2011-12

Compilation of Water Quality Data Recorded by MPCB


Tapi River


Darna River


Godavari River

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

The Energy and Resources Institute

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May 2014

The Energy and Resources Institute

...towards global sustainable development

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सदस्य सचिव
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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 2011 to 2012. The various statistical tools have been used for useful interpretation and analysis of data. The finding of this analysis will help various departments to prioritize the areas of concerns to facilitate mitigation measures & development of preventive action plans.

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 general public at large. 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 Resourses 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.

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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 untreated sewage from urban centres, industrial effluents 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. These monitoring programs analyse the water samples for 9 core quality parameters including pH, BOD (Bio-chemical Oxygen Demand), Nitrate, Fecal Coliform, Total Coliform and 19 general parameters like turbidity, COD (Chemical Oxygen Demand), Magnesium, Sulpahte, Sodium and so on.

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.

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. Majority of the WQMS which recorded WQI (Water Quality Index) below 50 (polluted) in the summer month of April, lie in the western region of Maharashtra. A total of 17 WQMS located in the Bhima Upper- Sub Basin of Krishna Basin and the Coastal basin (West flowing rivers), recorded a high level of pollution in the peak summer and winter months.

The nallah represented by WQMS (2786) 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 at these locations.

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.

Saline (Sea and Creek) Water Quality

In the year 2011-12 saline water quality was monitored at around 34 locations across the 720km long coastline of the state. These WQMS are located in the districts of Mumbai (10), Thane (18), Raigad (2) and Ratnagiri (4). 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 the 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 at higher levels in the regions of Aurangabad, Pune Solapur and Kolhapur.

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 and birds, 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. 1). 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. 1). 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. 1). 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 2011-12 is presented in Figure No. 2.

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

[7] CPCB 2010, *Status of Water Quality in India*,

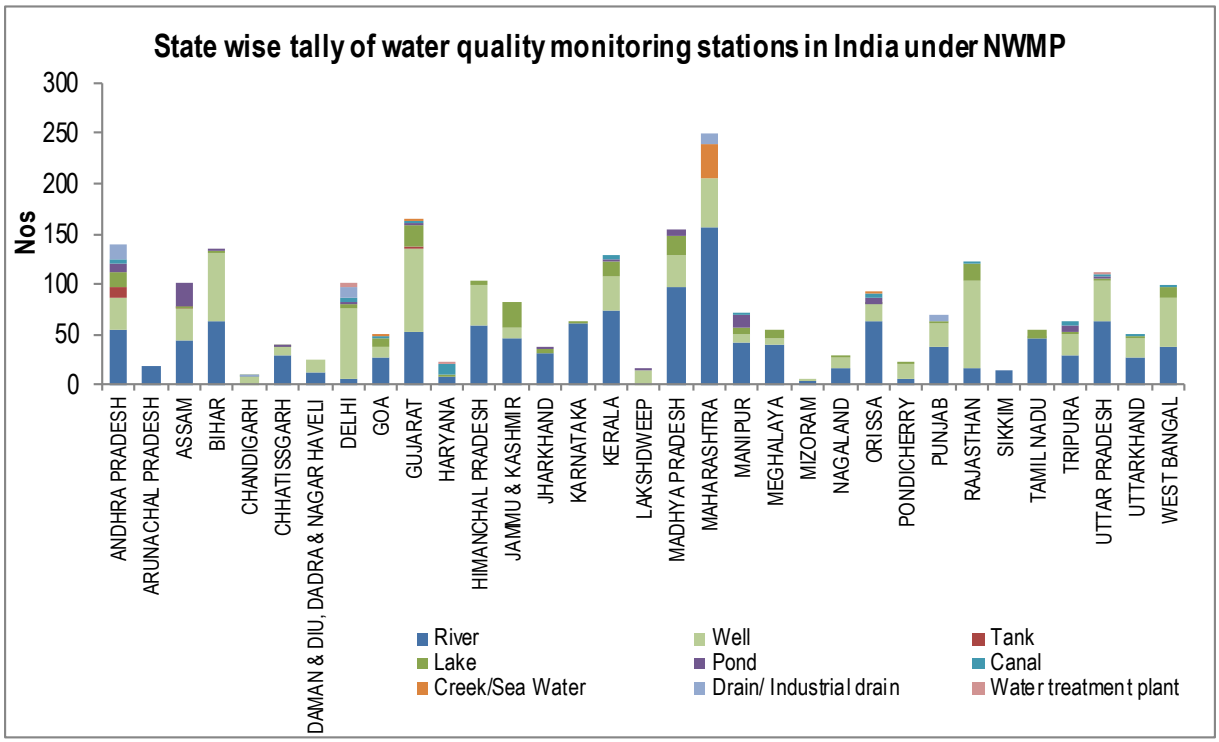


Figure No. 1: State wise tally of water quality monitoring stations in India under NWMP (2011-12)

Data Source: CPCB, 2012[8]

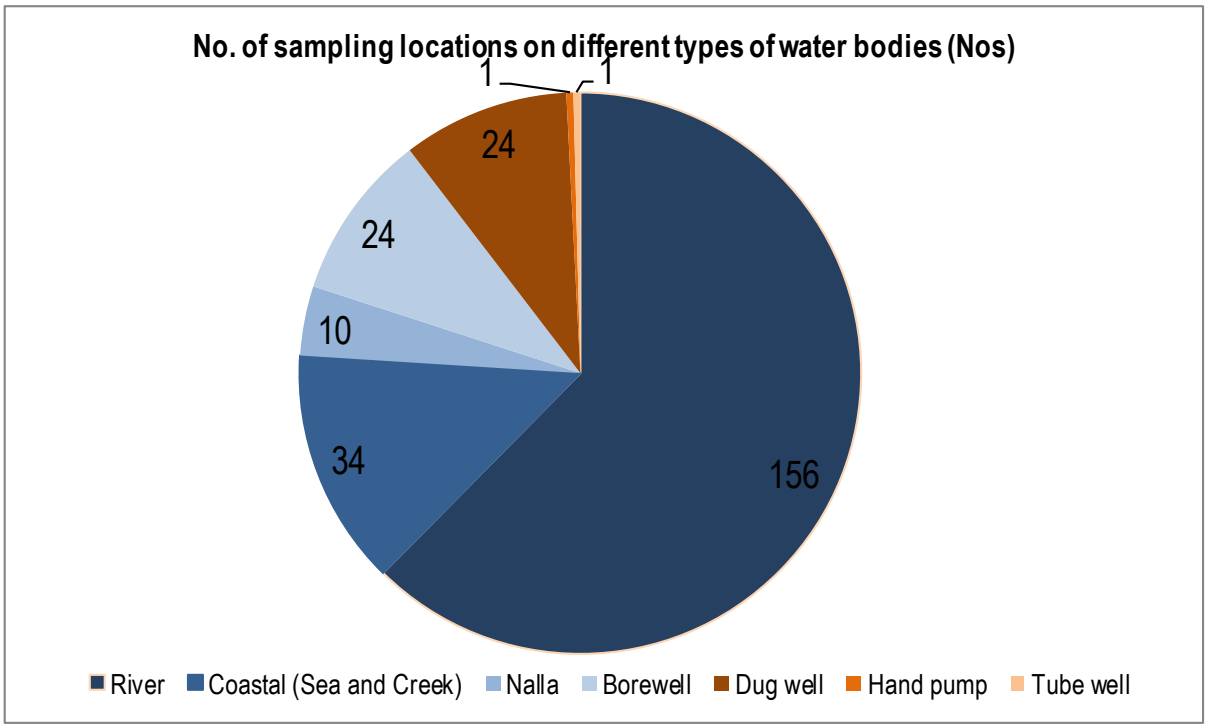


Figure No. 2: Number of sampling locations of MPCB on different types of water bodies

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

Table No. 1: 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. 2 and the equations used to determine the sub index values are given in Table No. 3.

Table No. 2: 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. 3: 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. 4.

Table No. 4: 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. 5) for the parameters monitored and recorded by MPCB for the water samples monitored in the year 2011-12.

Table No. 5: 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

[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

The relative weight is then computed from the following equation

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

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. 6.

Table No. 6: 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	

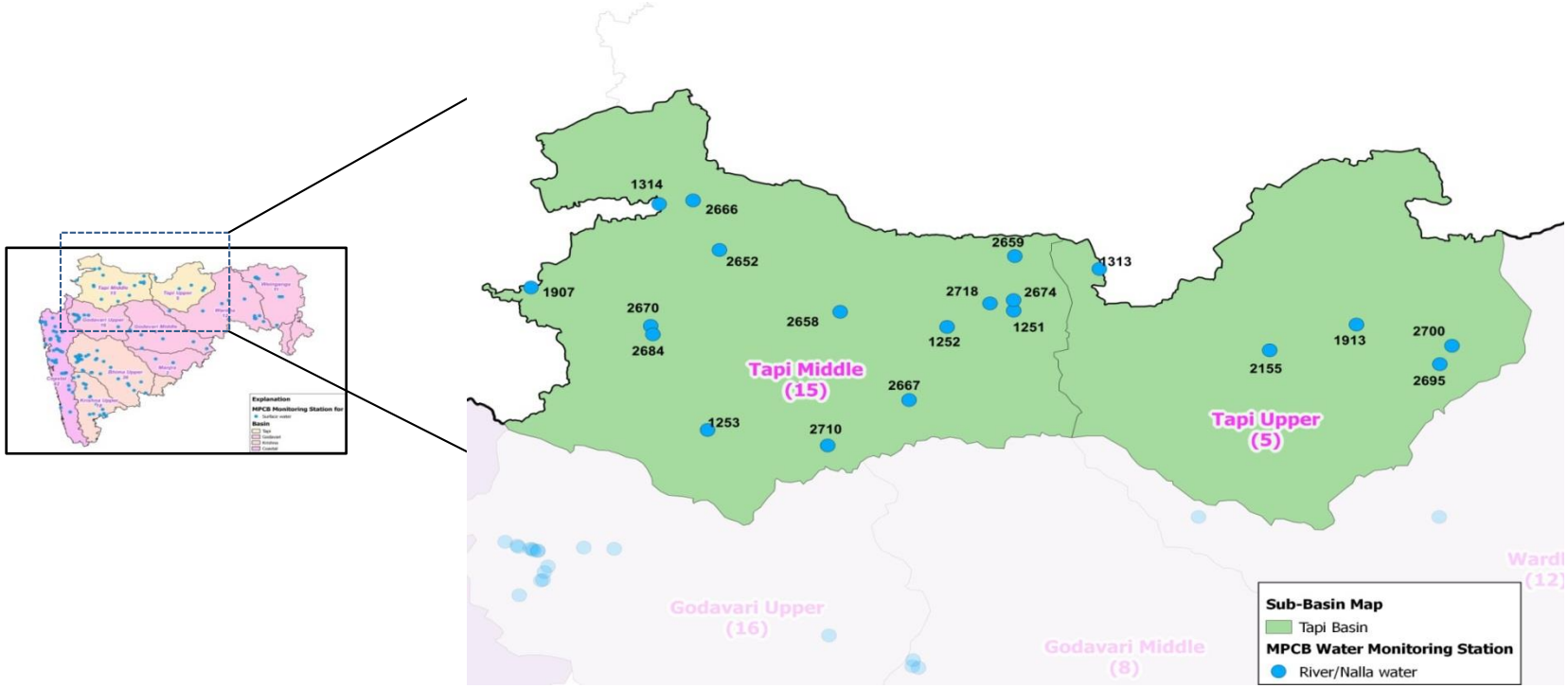
Surface Water Quality

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.

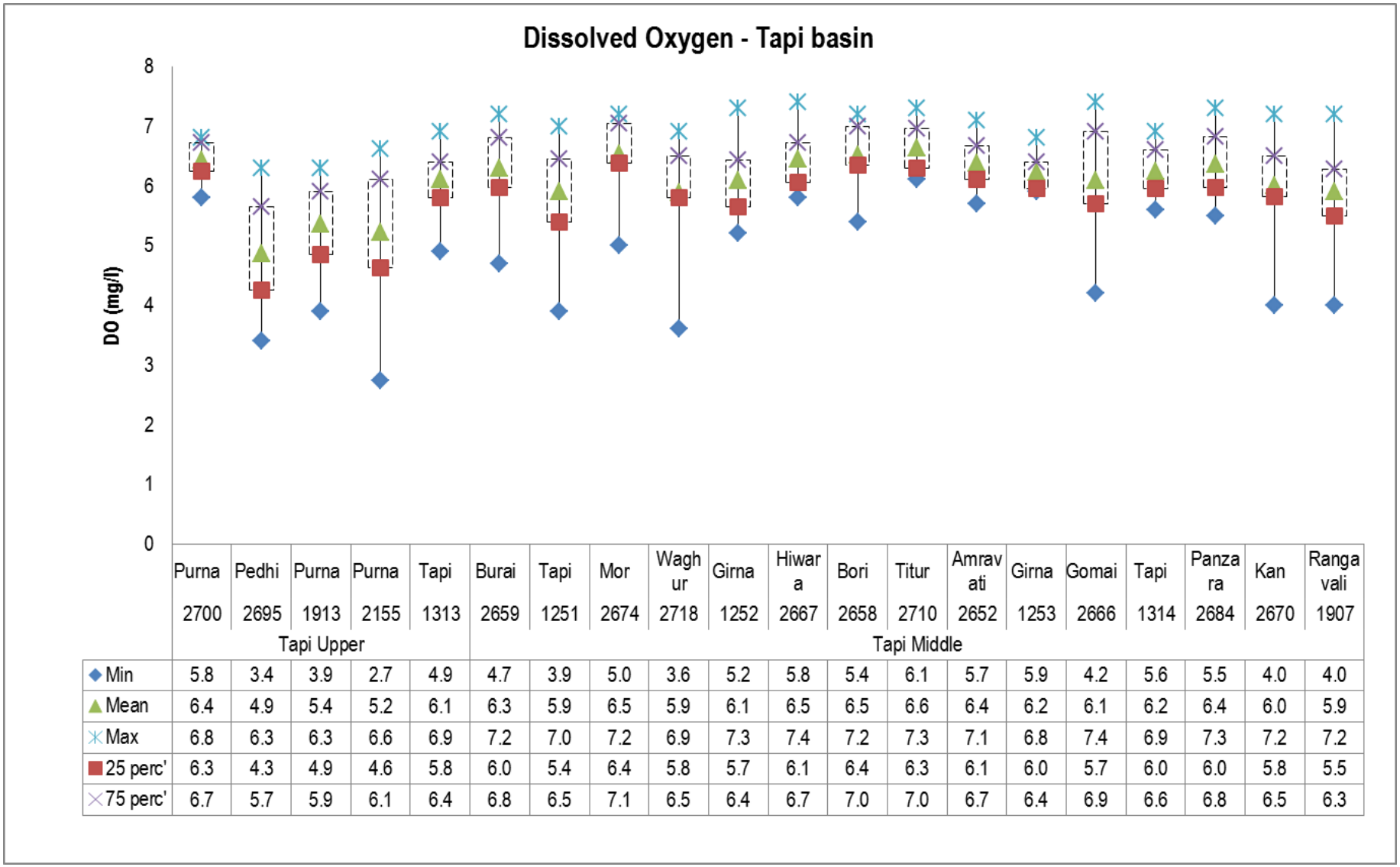
The following section presents the illustrations of the parameters pH, DO, BOD and FC recorded across the 200 stations of MPCB in a lucid format. Further, basin wise water quality index is presented in this section for the basins of Krishna, Godvari, Tapi and West flowing rivers.

Tapi Basin



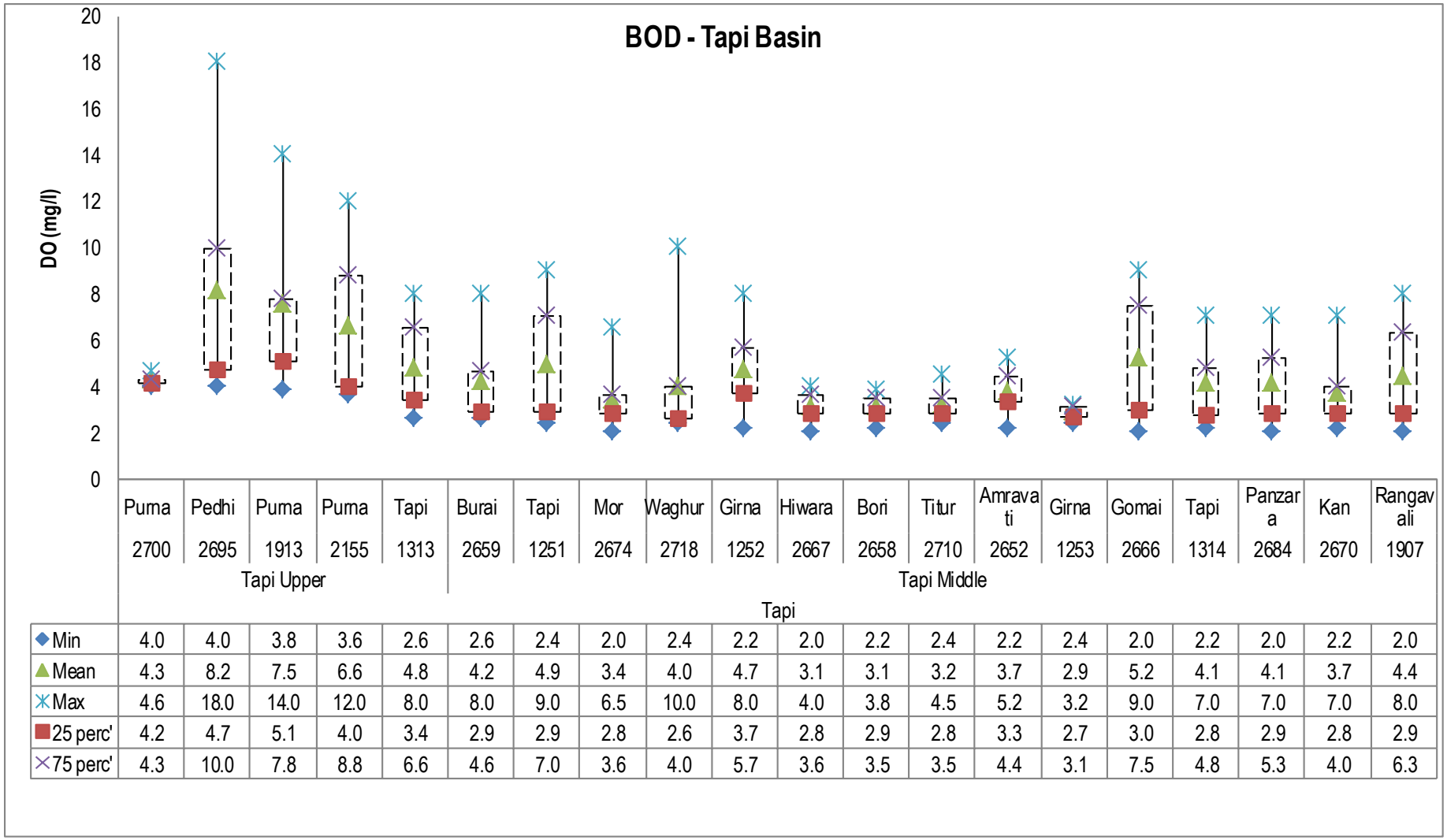
Map No. 1: Network of surface water quality monitoring stations in Tapi Basin

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. 7.



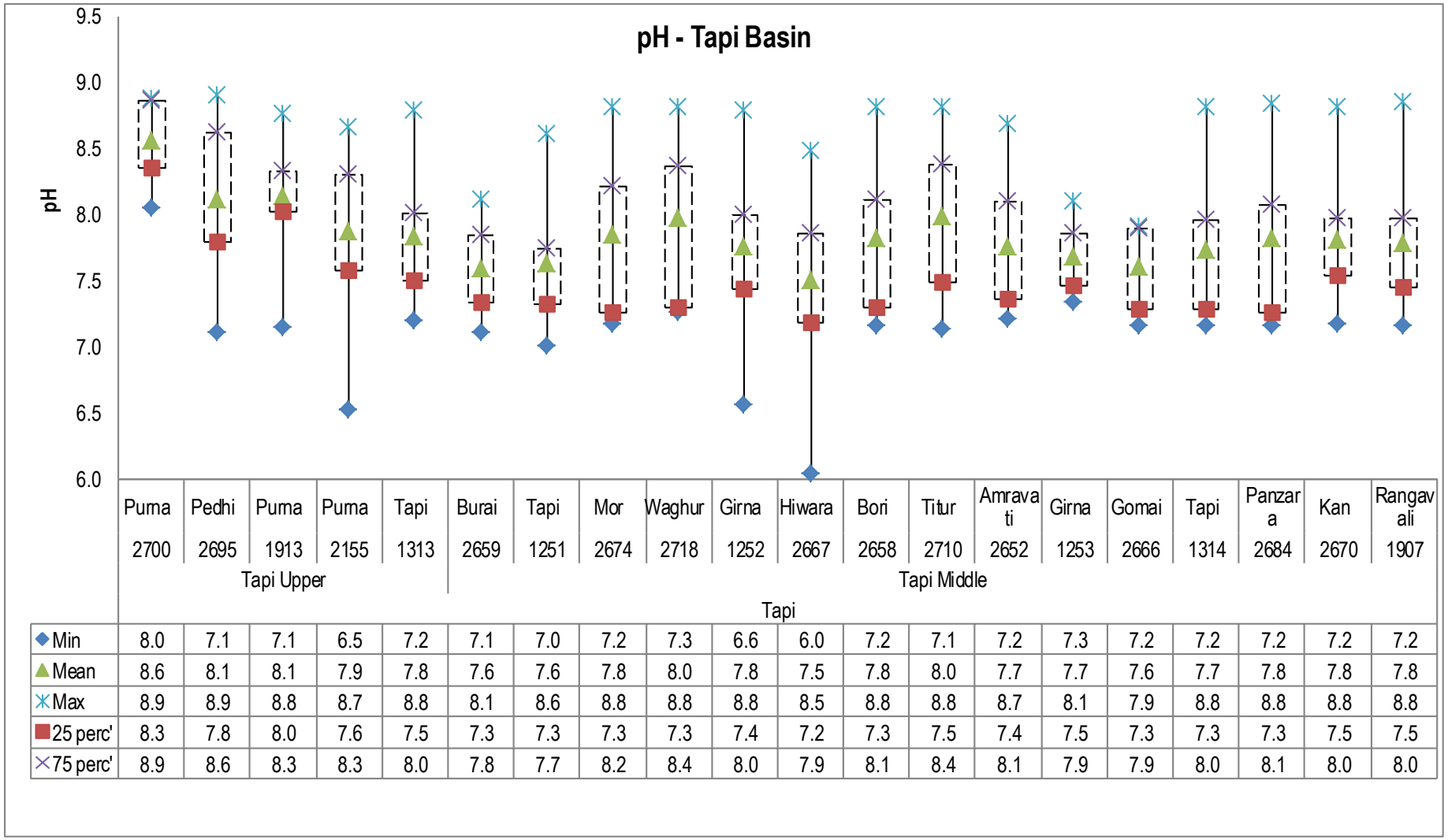
	Purna 2700	Pedhi 2695	Purna 1913	Purna 2155	Tapi 1313	Burai 2659	Tapi 1251	Mor 2674	Wagh ur 2718	Girna 1252	Hiwar a 2667	Bori 2658	Titur 2710	Amrav ati 2652	Girna 1253	Gomai 2666	Tapi 1314	Panza ra 2684	Kan 2670	Ranga vali 1907
	Tapi Upper					Tapi Middle														
◆ Min	5.8	3.4	3.9	2.7	4.9	4.7	3.9	5.0	3.6	5.2	5.8	5.4	6.1	5.7	5.9	4.2	5.6	5.5	4.0	4.0
▲ Mean	6.4	4.9	5.4	5.2	6.1	6.3	5.9	6.5	5.9	6.1	6.5	6.5	6.6	6.4	6.2	6.1	6.2	6.4	6.0	5.9
✳ Max	6.8	6.3	6.3	6.6	6.9	7.2	7.0	7.2	6.9	7.3	7.4	7.2	7.3	7.1	6.8	7.4	6.9	7.3	7.2	7.2
■ 25 perc'	6.3	4.3	4.9	4.6	5.8	6.0	5.4	6.4	5.8	5.7	6.1	6.4	6.3	6.1	6.0	5.7	6.0	6.0	5.8	5.5
✕ 75 perc'	6.7	5.7	5.9	6.1	6.4	6.8	6.5	7.1	6.5	6.4	6.7	7.0	7.0	6.7	6.4	6.9	6.6	6.8	6.5	6.3

Figure No. 3: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Tapi basin



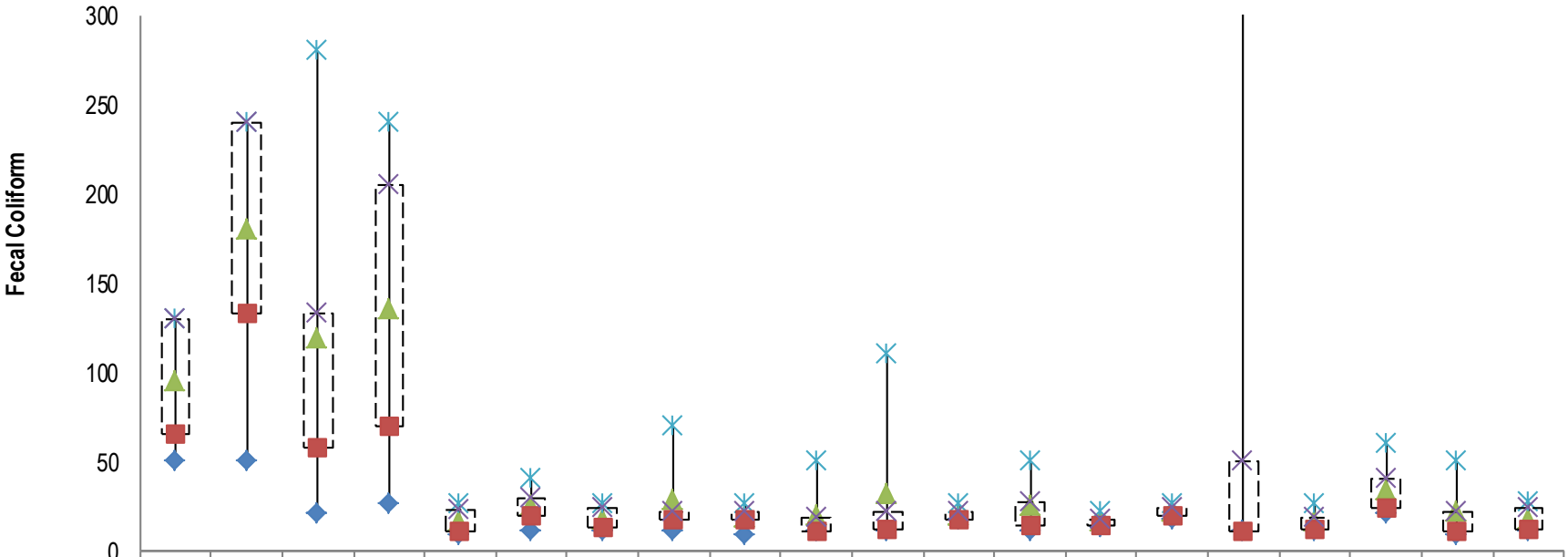
	Purna 2700	Pedhi 2695	Purna 1913	Purna 2155	Tapi 1313	Burai 2659	Tapi 1251	Mor 2674	Waghur 2718	Girna 1252	Hiwara 2667	Bori 2658	Titur 2710	Amravati 2652	Girna 1253	Gomai 2666	Tapi 1314	Panzara 2684	Kan 2670	Rangavali 1907
Min	4.0	4.0	3.8	3.6	2.6	2.6	2.4	2.0	2.4	2.2	2.0	2.2	2.4	2.2	2.4	2.0	2.2	2.0	2.2	2.0
Mean	4.3	8.2	7.5	6.6	4.8	4.2	4.9	3.4	4.0	4.7	3.1	3.1	3.2	3.7	2.9	5.2	4.1	4.1	3.7	4.4
Max	4.6	18.0	14.0	12.0	8.0	8.0	9.0	6.5	10.0	8.0	4.0	3.8	4.5	5.2	3.2	9.0	7.0	7.0	7.0	8.0
25 perc'	4.2	4.7	5.1	4.0	3.4	2.9	2.9	2.8	2.6	3.7	2.8	2.9	2.8	3.3	2.7	3.0	2.8	2.9	2.8	2.9
75 perc'	4.3	10.0	7.8	8.8	6.6	4.6	7.0	3.6	4.0	5.7	3.6	3.5	3.5	4.4	3.1	7.5	4.8	5.3	4.0	6.3

Figure No. 4: Trend of BOD levels recorded at WQMS at Tapi basin



	Purna 2700	Pedhi 2695	Purna 1913	Purna 2155	Tapi 1313	Burai 2659	Tapi 1251	Mor 2674	Waghur 2718	Girna 1252	Hiwara 2667	Bori 2658	Titur 2710	Amravati 2652	Girna 1253	Gomai 2666	Tapi 1314	Panzara 2684	Kan 2670	Rangavali 1907
Min	8.0	7.1	7.1	6.5	7.2	7.1	7.0	7.2	7.3	6.6	6.0	7.2	7.1	7.2	7.3	7.2	7.2	7.2	7.2	7.2
Mean	8.6	8.1	8.1	7.9	7.8	7.6	7.6	7.8	8.0	7.8	7.5	7.8	8.0	7.7	7.7	7.6	7.7	7.8	7.8	7.8
Max	8.9	8.9	8.8	8.7	8.8	8.1	8.6	8.8	8.8	8.8	8.5	8.8	8.8	8.7	8.1	7.9	8.8	8.8	8.8	8.8
25 perc'	8.3	7.8	8.0	7.6	7.5	7.3	7.3	7.3	7.3	7.4	7.2	7.3	7.5	7.4	7.5	7.3	7.3	7.3	7.5	7.5
75 perc'	8.9	8.6	8.3	8.3	8.0	7.8	7.7	8.2	8.4	8.0	7.9	8.1	8.4	8.1	7.9	7.9	8.0	8.1	8.0	8.0

Figure No. 5: Trend of pH levels recorded at WQMS at Tapi basin



	Purna	Pedhi	Purna	Purna	Tapi	Burai	Tapi	Mor	Waghur	Girna	Hiwara	Bori	Titur	Amravati	Girna	Gomai	Tapi	Panzara	Kan	Rangavali
	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	50.0	50.0	21.0	26.0	9.0	11.0	11.0	11.0	9.0	11.0	11.0	17.0	11.0	13.0	17.0	11.0	11.0	21.0	9.0	11.0
Mean	95.0	180.0	118.6	135.1	16.8	24.8	17.8	28.2	18.7	19.3	31.7	19.8	24.8	16.6	21.5	339.6	16.1	33.4	21.8	17.5
Max	130.0	240.0	280.0	240.0	26.0	40.0	26.0	70.0	26.0	50.0	110.0	26.0	50.0	22.0	26.0	1600.0	26.0	60.0	50.0	27.0
25 perc'	65.0	132.5	57.5	70.0	11.0	19.3	13.3	17.0	17.0	11.0	12.5	17.0	14.0	14.0	19.3	11.0	12.0	23.5	11.0	11.5
75 perc'	130.0	240.0	132.5	205.0	23.0	29.5	23.8	22.0	21.8	19.0	21.8	22.0	27.0	17.0	23.8	50.0	19.0	40.0	22.0	23.8

igure No. 6: Trend of Fecal Coliform levels recorded at WQMS at Tapi basin

Water Quality Index for WQMS in Tapi Basin

Mar	NA	NA	45	49	56	48	57	56	79	74	80	NA	74	75	81	74	80	76	79	75	81	80	76	76	77	73	81	77	NA	NA	81	NA	81	74	73	72	80	75	80	75
Feb	NA	NA	33	51	69	61	69	48	86	84	80	86	79	86	87	86	84	83	82	87	83	83	86	85	88	85	82	85	71	NA	86	54	83	85	88	80	84	86	80	85
Jan	66	NA	76	48	NA	59	NA	74	71	86	74	81	68	81	70	82	62	80	64	75	69	75	70	81	63	77	63	77	70	NA	66	83	64	82	65	79	65	82	67	78
Dec	61	NA	36	77	NA	77	50	68	68	78	74	80	66	77	70	74	68	79	NA	79	69	72	63	77	66	76	66	82	NA	78	63	79	61	79	66	75	61	65	NA	60
Nov	56	72	40	63	NA	65	69	76	NA	81	NA	NA	NA	85	NA	80	NA	67	NA	77	NA	82	NA	80	NA	81	NA	NA	NA	NA	NA	74	NA	NA	NA	NA	NA	NA	NA	NA
Oct	57	76	47	78	73	78	67	81	63	72	70	81	61	NA	65	NA	72	NA	NA	NA	59	84	53	NA	64	NA	60	75	NA	NA	58	81	60	88	72	81	54	81	NA	83
Sep	61	66	61	55	NA	76	54	72	85	NA	69	NA	76	NA	86	NA	85	NA	NA	NA	50	NA	89	NA	80	NA	82	NA	NA	NA	81	NA	78	NA	61	NA	74	NA	NA	NA
Aug	54	70	50	64	NA	53	53	67	64	NA	65	NA	70	NA	58	NA	71	NA	64	NA	68	NA	67	NA	75	NA	61	NA	NA	85	65	NA	73	NA	70	NA	76	NA	72	NA
Jul	NA	NA	NA	57	53	62	41	55	62	NA	NA	NA	66	NA	NA	NA	74	NA	NA	NA	NA	NA	68	NA	73	NA	NA	NA	60	NA	49	NA	61	NA	61	NA	76	NA	NA	NA
Jun	NA	NA	NA	NA	NA	53	NA	NA	NA	67	NA	NA	65	NA	NA	NA	75	55	NA	65	NA	NA	63	NA	68	NA	NA	NA	NA	NA	NA	NA	60	66	NA	68	NA	NA	NA	NA
May	NA	NA	52	NA	NA	62	NA	47	82	72	NA	NA	79	71	NA	NA	NA	NA	NA	70	NA	NA	NA	NA	80	NA	NA	NA	NA	NA	NA	NA	79	75	NA	73	NA	NA	83	71
Apr	NA	NA	55	54	56	71	NA	66	71	NA	NA	NA	79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	85	NA	NA	NA	NA	NA	71	NA	NA	NA	NA	NA	NA	NA	NA	NA
Month	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
	2700		2695		1913		2155		1313		2659		1251		2674		2718		1252		2667		2658		2710		2652		1253		2666		1314		2684		2670		1907	
	Tapi Upper										Tapi Middle																													

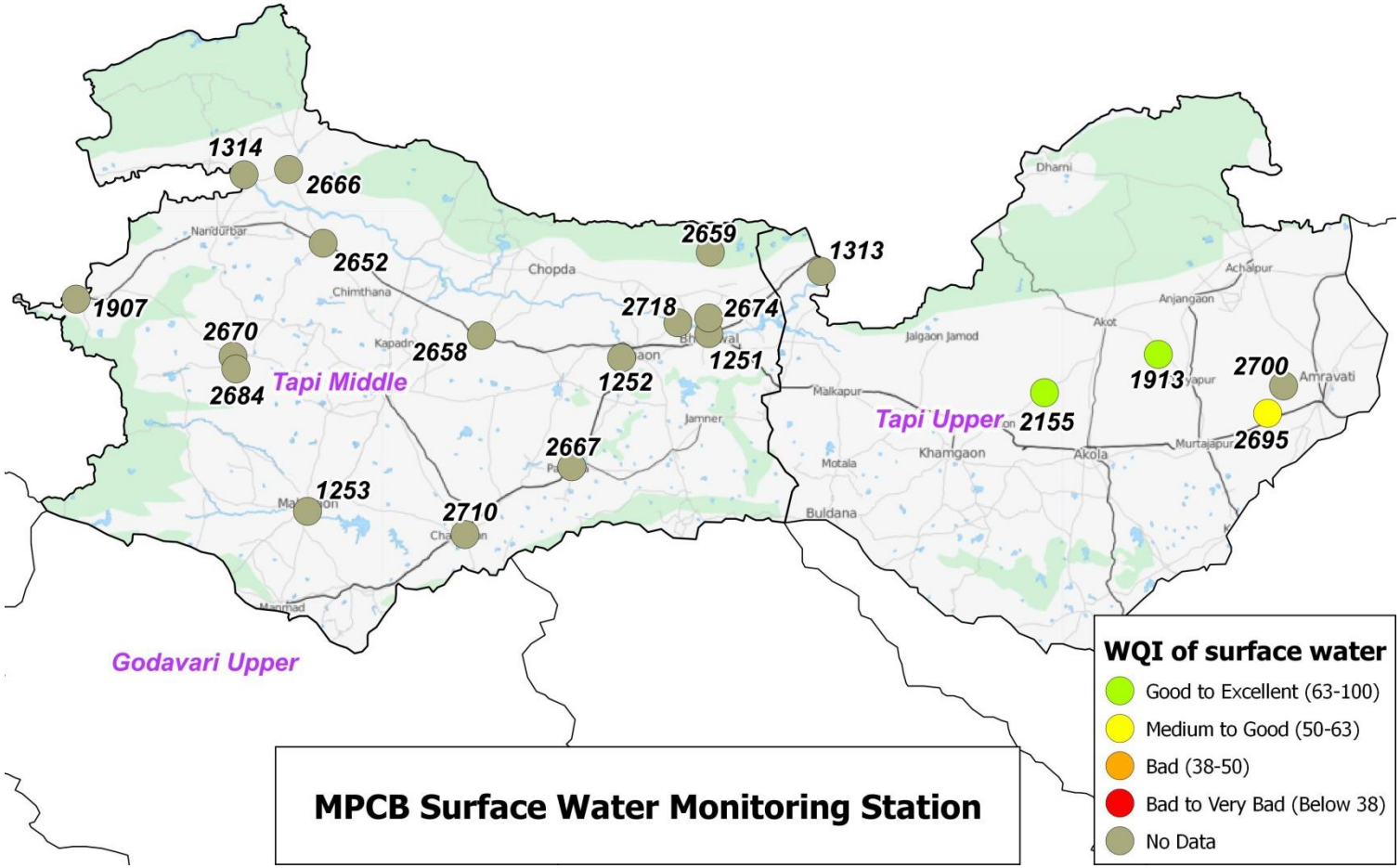
Legend

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

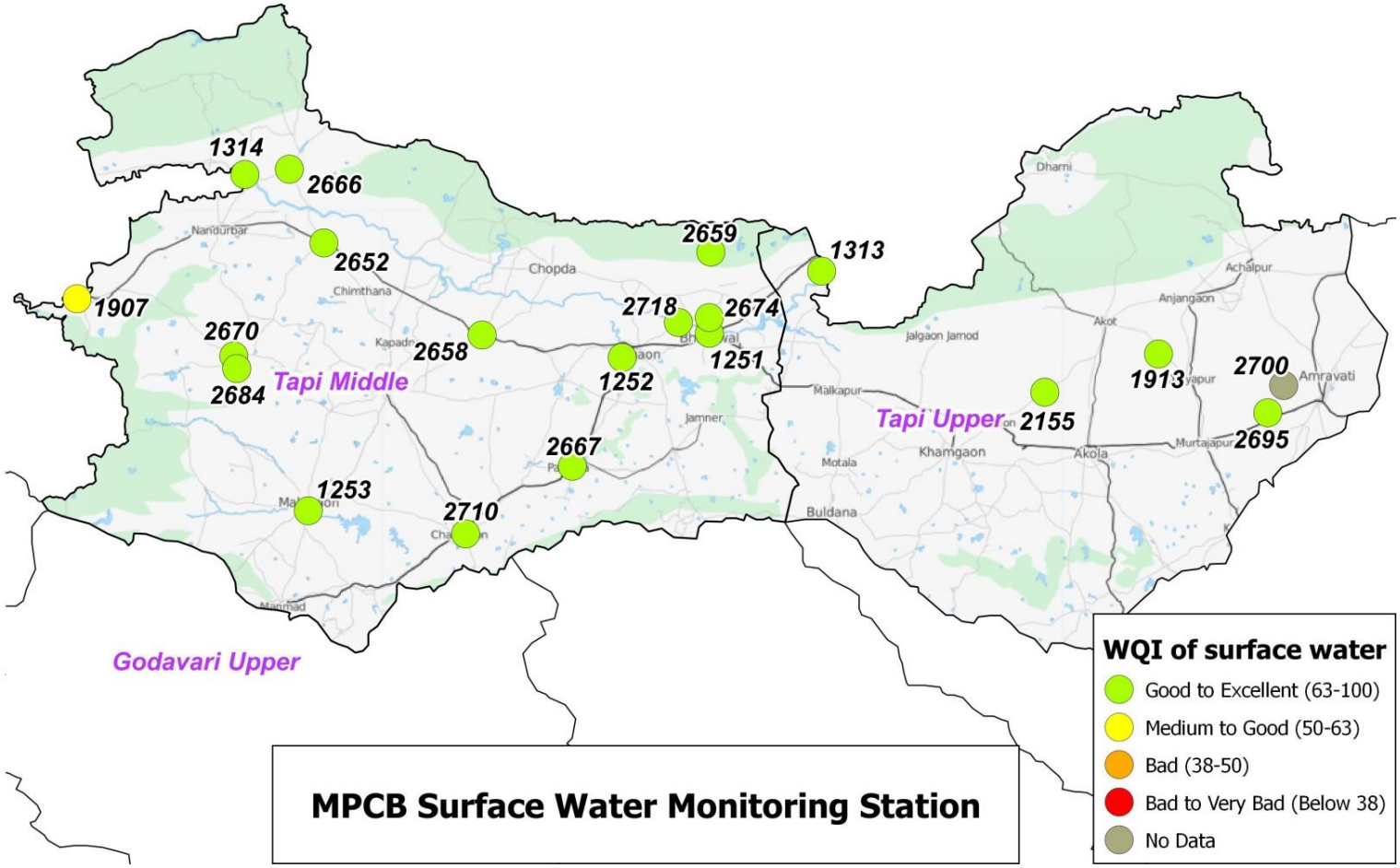
Table No. 7: Surface water quality monitoring stations in Tapi river basin

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
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
2684	Panzara	Panzare river near Panzarakan SSK Ltd.	Panzare	Dhule	Dhule
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

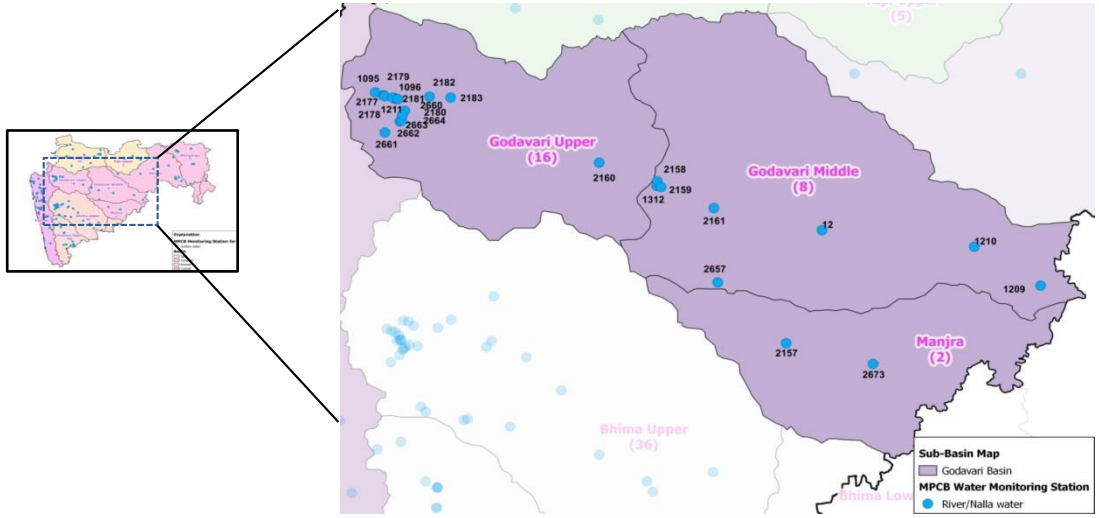
Spatial map of Surface WQI at Tapi Basin (April-2011)



Spatial map of Surface WQI at Tapi Basin (December-2011)



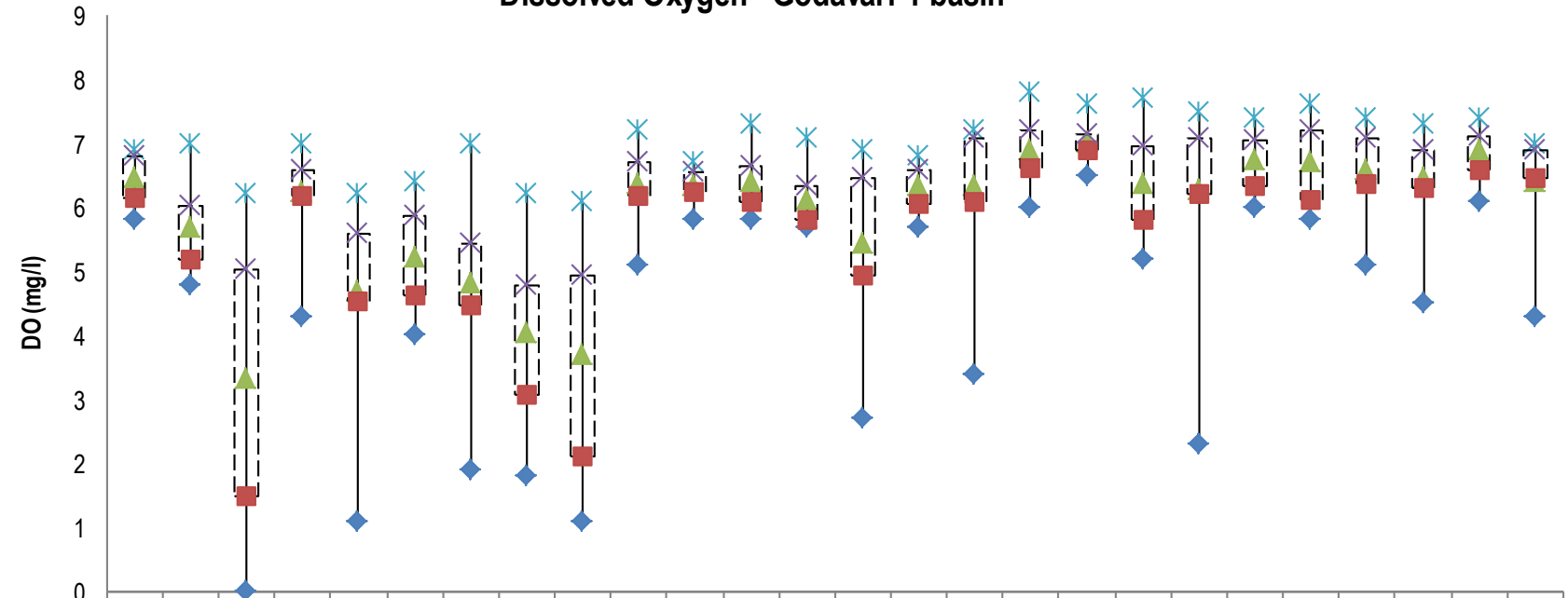
Godavari Basin (1 of 2): Godavari upper, Godavari Middle and Manjra Sub basin



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

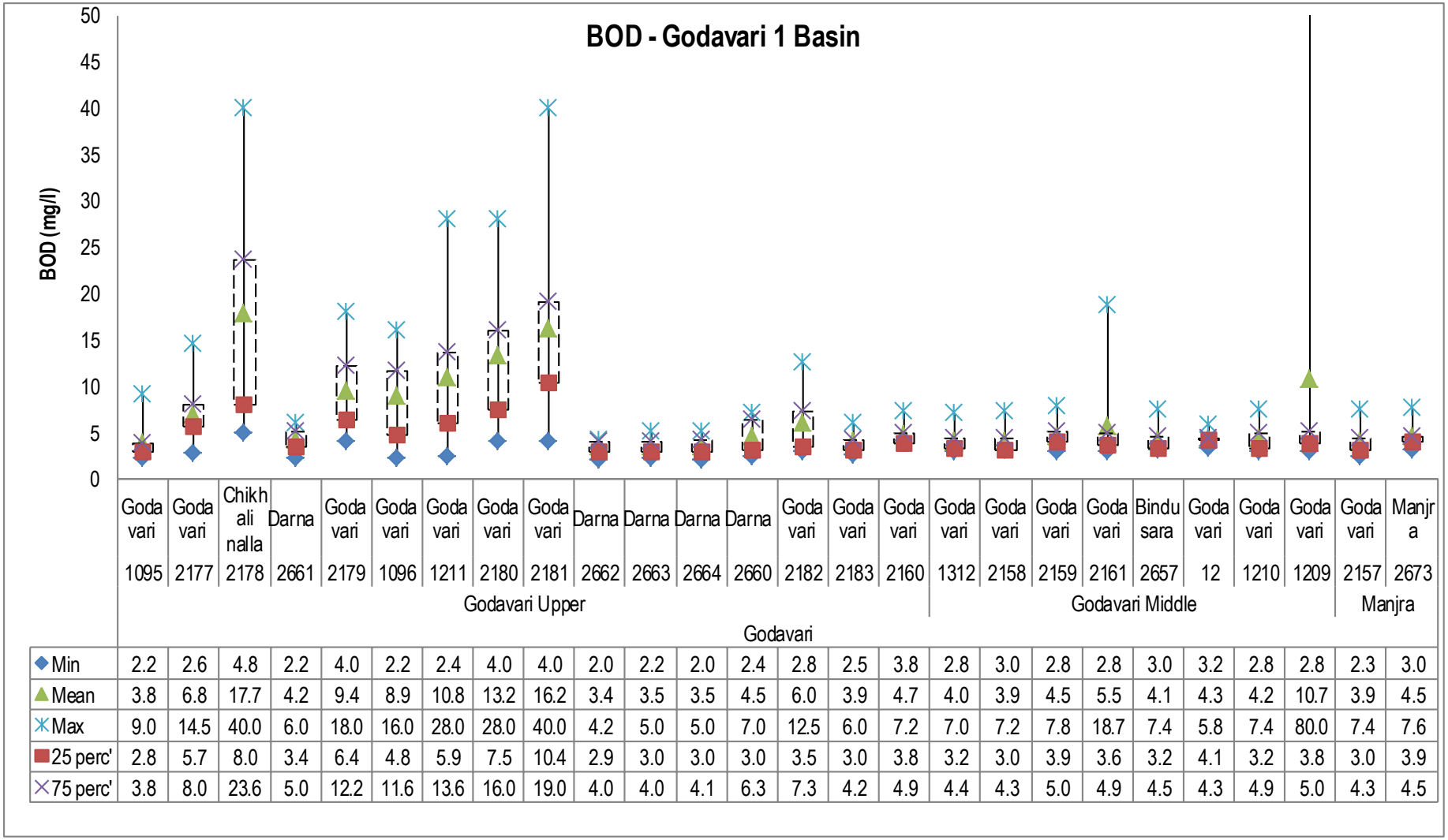
The Godavari river basin passes through six states (third largest basin in India) and drains about 10% of the total geographical area of the country[13]. Approximately 50 percent of the catchment area comes under Maharashtra. In Maharashtra the Godavari Basin could be divided into six sub-basins Godavari 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. 8. 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. 9.

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



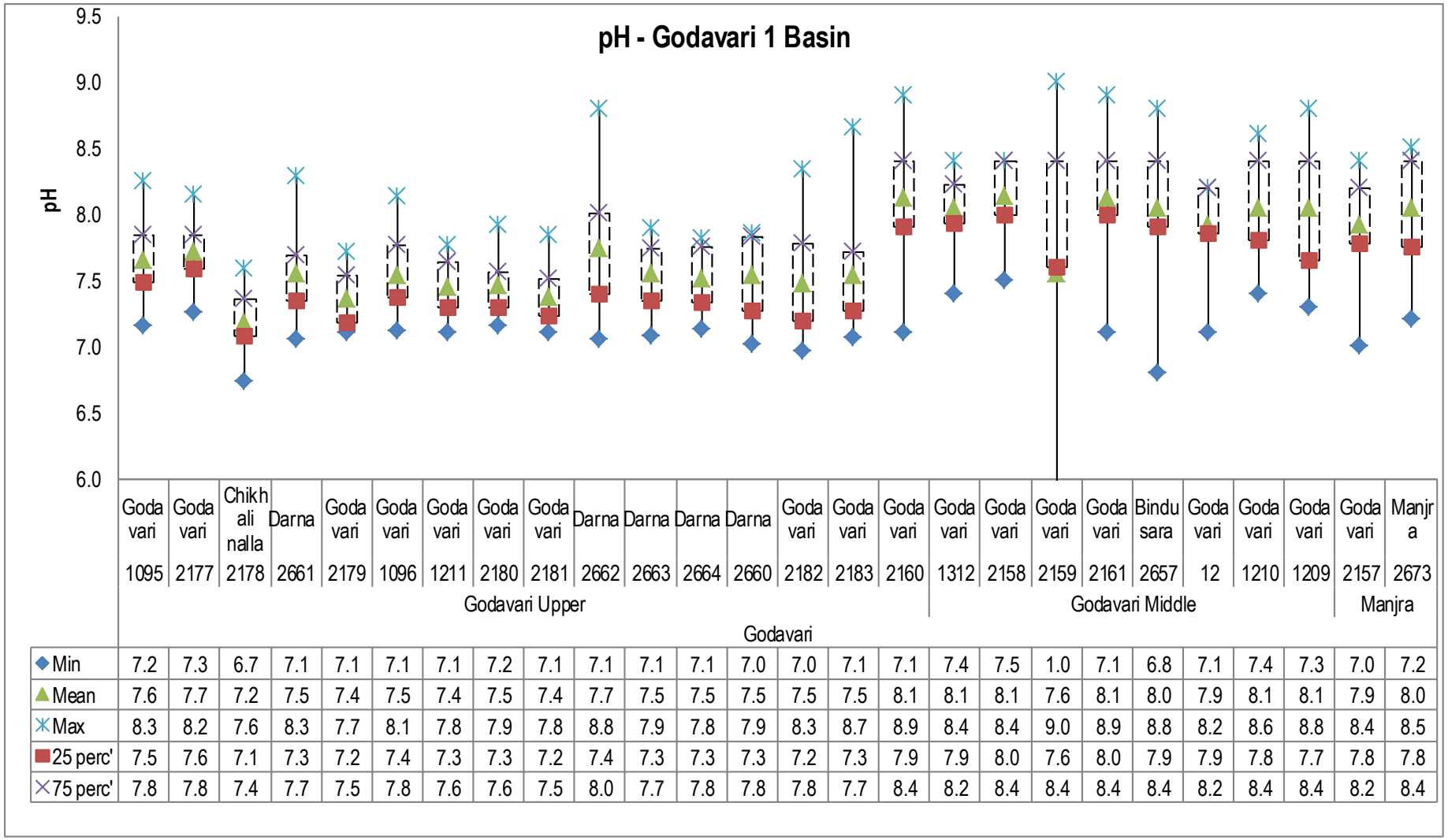
	Godavari river 1095	Godavari river 2177	Chikhali nalla 2178	Darna river 2661	Godavari river 2179	Godavari river 1096	Godavari river 1211	Godavari river 2180	Godavari river 2181	Darna river 2662	Darna river 2663	Darna river 2664	Darna river 2660	Godavari river 2182	Godavari river 2183	Godavari river 2160	Godavari river 1312	Godavari river 2158	Godavari river 2159	Godavari river 2161	Bindusara river 2657	Godavari river 12	Godavari river 1210	Godavari river 1209	Godavari river 2157	Manjra river 2673
	Godavari Upper																Godavari Middle								Manjra	
Min	5.8	4.8	0.0	4.3	1.1	4.0	1.9	1.8	1.1	5.1	5.8	5.8	5.7	2.7	5.7	3.4	6.0	6.5	5.2	2.3	6.0	5.8	5.1	4.5	6.1	4.3
Mean	6.5	5.7	3.3	6.3	4.7	5.2	4.8	4.0	3.7	6.4	6.4	6.4	6.1	5.4	6.3	6.3	6.9	7.0	6.4	6.3	6.7	6.7	6.6	6.5	6.9	6.4
Max	6.9	7.0	6.2	7.0	6.2	6.4	7.0	6.2	6.1	7.2	6.7	7.3	7.1	6.9	6.8	7.2	7.8	7.6	7.7	7.5	7.4	7.6	7.4	7.3	7.4	7.0
25 perc'	6.2	5.2	1.5	6.2	4.6	4.6	4.5	3.1	2.1	6.2	6.3	6.1	5.8	5.0	6.1	6.1	6.6	6.9	5.8	6.2	6.4	6.1	6.4	6.3	6.6	6.5
75 perc'	6.8	6.0	5.0	6.6	5.6	5.9	5.5	4.8	5.0	6.7	6.6	6.7	6.3	6.5	6.6	7.1	7.2	7.2	7.0	7.1	7.1	7.2	7.1	6.9	7.1	6.9

Figure No. 7: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Godavari-1 basin



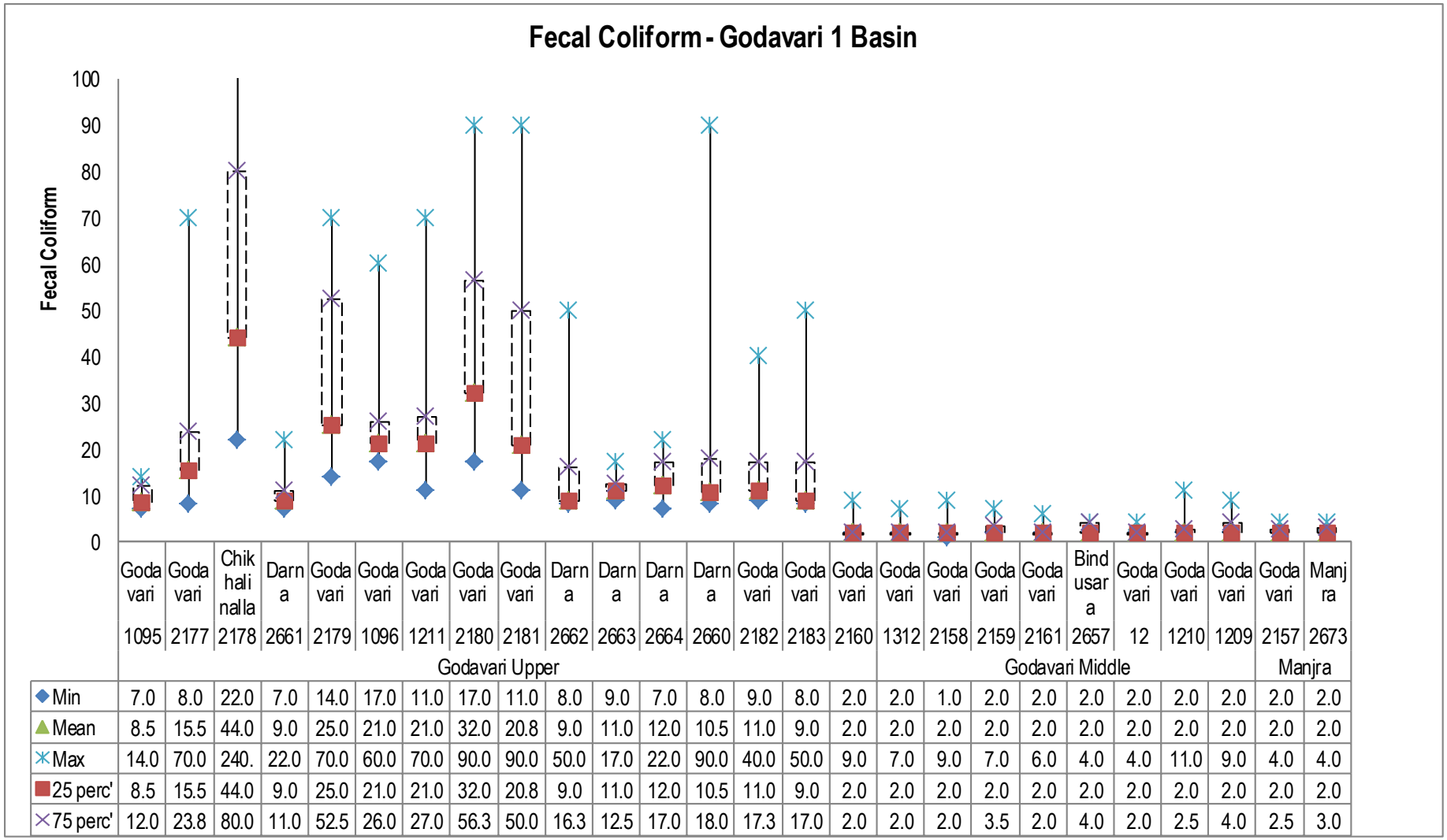
	Godavari Upper																Godavari Middle									Manjra	
	Godavari																										
	Godavari 1095	Godavari 2177	Chikhali nalla 2178	Darna 2661	Godavari 2179	Godavari 1096	Godavari 1211	Godavari 2180	Godavari 2181	Darna 2662	Darna 2663	Darna 2664	Darna 2660	Godavari 2182	Godavari 2183	Godavari 2160	Godavari 1312	Godavari 2158	Godavari 2159	Godavari 2161	Bindusara 2657	Godavari 12	Godavari 1210	Godavari 1209	Godavari 2157	Manjra 2673
Min	2.2	2.6	4.8	2.2	4.0	2.2	2.4	4.0	4.0	2.0	2.2	2.0	2.4	2.8	2.5	3.8	2.8	3.0	2.8	2.8	3.0	3.2	2.8	2.8	2.3	3.0
Mean	3.8	6.8	17.7	4.2	9.4	8.9	10.8	13.2	16.2	3.4	3.5	3.5	4.5	6.0	3.9	4.7	4.0	3.9	4.5	5.5	4.1	4.3	4.2	10.7	3.9	4.5
Max	9.0	14.5	40.0	6.0	18.0	16.0	28.0	28.0	40.0	4.2	5.0	5.0	7.0	12.5	6.0	7.2	7.0	7.2	7.8	18.7	7.4	5.8	7.4	80.0	7.4	7.6
25 perc'	2.8	5.7	8.0	3.4	6.4	4.8	5.9	7.5	10.4	2.9	3.0	3.0	3.0	3.5	3.0	3.8	3.2	3.0	3.9	3.6	3.2	4.1	3.2	3.8	3.0	3.9
75 perc'	3.8	8.0	23.6	5.0	12.2	11.6	13.6	16.0	19.0	4.0	4.0	4.1	6.3	7.3	4.2	4.9	4.4	4.3	5.0	4.9	4.5	4.3	4.9	5.0	4.3	4.5

Figure No. 8: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Godavari-1 basin



	Godavari																									
	Godavari																									
	Godavari Upper																Godavari Middle								Manjra	
	Godavari vari 1095	Godavari vari 2177	Chikhali nalla 2178	Darna 2661	Godavari vari 2179	Godavari vari 1096	Godavari vari 1211	Godavari vari 2180	Godavari vari 2181	Darna 2662	Darna 2663	Darna 2664	Darna 2660	Godavari vari 2182	Godavari vari 2183	Godavari vari 2160	Godavari vari 1312	Godavari vari 2158	Godavari vari 2159	Godavari vari 2161	Bindusara 2657	Godavari vari 12	Godavari vari 1210	Godavari vari 1209	Godavari vari 2157	Manjra 2673
Min	7.2	7.3	6.7	7.1	7.1	7.1	7.1	7.2	7.1	7.1	7.1	7.1	7.0	7.0	7.1	7.1	7.4	7.5	1.0	7.1	6.8	7.1	7.4	7.3	7.0	7.2
Mean	7.6	7.7	7.2	7.5	7.4	7.5	7.4	7.5	7.4	7.7	7.5	7.5	7.5	7.5	7.5	8.1	8.1	8.1	7.6	8.1	8.0	7.9	8.1	8.1	7.9	8.0
Max	8.3	8.2	7.6	8.3	7.7	8.1	7.8	7.9	7.8	8.8	7.9	7.8	7.9	8.3	8.7	8.9	8.4	8.4	9.0	8.9	8.8	8.2	8.6	8.8	8.4	8.5
25 perc'	7.5	7.6	7.1	7.3	7.2	7.4	7.3	7.3	7.2	7.4	7.3	7.3	7.3	7.2	7.3	7.9	7.9	8.0	7.6	8.0	7.9	7.9	7.8	7.7	7.8	7.8
75 perc'	7.8	7.8	7.4	7.7	7.5	7.8	7.6	7.6	7.5	8.0	7.7	7.8	7.8	7.8	7.7	8.4	8.2	8.4	8.4	8.4	8.4	8.2	8.4	8.4	8.2	8.4

Figure No. 9: Trend of pH levels recorded at WQMS at Godavari-1 basin



	Godavari 1095	Godavari 2177	Chikhalinalla 2178	Darna 2661	Godavari 2179	Godavari 1096	Godavari 1211	Godavari 2180	Godavari 2181	Darna 2662	Darna 2663	Darna 2664	Darna 2660	Godavari 2182	Godavari 2183	Godavari 2160	Godavari 1312	Godavari 2158	Godavari 2159	Godavari 2161	Bindusara 2657	Godavari 12	Godavari 1210	Godavari 1209	Godavari 2157	Manjra 2673
	Godavari Upper																Godavari Middle								Manjra	
Min	7.0	8.0	22.0	7.0	14.0	17.0	11.0	17.0	11.0	8.0	9.0	7.0	8.0	9.0	8.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mean	8.5	15.5	44.0	9.0	25.0	21.0	21.0	32.0	20.8	9.0	11.0	12.0	10.5	11.0	9.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max	14.0	70.0	240.	22.0	70.0	60.0	70.0	90.0	90.0	50.0	17.0	22.0	90.0	40.0	50.0	9.0	7.0	9.0	7.0	6.0	4.0	4.0	11.0	9.0	4.0	4.0
25 perc'	8.5	15.5	44.0	9.0	25.0	21.0	21.0	32.0	20.8	9.0	11.0	12.0	10.5	11.0	9.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
75 perc'	12.0	23.8	80.0	11.0	52.5	26.0	27.0	56.3	50.0	16.3	12.5	17.0	18.0	17.3	17.0	2.0	2.0	2.0	3.5	2.0	4.0	2.0	2.5	4.0	2.5	3.0

Figure No. 10: Trend of Fecal Coliform levels recorded at WQMS at Godavari-1 basin

Water Quality Index for WQMS in Godavari Basin (1 of 2)

Mar	83	82	79	70	58	32	81	88	72	82	71	72	72	81	67	82	80	81	81	84	79	86	80	83	83	87	83	87	82	87	83	81	87	80	86	82	84		85	83	81	82	86	82	85	84	79	84	84	82	66	
Feb	84	88	85	76	29	66		80	65	74	67	68	66	79	71	80	52	84	79	85	81	84	49	85	82	85	67	85	81	88	79	84	73	82	77	79	71	78	74	81	81	85	73	83	83	88	80	87	81	83	84	
Jan	84	86	78	71	46	33	71	80	82	43	56	57	63	60	81	44	83	34	65	81	74	83	61	83	77	82	74	51	81	77	78	80	83	83	77	84	83	82	79	82	81	83	79		81	84	81	84	79	82	77	84
Dec	84	79	75	66	54	57	77	84	81	54	59	65	68	59	80	52	77	52	70	80		82	65	77	69	83	78	64	80	81	78	82	79	81	75	82	79	66	76	83		83	75	81	76	85	77	83	78	84	76	85
Nov	86	84	83	81	56	70	84	70	81	42	64	81	65	71	62	59	82	44	76	77	74	87	63	83	75	83	75	53	82	79			83	85		82		79	86	42	79	83	83	83	78	82	77	82	79	82		63
Oct	70	85	72	79	43	36	87	74	55	72	51	81	49	51	50	52	67	38	66	81	72	83	68	81	75	76	66	61	73	76	44	81	52	81	49	83	42	83	49	82	45	81	49	83	44	84	49	80	49	86	50	81
Sep	82	88	77	86	62	77	76	89	54	70	75	87	74	86	55	78	59	75	74	87	82	88	71	86	77	86	76	84	76	87	83		75	86	76	84	79	88		90	76	83	77			87	82	89	52	85	52	86
Aug	83	84	72	65	52	71	78	86	63	57	60	66	65	58	64	52	78	59	82	79	81	84	74	86	77	77	75	73	77	85	83	88	84	86	79		53		80	84	77	88	85	87		81	83	85	83	86		87
Jul	79	84	66	60	59	47	77	82	62	77	53	56	58	66	59	38	76	36	82	78	80	81	77	79		72	74	79	81	82	81	81	79	83		83		77	79		77		79			81	82	83		84		
Jun	79		64	74	67	50	83	82	57	73	53	56	62	63	53	61	72	64	87	79	87	79	83	81	78	75	82	70	87	83		73	37	78		78		69		82		78				74	49	64	50	76		
May	81	78	73	72	53	51	84	81	69	63	76	64	67	63	68	57	76	62	82	84	78	85	82	86	78	76	80	72	87	82		79		84		82		74		75		69				76	80	73	49	84		
Apr	88	73	86	71	61	34	85	86	67	65	65	64	41	39	60	39	58	50	86	84	85		87	87	88	76	83	82	81	83		60		81		85		79		75		81		76		69		62		81		80
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
	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			

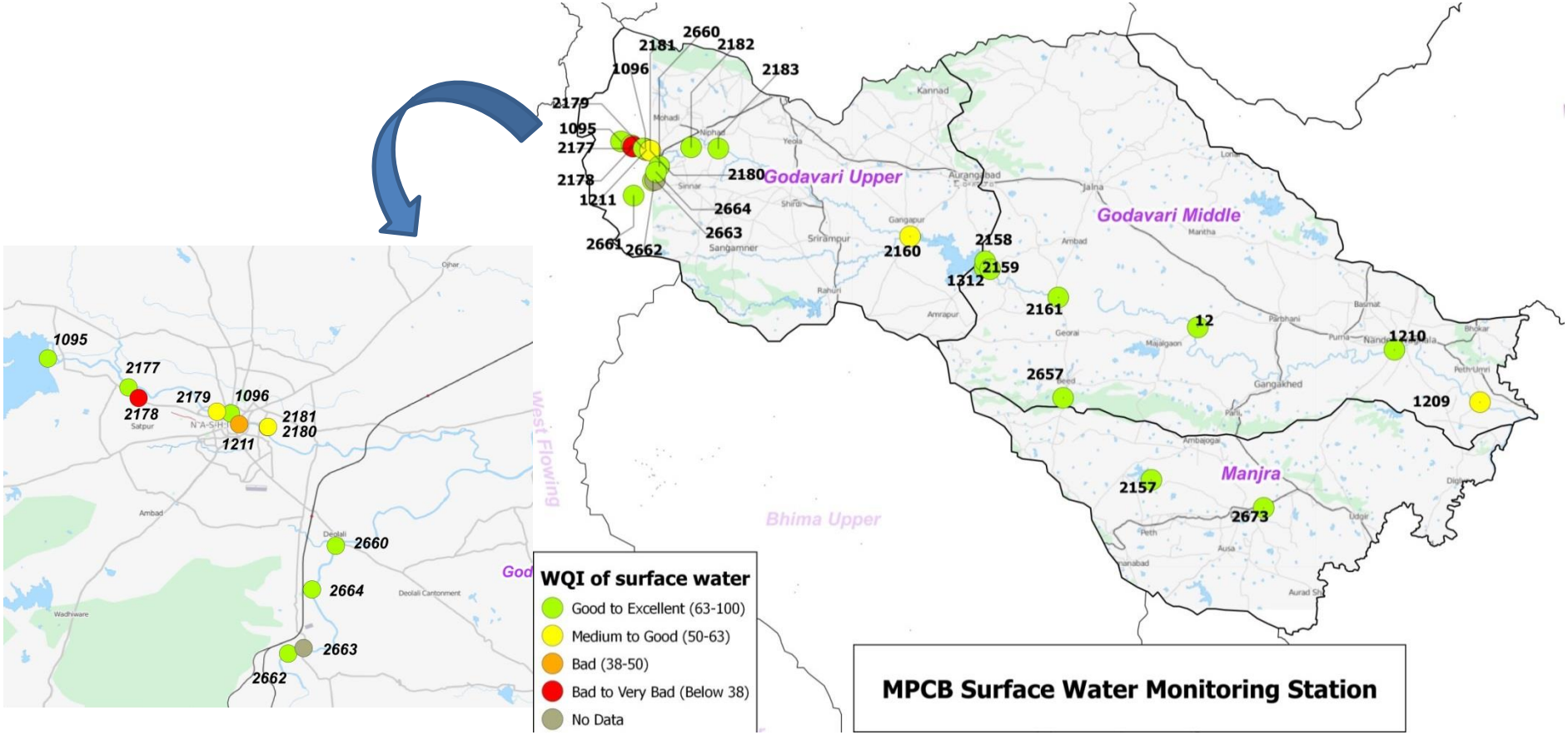
Legend

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

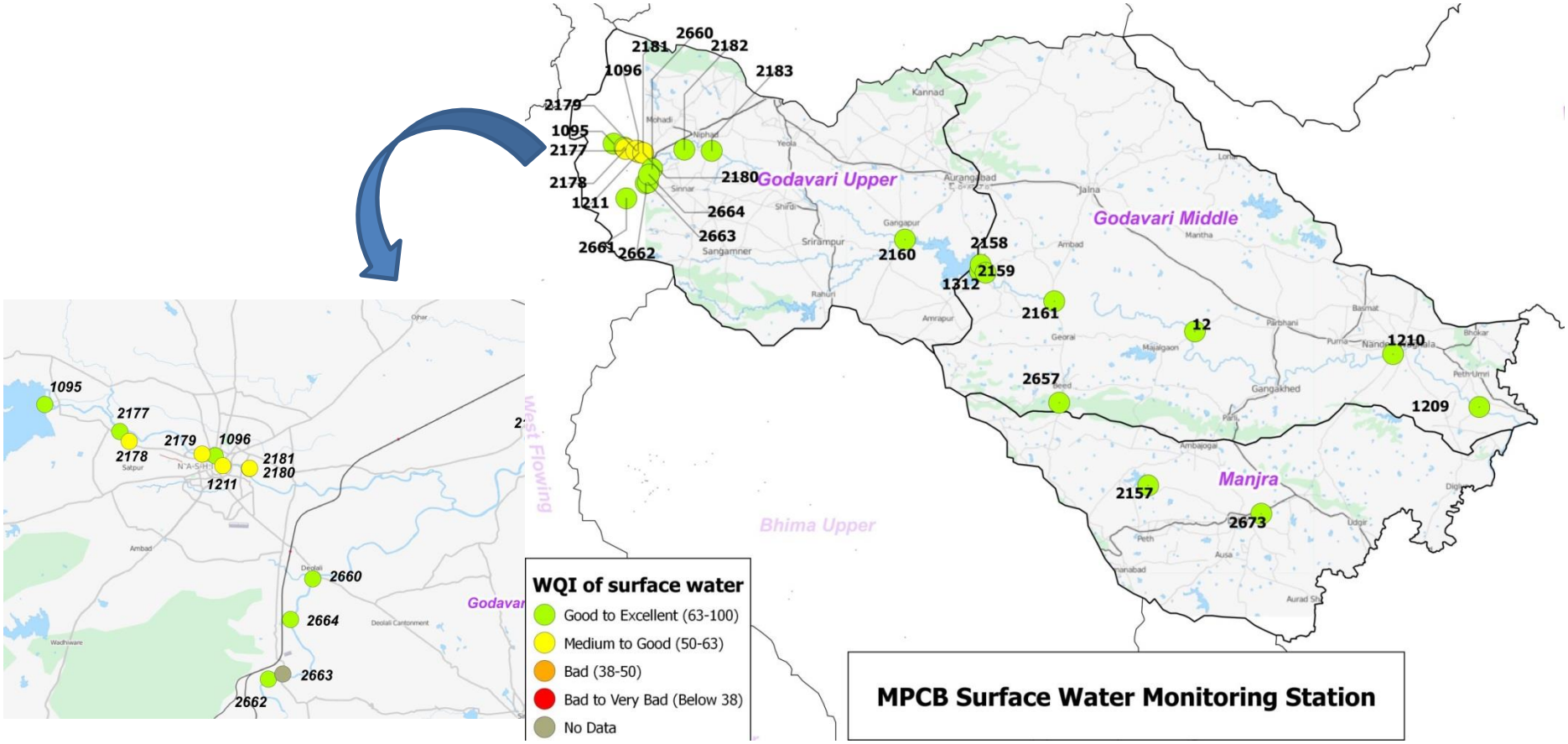
Table No. 8: Surface water quality monitoring stations in Godavari Basin (1 of 2)

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
1211	Godavari	Godavari river at Nashik D/s near Amardham	Gadgebaba Maharaj Nagar	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
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
12	Godavari	Godavari river at Dhalegaon	Dhalegaon	Pathari	Parbhani
1210	Godavari	Godavari river at Nanded near Intake water pump house.	Vishnupuri	Nanded	Nanded
1209	Godavari	Godavari river at Raher	Raher	Nayagaon	Nanded
2157	Godavari	Godavari river at Latur water intake near Pump house.	Dhamegaon	Kalumb	Osmanabad
2673	Manjra	Manjra river at D/s of Latur, near Latur-Nanded bridge..	Bhatkheda	Latur	Latur

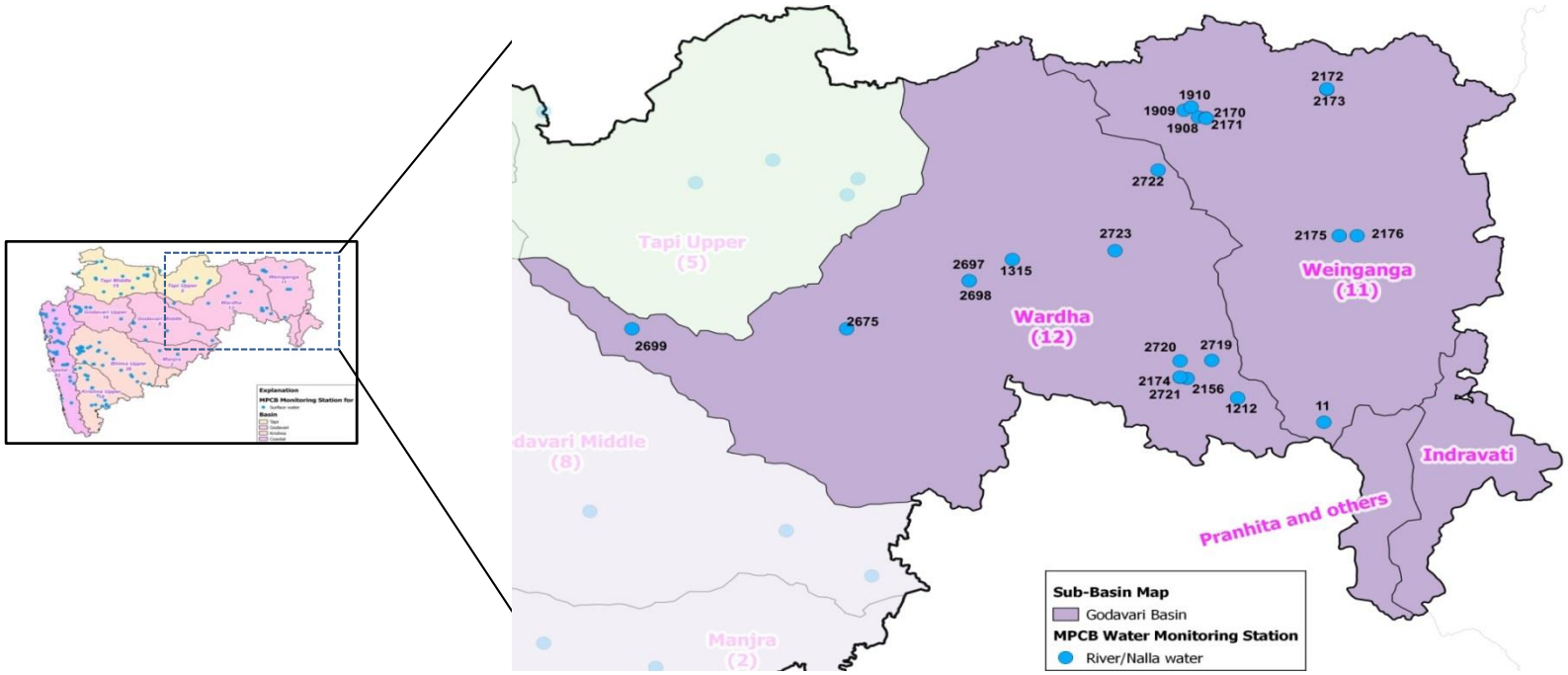
Spatial map of Surface WQI at Godavari Basin (1 of 2) (April 2011)



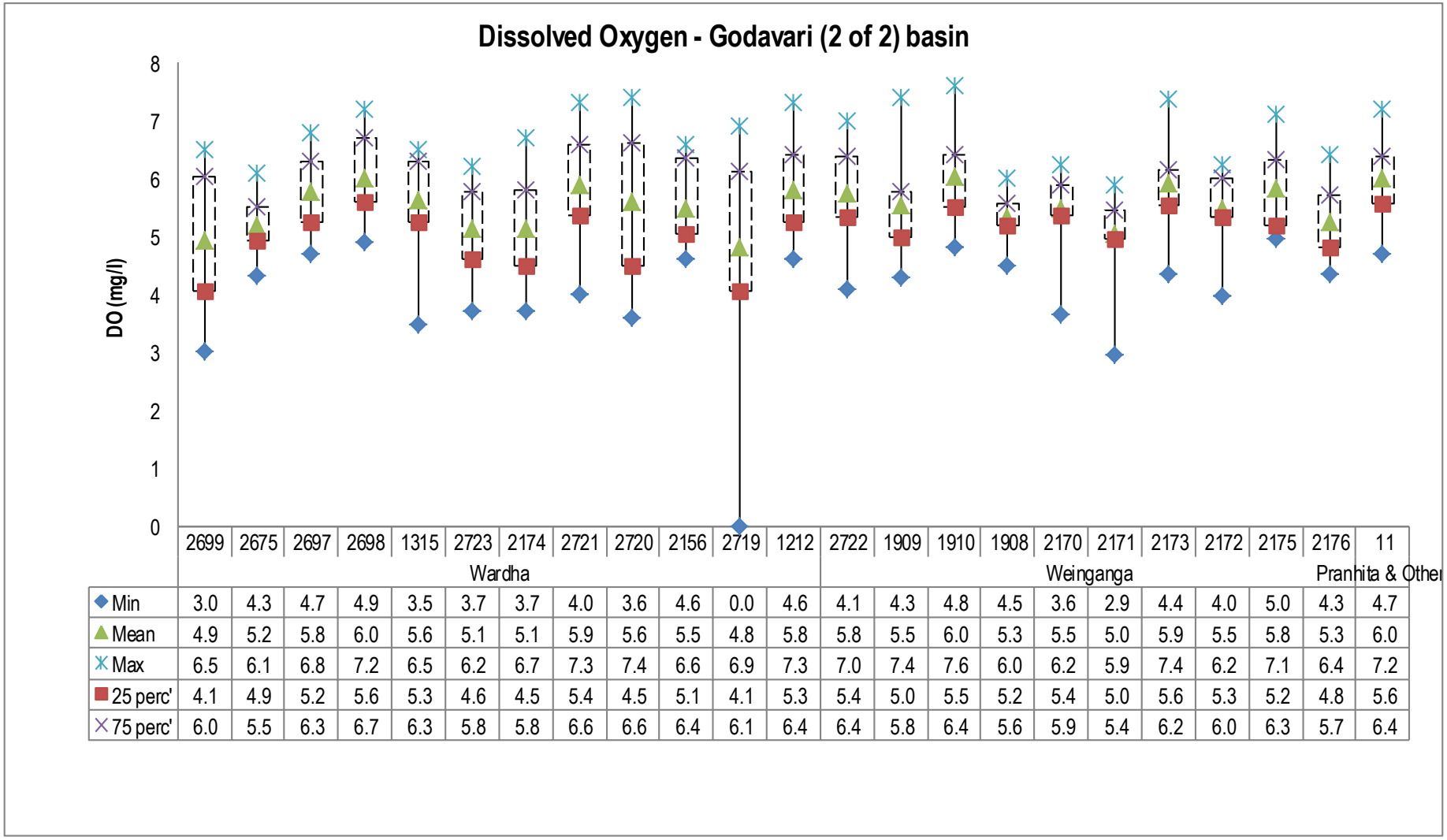
Spatial map of Surface WQI at Godavari Basin (1 of 2) (December 2011)



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

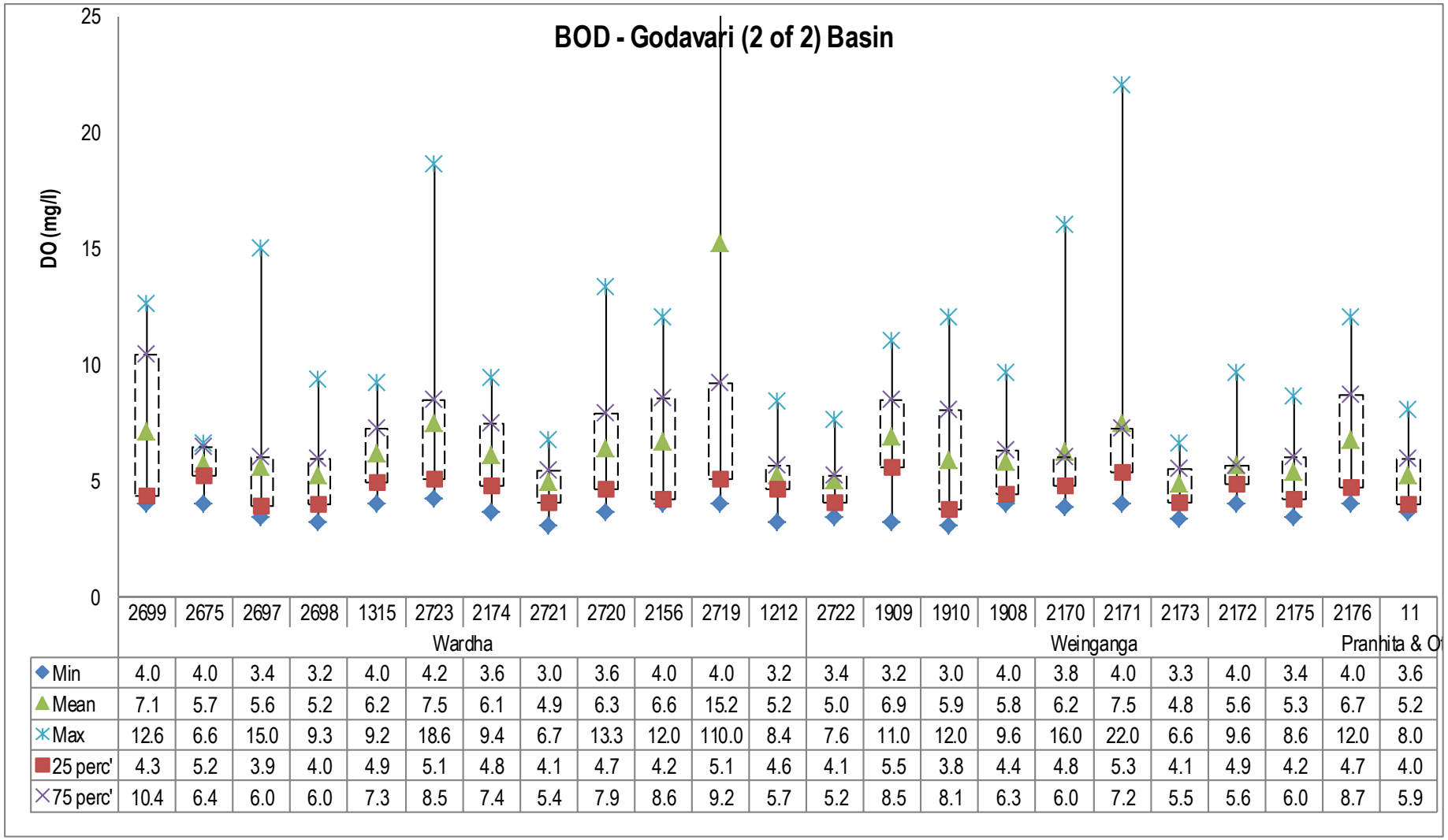


Map No. 3: Network of surface water quality monitoring stations in Godavari basin 2 of 2: Wardh, Weinganga and Pranhita Sub basin



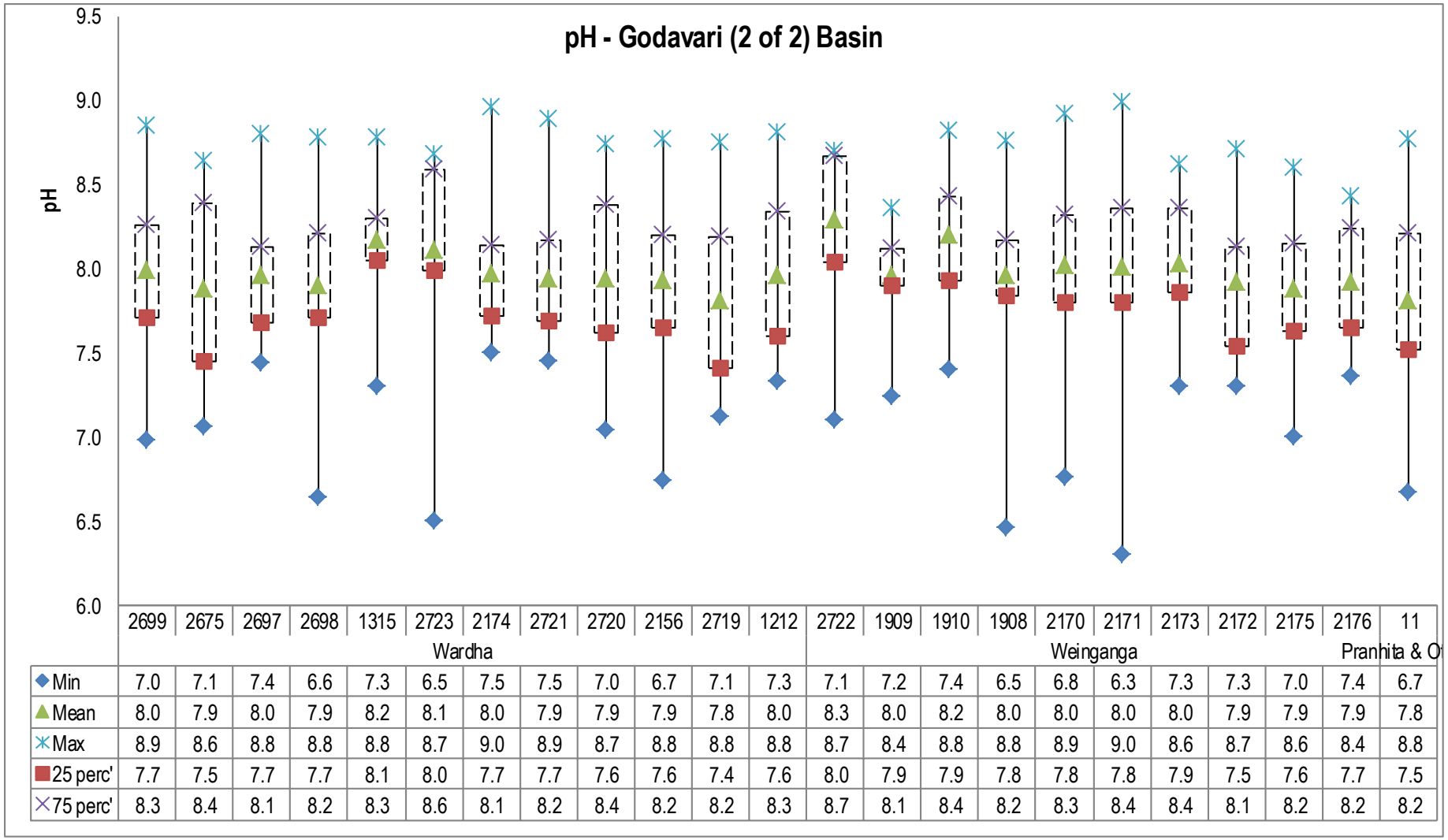
	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga										Pranhita & Other
Min	3.0	4.3	4.7	4.9	3.5	3.7	3.7	4.0	3.6	4.6	0.0	4.6	4.1	4.3	4.8	4.5	3.6	2.9	4.4	4.0	5.0	4.3	4.7
Mean	4.9	5.2	5.8	6.0	5.6	5.1	5.1	5.9	5.6	5.5	4.8	5.8	5.8	5.5	6.0	5.3	5.5	5.0	5.9	5.5	5.8	5.3	6.0
Max	6.5	6.1	6.8	7.2	6.5	6.2	6.7	7.3	7.4	6.6	6.9	7.3	7.0	7.4	7.6	6.0	6.2	5.9	7.4	6.2	7.1	6.4	7.2
25 perc'	4.1	4.9	5.2	5.6	5.3	4.6	4.5	5.4	4.5	5.1	4.1	5.3	5.4	5.0	5.5	5.2	5.4	5.0	5.6	5.3	5.2	4.8	5.6
75 perc'	6.0	5.5	6.3	6.7	6.3	5.8	5.8	6.6	6.6	6.4	6.1	6.4	6.4	5.8	6.4	5.6	5.9	5.4	6.2	6.0	6.3	5.7	6.4

Figure No. 11: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Godavari-2 of 2 basin



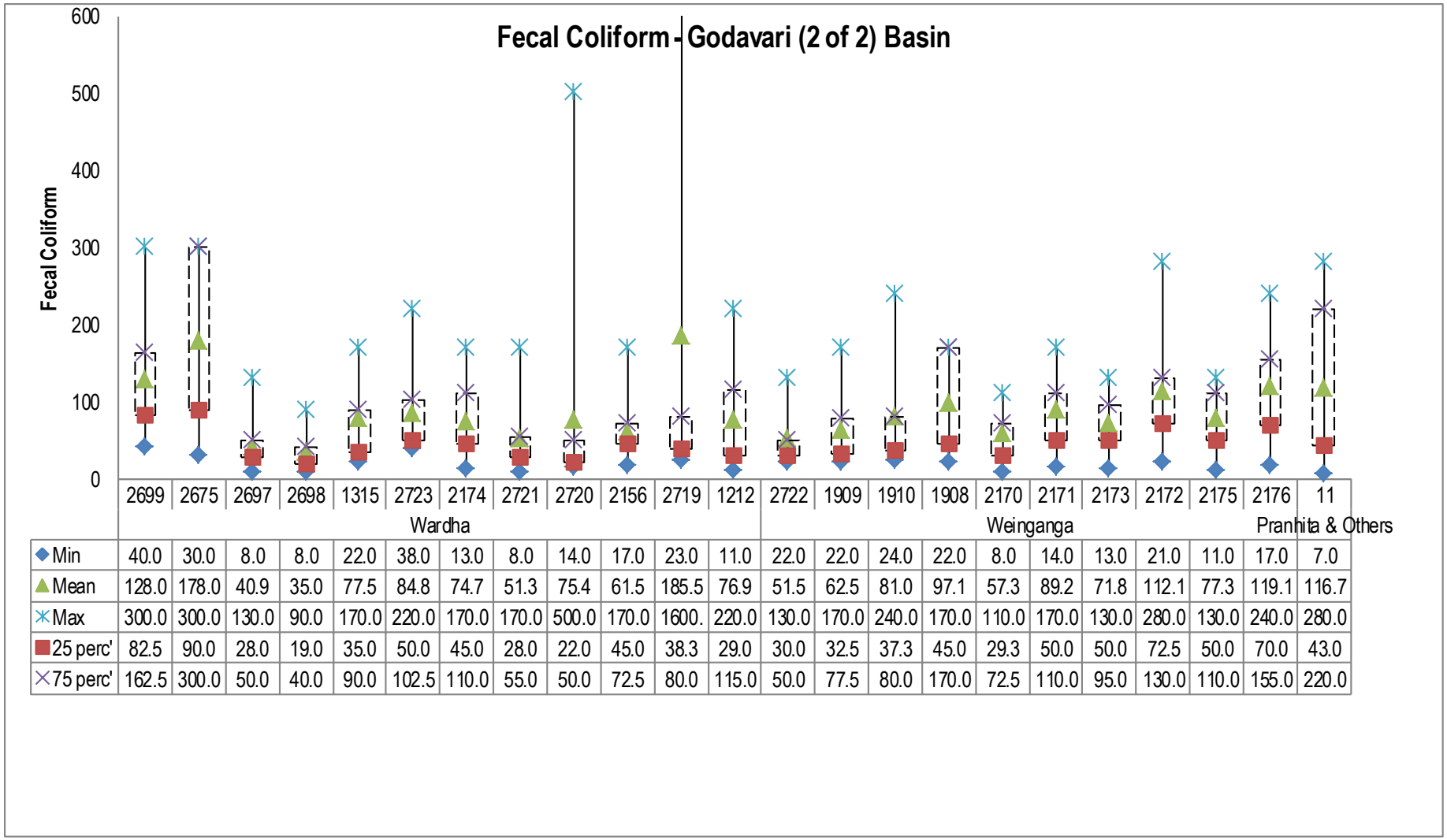
	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga										Pranhita & O
Min	4.0	4.0	3.4	3.2	4.0	4.2	3.6	3.0	3.6	4.0	4.0	3.2	3.4	3.2	3.0	4.0	3.8	4.0	3.3	4.0	3.4	4.0	3.6
Mean	7.1	5.7	5.6	5.2	6.2	7.5	6.1	4.9	6.3	6.6	15.2	5.2	5.0	6.9	5.9	5.8	6.2	7.5	4.8	5.6	5.3	6.7	5.2
Max	12.6	6.6	15.0	9.3	9.2	18.6	9.4	6.7	13.3	12.0	110.0	8.4	7.6	11.0	12.0	9.6	16.0	22.0	6.6	9.6	8.6	12.0	8.0
25 perc'	4.3	5.2	3.9	4.0	4.9	5.1	4.8	4.1	4.7	4.2	5.1	4.6	4.1	5.5	3.8	4.4	4.8	5.3	4.1	4.9	4.2	4.7	4.0
75 perc'	10.4	6.4	6.0	6.0	7.3	8.5	7.4	5.4	7.9	8.6	9.2	5.7	5.2	8.5	8.1	6.3	6.0	7.2	5.5	5.6	6.0	8.7	5.9

Figure No. 12: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Godavari-2 of 2 basin



	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
	Wardha												Weinganga										Pranhita & O
Min	7.0	7.1	7.4	6.6	7.3	6.5	7.5	7.5	7.0	6.7	7.1	7.3	7.1	7.2	7.4	6.5	6.8	6.3	7.3	7.3	7.0	7.4	6.7
Mean	8.0	7.9	8.0	7.9	8.2	8.1	8.0	7.9	7.9	7.9	7.8	8.0	8.3	8.0	8.2	8.0	8.0	8.0	8.0	7.9	7.9	7.9	7.8
Max	8.9	8.6	8.8	8.8	8.8	8.7	9.0	8.9	8.7	8.8	8.8	8.8	8.7	8.4	8.8	8.8	8.9	9.0	8.6	8.7	8.6	8.4	8.8
25 perc'	7.7	7.5	7.7	7.7	8.1	8.0	7.7	7.7	7.6	7.6	7.4	7.6	8.0	7.9	7.9	7.8	7.8	7.8	7.9	7.5	7.6	7.7	7.5
75 perc'	8.3	8.4	8.1	8.2	8.3	8.6	8.1	8.2	8.4	8.2	8.2	8.3	8.7	8.1	8.4	8.2	8.3	8.4	8.4	8.1	8.2	8.2	8.2

Figure No. 13: Trend of pH levels recorded at WQMS at Godavari-2 of 2 basin



	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
Min	40.0	30.0	8.0	8.0	22.0	38.0	13.0	8.0	14.0	17.0	23.0	11.0	22.0	22.0	24.0	22.0	8.0	14.0	13.0	21.0	11.0	17.0	7.0
Mean	128.0	178.0	40.9	35.0	77.5	84.8	74.7	51.3	75.4	61.5	185.5	76.9	51.5	62.5	81.0	97.1	57.3	89.2	71.8	112.1	77.3	119.1	116.7
Max	300.0	300.0	130.0	90.0	170.0	220.0	170.0	170.0	500.0	170.0	1600.	220.0	130.0	170.0	240.0	170.0	110.0	170.0	130.0	280.0	130.0	240.0	280.0
25 perc'	82.5	90.0	28.0	19.0	35.0	50.0	45.0	28.0	22.0	45.0	38.3	29.0	30.0	32.5	37.3	45.0	29.3	50.0	50.0	72.5	50.0	70.0	43.0
75 perc'	162.5	300.0	50.0	40.0	90.0	102.5	110.0	55.0	50.0	72.5	80.0	115.0	50.0	77.5	80.0	170.0	72.5	110.0	95.0	130.0	110.0	155.0	220.0

Figure No. 14: Trend of Fecal Coliform levels recorded at WQMS at Godavari-2 basin

Water Quality Index for WQMS at Godavari Basin (2 of 2)

Mar	63	70	73	73	69	69	67	63	51	44	62	50	70	72	72	74	NA	NA	44	44	66	NA	84	82	59	57	64	62	56	40	59	47	67	63	72	59	62	58	64	56	NA	74	62	59	67	79
Feb	77	60	71	56	75	71	71	50	73	48	75	59	78	68	80	70	NA	NA	61	48	84	NA	81	83	72	50	72	59	57	58	72	65	NA	64	NA	52	NA	64	76	55	NA	67	70	60	74	69
Jan	69	66	76	55	70	73	59	62	54	70	75	74	74	73	60	72	NA	NA	NA	50	77	84	79	82	53	72	72	73	58	65	74	73	77	53	77	74	80	69	70	70	65	66	67	51	78	63
Dec	70	76	68	77	76	74	64	73	54	68	61	74	64	79	63	79	37	65	67	73	76	85	78	84	64	75	74	75	57	66	71	70	NA	68	NA	75	NA	76	70	70	NA	79	48	77	73	76
Nov	67	68	68	78	62	75	53	72	56	67	75	69	69	75	72	79	37	55	72	75	NA	63	79	82	53	72	64	74	64	68	73	74	NA	70	NA	71	NA	59	72	76	NA	68	63	74	68	71
Oct	NA	81	74	79	77	74	NA	73	59	78	59	75	NA	84	NA	82	68	78	63	75	50	81	49	86	63	73	68	75	50	75	71	76	65	71	69	77	67	78	70	78	72	82	76	79	77	81
Sep	76	76	76	78	74	82	67	76	69	67	69	68	76	81	69	79	52	68	68	72	52	86	52	85	61	67	73	70	63	66	72	72	NA	64	NA	70	NA	69	78	74	NA	77	73	76	73	75
Aug	70	63	72	69	71	67	NA	60	59	58	62	75	NA	68	68	68	58	64	63	65	NA	87	83	86	54	76	62	64	67	63	75	67	NA	71	NA	72	NA	77	66	73	NA	67	70	67	78	65
Jul	NA	58	NA	62	NA	72	NA	66	66	68	59	64	NA	65	NA	66	54	NA	NA	61	NA	NA	NA	84	38	71	51	79	55	63	59	63	55	74	67	70	65	63	70	69	52	56	NA	59	51	71
Jun	NA	54	NA	48	NA	61	NA	57	60	NA	65	NA	NA	71	NA	58	NA	NA	NA	NA	NA	NA	50	76	60	NA	63	NA	61	66	72	71	NA	71	NA	NA	NA	NA	62	NA	NA	67	NA	25	65	65
May	NA	63	NA	69	NA	81	NA	72	58	NA	65	NA	NA	82	NA	77	NA	NA	NA	NA	NA	NA	49	84	61	NA	66	78	61	59	72	66	NA	62	NA	NA	NA	NA	60	NA	NA	79	NA	60	63	75
Apr	63	78	NA	76	NA	75	NA	72	53	59	64	70	66	56	71	76	NA	NA	NA	61	NA	80	NA	81	58	75	59	82	54	67	63	79	48	71	54	71	59	59	63	76	71	74	NA	72	63	73
Month	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
	2697		2721		2699		2675		2698		1315		2723		2174		2720		2156		2719		1212		2722		1909		1910		1908		2170		2171		2173		2172		2175		2176		11	
	Wardha																								Weinganga																				Pranhita & Others	

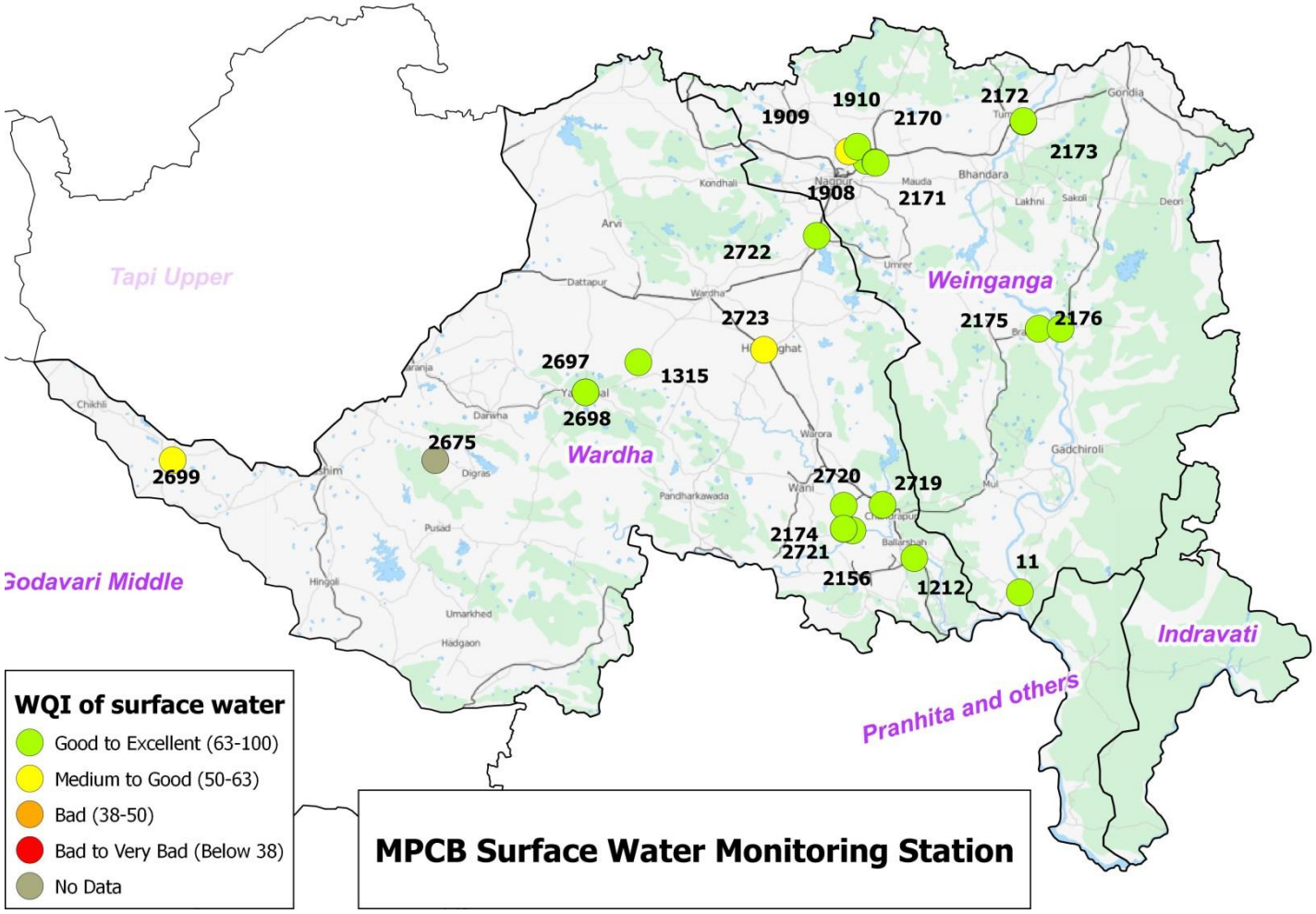
Legend

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

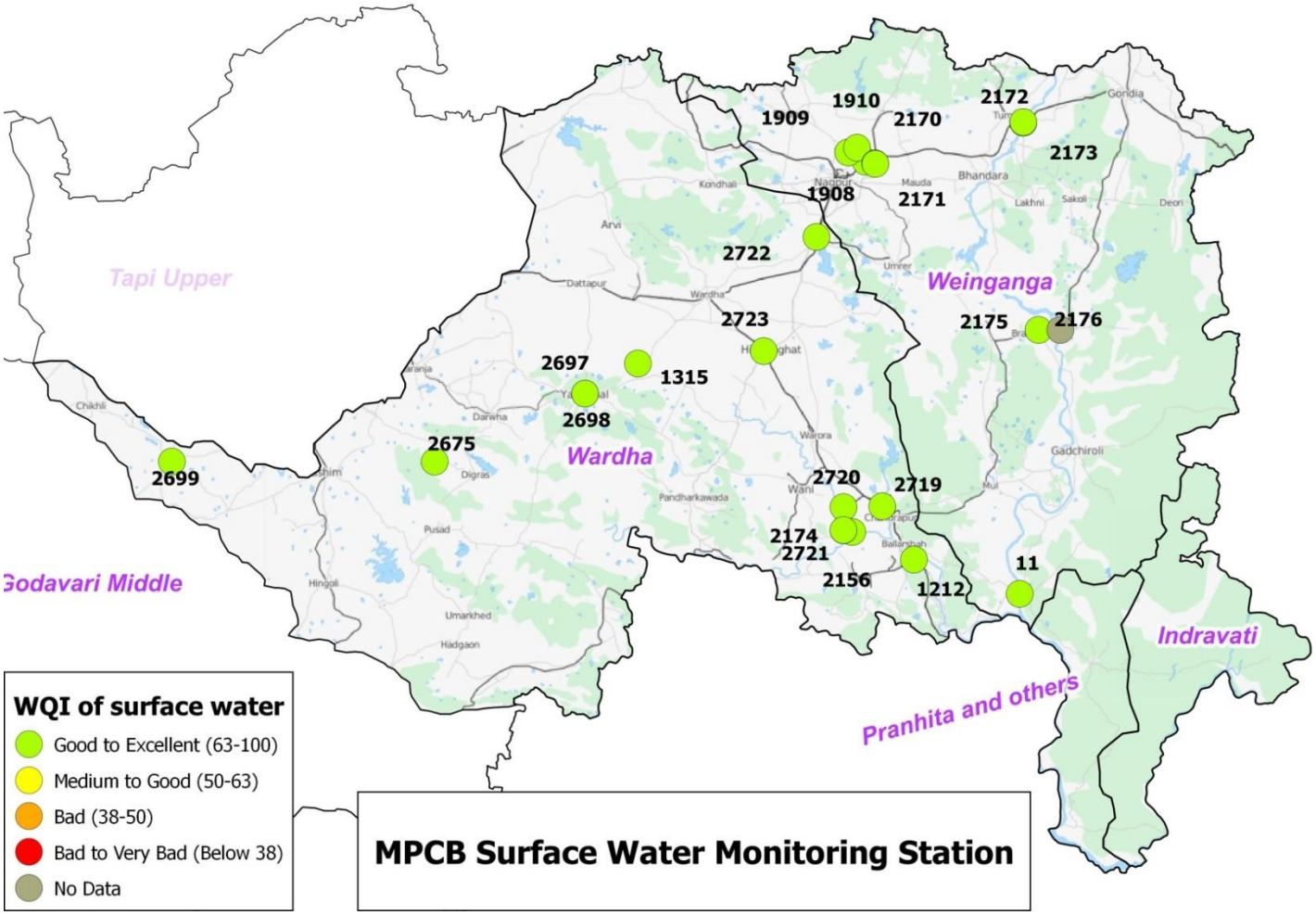
Table No. 9: Surface water quality monitoring stations in Godavari Basin (2 of 2)

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
2174	Wardha	Wardha river at D/s of ACC Ltd, Ghugus near WCL pump house	Ghuggus	Chandrapur	Chandrapur
2721	Wardha	Wardha river at U/s of ACC Ltd, Ghuggus 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
2722	Wena	Wena river at U/s of Mohata Mills,	Hinganghat	Hinganghat	Wardha
1909	Kanhan	Village- Agargaon, Taluka- Kuhi, District- Nagpur	Agargaon	Kuhi	Nagpur
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

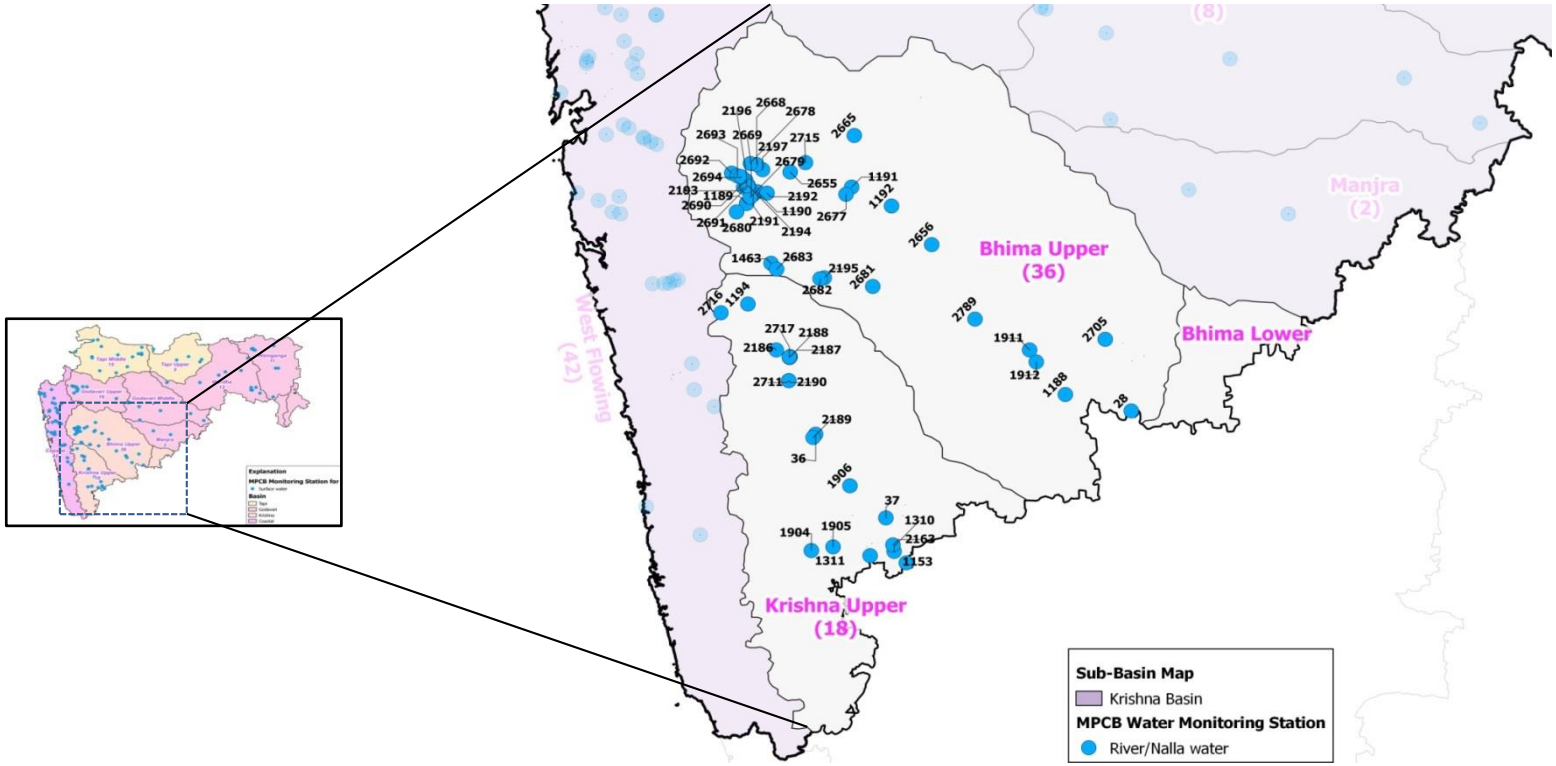
Spatial map of Surface WQI in Godavari Basin (2 of 2) (April 2011)



Spatial map of Surface WQI in Godavari Basin (2 of 2) (December 2011)

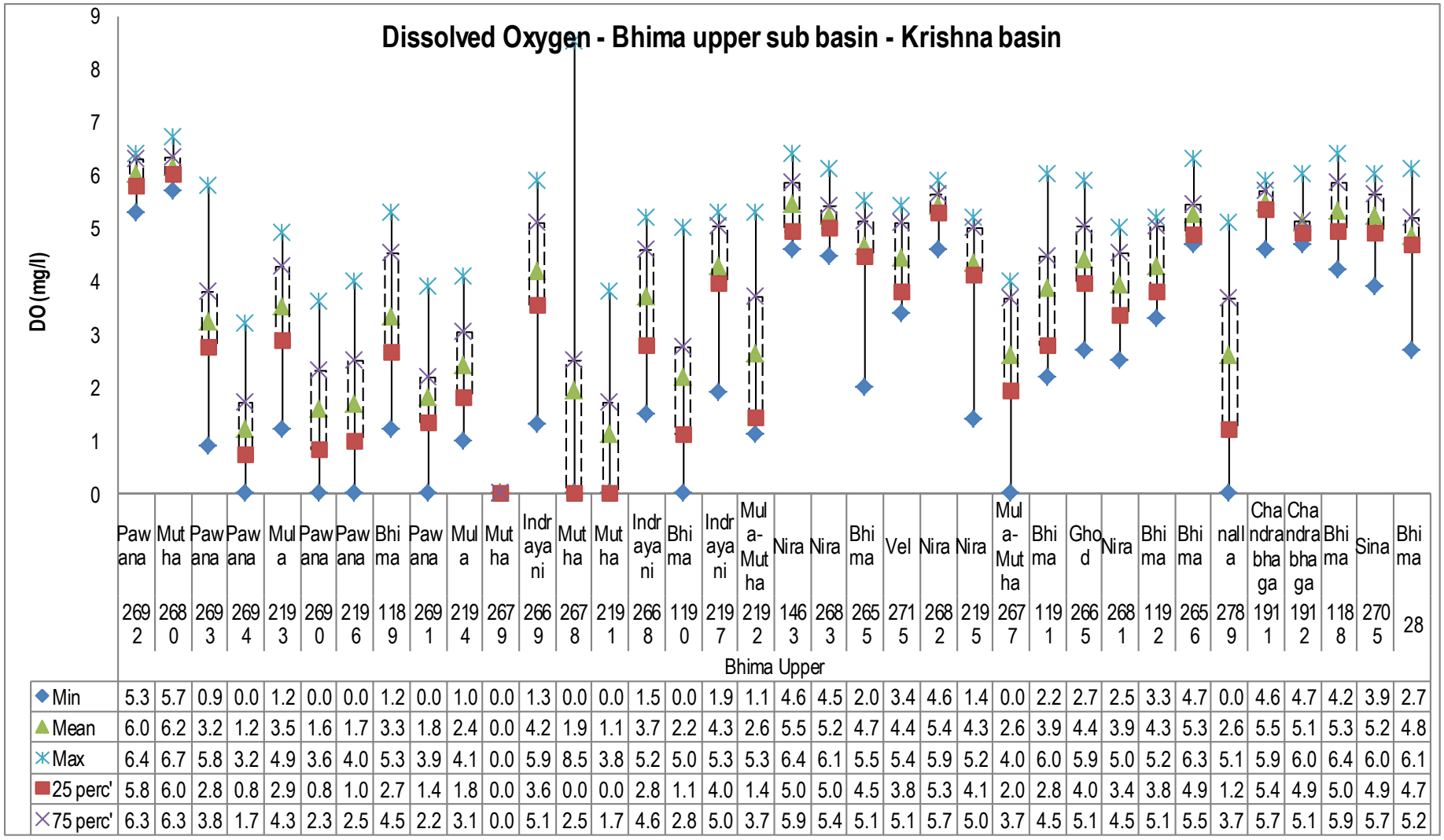


Krishna Basin



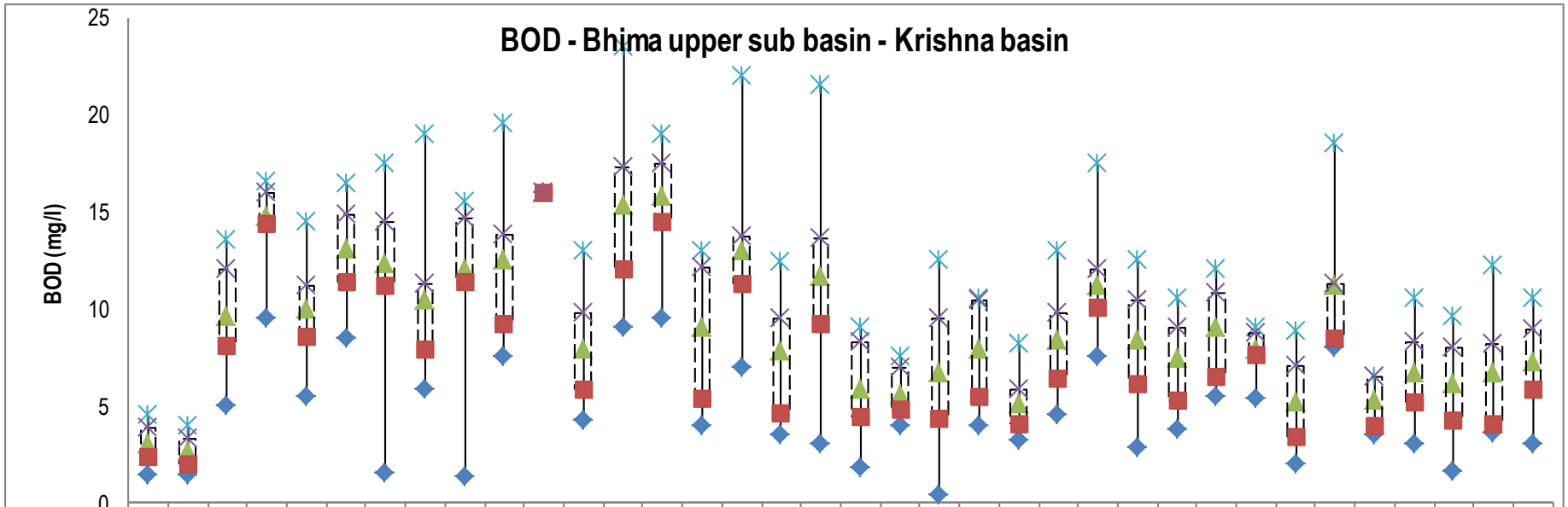
Map No. 4: Network of surface water quality monitoring stations in Bhima upper sub basin; Krishna Basin 1of 2

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. A list of the station and the codes has been provided below in Table No. 10, Table No. 11 and Table No. 12.



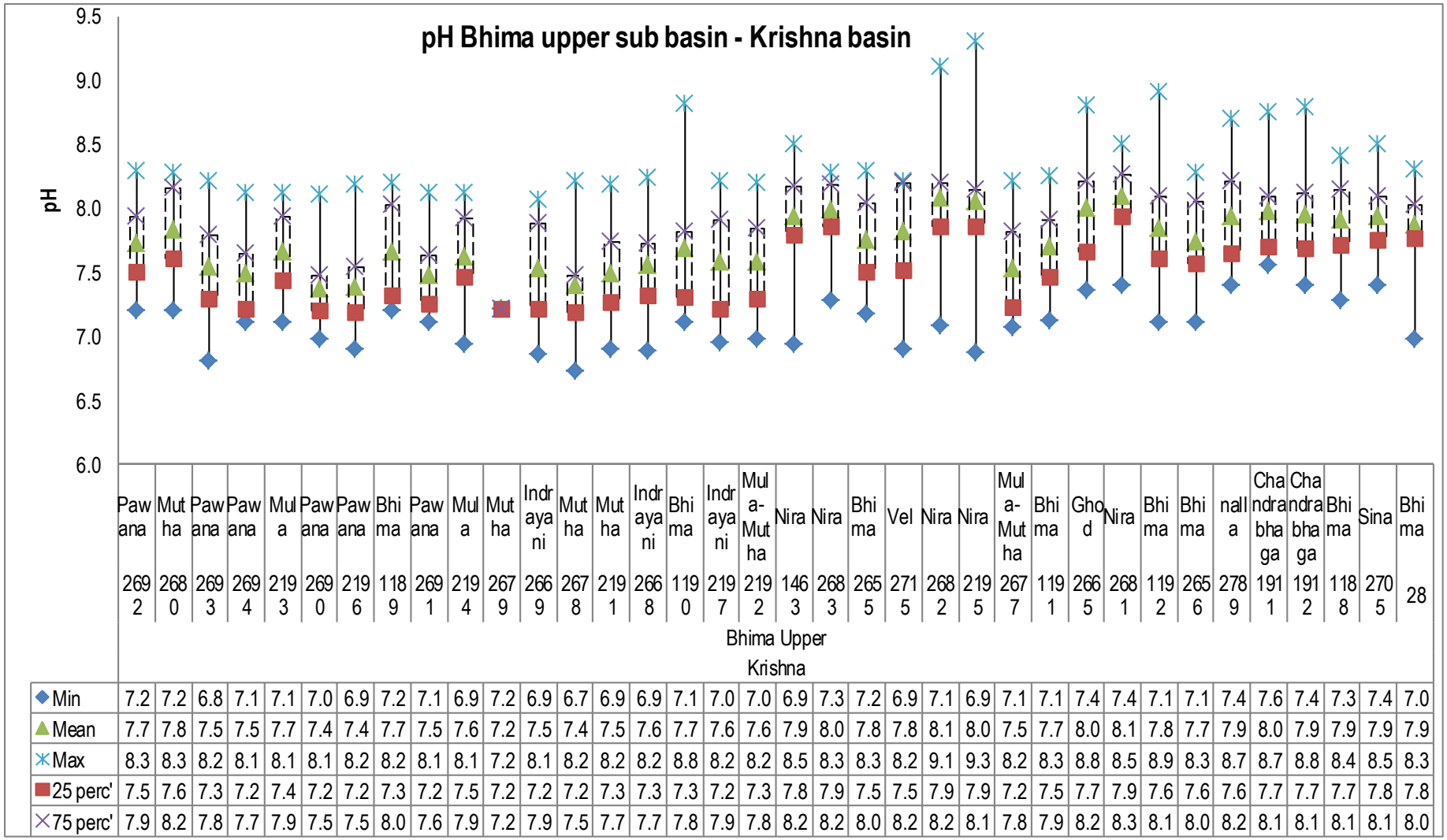
	Pawana 2692	Mutha 2680	Pawana 2693	Pawana 2694	Mula 2193	Pawana 2690	Pawana 2196	Bhima 1189	Pawana 2691	Mula 2194	Mutha 2679	Indrayani 2669	Mutha 2678	Mutha 2191	Indrayani 2668	Bhima 1190	Indrayani 2197	Mula-Mutha 2192	Nira 1463	Nira 2683	Bhima 2655	Vel 2715	Nira 2682	Nira 2195	Mula-Mutha 2677	Bhima 1191	Ghod 2665	Nira 2681	Bhima 1192	Bhima 2656	nalla 2789	Chandrabhaga 1911	Chandrabhaga 1912	Bhima 1188	Sina 2705	Bhima 28
	Bhima Upper																																		
Min	5.3	5.7	0.9	0.0	1.2	0.0	0.0	1.2	0.0	1.0	0.0	1.3	0.0	0.0	1.5	0.0	1.9	1.1	4.6	4.5	2.0	3.4	4.6	1.4	0.0	2.2	2.7	2.5	3.3	4.7	0.0	4.6	4.7	4.2	3.9	2.7
Mean	6.0	6.2	3.2	1.2	3.5	1.6	1.7	3.3	1.8	2.4	0.0	4.2	1.9	1.1	3.7	2.2	4.3	2.6	5.5	5.2	4.7	4.4	5.4	4.3	2.6	3.9	4.4	3.9	4.3	5.3	2.6	5.5	5.1	5.3	5.2	4.8
Max	6.4	6.7	5.8	3.2	4.9	3.6	4.0	5.3	3.9	4.1	0.0	5.9	8.5	3.8	5.2	5.0	5.3	5.3	6.4	6.1	5.5	5.4	5.9	5.2	4.0	6.0	5.9	5.0	5.2	6.3	5.1	5.9	6.0	6.4	6.0	6.1
25 perc'	5.8	6.0	2.8	0.8	2.9	0.8	1.0	2.7	1.4	1.8	0.0	3.6	0.0	0.0	2.8	1.1	4.0	1.4	5.0	5.0	4.5	3.8	5.3	4.1	2.0	2.8	4.0	3.4	3.8	4.9	1.2	5.4	4.9	5.0	4.9	4.7
75 perc'	6.3	6.3	3.8	1.7	4.3	2.3	2.5	4.5	2.2	3.1	0.0	5.1	2.5	1.7	4.6	2.8	5.0	3.7	5.9	5.4	5.1	5.1	5.7	5.0	3.7	4.5	5.1	4.5	5.1	5.5	3.7	5.7	5.1	5.9	5.7	5.2

Figure No. 15: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



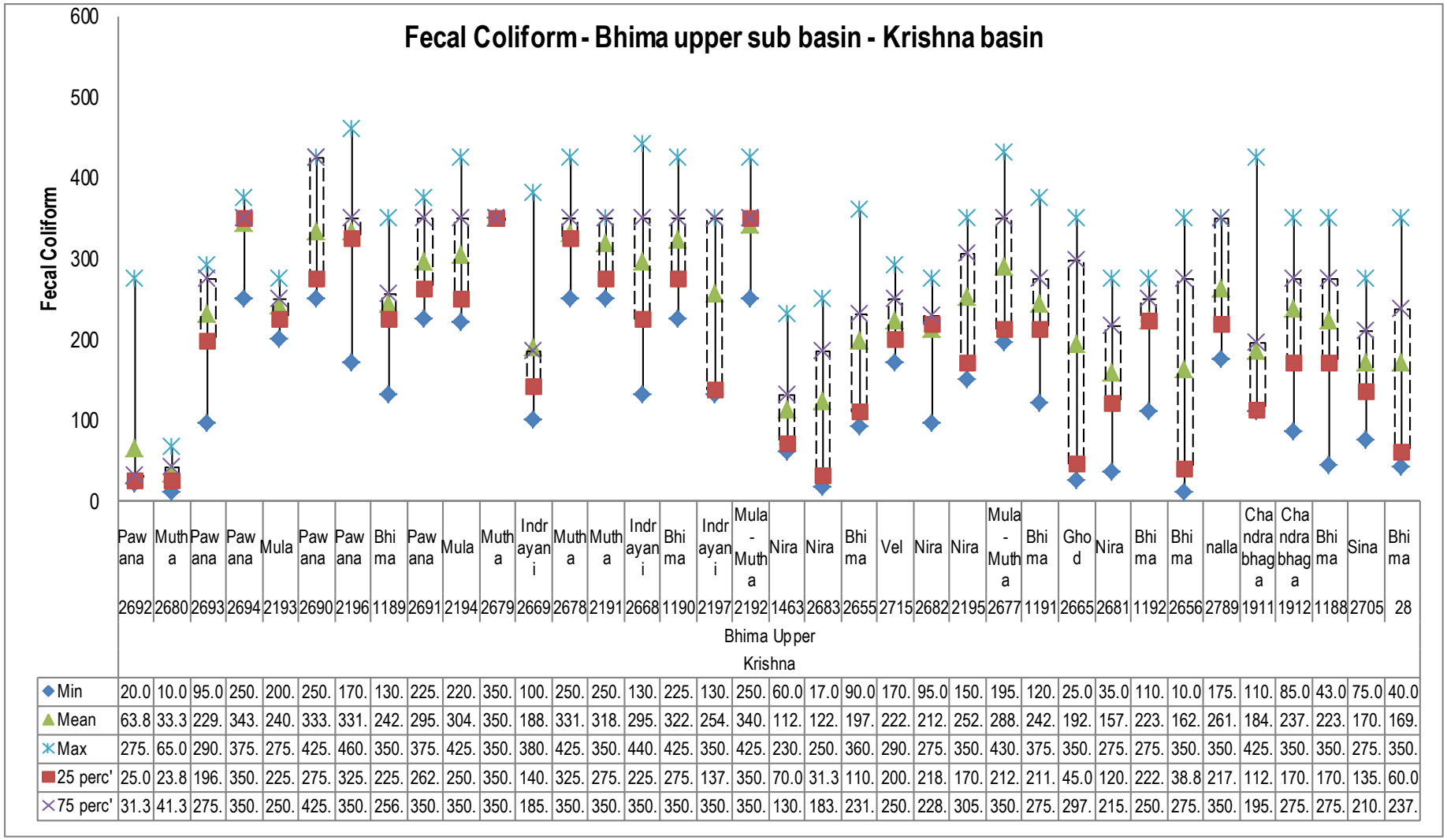
	Pawana 2692	Mutha 2680	Pawana 2693	Pawana 2694	Mula 2193	Pawana 2690	Pawana 2196	Bhima 1189	Pawana 2691	Mula 2194	Mutha 2679	Indrayani 2669	Mutha 2678	Mutha 2191	Indrayani 2668	Bhima 1190	Indrayani 2197	Mula-Mutha 2192	Nira 1463	Nira 2683	Bhima 2655	Vel 2715	Nira 2682	Nira 2195	Mula-Mutha 2677	Bhima 1191	Ghod 2665	Nira 2681	Bhima 1192	Bhima 2656	nalla 2789	Chandrabhaga 1911	Chandrabhaga 1912	Bhima 1188	Sina 2705	Bhima 28
	Bhima Upper Krishna																																		
Min	1.4	1.4	5.0	9.5	5.5	8.5	1.6	5.8	1.3	7.5	16.0	4.2	9.0	9.5	4.0	7.0	3.5	3.0	1.8	4.0	0.4	4.0	3.2	4.5	7.5	2.8	3.8	5.5	5.4	2.0	8.0	3.5	3.0	1.6	3.6	3.0
Mean	3.1	2.6	9.6	14.8	9.9	13.0	12.3	10.4	12.1	12.5	16.0	7.9	15.3	15.8	9.0	13.0	7.8	11.7	5.9	5.6	6.7	7.9	5.1	8.4	11.2	8.4	7.5	9.0	7.9	5.2	11.2	5.3	6.7	6.1	6.7	7.3
Max	4.5	4.0	13.5	16.5	14.5	16.4	17.5	19.0	15.5	19.5	16.0	13.0	23.5	19.0	13.0	22.0	12.4	21.5	9.0	7.5	12.5	10.5	8.2	13.0	17.5	12.5	10.5	12.0	9.0	8.8	18.5	6.5	10.5	9.6	12.2	10.5
25 perc'	2.4	2.0	8.1	14.4	8.6	11.4	11.2	7.9	11.4	9.3	16.0	5.8	12.0	14.5	5.4	11.3	4.6	9.3	4.4	4.8	4.4	5.5	4.1	6.4	10.1	6.2	5.3	6.5	7.7	3.4	8.5	4.0	5.2	4.3	4.1	5.8
75 perc'	3.9	3.3	12.0	16.0	11.2	14.9	14.5	11.3	14.6	13.8	16.0	9.8	17.3	17.5	12.1	13.8	9.5	13.7	8.3	7.0	9.5	10.4	5.9	9.8	12.1	10.4	9.0	10.9	8.7	7.1	11.3	6.5	8.3	8.0	8.2	9.0

Figure No. 16: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



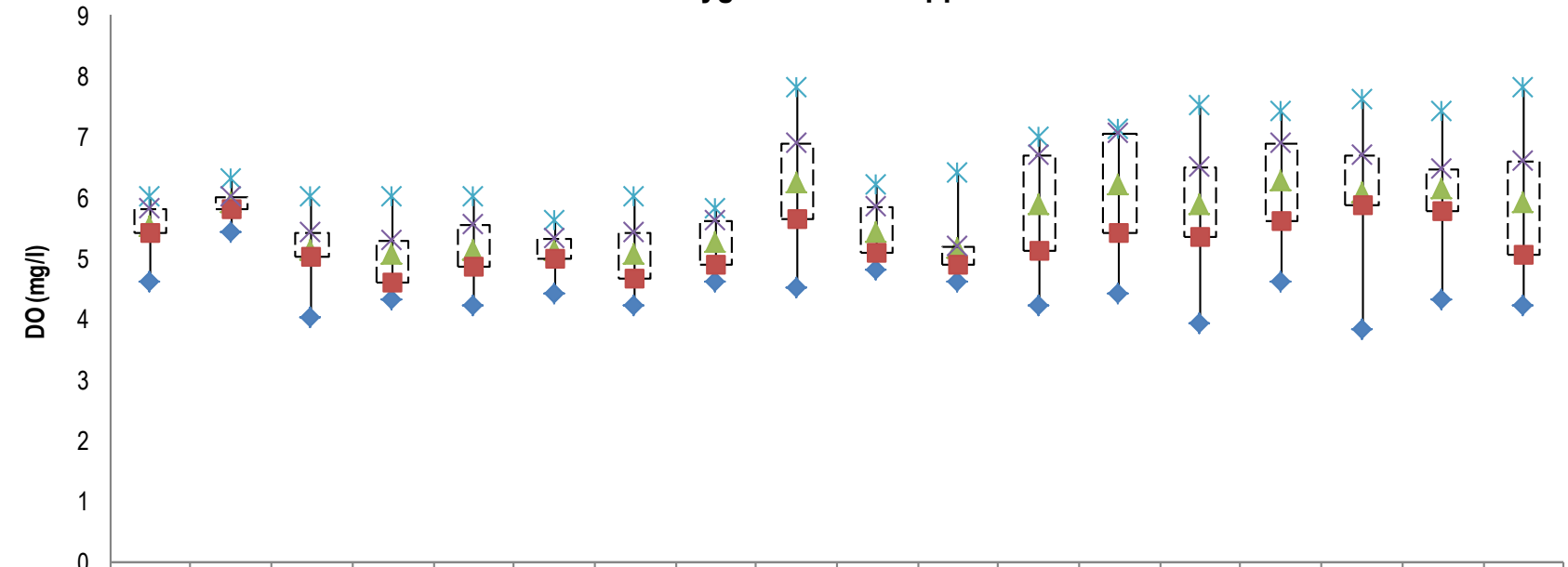
	Pawana 2692	Mutha 2680	Pawana 2693	Pawana 2694	Mula 2193	Pawana 2690	Pawana 2196	Bhima 1189	Pawana 2691	Mula 2194	Mutha 2679	Indrayani 2669	Mutha 2678	Mutha 2191	Indrayani 2668	Bhima 1190	Indrayani 2197	Mula-Mutha 2192	Nira 1463	Nira 2683	Bhima 2655	Vel 2715	Nira 2682	Nira 2195	Mula-Mutha 2677	Bhima 1191	Ghod 2665	Nira 2681	Bhima 1192	Bhima 2656	nalla 2789	Chandrabhaga 1911	Chandrabhaga 1912	Bhima 1188	Sina 2705	Bhima 28
	Bhima Upper Krishna																																		
Min	7.2	7.2	6.8	7.1	7.1	7.0	6.9	7.2	7.1	6.9	7.2	6.9	6.7	6.9	6.9	7.1	7.0	7.0	6.9	7.3	7.2	6.9	7.1	6.9	7.1	7.1	7.4	7.4	7.1	7.1	7.4	7.6	7.4	7.3	7.4	7.0
Mean	7.7	7.8	7.5	7.5	7.7	7.4	7.4	7.7	7.5	7.6	7.2	7.5	7.4	7.5	7.6	7.7	7.6	7.6	7.9	8.0	7.8	7.8	8.1	8.0	7.5	7.7	8.0	8.1	7.8	7.7	7.9	8.0	7.9	7.9	7.9	7.9
Max	8.3	8.3	8.2	8.1	8.1	8.1	8.2	8.2	8.1	8.1	7.2	8.1	8.2	8.2	8.2	8.8	8.2	8.2	8.5	8.3	8.3	8.2	9.1	9.3	8.2	8.3	8.8	8.5	8.9	8.3	8.7	8.7	8.8	8.4	8.5	8.3
25 perc'	7.5	7.6	7.3	7.2	7.4	7.2	7.2	7.3	7.2	7.5	7.2	7.2	7.2	7.3	7.3	7.3	7.2	7.3	7.8	7.9	7.5	7.5	7.9	7.9	7.2	7.5	7.7	7.9	7.6	7.6	7.6	7.7	7.7	7.7	7.8	7.8
75 perc'	7.9	8.2	7.8	7.7	7.9	7.5	7.5	8.0	7.6	7.9	7.2	7.9	7.5	7.7	7.7	7.8	7.9	7.8	8.2	8.2	8.0	8.2	8.2	8.1	7.8	7.9	8.2	8.3	8.1	8.0	8.2	8.1	8.1	8.1	8.1	8.0

Figure No. 17: Trend of pH levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



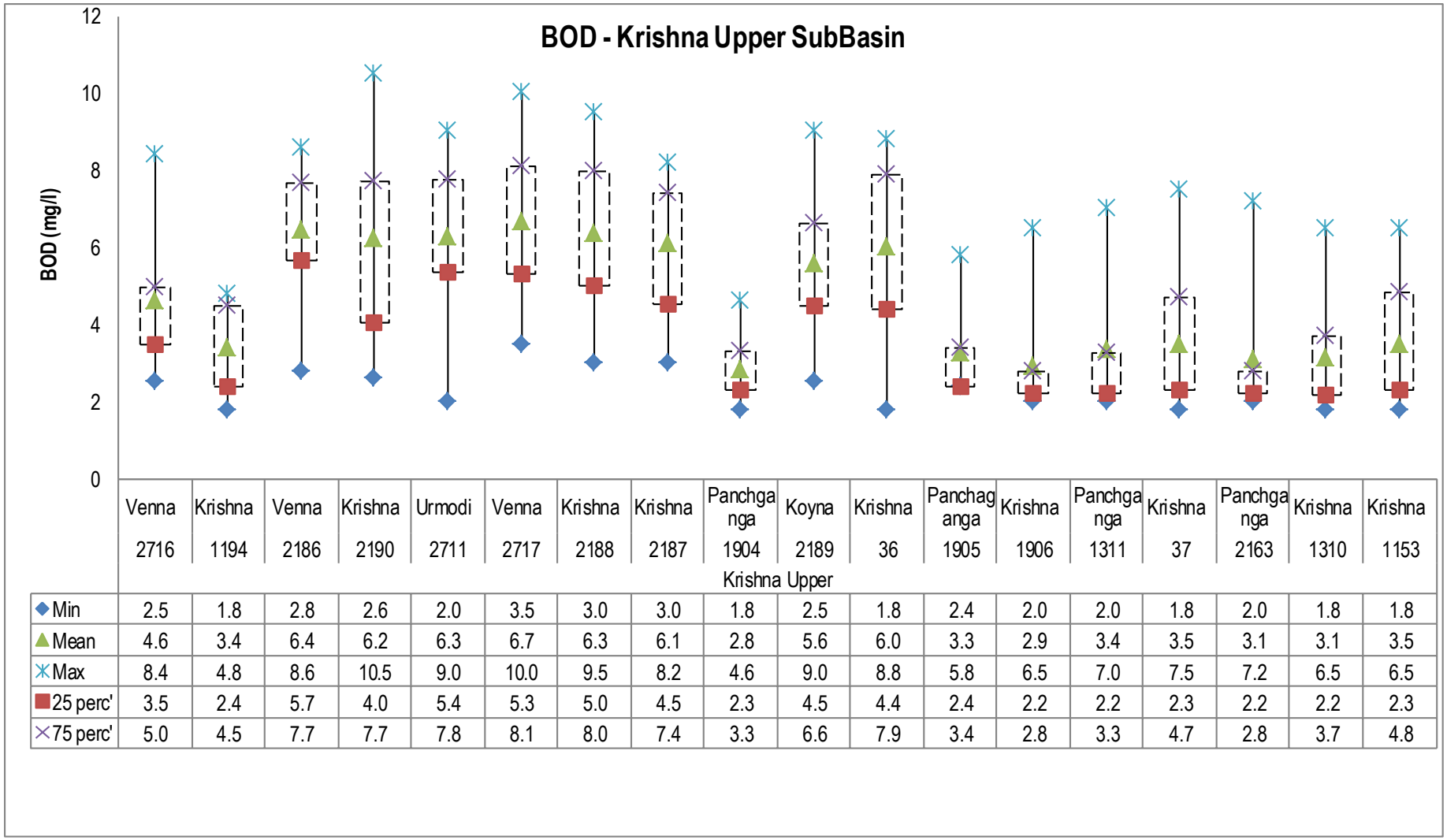
	Pawana 2692	Mutha 2680	Pawana 2693	Pawana 2694	Mula 2193	Pawana 2690	Pawana 2196	Bhima 1189	Pawana 2691	Mula 2194	Mutha 2679	Indrayani 2669	Mutha 2678	Mutha 2191	Indrayani 2668	Bhima 1190	Indrayani 2197	Mula - Mutha 2192	Nira 1463	Nira 2683	Bhima 2655	Vel 2715	Nira 2682	Nira 2195	Mula - Mutha 2677	Bhima 1191	Ghod 2665	Nira 2681	Bhima 1192	Bhima 2656	nalla 2789	Chandrabhaga 1911	Chandrabhaga 1912	Bhima 1188	Sina 2705	Bhima 28
	Bhima Upper Krishna																																		
Min	20.0	10.0	95.0	250.	200.	250.	170.	130.	225.	220.	350.	100.	250.	250.	130.	225.	130.	250.	60.0	17.0	90.0	170.	95.0	150.	195.	120.	25.0	35.0	110.	10.0	175.	110.	85.0	43.0	75.0	40.0
Mean	63.8	33.3	229.	343.	240.	333.	331.	242.	295.	304.	350.	188.	331.	318.	295.	322.	254.	340.	112.	122.	197.	222.	212.	252.	288.	242.	192.	157.	223.	162.	261.	184.	237.	223.	170.	169.
Max	275.	65.0	290.	375.	275.	425.	460.	350.	375.	425.	350.	380.	425.	350.	440.	425.	350.	425.	230.	250.	360.	290.	275.	350.	430.	375.	350.	275.	275.	350.	350.	425.	350.	350.	275.	350.
25 perc'	25.0	23.8	196.	350.	225.	275.	325.	225.	262.	250.	350.	140.	325.	275.	225.	275.	137.	350.	70.0	31.3	110.	200.	218.	170.	212.	211.	45.0	120.	222.	38.8	217.	112.	170.	170.	135.	60.0
75 perc'	31.3	41.3	275.	350.	250.	425.	350.	256.	350.	350.	350.	185.	350.	350.	350.	350.	350.	350.	130.	183.	231.	250.	228.	305.	350.	275.	297.	215.	250.	275.	350.	195.	275.	275.	210.	237.

Figure No. 18: Trend of Fecal Coliform levels recorded at WQMS at Bhima upper sub basin - Krishna basin 1 of 2



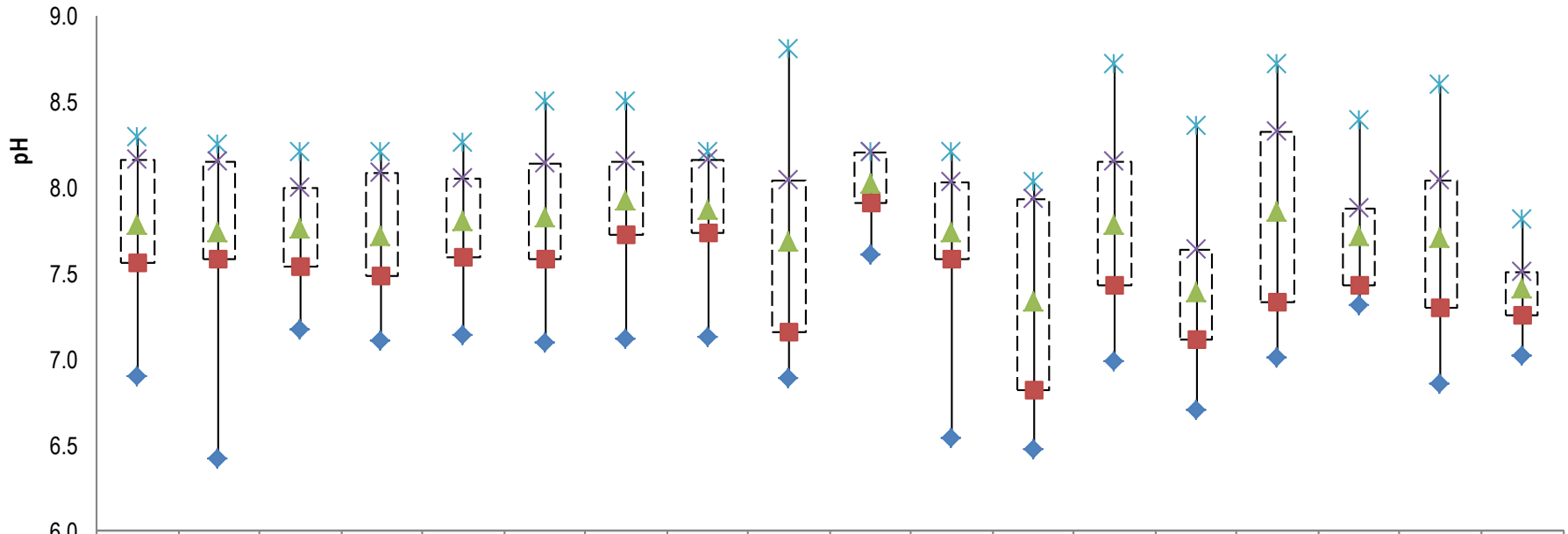
	Venna 2716	Krishna 1194	Venna 2186	Krishna 2190	Urmodi 2711	Venna 2717	Krishna 2188	Krishna 2187	Panchg anga 1904	Koyna 2189	Krishna 36	Pancha ganga 1905	Krishna 1906	Panchg anga 1311	Krishna 37	Panchg anga 2163	Krishna 1310	Krishna 1153
	Krishna Upper																	
Min	4.6	5.4	4.0	4.3	4.2	4.4	4.2	4.6	4.5	4.8	4.6	4.2	4.4	3.9	4.6	3.8	4.3	4.2
Mean	5.5	5.9	5.1	5.1	5.1	5.1	5.1	5.3	6.2	5.4	5.1	5.9	6.2	5.9	6.3	6.1	6.1	5.9
Max	6.0	6.3	6.0	6.0	6.0	5.6	6.0	5.8	7.8	6.2	6.4	7.0	7.1	7.5	7.4	7.6	7.4	7.8
25 perc'	5.4	5.8	5.0	4.6	4.9	5.0	4.7	4.9	5.7	5.1	4.9	5.1	5.4	5.4	5.6	5.9	5.8	5.1
75 perc'	5.8	6.0	5.4	5.3	5.6	5.3	5.4	5.6	6.9	5.8	5.2	6.7	7.1	6.5	6.9	6.7	6.5	6.6

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



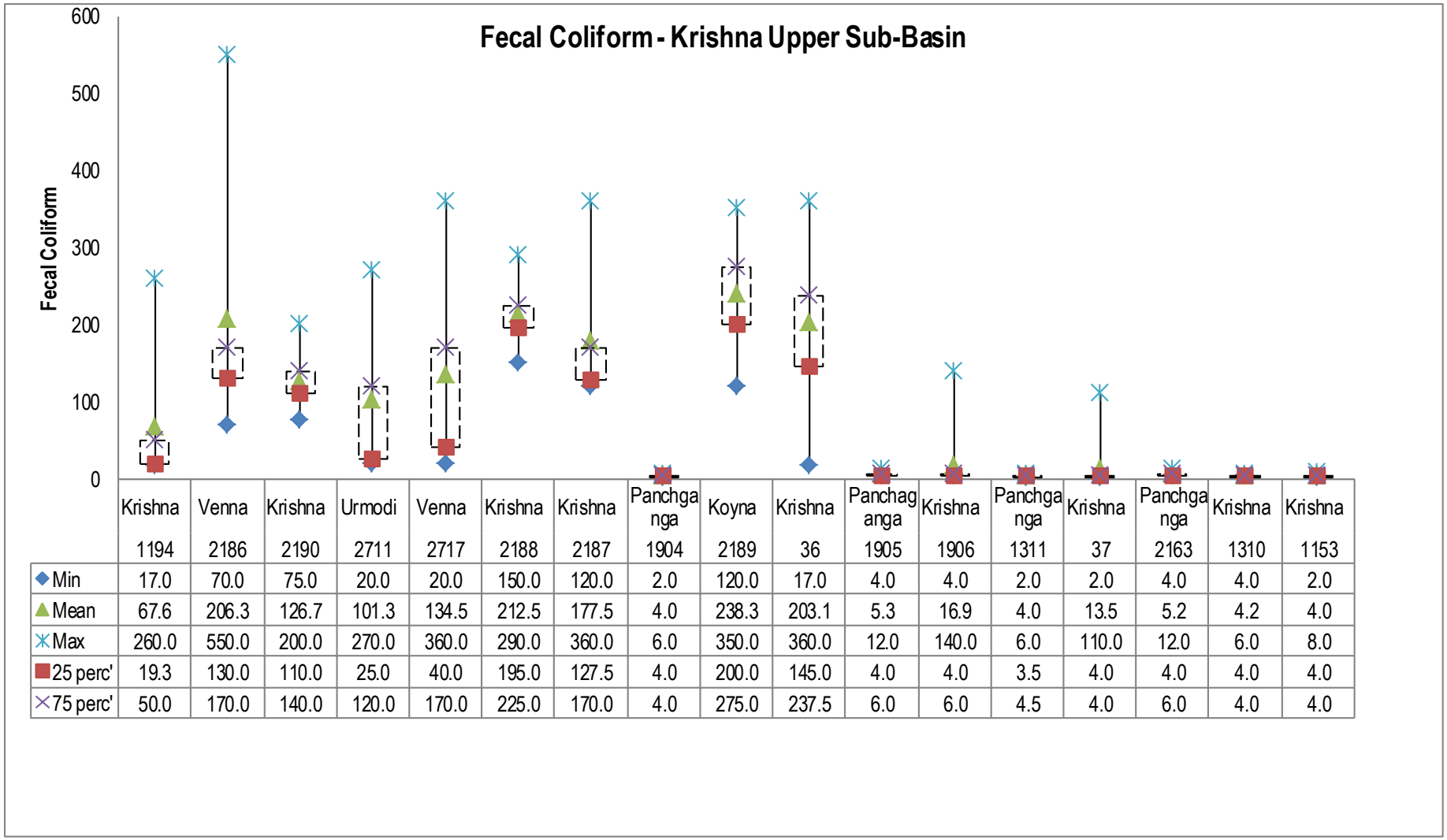
	Venna 2716	Krishna 1194	Venna 2186	Krishna 2190	Urmodi 2711	Venna 2717	Krishna 2188	Krishna 2187	Panchganga 1904	Koyna 2189	Krishna 36	Panchganga 1905	Krishna 1906	Panchganga 1311	Krishna 37	Panchganga 2163	Krishna 1310	Krishna 1153
	Krishna Upper																	
Min	2.5	1.8	2.8	2.6	2.0	3.5	3.0	3.0	1.8	2.5	1.8	2.4	2.0	2.0	1.8	2.0	1.8	1.8
Mean	4.6	3.4	6.4	6.2	6.3	6.7	6.3	6.1	2.8	5.6	6.0	3.3	2.9	3.4	3.5	3.1	3.1	3.5
Max	8.4	4.8	8.6	10.5	9.0	10.0	9.5	8.2	4.6	9.0	8.8	5.8	6.5	7.0	7.5	7.2	6.5	6.5
25 perc'	3.5	2.4	5.7	4.0	5.4	5.3	5.0	4.5	2.3	4.5	4.4	2.4	2.2	2.2	2.3	2.2	2.2	2.3
75 perc'	5.0	4.5	7.7	7.7	7.8	8.1	8.0	7.4	3.3	6.6	7.9	3.4	2.8	3.3	4.7	2.8	3.7	4.8

Figure No. 20: Trend of Biological Oxygen Demand (B) levels recorded at WQMS at Krishna upper sub basin - Krishna basin 2 of 2



	Venna 2716	Krishna 1194	Venna 2186	Krishna 2190	Urmodi 2711	Venna 2717	Krishna 2188	Krishna 2187	Panchganga 1904	Koyna 2189	Krishna 36	Panchganga 1905	Krishna 1906	Panchganga 1311	Krishna 37	Panchganga 2163	Krishna 1310	Krishna 1153
	Krishna Upper																	
Min	6.9	6.4	7.2	7.1	7.1	7.1	7.1	7.1	6.9	7.6	6.5	6.5	7.0	6.7	7.0	7.3	6.9	7.0
Mean	7.8	7.7	7.8	7.7	7.8	7.8	7.9	7.9	7.7	8.0	7.7	7.3	7.8	7.4	7.9	7.7	7.7	7.4
Max	8.3	8.3	8.2	8.2	8.3	8.5	8.5	8.2	8.8	8.2	8.2	8.0	8.7	8.4	8.7	8.4	8.6	7.8
25 perc'	7.6	7.6	7.5	7.5	7.6	7.6	7.7	7.7	7.2	7.9	7.6	6.8	7.4	7.1	7.3	7.4	7.3	7.3
75 perc'	8.2	8.2	8.0	8.1	8.1	8.1	8.2	8.2	8.0	8.2	8.0	7.9	8.2	7.6	8.3	7.9	8.0	7.5

Figure No. 21: Trend of pH levels recorded at WQMS at Krishna upper sub basin - Krishna basin 2 of 2



	Krishna 1194	Venna 2186	Krishna 2190	Urmodi 2711	Venna 2717	Krishna 2188	Krishna 2187	Panchganga 1904	Koyna 2189	Krishna 36	Panchganga 1905	Krishna 1906	Panchganga 1311	Krishna 37	Panchganga 2163	Krishna 1310	Krishna 1153
Min	17.0	70.0	75.0	20.0	20.0	150.0	120.0	2.0	120.0	17.0	4.0	4.0	2.0	2.0	4.0	4.0	2.0
Mean	67.6	206.3	126.7	101.3	134.5	212.5	177.5	4.0	238.3	203.1	5.3	16.9	4.0	13.5	5.2	4.2	4.0
Max	260.0	550.0	200.0	270.0	360.0	290.0	360.0	6.0	350.0	360.0	12.0	140.0	6.0	110.0	12.0	6.0	8.0
25 perc'	19.3	130.0	110.0	25.0	40.0	195.0	127.5	4.0	200.0	145.0	4.0	4.0	3.5	4.0	4.0	4.0	4.0
75 perc'	50.0	170.0	140.0	120.0	170.0	225.0	170.0	4.0	275.0	237.5	6.0	6.0	4.5	4.0	6.0	4.0	4.0

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

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

Month	2692		2680		2693		2694		2193		2690		2196		1189		2691		2194		2679		2669		2678		2191		2668		1190		2197		2192		1463		2683	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
Mar	79	77	84	81	54	42	41	33	41	55	36	32	38	51		38	35	54	33	38		33	64	53	27	33	27	32	59	49		32	62	55	28	38	70	70	61	78
Feb	75	83	84	79	47	35	40	31	46	36	35	30	42	31		59	33	36	37	35			58	36	26	29	29	32	33	43		34	50	36	31	35	71	58	61	65
Jan	81	84	85	79	37	46	22	32	34	50	30	32	22	35	38	41	30	33	30	52			41	47	28	32	26	32		40	35	35	55	44	34	36	66	57	53	70
Dec	81	80		82	58	44	49	36	46	43	71	39	67	39		47	43	36	38	37			72	59	35	31	32	33	67	44		38	70	54	44	38	68	72	77	64
Nov	87	77	83	78	67	46	50	35		50	38	35	46	37		43	36	38		34				64		38		29		47		35	50	57		33	77	69	76	63
Oct	84	79	60	80	57	51	44	39	37	44	35	36	43	34	51	45	38	39	39	35			70	64	38	33	32	36	60	53	38	33	64	59	35	34	52	60	78	66
Sep	85	79		80	68	68	46	44	58	63	46	49	45	53		61	43	50	46	54			73	70	37	50	34	48	67	65		55	65	67	41	57	74	69		65
Aug	83	83	40	85	65	62	45	36	56		35	41	41	40		59	40	40	43	50				67	39	60	34	36	64	64		49	33	71	38	49	70	75	68	68
Jul	85	80	83	81	52	37	36	31	50	52	40	36	37	41	45	57	33	34	32	41			74		32	32	29	35		65	36	55	44	66	29	54	73	80	47	69
Jun	76	80	79	85	49	56	34	38	29	48	33	42	26	38		56	27	42	29	41	27		40	74	25	42	28	38	36	67		39	39	70	26	44	73	79	50	63
May	80	74	73	82	54	51	51	40	53	61	59	46	27	46		56	26	41	26	41	41		64	44	34	43	24	37	28	39		43	56	56	33	74	70	52	68	67
Apr	73	81	77	82	68	56	52	36	34		36	43	50	43	36	33	36	48	45		28		59	59	27	38	28		53	58	27	40	56	56	28		75		70	69

Legend

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

Table No. 10: Surface water quality monitoring stations in Bhima upper Sub basin (1 of 2): Krishna Basin (1 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
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
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

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

Month	2655		2715		2682		2195		2677		1191		2665		2681		1192		2656		2789		1911		1912		1188		2705		28	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
Mar	60	56	67	62	65	67	52	54	37	41		46	63	52	48	56		50	76	59	52	32		71		60	68	67	51	76	49	63
Feb	60	37	55	45	74	55	62	46	38	31		51	65	54	41	42		59	75	60	40	27		67		66	75	66	54	65	55	63
Jan	40	61		48	74	67	60	56		51	37	45	62	63	49	44	46	61	75	57	49	37	64	66	55	57	73	54	69	62	69	64
Dec		55		53	61	68	48	54		38		51		60	63	49		54	73	60		48		69		59	65	52	61	59	70	65
Nov	77	50	72	55	74	64	64	59	44	49		53	67	58	81	63		52	77	67		57		62		55	61	54	68	60	65	58
Oct	71	64	76	50	53	70	45	57	78	51	51	62	76	52	65	54	69	54	83	77		61	81	69	74	58	75	69	63	53	82	56
Sep	74	73	64		69	66	63	61	38			63	61	67		63		65	66	78		54		70		65	65			63	70	
Aug	74	69	66		66	70	59	66	75	48		71	57	70	70	56		69	68	79	56	42		72		67	67	72	72	68	76	62
Jul	81	63	76		76	70		67	80	52	69	72	75	66	46	43	78		81	80	44	32	74		71	73	73	73	77		59	74
Jun	73	72	74	62	73	76	70	59	40	47		39	76	46	36	57		49	76	73	50	42		70		65	72	65	68	72	80	60
May	65	75	67	72	58	61	56	39	44	40		41		61	65	56		53	74	70	47	39		70		66	56	70	63	65	26	66
Apr	55	66		65	73	61	56	29	59	36	50	51	68	47	55	44	49	50	75	71	29	45	68	59	71	59		76	70	65	73	42

Legend

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

Table No. 11: Surface water quality monitoring stations in Bhima upper Sub basin (2 of 2): Krishna Basin (1 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
2655	Bhima river	Bhima river at Koregaon near Koregaon bridge, Pune	Koregaon	Shirur	Pune
2715	Vel river	Vel river at Shikrapur, Pune	Shikrapur	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
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 upper Sub Basin: Krishna Basin (2 of 2)

Mar		69	79	74	65	62	60	57	65	63	65	63	68	58	65	63	78	86	66	63	64	62	36	85	80	87		86	72	82	55	89	59	85	39	88
Feb	75	62	79	76	68	54	62	59	62	54	60	56	64	54	72	60	80	86	64	68	69	59	81	84		84		67		85	80	88	81	91	81	89
Jan		75		78	70	63		64	60	58	47	59	72	61	71	69		76	65	61	53	60		70	83	77		68	81	70	86	62		80	85	72
Dec	78	74	85	81	67	66	72	61	75	67	68	63	68	57	70	66	82	82	66	70		55	81	81	81	90		83	90	86	88	85	84	81	78	83
Nov	82	72	83	78	81	59	77	62	78	64	75	62	78	58	78	65		87	77	56	79	54		89	80	72		89	82	77	87	90		71		74
Oct	75	81	82	75	80	66	71	64	80	70	72	39	67	67	83	62	85	89	65	63	71	75	82	68	81	88		87	88	88	82	83	82	81	81	
Sep	81	75	79	78		68	68	65	68	70	69	67	61	66	76	62	86	86	63	64	63	64	86	89	87	89		90	88	90	84	86	89	90	91	88
Aug	72	81	74	85	69	69	67	75		68		71	66	69		71	88	89	61	68	61	71	87	86	86	85		91	91	87	87	90	90	86	88	89
Jul	83	76	83	82	58	75	80	76	67	79	77		79	74	71	73	83	70	78	75	71	78	82	70	81		81	80	85		80	69	83	84	83	72
Jun	83	81	79	72	75	70	73	62	58	74	76	76	59	71	70	74		85	78	65	64	65		85	84	77		81	86	72		88		84		90
May	76	76	69	77	65	67	70	71	73	67	72	68	71	64	71	65	83		73	64	71	72	82	87	82	72		88	83	75	80	85	81	85	49	89
Apr	76	61	75	75	61	57	63	71	71	66	53	66	74	58	69	54	80	83	71	72	69	66	57	83	60	82	55	81	77	80	76	79	49	81	89	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
	2716		1194		2186		2190		2711		2717		2188		2187		1904		2189		36		1905		1906		1311		37		2163		1310		1153	
	Krishna Upper																																			

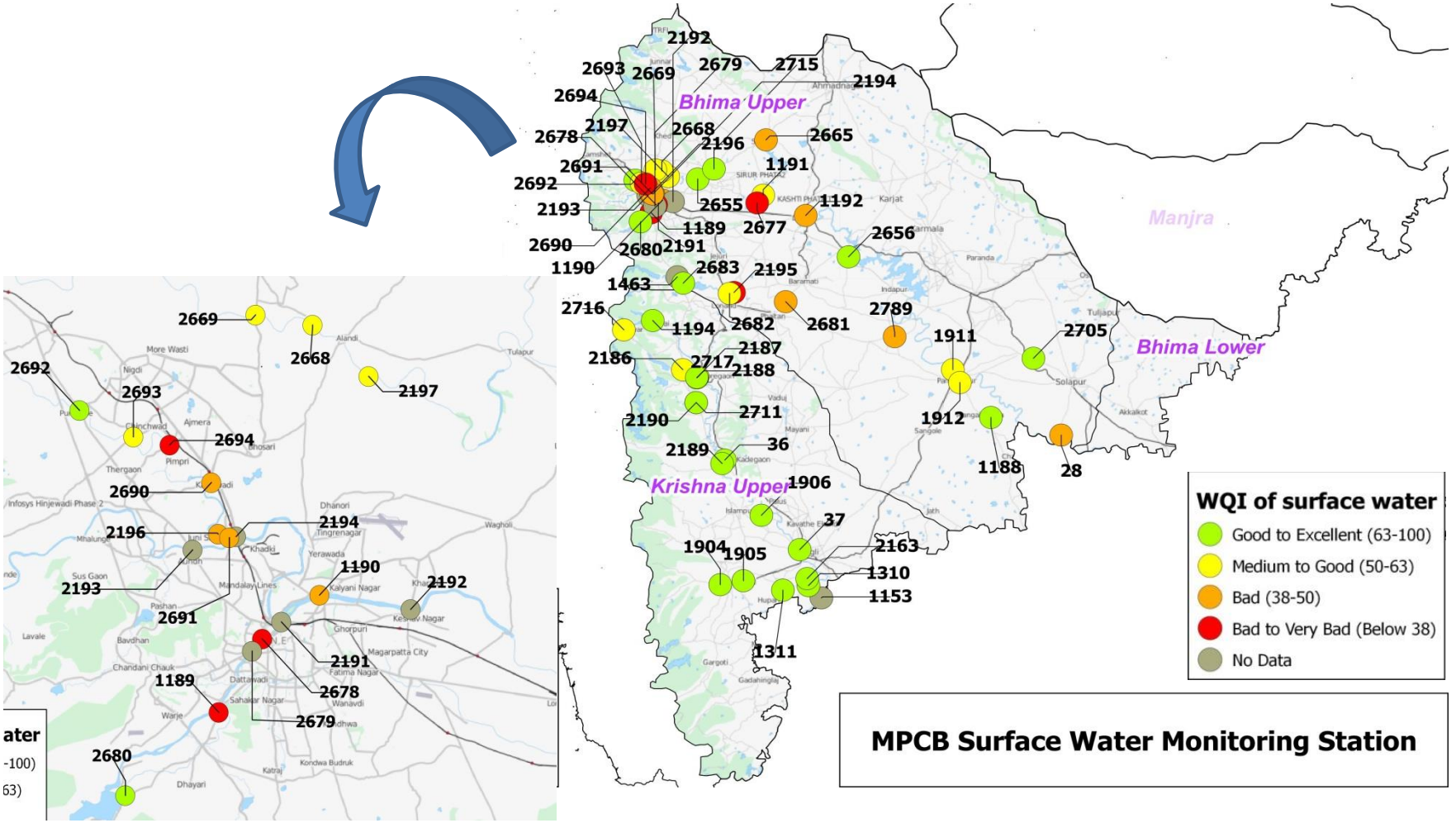
Legend

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

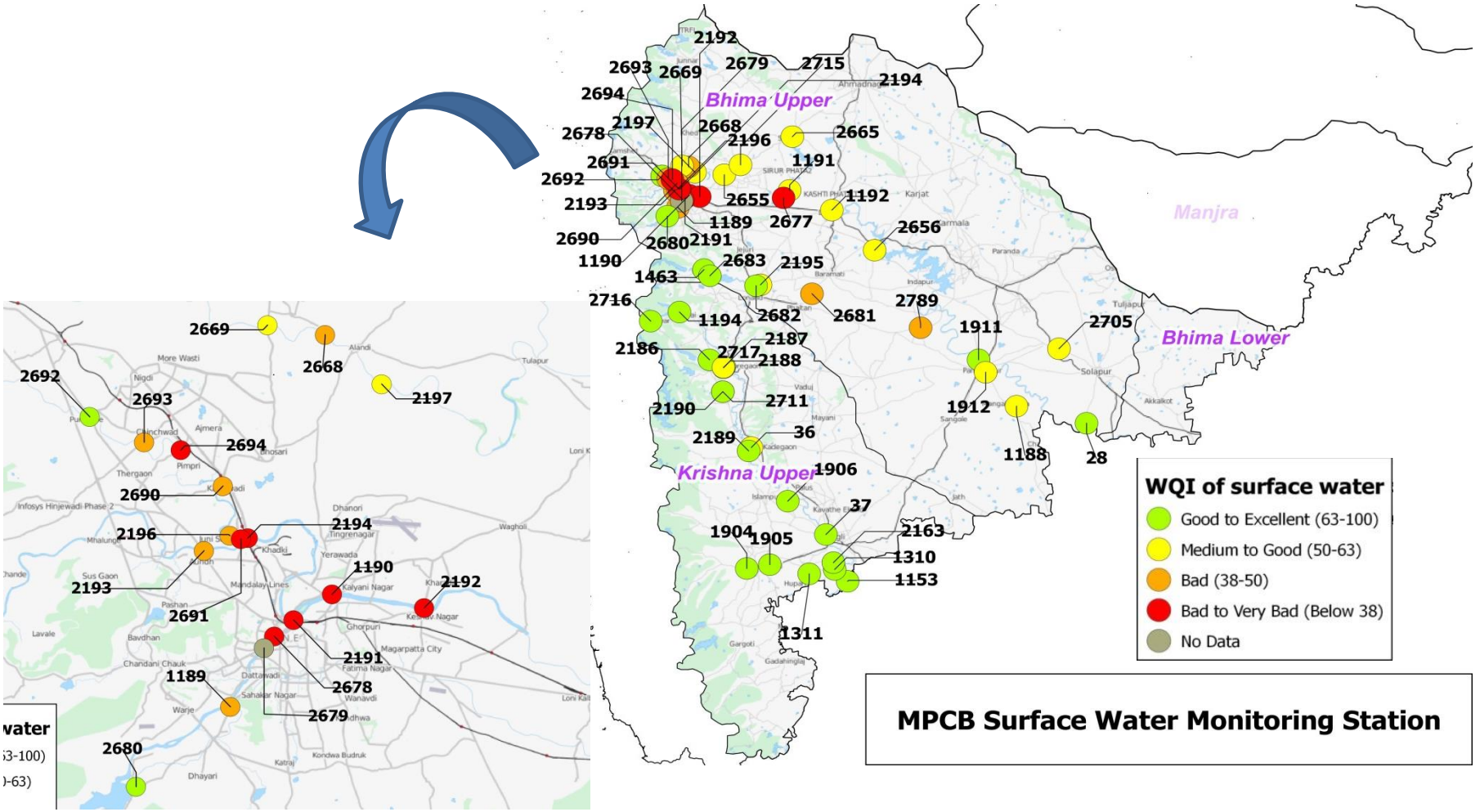
Table No. 12: Surface water quality monitoring stations in Krishna upper Sub basin: Krishna Basin (2 of 2)

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
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 2011)

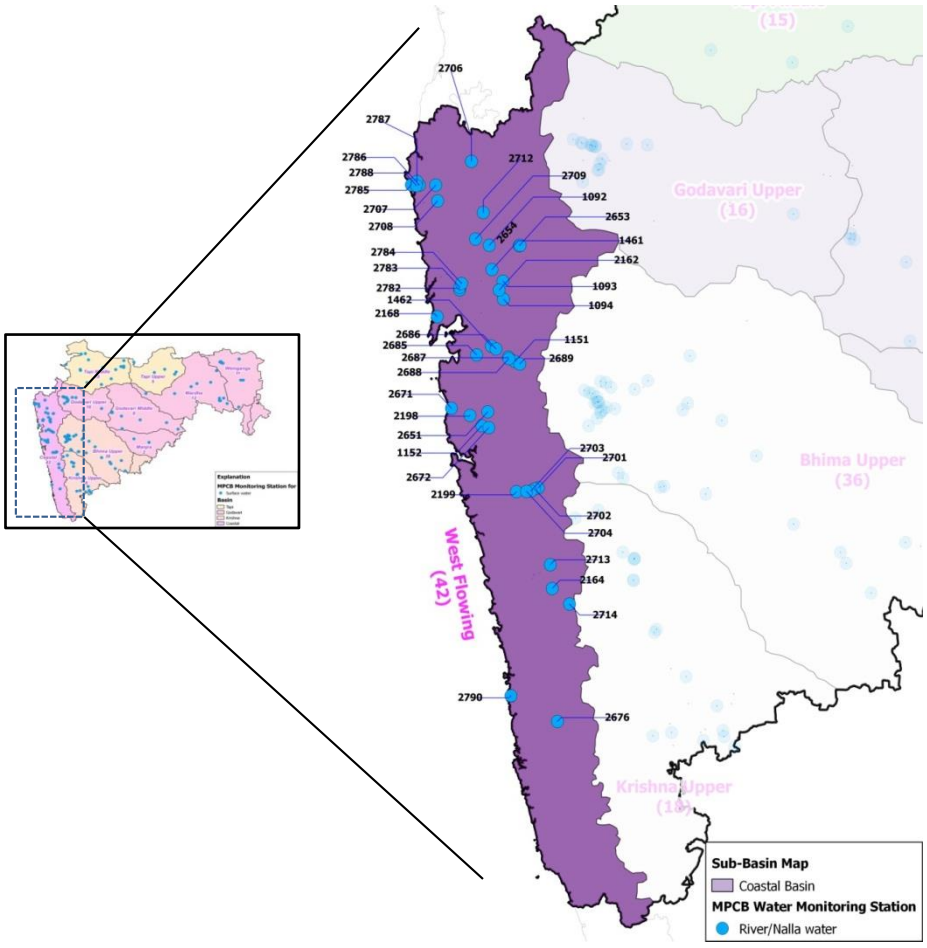


Spatial map of Surface WQI at Krishna Basin (December 2011)



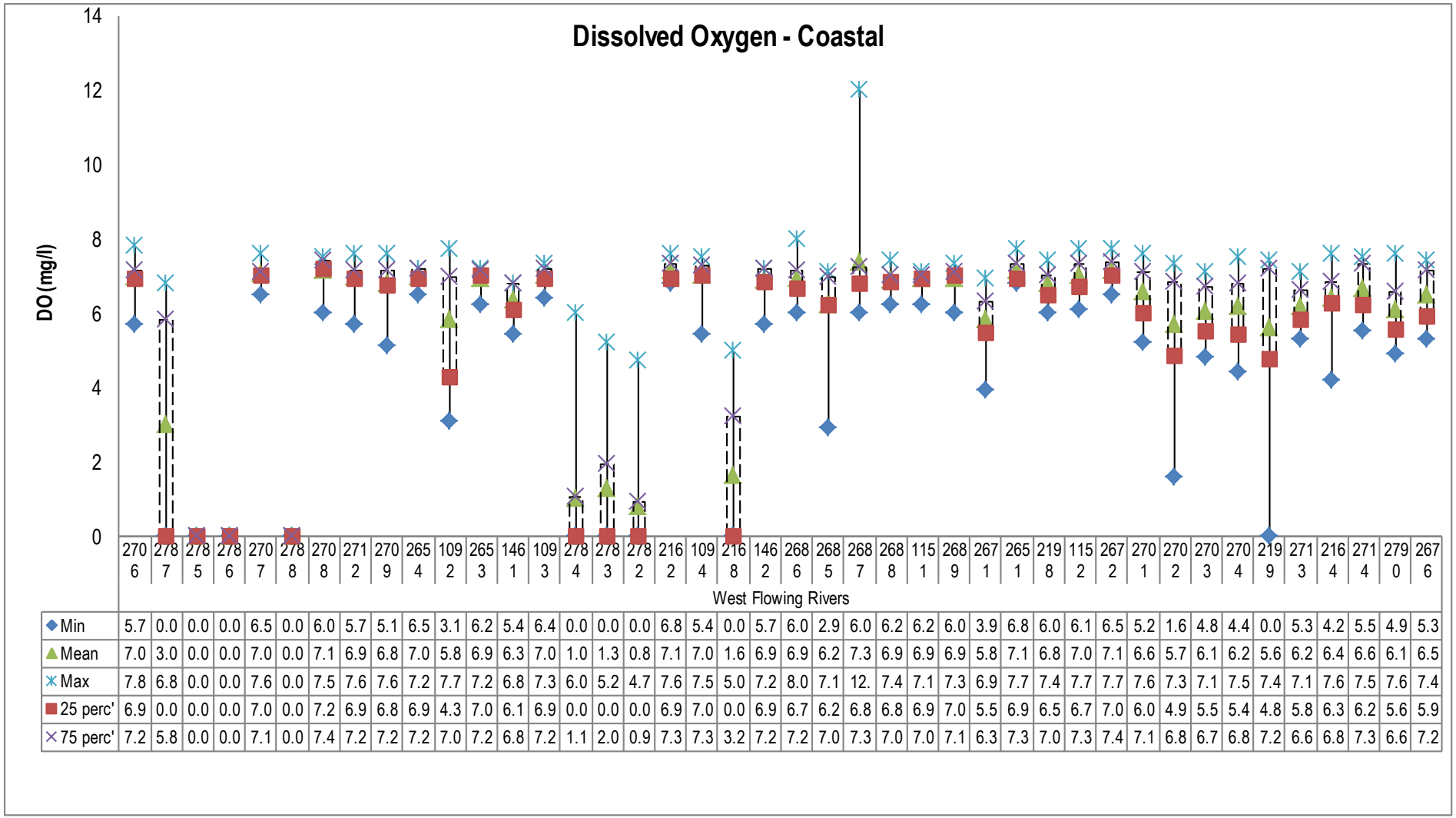
West Flowing Rivers

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. 5**.



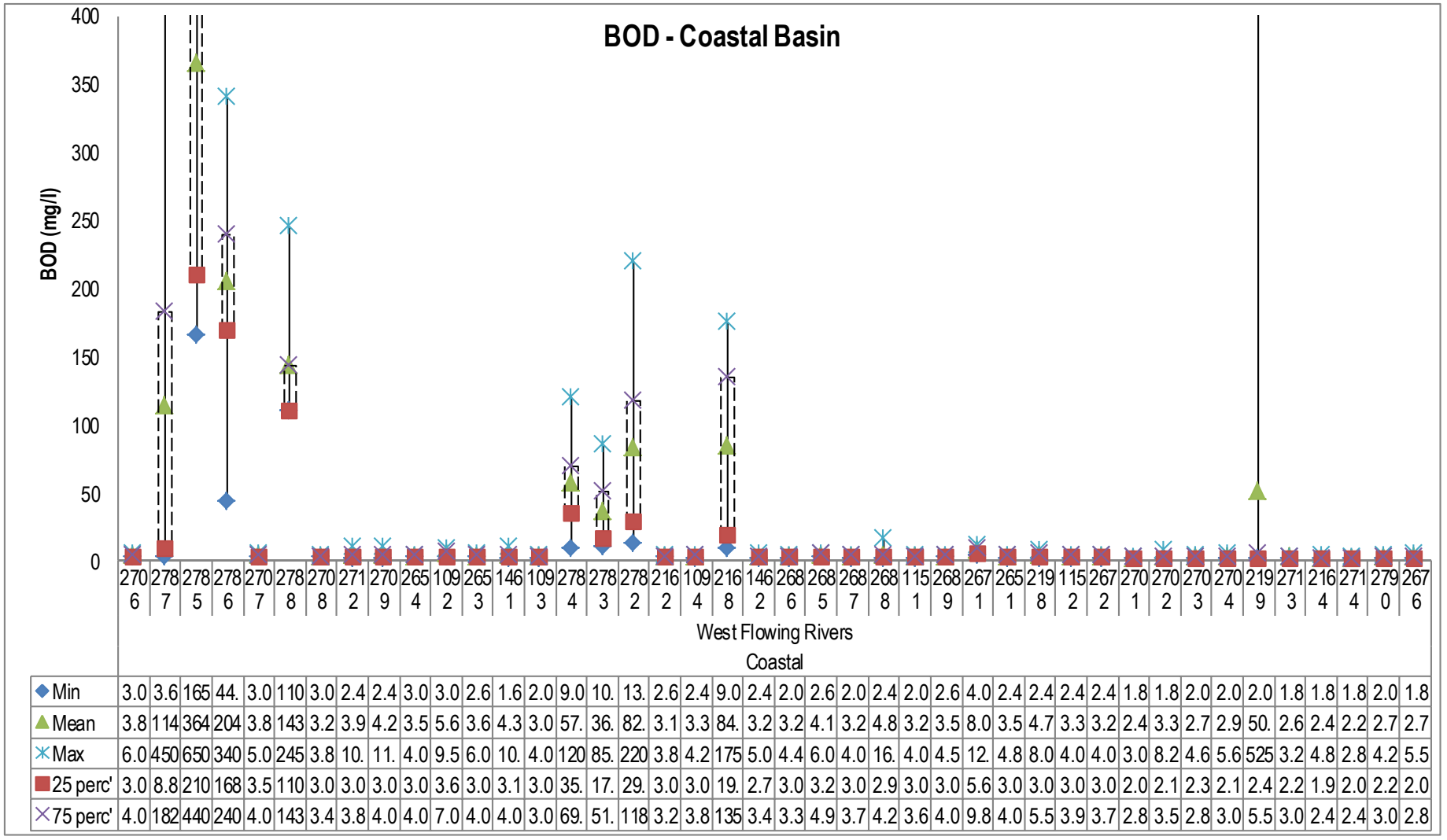
Map No. 5: Network of surface water quality monitoring stations for west flowing rivers

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



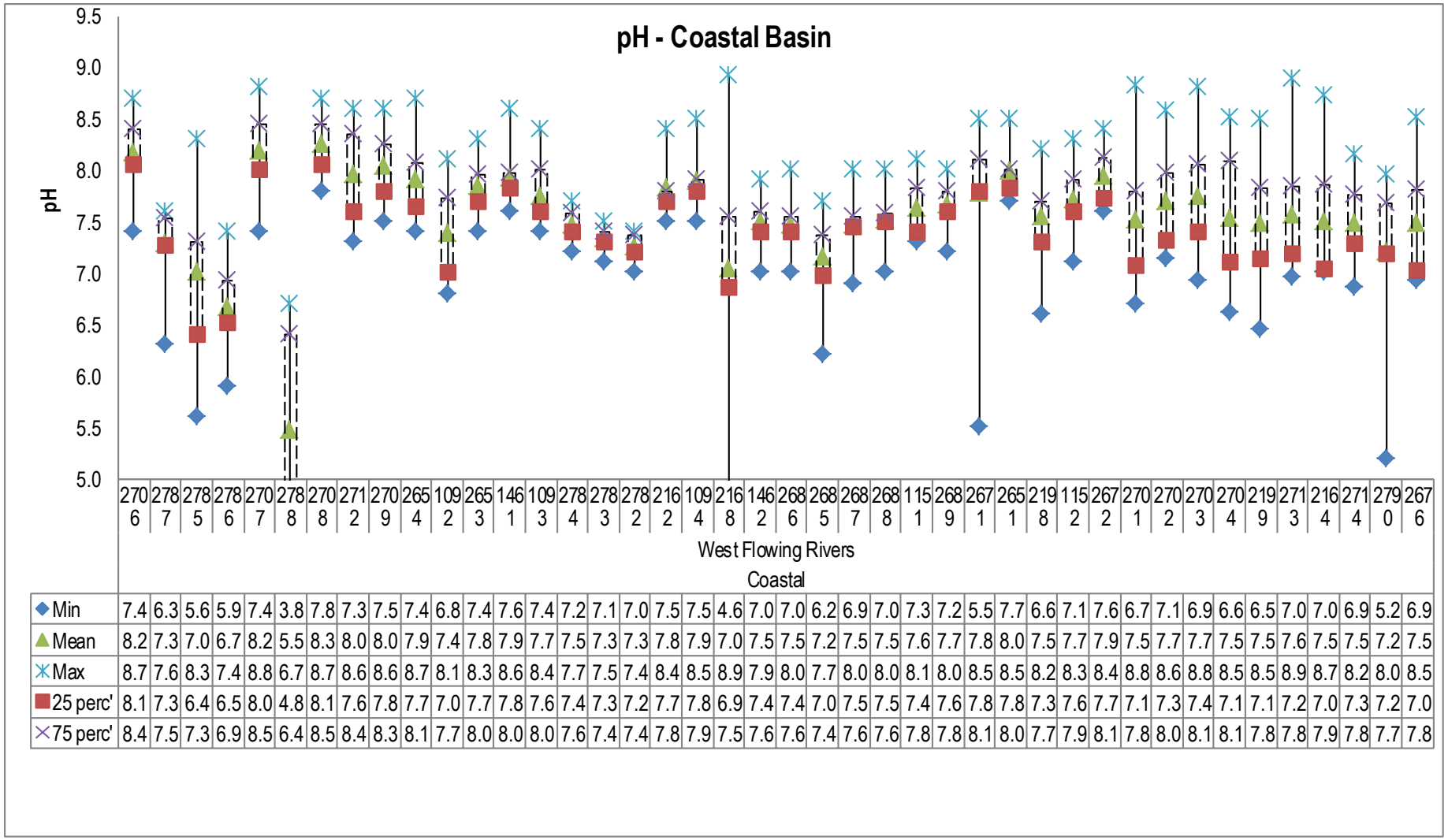
	2706	2787	2785	2786	2707	2788	2708	2712	2709	2654	1092	2653	1461	1093	2784	2783	2782	2162	1094	2168	1462	2686	2685	2687	2688	1151	2689	2671	2651	2198	1152	2672	2701	2702	2703	2704	2199	2713	2164	2714	2790	2676
Min	5.7	0.0	0.0	0.0	6.5	0.0	6.0	5.7	5.1	6.5	3.1	6.2	5.4	6.4	0.0	0.0	0.0	6.8	5.4	0.0	5.7	6.0	2.9	6.0	6.2	6.2	6.0	3.9	6.8	6.0	6.1	6.5	5.2	1.6	4.8	4.4	0.0	5.3	4.2	5.5	4.9	5.3
Mean	7.0	3.0	0.0	0.0	7.0	0.0	7.1	6.9	6.8	7.0	5.8	6.9	6.3	7.0	1.0	1.3	0.8	7.1	7.0	1.6	6.9	6.9	6.2	7.3	6.9	6.9	6.9	5.8	7.1	6.8	7.0	7.1	6.6	5.7	6.1	6.2	5.6	6.2	6.4	6.6	6.1	6.5
Max	7.8	6.8	0.0	0.0	7.6	0.0	7.5	7.6	7.6	7.2	7.7	7.2	6.8	7.3	6.0	5.2	4.7	7.6	7.5	5.0	7.2	8.0	7.1	12.	7.4	7.1	7.3	6.9	7.7	7.4	7.7	7.7	7.6	7.3	7.1	7.5	7.4	7.1	7.6	7.5	7.6	7.4
25 perc'	6.9	0.0	0.0	0.0	7.0	0.0	7.2	6.9	6.8	6.9	4.3	7.0	6.1	6.9	0.0	0.0	0.0	6.9	7.0	0.0	6.9	6.7	6.2	6.8	6.8	6.9	7.0	5.5	6.9	6.5	6.7	7.0	6.0	4.9	5.5	5.4	4.8	5.8	6.3	6.2	5.6	5.9
75 perc'	7.2	5.8	0.0	0.0	7.1	0.0	7.4	7.2	7.2	7.2	7.0	7.2	6.8	7.2	1.1	2.0	0.9	7.3	7.3	3.2	7.2	7.2	7.0	7.3	7.0	7.0	7.1	6.3	7.3	7.0	7.3	7.4	7.1	6.8	6.7	6.8	7.2	6.6	6.8	7.3	6.6	7.2

Figure No. 23: Trend of Dissolved Oxygen (DO) levels recorded monitoring west flowing rivers



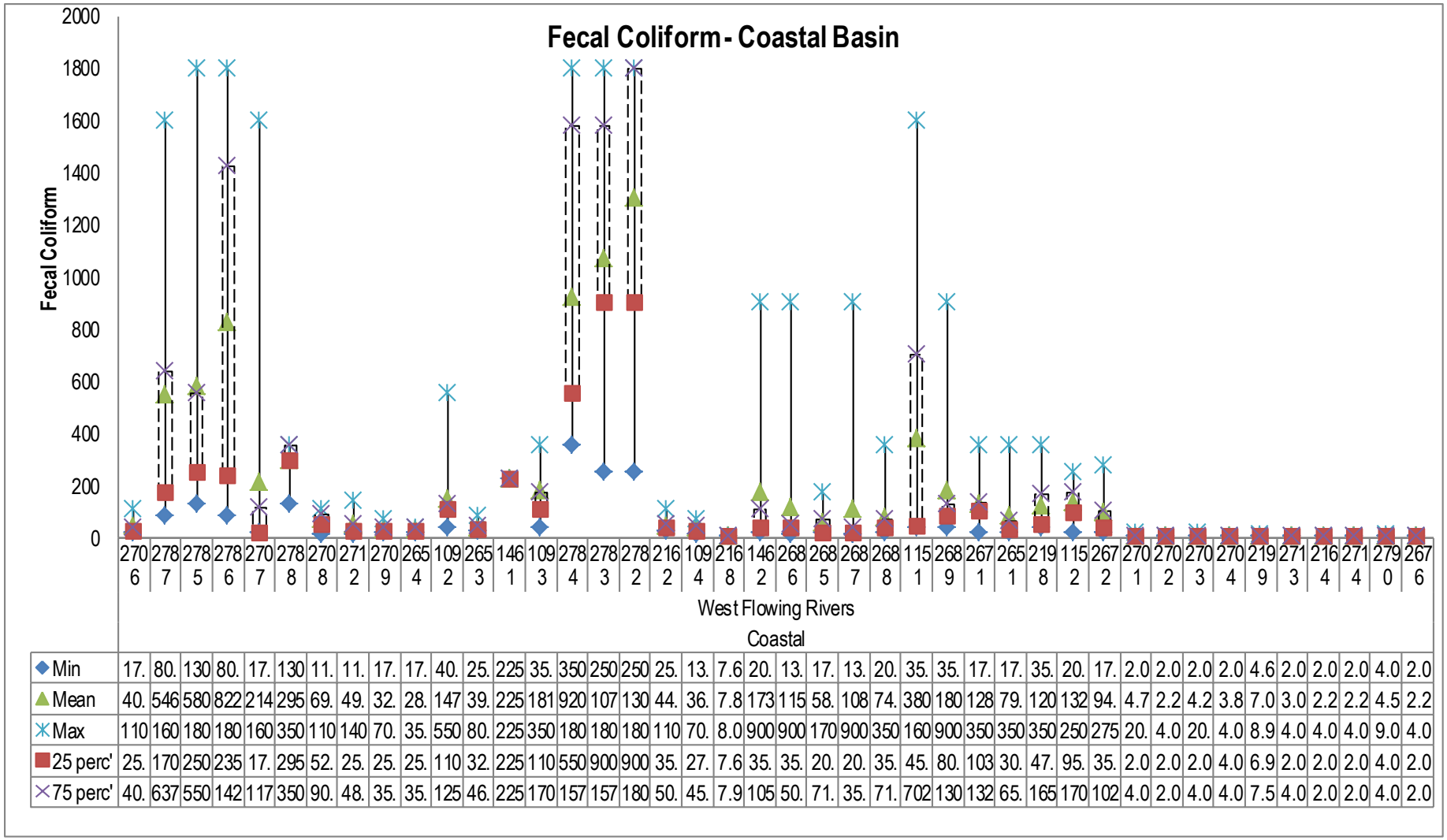
	2706	2787	2785	2786	2707	2788	2708	2712	2709	2654	1092	2653	1461	1093	2784	2783	2782	2162	1094	2168	1462	2686	2685	2687	2688	1151	2689	2671	2651	2198	1152	2672	2701	2702	2703	2704	2199	2713	2164	2714	2790	2676
Min	3.0	3.6	165	44.	3.0	110	3.0	2.4	2.4	3.0	3.0	2.6	1.6	2.0	9.0	10.	13.	2.6	2.4	9.0	2.4	2.0	2.6	2.0	2.4	2.0	2.6	4.0	2.4	2.4	2.4	2.4	1.8	1.8	2.0	2.0	2.0	1.8	1.8	1.8	2.0	1.8
Mean	3.8	114	364	204	3.8	143	3.2	3.9	4.2	3.5	5.6	3.6	4.3	3.0	57.	36.	82.	3.1	3.3	84.	3.2	3.2	4.1	3.2	4.8	3.2	3.5	8.0	3.5	4.7	3.3	3.2	2.4	3.3	2.7	2.9	50.	2.6	2.4	2.2	2.7	2.7
Max	6.0	450	650	340	5.0	245	3.8	10.	11.	4.0	9.5	6.0	10.	4.0	120	85.	220	3.8	4.2	175	5.0	4.4	6.0	4.0	16.	4.0	4.5	12.	4.8	8.0	4.0	4.0	3.0	8.2	4.6	5.6	525	3.2	4.8	2.8	4.2	5.5
25 perc'	3.0	8.8	210	168	3.5	110	3.0	3.0	3.0	3.0	3.6	3.0	3.1	3.0	35.	17.	29.	3.0	3.0	19.	2.7	3.0	3.2	3.0	2.9	3.0	3.0	5.6	3.0	3.0	3.0	3.0	2.0	2.1	2.3	2.1	2.4	2.2	1.9	2.0	2.2	2.0
75 perc'	4.0	182	440	240	4.0	143	3.4	3.8	4.0	4.0	7.0	4.0	4.0	3.0	69.	51.	118	3.2	3.8	135	3.4	3.3	4.9	3.7	4.2	3.6	4.0	9.8	4.0	5.5	3.9	3.7	2.8	3.5	2.8	3.0	5.5	3.0	2.4	2.4	3.0	2.8

Figure No. 24: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at west flowing rivers (coastal basin)



	2706	2787	2785	2786	2707	2788	2708	2712	2709	2654	1092	2653	1461	1093	2784	2783	2782	2162	1094	2168	1462	2686	2685	2687	2688	1151	2689	2671	2651	2198	1152	2672	2701	2702	2703	2704	2199	2713	2164	2714	2790	2676
Min	7.4	6.3	5.6	5.9	7.4	3.8	7.8	7.3	7.5	7.4	6.8	7.4	7.6	7.4	7.2	7.1	7.0	7.5	7.5	4.6	7.0	7.0	6.2	6.9	7.0	7.3	7.2	5.5	7.7	6.6	7.1	7.6	6.7	7.1	6.9	6.6	6.5	7.0	7.0	6.9	5.2	6.9
Mean	8.2	7.3	7.0	6.7	8.2	5.5	8.3	8.0	8.0	7.9	7.4	7.8	7.9	7.7	7.5	7.3	7.3	7.8	7.9	7.0	7.5	7.5	7.2	7.5	7.5	7.6	7.7	7.8	8.0	7.5	7.7	7.9	7.5	7.7	7.7	7.5	7.5	7.6	7.5	7.5	7.2	7.5
Max	8.7	7.6	8.3	7.4	8.8	6.7	8.7	8.6	8.6	8.7	8.1	8.3	8.6	8.4	7.7	7.5	7.4	8.4	8.5	8.9	7.9	8.0	7.7	8.0	8.0	8.1	8.0	8.5	8.5	8.2	8.3	8.4	8.8	8.6	8.8	8.5	8.5	8.9	8.7	8.2	8.0	8.5
25 perc'	8.1	7.3	6.4	6.5	8.0	4.8	8.1	7.6	7.8	7.7	7.0	7.7	7.8	7.6	7.4	7.3	7.2	7.7	7.8	6.9	7.4	7.4	7.0	7.5	7.5	7.4	7.6	7.8	7.8	7.3	7.6	7.7	7.1	7.3	7.4	7.1	7.1	7.2	7.0	7.3	7.2	7.0
75 perc'	8.4	7.5	7.3	6.9	8.5	6.4	8.5	8.4	8.3	8.1	7.7	8.0	8.0	8.0	7.6	7.4	7.4	7.8	7.9	7.5	7.6	7.6	7.4	7.6	7.6	7.8	7.8	8.1	8.0	7.7	7.9	8.1	7.8	8.0	8.1	8.1	7.8	7.8	7.9	7.8	7.7	7.8

Figure No. 25: Trend of pH levels recorded at WQMS at west flowing rivers (coastal basin)



	2706	2787	2785	2786	2707	2788	2708	2712	2709	2654	1092	2653	1461	1093	2784	2783	2782	2162	1094	2168	1462	2686	2685	2687	2688	1151	2689	2671	2651	2198	1152	2672	2701	2702	2703	2704	2199	2713	2164	2714	2790	2676
Min	17.	80.	130	80.	17.	130	11.	11.	17.	17.	40.	25.	225	35.	350	250	250	25.	13.	7.6	20.	13.	17.	13.	20.	35.	35.	17.	17.	35.	20.	17.	2.0	2.0	2.0	2.0	4.6	2.0	2.0	2.0	4.0	2.0
Mean	40.	546	580	822	214	295	69.	49.	32.	28.	147	39.	225	181	920	107	130	44.	36.	7.8	173	115	58.	108	74.	380	180	128	79.	120	132	94.	4.7	2.2	4.2	3.8	7.0	3.0	2.2	2.2	4.5	2.2
Max	110	160	180	180	160	350	110	140	70.	35.	550	80.	225	350	180	180	180	110	70.	8.0	900	900	170	900	350	160	900	350	350	350	250	275	20.	4.0	20.	4.0	8.9	4.0	4.0	4.0	9.0	4.0
25 perc'	25.	170	250	235	17.	295	52.	25.	25.	25.	110	32.	225	110	550	900	900	35.	27.	7.6	35.	35.	20.	20.	35.	45.	80.	103	30.	47.	95.	35.	2.0	2.0	2.0	4.0	6.9	2.0	2.0	2.0	4.0	2.0
75 perc'	40.	637	550	142	117	350	90.	48.	35.	35.	125	46.	225	170	157	157	180	50.	45.	7.9	105	50.	71.	35.	71.	702	130	132	65.	165	170	102	4.0	2.0	4.0	4.0	7.5	4.0	2.0	2.0	4.0	2.0

Figure No. 26: 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 2)

Month	2706		2787		2785		2786		2707		2788		2708		2712		2709		2654		1092		2653		1461		1093		2784		2783		2782		2162		1094		2168	
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
Mar	72	67	13		25	23	14	24	72	74	14		75		77	80	79	81	79	84	52	60	79	81			69		24	26	24	27	26	26	75	83	75	76	34	24
Feb	72	79	25		22	24	22	27		75				76	71	84	72	80	79	81		50	78	79			70	82	25	26	24	25	25	26	80	81	82	81	24	26
Jan	75	75	26	74	26	22	23	20	75	68	23		75	73		74		74		77	39	59		78			70	78	26	26	26	27	27	26	77	76	77	75	57	27
Dec	77	74	15	67		23	14	26	76	74	13		80	72		79		78		79		74		80			72	78		27	40	35	26	29	77	79		78		28
Nov		75	26	67	23	29		25		74	15					77		78		73		78		75			76	78	26	25	25	28	23	26	84	77	80	77		53
Oct		81		53		17		26	74	77		16	78			84		76		78				75				75		26		26		26	79	79	81	79	65	25
Sep	82	75		25		29		22	79	76		24	79	75		81		82				77		82			73	78		64		57		53	77	81	74	81		59
Aug	79	77		25		22		20	82	77		23	81	78		77		75		82		71		74				76		38		36		25	79		78	80	58	41
Jul		77		31		25		23				12				73		76		80		78		80				78		28		32		34		79		79		36
Jun																73		75		78				80			80										82			
May	80	78							80	78			81	79								63					82								83		84			
Apr	85	78		26				17	83	76			79	72		66		63		80		78		80		65	84	74	27	25	27	37	17	29	83	77	85	78	44	

Legend

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

Table No. 13: Surface water quality monitoring stations on West flowing rivers (1 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
2706	Surya river	Surya river at U/s of Surya Dam	Dhamni	Vikramgad	Thane
2785	BPT Navapur	BPT, Navapur	Navapur	Palghar	Thane
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
2707	Surya river	Surya river at MIDC Pumping station on Boisar-	Garvashet	Palghar	Thane
2788	Tarapur MIDC nalla	Tarapur MIDC Nalla, near sump No.III	MIDC Tarapur	Palghar	Thane
2708	Surya river	Surya river at intake of Vasai- Virar water scheme	Masvan	Palghar	Thane
2712	Vaitarna river	Vaitarna river near Road bridge	Gandhare	Wada	Thane
2709	Tansa river	Tansa River near Road bridge	Dakewali	Wada	Thane
1092	Kalu river	Kalu river at Atale village	Atale	Kalyan	Thane
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
1461	Bhatsa river	Bhatsa river at D/s of Pise Dam	Pise	Bhiwandi	Thane
1093	Ulhas river	Ulhas river at U/s of NRC Bund,	Mohane	Kalyan	Thane
2784	Sandoz nalla	Sandoz Nalla	Sandozbaug	Thane	Thane
2783	Colour Chem nalla	Colour Chem Nalla	Majiwada	Thane	Thane
2782	Rabodi nalla	Rabodi Nalla	Rabodi	Thane	Thane
2162	Ulhas river	Ulhas River at Jambhul water works	Jambhul	Ambernath	Thane
1094	Ulhas river	Ulhas river at U/s of Badlapur water works	Kulgaon	Ambernath	Thane
2168	Mithi river	Mithi River near Road bridge	Mahim	Bandra	Mumbai

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

Mar			78		69		84		65		85		75		79	65	80	77	56	82		76
Feb		82	85	82	69	81	78	79	75	84	85	81	81	78	74	58	76	77	75	81		80
Jan	79	76	80	72	63	62	83	59	80	77	84	73	85	72	79	73	83	75	67	79	78	76
Dec	80	85	78	86	77	78	82	86	80	82	82	84	83	78	15	57	74	81	67	77		78
Nov		84		81		84		85		81		80		81	15	54	78	79	77	79		79
Oct	84	80	87	75		81		80	83	76		78	86	79		59	82	77		76		73
Sep	80	82	76	80	81	80	78	81	80	78	76	83	83	79	15	69	76	75	76	77		78
Aug		81	82	82	78	82	75	80	80	80	75	81	78	78	15	76	77		77	70		75
Jul		79		82		80		82		81	80	80		77		70	76	77	73	66	75	77
Jun		79		82		77		82	79	66		70	82		15	75		73		71		73
May	84	75	88	83	87		86	83	86	82	83	72	78	75		63			75			
Apr	76	75	83	84	78	70	81	84	81		76		81		15	52	82	79	88	76	53	83
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
	1462		2686		2685		2687		2688		1151		2689		2671		2651		2198		1152	

Mar	73		79	89	83	86	77	88	52	85	46	89	87	88	85	89	86	88	82	72	87	88
Feb	73	77	85	88	88	77		76		79		53	87	91	88	92	90	92	77	85	86	90
Jan	76	78	83	86	86	54	86	79	89	71	84	72	87	85	84	84	85	84	82	86	85	84
Dec	74	80	86	87	87	73	85	78	87	85	88	85	87	89	88	90	87	90	87	75	80	82
Nov	80	79	91	83	92	93	84	88	92	85	90	70		88		93		92	77	56	89	83
Oct		75		88		90		88		84	84	88	84		83		86					89
Sep	77	82		89		90		91		90	88	89	90	91	92	89	90	90		91		90
Aug	77	75		90		83		92		88		89	90	86	92	90	90	91	92	90		89
Jul	62	76		88		90		88		92	83	86	87	81	87	72	81	89	84	85		
Jun		74		88							87	32	89		90		90		83	87		90
May				81		85		81		83	84	81	86	88	91	92	86	90	85	78		
Apr	84	77		75		79		81		77	59		88	79	90	81	87		85	84		81
	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12	10-11	11-12
	2672		2701		2702		2703		2704		2199		2713		2164		2714		2790		2676	

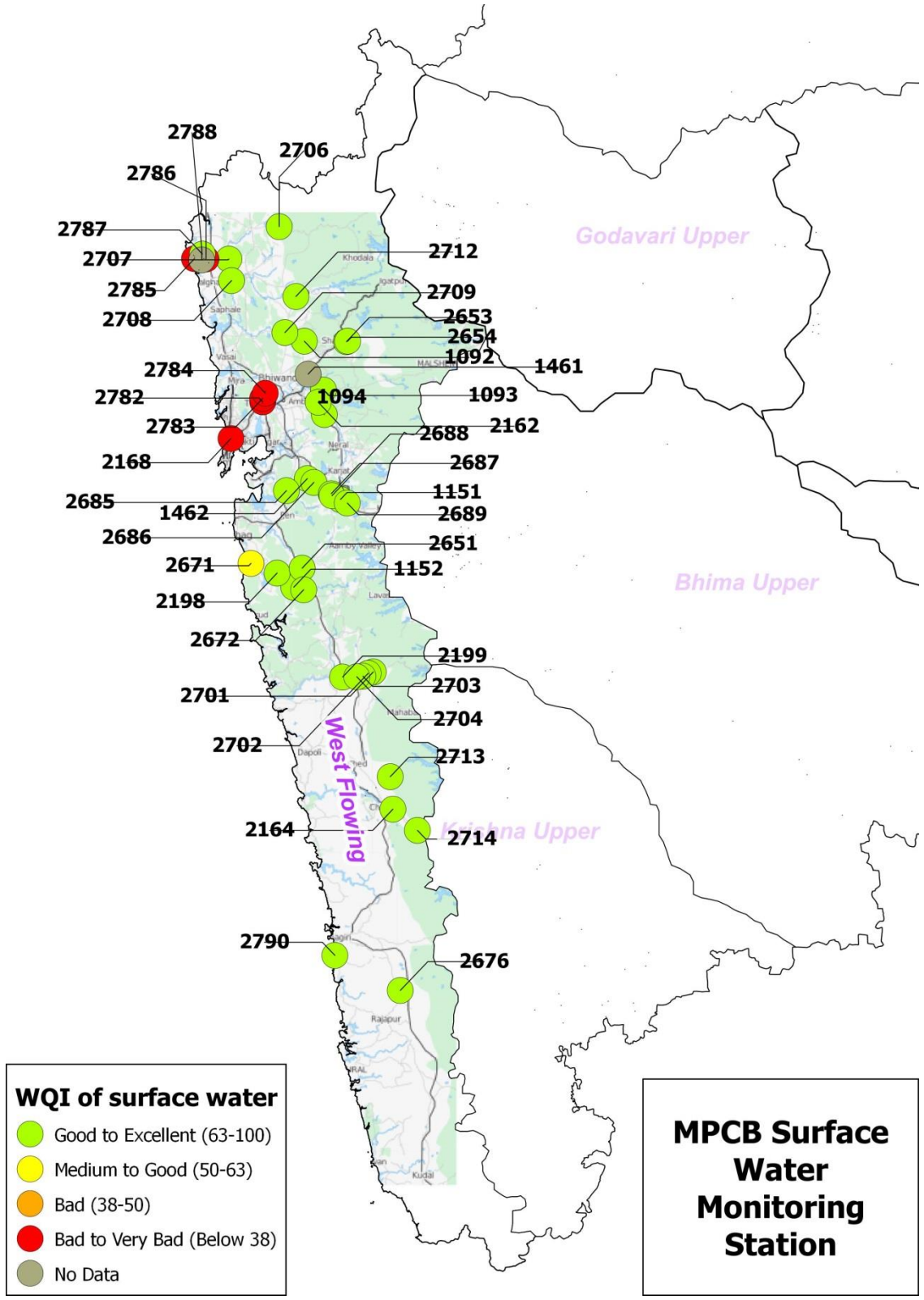
Legend

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

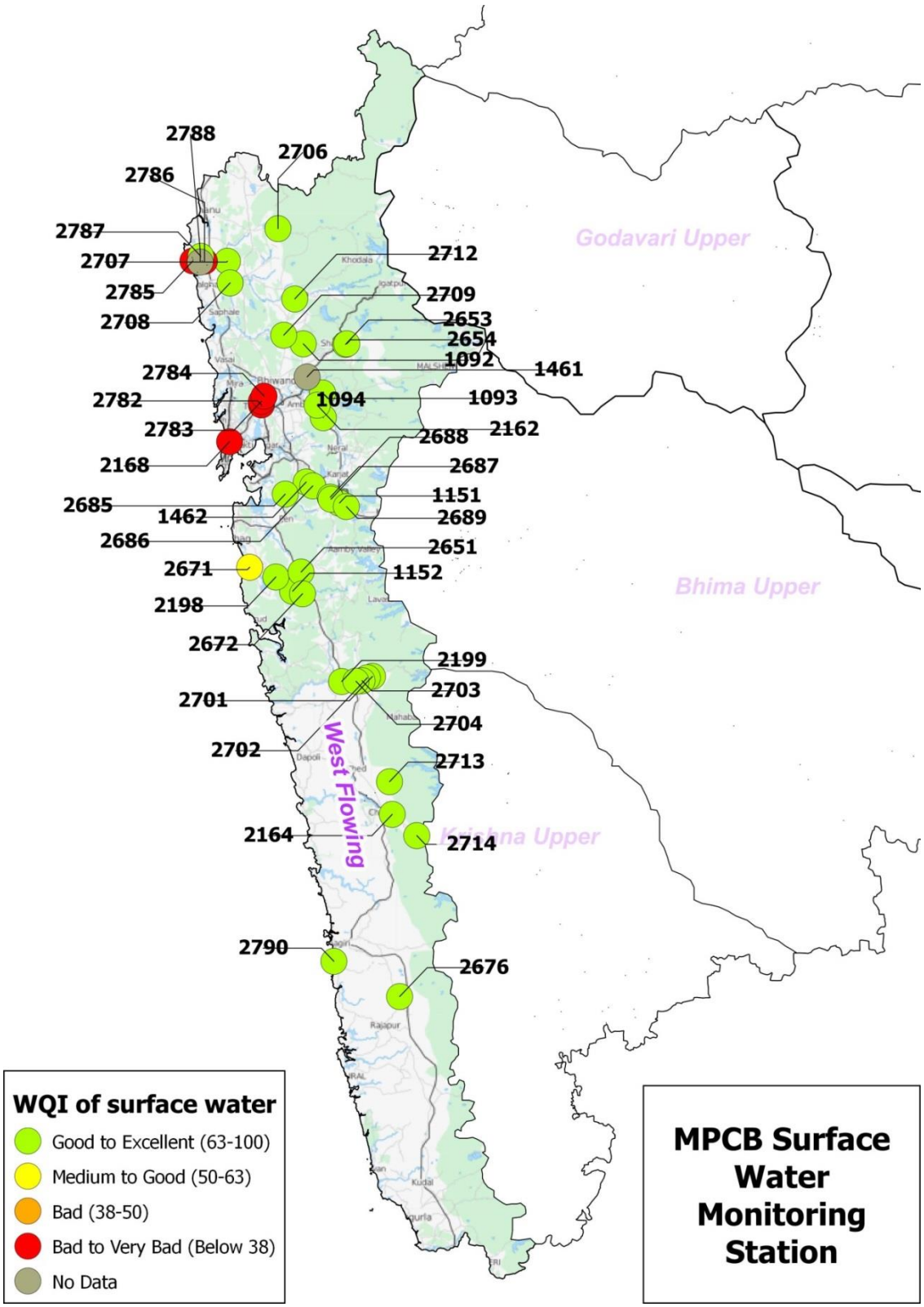
Table No. 14: Surface water quality monitoring stations at west flowing rivers (2 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
1462	Patalganga	Patalganga near intake of MIDC water works(Turade w/w)	Turade	Khalapur	Raigad
2686	Patalganga	Patalganga river at Vyal Pump House	Vyal	Khalapur	Raigad
2685	Patalganga	Patalganga river at D/s of Kharpada bridge.	Kharpada	Khalapur	Raigad
2687	Patalganga	Patalganga river at Khalapur Pumping Station	Khalapur	Khalapur	Raigad
2688	Patalganga	Patalganga river at Savroli bridge	Savroli	Khalapur	Raigad
1151	Patalganga	Patalganga river at Shilphata bridge	Khopoli	Khalapur	Raigad
2689	Patalganga	Patalganga river at Gagangiri Maharaj Temple	Khopoli	Khalapur	Raigad
2671	Kundalik	Kundalika river near Salav bridge (saline zone)	Salav	Roha	Raigad
2651	Amba	Amba river at D/s of Waken bridge	Waken Phata	Roha	Raigad
2198	Kundalika	Kundalika river at Are Khurd (saline zone)	Are Khurd	Roha	Raigad
1152	Kundalika	Kundalika river at Roha bridge	Roha	Roha	Raigad
2672	Kundalika	Kundalika river at Dhatav Jackwell	Dhatav	Roha	Raigad
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
2199	Savitri	Savitri river at Ovale Village	Ovale	Mahad	Raigad
2713	Vashishti	Vashisti river at D/s of Three M Paper Mills near Chiplun water intake jackwell.	Kherdi	Chiplun	Ratnagiri
2164	Vashishti	Vashisti river at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt. Ltd..	Kherdi	Chiplun	Ratnagiri
2714	Vashishti	Vashisti river at U/s of Pophali near Konphansawane bridge.	Pophali	Chiplun	Ratnagiri
2790	Pimpal-Paneri nalla	Pimpal-Paneri nalla at Ratnagiri near Finolex Industries.	Yahganigaon	Ratnagiri	Ratnagiri
2676	Muchkundi	Muchkundi river at Waked, Ratnagiri, near M/s Asahi Maharashtra Glass Ltd	Waked	Lanja	Ratnagiri

Spatial map of Surface WQI of West Flowing Rivers (April 2011)



Spatial map of Surface WQI of West Flowing Rivers (December 2011)

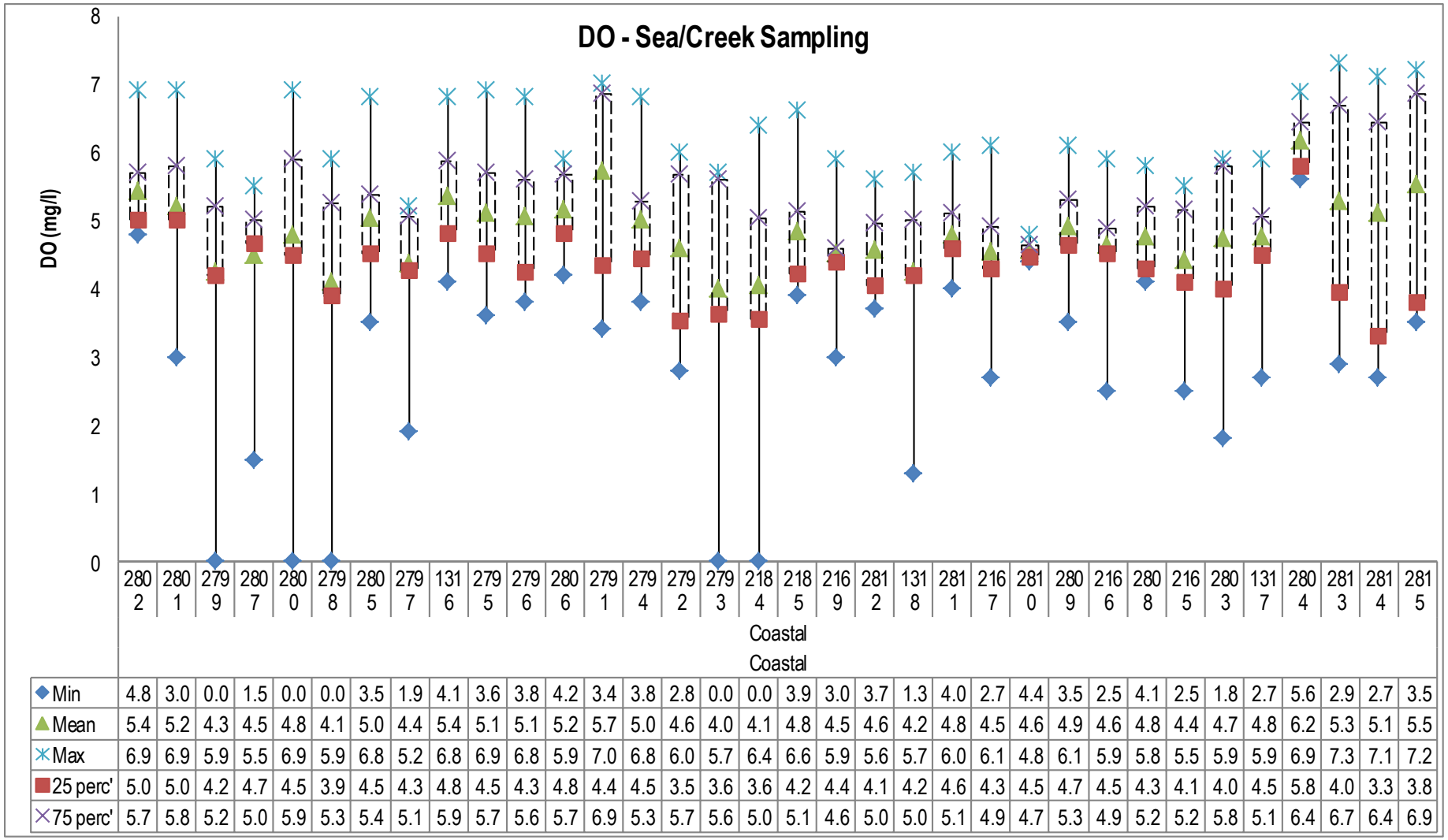


Saline (Sea and Creek) Water Quality

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.

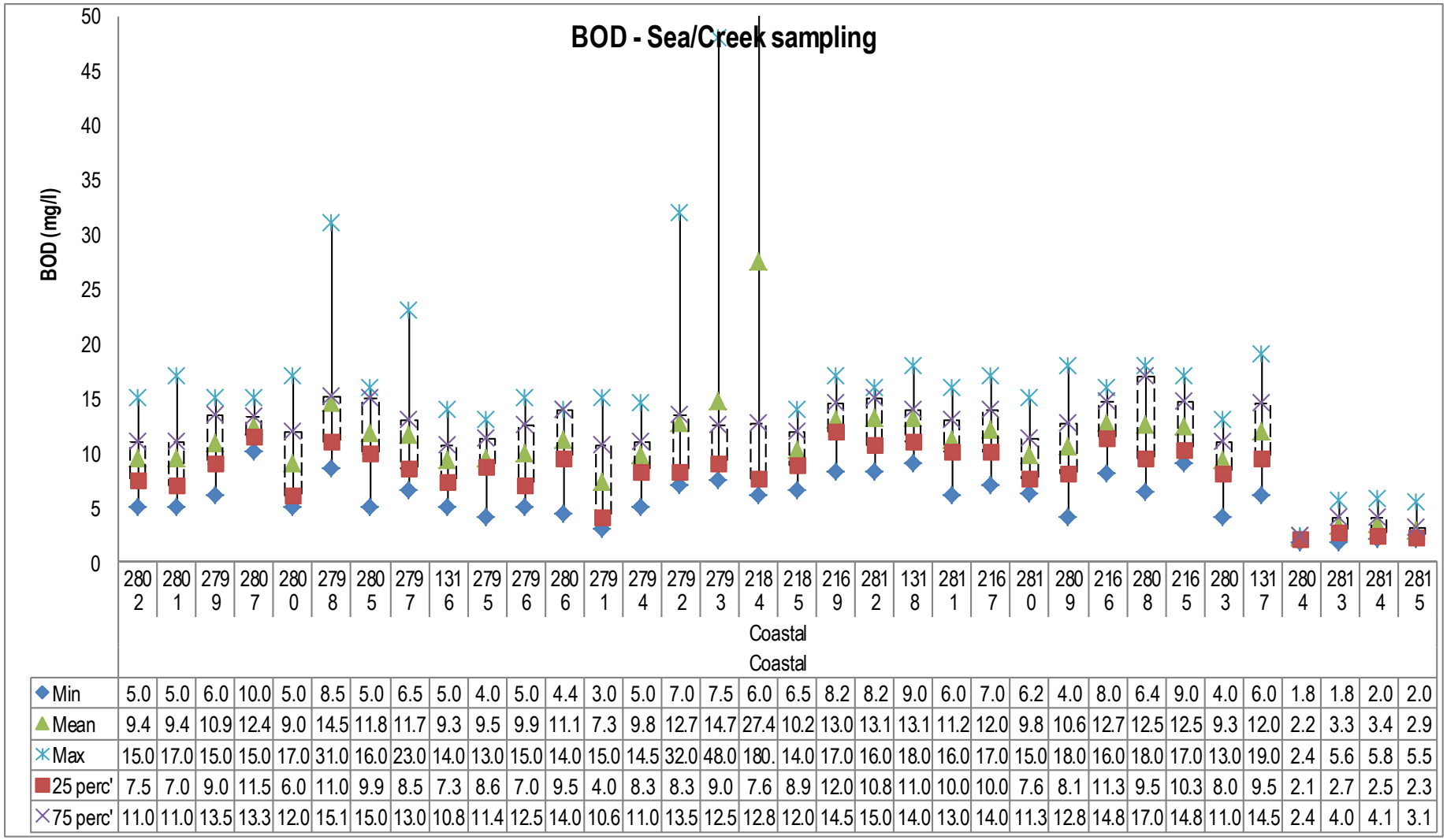
Given the fact that water pollution on the coastal front shall directly impact the marine ecosystem and through consumption of fish and salt it poses a potential threat to humans, it is of significant importance to monitor sea water quality.

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.



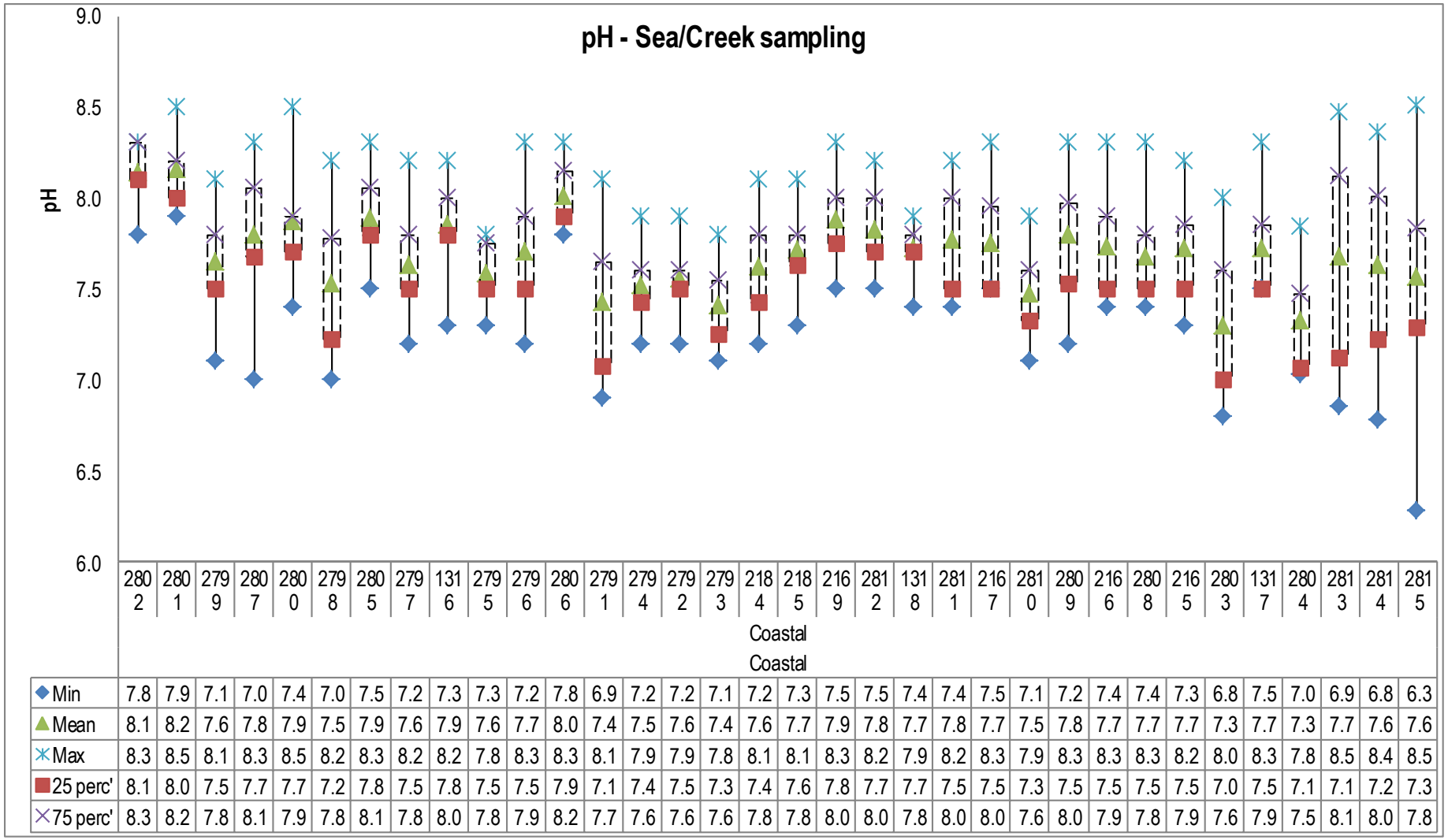
	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
Min	4.8	3.0	0.0	1.5	0.0	0.0	3.5	1.9	4.1	3.6	3.8	4.2	3.4	3.8	2.8	0.0	0.0	3.9	3.0	3.7	1.3	4.0	2.7	4.4	3.5	2.5	4.1	2.5	1.8	2.7	5.6	2.9	2.7	3.5
Mean	5.4	5.2	4.3	4.5	4.8	4.1	5.0	4.4	5.4	5.1	5.1	5.2	5.7	5.0	4.6	4.0	4.1	4.8	4.5	4.6	4.2	4.8	4.5	4.6	4.9	4.6	4.8	4.4	4.7	4.8	6.2	5.3	5.1	5.5
Max	6.9	6.9	5.9	5.5	6.9	5.9	6.8	5.2	6.8	6.9	6.8	5.9	7.0	6.8	6.0	5.7	6.4	6.6	5.9	5.6	5.7	6.0	6.1	4.8	6.1	5.9	5.8	5.5	5.9	5.9	6.9	7.3	7.1	7.2
25 perc'	5.0	5.0	4.2	4.7	4.5	3.9	4.5	4.3	4.8	4.5	4.3	4.8	4.4	4.5	3.5	3.6	3.6	4.2	4.4	4.1	4.2	4.6	4.3	4.5	4.7	4.5	4.3	4.1	4.0	4.5	5.8	4.0	3.3	3.8
75 perc'	5.7	5.8	5.2	5.0	5.9	5.3	5.4	5.1	5.9	5.7	5.6	5.7	6.9	5.3	5.7	5.6	5.0	5.1	4.6	5.0	5.0	5.1	4.9	4.7	5.3	4.9	5.2	5.2	5.8	5.1	6.4	6.7	6.4	6.9

Figure No. 27: Trend of Dissolved Oxygen (DO) levels recorded at WQMS monitoring sea and creek water



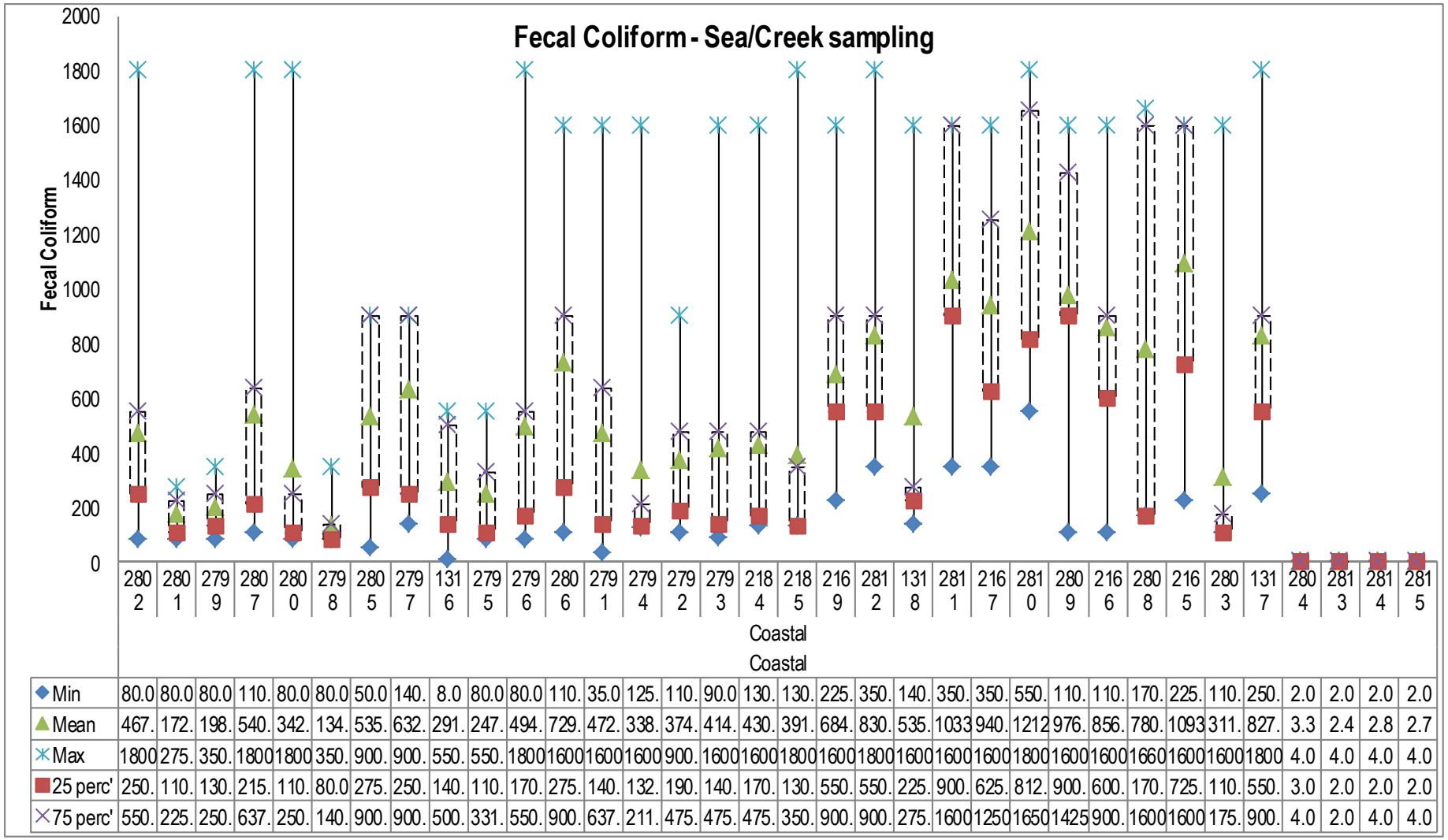
	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
Min	5.0	5.0	6.0	10.0	5.0	8.5	5.0	6.5	5.0	4.0	5.0	4.4	3.0	5.0	7.0	7.5	6.0	6.5	8.2	8.2	9.0	6.0	7.0	6.2	4.0	8.0	6.4	9.0	4.0	6.0	1.8	1.8	2.0	2.0
Mean	9.4	9.4	10.9	12.4	9.0	14.5	11.8	11.7	9.3	9.5	9.9	11.1	7.3	9.8	12.7	14.7	27.4	10.2	13.0	13.1	13.1	11.2	12.0	9.8	10.6	12.7	12.5	12.5	9.3	12.0	2.2	3.3	3.4	2.9
Max	15.0	17.0	15.0	15.0	17.0	31.0	16.0	23.0	14.0	13.0	15.0	14.0	15.0	14.5	32.0	48.0	180.	14.0	17.0	16.0	18.0	16.0	17.0	15.0	18.0	16.0	18.0	17.0	13.0	19.0	2.4	5.6	5.8	5.5
25 perc'	7.5	7.0	9.0	11.5	6.0	11.0	9.9	8.5	7.3	8.6	7.0	9.5	4.0	8.3	8.3	9.0	7.6	8.9	12.0	10.8	11.0	10.0	10.0	7.6	8.1	11.3	9.5	10.3	8.0	9.5	2.1	2.7	2.5	2.3
75 perc'	11.0	11.0	13.5	13.3	12.0	15.1	15.0	13.0	10.8	11.4	12.5	14.0	10.6	11.0	13.5	12.5	12.8	12.0	14.5	15.0	14.0	13.0	14.0	11.3	12.8	14.8	17.0	14.8	11.0	14.5	2.4	4.0	4.1	3.1

Figure No. 28: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS monitoring sea and creek water



	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
Min	7.8	7.9	7.1	7.0	7.4	7.0	7.5	7.2	7.3	7.3	7.2	7.8	6.9	7.2	7.2	7.1	7.2	7.3	7.5	7.5	7.4	7.4	7.5	7.1	7.2	7.4	7.4	7.3	6.8	7.5	7.0	6.9	6.8	6.3
Mean	8.1	8.2	7.6	7.8	7.9	7.5	7.9	7.6	7.9	7.6	7.7	8.0	7.4	7.5	7.6	7.4	7.6	7.7	7.9	7.8	7.7	7.8	7.7	7.5	7.8	7.7	7.7	7.7	7.3	7.7	7.3	7.7	7.6	7.6
Max	8.3	8.5	8.1	8.3	8.5	8.2	8.3	8.2	8.2	7.8	8.3	8.3	8.1	7.9	7.9	7.8	8.1	8.1	8.3	8.2	7.9	8.2	8.3	7.9	8.3	8.3	8.3	8.2	8.0	8.3	7.8	8.5	8.4	8.5
25 perc'	8.1	8.0	7.5	7.7	7.7	7.2	7.8	7.5	7.8	7.5	7.5	7.9	7.1	7.4	7.5	7.3	7.4	7.6	7.8	7.7	7.7	7.5	7.5	7.3	7.5	7.5	7.5	7.5	7.0	7.5	7.1	7.1	7.2	7.3
75 perc'	8.3	8.2	7.8	8.1	7.9	7.8	8.1	7.8	8.0	7.8	7.9	8.2	7.7	7.6	7.6	7.6	7.8	7.8	8.0	8.0	7.8	8.0	8.0	7.6	8.0	7.9	7.8	7.9	7.6	7.9	7.5	8.1	8.0	7.8

Figure No. 29: Trend of pH levels recorded at WQMS monitoring sea and creek water



	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
Min	80.0	80.0	80.0	110.	80.0	80.0	50.0	140.	8.0	80.0	80.0	110.	35.0	125.	110.	90.0	130.	130.	225.	350.	140.	350.	350.	550.	110.	110.	170.	225.	110.	250.	2.0	2.0	2.0	2.0
Mean	467.	172.	198.	540.	342.	134.	535.	632.	291.	247.	494.	729.	472.	338.	374.	414.	430.	391.	684.	830.	535.	1033	940.	1212	976.	856.	780.	1093	311.	827.	3.3	2.4	2.8	2.7
Max	1800	275.	350.	1800	1800	350.	900.	900.	550.	550.	1800	1600	1600	1600	900.	1600	1600	1800	1600	1800	1600	1600	1600	1800	1600	1600	1660	1600	1600	1800	4.0	4.0	4.0	4.0
25 perc'	250.	110.	130.	215.	110.	80.0	275.	250.	140.	110.	170.	275.	140.	132.	190.	140.	170.	130.	550.	550.	225.	900.	625.	812.	900.	600.	170.	725.	110.	550.	3.0	2.0	2.0	2.0
75 perc'	550.	225.	250.	637.	250.	140.	900.	900.	500.	331.	550.	900.	637.	211.	475.	475.	475.	350.	900.	900.	275.	1600	1250	1650	1425	900.	1600	1600	175.	900.	4.0	2.0	4.0	4.0

Figure No. 30: 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 2)

Month	2802		2801		2799		2807		2800		2798		2805		2797		1316		2795		2796		2806		2791		2794		2792		2793		2184		2185	
	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
Apr	47	NA	41	NA	NA	NA	NA	NA	NA	NA	NA	62	45	62	50	NA	50	NA	43	52	44	53	47	68	NA	NA	45	54	47	52	42	50	46	51	47	50
May	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	59	25	NA	NA
Jun	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	47	NA	NA	NA	51	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jul	NA	61	NA	64	NA	49	NA	49	NA	53	NA	49	NA	56	NA	57	NA	67	NA	61	NA	55	NA	50	NA	70	NA	57	NA	47	NA	30	NA	59	39	52
Aug	NA	69	NA	70	NA	70	NA	NA	NA	77	NA	67	NA	69	NA	33	NA	71	NA	74	NA	72	NA	54	NA	75	NA	72	NA	67	NA	63	73	45	NA	68
Sep	NA	49	NA	54	NA	53	NA	52	NA	67	NA	52	NA	48	NA	30	NA	58	NA	62	NA	69	NA	49	NA	82	NA	67	NA	65	NA	60	74	70	63	54
Oct	NA	57	NA	57	NA	58	NA	57	NA	62	NA	62	NA	55	NA	54	NA	58	NA	65	NA	52	NA	50	NA	77	NA	54	NA	67	NA	64	NA	53	NA	56
Nov	71	53	73	42	74	53	65	52	69	53	75	57	67	49	59	59	NA	63	68	64	69	64	65	53	NA	77	69	59	66	63	63	64	NA	59	63	54
Dec	72	54	68	59	70	67	71	54	38	51	64	58	67	51	72	51	NA	57	51	57	63	60	70	53	NA	46	46	59	NA	49	NA	55	72	53	NA	53
Jan	72	58	74	61	72	56	71	34	53	62	62	50	71	62	NA	54	72	55	50	51	NA	52	23	60	59	53	64	54	41	60	68	35	51	62	55	62
Feb	NA	63	NA	47	72	42	70	56	62	37	70	38	74	44	68	60	72	66	58	60	69	54	70	50	46	NA	50	56	52	48	45	51	44	NA	NA	53
Mar	NA	60	NA	72	72	48	NA	57	NA	71	NA	36	69	56	68	58	72	67	59	60	69	64	NA	69	25	48	60	68	61	36	57	59	63	55	65	67

Legend

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

Table No. 15: Surface water quality monitoring stations monitoring Sea and Creek water (1 of 2)

Station Code	Water body	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
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
2185	Vashi creek	Vashi Creek at Vashi bridge	Vashi	Thane	Thane

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

Mar	64	52	67	56	53	NA	64	50	64	51	NA	53	NA	62	67	54	66	57	65	49	64	NA	65	58	NA	89	83	85	81	86	86	88
Feb	46	62	54	62	24	65	67	66	66	52	NA	53	67	58	66	NA	67	50	67	58	29	52	66	63	NA	87	85	71	89	66	87	73
Jan	63	61	66	59	66	38	NA	61	70	59	NA	62	NA	51	66	59	63	68	71	44	NA	40	62	63	NA	86	83	76	84	68	85	72
Dec	58	49	61	46	NA	53	65	46	68	52	NA	NA	48	51	67	49	NA	51	62	47	NA	74	NA	50	NA	NA	85	87	86	83	88	87
Nov	NA	49	NA	47	NA	58	57	53	62	48	NA	NA	NA	45	66	51	NA	49	61	52	NA	56	NA	53	NA	NA	83	69	78	69	79	69
Oct	61	50	NA	45	NA	51	NA	52	68	51	NA	52	NA	51	NA	53	NA	54	67	54	NA	68	NA	51	NA	NA	NA	NA	NA	NA	NA	NA
Sep	64	45	NA	46	NA	55	NA	50	64	50	NA	NA	NA	51	NA	47	NA	47	NA	46	NA	67	NA	43	NA	NA	NA	90	NA	89	NA	92
Aug	NA	49	NA	50	56	54	NA	52	32	63	NA	NA	NA	59	NA	62	NA	57	59	56	NA	66	54	58	NA	NA	85	91	86	92	87	90
Jul	64	48	NA	48	NA	47	NA	53	NA	52	NA	NA	NA	54	64	54	NA	54	56	54	NA	59	NA	54	NA	NA	84	64	84	63	82	70
Jun	NA	40	NA	NA	NA	NA	NA	NA	55	NA	NA	NA	NA	NA	51	NA	NA	NA	55	NA	NA	NA	NA	NA	NA	NA	83	75	81	89	83	89
May	52	NA	NA	NA	NA	40	NA	NA	51	42	NA	NA	NA	NA	51	38	NA	NA	51	40	NA	NA	NA	42	NA	NA	86	80	86	NA	84	81
Apr	50	48	40	47	40	NA	46	NA	46	50	NA	NA	48	68	44	49	45	NA	49	54	NA	51	46	53	NA	NA	76	80	78	81	85	79
Month	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
	2169		2812		1318		2811		2167		2810		2809		2166		2808		2165		2803		1317		2804		2813		2814		2815	

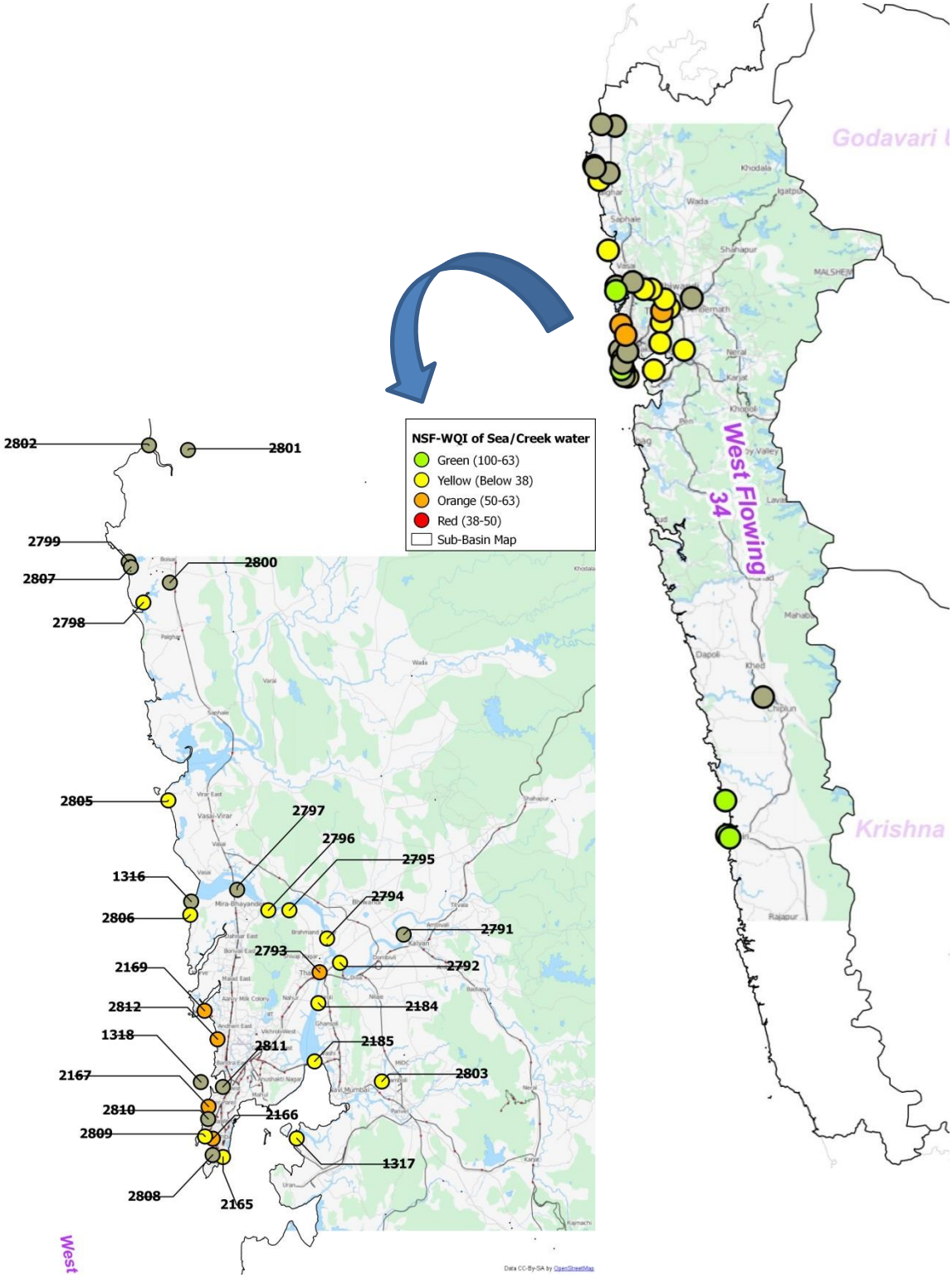
Legend

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

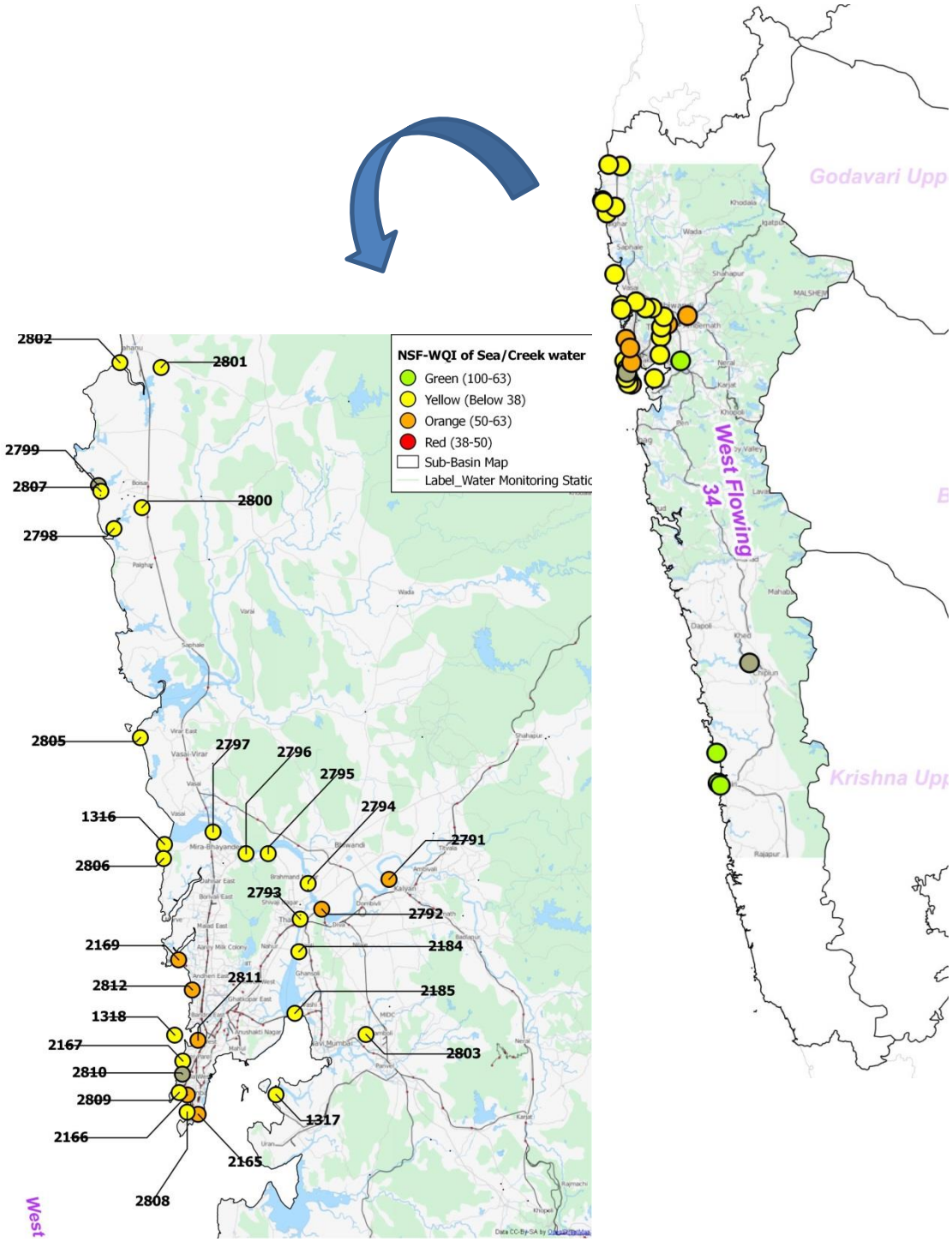
Table No. 16: Surface water quality monitoring stations monitoring Sea and Creek water (2 of 2)

Station Code	Water body	Name of the Station	Village	Taluka	District
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
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 2011)



Spatial map of WQI for Sea and Creek Water (December 2011)



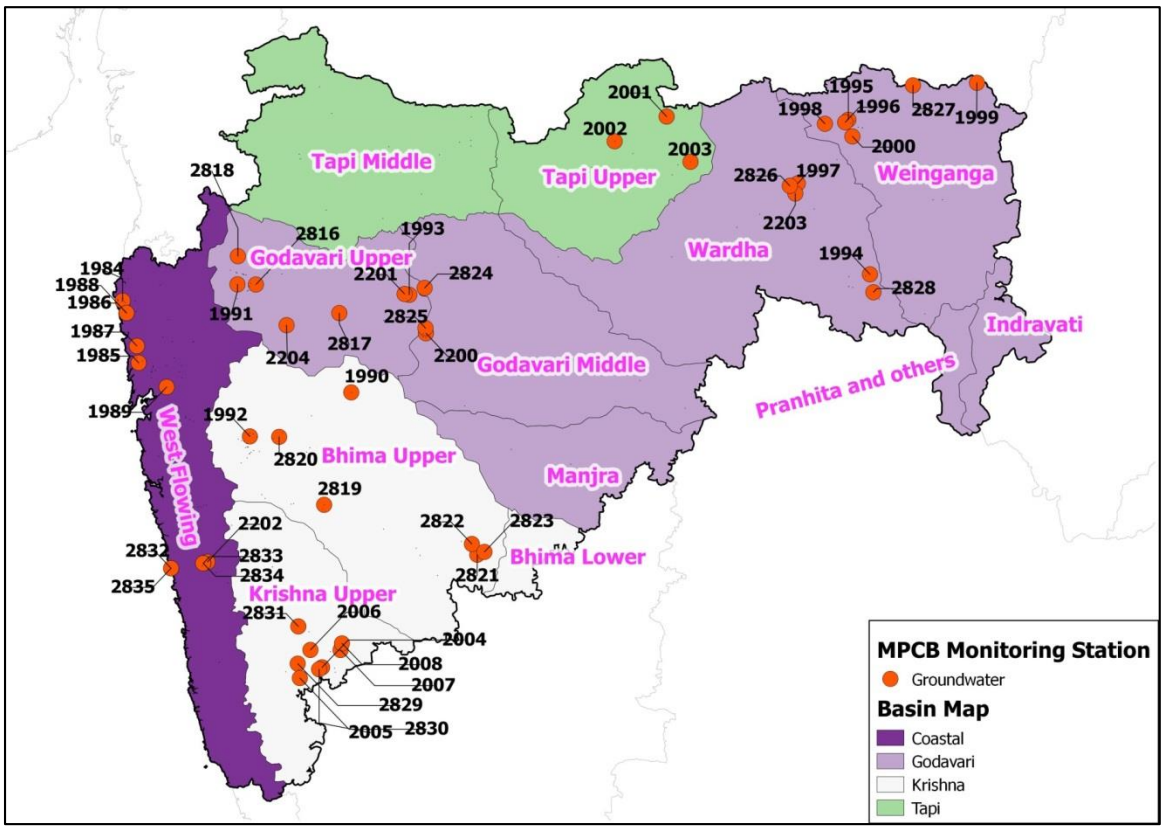
Groundwater Quality

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.

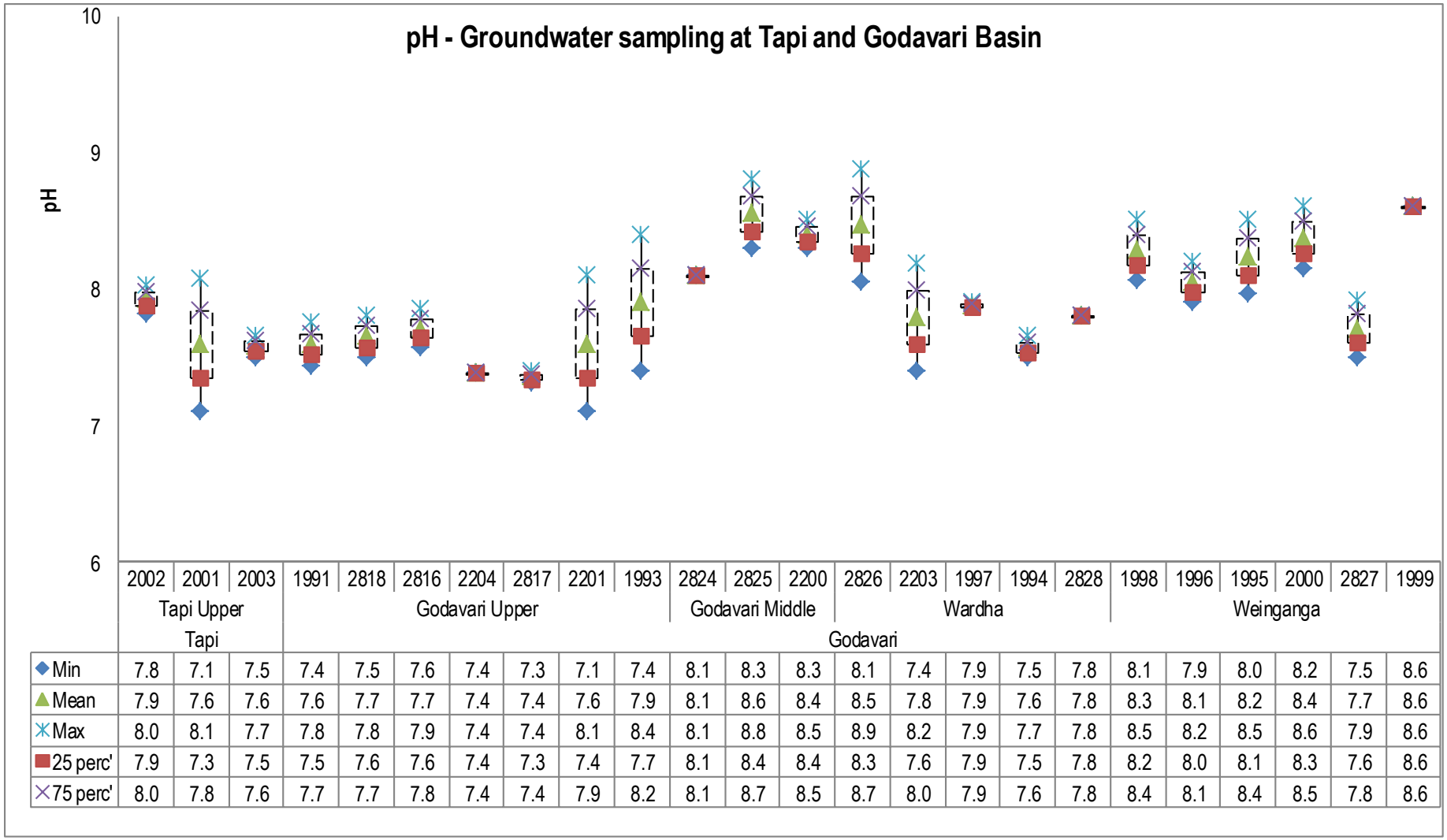
In Maharashtra CGWB (Central Ground Water Board), GSDA (Groundwater Survey and Development Agency) and MPCB, monitor the ground water quality across various districts of the state. MPCB has 50 ground water monitoring stations which monitor water quality twice a year for parameters like pH, Nitrate, TDS,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

The network of the monitoring stations is spatially presented in Map No. 6 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.



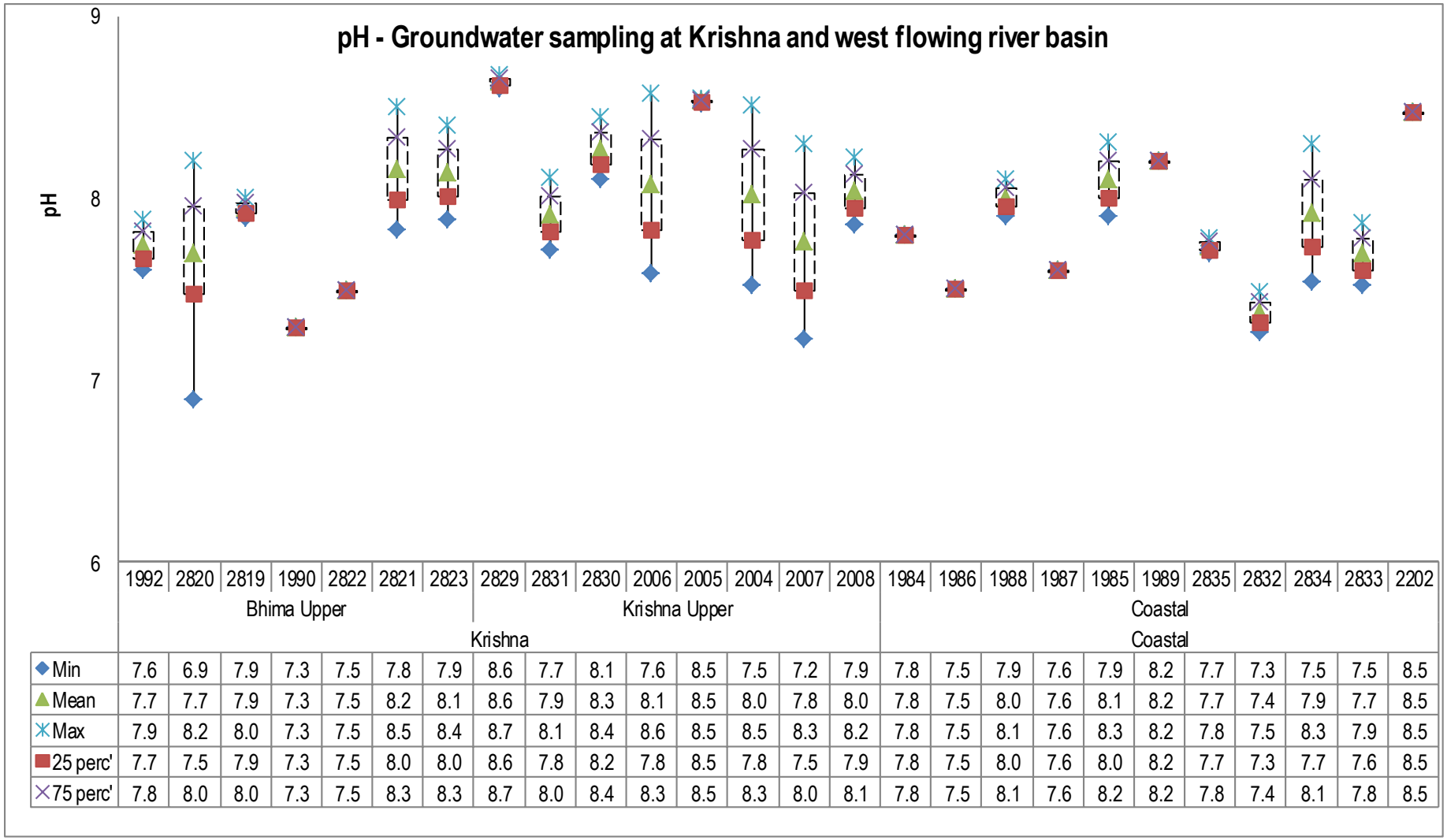
Map No. 6: Network of Groundwater quality monitoring stations monitored by MPCB in Maharashtra

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



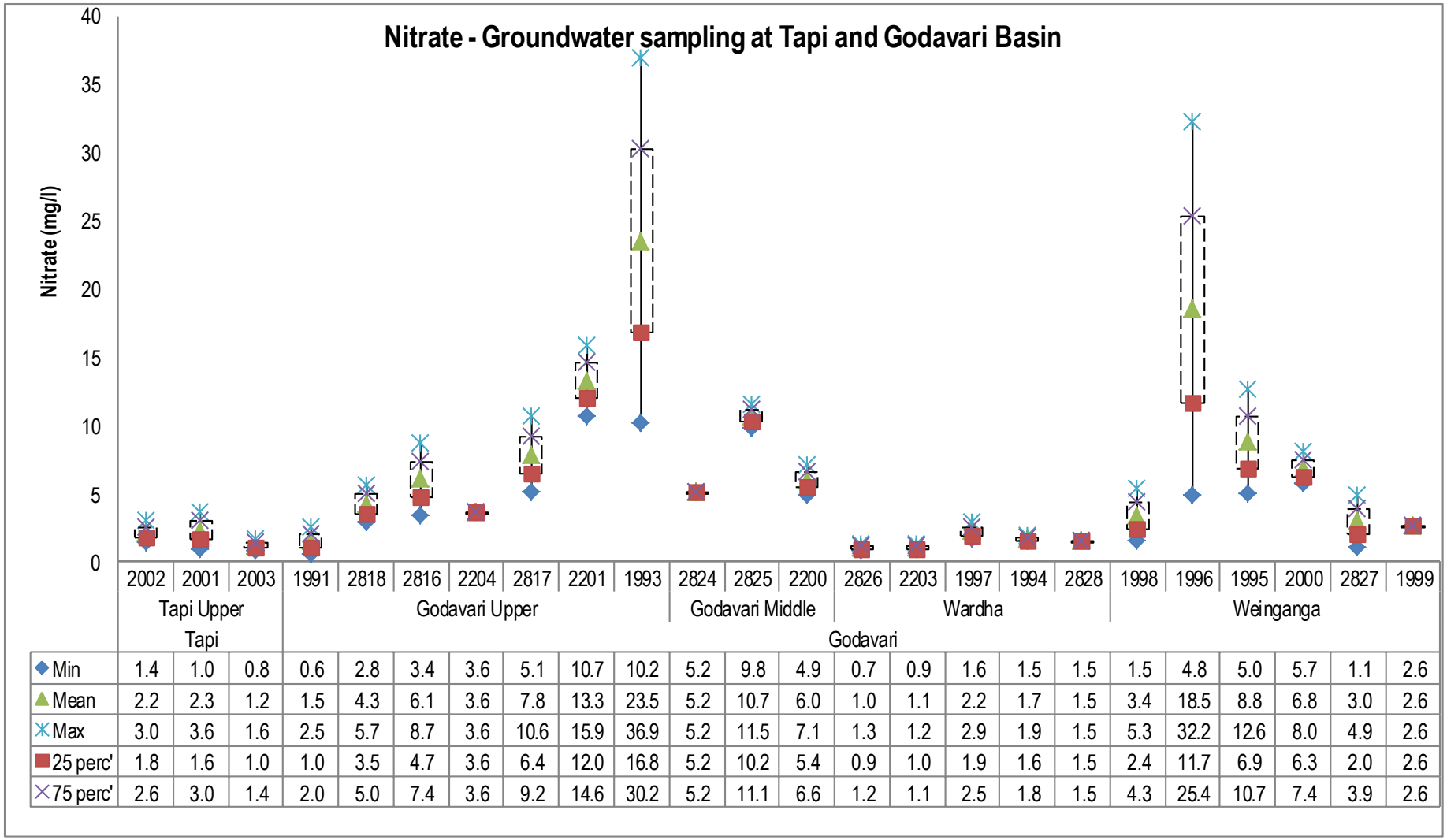
	2002	2001	2003	1991	2818	2816	2204	2817	2201	1993	2824	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper			Godavari Upper							Godavari Middle			Wardha					Weinganga					
	Tapi			Godavari																				
Min	7.8	7.1	7.5	7.4	7.5	7.6	7.4	7.3	7.1	7.4	8.1	8.3	8.3	8.1	7.4	7.9	7.5	7.8	8.1	7.9	8.0	8.2	7.5	8.6
Mean	7.9	7.6	7.6	7.6	7.7	7.7	7.4	7.4	7.6	7.9	8.1	8.6	8.4	8.5	7.8	7.9	7.6	7.8	8.3	8.1	8.2	8.4	7.7	8.6
Max	8.0	8.1	7.7	7.8	7.8	7.9	7.4	7.4	8.1	8.4	8.1	8.8	8.5	8.9	8.2	7.9	7.7	7.8	8.5	8.2	8.5	8.6	7.9	8.6
25 perc'	7.9	7.3	7.5	7.5	7.6	7.6	7.4	7.3	7.4	7.7	8.1	8.4	8.4	8.3	7.6	7.9	7.5	7.8	8.2	8.0	8.1	8.3	7.6	8.6
75 perc'	8.0	7.8	7.6	7.7	7.7	7.8	7.4	7.4	7.9	8.2	8.1	8.7	8.5	8.7	8.0	7.9	7.6	7.8	8.4	8.1	8.4	8.5	7.8	8.6

Figure No. 31: Parametric values of pH recorded at WQMS monitoring groundwater in Godavari and Tapi basin



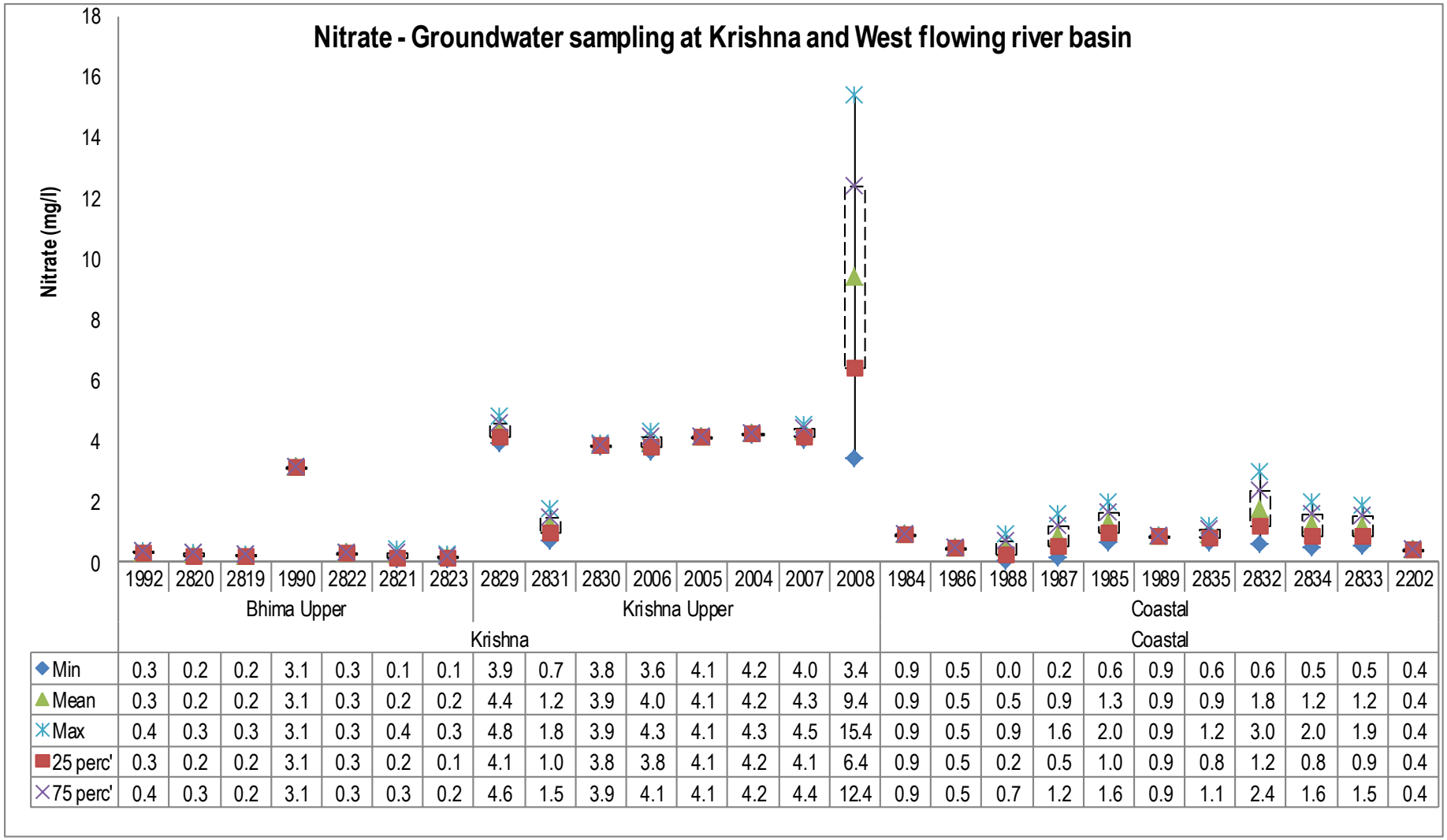
	1992	2820	2819	1990	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1984	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper							Krishna Upper								Coastal										
	Krishna															Coastal										
Min	7.6	6.9	7.9	7.3	7.5	7.8	7.9	8.6	7.7	8.1	7.6	8.5	7.5	7.2	7.9	7.8	7.5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

Figure No. 32: Parametric values of pH recorded at WQMS monitoring groundwater in Krishna and west flowing river basin



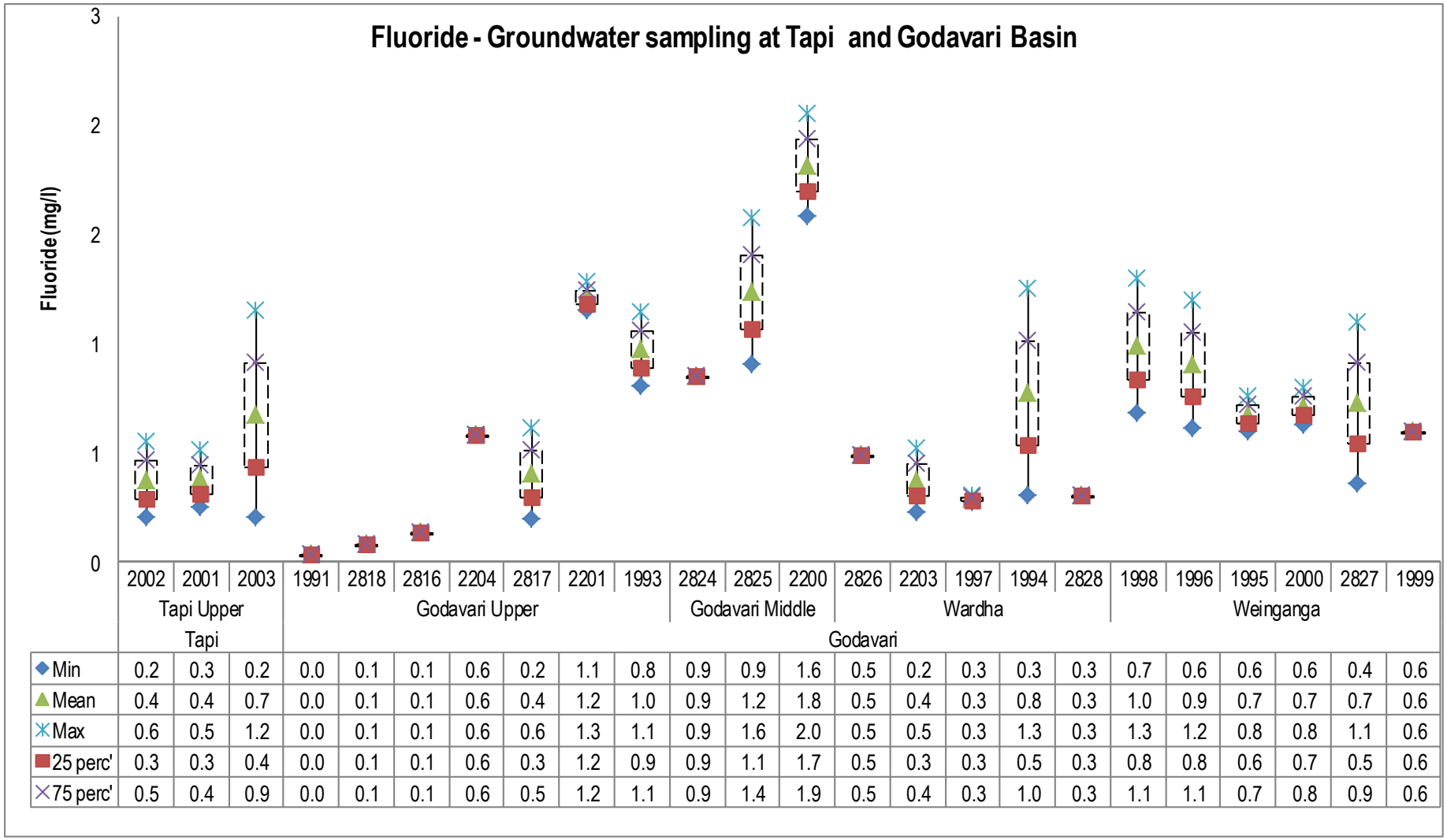
	2002	2001	2003	1991	2818	2816	2204	2817	2201	1993	2824	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper			Godavari Upper							Godavari Middle			Wardha					Weinganga					
	Tapi			Godavari																				
Min	1.4	1.0	0.8	0.6	2.8	3.4	3.6	5.1	10.7	10.2	5.2	9.8	4.9	0.7	0.9	1.6	1.5	1.5	1.5	4.8	5.0	5.7	1.1	2.6
Mean	2.2	2.3	1.2	1.5	4.3	6.1	3.6	7.8	13.3	23.5	5.2	10.7	6.0	1.0	1.1	2.2	1.7	1.5	3.4	18.5	8.8	6.8	3.0	2.6
Max	3.0	3.6	1.6	2.5	5.7	8.7	3.6	10.6	15.9	36.9	5.2	11.5	7.1	1.3	1.2	2.9	1.9	1.5	5.3	32.2	12.6	8.0	4.9	2.6
25 perc'	1.8	1.6	1.0	1.0	3.5	4.7	3.6	6.4	12.0	16.8	5.2	10.2	5.4	0.9	1.0	1.9	1.6	1.5	2.4	11.7	6.9	6.3	2.0	2.6
75 perc'	2.6	3.0	1.4	2.0	5.0	7.4	3.6	9.2	14.6	30.2	5.2	11.1	6.6	1.2	1.1	2.5	1.8	1.5	4.3	25.4	10.7	7.4	3.9	2.6

Figure No. 33: Parametric values of Nitrate recorded at WQMS monitoring groundwater in Godavari and Tapi basin



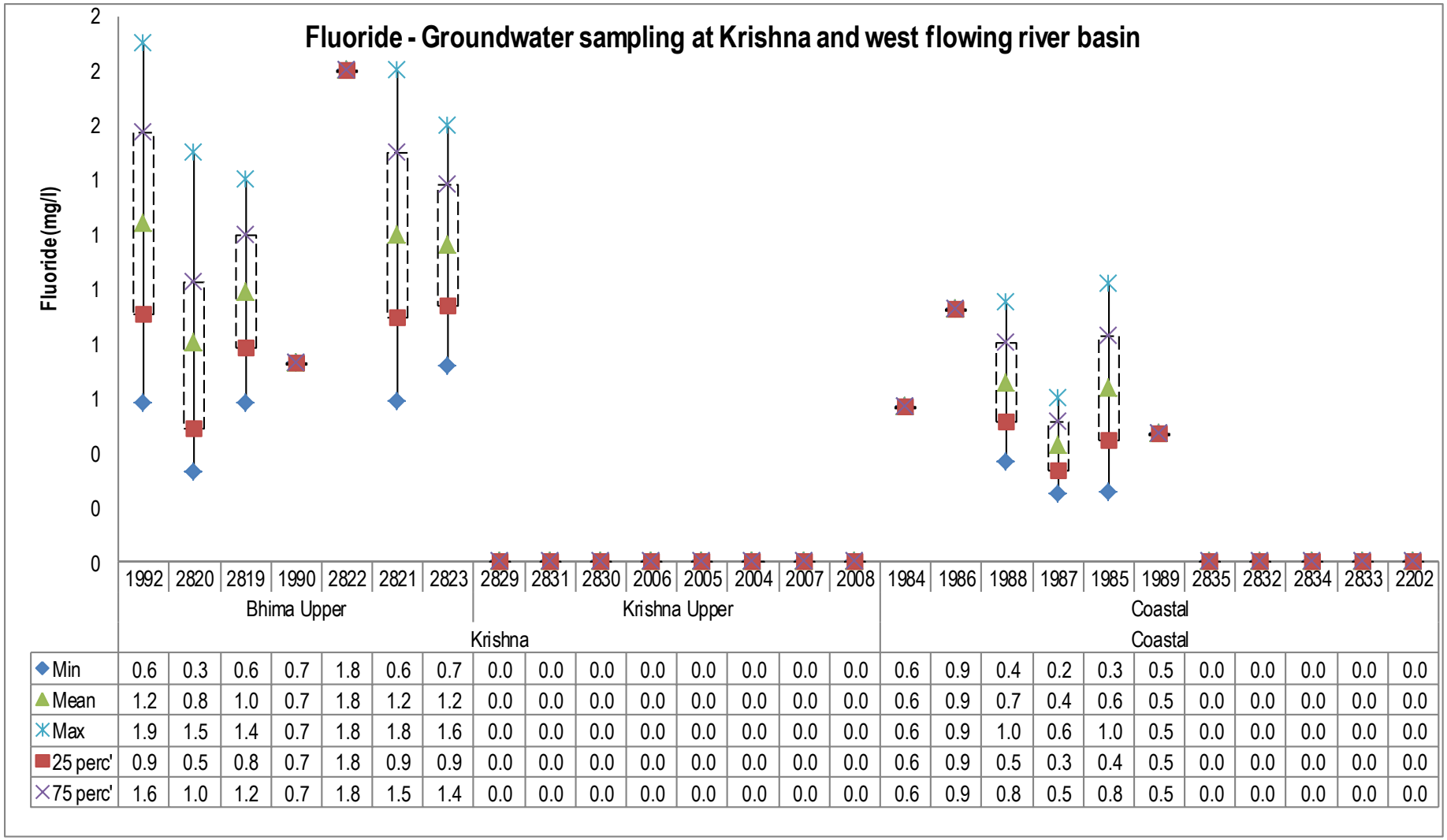
	1992	2820	2819	1990	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1984	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper							Krishna Upper								Coastal										
	Krishna															Coastal										
Min	0.3	0.2	0.2	3.1	0.3	0.1	0.1	3.9	0.7	3.8	3.6	4.1	4.2	4.0	3.4	0.9	0.5	0.0	0.2	0.6	0.9	0.6	0.6	0.5	0.5	0.4
Mean	0.3	0.2	0.2	3.1	0.3	0.2	0.2	4.4	1.2	3.9	4.0	4.1	4.2	4.3	9.4	0.9	0.5	0.5	0.9	1.3	0.9	0.9	1.8	1.2	1.2	0.4
Max	0.4	0.3	0.3	3.1	0.3	0.4	0.3	4.8	1.8	3.9	4.3	4.1	4.3	4.5	15.4	0.9	0.5	0.9	1.6	2.0	0.9	1.2	3.0	2.0	1.9	0.4
25 perc'	0.3	0.2	0.2	3.1	0.3	0.2	0.1	4.1	1.0	3.8	3.8	4.1	4.2	4.1	6.4	0.9	0.5	0.2	0.5	1.0	0.9	0.8	1.2	0.8	0.9	0.4
75 perc'	0.4	0.3	0.2	3.1	0.3	0.3	0.2	4.6	1.5	3.9	4.1	4.1	4.2	4.4	12.4	0.9	0.5	0.7	1.2	1.6	0.9	1.1	2.4	1.6	1.5	0.4

Figure No. 34: Parametric values of Nitrate recorded at WQMS monitoring groundwater in Krishna and west flowing river basin



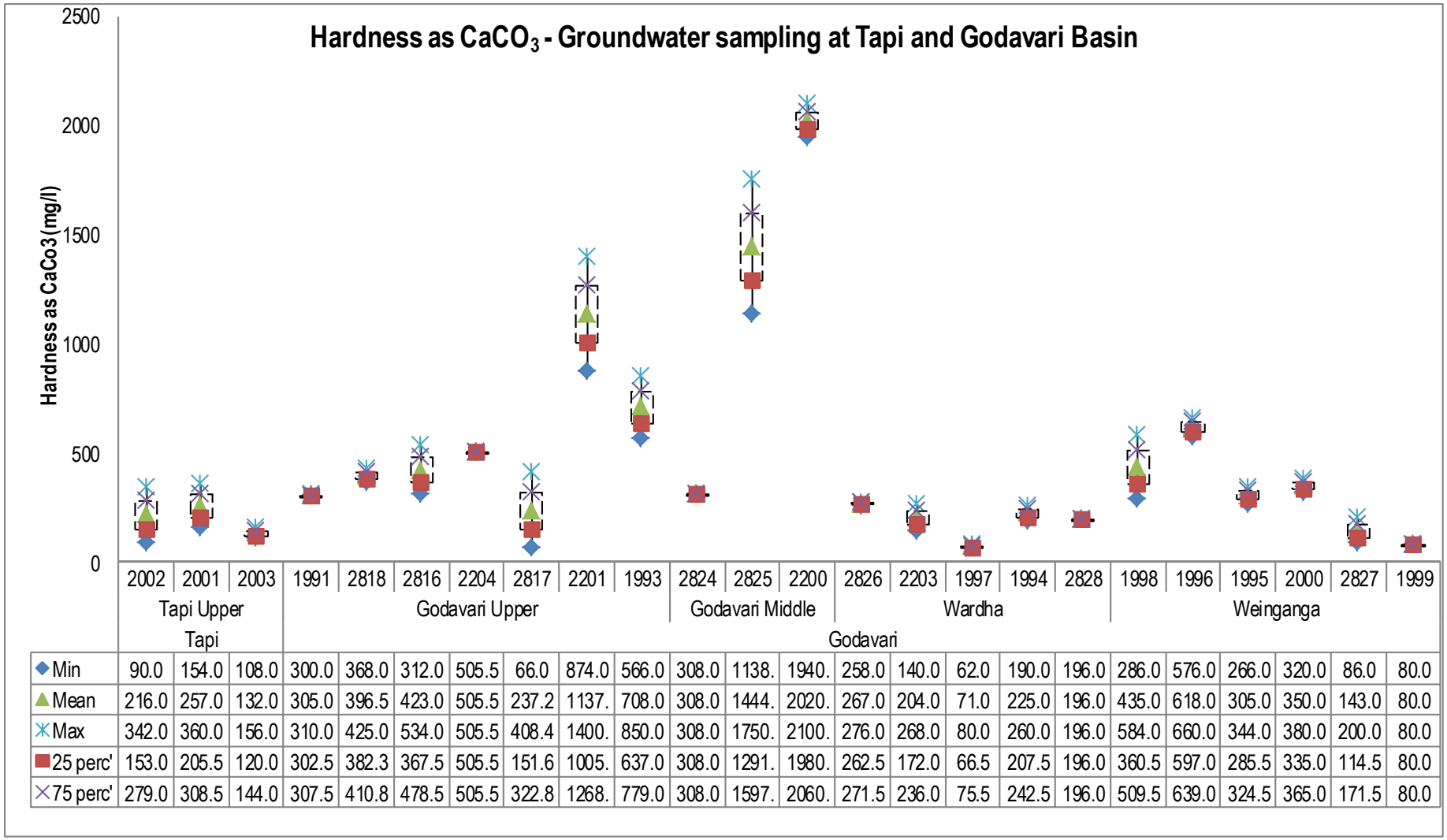
	2002	2001	2003	1991	2818	2816	2204	2817	2201	1993	2824	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper			Godavari Upper							Godavari Middle			Wardha					Weinganga					
	Tapi			Godavari																				
Min	0.2	0.3	0.2	0.0	0.1	0.1	0.6	0.2	1.1	0.8	0.9	0.9	1.6	0.5	0.2	0.3	0.3	0.3	0.7	0.6	0.6	0.6	0.4	0.6
Mean	0.4	0.4	0.7	0.0	0.1	0.1	0.6	0.4	1.2	1.0	0.9	1.2	1.8	0.5	0.4	0.3	0.8	0.3	1.0	0.9	0.7	0.7	0.7	0.6
Max	0.6	0.5	1.2	0.0	0.1	0.1	0.6	0.6	1.3	1.1	0.9	1.6	2.0	0.5	0.5	0.3	1.3	0.3	1.3	1.2	0.8	0.8	1.1	0.6
25 perc'	0.3	0.3	0.4	0.0	0.1	0.1	0.6	0.3	1.2	0.9	0.9	1.1	1.7	0.5	0.3	0.3	0.5	0.3	0.8	0.8	0.6	0.7	0.5	0.6
75 perc'	0.5	0.4	0.9	0.0	0.1	0.1	0.6	0.5	1.2	1.1	0.9	1.4	1.9	0.5	0.4	0.3	1.0	0.3	1.1	1.1	0.7	0.8	0.9	0.6

Figure No. 35: Parametric values of Fluoride recorded at WQMS monitoring groundwater in Godavari and Tapi basin



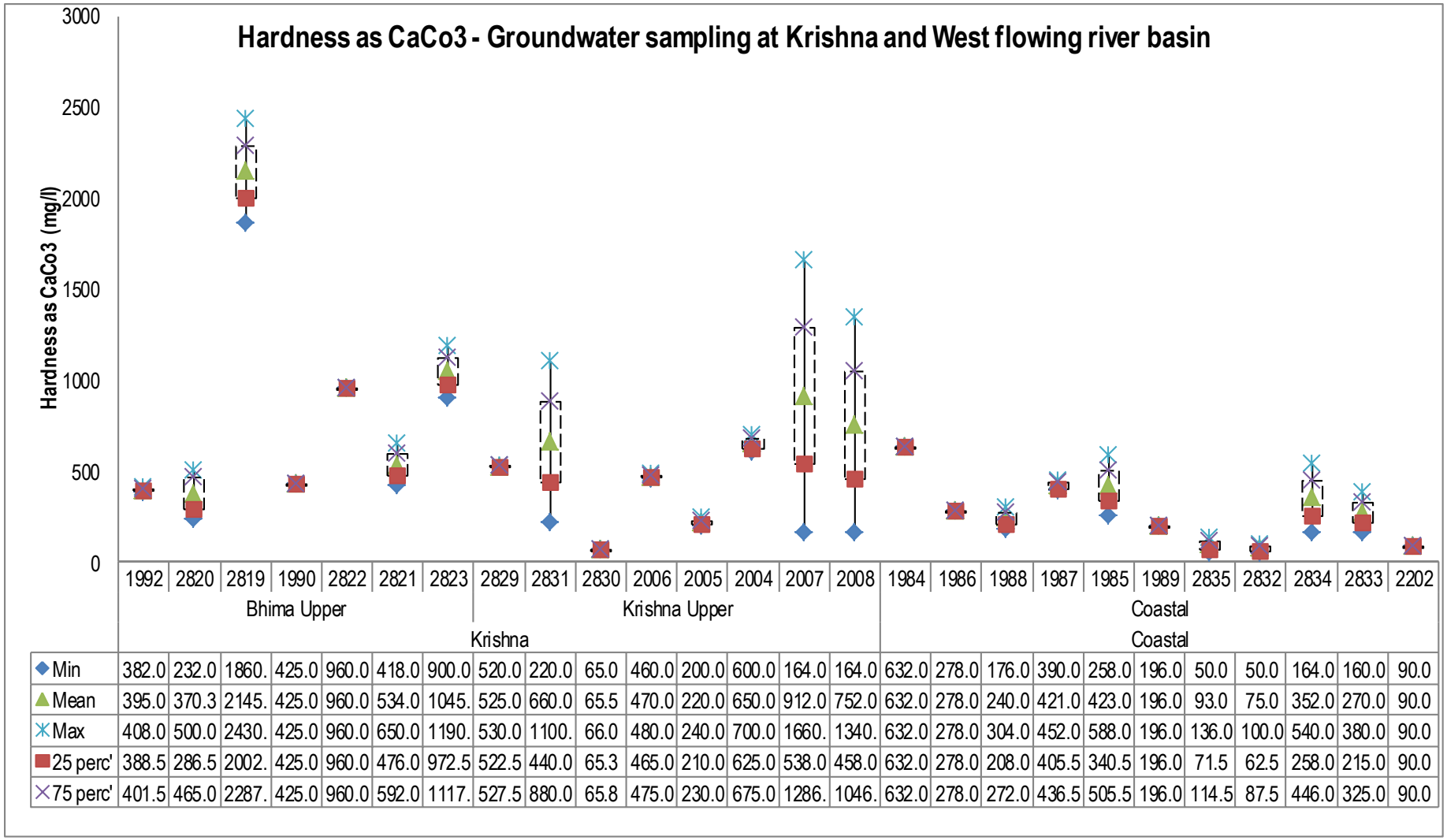
	1992	2820	2819	1990	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1984	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper							Krishna Upper								Coastal										
	Krishna															Coastal										
Min	0.6	0.3	0.6	0.7	1.8	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.4	0.2	0.3	0.5	0.0	0.0	0.0	0.0	0.0
Mean	1.2	0.8	1.0	0.7	1.8	1.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.7	0.4	0.6	0.5	0.0	0.0	0.0	0.0	0.0
Max	1.9	1.5	1.4	0.7	1.8	1.8	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	1.0	0.6	1.0	0.5	0.0	0.0	0.0	0.0	0.0
25 perc'	0.9	0.5	0.8	0.7	1.8	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.5	0.3	0.4	0.5	0.0	0.0	0.0	0.0	0.0
75 perc'	1.6	1.0	1.2	0.7	1.8	1.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.8	0.5	0.8	0.5	0.0	0.0	0.0	0.0	0.0

Figure No. 36: Parametric values of Fluoride recorded at WQMS monitoring groundwater in Krishna and west flowing basin



	2002	2001	2003	1991	2818	2816	2204	2817	2201	1993	2824	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper			Godavari Upper							Godavari Middle			Wardha					Weinganga					
	Tapi			Godavari																				
Min	90.0	154.0	108.0	300.0	368.0	312.0	505.5	66.0	874.0	566.0	308.0	1138.	1940.	258.0	140.0	62.0	190.0	196.0	286.0	576.0	266.0	320.0	86.0	80.0
Mean	216.0	257.0	132.0	305.0	396.5	423.0	505.5	237.2	1137.	708.0	308.0	1444.	2020.	267.0	204.0	71.0	225.0	196.0	435.0	618.0	305.0	350.0	143.0	80.0
Max	342.0	360.0	156.0	310.0	425.0	534.0	505.5	408.4	1400.	850.0	308.0	1750.	2100.	276.0	268.0	80.0	260.0	196.0	584.0	660.0	344.0	380.0	200.0	80.0
25 perc'	153.0	205.5	120.0	302.5	382.3	367.5	505.5	151.6	1005.	637.0	308.0	1291.	1980.	262.5	172.0	66.5	207.5	196.0	360.5	597.0	285.5	335.0	114.5	80.0
75 perc'	279.0	308.5	144.0	307.5	410.8	478.5	505.5	322.8	1268.	779.0	308.0	1597.	2060.	271.5	236.0	75.5	242.5	196.0	509.5	639.0	324.5	365.0	171.5	80.0

Figure No. 37: Parametric values of Hardness at $CaCO_3$ recorded at WQMS monitoring groundwater in Godavari and Tapi basin



	1992	2820	2819	1990	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1984	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper							Krishna Upper								Coastal										
	Krishna															Coastal										
Min	382.0	232.0	1860.	425.0	960.0	418.0	900.0	520.0	220.0	65.0	460.0	200.0	600.0	164.0	164.0	632.0	278.0	176.0	390.0	258.0	196.0	50.0	50.0	164.0	160.0	90.0
Mean	395.0	370.3	2145.	425.0	960.0	534.0	1045.	525.0	660.0	65.5	470.0	220.0	650.0	912.0	752.0	632.0	278.0	240.0	421.0	423.0	196.0	93.0	75.0	352.0	270.0	90.0
Max	408.0	500.0	2430.	425.0	960.0	650.0	1190.	530.0	1100.	66.0	480.0	240.0	700.0	1660.	1340.	632.0	278.0	304.0	452.0	588.0	196.0	136.0	100.0	540.0	380.0	90.0
25 perc'	388.5	286.5	2002.	425.0	960.0	476.0	972.5	522.5	440.0	65.3	465.0	210.0	625.0	538.0	458.0	632.0	278.0	208.0	405.5	340.5	196.0	71.5	62.5	258.0	215.0	90.0
75 perc'	401.5	465.0	2287.	425.0	960.0	592.0	1117.	527.5	880.0	65.8	475.0	230.0	675.0	1286.	1046.	632.0	278.0	272.0	436.5	505.5	196.0	114.5	87.5	446.0	325.0	90.0

Figure No. 38: 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 and Godavari basin

Mar	NA	NA	NA	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	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	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	NA	NA	NA
Nov	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oct	69	38	68	62	71	79	79	63	435	233	NA	573	609	NA	49	67	91	NA	66	129	72	78	33	NA
Sep	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aug	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jul	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jun	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
May	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Apr	80	86	38	46	65	59	NA	69	265	199	119	246	740	69	NA	89	55	58	140	110	105	109	56	58
	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12
	2002	2001	2003	1991	2818	2816	2204	2817	2201	1993	2824	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper			Godavari Upper							Godavari Middle			Wardha					Weinganga					

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 17: Ground water quality monitoring stations in Tapi and Godavari basin

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
2825	Bore well at Wahegaon, near Zilla Parishet School.	Wahegaon	Paithan	Aurangabad
2200	Bore well at Katpur, near Z.PSchool.	Katpur	Paithan	Aurangabad
1991	Bore well at MSW Site, Pathardi	Pathardi	Nashik	Nashik
2818	Bore well at M/s Spectron Ethers, Rasegaon near Siddeshwar Mahadev Mandir.	Rasegaon	Dindori	Nashik
2816	Dug well of Mr. Sampat Walunj, near M/s Mahajeet Clayton.	Shinde village	Nashik	Nashik
2204	Dug well at Gunjalwadi, Sangamner near Primary Health Care Center.	Gunjalwadi	Sangamner	Ahmadnagar
2817	Bore well at Chitali near Wagh vasthi.	Chitali	Rahata	Ahmadnagar
2201	Dug well at Ranjangaon.	Ranjangaon	Gangapur	Aurangabad
1993	Dug well at Pandarpur	Pandharpur	Gangapur	Aurangabad
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
1997	Bore well near Primary Health Centre.	Raipur	Hingna	Nagpur
1994	Dug well at TPS-Durgapur	Durgapur	Chandrapur	Chandrapur
2828	Dug well near Jilla Parishet Primary school, Visapur.	Visapur	Ballarpur	Chandrapur
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
1995	Gram Panchayath Dug well , Near Balaji Gajbhiye CHouse,	Khaperkheda	Saoner	Nagpur
2000	Dug well near Sarode Kirana Store.	Bhandewadi	Nagpur	Nagpur
2827	Bore well Near Railway crossing at Dongri Buzurg.	Dongri-Buzurg	Tumsar	Bandara
1999	Bore well Near Gram Panchayat office.	Changera	Gondia	Gondia

Water Quality Index for ground water in Krishna and west flowing river basin

Mar	NA	72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Feb	NA	149	NA	NA	NA	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	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	NA	NA	NA	NA	NA
Nov	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oct	109	171	855	75	222	155	285	83	117	102	117	91	85	116	142	165	72	81	81	88	67	23	22	27	25	29
Sep	NA	115	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aug	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jul	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jun	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
May	NA	72	NA	NA	NA	185	254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Apr	69	50	250	NA	NA	NA	NA	69	207	109	111	78	92	332	224	NA	NA	84	108	222	NA	11	9	46	124	NA
	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12
	1992	2820	2819	1990	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1984	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper							Krishna Upper								Coastal										

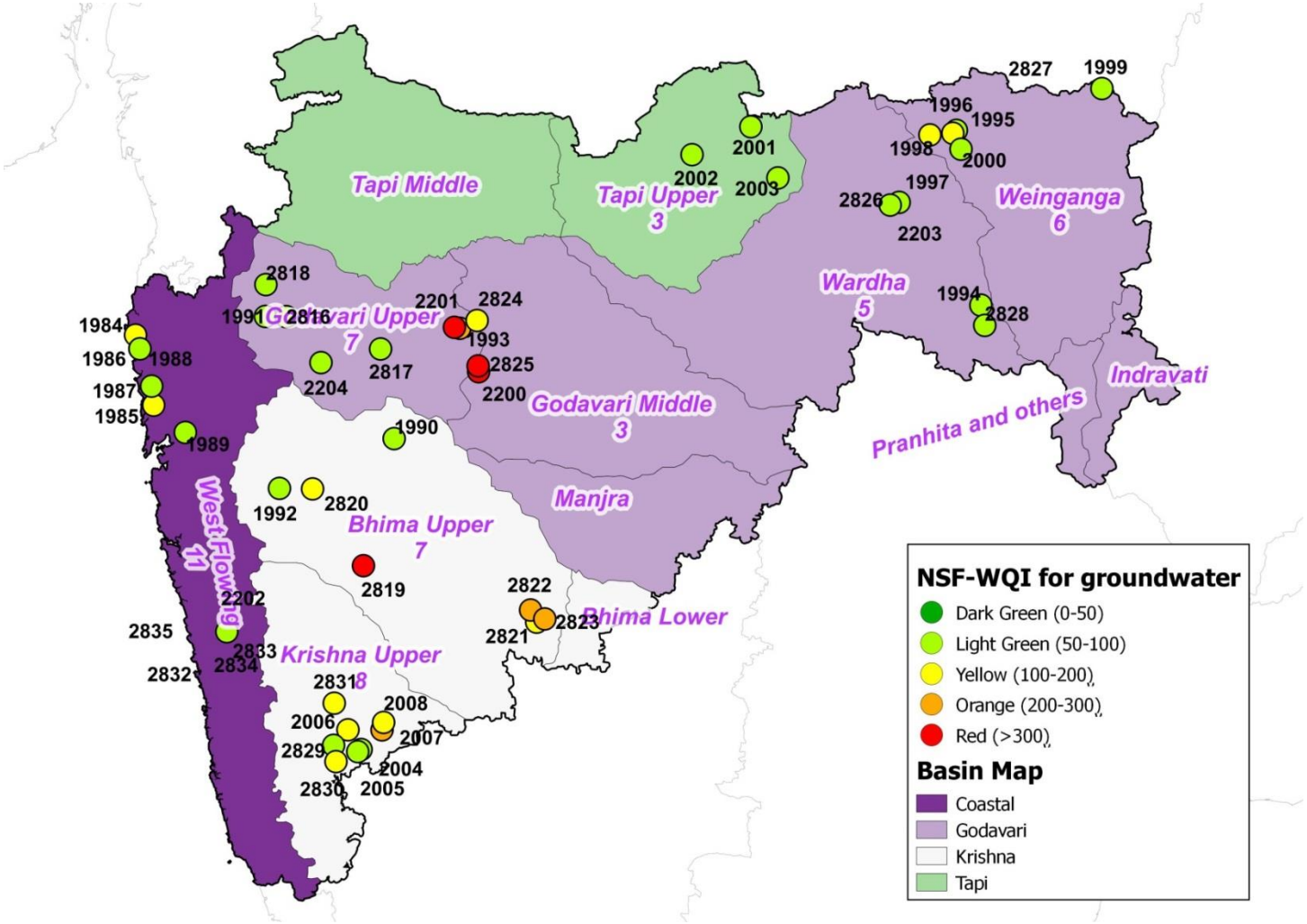
Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	No Data

Table No. 18: Ground water quality monitoring stations in Krishna and West Flowing river basin

Station ID	Location of the Station	Village	Taluka	District
1992	Dug well at MSW Site, Pimpri-Chinchwad.	Moshi	Haveli	Pune
2820	Dug well owned by Shri Shivaji Baban Darekar	Sanaswadi	Shirur	Pune
2819	Dug well owned by Shri Deshmukh.	Malegaon	Baramati	Pune
1990	Bore well at BMW Site , Burudgaon	Burudgaon	Ahmednagar	Ahmadnagar
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
2829	Bore well at MIDC Shiroli nearM/s Pratibha Enterprises.	Shiroli	Hatkanangale	Kolhapur
2831	Dug well at Sakharali, near MIDC Islampur near Krishna Milk Industry.	Sakharali	Walwa	Sangli
2830	Bore well at MIDC Gokul-Shirgaon.	Gokul-Shirgaon	Karvir	Kolhapur
2006	Bore well at MIDC, Shiroli.	Shinoli	Chandgad	Kolhapur
2005	Bore well at Khanjirenagar.	Khanjirenagar	Hatkanangale	Kolhapur
2004	Bore well at Parvati Industrial Estate.	Yadrav	Shirol	Kolhapur
2007	Bore well at Savali, near Gram Panchayat office.	Savali	Miraj	Sangli
2008	Dug well at Rusulwadi-Sambarwadi.	Sambarwadi	Miraj	Sangli
1984	Bore well at M/s Tata Iron &Steel Co.Ltd, S-76, (Indl.Estate,Tarapur)	MIDC Tarapur,	Palghar	Thane
1986	Bore well at Motapada	Motapada	Dahanu	Thane
1988	Bore well at Gharatwadi	Aliyali	Palghar	Thane
1987	Bore well at Vasai	Gokhiware	Vasai	Thane
1985	Dug well at 5 -Star Industrial estate	Kashimira	Mira-Bhayander	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
2834	Dug well No.2 at Arketwadi.	Arketwadi	Khed	Ratnagiri
2833	Dug well No.-1 at Group Gram Panchayat at Arketwadi, near Masjid	Arketwadi	Khed	Ratnagiri
2202	Dug well at Ghane Kunt, near Awashi, owned by Shri.Rajendra Amre.	Ghane Kunt	Khed	Ratnagiri

Spatial map for Ground WQI in Maharashtra



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 water bodies. 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 2011-12

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

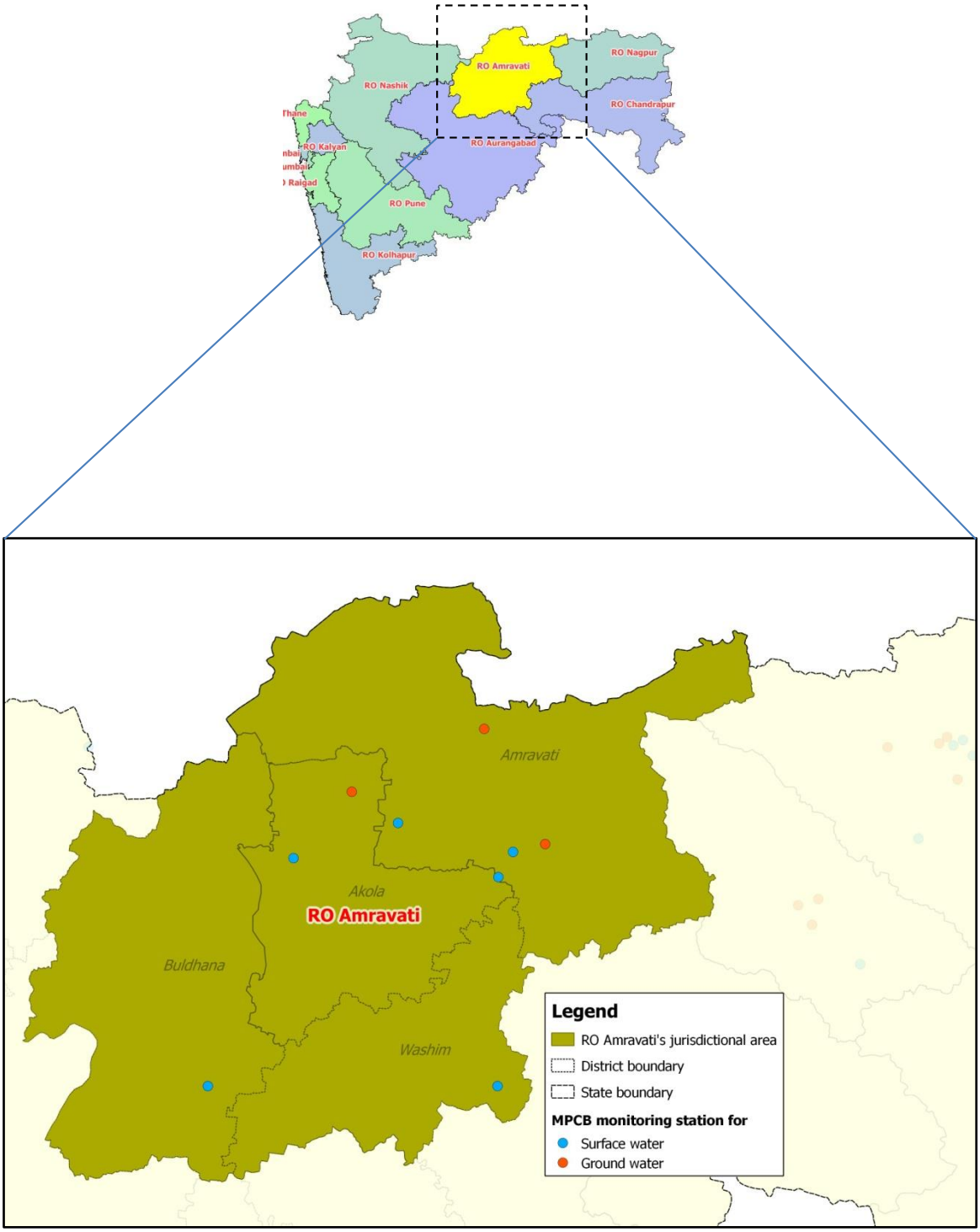

RO Amravati
RO Nagpur
RO Nashik
RO Chandrapur
RO Kalyan
RO Aurangabad
RO Pune
RO Kolhapur
Amravati
Akola
RO Amravati
Buldhana
Washim
Legend
RO Amravati's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No 1: Surface water quality index for April and December month at Amravati-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2699	Penganga River at Mehkar-Buldana Road Bridge	61	73
	2675	Morna River at D/s. of Railway Bridge	NA	65
	2697	Penganga River near water supply scheme of Umarkhed M.C	56	79
	2698	Penganga River D/s of Isapur Dam	76	79
	2695	Pedhi River near Road Bridge at Dadhi-Pedhi village	54	77
	2155	Purna River at D/s of confluence of Morna Purna at Andhura village	66	68
	2700	Purna River near Achalpur-Amravati Road Bridge, Asegaon	NA	NA
	1913	Purna River at Dhupeshwar at U/s of Malkapur Water works.	71	77

Table No 2: Groundwater quality index for April and October at Amravati-RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	2003	Dug well at Plot No- 4, Street No. 49-C, at Nehru Bal Udyan Azad Maidan, owned by Yavatmal M.C.	38	68
	2002	Bore well Opp. Gajanan Maharaj Temple at Anjangaon road.	80	69
	2001	Tube well at water treatment plant of M.C.Achalpur near Post Office.	86	38

Ro – Aurangabad

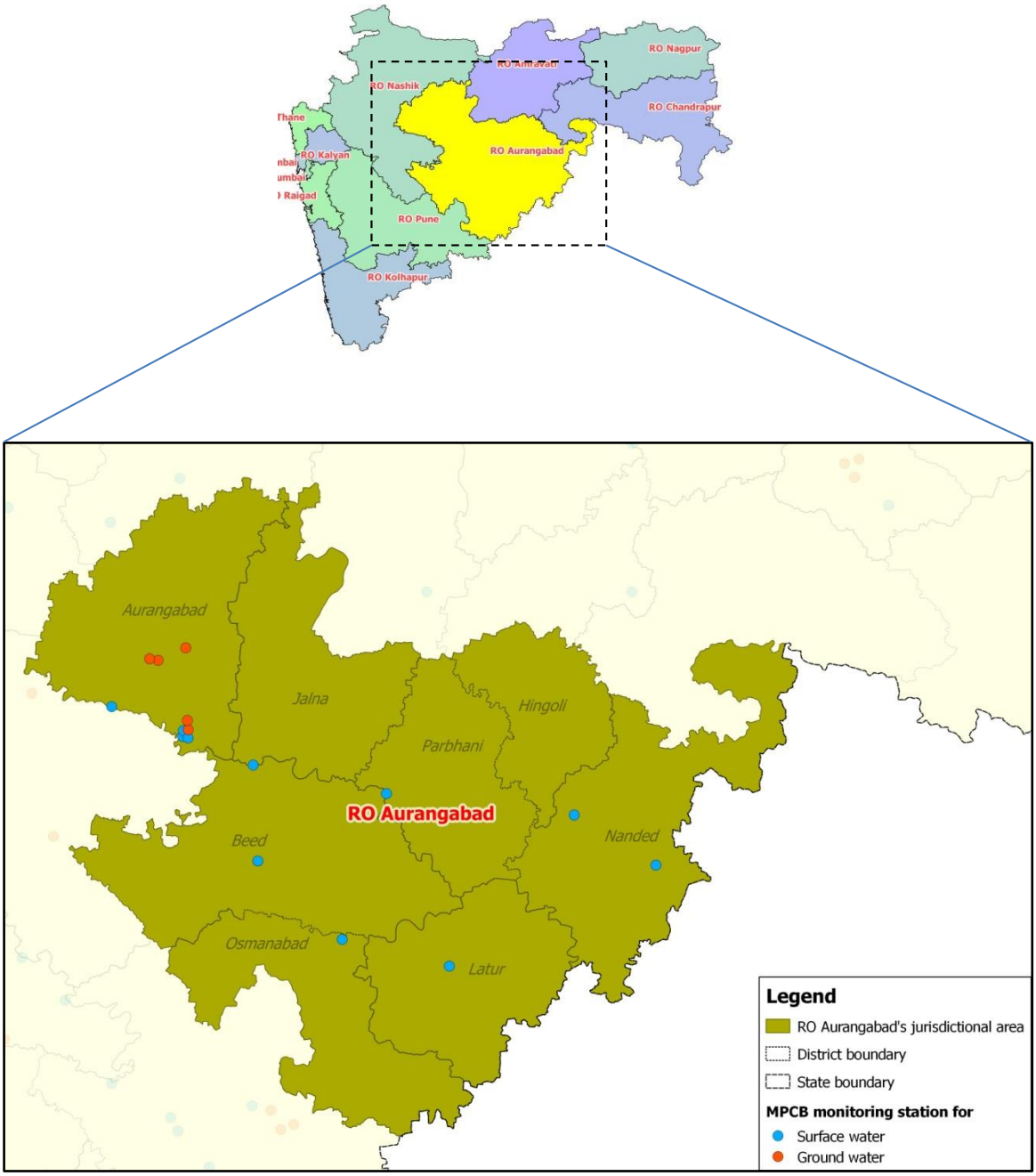


Table No 3: Surface water quality index for April and December month at Aurangabad-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2673	Manjra River at D/s of Latur, near Latur-Nanded Bridge	80	85
	2157	Godavari River at Latur Water intake near pump house	81	84
	1209	Godavari River at Raher	62	83
	2657	Bindusara River at Beed, near Intake water pump house at Dam	81	83
	1210	Godavari River at Intake of pump house	69	85
	12	Godavari River at Dhalegaon	76	81
	2161	Godavari River at Jalna Intake water pump house Shahagad	75	83
	2159	Godavari River at D/s of Paithan at Pathegaon bridge	79	66
	1312	Godavari river at Jaikwadi Dam, Paithan.	81	81
	2158	Godavari River at Paithan U/s of Paithan Intake pump house	85	82
	2160	Godavari River at U/s of Aurangabad Reservoir Kaigaon Tokka near, Kaigaon Bridge	60	82

Table No 4: Groundwater quality index for April and October month at Aurangabad-RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	2200	Bore Well at Katpur, Near Z.P.School	740	609
	2825	Bore Well at Wahegaon, near Zilla Parishet School	246	573
	1993	Dug well at Pandarpur, Gangapur, Aurangabad	199	233
	2201	Dug Well at Ranjangaon	265	435
	2824	Dug Well at Naregaon	119	NA

RO – Chandrapur

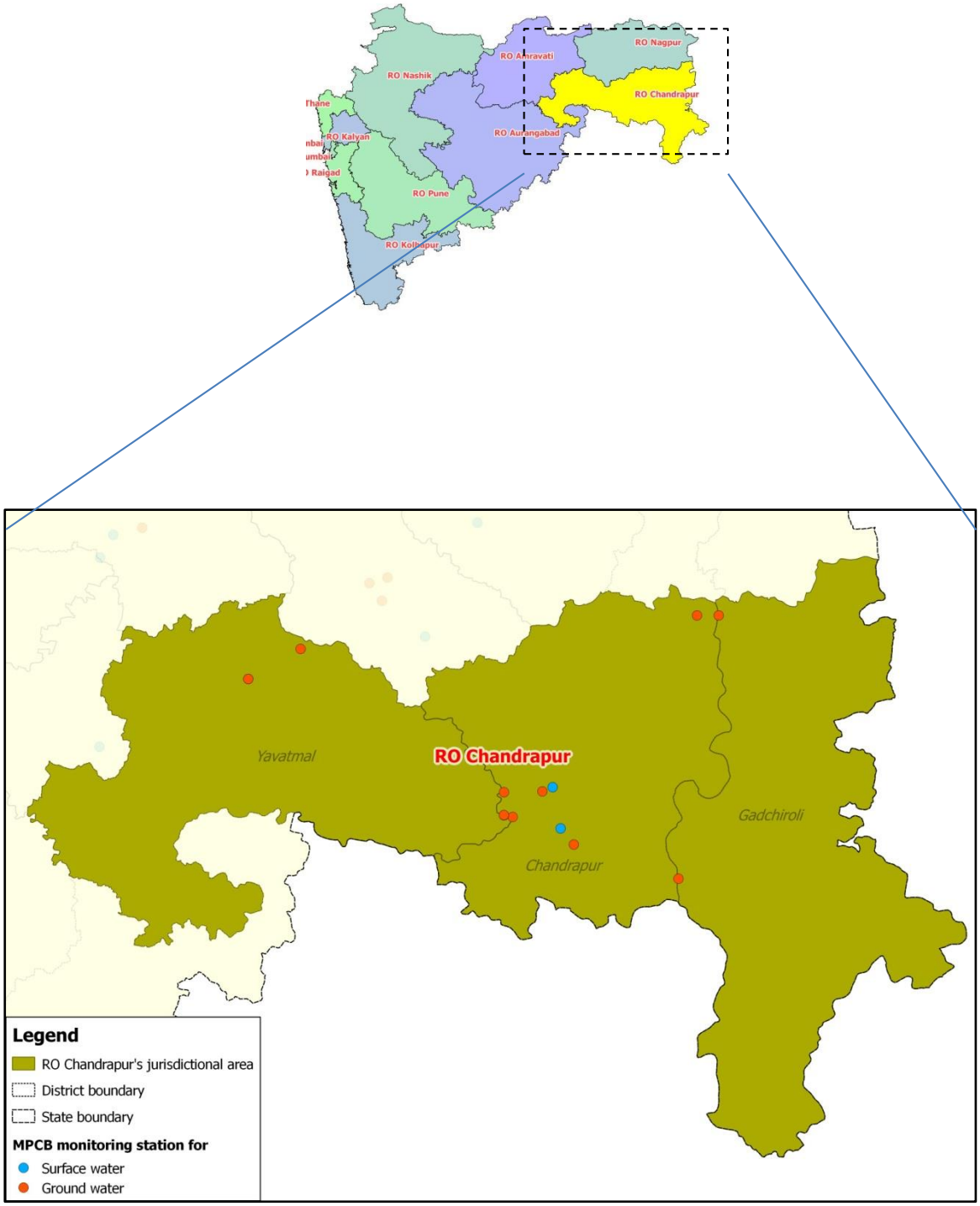


Table No 5: Surface water quality index for April and December month at Chandrapur-RO

Types	Station ID	Station Name	Apr	Dec
River/Nalla	11	Wainganga River at Ashti	73	76
	1212	Wardha river at Rajura bridge	74	79
	2156	Wardha River at confluence point of Penganga {} Wardha	78	76
	2174	Wardha River at D/s of ACC Ghuggus	72	73
	2721	Wardha River at U/s of ACC Ghuggus	75	74
	2720	Wardha River at U/s of Erai River	76	77
	2719	Wardha River at D/s. of Erai River	72	77
	2697	Penganga River near water supply scheme of Umarkhed M.C	56	79
	2698	Penganga River D/s of Isapur Dam	76	79
	1315	Wardha River at Pulgaon Railway Bridge	70	74
	2175	Wainganga at U/s of Gaurav Paper Mills near Jack Well	75	75
	2176	Wainganga River at D/s of Gaurav Paper Mills Near Jackwell	71	NA

Table No 6: Groundwater quality index for April and October month at Chandrapur-RO

Types	Station ID	Station Name	Apr	Oct
Groundwater	2828	Dug Well near Jilla Parishad Primary School Visapur	58	NA
	1994	Dug well At TPS Durgapur near Naseeb Kirana general Store.	55	91

RO – Kalyan

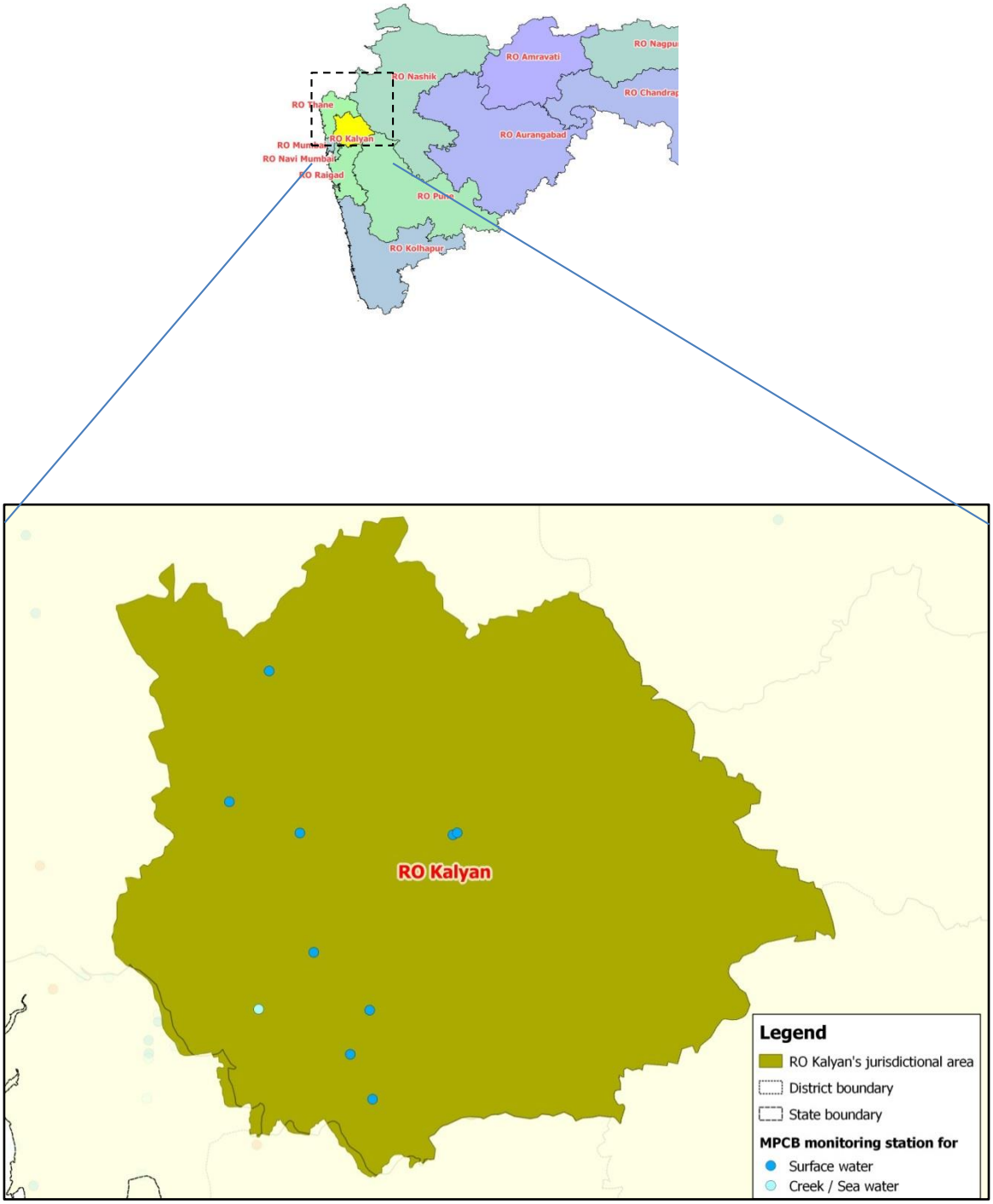

RO Nashik
RO Amravati
RO Aurangabad
RO Thane
RO Kalyan
RO Navi Mumbai
RO Raigad
RO Pune
RO Kolhapur
RO Kalyan
Legend
RO Kalyan's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water

Table No 7: Surface water quality index for April and December month at Kalyan RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	1094	Ulhas River at U/s of Badlapur water works	78	78
	2162	Ulhas River at Jambhul water works	77	79
	1093	Ulhas river at U/s of NRC Bund.	74	78
	1461	Bhatsa river at D/s of Pise Dam	65	NA
	2653	Bhatsa River at D/s. of Liberty Oil Mills	80	80
	1092	Kalu River at Atale village	78	74
	2654	Bhatsa River at D/s of Liberty Oil Mills	80	79
	2709	Tansa River near road bridge	63	78
	2712	Vaitarna River near Road Bridge	66	79
Sea/Creek	2791	Ulhas Creek at Reti Bunder, D/s of Kalyan-Bhiwandi Bridge	NA	46

RO – Kolhapur

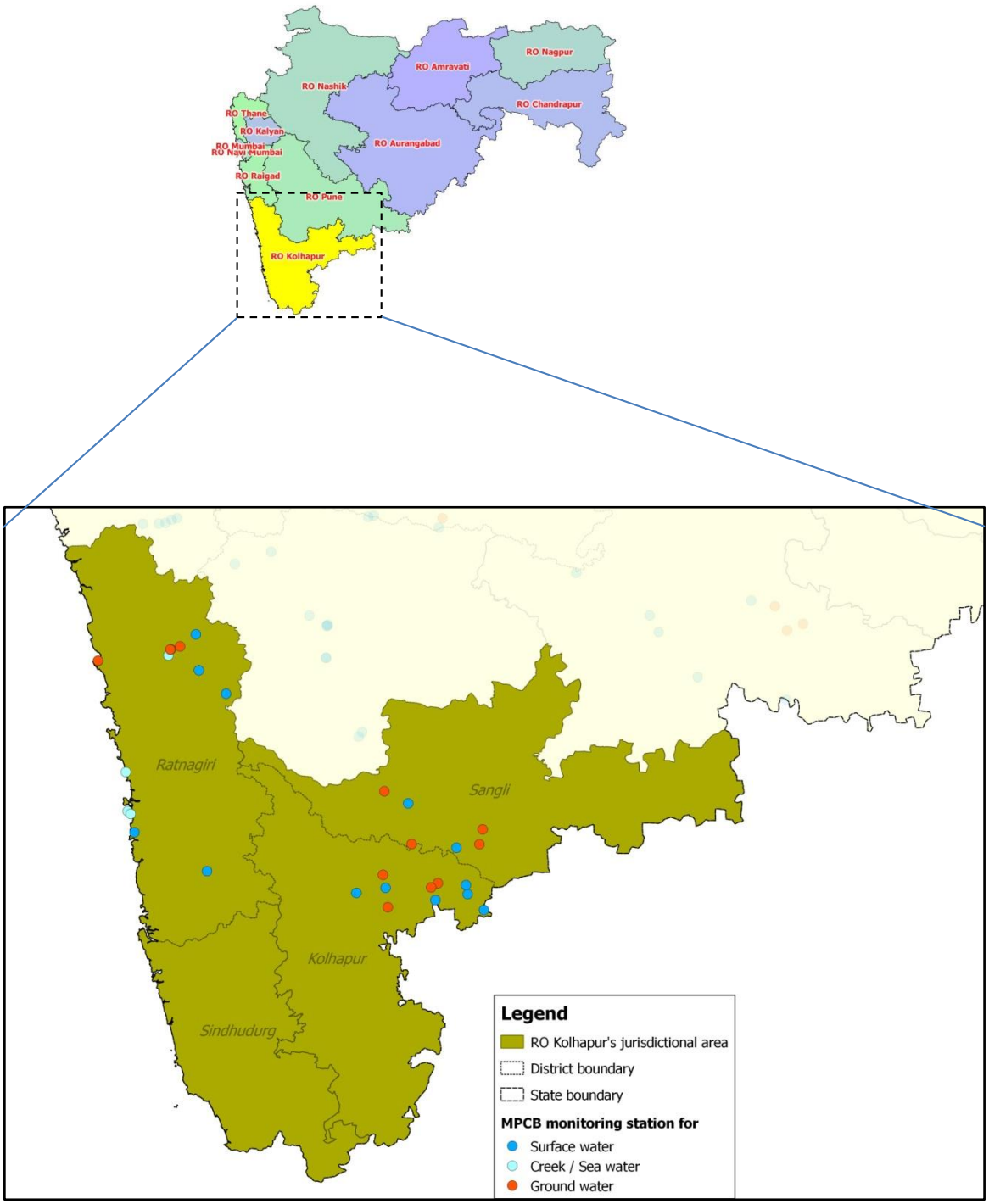

RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Thane
RO Kalyan
RO Mumbai
RO Navi Mumbai
RO Aurangabad
RO Raigad
RO Pune
RO Kolhapur
Ratnagiri
Sangli
Kolhapur
Sindhudurg
Legend
RO Kolhapur's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water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

Table No 8: Surface water quality index for April and December month at Kolhapur-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	1153	Krishna River at Rajapur Weir	NA	83
	1311	Panchganga River at Ichalkaranji near MIDC intake well	81	83
	1310	Krishna River at Kurundwad	81	81
	1904	Panchganga River at U/s of Kolhapur town near Balinga Pumping Station	83	82
	1905	Panchaganga river at D/s of Kolhapur town at Gandhi nagar near NH-4 bridge and MIDC intake well.	83	81
	2163	Panchganga River at Shirol near Shirol intake well	79	85
	2676	Muchkundi River at Waked Ratnagiri near M/s. Asahi India Glass	81	82
	37	Krishna River at Maighat, Sangli	80	86
	2790	Pimpal-Paneri Nalla at Ratnagiri near Finolex Industries	84	75
	1906	Krishna river at Walwa, D/s of Islampur near Vithal Temple.	82	90
	2714	Vashishti River at U/s of Pophali near Konphansawane Bridge	NA	90
	2164	Vashishti River at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt Ltd	81	90
	2713	Vashishti River at D/s of Three M Paper Mills near Chiplun water intake Jackwell	79	89
Sea/Creek	2815	Madvi Sea Water at Ratnagiri near Jodhale Maruti Temple	79	87
	2814	Sea Water at Bhagwati Bunder, Ratnagiri near Ultra Tech Cement Jetty	81	83
	2813	Sea Water at Ganapatipule	80	87
	2804	Karambavane creek at Chiplun	NA	NA

Table No 9: Ground water quality index for April and October month at Kolhapur-RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	2830	Bore Well at MIDC Gokul Shirgaon	109	102
	2005	Bore well at Khanjirenagar, Kolhapur	78	91
	2004	Bore well at Parvati Industrial Estate, Yadrav, Kolhapur	92	85
	2829	Bore Well at MIDC Shiroli near M/s. Pratibha Enterprises	69	83
	2007	Bore well at Savali, near Gram Panchayat office.	332	116
	2006	Bore well at Shinoli near M/s Aqua Alloy Steel.	111	117
	2008	Dug well at Sambarwadi, owned by Shri. Kishan Hali Rajput.	224	142
	2831	Dug Well at Sakharali near MIDC Islampur near Krishna Milk Industry	207	117
	2832	Dug Well No.1 at Brahmanwadi-Anjanwel, owned by Shri Vaidya	9	22
	2835	Dug Well No.2 at owned by Group Gram Panchayat, Brahmanwadi-Anjanwel	11	23
	2834	Dug Well No.2 at Arketwadi	46	27
	2833	Dug Well No.1 at Group Gram Panchayat at Arketwadi, near Masjid	124	25
	2202	Dug Well at Ghane Kunt, near Awashi, onwed by shri Rajendra Amre	NA	29

RO – Mumbai

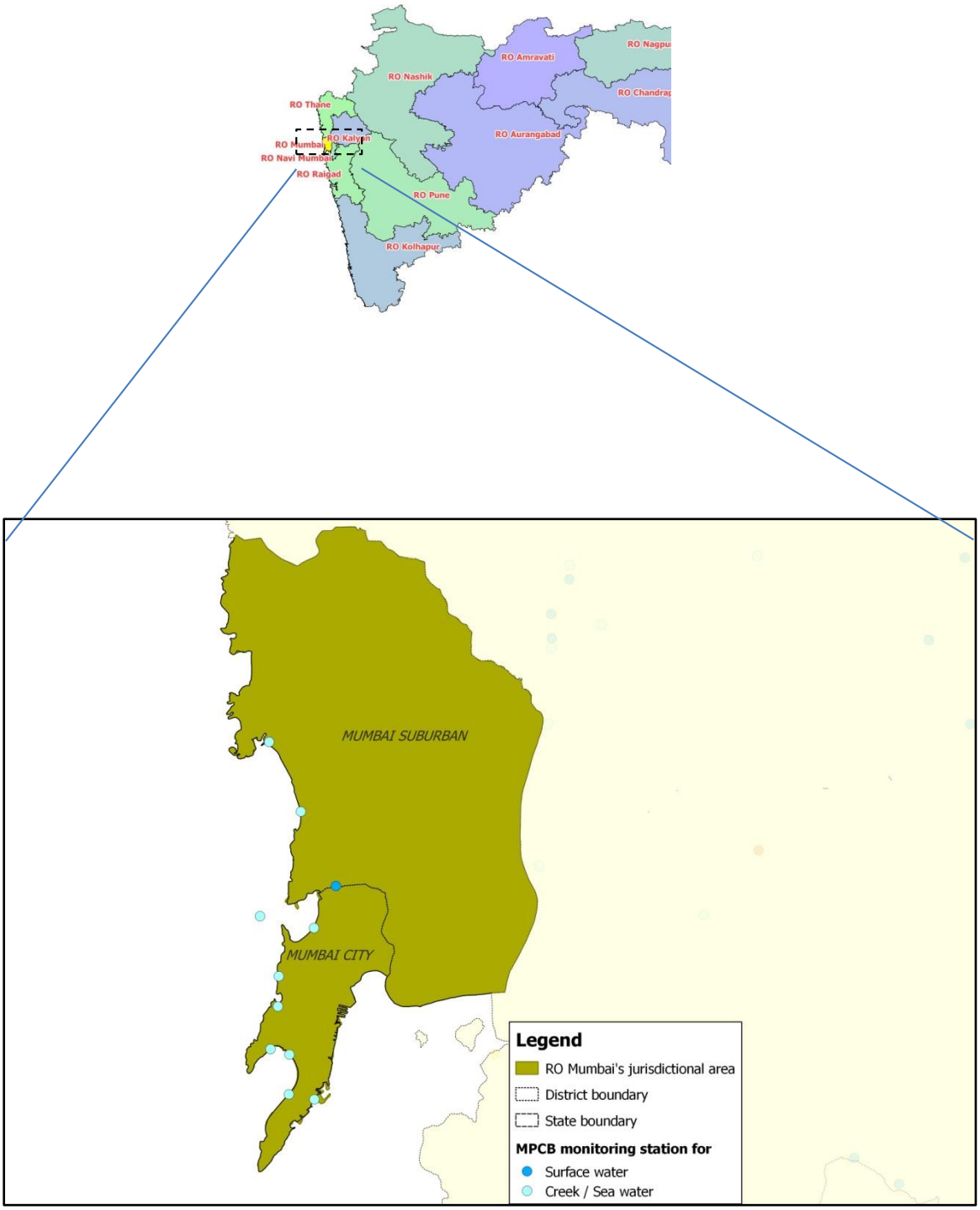

RO Amravati
RO Nashik
RO Thane
RO Kalyan
RO Mumbai
RO Navi Mumbai
RO Raigad
RO Aurangabad
RO Pune
RO Kolhapur
MUMBAI SUBURBAN
MUMBAI CITY
Legend
RO Mumbai's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water

Table No 10: Surface water quality index for April and December month at Mumbai-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2168	Mithi River at near bridge	NA	28
Sea/Creek	2165	Sea Water at Gateway of India	54	47
	2808	Sea Water at Nariman Point	NA	51
	2166	Sea Water at Charni Road Choupathy	49	49
	2809	Sea Water at Malabar Hill	68	51
	2810	Sea%20water%20at%20haji%20ali	NA	NA
	2167	Sea Water at Worli Seaface	50	52
	2811	Sea Water at Shivaji Park (Dadar Choupathy)	NA	46
	1318	Mahim creek at Mahim Bay	NA	53
	2812	Sea Water at Juhu Beach	47	46
	2169	Sea Water at Varsova Beach	48	49

RO – Nagpur

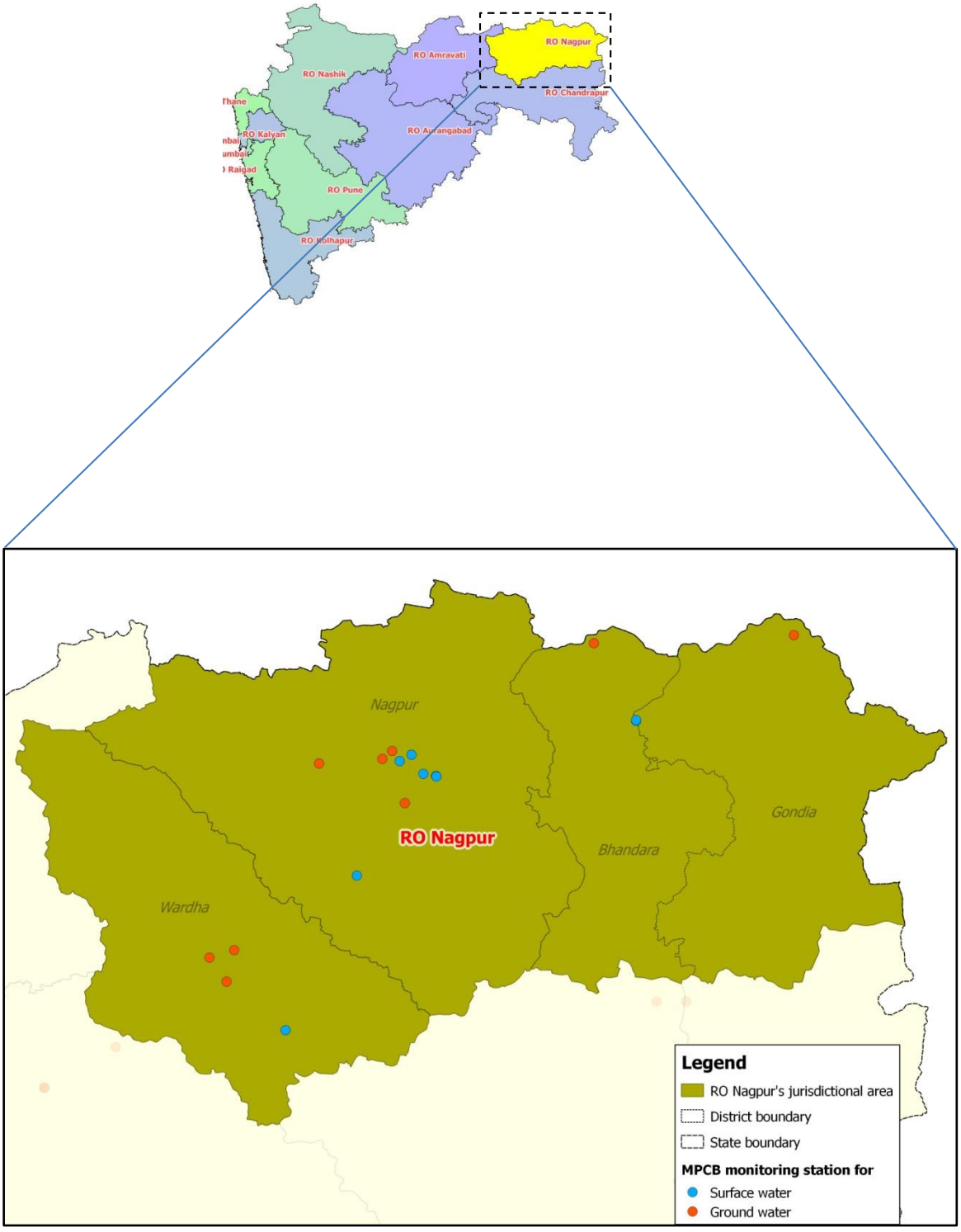

RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Kalyan
RO Pune
RO Kolhapur
Nagpur
RO Nagpur
Bhandara
Gondia
Wardha
Legend
RO Nagpur's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No 11: Surface water quality index for April and December month at Nagpur-RO

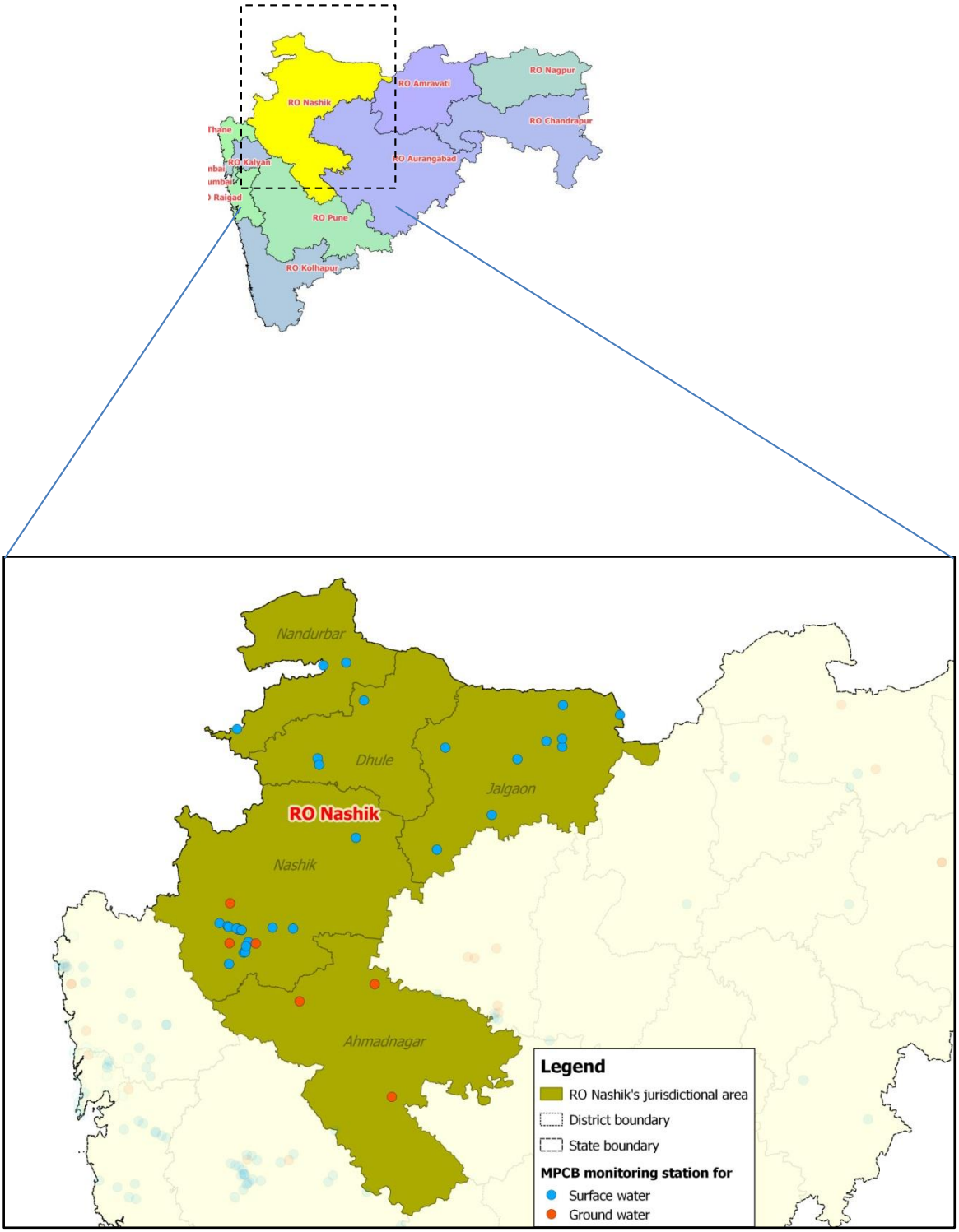
Types	Station ID	Station Name	Apr	Dec
River/Nalla	2723	Wena River at D/s. of Mohata Mills, near Bridge on Hinganghat-Wadner Road	59	68
	2722	Wena River at U/s. of Mohata Mills, nearby Brigde on Hinganghat Wadner Road	76	70
	2171	Kanhan River (Wainganga basin) at D/s of M/s Vidharbha Paper Mills	67	66
	2170	Kanhan River (Wainganga basin) at U/s. of M/s Vidharba Paper Mill	79	70
	1908	Kolar river before confluence with Kanhan river at Waregaon Bridge.	71	68
	1909	Kanhan river at D/s of Nagpur	59	76
	1910	Wainganga river after confluence with Kanhan river	71	75
	2172	Wainganga River at D/s of Ellora Paper Mill	75	75
	2173	Wainganga River at U/s of Ellora Paper Mills	82	75

Table No 12: Ground water quality index for April and October month at Nagpur-RO

Types	Station ID	Station Name	Apr	Oct
Groundwater	2203	Hand Pump in the premises of Z.P.Primary School	NA	49
	2826	Dug Well near Railway Station, Cottaon Market	69	NA
	1997	Bore well near Primary Health Centre, Raipur(Hingna)	89	67
	2000	Dug well near Sarode Kirana Store, Bhandewadi, Nagpur	109	78
	1998	Gram Panchayat Dug well near Gram Panchayat Office, Brahmni	140	66

Types	Station ID	Station Name	Apr	Oct
	1996	Gram Panchayath Dug well , Near Jagadamba G M S Mandir Sahakari Sanstha	110	129
	1995	Gram Panchayath Dug well , Near Balaji Gajbhiye House, Khaperkheda	105	72
	2827	Bore Well near Railway crossing at Dongi Buzurg	56	33
	1999	Bore well Near Gram Panchayat,Changera.	58	NA

RO – Nashik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RO Amravati
RO Nashik
RO Chandrapur
RO Aurangabad
RO Kalyan
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 13: Surface water quality index for April and December month at Nashi-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2661	Darna River at Aswali (Darna Dam)	86	84
	2662	Darna River at MES site Pumping station	84	80
	2663	Darna River at Bhagur Pumping station near Pandhurli Bridge	NA	82
	2664	Darna River at Sansari	87	77
	2660	Darna River at Chehedi pumping station	76	83
	2180	Godavari River at near Tapovan	39	52
	2181	Godavari River at Kapila -Godavari confluence point	50	52
	1211	Godavari River at Nashik D/s of near Amardham	39	59
	1096	Godavari River at Panchavati at Ramkund	64	65
	2183	Godavari River at Nandur-Madhameshwar Dam	83	81
	2179	Godavari River at Hanuman Ghat	65	54
	2182	Godavari River at Saikheda	82	64
	2178	Chikhali Nalla Meets Godavari River	34	57
	2177	Godavari River near Someshwar Temple	71	66
	1095	Godavari River at U/s of Gangapur Dam	73	79
	2710	Titur River D/s of Chalisgaon	NA	76
	1253	Girna river at Malegaon at Malegaon road bridge.	NA	78
	2667	Hiwara River D/s of Pachora	NA	72
	2684	Panzara River near Panzarakan SSK Ltd	NA	75
	1252	Girna river at Jalgaon at intake of Girna pump huose.	NA	79
	2670	Kan River near Sakri water works	NA	65

Type	Station ID	Station Name	Apr	Dec
	2658	Bori River D/s of Amalner	NA	77
	1251	Tapi River at Bhusawal	NA	77
	2718	Waghur River at Sakegaon before Confluence with Tapi River	NA	79
	2674	Mor River near Padalshe	NA	74
	1907	Rangavali river at D/s of Navapur near Rangavali bridge.	NA	60
	1313	Tapi River at Ajnad	NA	78
	2659	Burai River before confluece to Tapi River	NA	80
	2652	Amravati River D/s of Dondaicha	NA	82
	1314	Tapi river at UbadVillage near Gujrat border.	NA	79
	2666	Gomai River D/s of Shahada	NA	79

Table No 14:Groundwater quality index for April and October month at Nashik- RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	1990	Bore well at BMW Site , Burudgaon	NA	75
	2204	Dug well at Gunjalwadi, Sangamner near Primary Health Care Center.	NA	79
	2817	Bore Well at Chitali near Wagh vasthi	69	63
	2816	Dug Well of Mr. Sampat Walunj, near M/s. Mahajeet Clayton	59	79
	1991	Bore well at MSW Site, Pathardi, Nashik	46	62
	2818	Bore Well at M/s. Spectron Ethers Rasegaon near Siddeshwar Mahadev Mandir	65	71

RO – Navi Mumbai

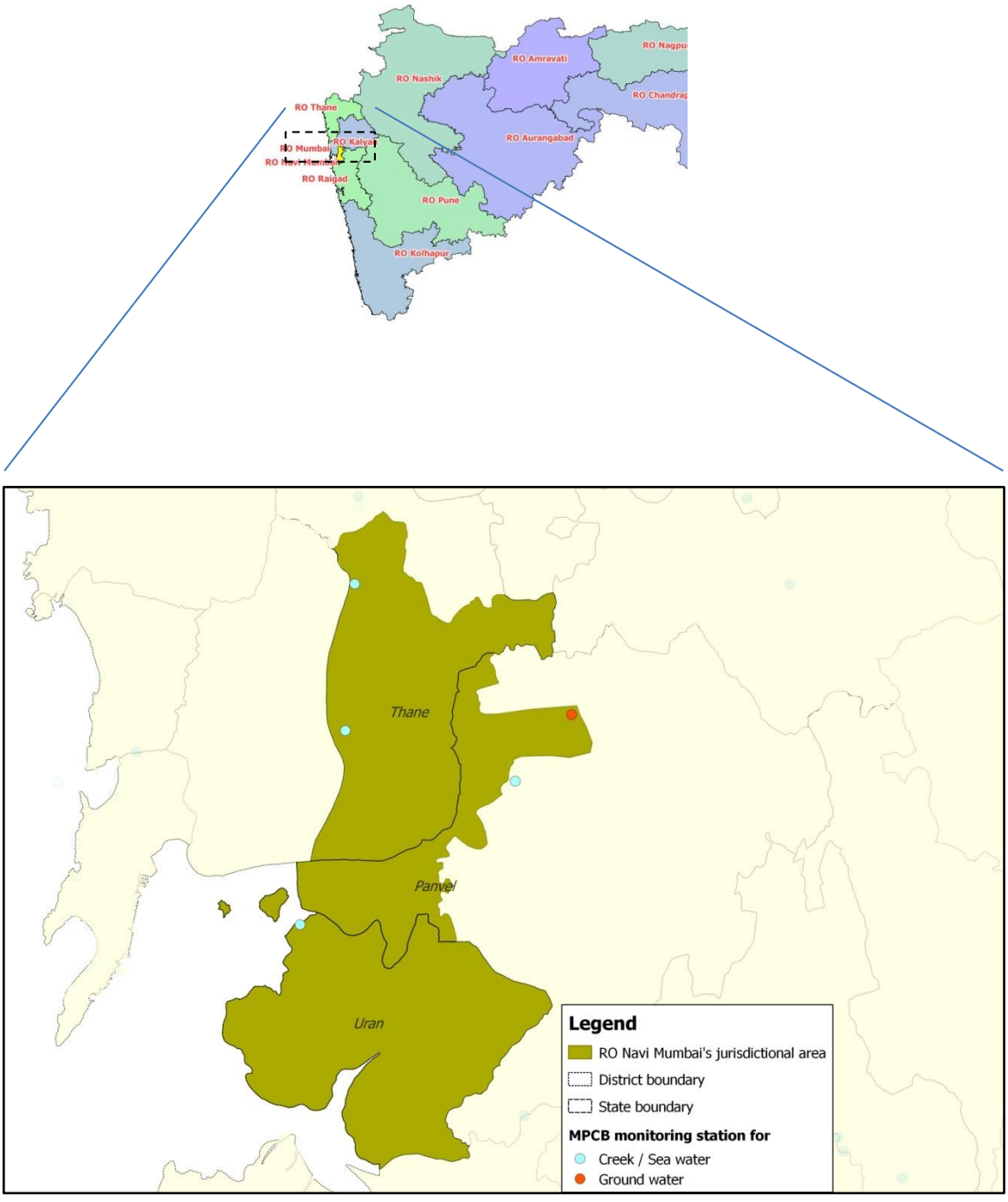

Table No 15: Surface water quality index for April and December month at Navi Mumbai-RO

Type	Station ID	Station Name	Apr	Dec
Sea/Creek	1317	Thane creek at Elephanta Island	53	50
	2803	Panvel Creek at Kopra Bridge	51	74
	2185	Vashi Creek at Vashi Bridge	50	53
	2184	Vashi Creek at Airoli Bridge	51	53

Table No 16: Ground water quality index for April and October month at Navi Mumbai-RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	1989	Bore well at MWML Site at Taloja	NA	67

RO – Pune

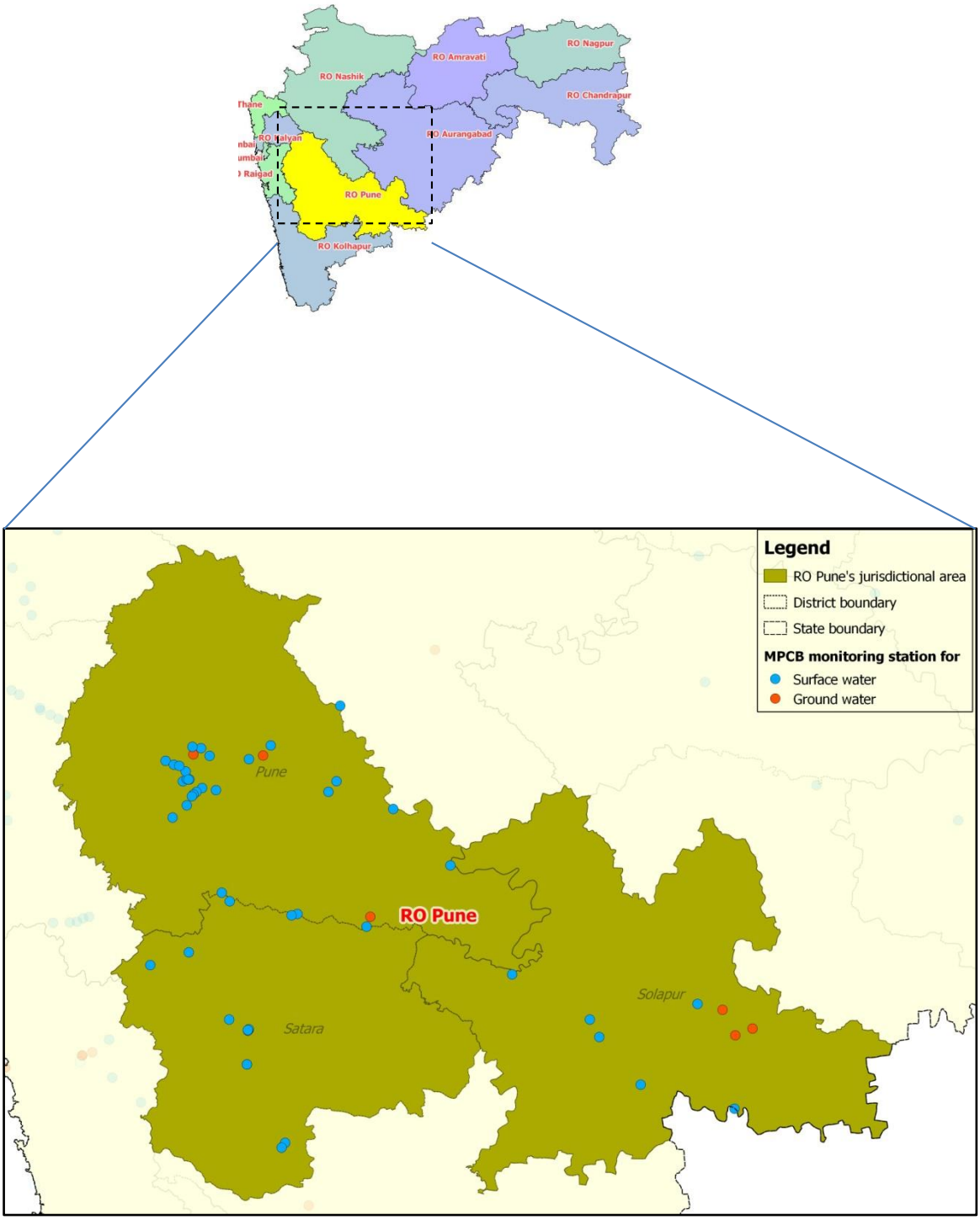
RO Nagpur
RO Amravati
RO Nashik
RO Chandrapur
RO Aurangabad
RO Pune
RO Kolhapur
Legend
RO Pune's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water
Pune
RO Pune
Satara
Solapur

Table No 17: Surface water quality index for April and December month at Pune -RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2189	Koyna River at Karad	72	70
	36	Krishna River at Krishna Bridge, Karad	66	55
	28	Bhima River at Takli	42	65
	1188	Bhima River at Narshingpur near Sangam Bridge after confluence with Nira	76	52
	2190	Krishna River at Wai	71	61
	2711	Urmodi River at Nagthane Satara	66	67
	1912	Chandrabhaga river at D/s of Pandharpur town near Vishnupant Mandir.	59	59
	2188	Krishna River at Krishna-Venna Sangam, Mahuli	58	57
	2717	Venna River at Mahuli	66	63
	2187	Krishna River at Kshetra Mahuli Satara	54	66
	2186	Venna River at Varya, Satara	57	66
	1911	Chandrabhaga river at U/s of Pandharpur town.	59	69
	2705	Sina River near Laboti till naka Solapur	65	59
	2789	Nalla at D/s of Alkai Mandir, Solapur	45	48
	2716	Venna River at Mahabaleshwar	61	74
	1194	Krishna river at Dhom Dam	75	81
	2681	Nira River at Sangavi	44	49
	2682	Nira River at U/s of Jubilant Organosis Pune	61	68
	2195	Nira River at D/s of Jubilant Organosis Pune	29	54
	2683	Nira River at Shindewadi	69	64
	1463	Nira river at Sarola bridge	NA	72
	2656	Bhima River Backwater of Ujani Dam near raw	71	60

Type	Station ID	Station Name	Apr	Dec
		water pump house		
	2680	Mutha River at Khadakvasla Dam Pune	82	82
	1192	Bhima river at Daund near Mahadev temple.	50	54
	1189	Bhima river at Pune(Mutha river) at U/s of Vithalwadi near Sankar Mandir.	33	47
	2679	Mutha River at Deccan Bridge, Pune	NA	NA
	2678	Mutha River near Veer Savarkar Bhavan	38	31
	2191	Mutha River at Sangam Bridge Near Ganpathi Ghat	NA	33
	2677	Mula-Mutha River at D/s of Theur, Pune	36	38
	2192	Mula-Mutha River at Mundhwa Bridge	NA	38
	1190	Bhima river at D/s of Bundgarden, Pune.	40	38
	2193	Mula River at Aundh Bridge -Aundgaon	NA	43
	1191	Bhima river after confluence with Mula-Mutha at Pargaon near Vasant Bandara.	51	51
	2691	Pawana River at Dapodi Bridge at Pawana-Mulla Sangan Pune	48	36
	2194	Mula River at Harrison Bridge near Mula - Pawana Sangam	NA	37
	2196	Pawana River at Sangavigaon, Pune	43	39
	2690	Pawana River at Kasarwadi Pune	43	39
	2694	Pawana River at Pimprigaon, Pune	36	36
	2693	Pawana River at Chinchwadgaon, Pune	56	44
	2692	Pawana River at Ravet Weir, Pune	81	80
	2655	Bhima River at Koregaon near Koregaon Bridge, Pune	66	55

Type	Station ID	Station Name	Apr	Dec
	2197	Indrayani River at D/s. of Alandigaon, Pune	56	54
	2668	Indrayani River at D/s of Moshi village	58	44
	2669	Indrayani River at U/s of Moshigaon, Pune	59	59
	2715	Vel River at Shikrapur, Pune	65	53
	2665	Ghod River at Shirur, Pune	47	60

Table No 18: Ground water quality index in April and October at Pune-RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	2821	Bore Well at Bale Railway Station premises Owned by Shri Digambar Joshi	NA	155
	2823	Bore Well at Shete Vasti near old Tuljapur Road	NA	285
	2822	Bore Well near Chincholi	NA	222
	2819	Dug Well Owned by Shri Deshmukh	250	855
	2820	Dug Well Owned by Shri Shivaji Baban Darekar	50	171
	1992	Dug well at MSW Site,owned by Shri.Dattu Kondiba Borate at Borate Vasthi.	69	109

RO – Raigad

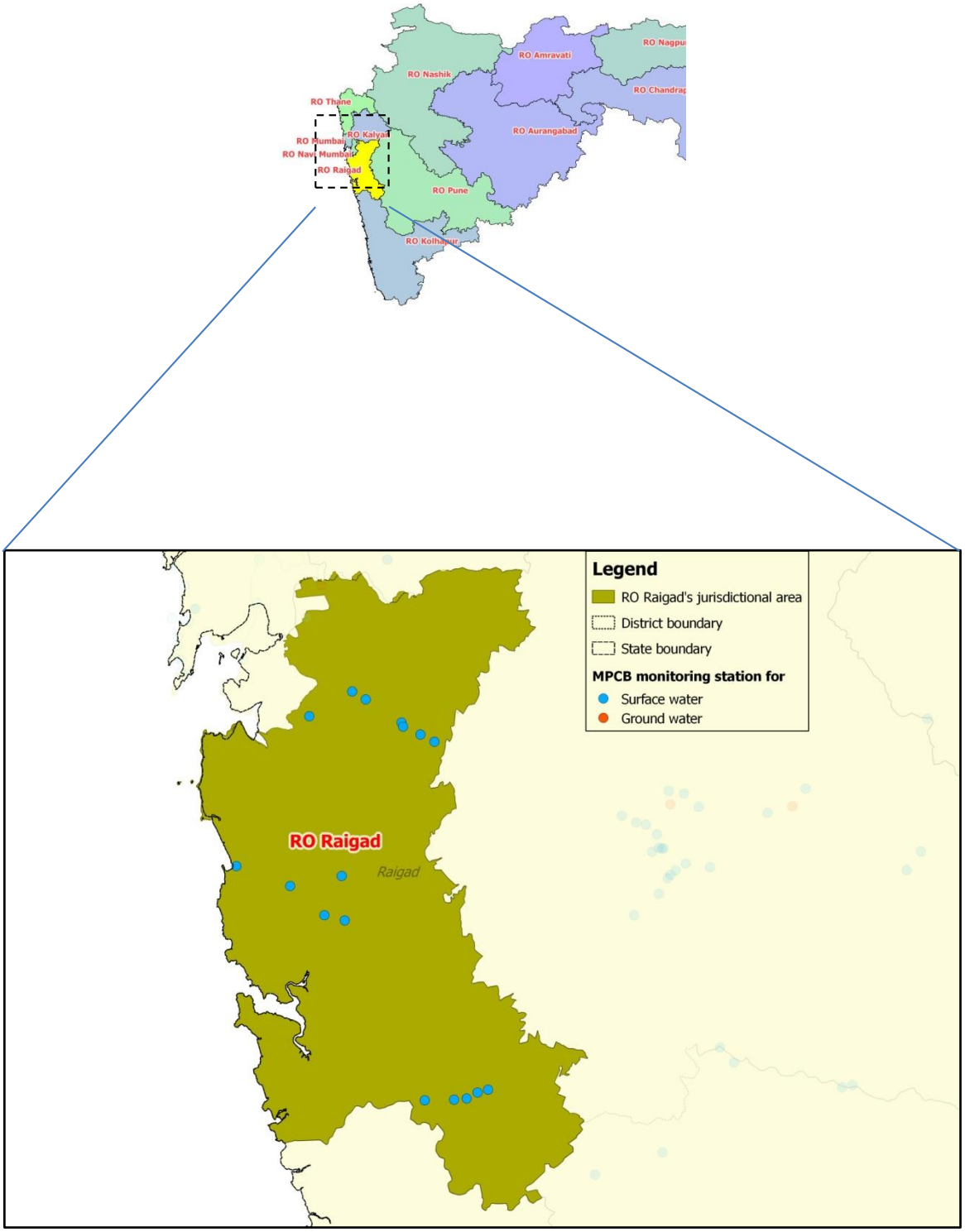
RO Amravati
RO Nashik
RO Thane
RO Kalyan
RO Mumbai
RO Navi Mumbai
RO Raigad
RO Aurangabad
RO Pune
RO Kolhapur
Legend
RO Raigad's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water
RO Raigad
Raigad

Table No 19: Surface water quality index for April and December month at Raigad-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2199	Savitri River at Ovale village	NA	85
	2704	Savitri River at Muthavali village	77	85
	2703	Savitri River at Dadli Bridge	81	78
	2702	Savitri River at Shedav Doh	79	73
	2701	Savitri River Jackwell at Upsa kendra	75	87
	2672	Kundalika River at Dhatav at Jackwell	77	80
	1152	Kundalika River at Roha Bridge	83	78
	2198	Kundalika River at Are Khurd (Saline Zone)	76	77
	2651	Amba River at D/s. of Waken Bridge	79	81
	2671	Kundalik River near Salav Bridge (Saline Zone)	52	57
	2689	Patalganga River at Gagangiri Maharaj Temple	NA	78
	1151	Patalganga River at Shilphata Bridge	NA	84
	2688	Patalganga River at Savroli Bridge	NA	82
	2687	Patalganga River at Khalapur pumping house	84	86
	2685	Patalganga River at D/s. of Kharpada Bridge	70	78
	2686	Patalganga River at Vyal pump house	84	86
	1462	Patalganga near intake of MIDC water works(Turade w/w)	75	85

RO – Thane

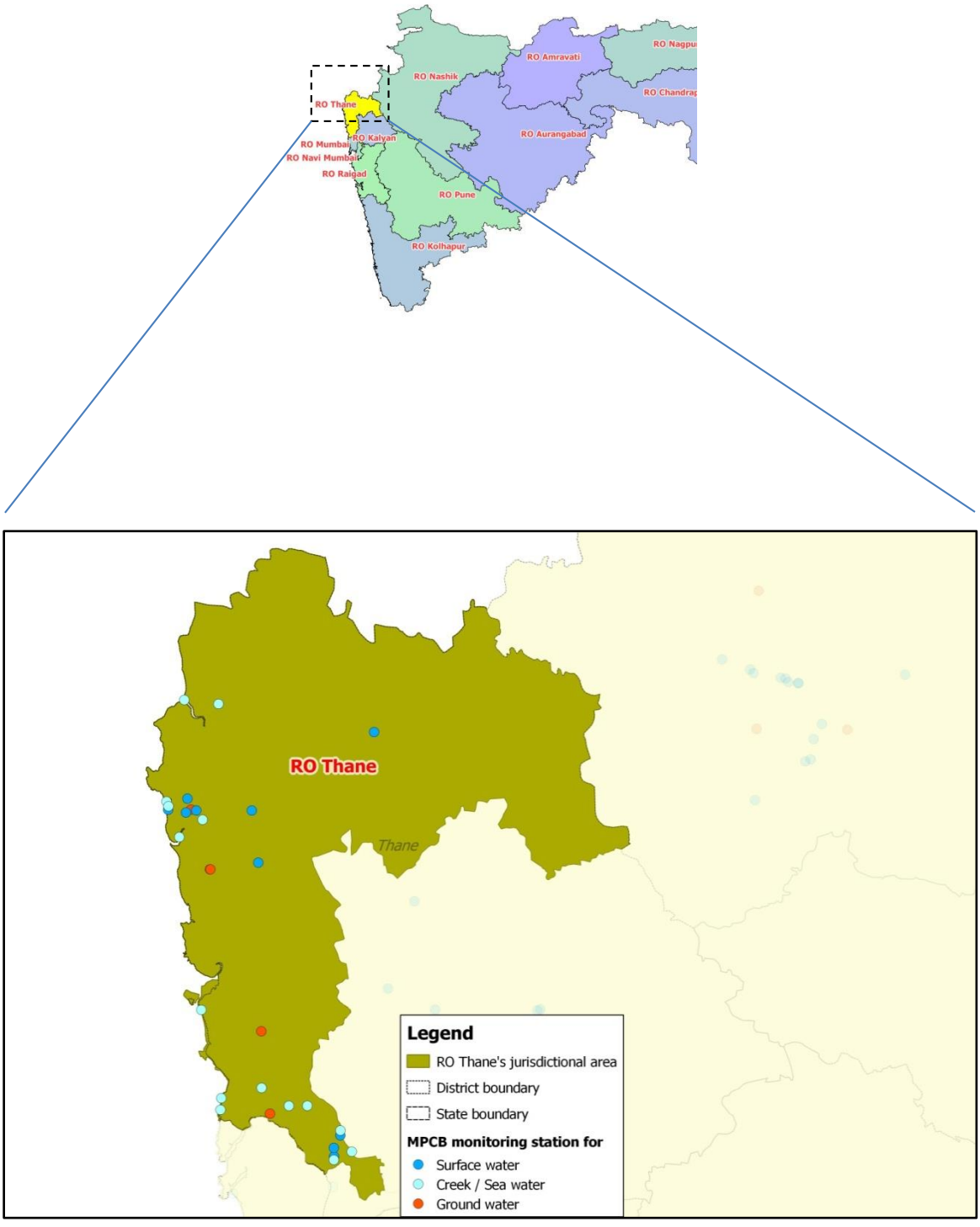
RO Nashik
RO Amravati
RO Thane
RO Kalyan
RO Aurangabad
RO Mumbai
RO Navi Mumbai
RO Raigad
RO Pune
RO Kolhapur
RO Thane
Thane
Legend
RO Thane's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water
Ground water

Table No 20: Surface water quality index for April and December month at Thane-RO

Type	Station ID	Station Name	Apr	Dec
River/Nalla	2782	Rabodi Nalla	29	29
	2783	Colour Chem Nalla	37	35
	2784	Sandoz Nalla	25	27
	2708	Surya River at Intake of Vasai-Virar water scheme	72	72
	2788	Tarapur MIDC Nalla near sump-III	NA	NA
	2707	Surya River at MIDC pumping station	76	74
	2786	Tarapur MIDC Nalla, near sump No.1	17	26
	2785	BPT Navapur	NA	23
	2787	Tarapur MIDC Nalla	26	67
	2706	Surya River U/s of Surya Dam	78	74
Sea/Creek	2793	Thane Creek at Kalwa Road Bridge	50	55
	2792	Ulhas Creek at Mumbra Reti Bunder	52	49
	2794	Ulhas Creek at Kolshet Reti Bunder	54	59
	2806	Uttan Sea at Bhayander	68	53
	2796	Ulhas Creek at Versova Bridge	53	60
	2795	Ulhas Creek at Gaimukh at Nagla Bunder on Ghod Bunder Road	52	57
	1316	Bassein creek at Vasai Fort, Thane	NA	57
	2797	Bhayander Creek at D/s. of Railway Bridge at Jasal Park Choupathy	NA	51
	2805	Arnala Sea	62	51

Type	Station ID	Station Name	Apr	Dec
	2798	Kharekuran Murbe Creek	62	58
	2800	Sarwali Creek	NA	51
	2807	Navapur Sea	NA	54
	2799	Dandi Creek	NA	67
	2801	Savta Creek	NA	59
	2802	Dahanu Creek at Dahanu Fort	NA	54

Table No 21: Ground water quality index for April and October month at Thane-RO

Type	Station ID	Station Name	Apr	Oct
Groundwater	1985	Dug well at 5 Star Industrial Estate	222	88
	1987	Bore well at Vasai	108	81
	1988	Bore well at Gharatwadi, Palghar	84	81
	1986	Bore well at Motapada	NA	72
	1984	Bore well at M/s Tata Iron Steel Co. Ltd, S-76	NA	165

Annex II – Data Sets of Water Quality Monitored in 11-12

Soft Copy of the Data sets on a CD

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