Water Quality Status of Maharashtra

2014-15

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

The Energy & Resources Institute

Water Quality Status of Maharashtra 2014-15

(Compilation of Water Quality Data Recorded by MPCB)

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Prepared by

The Energy and Resources Institute

...towards global sustainable development

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MAHARASHTRA POLLUTION CONTROL BOARD

Preface

Maharashtra Pollution Control Board is monitoring water quality in Maharashtra to comply with the mandate of Water (Prevention & Control of Pollution) Act, 1974 and to disseminate status of water quality in the State of Maharashtra. 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 April 2014 to March 2015. Also National Sanitation Foundation, USA's formula has been used to calculate Water Quality Index (WQI) to depict the water quality in a easy to understand the general public at large. The WQI is also used to compare with the water quality of last 3 years.

Also presents a comparison for the trend in water quality index for intra-basin analysis for the past eight years. The water bodies at Bhima upper sub basin comprising of Indrayani, Mutha, Bhima and Pawna rivers which was polluted sub basin has recorded an improvement in water quality as compared to the previous year. Tapi upper sub basin and Wardha sub basin recorded no improvement in the water quality as compared to the previous year and water bodies near the coast line along Mumbai and Tarapur stretch (Thane district) recorded as polluted. Spatial maps have been generated in GIS platform to present the status of water quality at a glance. Also maps showing status of surface and ground water quality are attached. 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 *Dr.Y.B.Sontakke, Joint Director-WPC and Ms Yamini Chachad, Junior Scientific Officer* are appreciated for their inputs in the report.

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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

The MPCB (Maharashtra Pollution Control Board), being the state nodal agency under CPCB (Central Pollution Control Board), regularly monitors the water quality across 250 WQMS (Water Quality Monitoring Stations) for both surface (156 are on rivers, 34 on sea/creeks, 10 on drains) and ground water (50 handpumps, tubewells, dugwells and borewells) under two programs of NWMP (National Water Quality Monitoring Program) titled GEMS (Global Environment Monitoring System) and MINARS (Monitoring of Indian National Aquatic Resources). Surface water samples are monitored every month whereas the ground water samples are monitored every six months.

This report presents the statistical analysis of the data representing water quality monitored in the year 2014-15, along with illustrations and spatial representations to have an overview on the performance for quality of surface and ground water in the state. The report further discusses the highlights on the annual and seasonal performance of the Water quality Index (WQI) for major river basins (Tapi, Godavari, Krishna, West Flowing) as well as for the water samples representing saline (sea/creek) and groundwater for general classification (Table No. 1). The WQI has been determined based on the formula developed by NSF (National Sanitation Foundation) and modified by CPCB (Central Pollution Control Board)[1] which depicts the water quality in simple and easy way for general public at large. The WQI for Surface water is calculated using the formula presented below in **Table No. 1**.

Table No. 1: Formula and classification of Water quality indices for surface and groundwater

Surface Water Quality	**Ground Water Quality**
$WQI = \sum_{i=1}^{p} WiIi$	$WQI = \sum_{i=1}^{n=9} qi.wi$
Where; Ii = sub index for water quality parameter Wi = weight (in terms of importance) associated with water quality parameter P = number of water quality parameters	Where; qi = quality rating wi = relative of each weight

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] Maharashtra Pollution Control Board, Methodology for Data Interpretation

Surface Water Quality

In the year 2014-15, surface (rivers, sea, creek and nallahs) water quality was monitored at about 200 locations (WQMS). The four major river basins namely Tapi, Godavari, Krishna and West flowing rivers were considered to categorize the rivers in respective basins and sub basins (Table No. 6). Based on the annual average WQI for the 200 WQMS, it was recorded that 95 WQMS were recorded to be in the 'Good to Excellent' category while 76 WQMS were in 'Medium to Good' category. As for the polluted categories only 26 and 3 WQMS were recorded in 'Bad' and 'Bad to Very Bad' categories respectively.

Table No. 2: Annual Average WQI for surface WQMS in various basins and sub basins

Basin	Sub basins	Name of rivers	Category wise No of WQMS				
			G2E	M2G	B	B2V	Total
Tapi	Tapi Upper	Tapi, Purna, Pedhi	1	1	3		5
	Tapi Middle	Tapi, Girna, Rangavali, Amravati, Bori, Burai, Gomai, Hiwara, Kan, Mor, Panzara, Titur, Waghur,	15				15
Godavari 1	Godavari Upper	Godavari, Chikhali nalla, Darna	16				16
	Godavari Middle	Godavari, Bindusara	8				8
	Manjra	Godavari, Manjra	2				2
Godavari 2	Wardha	Wardha, Penganga		7	4	1	12
	Weinganga	Kolar, Kanhan, Weinganga		9	1		10
	Pranhita and others	Wainganga	1				1
Krishna	Bhima Upper	Bhima, Nira, Chandrabhaga, Mutha, Ghod, Indrayani, Pawana, Sina, Vel, Nalla, Mula-Mutha	10	16	10		36
	Krishna Upper	Krishna, Panchganga, Koyna, Urmodi, Venna	9	9			18
West Flowing rivers		Kalu, Ulhas, Patalganga, Bhatsa, Vashishti, Mithi, Kundalika, Savitri, Amba, Kundalik, Muchkundi, Surya, Tansa, Vaitarna, Rabodi nalla, Colour Chem nalla, Sandoz nalla, BPT Navapur, Tarapur MIDC nalla, Pimpal-Paneri nalla	31	4	6	2	43
Saline			2	30	2		34
Total			**95**	**76**	**26**	**3**	**200**

Legend

G2E: Good to Excellent	M2G: Medium to Good	B: Bad	B2V: Bad to Very bad

The quality of water is affected by various factors like dilution during monsoon, high evaporation rate during the summers, sporadic pollution loads from various anthropogenic activities, flow rate of water and so on. Hence, there could be varied fluctuations in the quality of water at the same monitoring location leading to seasonal variations. Thus to eliminate this shortcoming an interbasin analysis for the occurrence and share of water quality index across the basins has been developed without averaging any values.

As seen in Figure No. 1, it is interesting to note that the sub-basins of Wardha, Weinganga and Pranhita, recorded less than 30% of the observations in 'Good to Excellent' category while remaining observations were in 'Medium to Good' or 'Bad' category. Similarly, the performance of water quality in Bhima sub-basin has improved as the share of 'Good to Excellent' category of WQI increased to 45% from 13% in the previous year (2013-14) and also showed reduction in share of 'Bad to Very Bad' category of water samples to 20% from 35% during the same period. Tapi Upper, Tapi Middle, and West flowing basins recorded deterioration in water quality as compared to the last year as the share of polluted water samples (WQI <50) increased in the range of 10-15% across all the sub-basins.

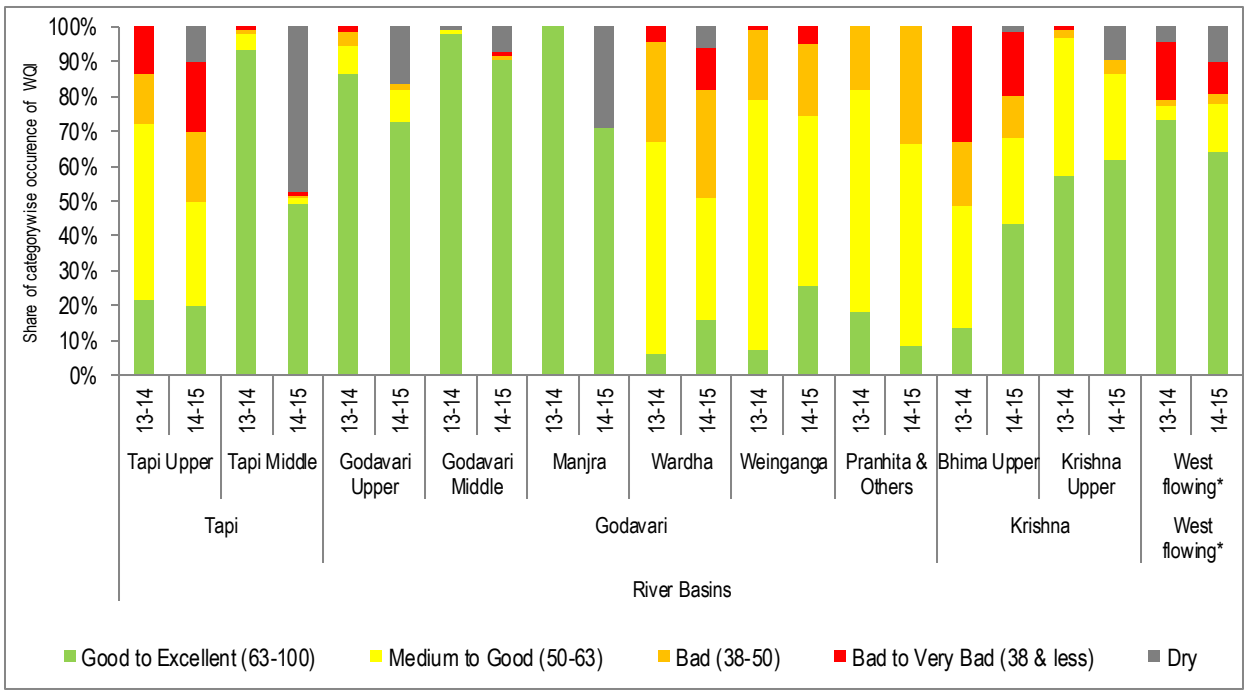


Figure No. 1: Average occurrence of different category of Water Quality Index across WQMS in respective sub basins of Maharashtra

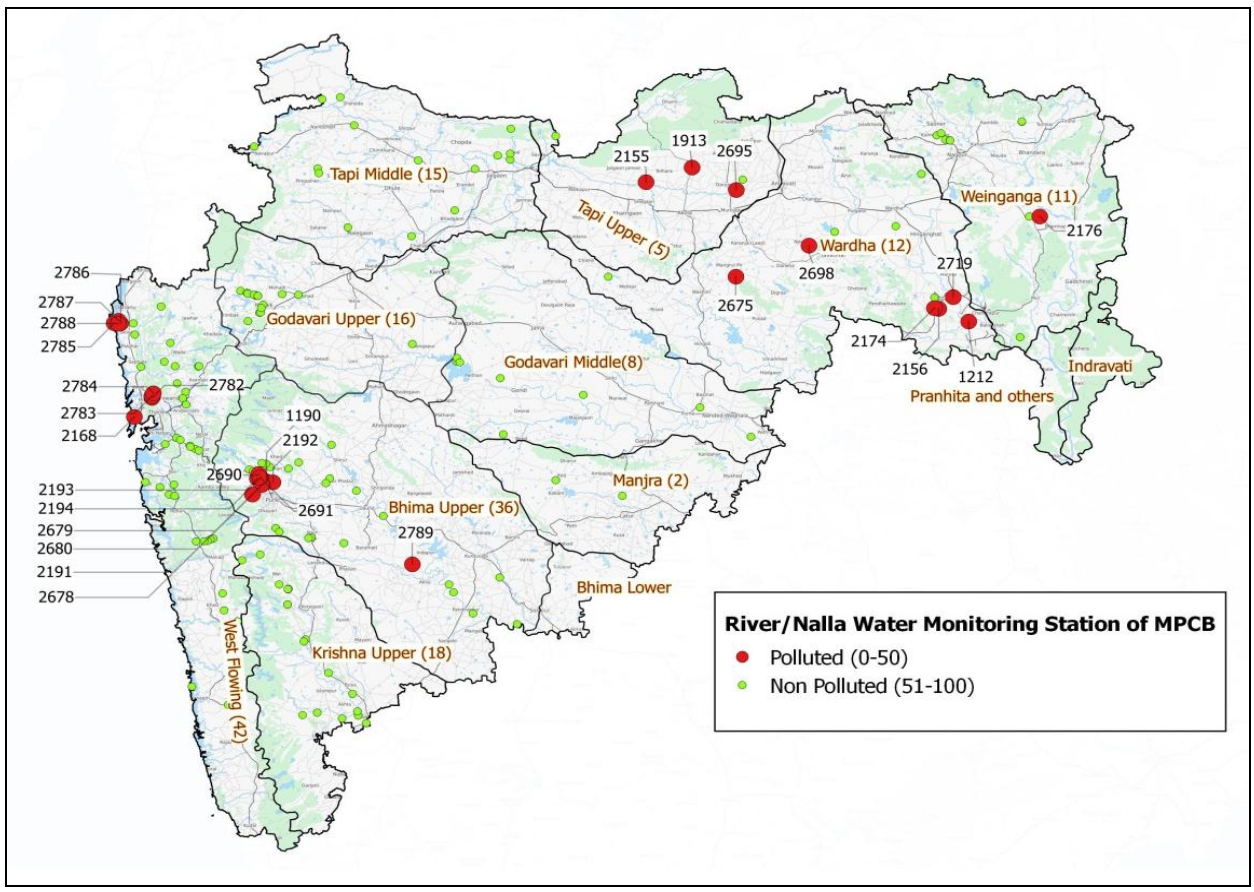
Note: *The above comparison is based on the WQI recorded at a monitoring station and the average number of times the WQI was of a certain category at all the WQMS in that basin.*

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

A spatial representation of the polluted locations (WQI < 50) for more than 50% of the observations has been presented in Map No. 1 and the corresponding details of the WQMS have been enlisted in Table No. 3. It is the western region of the state which recorded more polluted samples especially in the Pune region of Bhima sub-basin.

In the year 2014-15, saline water quality was monitored at around 34 locations across the 720km long coastline of the state. In terms of the monitoring done for sea and creek water along the coastline of the state, a majority of the WQMS are located in Mumbai (8), Mumbai Suburban (2) and Thane (18) districts. The Raigad and Ratnagiri districts have 2 and 4 WQMS respectively while there is no WQMS in the Sindhudurg district. The sea and creek water samples were recorded to be deteriorated as compared to the previous year (2013-14) asmore than 35% of the samples were recorded in the 'Good to Excellent' category, while in this year mere 23% of the samples were recorded in this category. In 2014- 15 more than 50% of the observations were recorded in the category 'Medium to Good' as against the 35% in the last year, indicating that the quality of water, i.e sea water has deteriorated.

Sea water samples from Mumbai (Worli sea face and the beaches of Versova, Juhu, Girgaum) and Thane were recorded to be polluted throughout the year and the WQI at these locations was in the category 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.



Map No. 1: Spatial representation surface WQMS which recorded WQI as polluted for more than 50 percent of the observations

Table No. 3: WQMS which recorded WQI as polluted for more than 50% observations in 2014-15

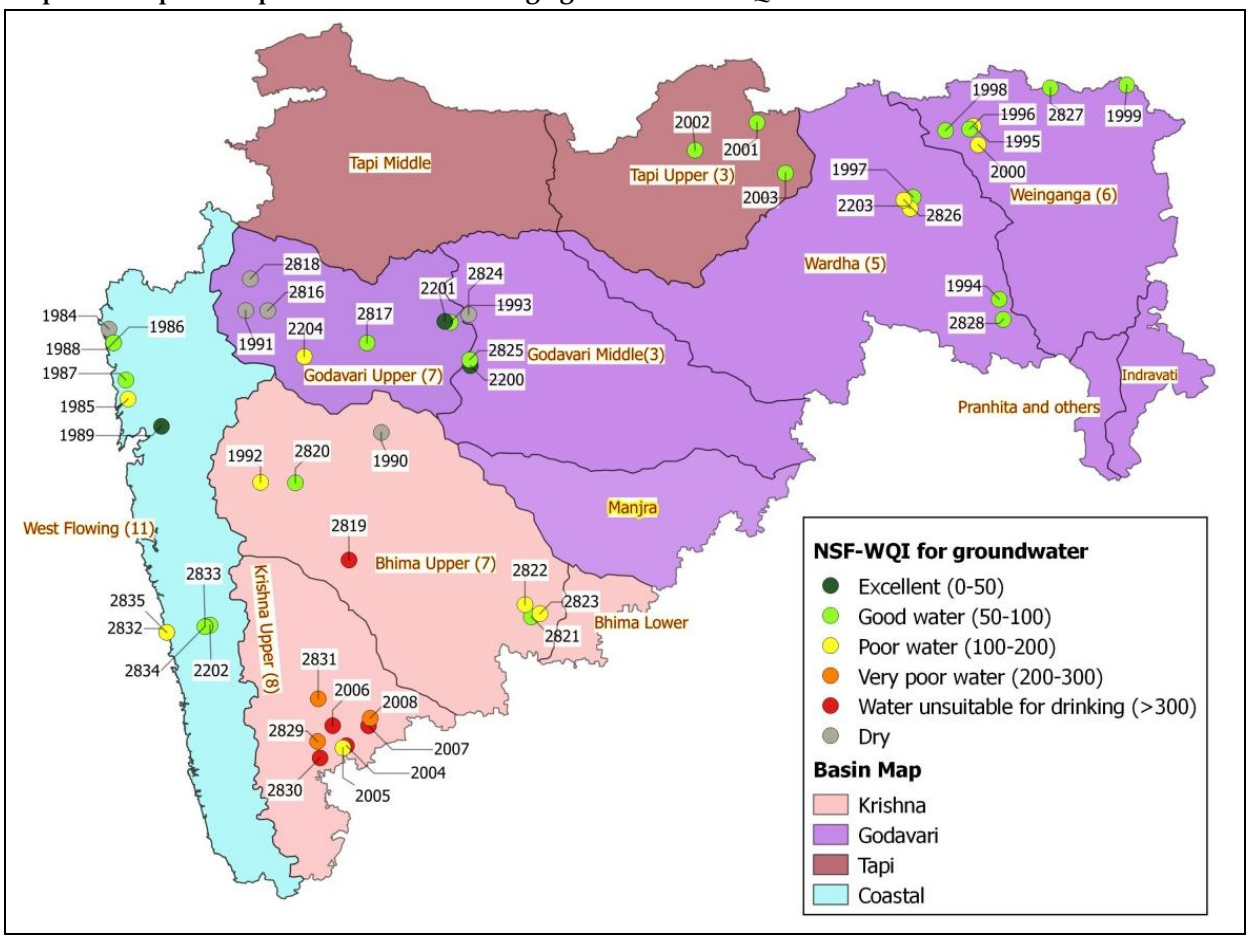
Station Code	River/ Nallah	StationName	Village	Taluka	District
1190	Bhima	D/s of Bundgarden; Pune.	Yerwada	Haweli	Pune
1212	Wardha	Rajura bridge	Rajura	Chandrapur	Chandrapur
1913	Purna	Dhupeshwar at U/s of Malkapur Water works.	Malkapur	Akola	Akola
2155	Purna	D/s of confluence of Morna	Andura	Balapur	Akola
2168	Mithi	Near bridge	Mahim	Bandra	Mumbai
2174	Wardha	D/s of ACC	Ghuggus	Chandrapur	Chandrapur
2176	Wainganga	D/s of Gaurav Paper Mills Near Jackwell	Bramhpuri	Chandrapur	Chandrapur
2191	Mutha	Sangam Bridge Near Ganpathi Ghat	Shivaji Nagar	Pune	Pune
2192	Mula-Mutha	Mundhwa Bridge	Mundhawa	Haweli	Pune
2193	Mula	Aundh Bridge	Aundhgaon	Haweli	Pune
2194	Mula	Harrison Bridge near Mula -Pawana Sangam	Bopodi	Haweli	Pune
2675	Morna	D/s. of Railway Bridge	Akola	Akola	Akola
2678	Mutha	Near Veer Savarkar Bhavan	Pune M.C	Pune	Pune
2679	Mutha	Deccan Bridge; Pune	Deccan	Pune	Pune
2680	Mutha	Khadakvasla Dam Pune	Khadakvasla	Haweli	Pune
2690	Pawana	Kasarwadi Pune	Kasarwadi	Haweli	Pune
2695	Pedhi	Road Bridge at Dadhi-Pedhi	Asegaon	Chandur Bazar	Amravati
2698	Penganga	D/s of Isapur Dam	Isapur	Pusad	Yavatmal
2719	Wardha	D/s. of Erai River	Hadasti	Chandrapur	Chandrapur
2782	Nallah	Rabodi Nalla	Rabodi	Thane	Thane
2783	Nallah	Colour Chem Nalla	Majiwada	Thane	Thane
2784	Nallah	Sandoz Nalla	Sandozbaug	Thane	Thane
2785	Nallah	BPT Navapur	Navapur	Palghar	Thane
2786	Nallah	Tarapur MIDC Nalla; near sump No.1	MIDC Tarapur	Palghar	Thane
2787	Nallah	Tarapur MIDC Nalla	MIDC Tarapur	Palghar	Thane
2788	Nallah	Tarapur MIDC Nalla near sump-III	MIDC Tarapur	Palghar	Thane
2789	Nallah	D/s of Alkai Mandir; Solapur	Aklai	Malshiras	Solapur

Ground water Quality

MPCB, monitors the ground water quality of 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. The ground water quality analysis for the year 2014-15 has been done for 45 stations as data for 5 stations (1990, 1991, 1984, 2816, and 2818) was not available owing to some technical reasons. The water quality of Kolhapur district was recorded to be polluted throughout the year and the WQI indicated that the ground water in that location was 'Unsuitable for drinking'. Kolhapur district was followed by Sangli district which recorded WQI in the 'Very poor' category for the year 2014-15.

The pH levels for all ground WQMS were observed in range of 6.5-8.5 except for bore well at Akola district. The bore well at Akot taluka of Akola district is recorded as alkaline with pH 8.6. The levels of Fluoride were found to exceed the permissible limit (0.6-1.2 mg/l) in taluka of Paithan-1.5 mg/l (Aurangabad) and Gangapur- 1.4 mg/l - (Aurangabad). The levels of total hardness in Barmati taluka of Pune is noted to be 1600 mg/l which exceeds almost 5 times the standard (300 mg/l) limits. The levels of total hardness also exceeds in range of 1.5 to 3.5 times in Kolhapur, Ratnagiri, Nagpur, Sangli, Ahmadnagar and Wardha districts.

Map No. 2: Spatial representation for average groundwater WQI



Introduction

Water Pollution

Any change in the physical, chemical and biological properties of water that has a harmful effect on living things is termed as 'water pollution' (WHO 1997)[2]. In India, almost 70 percent of its surface water resources and most of its groundwater reserves are contaminated by biological, toxic, organic and inorganic pollutants[3].

Water pollution results from various point sources such as industrial effluents and domestic waste, and non-point sources such as fertilizer and pesticide run-offs in rural areas from the agricultural fields. It is estimated that amount of wastewater produced annually is about 1,500 km^3 which is six times more water that exists in all the rivers of the world.[4] As per Central Pollution Control Board (CPCB), 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[5]. Along with human activities, various micro-biological agents like bacteria, viruses and protozoa also cause water pollution which may cause various water-borne diseases. Based on the set of hazards the present pollutants are can be classed into eight categories: petroleum products, pesticides and herbicides, heavy metals, hazardous wastes, excess organic matter, sediment, infectious organisms, thermal pollution. [6]

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. The annual replenishable ground water resource of country has been estimated as 433 billion cubic meter (bcm) out of which 33 bcm is available in Maharashtra state.[7] Growing demand for water in agriculture, industrial and domestic sectors has brought problems of over-exploitation of the groundwater resource resulting in continuous decline in groundwater levels. In Maharashtra, out of 353 assests of groundwater, 19 are semi critical, 1 is critical and 9 are over exploited.[8]

The effects of water pollution are not only devastating to humans but also to flora and fuana Water pollution can also significantly increase the rate of algal blooms which can cause depletion of oxygen in the water affecting the aquatic life. In India, about one third of deaths of children (0-5 years) are due to diarrhoea and pneumonia[9]. Water contaminated with nitrate can lead to methemoglobinemia, a condition where nitrates are converted into nitrites in the digestive system, impairing the ability of blood to carry oxygen. The consumption of water contaminated with pesticides can result in cellular and Deoxyribonucleic Acid (DNA) damage, suppression on immune system, cancers, tumours and lesions on fish and animals. Physical deformaties such as hooked beaks in birds and thinning of egg shell can occur in

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[2] R.Gambhir, *Water Pollution: Impact of Pollutants and New Promising Techniques in Purification Process*

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

[4] Pacific Institute, *World water quality facts and statistics*.

[5] Central Pollution Control Board, *Status of Sewage treatment plant in Ganga basin*

[6] *http://www.oocities.org/pollution_nirantar/water_pollution.htm*

[7] India, WRIS *State-Wise Ground Water Resources Availability, Utilization and Stage of Development, India*

[8] Ministry of water resources, *Groundwater year book 2013-14*

[9] Unicef, *Water in India:Situation and Prospects*

avifauna.[10] The consumption of polluted water may lead to not only poisoning of humans, animals, birds, but also disturbs the fragile aquatic and riparian ecosystem.

Dumping of solid wastes is also an important factor resulting in deterioration of the groundwater quality. It is noted that more than 90% of the Municipal Solid Waste (MSW) generated in India is directly dumped on land in an unsatisfactory manner[11]. Solid waste includes all the discarded solid materials from commercial, municipal, industrial, and agricultural activities. Surface water percolating through the waste can dissolve out or leach harmful chemicals that are then carried away from the dumpsites in surface or subsurface runoff which percolates through the soil and reaches the groundwater thus resulting in groundwater pollution. Direct dumping of sewage in rivers, seas, and lakes results in the accumulation of toxic substances which affects the food chain of birds and animals[12].

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 becomes very essential. Realising the gravity of the issue, Ministry of Environment and Forests (MoEF), Government of India, under a policy decision enacted at The Water (Prevention and Control of Pollution) Act in 1974, to provide prevention and control of water pollution, and for maintaining or restoring of wholesomeness of water in the country. Under the Act, MoEF has established and delegated the powers and functions to CPCB. Further, The Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide the levy and collection of a cess/tax on water consumed by stakeholders operating and carrying out certain types of industrial activities.

National Water Quality Monitoring Program

The Central Pollution Control Board (CPCB) in collaboration with State Pollution Control Board (SPCB) has established a network of monitoring stations on rivers across the country. Presently, 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 carry out water quality monitoring under the United Nation's, Global Environment Monitoring System (GEMS) Water Programme under 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. Water samplesare

[10] A.Agrawal & R.Pandey, *Water Pollution with Special Reference to Pesticide Contamination in India*, 2010
[11] R.Chatterjee, *Municipal Solid waste management in Kohima city*, India, 2010
[12] N.Raman & D.Narayan, *Impact of solid waste effect on groundwater and soil qualitynearer to Pallavaram solid waste landfill site in Chennai*, 2008

being analysed for 28 parameters consisting of physico-chemical and bacteriological parameters for ambient water samples apart from field observations[13].

Monitoring Network

CPCB has established National water quality monitoring programme for monitoring stations across the country. The present network comprises of 2500 stations in 28 states and 6 Union Territories spread over the country.[14]The various water bodies and the correspondingnumber of monitoring stations under the network of National water quality monitoring programme is represented in

Figure No. 2.

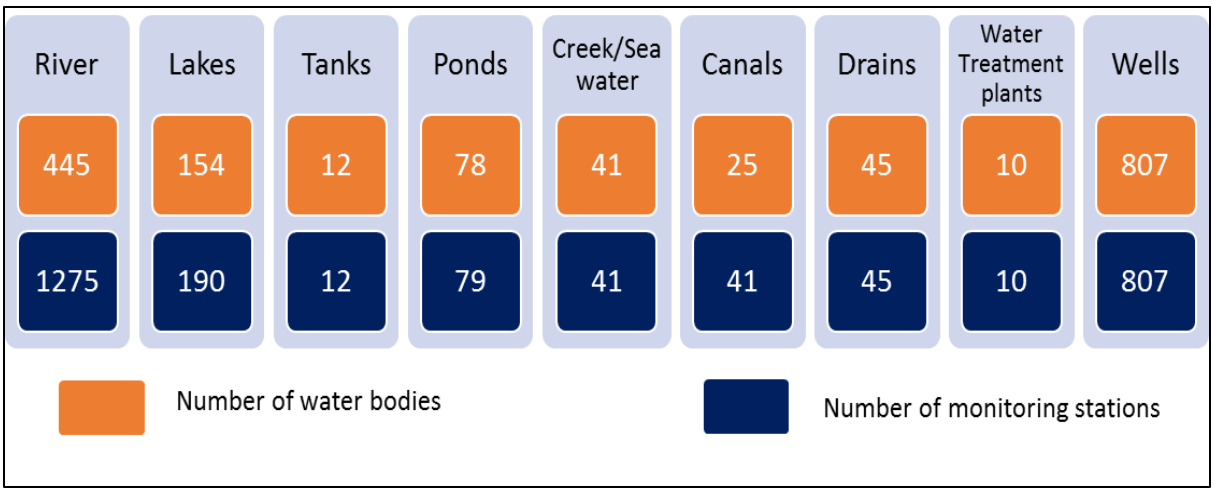


Figure No. 2 National Water Quality Monitoring Programme (NWMP) Network

Source: CPCB Envis

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

[14] CPCB Envis

Water Quality Monitoring in Maharashtra

Located on the west coast of India, Maharashtra is the second state in India in terms of population (11.24 crores)[15] and the third largest in terms of area (30.7Mha).[16]. The total geographical area of the state is divided into 5 river basins, namely Godavari, Tapi, Narmada, Krishna and West flowing rivers of the Konkan region.

In Maharashtra, 55% of the dependable yield is received from four river basins (Krishna, Godavari, Tapi and Narmada) whereas remaining 45% of state's water resources is from West Flowing rivers[17]. The 75% dependable yield from river basin in Maharashtra is represented in Figure No. 3. Maharashtra tops the list of Indian states and union territories in terms of infrastructure available for monitoring water quality (Figure No. 4). As per Ministry of Drinking Water and Sanitation, 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.[18]

In Maharashtra, water quality is monitored by various agencies namely Hydrology Project (SW), Groundwater Surveys & Development Agency (GSDA), 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 (Act No.29 of 1986).

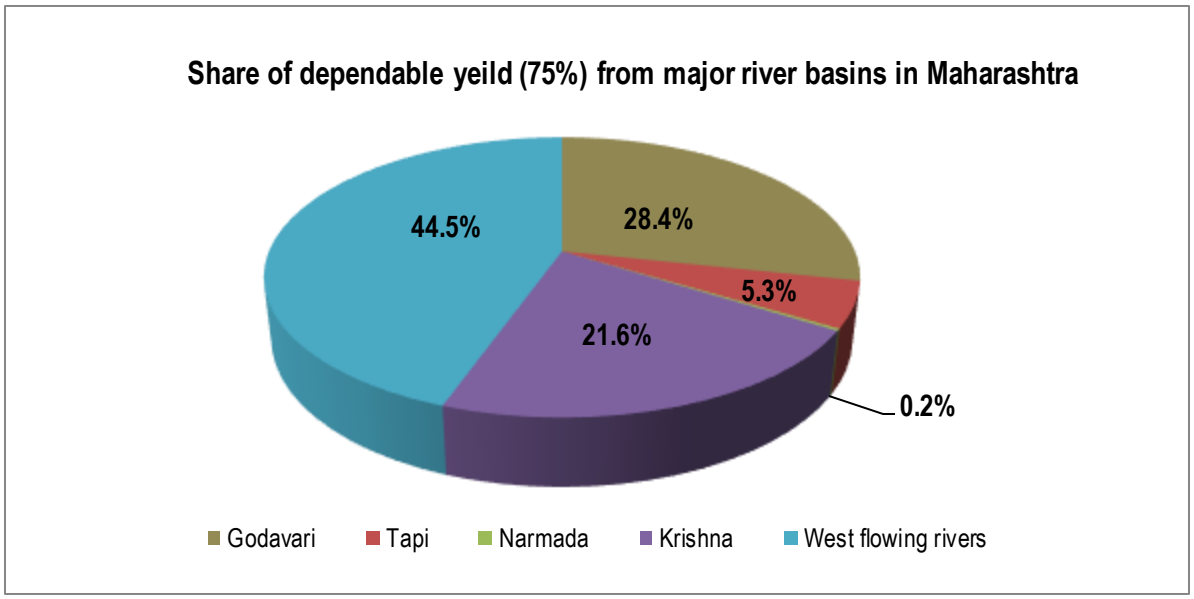


Figure No. 3: Share of dependable yeild (75%) from major river basins in Maharashtra

Source: www.mwrra.org

[15] Census 2011
[16] Centre for Technology Alternatives for Rural Areas, Water resources of Maharashtra State
[17] Maharashtra Water Resources Regulatory Authority
[18] Central Pollution Control Board 2011-12, *National Water Monitoring Programme*

Monitoring network in Maharashtra – GEMS and MINARS

The water quality testing under the GEMS and MINARS program under NWMP in Maharashtra is monitored by MPCB (state nodal agency). Monitoring is carried out at 250 station, Table No. 4, (156 are on rivers, 34 on sea/creek, 10 on nallahs and 50 groundwater), the highest across all states of Maharashtra (Figure No. 4). MPCB has infrastructure to monitor 44 parameters including field observations, general parameters, core parameters and trace metals (Table No. 5). The water samples are monitored with a monthly and six monthly frequency for surface and groundwater stations respectively.

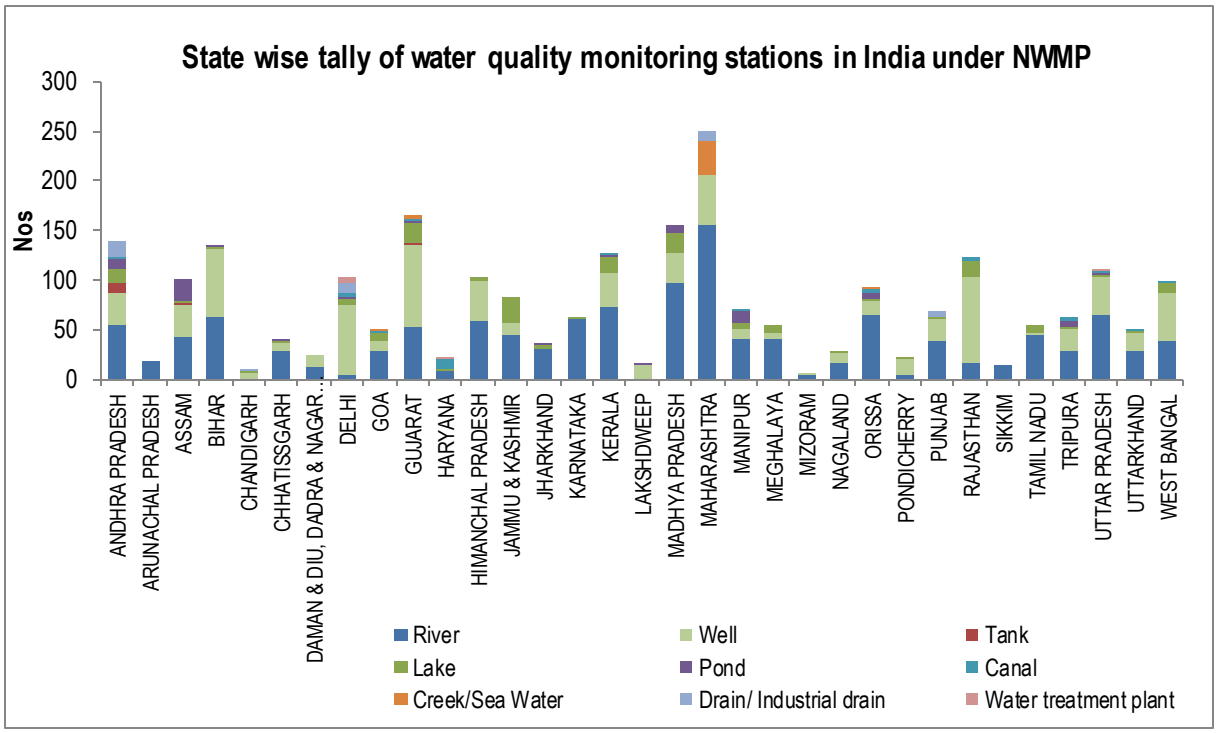


Figure No. 4: State wise tally of water quality monitoring stations in India under NWMP (2011-12)

Data Source: CPCB, 2012

Table No. 4: Basin and water body typewise tally of WQMS in Maharashtra

Water Body	Basins				Total
	Tapi	Godavari	Krishna	West Flowing Rivers	
Rivers	20	48	53	35	156
Sea/creek	0	0	0	34	34
Nallah	0	1	1	8	10
Borewell	1	8	10	5	24
Dugwell	1	12	5	6	24
Hand pump	0	1	0	0	1
Tube well	1	0	0	0	1
Total	**23**	**70**	**69**	**88**	**250**

Table No. 5: 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		Ammonia-N	Hardness as CaCO3	Iron
8		Fecal Coliform	Calcium CaCO3	Arsenic
9		Total coliform	Magnesium CaCO3	Mercury
10			Sulphate	Cyanide
11			Sodium	
12			Total dissolved solids	
13			Total fixed solids	
14			Total suspended solids	
15			Phosphate	
16			Boron	
17			Potassium	
18			Fluoride	

Methodology

The comprehensive data sets recorded by WQMS across the state were organised basin wise for evaluation for both surface and groundwater quality. The water monitoring stations were further arranged from upstream to downstream in order to study basin wise trend of water quality. The classification of the various rivers, their basins and subbasins considered in this report is presented in Table No. 6. The Water quality index is determined by calculating the basic parameters like pH, BOD (mg/l), DO (mg/l to %) and FC (MPN/100ml). The WQI has been calculated separately for surface water and groundwater water samples using the formula provided by National Sanitation Foundation (NSF) and the relative weights modified by CPCB. To present the data in a spatial format GIS (Geographical Information System) maps were generated.

Table No. 6: Classification of the rivers considered under basins and sub basins in the report

Basin	Sub basins	Name of Rivers	Number of WQM stations
Tapi	Tapi Upper	Tapi, Purna, Pedhi	8
	Tapi Middle	Tapi, Girna, Rangavali, Amravati, Bori, Burai, Gomai, Hiwara, Kan, Mor, Panzara, Titur, Waghur, Waghur	15
Godavari 1	Godavari Upper	Godavari, Chikhali nalla, Darna	23
	Godavari Middle	Godavari, Bindusara	11
	Manjra	Godavari, Manjra	2
Godavari 2	Wardha	Wardha, Penganga	17
	Weinganga	Kolar, Kanhan, Wainganga	16
	Pranhita and others	Wainganga	1
Krishna	Bhima Upper	Bhima, Nira, Chandrabhaga, Mutha, Ghod, Indrayani, Pawana, Sina, Vel, Nalla, Mula-Mutha	43
	Krishna Upper	Krishna, Panchganga, Koyna, Urmodi, Venna	26
West Flowing rivers		Kalu, Ulhas, Patalganga, Bhatsa, Vashishti, Mithi, Kundalika, Savitri, Amba, Kundalik, Muchkundi, Surya, Tansa, Vaitarna, Rabodi nalla, Colour Chem nalla, Sandoz nalla, BPT Navapur, Tarapur MIDC nalla, Pimpal-Paneri nalla	54
Saline			34
Total			**250**

Spatial Maps

Sub -basin level maps

Of the 5 major river basin, Narmada basin comprises of just 0.5%[19] 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[20] (Central Ground Water Board), Ministry of Water Resources Government of India. The imageries, for the basins of Tapi, Krishna and Godavari, were downloaded and upon geo-referencing those, the maps were 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 like temperature, dissolved oxygen, pH, conductivity, BOD, COD, Fecal Coliform and so on were shared by MPCB in soft copy for the years 2008 to 2012. 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 in the spread sheets.

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) for 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 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, USA 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

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

- 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;

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

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 as per CPCB are given in Table No. 7 and the equations used to determine the sub index values are given Table No. 8. 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. 9.

Table No. 7: 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. 8: 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

Table No. 9: Water Quality Classification and Best Designated use

WQI	Quality classification	Class by CPCB	Class by MPCB	Remarks	Colour code
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	

Sample calculation for determining Surface WQI

Parameters considered in the year 2014-15- Biological Oxygen Demand (BOD), Dissolved Oxygen (DO), pH, Fecal Coliform (FC)

Station Name	:	Wainganga River at Ashti	Station Code	:	11
Sub basin	:	Pranhita	Basin	:	Godavari
BOD	:	6.9 mg/l	DO	:	5mg/l
FC	:	70 MPN/100 ml	pH	:	8.66

Formula

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

Where;

Ii= sub index for water quality parameter

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

P= number of water quality parameters

Sub index for BOD

BOD value = 6.9 mg/l

Since 6.9 lies in range (0-10), the corresponding formula is used from Table No. 8

Sub Index (BOD) = 96.67 – 7 X (BOD value)

= 96.67 – 7 X 6.9

= 48.37 X Modified Weights by CPCB for BOD (Table No. 7)

= 48.37 X 0.19

= 9.1903

Sub index for Dissolved Oxygen (DO)

DO value = 5 mg/l

DO (saturation %) = 5 /6.5 X 100 [6.5 has been taken as constant as per DO vs temp]

= 76.92308

Since 76.92 lies in range (40-100), the corresponding formula is used from Table No. 8

Sub Index (DO) = (-13.55) + 1.17 X % Saturation DO value

= (-13.55) + 1.17 X 76.92

= 76.4464 X Modified Weights by CPCB for DO (Table No. 7)

= 76.4464* 0.31

= 23.69839

Sub index for Fecal Coliform (FC)

Fecal Coliform value = 70 MPN/100ml

Since 70 lies in range (0-10^3), the corresponding formula is used from Table No. 8

Sub Index (FC) = 97.2 - 26.6 X log FC

= 97.2-26.6 X log 70

= 48.12039 X Modified Weights by CPCB for FC (Table No. 7)

= 48.12039 X 0.28

= 13.47371

Sub Index for pH

pH value = 8.66

Since 8.6 lies in range (7.3-10), the corresponding formula is used from Table No. 8

Sub Index (pH) = 316.96 - 29.85 X (pH)

= 316.96-29.85 X 8.66

= 58.459 X Modified Weights by CPCB for pH (Table No. 7)

= 58.459 X 0.22

= 12.86098

WQI of Wainganga River at Ashti

WQI = $\sum$ (sub –index of all parameters)

= $\sum$ (9.1903+23.69839+13.47371+12.86098)

= 59

Quality Classification: Medium to Good

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[21]. The relative weights of the same have been determined (

Table No. 10) for the parameters monitored and recorded by MPCB for the water samples monitored in the year 2014-15.These weights indicate the relative harmfulness when present in water. The maximum weight assigned is 5 and minimum is 1.

Table No. 10: Relative Weight of chemical parameters used for calculating WQI for Ground water

Chemical Parameters	Indian Standards for Drinking Water Quality[22]		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

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

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

The maximum weight of 5 has been assigned to the parameter nitrate due to its major importance in water quality while, magnesium is given the minimum weight of 1 as may notbe harmful.

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. 11.

Table No. 11: 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	

Sample Calculation for determining Ground WQI

Station name : Bore well at Parvati Industrial Estate, Yadrav, Kolhapur

Station code	: 2004	Sub basin	: Krishna Upper	Basin	: Krishna
Calcium	: 235 mg/l	Chlorides	: 473 mg/l	Fluoride: BDL	
Magnesium	: 925 mg/l	Nitrate	: 0.62 mg/l	Sulphate: 278.5 mg/l	
pH	: 6.9	TDS	: 2166 mg/l	TH	: 1160 mg/l

Formula

$$\text{WQI} = \sum_{i=1}^{n=9} qi.wi$$

Where;

Wi = relative weight

qi = quality rating

wi = relative of each weight

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

Where;

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)

Parameters considered for groundwater monitoring: pH, Total hardness, Calcium, Magnesium, Chloride, Total Dissolved Solids, Fluoride and Sulphate.

*The relative weight (wi) without iron, manganese and Bicarbonate has been considered in calculation.

Sub Index for pH

pH = 6.9

Sub index (pH) = Concentration /Standard X 100

= 6.9/7.5 X 100

= 92 X relative weight (Table No. 10)

= 92 X 0.13333

= 12.26636

Sub index for Total hardness

Total hardness = 1160

Sub index (TH) = Concentration /Standard X 100

= 1160 / 300*100

= 386.6667 X relative weight (Table No. 10)

= 386.667 X 0.06667

= 25.77907

Sub index Calcium

Calcium = 235

Sub index (Calcium) = Concentration /Standard *100

= 235 / 75 X 100

= 313.3333 X relative weight (Table No. 10)

= 313.3333 X 0.0666

= 20.88993

Sub index for Chloride

Chloride = 473

Sub index (Chloride) = Concentration /Standard X 100

= 473 / 250 X 100

= 189.2 X relative weight (Table No. 10)

= 189.2 X 0.1

= 18.92

Sub index for Fluoride

Fluoride = 0

Sub index (Fluoride) = Concentration /Standard X 100

= 0 / 1 X 100

= 0 X relative weight (Table No. 10)

= 0 X 0.1333

= 0

Sub index for Magnesium

Magnesium = 925

Sub index (Mg) = Concentration / Standard X 100

= 925 / 30*100

= 3083.333 X relative weight (Table No. 10)

= 3083.333 X 0.06667

= 205.5658

Sub index for Nitrate

Nitrate = 0.62

Sub index (Nitrate) = Concentration / Standard X 100

= 0.62 / 45 *100

= 1.377778 X relative weight (Table No. 10)

= 1.377778 X 0.16667

= 0.229634

Sub index for Sulphate

Sulphate = 278.5

Sub index (Sulphate) = Concentration / Standard X 100

= 278.5 / 200 X 100

= 139.25 X relative weight (Table No. 10)

= 139.25 X 0.13333

= 18.5662

Total Dissolved Solids

Total Dissolved Solids= 2166

Sub index (TDS) = Concentration / Standard X 100

= 2166 / 500 X 100

= 433.2 X relative weight (Table No. 10)

= 433.2 X 0.13333

= 57.75856

WQI of Bore well at Parvati Industrial Estate, Yadrav, Kolhapur

WQI = ∑ (sub –index of all parameters)

= ∑ (12.26636 + 25.77907 + 20.88993+ 18.92 + 0+ 205.5658 + 0.229634+ 18.5662 + 57.75856)

= 360

Quality Classification: Water Unsuitable for drinking

Surface Water Quality

Surface water is available in the form of rivers, lakes, ponds, canals and so on. However, rivers comprise the most important source of surface water. The surface water resources potential of India, is about 1869 Billion Cubic Meters (BCM). Due to various topographical constraints and uneven distribution over space and time, only about 690 BCM of surface water and 431 BCM of ground water can be used.[23] It has been estimated that due to increase in population between 2001 and 2011 in India, the per capita availability of water resources has reduced from 1,816 cubic meter to 1,544 cubic meter.[24] The stress on water resources is increasing rapidly due to the pressure from urbanization and industrialization. The pollution of water resources caused by discharge of sewage and industrial effluents in water bodies further deteriorate quality of water.

In order to have contionous vigilance check on water quality across the state, MPCB has installed WQMS (Water Quality Monitoring Stations) across the state.The total WQMS for year 2013-14 and 2014-15 are represented in the Table No. 12. Water quality is monitored per month across all the stations. The spatial presence of the stations is presented basin wise in the respective sections.

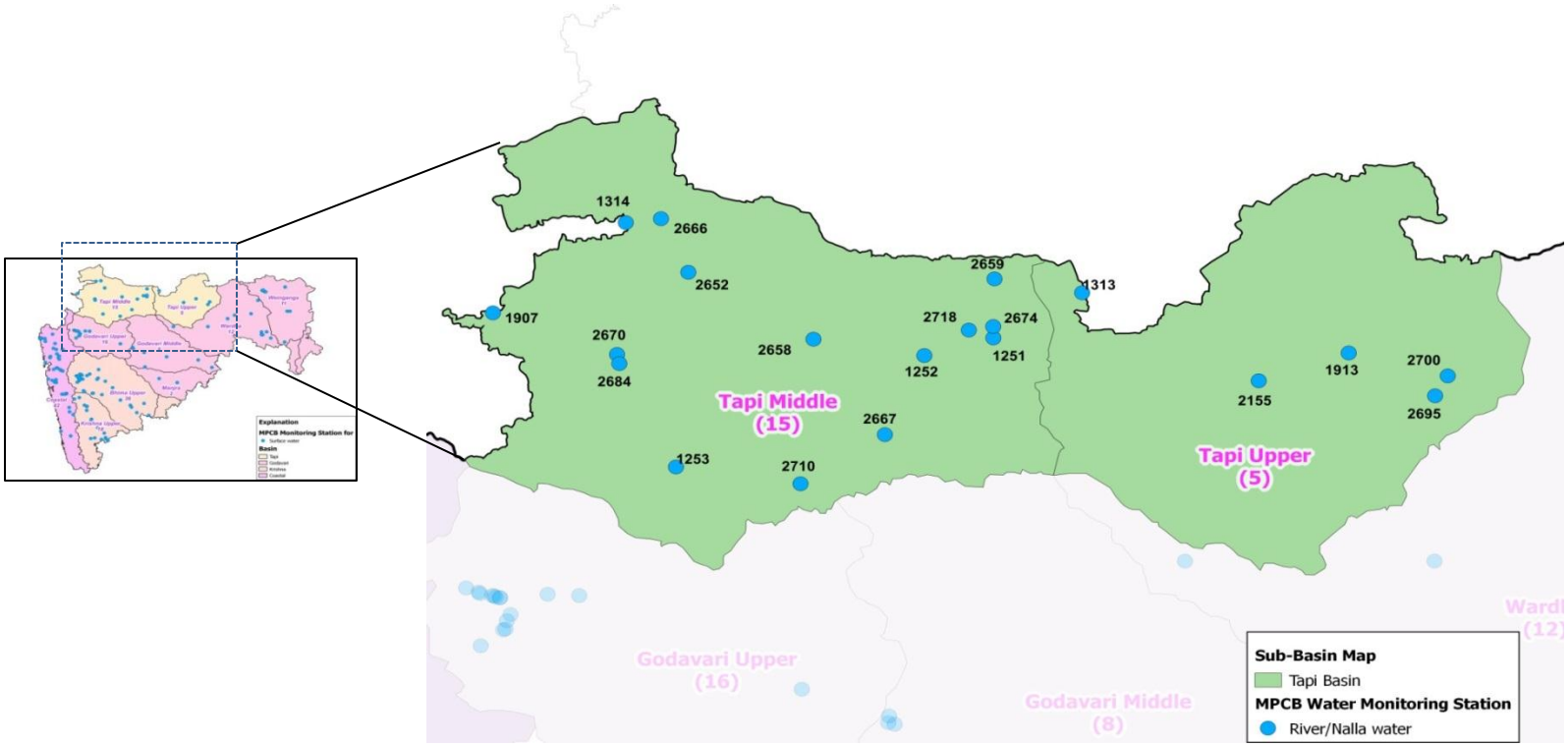
Table No. 12: List of monitoring stations across different type of water bodies under MPCB

Water quality monitoring stations	
Water Bodies	**2014-15**
Rivers	156
Sea and Creek	34
Nalla	10
Borewell	24
Dug well	24
Hand pump	1
Tube well	1
Total	250
Note:Data for stations codes- 1984, 1990, 1991, 2816, 2818 was not recorded for the year 2014-15	

The following section presents the illustrations of the parameters pH, DO, BOD and FC recorded across the 200 surface water quality monitoring 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.

[23] Central Water Comission, *Annual Report 2013-14*
24 Central Water Comission, *Water and related statistics*

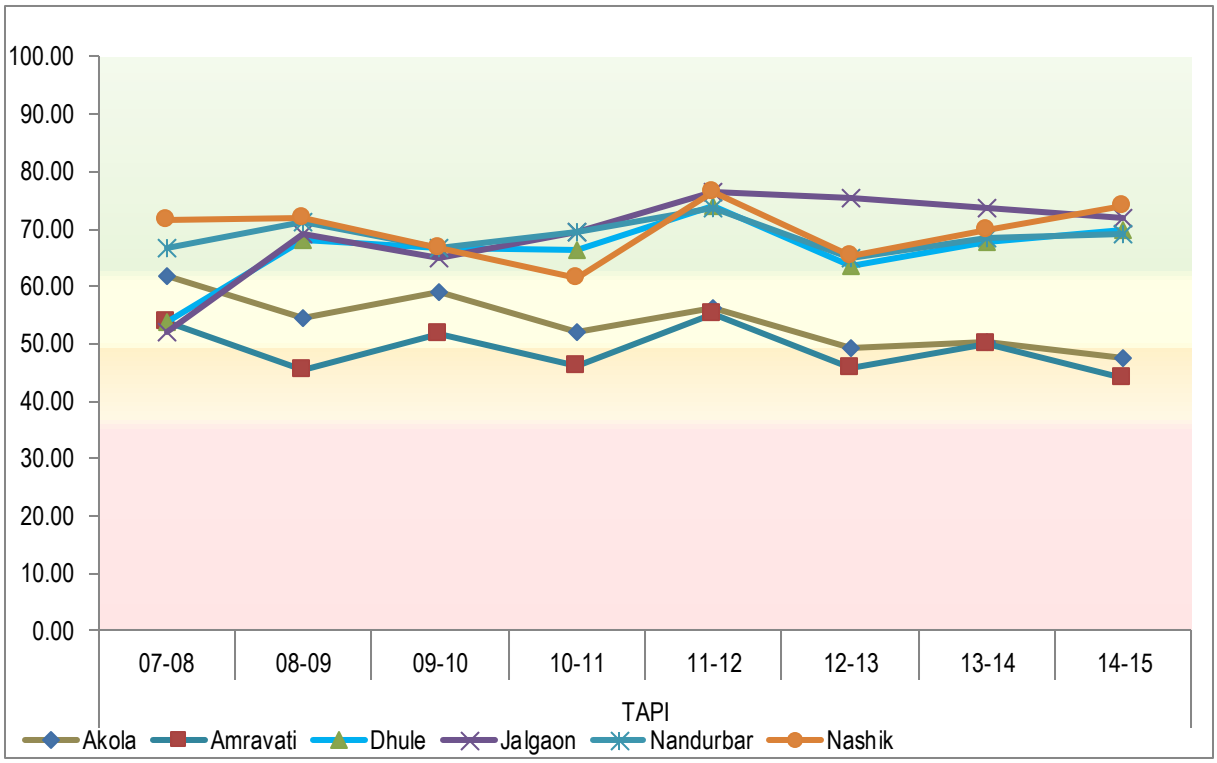
Tapi Basin



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

In Maharashtra, the Tapi Basin could be divided into two sub-basins Tapi Upper and Tapi Middle. There are a total of 20 surface water monitoring stations (5 on upper and 15 on middle) in Tapi river basin in Maharashtra. A list of the station and the codes has been provided below in Table No. 13

Tapi Basin (Intra Basin analysis)



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

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

Note:

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

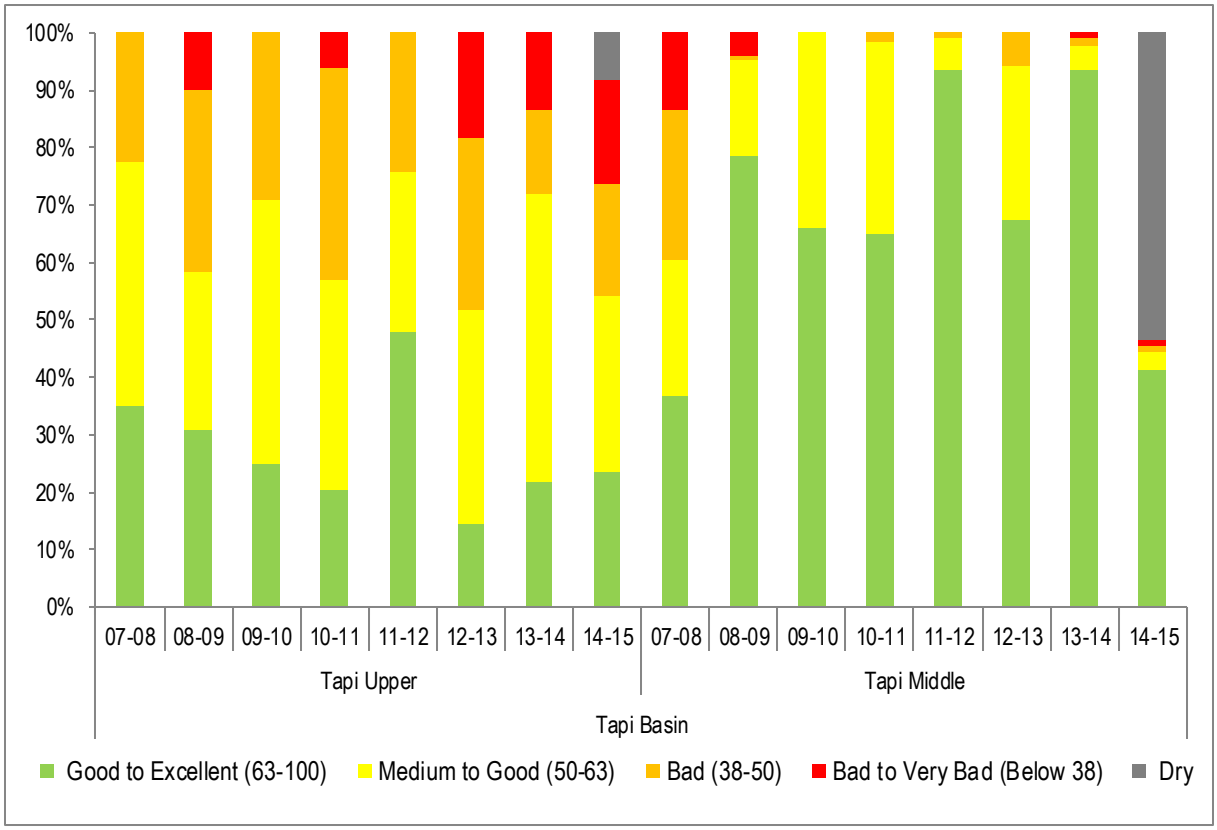
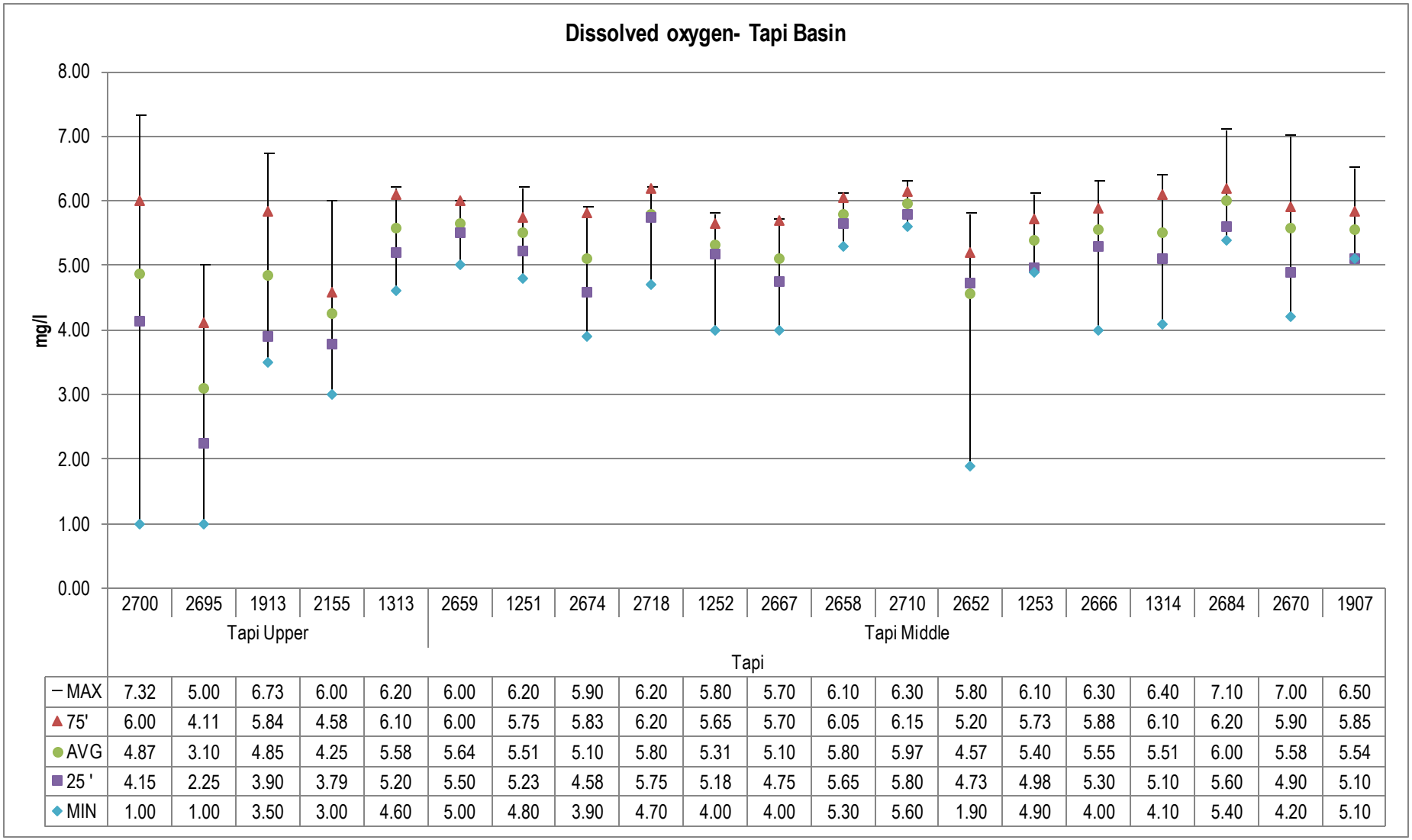


Figure No. 6: Trend of average occurrence for different category of WQI in Tapi basin

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

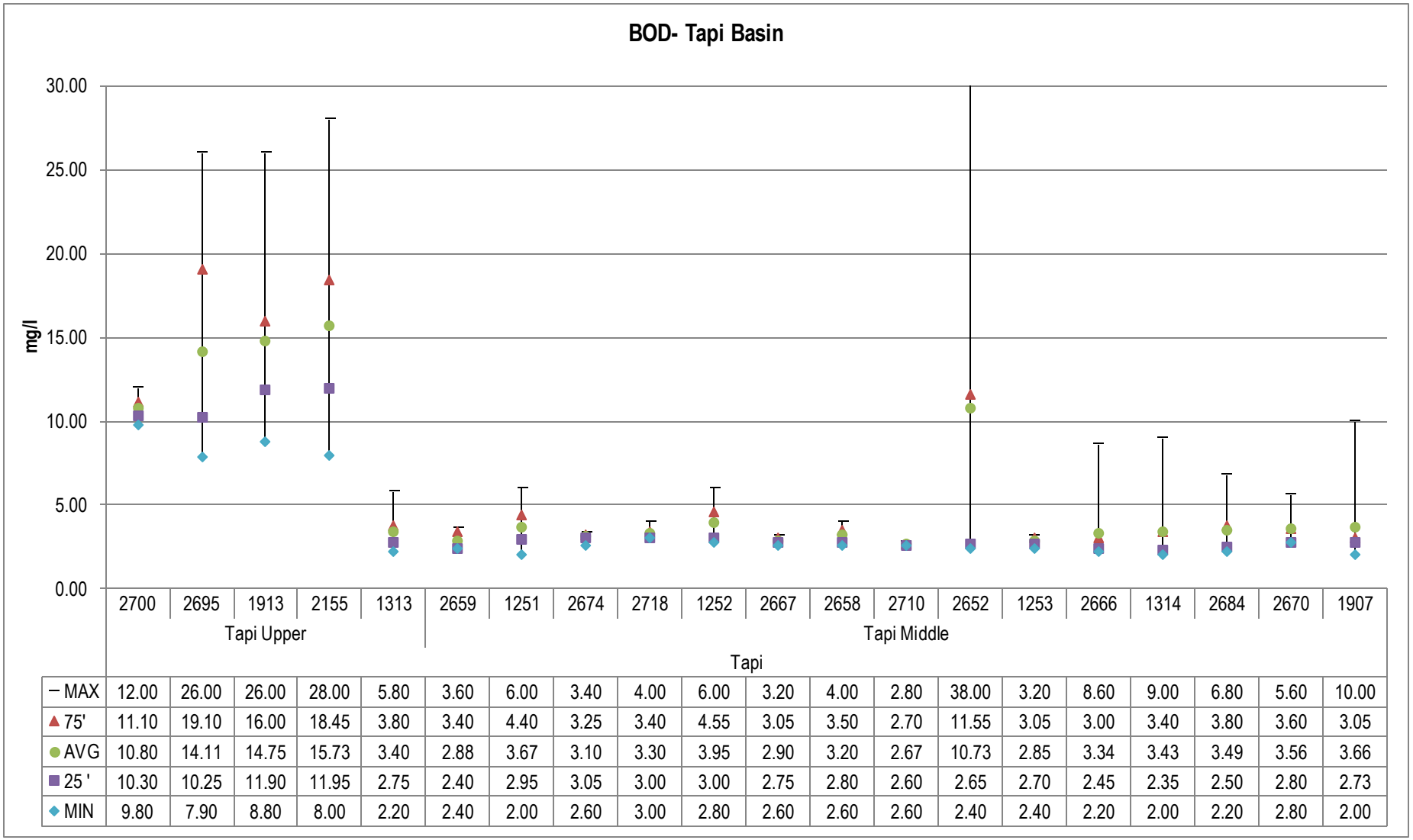
It is observed that among six districts, namely Akola, Amravati, Dhule, Jalgaon, Nandurbar and Nashik, the annual average WQI of Amravati and Akola were consistently in Bad to Medium category (i.e. WQI in range of 38-63) from 07-08 till 14-15. Whereas, Dhule (5 WQMS), Jalgaon (8 WQMS), Nandurbar (2 WQMS) and Nashik (1 WQMS) were Good to Excellent (i.e. WQI in range of 63-100). A slight deterioration in the WQI is observed in Nandurbar and Jalgoan district wheras improvement in WQI is noted in Nashik district.

The Tapi basin has 8 WQMS in Tapi Upper and 15 WQMS in Tapi Middle. From Figure No. 6, it can be noted that the average occurrence for Good to Excellent category of WQI in Tapi Middle is twice as compared to Tapi Upper..Hence the water quality of Tapi Middle is better as compared to Tapi Upper.



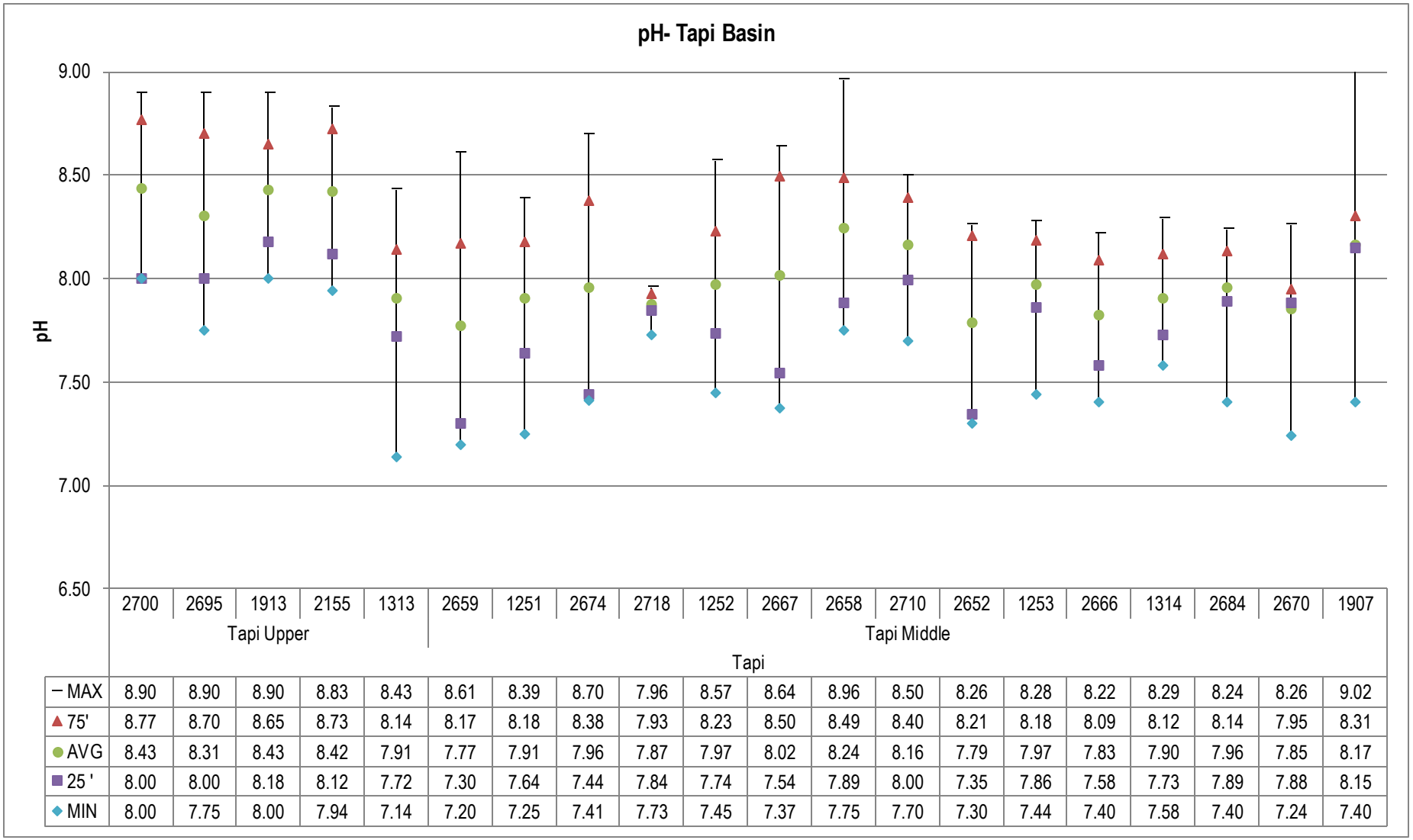
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
MAX	7.32	5.00	6.73	6.00	6.20	6.00	6.20	5.90	6.20	5.80	5.70	6.10	6.30	5.80	6.10	6.30	6.40	7.10	7.00	6.50
75'	6.00	4.11	5.84	4.58	6.10	6.00	5.75	5.83	6.20	5.65	5.70	6.05	6.15	5.20	5.73	5.88	6.10	6.20	5.90	5.85
AVG	4.87	3.10	4.85	4.25	5.58	5.64	5.51	5.10	5.80	5.31	5.10	5.80	5.97	4.57	5.40	5.55	5.51	6.00	5.58	5.54
25 '	4.15	2.25	3.90	3.79	5.20	5.50	5.23	4.58	5.75	5.18	4.75	5.65	5.80	4.73	4.98	5.30	5.10	5.60	4.90	5.10
MIN	1.00	1.00	3.50	3.00	4.60	5.00	4.80	3.90	4.70	4.00	4.00	5.30	5.60	1.90	4.90	4.00	4.10	5.40	4.20	5.10

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



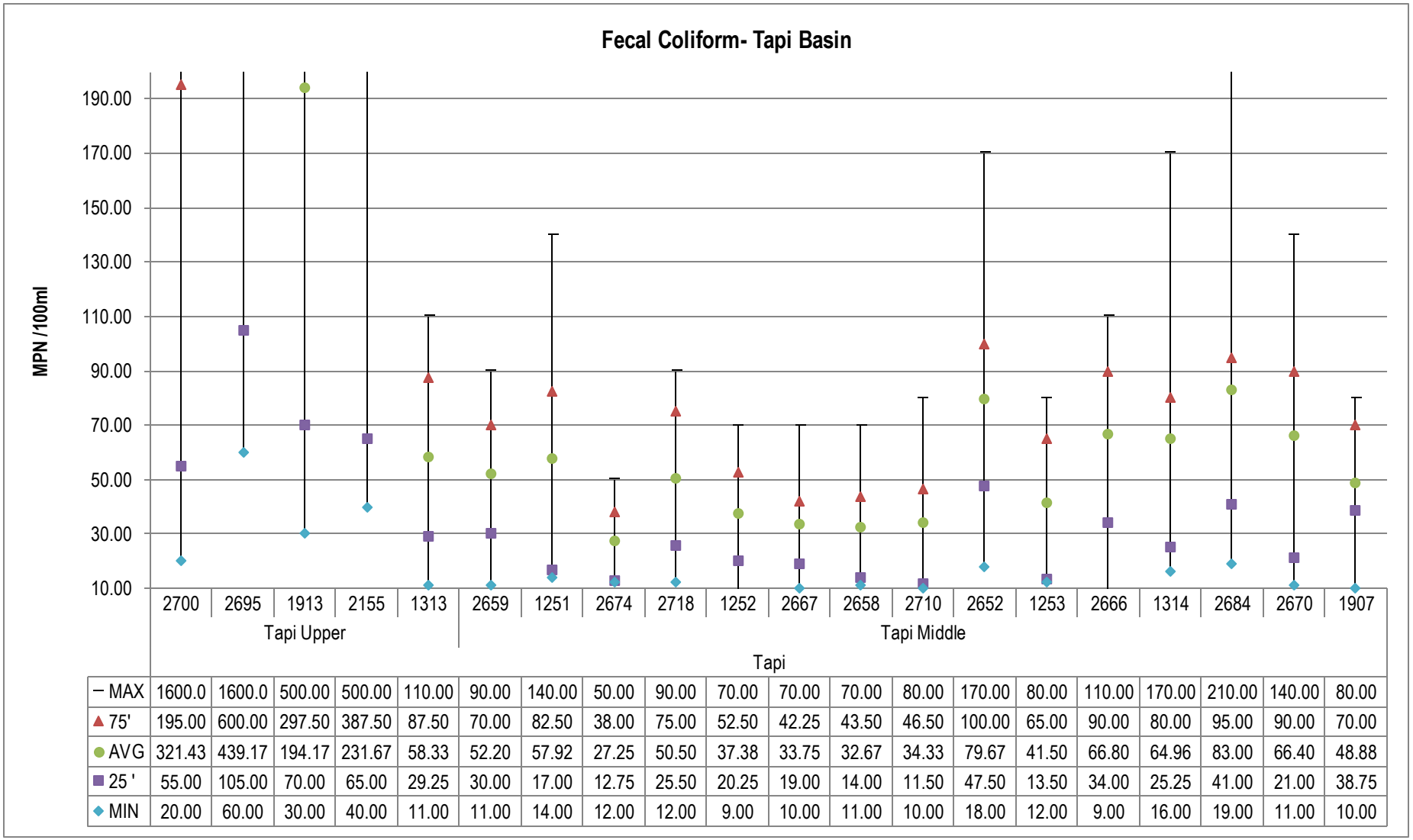
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
MAX	12.00	26.00	26.00	28.00	5.80	3.60	6.00	3.40	4.00	6.00	3.20	4.00	2.80	38.00	3.20	8.60	9.00	6.80	5.60	10.00
75'	11.10	19.10	16.00	18.45	3.80	3.40	4.40	3.25	3.40	4.55	3.05	3.50	2.70	11.55	3.05	3.00	3.40	3.80	3.60	3.05
AVG	10.80	14.11	14.75	15.73	3.40	2.88	3.67	3.10	3.30	3.95	2.90	3.20	2.67	10.73	2.85	3.34	3.43	3.49	3.56	3.66
25 '	10.30	10.25	11.90	11.95	2.75	2.40	2.95	3.05	3.00	3.00	2.75	2.80	2.60	2.65	2.70	2.45	2.35	2.50	2.80	2.73
MIN	9.80	7.90	8.80	8.00	2.20	2.40	2.00	2.60	3.00	2.80	2.60	2.60	2.60	2.40	2.40	2.20	2.00	2.20	2.80	2.00

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



	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
MAX	8.90	8.90	8.90	8.83	8.43	8.61	8.39	8.70	7.96	8.57	8.64	8.96	8.50	8.26	8.28	8.22	8.29	8.24	8.26	9.02
75'	8.77	8.70	8.65	8.73	8.14	8.17	8.18	8.38	7.93	8.23	8.50	8.49	8.40	8.21	8.18	8.09	8.12	8.14	7.95	8.31
AVG	8.43	8.31	8.43	8.42	7.91	7.77	7.91	7.96	7.87	7.97	8.02	8.24	8.16	7.79	7.97	7.83	7.90	7.96	7.85	8.17
25 '	8.00	8.00	8.18	8.12	7.72	7.30	7.64	7.44	7.84	7.74	7.54	7.89	8.00	7.35	7.86	7.58	7.73	7.89	7.88	8.15
MIN	8.00	7.75	8.00	7.94	7.14	7.20	7.25	7.41	7.73	7.45	7.37	7.75	7.70	7.30	7.44	7.40	7.58	7.40	7.24	7.40

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



	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
MAX	1600.0	1600.0	500.00	500.00	110.00	90.00	140.00	50.00	90.00	70.00	70.00	70.00	80.00	170.00	80.00	110.00	170.00	210.00	140.00	80.00
75'	195.00	600.00	297.50	387.50	87.50	70.00	82.50	38.00	75.00	52.50	42.25	43.50	46.50	100.00	65.00	90.00	80.00	95.00	90.00	70.00
AVG	321.43	439.17	194.17	231.67	58.33	52.20	57.92	27.25	50.50	37.38	33.75	32.67	34.33	79.67	41.50	66.80	64.96	83.00	66.40	48.88
25 '	55.00	105.00	70.00	65.00	29.25	30.00	17.00	12.75	25.50	20.25	19.00	14.00	11.50	47.50	13.50	34.00	25.25	41.00	21.00	38.75
MIN	20.00	60.00	30.00	40.00	11.00	11.00	14.00	12.00	12.00	9.00	10.00	11.00	10.00	18.00	12.00	9.00	16.00	19.00	11.00	10.00

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

Water Quality Index for WQMS in Tapi Basin

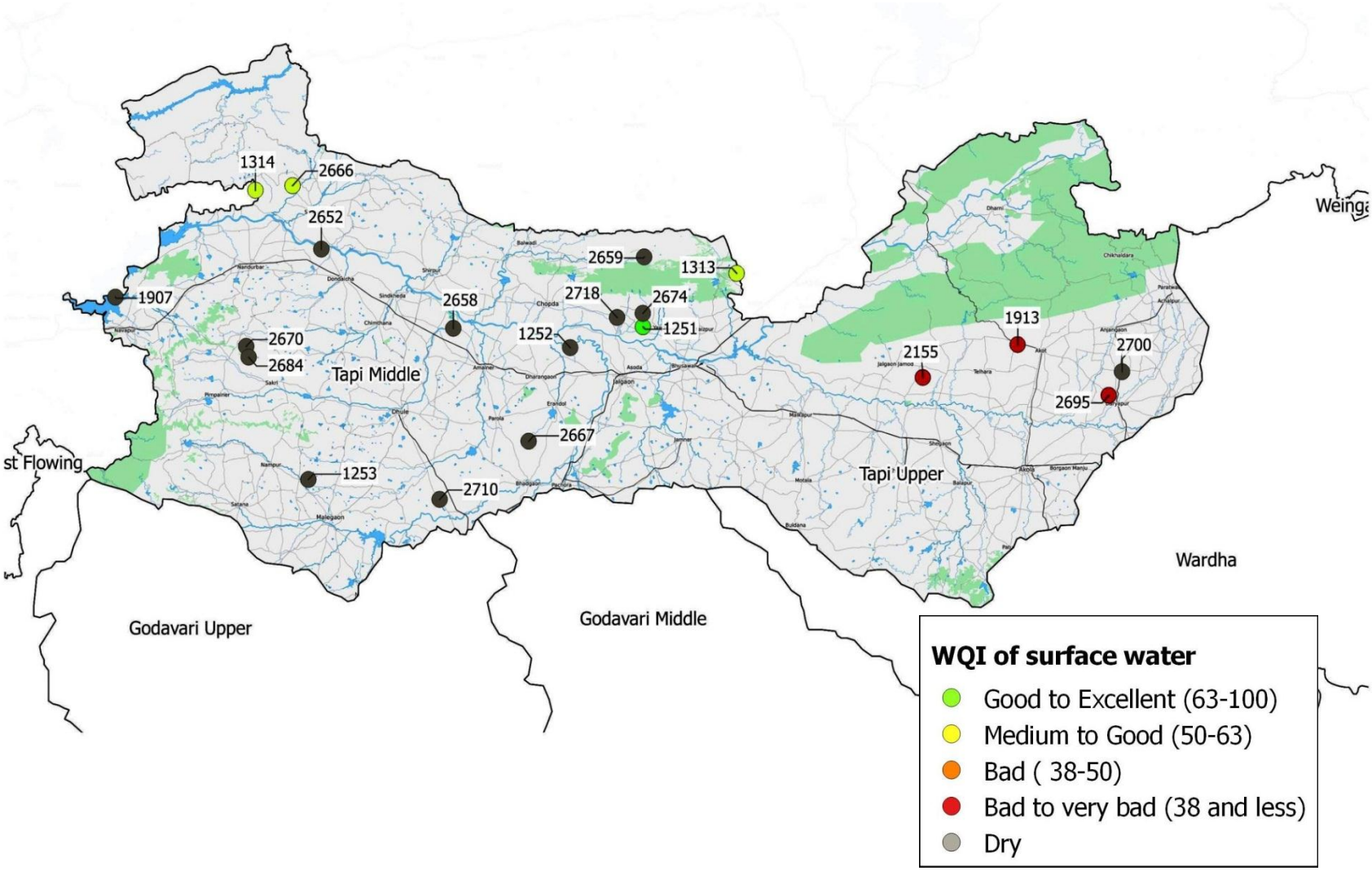
APR	Dry	32	28	31	54	Dry	79	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	54	56	Dry	Dry
MAY	Dry	20	17	15	30	Dry	79	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	28	29	Dry	Dry
JUNE	Dry	41	59	59	71	Dry	67	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	70	67	Dry	Dry
JUL	Dry	37	53	48	70	Dry	69	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	73	Dry	Dry
AUG	69	52	63	61	81	75	76	69	69	68	69	Dry	Dry	75	39	71	76	78	75	76
SEP	69	62	64	62	76	70	67	72	75	70	69	77	72	75	64	68	71	68	67	70
OCT	49	54	43	45	69	78	72	68	81	68	71	69	76	72	71	77	68	74	70	69
NOV	24	29	47	39	79	Dry	77	83	77	75	81	79	84	77	57	81	79	64	83	73
DEC	52	39	60	54	72	Dry	73	Dry	Dry	74	Dry	Dry	Dry	69	Dry	Dry	68	71	69	62
JAN	56	27	53	41	64	73	64	Dry	Dry	68	Dry	Dry	Dry	75	73	Dry	74	74	Dry	78
FEB	Dry	29	43	43	70	Dry	74	Dry	Dry	75	Dry	Dry	Dry	Dry	Dry	Dry	Dry	73	Dry	73
MAR	55	38	60	52	58	81	76	Dry	Dry	79	Dry	Dry	Dry	72	82	Dry	80	78	Dry	79
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2684	2652	1253	2666	1314	2670	1907
	TAPI UPPER					TAPI MIDDLE														

Legend				
Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

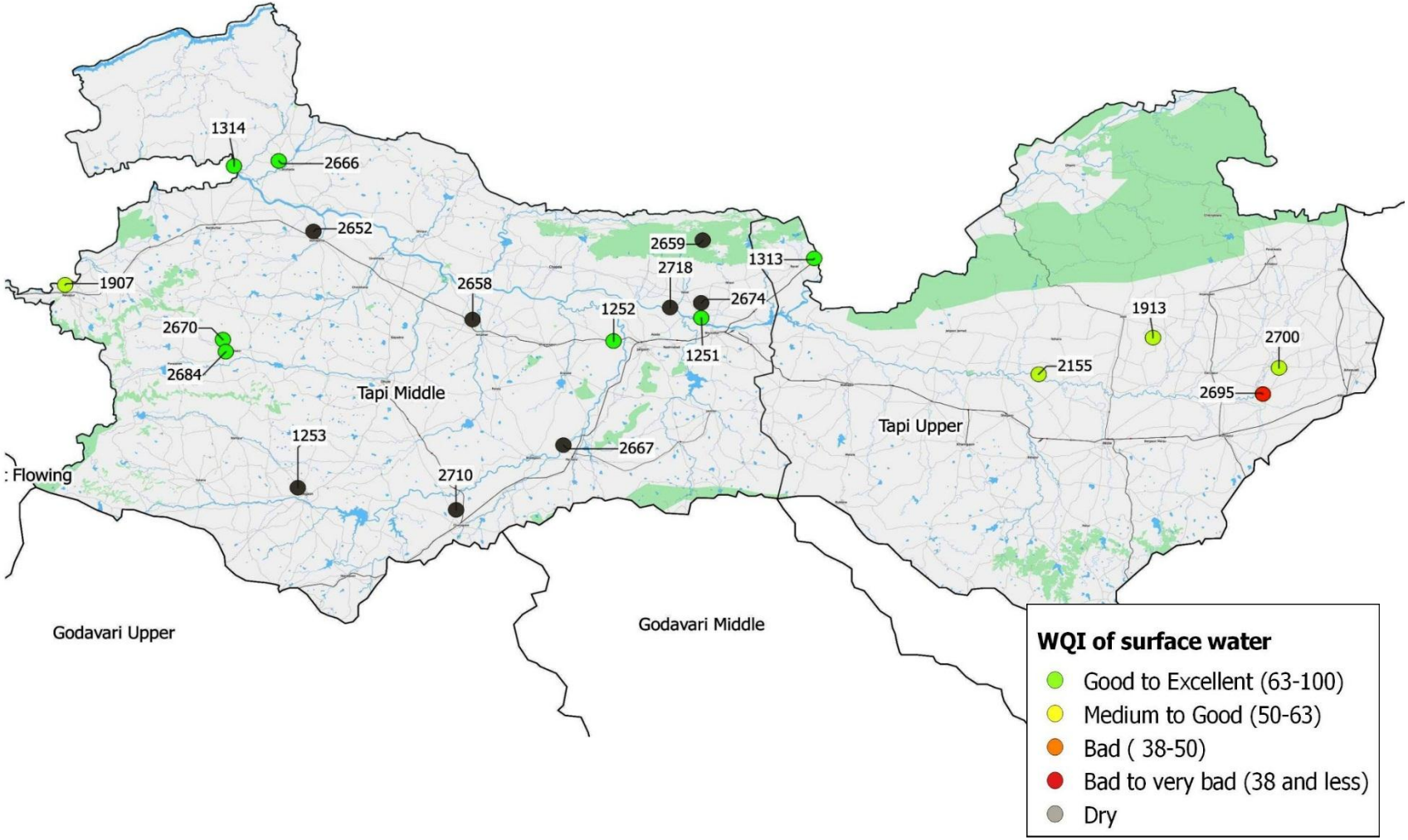
Table No. 13: Surface water quality monitoring stations in Tapi river basin

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

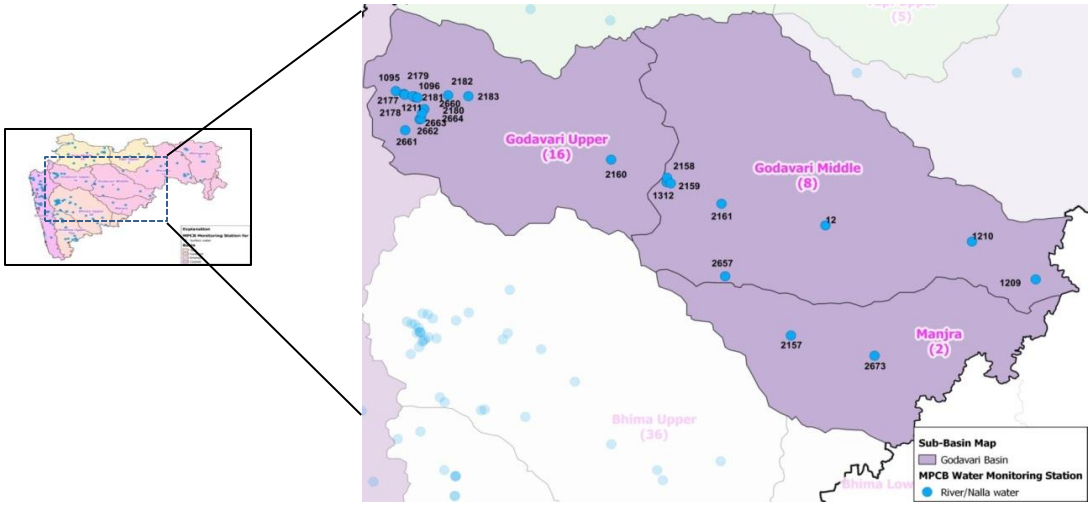
Spatial map of Surface WQI at Tapi Basin (April -2014)



Spatial map of Surface WQI at Tapi Basin (December-2014)



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

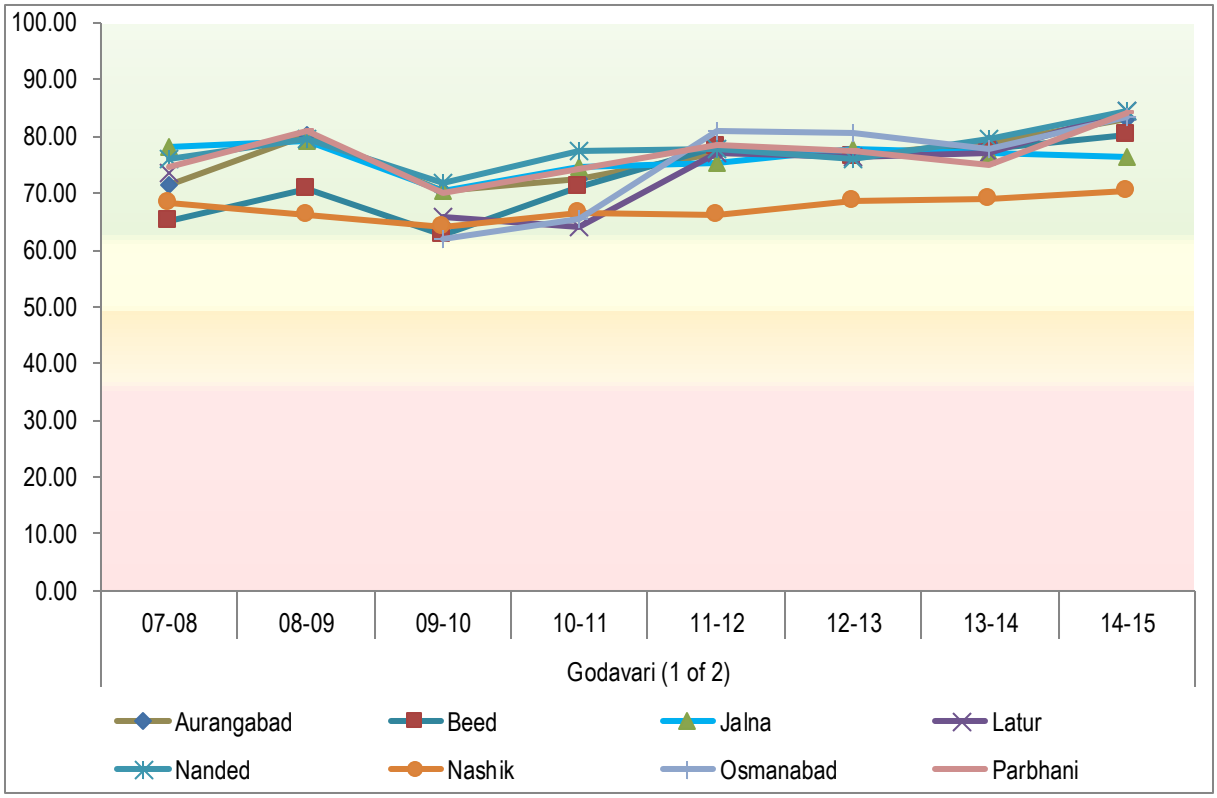


Map No. 4: Network of surface water quality monitoring stations in Godavari basin 1 of 2 –Godavari upper, Godavari middle and Manjra Sub basin

The Godavari river basin passes through six states (third largest basin in India) and drains about 10% of the total geographical area of the country[25]. Approximately 50 percent of the catchment area comes under the state of Maharashtra. In Maharashtra the Godavari Basin couldbe 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 Godavari2basin covering Wardha, Weinganga, Indravati and Pranhita. In basin 1 there are a total of 36 surface water monitoring stations (23 on upper, 11 on middle and 2 on Manjra). A list of the station and the codes has been provided below in Table No. 14. In basin 2 there are a total of 34 surface water monitoring stations (17 on Wardha, 16 on Weinganga and 1 on Pranhita). A list of stations and codes has been provided below in Table No. 15.

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

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



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

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

Note:

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

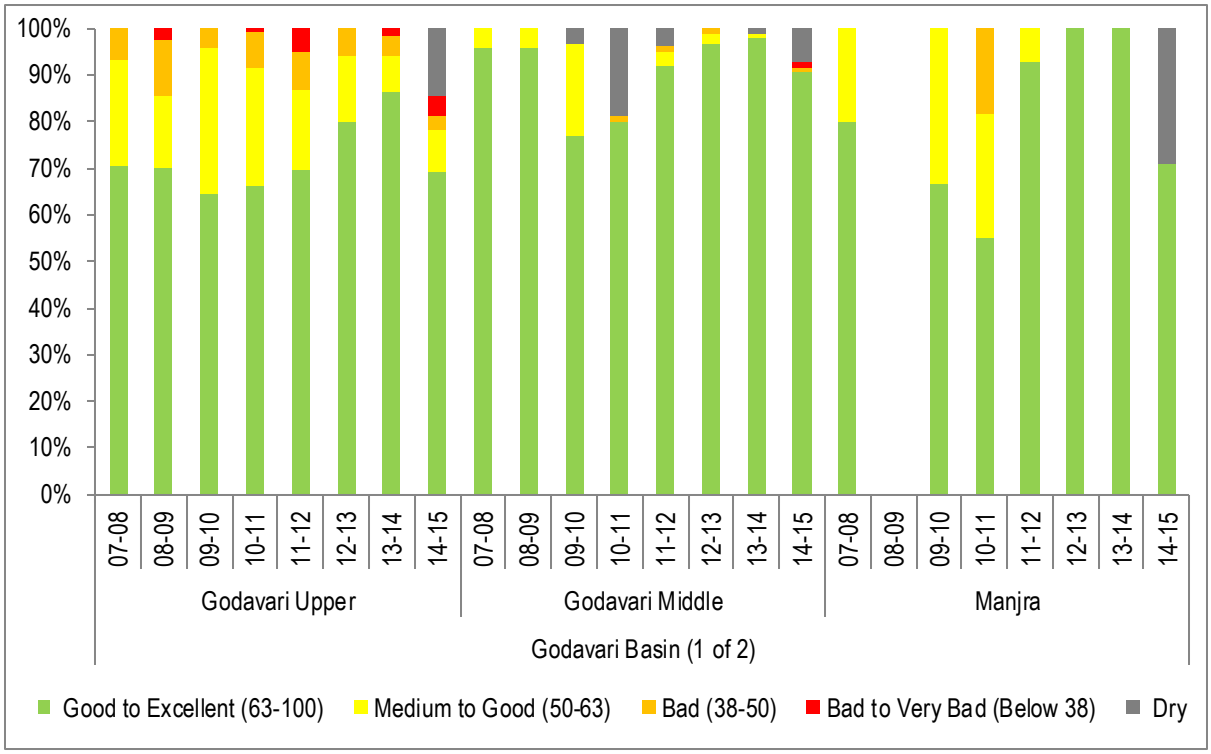
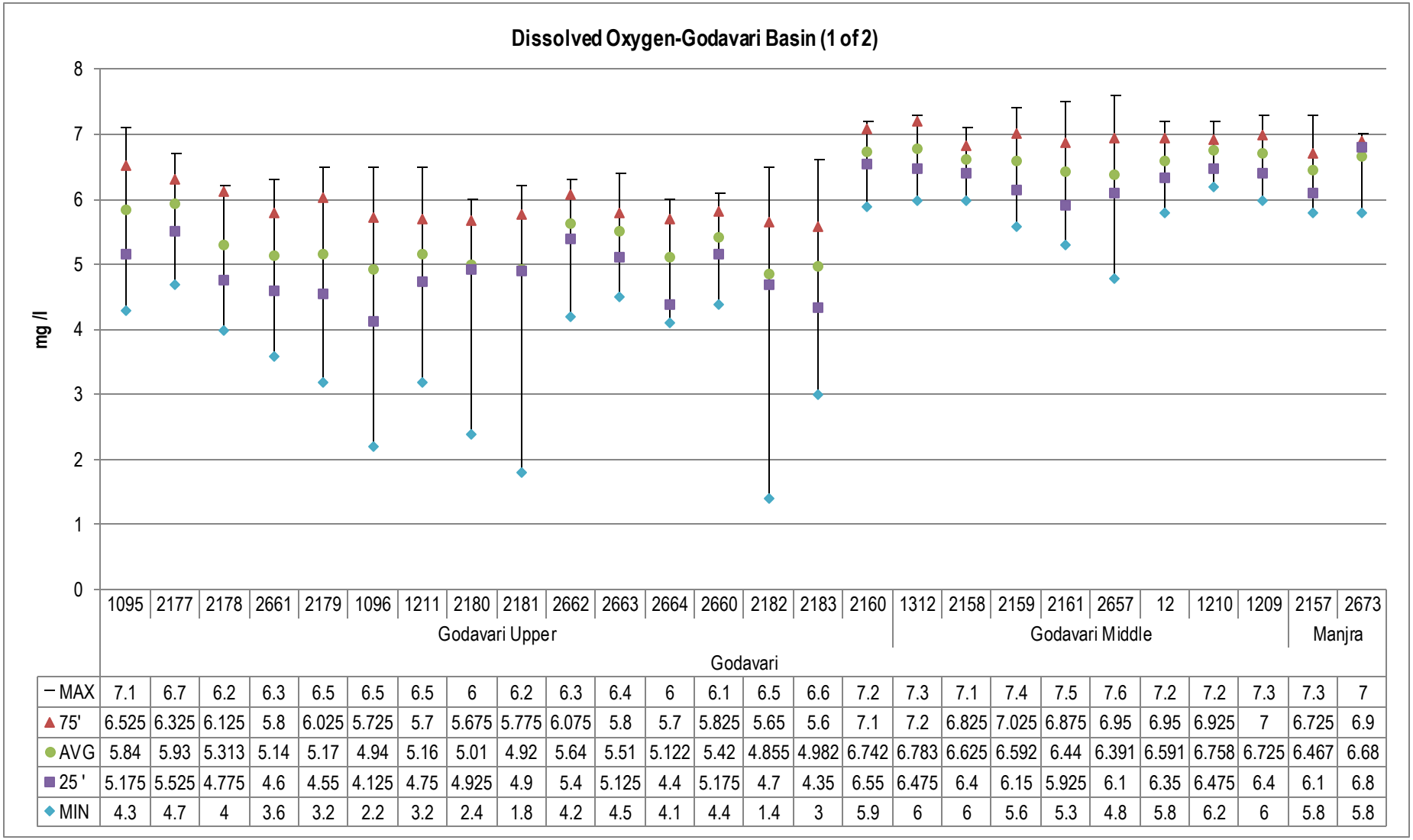


Figure No. 12 Trend of average occurrence for different category of WQI in Godavari basin (1 of 2)

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

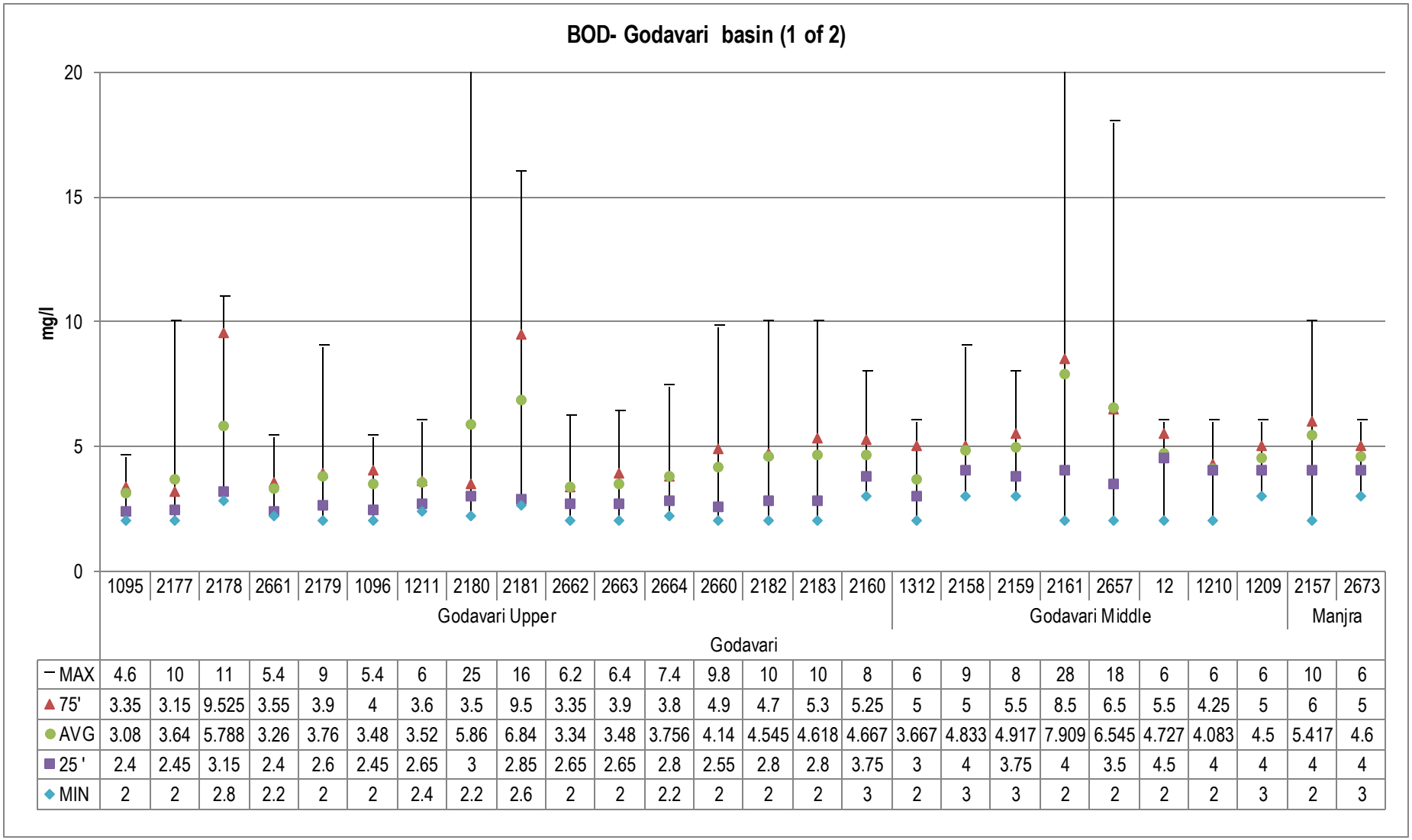
It is observed that the annual average WQI across all districts of Godavari basin (1 of 2) namely - Aurangabad, Beed, Jalna, Latur, Nanded, Nashik, Osmanabad and Parbhani were in Good to medium category (63-100) from 07-08 till 14-15. The increase in trend of WQI in Prabhani, Osmanabad and Nanded is noted in the year 2014-15.

Figure No. 12 shows average annual occurrence of WQI across 23 WQM stations of Godavari Upper, 11 WQMS of Godavari Middle and 2 WQMS of Manjra sub basins for last 8 years (07-08 to 2014-15) Intra basin graphs shows that the occurrence of Good to Excellent category of WQI in Godavari Middle is higher as compared to Godavari Upper and Manjra sub basin.



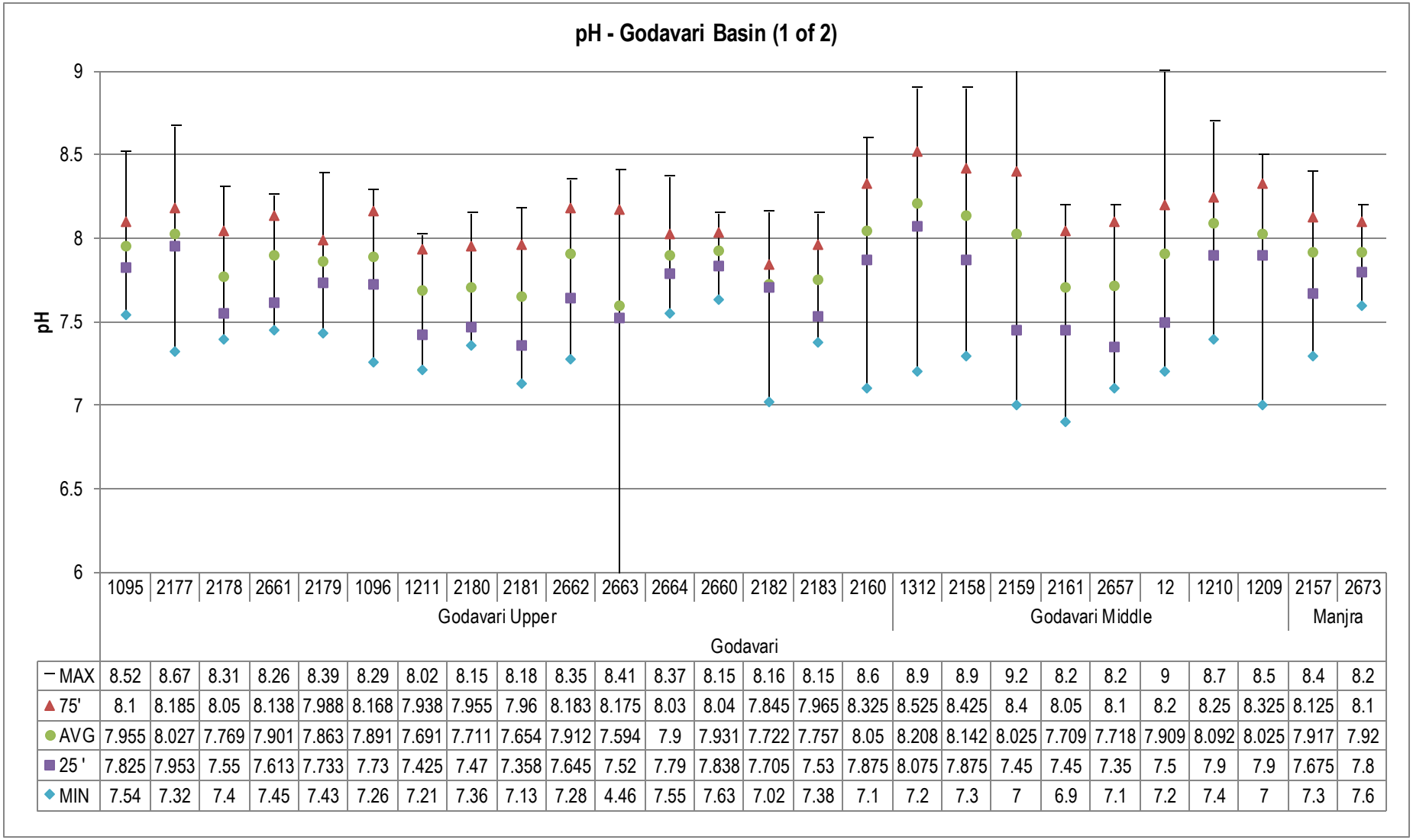
	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
MAX	7.1	6.7	6.2	6.3	6.5	6.5	6.5	6	6.2	6.3	6.4	6	6.1	6.5	6.6	7.2	7.3	7.1	7.4	7.5	7.6	7.2	7.2	7.3	7.3	7
75'	6.525	6.325	6.125	5.8	6.025	5.725	5.7	5.675	5.775	6.075	5.8	5.7	5.825	5.65	5.6	7.1	7.2	6.825	7.025	6.875	6.95	6.95	6.925	7	6.725	6.9
AVG	5.84	5.93	5.313	5.14	5.17	4.94	5.16	5.01	4.92	5.64	5.51	5.122	5.42	4.855	4.982	6.742	6.783	6.625	6.592	6.44	6.391	6.591	6.758	6.725	6.467	6.68
25 '	5.175	5.525	4.775	4.6	4.55	4.125	4.75	4.925	4.9	5.4	5.125	4.4	5.175	4.7	4.35	6.55	6.475	6.4	6.15	5.925	6.1	6.35	6.475	6.4	6.1	6.8
MIN	4.3	4.7	4	3.6	3.2	2.2	3.2	2.4	1.8	4.2	4.5	4.1	4.4	1.4	3	5.9	6	6	5.6	5.3	4.8	5.8	6.2	6	5.8	5.8

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



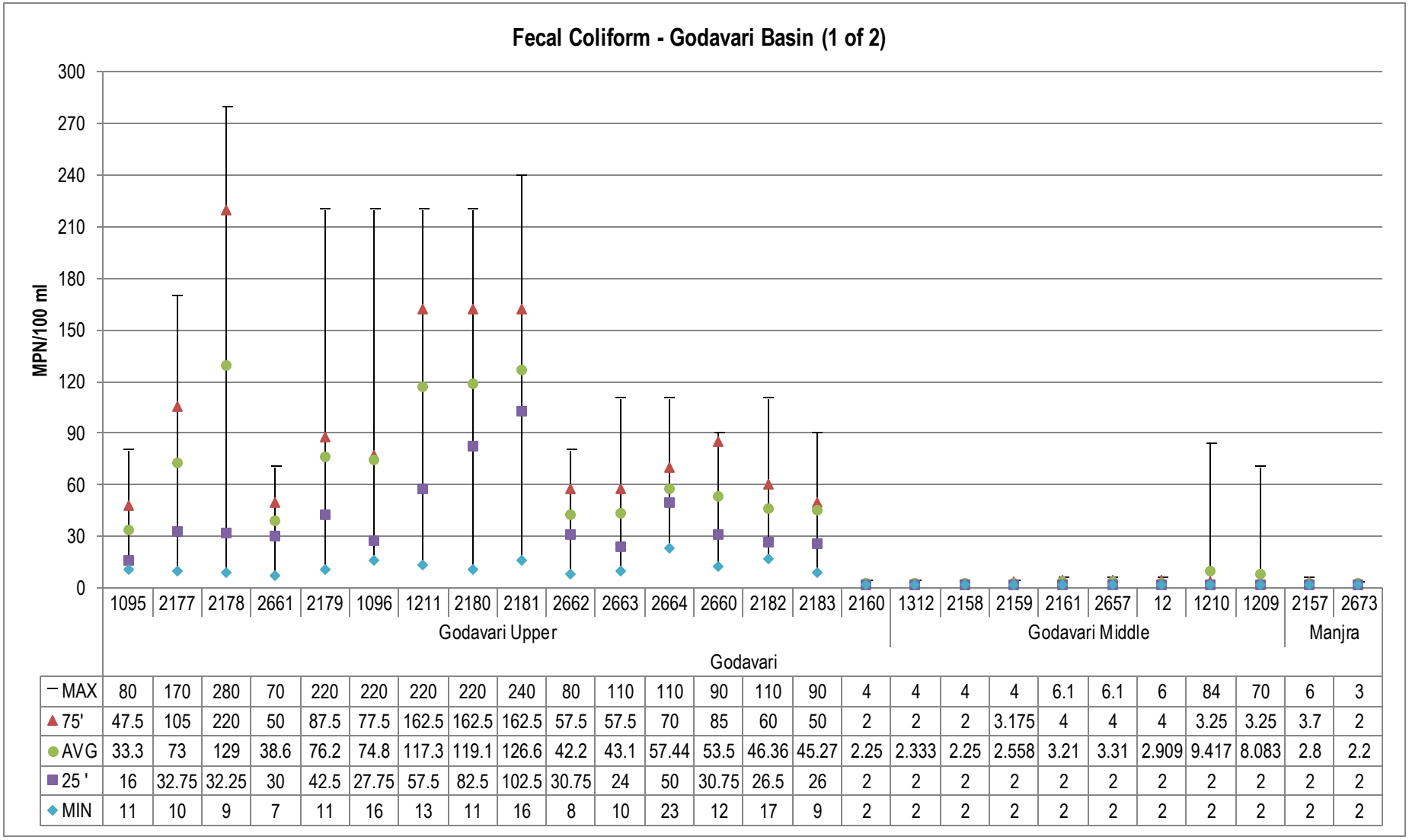
	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
MAX	4.6	10	11	5.4	9	5.4	6	25	16	6.2	6.4	7.4	9.8	10	10	8	6	9	8	28	18	6	6	6	10	6
75'	3.35	3.15	9.525	3.55	3.9	4	3.6	3.5	9.5	3.35	3.9	3.8	4.9	4.7	5.3	5.25	5	5	5.5	8.5	6.5	5.5	4.25	5	6	5
AVG	3.08	3.64	5.788	3.26	3.76	3.48	3.52	5.86	6.84	3.34	3.48	3.756	4.14	4.545	4.618	4.667	3.667	4.833	4.917	7.909	6.545	4.727	4.083	4.5	5.417	4.6
25 '	2.4	2.45	3.15	2.4	2.6	2.45	2.65	3	2.85	2.65	2.65	2.8	2.55	2.8	2.8	3.75	3	4	3.75	4	3.5	4.5	4	4	4	4
MIN	2	2	2.8	2.2	2	2	2.4	2.2	2.6	2	2	2.2	2	2	2	3	2	3	3	2	2	2	2	3	2	3

Figure No. 14: Trend of BOD levels recorded at WQMS at Godavari basin (1 of 2)



	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
MAX	8.52	8.67	8.31	8.26	8.39	8.29	8.02	8.15	8.18	8.35	8.41	8.37	8.15	8.16	8.15	8.6	8.9	8.9	9.2	8.2	8.2	9	8.7	8.5	8.4	8.2
75'	8.1	8.185	8.05	8.138	7.988	8.168	7.938	7.955	7.96	8.183	8.175	8.03	8.04	7.845	7.965	8.325	8.525	8.425	8.4	8.05	8.1	8.2	8.25	8.325	8.125	8.1
AVG	7.955	8.027	7.769	7.901	7.863	7.891	7.691	7.711	7.654	7.912	7.594	7.9	7.931	7.722	7.757	8.05	8.208	8.142	8.025	7.709	7.718	7.909	8.092	8.025	7.917	7.92
25 '	7.825	7.953	7.55	7.613	7.733	7.73	7.425	7.47	7.358	7.645	7.52	7.79	7.838	7.705	7.53	7.875	8.075	7.875	7.45	7.45	7.35	7.5	7.9	7.9	7.675	7.8
MIN	7.54	7.32	7.4	7.45	7.43	7.26	7.21	7.36	7.13	7.28	4.46	7.55	7.63	7.02	7.38	7.1	7.2	7.3	7	6.9	7.1	7.2	7.4	7	7.3	7.6

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



	1095	2177	2178	2661	2179	1096	1211	2180	2181	2662	2663	2664	2660	2182	2183	2160	1312	2158	2159	2161	2657	12	1210	1209	2157	2673
MAX	80	170	280	70	220	220	220	220	240	80	110	110	90	110	90	4	4	4	4	6.1	6.1	6	84	70	6	3
75'	47.5	105	220	50	87.5	77.5	162.5	162.5	162.5	57.5	57.5	70	85	60	50	2	2	2	3.175	4	4	4	3.25	3.25	3.7	2
AVG	33.3	73	129	38.6	76.2	74.8	117.3	119.1	126.6	42.2	43.1	57.44	53.5	46.36	45.27	2.25	2.333	2.25	2.558	3.21	3.31	2.909	9.417	8.083	2.8	2.2
25 '	16	32.75	32.25	30	42.5	27.75	57.5	82.5	102.5	30.75	24	50	30.75	26.5	26	2	2	2	2	2	2	2	2	2	2	2
MIN	11	10	9	7	11	16	13	11	16	8	10	23	12	17	9	2	2	2	2	2	2	2	2	2	2	2

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

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

APR	81	78	70	77	70	75	71	72	83	80	75	79	78	79	86	72
MAY	84	77	59	82	75	77	74	72	77	83	78	79	82	82	87	73
JUNE	83	72	55	76	71	74	68	68	75	76	70	75	79	78	89	69
JUL	80	74	Dry	74	60	62	45	48	73	74	75	65	46	56	80	57
AUG	76	74	65	65	65	59	71	43	66	66	67	72	62	62	81	69
SEP	70	76	80	65	66	68	68	71	74	72	63	68	66	64	86	69
OCT	67	69	76	72	76	77	80	75	75	76	Dry	77	74	73	82	82
NOV	72	79	77	73	81	63	77	81	82	70	68	71	66	68	83	72
DEC	75	68	64	68	68	69	51	61	71	68	67	61	62	60	80	68
JAN	68	68	Dry	69	71	68	68	64	73	63	67	68	74	73	80	69
FEB													73	75	85	
MAR	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	1095	2177	2178	2661	2179	1096	2180	2181	2662	2663	2664	2660	2182	2183	2160	1211

UPPER GODAVARI

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry	Not Collected

Table No. 14: Surface water quality monitoring stations in Godavari Basin (1 of 2)

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

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

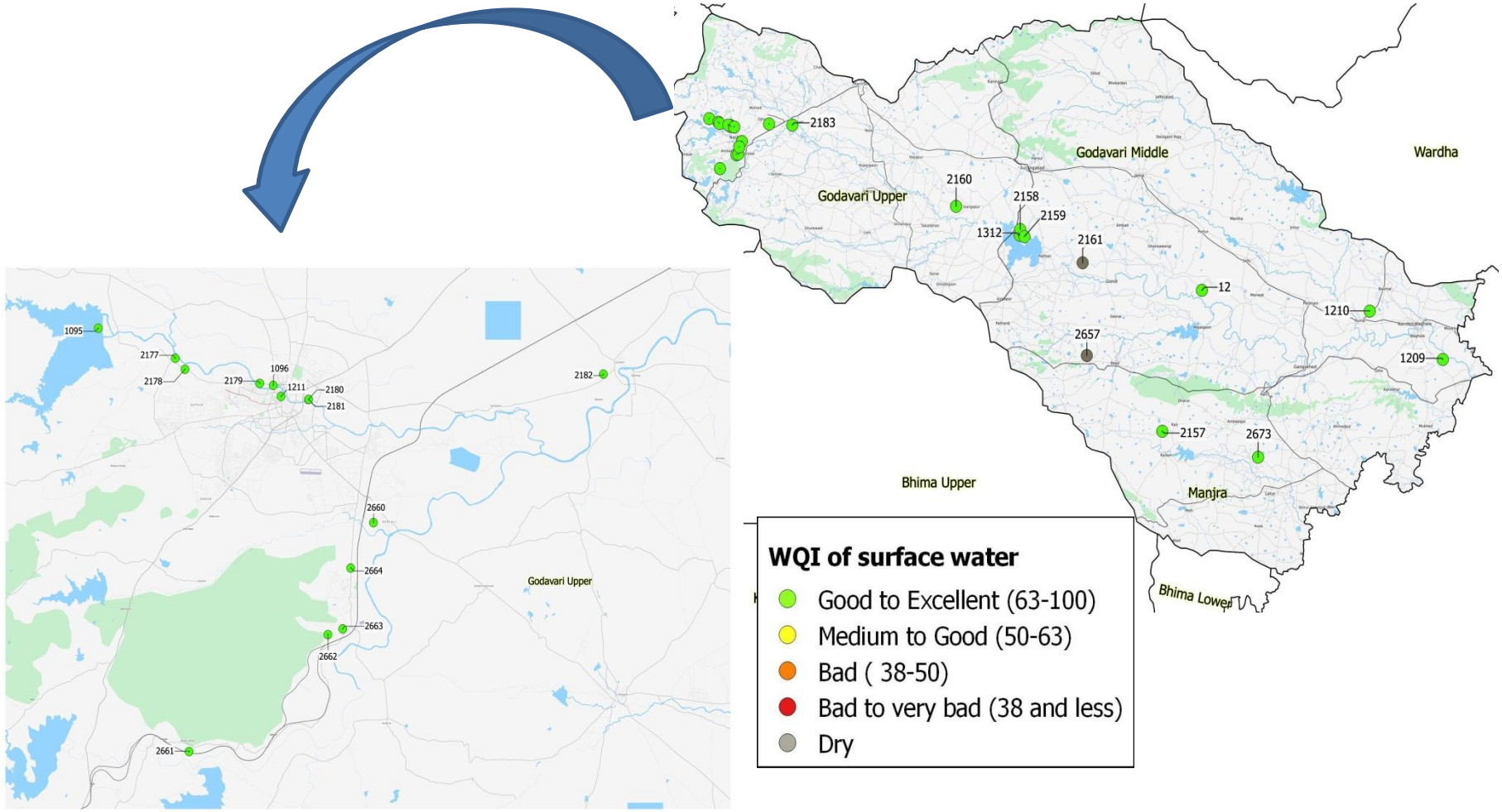
APR	87	85	89	Dry	Dry	88	88	87	86	84
MAY	90	91	88	84	87	86	85	Dry	84	84
JUNE	85	85	86	86	86	85	86	90	86	87
JUL	81	81	81	81	86	84	86	91	82	Dry
AUG	83	78	73	78	84	84	81	79	83	83
SEP	85	85	82	88	86	84	82	84	80	84
OCT	79	81	81	88	91	84	89	85	90	Dry
NOV	85	84	79	20	47	84	82	79	84	Dry
DEC	83	80	83	81	85	69	73	82	79	Dry
JAN	81	82	79	68	66	83	80	83	78	Dry
FEB	85	86	85	78	79	85	80	81	82	Dry
MAR	84	82	78	90	85	84	84	86	84	Dry
	84	83	82	77	80	83	83	84	83	85
	1312	2158	2159	2161	2657	1210	1209	12	2157	2673
	GODAVARI MIDDLE								MANJRA	

Legend				
Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

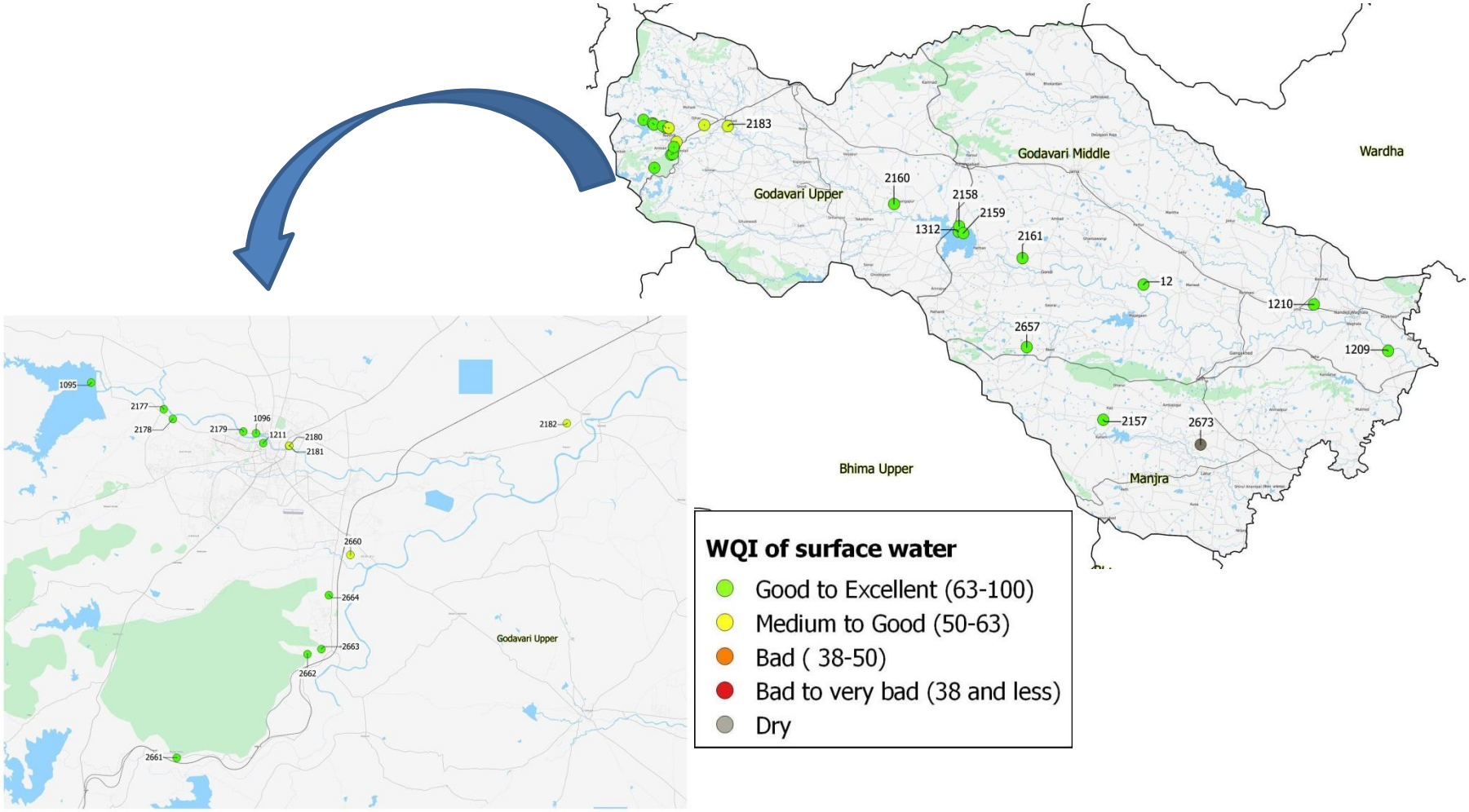
Table No. 15: Surface water quality monitoring stations in Godavari Basin (1of 2)

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

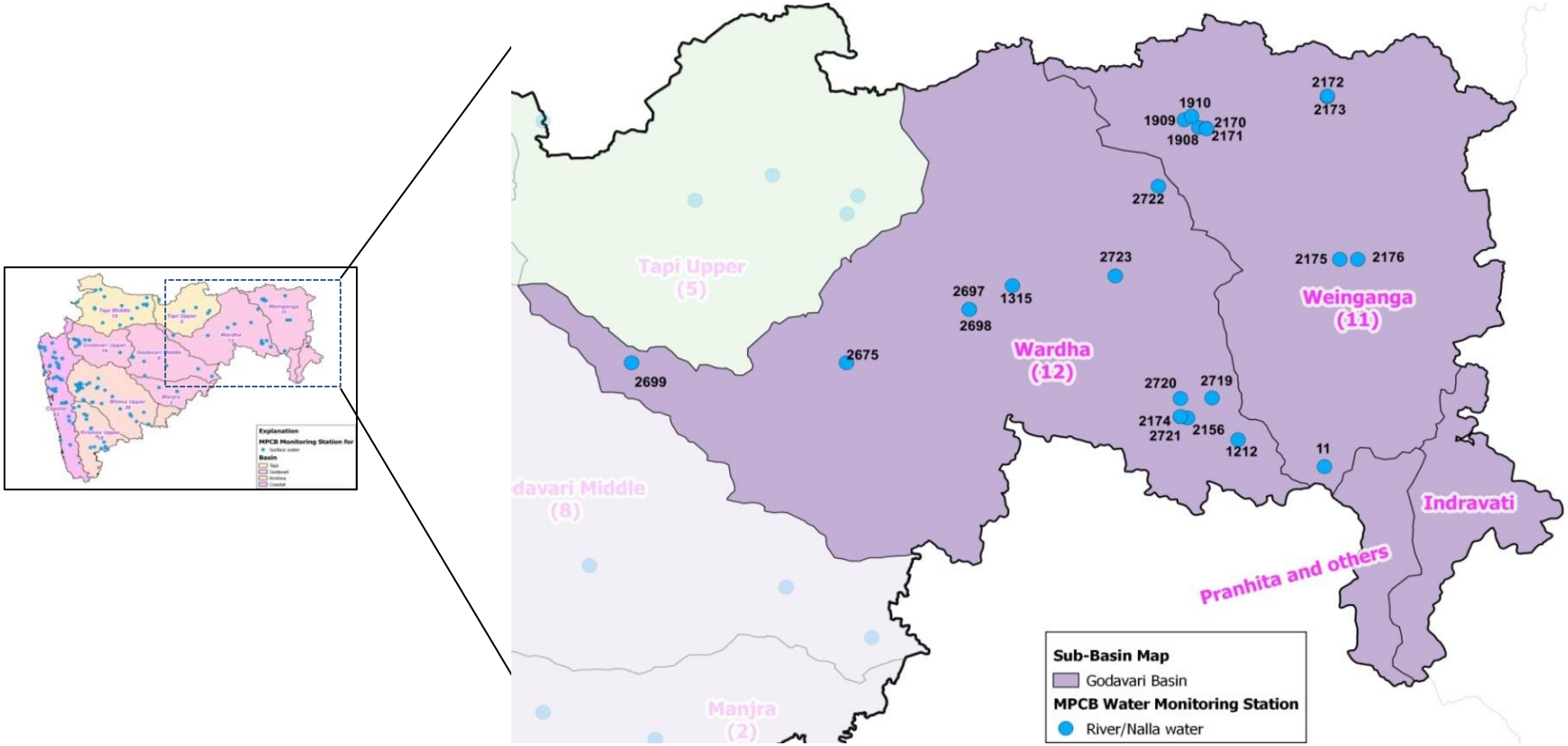
Spatial map of SurfaceWQI at Godavari Basin (1 of 2) (April 2014)



Spatial map of Surface WQI at Godavari Basin (1 of 2) (December 2014)

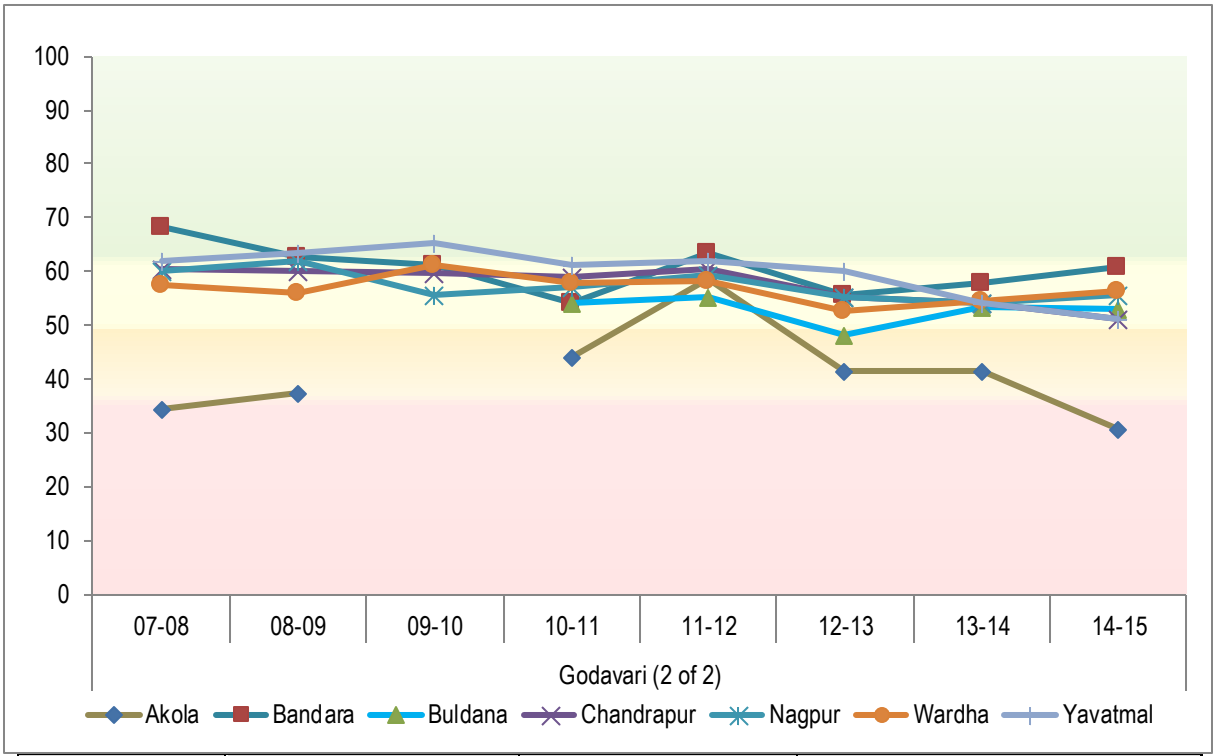


Godavari Basin (2 of 2): Wardha, Weinganga and Pranhita Sub basin



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

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



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

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

Note:

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

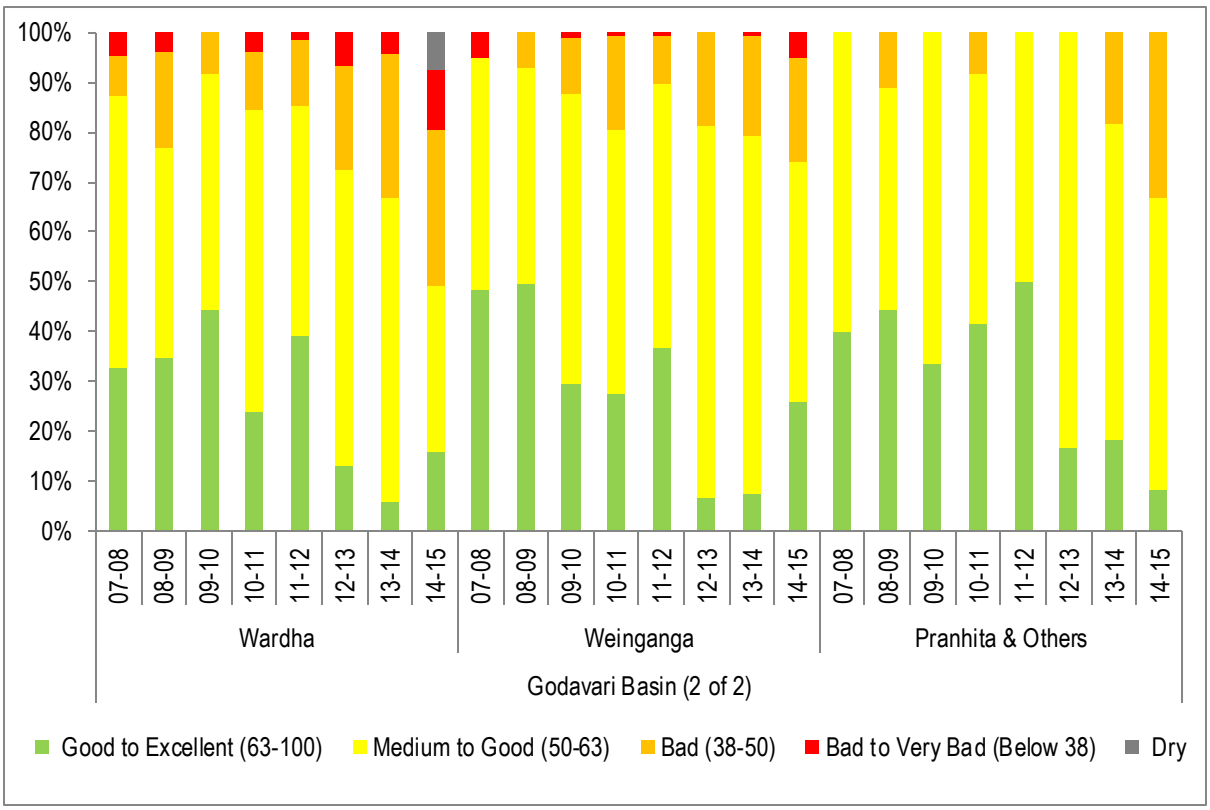
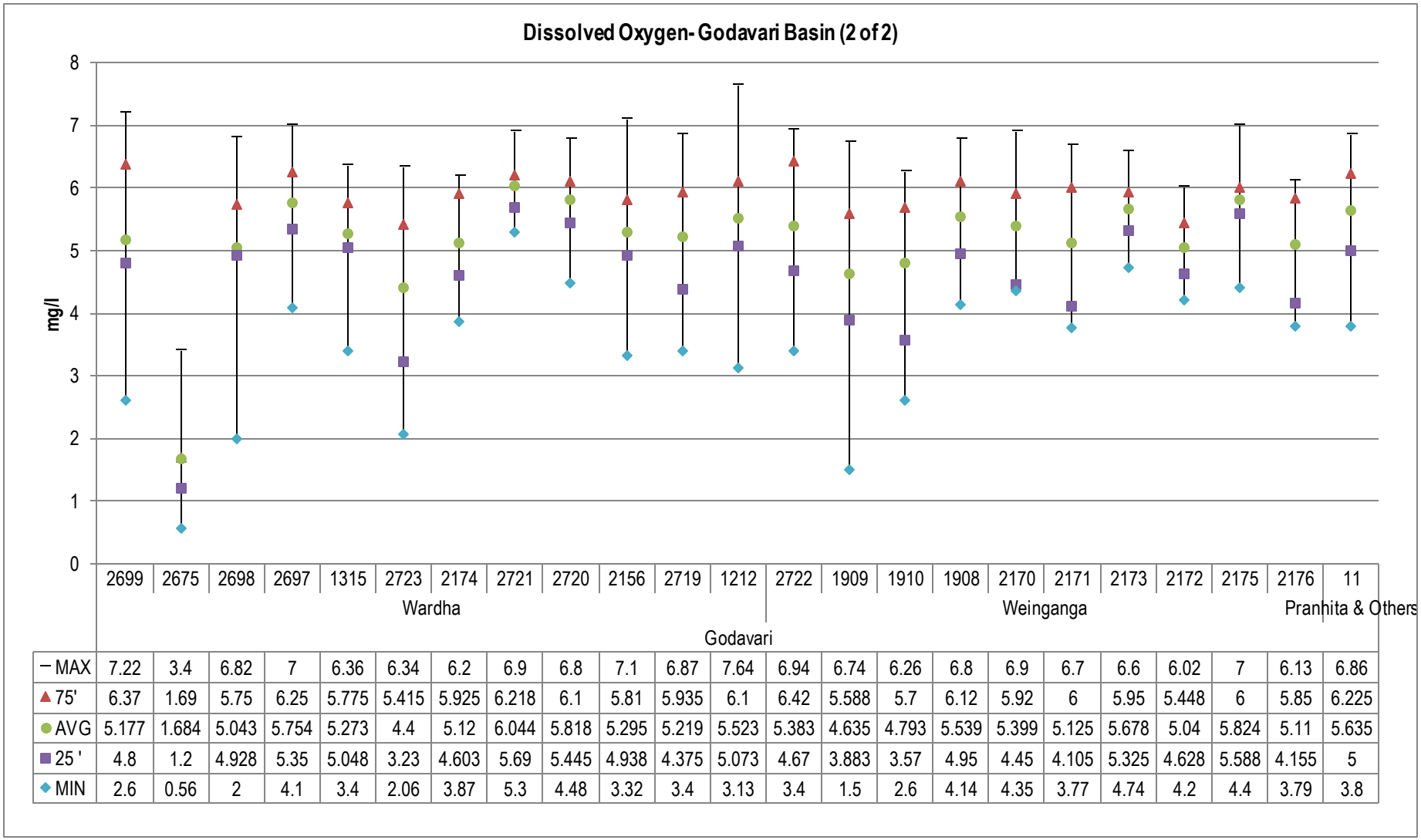


Figure No. 18: Trend of average occurrence for different category of WQI in Godavari basin (2 of 2)

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

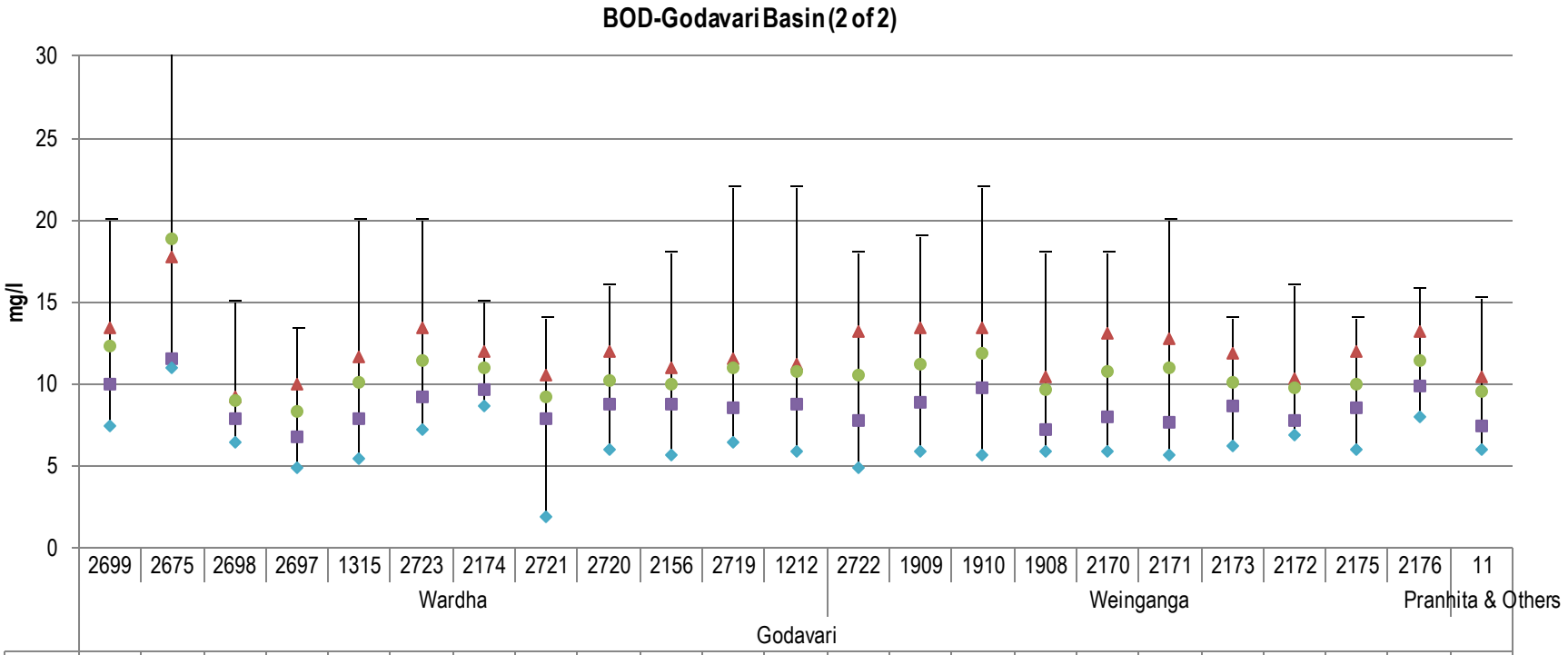
Among the seven districts namely Akola, Bandara, Buldhana, Chandrapur, Nagpur, Wardha and Yavatmal, the annual average WQI of all the districts except Akola were Medium to Good (50-63). The WQI of Akola district was observed to have declining trend showing average water quality in the district in the range of Very Bad to Bad category (50 and less) in year 2014-15.

The intra sub basins results for Godavari (2 of 2) basin showed that occurrence of Medium to good catergory of WQI is almost similar however, the average occurrence for Good to Excellent (63-100) was noted to be higher in Weinganga as compared to Wardha and Pranhita sub basin. The Bad and Bad to very bad category of WQI was noted to be higher in Wardha Sub basin followed by Weinganaga and Pranhita. Hence, overall the WQI of Weinganga and Pranhita sub basin is better than Wardha sub basin.



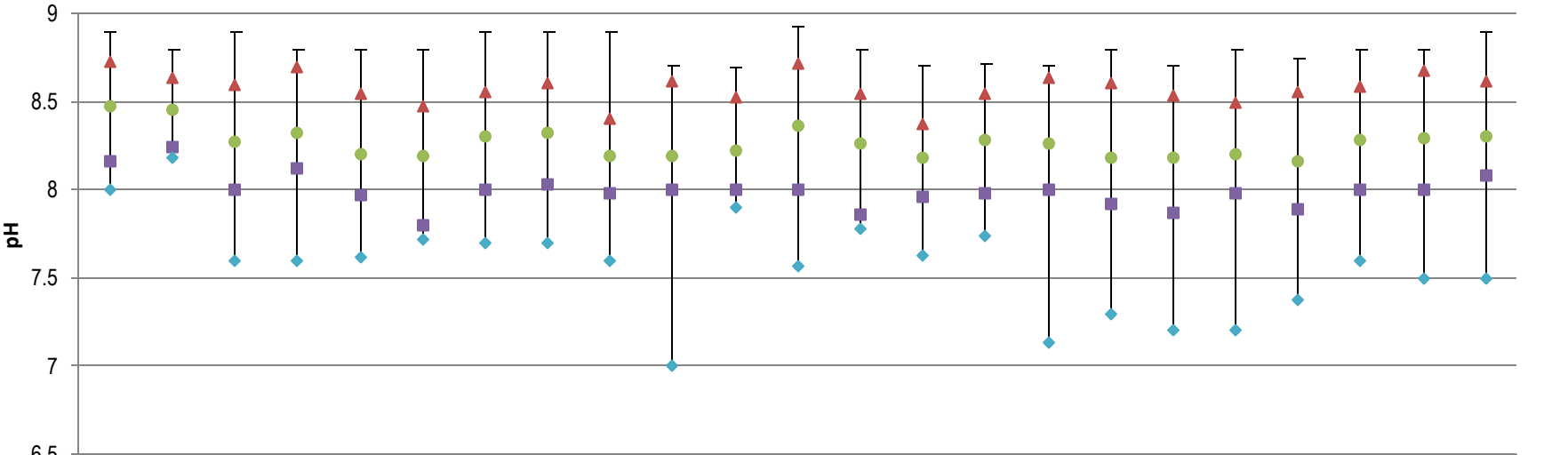
	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
MAX	7.22	3.4	6.82	7	6.36	6.34	6.2	6.9	6.8	7.1	6.87	7.64	6.94	6.74	6.26	6.8	6.9	6.7	6.6	6.02	7	6.13	6.86
75'	6.37	1.69	5.75	6.25	5.775	5.415	5.925	6.218	6.1	5.81	5.935	6.1	6.42	5.588	5.7	6.12	5.92	6	5.95	5.448	6	5.85	6.225
AVG	5.177	1.684	5.043	5.754	5.273	4.4	5.12	6.044	5.818	5.295	5.219	5.523	5.383	4.635	4.793	5.539	5.399	5.125	5.678	5.04	5.824	5.11	5.635
25 '	4.8	1.2	4.928	5.35	5.048	3.23	4.603	5.69	5.445	4.938	4.375	5.073	4.67	3.883	3.57	4.95	4.45	4.105	5.325	4.628	5.588	4.155	5
MIN	2.6	0.56	2	4.1	3.4	2.06	3.87	5.3	4.48	3.32	3.4	3.13	3.4	1.5	2.6	4.14	4.35	3.77	4.74	4.2	4.4	3.79	3.8

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



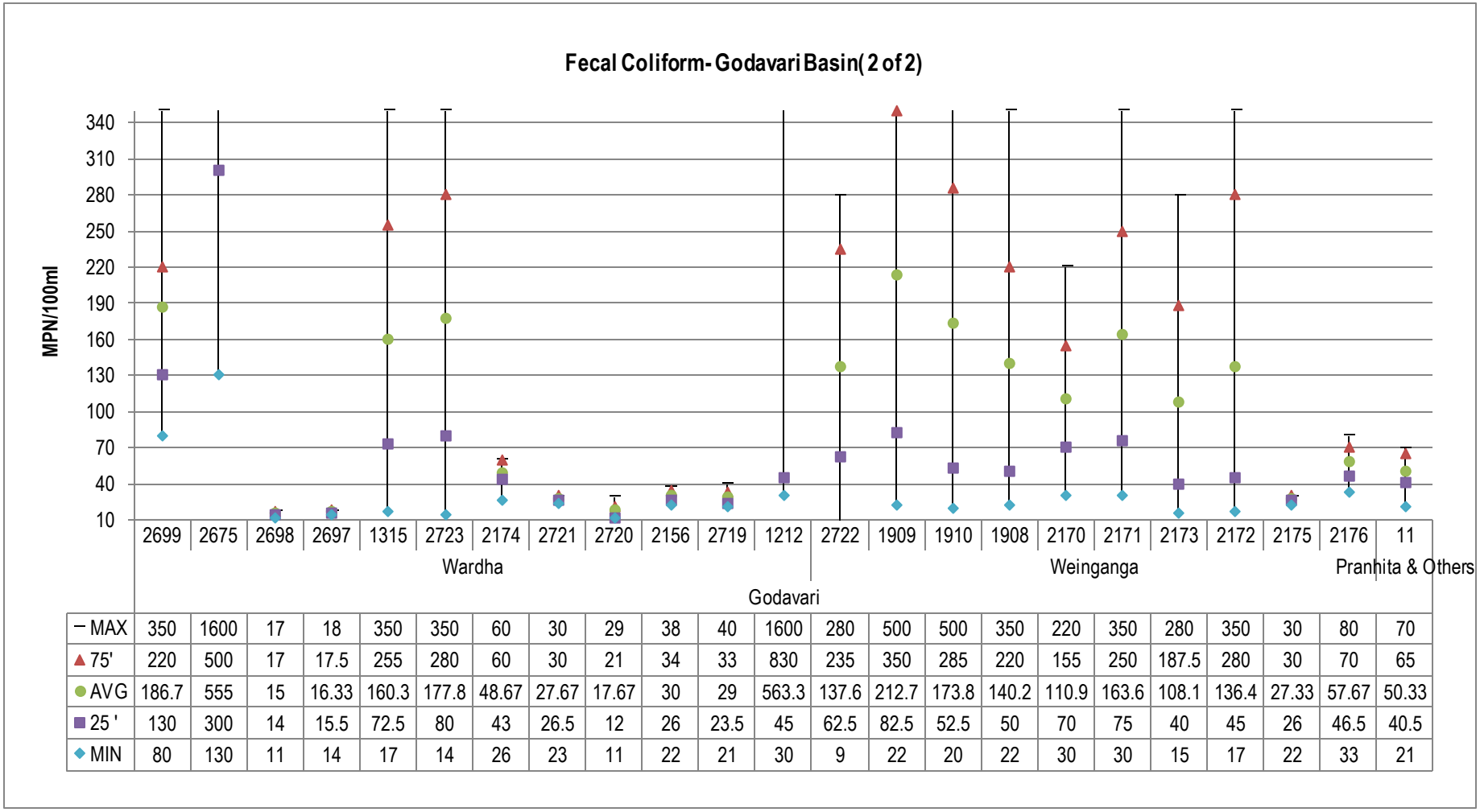
	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
MAX	20	44	15	13.4	20	20	15	14	16	18	22	22	18	19	22	18	18	20	14	16	14	15.8	15.2
75'	13.4	17.7	9.2	10	11.6	13.35	12	10.55	11.98	11	11.5	11.2	13.2	13.45	13.45	10.35	13.1	12.7	11.85	10.25	12	13.2	10.4
AVG	12.29	18.87	8.992	8.308	10.12	11.43	10.97	9.167	10.14	9.917	11.01	10.68	10.47	11.18	11.9	9.6	10.7	10.95	10.05	9.75	9.927	11.42	9.475
25 '	10	11.55	7.825	6.75	7.8	9.15	9.625	7.8	8.7	8.7	8.475	8.7	7.75	8.8	9.7	7.15	7.95	7.65	8.6	7.7	8.5	9.8	7.45
MIN	7.4	11	6.4	4.8	5.4	7.2	8.6	1.8	6	5.6	6.4	5.8	4.8	5.8	5.6	5.8	5.8	5.6	6.2	6.8	5.92	8	6

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



	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
MAX	8.9	8.8	8.9	8.8	8.8	8.8	8.9	8.9	8.9	8.7	8.69	8.93	8.8	8.7	8.71	8.7	8.8	8.7	8.8	8.74	8.8	8.8	8.9
75'	8.73	8.643	8.595	8.7	8.55	8.475	8.555	8.613	8.41	8.62	8.525	8.72	8.55	8.375	8.55	8.635	8.608	8.54	8.5	8.563	8.588	8.678	8.623
AVG	8.477	8.457	8.278	8.33	8.205	8.196	8.31	8.326	8.194	8.193	8.223	8.369	8.268	8.188	8.29	8.264	8.188	8.18	8.2	8.164	8.29	8.298	8.302
25 '	8.16	8.243	8	8.12	7.975	7.798	8	8.03	7.988	8	8	8	7.865	7.965	7.983	8	7.925	7.875	7.98	7.888	8	8	8.083
MIN	8	8.18	7.6	7.6	7.62	7.72	7.7	7.7	7.6	7	7.9	7.57	7.78	7.63	7.74	7.13	7.3	7.2	7.2	7.38	7.6	7.5	7.5

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



	2699	2675	2698	2697	1315	2723	2174	2721	2720	2156	2719	1212	2722	1909	1910	1908	2170	2171	2173	2172	2175	2176	11
MAX	350	1600	17	18	350	350	60	30	29	38	40	1600	280	500	500	350	220	350	280	350	30	80	70
75'	220	500	17	17.5	255	280	60	30	21	34	33	830	235	350	285	220	155	250	187.5	280	30	70	65
AVG	186.7	555	15	16.33	160.3	177.8	48.67	27.67	17.67	30	29	563.3	137.6	212.7	173.8	140.2	110.9	163.6	108.1	136.4	27.33	57.67	50.33
25 '	130	300	14	15.5	72.5	80	43	26.5	12	26	23.5	45	62.5	82.5	52.5	50	70	75	40	45	26	46.5	40.5
MIN	80	130	11	14	17	14	26	23	11	22	21	30	9	22	20	22	30	30	15	17	22	33	21

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

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

APR	35	29	72	70	61	39	66	61	70	64	63	58
MAY	Dry	Dry	73	68	62	58	63	50	64	66	55	62
JUNE	Dry	Dry	68	64	67	66	66	61	67	61	61	40
JUL	Dry	Dry	44	36	62	27	42	48	35	43	41	41
AUG	56	Dry	54	53	64	61	53	45	54	53	34	55
SEP	57	Dry	26	54	70	66	54	52	53	53	51	45
OCT	46	45	54	27	51	60	50	38	57	38	43	42
NOV	49	25	40	32	41	34	42	40	44	46	40	48
DEC	67	Dry	59	57	67	67	58	44	56	54	56	56
JAN	57	30	46	47	52	32	58	47	48	46	48	46
FEB	58	31	46	46	58	47	48	49	50	41	52	49
MAR	54	25	52	47	63	58	48	45	50	47	51	48
	2699	2675	2697	2698	1315	2723	2721	2174	2720	2156	2719	1212
WARDHA												
Legend												
Good to Excellent			Medium to Good			Bad		Bad to Very Bad			Dry	

Table No. 16: Surface water quality monitoring stations in Godavari Basin (2 of 2)

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

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

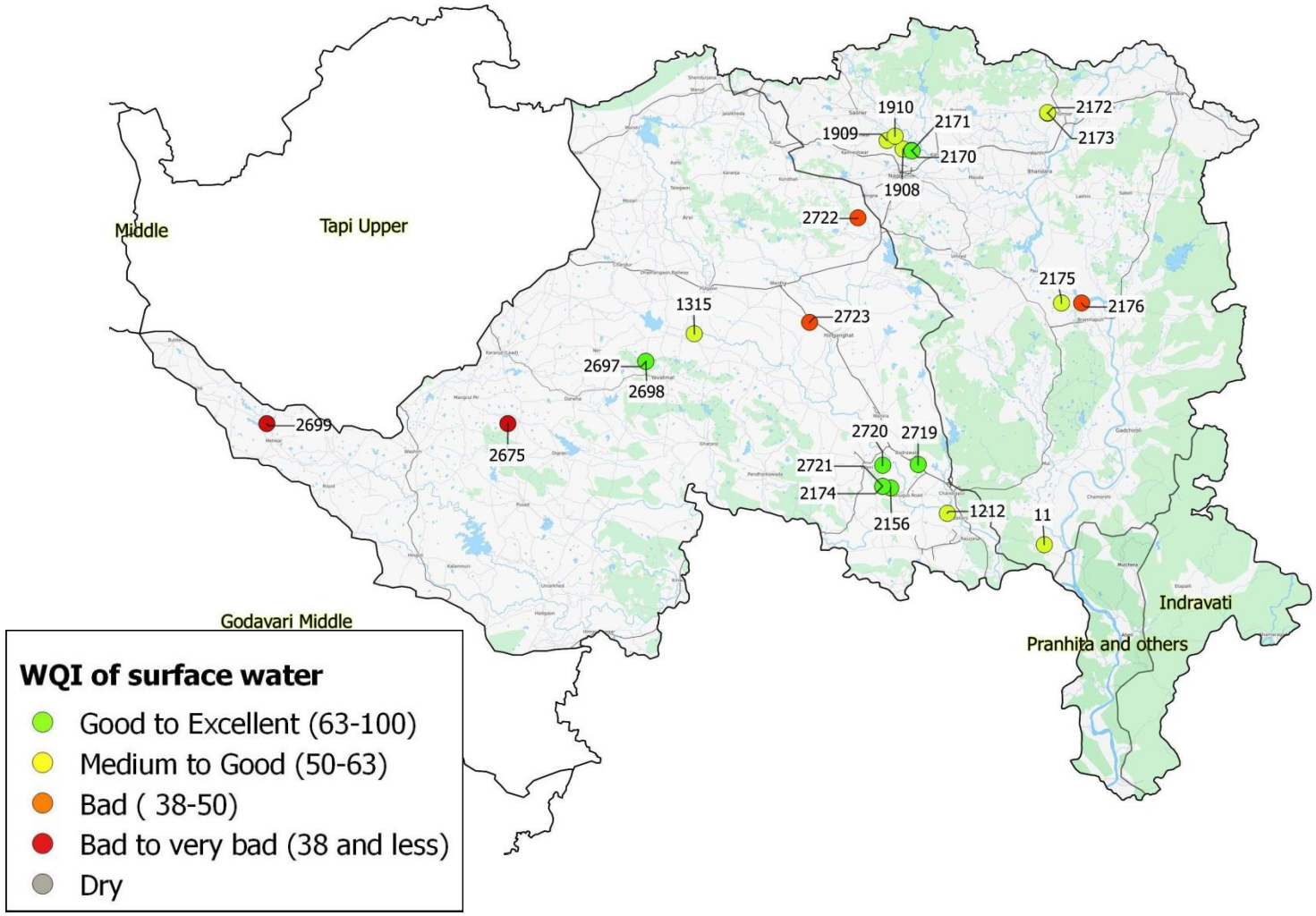
APR	60	44	61	59	64	63	60	56	61	50	59
MAY	58	65	59	70	61	61	66	58	55	48	56
JUNE	51	75	51	59	51	48	66	61	68	59	65
JUL	49	35	48	57	55	50	56	58	48	48	51
AUG	56	57	71	56	57	53	70	67	55	55	58
SEP	66	63	69	62	63	65	74	74	55	54	55
OCT	53	69	43	39	51	46	68	58	50	39	41
NOV	52	43	33	64	64	65	62	55	46	43	40
DEC	68	69	68	65	68	61	66	64	56	42	58
JAN	50	56	49	27	28	27	51	52	46	46	44
FEB	58	57	52	58	62	63	52	48	53	46	51
MAR	32	61	56	61	61	58	60	58	48	48	48
	1909	2722	1910	1908	2170	2171	2173	2172	2175	2176	11
	WEINGANGA										PRAHNITA

Legend				
Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

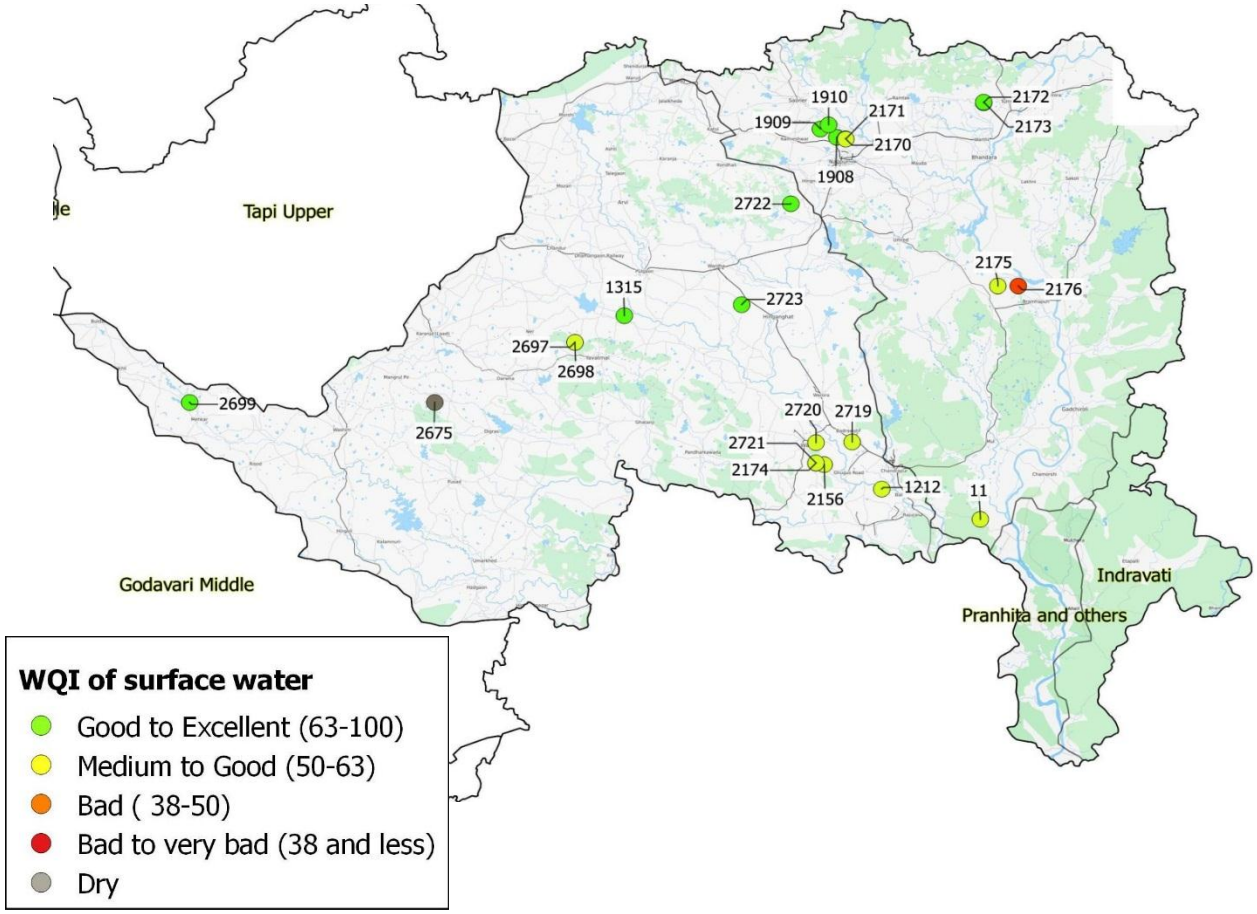
Table No. 17: Surface water quality monitoring stations in Godavari Basin (2 of 2)

Station Code	River	Name of the Station	Village	Taluka	District
1909	Kanhan	Village- Agargaon, Taluka- Kuhi, District- Nagpur	Agargaon	Kuhi	Nagpur
2722	Wena	Wena river at U/s of Mohata Mills,	Hinganghat	Hinganghat	Wardha
1910	Wainganga	Wainganga river after confluence with Kanhan river	Ambhora	Kuhi	Nagpur
1908	Kolar	Kolar river before confluence with Kanhan river at Waregaon Bridge.	Waregaon	Kamptee	Nagpur
2170	Kanhan	Kanhan river at U/s of M/s Vidharbha 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

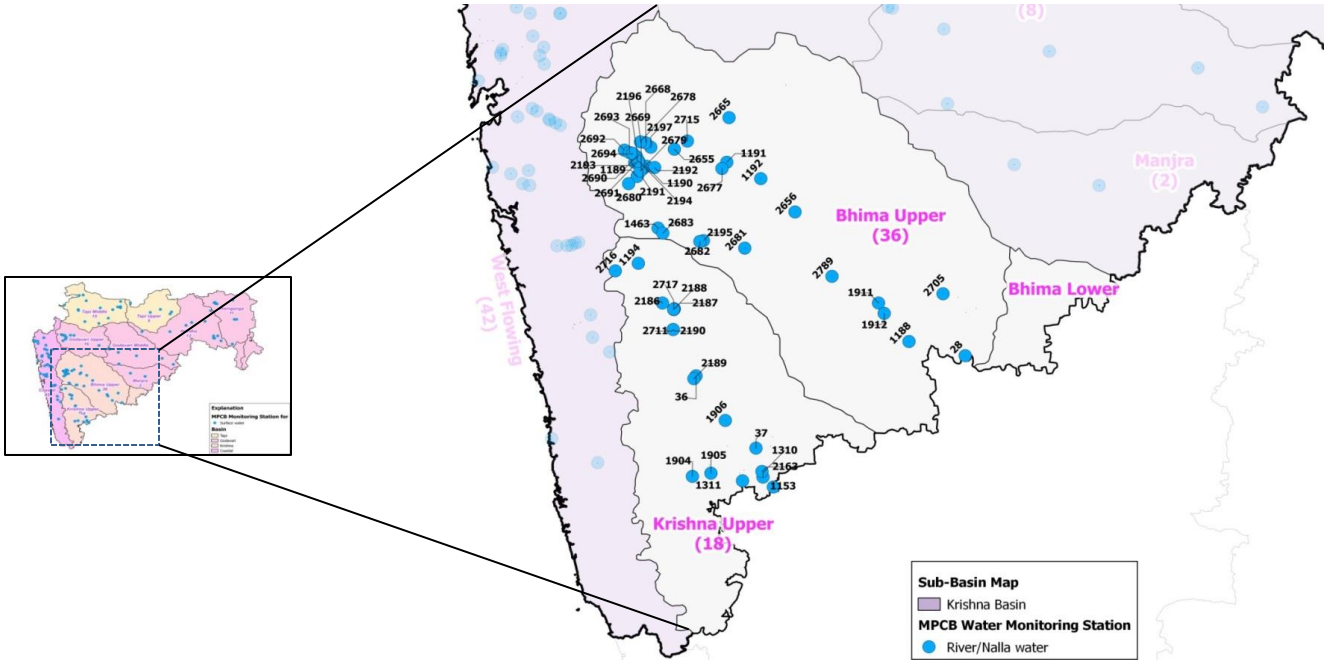
Spatial map of Surface WQI in Godavari Basin (2 of 2) (April 2014)



Spatial map of Surface WQI in Godavari Basin (2 of 2) (December 2014)



Krishna Basin

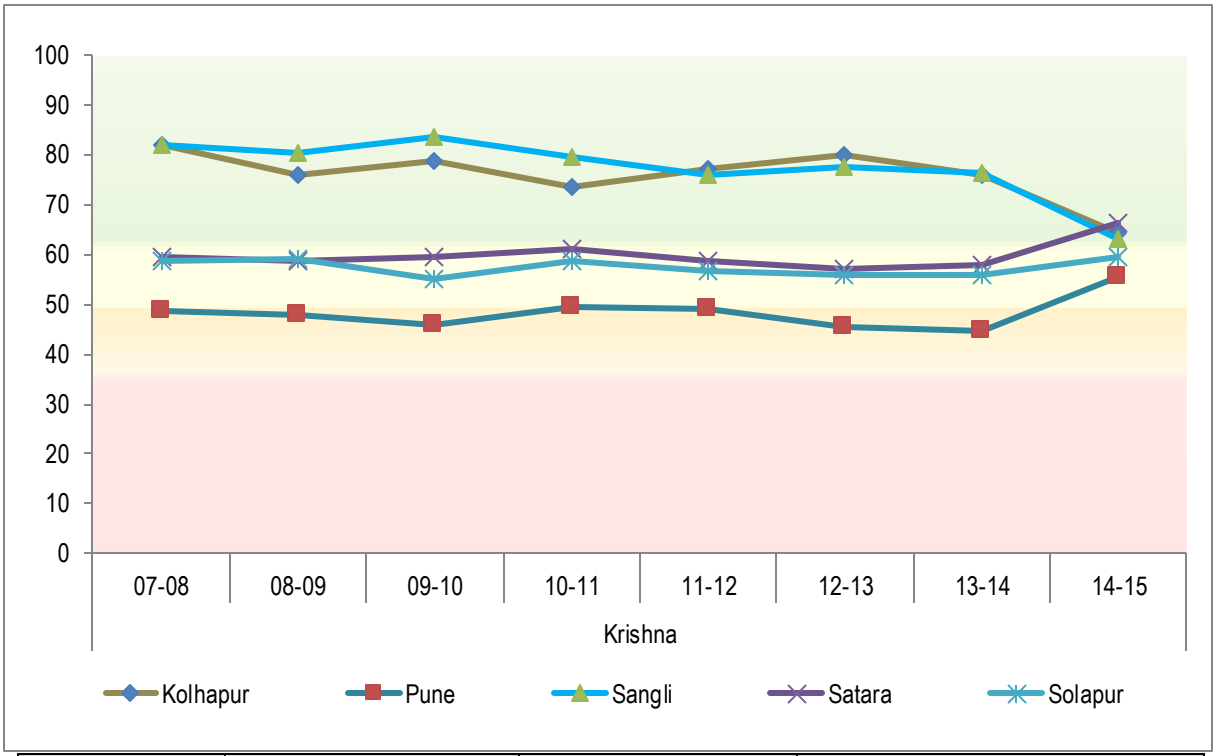


Map No. 6: Network of surface water quality monitoring stations in Krishna basin

The Krishna River originates as the Upper Krishna basin in the Western Ghats of Maharashtra and Karnataka, drains the Deccan Plateau, and discharges into the Bay of Bengal. The Krishna basin spreads across the states of Maharashtra(69,425sq km), Karnataka(113,271 sq km) and Andhra Pradesh (76,252 sq km) covering total area of 2,58,948 sq km which is about 8% of total geographical area of country. The principal tributaries joining Krishna are the Ghataprabha, the Malaprabha, the Bhima, the Tungabhadra and the Musi[26].

[26] India,WRIS

Krishna Basin (Intra Basin analysis)



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

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

Note:

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

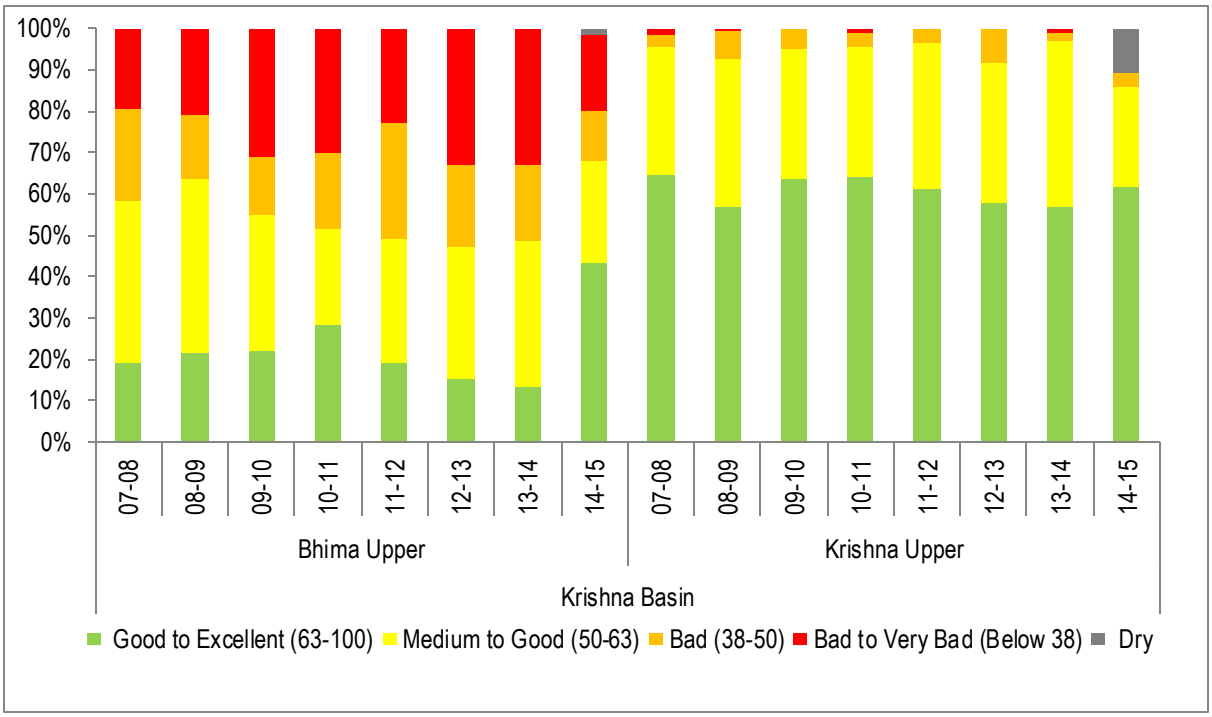
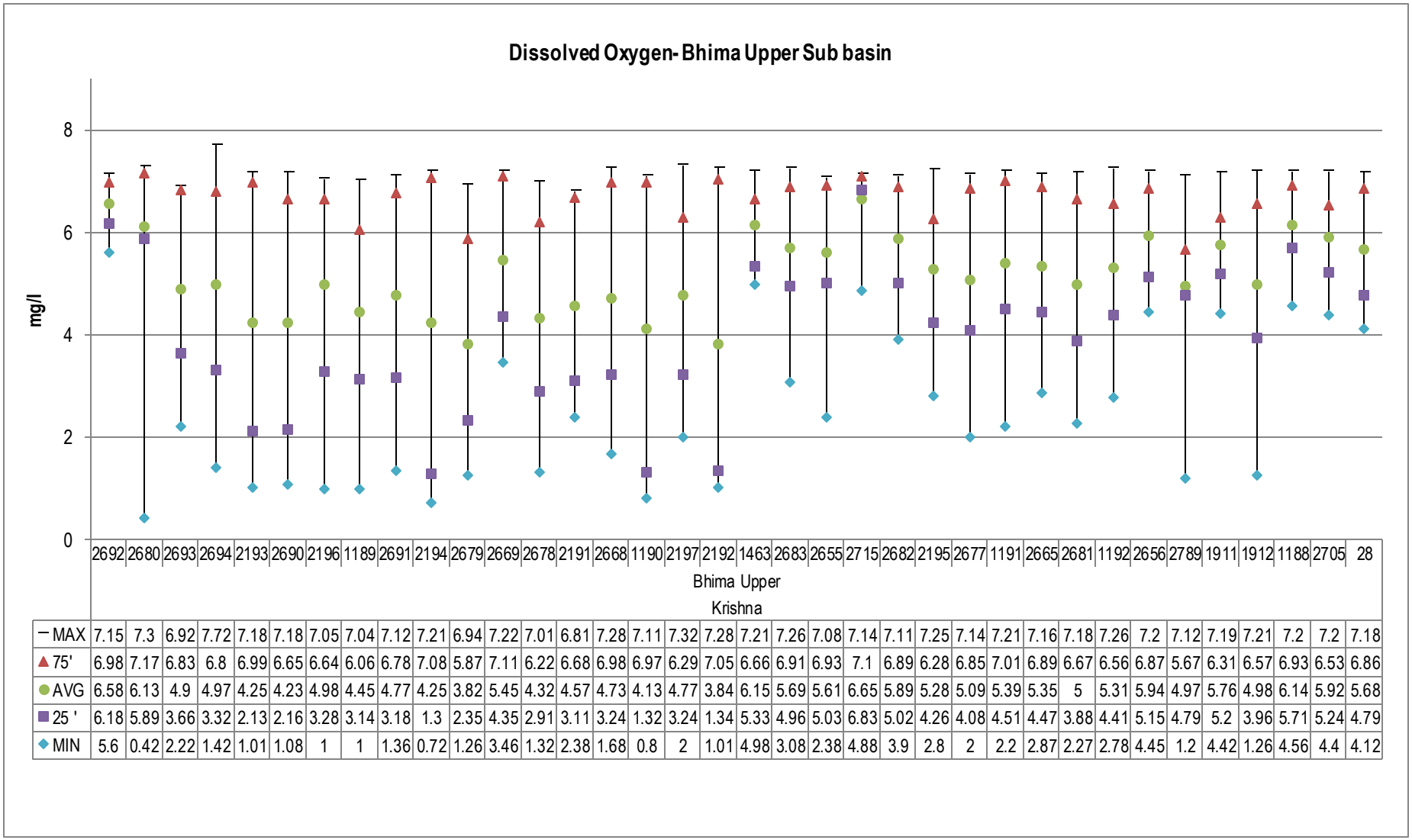


Figure No. 24: Trend of average occurrence for different category of WQI in Krishna basin

The intra basin performance of Krishna Basin across five districts is depicted in the FigureNo. 23 and the average annual occurrence of different category of WQI across all WQMS is depicted in the Figure No. 24.

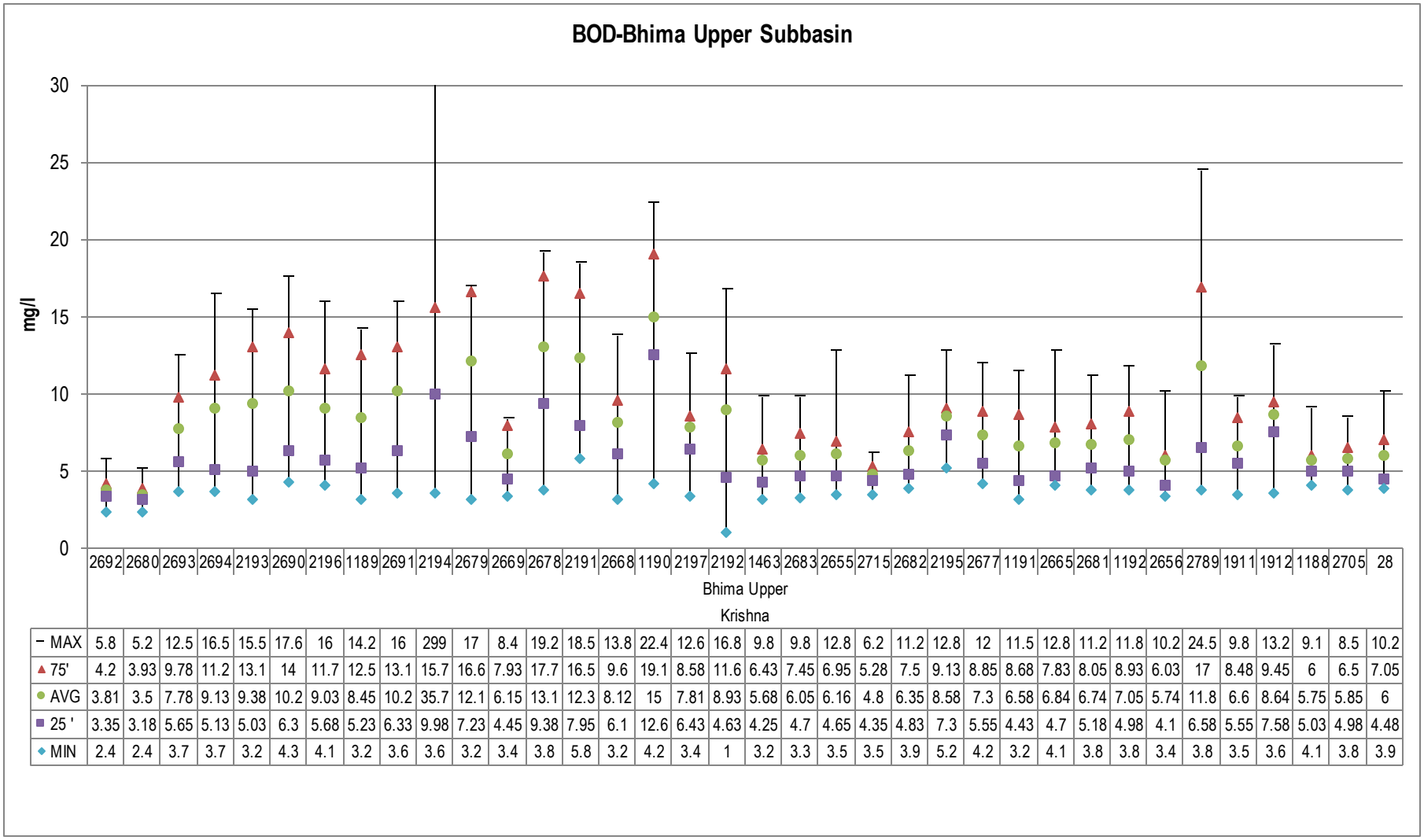
It is observed that among the 5 districts- Kolhapur, Pune, Sangli, Satara and Solapur, the annual average WQI of Sangli and Kolhapur were Good to Excellent category (63-100). The increase in average WQI was noted in Pune district and recorded an improvement in water quality which ranged in Medium to Good category (50-63). The annual average WQI across Solapur and Satara was Medium to Excellent (50-100). The average WQI across Sangli and Kolhapur showed a decline curve.

Intra sub basins results for Krishna basin showed that occurrence of Bad and Bad to very bad category of WQI in Bhima upper is high as compared to Krishna Basin over the years wheras Good to Excellent category is twice in Krishna Upper. Hence the overall preview of WQI in Krishna sub basin is better as compared to Bhima Upper.



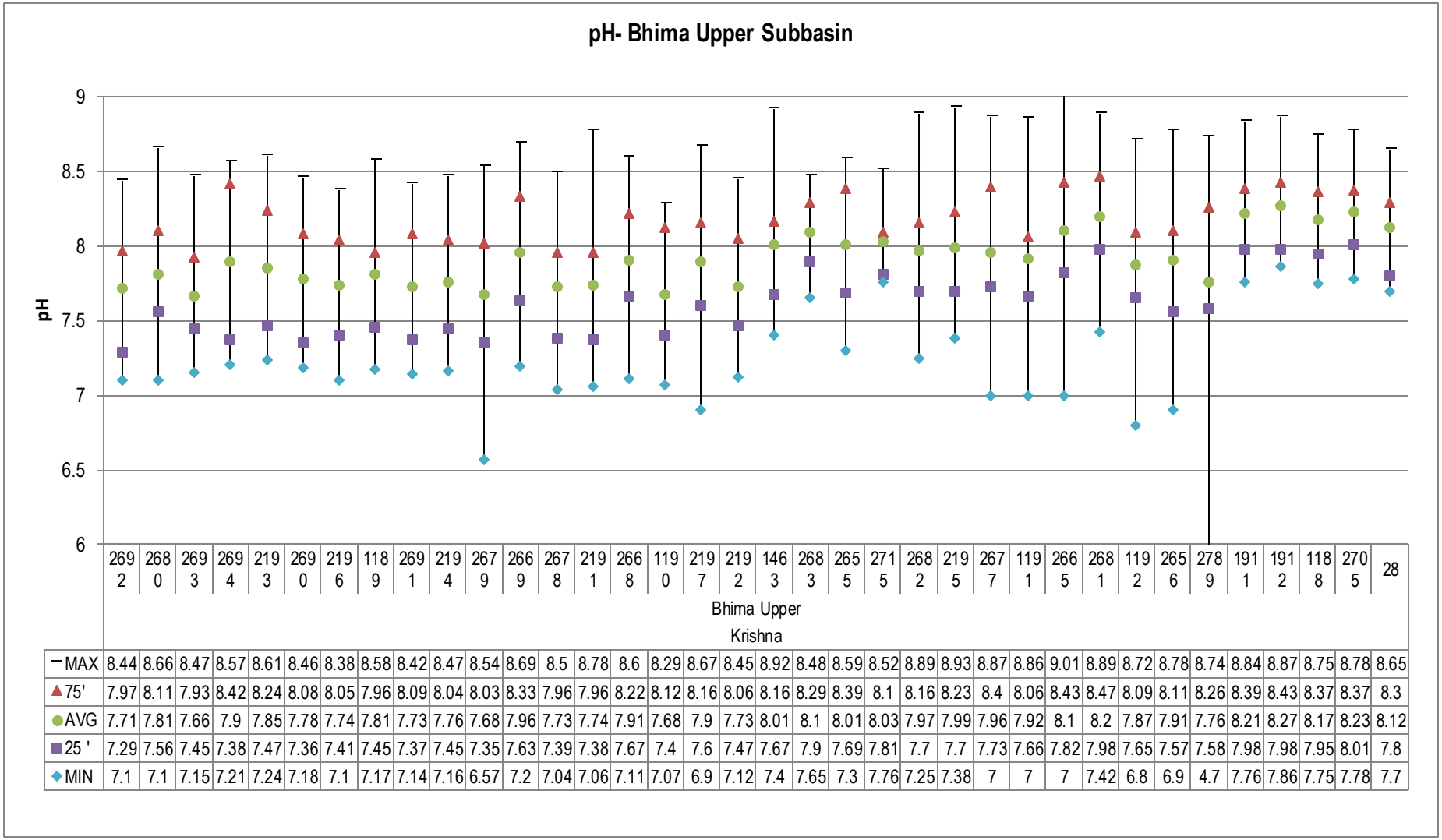
MAX	7.15	7.3	6.92	7.72	7.18	7.18	7.05	7.04	7.12	7.21	6.94	7.22	7.01	6.81	7.28	7.11	7.32	7.28	7.21	7.26	7.08	7.14	7.11	7.25	7.14	7.21	7.16	7.18	7.26	7.2	7.12	7.19	7.21	7.2	7.2	7.18
75'	6.98	7.17	6.83	6.8	6.99	6.65	6.64	6.06	6.78	7.08	5.87	7.11	6.22	6.68	6.98	6.97	6.29	7.05	6.66	6.91	6.93	7.1	6.89	6.28	6.85	7.01	6.89	6.67	6.56	6.87	5.67	6.31	6.57	6.93	6.53	6.86
AVG	6.58	6.13	4.9	4.97	4.25	4.23	4.98	4.45	4.77	4.25	3.82	5.45	4.32	4.57	4.73	4.13	4.77	3.84	6.15	5.69	5.61	6.65	5.89	5.28	5.09	5.39	5.35	5	5.31	5.94	4.97	5.76	4.98	6.14	5.92	5.68
25 '	6.18	5.89	3.66	3.32	2.13	2.16	3.28	3.14	3.18	1.3	2.35	4.35	2.91	3.11	3.24	1.32	3.24	1.34	5.33	4.96	5.03	6.83	5.02	4.26	4.08	4.51	4.47	3.88	4.41	5.15	4.79	5.2	3.96	5.71	5.24	4.79
MIN	5.6	0.42	2.22	1.42	1.01	1.08	1	1	1.36	0.72	1.26	3.46	1.32	2.38	1.68	0.8	2	1.01	4.98	3.08	2.38	4.88	3.9	2.8	2	2.2	2.87	2.27	2.78	4.45	1.2	4.42	1.26	4.56	4.4	4.12

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



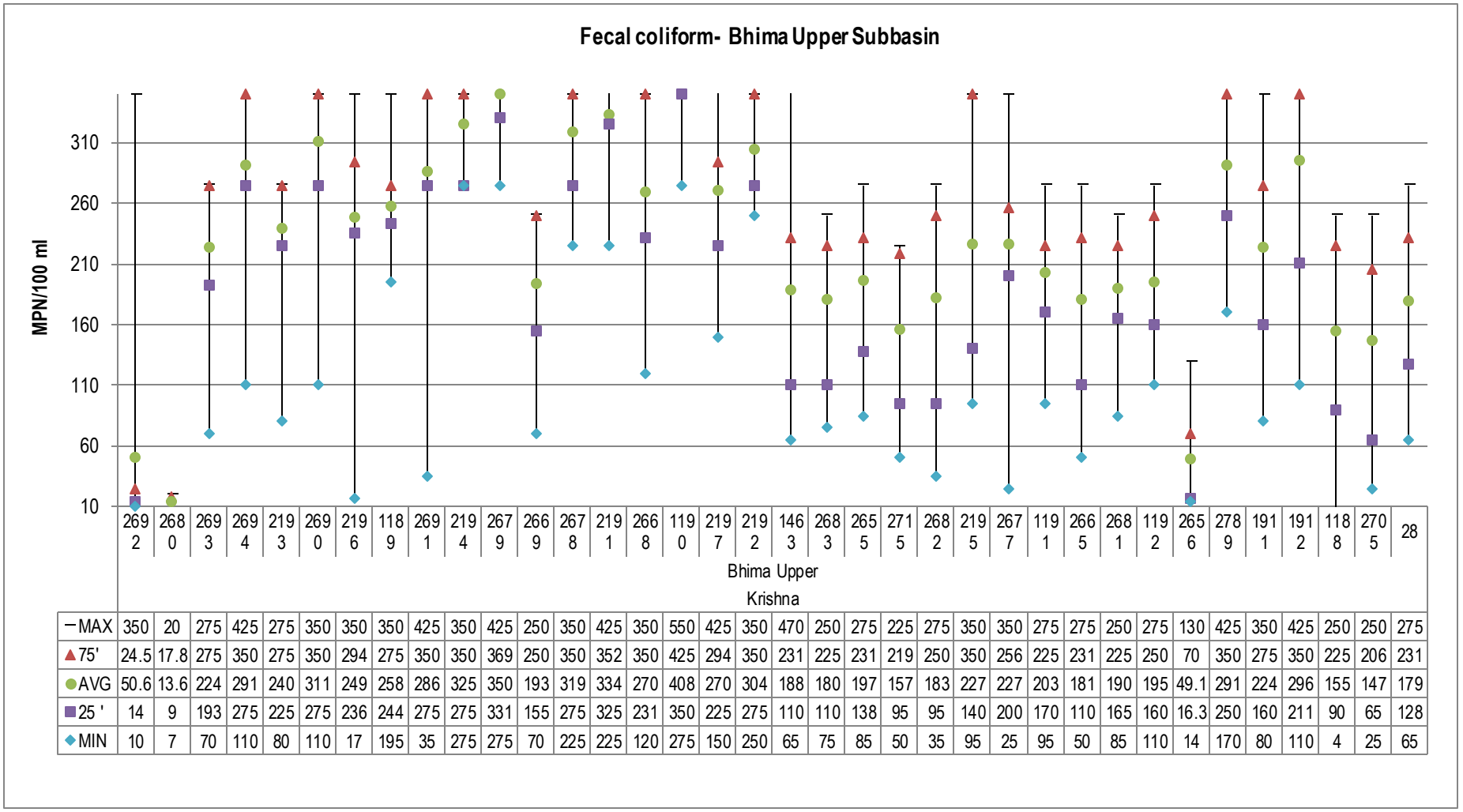
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
MAX	5.8	5.2	12.5	16.5	15.5	17.6	16	14.2	16	299	17	8.4	19.2	18.5	13.8	22.4	12.6	16.8	9.8	9.8	12.8	6.2	11.2	12.8	12	11.5	12.8	11.2	11.8	10.2	24.5	9.8	13.2	9.1	8.5	10.2
75'	4.2	3.93	9.78	11.2	13.1	14	11.7	12.5	13.1	15.7	16.6	7.93	17.7	16.5	9.6	19.1	8.58	11.6	6.43	7.45	6.95	5.28	7.5	9.13	8.85	8.68	7.83	8.05	8.93	6.03	17	8.48	9.45	6	6.5	7.05
AVG	3.81	3.5	7.78	9.13	9.38	10.2	9.03	8.45	10.2	35.7	12.1	6.15	13.1	12.3	8.12	15	7.81	8.93	5.68	6.05	6.16	4.8	6.35	8.58	7.3	6.58	6.84	6.74	7.05	5.74	11.8	6.6	8.64	5.75	5.85	6
25 '	3.35	3.18	5.65	5.13	5.03	6.3	5.68	5.23	6.33	9.98	7.23	4.45	9.38	7.95	6.1	12.6	6.43	4.63	4.25	4.7	4.65	4.35	4.83	7.3	5.55	4.43	4.7	5.18	4.98	4.1	6.58	5.55	7.58	5.03	4.98	4.48
MIN	2.4	2.4	3.7	3.7	3.2	4.3	4.1	3.2	3.6	3.6	3.2	3.4	3.8	5.8	3.2	4.2	3.4	1	3.2	3.3	3.5	3.5	3.9	5.2	4.2	3.2	4.1	3.8	3.8	3.4	3.8	3.5	3.6	4.1	3.8	3.9

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



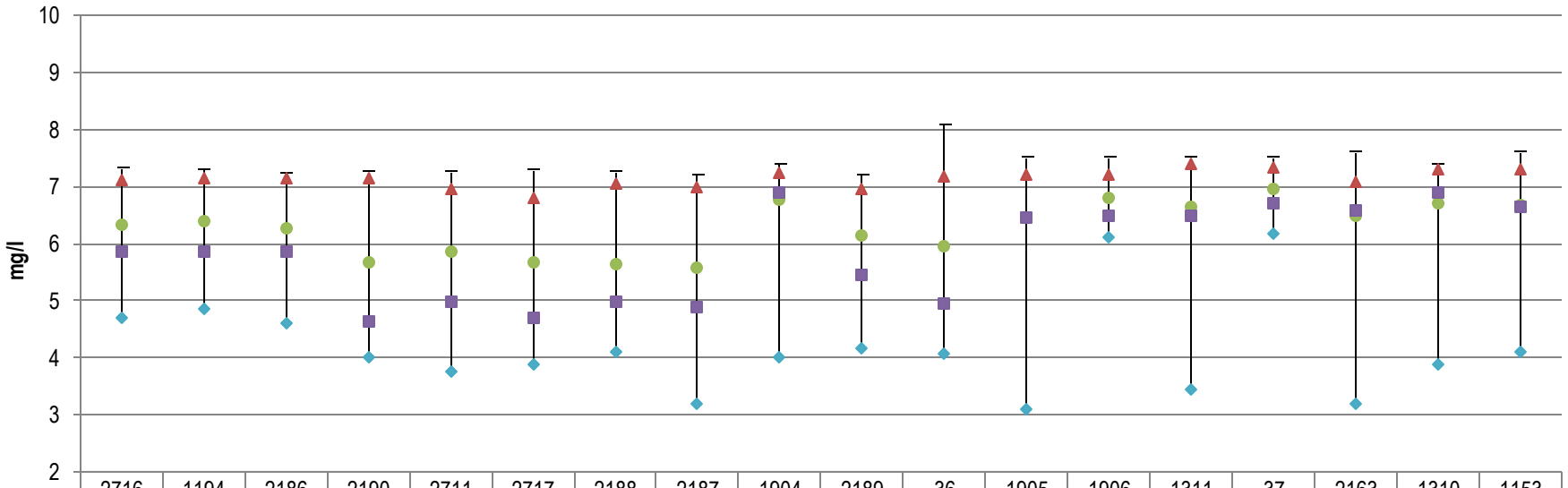
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
MAX	8.44	8.66	8.47	8.57	8.61	8.46	8.38	8.58	8.42	8.47	8.54	8.69	8.5	8.78	8.6	8.29	8.67	8.45	8.92	8.48	8.59	8.52	8.89	8.93	8.87	8.86	9.01	8.89	8.72	8.78	8.74	8.84	8.87	8.75	8.78	8.65
75'	7.97	8.11	7.93	8.42	8.24	8.08	8.05	7.96	8.09	8.04	8.03	8.33	7.96	7.96	8.22	8.12	8.16	8.06	8.16	8.29	8.39	8.1	8.16	8.23	8.4	8.06	8.43	8.47	8.09	8.11	8.26	8.39	8.43	8.37	8.37	8.3
AVG	7.71	7.81	7.66	7.9	7.85	7.78	7.74	7.81	7.73	7.76	7.68	7.96	7.73	7.74	7.91	7.68	7.9	7.73	8.01	8.1	8.01	8.03	7.97	7.99	7.96	7.92	8.1	8.2	7.87	7.91	7.76	8.21	8.27	8.17	8.23	8.12
25 '	7.29	7.56	7.45	7.38	7.47	7.36	7.41	7.45	7.37	7.45	7.35	7.63	7.39	7.38	7.67	7.4	7.6	7.47	7.67	7.9	7.69	7.81	7.7	7.7	7.73	7.66	7.82	7.98	7.65	7.57	7.58	7.98	7.98	7.95	8.01	7.8
MIN	7.1	7.1	7.15	7.21	7.24	7.18	7.1	7.17	7.14	7.16	6.57	7.2	7.04	7.06	7.11	7.07	6.9	7.12	7.4	7.65	7.3	7.76	7.25	7.38	7	7	7	7.42	6.8	6.9	4.7	7.76	7.86	7.75	7.78	7.7

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



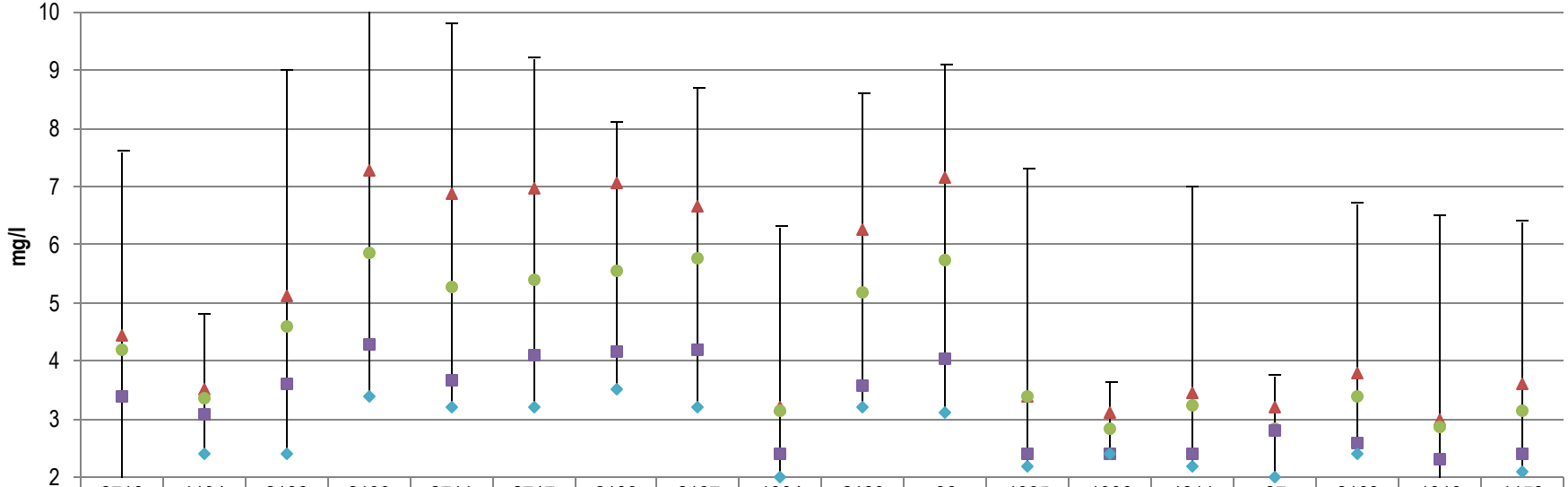
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
MAX	350	20	275	425	275	350	350	350	425	350	425	250	350	425	350	550	425	350	470	250	275	225	275	350	350	275	275	250	275	130	425	350	425	250	250	275
75'	24.5	17.8	275	350	275	350	294	275	350	350	369	250	350	352	350	425	294	350	231	225	231	219	250	350	256	225	231	225	250	70	350	275	350	225	206	231
AVG	50.6	13.6	224	291	240	311	249	258	286	325	350	193	319	334	270	408	270	304	188	180	197	157	183	227	227	203	181	190	195	49.1	291	224	296	155	147	179
25 '	14	9	193	275	225	275	236	244	275	275	331	155	275	325	231	350	225	275	110	110	138	95	95	140	200	170	110	165	160	16.3	250	160	211	90	65	128
MIN	10	7	70	110	80	110	17	195	35	275	275	70	225	225	120	275	150	250	65	75	85	50	35	95	25	95	50	85	110	14	170	80	110	4	25	65

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



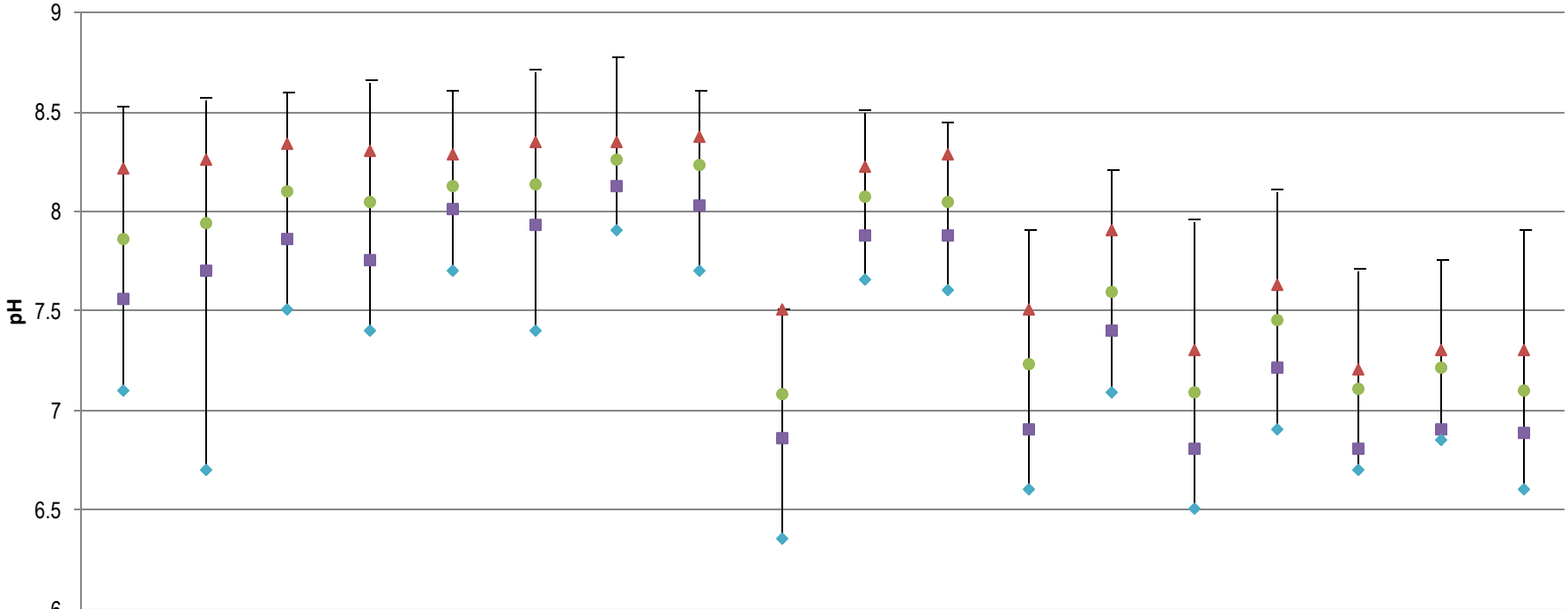
	2716	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
MAX	7.32	7.3	7.24	7.26	7.26	7.28	7.26	7.21	7.4	7.21	8.08	7.5	7.5	7.5	7.5	7.6	7.4	7.6
75'	7.125	7.135	7.155	7.16	6.97	6.79	7.0425	6.995	7.25	6.96	7.1875	7.2	7.2	7.4	7.35	7.1	7.3	7.3
AVG	6.345	6.4075	6.265	5.6825	5.875	5.68417	5.6525	5.59083	6.76667	6.135	5.95667	6.46667	6.81852	6.66111	6.97407	6.48333	6.72222	6.67222
25 '	5.86	5.85	5.865	4.64	4.98	4.6875	4.975	4.875	6.9	5.47	4.9575	6.45	6.5	6.5	6.7	6.6	6.9	6.65
MIN	4.7	4.86	4.6	4	3.76	3.9	4.11	3.2	4	4.18	4.08	3.1	6.1	3.45	6.16667	3.2	3.9	4.1

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



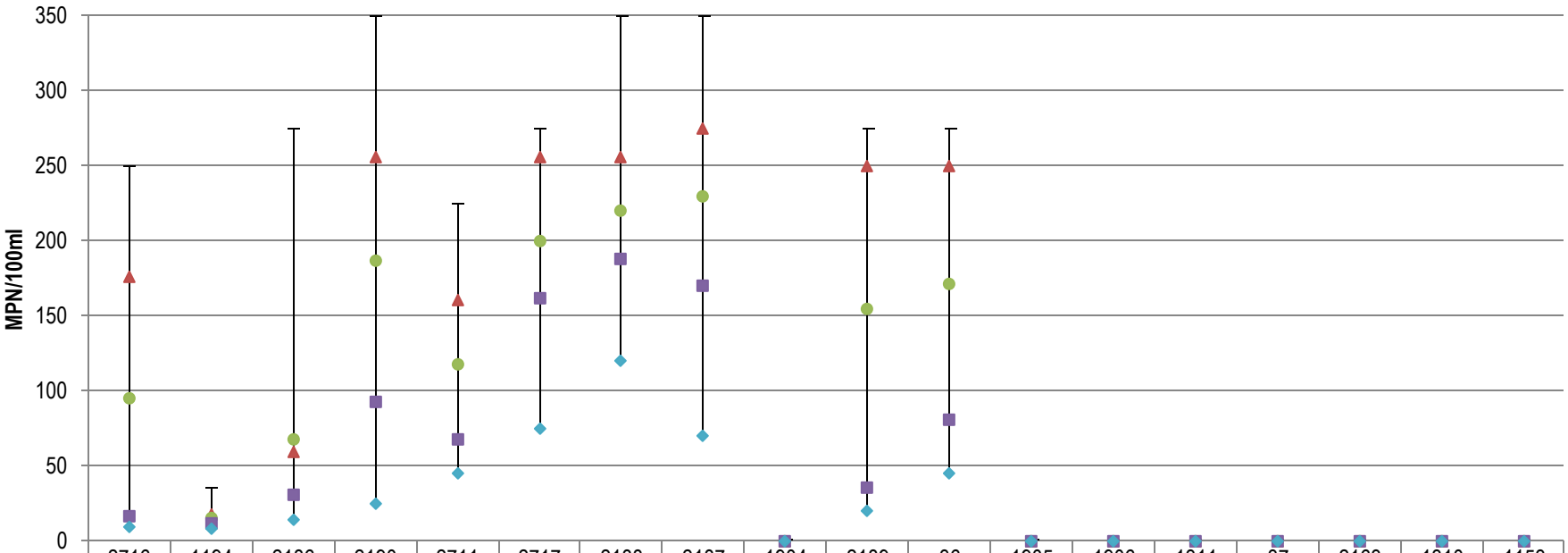
MAX	7.6	4.8	9	10.2	9.8	9.2	8.1	8.7	6.3	8.6	9.1	7.3	3.63333	7	3.73333	6.7	6.5	6.4
75'	4.45	3.525	5.125	7.275	6.875	6.975	7.05	6.65	3.2	6.25	7.15	3.4	3.1	3.45	3.2	3.8	3	3.6
AVG	4.19167	3.35	4.58333	5.86667	5.28333	5.4	5.55833	5.78333	3.13333	5.175	5.725	3.37778	2.82593	3.25	2.83704	3.37778	2.85111	3.14444
25 '	3.375	3.075	3.6	4.3	3.675	4.1	4.175	4.2	2.4	3.575	4.025	2.4	2.4	2.4	2.8	2.6	2.3	2.4
MIN	1.6	2.4	2.4	3.4	3.2	3.2	3.5	3.2	2	3.2	3.1	2.2	2.4	2.2	2	2.4	0.66	2.1

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



	2716	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
MAX	8.52	8.56	8.59	8.65	8.6	8.7	8.77	8.6	7.5	8.5	8.44	7.9	8.2	7.95	8.1	7.7	7.75	7.9
75'	8.21	8.255	8.3325	8.3	8.285	8.345	8.3425	8.3725	7.5	8.22	8.2875	7.5	7.9	7.3	7.625	7.2	7.3	7.3
AVG	7.85833	7.94083	8.09583	8.04167	8.12417	8.13	8.25917	8.23417	7.07889	8.07333	8.04083	7.23167	7.59333	7.08778	7.45208	7.10444	7.20833	7.09778
25 '	7.56	7.7	7.86	7.7525	8.01	7.925	8.1275	8.03	6.86	7.875	7.8725	6.9	7.4	6.8	7.215	6.8	6.9	6.88
MIN	7.1	6.7	7.5	7.4	7.7	7.4	7.9	7.7	6.35	7.65	7.6	6.6	7.09	6.5	6.9	6.7	6.85	6.6

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



	2716	1194	2186	2190	2711	2717	2188	2187	1904	2189	36	1905	1906	1311	37	2163	1310	1153
MAX	250	35	275	350	225	275	350	350	0	275	275	0	0	0	0	0	0	0
75'	176.25	17.75	60	256.25	161.25	256.25	256.25	275	0	250	250	0	0	0	0	0	0	0
AVG	95.4167	15.5	67.75	187.083	118.333	200	220.417	229.583	0	155	171.667	0	0	0	0	0	0	0
25 '	17	11.5	30.5	92.5	67.5	162.5	188.75	170	0	36.25	81.25	0	0	0	0	0	0	0
MIN	10	8	14	25	45	75	120	70	0	20	45	0	0	0	0	0	0	0

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

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

APR	Dry	70	29	51	30	35	30	34	29	30	26	28
MAY	Dry	74	32	56	30	41	31	32	39	33	34	30
JUNE	Dry	77	28	56	57	32	45	61	48	56	31	27
JUL	Dry	79	30	48	48	41	35	45	32	35	32	30
AUG	61	80	25	37	35	28	31	41	48	32	28	26
SEP	68	83	33	71	74	32	73	67	68	73	28	33
OCT	70	82	72	74	72	75	71	74	76	72	73	68
NOV	72	84	66	73	66	72	71	72	73	80	72	69
DEC	72	71	56	73	68	70	68	77	44	69	69	41
JAN	Dry	84	45	65	56	72	53	70	57	53	47	43
FEB	70	81	36	52	50	54	43	56	64	44	29	36
MAR	Dry	80	52	34	40	49	40	34	70	33	33	57
	2715	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679
	BHIMA UPPER SUBBASIN (1 of 3)											

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 18: Surface water quality monitoring stations in Krishna Basin (1 of 2): Sub basin Bhima upper (1 of 3)

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

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

APR	56	29	30	51	32	56	42	59	59	59	47	39
MAY	61	32	32	54	31	52	35	62	58	58	63	55
JUNE	47	28	24	41	28	34	26	62	44	35	55	57
JUL	56	30	31	38	30	49	36	74	61	62	74	61
AUG	56	25	26	45	25	48	32	68	57	58	65	53
SEP	72	33	32	69	38	66	41	72	69	69	69	69
OCT	71	72	70	69	69	68	72	75	73	72	73	64
NOV	69	66	69	69	67	69	71	65	70	72	67	65
DEC	71	56	46	72	71	69	69	71	73	71	73	69
JAN	59	45	56	52	38	54	50	61	65	75	60	49
FEB	62	36	40	47	27	47	54	68	62	61	67	61
MAR	67	52	37	55	32	58	39	68	65	68	69	66
	2669	2678	2191	2668	1190	2197	2192	1463	2683	2655	2682	2195
	BHIMA UPPER SUBBASIN (2 of 3)											

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 19: Surface water quality monitoring stations in Krishna Basin (1 of 2): Sub basin Bhima upper (2 of 3)

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

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

APR	41	40	41	44	49	60	28	58	52	60	63	61
MAY	37	39	52	57	47	67	29	58	53	73	58	57
JUNE	45	58	40	35	43	56	58	57	55	64	71	58
JUL	54	46	54	39	56	55	55	67	51	70	65	69
AUG	53	60	64	57	60	69	52	58	38	56	58	53
SEP	68	67	70	70	70	80	70	64	63	70	66	72
OCT	73	73	70	70	72	77	35	68	64	70	69	71
NOV	78	70	67	72	70	76	31	68	67	67	67	67
DEC	68	69	73	70	67	71	29	69	68	71	73	69
JAN	61	69	64	58	61	84	64	54	50	68	62	65
FEB	59	68	63	62	67	74	69	65	36	67	69	60
MAR	66	73	69	61	70	80	48	60	28	62	64	56
	2677	1191	2665	2681	1192	2656	2789	1911	1912	1188	2705	28
BHIMA UPPER SUBBASIN (3 of 3)												

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 20: Surface water quality monitoring stations in Krishna Basin (1of 2): Sub basin Bhima upper (3of 3)

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

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

APR	74	78	50	51	54	51	56	61	44
MAY	62	77	64	54	63	55	57	59	64
JUNE	77	70	63	68	48	54	53	58	66
JUL	79	79	72	52	57	63	61	58	65
AUG	69	79	73	58	68	58	56	54	65
SEP	75	76	77	66	72	71	68	67	67
OCT	75	81	77	71	76	68	68	69	64
NOV	74	81	76	70	69	63	67	62	62
DEC	80	79	69	72	71	68	69	68	Dry
JAN	67	83	81	72	78	68	63	69	Dry
FEB	75	74	79	65	71	71	64	61	63
MAR	80	81	84	67	68	71	60	49	Dry
	2716	**1194**	**2186**	**2190**	**2711**	**2717**	**2188**	**2187**	**1904**
Krishna upper (1 of 2)									

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 21: Surface water quality monitoring stations in Krishna Basin (1of 2): Sub basin Krishna upper (1of 2)

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

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

APR	68	62	41	64	41	64	41	46	48
MAY	64	59	66	66	66	65	64	64	64
JUNE	72	60	64	67	69	66	66	68	68
JUL	61	54	64	63	63	66	61	63	64
AUG	62	56	64	66	64	63	63	64	62
SEP	70	73	61	66	62	66	65	64	67
OCT	73	71	64	Dry	62	Dry	65	65	63
NOV	67	69	65	61	63	44	65	66	67
DEC	77	73	Dry	65	Dry	63	Dry	Dry	Dry
JAN	72	73	Dry	Dry	Dry	Dry	Dry	Dry	Dry
FEB	61	66	62	60	64	61	63	65	62
MAR	69	61	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	2189	**36**	**1905**	**1906**	**1311**	**37**	**2163**	**1310**	**1153**
Krishna Upper (2 of 2)									

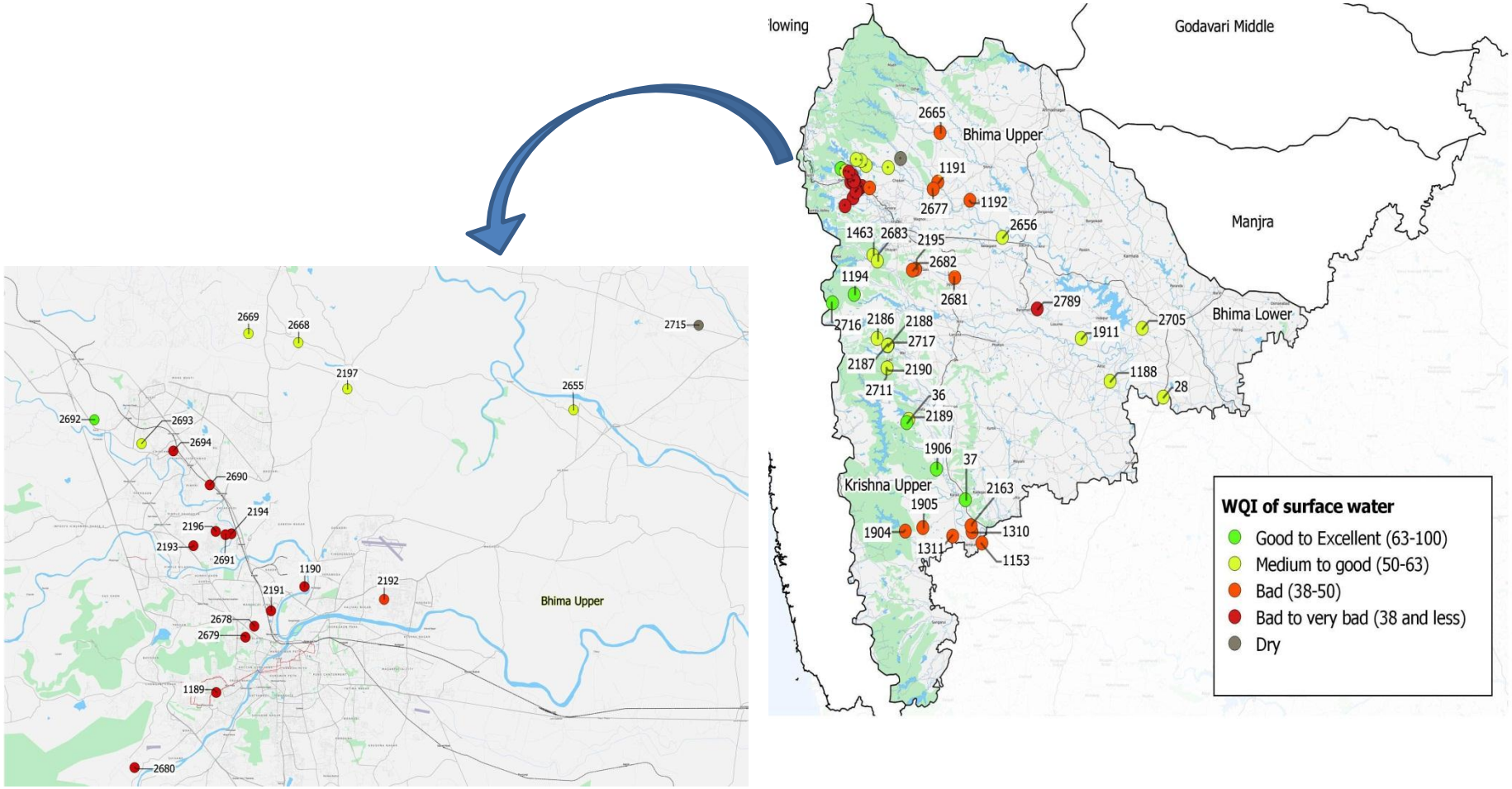
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

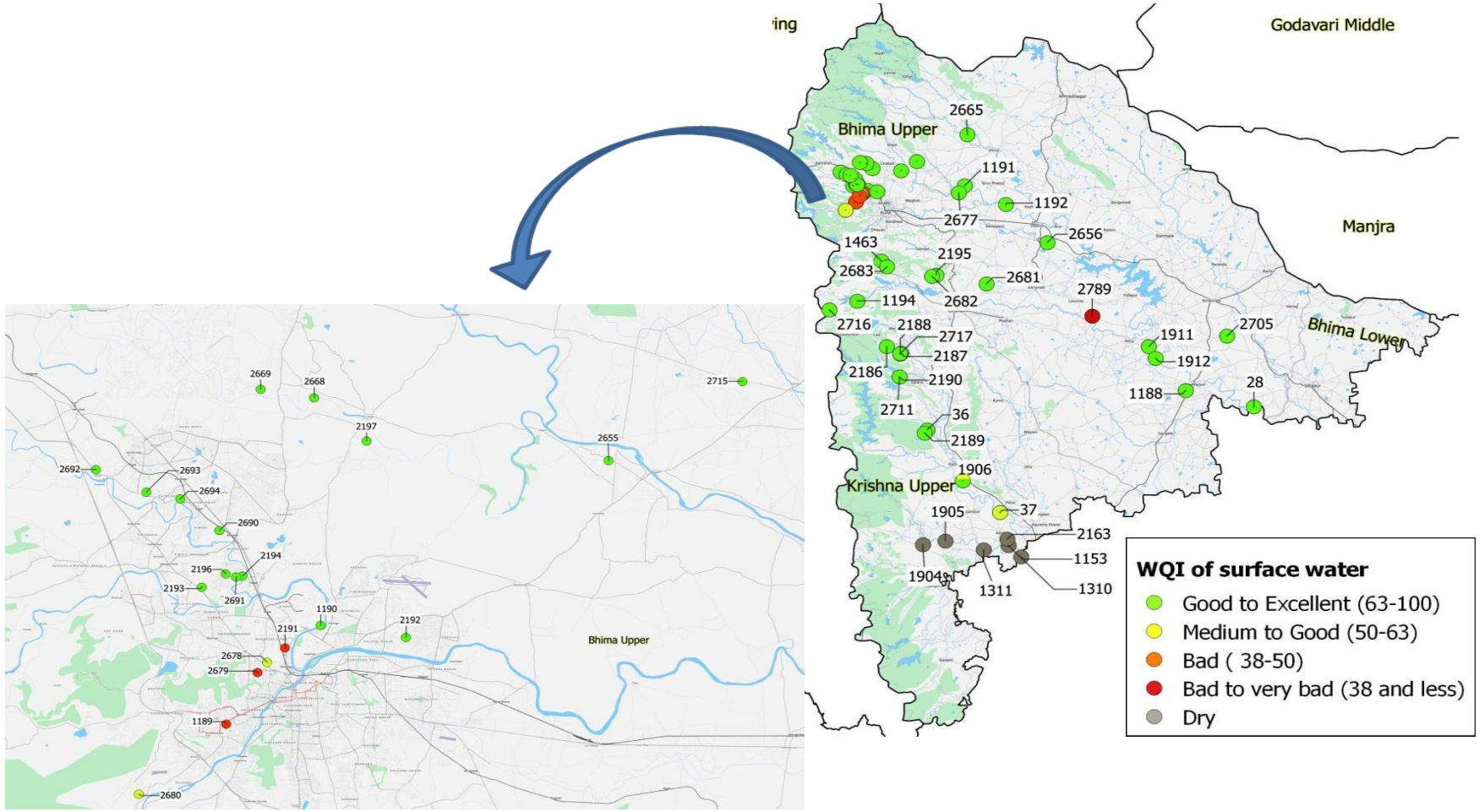
Table No. 22: Surface water quality monitoring stations in Krishna Basin (1of 2): Sub basin Krishna upper (2 of 2)

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

Spatial map of Surface WQI at Krishna Basin (April 2014)

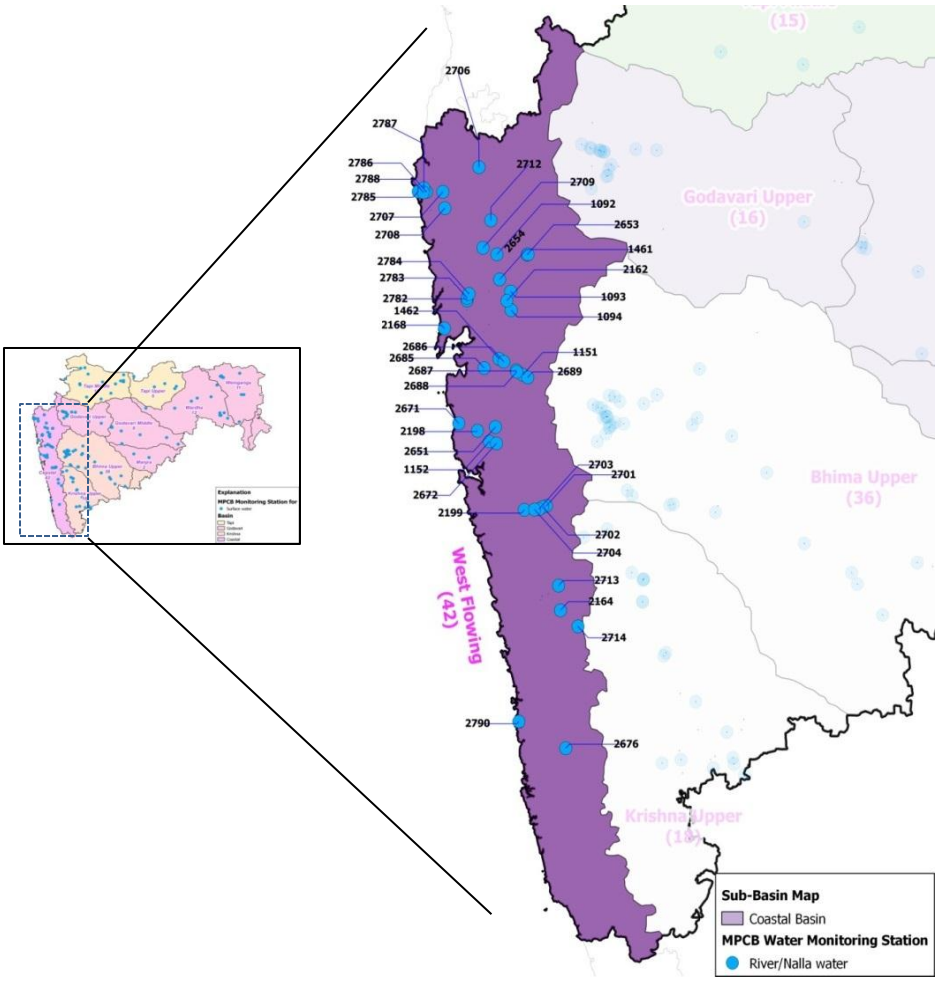


Spatial map of Surface WQI at Krishna Basin (December 2014)



West Flowing Rivers

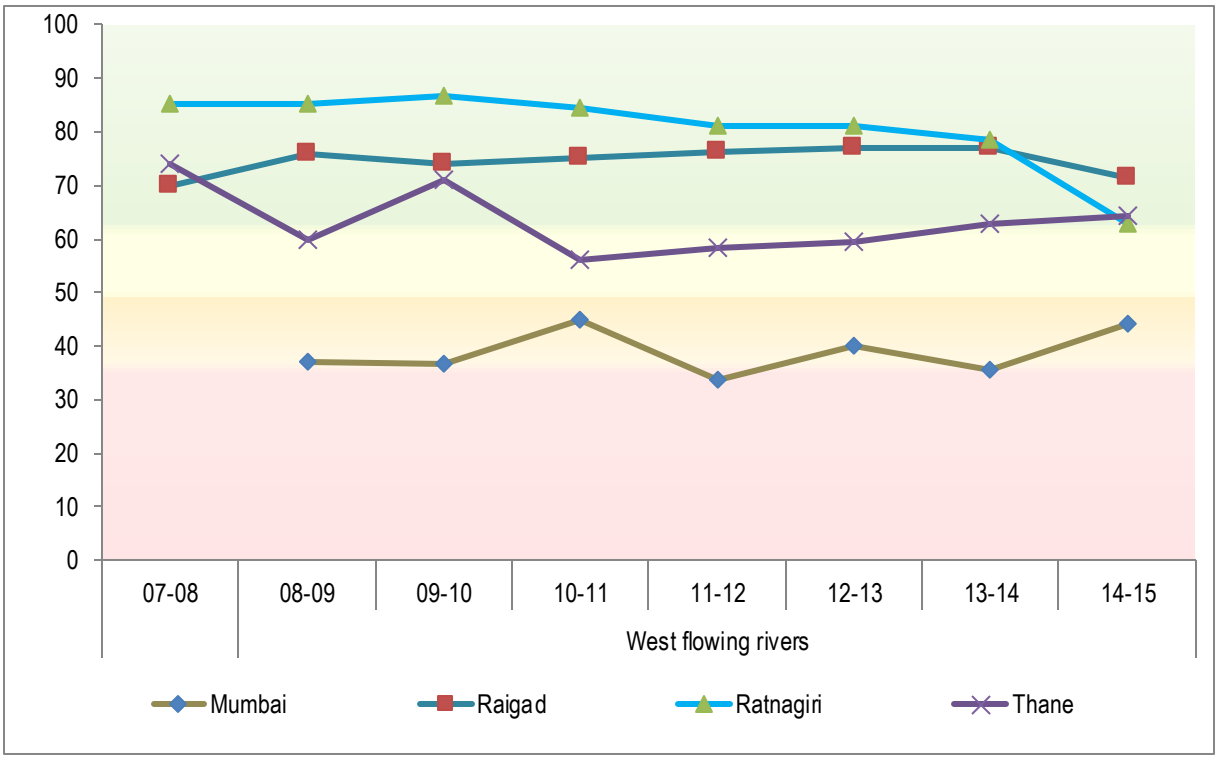
Maharashtra has many westwards flowing rivers originating from the Western Ghats like Damanganga, Surya, Vaitarna, Ulhas, Savitri, Kundalika, Patalganga, Vashisti, Shastri, Karli, Terekhol and so on[27]. These rivers are an important source of drinking water, agricultural applications and industrial 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 Map No. 7.



Map No. 7: Network of surface water quality monitoring stations in West flowing rivers basin

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

West Flowing River Basin (Intra Basin analysis)



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

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

Note:

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

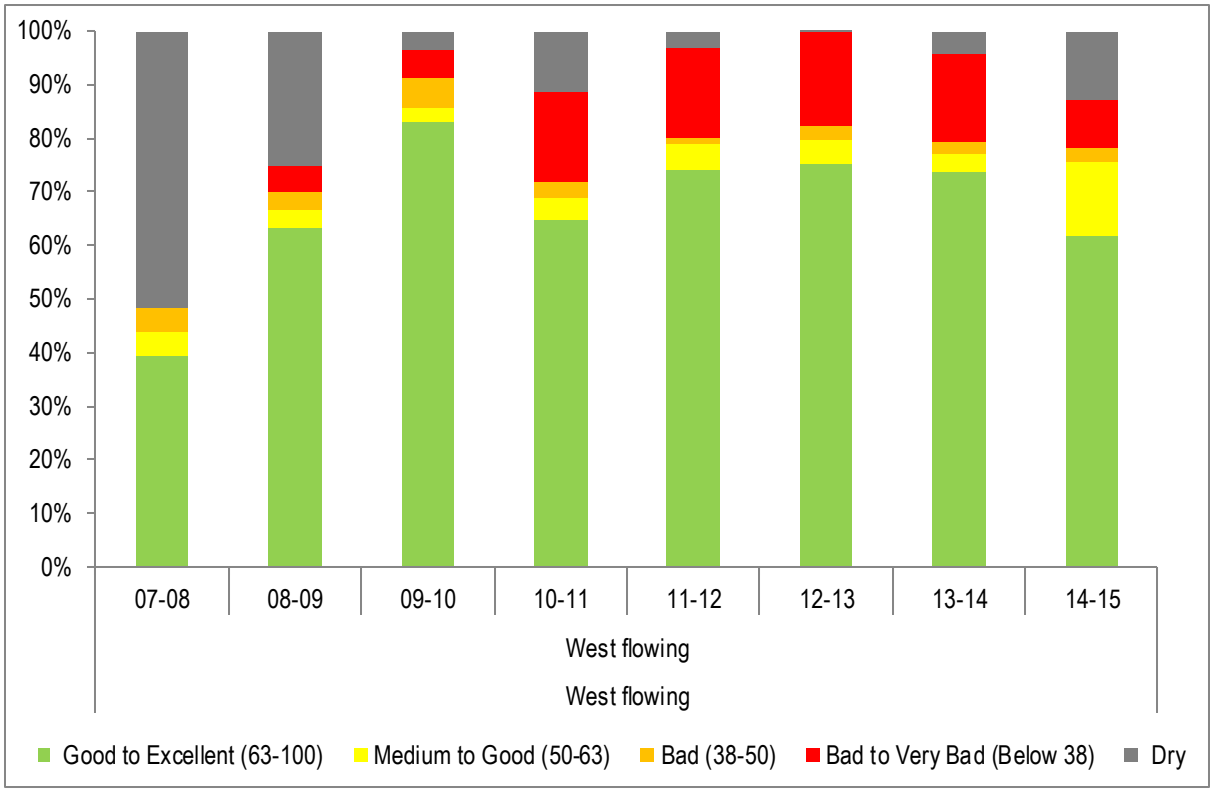
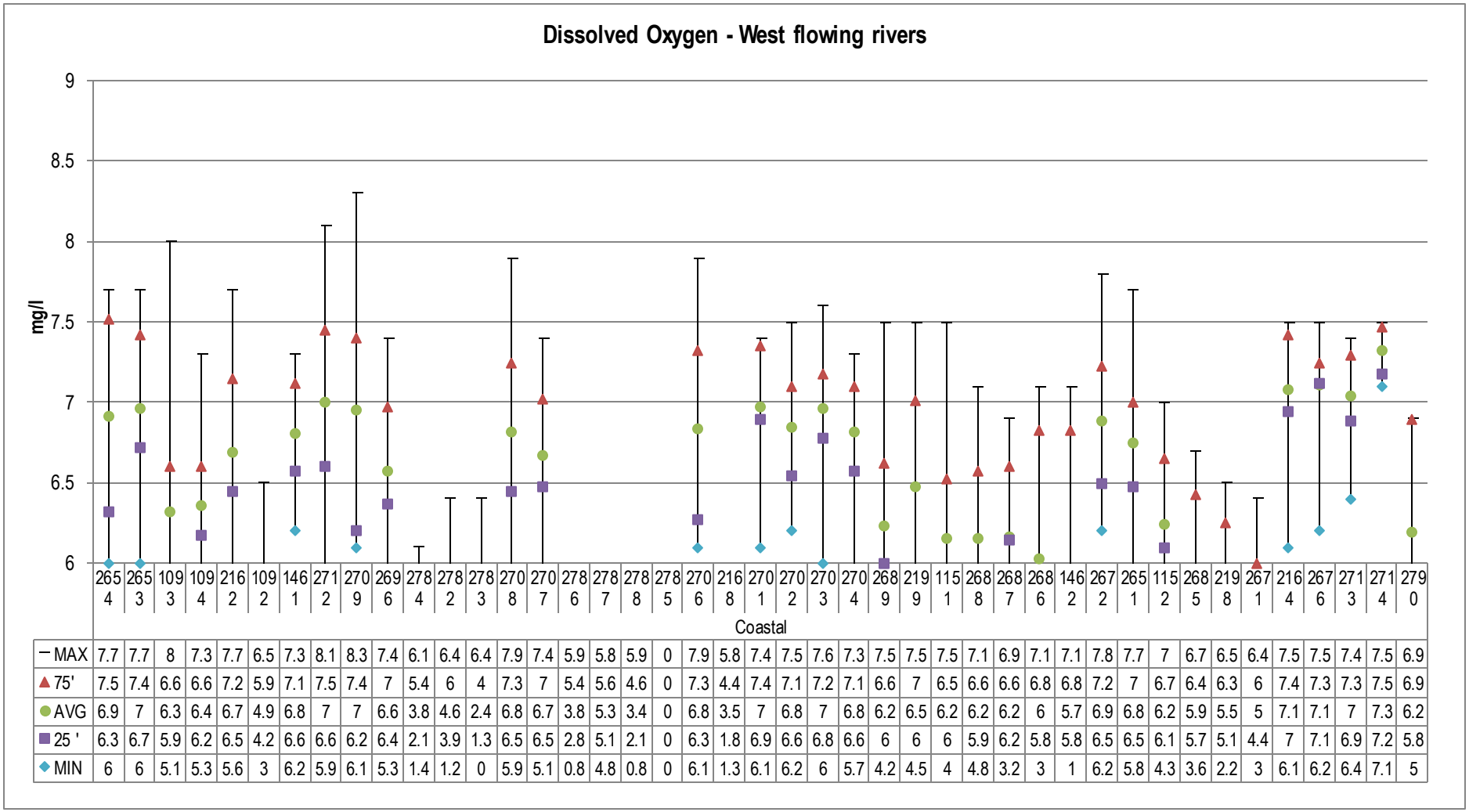


Figure No. 34: Trend of average occurrence for different category of WQI in West flowing river

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

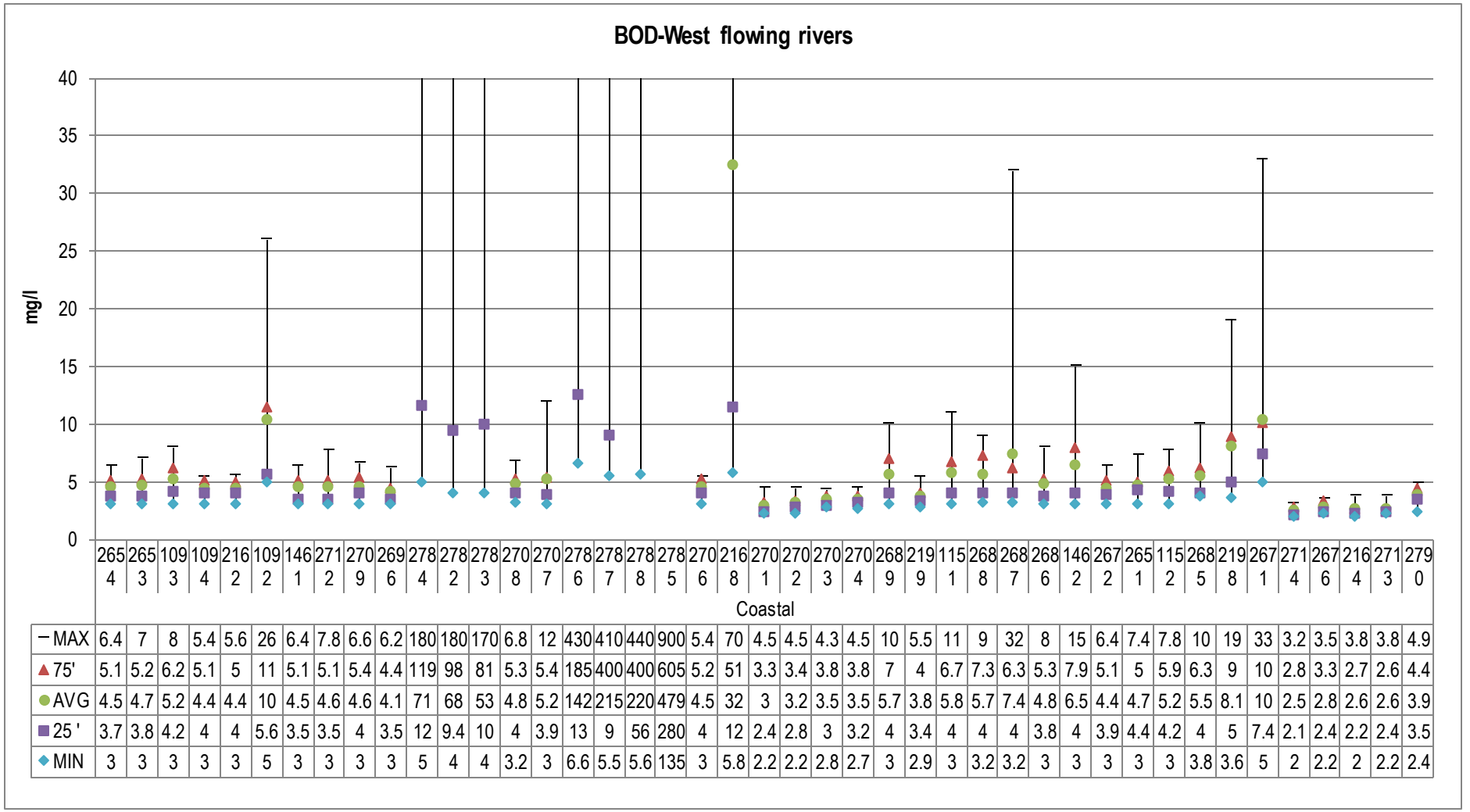
The results showed that among four districts, namely Thane, Mumbai, Raigad and Ratnagiri, the annual average WQI of Mumbai were consistently in Bad to Medium category (38-63) from 07-08 till 14-15. Whereas, Raigad and Ratnagiri were in Good to Excellent (63-100). The Average WQI of Thane district is observed in Medium to good category in most of the years. The results showed that average WQI across Mumbai and Thane districts displayed upward trend in recent years whereas a decline curve was observed in district of Ratnagiri.

Figure No. 34 shows average annual occurrence of WQI across WQM stations of coastalbasin for west flowing rivers and nallas. In the year 2014-15 West flowing rivers shows the occurrence of Medium to Good category of WQI as compared to last 7 years. The declinetrend in WQI maybe due to unavailaibility of data.



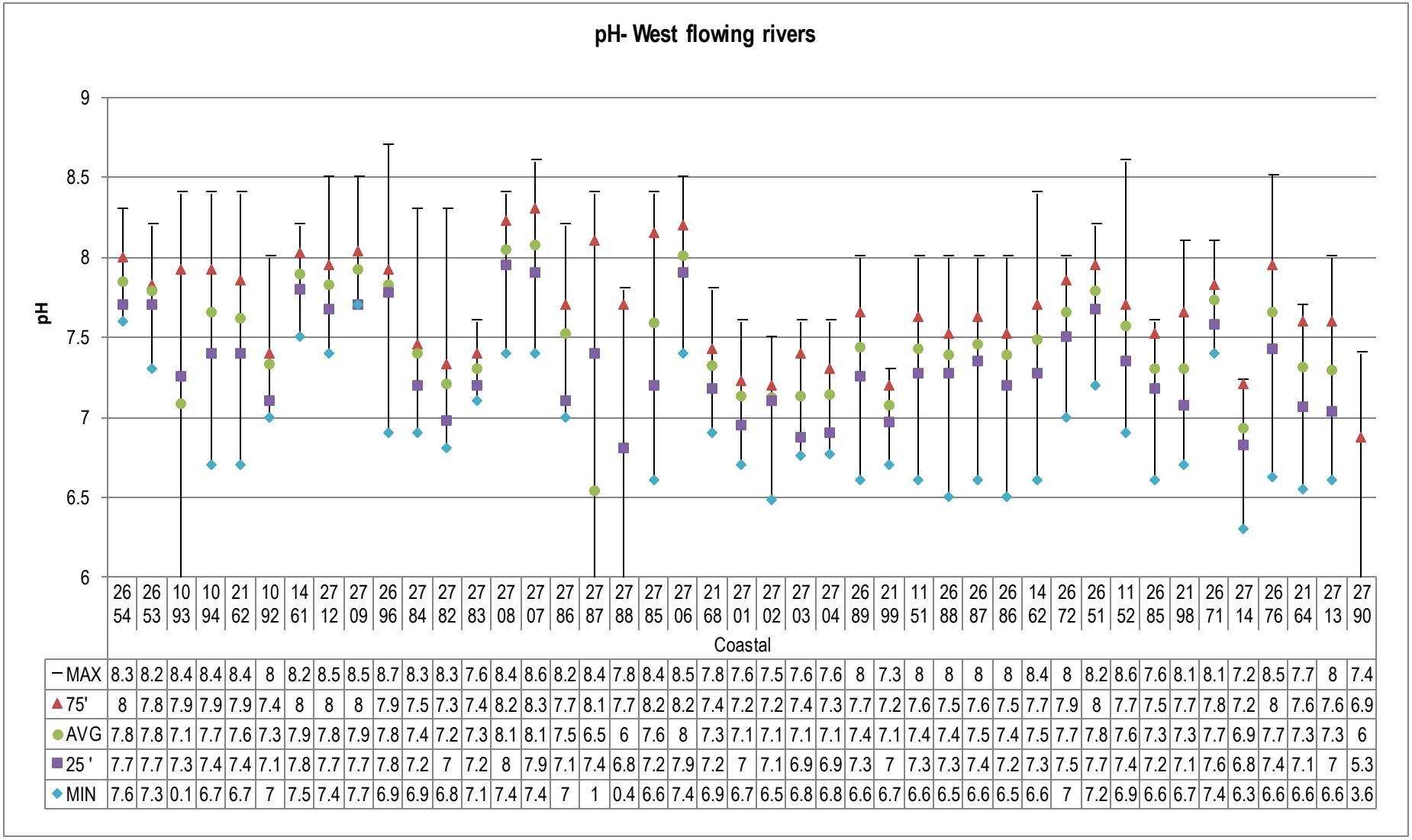
	2654	2653	1093	1094	2162	1092	1461	2712	2709	2696	2784	2782	2783	2708	2707	2786	2787	2788	2785	2706	2168	2701	2702	2703	2704	2689	2199	1151	2688	2687	2686	1462	2672	2651	1152	2685	2198	2671	2164	2676	2713	2714	2790
MAX	7.7	7.7	8	7.3	7.7	6.5	7.3	8.1	8.3	7.4	6.1	6.4	6.4	7.9	7.4	5.9	5.8	5.9	0	7.9	5.8	7.4	7.5	7.6	7.3	7.5	7.5	7.5	7.1	6.9	7.1	7.1	7.8	7.7	7	6.7	6.5	6.4	7.5	7.5	7.4	7.5	6.9
75'	7.5	7.4	6.6	6.6	7.2	5.9	7.1	7.5	7.4	7	5.4	6	4	7.3	7	5.4	5.6	4.6	0	7.3	4.4	7.4	7.1	7.2	7.1	6.6	7	6.5	6.6	6.6	6.8	6.8	7.2	7	6.7	6.4	6.3	6	7.4	7.3	7.3	7.5	6.9
AVG	6.9	7	6.3	6.4	6.7	4.9	6.8	7	7	6.6	3.8	4.6	2.4	6.8	6.7	3.8	5.3	3.4	0	6.8	3.5	7	6.8	7	6.8	6.2	6.5	6.2	6.2	6.2	6	5.7	6.9	6.8	6.2	5.9	5.5	5	7.1	7.1	7	7.3	6.2
25 '	6.3	6.7	5.9	6.2	6.5	4.2	6.6	6.6	6.2	6.4	2.1	3.9	1.3	6.5	6.5	2.8	5.1	2.1	0	6.3	1.8	6.9	6.6	6.8	6.6	6	6	6	5.9	6.2	5.8	5.8	6.5	6.5	6.1	5.7	5.1	4.4	7	7.1	6.9	7.2	5.8
MIN	6	6	5.1	5.3	5.6	3	6.2	5.9	6.1	5.3	1.4	1.2	0	5.9	5.1	0.8	4.8	0.8	0	6.1	1.3	6.1	6.2	6	5.7	4.2	4.5	4	4.8	3.2	3	1	6.2	5.8	4.3	3.6	2.2	3	6.1	6.2	6.4	7.1	5

Figure No. 35: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at West flowing rivers (Coastal basin)



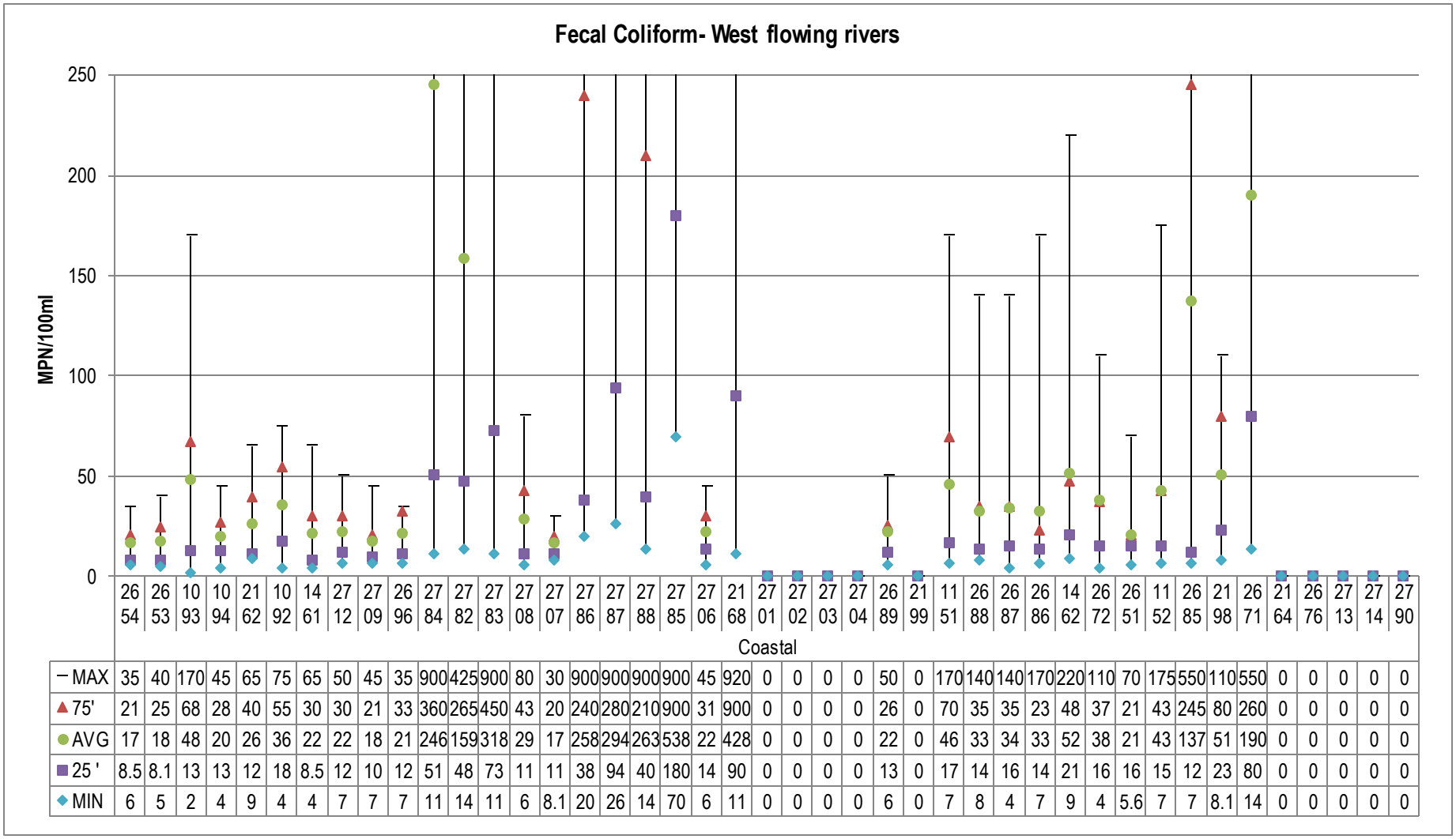
	2654	2653	1093	1094	2162	1092	1461	2712	2709	2696	2784	2782	2783	2708	2707	2786	2787	2788	2785	2706	2168	2701	2702	2703	2704	2689	2199	1151	2688	2687	2686	1462	2672	2651	1152	2685	2198	2671	2714	2676	2164	2713	2790
MAX	6.4	7	8	5.4	5.6	26	6.4	7.8	6.6	6.2	180	180	170	6.8	12	430	410	440	900	5.4	70	4.5	4.5	4.3	4.5	10	5.5	11	9	32	8	15	6.4	7.4	7.8	10	19	33	3.2	3.5	3.8	3.8	4.9
75'	5.1	5.2	6.2	5.1	5	11	5.1	5.1	5.4	4.4	119	98	81	5.3	5.4	185	400	400	605	5.2	51	3.3	3.4	3.8	3.8	7	4	6.7	7.3	6.3	5.3	7.9	5.1	5	5.9	6.3	9	10	2.8	3.3	2.7	2.6	4.4
AVG	4.5	4.7	5.2	4.4	4.4	10	4.5	4.6	4.6	4.1	71	68	53	4.8	5.2	142	215	220	479	4.5	32	3	3.2	3.5	3.5	5.7	3.8	5.8	5.7	7.4	4.8	6.5	4.4	4.7	5.2	5.5	8.1	10	2.5	2.8	2.6	2.6	3.9
25 '	3.7	3.8	4.2	4	4	5.6	3.5	3.5	4	3.5	12	9.4	10	4	3.9	13	9	56	280	4	12	2.4	2.8	3	3.2	4	3.4	4	4	4	3.8	4	3.9	4.4	4.2	4	5	7.4	2.1	2.4	2.2	2.4	3.5
MIN	3	3	3	3	3	5	3	3	3	3	5	4	4	3.2	3	6.6	5.5	5.6	135	3	5.8	2.2	2.2	2.8	2.7	3	2.9	3	3.2	3.2	3	3	3	3	3	3.8	3.6	5	2	2.2	2	2.2	2.4

Figure No. 36: Trend ofBiological Oxygen Demand (BOD) levels recorded at WQMS at West flowing rivers (Coastal basin)



	2654	2653	1093	1094	2162	1092	1461	2712	2709	2696	2784	2782	2783	2708	2707	2786	2787	2788	2785	2706	2168	2701	2702	2703	2704	2689	2199	1151	2688	2687	2686	1462	2672	2651	1152	2685	2198	2671	2714	2676	2164	2713	2790
MAX	8.3	8.2	8.4	8.4	8.4	8	8.2	8.5	8.5	8.7	8.3	8.3	7.6	8.4	8.6	8.2	8.4	7.8	8.4	8.5	7.8	7.6	7.5	7.6	7.6	8	7.3	8	8	8	8	8.4	8	8.2	8.6	7.6	8.1	8.1	7.2	8.5	7.7	8	7.4
75'	8	7.8	7.9	7.9	7.9	7.4	8	8	8	7.9	7.5	7.3	7.4	8.2	8.3	7.7	8.1	7.7	8.2	8.2	7.4	7.2	7.2	7.4	7.3	7.7	7.2	7.6	7.5	7.6	7.5	7.7	7.9	8	7.7	7.5	7.7	7.8	7.2	8	7.6	7.6	6.9
AVG	7.8	7.8	7.1	7.7	7.6	7.3	7.9	7.8	7.9	7.8	7.4	7.2	7.3	8.1	8.1	7.5	6.5	6	7.6	8	7.3	7.1	7.1	7.1	7.1	7.4	7.1	7.4	7.4	7.5	7.4	7.5	7.7	7.8	7.6	7.3	7.3	7.7	6.9	7.7	7.3	7.3	6
25 '	7.7	7.7	7.3	7.4	7.4	7.1	7.8	7.7	7.7	7.8	7.2	7	7.2	8	7.9	7.1	7.4	6.8	7.2	7.9	7.2	7	7.1	6.9	6.9	7.3	7	7.3	7.3	7.4	7.2	7.3	7.5	7.7	7.4	7.2	7.1	7.6	6.8	7.4	7.1	7	5.3
MIN	7.6	7.3	0.1	6.7	6.7	7	7.5	7.4	7.7	6.9	6.9	6.8	7.1	7.4	7.4	7	1	0.4	6.6	7.4	6.9	6.7	6.5	6.8	6.8	6.6	6.7	6.6	6.5	6.6	6.5	6.6	7	7.2	6.9	6.6	6.7	7.4	6.3	6.6	6.6	6.6	3.6

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



	2654	2653	1093	1094	2162	1092	1461	2712	2709	2696	2784	2782	2783	2708	2707	2786	2787	2788	2785	2706	2168	2701	2702	2703	2704	2689	2199	1151	2688	2687	2686	1462	2672	2651	1152	2685	2198	2671	2164	2676	2713	2714	2790
MAX	35	40	170	45	65	75	65	50	45	35	900	425	900	80	30	900	900	900	900	45	920	0	0	0	0	50	0	170	140	140	170	220	110	70	175	550	110	550	0	0	0	0	0
75'	21	25	68	28	40	55	30	30	21	33	360	265	450	43	20	240	280	210	900	31	900	0	0	0	0	26	0	70	35	35	23	48	37	21	43	245	80	260	0	0	0	0	0
AVG	17	18	48	20	26	36	22	22	18	21	246	159	318	29	17	258	294	263	538	22	428	0	0	0	0	22	0	46	33	34	33	52	38	21	43	137	51	190	0	0	0	0	0
25 '	8.5	8.1	13	13	12	18	8.5	12	10	12	51	48	73	11	11	38	94	40	180	14	90	0	0	0	0	13	0	17	14	16	14	21	16	16	15	12	23	80	0	0	0	0	0
MIN	6	5	2	4	9	4	4	7	7	7	11	14	11	6	8.1	20	26	14	70	6	11	0	0	0	0	6	0	7	8	4	7	9	4	5.6	7	7	8.1	14	0	0	0	0	0

Figure No. 38: Trend of Fecal Coliform recorded at WQMS at West flowing rivers (Coastal basin)

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

APR	72	72	73	80	76	61	80	76	73	34	35	34	76	75
MAY	78	80	71	78	76	57	73	74	73	40	33	38	75	79
JUNE	81	78	78	77	82	57	83	77	80	30	32	38	76	79
JUL	81	81	71	76	79	64	84	82	81	56	46	54	83	80
AUG	79	80	77	80	80	72	79	77	77	44	34	39	73	80
SEP	83	83	82	85	80	83	78	82	85	62	75	71	80	81
OCT	76	77	69	77	77	75	80	80	80	61	66	56	78	76
NOV	80	83	86	83	85	84	84	79	76	35	33	34	81	79
DEC	60	62	59	61	Dry	61	58	61	59	57	60	64	57	42
JAN	78	77	71	77	74	67	77	78	79	28	32	34	72	76
FEB	77	78	54	80	78	51	79	72	72	25	27	27	73	76
MAR	83	79	75	81	79	72	75	77	79	28	29	27	76	78
	2654	2653	1093	1094	2162	1092	1461	2712	2709	2784	2782	2783	2708	2707
	WEST FLOWING RIVERS (1 of 3)													

Legend				
Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 23: Surface water quality monitoring stations on West flowing rivers (1 of 3)

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

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

APR	Dry	Dry	Dry	31	77	29	65	65	63	62	76	60	79	73
MAY	Dry	Dry	Dry	31	78	34	61	61	63	59	78	57	76	75
JUNE	Dry	Dry	Dry	27	72	37	64	66	63	66	81	65	81	85
JUL	21	22	24	21	82	69	65	67	65	66	84	64	86	85
AUG	62	27	29	20	83	52	65	66	65	66	72	67	76	77
SEP	77	71	79	33	78	61	Dry	Dry	Dry	Dry	62	Dry	55	65
OCT	32	29	37	32	78	28	63	66	64	64	75	63	75	73
NOV	33	44	11	30	78	66	64	64	64	62	72	61	75	75
DEC	Dry	Dry	Dry	16	55	46	Dry	Dry	Dry	Dry	62	Dry	62	62
JAN	Dry	Dry	Dry	NA	75	31	Dry	Dry	Dry	Dry	83	Dry	77	80
FEB	Dry	Dry	Dry	22	74	27	65	66	63	64	82	66	78	81
MAR	Dry	Dry	Dry	25	76	52	63	66	63	65	82	54	77	81
	2786	2787	2788	2785	2706	2168	2701	2702	2703	2704	2689	2199	1151	2688
	WEST FLOWING RIVERS (2 of 3)													

Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 24: Surface water quality monitoring stations on West flowing rivers (2 of 3)

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

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

APR	80	76	85	73	74	70	81	52	56	Dry	57	64	66	43	79
MAY	76	61	44	72	81	74	63	65	49	Dry	62	61	62	58	77
JUNE	83	83	84	77	79	73	84	52	49	Dry	67	66	66	63	69
JUL	86	85	45	80	80	76	87	67	60	Dry	63	67	63	67	81
AUG	75	81	75	76	73	74	76	73	73	64	64	65	68	Dry	79
SEP	47	70	71	86	84	84	72	84	70	65	64	63	61	Dry	80
OCT	78	74	67	79	80	80	73	76	60	66	60	65	66	54	82
NOV	77	76	76	85	78	82	82	76	80	58	61	63	65	52	81
DEC	62	62	63	64	61	Dry	65	63	60	65	65	65	67	62	63
JAN	79	82	82	75	77	79	72	69	52	64	Dry	65	64	Dry	80
FEB	83	82	80	81	84	74	73	76	52	Dry	62	63	64	Dry	78
MAR	81	79	79	80	79	80	57	77	65	Dry	Dry	65	62	52	77
	2687	2686	1462	2672	2651	1152	2685	2198	2671	2714	2676	2164	2713	2790	2696
	WEST FLOWING RIVERS (3 of 3)														

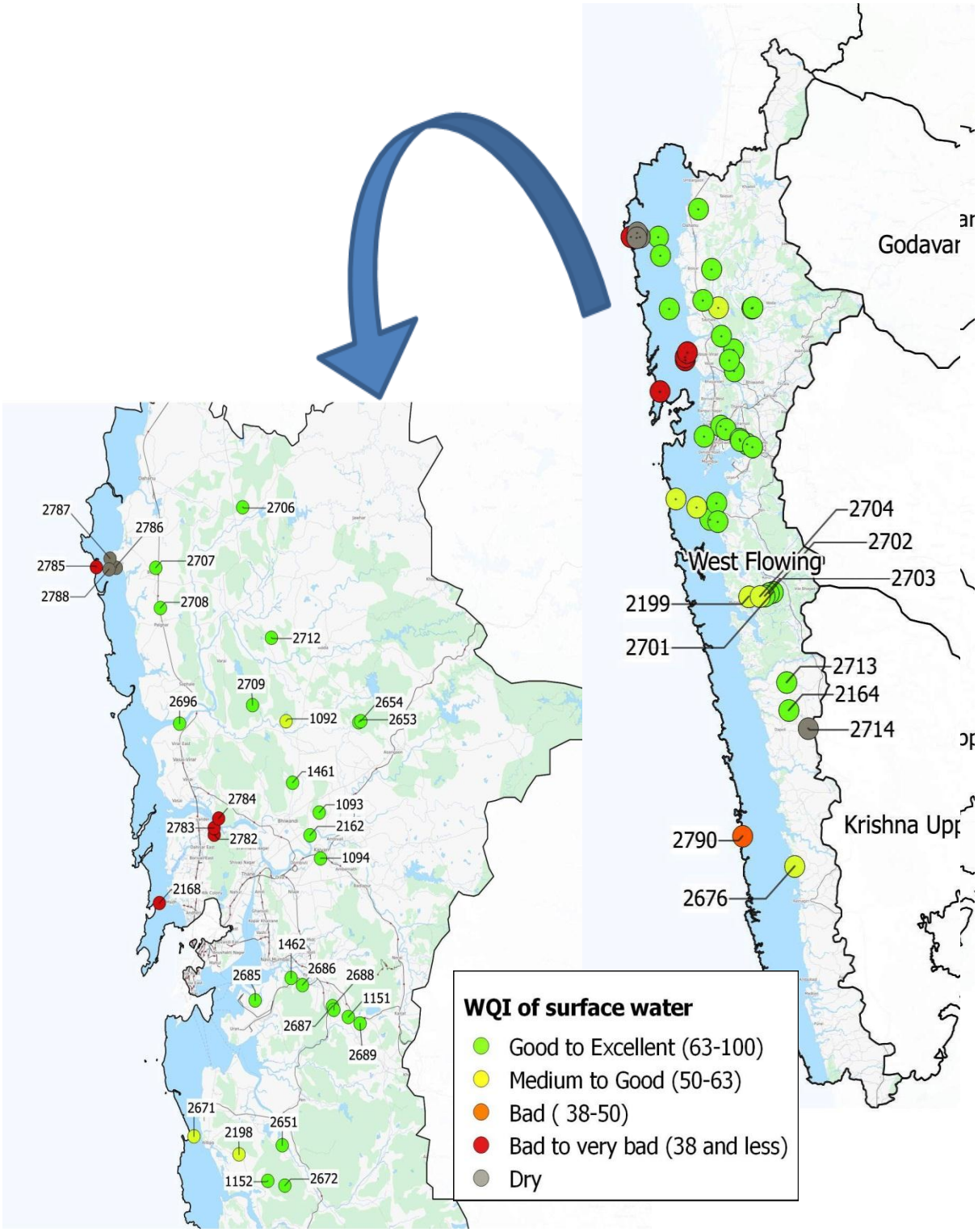
Legend

Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

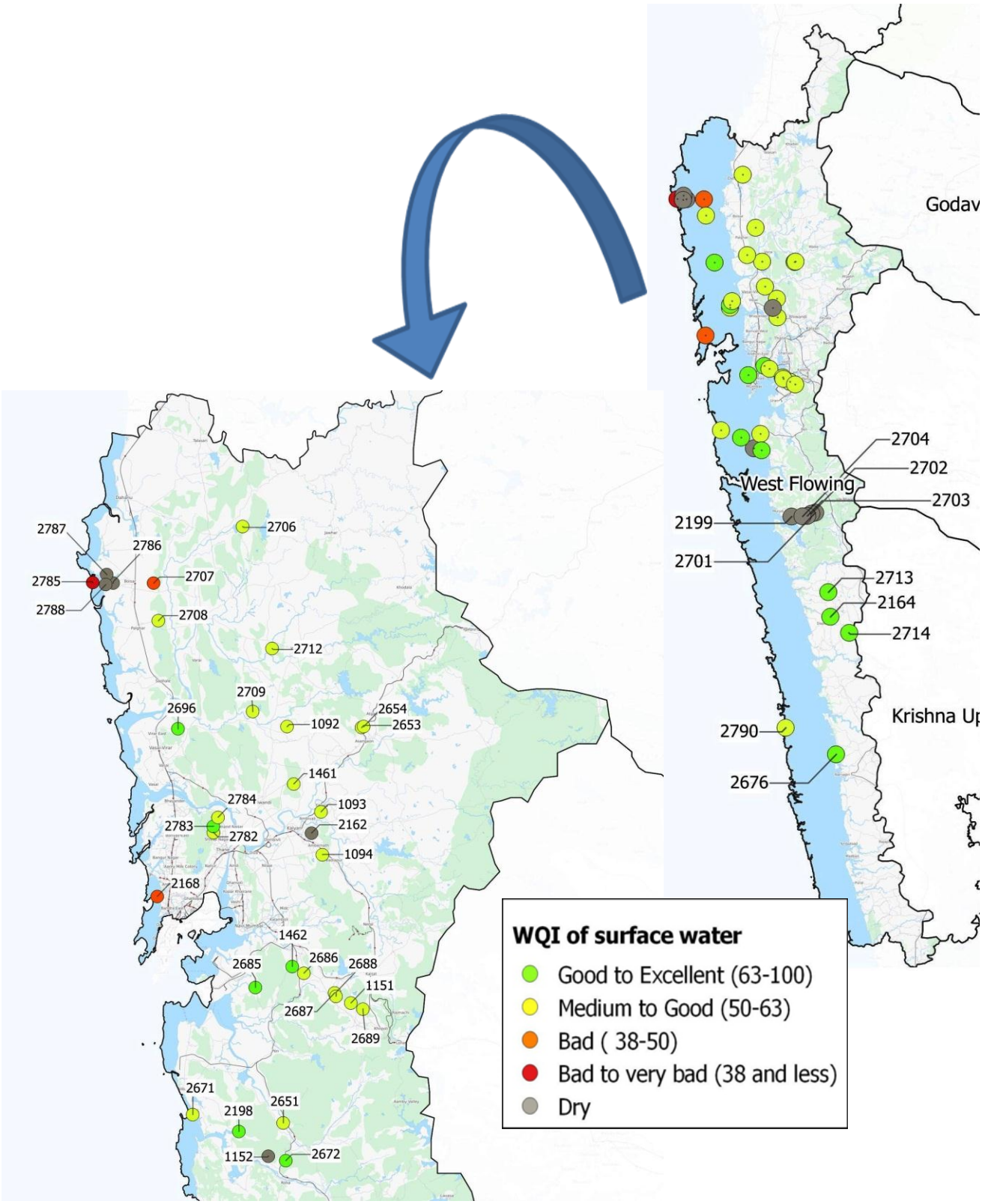
Table No. 25: Surface water quality monitoring stations on West flowing rivers (3 of 3)

Station Code	River	Name of the Station	Village	Taluka	District
2687	Patalganga	Patalganga river at Khalapur Pumping Station	Khalapur	Khalapur	Raigad
2686	Patalganga	Patalganga river at Vyal Pump House	Vyal	Khalapur	Raigad
1462	Patalganga	Patalganga near intake of MIDC water works(Turade w/w)	Turade	Khalapur	Raigad
2672	Kundalika	Kundalika river at Dhatav Jackwell	Dhatav	Roha	Raigad
2651	Amba	Amba river at D/s of Waken bridge	Waken Phata	Roha	Raigad
1152	Kundalika	Kundalika river at Roha bridge	Roha	Roha	Raigad
2685	Patalganga	Patalganga river at D/s of Kharpada bridge.	Kharpada	Khalapur	Raigad
2198	Kundalika	Kundalika river at Are Khurd (saline zone)	Are Khurd	Roha	Raigad
2671	Kundalik	Kundalika river near Salav bridge (saline zone)	Salav	Roha	Raigad
2714	Vashishti	Vashisti river at U/s of Pophali near Konphansawane bridge.	Pophali	Chiplun	Ratnagiri
2676	Muchkundi	Muchkundi river at Waked, Ratnagiri, near M/s Asahi Maharashtra Glass Ltd	Waked	Lanja	Ratnagiri
2164	Vashishti	Vashisti river at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt. Ltd.	Kherdi	Chiplun	Ratnagiri
2713	Vashishti	Vashisti river at D/s of Three M Paper Mills near Chiplun water intake jackwell.	Kherdi	Chiplun	Ratnagiri
2790	Pimpal-Paneri nalla	Pimpal-Paneri nalla at Ratnagiri near Finolex Industries.	Yahganigaon	Ratnagiri	Ratnagiri
2696	Pelhar	Pelhar Dam	Pelhar	Vasai	Palghar

Spatial map of Surface WQI of West Flowing Rivers (April 2014)



Spatial map of Surface WQI of West Flowing Rivers (December 2014)



Saline (Sea and Creek) Water Quality

Ranking seventh largest in the world in terms of coastline, India has 7,517 km long coastline out of which 5,423 km belongs to peninsular India and remaining 2,094 km to the Andaman, Nicobar and Lakshadweep Islands. India has 43 % sandy beaches; 11 %, rocky coast including cliffs; and 46 %, mudflats or marshy coast. It is estimated that nearly 250 million people live within area of 50 km from the coastline of India. This coastline supports a huge human population, which is dependent on the rich coastal and marine resources for economic growth[28].

Rapid industrialization has taken place along the coastline of India. Among the coastlines, industrial pollution is recorded high on coast of West Bengal, Tamil Nadu, Gujarat, Maharashtra and Andhra Pradesh. It is estimated about 8000 industries release 390 million tonnes of effluents annually into the Indian coastal waters either directly or indirectly.

Disposal of Municipal solid waste also acts as source of marine pollution. Municipal waste consists of degradable and non- degradable waste which comprises of plastic, rubber, glass, heavy metals and so on. The discarded plastic waste leads to entanglement, suffocation and ingestion of aquatic life. Consumption of plastic by the marine animals causes disruption of the endocrine system and reduction in reproduction rate[29]. Heavy metals such as mercury, lead, nickel, arsenic, and cadmium, could also accumulate in the tissues of many species in a bio accumulation process. Recreational activities like tourism and oil spills from shipping industries also contribute to coastal pollution.

Being a coastal state, Maharashtra is bestowed with a 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.

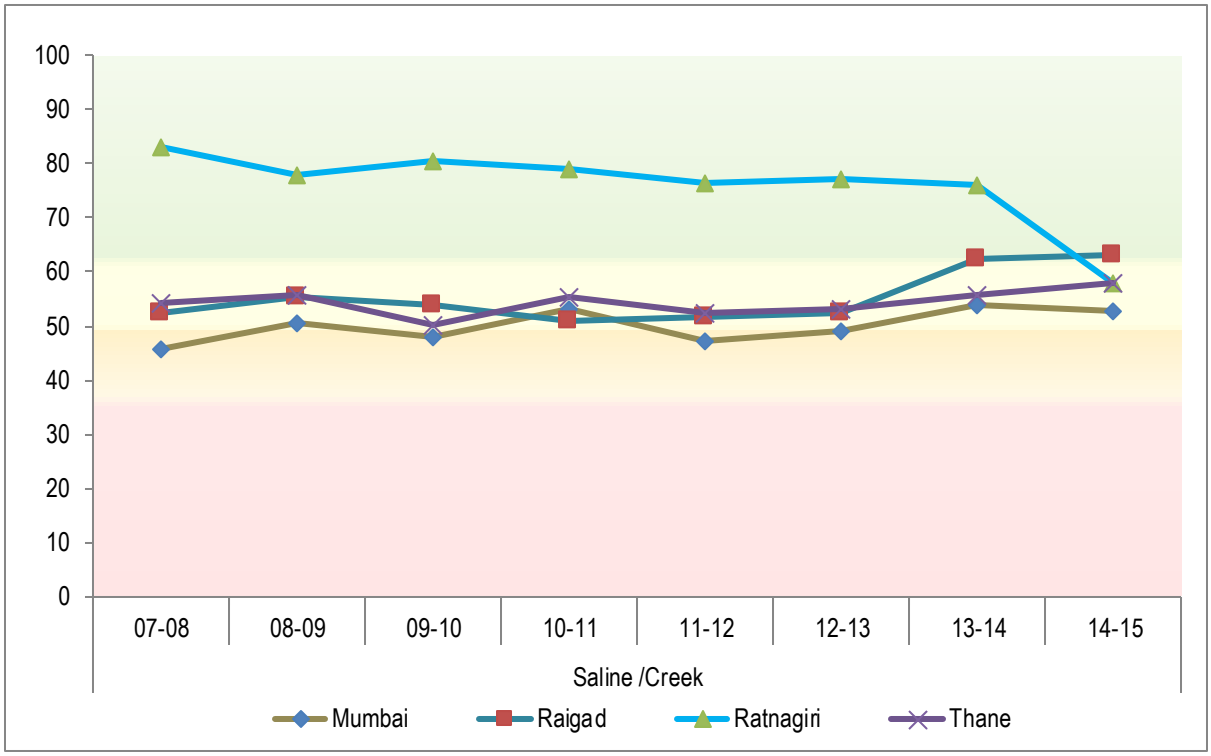
Given the fact that water pollution on the coastal front shall directly impact the marine ecosystem and also the humans, it is of significant importance to monitor sea water quality.

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 an illustrative manner.

[28] UNDP, Review paper: *Status of coastal and marine ecosystem management in South Asia*, 2012

[29] A. Duraisamy, S. Latha, *Impact of pollution on marine environment -A case study of coastal Chennai*, 2011

Coastal Basin (Sea / Creek water sample)



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

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

Note:

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

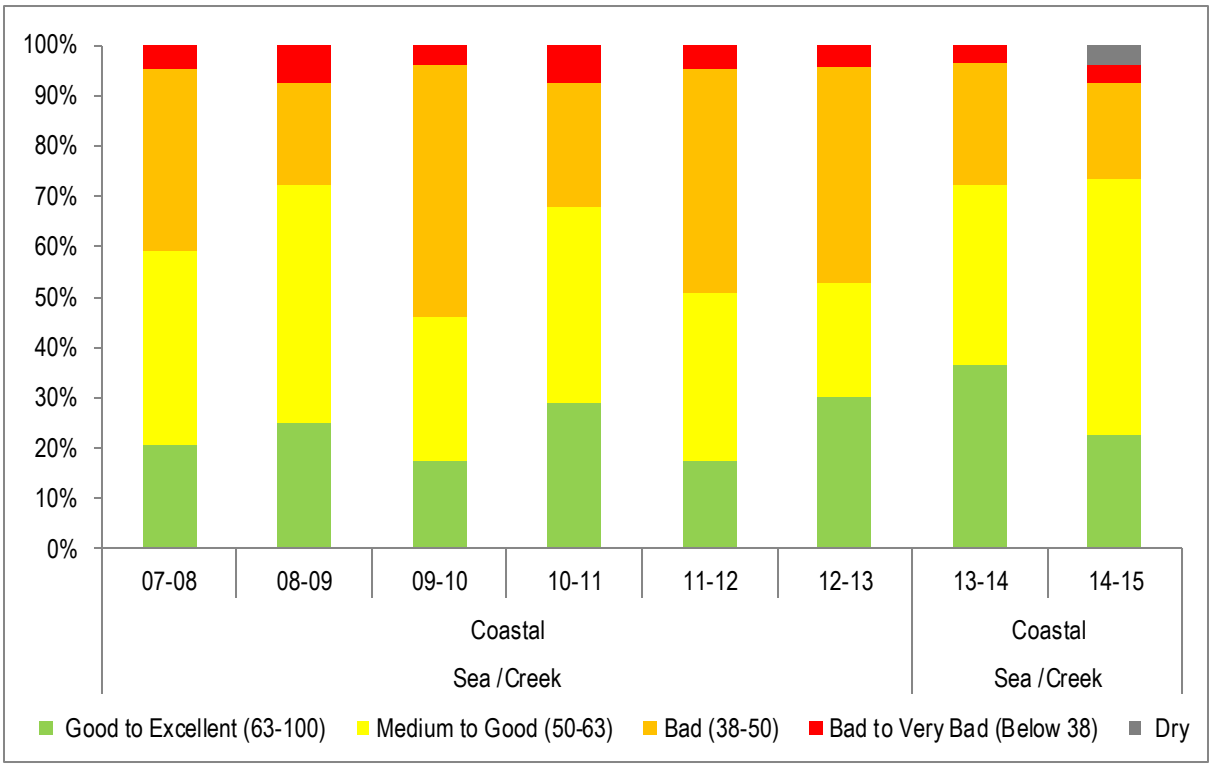
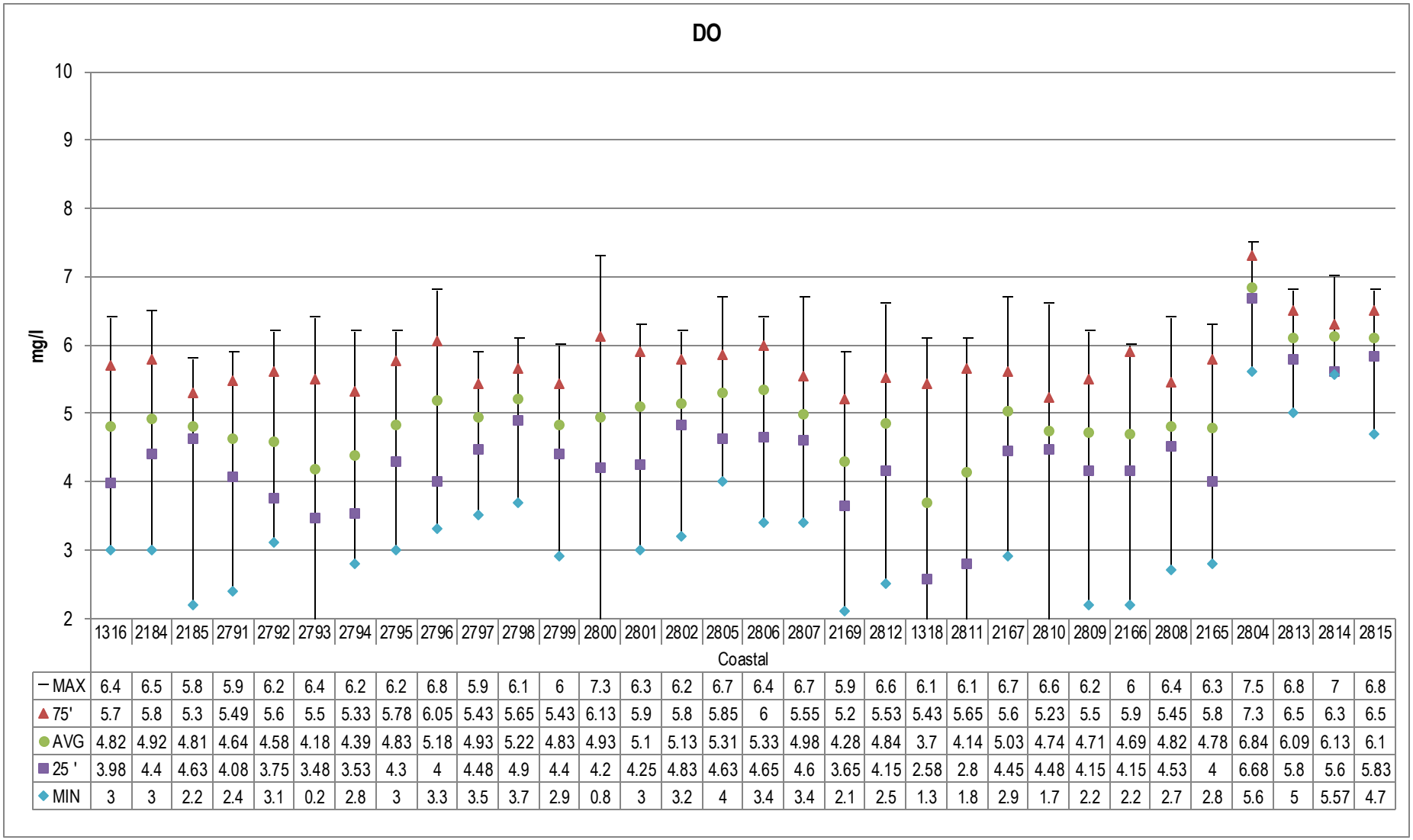


Figure No. 40: Trend of average occurrence for different category of WQI Coastal basin

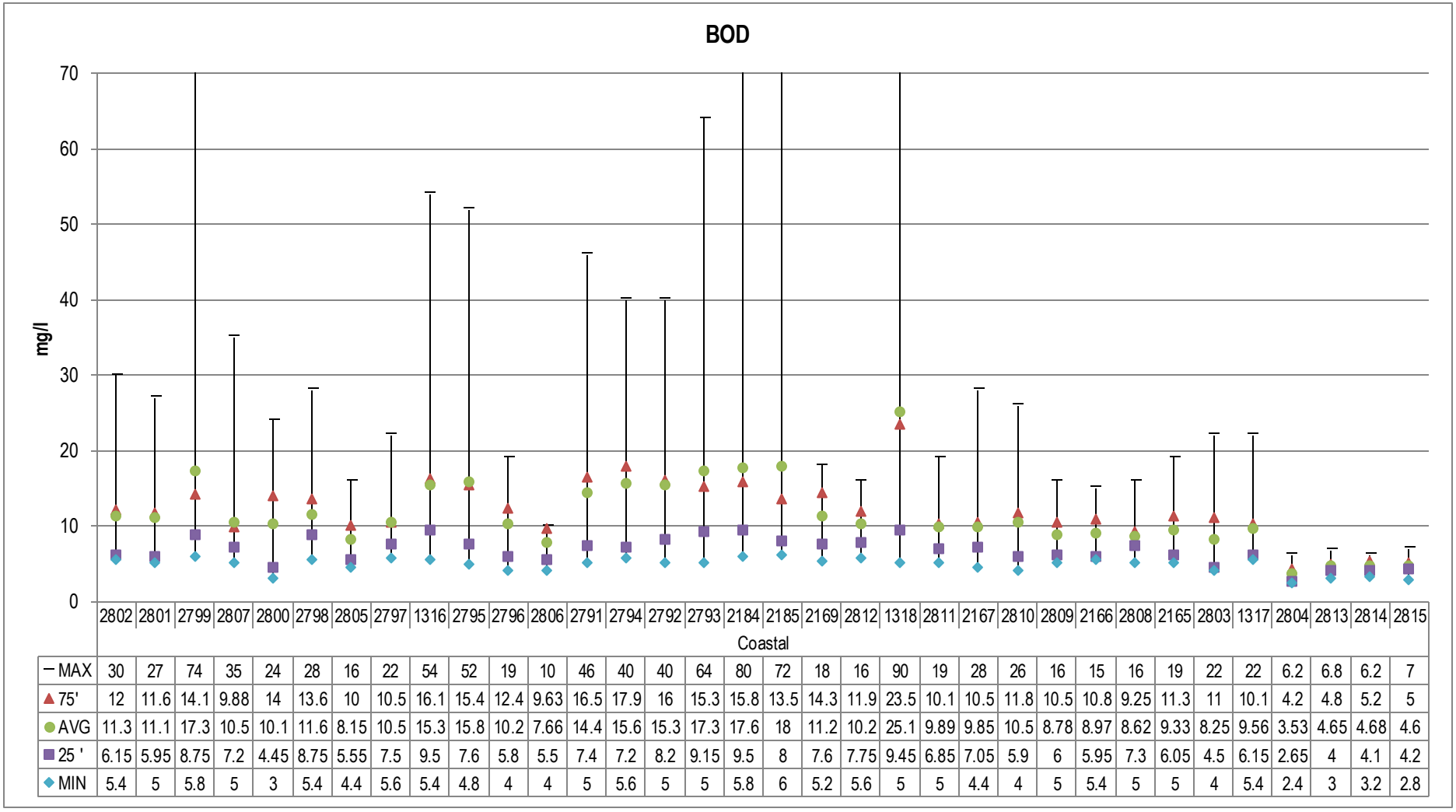
The water quality results for the test conducted for the year 2014-15 showed that among the four coastal districts, the sea/creek water quality at Thane and Ratnagiri were in the category of Bad to Medium category (38-63). A sudden decrease in the average water quality of Ratnagiri district is noted and the WQMS in this district, monitoring sea water quality, registered the average WQI in the category of Medium to Good (50-63). The decrease in curve maybe due to unavailaibilty of data for the Ratnagiri district for two stations.

The trend in average occurrence for WQI across 34 WQMS was noted and it is observed that occurrence of Medium to good category has increased across the past 8 years. But the category of "Good to Excellent" is recorded to decrease in current year 2014-15 as shown in Figure No. 40.



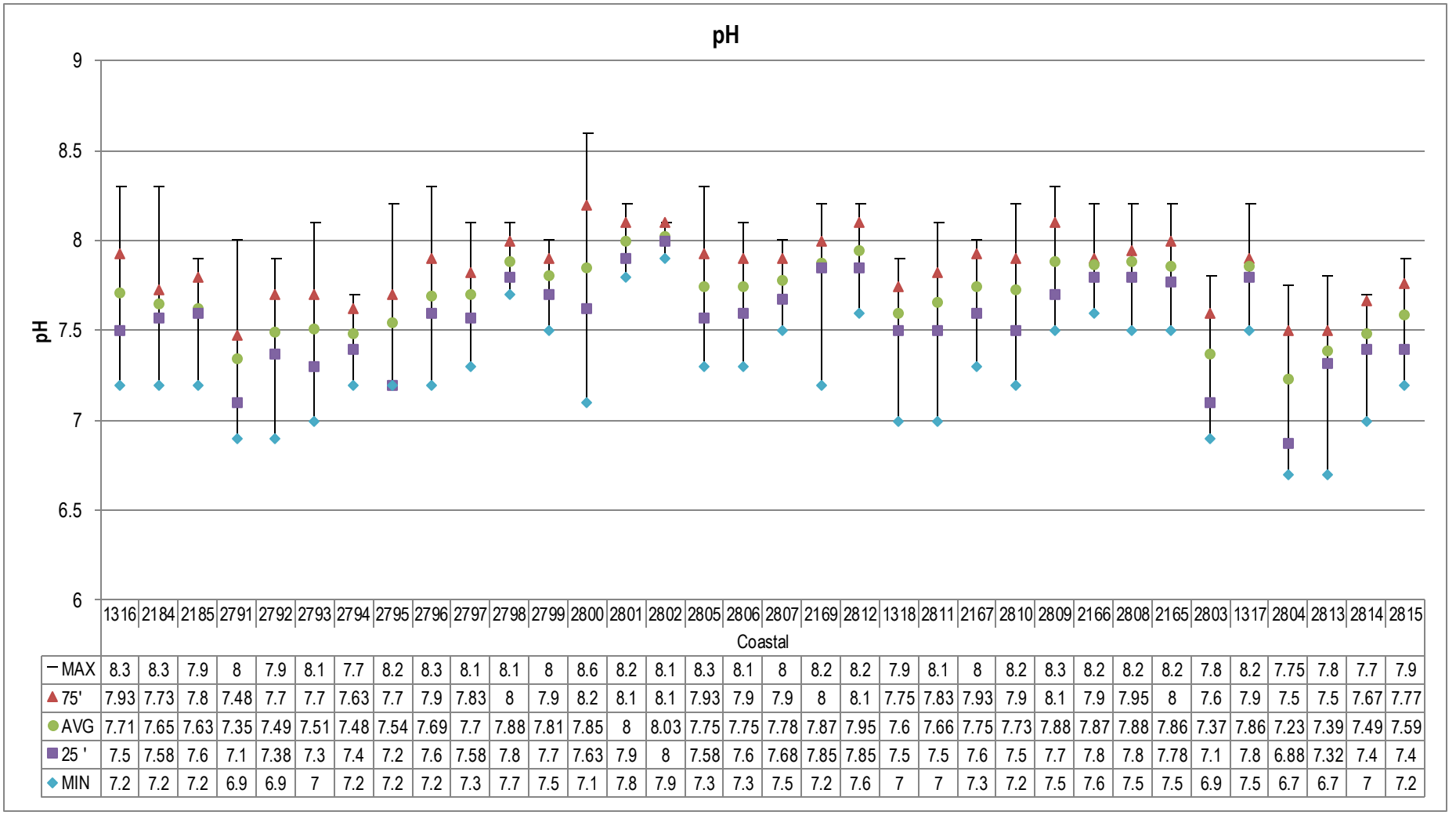
	1316	2184	2185	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2805	2806	2807	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2804	2813	2814	2815
MAX	6.4	6.5	5.8	5.9	6.2	6.4	6.2	6.2	6.8	5.9	6.1	6	7.3	6.3	6.2	6.7	6.4	6.7	5.9	6.6	6.1	6.1	6.7	6.6	6.2	6	6.4	6.3	7.5	6.8	7	6.8
75'	5.7	5.8	5.3	5.49	5.6	5.5	5.33	5.78	6.05	5.43	5.65	5.43	6.13	5.9	5.8	5.85	6	5.55	5.2	5.53	5.43	5.65	5.6	5.23	5.5	5.9	5.45	5.8	7.3	6.5	6.3	6.5
AVG	4.82	4.92	4.81	4.64	4.58	4.18	4.39	4.83	5.18	4.93	5.22	4.83	4.93	5.1	5.13	5.31	5.33	4.98	4.28	4.84	3.7	4.14	5.03	4.74	4.71	4.69	4.82	4.78	6.84	6.09	6.13	6.1
25 '	3.98	4.4	4.63	4.08	3.75	3.48	3.53	4.3	4	4.48	4.9	4.4	4.2	4.25	4.83	4.63	4.65	4.6	3.65	4.15	2.58	2.8	4.45	4.48	4.15	4.15	4.53	4	6.68	5.8	5.6	5.83
MIN	3	3	2.2	2.4	3.1	0.2	2.8	3	3.3	3.5	3.7	2.9	0.8	3	3.2	4	3.4	3.4	2.1	2.5	1.3	1.8	2.9	1.7	2.2	2.2	2.7	2.8	5.6	5	5.57	4.7

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



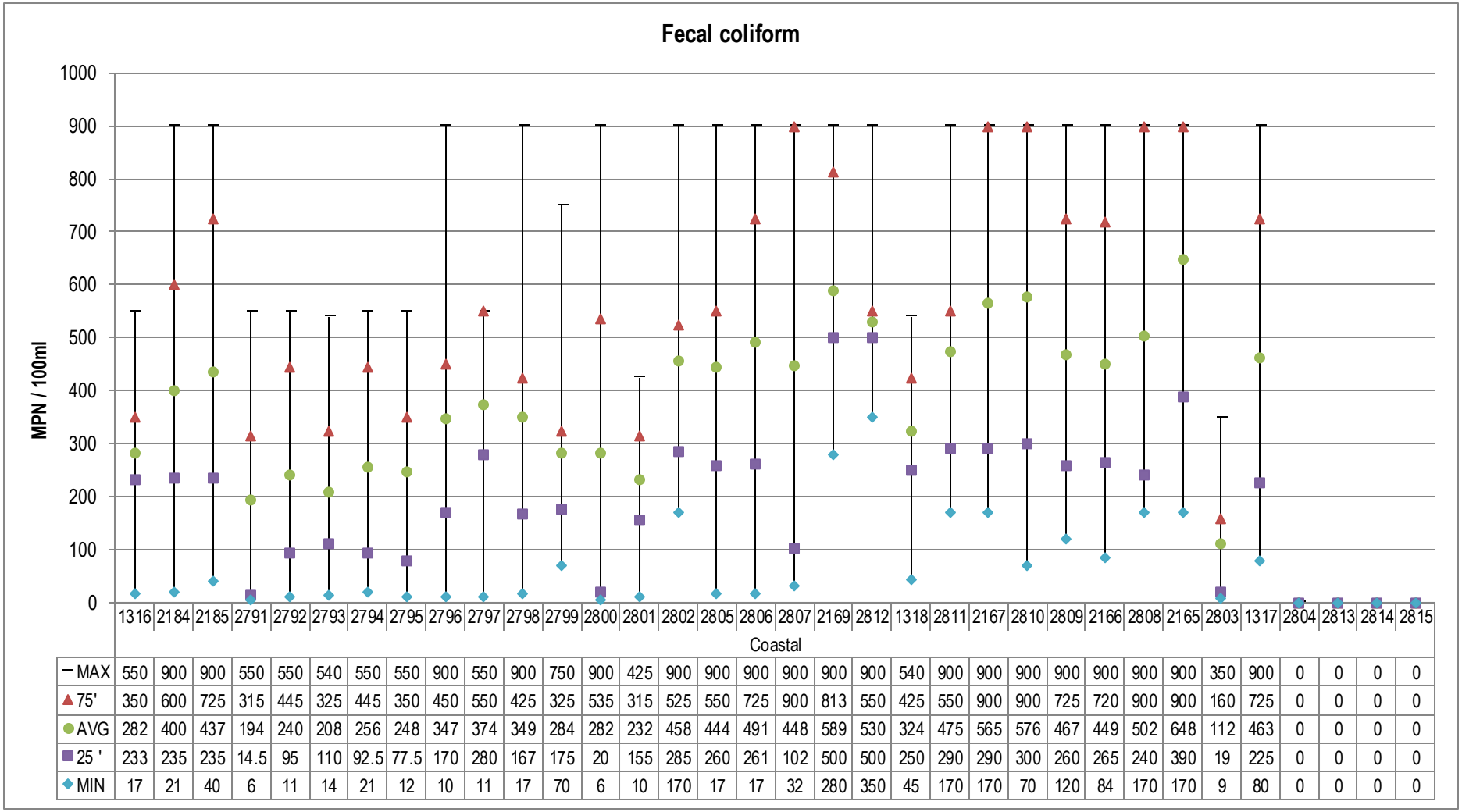
	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
MAX	30	27	74	35	24	28	16	22	54	52	19	10	46	40	40	64	80	72	18	16	90	19	28	26	16	15	16	19	22	22	6.2	6.8	6.2	7
75'	12	11.6	14.1	9.88	14	13.6	10	10.5	16.1	15.4	12.4	9.63	16.5	17.9	16	15.3	15.8	13.5	14.3	11.9	23.5	10.1	10.5	11.8	10.5	10.8	9.25	11.3	11	10.1	4.2	4.8	5.2	5
AVG	11.3	11.1	17.3	10.5	10.1	11.6	8.15	10.5	15.3	15.8	10.2	7.66	14.4	15.6	15.3	17.3	17.6	18	11.2	10.2	25.1	9.89	9.85	10.5	8.78	8.97	8.62	9.33	8.25	9.56	3.53	4.65	4.68	4.6
25 '	6.15	5.95	8.75	7.2	4.45	8.75	5.55	7.5	9.5	7.6	5.8	5.5	7.4	7.2	8.2	9.15	9.5	8	7.6	7.75	9.45	6.85	7.05	5.9	6	5.95	7.3	6.05	4.5	6.15	2.65	4	4.1	4.2
MIN	5.4	5	5.8	5	3	5.4	4.4	5.6	5.4	4.8	4	4	5	5.6	5	5	5.8	6	5.2	5.6	5	5	4.4	4	5	5.4	5	5	4	5.4	2.4	3	3.2	2.8

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



	1316	2184	2185	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2805	2806	2807	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
	Coastal																																	
MAX	8.3	8.3	7.9	8	7.9	8.1	7.7	8.2	8.3	8.1	8.1	8	8.6	8.2	8.1	8.3	8.1	8	8.2	8.2	7.9	8.1	8	8.2	8.3	8.2	8.2	8.2	7.8	8.2	7.75	7.8	7.7	7.9
75'	7.93	7.73	7.8	7.48	7.7	7.7	7.63	7.7	7.9	7.83	8	7.9	8.2	8.1	8.1	7.93	7.9	7.9	8	8.1	7.75	7.83	7.93	7.9	8.1	7.9	7.95	8	7.6	7.9	7.5	7.5	7.67	7.77
AVG	7.71	7.65	7.63	7.35	7.49	7.51	7.48	7.54	7.69	7.7	7.88	7.81	7.85	8	8.03	7.75	7.75	7.78	7.87	7.95	7.6	7.66	7.75	7.73	7.88	7.87	7.88	7.86	7.37	7.86	7.23	7.39	7.49	7.59
25 '	7.5	7.58	7.6	7.1	7.38	7.3	7.4	7.2	7.6	7.58	7.8	7.7	7.63	7.9	8	7.58	7.6	7.68	7.85	7.85	7.5	7.5	7.6	7.5	7.7	7.8	7.8	7.78	7.1	7.8	6.88	7.32	7.4	7.4
MIN	7.2	7.2	7.2	6.9	6.9	7	7.2	7.2	7.2	7.3	7.7	7.5	7.1	7.8	7.9	7.3	7.3	7.5	7.2	7.6	7	7	7.3	7.2	7.5	7.6	7.5	7.5	6.9	7.5	6.7	6.7	7	7.2

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



	1316	2184	2185	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2805	2806	2807	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
MAX	550	900	900	550	550	540	550	550	900	550	900	750	900	425	900	900	900	900	900	900	540	900	900	900	900	900	900	900	350	900	0	0	0	0
75'	350	600	725	315	445	325	445	350	450	550	425	325	535	315	525	550	725	900	813	550	425	550	900	900	725	720	900	900	160	725	0	0	0	0
AVG	282	400	437	194	240	208	256	248	347	374	349	284	282	232	458	444	491	448	589	530	324	475	565	576	467	449	502	648	112	463	0	0	0	0
25 '	233	235	235	14.5	95	110	92.5	77.5	170	280	167	175	20	155	285	260	261	102	500	500	250	290	290	300	260	265	240	390	19	225	0	0	0	0
MIN	17	21	40	6	11	14	21	12	10	11	17	70	6	10	170	17	17	32	280	350	45	170	170	70	120	84	170	170	9	80	0	0	0	0

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

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

APR	58	41	43	62	64	54	62	49	68	44	49
MAY	38	39	46	40	53	53	51	49	47	53	53
JUNE	57	50	52	54	36	55	62	57	55	44	61
JUL	54	56	56	67	67	60	61	61	52	61	60
AUG	65	75	53	55	60	57	71	66	72	77	83
SEP	62	66	71	66	82	72	80	72	77	65	81
OCT	62	66	62	37	57	64	57	58	47	56	60
NOV	59	62	58	67	61	63	70	61	60	71	72
DEC	57	60	54	58	57	50	55	59	53	57	59
JAN	58	64	64	59	63	61	49	54	46	70	43
FEB	50	50	52	50	64	51	54	56	47	55	47
MAR	43	70	51	53	65	55	54	49	49	48	52
	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796
	Saline /creek (1 of 3)										

Legend				
Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry

Table No. 26: Surface water quality monitoring stations monitoring Sea/Creek water (1 of 3)

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

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

APR	65	38	46	47	34	56	32	59	61	35	47
MAY	50	49	51	52	39	63	29	54	58	47	55
JUNE	62	53	43	52	42	61	63	48	41	42	40
JUL	61	63	53	57	62	58	58	62	53	55	64
AUG	72	77	69	76	71	61	59	49	55	44	53
SEP	78	83	74	79	82	62	Dry	41	67	65	67
OCT	70	69	60	60	58	Dry	60	35	35	30	43
NOV	61	69	74	57	61	65	64	56	56	60	62
DEC	62	52	60	62	63	62	Dry	45	41	59	59
JAN	48	64	44	50	51	Dry	50	53	54	47	42
FEB	54	44	53	46	52	Dry	54	44	47	40	39
MAR	53	57	50	51	47	63	61	Dry	65	62	49
	2806	2791	2794	2792	2793	2184	2185	2169	2812	1318	2811
Saline /Creek (2 of 3)											
Legend											
Good to Excellent		Medium to Good				Bad		Bad to Very Bad			Dry

Table No. 27: Surface water quality monitoring stations monitoring Sea/Creek water (2 of 3)

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

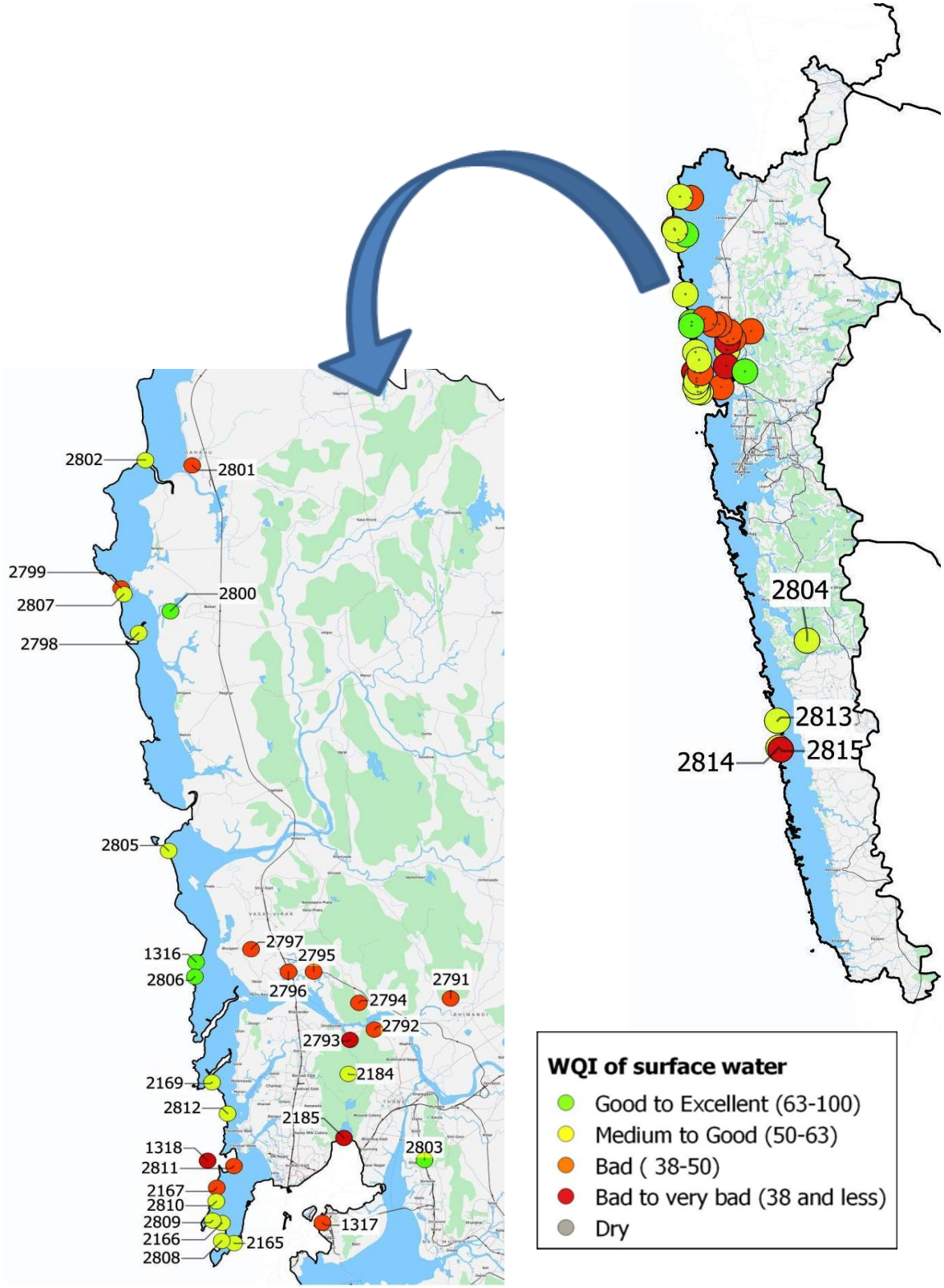
Water quality Index for WQMS monitoring Sea and Creek water (3 of 3)

APR	48	54	53	51	51	62	82	50	59	55	51	32
MAY	55	55	64	57	52	63	73	61	62	63	29	29
JUNE	29	28	53	65	58	58	43	62	61	61	43	63
JUL	65	54	64	57	64	49	84	67	63	59	57	58
AUG	60	38	57	51	60	58	75	56	65	63	56	59
SEP	70	77	61	72	61	61	56	65	67	63	82	Dry
OCT	43	37	39	38	43	43	70	42	67	Dry	53	60
NOV	60	58	59	60	62	61	81	62	62	63	68	64
DEC	59	61	57	58	61	59	61	58	64	64	52	Dry
JAN	56	51	48	46	50	43	73	50	62	Dry	52	50
FEB	51	51	52	51	52	50	77	58	65	Dry	46	54
MAR	57	53	51	51	49	43	57	55	62	64	62	61
	2167	2810	2809	2166	2808	2165	2803	1317	2804	2813	2814	2815
Saline /Creek (3 of 3)												
Legend												
Good to Excellent			Medium to Good				Bad			Bad to Very Bad		Dry

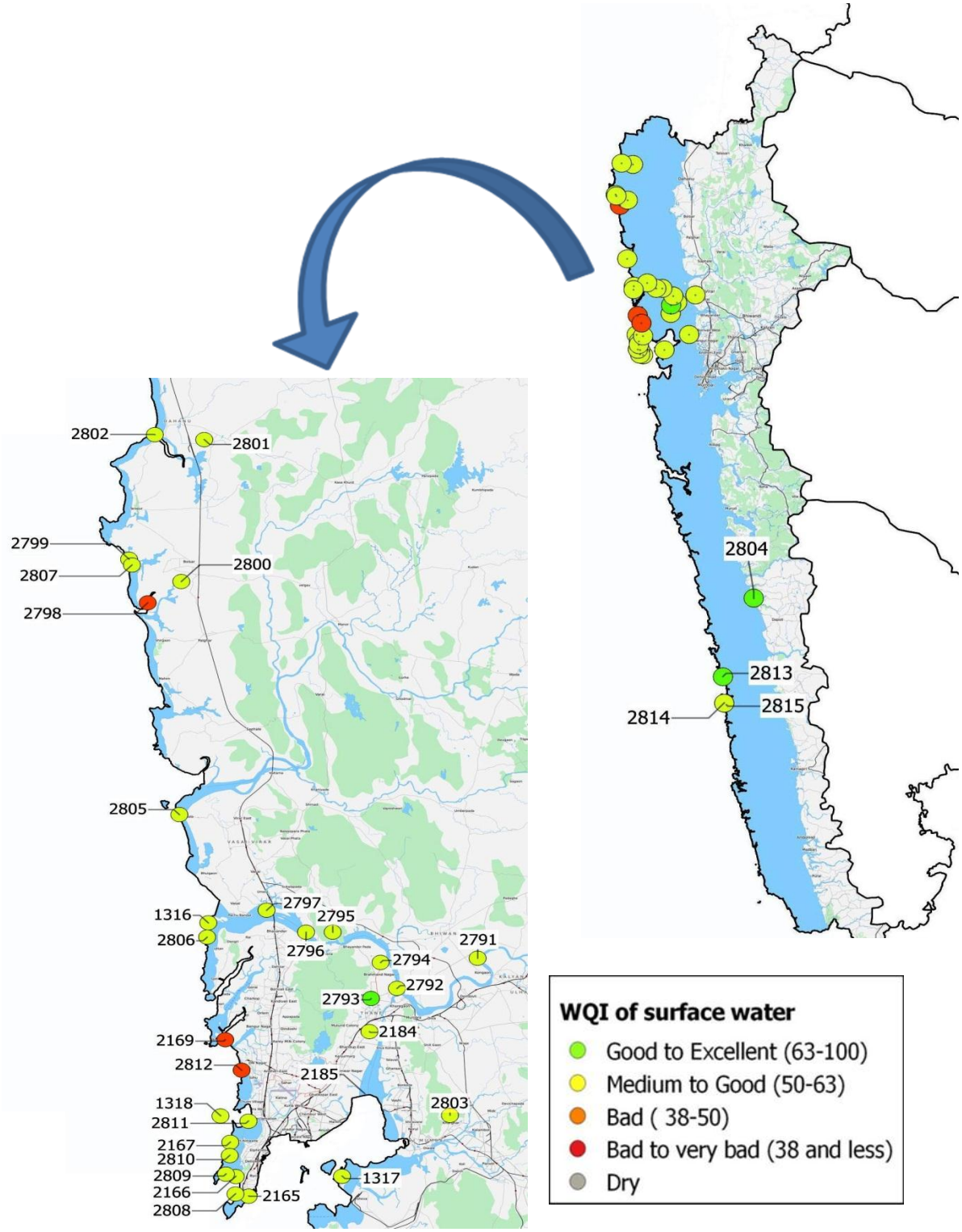
Table No. 28: Surface water quality monitoring stations monitoring Sea/Creek water (3of 3)

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

Spatial map of WQI for Sea and Creek Water (April 2014)



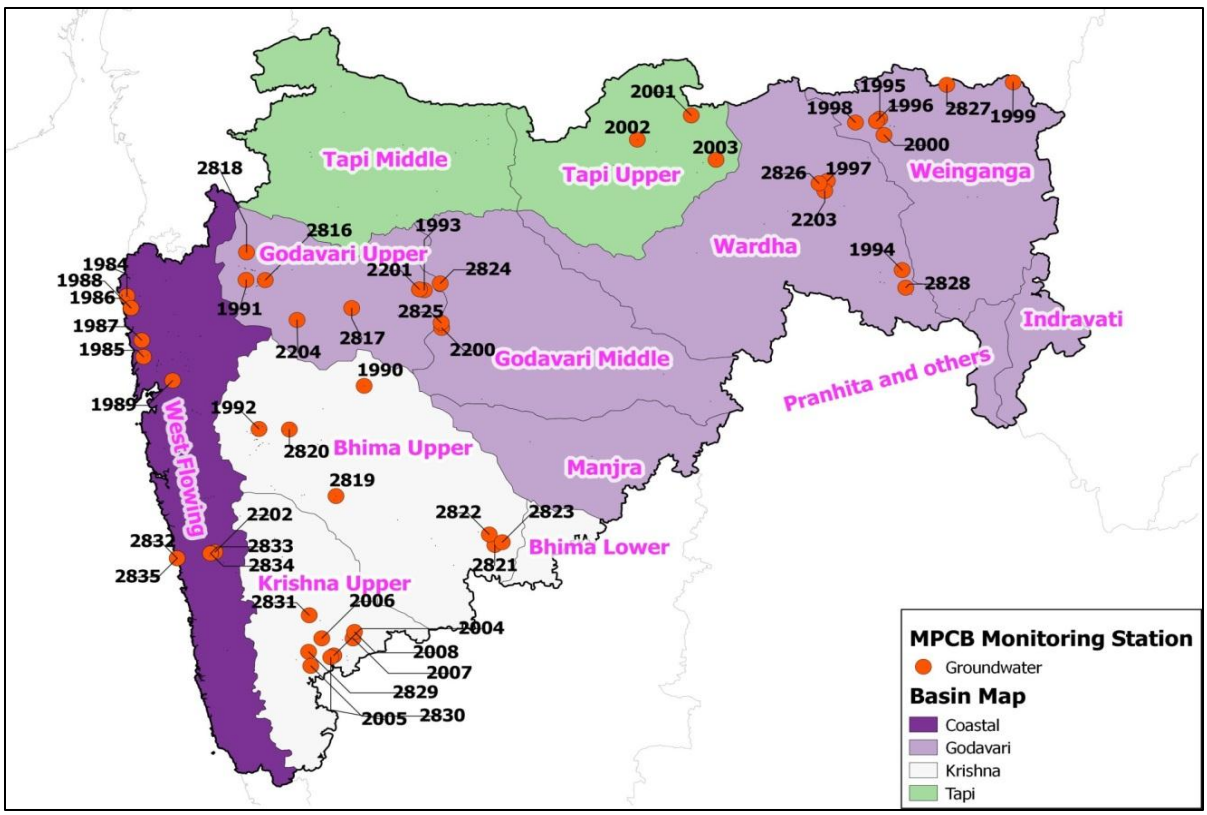
Spatial map of WQI for Sea and Creek Water (December 2014)



Groundwater Quality

Water located beneath the earth's surface in soil pore spaces and aquifers formed due to formation of cracks in the rocks is termed as Groundwater.Groundwater is recharged from rain and surface water and at times the only source for water supply in regions. Groundwater constitutes about two thirds of the freshwater resources of the world[30] and accounts for nearly 80 per cent of the rural and 50 per cent of the urban water needs in India[31].Groundwater is intensively drawn for agricultural, irrigation and industrial purposes.The accumulation and inadequade disposal of waste generated by the industries leads to groundwater pollution. The overall estimates of ground water resources of the entire country shows a marginal decrease about 2 bcm as compared to 2004[32].

In Maharashtra CGWB (Central Ground Water Board), GSDA (Groundwater Survey and Development Agency) and MPCB, monitor the ground water quality across various districts of the state. MPCB has 50 ground water monitoring stations which monitor water quality twice a year for parameters like pH, Nitrate, TDS, Hardness, Fluoride, microbial content, Sulphates and so on. The network of the monitoring stations is spatially presented in Map No. 8 and the parametric values for the pH, Nitrate, Flouride and hardness in terms of $CaCO_3$ is presented in the following section.

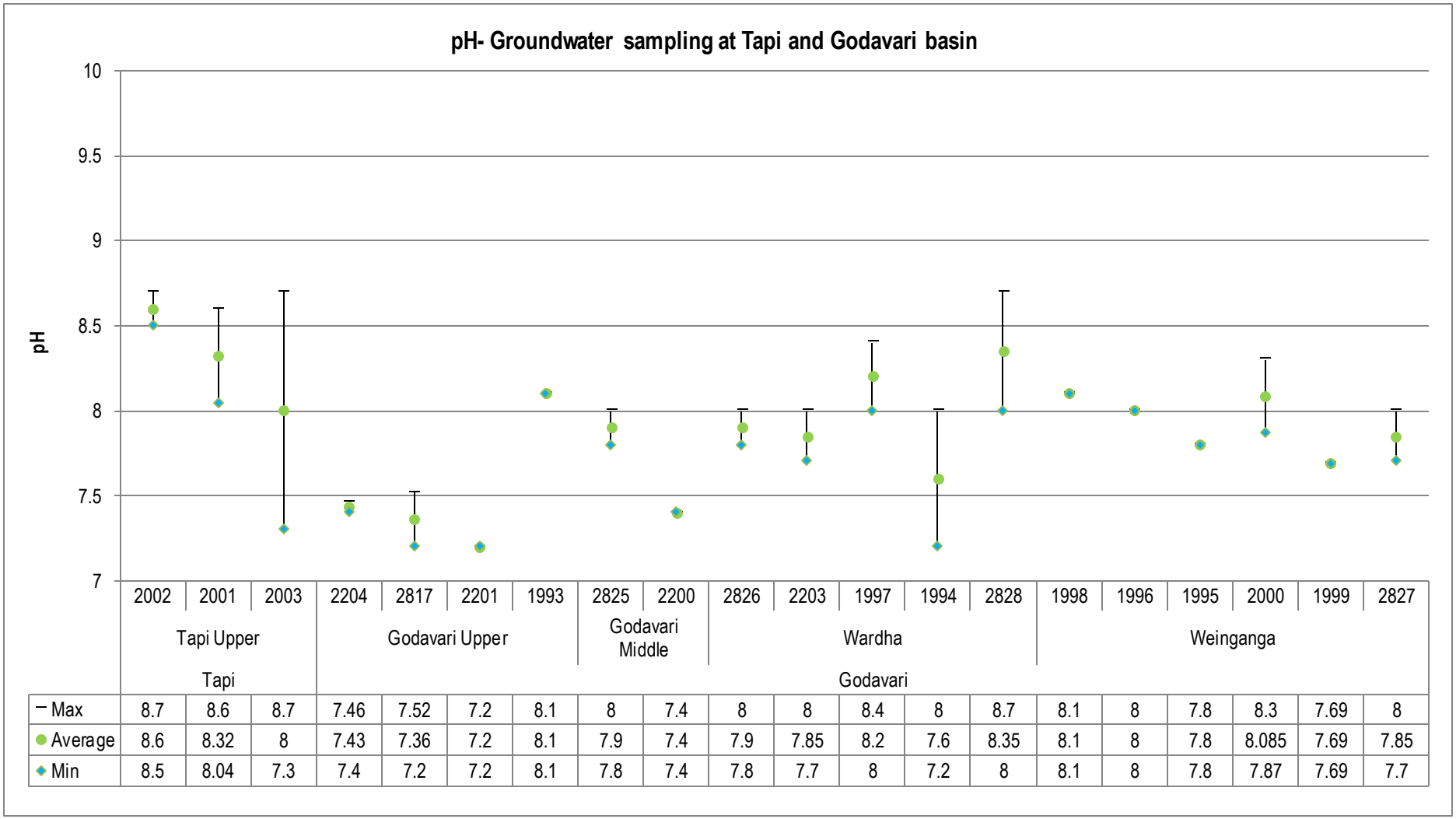


Map No. 8: Network of ground water quality monitoring stations in Maharashtra

[30] UNESCO/WHO/UNEP, *Water Quality Assessments - A Guide to Use of Biota, Sediments and Water in Environmental Monitoring - Second Edition*

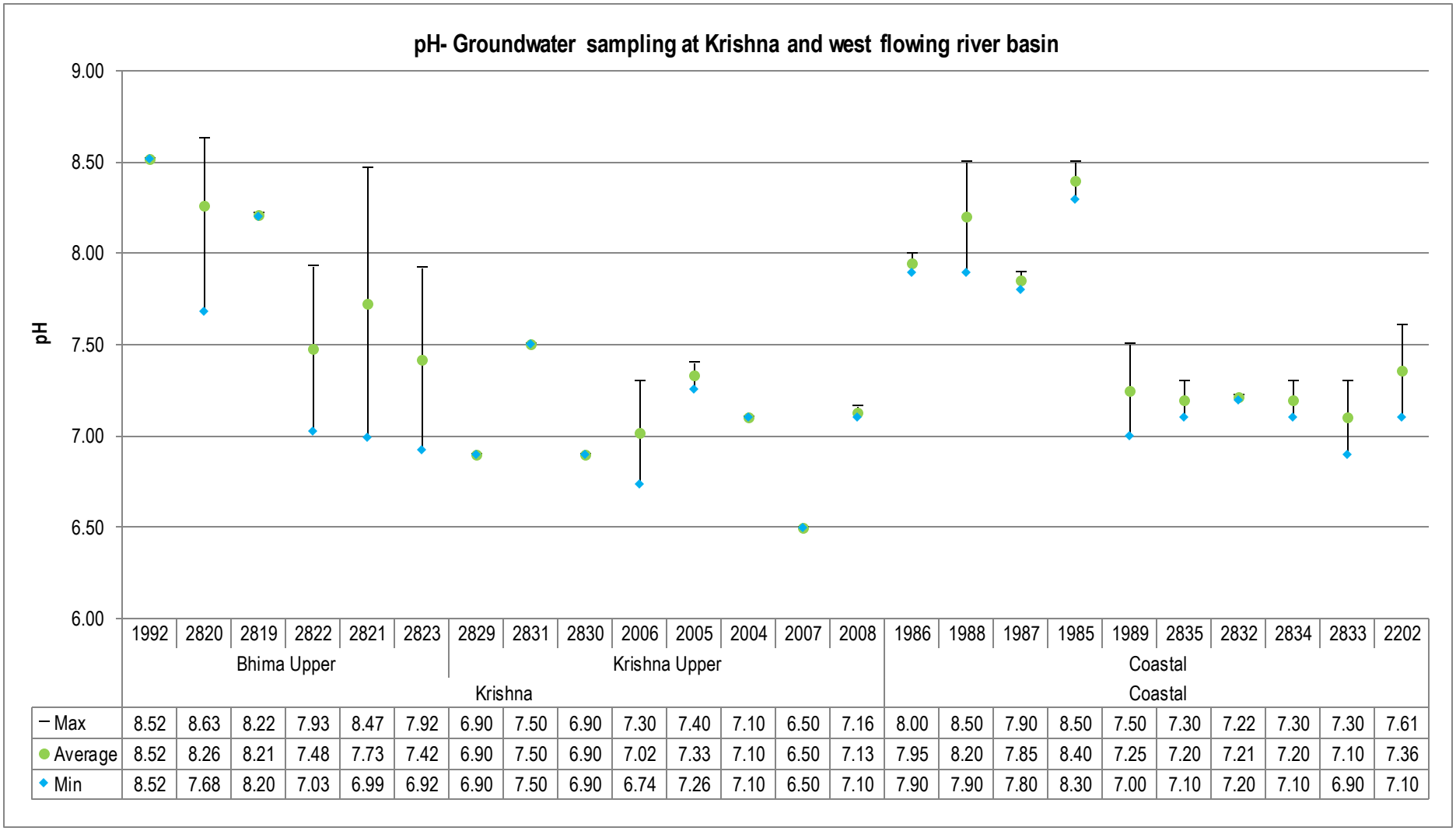
[31] M. Dinesh Kumar and Tushaar Shah, *Groundwater Pollution and Contamination in India: The Emerging Challenge*

[32] Central ground water committee, *Groundwater Year Book –India 2013-14*



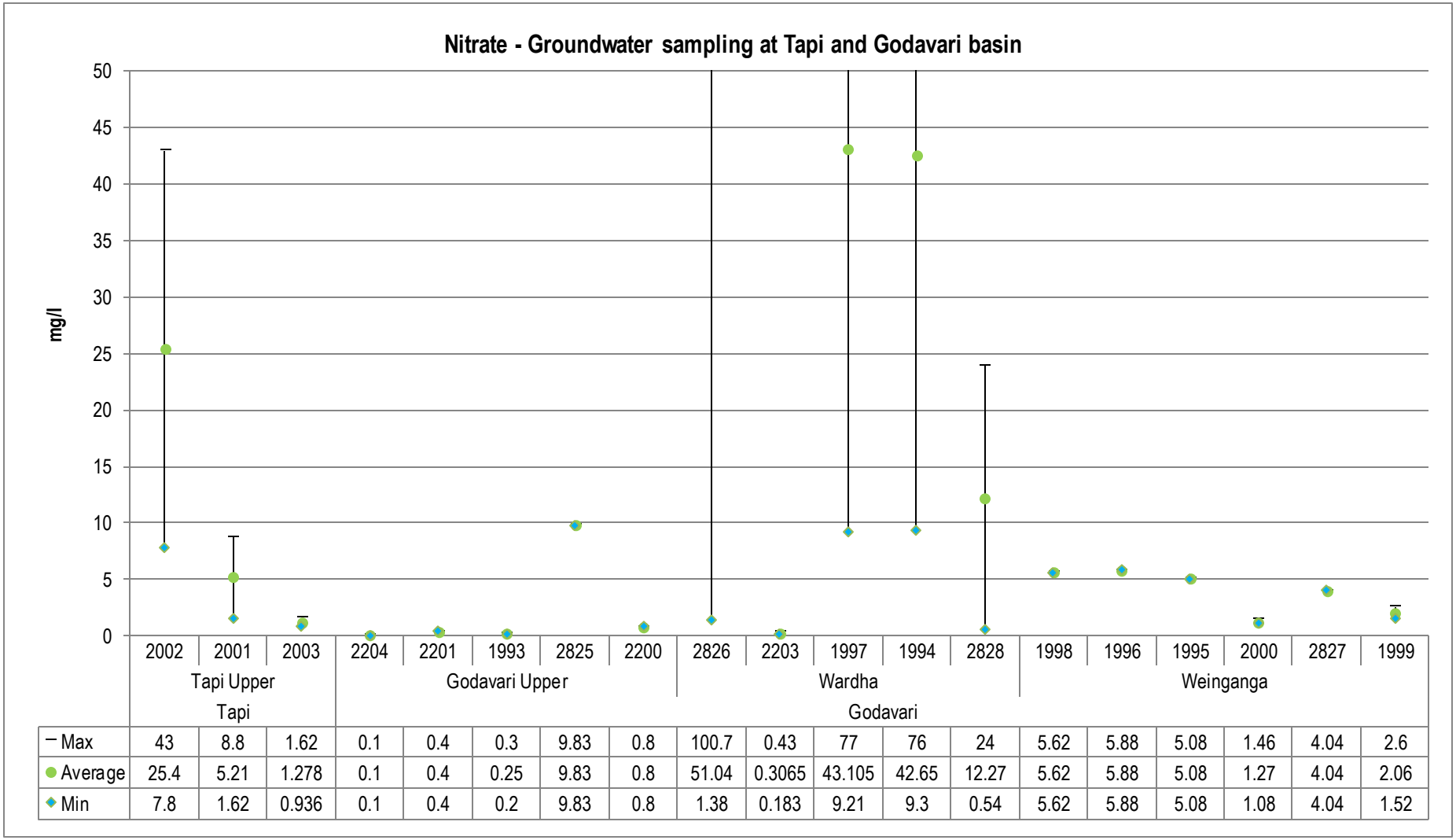
	2002	2001	2003	2204	2817	2201	1993	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	1999	2827
	Tapi Upper			Godavari Upper				Godavari Middle		Wardha					Weinganga					
	Tapi			Godavari																
Max	8.7	8.6	8.7	7.46	7.52	7.2	8.1	8	7.4	8	8	8.4	8	8.7	8.1	8	7.8	8.3	7.69	8
Average	8.6	8.32	8	7.43	7.36	7.2	8.1	7.9	7.4	7.9	7.85	8.2	7.6	8.35	8.1	8	7.8	8.085	7.69	7.85
Min	8.5	8.04	7.3	7.4	7.2	7.2	8.1	7.8	7.4	7.8	7.7	8	7.2	8	8.1	8	7.8	7.87	7.69	7.7

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



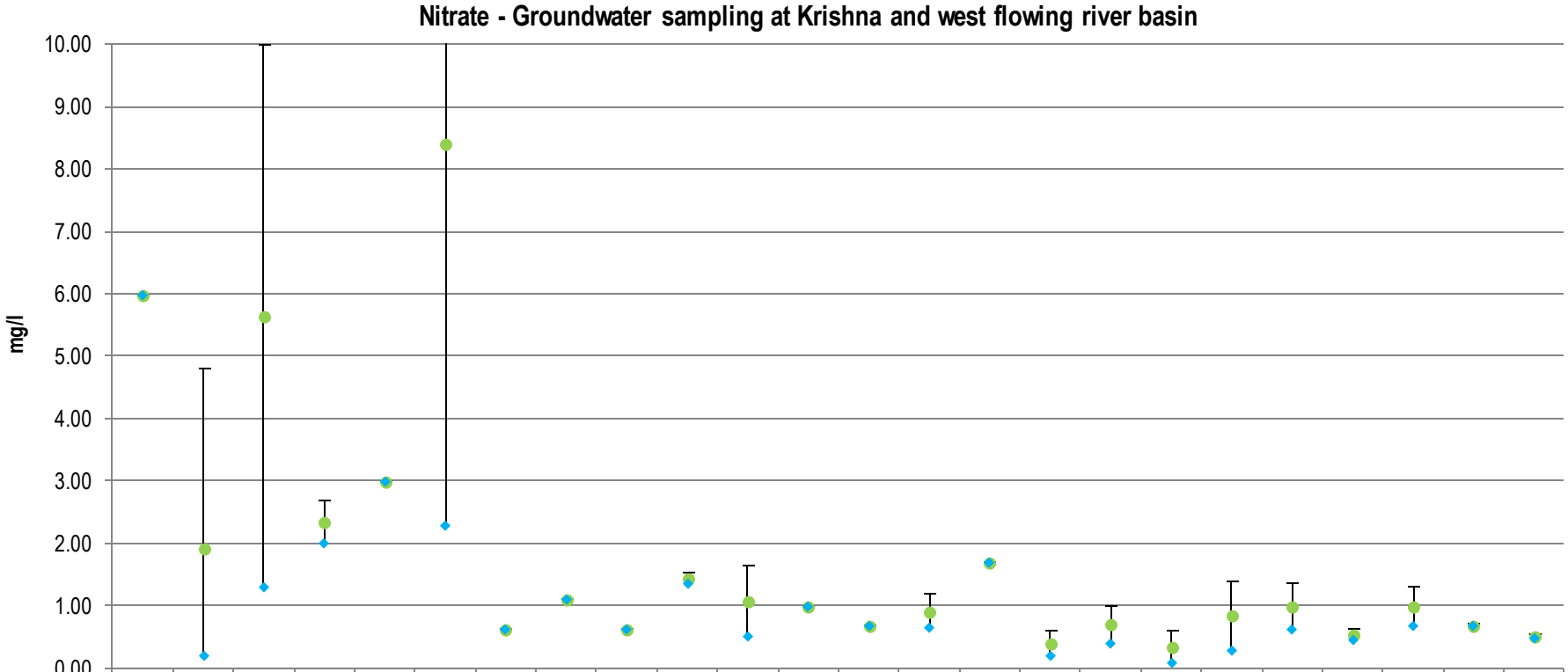
	1992	2820	2819	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper						Krishna Upper								Coastal									
	Krishna														Coastal									
Max	8.52	8.63	8.22	7.93	8.47	7.92	6.90	7.50	6.90	7.30	7.40	7.10	6.50	7.16	8.00	8.50	7.90	8.50	7.50	7.30	7.22	7.30	7.30	7.61
Average	8.52	8.26	8.21	7.48	7.73	7.42	6.90	7.50	6.90	7.02	7.33	7.10	6.50	7.13	7.95	8.20	7.85	8.40	7.25	7.20	7.21	7.20	7.10	7.36
Min	8.52	7.68	8.20	7.03	6.99	6.92	6.90	7.50	6.90	6.74	7.26	7.10	6.50	7.10	7.90	7.90	7.80	8.30	7.00	7.10	7.20	7.10	6.90	7.10

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



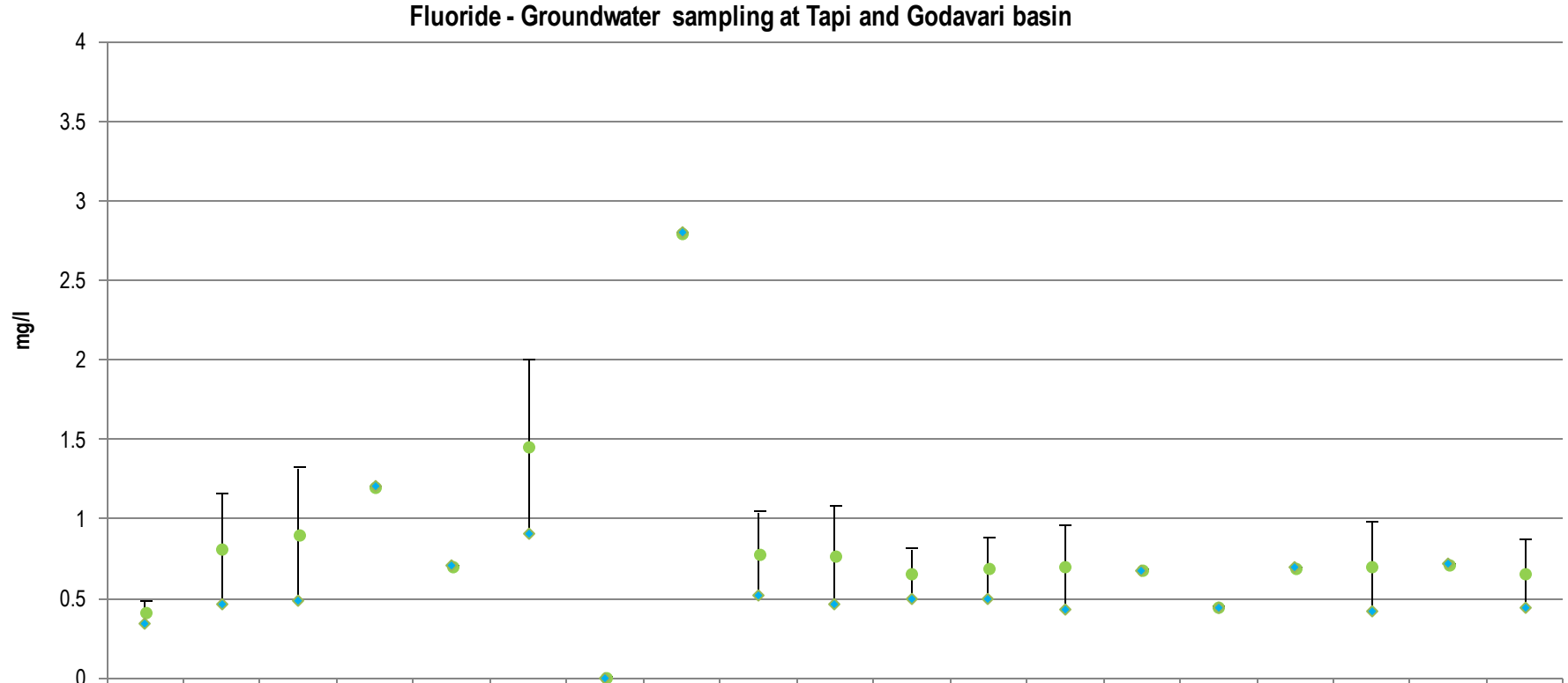
	2002	2001	2003	2204	2201	1993	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper Tapi			Godavari Upper					Wardha					Weinganga					
	Godavari																		
Max	43	8.8	1.62	0.1	0.4	0.3	9.83	0.8	100.7	0.43	77	76	24	5.62	5.88	5.08	1.46	4.04	2.6
Average	25.4	5.21	1.278	0.1	0.4	0.25	9.83	0.8	51.04	0.3065	43.105	42.65	12.27	5.62	5.88	5.08	1.27	4.04	2.06
Min	7.8	1.62	0.936	0.1	0.4	0.2	9.83	0.8	1.38	0.183	9.21	9.3	0.54	5.62	5.88	5.08	1.08	4.04	1.52

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



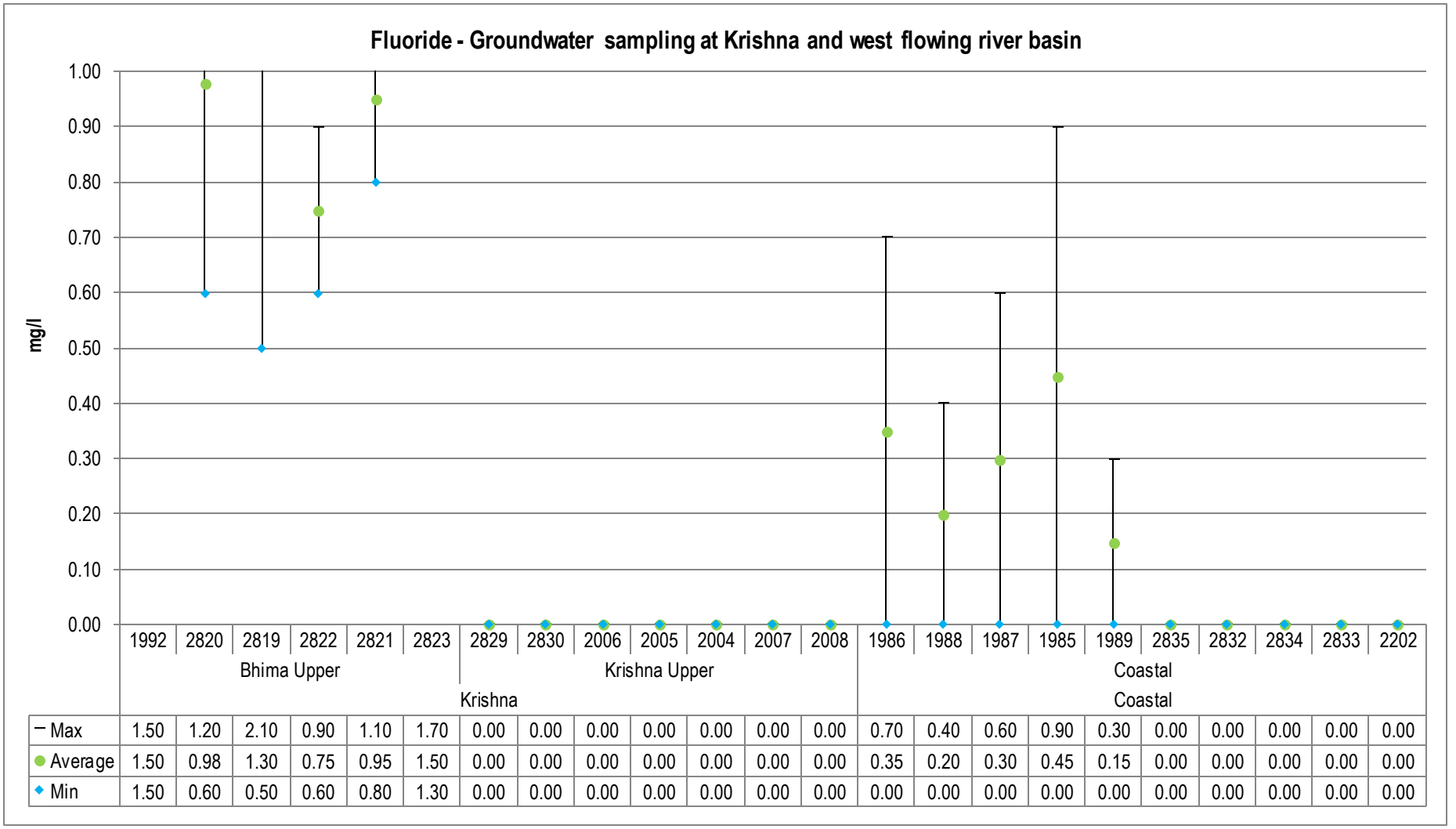
	1992	2820	2819	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper						Krishna Upper								Coastal									
	Krishna														Coastal									
Max	6.00	4.80	10.00	2.70	3.00	14.50	0.62	1.12	0.62	1.54	1.64	0.98	0.69	1.19	1.70	0.60	1.00	0.60	1.40	1.37	0.62	1.30	0.71	0.53
Average	6.00	1.93	5.65	2.35	3.00	8.40	0.62	1.12	0.62	1.46	1.08	0.98	0.69	0.92	1.70	0.40	0.70	0.35	0.85	1.00	0.55	0.99	0.69	0.51
Min	6.00	0.20	1.30	2.00	3.00	2.30	0.62	1.12	0.62	1.37	0.52	0.98	0.69	0.65	1.70	0.20	0.40	0.10	0.30	0.62	0.47	0.68	0.67	0.49

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



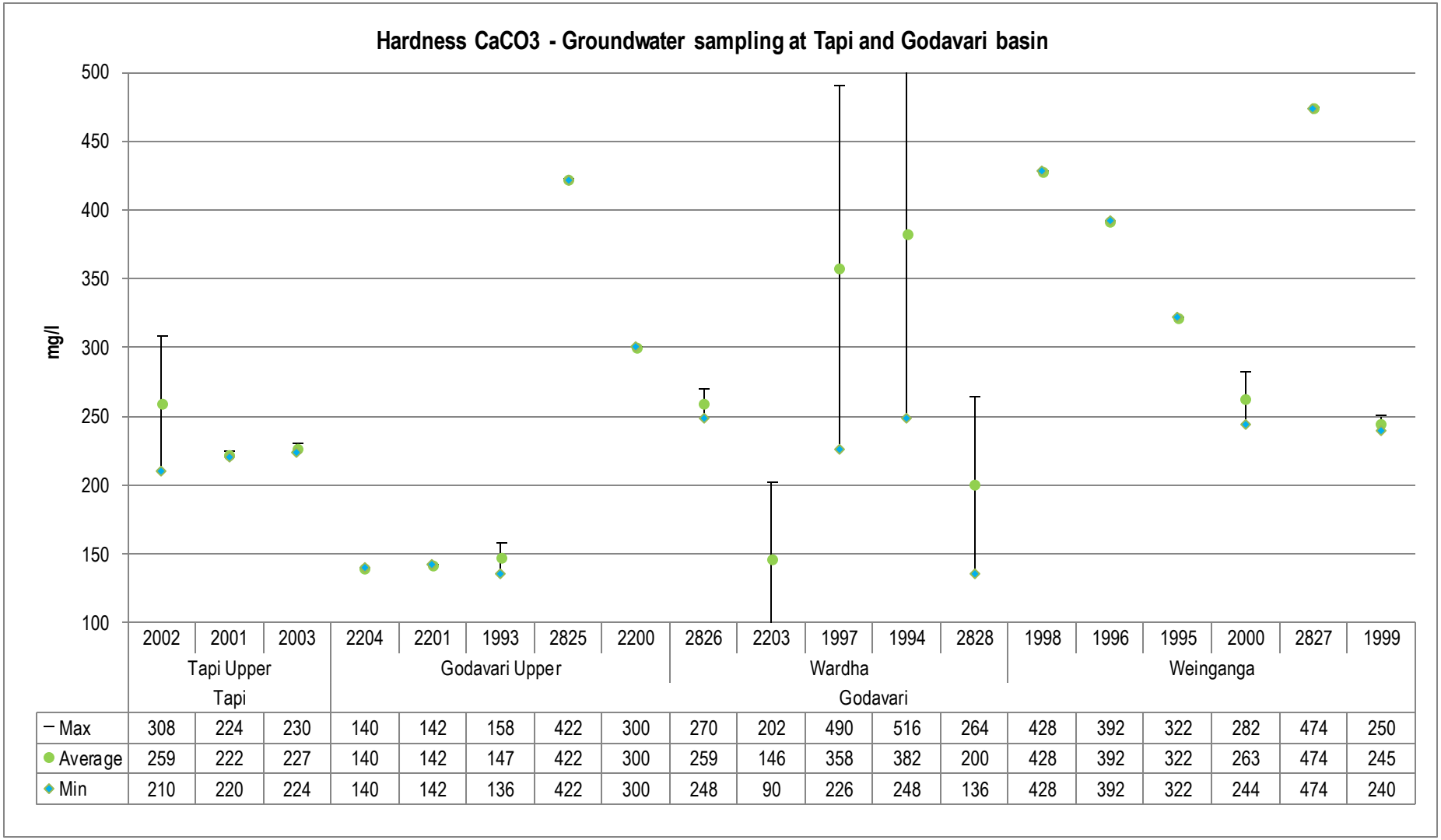
	2002	2001	2003	2204	2201	1993	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper Tapi			Godavari Upper					Wardha					Weinganga					
	Godavari																		
Max	0.482	1.16	1.32	1.2	0.7	2	0	2.8	1.04	1.08	0.809	0.881	0.96	0.677	0.444	0.689	0.982	0.712	0.868
Average	0.4115	0.8085	0.901	1.2	0.7	1.45	0	2.8	0.78	0.771	0.6505	0.6865	0.6945	0.677	0.444	0.689	0.6995	0.712	0.6535
Min	0.341	0.457	0.482	1.2	0.7	0.9	0	2.8	0.52	0.462	0.492	0.492	0.429	0.677	0.444	0.689	0.417	0.712	0.439

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



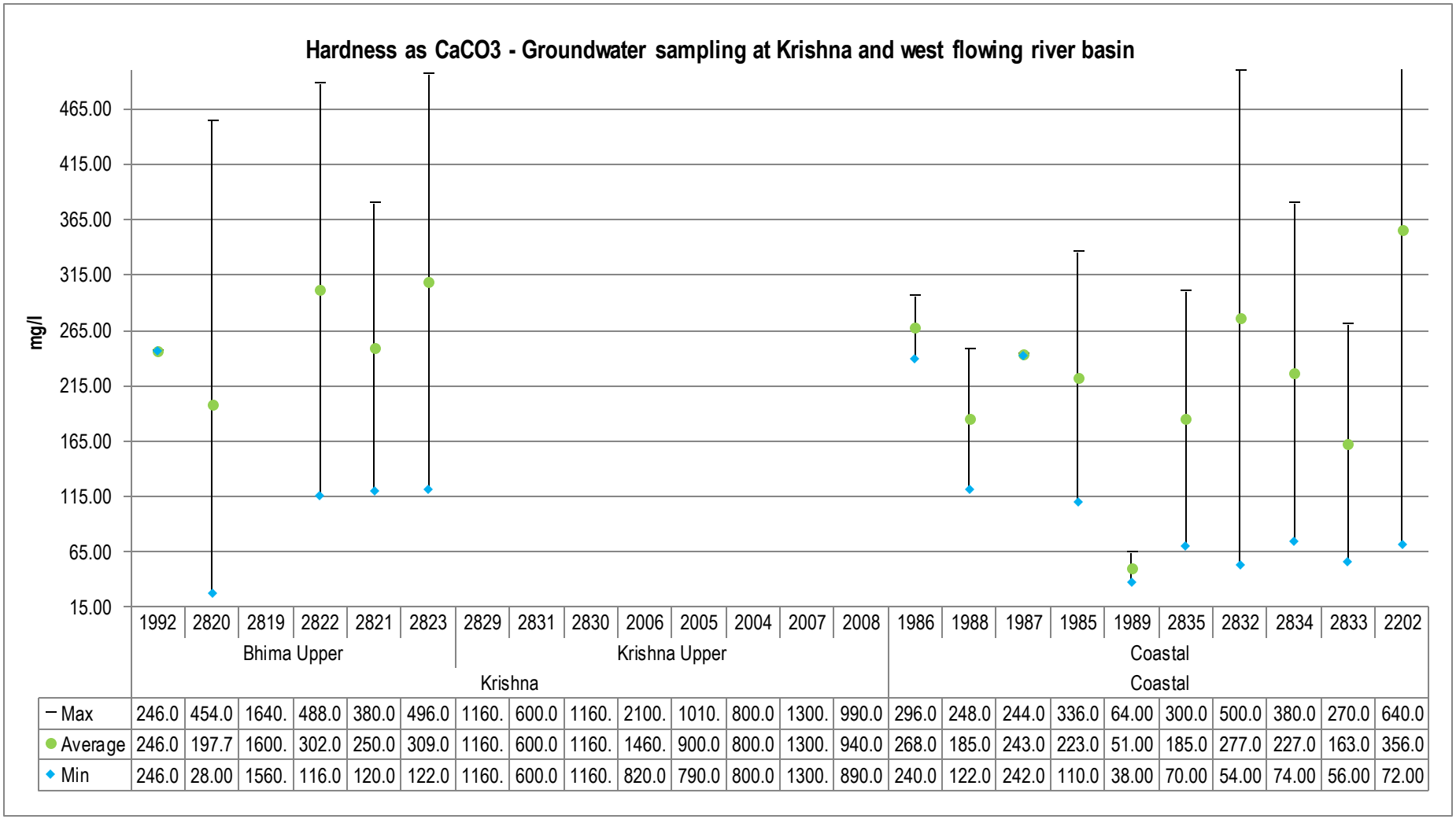
	1992	2820	2819	2822	2821	2823	2829	2830	2006	2005	2004	2007	2008	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper						Krishna Upper							Coastal									
	Krishna													Coastal									
Max	1.50	1.20	2.10	0.90	1.10	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.40	0.60	0.90	0.30	0.00	0.00	0.00	0.00	0.00
Average	1.50	0.98	1.30	0.75	0.95	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.20	0.30	0.45	0.15	0.00	0.00	0.00	0.00	0.00
Min	1.50	0.60	0.50	0.60	0.80	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure No. 50: Parametric values of Nitrate recorded at WQMS monitoring groundwater in Krishna and West flowing river basin



	2002	2001	2003	2204	2201	1993	2825	2200	2826	2203	1997	1994	2828	1998	1996	1995	2000	2827	1999
	Tapi Upper Tapi			Godavari Upper					Wardha					Weinganga					
	Godavari																		
Max	308	224	230	140	142	158	422	300	270	202	490	516	264	428	392	322	282	474	250
Average	259	222	227	140	142	147	422	300	259	146	358	382	200	428	392	322	263	474	245
Min	210	220	224	140	142	136	422	300	248	90	226	248	136	428	392	322	244	474	240

Figure No. 51: Parametric values of Hardness at $CaCo_3$ recorded at WQMS monitoring groundwater in Tapi and Godavari basin



	1992	2820	2819	2822	2821	2823	2829	2831	2830	2006	2005	2004	2007	2008	1986	1988	1987	1985	1989	2835	2832	2834	2833	2202
	Bhima Upper						Krishna Upper								Coastal									
	Krishna														Coastal									
Max	246.0	454.0	1640.	488.0	380.0	496.0	1160.	600.0	1160.	2100.	1010.	800.0	1300.	990.0	296.0	248.0	244.0	336.0	64.00	300.0	500.0	380.0	270.0	640.0
Average	246.0	197.7	1600.	302.0	250.0	309.0	1160.	600.0	1160.	1460.	900.0	800.0	1300.	940.0	268.0	185.0	243.0	223.0	51.00	185.0	277.0	227.0	163.0	356.0
Min	246.0	28.00	1560.	116.0	120.0	122.0	1160.	600.0	1160.	820.0	790.0	800.0	1300.	890.0	240.0	122.0	242.0	110.0	38.00	70.00	54.00	74.00	56.00	72.00

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

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

APR	87	78	78	165	139	82	96
OCT	75	108	76	16	NA	13	13
Station code	**2002**	**2001**	**2003**	**2817**	**2204**	**2201**	**1993**
Subbasin	**Tapi upper**			**Godavari upper**			
Basin	**Tapi**			**Godavari**			
Legend							
Excellent	Good	Poor	Very Poor	Not suitable for drinking		Dry	

Table No. 29: Groundwater quality monitoring stations in Tapi and Godavari basin (1 of 3)

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

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

APR	149	Dry	51	76	70	83	80
JULY	68	75	NA	NA	NA	NA	NA
OCT	13	14	99	117	85	177	176
Station Code	**2825**	**2200**	**2828**	**1994**	**1997**	**2826**	**2203**
Subbasin	**Godavari middle**			**Wardha**			
Basin	**Godavari**						
Legend							
Excellent	Good	Poor	Very Poor	Not suitable for drinking			Dry

Table No. 30: Groundwaterquality monitoring stations in Tapi and Godavari basin (2 of 3)

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

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

APR	101	86	80	94	108	103
OCT	77	80	NA	NA	NA	NA
Station code	**2827**	**1999**	**1998**	**1996**	**2000**	**1995**
Subbasin	**Weinganga**					
Basin	**Godavari**					

Legend					
Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

Table No. 31: Groundwater quality monitoring stations in Tapi basin and Godavari basin (3 of 3)

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

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

APR	458	104	55	159	138	179
MAY			75			
JUN			55			
JUL			59			
AUG			100			
SEPT			47			
OCT	467		130	57	61	64
NOV			151			
DEC			37			
JAN			139			
FEB			55			
MAR			119			
Station code	**2819**	**1992**	**2820**	**2822**	**2821**	**2823**
Subbasin	**Upper Bhima**					
Basin	**Krishna**					
Legend						
Excellent	Good	Poor	Very Poor	Not suitable for drinking		Dry

Table No. 32: Groundwater quality monitoring stations in Krishna Basin (1 of 2)

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

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

APR	360	226	182	380	360	248	567	276
Oct								
Station code	2006	2829	2005	2830	2004	2008	2007	2831
Subbasin	Krishna upper							
Basin	Krishna							

Legend					
Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

Table No. 33: Groundwater quality monitoring stations in Krishna Basin (2 of 2)

Station ID	Location of the Station	Village	Taluka	District
2006	Bore well at MIDC, Shiroli.	Shinoli	Chandgad	Kolhapur
2829	Bore well at MIDC Shiroli nearM/s Pratibha Enterprises.	Shiroli	Hatkanangale	Kolhapur
2005	Bore well at Khanjirenagar.	Khanjirenagar	Hatkanangale	Kolhapur
2830	Bore well at MIDC Gokul-Shirgaon.	Gokul-Shirgaon	Karvir	Kolhapur
2004	Bore well at Parvati Industrial Estate.	Yadrav	Shirol	Kolhapur
2008	Dug well at Sambarwadi, owned by Shri. Kishan Hali Rajput.	Sambarwadi	Miraj	Sangli
2007	Bore well at Savali, near Gram Panchayat office.	Savali	Miraj	Sangli
2831	Dug well at Sakharali, near MIDC Islampur near Krishna Milk Industry.	Sakharali	Walwa	Sangli

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

APR	46	94	62	90		185	148	93	116	84	185
MAY					31						
OCT	91	128	112	81	22	32	27	32	33	29	32
Station Code	1986	1985	1988	1987	1989	2835	2832	2202	2833	2834	2835
Basin	**West flowing rivers**										

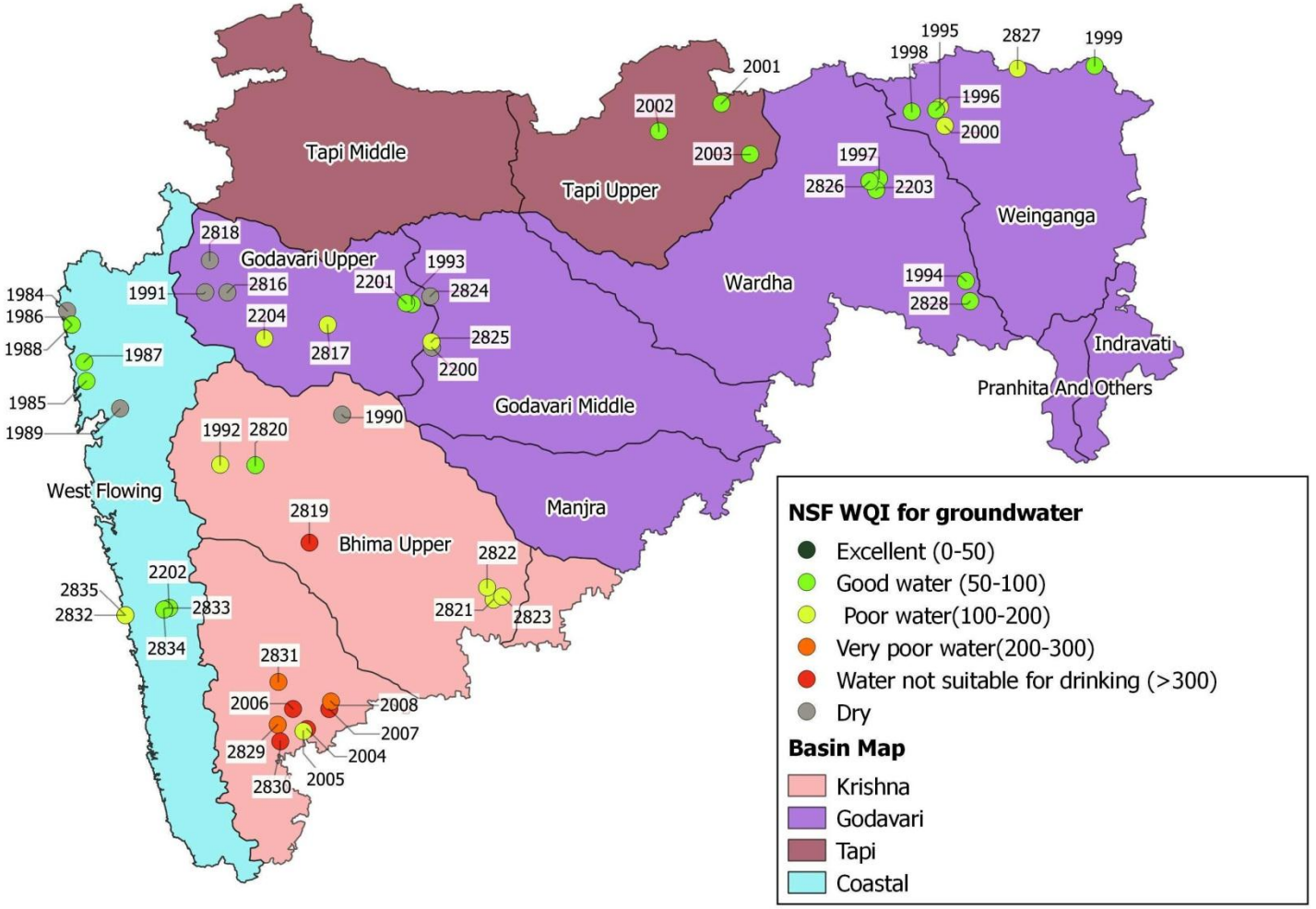
Legend

Excellent	Good	Poor	Very poor	Not suitable for drinking	Dry

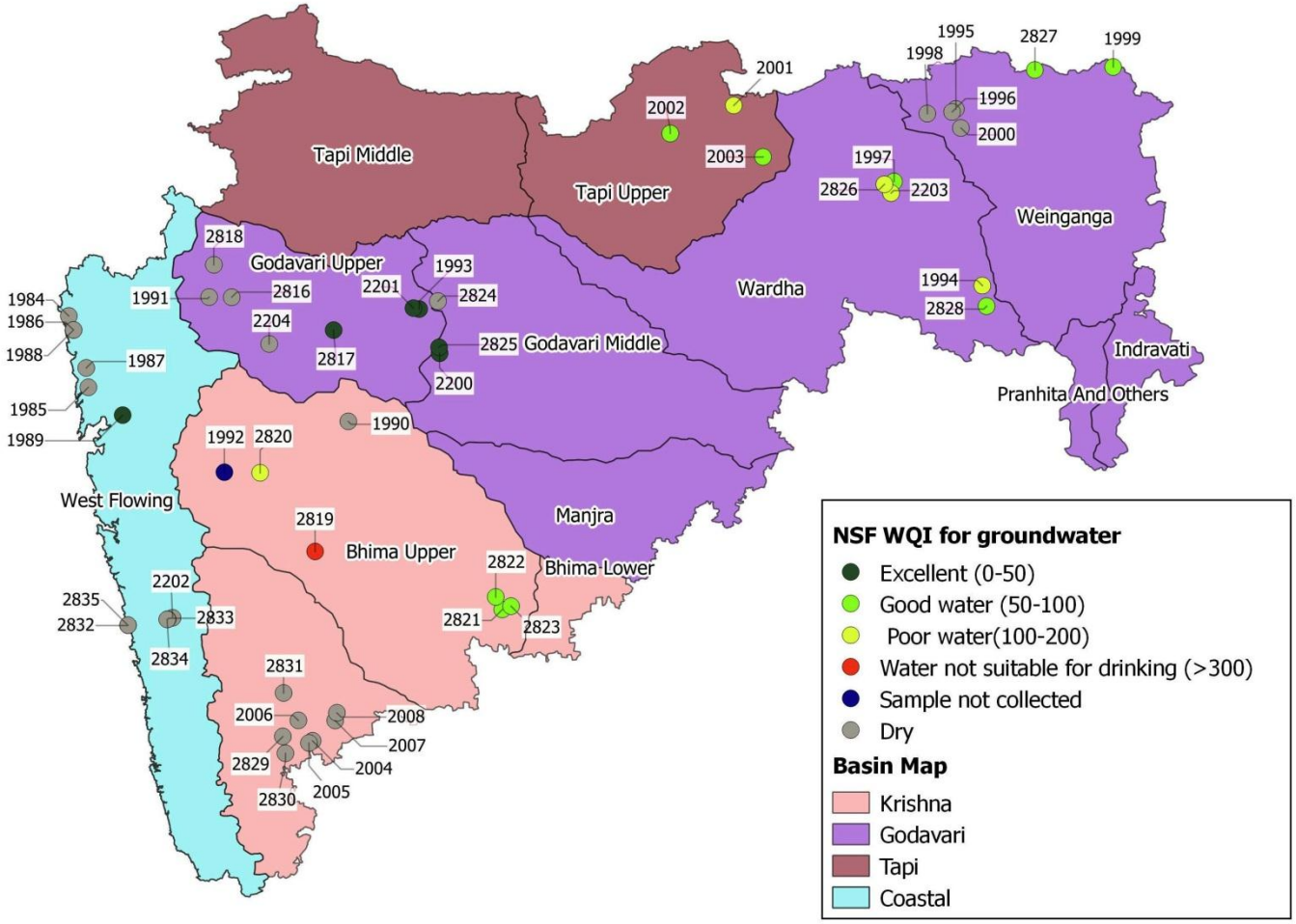
Table No. 34: Groundwater quality monitoring stations in West flowing river Basin

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

Spatial map for Ground WQI in Maharashtra 2014-15 (April 2014)



Spatial map for Ground WQI in Maharashtra 2014-15 (October 2014)



Conclusion

Water pollution level of the water bodies were recorded mostly near the urbanized and industrialized cities such as Pune, Thane, Mumbai, Akola and Chandrapur which were recorded to be polluted for more than six months of the year 2014-15.

The Bhima sub basin of Krishna basin was recorded to be polluted throughout the year. The Bhima river of Haweli taluka of Pune district was noted to be most polluted because of high feacal coliform levels (408 MPN/100ml) which is more than 10 times the standard for coliform levels (50 MPN/100 ml) as per CPCB, to categorise the water as A class (potable with basic treatment and disinfection). Similarly the nallahs at Thane (Rabodi, Colour Chem, Sandoz) and BPT Navapur 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.

High levels of FC and BOD levels indicate that the main reason for polluted river/water bodies is release of semi-treated domestic waste water and to tackle this issue it is highly desired to have appropriate waste water treatment facilities to treat sewage. Appropriate technologies should be immedietly incorporated to have sewage treatment plants with tertiary treatment facilities in the urban as well as peri-urban areas.

Some industrial regions like Chandrapur, Amravati, Akola and tourist places like Ratnagiri have recorded a sudden change in the water quality levels as compared to the last year. These places should immedietly be investigated further for the cause of pollution.

Out of 50 water monitoring stations of groundwater, 5 WQMS of groundwater records polluted water throughout the year. The Dug well of Baramati Taluka of Pune District recorded the most polluted water quality in terms of Groundwater. The levels of Total Hardness, pH, Fluoride and Nitrate were recorded to be high in 2014-15.

Annex I – RO wise summary of WQI in 2014-15

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 2014-15 and presents the gist of the water quality index for the respective stations for months of May and December.

RO – Amravati

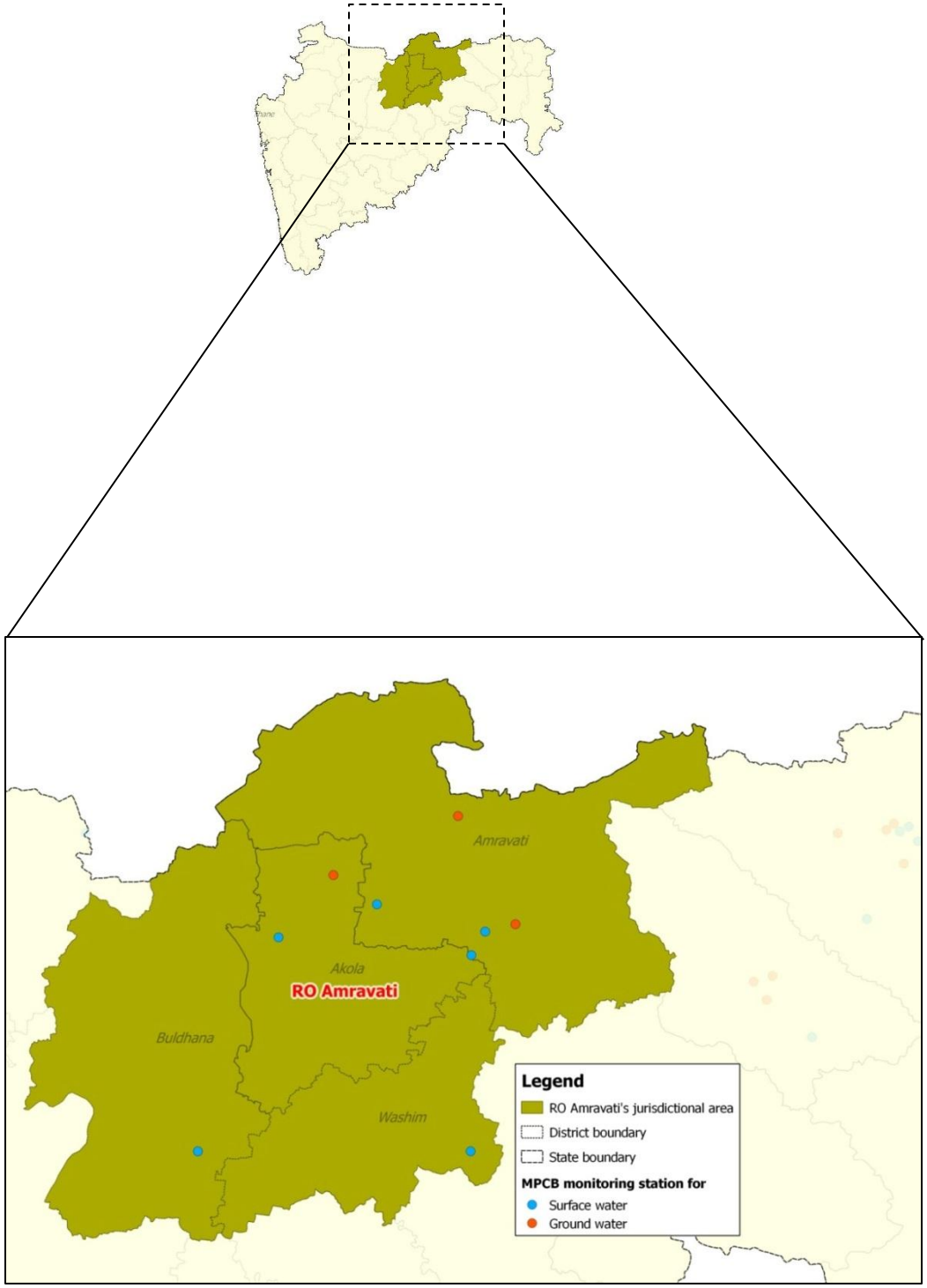

Amravati
Akola
RO Amravati
Buldhana
Washim
Legend
RO Amravati's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No. 35: Water quality Index for surface and ground water monitoring at Amravati-RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River /Nalla	1913	Purna River at Dhupeshwar at U/s of Malkapur Water works.	28	60	49	Akola	Akola	Malkapur
	2155	Purna River at D/s of confluence of Morna {} Purna at Andhura village	31	54	46	Akola	Balapur	Andura
	2675	Morna River at D/s. of Railway Bridge	29	Dry	31	Akola	Akola	Akola
	2695	Pedhi River near Road Bridge at Dadhi-Pedhi village	32	39	38	Amravati	Chandur Bazar	Asegaon
	2699	Penganga River at Mehkar-Buldana Road Bridge	35	67	53	Buldana	Mehkar	Mehkar
	2700	Purna River near Achalpur-Amravati Road Bridge; Asegaon	Dry	52	53	Amravati	Chandur bazaar	Asegaon

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Ground water	2001	Tube well at water treatment plant of M.C.Achalpur near Post Office.	78	108	93	Amravati	Achalpur	Paratwada
	2002	Bore well Opp. Gajanan Maharaj Temple at Anjangaon road.	87	75	81	Akola	Akot	Anjangaon

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Aurangabad

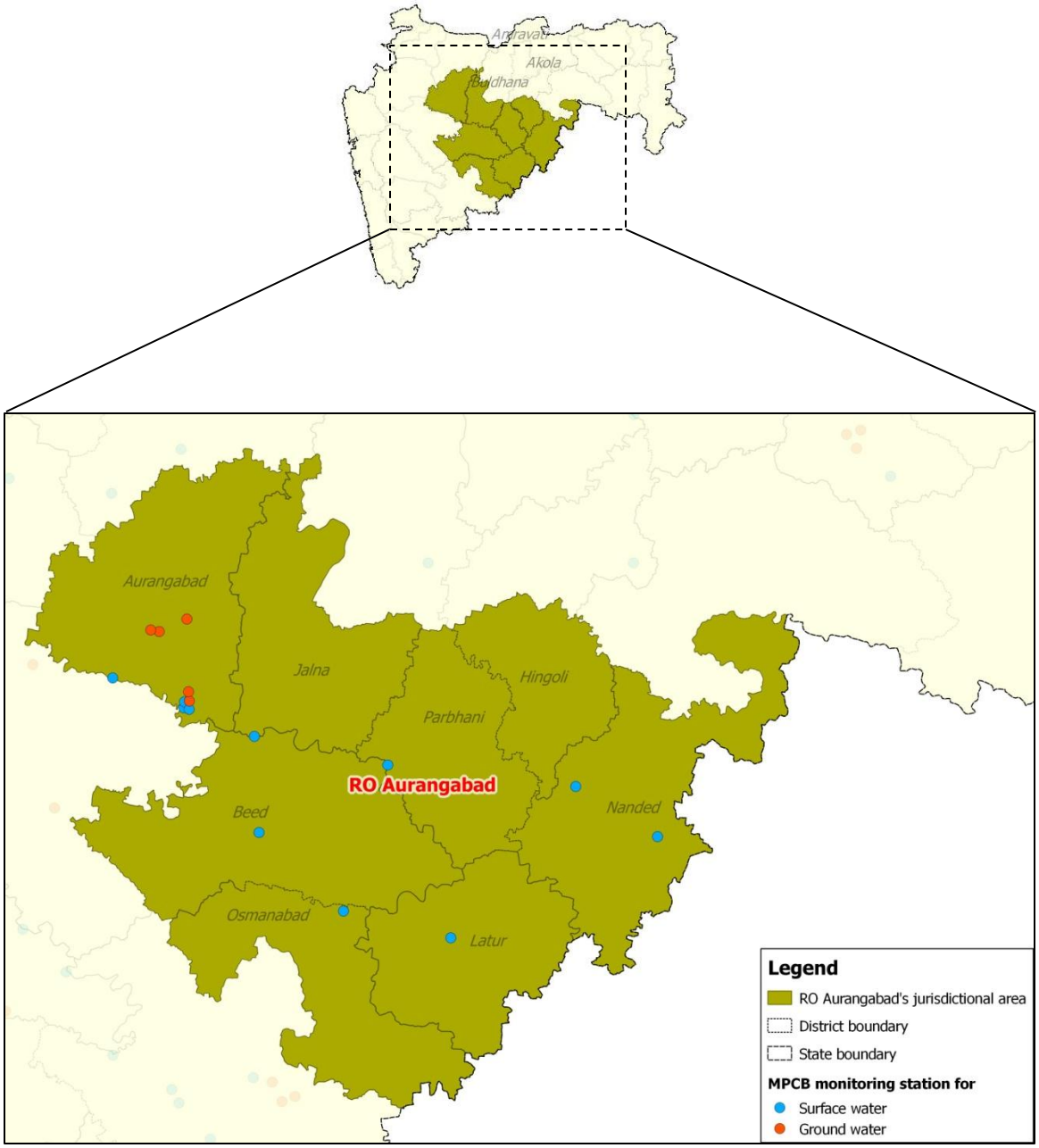


Table No. 36: Water quality Index for surface and ground water monitoring at Aurangabad-RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River/Nalla	12	Godavari River at Dhalegaon	87	82	84	Parbhani	Pathari	Dhalegaon
	1209	Godavari River at Raher	88	73	83	Nanded	Nayagaon	Raher
	1210	Godavari River at Intake of pump house	88	69	83	Nanded	Nanded	Vishnupuri
	1312	Godavari river at Jaikwadi Dam; Paithan.	87	83	84	Aurangabad	Paithan	Paithan
	2157	Godavari River at Latur Water intake near pump house	86	79	83	Osmanabad	Kalumb	Dhamegaon
	2158	Godavari River at Paithan U/s of Paithan Intake pump house	85	80	83	Aurangabad	Paithan	Jayakwadi
	2159	Godavari River at D/s of Paithan at Pathegaon bridge	89	83	82	Aurangabad	Paithan	Pathegaon
	2160	Godavari River at U/s of Aurangabad Reservoir Kaigaon Tokka near; Kaigaon Bridge	86	80	84	Aurangabad	Gangapur	Kaigaon
	2161	Godavari River at Jalna Intake water pump house Shahagad	Dry	81	77	Jalna	Ambad	Shahabad
	2657	Bindusara River at Beed; near Intake water pump house at Dam	Dry	85	80	Beed	Beed	Paligaon
	2673	Manjra River at D/s of Latur; near Latur-Nanded Bridge	84	Dry	85	Latur	Latur	Bhatkheda

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Groundwater	2200	Bore Well at Katpur; Near Z.P.School	Dry	14	14	Aurangabad	Paithan	Katpur
	2201	Dug Well at Ranjangaon	82	13	48	Aurangabad	Gangapur	Ranjangaon
	1993	Dug well at Pandarpur; Gangapur; Aurangabad	96	13	55	Aurangabad	Gangapur	Pandharpur
	2825	Bore Well at Wahegaon; near Zilla Parishet School	149	13	81	Aurangabad	Paithan	Wahegaon

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Chandrapur

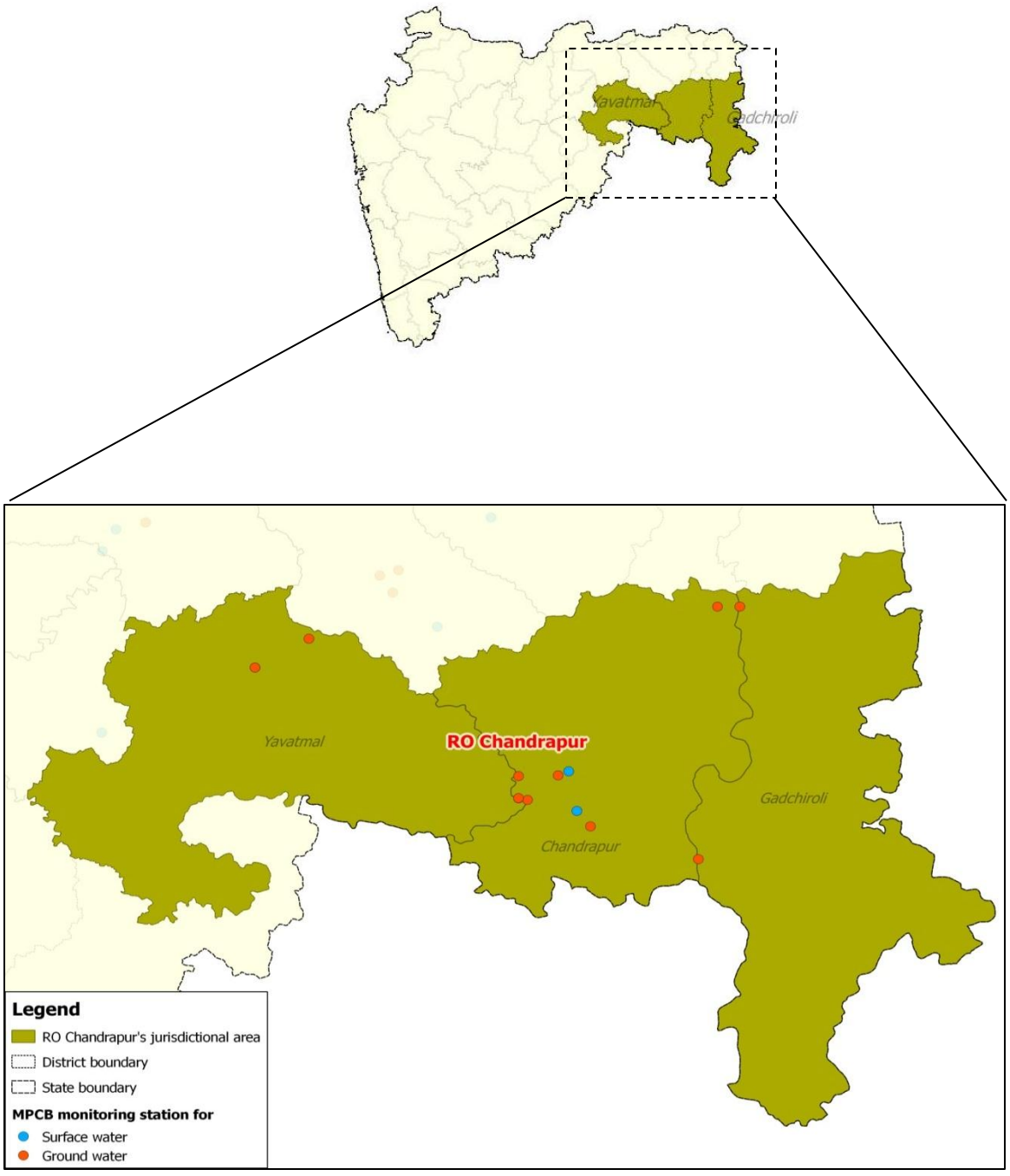


Table No. 37: Water quality Index for surface and ground water monitoring at Chandrapur RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River/Nalla	11	Wainganga River at Ashti	59	58	52	Chandrapur	Gondpipri	Ashti
	1212	Wardha river at Rajura bridge	58	56	49	Chandrapur	Chandrapur	Rajura
	2156	Wardha River at confluence point of Penganga {} Wardha	64	54	51	Yavatmal	Wani	Jugad
	2174	Wardha River at D/s of ACC Ghuggus	61	44	48	Chandrapur	Chandrapur	Ghuggus
	2175	Wainganga at U/s of Gaurav Paper Mills near Jack Well	61	56	53	Chandrapur	Chandrapur	Bramhpuri
	2176	Wainganga River at D/s of Gaurav Paper Mills Near Jackwell	50	42	48	Chandrapur	Chandrapur	Bramhpuri
	2697	Penganga River near water supply scheme of Umarkhed M.C	72	59	53	Yavatmal	Umarkhed	Belkhed
	2698	Penganga River D/s of Isapur Dam	70	57	50	Yavatmal	Pusad	Isapur
	2719	Wardha River at D/s. of Erai River	63	56	50	Chandrapur	Chandrapur	Hadasti
	2720	Wardha River at U/s of Erai River	70	56	54	Chandrapur	Chandrapur	Hadasti
	2721	Wardha River at U/s of ACC Ghuggus	66	58	54	Chandrapur	Chandrapur	Ghuggus

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Groundwater	2828	Dug Well near Jilla Parishad Primary School Visapur	51	99	75	Chandrapur	Ballarpur	Visapur
	1994	Dug well	76	117	96	Chandrapur	Chandrapur	Durgapur
	2003	Dug well at Plot No- 4; Street No. 49-C; at Nehru Bal Udyan Azad Maidan; owned by Yavatmal M.C.	78	76	77	Yavatmal	Yavatmal	Yavatmal

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Kalyan

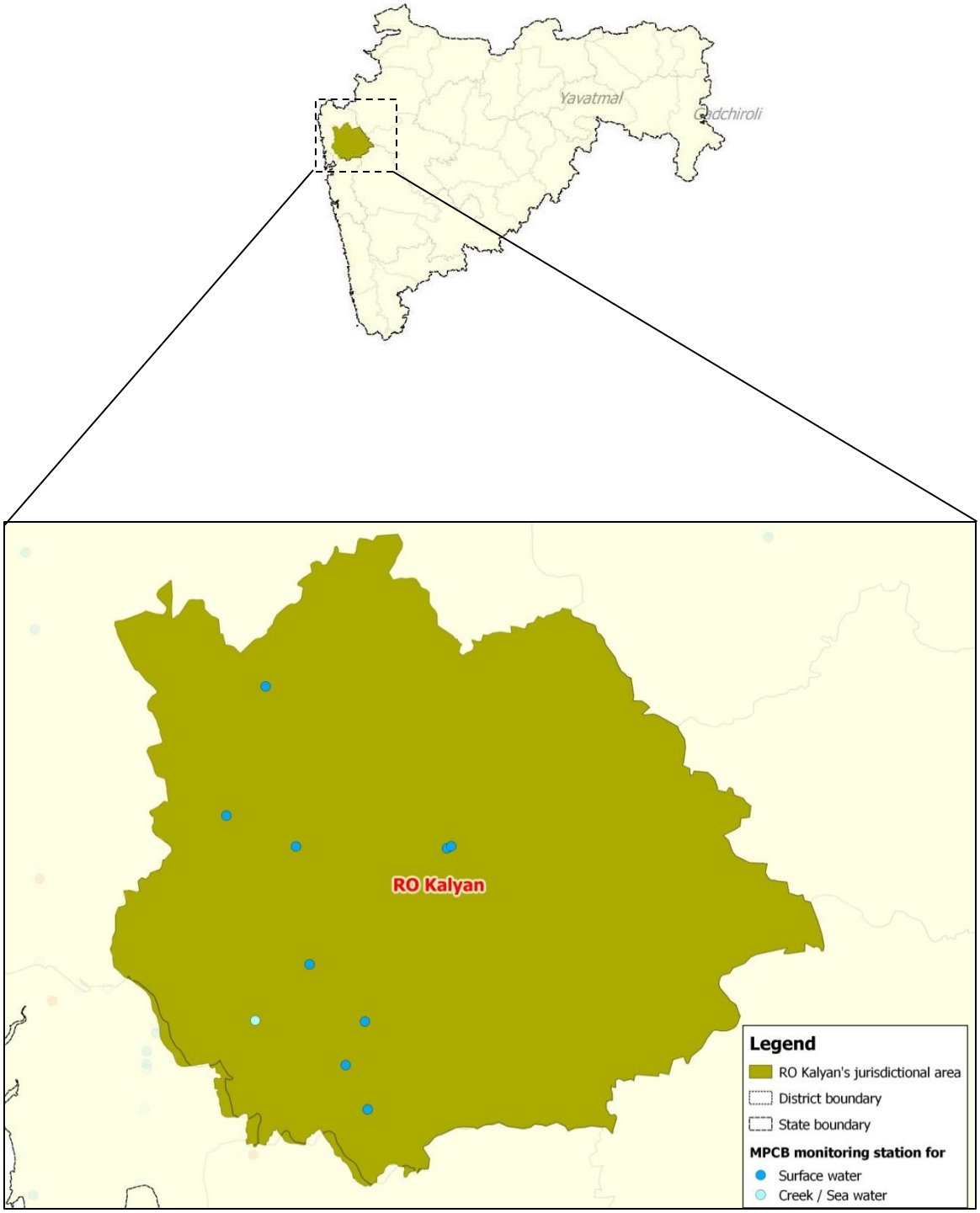

Yavatmal
Gadchiroli
RO Kalyan
Legend
RO Kalyan's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water

Table No. 38: Water quality Index for surface and ground water monitoring at Kalyan-RO – 2014-15

Type of water	RO	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River /Nalla	Kalyan	1092	Kalu River at Atale village	61	61	67	Thane	Kalyan	Atale
	Kalyan	1093	Ulhas river at U/s of NRC Bund.	73	59	72	Thane	Kalyan	Mohane
	Kalyan	1094	Ulhas River at U/s of Badlapur water works	80	61	78	Thane	Ambernath	Kulgaon
	Kalyan	1461	Bhatsa river at D/s of Pise Dam	80	58	78	Thane	Bhiwandi	Pise
	Kalyan	2162	Ulhas River at Jambhul water works	76	Dry	79	Thane	Ambernath	Jambhul
	Kalyan	2653	Bhatsa River at D/s. of Liberty Oil Mills	72	62	78	Thane	Shahapur	Satne
	Kalyan	2654	Bhatsa River at D/s of Liberty Oil Mills	72	60	77	Thane	Shahapur	Satne
	Kalyan	2709	Tansa River near road bridge	73	59	76	Thane	Wada	Dakewali
	Kalyan	2712	Vaitarna River near Road Bridge	76	61	76	Thane	Wada	Gandhare
Creek /sea	Kalyan	2791	Ulhas Creek at Reti Bunder; D/s of Kalyan-Bhiwandi Bridge	38	52	60	Thane	Kalyan	Kalyan

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Kolhapur

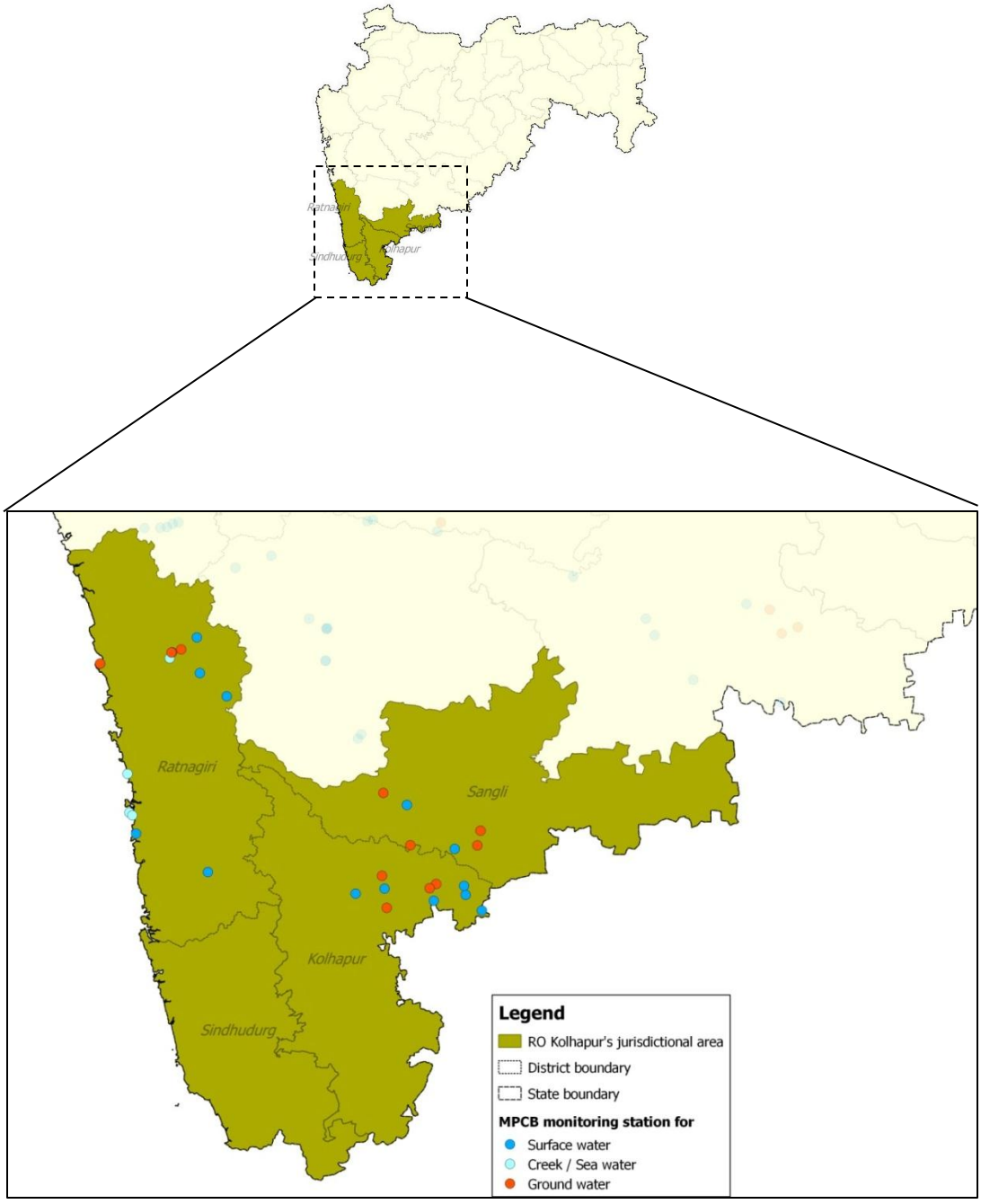

Ratnagiri
Sangli
Kolhapur
Sindhudurg
Legend
RO Kolhapur's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water
Ground water

Table No. 39 Water quality Index for surface and ground water monitoring at Kolhapur-RO – 2014-15:

Type of water	Station Code	Station Name	Apr	Dec/ Oct	Avg	District	Taluka	Village
River /Nalla	37	Krishna River at Maighat; Sangli	64	63	62	Sangli	Miraj	Gawali gally
	1153	Krishna River at Rajapur Weir	48	Dry	63	Kolhapur	Shirol	Rajapur
	1310	Krishna River at Kurundwad	46	Dry	63	Kolhapur	Shirol	Narshingwadi
	1311	Panchganga River at Ichalkaranji near MIDC intake well	41	Dry	61	Kolhapur	Hatkanangale	Shiradhwad
	1904	Panchganga River at U/s of Kolhapur town near Balinga Pumping Station	44	Dry	62	Kolhapur	Karvir	Balinga
	1905	Panchaganga river at D/s of Kolhapur town at Gandhi nagar near NH-4 bridge and MIDC intake well.	41	Dry	61	Kolhapur	Kolhapur	Uchegaon
	1906	Krishna river at Walwa; D/s of Islampur near Vithal Temple.	64	65	64	Sangli	Walwa	Walwa
	2163	Panchganga River at Shirol near Shirol intake well	41	Dry	62	Kolhapur	Shirol	Shirol
	2164	Vashishti River at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt Ltd	64	65	64	Ratnagiri	Chiplun	Kherdi
	2676	Muchkundi River at Waked Ratnagiri near M/s. Asahi India Glass	57	65	64	Ratnagiri	Lanja	Waked
	2713	Vashishti River at D/s of Three M Paper Mills near Chiplun water intake Jackwell	66	67	56	Ratnagiri	Chiplun	Kherdi
	2714	Vashishti River at U/s of Pophali near Konphansawane Bridge	Dry	65	63	Ratnagiri	Chiplun	Pophali
	2790	Pimpal-Paneri Nalla at Ratnagiri near Finolex Industries	43	62	77	Ratnagiri	Ratnagiri	Yahganigaon
Creek/sea	2804	karambavane%20creek%20at%20chiplun	59	64	63	Ratnagiri	Chiplun	Karambavane
	2813	Sea Water at Ganapatipule	55	64	62	Ratnagiri	Ratnagiri	Ganapatipule
	2814	Sea Water at Bhagwati Bunder; Ratnagiri near Ultra Tech Cement Jetty	51	52	54	Ratnagiri	Ratnagiri	Mirkarwada
	2815	Madvi Sea Water at Ratnagiri near Jodhale Maruti Temple	32	Dry	53	Ratnagiri	Ratnagiri	Madvigaon

Type of water	Station Code	Station Name	Apr	Dec/ Oct	Average	District	Taluka	Village
Groundwater	2004	Bore well at Parvati Industrial Estate; Yadrav; Kolhapur	360	Dry	360	Kolhapur	Shirol	Yadrav
	2005	Bore well at Khanjirenagar; Kolhapur	182	Dry	182	Kolhapur	Hatkananga le	Khanjirenagar
	2006	Bore well at Shinoli near M/s Aqua Alloy Steel.	360	Dry	360	Kolhapur	Chandgad	Shinoli
	2007	Bore well at Savali; near Gram Panchayat office.	567	Dry	567	Sangli	Miraj	Savali
	2008	Dug well at Sambarwadi; owned by Shri. Kishan Hali Rajput.	248	Dry	248	Sangli	Miraj	Sambarwadi
	2202	Dug Well at Ghane Kunt; near Awashi; onwed by shri Rajendra Amre	93	Dry	63	Ratnagiri	Khed	Ghane Kunt
	2829	Bore Well at MIDC Shiroli near M/s. Pratibha Enterprises	226	Dry	226	Kolhapur	Hatkananga le	Shiroli
	2830	Bore Well at MIDC Gokul Shirgaon	380	Dry	380	Kolhapur	Karvir	Gokul-Shirgaon
	2831	Dug Well at Sakharali near MIDC Islampur near Krishna Milk Industry	276	Dry	276	Sangli	Walwa	Sakharali
	2832	Dug Well No.1 at Brahmanwadi-Anjanwel; owned by Shri Vaidya	148	Dry	88	Ratnagiri	Guhagar	Anjanwel
	2833	Dug Well No.1 at Group Gram Panchayat at Arketwadi; near Masjid	116	Dry	75	Ratnagiri	Khed	Arketwadi
	2834	Dug Well No.2 at Arketwadi	84	Dry	56	Ratnagiri	Khed	Arketwadi
	2835	Dug Well No.2 at owned by Group Gram Panchayat; Brahmanwadi-Anjanwel	185	Dry	109	Ratnagiri	Guhagar	Anjanwel

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

RO – Mumbai

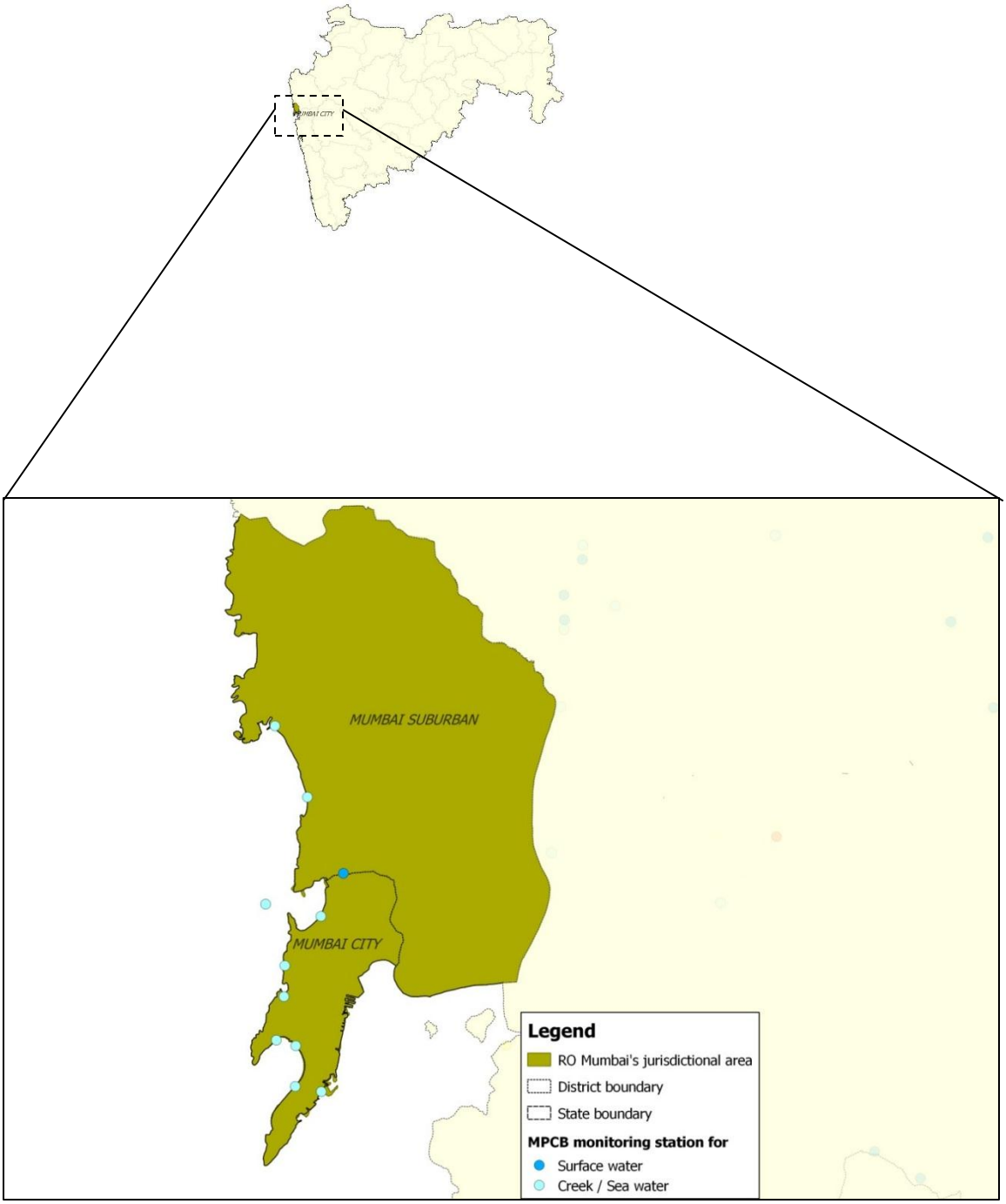

MUMBAI SUBURBAN
MUMBAI CITY
Legend
RO Mumbai's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water

Table No. 40: Water quality Index for surface and ground water monitoring at Mumbai-RO – 2014-15

Type-of-water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Creek/sea	1318	Mahim creek at Mahim Bay	35	59	49	Mumbai	Bandra	Mahim
	2165	Sea Water at Gateway of India	62	59	54	Mumbai	Colaba	Colaba
	2166	Sea Water at Charni Road Choupathy	51	58	55	Mumbai	Mumbai	Girgaon
	2167	Sea Water at Worli Seaface	48	59	55	Mumbai	Worli	Worli
	2168	Mithi River at near bridge	29	46	44	Mumbai	Bandra	Mahim
	2169	Sea Water at Varsova Beach	59	45	50	Mumbai	Andheri	Versova
	2808	Sea Water at Nariman Point	51	61	55	Mumbai	Colaba	Colaba
	2809	Sea Water at Malabar Hill	53	57	55	Mumbai	Mumbai	Walkeshwar
	2810	Sea%20water%20at%20haji%20ali	54	61	51	Mumbai	Worli	Worli
	2811	Sea Water at Shivaji Park (Dadar Choupathy)	47	59	52	Mumbai	Dadar	Dadar
	2812	Sea Water at Juhu Beach	61	41	53	Mumbai	Santacruz	Juhugaon

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Nagpur

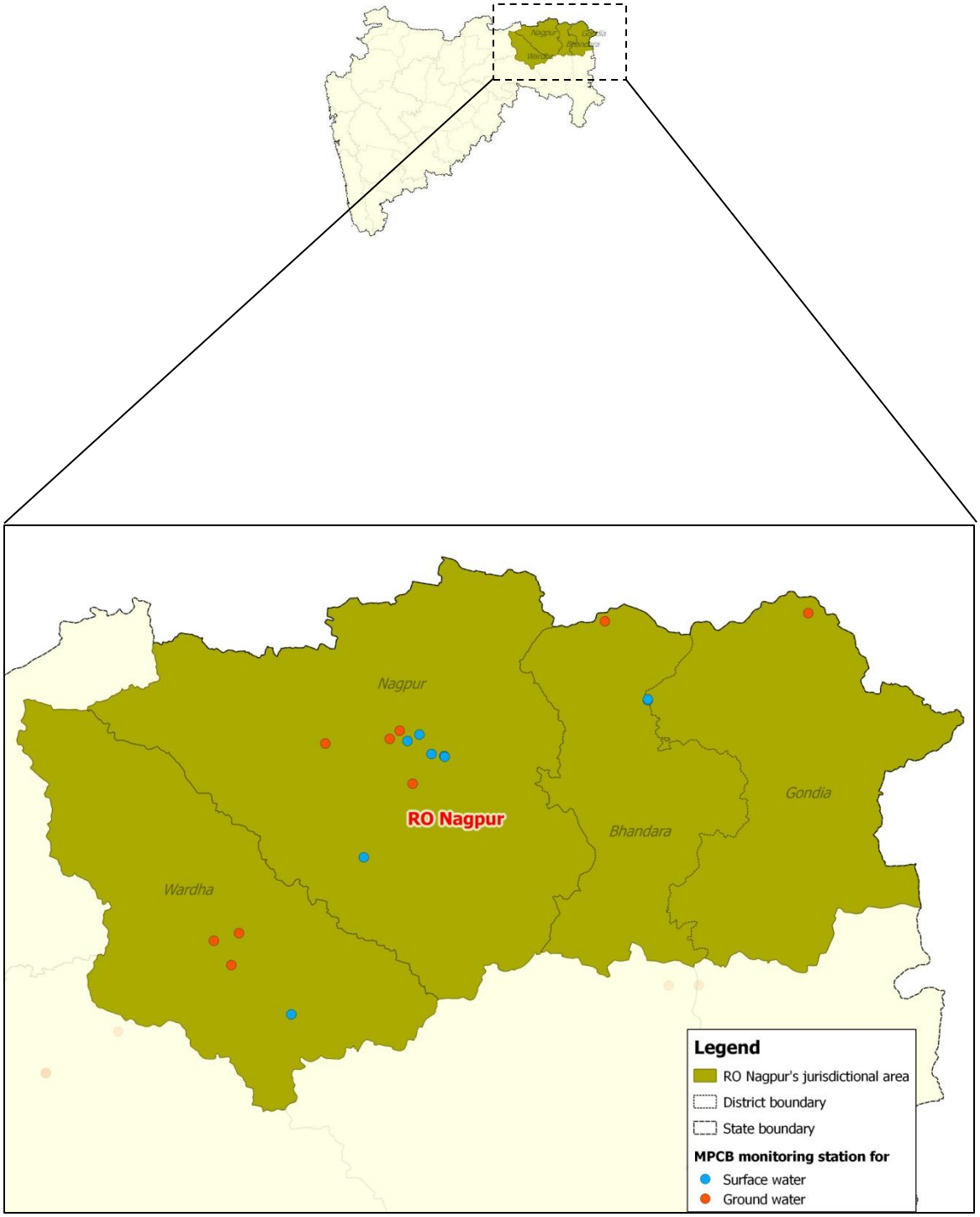

Nagpur
RO Nagpur
Bhandara
Gondia
Wardha
Legend
RO Nagpur's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No. 41: Water quality Index for surface and ground water monitoring at Nagpur-RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River /Nalla	1315	Wardha River at Pulgaon Railway Bridge	61	67	60	Wardha	wardha	Pulgaon
	1908	Kolar river before confluence with Kanhan river at Waregaon Bridge.	59	65	56	Nagpur	Kamptee	Waregaon
	1909	Kanhan river at D/s of Nagpur	60	68	54	Nagpur	Kuhi	Agargaon
	1910	Wainganga river after confluence with Kanhan river	61	68	55	Nagpur	Kuhi	Ambhora
	2170	Kanhan River (Wainganga basin) at U/s. of M/s Vidharba Paper Mill	64	68	57	Nagpur	Parseoni	Sinora
	2171	Kanhan River (Wainganga basin) at D/s of M/s Vidharbha Paper Mills	63	61	55	Nagpur	Parseoni	Sinora
	2172	Wainganga River at D/s of Ellora Paper Mill	56	64	59	Bandara	Tumsar	Tumsar
	2173	Wainganga River at U/s of Ellora Paper Mills	60	66	63	Bandara	Tumsar	Tumsar
	2722	Wena River at U/s. of Mohata Mills; nearby Brigde on Hinganghat Wadner Road	44	69	58	Wardha	Hinganghat	Hinganghat
	2723	Wena River at D/s. of Mohata Mills; near Bridge on Hinganghat-Wadner Road	39	67	51	Wardha	Hinganghat	Hinganghat

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Groundwater	2826	Dug Well near Railway Station; Cottaon Market	83	177	130	Wardha	wardha	Wardha
	2827	Bore Well near Railway crossing at Dongi Buzurg	101	77	89	Bandara	Tumsar	Dongri-Buzurg
	1995	Gram Panchayath Dug well ; Near Balaji Gajbhiye House; Khaperkheda	103	Dry	103	Nagpur	Saoner	Khaperkheda
	1996	Gram Panchayath Dug well ; Near Jagadamba G M S Mandir Sahakari Sanstha	94	Dry	94	Nagpur	Kamptee	Koradi
	1997	Bore well near Primary Health Centre; Raipur(Hingna)	70	85	78	Nagpur	Hingna	Raipur
	1998	Gram Panchayat Dug well near Gram Panchayat Office; Brahmni	80	Dry	80	Nagpur	Kalmeshwar	Brahmni
	1999	Bore well	86	80	83	Gondia	Gondia	Changera
	2000	Dug well near Sarode Kirana Store; Bhandewadi; Nagpur	108	Dry	108	Nagpur	Nagpur	Bhandewadi
	2203	Hand Pump in the premises of Z.P.Primary School	80	176	128	Wardha	wardha	Bhugaon

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Nashik

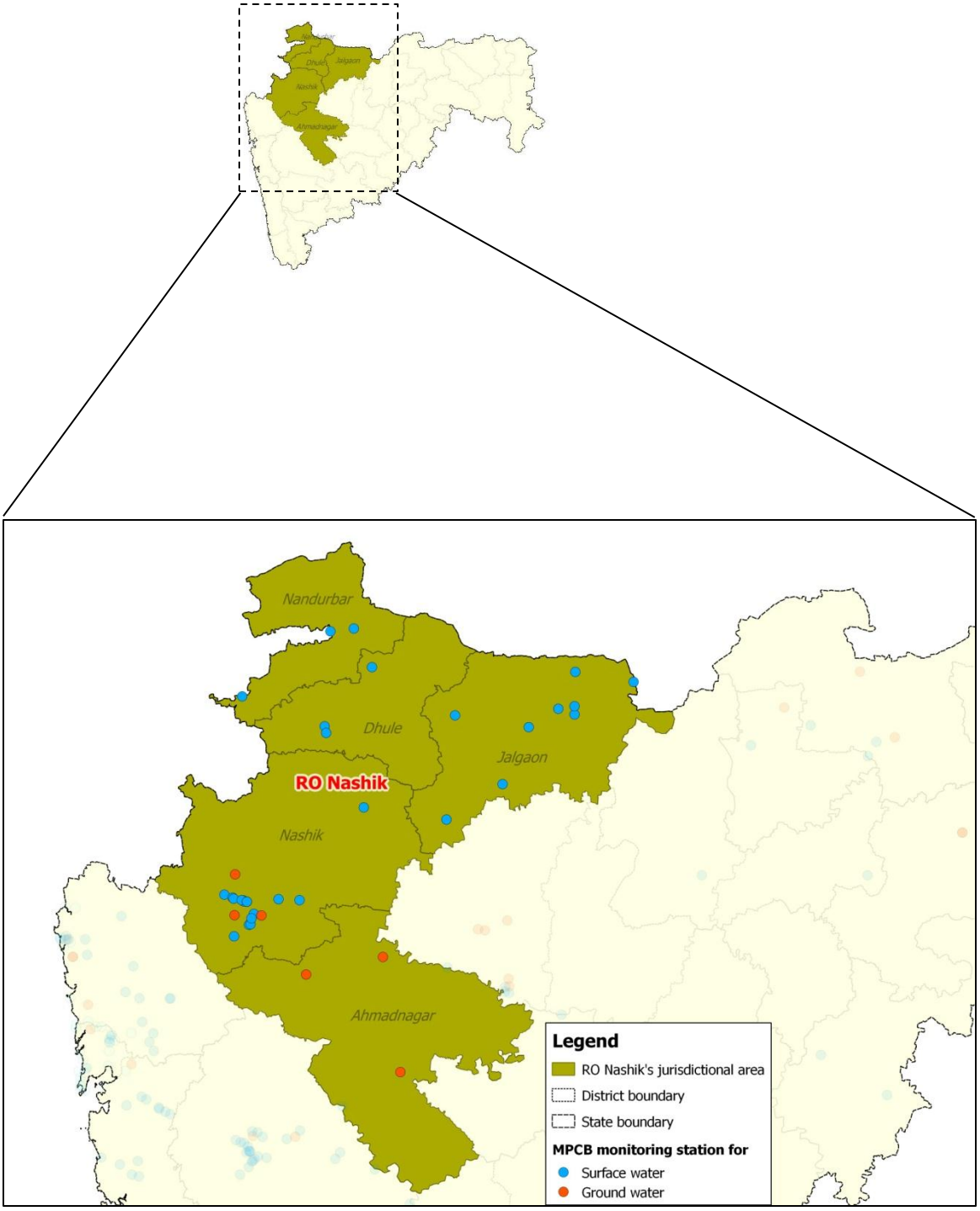

Nandurbar
Dhule
Jalgaon
RO Nashik
Nashik
Ahmadnagar
Legend
RO Nashik's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water

Table No. 42: Water quality Index for surface and ground water monitoring at Nashik -RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/ Oct	Average	District	Taluka	Village
River /Nalla	1095	Godavari River at U/s of Gangapur Dam	81	75	76	Nashik	Nashik	Gangapur
	1096	Godavari River at Panchavati at Ramkund	75	69	69	Nashik	Nashik	Panchavati
	1211	Godavari River at Nashik D/s of near Amardham	72	68	70	Nashik	Nashik	Gadgebaba Maharaj Nagar
	1251	Tapi River at Bhusawal	79	73	73	Jalgaon	Bhusawal	Bhusawal Railway Colony
	1252	Girna river at Jalgaon at intake of Girna pump huose.	Dry	74	72	Jalgaon	Jalgaon	Girna pump house area
	1253	Girna river at Malegaon at Malegaon road bridge.	Dry	Dry	74	Nashik	Malegaon	Malegaon
	1313	Tapi River at Ajnad	54	72	66	Jalgaon	Raver	Ajnad
	1314	Tapi river at UbadVillage near Gujrat border.	56	71	67	Nandurbar	Shahada	Ubad
	1907	Rangavali river at D/s of Navapur near Rangavali bridge.	Dry	62	72	Nandurbar	Navapur	Navapur
	2177	Godavari River near Someshwar Temple	78	68	73	Nashik	Nashik	Someshwar
	2178	Chikhali Nalla Meets Godavari River	70	64	68	Nashik	Nashik	Chikhali
	2179	Godavari River at Hanuman Ghat	70	68	70	Nashik	Nashik	Nashik city
	2180	Godavari River at near Tapovan	71	51	67	Nashik	Nashik	Tapovan
	2181	Godavari River at Kapila -Godavari confluence point	72	61	65	Nashik	Nashik	Tapovan
	2182	Godavari River at Saikheda	78	62	69	Nashik	Niphad	Saikheda
	2183	Godavari River at Nandur-Madhameshwar Dam	79	60	70	Nashik	Niphad	Nandur
	2652	Amravati River D/s of Dondaicha	Dry	Dry	64	Dhule	Dhule	Dondaicha
	2658	Bori River D/s of Amalner	Dry	Dry	75	Jalgaon	Jalgaon	Amalner

Type of water	Station Code	Station Name	April	Dec/ Oct	Average	District	Taluka	Village
	2659	Burai River before confluece to Tapi River	Dry	Dry	76	Dhule	Dhule	Mukudas
	2660	Darna River at Chehedi pumping station	79	61	71	Nashik	Nashik	Chehedi
	2661	Darna River at Aswali (Darna Dam)	77	68	72	Nashik	Igatpuri	Aswali
	2662	Darna River at MES site Pumping station	83	71	75	Nashik	Nashik	Bhagur
	2663	Darna River at Bhagur Pumping station near Pandhurli Bridge	80	68	73	Nashik	Nashik	Bhagur
	2664	Darna River at Sansari	75	67	70	Nashik	Nashik	Sansari
	2666	Gomai River D/s of Shahada	54	68	67	Dhule	Dhule	Shahada
	2667	Hiwara River D/s of Pachora	Dry	Dry	72	Jalgaon	Jalgaon	Pachora
	2670	Kan River near Sakri water works	Dry	69	73	Dhule	Dhule	Sakri
	2674	Mor River near Padalshe	Dry	Dry	73	Jalgaon	Jalgaon	Padalashe
	2684	Panzara River near Panzarakan SSK Ltd	Dry	69	74	Dhule	Dhule	Panzare
	2710	Titur River D/s of Chalisgaon	Dry	Dry	77	Jalgaon	Jalgaon	Chalisgaon
	2718	Waghur River at Sakegaon before Confluence with Tapi River	Dry	Dry	76	Jalgaon	Jalgaon	Sakegaon

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Groundwater	2826	Dug Well near Railway Station; Cottaon Market	83	177	130	Wardha	wardha	Wardha
	2827	Bore Well near Railway crossing at Dongi Buzurg	101	77	89	Bandara	Tumsar	Dongri-Buzurg
	1995	Gram Panchayath Dug well ; Near Balaji Gajbhiye House; Khaperkheda	103	Dry	103	Nagpur	Saoner	Khaperkheda
	1996	Gram Panchayath Dug well ; Near Jagadamba G M S Mandir Sahakari Sanstha	94	Dry	94	Nagpur	Kamptee	Koradi
	1997	Bore well near Primary Health Centre; Raipur(Hingna)	70	85	78	Nagpur	Hingna	Raipur
	1998	Gram Panchayat Dug well near Gram Panchayat Office; Brahmni	80	Dry	80	Nagpur	Kalmeshwar	Brahmni
	1999	Bore well	86	80	83	Gondia	Gondia	Changera
	2000	Dug well near Sarode Kirana Store; Bhandewadi; Nagpur	108	Dry	108	Nagpur	Nagpur	Bhandewadi
	2203	Hand Pump in the premises of Z.P.Primary School	80	176	128	Wardha	wardha	Bhugaon

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

RO – Navi Mumbai

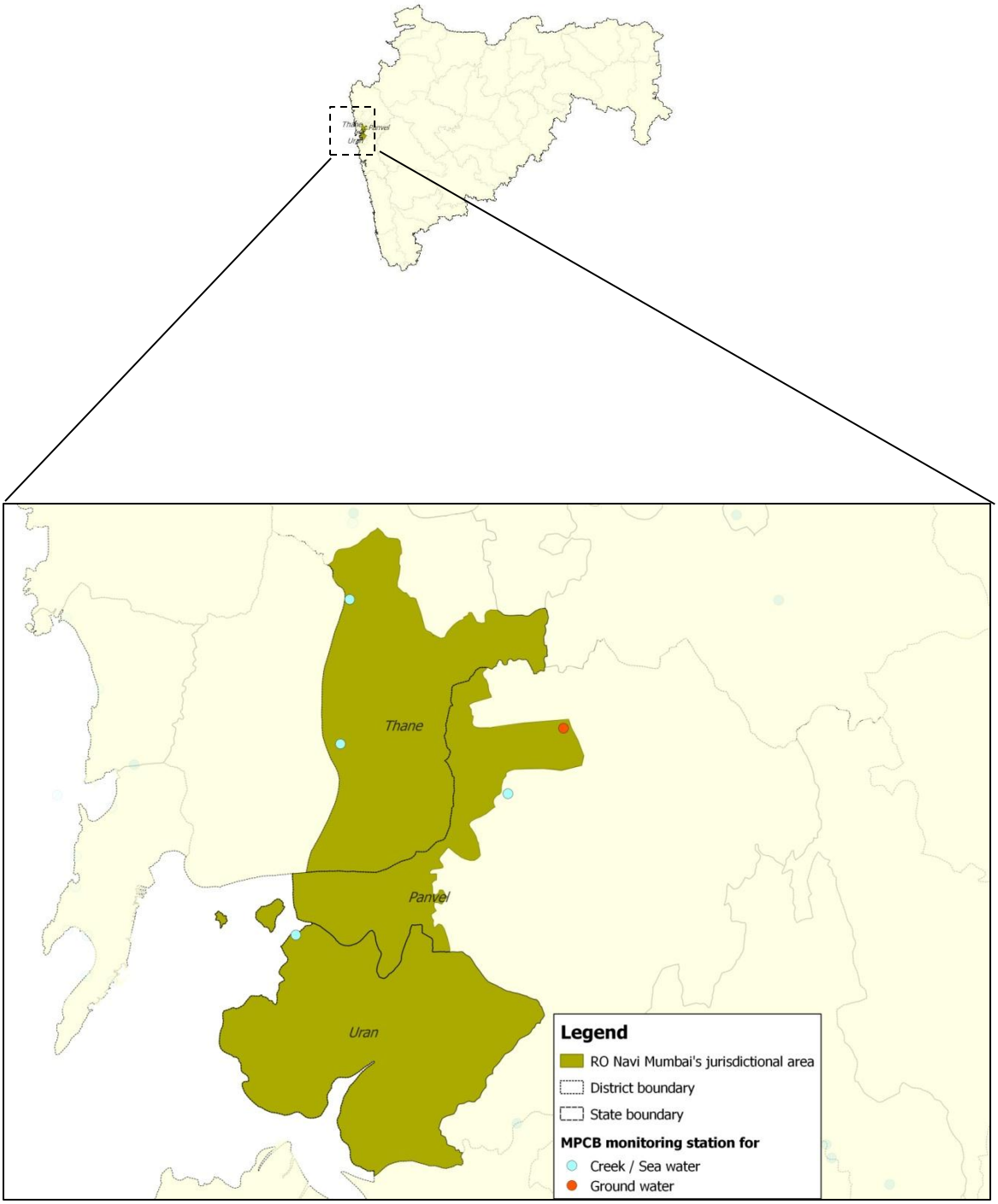


Table No. 43: Water quality Index for surface and ground water monitoring at Navi Mumbai-RO – 2014-15

Type of water	RO	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Creek/sea	Navi Mumbai	1317	Thane creek at Elephanta Island	50	58	57	Raigad	Uran	Gharapuri, Elephanta Island
	Navi Mumbai	2184	Vashi Creek at Airoli Bridge	56	62	61	Thane	Thane	Airoli
	Navi Mumbai	2185	Vashi Creek at Vashi Bridge	32	Dry	53	Thane	Thane	Vashi

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Pune

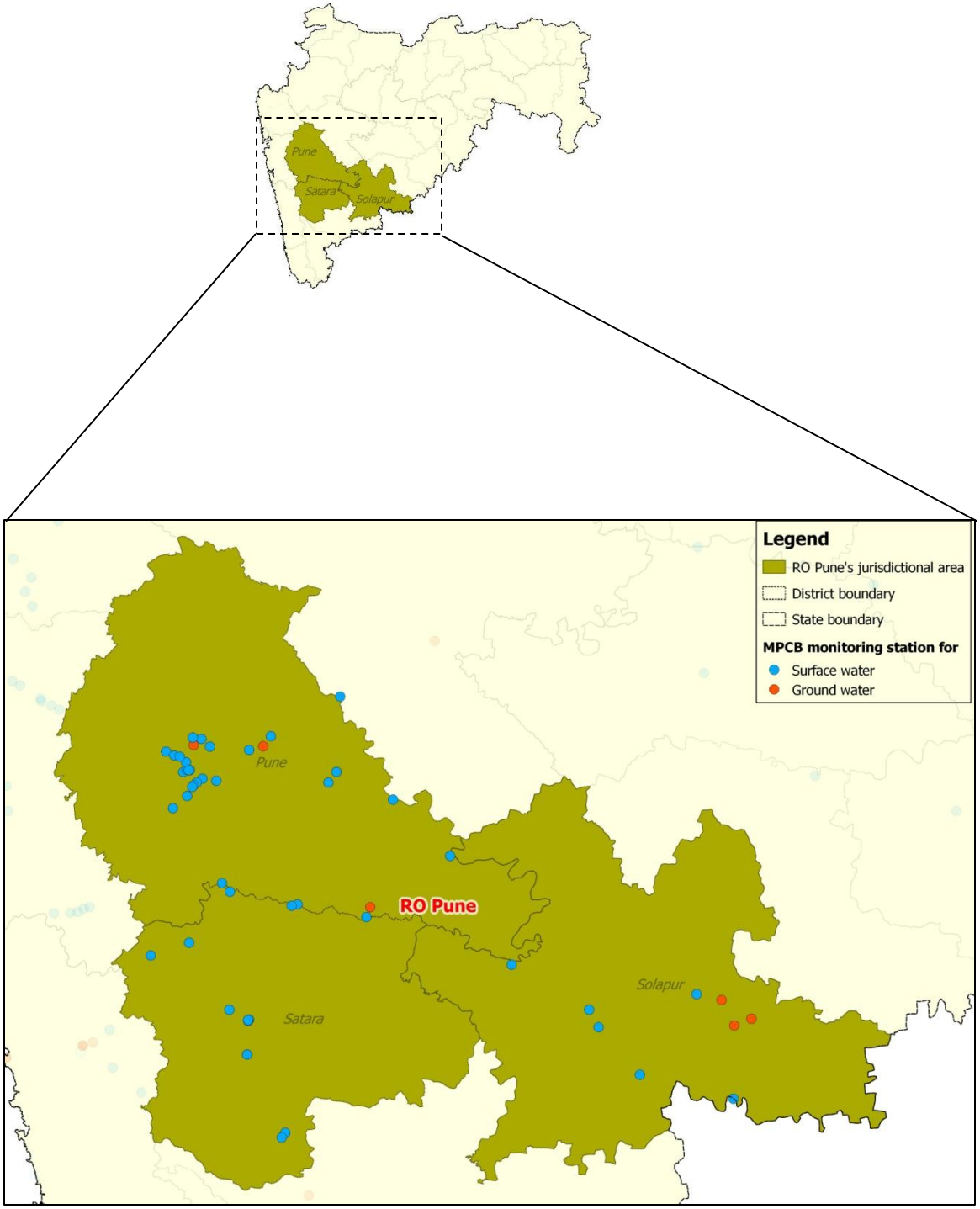

Pune
Satara
Solapur
Legend
RO Pune's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water
Pune
RO Pune
Satara
Solapur

Table No. 44: Water quality Index for surface and ground water monitoring at Pune-RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River/Nallah	28	Bhima River at Takli	61	69	63	Solapur	South Solapur	Takali
	36	Krishna River at Krishna Bridge; Karad	62	73	65	Satara	Karad	Karad
	1188	Bhima River at Narshingpur near Sangam Bridge after confluence with Nira	60	71	67	Solapur	Malshiros	Narsingpur
	1189	Bhima river at Pune (Mutha river) at U/s of Vithalwadi near Sankar Mandir.	29	44	54	Pune	Haweli	Vithalwadi
	1190	Bhima river at D/s of Bundgarden; Pune.	32	71	41	Pune	Haweli	Yerwada
	1191	Bhima river after confluence with Mula-Mutha at Pargaon near Vasant Bandara.	40	69	61	Pune	Daund	Pargaon
	1192	Bhima river at Daund near Mahadev temple.	49	67	61	Pune	Daund	Daund
	1194	Krishna river at Dhom Dam	78	79	78	Satara	Mahabaleshwar	Wai
	1463	Nira river at Sarola bridge	59	71	67	Pune	Bhor	Sarola
	1911	Chandrabhaga river at U/s of Pandharpur town.	58	69	62	Solapur	Pandarpur	Gursale
	1912	Chandrabhaga river at D/s of Pandharpur town near Vishnupant Mandir.	52	68	52	Solapur	Pandarpur	Gopalpur
	2186	Venna River at Varya; Satara	50	69	72	Satara	Satara	Varye
	2187	Krishna River at Kshetra Mahuli Satara	61	68	61	Satara	Mahuli	Kshetra Mahuli
	2188	Krishna River at Krishna-Venna Sangam; Mahuli	56	69	62	Satara	Mahuli	Mahuli
	2189	Koyna River at Karad	68	77	68	Satara	Karad	Karad
	2190	Krishna River at Wai	51	72	64	Satara	Wai	Wai
	2191	Mutha River at Sangam Bridge Near Ganpathi Ghat	30	46	41	Pune	Pune	Shivaji Nagar
	2192	Mula-Mutha River at Mundhwa Bridge	42	69	47	Pune	Haweli	Mundhawa
	2193	Mula River at Aundh Bridge -Aundgaon	35	70	50	Pune	Haweli	Aundhgaon
	2194	Mula River at Harrison Bridge near Mula -Pawana Sangam	26	69	42	Pune	Haweli	Bopodi
	2195	Nira River at D/s of Jubilant Organosis Pune	39	69	59	Pune	Baramati	Nimbut
	2196	Pawana River at Sangavigaon; Pune	34	77	55	Pune	Haweli	Sangavigaon

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
	2197	Indrayani River at D/s. of Alandigaon; Pune	56	69	56	Pune	Haweli	Alandigaon
	2655	Bhima River at Koregaon near Koregaon Bridge; Pune	59	71	63	Pune	Shirur	Koregaon
	2656	Bhima River Backwater of Ujani Dam near raw water pump house	60	71	71	Pune	Indapur	Kumbargaon
	2665	Ghod River at Shirur; Pune	41	73	60	Pune	Shirur	Shirur
	2668	Indrayani River at D/s of Moshi village	51	72	55	Pune	Haveli	Moshi
	2669	Indrayani River at U/s of Moshigaon; Pune	56	71	62	Pune	Haweli	Moshigaon
	2677	Mula-Mutha River at D/s of Theur; Pune	41	68	59	Pune	Haweli	Theur
	2678	Mutha River near Veer Savarkar Bhavan	29	56	42	Pune	Pune	Pune M.C
	2679	Mutha River at Deccan Bridge; Pune	28	41	41	Pune	Pune	Deccan
	2680	Mutha River at Khadakvasla Dam Pune	29	56	42	Pune	Haweli	Kadakvasla
	2681	Nira River at Sangavi	44	70	58	Satara	Phaltan	Sangavi
	2682	Nira River at U/s of Jubilant Organosis Pune	47	73	65	Pune	Baramati	Nira(Datta ghat)
	2683	Nira River at Shindewadi	59	73	63	Satara	Khandala	Shindewadi, Shirwal
	2690	Pawana River at Kasarwadi Pune	30	68	49	Pune	Haweli	Kasarwadi
	2691	Pawana River at Dapodi Bridge at Pawana-Mulla Sangan Pune	30	69	51	Pune	Haweli	Dapodi
	2692	Pawana River at Ravet Weir; Pune	70	71	79	Pune	Haweli	Ravet
	2693	Pawana River at Chinchwadgaon; Pune	51	73	57	Pune	Haweli	Chinchwadgaon
	2694	Pawana River at Pimprigaon; Pune	30	68	52	Pune	Haweli	Pimprigaon
	2705	Sina River near Laboti till naka Solapur	63	73	65	Solapur	Mohal	Laboti
	2711	Urmodi River at Nagthane Satara	54	71	66	Satara	Satara	Nagthane
	2715	Vel River at Shikrapur; Pune	Dry	72	69	Pune	Shirur	Shikrapur
	2716	Venna River at Mahabaleshwar	74	80	74	Satara	Mahabaleshwar	Mahabaleshwar
	2717	Venna River at Mahuli	51	68	64	Satara	Satara	Mahuli
	2789	Nalla at D/s of Alkai Mandir; Solapur	28	29	47	Solapur	Malshiras	Aklai

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
Groundwater	1992	Dug well at MSW Site; owned by Shri.Dattu Kondiba Borate at Borate Vasthi.	104	Not collected	104	Pune	Haveli	Moshi
	2819	Dug Well Owned by Shri Deshmukh	458	467	463	Pune	Baramati	Malegaon
	2820	Dug Well Owned by Shri Shivaji Baban Darekar	55	130	85	Pune	Shirur	Sanaswadi
	2821	Bore Well at Bale Railway Station premises Owned by Shri Digambar Joshi	138	61	100	Solapur	North Solapur	Dahegaon
	2822	Bore Well near Chincholi	159	57	108	Solapur	Mohol	Chincholi
	2823	Bore Well at Shete Vasti near old Tuljapur Road	179	64	122	Solapur	Solapur	Shete vasthi, Tuljapur Naka

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry	
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry	Not Collected

RO – Raigad

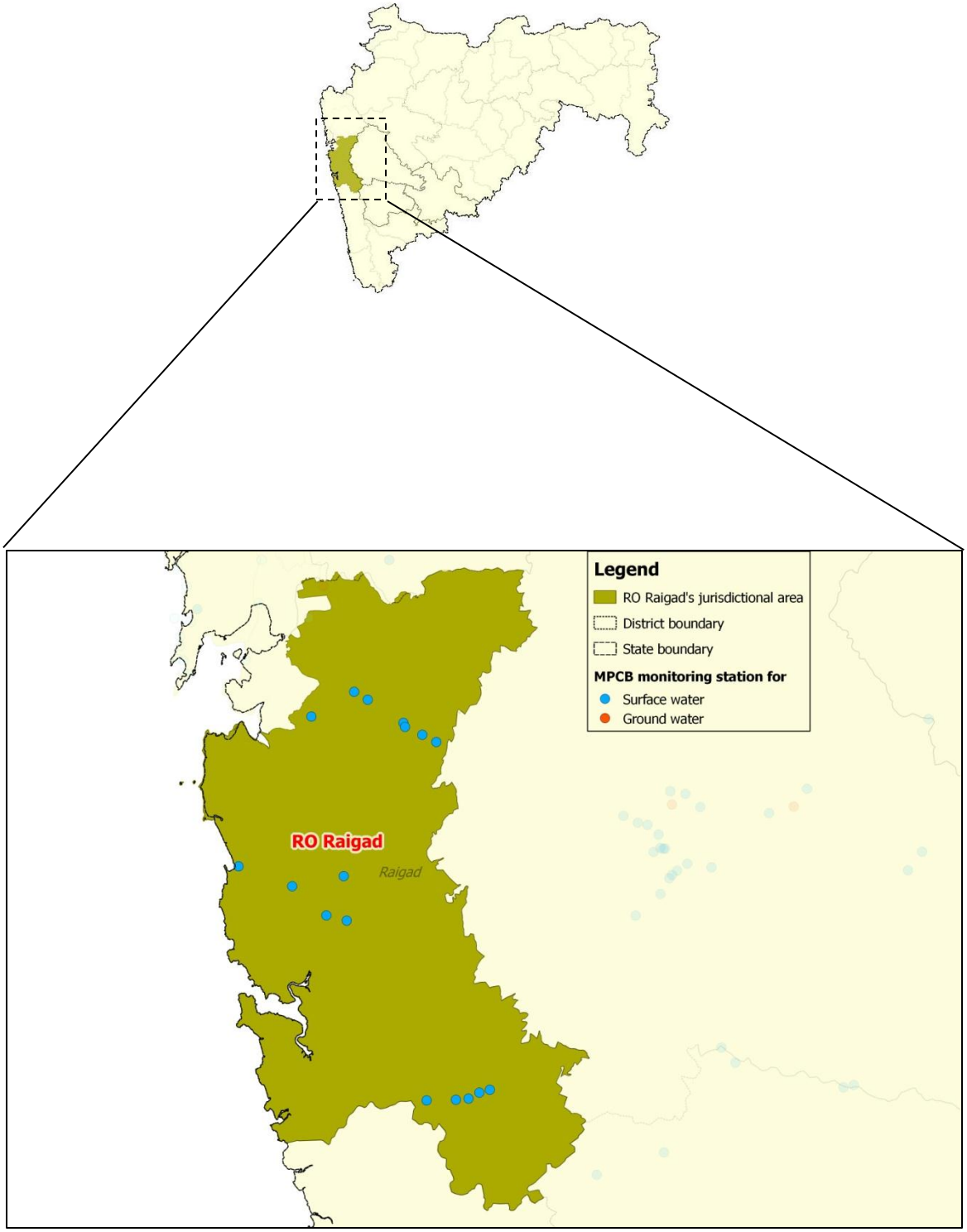

Legend
RO Raigad's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Ground water
RO Raigad
Raigad

Table No. 45: Water quality Index for surface and ground water monitoring at Raigad RO – 2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River/Nallah	1151	Patalganga River at Shilphata Bridge	79	62	75	Raigad	Khalapur	Khopoli
	1152	Kundalika River at Roha Bridge	70	Dry	77	Raigad	Roha	Roha
	1462	Patalganga near intake of MIDC water works(Turade w/w)	85	63	71	Raigad	Khalapur	Turade
	2198	Kundalika River at Are Khurd (Saline Zone)	52	63	69	Raigad	Roha	Are Khurd
	2199	Savitri River at Ovale village	60	Dry	62	Raigad	Mahad	Ovale
	2651	Amba River at D/s. of Waken Bridge	74	61	77	Raigad	Roha	Waken Phata
	2671	Kundalik River near Salav Bridge (Saline Zone)	56	60	60	Raigad	Roha	Salav
	2672	Kundalika River at Dhatav at Jackwell	73	64	77	Raigad	Roha	Dhatav
	2685	Patalganga River at D/s. of Kharpada Bridge	81	65	74	Raigad	Khalapur	Kharpada
	2686	Patalganga River at Vyal pump house	76	62	76	Raigad	Khalapur	Vyal
	2687	Patalganga River at Khalapur pumping house	80	62	76	Raigad	Khalapur	Khalapur
	2688	Patalganga River at Savroli Bridge	73	62	76	Raigad	Khalapur	Savroli
	2689	Patalganga River at Gagangiri Maharaj Temple	76	62	76	Raigad	Khalapur	Khopoli
	2701	Savitri River Jackwell at Upsa kendra	65	Dry	64	Raigad	Mahad	Nangalwadi
	2702	Savitri River at Shedav Doh	65	Dry	65	Raigad	Mahad	Shedav Dov
	2703	Savitri River at Dadli Bridge	63	Dry	64	Raigad	Mahad	Dadli
	2704	Savitri River at Muthavali village	62	Dry	64	Raigad	Mahad	Muthavali
Saline	2803	Panvel Creek at Kopra Bridge	82	61	69	Raigad	Panvel	Kopra
GW	1989	Bore well at MWML Site at Taloja	Dry	31	26	Raigad	Panvel	Karawla- Taloja

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

RO – Thane

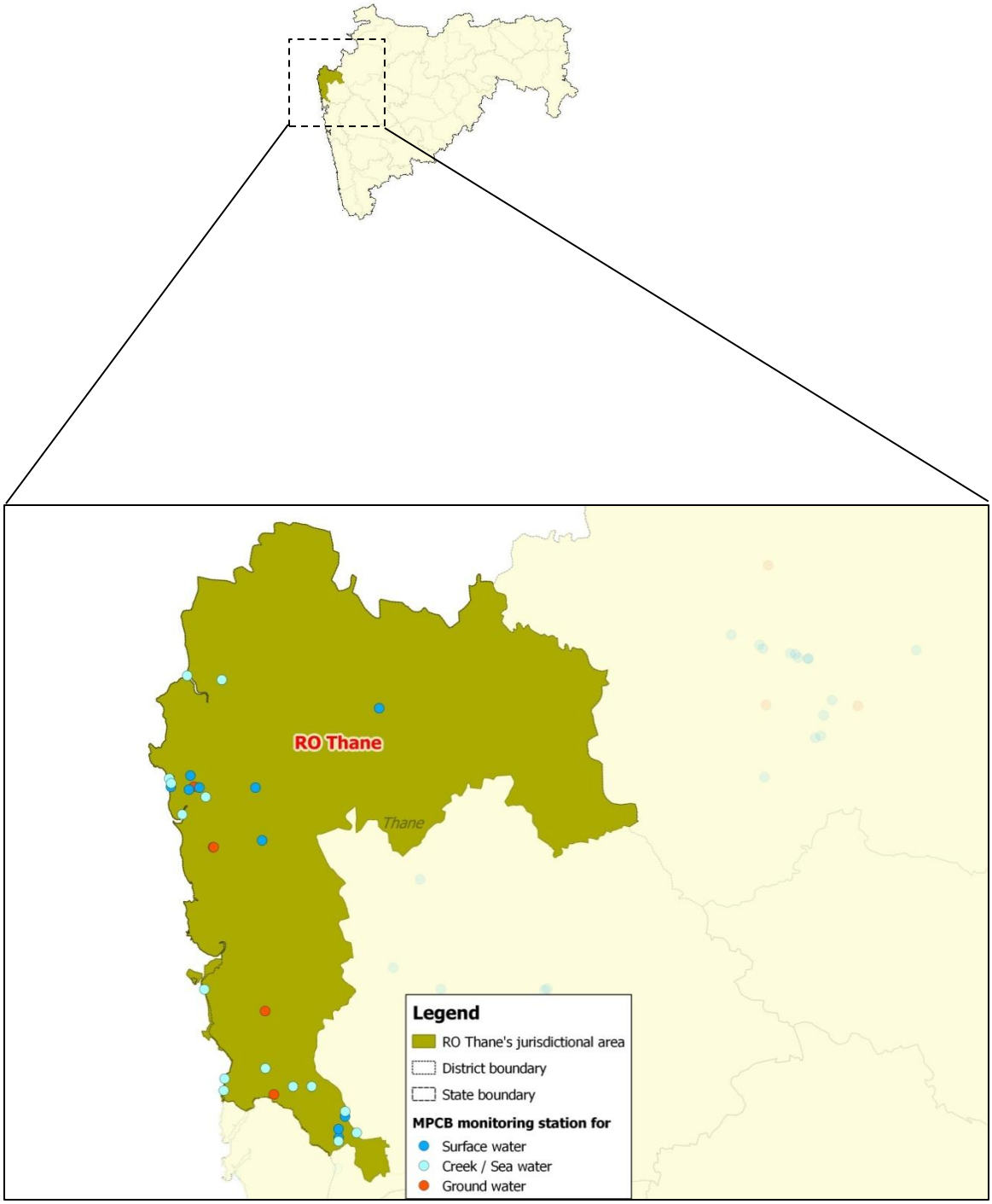

RO Thane
Thane
Legend
RO Thane's jurisdictional area
District boundary
State boundary
MPCB monitoring station for
Surface water
Creek / Sea water
Ground water

Table No. 46: Water quality index for surface and groundwater monitoring at Thane RO -2014-15

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
River/Nallah	2696	Pelhar Dam on Pelhar River Inlet of water works , Vasai, Thane	79	63	77	Thane	Vasai	Nallasopara
	2706	Surya River U/s of Surya Dam	77	55	75	Thane	Vikramgad	Dhamni
	2707	Surya River at MIDC pumping station	75	42	75	Thane	Palghar	Garvashet
	2708	Surya River at Intake of Vasai-Virar water scheme	76	57	75	Thane	Palghar	Masvan
	2782	Rabodi Nalla	35	60	42	Thane	Thane	Rabodi
	2783	Colour Chem Nalla	34	64	43	Thane	Thane	Majiwada
	2784	Sandoz Nalla	34	57	42	Thane	Thane	Sandozbaug
	2785	BPT Navapur	31	16	26	Thane	Palghar	Navapur
	2786	Tarapur MIDC Nalla; near sump No.1	Dry	Dry	45	Thane	Palghar	MIDC Tarapur
	2787	Tarapur MIDC Nalla	Dry	Dry	39	Thane	Palghar	MIDC Tarapur
	2788	Tarapur MIDC Nalla near sump-III	Dry	Dry	36	Thane	Palghar	MIDC Tarapur
Saline	1316	Bassein creek at Vasai Fort; Thane	68	53	56	Thane	Vasai	Bassein
	2792	Ulhas Creek at Mumbra Reti Bunder	47	62	57	Thane	Thane	Mumbra
	2793	Thane Creek at Kalwa Road Bridge	34	63	55	Thane	Thane	Kalwa
	2794	Ulhas Creek at Kolshet Reti Bunder	46	60	56	Thane	Thane	Kolshet
	2795	Ulhas Creek at Gaimukh at Nagla Bunder on Ghod Bunder Road	44	57	59	Thane	Thane	Nagla
	2796	Ulhas Creek at Versova Bridge	49	59	60	Thane	Vasai	Versova
	2797	Bhayander Creek at D/s. of Railway Bridge at Jasal Park Choupathy	49	59	58	Thane	Bhayander	Navghar
	2798	Kharekuran Murbe Creek	54	50	58	Thane	Palghar	Kharekuran
	2799	Dandi Creek	43	54	55	Thane	Palghar	Dandi
	2800	Sarwali Creek	64	57	61	Thane	Palghar	Sarwali
	2801	Savta Creek	41	60	58	Thane	Dahanu	Savta
	2802	Dahanu Creek at Dahanu Fort	58	57	55	Thane	Dahanu	Danugaon

Type of water	Station Code	Station Name	April	Dec/Oct	Average	District	Taluka	Village
	2805	Arnala Sea	62	55	60	Thane	Vasai	Arnala
	2806	Uttan Sea at Bhayander	65	62	61	Thane	Bhayander	Uttan
	2807	Navapur Sea	62	58	56	Thane	Palghar	Navapur
Groundwater	1984	Bore well at M/s Tata Iron {} Steel Co. Ltd; S-76	Dry	Dry	Dry	Thane	Palghar	Tarapur
	1985	Dug well at 5 Star Industrial Estate	94	Dry	111	Thane	Mira-Bhayander	Kashimira
	1986	Bore well at Motapada	46	Dry	68	Thane	Dahanu	Motapada
	1987	Bore well at Vasai	90	Dry	85	Thane	Vasai	Gokhiware
	1988	Bore well at Gharatwadi; Palghar	62	Dry	87	Thane	Palghar	Aliyali

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry

Annex II – List of Pending Writ petitions

List of writ petition / PIL pending before the honb'le high court of judicature Mumbai , Nagpur, Aurangabad bench

Sr No	Name of the parties	Pil no.	Region	Subject matter
1	Vikas Raghunath Patil V/s. The State of Maharashtra & Ors	21204 of 2010	Pune	River of Indrayani
2	Lalit Vathade V/s MPCB	85/2015	Aurangabad	Bank of River Panzra
3	Bombay Environment Action Group V/s. Union of India	Writ Petition no. 4564/88		Regarding pollution of Patalganga River
4	Shri Prakash Jadhav	Writ Petition no. 3366/08	Nagpur	Wardha, Painganga & Wainganga river major water polluting sources.
5	Daattatraya Hari Mane V/s. The state of Maharashtra & Ors	183/2012	Kolhapur	Pollution of Panchganga river
6	Narsinh S/o Laxmanrao Jadhav V/s. The State of Maharashtra & Ors	130/2014	Aurangabad	Sukhna river and Kham River

Application Green Pending National Tribunal Wz , Pune, Regd . River Pollution Matters Before Ngt, Nagpur & Pune

Sr No.	Name Of The Parties	Application / Appeal No.	Region	Subject Matter
1	Court In Own Motion V/s. The State of Maharashtra & Ors	114/2014	Nagpur	River Pollution in Vidarbha Region
2	M/s. Janardhan Kundlikrao Pharande & Anr V/s. M.O.E.F & Ors	07/2014 (wz)	Pune	Regarding Nira River Pollution
3	Mrs. Indu Gupta & Ors V/s. Goel Ganga Group & Ors	39/2015	Pune	Regarding Ram Nadi Pollution
4	Subhash Ramkrishna Patil V/s. MPCB	55/2015	Pune	Reg. RRZ policy

Annex III – List of Polluted Stretches across Maharashtra

Priority wise list of rivers declared by CPCB on 2015 based on data of 2009-12 (Total 49 rivers & 49 stretches)				
Priority 1 (4 nos.)	**Priority 2 (5 nos.)**	**Priority 3 (18 nos.)**	**Priority 4 (12 nos.)**	**Priority 5 (10 nos.)**
Godavari	Kanhan	Amrawati	Bhatsa	Amba
Mithi	Krishna	Bhima	Bindusara	Hiwara
Morna	Kundalika	Chandrabhaga	Darna	Mor
Wardha	Purna	Ghod	Girna	Panzara
	Wainganga	Indrayani	Gomai	Patalganga
		Mula	Kan	Pelhar
		Mula - Mutha	Koyna	Ulhas
		Mutha	Manjara	Vaitarna
		Nira	Panchganga	Vashishti
		Pawna	Surya	Waghur
		Pedhi	Urmodi	
		Penganga	Venna	
		Rangavali		
		Savitri		
		Sina		
		Tapi		
		Vel		
		Wena		

Priority wise list of rivers as per 12 month average for 2014-15 (Total 49 rivers & 49 stretches)				
Priority 1 (1 nos.)	**Priority 2 (0 nos.)**	**Priority 3 (8 nos.)**	**Priority 4 (10 nos.)**	**Priority 5 (20 nos.)**
Mithi River		Wena River	Wainganga River	Godavari River
		Kanhan river	Bhima River	Ulhas River
		Amravati River	Nira River	Kundalika River
		Morna River	Indrayani River	Girna river
		Pawana River	Chandrabhaga river	Bhatsa River
		Pedhi River	Bindusara River	Rangavali river
		Purna River	Ghod River	Koyna River
		Wardha river	Mula River	Amba River
			Mula-Mutha River	Darna River
			Penganga River	Manjra River
				Panzara River
				Patalganga River
				Pelhar dam

	Savitri River
	Sina river
	Venna river
	Urmodi river
	Surya river
	Vel river
	Vaitarna river
Note: 10 stretches are considered non-polluted, considering BOD value of 20% relaxation of 3 mg/l. Hiwara, Krishna, Mor, Mutha, Panchganga, Tapi, Vashishti, Waghur ,Gomai ,Kan	

Observations:

The overall increase in water quality is recorded as:

- Only 1 river (Mithi) is noted to be in Priority 1 category in the year 2014-15 as compared to 4 rivers (Mithi, Morna, Godavari and Wardha) in 2009-12
- No river is recorded in Priority 2 as compared to 5 rivers recorded in year 2009-12
- Priority 3 records decrease in number of rivers from 10 rivers (2009-12) to 8 river (2014-15)
- As for priority 4 the number of river stretches have gone down to 10 in 2014-15 as compared to 12 in the year 2009-12.
- However increase in river in Priority 5 in the current year 2014-15 as compared to 2009-12 (20 nos.) is observed.

This indicates that the polluted stretches have shown improvement and hence slipped in the priority ranks considerably. This may be attributed to consistent efforts from MPCB to curb water pollution by implementing stringent vigilance and promoting best practices.

Annex IV – Status of Sewage Treatment in Municipal Corporations of Maharashtra

	Name of Municipal Corporation	Class	District	River	Sewage Generation MLD	Sewage Treatment MLD	Percentage Treatment (%)	Disposal	Type of Treatment
1	Ahmednagar Corporation	B	Ahmednagar	Seena	60	0	0	Open Nalla	-
2	Akola Corporation	D	Akola	Morna - Tapi	48	0	0	Morna River	No any treatment facility i.e. STP not provided.
3	Amravati Corporation	D	Amaravati	Pedhi - Tapi	92	30.5	33.15	Amba Nalla to Pedhi River	ASP
4	Aurangabad Corporation	D	Aurangabad	Godavari	107	9	8.41	Sukhna River Dr. Salim ali Lake Kham River	ASP, SBR
5	Bhiwandi-Nizampur Corporation	D	Thane	Creek	84	17	20.24	Kamavari Creek	
6	Chandrapur Corporation	D	Chandrapur	Irai - Wardha	30	30	100	Erai River	
7	Dhule Corporation	D	Dhule	Panjara	48	0	0	Panzara river	-
8	Jalgaon Corporation	D	Jalgaon	Tapi	48	0	0	Nalla to Girna River	-
9	Kalyan-Dombivli Corporation	D	Thane	Creek	200	30	15	Ulhas creek	Primary Clarifier
10	Kolhapur Corporation	D	Kolhapur	Panchganga	96	43.5	45.31	Panchaganga river	Primary, Trickling Filter, SBR
11	Latur Corporation	D	Latur	Manjara	24	0	0	Local Nalla to Manjara River	-

	Name of Municipal Corporation	Class	District	River	Sewage Generation MLD	Sewage Treatment MLD	Percentage Treatment (%)	Disposal	Type of Treatment
12	Malegaon Corporation	C	Nashik	Mousam & Girana	28	0	0	Mausam Local to River Girna	-
13	Mira-Bhayander Corporation	C	Thane	Creek	93	3.5	3.76	Creek	Primary,
14	Municipal Corporation of Grater Mumbai	A	Mumbai	Creek	2671	2028	75.93	Marine outfall Malad Creek Thane Creek Gorai Creek	Partly Primary Treatment (Bar Screen, Grit Chamber/sedimentation). And Partly Primary Treatment followed by Aerated Lagoons
15	Nagpur Corporation	B	Nagpur	Nag River	345	85	24.64	Nag River	Full fledged STP based on ASP with bio gas generation
16	Nanded-Waghala Corporation	D	Nanded	Godavari	48	38	80	Local Nalla to Godavari River	1) Bondar STP- Anaerobic Lagoons, Facultative Tank. 2) Elichpur STP- ASP
17	Nashik Corporation	A	Nashik	Godavari	280	210	75	Godavari River Darna River	UASB Reactor & ASP
18	Navi Mumbai Corporation	C	Thane		280	230	82.14	Creek	SBR
19	Parbhani Corporation	D	Parbhani	Purna - Godavari	10	0	0	Godavari River	-

	Name of Municipal Corporation	Class	District	River	Sewage Generation MLD	Sewage Treatment MLD	Percentage Treatment (%)	Disposal	Type of Treatment
20	Pimpri-Chinchwad Corporation	C	Pune	Mula, Pavana and Indrayani	291	230	79.03	Pawana River	SBR
21	Pune Corporation	B	Pune	Ram	744	567	76.21	Mutha River	ASP, SBR
				Mula				Mula River	
				Mutha				Ram River	
22	Sangali-Miraj Kupwad Corporation	D	Sangali	Krishna	52.5	27	68.57	Krishna River	Primary + Oxidation Pond
23	Solapur Corporation	D	Solapur	Seena	88	0	0	Nalla to Seena River	-
24	Thane Corporation	C	Thane	Creek	350	120	34.29	Thane creek	SBR
25	Ulhasnagar Corporation	D	Thane	Creek	90	28	31.11	Waldhuni river	Primary Clarifier
26	Vasai Virar Region Corporation	D	Thane	Creek	175.4	0	0	-	-
	Total			**Total**	**6382.9**	**3726.5**	**58.38**		

Status of Sewage Treatment in A class Municipal Council in Maharashtra

Sr No.	A Class Municipal Council	Effluent Generated	Effluent treated (MLD)	Treatment (%)	Disposal
1	Achalpur	8.5	0	0	Local nalla to chandrabhaga river
2	Bhusaval	11.4	0	0	Nalla to Tapi River

Status of Sewage Treatment in A class Municipal Council in Maharashtra					
3	Wardha	18	0	0	Dham river
4	Gondia	18.28	0	0	Weinganga river
5	Ichalkaranji	32	14	37.35%	Panchganga river
6	Ambernath	30	28	93.33%	Local nalla to Waldhuni River
7	Barshi	15	0	0	Lendi nalla
	Total	**133.18**	**42**	**1.3068**	

Status of Sewage Treatment in B – Class Council in Maharashtra					
Sr No.	B-Class Municipal Council	Effluent generated (MLD)	Effluent treated (MLD)	Treatment (%)	Disposal
1	Anjangaon	2.28	0	0.00%	Local nalla to Sahanura river
2	Warud	2.4	0	0.00%	Local nalla to Wardha river
3	Washim	4	0	0.00%	Local nalla to Katepurna river
4	Karanja	4	0	0.00%	Local nalla to Wardha river
5	Akot	0.8	0	0.00%	local nalla to Purna river
6	Buldhana	0.62	0	0.00%	Local nalla to Penganga river
7	Khamgoan	0.886	0	0.00%	local nalla to Purna river
8	Shegoan	4	2	50.00%	Local nalla to Mann river
9	Malkapur	0.5	0	0.00%	Local nalla to Nalganga river

Status of Sewage Treatment in B – Class Council in Maharashtra					
10	Chikhali	0.485	0	0.00%	Local nalla to Penganga river
11	Sangamner	3.8	0	0.00%	Pavara river
12	Kopargaan	7	0	0.00%	Darna and Nandur Madhmeshwar Dam
13	Shrirampur	2.5	0	0.00%	Bhandadara Dam
14	Pochara	32	0	0.00%	Girna river
15	Amalner	3.15	0	0.00%	Bori river
16	Chalisgoan	7.21	0	0.00%	Girna river
17	Sawadha	0.57	0	0.00%	Tubewell
18	Chopada	3.2	0	0.00%	Tapi river
19	Shirpur	32	0	0.00%	Karanvada Tapi river and dam
20	Daudai	18	0	0.00%	Tapi river and Amravati river
21	Nandurbar	45	0	0.00%	Chivan river and Jharali dam
22	Kamthi	8	0	0.00%	Kanhan river
23	Hinganghat	1.53	0	0.00%	Wena rriver
24	Umred	4.5	0	0.00%	Aam river
25	Bhandara	13.52	0	0.00%	Weinganga
26	Tumsar	6.35	0	0.00%	Weinganga
27	Chiplun	7	0	0.00%	Vashishthi river
28	Vita	4.87	0	0.00%	Krishna river
29	Islampur	9	0	0.00%	Krishna river

Status of Sewage Treatment in B – Class Council in Maharashtra					
30	Khudgoan Badlapur	18	0	0.00%	Ulhas river
31	Gangakhed	2	0	0.00%	Godavari river
32	Hingoli	4.2	0	0.00%	Kayadhu river
33	Wasmat	2.5	0	0.00%	Ughadi river
34	Degalura	15	0	0.00%	Sharaj nalla
35	Udgir	5.4	0	0.00%	Local nalla to lendhi river
36	Osmanabad	5.3	0	0.00%	Local nalla to Bhogawati river
37	Dhaud	4.2	0	0.00%	Bhima river
38	Baramati	4.2	0	0.00%	Kanha river
39	Pandharpur	12	15	100.00%	Irrigation
	Total	**301.971**	**17**	**1.5**	

Status of Sewage Treatment in C class Municipal Council Nagar in Maharashtra					
Sr No.	**C-Class Municipal Council**	**Effluent generated (MLD)**	**Effluent treated (MLD)**	**Treatment (%)**	**Disposal**
1	Chandur Railway	1.8	0	0.00%	Local Nalla to Wardha river
2	Chilakhadara	0.4	0	0.00%	Local Nalla to Chandrabhaga river
3	Daryapur	2	0	0.00%	Local Nalla to Chandrabhaga river
4	Chandur Bazaar	1.2	0	0.00%	Local Nalla to Purna river
5	Dhamangaon Railway	1.8	0	0.00%	Local Nalla to Wardha river
6	Sedurajana Ghat	1.6	0	0.00%	Local Nalla to Wardha river

Status of Sewage Treatment in C class Municipal Council Nagar in Maharashtra					
7	Morshi	3.2	0	0.00%	Local Nalla to Wardha river
8	Mangarularpir	2.4	0	0.00%	Local Nalla to Wardha river
9	Risod	1.6	0	0.00%	Local Nalla to Penganga river
10	Murtizapur	0.388	0	0.00%	Local Nalla to Purna river
11	Patur	0.22	0	0.00%	Local Nalla to Bordi river
12	Balapur	0.39	0	0.00%	Local Nalla to Mann river
13	Telhara	0.18	0	0.00%	Local Nalla to Purna river
14	Jalgoan Jamod	0.26	0	0.00%	Local Nalla to Purna river
15	Mehekar	0.377	0	0.00%	Local Nalla to Penganga river
16	Deulgoan raja	1.4	0	0.00%	Local Nalla to Amana river
17	Sindkhed Raja	0.13	0	0.00%	Local Nalla to Khadakpurna river
18	Nandura	1.5	0	0.00%	Local Nalla to Gyan ganga river
19	Lonar	0.2	0	0.00%	Lendhi/Ambar Lake to Lonar dam
20	Alibaug	4.4	0	0.00%	Sea
21	Khopoli	5.6	0	0.00%	Patalganga river
22	Pen	4.8	0	0.00%	Bhogeshwari river
23	Murud -Janjhira	1.3	0	0.00%	Sea
24	Satana	1.47	0	0.00%	Local nalla to Girna river
25	Nandagoan	1.2	0	0.00%	Local nalla to Girna river
26	Sinnar	4.3	0	0.00%	Local nalla to Darna river
27	Bhagur	0.87	0	0.00%	Local nalla to Darna river
28	Tribakeshwar	1	0.7	70.00%	Local nalla to Godavari river
29	Yeola	2.8	0	0.00%	Local nalla to Palkhed dam
30	Manmad	6	0	0.00%	Local nalla to Waghad dam
31	Igatpuri	4.2	0	0.00%	Local nalla to Darna river
32	Shrigonda	1.9	0	0.00%	Local nalla to Ghod canal
33	Pathardi	2	0	0.00%	Local nalla to Jayakwadi dam
34	Rahata	6	0	0.00%	Local nalla to Darna dam

Status of Sewage Treatment in C class Municipal Council Nagar in Maharashtra					
35	Rahuri	2.7	0	0.00%	Mula dam
36	Devlali pravaha	3	0	0.00%	Mula dam
37	Erandol	9.1	0	0.00%	Local Nalla to Anjani and Girna river
38	Parola	3.49	0	0.00%	Local Nalla to Bori river
39	Raver	11	0	0.00%	Local Nalla toTapi river
40	Faizpur	0.7	0	0.00%	Local Nalla to Suki river
41	Yawal	0.28	0	0.00%	Local Nalla to Borewell
42	Dharangaon	8.4	0	0.00%	Local Nalla to Anjani /Tapi river
43	Jamner	11	0	0.00%	Local Nalla to Kang river
44	Bhadgaon	9.5	0	0.00%	Local Nalla to Girna river
45	Navapur	10.02	0	0.00%	Local Nalla to Rangawali river
46	Shahada	12	0	0.00%	Local Nalla to Gomati river
47	Taloda	12	0	0.00%	Local Nalla to Vihiri
48	Arvi	0.41	0	0.00%	Bakadi river
49	Pulgoan	0.36	0	0.00%	Wardha river
50	Deoli	0.15	0	0.00%	Yashoda river
51	Sindhi	0.15	0	0.00%	Wena river
52	Wadi	1	0	0.00%	Nag river
53	Tiroda	3.4	0	0.00%	Weinganga river
54	Paoni	3.41	0	0.00%	Weinganga river
55	Kurundwad	0.8	0	0.00%	Panchganga river
56	Kagal	2.4	0	0.00%	Irrigation
57	Gadhinglaj	2.4	0	0.00%	Irrigation
58	Murgud	0.64	0	0.00%	Irrigation
59	Malkapur	0.2	0	0.00%	Irrigation
60	Panhala	0.45	0	0.00%	Irrigation
61	Wadgoan	0.9	0	0.00%	Irrigation
62	Jaisinghpur	4.64	0	0.00%	Irrigation
63	Tasgoan	2.63	0	0.00%	Irrigation

Status of Sewage Treatment in C class Municipal Council Nagar in Maharashtra					
64	Ashta	2.1	0	0.00%	Krishna river
65	Jaat	1.5	0	0.00%	Irrigation
66	Purna	1.45	0	0.00%	Local Nalla to Thuna river
67	Selu	2.1	0	0.00%	Local Nalla to Dudhana river
68	Jintur	0.537	0	0.00%	Local Nalla to Ullti river
69	Pathri	2.2	0	0.00%	Local Nalla to Godavari river
70	Manvat	0.66	0	0.00%	Local Nalla to Laghu lake
71	Sonpeth	0.3	0	0.00%	Local Nalla to Weinganga river
72	Kalamnuri	1.8	0	0.00%	Local Nalla to Weinganga river
73	Ausa	3.6	0	0.00%	
74	Ahmedpur	1.8	0	0.00%	Local Nalla to Manyara river
75	Nilanga	1.7	0	0.00%	
76	Kalamb	1.55	0	0.00%	Local Nalla to Manjara river
77	Murum	1.25	0	0.00%	Local Nalla to Benitura river
78	Naldurg	1.2	0	0.00%	Local Nalla to Bori river
79	Tuljapur	1.9	0	0.00%	Local Nalla to Bori river
80	Paranda	1	0	0.00%	Local Nalla to Sinna river
81	Bhum	1.3	0	0.00%	Local Nalla to Banganga river
82	Umerga	2.4	0	0.00%	Local Nalla to Benitura river
83	Paithan	2.4	1.7	0.00%	Local Nalla to Godavari river
84	Kannad	2.4	1.7	0.00%	Local Nalla to Shivana river
85	Sillod	3	2.2	0.00%	Local Nalla to Dudhana river
86	Gangapur	1.5	1.1	0.00%	Local Nalla to Godavari river
87	Vaijapur	2.6	1.85	0.00%	Local Nalla to Godavari river
88	Khuldabad	0.9	0.65	0.00%	Local Nalla to Godavari river
89	Indapur	2.4	0	0.00%	Bhima river
90	Jejuri	2.4	0	0.00%	Kahna river
91	Saswad	4	0	0.00%	Kahna river
92	Bhor	0.9	0	0.00%	Neera river

Status of Sewage Treatment in C class Municipal Council Nagar in Maharashtra					
93	Wai	4.8	0	0.00%	
94	Karmala	1.4	0	0.00%	Irrigation
95	Akkalkot	0.4	0	0.00%	Irrigation
96	Mangalwedha	1.22	0	0.00%	Irrigation
97	Kurduwadi	1.45	0	0.00%	Local Nalla
98	Dudhani	0.56	0	0.00%	Irrigation
99	Maidargi	0.77	0	0.00%	Irrigation
100	Junnar	2.2	0	0.00%	Mina river
	Total	**251.662**	**9.9**	**0.7**	

Status of Sewage Treatment in A class Nagar Panchayat in Maharashtra					
Sr No.	**A Class Municipal Council**	**Effluent Generated (MLD)**	**Effluent treated (MLD)**	**Treatment (%)**	**Disposal**
1	Warora	4.5	0	0	Local nalla to Wardha river
2	Yavatmal	8.69	0	0	Local nalla to Jamwadi lake
3	Jalna	18.5	0	0	Local Nalla
4	Beed	11	0	0	Local Nalla
5	Satara	12.8	0	0	
	Total	55.49	0	0	

Staus of Sewage Treatment in B class Nagar Panchayat in Maharashtra					
Sr No.	**B class Nagar Panchayat**	**Effluent generated (MLD)**	**Effluent treated (MLD)**	**Treatment (%)**	**Disposal**
1	Dahanu	4	0	0.00%	Nalla
2	Palghar	2.4	0	0.00%	Nalla
3	Ratnagiri	८.८	0	0.00%	Sea
4	Ballarpur	8.4	0	0.00%	Local nalla to Wardha river

Staus of Sewage Treatment in B class Nagar Panchayat in Maharashtra					
5	Bhadrawati	2.1	0	0.00%	Local nalla to Wardha river
6	Pusad	4.02	0	0.00%	Local nalla to Pus river
7	Wani	4.11	0	0.00%	Local nalla to Nirguda river
8	Gircholi	2.8	0	0.00%	Local nalla to Weinganga river
9	Ambajogai	5	0	0.00%	Local Nalla
10	Karad	10.5	7.5	40.00%	Irrigation
11	Phaltan	5	0	0.00%	Girna river
12	Talegoan	8.5	0	0.00%	Indrayani river
	Total	65.63	7.5	0.4	

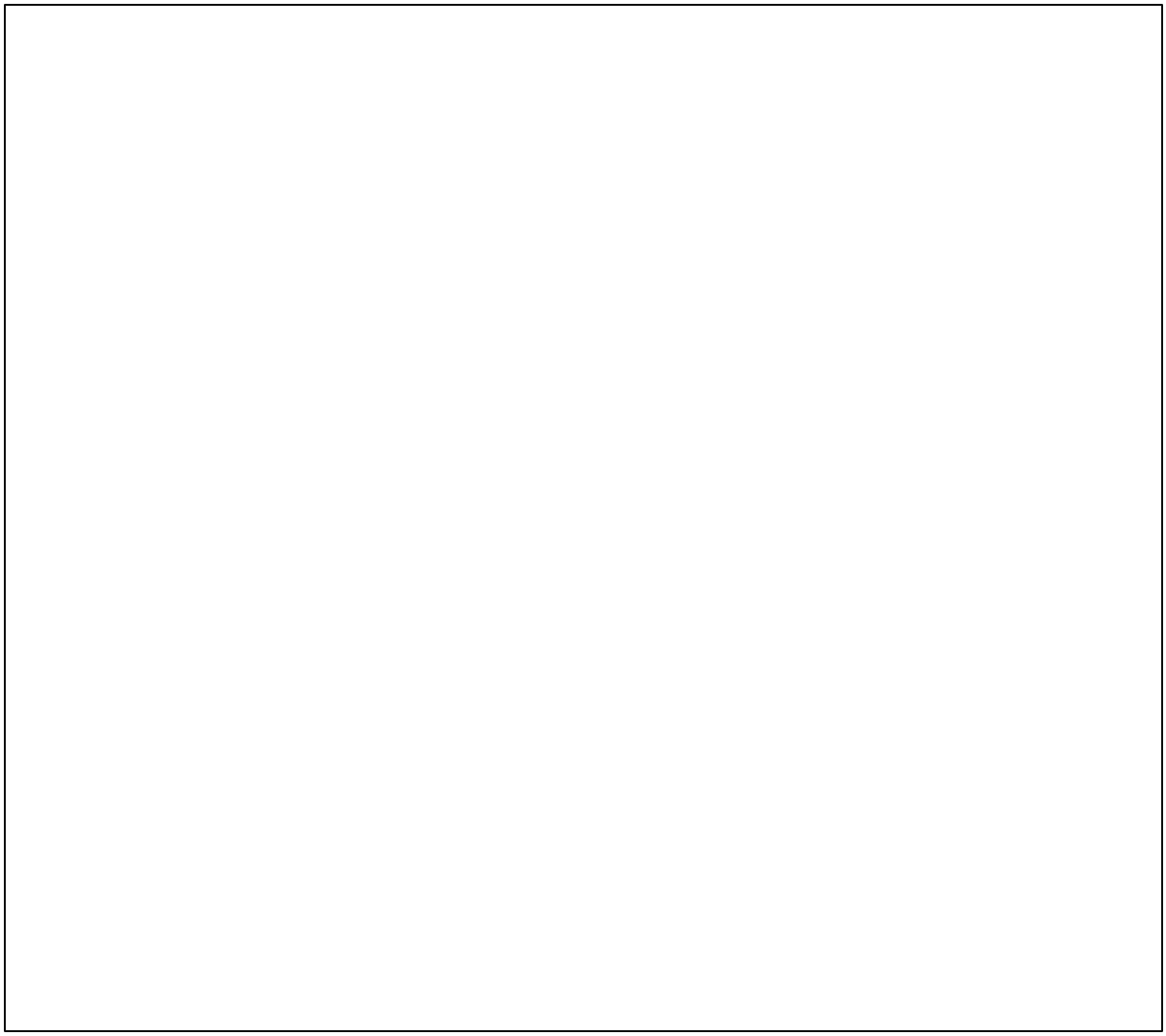
Status of Sewage Treatment in C- Class Nagar Panchayat in Maharashtra					
Sr No.	C- Class Nagar Panchayat	Effluent generated (MLD)	Effluent treated (MLD)	Treatment (%)	Disposal
1	Matharen	1.1	0	0.00%	Matheran valley
2	Karjat	4.8	0	0.00%	Ulhas river
3	Roha nagar	2.8	0	0.00%	Kundalika river
4	Shrivardhan	1.09	0	0.00%	Sea
5	Panvel	18	0	0.00%	Panvel creek
6	Jawhar	1.5	0	0.00%	Creek
7	Katol	5.6	0	0.00%	Local Nalla
8	Khapa	0.61	0	0.00%	Local Nalla
9	Narkhed	1.4	0	0.00%	Kolar river
10	Ramtek	0.835	0	0.00%	Local Nalla
11	Kalmeshwar	2.2	0	0.00%	Local Nalla
12	Saoner	4	0	0.00%	Kanhan river

Status of Sewage Treatment in C- Class Nagar Panchayat in Maharashtra					
13	Mohapa	0.52	0	0.00%	Local Nalla
14	Mowad	0.56	0	0.00%	Kolar river
15	Khed	2.5	0	0.00%	Jagbudi river
16	Malvan	0.5	0	0.00%	Sea
17	Sawantwadi	2.5	0	0.00%	Palankande lake
18	Rajapur	2.0	0	0.00%	Arjuna river
19	Rajura	2.1	0	0.00%	Local Nalla to Wardha river
20	Mul	1.4	0	0.00%	Local Nalla to Mul river
21	Bramhapuri	2.8	0	0.00%	Local Nalla to Weinganga river
22	Dwarka	1.82	0	0.00%	Local Nalla to Kupati river
23	Digras	2.02	0	0.00%	Local Nalla to Penganga river
24	Pandharkavda	1.99	0	0.00%	Local Nalla to Khoni river
25	Ghatanji	1.16	0	0.00%	Local Nalla to Waghali river
26	Ner Nawabpur	1.5	0	0.00%	Local Nalla to Weinganga river
27	Loha	0.5	0	0.00%	Nalla
28	Kandhar	0.5	0	0.00%	Nalla
29	Mudkhed	1.6	0	0.00%	Nalla
30	Dharmabad	2.5	0	0.00%	Nalla

Status of Sewage Treatment in C- Class Nagar Panchayat in Maharashtra					
31	Bhokar	20	0	0.00%	Nalla
32	Hadgoan	0.35	0	0.00%	Nalla
33	Mukhed	12	0	0.00%	Nalla
34	Kinwat	0.3	0	0.00%	Nalla
35	Kundalwadi	0.5	0	0.00%	Nalla
36	Biloli	1	0	0.00%	Nalla
37	Ambad	2.5	0	0.00%	Local Nalla
38	Bhokardan	0.7	0	0.00%	Local Nalla
39	Partur	2.3	0	0.00%	Local Nalla
40	Dharur	1.4	0	0.00%	Local Nalla
41	Georai	2.2	0	0.00%	Local Nalla
42	Majalgoan	2.8	0	0.00%	Local Nalla
43	Mahabaleshwar	6	2.5	90.00%	Irrigation & Hotel gardening
44	Panchgani	0.975	1.3	90.00%	Irrigation & Hotel gardening
45	Rahimatpur	0.8	0	0.00%	
46	Mhaswad	2.1	0	0.00%	
47	Sangola	1.79	0	0.00%	Local Nalla

Status of Sewage Treatment in C- Class Nagar Panchayat in Maharashtra					
48	Lonavala	18	3.69	20.50%	Indrayani river
49	Alandi	2.5	0	0.00%	Indrayani river
50	Shirur	3.5	3.5	100.00%	Ghodnadi
51	Uran	2.8	0	0.00%	Uran creek
52	Vengurla	2.5	0	0.00%	Sea
53	Umar khed	2.04	0	0.00%	Local Nalla to Penganga river
54	Wadsa-Desaiganj	8.4	0	0.00%	Local Nalla to Weinganga river
55	Umri	0.3	0	0.00%	Nalla
56	Mahad	3.3	0	0.00%	Savitri river
	Total	**173.46**	**10.99**	**3.005**	

Annex V – Data Sets of Water Quality Monitored in 2014-15



Maharashtra Pollution Control Board
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