone : +91 22 27580021/ 40241615
Fax : +91 22 27580022
Website : www.teriin.org