2017-18

Water Quality Status of Maharashtra

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

The Energy & Resources Institute

Water Quality Status of Maharashtra 2017-18

(Compilation of Water Quality Data Recorded by MPCB)

January 2019

Prepared by

teri
The Energy and Resources Institute

...towards global sustainable development

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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 294 monitoring stations during the period April 2017 to March 2018. 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 few years.

Also presents a comparison for the trend in water quality index for intra-basin analysis for the past ten years and specifically for last three years. Graphical presentation of water quality trend for last 10 years of 294 stations and also riverwise is added in this report. Spatial presentation of water quality indices for the peak summer and post monsoon months is shown for the year 2017-18. Among the basins in 2017-18 year, west flowing rivers recorded major portion of the observations in "Non polluted' category followed by Godavari basin and Krishna basin. In 2017-18 the Manjara sub-basin of Godavari basin has recorded the highest percentage of observations in Good to Excellent category. 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.

I place a record of gratitude to *Hon'ble Minister for Environment, Shri Ramdasbhai Kadam, Hon'ble Minister of State for Environment, Shri Pravin Pote Patil, Hon'ble Principal Secretary (Environment) Govt. of Maharashtra, Shri Anil Diggikar, IAS and Hon'ble Chairman, MPC Board, Shri Sudhir Shrivastava, IAS* for having guided through the process.

This report is prepared by The Energy and Resources Institute (TERI), Western Regional Centre and I appreciate the efforts of *Dr. Anjali Parasnis, Associate Director and Ms. Pranali Chavan, R.Associate*TERI in preparing the report. Contribution of *Dr. Y.B.Sontakke, Joint Director-WPC, MPCB and Ms.Yamini Chachad, Junior Scientific Officer, MPCB* are appreciated for their inputs in the report.

Date: December 2018

(E. Ravendiran, IAS)
Member Secretary

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	Ground water Surveys & Development Agency
MINARS	Monitoring of Indian National Aquatic Resources System
MoEF	Ministry of Environment and Forests
MPCB	Maharashtra Pollution Control Board
NSFWQI	National Sanitation Foundation Water Quality Index
NWMP	National Water Monitoring Program
pH	Power of Hydrogen
RO	Regional Office
SD	Standards Deviation
Shp	Shape files
SPCBs	State Pollution Control Boards
SW	Surface Water
WHO	World Health Organisation
WQMS	Water Quality Monitoring Stations
YAP	Yamuna Action Plan

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Executive Summary

Water quality is the measure of the physical, chemical and biological characteristics of water. Periodic water monitoring helps in decision making on health and environmental issues. It provides a real time scenario about the condition of water bodies and helps to determine the current, ongoing and future problems, compliance with the drinking water standards and to formulate policies that can help protect the human health and the environment.

MPCB (Maharashtra Pollution Control Board), being the state nodal agency under CPCB (Central Pollution Control Board), regularly monitors the water quality across 294 WQMS (Water Quality Monitoring Stations) for both surface (176 on rivers, 36 on sea/creeks, 12 on drains, 4 dams) and ground water (29 Borewells, 35 Dugwell, 1 Handpump, 1 Tubewell) under two programs of NWMP (National Water Quality Monitoring Program) and SWMP (State Water Quality Monitoring Program). Surface water samples are monitored once every month whereas the ground water samples are monitored bi-annually.

The report is the compilation of statistically analyzed data for the year 2017-18 along with the illustrations and spatial representations which depict the performance of surface and ground water quality in Maharashtra state. The report presents WQI for surface water which includes major basins (Tapi, Godavari, Krishna, and West Flowing) as well as for the water samples representing saline (sea/creek) and ground water. The WQI provides a single entity (number) which expresses the overall situation of a particular water body at a particular period after assessing several water parameters for that particular water body. The index simplifies the complex parametric data into comprehensive information for easy understanding. It also helps to identify on going and future problems with the water in the region.The WQI has been determined based on the formula developed by NSF (National Sanitation Foundation) and modified by CPCB (Central Pollution Control Board). The formula and WQI classification for both surface and ground water has been shown in Table No 1.

Table No 1: Formula and classification of Water quality indices for surface and ground water

Surface Water Quality	Ground Water Quality
$\mathrm{WQI} = \sum_{i=1}^{p} \mathrm{WiIi}$	$\mathrm{WQI} = \sum_{i=1}^{n=9} qi.wi$
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	

Surface Water Quality

Four parameters namely pH, Dissolved Oxygen, Biochemical Oxygen Demand and Feacal Coliform are used for calculating the WQI for surface water. Upon determining the WQI, the water quality is described for easy understanding and interpretation as shown in Table No 2

Table No 2: Classification of Water Quality for Surface Water

Water Quality Index - Surface Water			
WQI	Quality Classification	Remarks	Colour Code
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	

Source: http://www.mpcb.gov.in/envtdata/Ebulletin_pdf/E_bulletin_Oct2016.pdf

During the year 2017-18, MPCB carried out surface water quality monitoring at about 228 stations located on various rivers, sea, creek and nallahs. Rivers coming under basins such as Tapi, Godavari, Krishna and West flowing rivers were categorized in respective basins and sub-basins (Table No 3). It is important to know that based on the annual average WQI, the share of number of WQMS in 'Good to Excellent' category decreased considerably from 127 (2016-17) to just 76 in 2017-18 while share of WQMS in 'Medium to Good' increased from 58 (2016-17) to 97 in 2017-18.

Similar case was observed in case of 'Bad' category (from 34 in 2016-17) to 42 stations in 2017-18) and 'Bad to Very Bad' category (from 9 in 2016-17 to 12 in 2017-18) thereby indicating water quality deterioration and increased level of pollution.Besides this, 'No Data' was recorded for 2 stations throughout the year.

Table No 3: 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	Dry	Total
Tapi	Tapi Upper	Tapi, Purna, Pedhi	2	3	-	-	-	**5**
	Tapi Middle	Tapi, Girna, Rangavali, Amravati, Bori, Burai, Gomai, Hiwara, Kan, Mor, Panzara, Titur, Waghur,	9	4	-	-	2	**15**
Godavari 1	Godavari Upper	Godavari, Chikhali nalla, Darna	14	5	1	-		**20**
	Godavari Middle	Godavari, Bindusara	8	1	2	-	-	**11**
	Manjra	Godavari, Manjra	2	-	-	-	-	**2**
Godavari 2	Wardha	Wardha, Penganga	-	11	1	-	-	**12**
	Weinganga	Kolar, Kanhan, Weinganga	3	8	-	4	-	**15**
	Pranhita and others	Wainganga	-	1	-	-	-	**1**
Krishna	Bhima Upper	Bhima, Nira, Chandrabhaga, Mutha, Ghod, Indrayani, Pawana, Sina, Vel, Nalla, Mula-Mutha	3	18	15	-	-	**36**
	Krishna Upper	Krishna, Panchganga, Koyna, Urmodi, Venna	14	7	-	-	-	**21**
West Flowing Rivers		Kalu, Ulhas, Patalganga, Bhatsa, Vashishti, Mithi, Kundalika, Savitri, Amba, Kundalik, Muchkundi, Surya, Tansa, Vaitarna,	19	18	3	2	-	**42**
Nallah		Rabodi nalla, Colour Chem nalla, Sandoz nalla, BPT Navapur, Tarapur MIDC nalla, Pimpal-Paneri nalla	-	3	3	6	-	**12**
Saline			1	18	17	-	-	**36**
Total			75	97	42	12	2	**228**

Legend

G2E: Good to Excellent	M2G: Medium to Good	B: Bad	B2V: Bad to Very bad	Dry	No data

As seen in Figure No. 1, Except Manjra sub basin, all other sub basins recorded reduction in number of observations recorded under 'Good to Excellent' category compared to previous year. Manjra recorded around 74% of total observations under 'Good to Excellent 'category. Similarly, the percentage share of 'Medium to Good' observations increased in all major stations except Wardha and Pranhita and others substation.

It is important to note that the performance of water quality in Wardha, Pranhita, Bhima Upper has deteriorated to a greater extent as the share of 'Bad to Very Bad' category of WQI has increased considerably compared to previous year (2016-17). Similar trend was observed in Weinganga sub basin wherein the number of observations coming under 'Bad to Very Bad' increased compared to previous year.

On the Contrary, Tapi Upper, Manjra, Pranhita & others and Krishna Upper sub stations have not recorded any reading in 'Bad to Very Bad' category in this year.

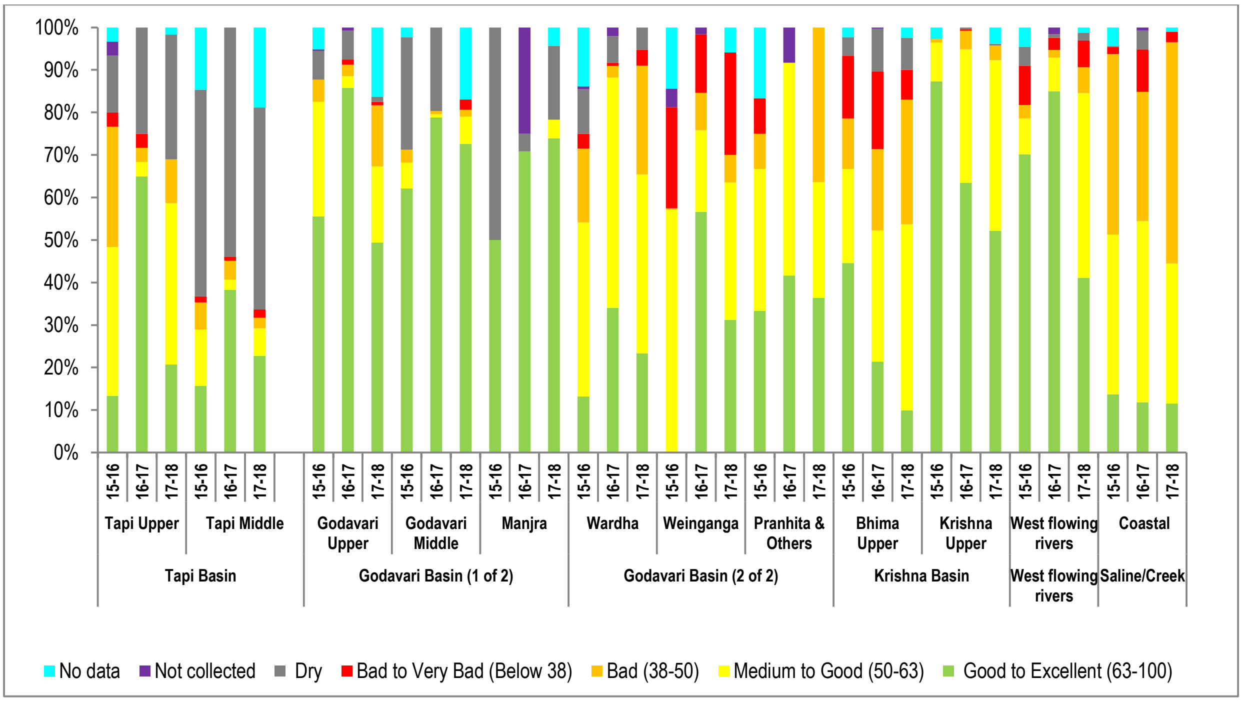


Figure No. 1: Average occurrence of different category of WQI across WQMS in respective sub basins of Maharashtra

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.*

Map No. 1 highlights spatial representation of the polluted locations which recorded WQI<50 for more than 50% of the observations and the corresponding details of WQMS are mentioned in Table No 4. The districts of Mumbai, Thane, Raigad, Ratnagiri, Pune and Nagpur followed by Jalgaon, Ahmednagar, Aurangabad, and Washim have been detected to have polluted rivers.

In case of Saline water quality, monitoring takes place at 36 locations located in 4 districts along the Maharashtra coastline as shown in Figure No. 2

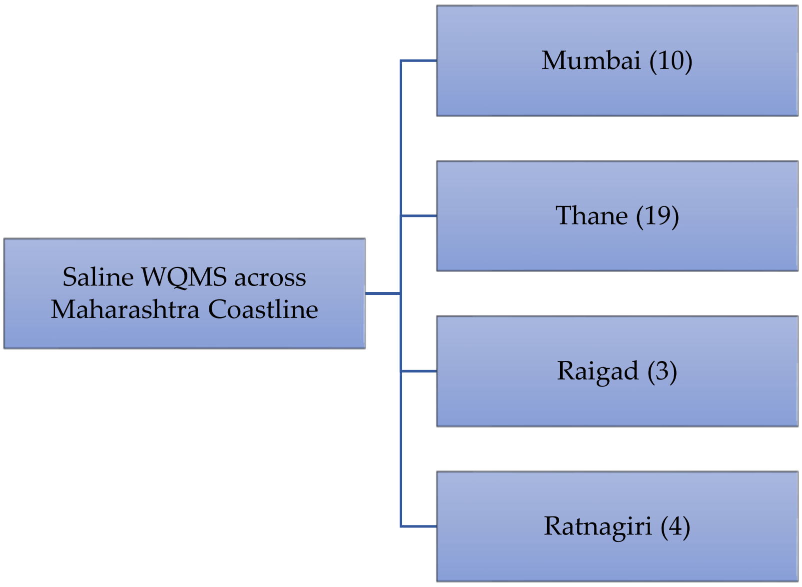
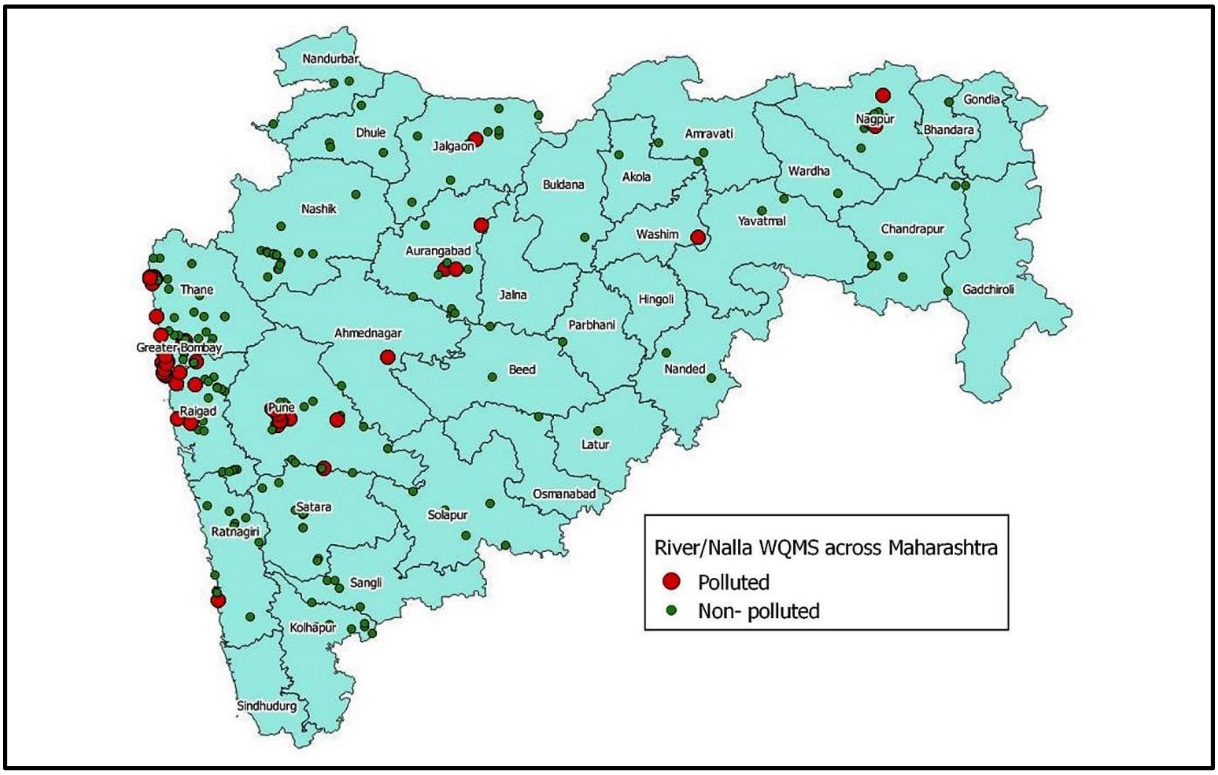


Figure No. 2: Saline WQMS across Maharashtra Coastline

Note: No WQMS in Sindhudurg District

Sea water samples from Mumbai and Thane were recorded to be polluted throughout the year and the WQI at these locations were found to be in the category of 'Bad' to 'Medium'. There are huge amount of human settlements and industrial establishments around the creeks in Thane and Mumbai and near the sea shore in Mumbai. The high level of pollution throughout the year may be attributed to the release of untreated or semi treated sewage directly into the sea and creek water of Mumbai and Thane from these possible pollution sources.



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

Table No 4: WQMS which recorded WQI as polluted for more than 50% observations in 2017-18

Sr. No	Station Code	Water Body	Station Name	Village	Taluka	District
1	2675	SW	Morna River at D/s of Railway Bridge	Akola	Akola	Akola
2	179	SW	Sillod - D/S of Sillod near bridge at bhavan	Sillod	Sillod	Aurangabad
3	180	SW	Aurangabad - Near Holly cross bridge	Aurangabad	Aurangabad	Aurangabad
4	182	SW	Aurangabad - Near Chikhalthana Bridge	Aurangabad	Aurangabad	Aurangabad
5	2790	Nalla	Pimpal-Paneri Nalla at Ratnagiri near Finolex Industries	Yahganigaon	Ratnagiri	Ratnagiri
6	1318	Creek	Mahim creek at Mahim Bay	Mahim	Bandra	Mumbai
7	2165	Sea	Sea Water at Gateway of India	Colaba	Colaba	Mumbai
8	2166	Sea	Sea Water at Charni Road Chowpatty	Girgaon	Mumbai	Mumbai
9	2167	Sea	Sea Water at Worli Seaface	Worli	Worli	Mumbai
10	2168	SW	Mithi River at near bridge	Mahim	Bandra	Mumbai
11	2169	Sea	Sea Water at Varsova Beach	Versova	Andheri	Mumbai
12	2808	Sea	Sea Water at Nariman Point	Colaba	Colaba	Mumbai
13	2809	Sea	Sea Water at Malabar Hill	Walkeshwar	Mumbai	Mumbai
14	2810	Sea	Sea Water at Haj Ali	Worli	Worli	Mumbai
15	2811	Sea	Sea Water at Shivaji Park (Dadar	Dadar	Dadar	Mumbai

Sr. No	Station Code	Water Body	Station Name	Village	Taluka	District
			Chowpatty)			
16	2812	Sea	Sea Water at Juhu Beach	Juhugaon	Santacruz	Mumbai
17	186	SW	Nag River Near, Bhandewadi Bridge, Nagpur	Nagpur	Nagpur	Nagpur
18	187	SW	Nag River Near, Asoli Bridge, Bhandara Road, Nagpur	Nagpur	Nagpur	Nagpur
19	188	SW	Pill River Near, Wanjra Layout Kamptee Road, Nagpur	Nagpur	Nagpur	Nagpur
20	189	SW	Pill River Near, Mankapur on Koradi Road, Nagpur	Nagpur	Nagpur	Nagpur
21	195	SW	Sina River Bridge At Burudgaon Road, A/P Ahmednagar, Taluka & District Ahmednagar	Burudgaon	Ahmednagar	Ahmednagar
22	196	Nalla	Lowki Nalla At Khedi, Taluka & District - Jalgaon	Khedi	Khedi	Jalgaon
23	191	Sea	Arabian Sea behind ONGC Uran	Uran	Uran	Raigad
24	216	SW	Kasardi River near Ganesh Ghat	Taloja	Panvel	Raigad
25	1317	Creek	Thane creek at Elephanta Island	Gharapuri, Elephanta Island	Uran	Raigad
26	1189	SW	Bhima river at Pune(Mutha river) at U/s of Vithalwadi near Sankar Mandir	Vithalwadi	Haweli	Pune
27	1190	SW	Bhima river at D/s of Bundgarden, Pune	Yerwada	Haweli	Pune
28	2191	SW	Mutha River at Sangam Bridge Near Ganpathi Ghat	Shivaji Nagar	Pune	Pune
29	2192	SW	Mula-Mutha River at Mundhwa Bridge	Mundhawa	Haweli	Pune
30	2194	SW	Mula River at Harrison Bridge near Mula -Pawana Sangam	Bopodi	Haweli	Pune
31	2195	SW	Nira River at D/s of Jubilant Organosis Pune	Nimbut	Baramati	Pune
32	2196	SW	Pawana River at Sangavigaon, Pune	Sangavigaon	Haweli	Pune
33	2677	SW	Mula-Mutha River at D/s of Theur, Pune	Theur	Haweli	Pune
34	2678	SW	Mutha River near Veer Savarkar Bhavan	Pune M.C	Pune	Pune
35	2679	SW	Mutha River at Deccan Bridge, Pune	Deccan	Pune	Pune
36	2690	SW	Pawana River at Kasarwadi Pune	Kasarwadi	Haweli	Pune
37	2691	SW	Pawana River at Dapodi Bridge at Pawana-Mulla Sangan Pune	Dapodi	Haweli	Pune
38	2693	SW	Pawana River at Chinchwadgaon, Pune	Chinchwadgaon	Haweli	Pune
39	2694	SW	Pawana River at Pimprigaon, Pune	Pimprigaon	Haweli	Pune

Sr. No	Station Code	Water Body	Station Name	Village	Taluka	District
40	2198	SW	Kundalika River at Are Khurd (Saline Zone)	Are Khurd	Roha	Raigad
41	2671	SW	Kundalik River near Salav Bridge (Saline Zone)	Salav	Roha	Raigad
42	2685	SW	Patalganga River at D/s of Kharpada Bridge	Kharpada	Khalapur	Raigad
43	2782	Nalla	Rabodi Nalla	Rabodi	Thane	Thane
44	2783	Nalla	Colour Chem Nalla	Majiwada	Thane	Thane
45	2784	Nalla	Sandoz Nalla	Sandozbaug	Thane	Thane
46	2785	Nalla	BPT Navapur	Navapur	Palghar	Palghar
47	2786	Nalla	Tarapur MIDC Nalla, near sump No1	MIDC Tarapur	Palghar	Palghar
48	2787	Nalla	Tarapur MIDC Nalla	MIDC Tarapur	Palghar	Palghar
49	2788	Nalla	Tarapur MIDC Nalla near sump-III	MIDC Tarapur	Palghar	Palghar
50	2798	Creek	Kharekuran Murbe Creek	Kharekuran	Palghar	Thane
51	2799	Creek	Dandi Creek	Dandi	Palghar	Thane
52	2805	Sea	Arnala Sea	Arnala	Vasai	Thane
53	2806	Sea	Uttan Sea at Bhayander	Uttan	Bhayander	Thane
54	2807	Sea	Navapur Sea	Navapur	Palghar	Thane

Ground water Quality

MPCB monitors ground water quality of around 66 ground water monitoring stations after every 6 months to check the pollution levels. For calculating ground WQI, 9 parameters namely pH, total hardness, Calcium and Magnesium hardness, Chloride, Total Dissolved solids, Fluoride, Nitrate and Sulphate are taken into consideration. CPCB has assigned specific weightage to each of these parameters based on the stringency of the parameter and its relative importance in overall water quality with respect to drinking. Upon determining the WQI, the water quality is described for easy understanding and interpretation as shown in Table No 5.

Table No 5: Classification of Water Quality for Ground water

Water Quality Index – Ground Water		
WQI	**Water Quality**	**Colour Code**
<50	Excellent	
50-100	Good Water	
100-200	Poor Water	
200-300	Very Very Poor Water	
>300	Water Unsuitable for Drinking	

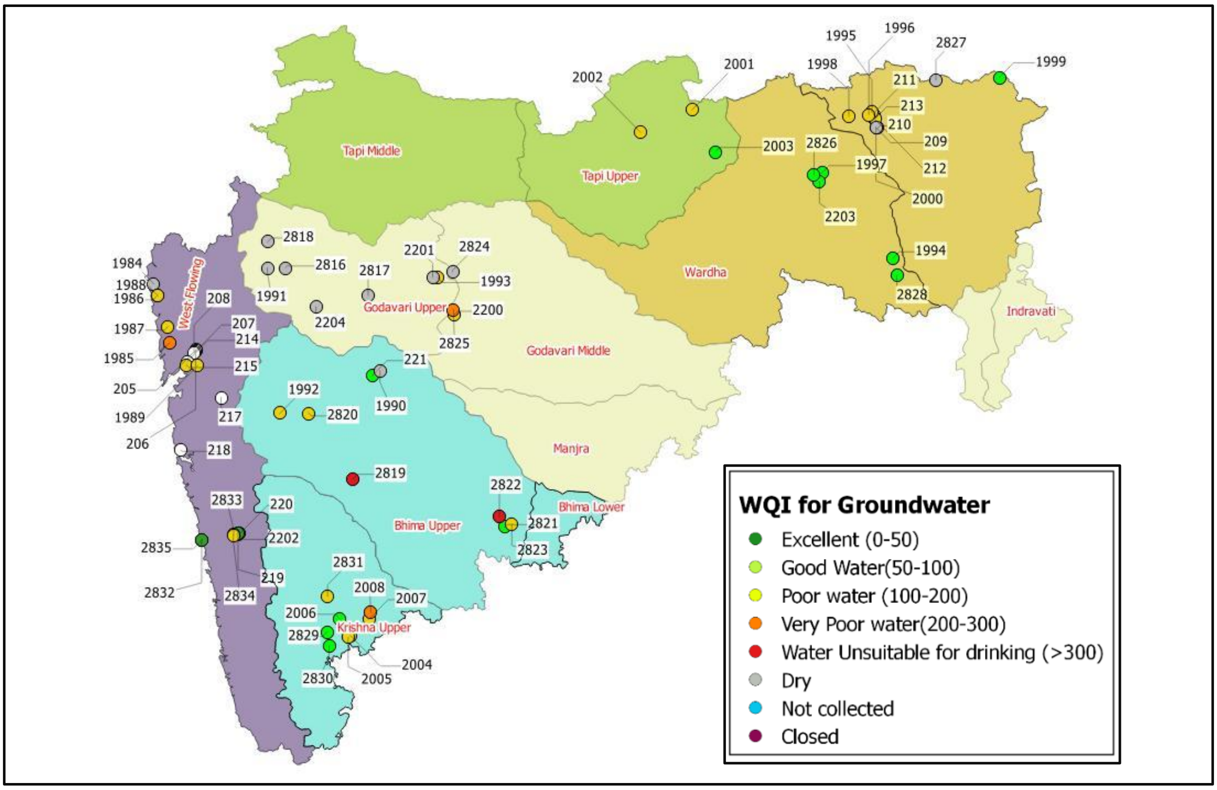
Source: http://www.mpcb.gov.in/envtdata/Ebulletin_pdf/E_bulletin_English_March2017_13062017.pdf

In the year 2017-18, out of 66 WQMS, 2 stations (2819 and 2822) recorded WQI in the category of 'Water Unsuitable for Drinking'as mentioned in Table No 6. These stations recorded high levels of TDS, Hardness, Calcium and Chloride levels. A total of 28 WQMS that falls in Amaravati, Aurangabad, Chandrapur, Kolhapur, Nagpur, Navi Mumbai, Pune, Raigad and Thane districts recorded WQI in polluted categories as shown in Map No. 2

The pH levels for all ground WQMS were observed in the range of 6.5-9. 4 WQMS namely 215 (Well Water at Turbhe store), 2825 (Bore well at Wahegaon, Aurangabad), 2819 (Dug well owned by Shri Deshmukh) and 2822 (Bore Well near Chincholi) were recorded very high levels of Hardness and Calcium ($CaCo_3$) of about 7400 mg/l, 1210 mg/l, 1380 mg/l and 1710 mg/l respectively. Station 2819 recorded highest Nitrate value of 21.0 mg/l. In case of Fluoride, the levels were found to be well within the limits (1.5mg/l)

Table No 6: List of WQMS which recorded WQI in 'Water Unsuitable for Drinking' category

Station ID	Regional Office	Water Body	Station Name	Village	Taluka	District
2819	Pune	Dug Well	Dug Well Owned by Shri Deshmukh	Malegaon	Baramati	Pune
2822	Pune	Bore Well	Bore Well near Chincholi	Chincholi	Mohol	Solapur



Map No. 2: Spatial representation for average groundwater WQI

Thus it can be concluded that in the year 2017-18, in case of the overall surface water quality, West Flowing Rivers recorded major portion of the observations (around 84%) in 'Non-polluted' category followed by Godavari basin (>68%) and Krishna basin (>67%). Nearly 44% of the observations from Tapi basin were found to be under 'Dry' category. Pollution is the major concern in Coastal area (Sea and Creek) of Maharashtra with more than 54% of the observations recorded under 'Polluted' category.

In case of Ground Water, 5 stations (station number 220,2202,2832,2833 and 2835) of Kolhapur district recorded 'excellent' WQI throughout the year. Around 23% and 35% of the total ground WQMS recorded WQI under 'Good water' and 'Poor Water' respectively. Station no. 2825, 2008 and 1985 from Aurngabad, Kolhapur and Thane district respectively recorded 'Very Very Poor Water' WQI while station no. 2819 and 2822 from Pune district recorded WQI under 'Water Unsuitable for drinking' thereby indicating high level of water quality deterioration due to pollution in the mentioned water source.

Introduction

Water Pollution

Many parts of the World faces major challenges due to limited freshwater resources. A significant portion of these freshwater resources in the world are contaminated due to ever increasing anthropogenic pressures, discharge of industrial wastes/effluents, agricultural run offs, energy generation and other activities. As per WHO (World Health Organization), Water Pollution can be defined as any change in the physical, chemical and biological properties of water that has a harmful effect on living things[1] Water pollution has become a major concern as more and more waste is being disposed of in water bodies thereby degrading the water quality and affecting the aquatic and human health.

Pollutants enter the water environment from two main types of sources namely Point and Non-point sources. Point source pollution results when the contaminants gets released from a single location or are directly emitted into the water body. In case of Non-point sources, the contaminants gets introduced into the environment over a large, widespread area through transport or environmental change. Some of the examples of these sources are mentioned Figure No. 3

Point Sources	Municipal and Industrial waste effluents
	Runoff and leachate from waste disposal sites
	Storm sewer outfall
Non-Point sources	Agricultural run offs
	Runoff from abandoned mines, lawns and golf courses
	Erosion from logging
	Bactria and other microbes, nutrients from agricultural livestock areas

Figure No. 3: Major Point and Non-point sources of water pollution

As per CPCB (Central Pollution Control Board), release of untreated sewage from urban settlements, the release of industrial effluents and organic run offs from agricultural fields are some of the major contributors of water pollution in India2. Along with human activities, various micro-organisms like bacteria, viruses and protozoa also cause water pollution which may cause various water-borne diseases.

Once these toxic substances gets entered in water bodies, they get dissolved or remains suspended in water thereby deteriorating water quality and also affecting aquatic ecosystems. Further these pollutants may seep down and affect the aquifers and groundwater deposits. As on 2011, the net annual ground water availability in the country

[1]https://www.researchgate.net/publication/266348835_Water_Pollution_Impact_of_Pollutants_and_New_Promising_Techniques_in_Purification_Process

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

has been estimated as 398.16 bcm (billion cubic meter) out of which 32.15 bcm was available in Maharashtra state. Decline in groundwater levels has been observed due to over exploitation of groundwater resources by industrial and domestic sectors. In Maharashtra, out of 353 assets of groundwater, 10 are over exploited, 16 are semi-critical and 2 are critical3.

Since Water is a Universal Solvent, it is a major source of infection. As per the WHO 80% diseases in the world are water borne and around 3.1% deaths occur due to unhygienic and poor water quality[4].The effects of water pollution are not only devastating to humans but also to flora and fauna. Industrial waste that contains harmful heavy metal content accumulates in the water bodies thereby making that water source harmful to humans and animals. Infectious diseases, like cholera, typhoid fever and other diseases gastroenteritis, diarrhea, vomiting, skin and kidney problem are spreading through polluted water. Water pollutants are killing sea weeds, mollusks, marine birds, fishes, crustaceans and other sea organisms that serve as food for human. Insecticides like DDT concentration is increasing along the food chain. These insecticides are harmful for humans.

In case of ground water contamination and quality degradation, solid waste dumping/landfilling is one of the main reason. The leachate from such dumping sites accumulates at the bottom and percolates through the soil thereby causes serious degradation of ground water quality. Similarly, direct dumping of industrial and municipal sewage into water body results in accumulation of toxic substances which depletes the oxygen levels in the water affecting the aquatic life resulting in algal bloom and also affects the entire food chain of birds, animals and humans.

Note:

Net Annual Groundwater Availability = Annual Replenishable Ground water resource – Natural discharge during non-monsoon season

Safe Areas: Areas having Ground water development potential

Semi-Critical: Cautious groundwater development is recommended

Critical and Overexploited: Intensive monitoring, evaluation and future ground development linked to water conservation is needed

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.

[3] http://164.100.47.193/lsscommittee/Water%20Resources/16_Water_Resources_5.pdf

[4] http://www.alliedacademies.org/articles/water-pollution-and-human-health-7925.html

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 s 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 basins. Water samples are being analysed for 28 parameters consisting of physico-chemical and bacteriological parameters for ambient water samples apart from field observations[5].

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. The various water bodies and the corresponding number of monitoring stations under the network of National water quality monitoring programme is represented in Figure No. 4.

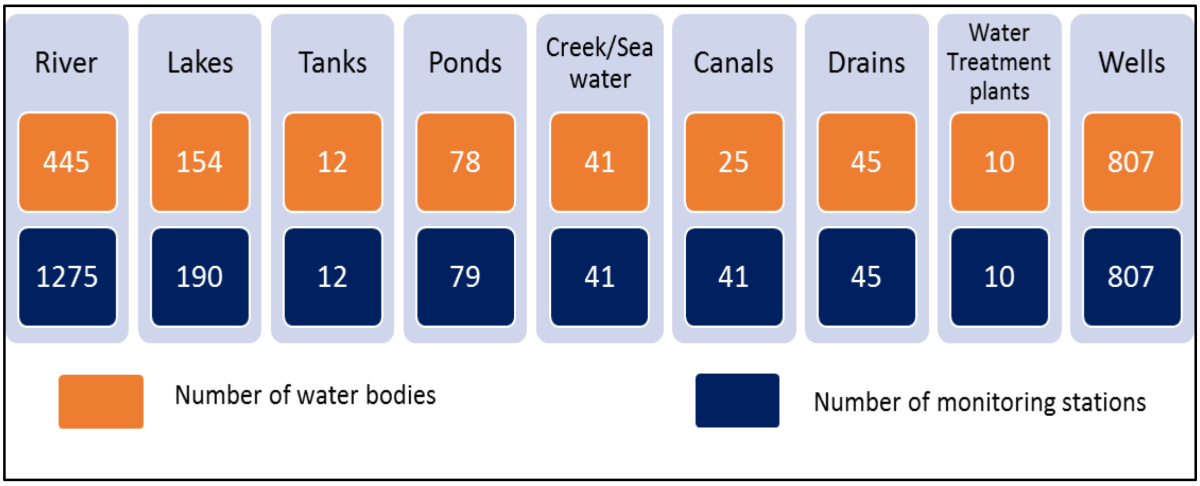


Figure No. 4: National Water Quality Monitoring Programme (NWMP) Network
Source: CPCB Envis

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

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)[6] and the third largest in terms of area (30.7Mha).[7]. The total geographical area of the state is divided into 5 basins, namely Godavari, Tapi, Narmada, Krishna and West flowing rivers of the Konkan region.

In Maharashtra, water quality is monitored by various agencies namely Hydrology Project (SW), Ground water 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).

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 294 station, (176 are on rivers, 36 on sea/creek, 12 on nallahs and 66 ground water), the highest across all states of Maharashtra Table No 7. MPCB has infrastructure to monitor 44 parameters including field observations, general parameters, core parameters and trace metals (Table No 8). The water samples are monitored with a monthly and six monthly frequency for surface and ground water stations respectively.

Table No 7: Basin and water body typewise tally of WQMS in Maharashtra

	Water body			**Basin**		
		Tapi	Godavari	Krishna	West Flowing Rivers	**Grand Total**
Surface Water	Rivers	20	60	57	40	176
	Dam		2		2	4
	Sea				16	16
	Creek				20	20
	Nalla	2	1	1	8	12
Groundwater	Bore well	1	10	10	8	29
	Dug well	1	14	6	13	34
	Hand pump		1			1
	Tube well	1				1
	Well		1			1
Total		**25**	**88**	**74**	**107**	**294**

[6] Census 2011
[7] Centre for Technology Alternatives for Rural Areas,Water resources of Maharashtra State

Table No 8: 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	Pesticides
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 ground water 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 9. 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 ground water 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 9: 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	17
Godavari 1	Godavari Upper	Godavari, Chikhali nalla, Darna	28
	Godavari Middle	Godavari, Bindusara	14
	Manjra	Godavari, Manjra	2
Godavari 2	Wardha	Wardha, Penganga	17
	Weinganga	Kolar, Kanhan, Wainganga	26
	Pranhita and others	Wainganga	1
Krishna	Bhima Upper	Bhima, Nira, Chandrabhaga, Mutha, Ghod, Indrayani, Pawana, Sina, Vel, Nalla, Mula-Mutha	45
	Krishna Upper	Krishna, Panchganga, Koyna, Urmodi, Venna	29
West Flowing rivers		Kalu, Ulhas, Patalganga, Bhatsa, Vashishti, Mithi, Kundalika, Savitri, Amba, Kundalik, Muchkundi, Surya, Tansa, Vaitarna	59
		Rabodi nalla, Colour Chem nalla, Sandoz nalla, BPT Navapur, Tarapur MIDC nalla, Pimpal-Paneri nalla	12
Saline			36
Total			**294**

Spatial Maps

Sub -basin level maps

Of the 5 major basin, Narmada basin comprises of just 0.5%[8] 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[9] (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, and 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

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

[9] 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;

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

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 10 and the equations used to determine the sub index values are given Table No 11. 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 12.

Table No 10: 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 11: 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 12: 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 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

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

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 Table No.11

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.10)

= 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.11

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.10)

= 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.11

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.10)

= 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.11

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.10)

= 58.459 X 0.22

= 12.86098

WQI of Wainganga at Ashti

WQI = ∑ (sub –index of all parameters)

= ∑ (9.1903+23.69839+13.47371+12.86098)

= 59

Quality Classification: Medium to Good

WQI for ground water

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[10]. The relative weights of the same have been determined (Table No 13) for the parameters monitored and recorded by MPCB for the water samples monitored in the year 2017-18.These weights indicate the relative harmfulness when present in water. The maximum weight assigned is 5 and minimum is 1.

Table No 13: Relative Weight of chemical parameters used for calculating WQI for Ground water

Chemical Parameters	**Indian Standards for Drinking Water Quality[11]**		**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

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

[11] 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 14

Table No 14: Ground water 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

$$qi = (Ci/Si) \text{ X } 100$$

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 ground water 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. 13)

= 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. 13)

= 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. 13)

= 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. 13)

= 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. 13)

= 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. 13)

= 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. 13)

= 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. 13)

= 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. 13)

= 433.2 X 0.13333

= 57.75856

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

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

= $\sum$ (12.26636 + 25.77907 + 20.88993+ 18.92 + 0+ 205.5658 + 0.229634+ 18.5662 + 57.75856)

= 360

Quality Classification: Water Unsuitable for drinking

CAGR: Compound Annual Growth Rate

Compound Annual Growth Rate= ((End value/Start value) ^ (1/Number of intervals))- 1

Number of intervals = (Number of observations)-1 *100

Sample Calculation for determining CAGR

Example Station code: 1317
WQI

(End value) : 48; WQI of 2007-08 (Start value) □ 57; Number of intervals□ 08

CAGR % = ((End value/Start Value) ^1/Number of intervals)) - 1 X 100

= ((48/57) ^ (1/8)-1 *100

= -2.29% =Quality Deteriorated

Surface Water Quality

The surface water resources i.e. the water available in country's rivers, lakes, reservoirs, streams and creeks are vitally important to meet our daily life water need. The surface water is used for drinking, agricultural and industrial purposes. Ecosystem associated with these resources provide habitat for many plant and animal species. In India, Monsoon is main source of surface water. The Annual utilizable surface water resources of India are estimated to be 690 Km^3 [12]. Rapid industrialization and Urbanization is putting an immense pressure on these resources. The quality of surface water resources is also deteriorating because of increasing pollutant loads from point and non-point sources.

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 2017-18 are represented in the Table No 15. Water quality is monitored per month across all the stations. The spatial presence of the stations is presented basin wise in the respective sections.

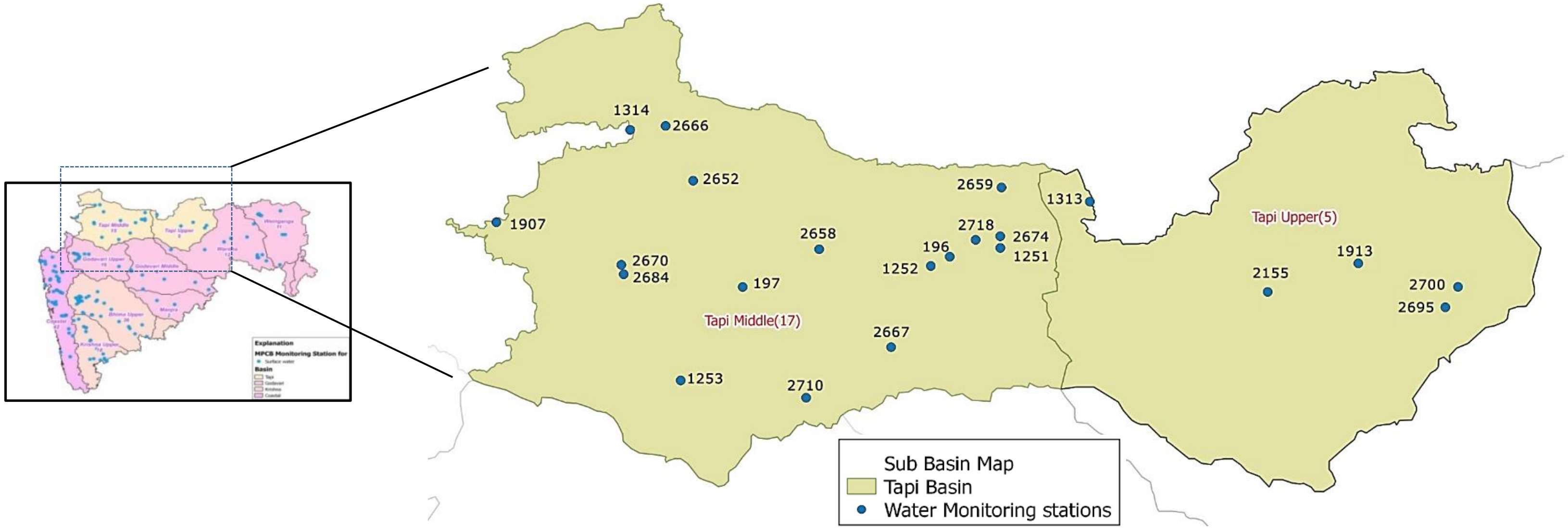
Table No 15: **List of monitoring stations across different type of water bodies under MPCB**

Water Quality monitoring stations	
Water Bodies	**2017-18**
Rivers	176
Sea and Creek	36
Nalla	12
Dams	4
Total	**228**

The following section presents the illustrations of the parameters pH, DO, BOD and FC recorded across the 228 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.

[12] http://www.iisc.ernet.in/currsci/sep102005/794.pdf

Tapi Basin



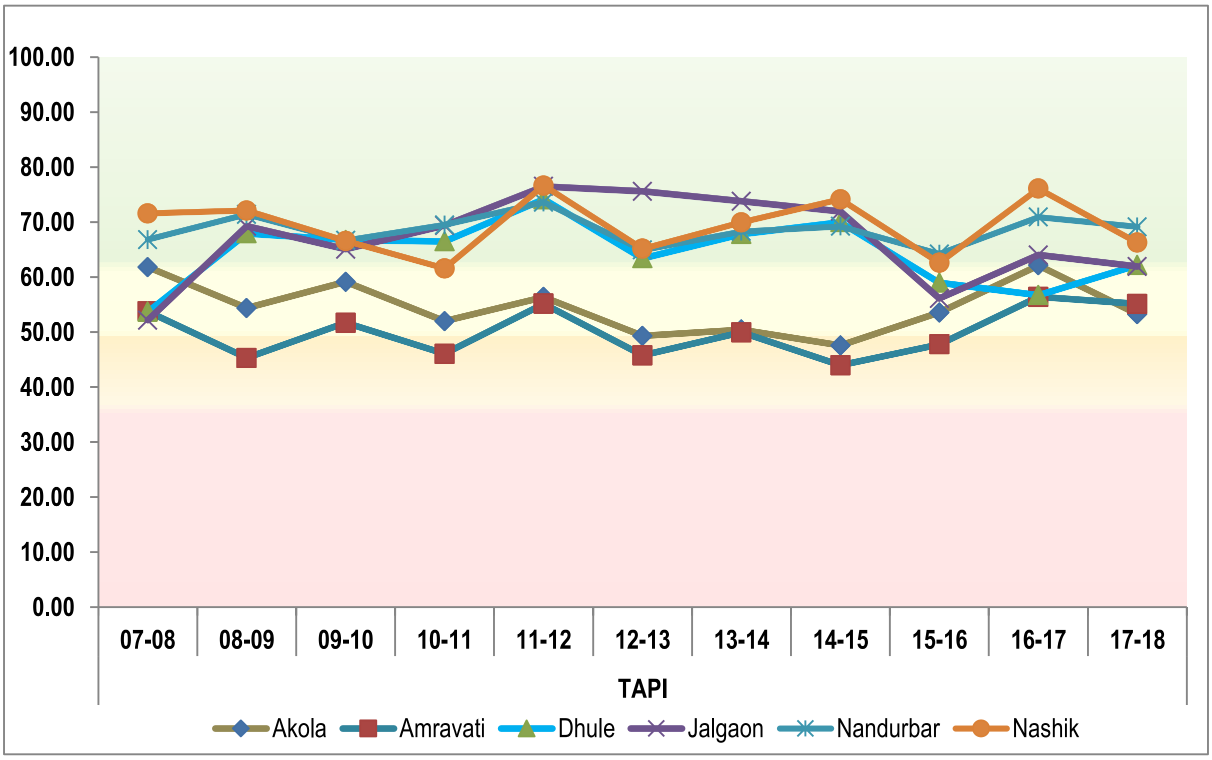
Map No. 3: Network of surface water quality monitoring stations in Tapi basin

The Tapi Basin is situated in the northern part of the Deccan plateau. The basin extends over states of Madhya Pradesh, Maharashtra and Gujarat with a coverage area of about 65,145 sq. km which is nearly 2% of the total geographic area of the country[13]. Nearly 80% of the basin lies in the state of Maharashtra followed 15% in Madhya Pradesh and nearly 6% in Gujarat. Rivers like Purna, Girna, Gomai, Panzara, Pedhi and Arna are some of the major tributaries of Tapi river system[14]. A list of the station and the codes has been provided below in. Table No 16

[13] http://cwc.gov.in/regionaloffices/ntbo/Water%20Year%20Book/Tapi%20WYB2011-12.pdf

[14] http://india-wris.nrsc.gov.in/wrpinfo/index.php?title=Tapi

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 s in that district.

The intra basin performance of Tapi basin across six districts of the state is depicted in Figure No. 5. It is observed that the annual average WQI of Akola, Amravati and Jalgaon belong to "Medium to Good" category but compared to 2016-17, the index showed a decreasing pattern (in the same category) which indicated deterioration of water quality in these stations whereas though in "Medium to Good Category", the WQI of Dhule increased from nearly 56 to 62 in 2017-18 indicating improvement in water quality in Dhule section.

In 2017-18, WQI of Nandurbar and Nashik district registered to be in "Good to Excellent" but compared to previous year's index value, both the districts registered decrease in pattern from nearly 71 (2016-17) to 69 (2017-18) and 76 (2016-17) to 66 (2017-18) respectively.

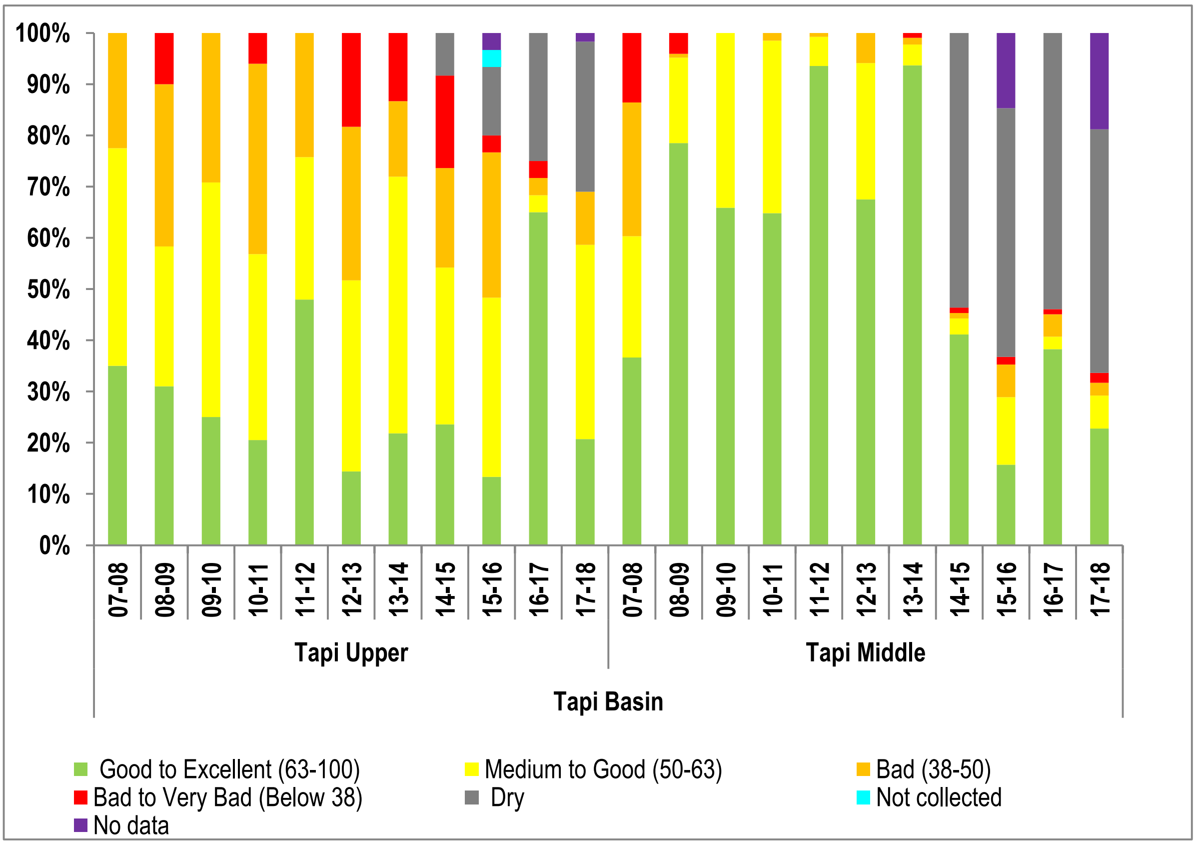
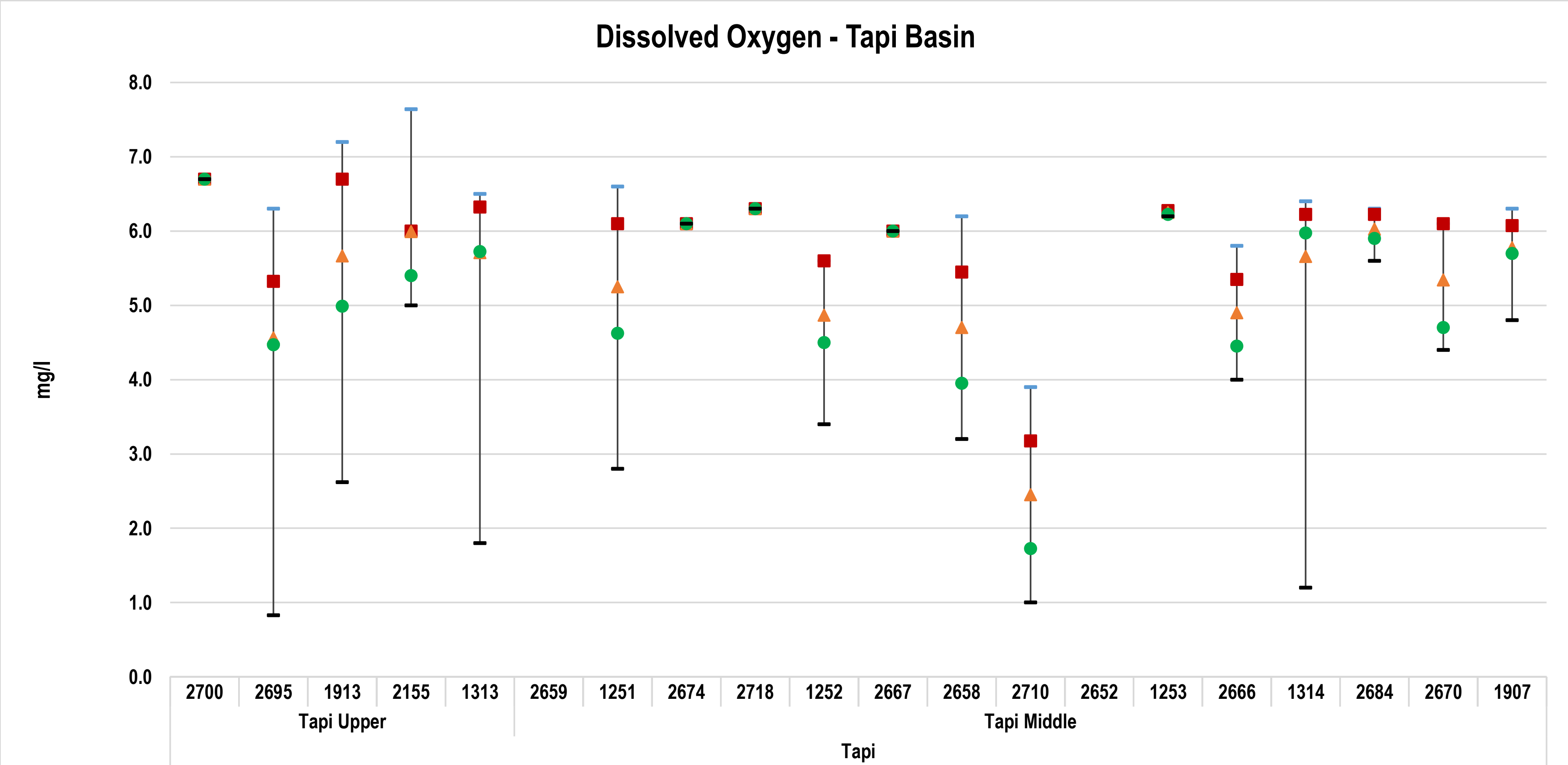


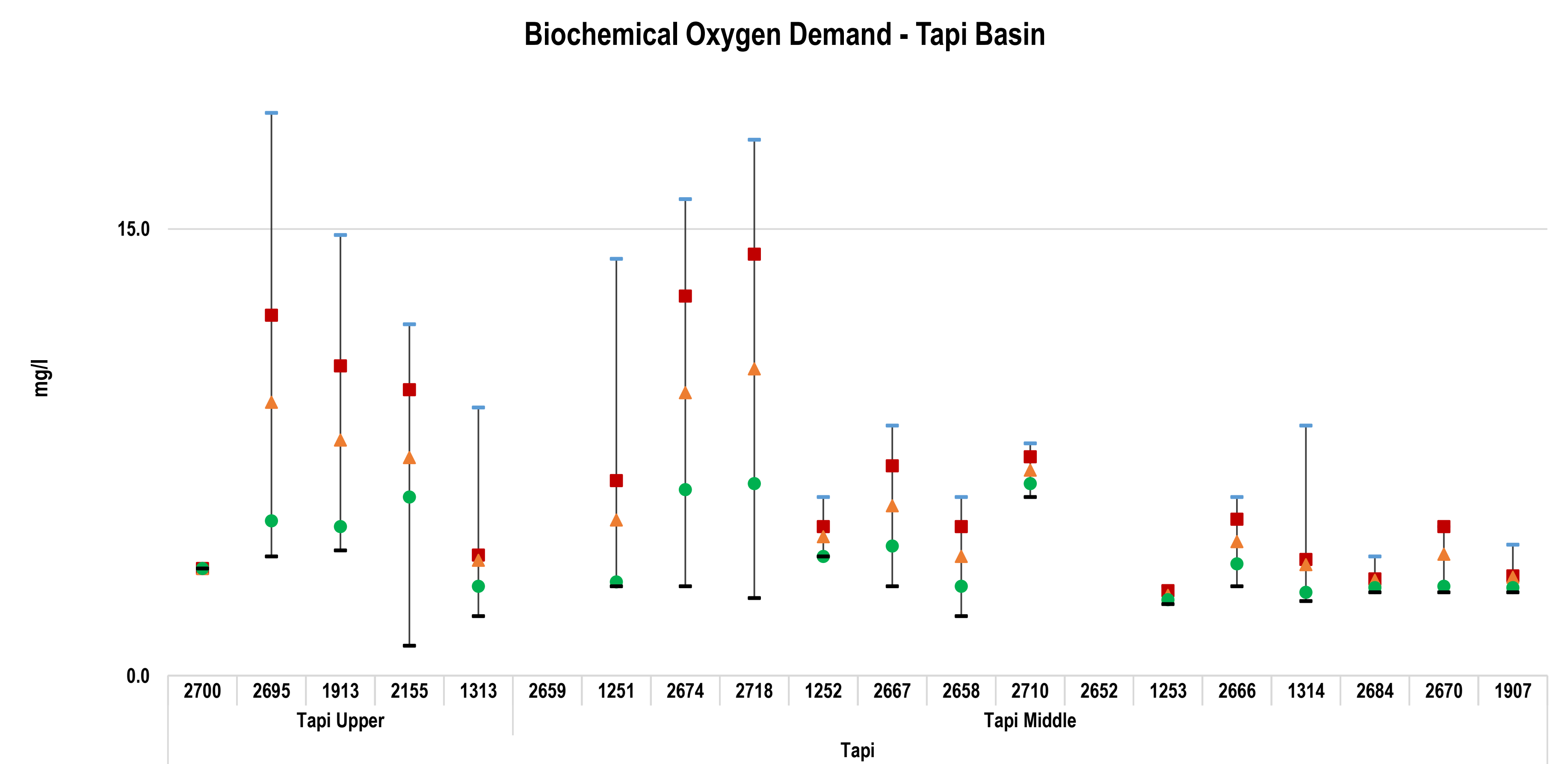
Figure No. 6: Trend in Average occurrence for different category of WQI in Tapi Basin

As seen in, Figure No. 6, the interbasin analysis for Tapi Basin, more than 60% of the observations from Tapi Upper were found to be falling under "Good to Excellent" and "Medium to Good" categories of WQI. Tapi Middle recorded only around 30% of the observations in above mentioned categories indicating that the water quality in Tapi Upper better compared to Tapi Middle. Around 11% of the observations from Tapi Upper were recorded under "Bad" WQI category compared to 2.5% in Tapi Middle basin. Almost 30% and 47% observations from Tapi Upper and Tapi Middle basin were recorded as "Dry" respectively.



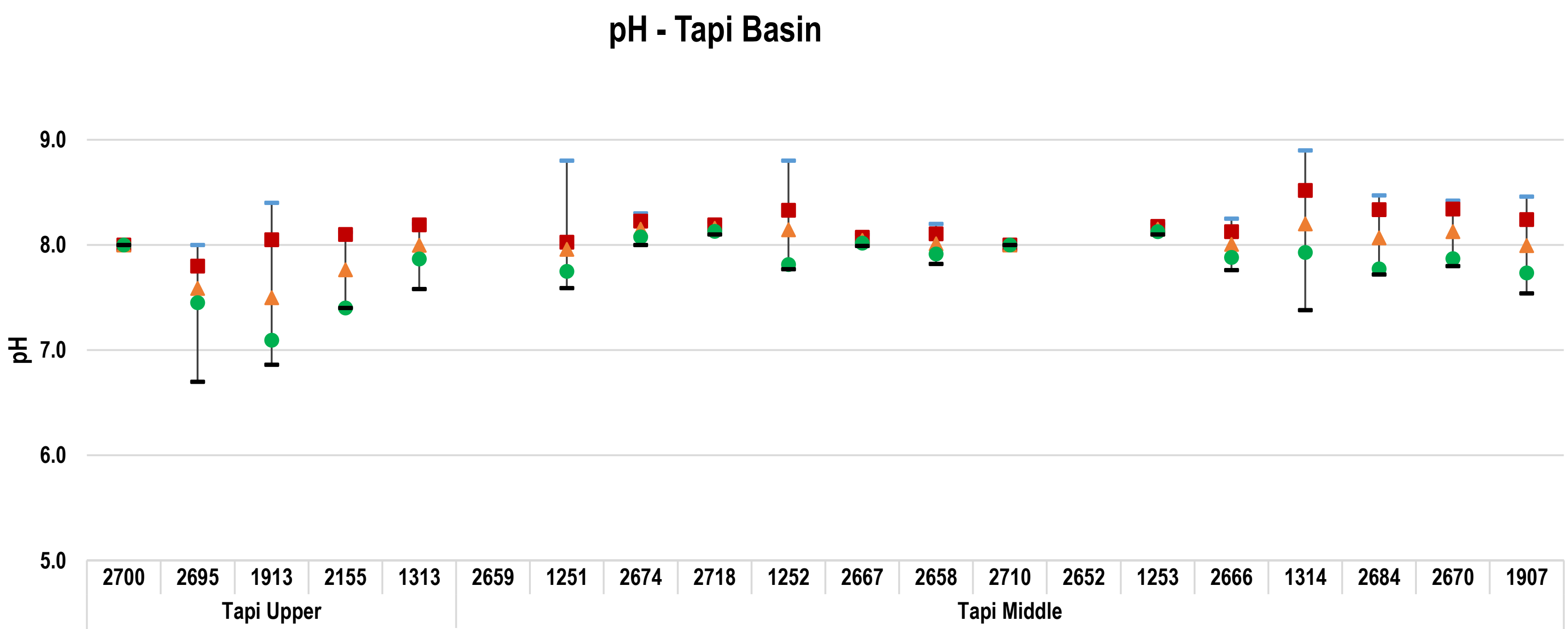
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
	Tapi Upper					Tapi Middle														
	Tapi																			
Max	6.7	6.3	7.2	7.6	6.5		6.6	6.1	6.3	5.6	6.0	6.2	3.9		6.3	5.8	6.4	6.3	6.1	6.3
75 Percentile	6.7	5.3	6.7	6.0	6.3		6.1	6.1	6.3	5.6	6.0	5.5	3.2		6.3	5.4	6.2	6.2	6.1	6.1
Average	6.7	4.6	5.7	6.0	5.7		5.3	6.1	6.3	4.9	6.0	4.7	2.5		6.3	4.9	5.7	6.0	5.3	5.8
25 Percentile	6.7	4.5	5.0	5.4	5.7		4.6	6.1	6.3	4.5	6.0	4.0	1.7		6.2	4.5	6.0	5.9	4.7	5.7
Min	6.7	0.8	2.6	5.0	1.8		2.8	6.1	6.3	3.4	6.0	3.2	1.0		6.2	4.0	1.2	5.6	4.4	4.8

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



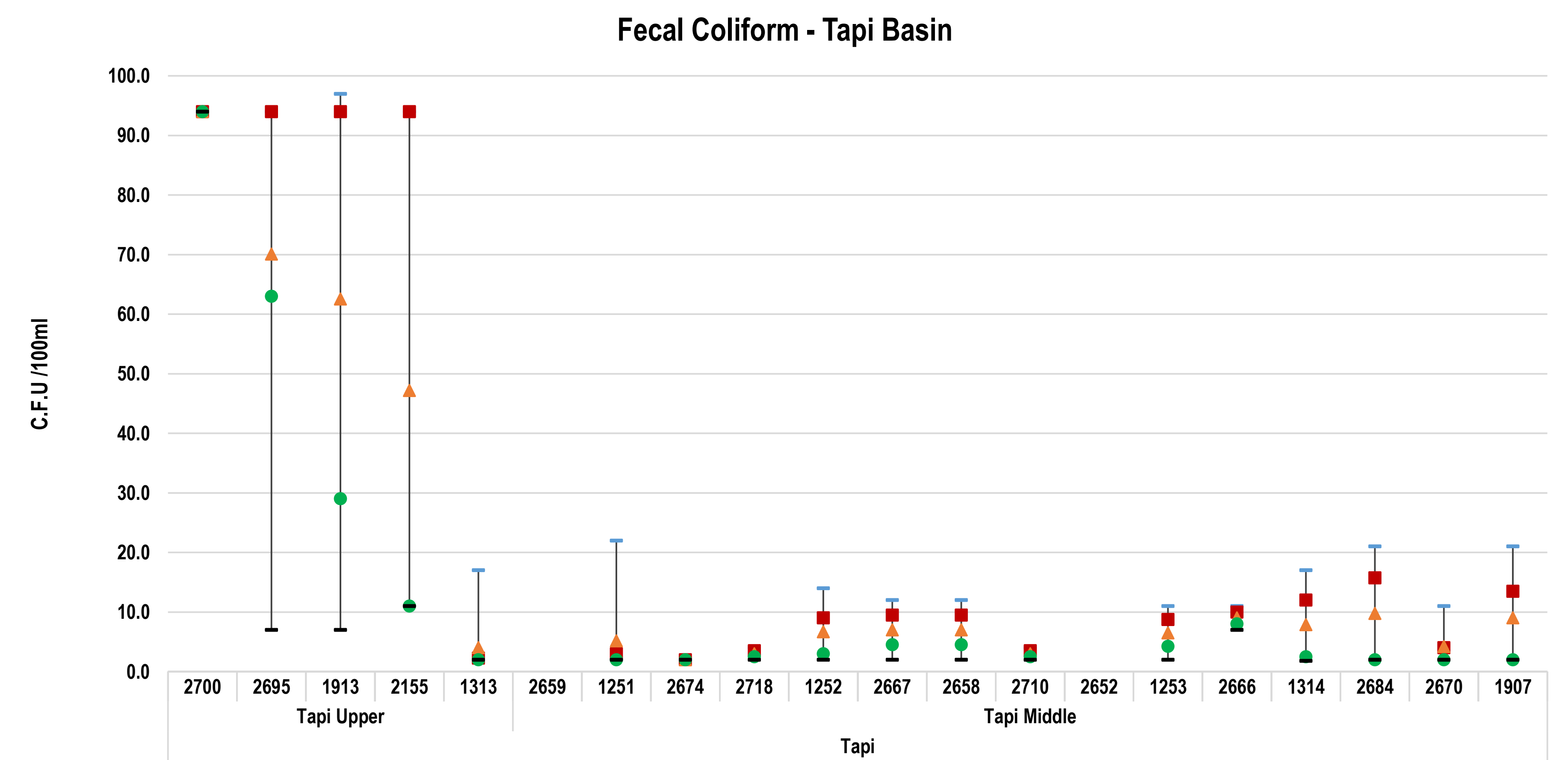
Tapi	Tapi Upper					Tapi Middle														
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
Max	3.6	18.9	14.8	11.8	9.0		14.0	16.0	18.0	6.0	8.4	6.0	7.8		3.0	6.0	8.4	4.0	5.0	4.4
75 Percentile	3.6	12.1	10.4	9.6	4.1		6.6	12.8	14.2	5.0	7.1	5.0	7.4		2.9	5.3	3.9	3.3	5.0	3.4
Average	3.6	9.2	7.9	7.3	3.9		5.2	9.5	10.3	4.7	5.7	4.0	6.9		2.7	4.5	3.7	3.2	4.1	3.3
25 Percentile	3.6	5.2	5.0	6.0	3.0		3.2	6.3	6.5	4.0	4.4	3.0	6.5		2.6	3.8	2.8	3.0	3.0	3.0
Min	3.6	4.0	4.2	1.0	2.0		3.0	3.0	2.6	4.0	3.0	2.0	6.0		2.4	3.0	2.5	2.8	2.8	2.8

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



	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
	Tapi Upper					Tapi Middle														
	Tapi																			
Max	8.0	8.0	8.4	8.1	8.2	0.0	8.8	8.3	8.2	8.8	8.1	8.2	8.0	0.0	8.2	8.3	8.9	8.5	8.4	8.5
75 Percentile	8.0	7.8	8.1	8.1	8.2	0.0	8.0	8.2	8.2	8.3	8.1	8.1	8.0	0.0	8.2	8.1	8.5	8.3	8.3	8.2
Average	8.0	7.6	7.5	7.8	8.0		8.0	8.2	8.2	8.1	8.0	8.0	8.0		8.2	8.0	8.2	8.1	8.1	8.0
25 Percentile	8.0	7.5	7.1	7.4	7.9	0.0	7.7	8.1	8.1	7.8	8.0	7.9	8.0	0.0	8.1	7.9	7.9	7.8	7.9	7.7
Min	8.0	6.7	6.9	7.4	7.6		7.6	8.0	8.1	7.8	8.0	7.8	8.0	0.0	8.1	7.8	7.4	7.7	7.8	7.5

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



	Tapi Upper					Tapi Middle														
	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
Max	94.0	94.0	97.0	94.0	17.0		22.0	2.0	4.0	14.0	12.0	12.0	4.0		11.0	11.0	17.0	21.0	11.0	21.0
75 Percentile	94.0	94.0	94.0	94.0	2.3		3.0	2.0	3.5	9.0	9.5	9.5	3.5		8.8	10.0	12.0	15.8	4.0	13.5
Average	94.0	70.1	62.5	47.2	4.0		5.1	2.0	3.0	6.7	7.0	7.0	3.0		6.5	9.0	7.9	9.8	4.2	9.0
25 Percentile	94.0	63.0	29.0	11.0	2.0		2.0	2.0	2.5	3.0	4.5	4.5	2.5		4.3	8.0	2.5	2.0	2.0	2.0
Min	94.0	7.0	7.0	11.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	7.0	1.8	2.0	2.0	2.0

Tapi

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

Water Quality Index for WQMS in Tapi Basin

Apr		62	59		52		53										71			
May		51	59		68		77										66			
Jun		77	72		80		80										73			
Jul		52	49	58	67		55									60	63		66	
Aug		54	44	52	54		61	44	44	65	49	64	53			71	50	70	72	67
Sep		63	61	58	76		73								71		77	77	77	77
Oct	64	63	66	56	78		67	76	75	66	70	72	63				72	65	67	74
Nov		53	60	62	47		49										68	66	67	66
Dec		39	58		51		77								75		57			
Jan		58	70		75		75			72							71			
Feb		43	64		46		67										77			
Mar		59	60		75		61										76			
Station Code	2700	2695	1913	2155	1313	2659	1251	2674	2718	1252	2667	2658	2710	2652	1253	2666	1314	2684	2670	1907
Sub Basin	Tapi Upper					Tapi Middle														
Basin	Tapi																			

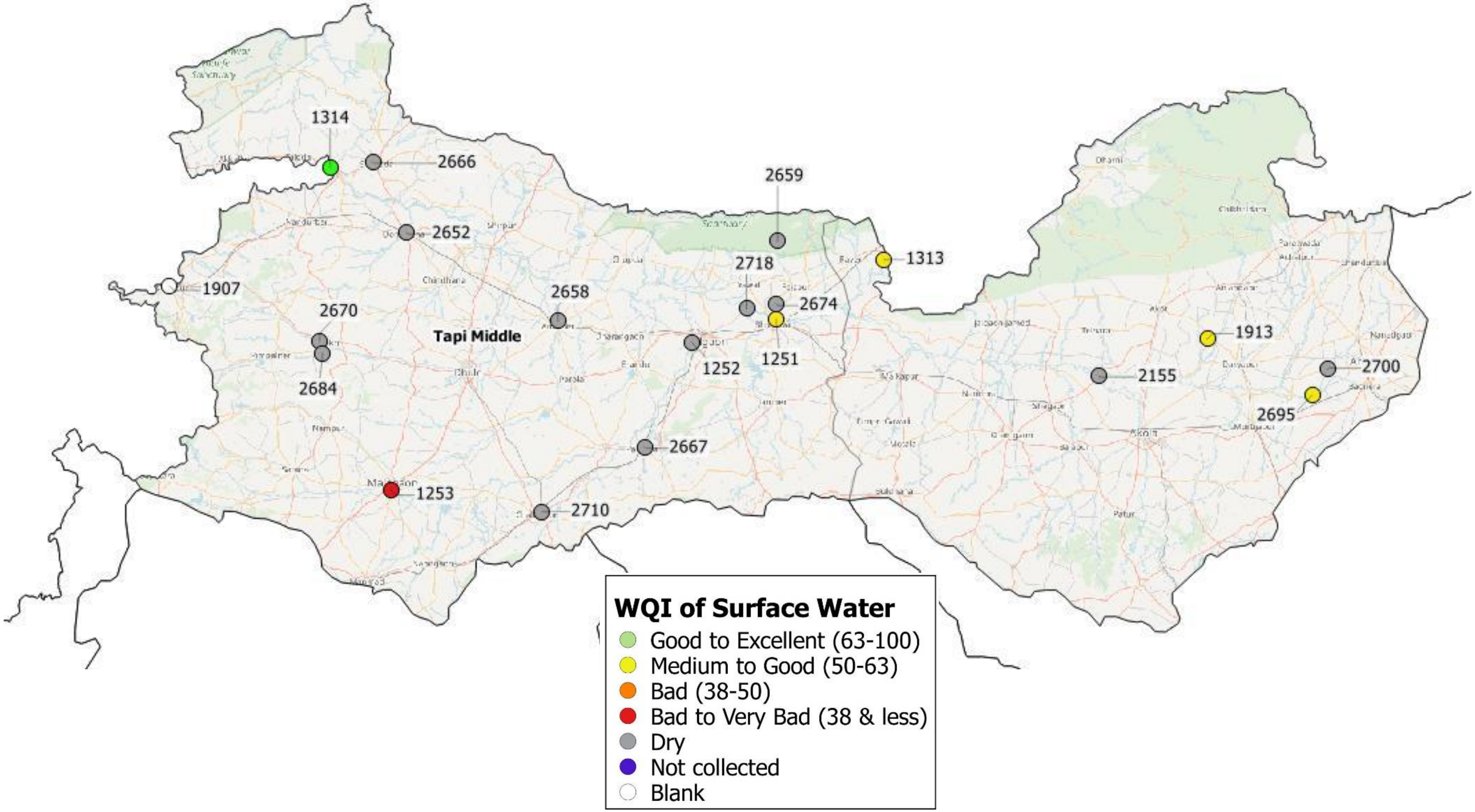
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

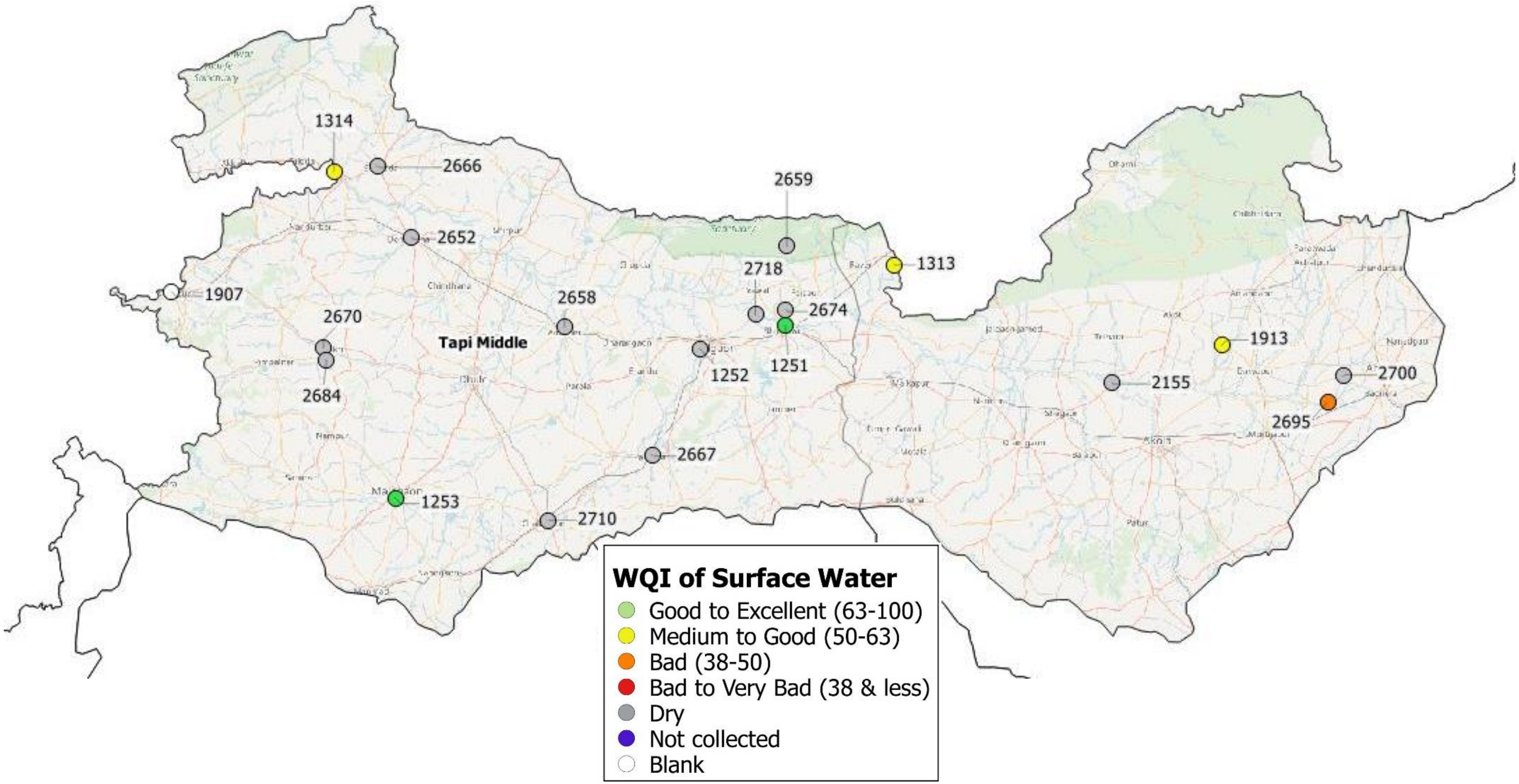
Table No 16: Surface water quality monitoring stations in Tapi basin

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

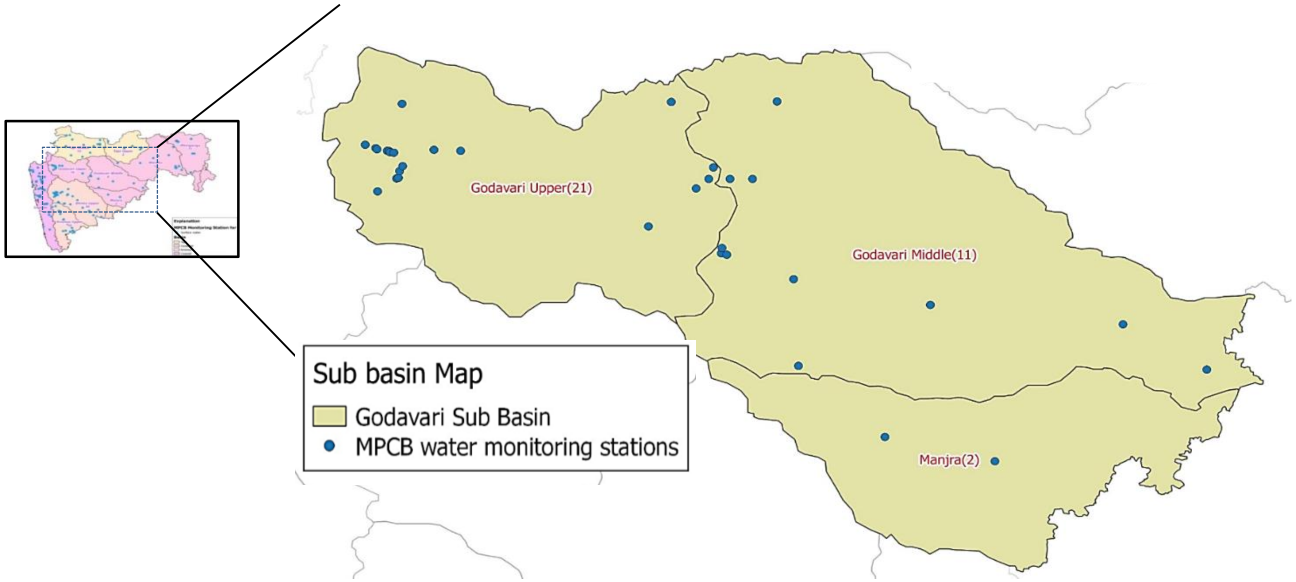
Spatial map of Surface WQI at Tapi Basin (April -2017)



Spatial map of Surface WQI at Tapi Basin (December-2017)



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

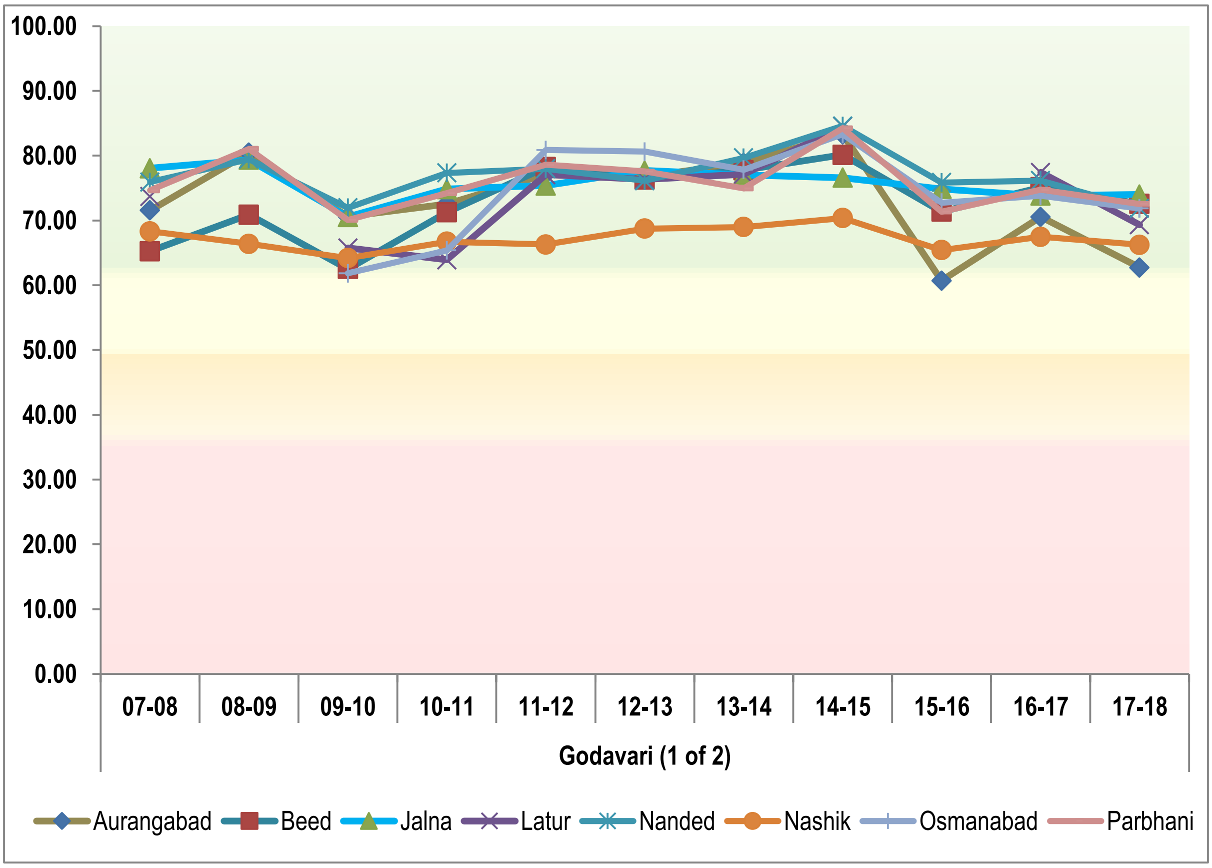


Map No. 4: Network of surface water quality monitoring stations in Godavari basin 1 of 2 –Godavari upper, Godavari middle and Manjra Sub basin

The Godavari basin extends over states of Maharashtra (48.65%), Andhra Pradesh (23.40%), Chhattisgarh (12.49%), Madhya Pradesh (8.63%), Orissa (5.67%) and Karnataka (1.41%). The basin area accounts for nearly 10% of the total geographical area of the country. The total length of the river from its origin (Trimbakeshwar, Nashik) to outfall into Bay of Bengal is around 1,465 km, making it the second largest river in India.

In Maharashtra, the Godavari Basin could be divided into six sub-basins namely Godavari Upper, Godavari Middle, Manjra, Wardha, Weinganga, Indravati and Pranhita. For analysis purpose, these sub-basins have been categorized into two, Godavari 1 Basin comprising of Godavari Upper, Godavari Middle and Manjra sub-basin and Godavari 2 covering Wardha, Weinganga, Indravati and Pranhita.

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 s in that district

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. Godavari basin (1 of 2) records annual average WQI of Aurnagabad, Beed, Jalna, Latur, Nanded, Nashik, Osmanabad and Parbhani districts.

In 2017-18, Except Aurangabad, The WQI of all other mentioned districts are in Good to Excellent category (63-100). The WQI of Aurangabad was found to be in Good to Medium category (50-63). Irrespective of the fact that majority if the indices for the districts recorded under Good to Excellent category, a slight decrease could be observed this year which is an indication of a slight deterioration in the water quality.

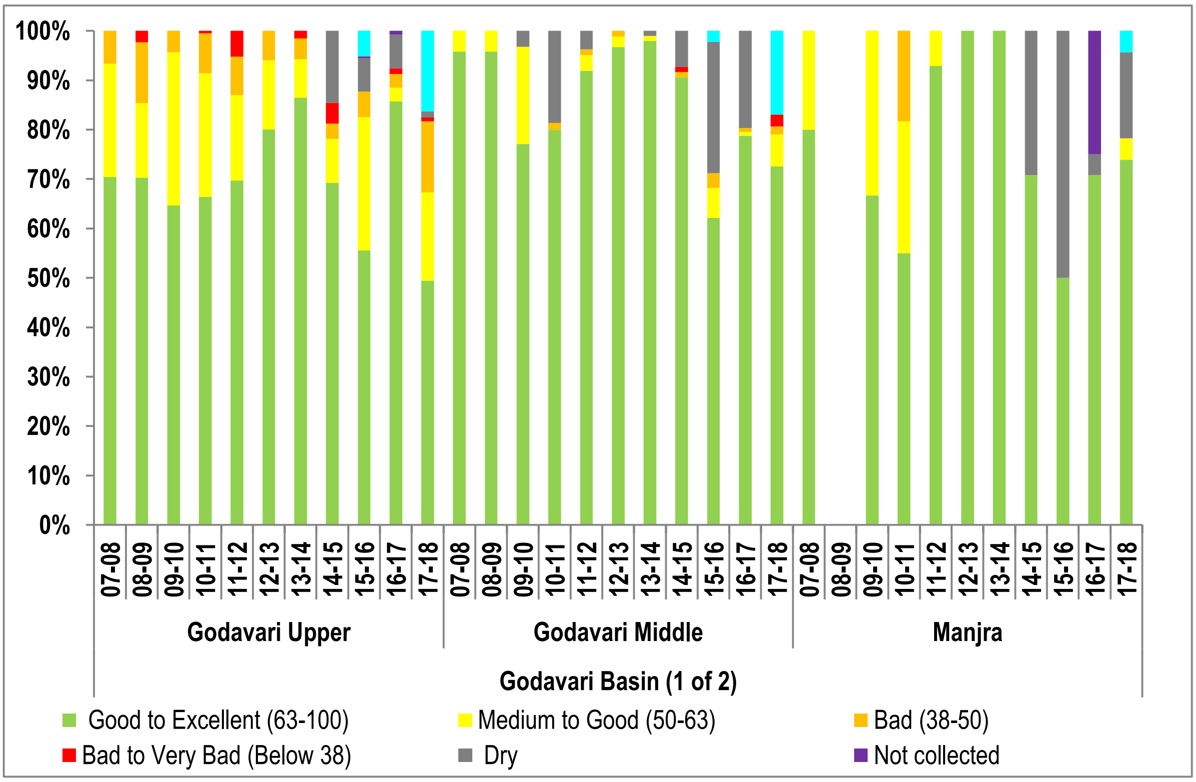
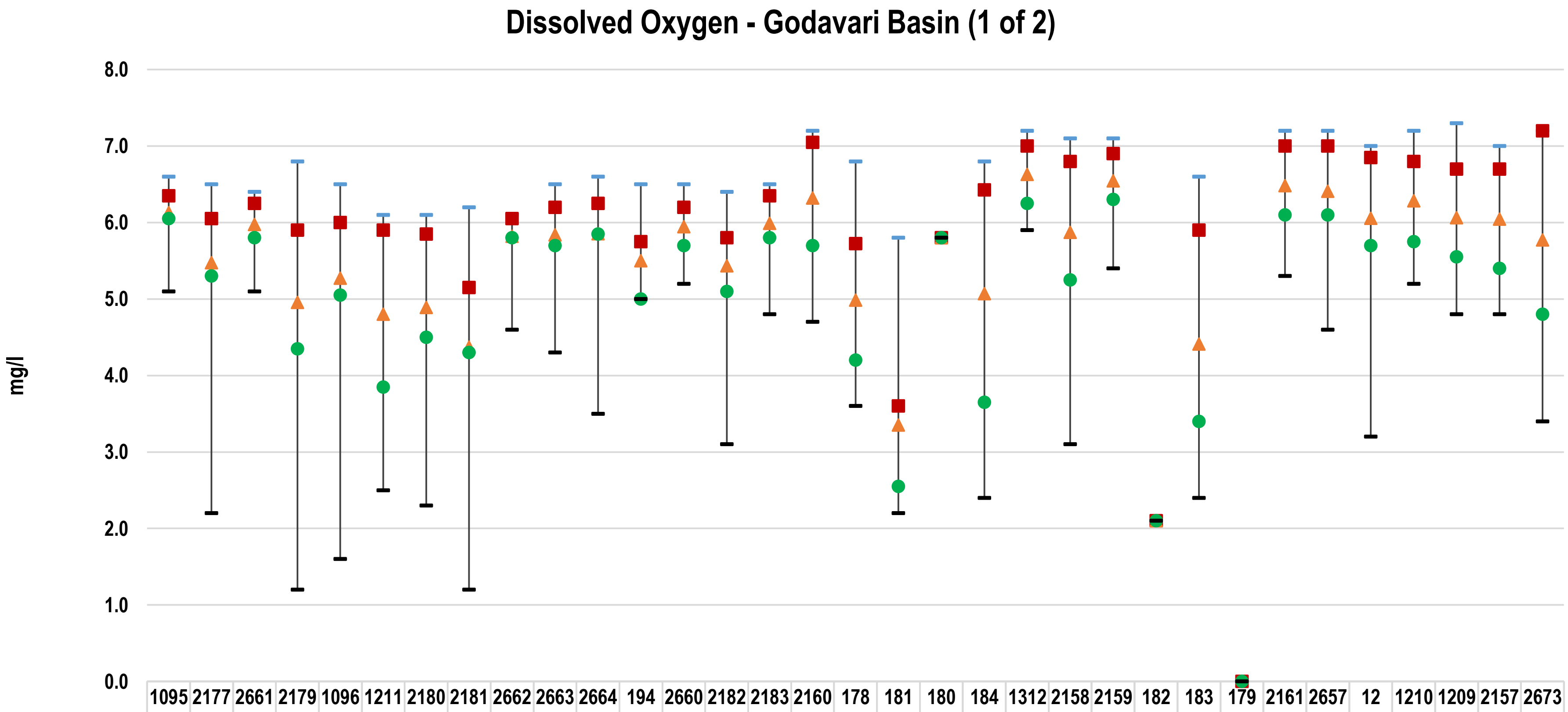


Figure No. 12: Trend of average occurrence for different category of WQI in Godavari basin (1 of 2)

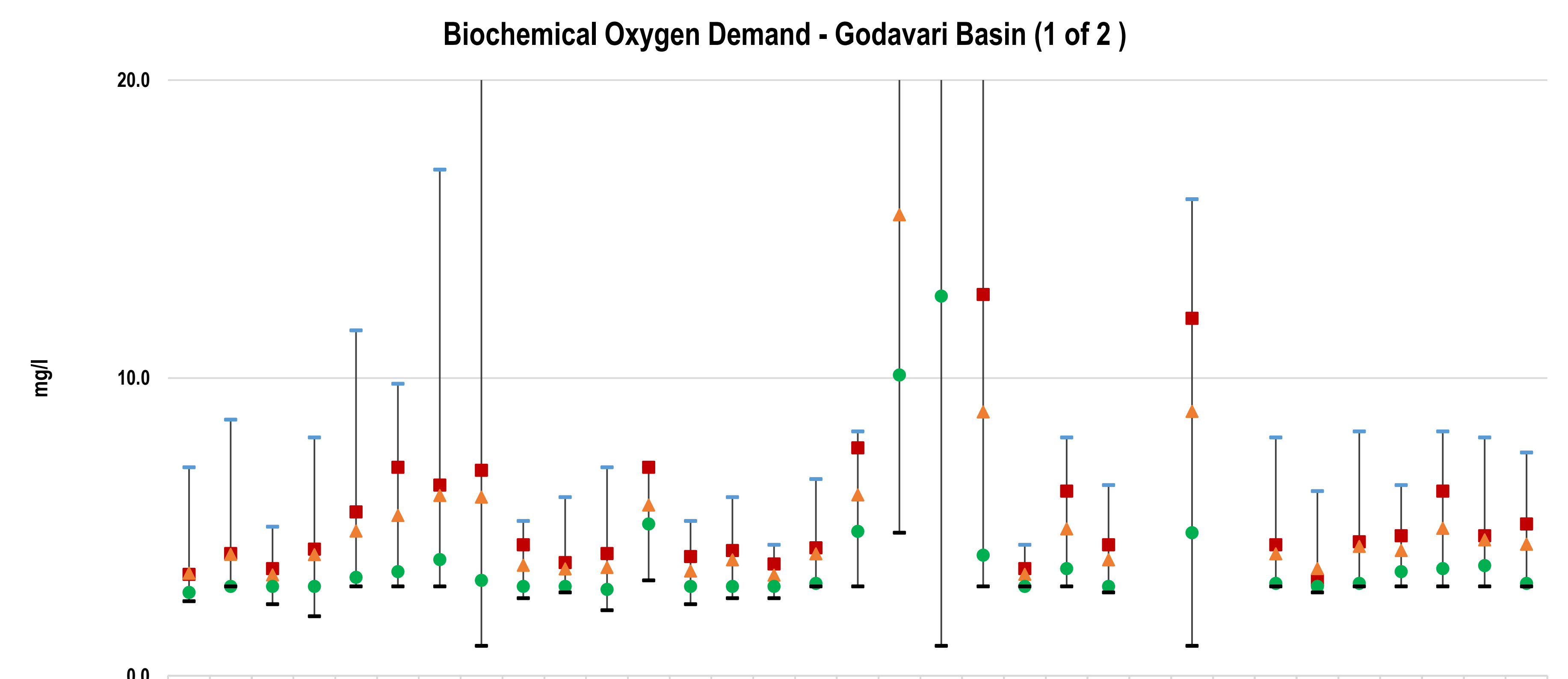
Basin 1 consists of 34 surface water monitoring stations (21 on Upper Godavari, 11 on Middle Godavari and 2 on Manjra). The list of the station and the codes has been provided below in Table No 17 and Table No 18. Figure No. 12 depicts the inter basin performance of Godavari river. In the year 2017-18, around 50% of the observations of Godavari Upper were found to be in "Good to Excellent" category while same category was observed in around 73% and 74% observations of Godavari Middle and Manjra sub basins respectively. The extent of observations coming under "Medium to Good" category was higher in Godavari Upper (~18%) compared to about 6% in Godavari Middle and nearly 4.5% in Manjra sub basin. Godavari Upper recorded around 14% of the observations in "Bad" category indicating the water pollution in Godavari Upper is more compared to other sub-basins (Godavari Middle and Manjra). Around 1% and 17% observations of Godavari Upper and Manjra basin respectively were recorded under "Dry" category.

Due to technical problems, around 16%, 17% and 4% observations from Godavari Upper, Godavari Middle and Manjra basin respectively were fell under "No Data" category.



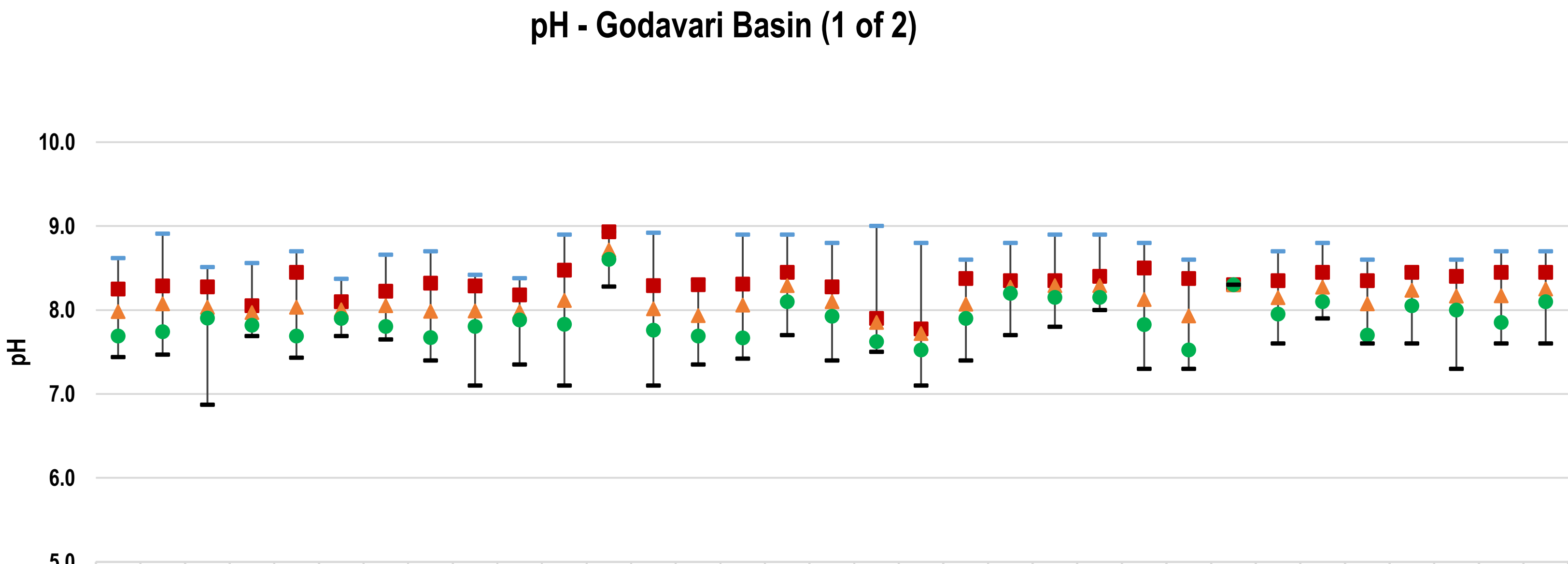
	1095	2177	2661	2179	1096	1211	2180	2181	2662	2663	2664	194	2660	2182	2183	2160	178	181	180	184	1312	2158	2159	182	183	179	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																				Godavari Middle											Manjra	
	Godavari																																
Max	6.6	6.5	6.4	6.8	6.5	6.1	6.1	6.2	6.1	6.5	6.6	6.5	6.5	6.4	6.5	7.2	6.8	5.8	5.8	6.8	7.2	7.1	7.1	2.1	6.6	0.0	7.2	7.2	7.0	7.2	7.3	7.0	7.2
75 Percentile	6.4	6.1	6.3	5.9	6.0	5.9	5.9	5.2	6.1	6.2	6.3	5.8	6.2	5.8	6.4	7.1	5.7	3.6	5.8	6.4	7.0	6.8	6.9	2.1	5.9	0.0	7.0	7.0	6.9	6.8	6.7	6.7	7.2
Average	6.1	5.5	6.0	5.0	5.3	4.8	4.9	4.4	5.8	5.8	5.9	5.5	5.9	5.4	6.0	6.3	5.0	3.4	5.8	5.1	6.6	5.9	6.5	2.1	4.4		6.5	6.4	6.1	6.3	6.1	6.0	5.8
25 Percentile	6.1	5.3	5.8	4.4	5.1	3.9	4.5	4.3	5.8	5.7	5.9	5.0	5.7	5.1	5.8	5.7	4.2	2.6	5.8	3.7	6.3	5.3	6.3	2.1	3.4	0.0	6.1	6.1	5.7	5.8	5.6	5.4	4.8
Min	5.1	2.2	5.1	1.2	1.6	2.5	2.3	1.2	4.6	4.3	3.5	5.0	5.2	3.1	4.8	4.7	3.6	2.2	5.8	2.4	5.9	3.1	5.4	2.1	2.4	0.0	5.3	4.6	3.2	5.2	4.8	4.8	3.4

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



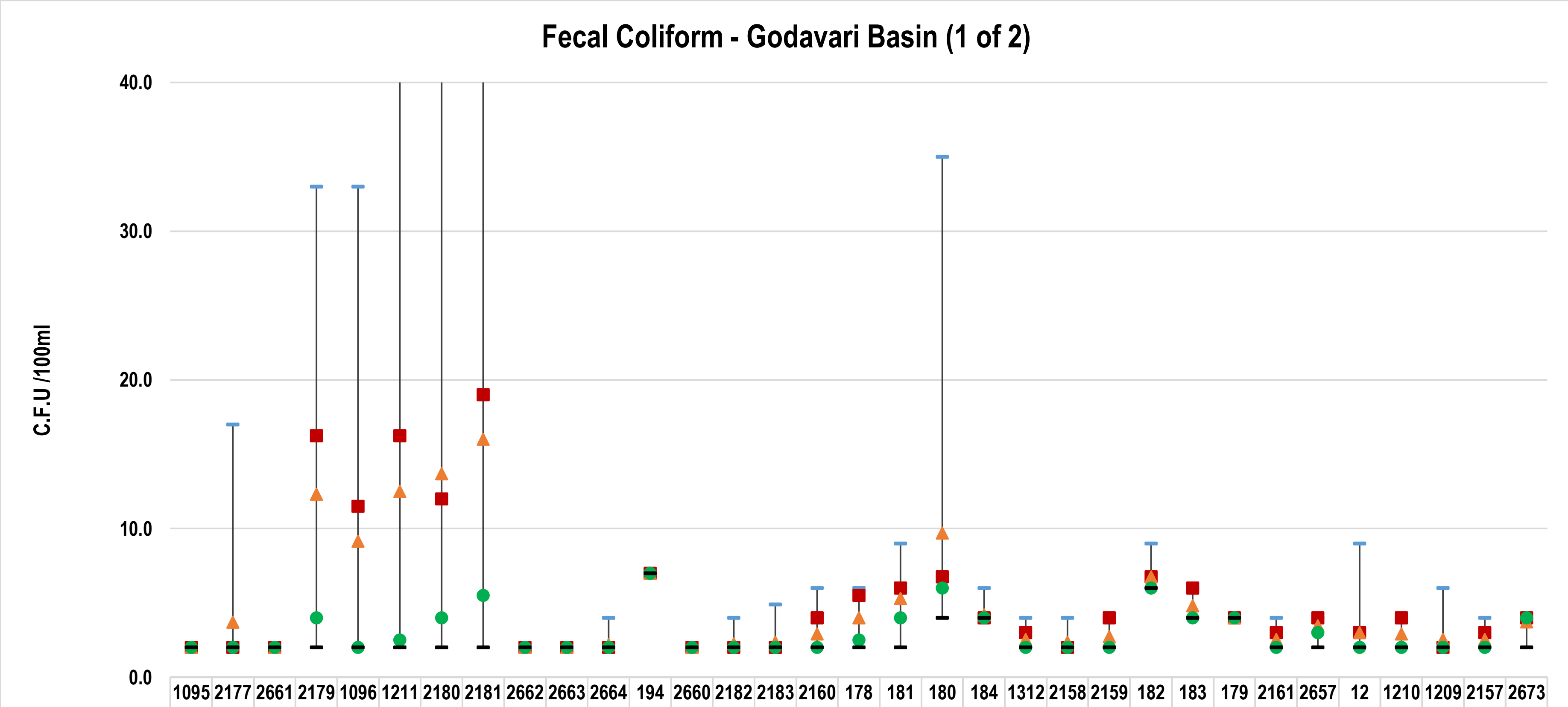
	1095	2177	2661	2179	1096	1211	2180	2181	2662	2663	2664	194	2660	2182	2183	2160	178	181	180	184	1312	2158	2159	182	183	179	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																				Godavari Middle											Manjra	
	Godavari																																
Max	7.0	8.6	5.0	8.0	11.6	9.8	17.0	21.0	5.2	6.0	7.0	7.0	5.2	6.0	4.4	6.6	8.2	28.0	225.	21.0	4.4	8.0	6.4	75.0	16.0	49.0	8.0	6.2	8.2	6.4	8.2	8.0	7.5
75 Percentile	3.4	4.1	3.6	4.3	5.5	7.0	6.4	6.9	4.4	3.8	4.1	7.0	4.0	4.2	3.8	4.3	7.7	20.5	62.5	12.8	3.6	6.2	4.4	68.3	12.0	49.0	4.4	3.2	4.5	4.7	6.2	4.7	5.1
Average	3.4	4.1	3.4	4.1	4.9	5.4	6.1	6.0	3.7	3.6	3.6	5.7	3.5	3.9	3.4	4.1	6.1	15.5	50.3	8.9	3.4	4.9	3.9	48.8	8.9	49.0	4.1	3.6	4.3	4.2	4.9	4.6	4.4
25 Percentile	2.8	3.0	3.0	3.0	3.3	3.5	3.9	3.2	3.0	3.0	2.9	5.1	3.0	3.0	3.0	3.1	4.9	10.1	12.8	4.1	3.0	3.6	3.0	27.5	4.8	49.0	3.1	3.0	3.1	3.5	3.6	3.7	3.1
Min	2.5	3.0	2.4	2.0	3.0	3.0	3.0	1.0	2.6	2.8	2.2	3.2	2.4	2.6	2.6	3.0	3.0	4.8	1.0	3.0	3.0	3.0	2.8	26.0	1.0	49.0	3.0	2.8	3.0	3.0	3.0	3.0	3.0

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



	1095	2177	2661	2179	1096	1211	2180	2181	2662	2663	2664	194	2660	2182	2183	2160	178	181	180	184	1312	2158	2159	182	183	179	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																				Godavari Middle											Manjra	
	Godavari																																
Max	8.6	8.9	8.5	8.6	8.7	8.4	8.7	8.7	8.4	8.4	8.9	8.9	8.9	8.4	8.9	8.9	8.8	9.0	8.8	8.6	8.8	8.9	8.9	8.8	8.6	8.3	8.7	8.8	8.6	8.5	8.6	8.7	8.7
75 Percentile	8.3	8.3	8.3	8.1	8.5	8.1	8.2	8.3	8.3	8.2	8.5	8.9	8.3	8.3	8.3	8.5	8.3	7.9	7.8	8.4	8.4	8.4	8.4	8.5	8.4	8.3	8.4	8.5	8.4	8.5	8.4	8.5	8.5
Average	8.0	8.1	8.0	8.0	8.0	8.0	8.1	8.0	8.0	8.0	8.1	8.7	8.0	7.9	8.1	8.3	8.1	7.9	7.7	8.1	8.3	8.3	8.3	8.1	7.9	8.3	8.1	8.3	8.1	8.2	8.2	8.2	8.3
25 Percentile	7.7	7.7	7.9	7.8	7.7	7.9	7.8	7.7	7.8	7.9	7.8	8.6	7.8	7.7	7.7	8.1	7.9	7.6	7.5	7.9	8.2	8.2	8.2	7.8	7.5	8.3	8.0	8.1	7.7	8.1	8.0	7.9	8.1
Min	7.4	7.5	6.9	7.7	7.4	7.7	7.7	7.4	7.1	7.4	7.1	8.3	7.1	7.4	7.4	7.7	7.4	7.5	7.1	7.4	7.7	7.8	8.0	7.3	7.3	8.3	7.6	7.9	7.6	7.6	7.3	7.6	7.6

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



	1095	2177	2661	2179	1096	1211	2180	2181	2662	2663	2664	194	2660	2182	2183	2160	178	181	180	184	1312	2158	2159	182	183	179	2161	2657	12	1210	1209	2157	2673
	Godavari Upper																				Godavari Middle											Manjra	
	Godavari																																
Max	2.0	17.0	2.0	33.0	33.0	46.0	63.0	63.0	2.0	2.0	4.0	7.0	2.0	4.0	4.9	6.0	6.0	9.0	35.0	6.0	4.0	4.0	4.0	9.0	6.0	4.0	4.0	4.0	9.0	4.0	6.0	4.0	4.0
75 Percentile	2.0	2.0	2.0	16.3	11.5	16.3	12.0	19.0	2.0	2.0	2.0	7.0	2.0	2.0	2.0	4.0	5.5	6.0	6.8	4.0	3.0	2.0	4.0	6.8	6.0	4.0	3.0	4.0	3.0	4.0	2.0	3.0	4.0
Average	2.0	3.7	2.0	12.3	9.1	12.5	13.7	16.0	2.0	2.0	2.2	7.0	2.0	2.3	2.4	2.9	4.0	5.3	9.7	4.2	2.5	2.4	2.7	6.8	4.8	4.0	2.5	3.5	3.0	2.9	2.5	2.5	3.7
25 Percentile	2.0	2.0	2.0	4.0	2.0	2.5	4.0	5.5	2.0	2.0	2.0	7.0	2.0	2.0	2.0	2.0	2.5	4.0	6.0	4.0	2.0	2.0	2.0	6.0	4.0	4.0	2.0	3.0	2.0	2.0	2.0	2.0	4.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	7.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0	6.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

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

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

Apr	48	45	48	48	64	40	58	63	75	76	76	57	44	46	45	78		58	65	75
May	50	74	48	61	61	52	47	44	52	45	38	57			47	78				
Jun	53	78	79	79	78	76	76	69	75	81	82		81	81	81	75		49	41	69
Jul	55	74	43	72	76	58	57	56	46	49	74		71	60	75	67		48	35	71
Aug	49	62	71	49	60	56	59	50	69	74	75		74	73	71	76	77	40	39	54
Sep	77	76	77	70	76	77	71	65	77	77	77		76	79	80	65	67	58	42	62
Oct	71	63	74	66	68	65	58	67	74	73	74					74	57	62	33	47
Nov	74	73	73	61	69	68	68	42	71	71	73		74	69	72	77	76	51	40	73
Dec	73	74	75	72	66	65	59	60	74	75	74		77	78	74	72	60	56	42	76
Jan	77	78	76	70	72	69	69	68	76	76	77		78	73	76	72				
Feb																67	57	55	43	55
Mar	77	65	78	48	63	62	57	55	74	73	68	50	69	70	73	69		49	43	61
Station Code	1095	2177	2661	2179	1096	1211	2180	2181	2662	2663	2664	194	2660	2182	2183	2160	178	181	180	184
Sub Basin	Godavari Upper																			
Basin	Godavari																			

Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

Table No 17: Surface water quality monitoring stations in Godavari Basin (1 of 2)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	1095	Godavari	Godavari at U/s of Gangapur Dam	Gangapur	Nashik	Nashik
NWMP	2177	Godavari	Godavari near Someshwar Temple	Someshwar	Nashik	Nashik
NWMP	2661	Darna	Darna at Aswali (Darna Dam)	Aswali	Igatpuri	Nashik
NWMP	2179	Godavari	Godavari at Hanuman Ghat	Nashik city	Nashik	Nashik
NWMP	1096	Godavari	Godavari at Panchavati at Ramkund	Panchavati	Nashik	Nashik
NWMP	1211	Godavari	Godavari at Nashik D/s of near Amardham	Gadgebaba Maharaj Nagar	Nashik	Nashik
NWMP	2180	Godavari	Godavari at near Tapovan	Tapovan	Nashik	Nashik
NWMP	2181	Godavari	Godavari at Kapila -Godavari confluence point	Tapovan	Nashik	Nashik
NWMP	2662	Darna	Darna at MES site Pumping station	Bhagur	Nashik	Nashik
NWMP	2663	Darna	Darna at Bhagur Pumping station near Pandhurli Bridge	Bhagur	Nashik	Nashik
NWMP	2664	Darna	Darna at Sansari	Sansari	Nashik	Nashik
SWMP	194	Kadwa	Kadwa at Awankhed Village, Taluka - Dindori, District - Nashik	Awankhed Village	Dindori	Nashik
NWMP	2660	Darna	Darna at Chehedi pumping station	Chehedi	Nashik	Nashik
NWMP	2182	Godavari	Godavari at Saikheda	Saikheda	Niphad	Nashik
NWMP	2183	Godavari	Godavari at Nandur-Madhameshwar Dam	Nandur	Niphad	Nashik
NWMP	2160	Godavari	Godavari at U/s of Aurangabad Reservoir Kaigaon Tokka near, Kaigaon Bridge	Kaigaon	Gangapur	Aurangabad
SWMP	178	Shivna	Kannad - D/S of Kannad near Bridge	Kannad	Kannad	Aurangabad
SWMP	181	Kham	Aurangabad - Near Patoda Village	Aurangabad	Aurangabad	Aurangabad
SWMP	180	Kham	Aurangabad - Near Holly cross bridge	Aurangabad	Aurangabad	Aurangabad
SWMP	184	Harsool Dam	Aurangabad - Harsool Dam	Aurangabad	Aurangabad	Aurangabad

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

Apr	79	78	78		67		81	78	79	81	85	78	
May	76	78	78				77	78	79	76	79	77	
Jun	79	75	78		59				78	78	77	74	
Jul	71	67	69		68		66	72	70	67	67	67	
Aug	69	65	75		69		74	75	74	71	67	63	
Sep	76	68	74	36	36	38	79	73	74	68	73	70	75
Oct	75	72	68	33	52		74	68	75	68	70	69	72
Nov	73	75	75	39	54		76	74	74	72	71	66	73
Dec	77	68	70	51	64		74	74	71	70	66	75	70
Jan	74	70	68				72	73	69	75	69	73	68
Feb	72	70	76		60		70	66	75	75	71	79	68
Mar	78	61	76		56		72	66	59	71	69	73	59
Station Code	1312	2158	2159	182	183	179	2161	2657	12	1210	1209	2157	2673
Sub Basin	Godavari Middle											Manjra	
Basin	Godavari												

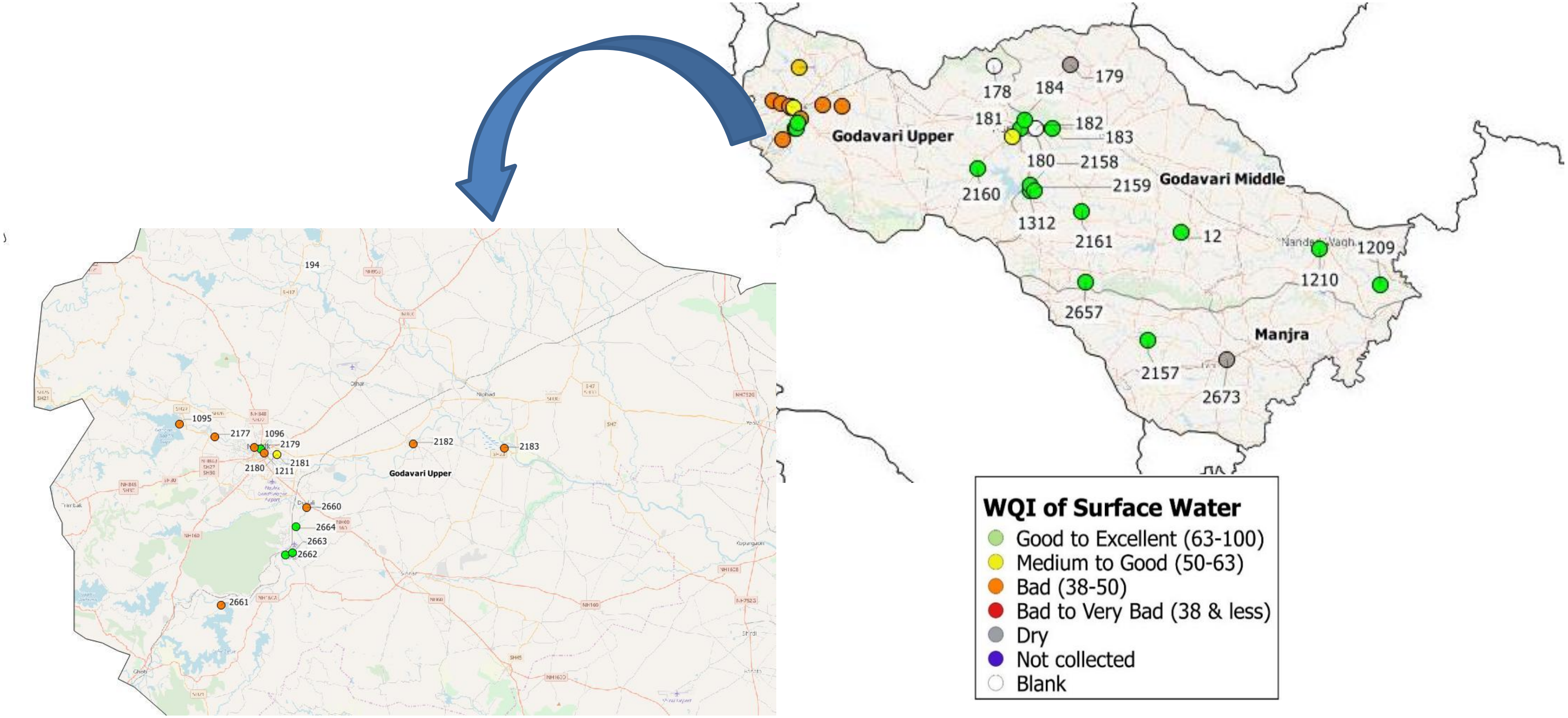
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

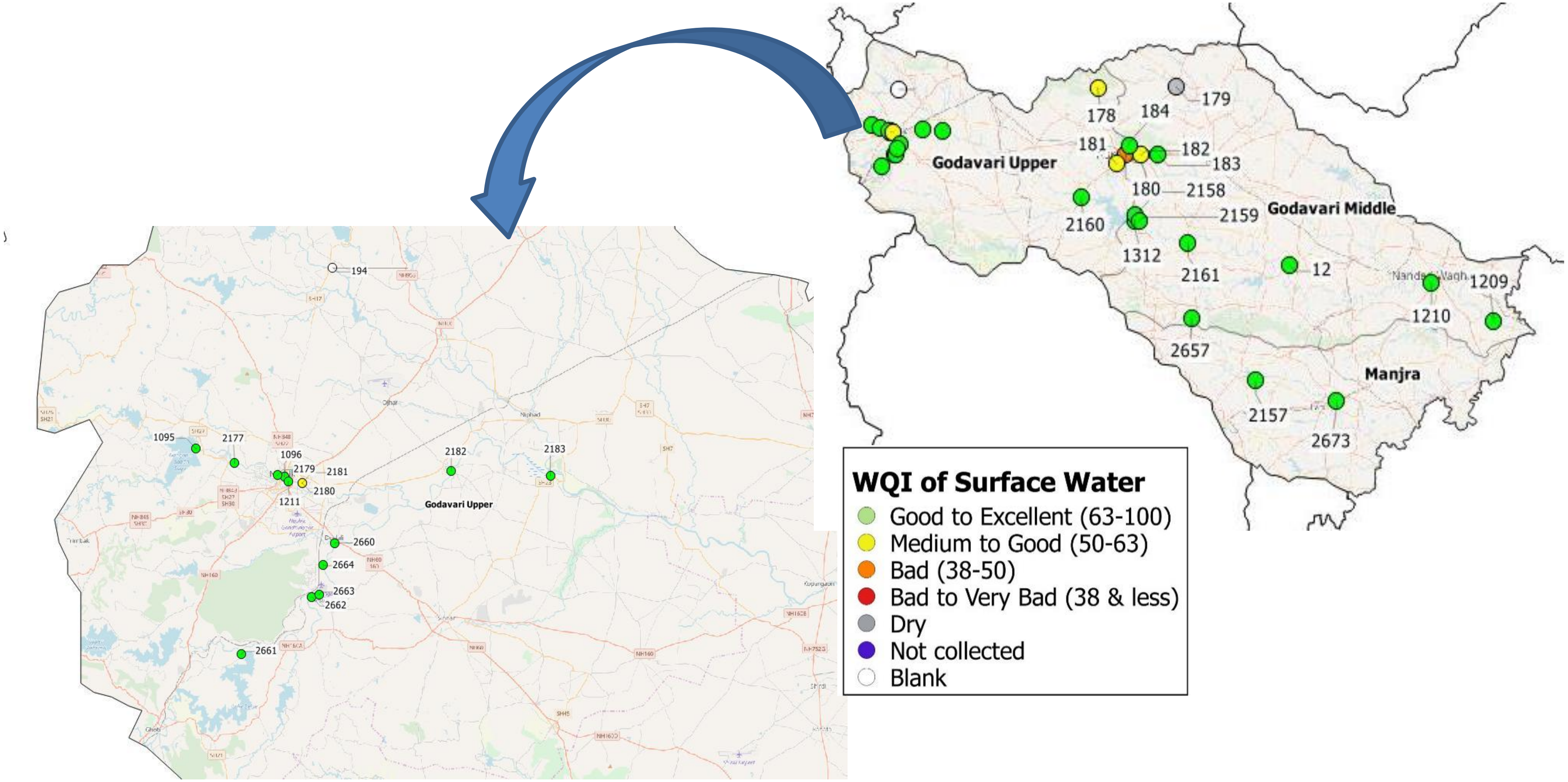
Table No 18: Surface water quality monitoring stations in Godavari Basin (1of 2)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	1312	Godavari	Godavari at Jaikwadi Dam, Paithan	Paithan	Paithan	Aurangabad
NWMP	2158	Godavari	Godavari at Paithan U/s of Paithan Intake pump house	Jayakwadi	Paithan	Aurangabad
NWMP	2159	Godavari	Godavari at D/s of Paithan at Pathegaon bridge	Pathegaon	Paithan	Aurangabad
SWMP	182	Sukhna	Aurangabad - Near Chikhalthana Bridge	Aurangabad	Aurangabad	Aurangabad
SWMP	183	Sukhna Dam	Aurangabad - At Sukhna Dam	Aurangabad	Aurangabad	Aurangabad
SWMP	179	Purna	Sillod - D/S of Sillod near bridge at bhavan	Sillod	Sillod	Aurangabad
NWMP	2161	Godavari	Godavari at Jalna Intake water pump house Shahagad	Shahabad	Ambad	Jalna
NWMP	2657	Bindusara	Bindusara at Beed, near Intake water pump house at Dam	Paligaon	Beed	Beed
NWMP	12	Godavari	Godavari at Dhalegaon	Dhalegaon	Pathari	Parbhani
NWMP	1210	Godavari	Godavari at Intake of pump house	Vishnupuri	Nanded	Nanded
NWMP	1209	Godavari	Godavari at Raher	Raher	Nayagaon	Nanded
NWMP	2157	Godavari	Godavari at Latur Water intake near pump house	Dhamegaon	Kalumb	Osmanabad
NWMP	2673	Manjra	Manjra at D/s of Latur, near Latur-Nanded Bridge	Bhatkheda	Latur	Latur

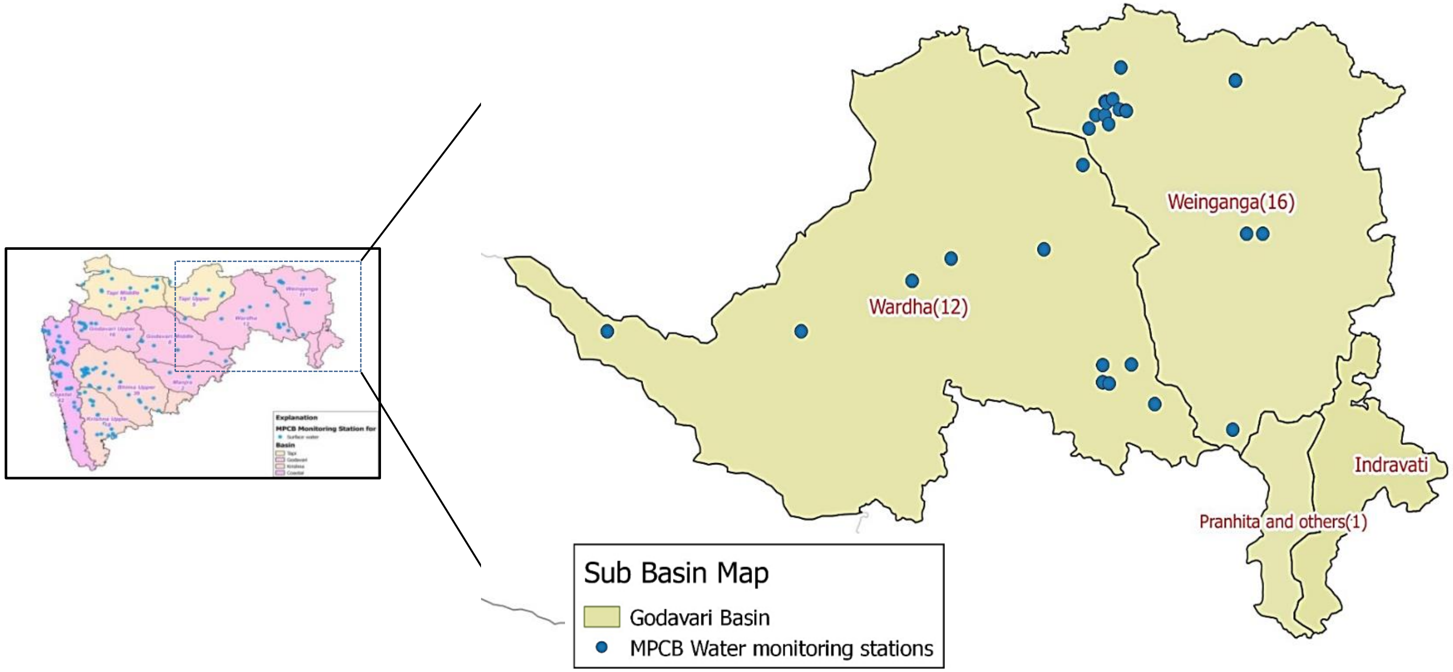
Spatial map of SurfaceWQI at Godavari Basin (1 of 2) (April 2017)



Spatial map of Surface WQI at Godavari Basin (1 of 2) (December 2017)



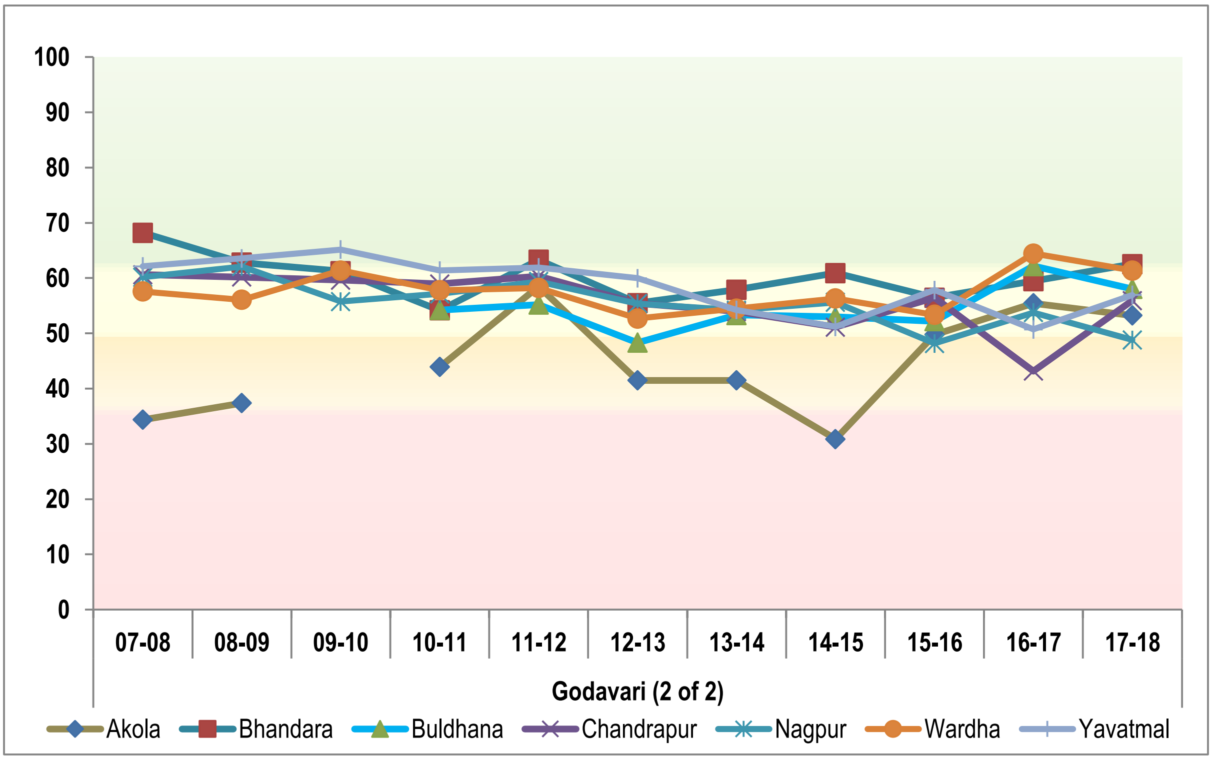
Godavari Basin (2 of 2): Wardha, Weinganga and Pranhita Sub basin



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

In basin 2, there are a total 29 surface water monitoring stations (12 on Wardha, 16 on Weinganga and 1 on Pranhita). The list of stations and codes has been provided below in Table No 19 and Table No 20

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 s in that district

Figure No. 18 depicts the intra basin performance of Godavari basin (2 of 2) across seven districts of the state. In the year 2017-18, Except Nagpur, The annual average WQI of all other mentioned districts were Medium to Good (50-63). The WQI of Nagpur is found to be in Bad category in 2017-18 compared to Medium to Good (2016-17) indicating decrease in water quality due to pollution. Though in same category of Medium to Good, the WQI of Bhandara, Chandrapur and Yavatmal increased considerable indiacting improvement in water quality while Akola, Buldhana and Wardha recorded decrease in WQI.

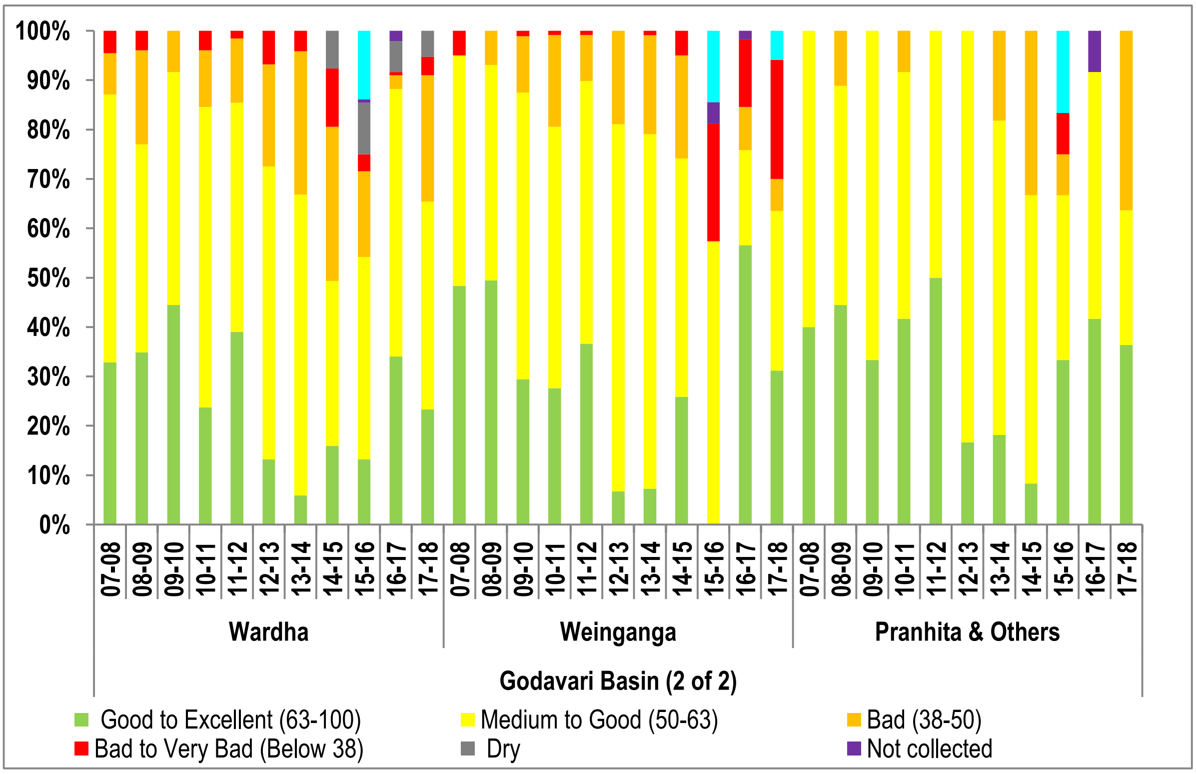
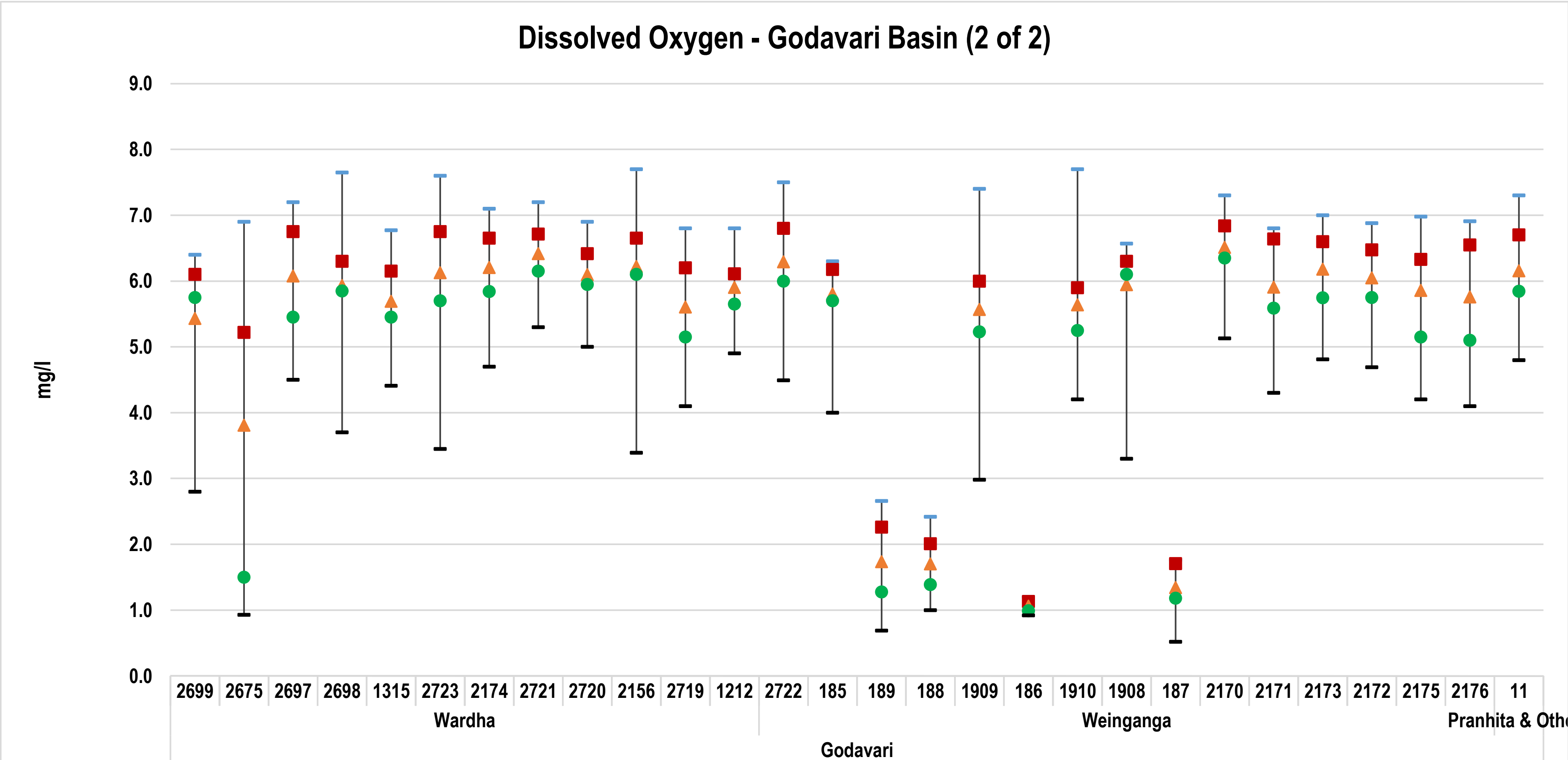


Figure No. 18: Trend of average occurrence for different category of WQI in Godavari basin (2 of 2)

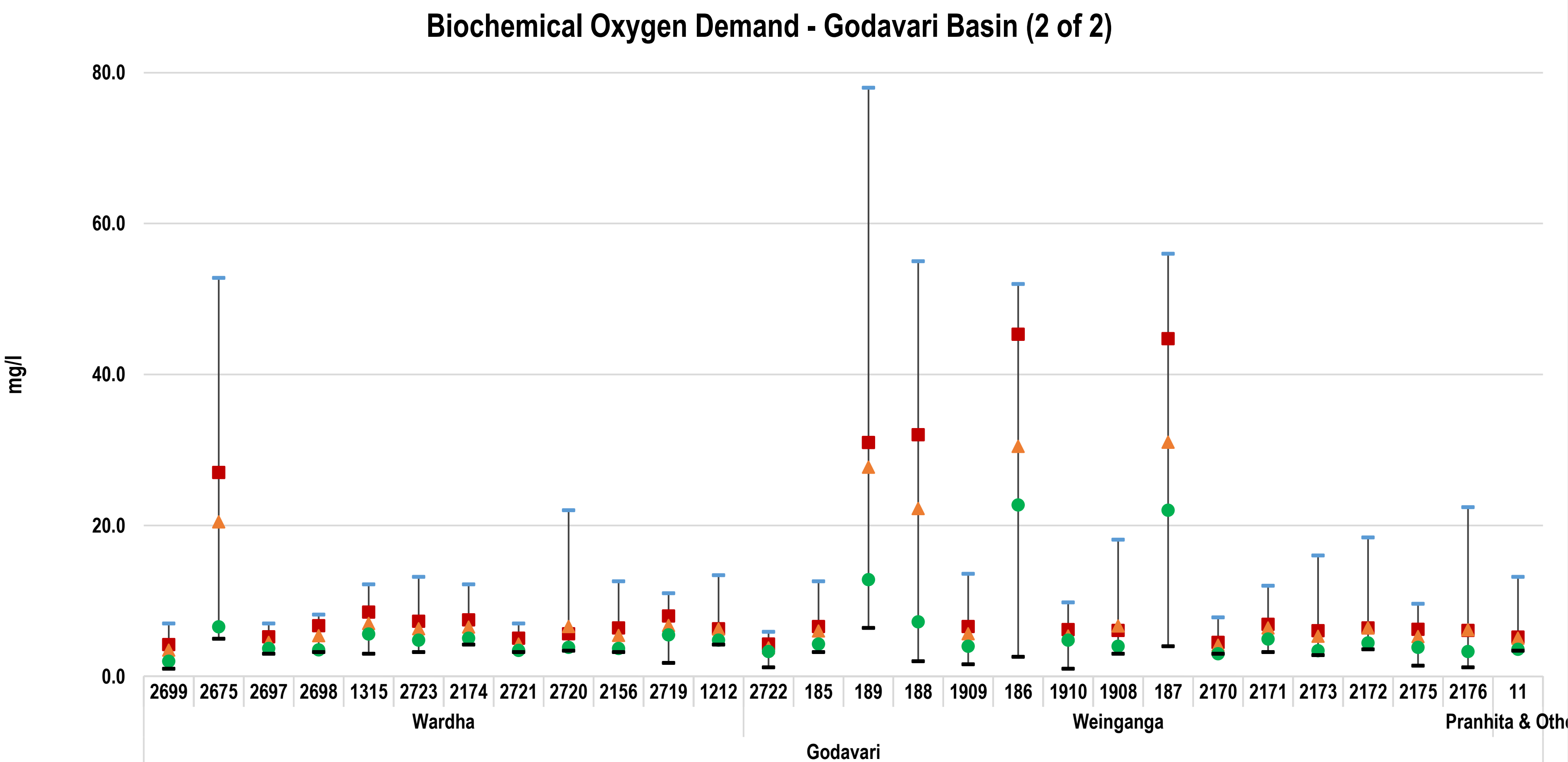
The trend of inter sub basin wise water quality for Godavari basin (2 of 2) recorded around 24%, 31% and 36% of the observations in "Good to Excellent" category for Wardha, Weinganga and Pranhita basin respectively. The extent of "Moderate to Good" WQI category was observed highest at Wardha (~43%) followed by Weinganga (~33) and Pranhita (~27%).

Around 36% of the observations from Pranhita basin were recorded under "Bad" category followed by Wardha (~26%) and Weinganga (~7%). Weinganga recorded around 24% of the observations in "Bad to Very Bad" category indicating the high extent of pollution compared to Wardha and Pranhita basin. As far as "Dry" category is concerned, 5.3% of the observations from Wardha sub basin fell under this category.



	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	185	189	188	1909	186	1910	1908	187	2170	2171	2173	2172	2175	2176	11
Max	6.4	6.9	7.2	7.7	6.8	7.6	7.1	7.2	6.9	7.7	6.8	6.8	7.5	6.3	2.7	2.4	7.4	1.2	7.7	6.6	1.8	7.3	6.8	7.0	6.9	7.0	6.9	7.3
75 Percentile	6.1	5.2	6.8	6.3	6.2	6.8	6.7	6.7	6.4	6.7	6.2	6.1	6.8	6.2	2.3	2.0	6.0	1.1	5.9	6.3	1.7	6.8	6.6	6.6	6.5	6.3	6.6	6.7
Average	5.4	3.8	6.1	5.9	5.7	6.1	6.2	6.4	6.1	6.2	5.6	5.9	6.3	5.8	1.7	1.7	5.6	1.1	5.6	5.9	1.3	6.5	5.9	6.2	6.0	5.9	5.8	6.2
25 Percentile	5.8	1.5	5.5	5.9	5.5	5.7	5.8	6.2	6.0	6.1	5.2	5.7	6.0	5.7	1.3	1.4	5.2	1.0	5.3	6.1	1.2	6.4	5.6	5.7	5.8	5.2	5.1	5.8
Min	2.8	0.9	4.5	3.7	4.4	3.5	4.7	5.3	5.0	3.4	4.1	4.9	4.5	4.0	0.7	1.0	3.0	0.9	4.2	3.3	0.5	5.1	4.3	4.8	4.7	4.2	4.1	4.8

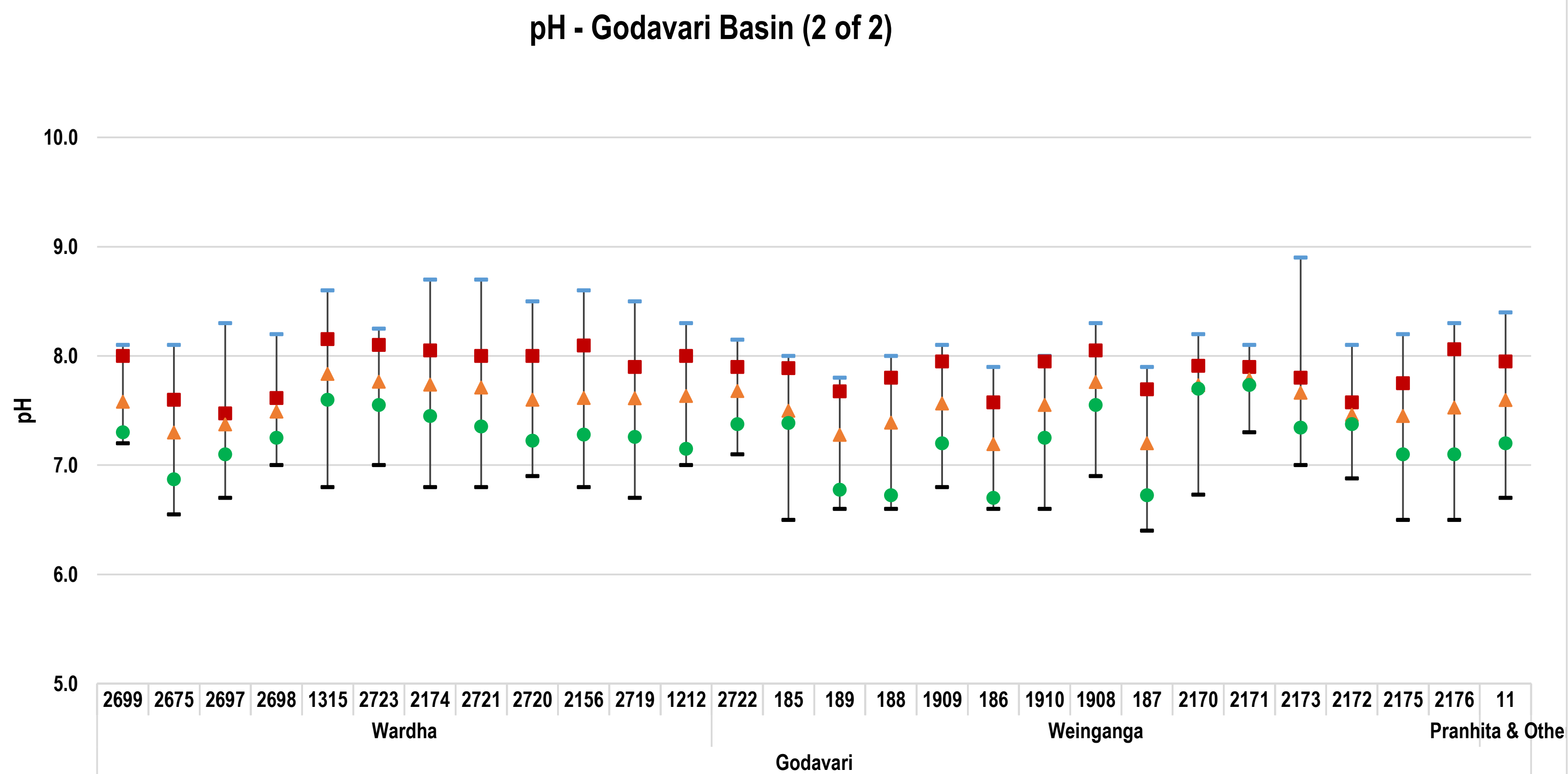
Figure No. 19: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Godavari basin (2 of 2)



	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	185
Max	7.0	52.8	7.0	8.2	12.2	13.2	12.2	7.0	22.0	12.6	11.0	13.4	5.9	12.6
75 Percentile	4.2	27.0	5.3	6.7	8.5	7.3	7.5	5.1	5.7	6.4	8.0	6.3	4.3	6.6
Average	3.5	20.5	4.5	5.4	7.0	6.3	6.5	4.3	6.6	5.4	6.8	6.3	3.8	6.0
25 Percentile	2.0	6.6	3.7	3.5	5.6	4.8	5.1	3.5	3.9	3.7	5.5	4.8	3.3	4.3
Min	1.0	5.0	3.0	3.2	3.0	3.2	4.2	3.2	3.4	3.2	1.8	4.2	1.2	3.2

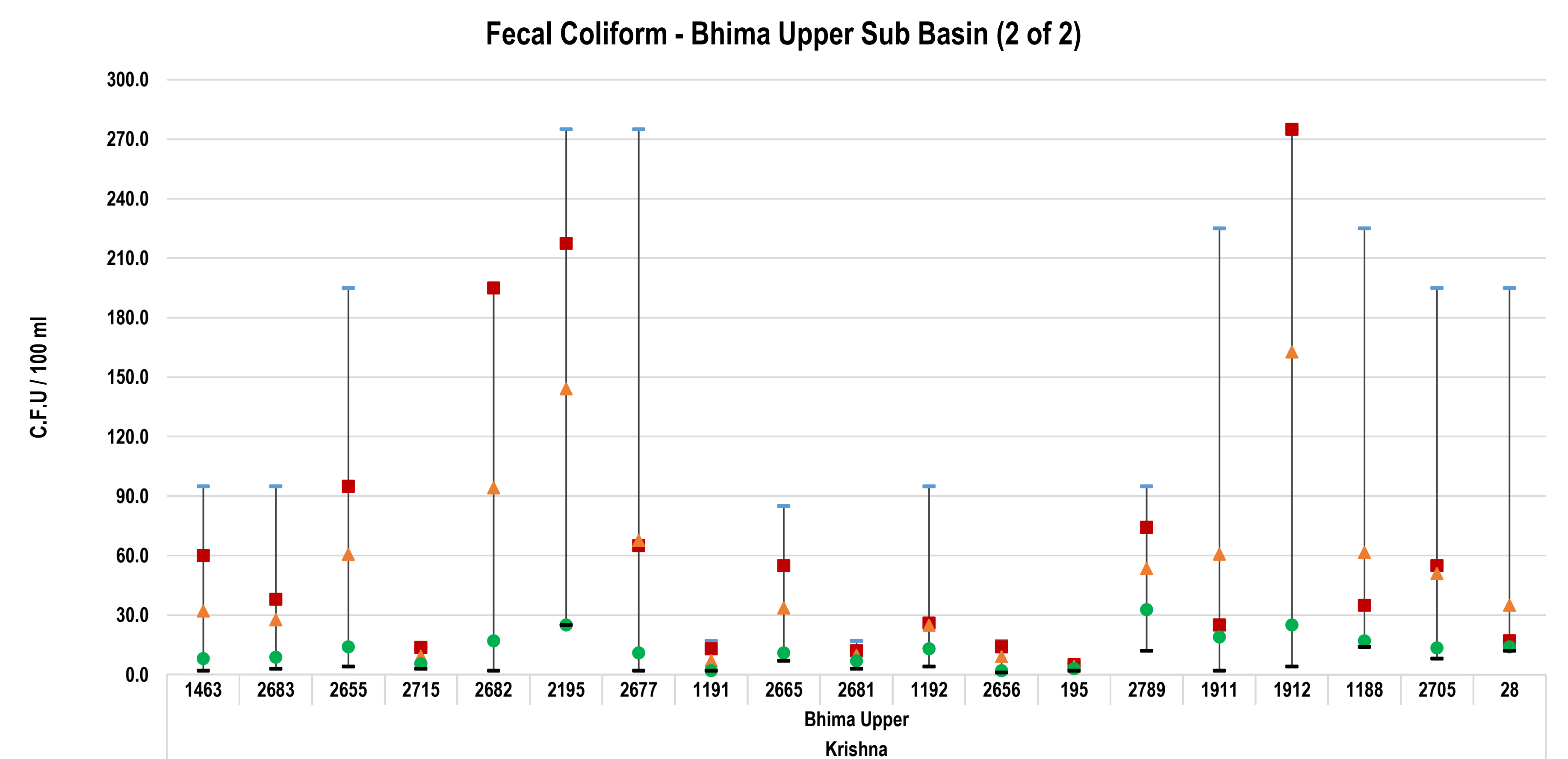
	189	188	1909	186	1910	1908	187	2170	2171	2173	2172	2175	2176	11
Max	78.0	55.0	13.6	52.0	9.8	18.1	56.0	7.8	12.0	16.0	18.4	9.6	22.4	13.2
75 Percentile	31.0	32.0	6.6	45.4	6.2	6.1	44.8	4.5	6.9	6.1	6.4	6.3	6.1	5.2
Average	27.7	22.3	5.7	30.5	5.3	6.7	31.0	4.1	6.4	5.3	6.4	5.3	6.2	5.1
25 Percentile	12.8	7.2	4.0	22.7	4.8	4.0	22.0	3.0	5.0	3.4	4.5	3.9	3.3	3.6
Min	6.4	2.0	1.6	2.6	1.0	3.0	4.0	3.0	3.2	2.8	3.6	1.4	1.2	3.4

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



	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212	2722	185	189	188	1909	186	1910	1908	187	2170	2171	2173	2172	2175	2176	11
Max	8.1	8.1	8.3	8.2	8.6	8.3	8.7	8.7	8.5	8.6	8.5	8.3	8.2	8.0	7.8	8.0	8.1	7.9	8.0	8.3	7.9	8.2	8.1	8.9	8.1	8.2	8.3	8.4
75 Percentile	8.0	7.6	7.5	7.6	8.2	8.1	8.1	8.0	8.0	8.1	7.9	8.0	7.9	7.9	7.7	7.8	8.0	7.6	8.0	8.1	7.7	7.9	7.9	7.8	7.6	7.8	8.1	8.0
Average	7.6	7.3	7.4	7.5	7.8	7.8	7.7	7.7	7.6	7.6	7.6	7.6	7.7	7.5	7.3	7.4	7.6	7.2	7.6	7.8	7.2	7.7	7.8	7.7	7.5	7.4	7.5	7.6
25 Percentile	7.3	6.9	7.1	7.3	7.6	7.6	7.5	7.4	7.2	7.3	7.3	7.2	7.4	7.4	6.8	6.7	7.2	6.7	7.3	7.6	6.7	7.7	7.7	7.3	7.4	7.1	7.1	7.2
Min	7.2	6.6	6.7	7.0	6.8	7.0	6.8	6.8	6.9	6.8	6.7	7.0	7.1	6.5	6.6	6.6	6.8	6.6	6.6	6.9	6.4	6.7	7.3	7.0	6.9	6.5	6.5	6.7

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



	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	195	2789	1911	1912	1188	2705	28
Max	95.0	95.0	195.0	14.0	195.0	275.0	275.0	17.0	85.0	17.0	95.0	17.0	6.0	95.0	225.0	275.0	225.0	195.0	195.0
75 Percentile	60.0	38.0	95.0	13.8	195.0	217.5	65.0	13.0	55.0	12.0	26.0	14.0	5.0	74.3	25.0	275.0	35.0	55.0	17.0
Average	32.1	27.7	60.7	9.3	94.2	144.0	67.7	6.9	33.6	9.8	24.9	9.1	4.0	53.5	60.8	162.7	61.6	51.0	34.9
25 Percentile	8.0	8.8	14.0	5.5	17.0	25.0	11.0	2.0	11.0	7.0	13.0	2.0	3.0	32.8	19.0	25.0	17.0	13.5	14.0
Min	2.0	3.0	4.0	3.0	2.0	25.0	2.0	2.0	7.0	3.0	4.0	1.0	2.0	12.0	2.0	4.0	14.0	8.0	12.0

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		34	45	49	58	58	41	45	47	47	41	45
May		49	54	47	53	64	44	47	55	46	40	50
Jun		43	65	65	57	No data	56	58	70	61	63	47
Jul	47	34	74	62	57	61	65	69	68	68	64	62
Aug	57	28	54	54	65	63	57	66	64	63	63	56
Sep	62	57	56	52	60	55	50	52	47	54	41	48
Oct	66	54	51	51	62	63	59	64	67	53	60	63
Nov	58	61	49	48	56	55	44	49	43	47	44	42
Dec		64	72	76	48	62	62	68	54	74	49	58
Jan		36	71	62	57	72	68	69	73	65	69	62
Feb		36	62	57	62	70	65	65	68	62	64	66
Mar		47	55	49	52	46	50	60	61	48	50	53
Station Code	2699	2675	2697	2698	1315	2723	2174	2721	2720	2156	2719	1212
Sub Basin	Wardha											
Basin	Godavari											

Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

Table No 19: Surface water quality monitoring stations in Godavari Basin (2 of 2)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	2699	Penganga	Penganga at Mehkar-Buldana Road Bridge	Mehkar	Mehkar	Buldana
NWMP	2675	Morna	Morna at D/s of Railway Bridge	Akola	Akola	Akola
NWMP	2697	Penganga	Penganga near water supply scheme of Umarkhed MC	Belkhed	Umarkhed	Yavatmal
NWMP	2698	Penganga	Penganga D/s of Isapur Dam	Isapur	Pusad	Yavatmal
NWMP	1315	Wardha	Wardha at Pulgaon Railway Bridge	Pulgaon	wardha	Wardha
NWMP	2723	Wena	Wena at D/s of Mohata Mills, near Bridge on Hinganghat-Wadner Road	Hinganghat	Hinganghat	Wardha
NWMP	2174	Wardha	Wardha at D/s of ACC Ghuggus	Ghuggus	Chandrapur	Chandrapur
NWMP	2721	Wardha	Wardha at U/s of ACC Ghuggus	Ghuggus	Chandrapur	Chandrapur
NWMP	2720	Wardha	Wardha at U/s of Erai	Hadasti	Chandrapur	Chandrapur
NWMP	2156	Wardha	Wardha at confluence point of Penganga & Wardha	Jugad	Wani	Yavatmal
NWMP	2719	Wardha	Wardha at D/s of Erai	Hadasti	Chandrapur	Chandrapur
NWMP	1212	Wardha	Wardha at Rajura bridge	Rajura	Chandrapur	Chandrapur

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

Apr	68	64	34	26	57	30	55	67	33	73	68	66	63	40	36	46
May	70	64	34	26	62	30	60	64	33	68	53	46	47	51	42	48
Jun	52	62	28	27	44	30	55	53	35	67	60	51	47	55	47	60
Jul	70	61	31	29	56	28	58	66	33	67	63	73	67	71	67	62
Aug	66	52	27	26	64	26	60	63	24	67	68	71	69	64	59	50
Sep	63	59	28	28	61	28	60	62	26	66	63	71	70	50	52	51
Oct	68	65	33	37	59	27	60	63	27	69	64	66	60	47	51	67
Nov	59				54		48	54		56	53	60	60	47	42	43
Dec	66	47	27	29	64	24	55	63	29	63	60	57	52	54	56	69
Jan	75	66	27	28	67	28	64	59	28	67	64	71	66	63	67	73
Feb	68				67		70	47		70	58	60	63	63	67	67
Mar	54	64	36	32	45	25	55	56	30	54	53	59	60	53	52	56
Station Code	2722	185	189	188	1909	186	1910	1908	187	2170	2171	2173	2172	2175	2176	11
Sub Basin	Weinganga															Pranhita & Others
Basin	Godavari															

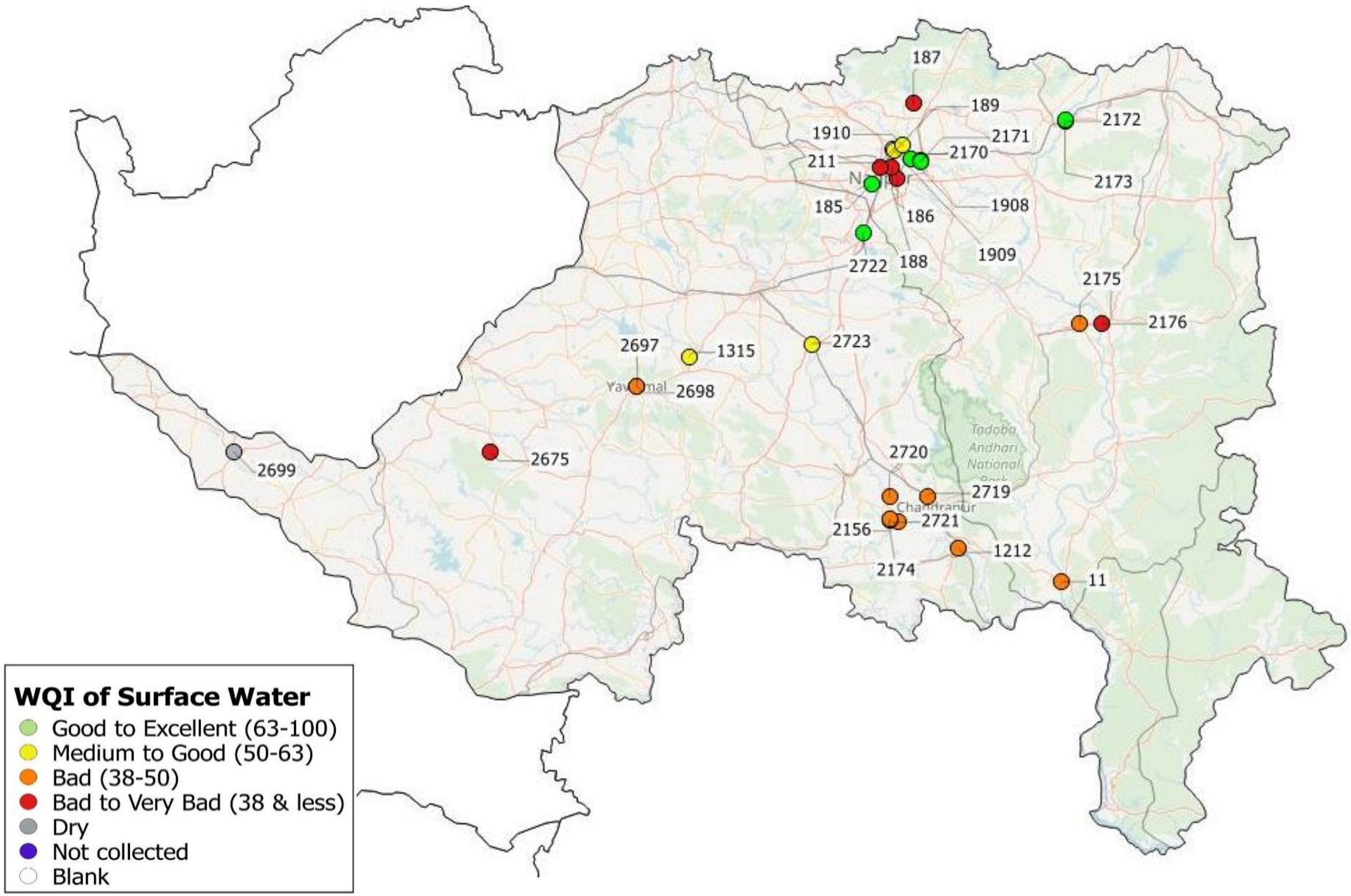
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

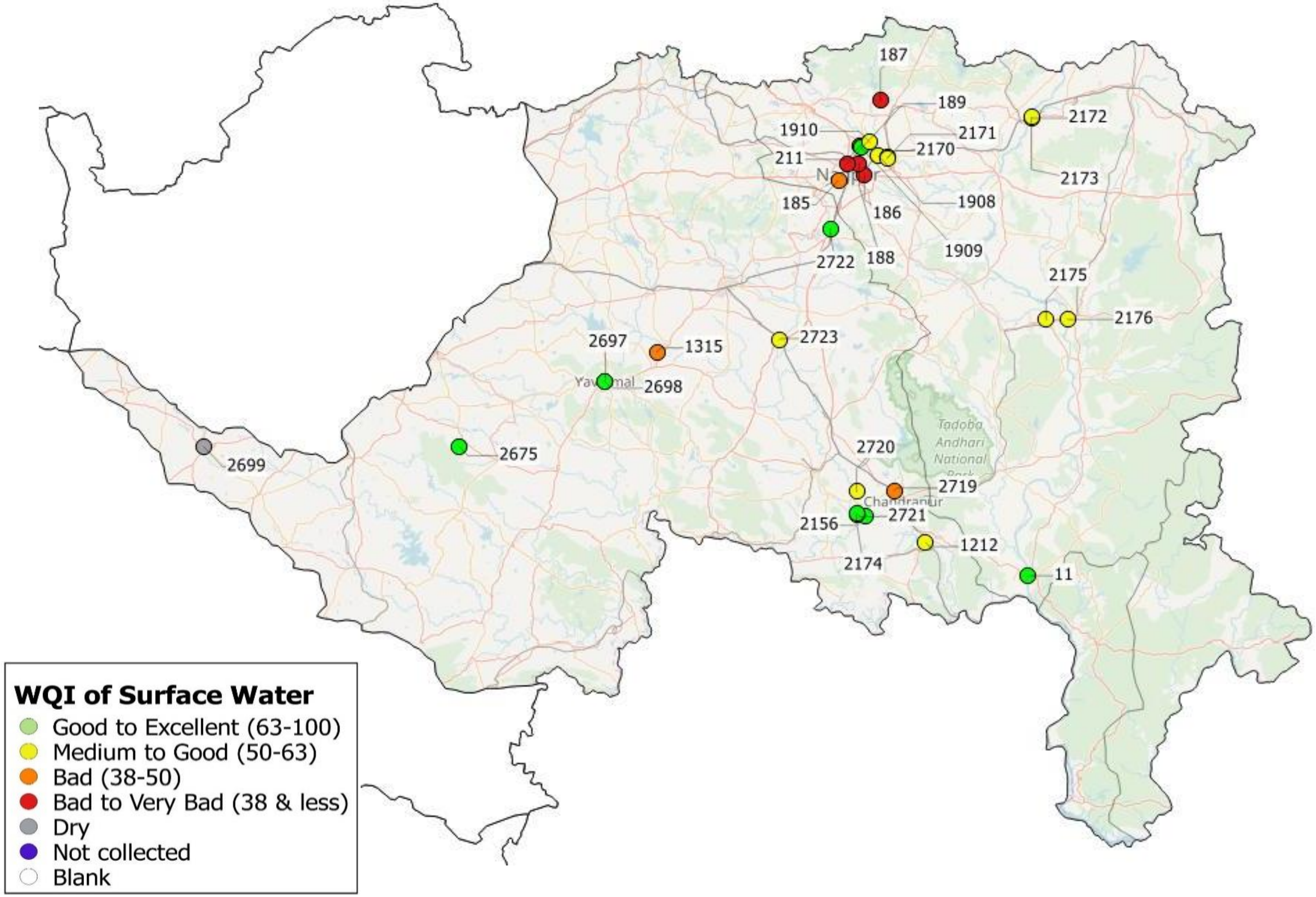
Table No 20: Surface water quality monitoring stations in Godavari Basin (2 of 2)

Program	Station ID	River/nalla	Station Name	Village	Taluka	District
NWMP	2722	Wena	Wena at U/s of Mohata Mills, nearby Brigde on Hinganghat Wadner Road	Hinganghat	Hinganghat	Wardha
SWMP	185	Nag	Nag Near, Ambazari Lake, Nagpur	Nagpur	Nagpur	Nagpur
SWMP	189	Pill	Pill Near, Mankapur on Koradi Road, Nagpur	Nagpur	Nagpur	Nagpur
SWMP	188	Pill	Pill Near, Wanjra Layout Kamptee Road, Nagpur	Nagpur	Nagpur	Nagpur
NWMP	1909	Kanhan	Kanhan at D/s of Nagpur	Agargaon	Kuhi	Nagpur
SWMP	186	Nag	Nag Near, Bhandewadi Bridge, Nagpur	Nagpur	Nagpur	Nagpur
NWMP	1910	Wainganga	Wainganga after confluence with Kanhan	Ambhora	Kuhi	Nagpur
NWMP	1908	Kolar	Kolar before confluence with Kanhan at Waregaon Bridge	Waregaon	Kamptee	Nagpur
SWMP	187	Nag	Nag Near, Asoli Bridge, Bhandara Road, Nagpur	Nagpur	Nagpur	Nagpur
NWMP	2170	Kanhan	Kanhan (Wainganga basin) at U/s of M/s Vidharba Paper Mill	Sinora	Parseoni	Nagpur
NWMP	2171	Kanhan	Kanhan (Wainganga basin) at D/s of M/s Vidharbha Paper Mills	Sinora	Parseoni	Nagpur
NWMP	2173	Wainganga	Wainganga at U/s of Ellora Paper Mills	Tumsar	Tumsar	Bandara
NWMP	2172	Wainganga	Wainganga at D/s of Ellora Paper Mill	Tumsar	Tumsar	Bandara
NWMP	2175	Wainganga	Wainganga at U/s of Gaurav Paper Mills near Jack Well	Bramhpuri	Chandrapur	Chandrapur
NWMP	2176	Wainganga	Wainganga at D/s of Gaurav Paper Mills Near Jackwell	Bramhpuri	Chandrapur	Chandrapur
NWMP	11	Wainganga	Wainganga at Ashti	Ashti	Gondpipri	Chandrapur

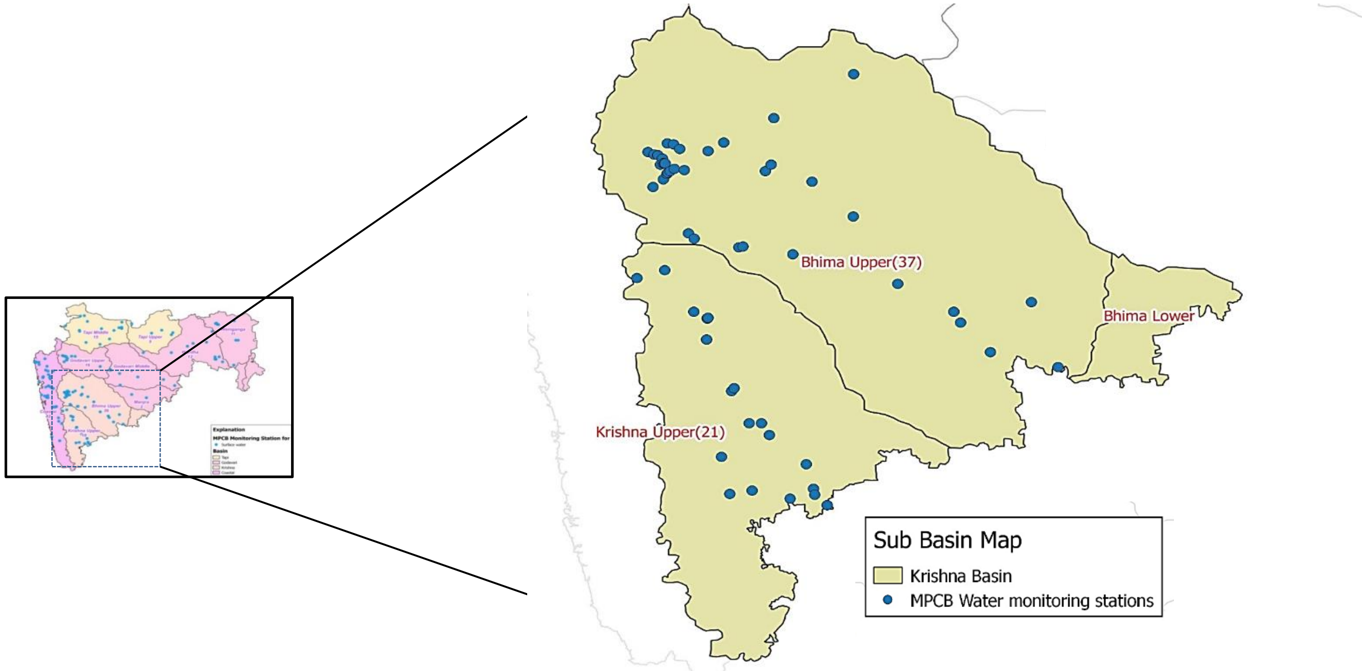
Spatial map of Surface WQI in Godavari Basin (2 of 2) (April 2017)



Spatial map of Surface WQI in Godavari Basin (2 of 2) (December 2017)



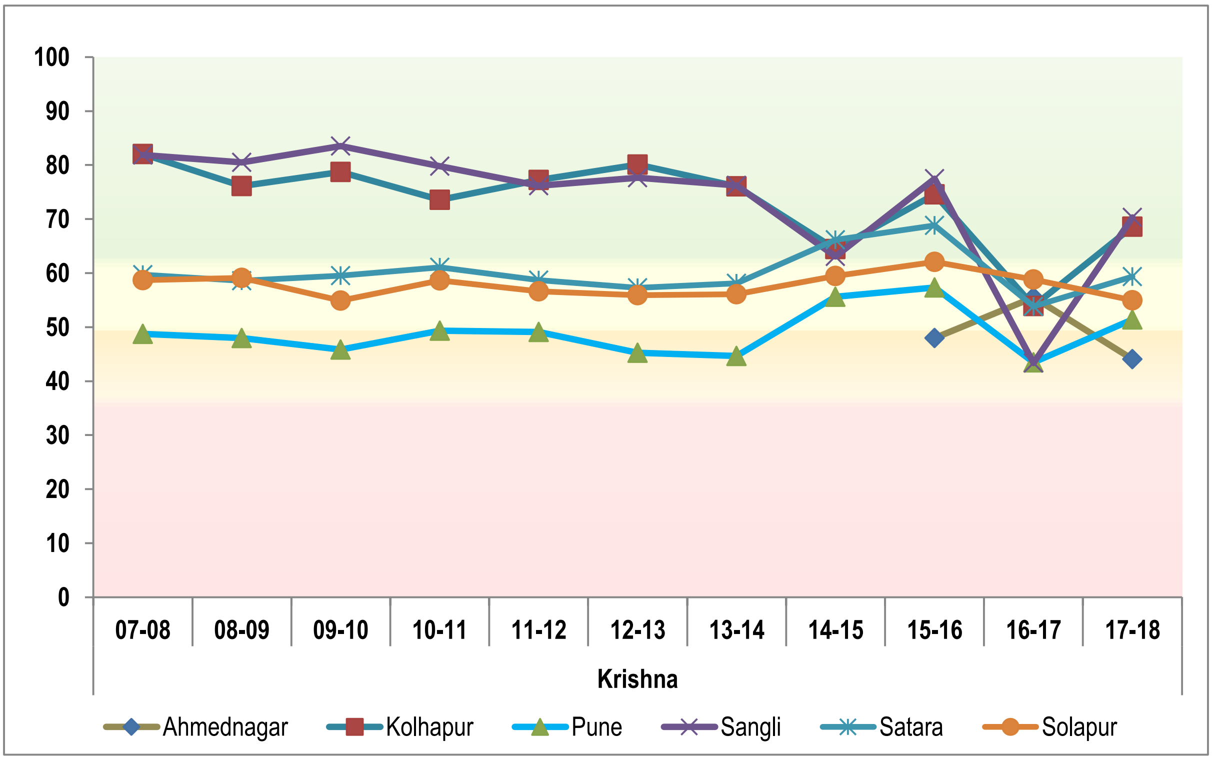
Krishna Basin



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

Krishna river basin covers a total area of around 2, 58,948 sq. km, extends over the states of Andhra Pradesh, Maharashtra and Karnataka which is nearly 8% of the total geographical area of the country. The length of the river is about 1400km which drains the Deccan plateau and discharges into the Bay of Bengal. Its major tributaries are the Ghataprabha, the Malaprabha, The Bhima, the Tungbhadra, the Munneru and the Musi River. The Krishna basin is divided into Krishna Upper (21 stations) and Bhima Upper (37 stations) for analysis in this report

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 s in that district

The intra basin performance of Krishna Basin across six districts is depicted in the Figure No. 23.Out of six districts, annual average of Sangli improved significantly from Bad category to Good and Excellent. Similar improvement was recorded Kolhapur wherein the WQI came under Good to excellent in 2017-18 from Medium to Good in 2016-17 indicating significant improvement in water quality. Pune WQI also registered improvement in annual average WQI from Bad (2016-17) to Medium to Good in 2017-18.

On the contrary, annual average WQI of Ahmednagar district decreased from Medium to Good (2016-17) to Bad category in 2017-18. Similar situation was observed Solapur where the WQI decreased slightly and came in Medium to Good category.

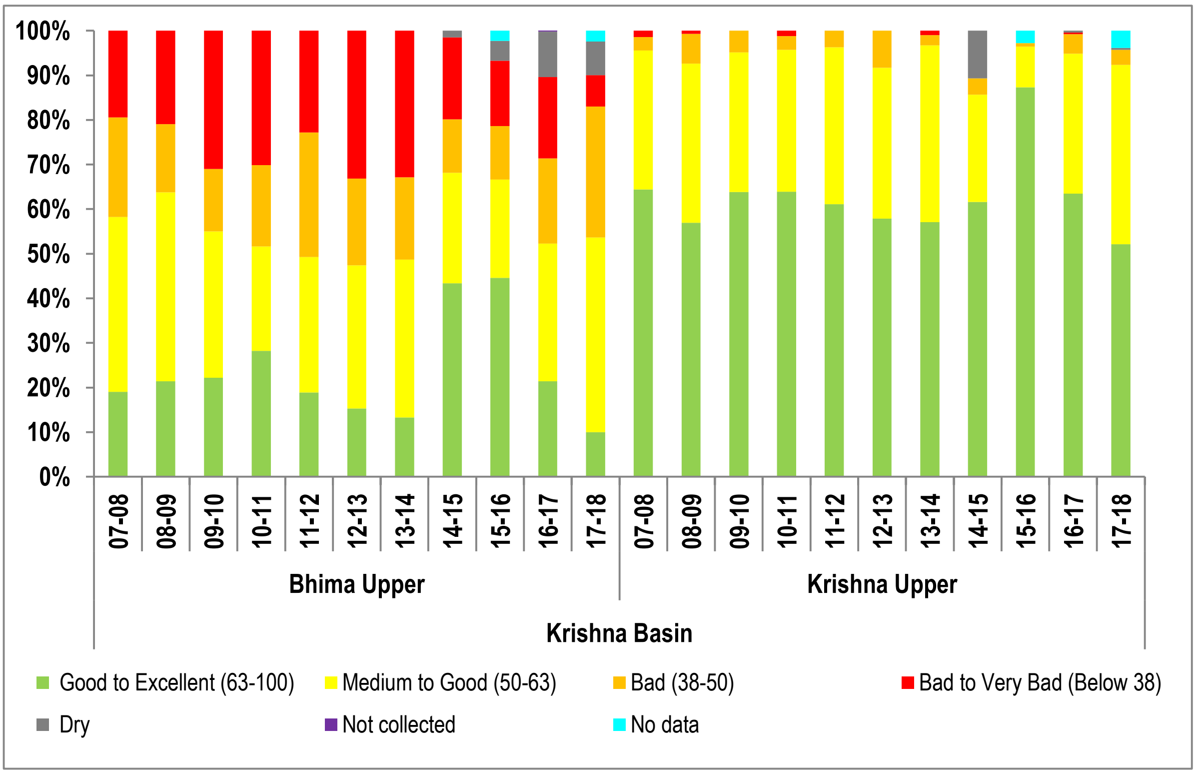
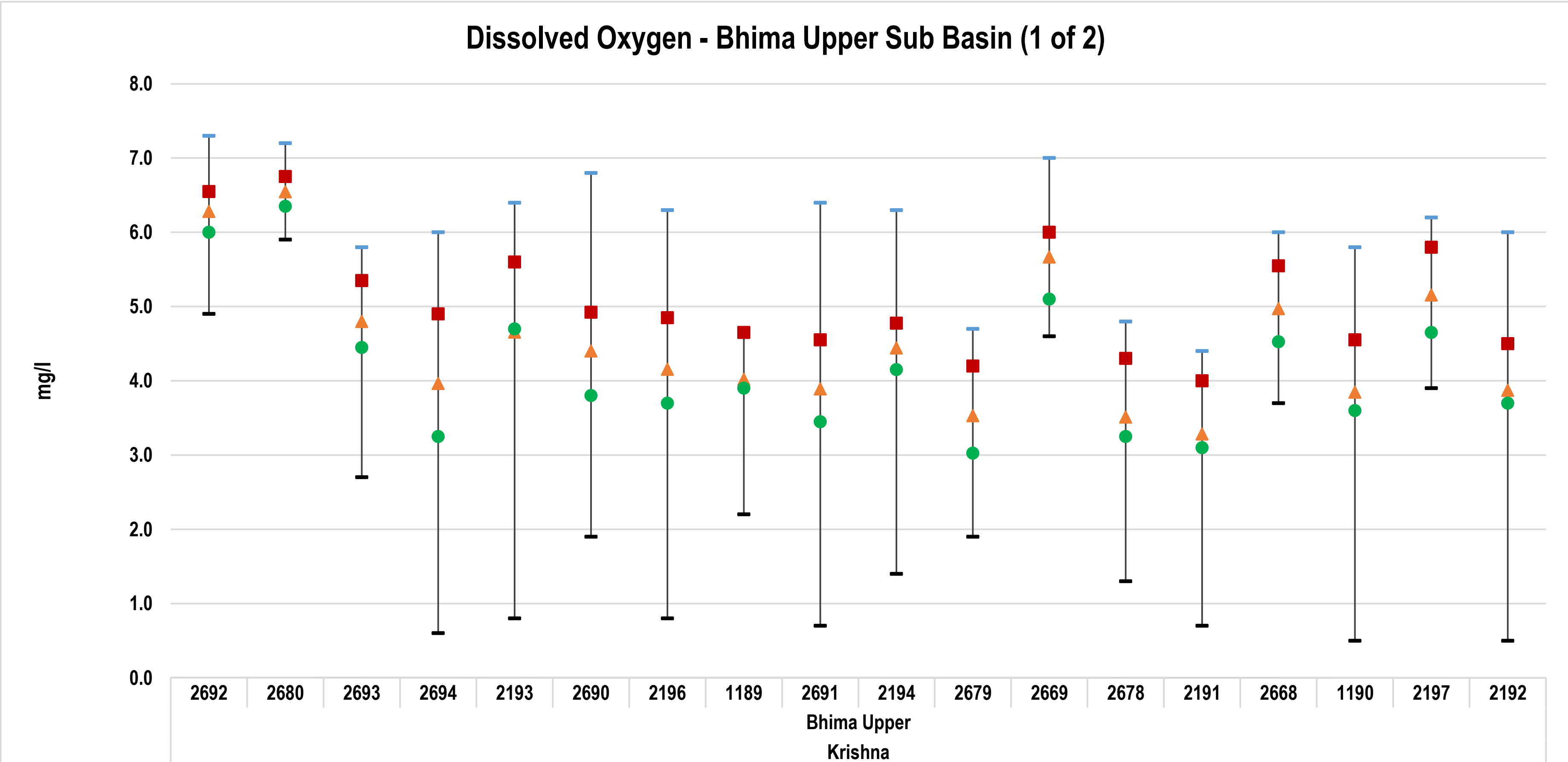


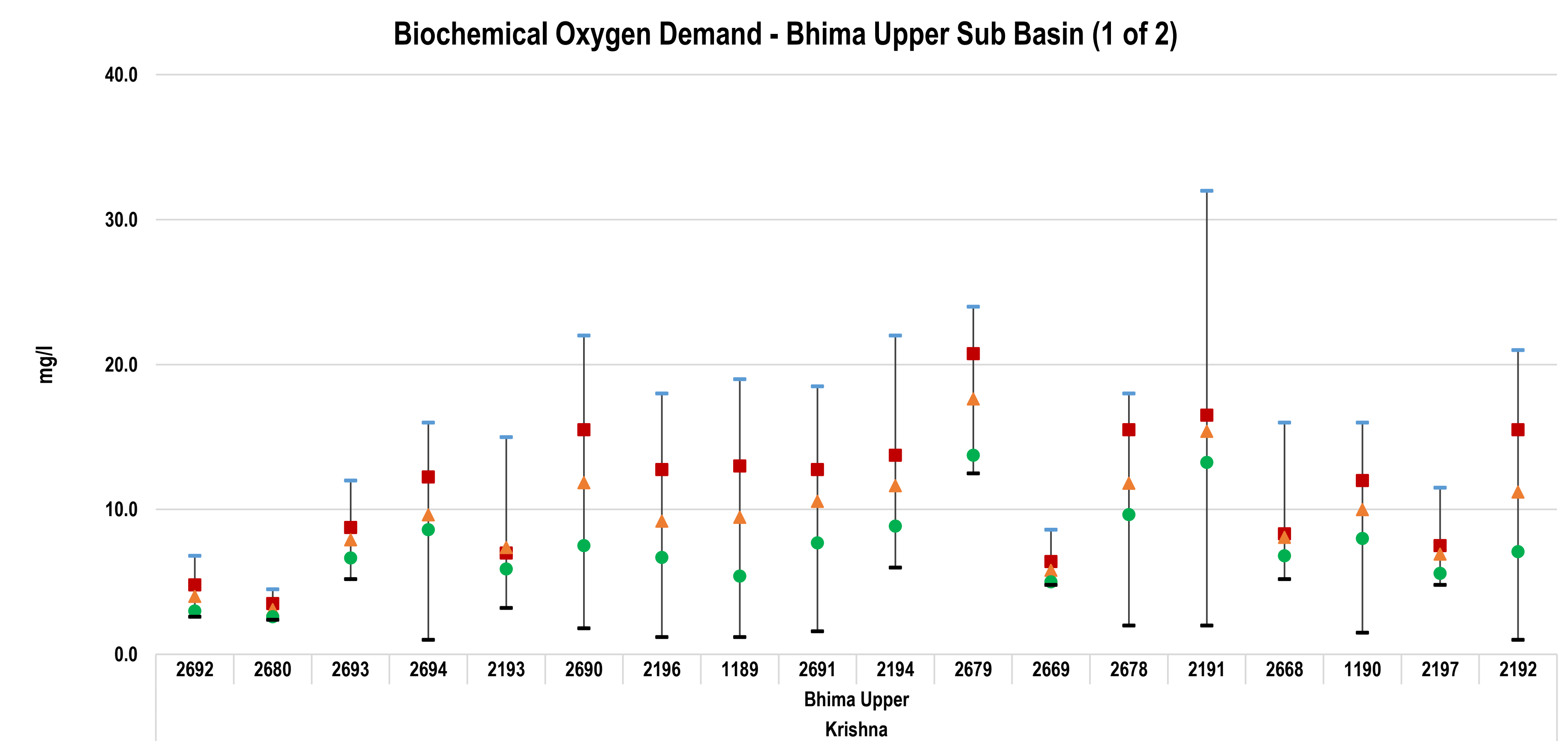
Figure No. 24: Trend of average occurrence for different category of WQI in Krishna basin

Inter sub basin results for Krishna basin are depicted in Figure No. 24. Around 52% observations from Krishna Upper were recorded within “Good to Excellent” category compared to just nearly 10% of the observations in Bhima Upper. In case of “Medium to Good” category, Krishna Upper recorded around 40% while Bhima Upper recorded around 44% of the observations in this category. The maximum occurrence of “Bad” category is recorded in Bhima Upper (~30%) compared to only about 3.5% in Krishna Upper basin. Bhima Upper also recorded nearly 7% observations under “Bad to Very Bad” category indicating extent of levels of water pollution in Bhima Upper basin compared to Krishna Upper basin. Around 2% and 4% of the observations from Bhima Upper and Krishna Upper basin respectively were recorded as “No data”



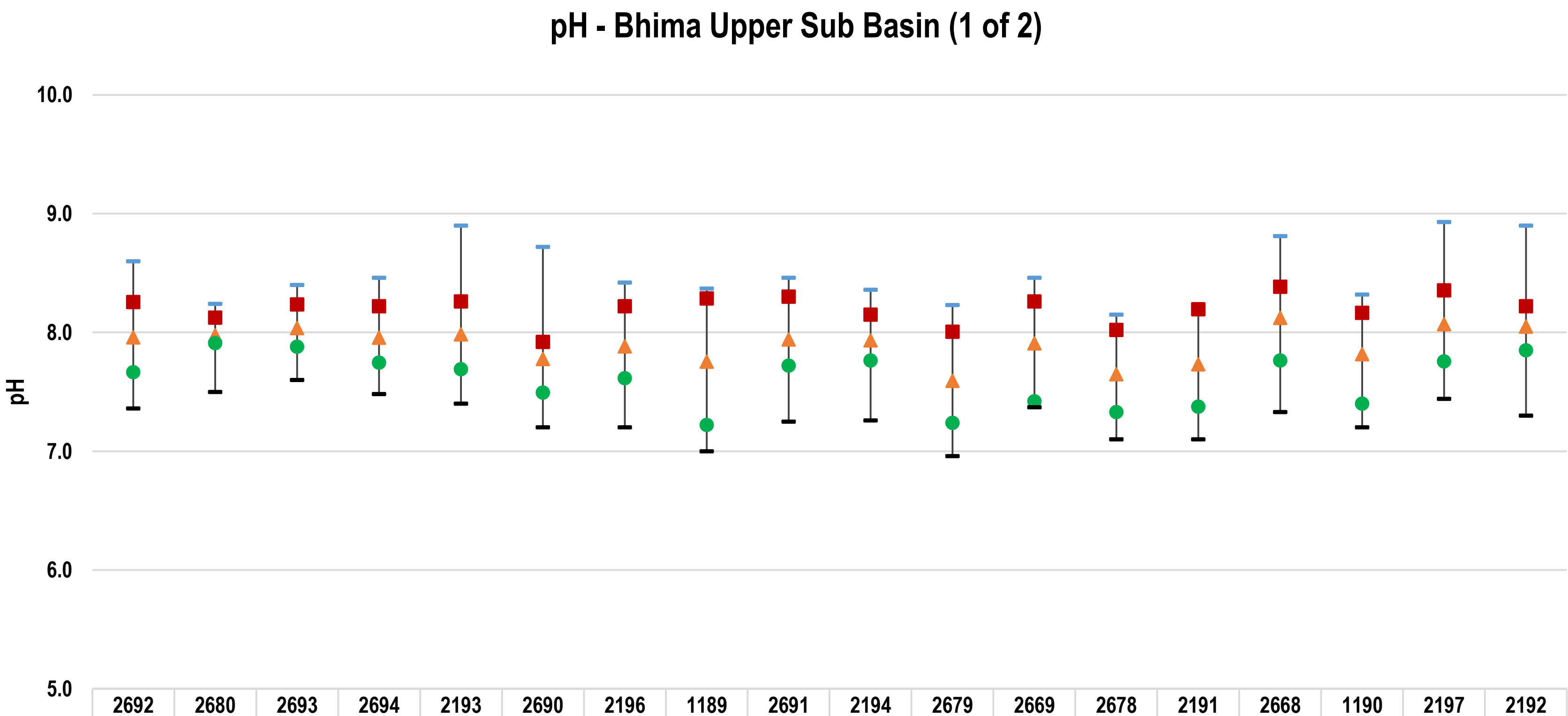
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	7.3	7.2	5.8	6.0	6.4	6.8	6.3	4.7	6.4	6.3	4.7	7.0	4.8	4.4	6.0	5.8	6.2	6.0
75 Percentile	6.6	6.8	5.4	4.9	5.6	4.9	4.9	4.7	4.6	4.8	4.2	6.0	4.3	4.0	5.6	4.6	5.8	4.5
Average	6.3	6.5	4.8	4.0	4.7	4.4	4.2	4.0	3.9	4.4	3.5	5.7	3.5	3.3	5.0	3.8	5.2	3.9
25 Percentile	6.0	6.4	4.5	3.3	4.7	3.8	3.7	3.9	3.5	4.2	3.0	5.1	3.3	3.1	4.5	3.6	4.7	3.7
Min	4.9	5.9	2.7	0.6	0.8	1.9	0.8	2.2	0.7	1.4	1.9	4.6	1.3	0.7	3.7	0.5	3.9	0.5

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



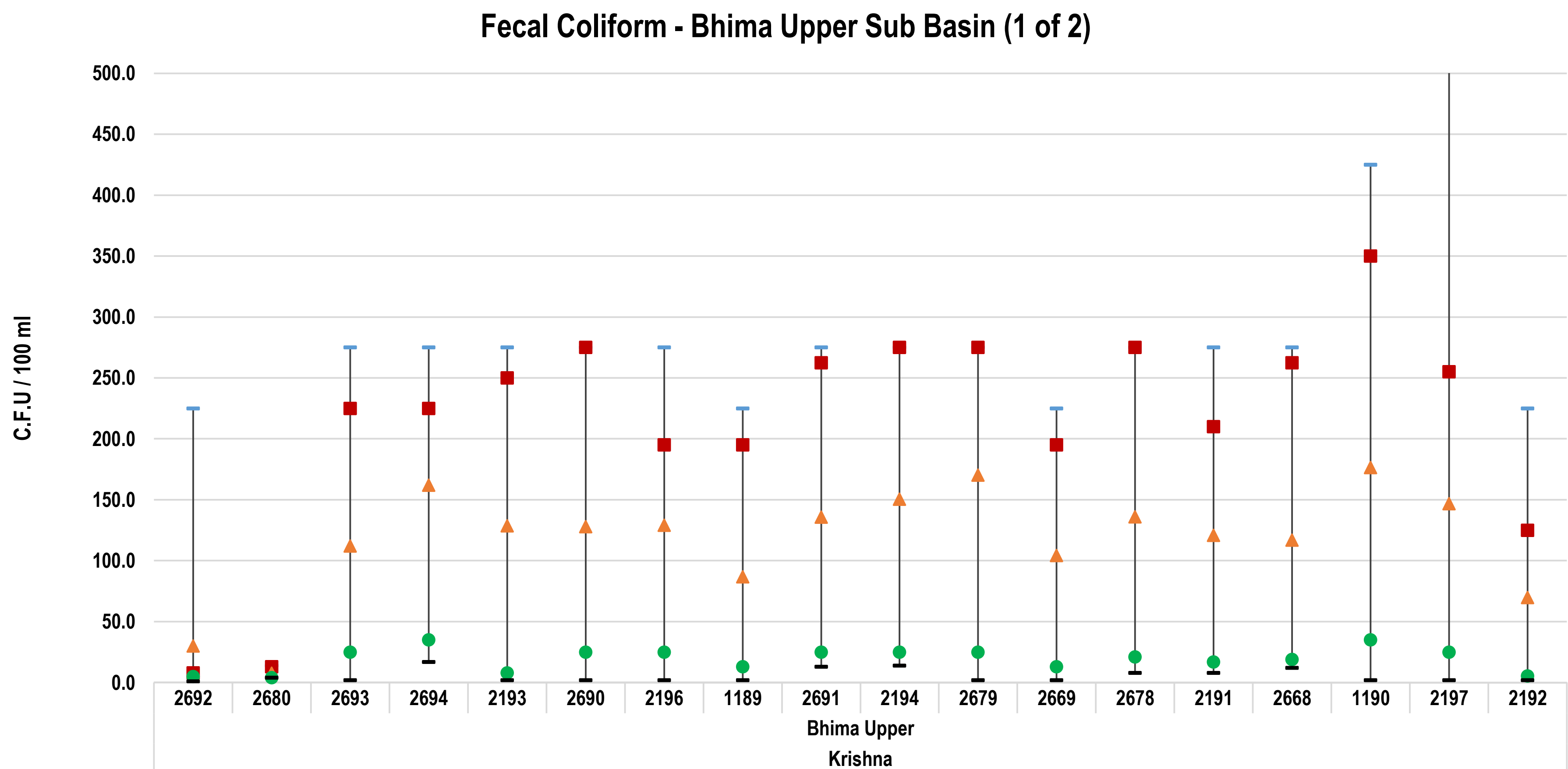
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	6.8	4.5	12.0	16.0	15.0	22.0	18.0	19.0	18.5	22.0	24.0	8.6	18.0	32.0	16.0	16.0	11.5	21.0
75 Percentile	4.8	3.5	8.8	12.3	7.0	15.5	12.8	13.0	12.8	13.8	20.8	6.4	15.5	16.5	8.3	12.0	7.5	15.5
Average	4.0	3.1	7.9	9.6	7.4	11.8	9.2	9.5	10.6	11.6	17.6	5.8	11.8	15.4	8.1	10.0	6.9	11.2
25 Percentile	3.0	2.6	6.7	8.6	5.9	7.5	6.7	5.4	7.7	8.9	13.8	5.0	9.7	13.3	6.8	8.0	5.6	7.1
Min	2.6	2.4	5.2	1.0	3.2	1.8	1.2	1.2	1.6	6.0	12.5	4.8	2.0	2.0	5.2	1.5	4.8	1.0

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



Bhima Upper / Krishna	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	8.6	8.2	8.4	8.5	8.9	8.7	8.4	8.4	8.5	8.4	8.2	8.5	8.2	8.2	8.8	8.3	8.9	8.9
75 Percentile	8.3	8.1	8.2	8.2	8.3	7.9	8.2	8.3	8.3	8.2	8.0	8.3	8.0	8.2	8.4	8.2	8.4	8.2
Average	8.0	8.0	8.0	8.0	8.0	7.8	7.9	7.8	7.9	7.9	7.6	7.9	7.6	7.7	8.1	7.8	8.1	8.1
25 Percentile	7.7	7.9	7.9	7.7	7.7	7.5	7.6	7.2	7.7	7.8	7.2	7.4	7.3	7.4	7.8	7.4	7.8	7.9
Min	7.4	7.5	7.6	7.5	7.4	7.2	7.2	7.0	7.3	7.3	7.0	7.4	7.1	7.1	7.3	7.2	7.4	7.3

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
Max	225.0	14.0	275.0	275.0	275.0	275.0	275.0	225.0	275.0	275.0	275.0	225.0	275.0	275.0	275.0	425.0	595.0	225.0
75 Percentile	8.0	13.0	225.0	225.0	250.0	275.0	195.0	195.0	262.5	275.0	275.0	195.0	275.0	210.0	262.5	350.0	255.0	125.0
Average	29.9	7.7	112.1	161.9	128.6	128.0	129.1	86.7	135.8	150.5	170.2	104.3	136.0	120.7	116.9	176.5	146.7	69.8
25 Percentile	5.0	4.0	25.0	35.0	8.0	25.0	25.0	13.0	25.0	25.0	25.0	13.0	21.0	17.0	19.0	35.0	25.0	5.5
Min	1.0	4.0	2.0	17.0	2.0	2.0	2.0	2.0	13.0	14.0	2.0	2.0	8.0	8.0	12.0	2.0	2.0	2.0

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

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

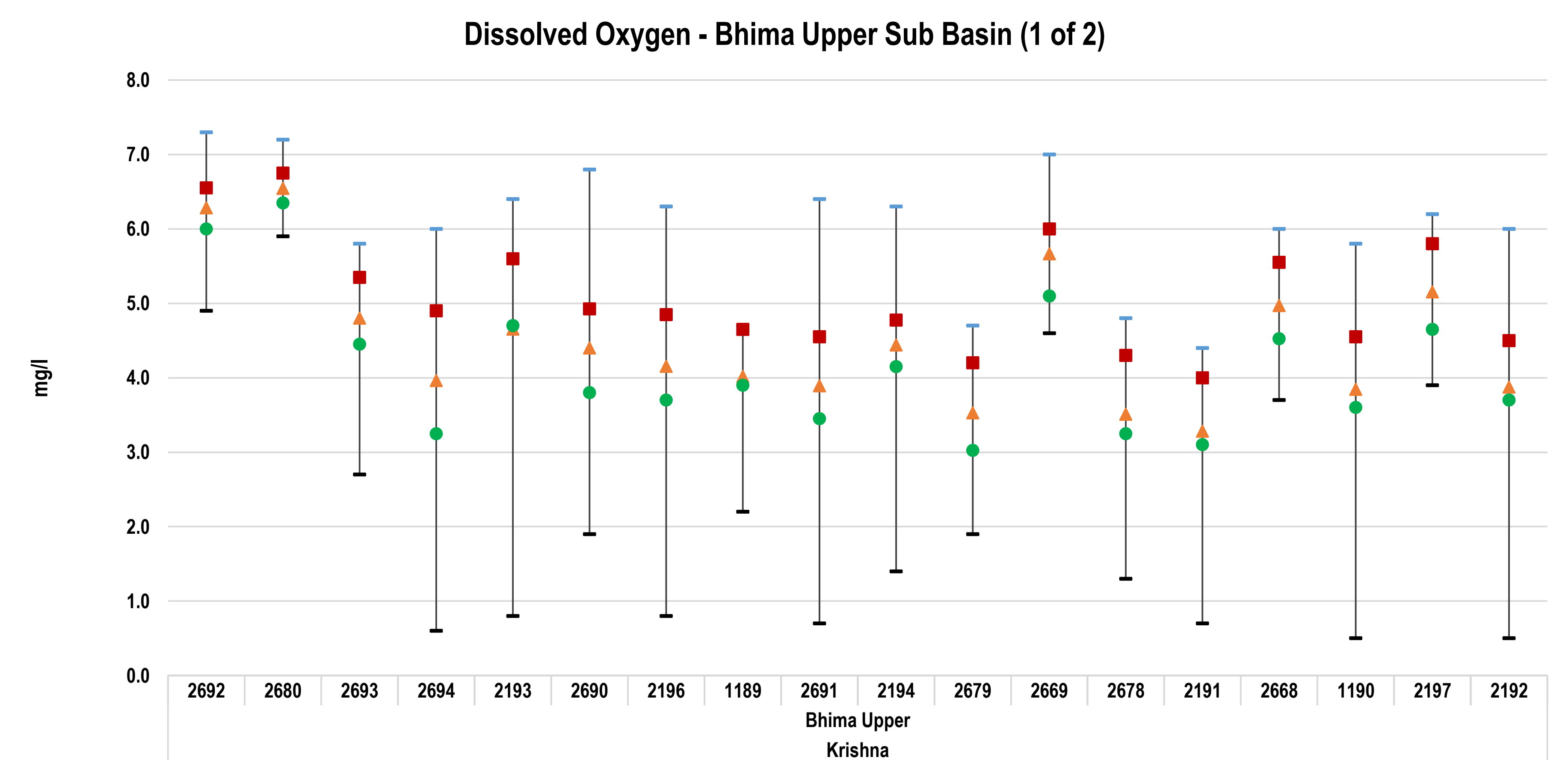
Apr	50	48	42	31	41	29	30	50	27	39	37		38	38		40	39	43
May	46	67	28	23	32	20	25	40	34	30	30		37	33	54	41	56	36
Jun	42	26	33	33	34	31	32	32	31	30	68		29	31	51	27	48	33
Jul	77	78	54	50	62	52	55	53	57	62	51	66	49	50	60	60	62	54
Aug	72	52	49	53	56	53	56	42	55	55	37	57	38	39	52	49	53	54
Sep	75	77	50	46	60	54	49	47	50	50	38	57	52	46	48	47	51	47
Oct	72	64	58	51	57	62	49	49	46	45	45	63	46	51	59	46	58	48
Nov	49	74	49	45	54	41	44	45	42	44	43	52	44	42	47	42	42	42
Dec	79	73	48	48	51	43	44	46	44	44	43	54	44	42	50	38	55	40
Jan	74	78	48	39	47	42	55	48	46	45	47	49	47	48	37	40	42	46
Feb	74	71	54	44	56	50	44	49	45	43	43	54	44	44	46	45	50	44
Mar	73	75	52	45	54	42	44	46	44	45	47	61	45	46	57	43	56	47
Station Code	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Sub Basin	Bhima Upper (1 of 2)																	
Basin	Krishna																	

Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

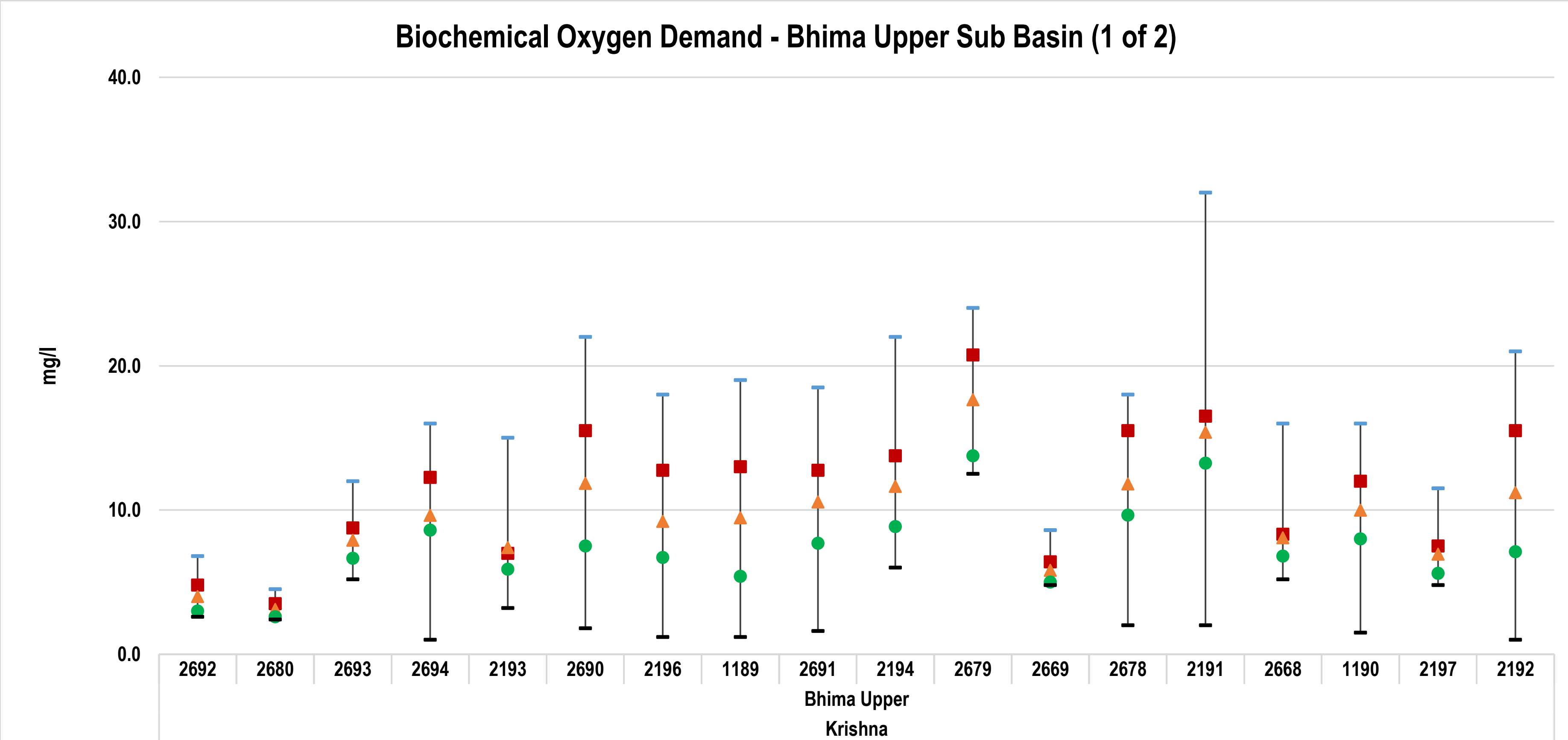
Table No 21: **Surface water quality monitoring stations in Krishna Basin (1 of 2) Sub Basin –Bhima Upper (1 of 2)**

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	2692	Pawana	Pawana at Ravet Weir, Pune	Ravet	Haweli	Pune
NWMP	2680	Mutha	Mutha at Khadakvasla Dam Pune	Kadakvasla	Haweli	Pune
NWMP	2693	Pawana	Pawana at Chinchwadgaon, Pune	Chinchwadgaon	Haweli	Pune
NWMP	2694	Pawana	Pawana at Pimprigaon, Pune	Pimprigaon	Haweli	Pune
NWMP	2193	Mula	Mula at Aundh Bridge -Aundgaon	Aundhgaon	Haweli	Pune
NWMP	2690	Pawana	Pawana at Kasarwadi Pune	Kasarwadi	Haweli	Pune
NWMP	2196	Pawana	Pawana at Sangavigaon, Pune	Sangavigaon	Haweli	Pune
NWMP	1189	Bhima	Bhima at Pune(Mutha) at U/s of Vithalwadi near Sankar Mandir	Vithalwadi	Haweli	Pune
NWMP	2691	Pawana	Pawana at Dapodi Bridge at Pawana-Mulla Sangan Pune	Dapodi	Haweli	Pune
NWMP	2194	Mula	Mula at Harrison Bridge near Mula -Pawana Sangam	Bopodi	Haweli	Pune
NWMP	2679	Mutha	Mutha at Deccan Bridge, Pune	Deccan	Pune	Pune
NWMP	2669	Indrayani	Indrayani at U/s of Moshigaon, Pune	Moshigaon	Haweli	Pune
NWMP	2678	Mutha	Mutha near Veer Savarkar Bhavan	Pune M.C	Pune	Pune
NWMP	2191	Mutha	Mutha at Sangam Bridge Near Ganpathi Ghat	Shivaji Nagar	Pune	Pune
NWMP	2668	Indrayani	Indrayani at D/s of Moshi village	Moshi	Haveli	Pune
NWMP	1190	Bhima	Bhima at D/s of Bundgarden, Pune	Yerwada	Haweli	Pune
NWMP	2197	Indrayani	Indrayani at D/s of Alandigaon, Pune	Alandigaon	Haweli	Pune
NWMP	2192	Mula-Mutha	Mula-Mutha at Mundhwa Bridge	Mundhawa	Haweli	Pune



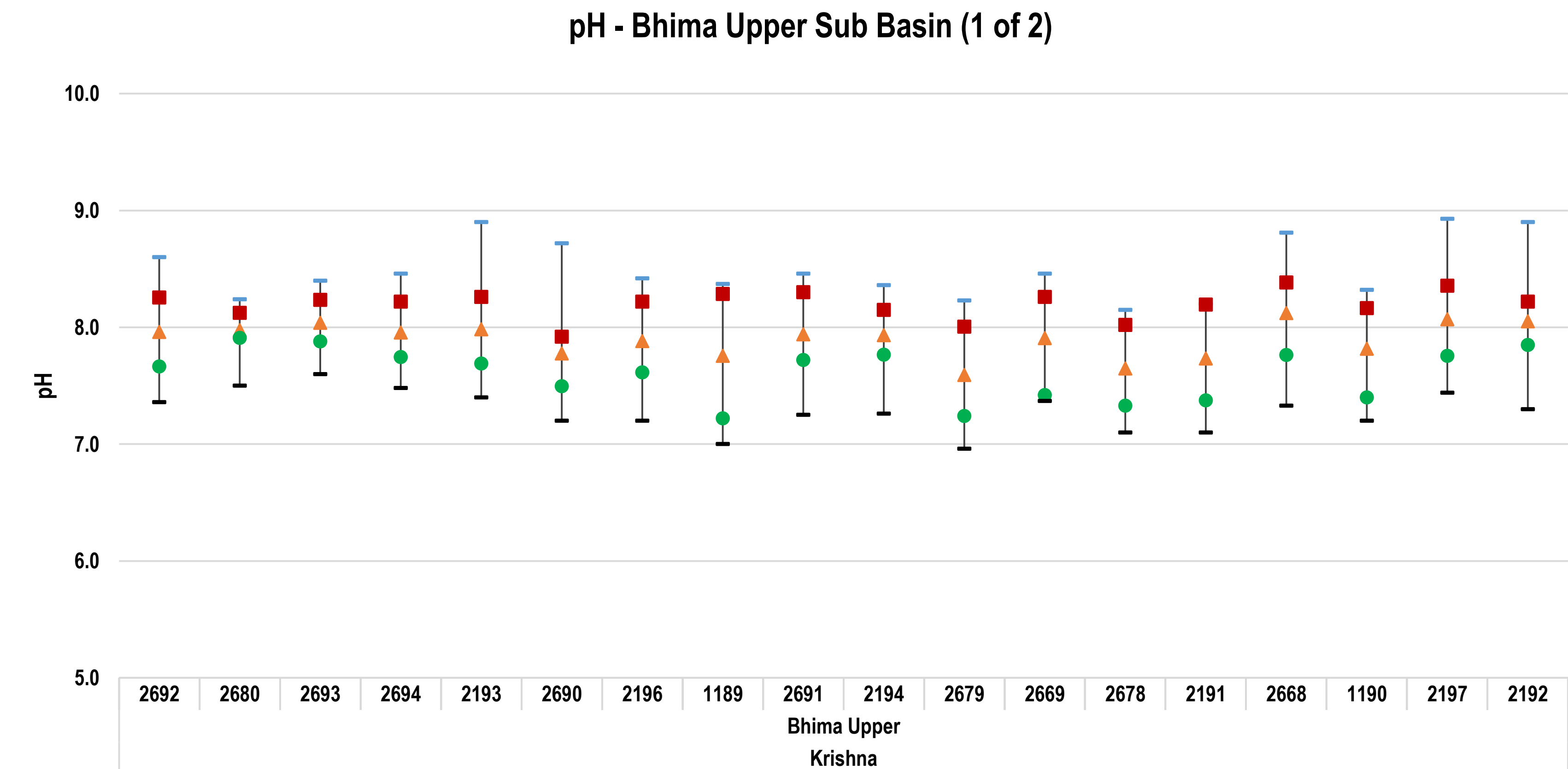
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	7.3	7.2	5.8	6.0	6.4	6.8	6.3	4.7	6.4	6.3	4.7	7.0	4.8	4.4	6.0	5.8	6.2	6.0
75 Percentile	6.6	6.8	5.4	4.9	5.6	4.9	4.9	4.7	4.6	4.8	4.2	6.0	4.3	4.0	5.6	4.6	5.8	4.5
Average	6.3	6.5	4.8	4.0	4.7	4.4	4.2	4.0	3.9	4.4	3.5	5.7	3.5	3.3	5.0	3.8	5.2	3.9
25 Percentile	6.0	6.4	4.5	3.3	4.7	3.8	3.7	3.9	3.5	4.2	3.0	5.1	3.3	3.1	4.5	3.6	4.7	3.7
Min	4.9	5.9	2.7	0.6	0.8	1.9	0.8	2.2	0.7	1.4	1.9	4.6	1.3	0.7	3.7	0.5	3.9	0.5

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



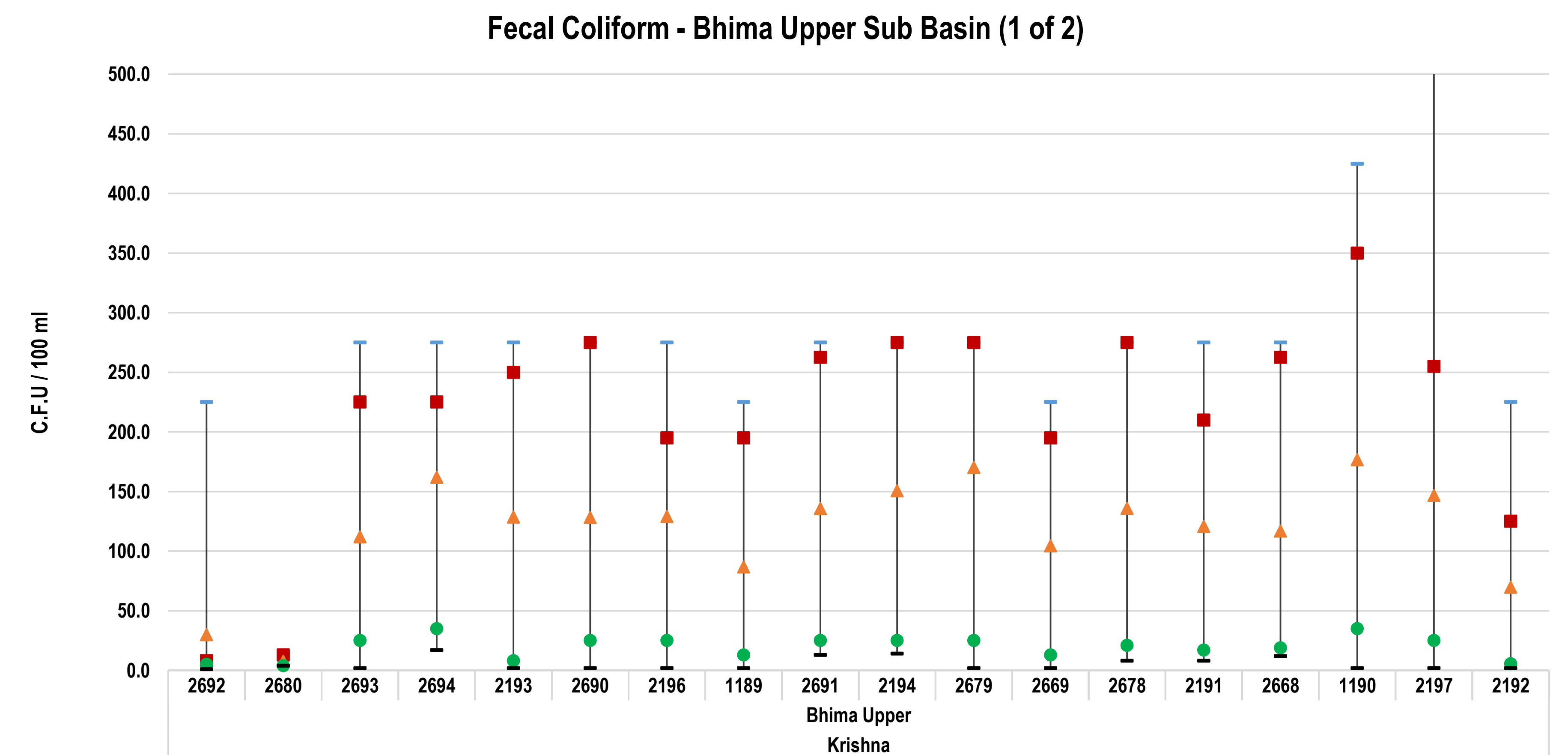
	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	6.8	4.5	12.0	16.0	15.0	22.0	18.0	19.0	18.5	22.0	24.0	8.6	18.0	32.0	16.0	16.0	11.5	21.0
75 Percentile	4.8	3.5	8.8	12.3	7.0	15.5	12.8	13.0	12.8	13.8	20.8	6.4	15.5	16.5	8.3	12.0	7.5	15.5
Average	4.0	3.1	7.9	9.6	7.4	11.8	9.2	9.5	10.6	11.6	17.6	5.8	11.8	15.4	8.1	10.0	6.9	11.2
25 Percentile	3.0	2.6	6.7	8.6	5.9	7.5	6.7	5.4	7.7	8.9	13.8	5.0	9.7	13.3	6.8	8.0	5.6	7.1
Min	2.6	2.4	5.2	1.0	3.2	1.8	1.2	1.2	1.6	6.0	12.5	4.8	2.0	2.0	5.2	1.5	4.8	1.0

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



	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	8.6	8.2	8.4	8.5	8.9	8.7	8.4	8.4	8.5	8.4	8.2	8.5	8.2	8.2	8.8	8.3	8.9	8.9
75 Percentile	8.3	8.1	8.2	8.2	8.3	7.9	8.2	8.3	8.3	8.2	8.0	8.3	8.0	8.2	8.4	8.2	8.4	8.2
Average	8.0	8.0	8.0	8.0	8.0	7.8	7.9	7.8	7.9	7.9	7.6	7.9	7.6	7.7	8.1	7.8	8.1	8.1
25 Percentile	7.7	7.9	7.9	7.7	7.7	7.5	7.6	7.2	7.7	7.8	7.2	7.4	7.3	7.4	7.8	7.4	7.8	7.9
Min	7.4	7.5	7.6	7.5	7.4	7.2	7.2	7.0	7.3	7.3	7.0	7.4	7.1	7.1	7.3	7.2	7.4	7.3

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



	2692	2680	2693	2694	2193	2690	2196	1189	2691	2194	2679	2669	2678	2191	2668	1190	2197	2192
Max	225.0	14.0	275.0	275.0	275.0	275.0	275.0	225.0	275.0	275.0	275.0	225.0	275.0	275.0	275.0	425.0	595.0	225.0
75 Percentile	8.0	13.0	225.0	225.0	250.0	275.0	195.0	195.0	262.5	275.0	275.0	195.0	275.0	210.0	262.5	350.0	255.0	125.0
Average	29.9	7.7	112.1	161.9	128.6	128.0	129.1	86.7	135.8	150.5	170.2	104.3	136.0	120.7	116.9	176.5	146.7	69.8
25 Percentile	5.0	4.0	25.0	35.0	8.0	25.0	25.0	13.0	25.0	25.0	25.0	13.0	21.0	17.0	19.0	35.0	25.0	5.5
Min	1.0	4.0	2.0	17.0	2.0	2.0	2.0	2.0	13.0	14.0	2.0	2.0	8.0	8.0	12.0	2.0	2.0	2.0

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

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

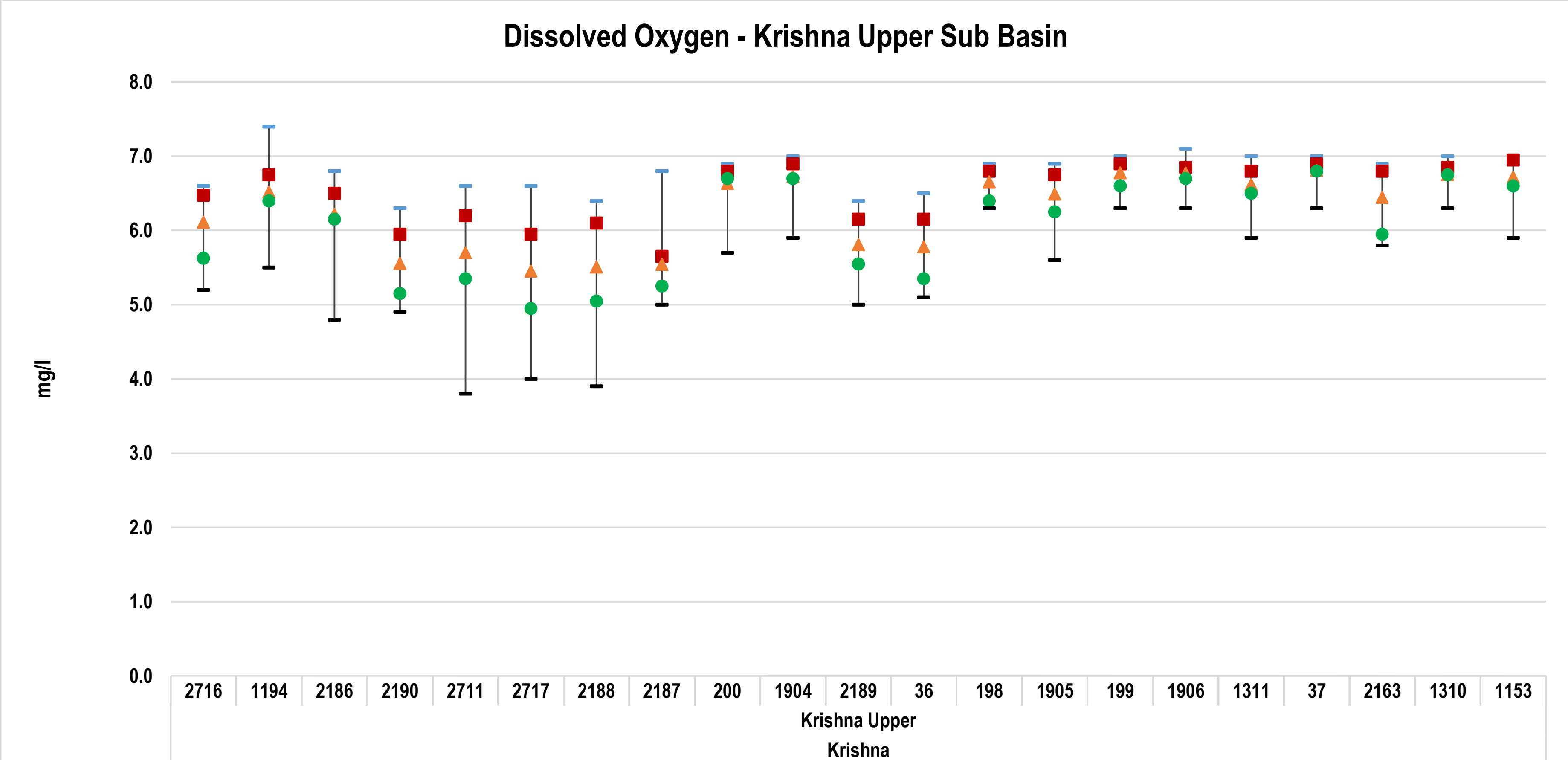
Apr	62	43	41		64	46	38	74	36	39	55	64	63	63	60		62	57
May	42	61	40		40	36	31	42		23	53	62	72	40	37			39
Jun	0	No data	49		52	49	30	48		55	44	52	22	53	49			52
Jul	66	59	59		56	47	52	69	63	58	63	73		62	53	59	61	56
Aug	61	60	63	61	61	56	47	62	51	59	58	69		54	51	59		61
Sep	57	58	52	51	53	43	53	55	49	54	41	69		51	44	54	54	53
Oct	67	59	57	58	61	56	53	56	60	55	54	66		58	57	57	57	58
Nov	59	55	56	57	52	47	46	56	55	54	53	65		57	49	55	53	55
Dec	65	67	53	62	61	55	48	55	54	55	57	73	18	58	55		55	59
Jan	62	56	51	55	56	51	53	59	53	55	55	64		55	47			54
Feb	60	61	56		56	51	55	63	59	59	60	68		58			63	60
Mar	60	56	58		58	55	55	61	57	55	51	66		56	54			59
Station Code	1463	2683	2655	2715	2682	2195	2677	1191	2665	2681	1192	2656	195	1911	1912	1188	2705	28
Sub Basin	Bhima Upper (2 of 2)																	
Basin	Krishna																	

Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

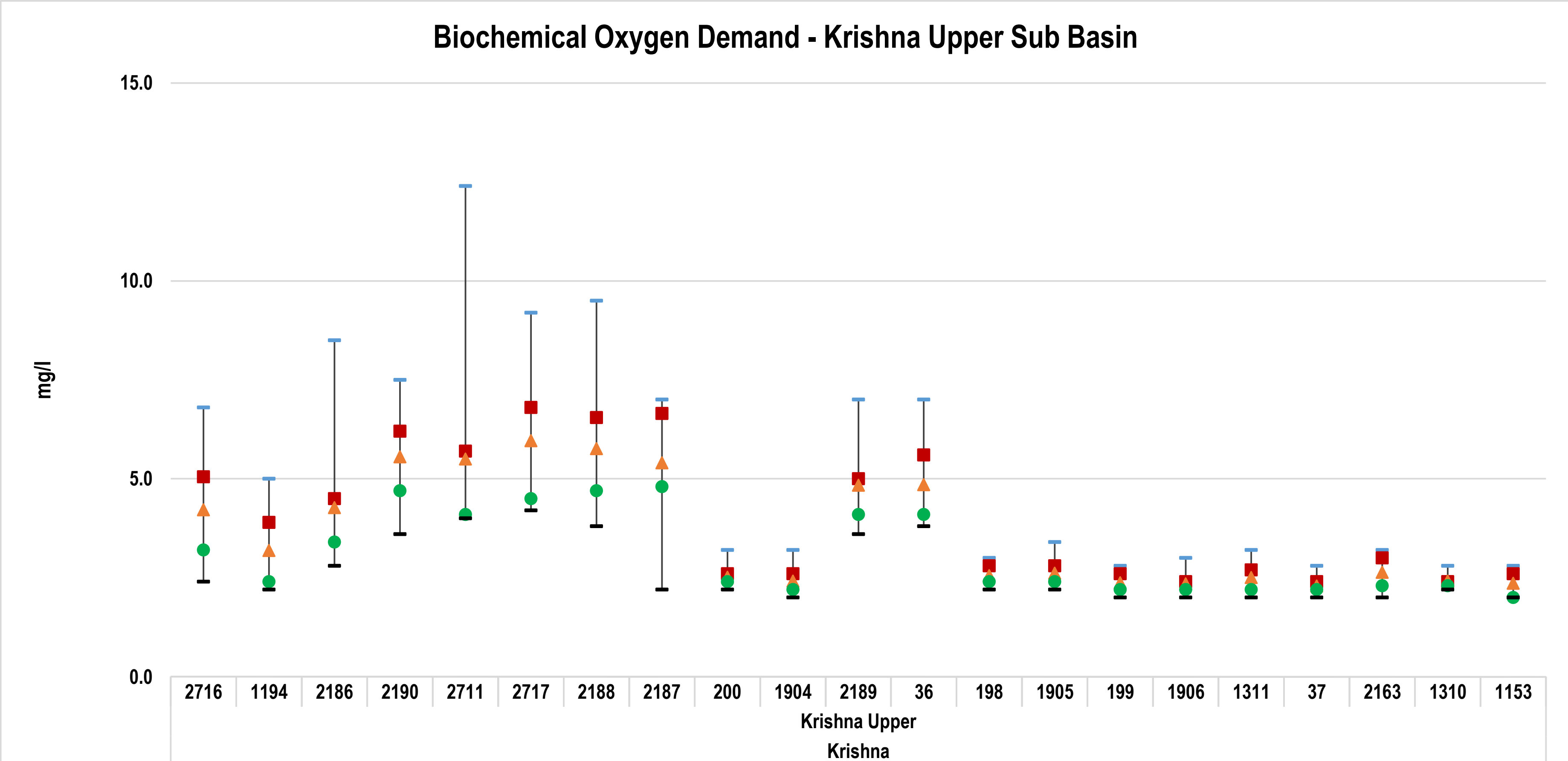
Table No 22: Surface water monitoring stations at Krishna Basin (1 of 2) Sub Basin Bhima Upper (2 of 2)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	1463	Nira	Nira at Sarola bridge	Sarola	Bhor	Pune
NWMP	2683	Nira	Nira at Shindewadi	Shindewadi, Shirwal	Khandala	Satara
NWMP	2655	Bhima	Bhima at Koregaon near Koregaon Bridge, Pune	Koregaon	Shirur	Pune
NWMP	2715	Vel	Vel at Shikrapur, Pune	Shikrapur	Shirur	Pune
NWMP	2682	Nira	Nira at U/s of Jubilant Organosis Pune	Nira(Datta ghat)	Baramati	Pune
NWMP	2195	Nira	Nira at D/s of Jubilant Organosis Pune	Nimbut	Baramati	Pune
NWMP	2677	Mula-Mutha	Mula-Mutha at D/s of Theur, Pune	Theur	Haweli	Pune
NWMP	1191	Bhima	Bhima after confluence with Mula-Mutha at Pargaon near Vasant Bandara	Pargaon	Daund	Pune
NWMP	2665	Ghod	Ghod at Shirur, Pune	Shirur	Shirur	Pune
NWMP	2681	Nira	Nira at Sangavi	Sangavi	Phaltan	Satara
NWMP	1192	Bhima	Bhima at Daund near Mahadev temple	Daund	Daund	Pune
NWMP	2656	Bhima	Bhima Backwater of Ujani Dam near raw water pump house	Kumbargaon	Indapur	Pune
SWMP	195	Sina	Sina Bridge At Burudgaon Road, A/P Ahmednagar, Taluka & District Ahmednagar	Burudgaon	Ahmednagar	Ahmednagar
NWMP	1911	Chandrabhaga	Chandrabhaga at U/s of Pandharpur town	Gursale	Pandarpur	Solapur
NWMP	1912	Chandrabhaga	Chandrabhaga at D/s of Pandharpur town near Vishnupant Mandir	Gopalpur	Pandarpur	Solapur
NWMP	1188	Bhima	Bhima at Narshingpur near Sangam Bridge after confluence with Nira	Narsingpur	Malshiros	Solapur
NWMP	2705	Sina	Sina near Laboti till naka Solapur	Laboti	Mohal	Solapur
NWMP	28	Bhima	Bhima at Takli	Takali	South Solapur	Solapur



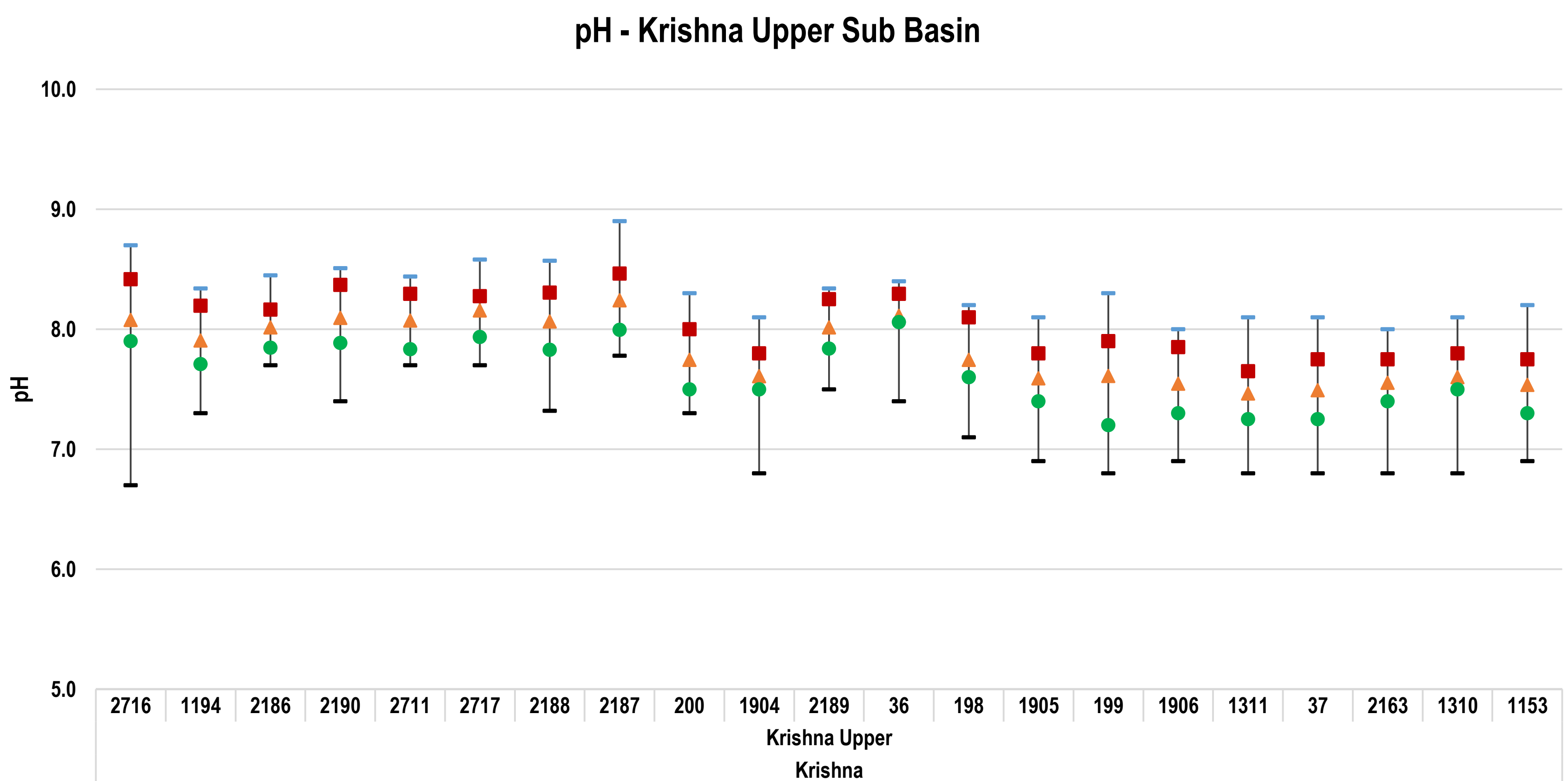
Krishna Upper Krishna	2716	1194	2186	2190	2711	2717	2188	2187	200	1904	2189	36	198	1905	199	1906	1311	37	2163	1310	1153
Max	6.6	7.4	6.8	6.3	6.6	6.6	6.4	6.8	6.9	7.0	6.4	6.5	6.9	6.9	7.0	7.1	7.0	7.0	6.9	7.0	7.0
75 Percentile	6.5	6.8	6.5	6.0	6.2	6.0	6.1	5.7	6.8	6.9	6.2	6.2	6.8	6.8	6.9	6.9	6.8	6.9	6.8	6.9	7.0
Average	6.1	6.5	6.2	5.6	5.7	5.5	5.5	5.5	6.6	6.7	5.8	5.8	6.7	6.5	6.8	6.8	6.6	6.8	6.4	6.8	6.7
25 Percentile	5.6	6.4	6.2	5.2	5.4	5.0	5.1	5.3	6.7	6.7	5.6	5.4	6.4	6.3	6.6	6.7	6.5	6.8	6.0	6.8	6.6
Min	5.2	5.5	4.8	4.9	3.8	4.0	3.9	5.0	5.7	5.9	5.0	5.1	6.3	5.6	6.3	6.3	5.9	6.3	5.8	6.3	5.9

Figure No. 33: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Krishna upper sub basin -Krishna Basin



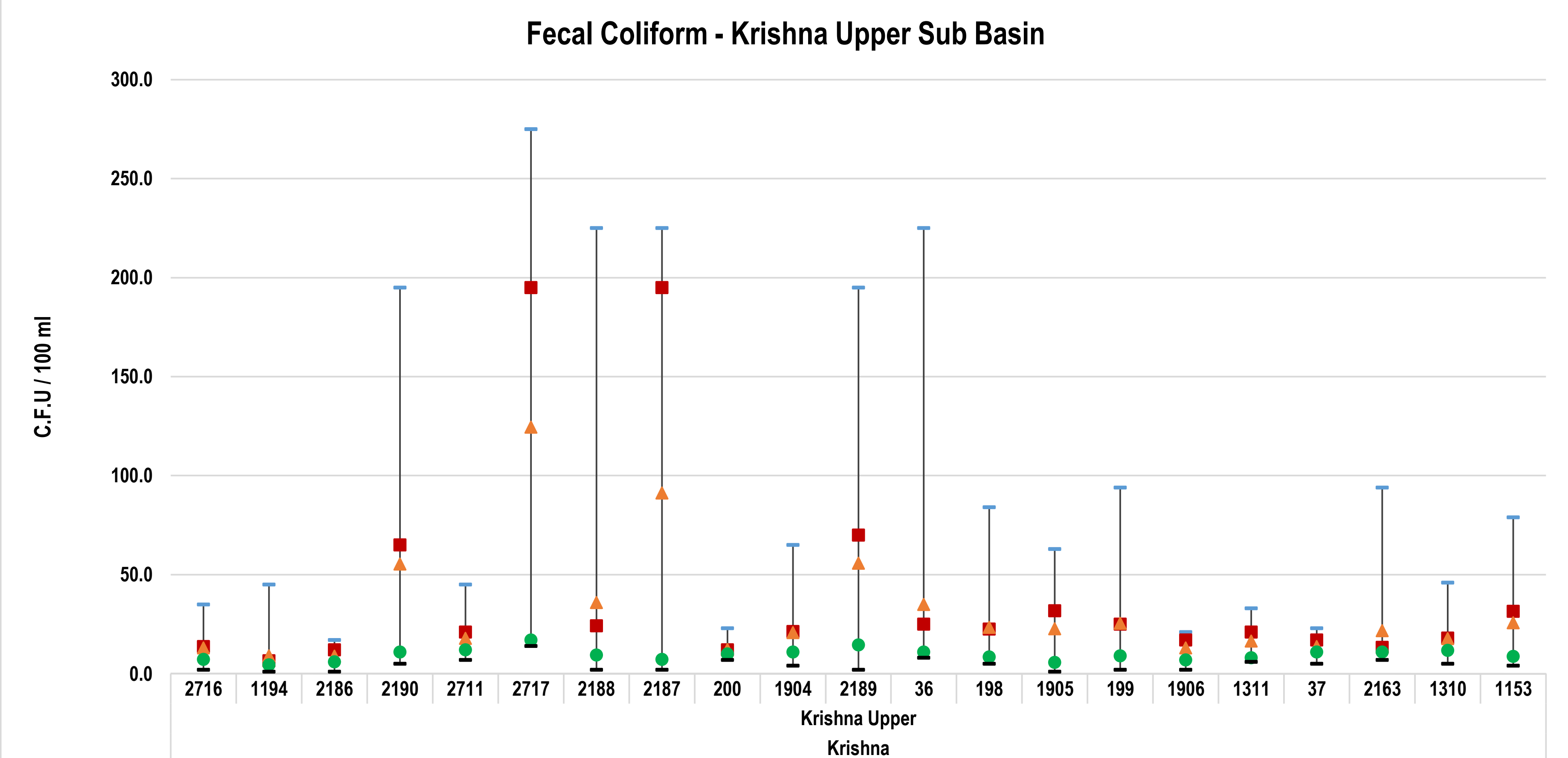
	2716	1194	2186	2190	2711	2717	2188	2187	200	1904	2189	36	198	1905	199	1906	1311	37	2163	1310	1153
Max	6.8	5.0	8.5	7.5	12.4	9.2	9.5	7.0	3.2	3.2	7.0	7.0	3.0	3.4	2.8	3.0	3.2	2.8	3.2	2.8	2.8
75 Percentile	5.1	3.9	4.5	6.2	5.7	6.8	6.6	6.7	2.6	2.6	5.0	5.6	2.8	2.8	2.6	2.4	2.7	2.4	3.0	2.4	2.6
Average	4.2	3.2	4.3	5.6	5.5	6.0	5.8	5.4	2.5	2.4	4.8	4.9	2.6	2.6	2.4	2.3	2.5	2.3	2.6	2.4	2.4
25 Percentile	3.2	2.4	3.4	4.7	4.1	4.5	4.7	4.8	2.4	2.2	4.1	4.1	2.4	2.4	2.2	2.2	2.2	2.2	2.3	2.3	2.0
Min	2.4	2.2	2.8	3.6	4.0	4.2	3.8	2.2	2.2	2.0	3.6	3.8	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.2	2.0

Figure No. 34: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Krishna upper sub basin - Krishna Basin



	2716	1194	2186	2190	2711	2717	2188	2187	200	1904	2189	36	198	1905	199	1906	1311	37	2163	1310	1153
Max	8.7	8.3	8.5	8.5	8.4	8.6	8.6	8.9	8.3	8.1	8.3	8.4	8.2	8.1	8.3	8.0	8.1	8.1	8.0	8.1	8.2
75 Percentile	8.4	8.2	8.2	8.4	8.3	8.3	8.3	8.5	8.0	7.8	8.3	8.3	8.1	7.8	7.9	7.9	7.7	7.8	7.8	7.8	7.8
Average	8.1	7.9	8.0	8.1	8.1	8.2	8.1	8.2	7.7	7.6	8.0	8.1	7.7	7.6	7.6	7.5	7.5	7.5	7.6	7.6	7.5
25 Percentile	7.9	7.7	7.8	7.9	7.8	7.9	7.8	8.0	7.5	7.5	7.8	8.1	7.6	7.4	7.2	7.3	7.3	7.3	7.4	7.5	7.3
Min	6.7	7.3	7.7	7.4	7.7	7.7	7.3	7.8	7.3	6.8	7.5	7.4	7.1	6.9	6.8	6.9	6.8	6.8	6.8	6.8	6.9

Figure No. 35: Trend of pH levels recorded at WQMS at Krishna upper sub basin -Krishna Basin



	2716	1194	2186	2190	2711	2717	2188	2187	200	1904	2189	36	198	1905	199	1906	1311	37	2163	1310	1153
Max	35.0	45.0	17.0	195.0	45.0	275.0	225.0	225.0	23.0	65.0	195.0	225.0	84.0	63.0	94.0	21.0	33.0	23.0	94.0	46.0	79.0
75 Percentile	13.8	6.5	12.0	65.0	21.0	195.0	24.3	195.0	12.0	21.3	70.0	25.0	22.5	31.8	25.0	17.0	21.0	17.0	13.3	18.0	31.5
Average	13.0	9.0	8.9	55.4	17.8	124.5	35.9	91.3	12.1	20.8	55.8	34.9	23.4	22.8	25.4	13.0	16.5	13.7	21.8	17.8	25.8
25 Percentile	7.3	4.5	6.0	11.0	12.0	17.0	9.5	7.3	10.0	11.0	14.5	11.0	8.5	5.8	9.0	7.0	8.0	11.0	11.0	11.8	8.8
Min	2.0	1.0	1.0	5.0	7.0	14.0	2.0	2.0	7.0	4.0	2.0	8.0	5.0	1.0	2.0	2.0	6.0	5.0	7.0	5.0	4.0

Figure No. 36: Trend of Fecal Coliform recorded at WQMS at Krishna upper sub basin -Krishna Basin

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

Apr	62	66	49	61	66	50	48	46	51	54	63	66	53	50	53	51	51	53	52	54	54
May		61	52	57	62	45	46	54		57	59	65		57		57	56	57	56	58	57
Jun	70	71	47	57	59	53	53	53	53	50	62	56	51	51	52	56	49	56	50	49	50
Jul	65	75	76	63	71	58	58	54	72	67	61	68	68	67	68	75	69	74	71	73	73
Aug	69	78	49	55	63	57	56	54		70	56	57		72		75	73	78	68	72	72
Sep	65	78	73	57	51	47	53	61	79	75	59	54	74	71	77	73	75	73	77	73	71
Oct	67	74	69	59	68	55	56	55	71	70	58	60	70	77	68	78	75	79	75	74	76
Nov	70	71	67	52	62	53	51	55	69	74	58	58	73	68	75	82	75	80	71	75	76
Dec	67	76	76	55	61	52	58	52	74	56	56	53	76	56	74	76	56	77	58	55	58
Jan	64	76	71	55	63	56	58	56	77	79	58	57	78	79	78	80	79	80	79	78	77
Feb	62	71	67	58	58	56	58	53		76	62	60		73		67	75	69	72	73	73
Mar	64	72	69	56	59	57	55	57	77	74	60	61	75	73	77	73	75	75	73	76	76
Station Code	2716	1194	2186	2190	2711	2717	2188	2187	200	1904	2189	36	198	1905	199	1906	1311	37	2163	1310	1153
Sub Basin	Krishna Upper																				
Basin	Krishna																				

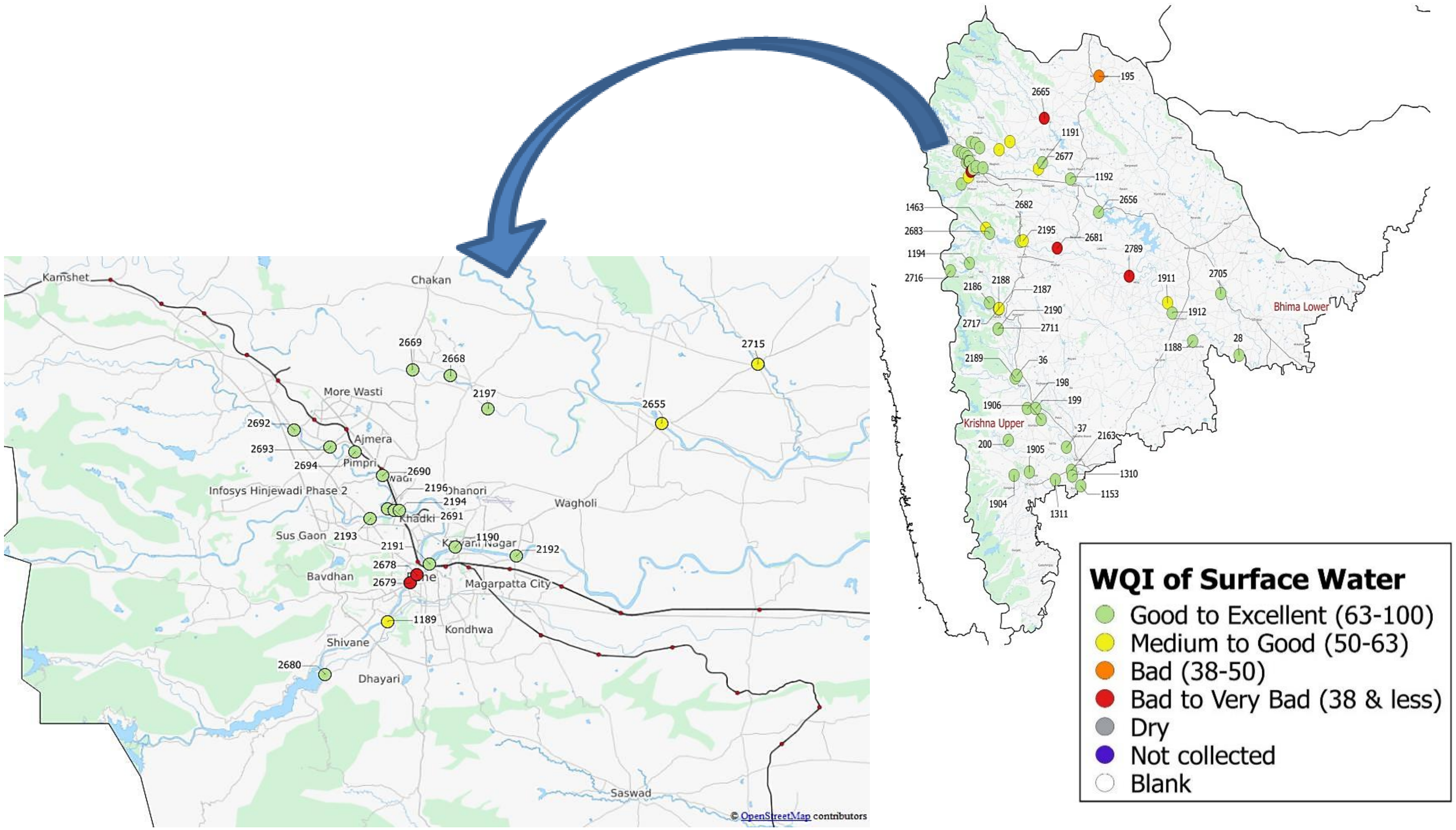
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

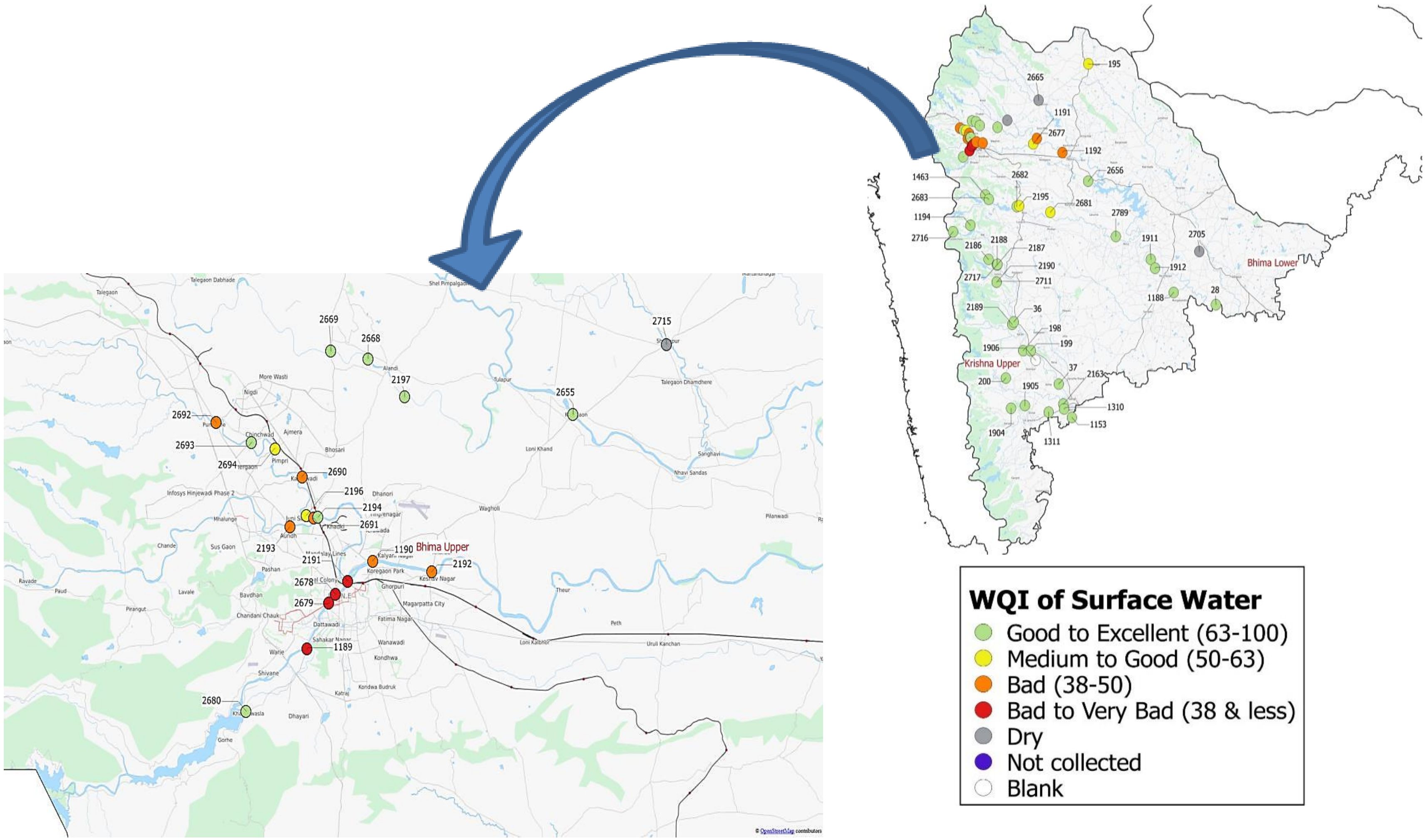
Table No 23: Surface water quality monitoring stations in Krishna Basin (1 of 2): Sub basin Bhima upper (1 of 3)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	2716	Venna	Venna at Mahabaleshwar	Mahabaleshwar	Mahabaleshwar n	Satara
NWMP	1194	Krishna	Krishna at Dhom Dam	Wai	Mahabaleshwar	Satara
NWMP	2186	Venna	Venna at Varya, Satara	Varye	Satara	Satara
NWMP	2190	Krishna	Krishna at Wai	Wai	Wai	Satara
NWMP	2711	Urmodi	Urmodi at Nagthane Satara	Nagthane	Satara	Satara
NWMP	2717	Venna	Venna at Mahuli	Mahuli	Satara	Satara
NWMP	2188	Krishna	Krishna at Krishna-Venna Sangam, Mahuli	Mahuli	Mahuli	Satara
NWMP	2187	Krishna	Krishna at Kshetra Mahuli Satara	Kshetra Mahuli	Mahuli	Satara
SWMP	200	Warna	Mangle Bridge, (After Confluence of Morna)	Mangle	Shirala	Sangli
NWMP	1904	Panchganga	U/s of Kolhapur town near Balinga Pumping Station	Balinga	Karvir	Kolhapur
NWMP	2189	Koyna	Koyna at Karad	Karad	Karad	Satara
NWMP	36	Krishna	Krishna at Krishna Bridge, Karad	Karad	Karad	Satara
SWMP	198	Krishna	Bahe KT Weir, Bahe, Taluka - Walwa, District - Sangli	Bahe	Walwa	Sangli
NWMP	1905	Panchaganga	Panchaganga at D/s of Kolhapur town at Gandhi nagar near NH-4 bridge and MIDC intake well	Uchegaon	Kolhapur	Kolhapur
SWMP	199	Krishna	Borgaon KT Weir, Borgaon, Taluka - Walwa, District - Sangli	Borgaon	Walwa	Sangli
NWMP	1906	Krishna	Krishna at Walwa, D/s of Islampur near Vithal Temple	Walwa	Walwa	Sangli
NWMP	1311	Panchganga	Panchganga at Ichalkaranji near MIDC intake well	Shiradhwad (Ichalkaranji ghat)	Hatkanangale	Kolhapur
NWMP	37	Krishna	Krishna at Maighat, Sangli	Gawali gally	Miraj	Sangli
NWMP	2163	Panchganga	Panchganga at Shirol near Shirol intake well	Shirol	Shirol	Kolhapur
NWMP	1310	Krishna	Krishna at Kurundwad	Narshingwadi, Kurundwad	Shirol	Kolhapur
NWMP	1153	Krishna	Krishna at Rajapur Weir	Rajapur	Shirol	Kolhapur

Spatial map of Surface WQI at Krishna Basin (April 2017)

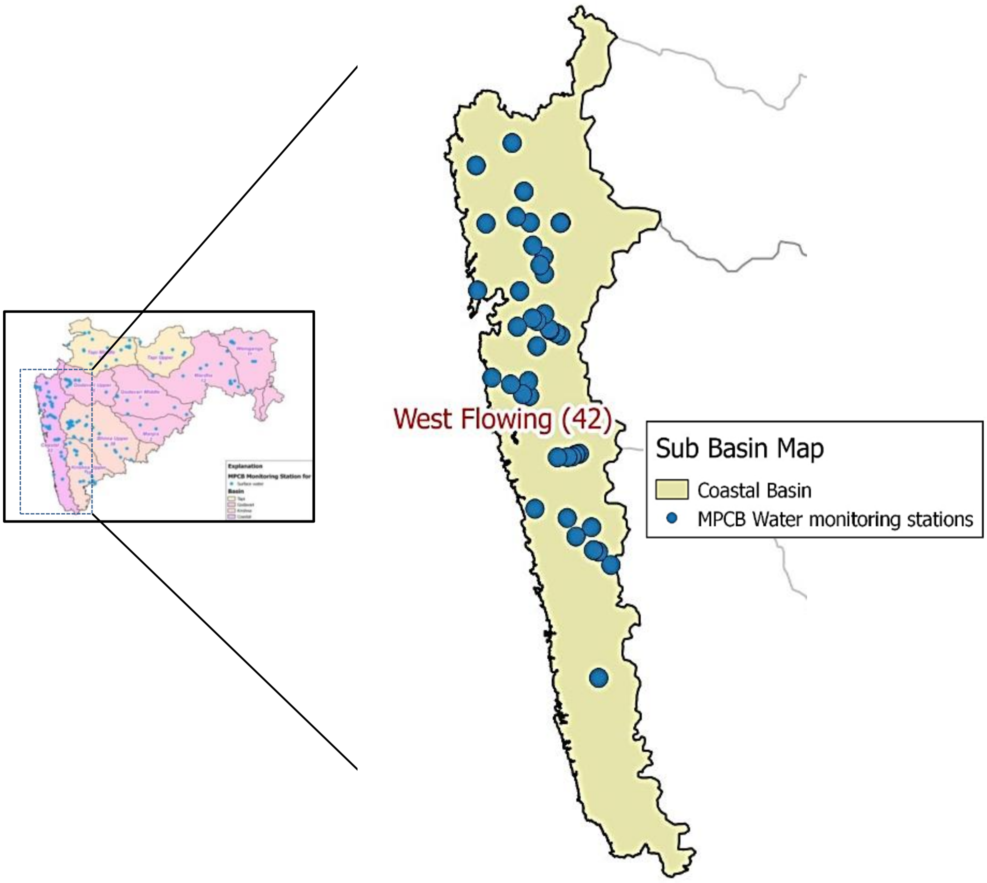


Spatial map of Surface WQI at Krishna Basin (December 2017)



West Flowing Rivers

Compared to East flowing rivers, the West flowing rivers of Peninsular India are fewer and smaller Map No. 7. Maharashtra has many westwards flowing rivers originating from Western Ghats which joins Arabian Sea at the end. Unlike East flowing rivers, these rivers do not form deltas, but only estuaries[15]. West flowing rivers from Maharashtra includes Damanganga, Vaitarna, Ulhas, Savitri, Vashishti, Kundalika, Shastri, Karli, Mithi, Terekhol, and Surya and so on. These Rivers are important source of drinking water, agricultural and industrial applications. The overall geographical area covered due to West flowing river basins in Maharashtra is around 3.16 Mha (Million hectares) which is 10.7% of the total geographical area of Maharashtra state[16].Many industrial complexes are lie very close to Ulhas, Bhogeshwari, Patalganga, Amba and few other tributaries which are prone to water pollution due to release of industrial effluents. To monitor the overall status of the river system, MPCB has installed total 41 WQMS along the west flowing rivers.

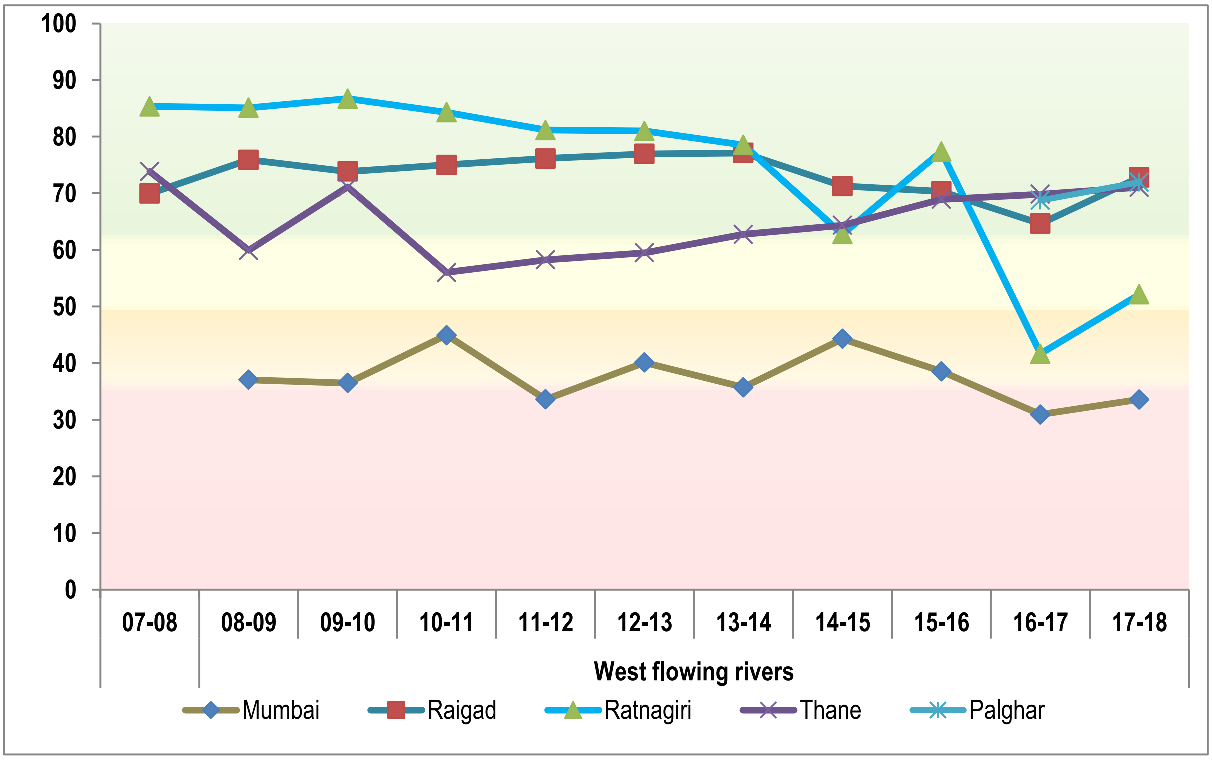


Map No. 7: **Network of surface water quality monitoring stations in West flowing rivers basin**

[15] https://www.pmfias.com/west-flowing-rivers-narmada-tapti-sabarmati-mahi-luni-ghaggar-rivers-sahyadris-western-ghats/

[16] https://sandrp.files.wordpress.com/2017/04/maharashtra-report.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. 37: Trend of annual average WQI across districts of West Flowing 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 s in that district.

Figure No. 37 depicts the intra basin performance of west flowing rivers across five districts of the state. The results showed that all five districts have shown slight improvement in annual average WQI. Out of 5 districts, Mumbai however, consistently recording poor WQI. In 2017-18, WQI, though improved slightly, came under Bad to Very Bad category indicating water quality deterioration in Mumbai. Raigad, Thane and Palghar were in Good To excellent (63-100) category have shown improvement in its category this year compared to last year (2016-17).

From Figure No. 38 it is observed that the percentage of extent of observations falling under "Good to Excellent" category went down from 85% in 2016-17 to around 41% in current year whereas the observations coming under "Medium to good" category increased by more than 5 times from 8% in 2016-17 to around 44% in current year. In 2017-18, an increasing trend was observed, both in the cases of "Bad" category observations (from 2% to more than 6%) and "Bad to Very Bad" category observations (from around 3% to more than 6%).

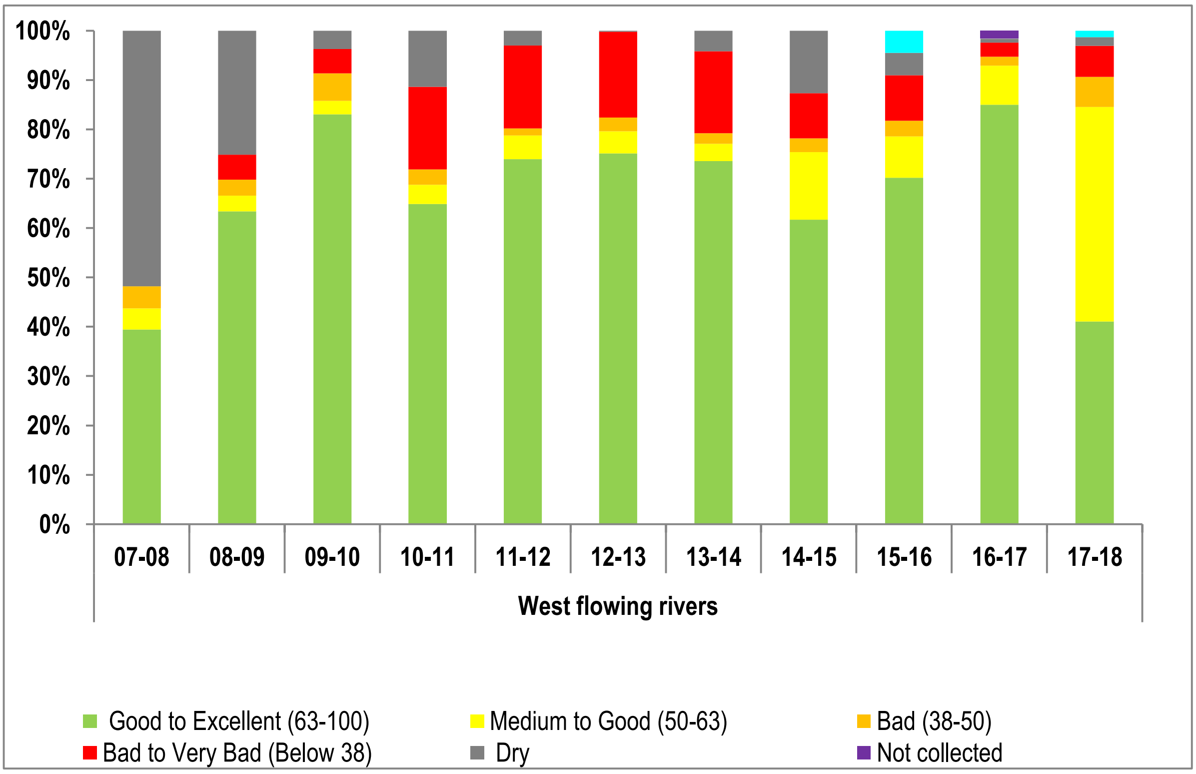
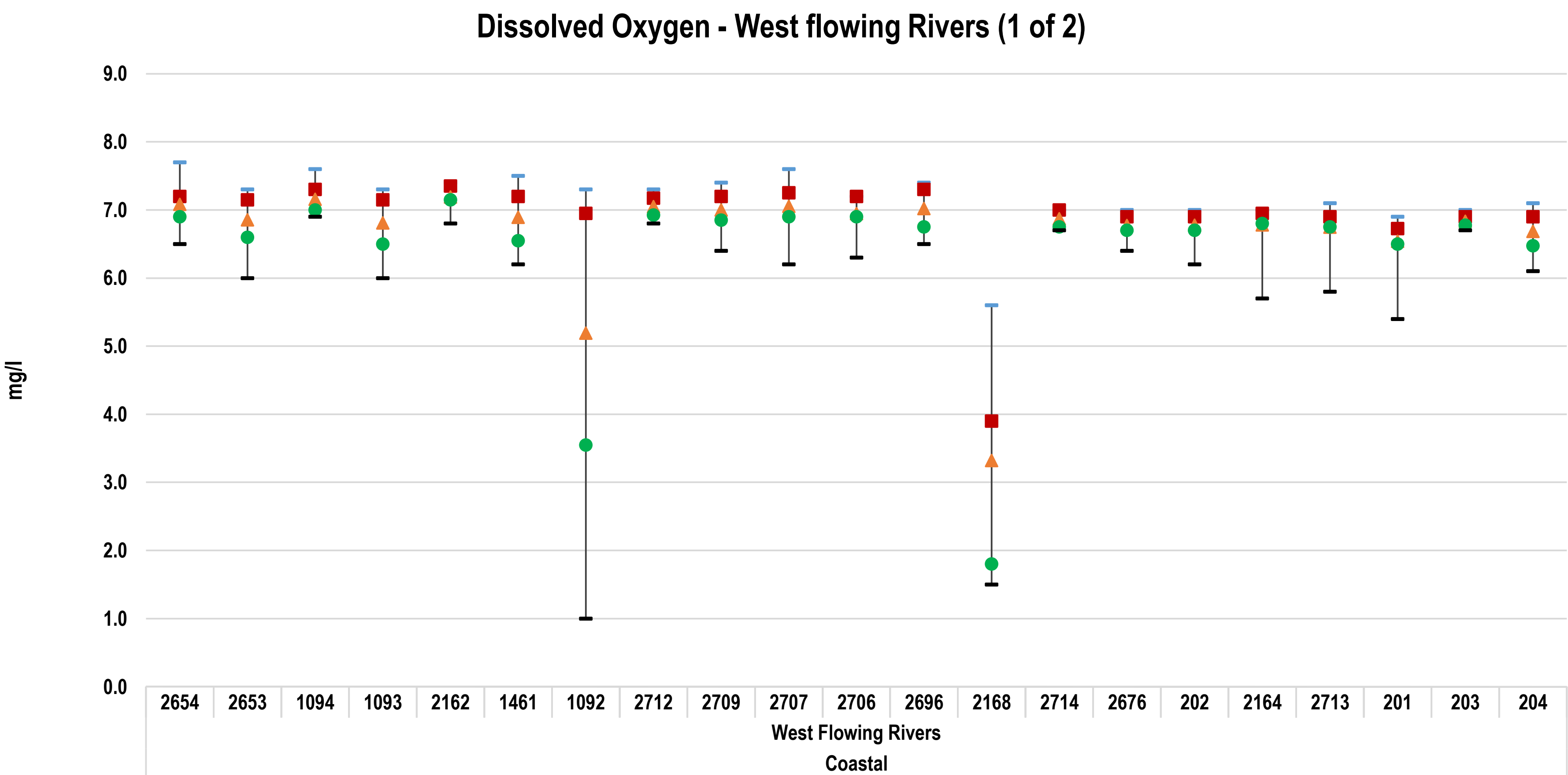
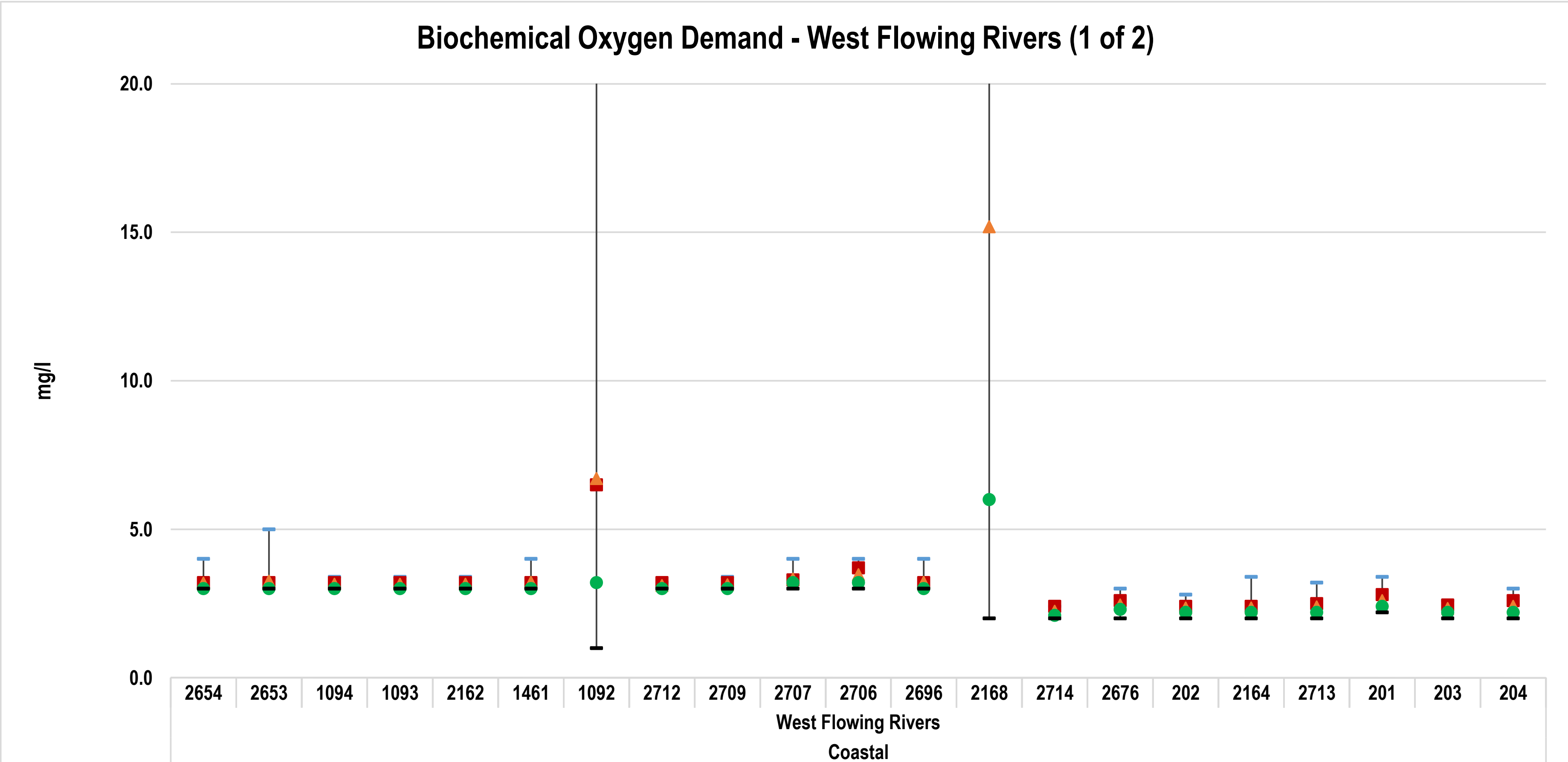


Figure No. 38: Trend of Average occurrence for different category of WQI in West flowing rivers



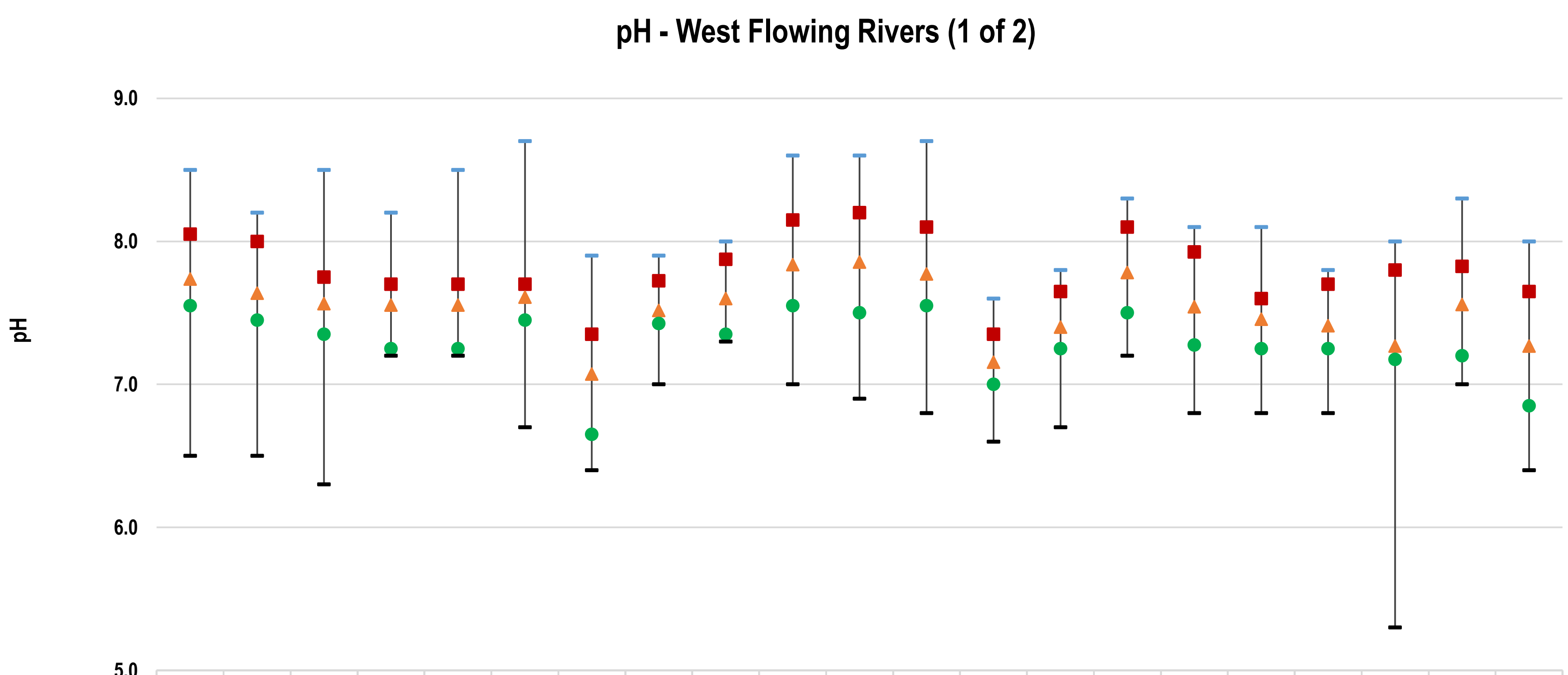
	2654	2653	1094	1093	2162	1461	1092	2712	2709	2707	2706	2696	2168	2714	2676	202	2164	2713	201	203	204
Max	7.7	7.3	7.6	7.3	7.4	7.5	7.3	7.3	7.4	7.6	7.2	7.4	5.6	7.0	7.0	7.0	7.0	7.1	6.9	7.0	7.1
75 Percentile	7.2	7.2	7.3	7.2	7.4	7.2	7.0	7.2	7.2	7.3	7.2	7.3	3.9	7.0	6.9	6.9	7.0	6.9	6.7	6.9	6.9
Average	7.1	6.9	7.2	6.8	7.2	6.9	5.2	7.1	7.0	7.1	6.9	7.0	3.3	6.9	6.8	6.8	6.8	6.7	6.5	6.8	6.7
25 Percentile	6.9	6.6	7.0	6.5	7.2	6.6	3.6	6.9	6.9	6.9	6.9	6.8	1.8	6.8	6.7	6.7	6.8	6.8	6.5	6.8	6.5
Min	6.5	6.0	6.9	6.0	6.8	6.2	1.0	6.8	6.4	6.2	6.3	6.5	1.5	6.7	6.4	6.2	5.7	5.8	5.4	6.7	6.1

Figure No. 39: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at West flowing rivers (Coastal basin) (1 OF 2)



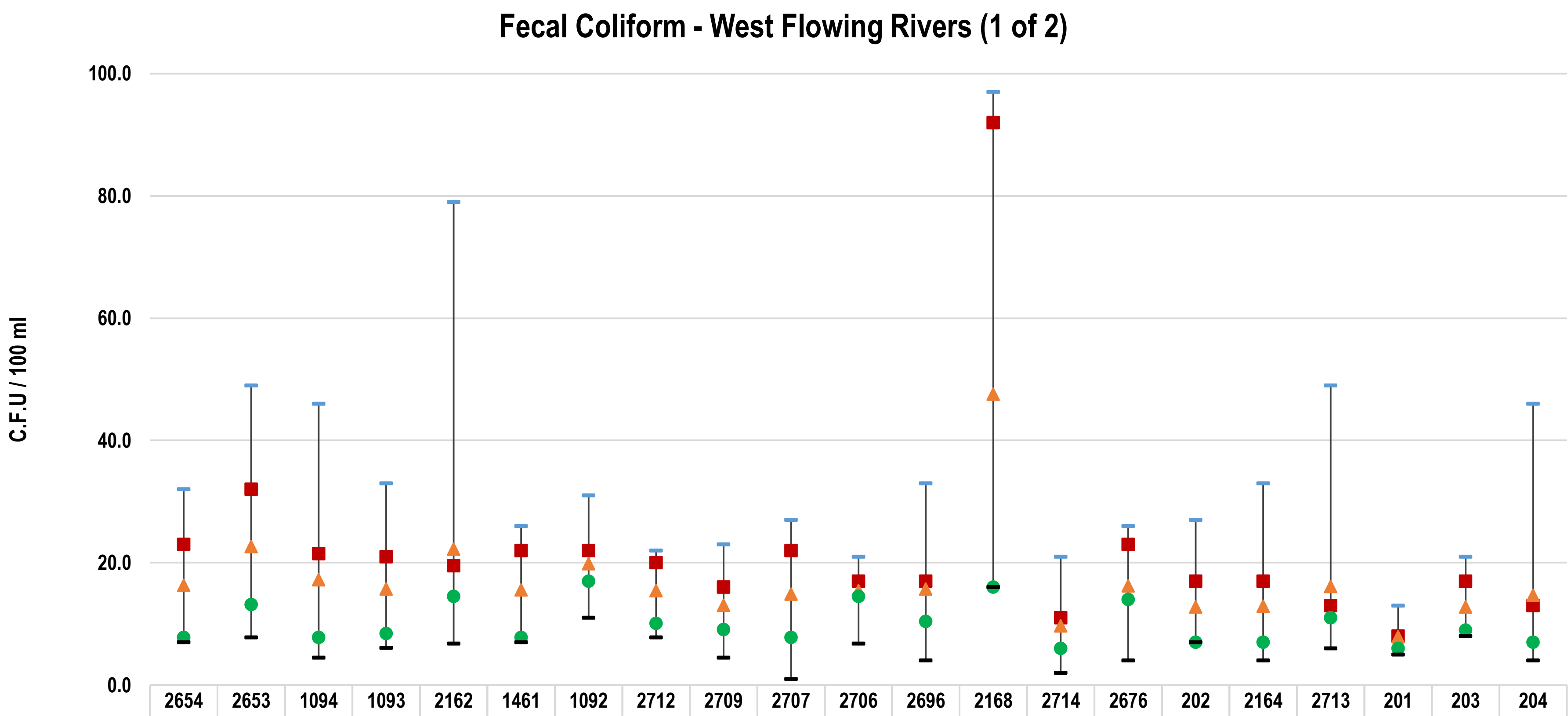
	2654	2653	1094	1093	2162	1461	1092	2712	2709	2707	2706	2696	2168	2714	2676	202	2164	2713	201	203	204
Max	4.0	5.0	3.4	3.4	3.4	4.0	23.0	3.2	3.4	4.0	4.0	4.0	45.0	2.4	3.0	2.8	3.4	3.2	3.4	2.6	3.0
75 Percentile	3.2	3.2	3.2	3.2	3.2	3.2	6.5	3.2	3.2	3.3	3.7	3.2	24.5	2.4	2.6	2.4	2.4	2.5	2.8	2.5	2.6
Average	3.2	3.3	3.1	3.1	3.1	3.2	6.7	3.1	3.1	3.3	3.5	3.2	15.2	2.2	2.5	2.4	2.3	2.4	2.6	2.3	2.4
25 Percentile	3.0	3.0	3.0	3.0	3.0	3.0	3.2	3.0	3.0	3.2	3.2	3.0	6.0	2.1	2.3	2.2	2.2	2.2	2.4	2.2	2.2
Min	3.0	3.0	3.0	3.0	3.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0

Figure No. 40: Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at West flowing rivers (Coastal basin) (1 of 2)



	2654	2653	1094	1093	2162	1461	1092	2712	2709	2707	2706	2696	2168	2714	2676	202	2164	2713	201	203	204
	West Flowing Rivers																				
	Coastal																				
Max	8.5	8.2	8.5	8.2	8.5	8.7	7.9	7.9	8.0	8.6	8.6	8.7	7.6	7.8	8.3	8.1	8.1	7.8	8.0	8.3	8.0
75 Percentile	8.1	8.0	7.8	7.7	7.7	7.7	7.4	7.7	7.9	8.2	8.2	8.1	7.4	7.7	8.1	7.9	7.6	7.7	7.8	7.8	7.7
Average	7.7	7.6	7.6	7.6	7.6	7.6	7.1	7.5	7.6	7.8	7.9	7.8	7.2	7.4	7.8	7.5	7.5	7.4	7.3	7.6	7.3
25 Percentile	7.6	7.5	7.4	7.3	7.3	7.5	6.7	7.4	7.4	7.6	7.5	7.6	7.0	7.3	7.5	7.3	7.3	7.3	7.2	7.2	6.9
Min	6.5	6.5	6.3	7.2	7.2	6.7	6.4	7.0	7.3	7.0	6.9	6.8	6.6	6.7	7.2	6.8	6.8	6.8	5.3	7.0	6.4

Figure No. 41: Trend of pH levels recorded at WQMS at West flowing rivers (Coastal basin) (1 of 2)



	2654	2653	1094	1093	2162	1461	1092	2712	2709	2707	2706	2696	2168	2714	2676	202	2164	2713	201	203	204
	West Flowing Rivers Coastal											West Flowing Rivers Coastal									
Max	32.0	49.0	46.0	33.0	79.0	26.0	31.0	22.0	23.0	27.0	21.0	33.0	97.0	21.0	26.0	27.0	33.0	49.0	13.0	21.0	46.0
75 Percentile	23.0	32.0	21.5	21.0	19.5	22.0	22.0	20.0	16.0	22.0	17.0	17.0	92.0	11.0	23.0	17.0	17.0	13.0	8.0	17.0	13.0
Average	16.3	22.6	17.2	15.7	22.2	15.6	19.8	15.4	13.1	14.9	15.4	15.7	47.5	9.7	16.2	12.8	12.9	16.1	7.9	12.8	14.7
25 Percentile	7.8	13.2	7.8	8.5	14.5	7.8	17.0	10.1	9.1	7.8	14.5	10.4	16.0	6.0	14.0	7.0	7.0	11.0	6.0	9.0	7.0
Min	7.0	7.8	4.5	6.1	6.8	7.0	11.0	7.8	4.5	1.0	6.8	4.0	16.0	2.0	4.0	7.0	4.0	6.0	5.0	8.0	4.0

Figure No. 42: Trend of Fecal Coliform recorded at WQMS at West flowing rivers (Coastal basin) (1 of 2)

Water Quality Index of WQMS on West Flowing rivers (1 of 2)

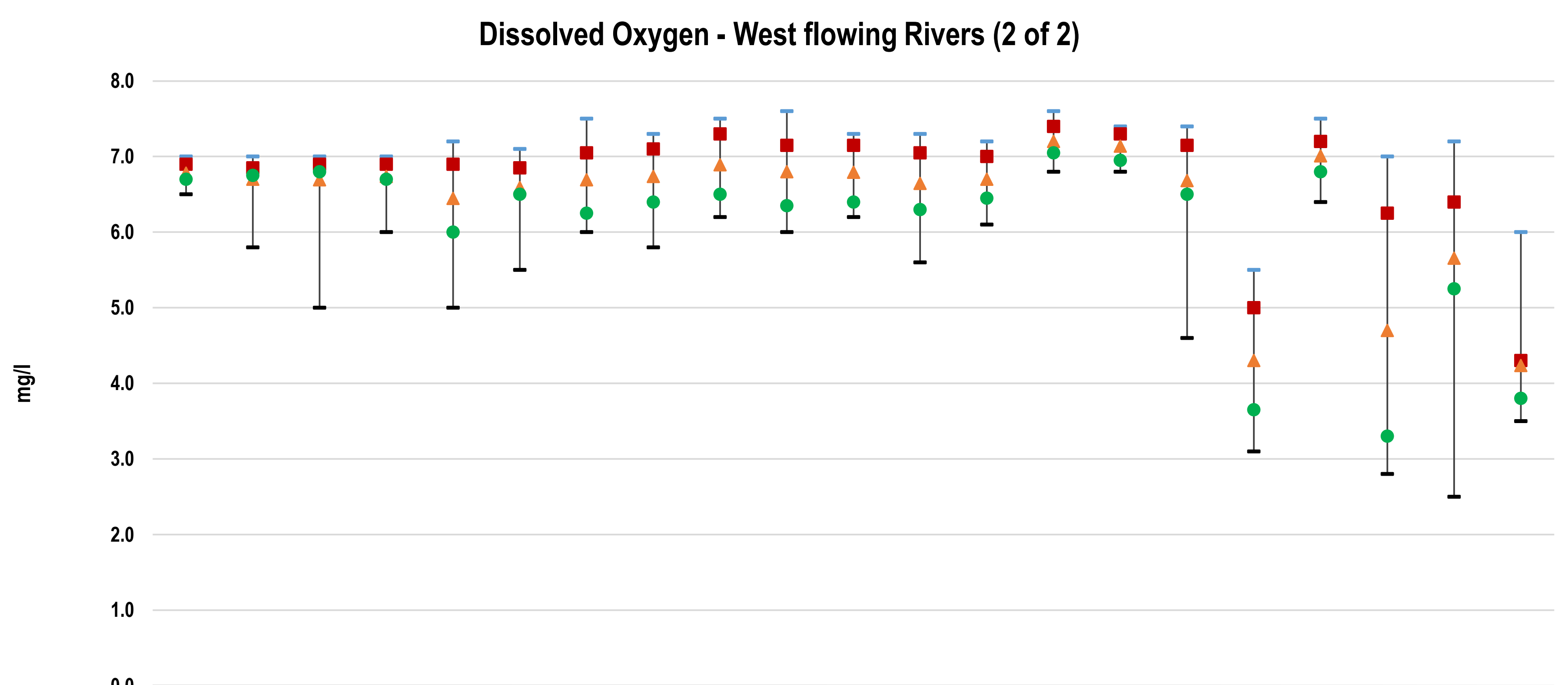
Apr	67	69	70	66	71	75	69			71	70	69	34	55	50	51	48	51	51	52	50
May	74	74	80	76	80	74	65			75	75	70	27	56	53	55	58	55	56	56	56
Jun	73	72	76	73	72	74	No data			No data	No data	77	25	54	52	52	53	53	55	52	53
Jul	68	68	72	76	74	71	64	75	75	71	70	73	46	80	71	75	76	76	76	75	78
Aug	71	70	72	74	73	72	69	75	76	77	77	75	53	77	74	74	77	76	76	76	74
Sep	72	71	74	77	75	75	64	72	76	70	74	76	45	77	75	76	75	78	79	76	70
Oct	74	73	74	73	78	70	75	75	77	74	71	75	25	78	71	76	73	71	67	77	68
Nov	74	71	72	71	72	75	62	75	71	70	70	75	30	84	77	76	80	79	65	79	75
Dec	77	78	72	75	74	76	43	77	79	72	70	75	25	77	74	78	73	76	78	75	77
Jan	69	71	72	71	69	69	45			71	70	69	30	81	78	80	80	80	80	76	80
Feb	73	74	80	76	79	72	47			71	74	72	26	76	75	80	78	73	71	78	78
Mar	71	73	81	75	77	75	56			73	69	73	28	76	75	77	76	77	75	75	77
Station Code	2654	2653	1094	1093	2162	1461	1092	2712	2709	2707	2706	2696	2168	2714	2676	202	2164	2713	201	203	204
Sub Basin	West Flowing Rivers (1 of 2)																				
Basin	Coastal																				

Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

Table No 24: Surface water monitoring stations at West Flowing Rivers (1 of 2)

Program	Station ID	River	Station Name	Village	Taluka	District
NWMP	2654	Bhatsa	Bhatsa at D/s of Liberty Oil Mills	Satne	Shahapur	Thane
NWMP	2653	Bhatsa	Bhatsa at D/s of Liberty Oil Mills	Satne	Shahapur	Thane
NWMP	1094	Ulhas	Ulhas at U/s of Badlapur water works	Kulgaon	Ambernath	Thane
NWMP	1093	Ulhas	Ulhas at U/s of NRC Bund	Mohane	Kalyan	Thane
NWMP	2162	Ulhas	Ulhas at Jambhul water works	Jambhul	Ambernath	Thane
NWMP	1461	Bhatsa	Bhatsa at D/s of Pise Dam	Pise	Bhiwandi	Thane
NWMP	1092	Kalu	Kalu at Atale village	Atale	Kalyan	Thane
NWMP	2712	Vaitarna	Vaitarna near Road Bridge	Gandhare	Wada	Thane
NWMP	2709	Tansa	Tansa near road bridge	Dakewali	Wada	Thane
NWMP	2707	Surya	Surya at MIDC pumping station	Garvashet	Palghar	Thane
NWMP	2706	Surya	Surya U/s of Surya Dam	Dhamni	Vikramgad	Thane
NWMP	2696	Pelhar	Pelhar dam	Pelhar	Vasai	Palghar
NWMP	2168	Mithi	Mithi at near bridge	Mahim	Bandra	Mumbai
NWMP	2714	Vashishti	Vashishti at U/s of Pophali near Konphansawane Bridge	Pophali	Chiplun	Ratnagiri
NWMP	2676	Muchkundi	Muchkundi at Waked Ratnagiri near M/s Asahi India Glass	Waked	Lanja	Ratnagiri
SWMP	202	Vashisti	Vashisti At Khadpoli, Taluka Chiplun, District - Ratnagiri	Khadpoli	Chiplun	Ratnagiri
NWMP	2164	Vashishti	Vashishti at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt Ltd	Kherdi	Chiplun	Ratnagiri
NWMP	2713	Vashishti	Vashishti at D/s of Three M Paper Mills near Chiplun water intake Jackwell	Kherdi	Chiplun	Ratnagiri
SWMP	201	Sonpatra	Sonpatra At Kotwali Village, Taluka - Khed, District - Ratnagiri	Kotwali	Khed	Ratnagiri
SWMP	203	Jagbudi	Jagbudi , D/S of Khed City, Taluka - Khed, District Ratnagiri	Khed City	Khed	Ratnagiri
SWMP	204	Jog	Jog at Dapoli, Taluka Dapoli, District - Rantnagiri	Dapoli	Dapoli	Ratnagiri

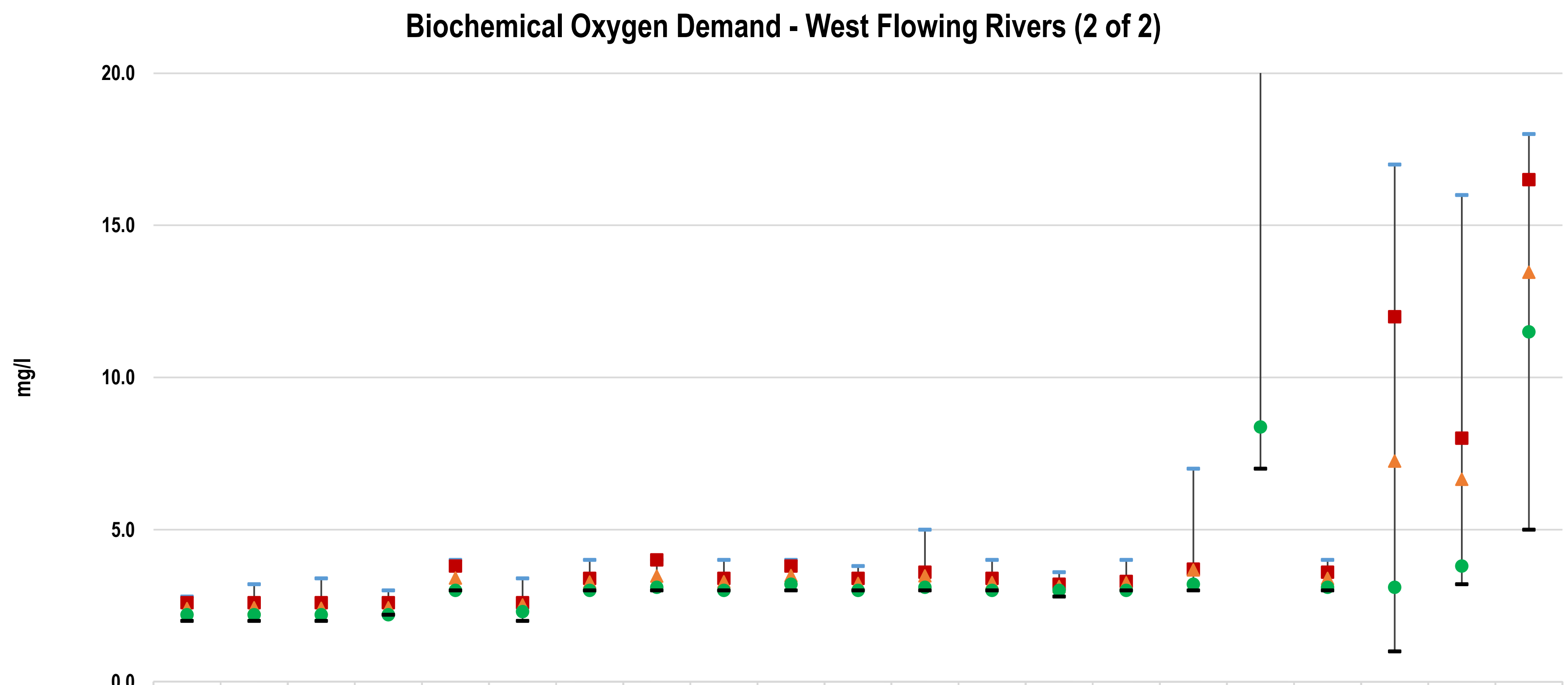


West Flowing Rivers

Coastal

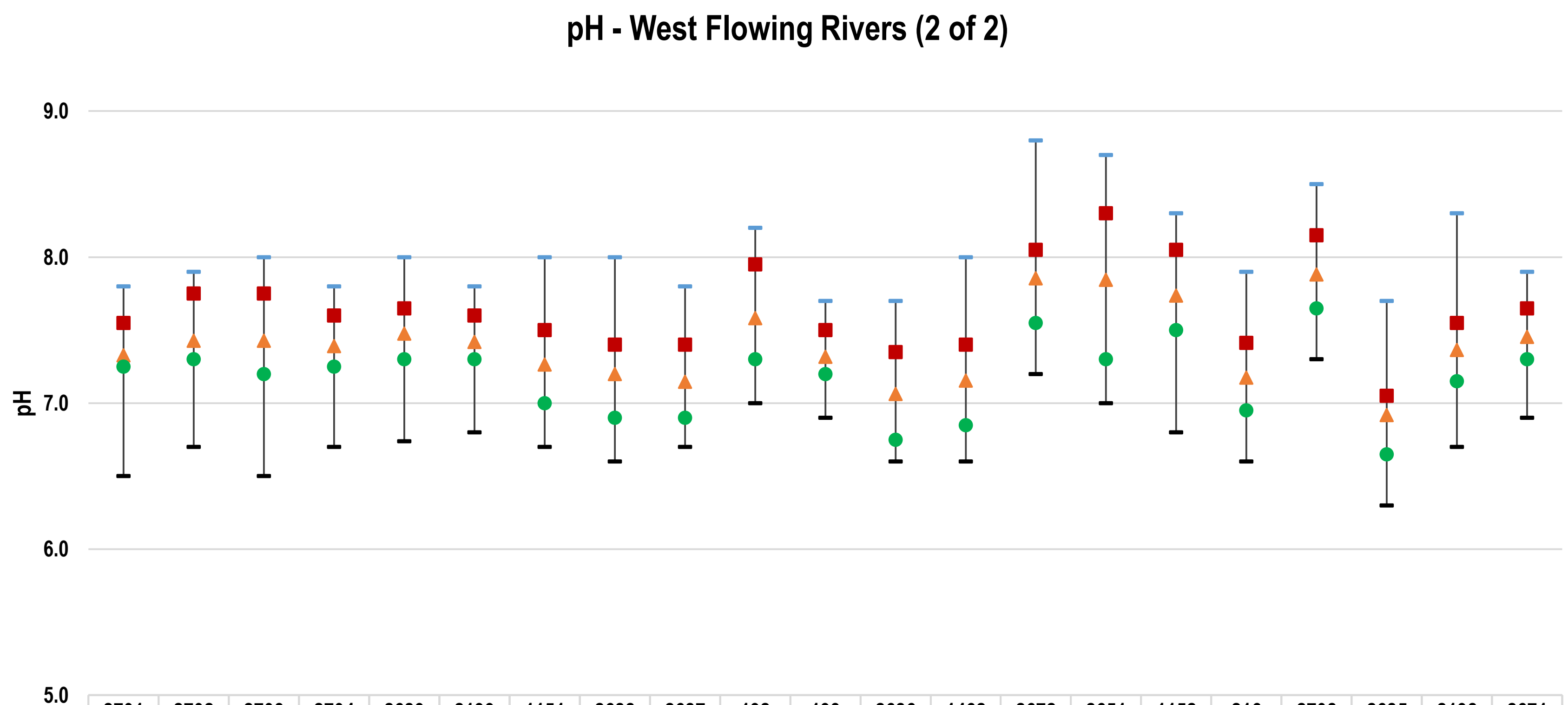
	2701	2702	2703	2704	2689	2199	1151	2688	2687	192	193	2686	1462	2672	2651	1152	216	2708	2685	2198	2671
Max	7.0	7.0	7.0	7.0	7.2	7.1	7.5	7.3	7.5	7.6	7.3	7.3	7.2	7.6	7.4	7.4	5.5	7.5	7.0	7.2	6.0
75 Percentile	6.9	6.9	6.9	6.9	6.9	6.9	7.1	7.1	7.3	7.2	7.2	7.1	7.0	7.4	7.3	7.2	5.0	7.2	6.3	6.4	4.3
Average	6.8	6.7	6.7	6.7	6.4	6.6	6.7	6.7	6.9	6.8	6.8	6.6	6.7	7.2	7.1	6.7	4.3	7.0	4.7	5.7	4.2
25 Percentile	6.7	6.8	6.8	6.7	6.0	6.5	6.3	6.4	6.5	6.4	6.4	6.3	6.5	7.1	7.0	6.5	3.7	6.8	3.3	5.3	3.8
Min	6.5	5.8	5.0	6.0	5.0	5.5	6.0	5.8	6.2	6.0	6.2	5.6	6.1	6.8	6.8	4.6	3.1	6.4	2.8	2.5	3.5

Figure No. 43: Trend of Dissolved Oxygen (DO) levels recorded at WQMS at West flowing rivers (Coastal basin) (2 of 2)



	2701	2702	2703	2704	2689	2199	1151	2688	2687	192	193	2686	1462	2672	2651	1152	216	2708	2685	2198	2671
	West Flowing Rivers Coastal																				
Max	2.8	3.2	3.4	3.0	4.0	3.4	4.0	4.0	4.0	4.0	3.8	5.0	4.0	3.6	4.0	7.0	127.5	4.0	17.0	16.0	18.0
75 Percentile	2.6	2.6	2.6	2.6	3.8	2.6	3.4	4.0	3.4	3.8	3.4	3.6	3.4	3.2	3.3	3.7	41.5	3.6	12.0	8.0	16.5
Average	2.4	2.4	2.4	2.4	3.4	2.5	3.3	3.5	3.3	3.5	3.2	3.5	3.3	3.1	3.3	3.7	34.3	3.4	7.3	6.7	13.5
25 Percentile	2.2	2.2	2.2	2.2	3.0	2.3	3.0	3.1	3.0	3.2	3.0	3.1	3.0	3.0	3.0	3.2	8.4	3.1	3.1	3.8	11.5
Min	2.0	2.0	2.0	2.2	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.8	3.0	3.0	7.0	3.0	1.0	3.2	5.0

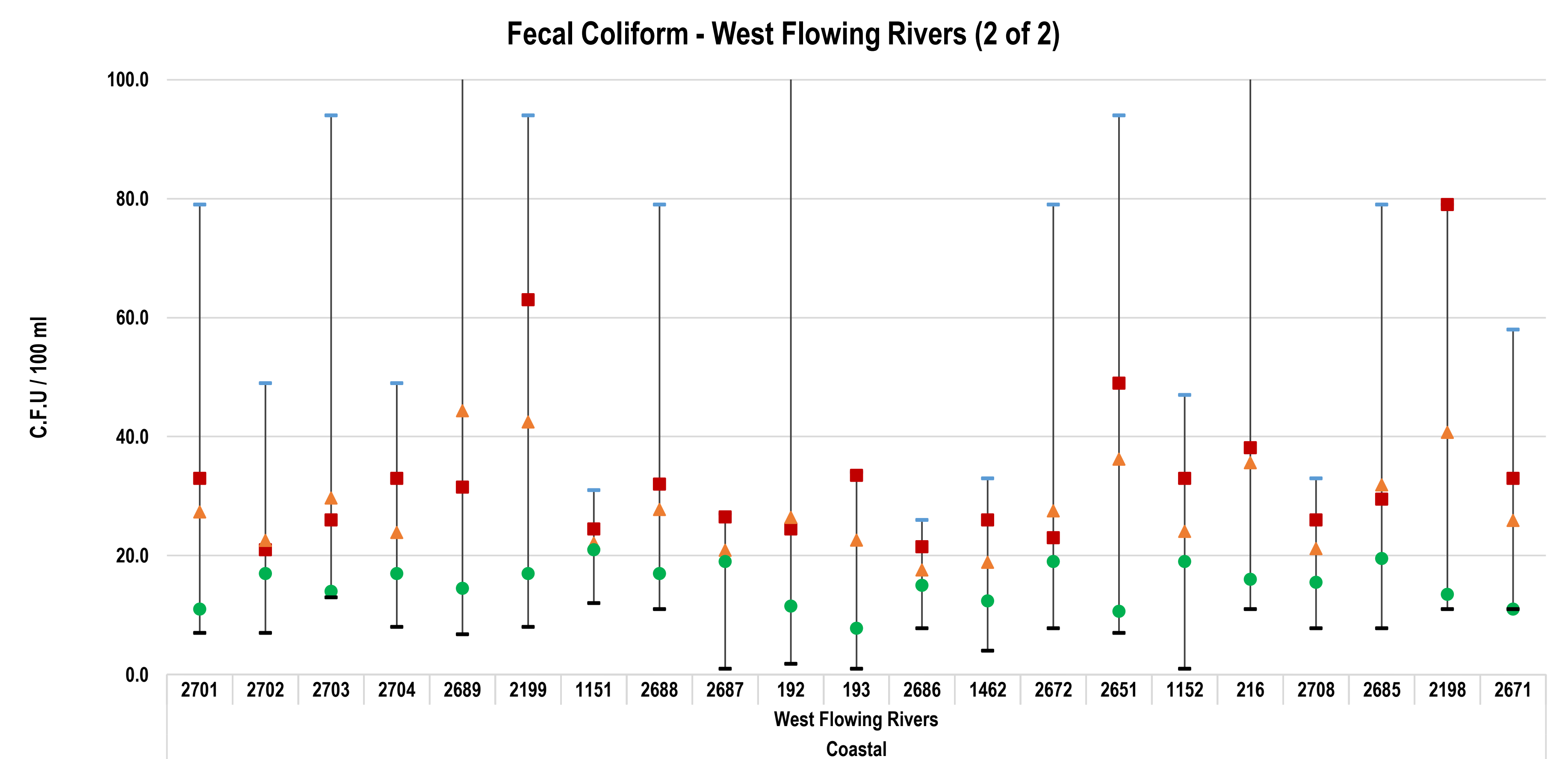
Figure No. 44: Trend ofBiological Oxygen Demand (BOD) levels recorded at WQMS at West flowing rivers (Coastal basin) (2 of 2)



West Flowing Rivers – Coastal

	2701	2702	2703	2704	2689	2199	1151	2688	2687	192	193	2686	1462	2672	2651	1152	216	2708	2685	2198	2671
Max	7.8	7.9	8.0	7.8	8.0	7.8	8.0	8.0	7.8	8.2	7.7	7.7	8.0	8.8	8.7	8.3	7.9	8.5	7.7	8.3	7.9
75 Percentile	7.6	7.8	7.8	7.6	7.7	7.6	7.5	7.4	7.4	8.0	7.5	7.4	7.4	8.1	8.3	8.1	7.4	8.2	7.1	7.6	7.7
Average	7.3	7.4	7.4	7.4	7.5	7.4	7.3	7.2	7.1	7.6	7.3	7.1	7.2	7.9	7.8	7.7	7.2	7.9	6.9	7.4	7.5
25 Percentile	7.3	7.3	7.2	7.3	7.3	7.3	7.0	6.9	6.9	7.3	7.2	6.8	6.9	7.6	7.3	7.5	7.0	7.7	6.7	7.2	7.3
Min	6.5	6.7	6.5	6.7	6.7	6.8	6.7	6.6	6.7	7.0	6.9	6.6	6.6	7.2	7.0	6.8	6.6	7.3	6.3	6.7	6.9

Figure No. 45 : Trend of pH levels recorded at WQMS at West flowing rivers (Coastal basin) (2 of 2)



	2701	2702	2703	2704	2689	2199	1151	2688	2687	192	193	2686	1462	2672	2651	1152	216	2708	2685	2198	2671
Max	79.0	49.0	94.0	49.0	274.0	94.0	31.0	79.0	27.0	129.0	34.0	26.0	33.0	79.0	94.0	47.0	115.0	33.0	79.0	79.0	58.0
75 Percentile	33.0	21.0	26.0	33.0	31.5	63.0	24.5	32.0	26.5	24.5	33.5	21.5	26.0	23.0	49.0	33.0	38.1	26.0	29.5	79.0	33.0
Average	27.3	22.6	29.7	23.9	44.4	42.4	22.1	27.7	20.9	26.4	22.6	17.6	18.9	27.5	36.2	24.1	35.6	21.2	31.9	40.7	25.9
25 Percentile	11.0	17.0	14.0	17.0	14.5	17.0	21.0	17.0	19.0	11.5	7.8	15.0	12.4	19.0	10.7	19.0	16.0	15.5	19.5	13.5	11.0
Min	7.0	7.0	13.0	8.0	6.8	8.0	12.0	11.0	1.0	1.8	1.0	7.8	4.0	7.8	7.0	1.0	11.0	7.8	7.8	11.0	11.0

Figure No. 46: Trend of Fecal Coliform recorded at WQMS at West flowing rivers (Coastal basin) (2 of 2)

Water Quality Index of WQMS on West Flowing rivers (Coastal basin) (2 of 2)

Apr	52	52	51	55	53	55	54	56	57			51	56	55	52	53	18	54	54	47	37
May	58	58	56	57	53	55	57	58	60	56	56	54	53	58	60	54	47	55	50	45	34
Jun	55	55	54	53	68	49	70	66	72	58	55	71	71	72	76	73	20	No data	57	72	52
Jul	52	54	53	56	58	57	55	56	55	59	57	56	55	60	59	54	44	52	53	55	51
Aug	56	56	56	57	53	55	53	55	55	56	56	55	55	58	56	56	44	56	43	55	44
Sep	57	56	60	57	53	57	55	50	54	58	55	50	51	53	57	55	44	53	38	55	38
Oct	55	58	54	59	59	56	56	57	56	57	59	56	58	54	54	59	36	56	57	48	40
Nov	60	56	55	57	56	52	58	60	56	54	56	57	57	56	55	56	36	53	36	58	35
Dec	59	57	59	55	51	56	55	50	56	50	55	55	55	56	54	52	29	52	30	48	36
Jan	57	58	57	57	53	59	52	51	52	48	55	52	52	50	51	51	28	52	32	42	34
Feb	56	58	58	57	56	57	59	58	58	54	56	57	56	53	49	41	36	58	34	41	36
Mar	56	55	56	56	51	58	49	51	52	52	57	56	53	50	51	50	22	53	30	35	38
Station Code	2701	2702	2703	2704	2689	2199	1151	2688	2687	192	193	2686	1462	2672	2651	1152	216	2708	2685	2198	2671
Sub Basin		West Flowing Rivers (2 of 2)																			
Basin		Coastal																			

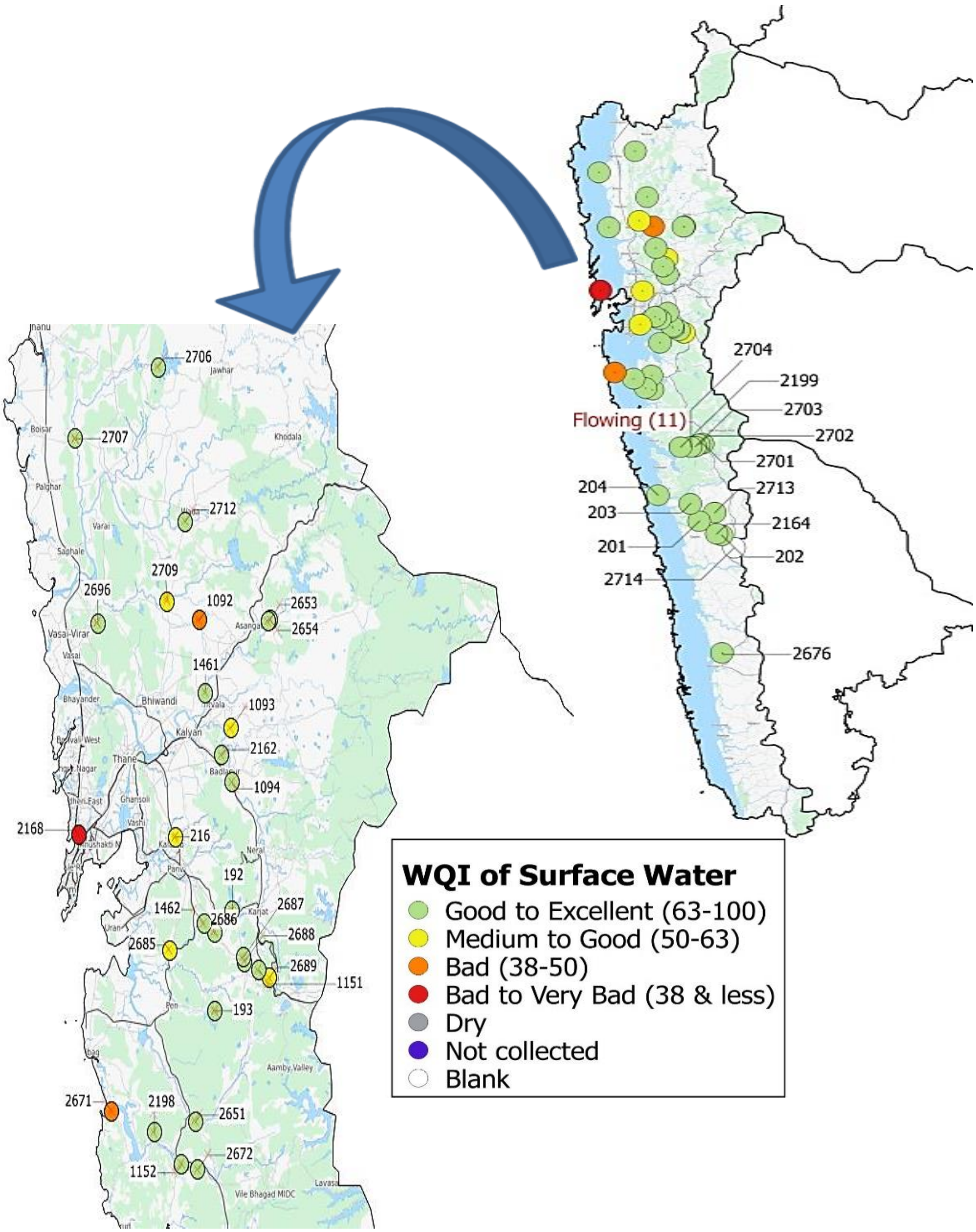
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

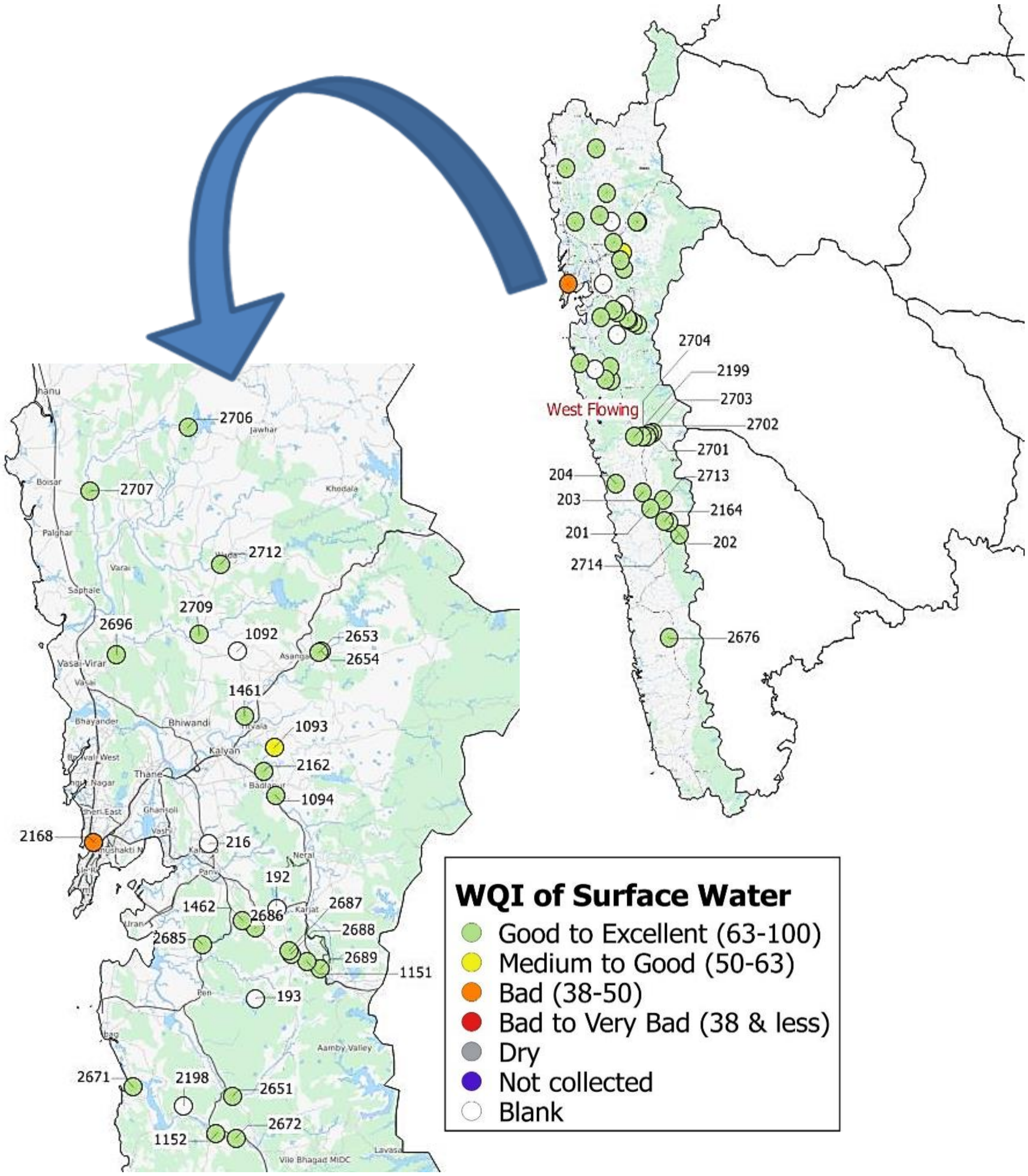
Table No 25: Surface water quality monitoring stations on West flowing rivers (2 of 2)

Program	Station ID	River	Station Name	Village	Taluka	District
NWMP	2701	Savitri	Savitri Jackwell at Upsa kendra	Nangalwadi	Mahad	Raigad
NWMP	2702	Savitri	Savitri at Shedav Doh	Shedav Dov	Mahad	Raigad
NWMP	2703	Savitri	Savitri at Dadli Bridge	Dadli	Mahad	Raigad
NWMP	2704	Savitri	Savitri at Muthavali village	Muthavali	Mahad	Raigad
NWMP	2689	Patalganga	Patalganga at Gagangiri Maharaj Temple	Khopoli	Khalapur	Raigad
NWMP	2199	Savitri	Savitri at Ovale village	Ovale	Mahad	Raigad
NWMP	1151	Patalganga	Patalganga at Shilphata Bridge	Khopoli	Khalapur	Raigad
NWMP	2688	Patalganga	Patalganga at Savroli Bridge	Savroli	Khalapur	Raigad
NWMP	2687	Patalganga	Patalganga at Khalapur pumping house	Khalapur	Khalapur	Raigad
SWMP	192	Dam	Morbe Dam, Taluka - Khalapur, District - Raigad	Khalapur	Khalapur	Raigad
SWMP	193	Balganga	Balganga , Village Ransai, Taluka - Khalapur, District - Raigad	Ransai	Khalapur	Raigad
NWMP	2686	Patalganga	Patalganga at Vyal pump house	Vyal	Khalapur	Raigad
NWMP	1462	Patalganga	Patalganga near intake of MIDC water works(Turade w/w)	Turade	Khalapur	Raigad
NWMP	2672	Kundalika	Kundalika at Dhatav at Jackwell	Dhatav	Roha	Raigad
NWMP	2651	Amba	Amba at D/s of Waken Bridge	Waken Phata	Roha	Raigad
NWMP	1152	Kundalika	Kundalika at Roha Bridge	Roha	Roha	Raigad
SWMP	216	Kasardi	Near Ganesh Ghat	Taloja	Panvel	Raigad
NWMP	2708	Surya	Surya at Intake of Vasai-Virar water scheme	Masvan	Palghar	Thane
NWMP	2685	Patalganga	Patalganga at D/s of Kharpada Bridge	Kharpada	Khalapur	Raigad
NWMP	2198	Kundalika	Kundalika at Are Khurd (Saline Zone)	Are Khurd	Roha	Raigad
NWMP	2671	Kundalik	Kundalik near Salav Bridge (Saline Zone)	Salav	Roha	Raigad

Spatial map of Surface WQI of West Flowing rivers (April 2017)

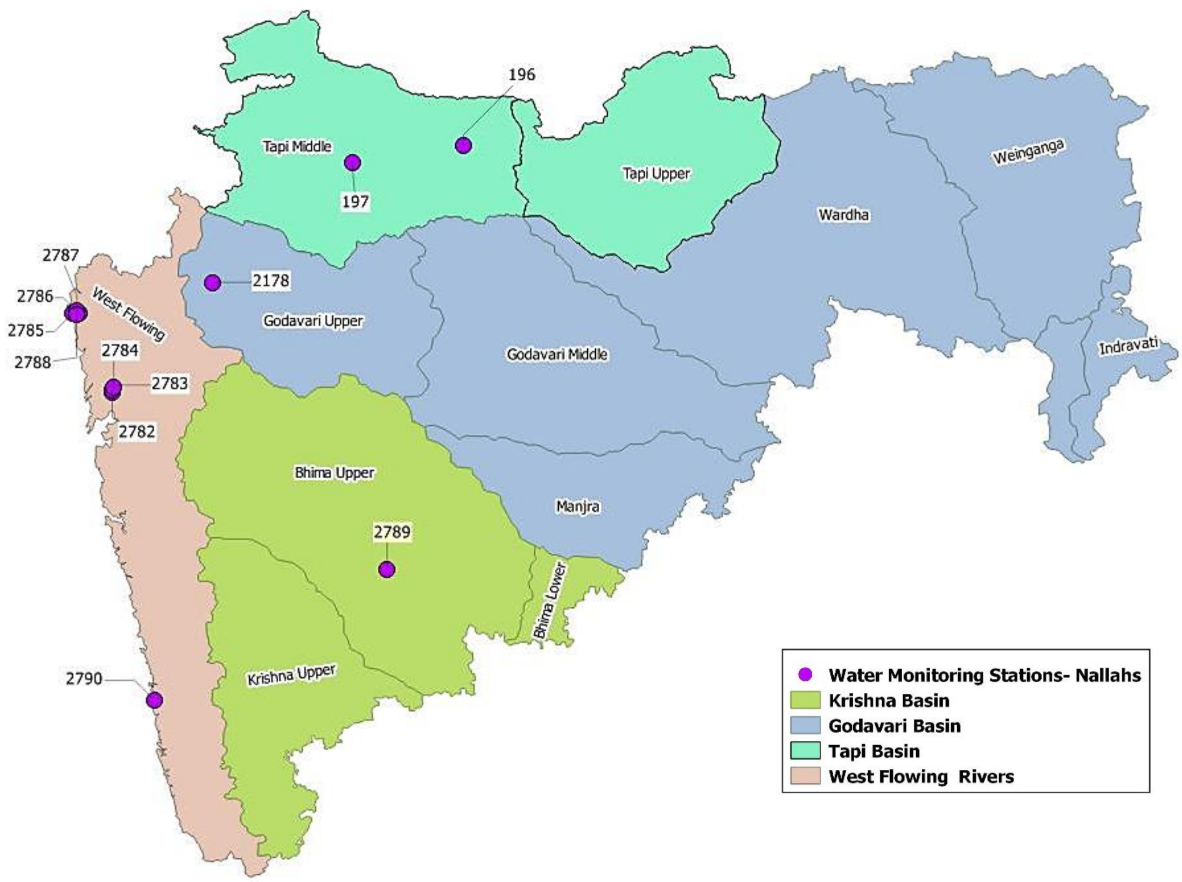


Spatial map of Surface WQI of West Flowing rivers (December 2017)

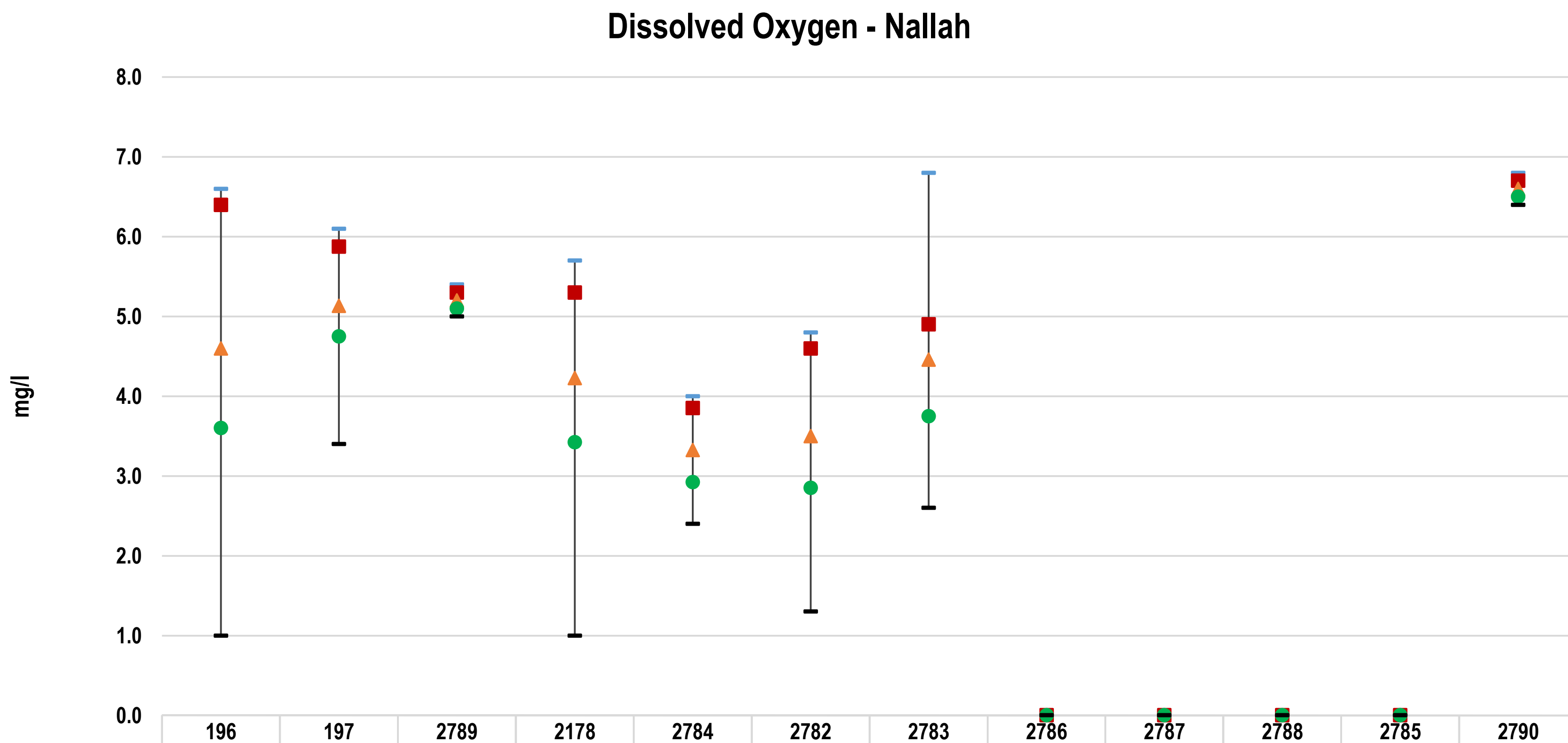


Nallahs

There are 12 water monitoring stations across nallahs in the state. The majority of nallahs of the coastal basin are located in Thane district. The Sandoz nallah, BPT Navpur nallah and Rabodi nalla of Thane are noted to be polluted throughout the year.

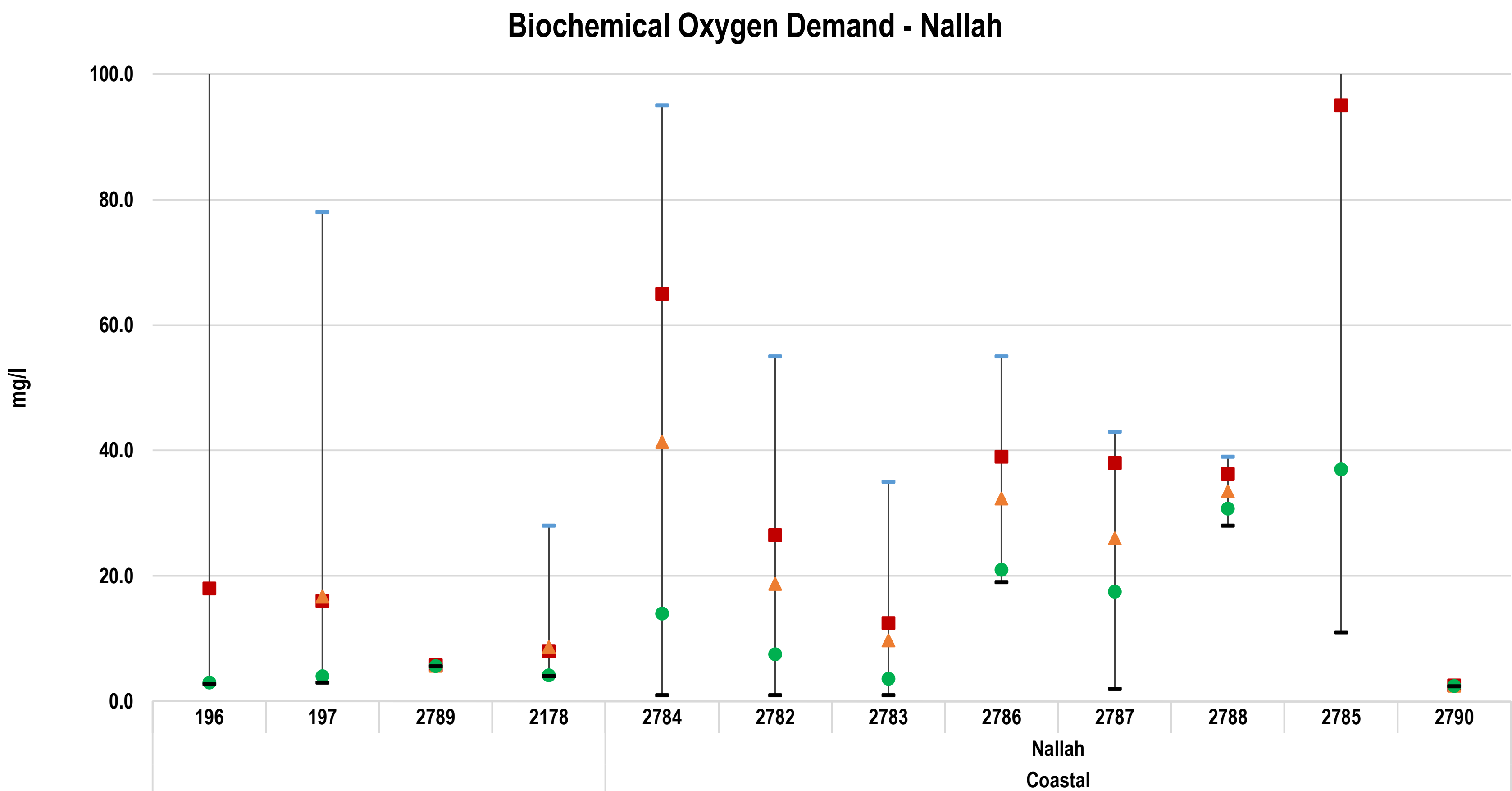


Map No. 8: Network of surface water quality monitoring stations on Nallahs



Nallah Coastal	196	197	2789	2178	2784	2782	2783	2786	2787	2788	2785	2790
Max	6.6	6.1	5.4	5.7	4.0	4.8	6.8	0.0	0.0	0.0	0.0	6.8
75 Percentile	6.4	5.9	5.3	5.3	3.9	4.6	4.9	0.0	0.0	0.0	0.0	6.7
Average	4.6	5.1	5.2	4.2	3.3	3.5	4.5					6.6
25 Percentile	3.6	4.8	5.1	3.4	2.9	2.9	3.8	0.0	0.0	0.0	0.0	6.5
Min	1.0	3.4	5.0	1.0	2.4	1.3	2.6	0.0	0.0	0.0	0.0	6.4

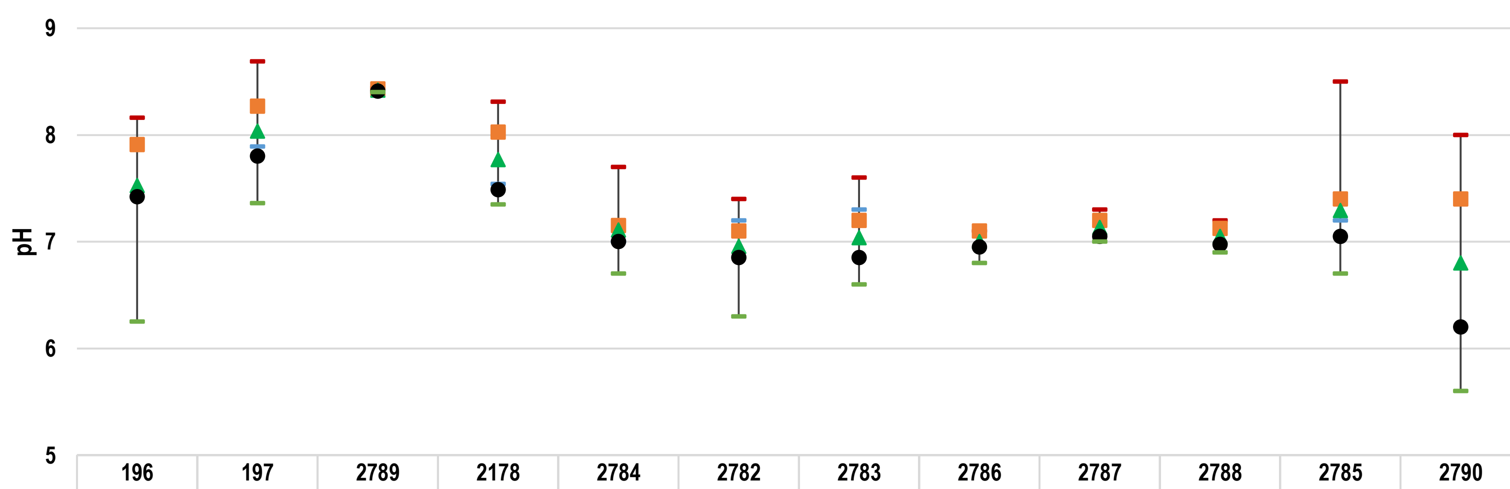
Figure No. 47 : Trend of Dissolved Oxygen (DO) levels recorded at WQMS at Nallah (Coastal basin)



	196	197	2789	2178	2784	2782	2783	2786	2787	2788	2785	2790
Max	724.0	78.0	5.8	28.0	95.0	55.0	35.0	55.0	43.0	39.0	775.0	2.6
75 Percentile	18.0	16.0	5.8	8.0	65.0	26.5	12.5	39.0	38.0	36.3	95.0	2.6
Average	150.4	16.8	5.7	8.7	41.4	18.7	9.7	32.3	26.0	33.5	160.7	2.5
25 Percentile	3.0	4.0	5.7	4.2	14.0	7.5	3.6	21.0	17.5	30.8	37.0	2.5
Min	2.8	3.0	5.6	4.0	1.0	1.0	1.0	19.0	2.0	28.0	11.0	2.4

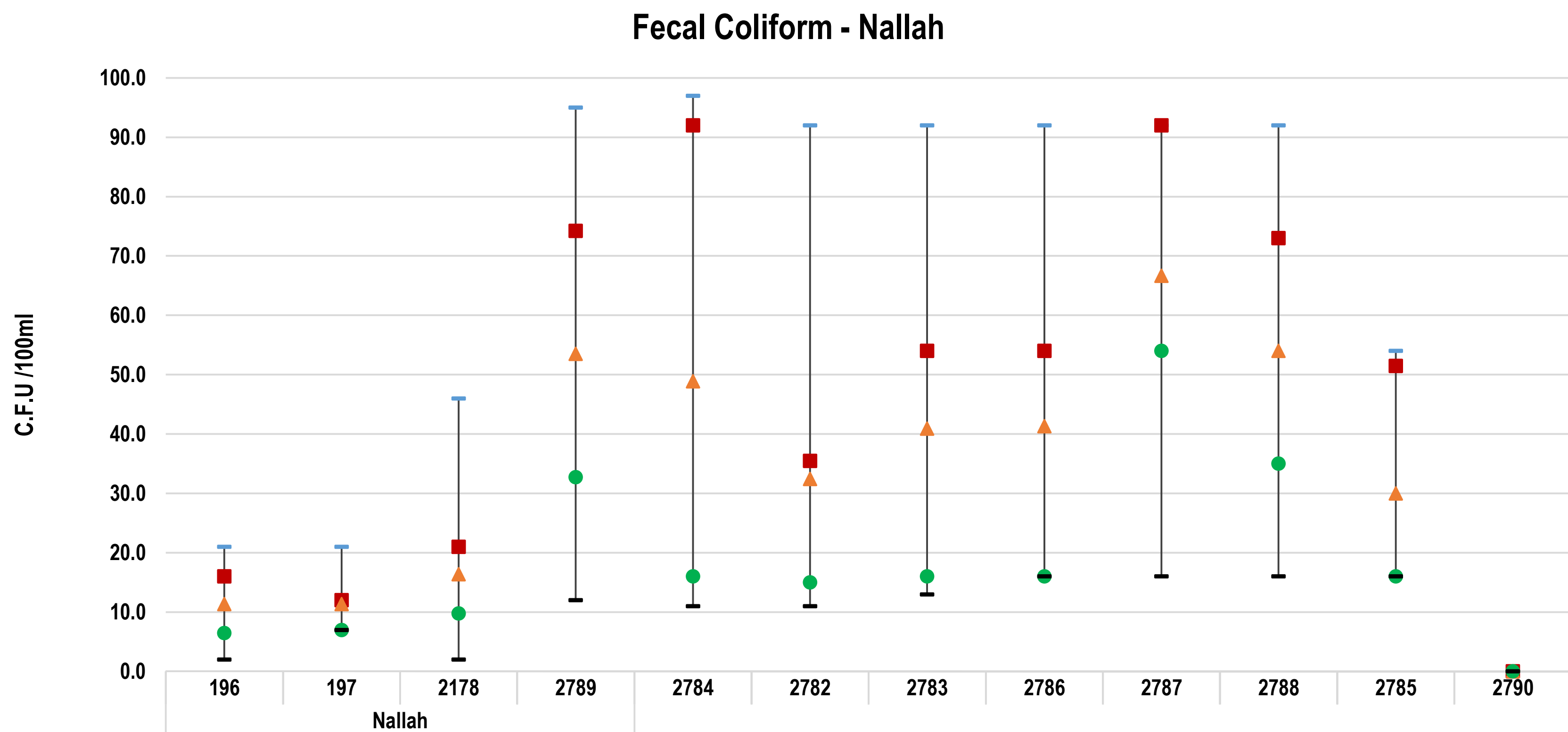
Figure No. 48 : Trend of Biological Oxygen Demand (BOD) levels recorded at WQMS at Nallah (Coastal basin)

pH - Nallah



	196	197	2789	2178	2784	2782	2783	2786	2787	2788	2785	2790
					Nallah Coastal							
Mar		7.89		7.54	7	7.2	7.3				7.2	
Max	8.2	8.7	8.4	8.3	7.7	7.4	7.6	7.1	7.3	7.2	8.5	8.0
75 Percentile	7.9	8.3	8.4	8.0	7.2	7.1	7.2	7.1	7.2	7.1	7.4	7.4
Average	7.5	8.0	8.4	7.8	7.1	7.0	7.0	7.0	7.1	7.1	7.3	6.8
25 Percentile	7.4	7.8	8.4	7.5	7.0	6.9	6.9	7.0	7.1	7.0	7.1	6.2
Min	6.3	7.4	8.4	7.4	6.7	6.3	6.6	6.8	7.0	6.9	6.7	5.6

Figure No. 49: Trend of pH levels recorded at WQMS at Nallah (Coastal basin)



	Nallah				Coastal							
	196	197	2178	2789	2784	2782	2783	2786	2787	2788	2785	2790
Max	21.0	21.0	46.0	95.0	97.0	92.0	92.0	92.0	92.0	92.0	54.0	0.0
75 Percentile	16.0	12.0	21.0	74.3	92.0	35.5	54.0	54.0	92.0	73.0	51.5	0.0
Average	11.3	11.3	16.4	53.5	48.9	32.5	40.9	41.3	66.7	54.0	30.0	0.0
25 Percentile	6.5	7.0	9.8	32.8	16.0	15.0	16.0	16.0	54.0	35.0	16.0	0.0
Min	2.0	7.0	2.0	12.0	11.0	11.0	13.0	16.0	16.0	16.0	16.0	0.0

Figure No. 50 : Trend of Fecal Coliform levels recorded at WQMS at Nallah (Coastal basin)

Water Quality Index for WQMS at Nallah (Coastal basin)

Apr	52	65			26	30	31				22	54
May					26	26	26				20	45
Jun	32	29									20	48
Jul	17	55	60		40	25	51	21	23		21	
Aug	52	69	70		24	26	52	21	21	22	21	
Sep	71	45	68		37	28	61	19	21	20	22	
Oct		69	61	56	26	25	27				23	
Nov			49	54	27	27	26				20	
Dec		37	50		32	52	47				14	
Jan		54	62		25	22	33				21	
Feb					46	31	45				18	
Mar		65	50		48	53	52				22	
Station Code	196	197	2178	2789	2784	2782	2783	2786	2787	2788	2785	2790
Sub Basin	Nallah											
Basin	Coastal											

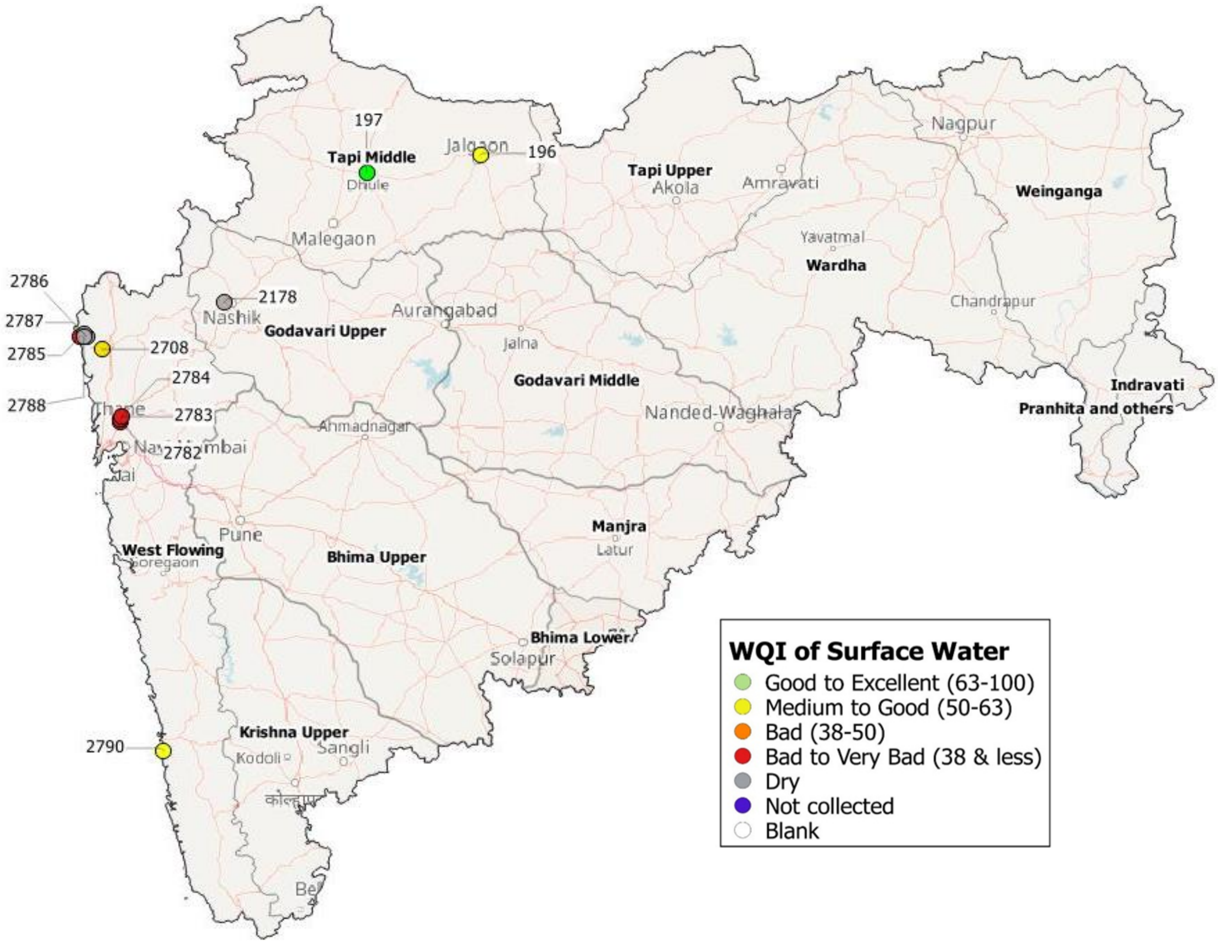
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

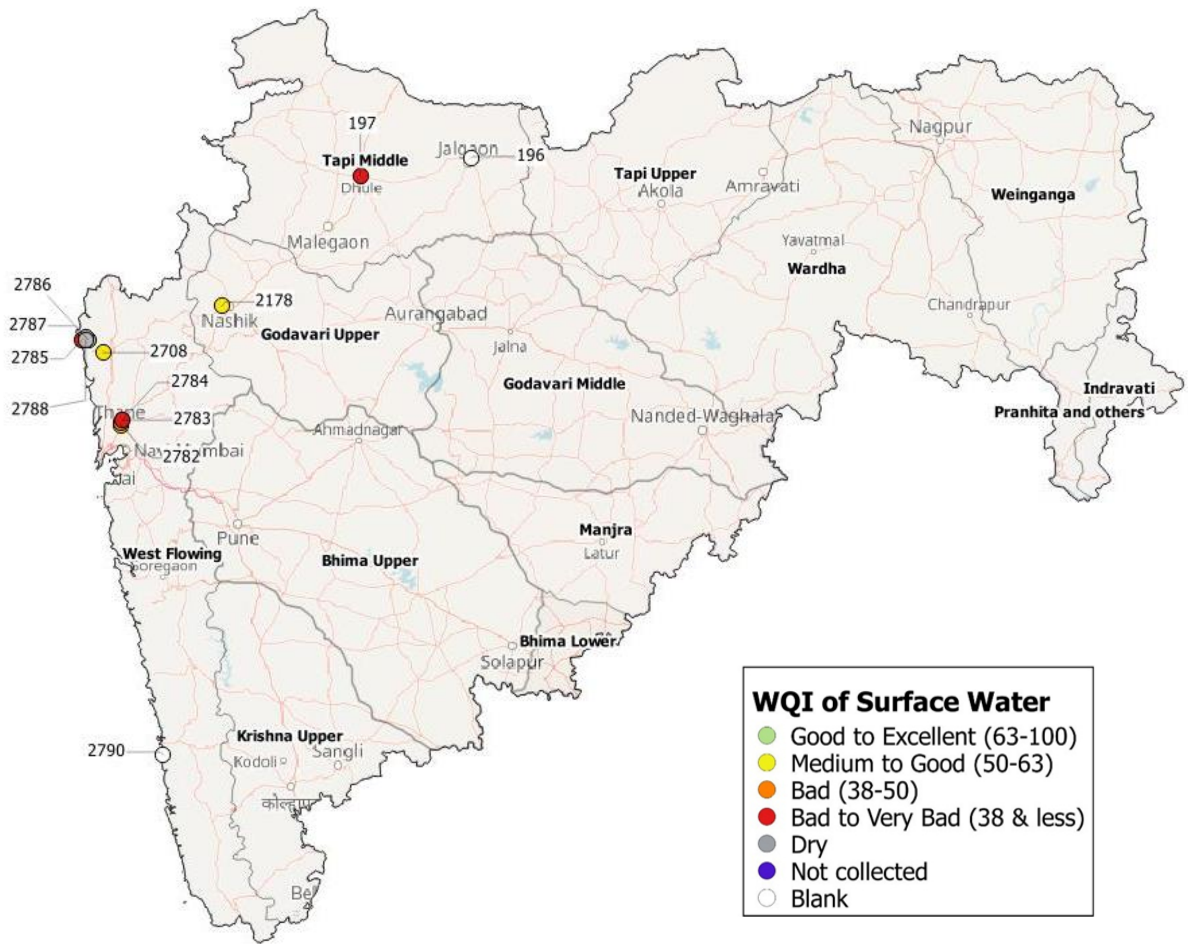
Table No 26: Surface water monitoring stations at Nallahs

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
SWMP	196	Lowki Nalla	Lowki Nalla At Khedi, Taluka & District - Jalgaon	Khedi	Khedi	Jalgaon
SWMP	197	Moti Nalla	Moti Nalla before Confluence with Panjara Dhule, Taluka & District - Dhule	Dhule	Dhule	Dhule
NWMP	2178	Chikhali nalla	Chikhali Nalla Meets Godavari	Chikhali	Nashik	Nashik
NWMP	2789	Nalla	Nalla at D/s of Alkai Mandir, Solapur	Aklai	Malshiras	Solapur
NWMP	2784	Sandoz nalla	Sandoz Nalla	Sandozbaug	Thane	Thane
NWMP	2782	Rabodi nalla	Rabodi Nalla	Rabodi	Thane	Thane
NWMP	2783	Colour Chem nalla	Colour Chem Nalla	Majiwada	Thane	Thane
NWMP	2786	Tarapur MIDC nalla	Tarapur MIDC Nalla, near sump No1	MIDC Tarapur	Palghar	Palghar
NWMP	2787	Tarapur MIDC nalla	Tarapur MIDC Nalla	MIDC Tarapur	Palghar	Palghar
NWMP	2788	Tarapur MIDC nalla	Tarapur MIDC Nalla near sump-III	MIDC Tarapur	Palghar	Palghar
NWMP	2785	BPT Navapur	BPT Navapur	Navapur	Palghar	Palghar
NWMP	2790	Pimpal-Paneri nalla	Pimpal-Paneri Nalla at Ratnagiri near Finolex Industries	Yahganigaon	Ratnagiri	Ratnagiri

Spatial map of Surface WQI of Nallahs (April 2017)



Spatial map of Surface WQI of Nallahs (Dec 2017)



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[17].

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[18]. 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 36 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.

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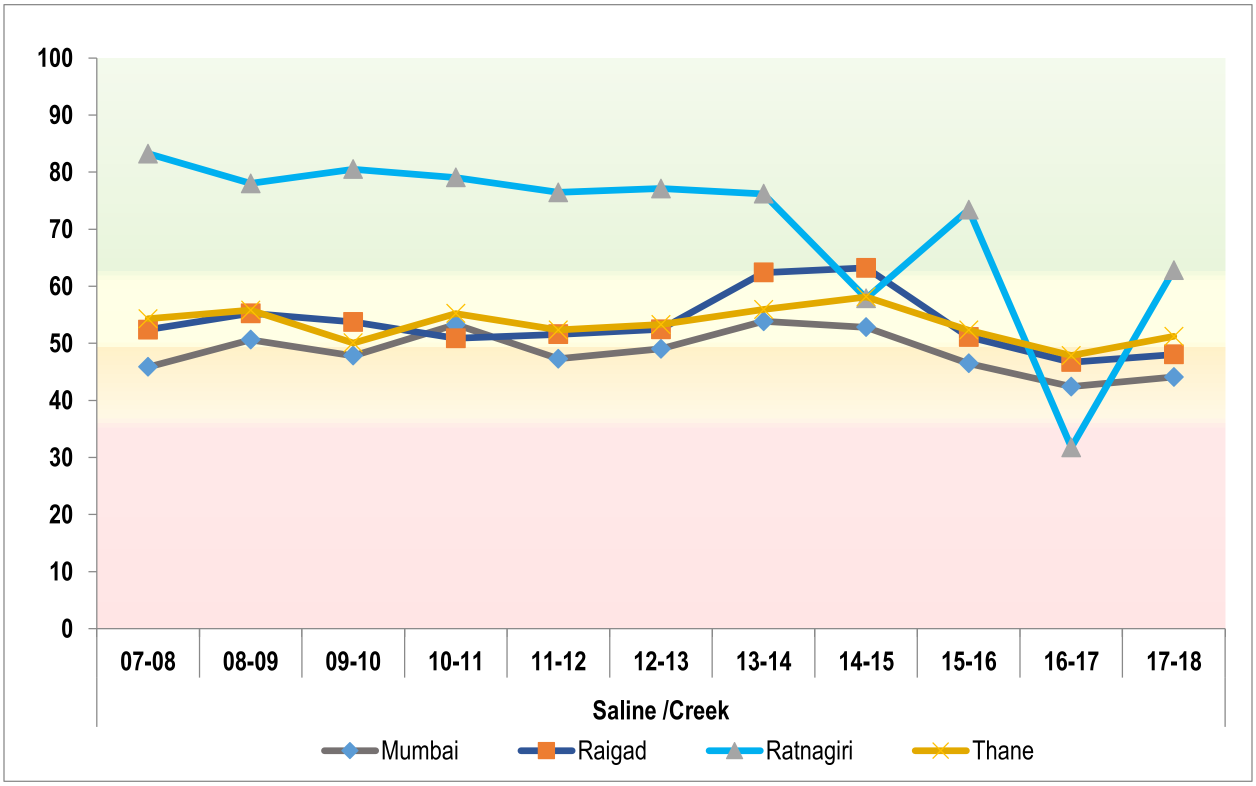
[17] UNDP,Review paper: *Status of coastal and marine ecosystem management in South Asia*,2012

[18] 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. 51: 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 s bodies in that district.

Figure No. 51 depicts the intra basin performance of west flowing rivers across four districts of the state. The annual average WQI of Mumbai and Raigad, though improves slightly, was found to be in Bad category (38-50). Significant improvement was observed in WQI of Thane from Bad category (2016-17) to Medium to Good category in 2017-18. Similar trend was observed in Retnagiri wherein the WQI for the year 2017-18 came in Good to Excellent (63-100) category indicating improved water quality in the district.

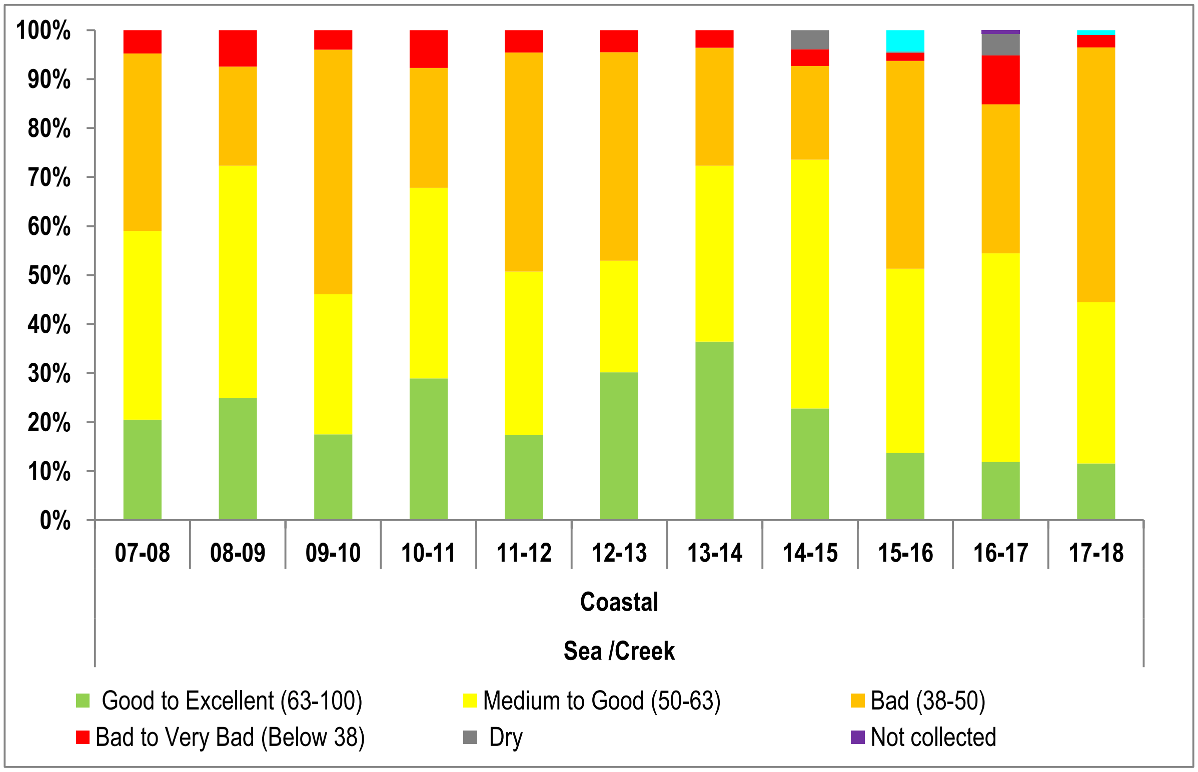
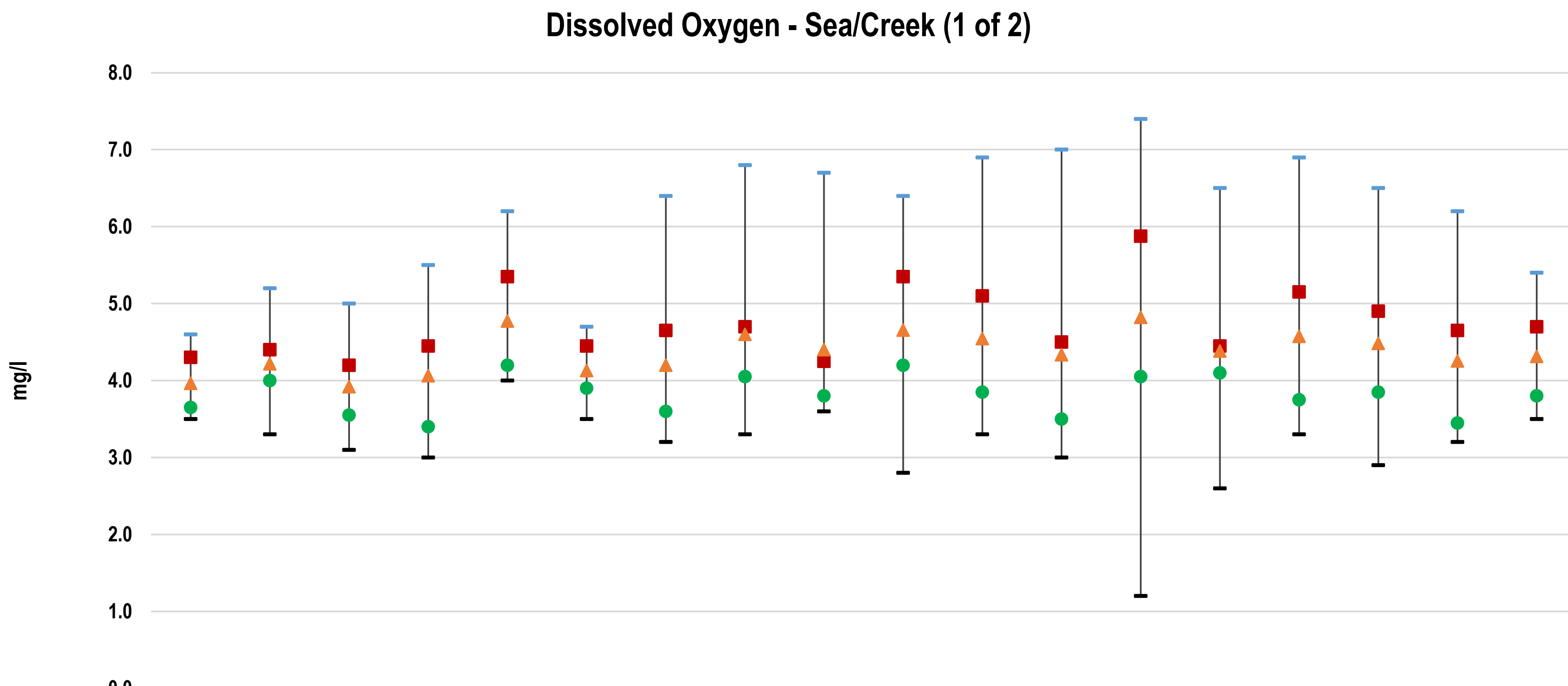


Figure No. 52: Trend of average occurrence for different category of WQI Coastal basin

Out of 36 districts, 5 districts namely Thane, Mumbai, Raigad, Ratnagiri and Sindhudurg are located along the 720kms coastal line in Maharshtra. These districts are blessed with rich biodiversity which is facing continuous anthropogenic pressures from rapid industrialization and urbanization. These are the reasons which are fueling the problem of pollution along the rich coastline which would impact the local marine and mangrove ecosystem and humans residing near the coastline. Hence it is important to monitor regularly the sea water quality and it is necessary to implement certain preventive measures to reduce the levels of pollution.

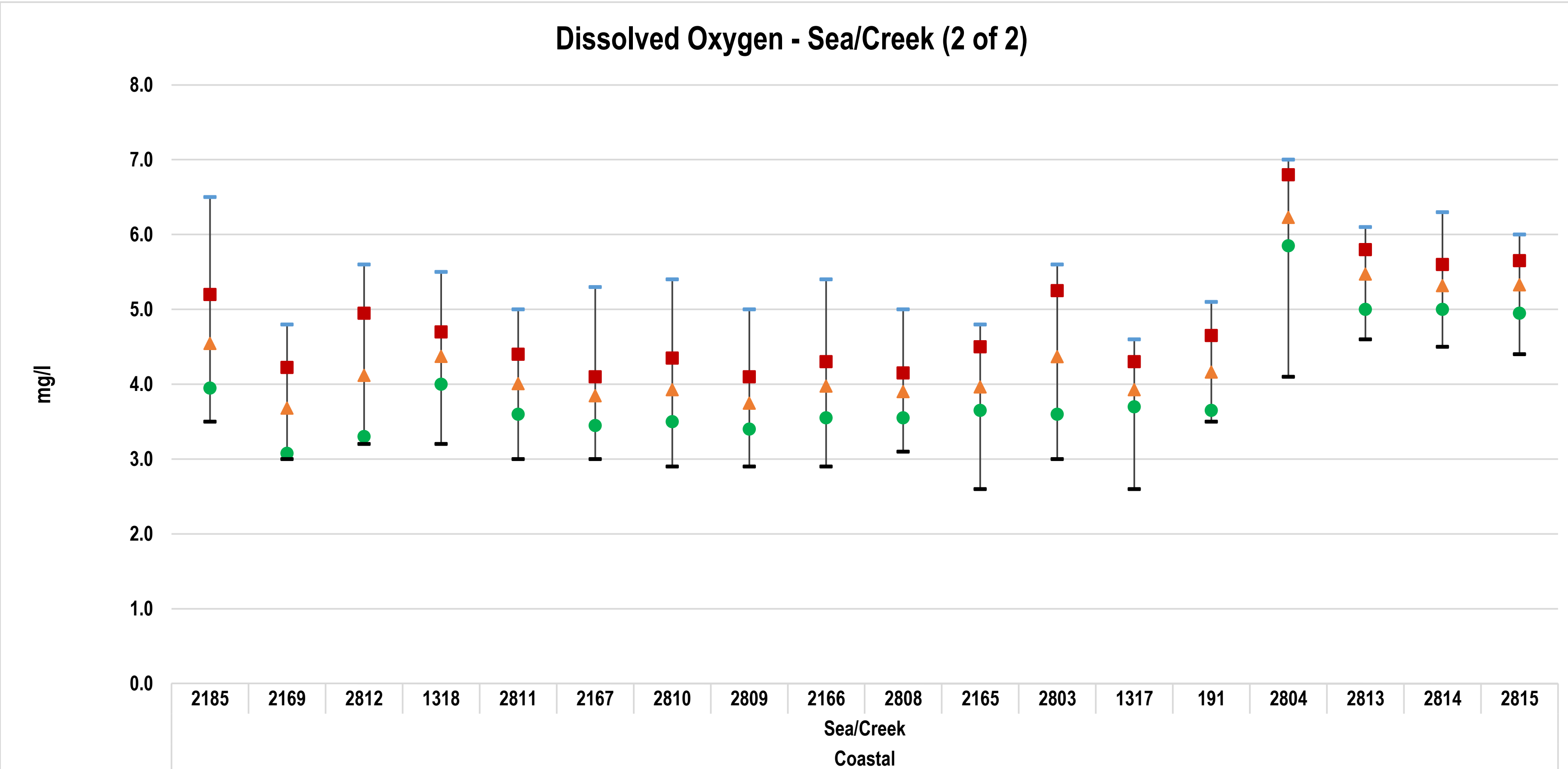
There are in all 45 monitoring stations which includes 36 stations on sea/creek and 9 stations along the nallahs. These stations are installed along the sensitive and pollution prone areas of the Maharashtra coastline. Basic parameters like DO, FC, pH and BOD data gets recorded through regular monitoring which helps in tracking the pollution levels throughout the saline water channels of Maharashtra.

As depicted in Figure No. 52, it is observed that more than 50% of the observations (52%) are recorded under "Bad" category followed by 33% in "Medium to Good" category, nearly 12% in "Good to Excellent" category and around 2.5 in "Bad to Very Bad" category.



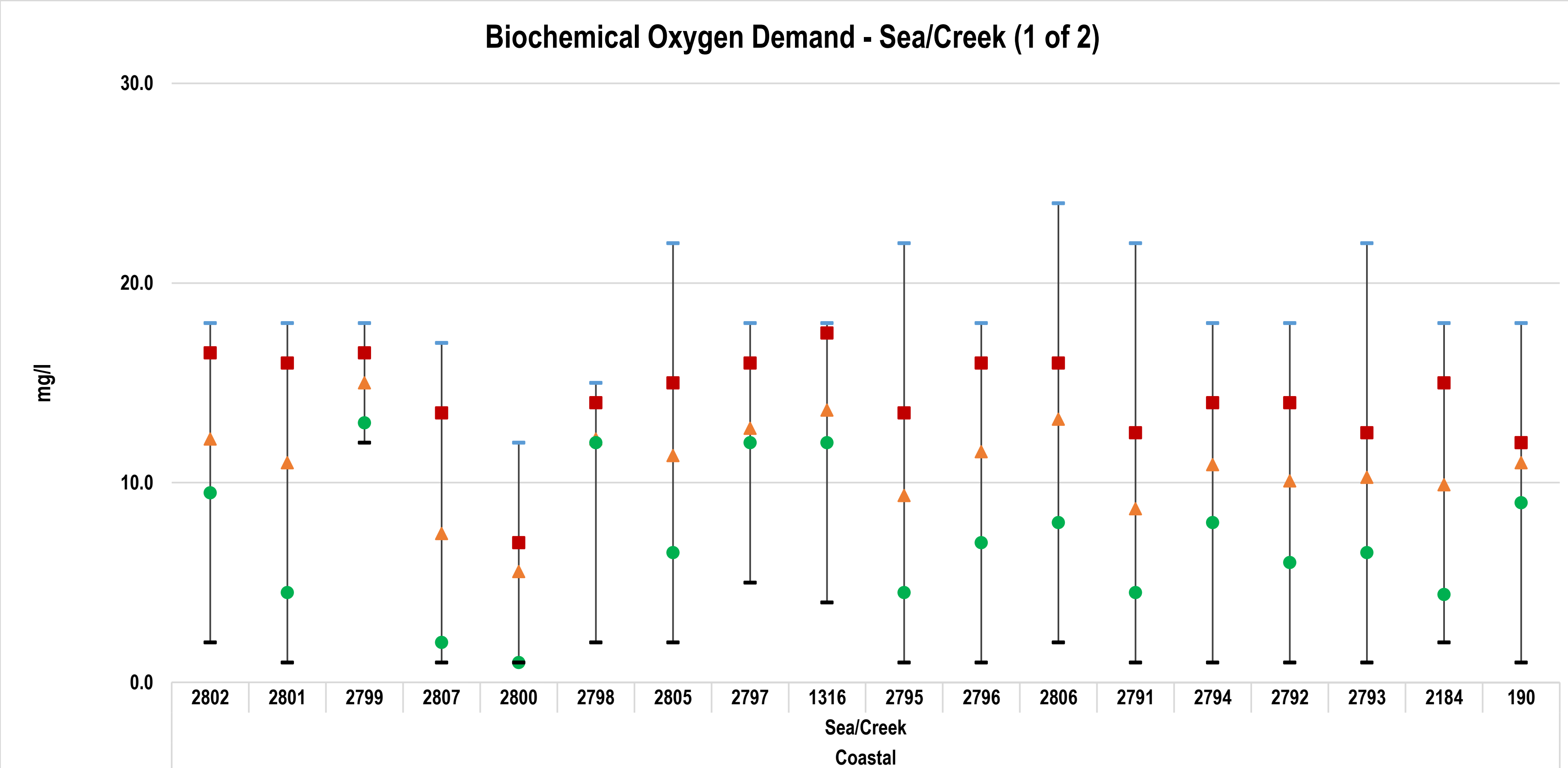
	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	190
	Sea/Creek Coastal																	
Max	4.6	5.2	5.0	5.5	6.2	4.7	6.4	6.8	6.7	6.4	6.9	7.0	7.4	6.5	6.9	6.5	6.2	5.4
75 Percentile	4.3	4.4	4.2	4.5	5.4	4.5	4.7	4.7	4.3	5.4	5.1	4.5	5.9	4.5	5.2	4.9	4.7	4.7
Average	4.0	4.2	3.9	4.1	4.8	4.1	4.2	4.6	4.4	4.7	4.5	4.3	4.8	4.4	4.6	4.5	4.3	4.3
25 Percentile	3.7	4.0	3.6	3.4	4.2	3.9	3.6	4.1	3.8	4.2	3.9	3.5	4.1	4.1	3.8	3.9	3.5	3.8
Min	3.5	3.3	3.1	3.0	4.0	3.5	3.2	3.3	3.6	2.8	3.3	3.0	1.2	2.6	3.3	2.9	3.2	3.5

Figure No. 53: Trend of Dissoved Oxygen (DO) levels recorded at WQMS monitoring sea and creek water (1 of 2)



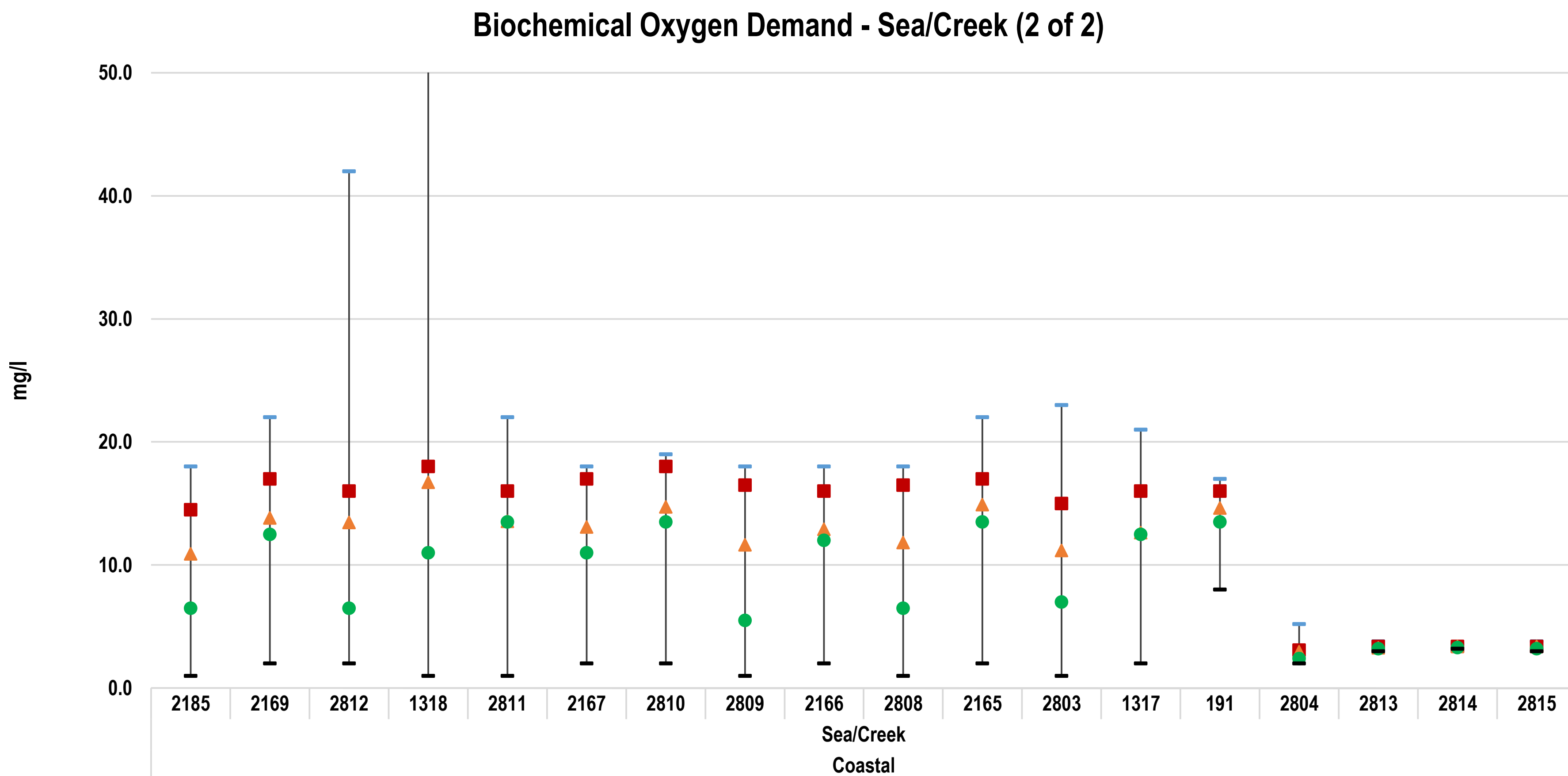
	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	191	2804	2813	2814	2815
Max	6.5	4.8	5.6	5.5	5.0	5.3	5.4	5.0	5.4	5.0	4.8	5.6	4.6	5.1	7.0	6.1	6.3	6.0
75 Percentile	5.2	4.2	5.0	4.7	4.4	4.1	4.4	4.1	4.3	4.2	4.5	5.3	4.3	4.7	6.8	5.8	5.6	5.7
Average	4.5	3.7	4.1	4.4	4.0	3.8	3.9	3.7	4.0	3.9	4.0	4.4	3.9	4.2	6.2	5.5	5.3	5.3
25 Percentile	4.0	3.1	3.3	4.0	3.6	3.5	3.5	3.4	3.6	3.6	3.7	3.6	3.7	3.7	5.9	5.0	5.0	5.0
Min	3.5	3.0	3.2	3.2	3.0	3.0	2.9	2.9	2.9	3.1	2.6	3.0	2.6	3.5	4.1	4.6	4.5	4.4

Figure No. 54: Trend of Dissoved Oxygen (DO) levels recorded at WQMS monitoring sea and creek water (2 of 2)



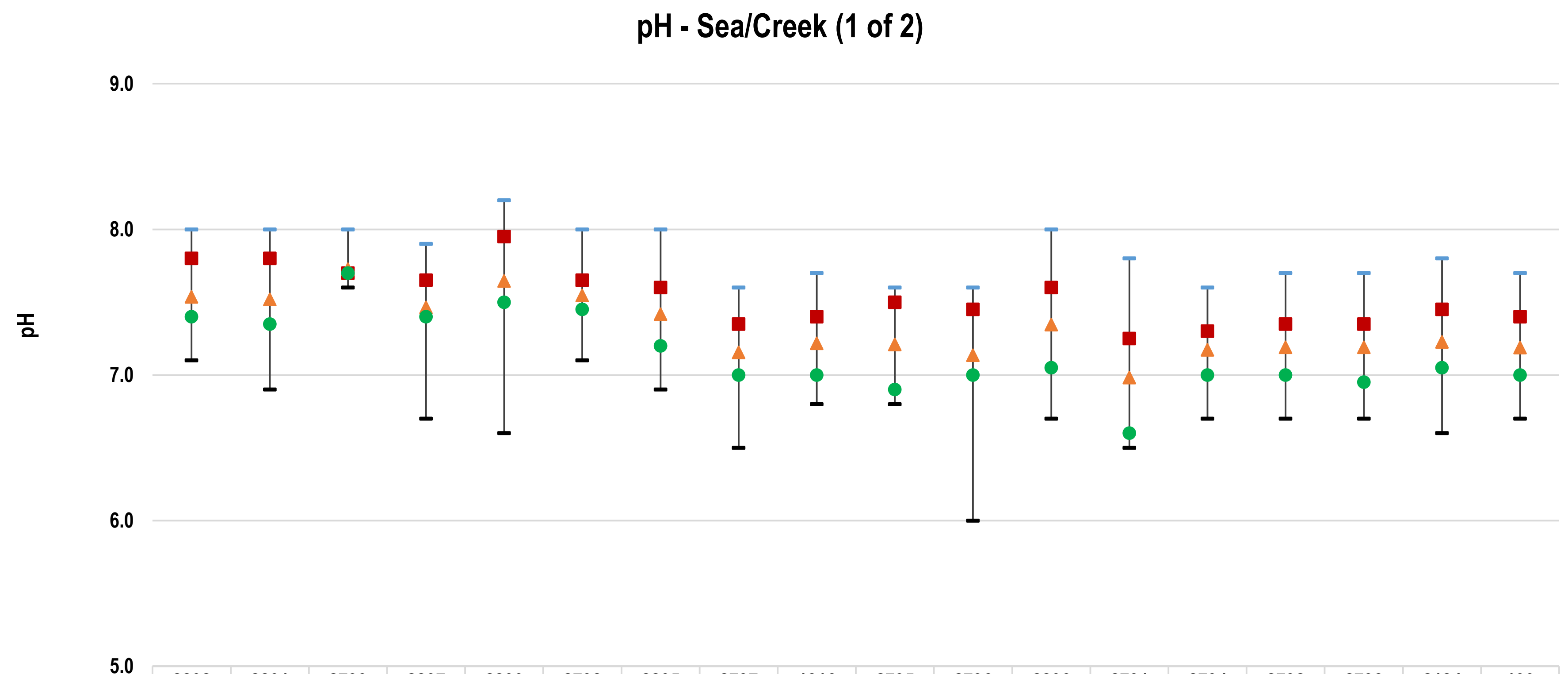
	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	190
Max	18.0	18.0	18.0	17.0	12.0	15.0	22.0	18.0	18.0	22.0	18.0	24.0	22.0	18.0	18.0	22.0	18.0	18.0
75 Percentile	16.5	16.0	16.5	13.5	7.0	14.0	15.0	16.0	17.5	13.5	16.0	16.0	12.5	14.0	14.0	12.5	15.0	12.0
Average	12.2	11.0	15.0	7.5	5.5	12.2	11.4	12.7	13.6	9.4	11.5	13.2	8.7	10.9	10.1	10.3	9.9	11.0
25 Percentile	9.5	4.5	13.0	2.0	1.0	12.0	6.5	12.0	12.0	4.5	7.0	8.0	4.5	8.0	6.0	6.5	4.4	9.0
Min	2.0	1.0	12.0	1.0	1.0	2.0	2.0	5.0	4.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	1.0

Figure No. 55: Trend ofBiological Oxygen Demand (BOD) levels recorded at WQMS monitoring sea and creek water (1 of 2)



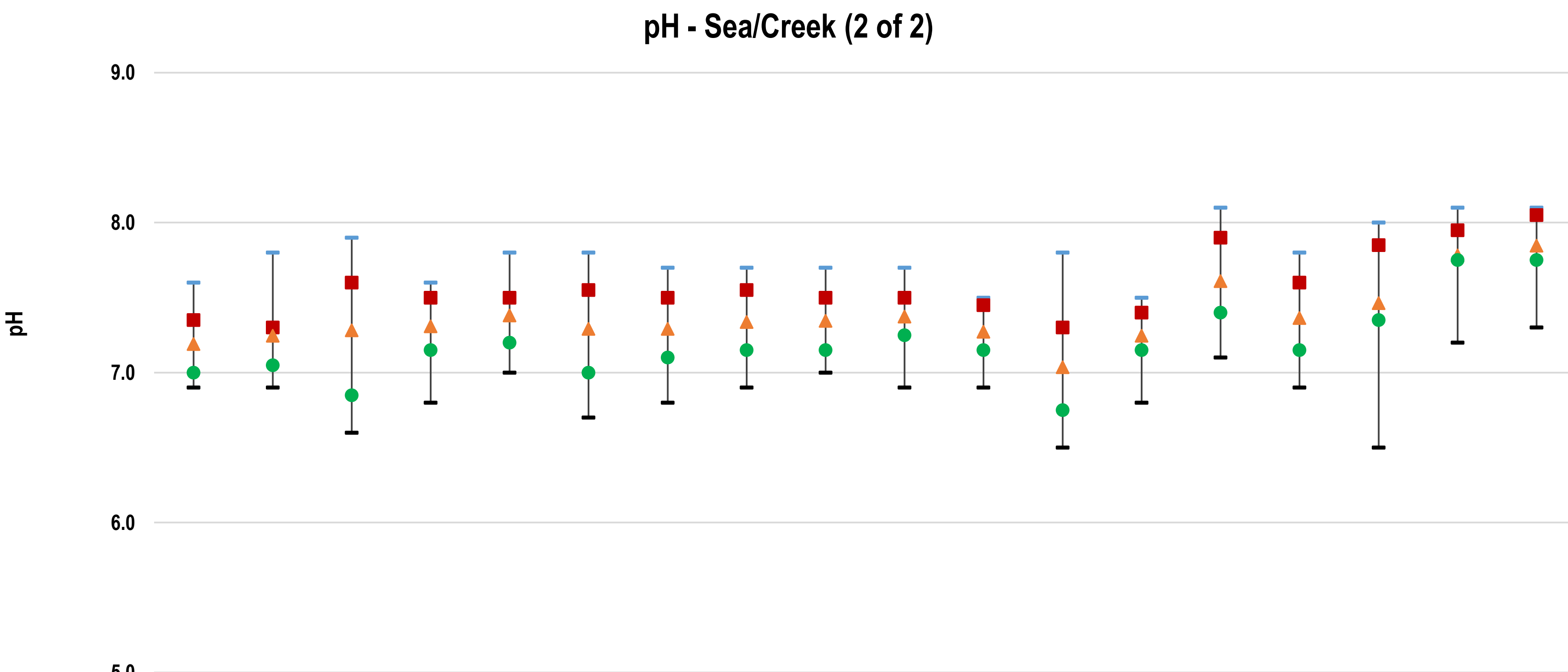
	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	191	2804	2813	2814	2815
Max	18.0	22.0	42.0	54.0	22.0	18.0	19.0	18.0	18.0	18.0	22.0	23.0	21.0	17.0	5.2	3.8	3.6	3.8
75 Percentile	14.5	17.0	16.0	18.0	16.0	17.0	18.0	16.5	16.0	16.5	17.0	15.0	16.0	16.0	3.1	3.4	3.4	3.4
Average	10.9	13.8	13.5	16.7	13.5	13.1	14.7	11.6	12.9	11.8	14.9	11.2	12.6	14.6	3.0	3.3	3.4	3.4
25 Percentile	6.5	12.5	6.5	11.0	13.5	11.0	13.5	5.5	12.0	6.5	13.5	7.0	12.5	13.5	2.4	3.2	3.3	3.2
Min	1.0	2.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	8.0	2.0	3.0	3.2	3.0

Figure No. 56: Trend ofBiological Oxygen Demand (BOD) levels recorded at WQMS monitoring sea and creek water (2 of 2)



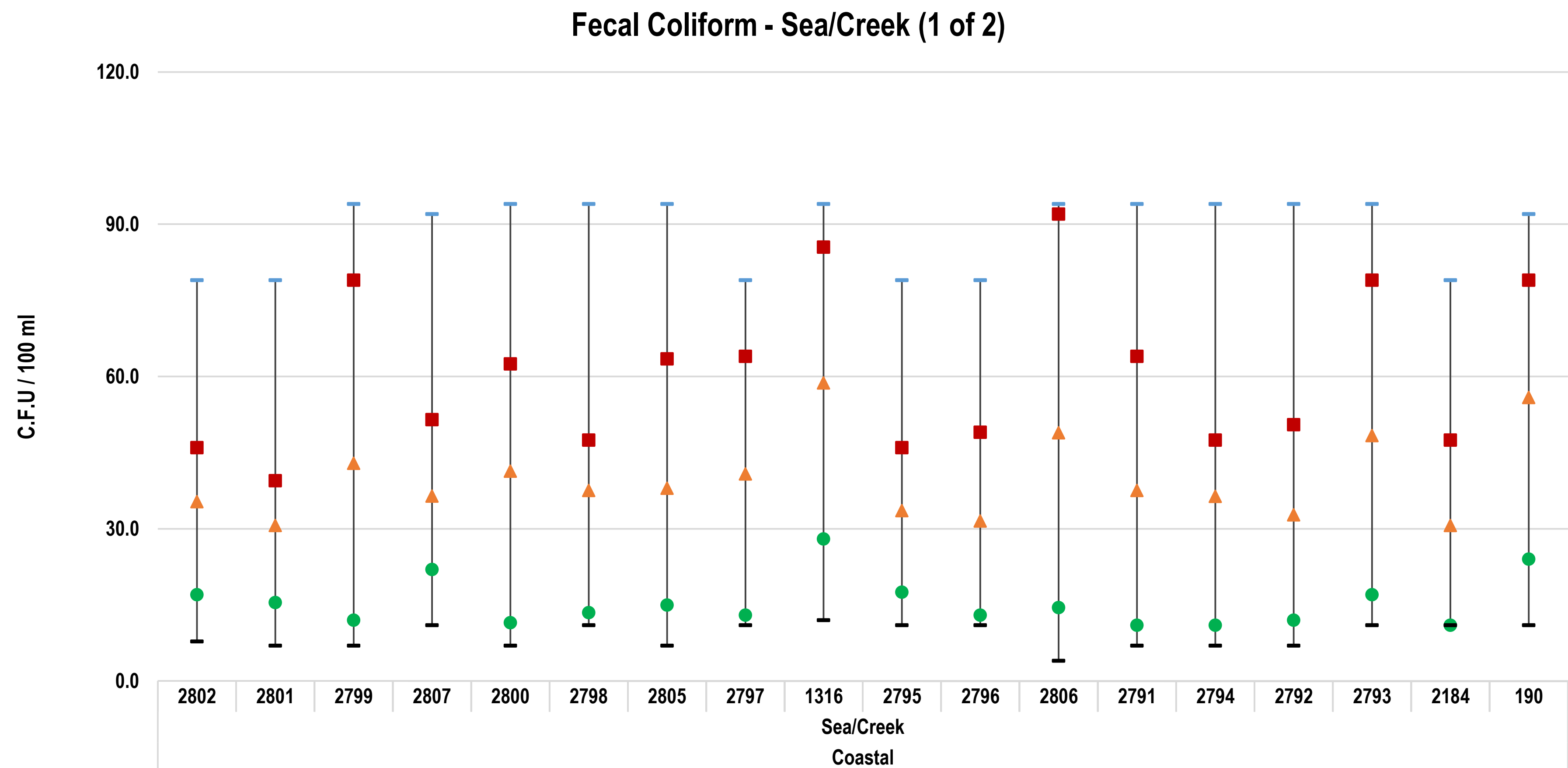
Sea/Creek Coastal	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	190
Max	8.0	8.0	8.0	7.9	8.2	8.0	8.0	7.6	7.7	7.6	7.6	8.0	7.8	7.6	7.7	7.7	7.8	7.7
75 Percentile	7.8	7.8	7.7	7.7	8.0	7.7	7.6	7.4	7.4	7.5	7.5	7.6	7.3	7.3	7.4	7.4	7.5	7.4
Average	7.5	7.5	7.7	7.5	7.6	7.5	7.4	7.2	7.2	7.2	7.1	7.3	7.0	7.2	7.2	7.2	7.2	7.2
25 Percentile	7.4	7.4	7.7	7.4	7.5	7.5	7.2	7.0	7.0	6.9	7.0	7.1	6.6	7.0	7.0	7.0	7.1	7.0
Min	7.1	6.9	7.6	6.7	6.6	7.1	6.9	6.5	6.8	6.8	6.0	6.7	6.5	6.7	6.7	6.7	6.6	6.7

Figure No. 57: Trend of pH levels recorded at WQMS monitoring sea and creek water (1 of 2)



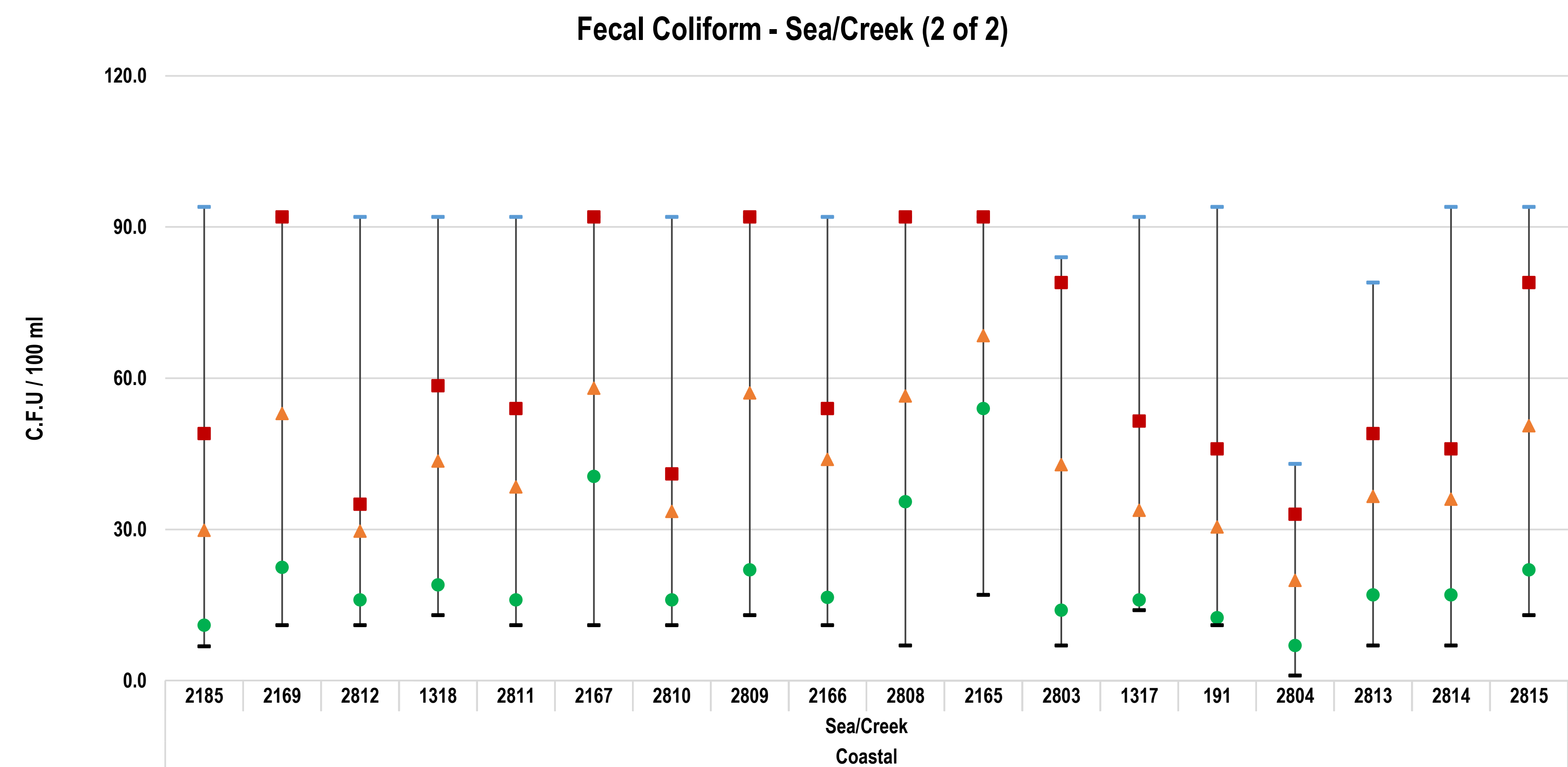
	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	191	2804	2813	2814	2815
	Sea/Creek Coastal																	
Max	7.6	7.8	7.9	7.6	7.8	7.8	7.7	7.7	7.7	7.7	7.5	7.8	7.5	8.1	7.8	8.0	8.1	8.1
75 Percentile	7.4	7.3	7.6	7.5	7.5	7.6	7.5	7.6	7.5	7.5	7.5	7.3	7.4	7.9	7.6	7.9	8.0	8.1
Average	7.2	7.2	7.3	7.3	7.4	7.3	7.3	7.3	7.3	7.4	7.3	7.0	7.2	7.6	7.4	7.5	7.8	7.8
25 Percentile	7.0	7.1	6.9	7.2	7.2	7.0	7.1	7.2	7.2	7.3	7.2	6.8	7.2	7.4	7.2	7.4	7.8	7.8
Min	6.9	6.9	6.6	6.8	7.0	6.7	6.8	6.9	7.0	6.9	6.9	6.5	6.8	7.1	6.9	6.5	7.2	7.3

Figure No. 58: Trend of pH levels recorded at WQMS monitoring sea and creek water (2 of 2)



	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	190
Max	79.0	79.0	94.0	92.0	94.0	94.0	94.0	79.0	94.0	79.0	79.0	94.0	94.0	94.0	94.0	94.0	79.0	92.0
75 Percentile	46.0	39.5	79.0	51.5	62.5	47.5	63.5	64.0	85.5	46.0	49.0	92.0	64.0	47.5	50.5	79.0	47.5	79.0
Average	35.3	30.6	42.9	36.5	41.4	37.5	38.0	40.8	58.7	33.5	31.5	48.9	37.5	36.4	32.7	48.4	30.6	55.9
25 Percentile	17.0	15.5	12.0	22.0	11.5	13.5	15.0	13.0	28.0	17.5	13.0	14.5	11.0	11.0	12.0	17.0	11.0	24.0
Min	7.8	7.0	7.0	11.0	7.0	11.0	7.0	11.0	12.0	11.0	11.0	4.0	7.0	7.0	7.0	11.0	11.0	11.0

Figure No. 59: Trend of Fecal coliform levels recorded at WQMS monitoring sea and creek water (1 of 2)



	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	191	2804	2813	2814	2815
Max	94.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	84.0	92.0	94.0	43.0	79.0	94.0	94.0
75 Percentile	49.0	92.0	35.0	58.5	54.0	92.0	41.0	92.0	54.0	92.0	92.0	79.0	51.5	46.0	33.0	49.0	46.0	79.0
Average	29.8	53.0	29.6	43.5	38.5	58.0	33.5	57.1	43.9	56.5	68.5	42.8	33.8	30.5	19.9	36.6	36.0	50.6
25 Percentile	11.0	22.5	16.0	19.0	16.0	40.5	16.0	22.0	16.5	35.5	54.0	14.0	16.0	12.5	7.0	17.0	17.0	22.0
Min	6.8	11.0	11.0	13.0	11.0	11.0	11.0	13.0	11.0	7.0	17.0	7.0	14.0	11.0	1.0	7.0	7.0	13.0

Figure No. 60: Trend of Fecal coliform levels recorded at WQMS monitoring sea and creek water (2 of 2)

Water quality Index for WQMS monitoring Sea and Creek water (1 of 2)

Apr	48	47	50	47	51	50	44	50	44	50	51	43	52	51	49	53	49	45
May	48	48	46	48	56	48	38	49	48	50	47	40	35	52	52	50	50	49
Jun	48	No data	56	45	No data	40	47	49	49	54	45	41	No data	No data	No data	No data	No data	46
Jul	62	49	51	53	63	54	63	60	66	66	53	57	61	58	66	69	57	60
Aug	50	52	53	47	56	55	47	69	60	65	65	59	64	54	67	55	63	56
Sep	49	55	49	47	58	51	45	54	49	68	58	44	69	69	56	62	66	55
Oct	49	57	45	52	57	48	47	55	52	57	51	43	60	52	59	51	52	48
Nov	53	54	46	40	49	48	44	53	49	43	50	44	60	49	51	51	48	
Dec	44	48	46	48	53	51	47	48	48	52	54	42	47	52	47	49	47	
Jan	58	53	49	48	46	49	50	51	51	40	52	51	40	40	41	40	48	
Feb	54	54	46	48	49	45	45	49	49	52	49	44	45	49	52	47	44	46
Mar	51	50	48	46	53	45	48	55	55	55	49	55	54	56	57	52	52	52
Station Code	2802	2801	2799	2807	2800	2798	2805	2797	1316	2795	2796	2806	2791	2794	2792	2793	2184	190
Sub Basin	Sea/Creek (1 of 2)																	
Basin	Coastal																	

Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

Table No 27: Surface water quality monitoring stations monitoring Sea/Creek water (1 of 2)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	2802	Dahanu creek	Dahanu Creek at Dahanu Fort	Danugaon	Dahanu	Thane
NWMP	2801	Savta creek	Savta Creek	Savta	Dahanu	Thane
NWMP	2799	Dandi creek	Dandi Creek	Dandi	Palghar	Thane
NWMP	2807	Navapur sea	Navapur Sea	Navapur	Palghar	Thane
NWMP	2800	Sarwali creek	Sarwali Creek	Sarwali	Palghar	Thane
NWMP	2798	Kharekuran Murbe creek	Kharekuran Murbe Creek	Kharekuran	Palghar	Thane
NWMP	2805	Arnala sea	Arnala Sea	Arnala	Vasai	Thane
NWMP	2797	Bhayander creek	Bhayander Creek at D/s of Railway Bridge at Jasal Park Chowpatty	Navghar	Bhayander	Thane
NWMP	1316	Bassein creek	Bassein creek at Vasai Fort, Thane	Bassein	Vasai	Thane
NWMP	2795	Ulhas creek	Ulhas Creek at Gaimukh at Nagla Bunder on Ghod Bunder Road	Nagla	Thane	Thane
NWMP	2796	Ulhas creek	Ulhas Creek at Versova Bridge	Versova	Vasai	Thane
NWMP	2806	Uttan sea	Uttan Sea at Bhayander	Uttan	Bhayander	Thane
NWMP	2791	Ulhas creek	Ulhas Creek at Reti Bunder, D/s of Kalyan-Bhiwandi Bridge	Kalyan	Kalyan	Thane
NWMP	2794	Ulhas creek	Ulhas Creek at Kolshet Reti Bunder	Kolshet	Thane	Thane
NWMP	2792	Ulhas creek	Ulhas Creek at Mumbra Reti Bunder	Mumbra	Thane	Thane
NWMP	2793	Thane creek	Thane Creek at Kalwa Road Bridge	Kalwa	Thane	Thane
NWMP	2184	Vashi creek	Vashi Creek at Airoli Bridge	Airoli	Thane	Thane
SWMP	190	Creek water	TTC Creek At Ghansoli Jetty	Ghansoli	Thane	Thane

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

Apr	50	46	42	41	45	44	44	46	45	42	47	59	44	43	54	50	46	46
May	54	43	36	42	42	41	41	39	41	41	42	56	43	43	52	46	45	46
Jun	48	44	49	48	43	47	44	40	44	44	46	53	49	41	43	51	48	48
Jul	65	45	58	56	43	45	43	43	46	43	45	61	44	49	61	66	63	60
Aug	56	46	50	55	53	51	50	48	50	47	45	56	47	52	63	61	56	57
Sep	50	39	45	52	45	46	43	44	44	44	47	47	54	40	74	60	66	65
Oct	49	43	40	43	42	41	39	42	42	41	42	53	42	45	72	63	64	61
Nov	53	38	33	46	42	40	39	40	41	42	42	55	43		76	71	65	68
Dec	63	38	36	42	40	39	39	38	39	41	36	47	36	54	76	64	65	68
Jan	52	42	48	45	43	41	44	43	45	48	46	44	43	46	79	64	65	66
Feb	46	30	50	50	48	47	51	46	51	48	45	47	46	48	74	66	66	60
Mar	60	44	50	40	56	46	43	45	55	46	49	50	57	50	73	66	66	64
Station Code	2185	2169	2812	1318	2811	2167	2810	2809	2166	2808	2165	2803	1317	191	2804	2813	2814	2815
Sub Basin	Sea/Creek (2 of 2)																	
Basin	Coastal																	

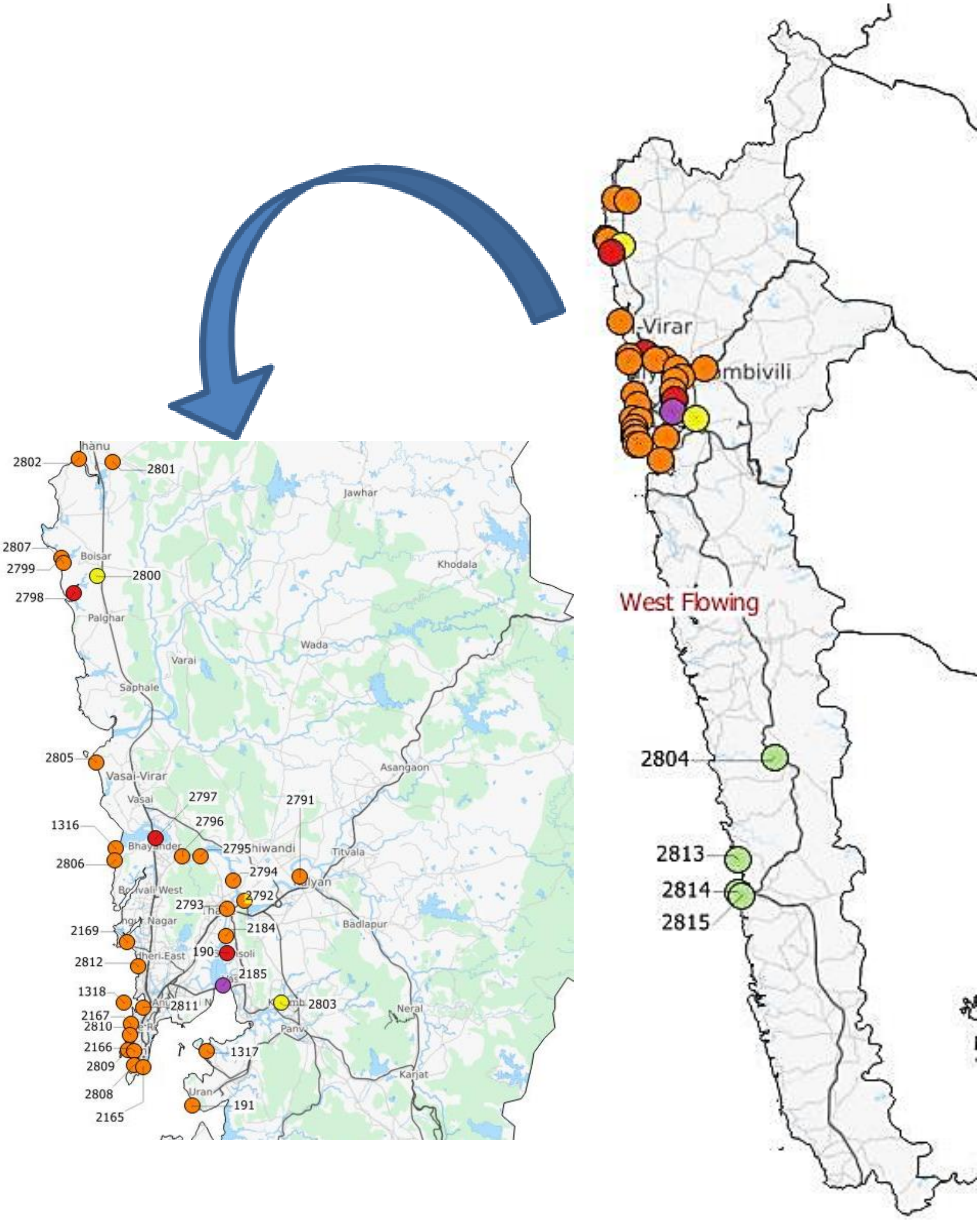
Legend

Good to Excellent	Medium to good	Bad	Bad to Very Bed	Dry	No data

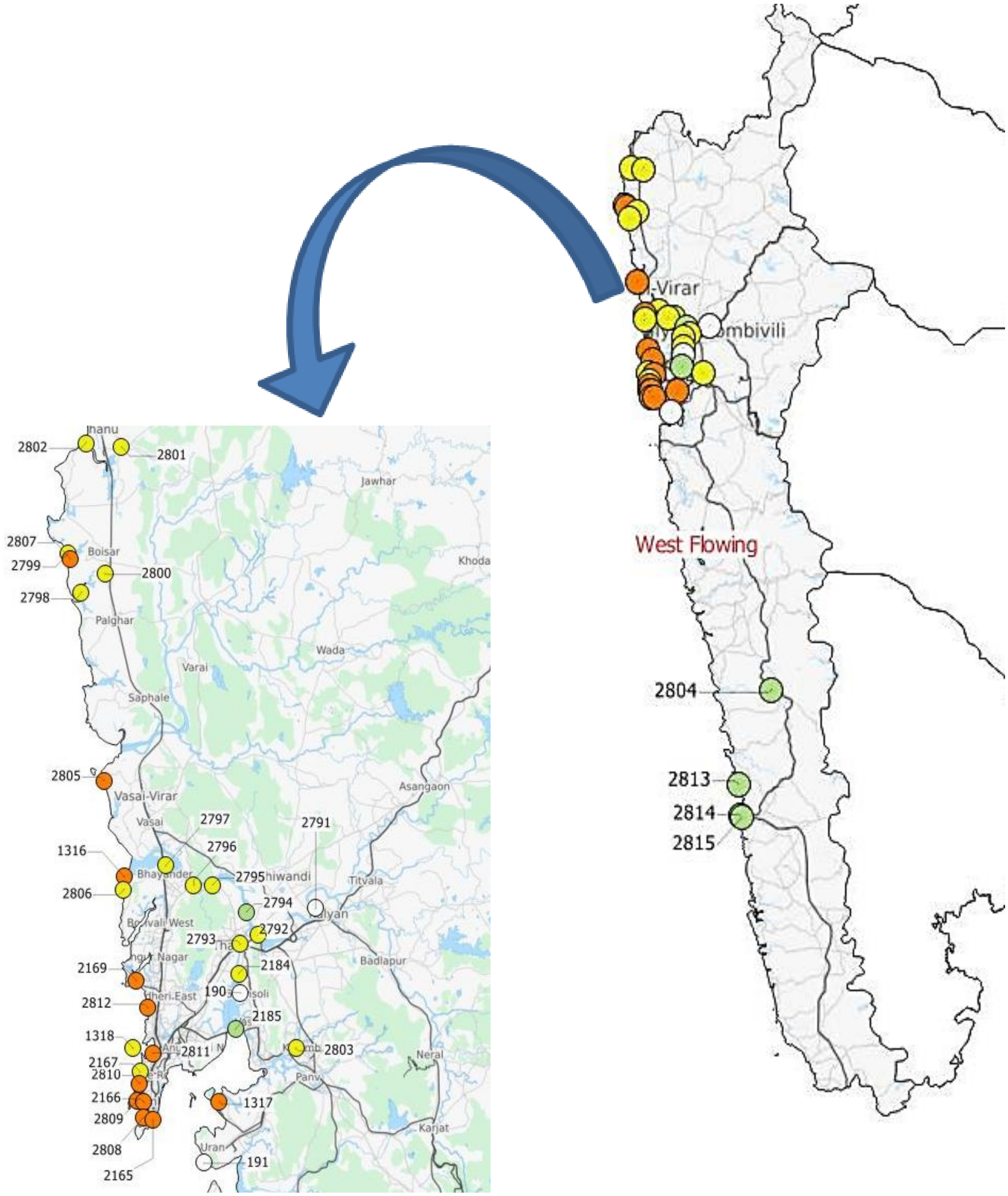
Table No 28: Surface water quality monitoring stations monitoring Sea/Creek water (2 of 2)

Program	Station ID	River/Nalla	Station Name	Village	Taluka	District
NWMP	2185	Vashi creek	Vashi Creek at Vashi Bridge	Vashi	Thane	Thane
NWMP	2169	Sea	Sea Water at Varsova Beach	Versova	Andheri	Mumbai
NWMP	2812	Sea	Sea Water at Juhu Beach	Juhugaon	Santacruz	Mumbai
NWMP	1318	Mahim creek	Mahim creek at Mahim Bay	Mahim	Bandra	Mumbai
NWMP	2811	Sea	Sea Water at Shivaji Park (Dadar Chowpatty)	Dadar	Dadar	Mumbai
NWMP	2167	Sea	Sea Water at Worli Seaface	Worli	Worli	Mumbai
NWMP	2810	Sea	Sea Water at Haj Ali	Worli	Worli	Mumbai
NWMP	2809	Sea	Sea Water at Malabar Hill	Walkeshwar	Mumbai	Mumbai
NWMP	2166	Sea	Sea Water at Charni Road Chowpatty	Girgaon	Mumbai	Mumbai
NWMP	2808	Sea	Sea Water at Nariman Point	Colaba	Colaba	Mumbai
NWMP	2165	Sea	Sea Water at Gateway of India	Colaba	Colaba	Mumbai
NWMP	2803	Panvel creek	Panvel Creek at Kopra Bridge	Kopra	Panvel	Raigad
NWMP	1317	Thane creek	Thane creek at Elephanta Island	Gharapuri, Elephanta Island	Uran	Raigad
SWMP	191	Sea Water	Arabian Sea behind ONGC Uran	Uran	Uran	Raigad
NWMP	2804	Karambavane creek	Karambavane Creek at Chiplun	Karambavane	Chiplun	Ratnagiri
NWMP	2813	Sea	Sea Water at Ganapatipule	Ganapatipule	Ratnagiri	Ratnagiri
NWMP	2814	Sea	Sea Water at Bhagwati Bunder, Ratnagiri near Ultra Tech Cement Jetty	Mirkarwada	Ratnagiri	Ratnagiri
NWMP	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 2017)



Spatial map of WQI for Sea and Creek Water (December 2017)



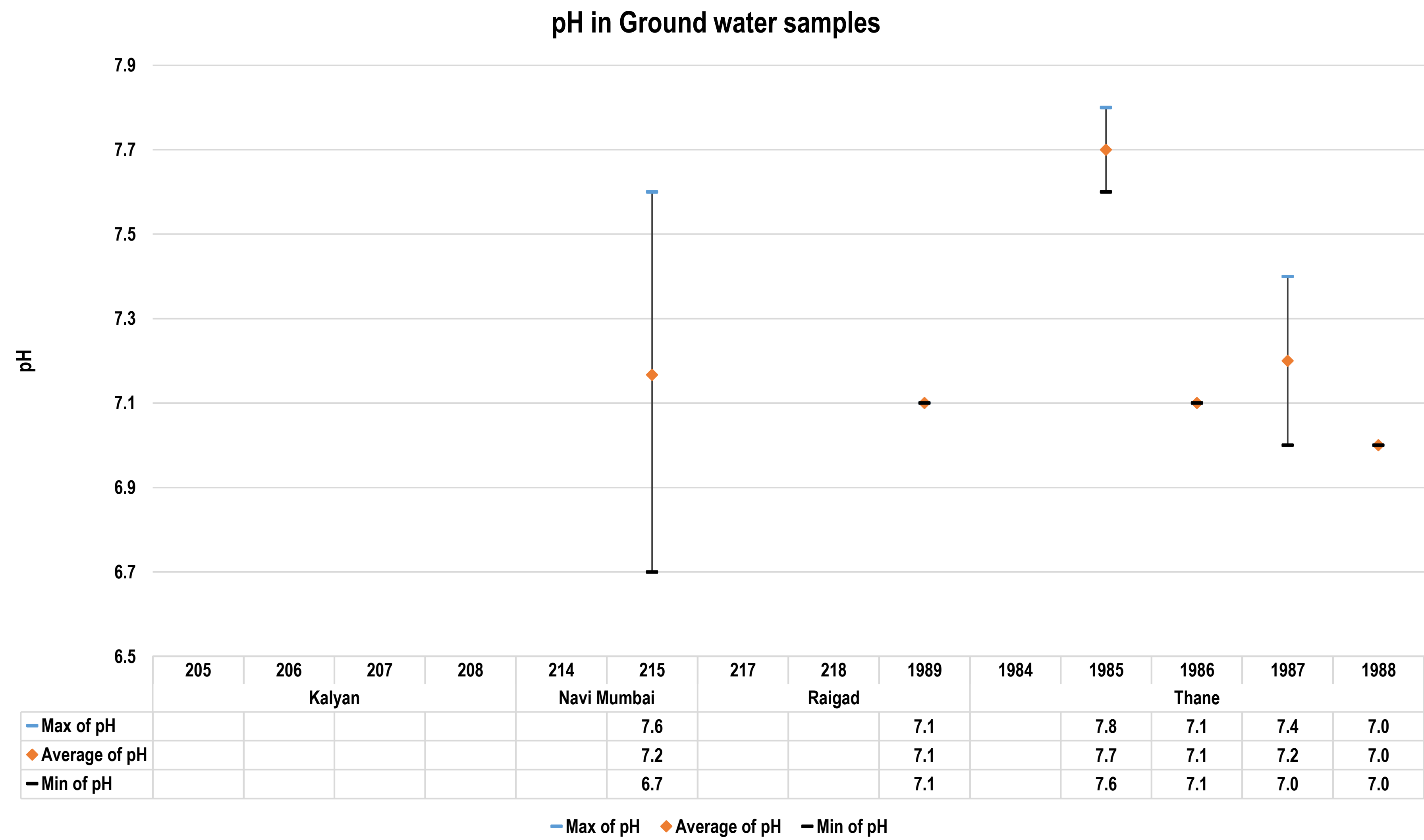
Ground Water Quality

Groundwater is termed as the water which is found underground in the cracks and spaces in soil, sand and rock. It is the most preferred source of water for various sectors in India owing to its availability, dependability and low capital cost involved in extraction operations. It accounts for over 400 km^3 of the annual utilizable resource in the country[19] . In recent years, groundwater has become a major alternative to surface water for irrigation and domestic use purposes.In Maharashtra CGWB (Central Ground Water Board), GSDA (Ground water Survey and Development Agency) and MPCB, monitor the ground water quality across various districts of the state. MPCB has 65 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 total WQMS for year 2017-18 are represented in the Table No 29

Table No 29: List of Groundwater Quality Monitoring stations

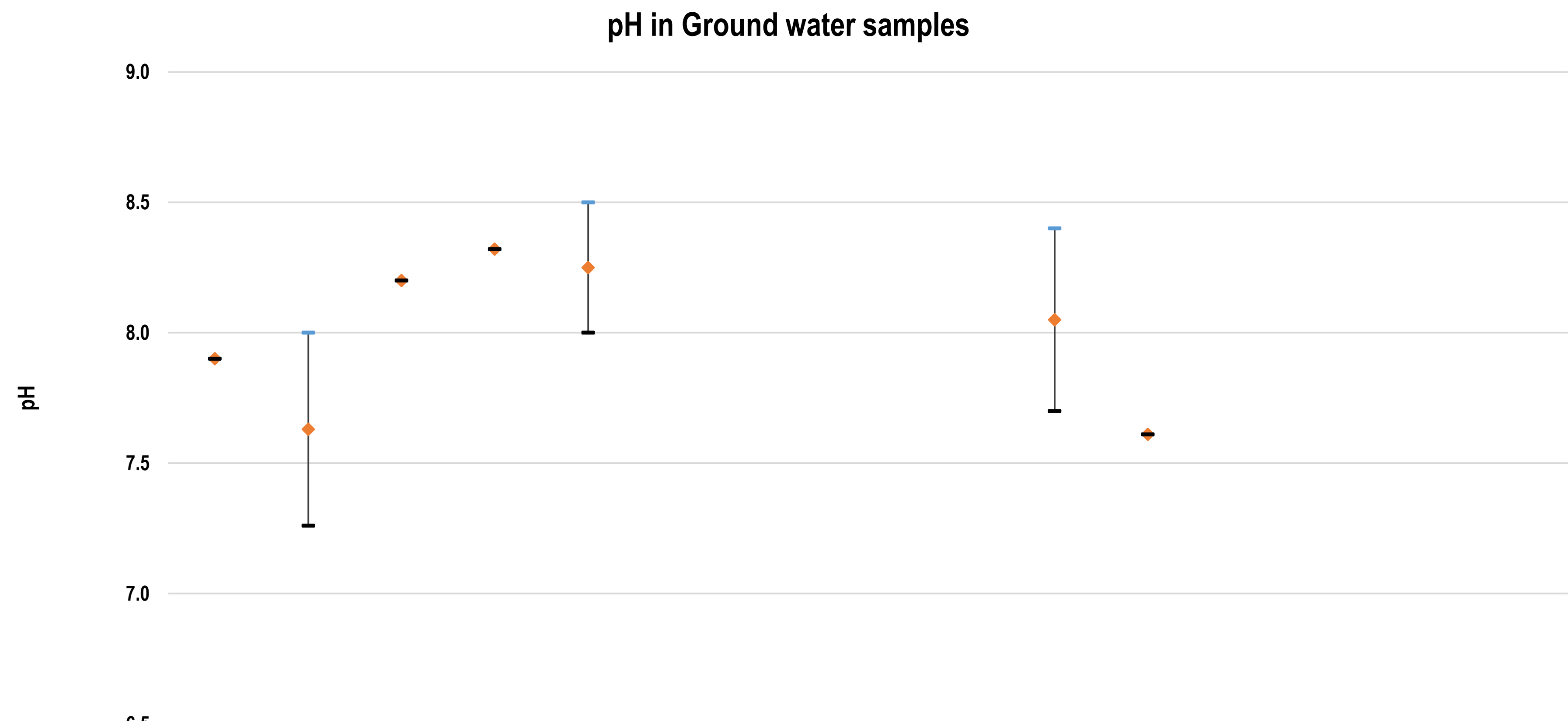
Water Quality monitoring stations	
Water Bodies	**2017-18**
Bore well	29
Dug well	34
Tube well	1
Hand pump	1
Total	**65**

[19] http://nihroorkee.gov.in/rbis/india_information/groundwater.htm



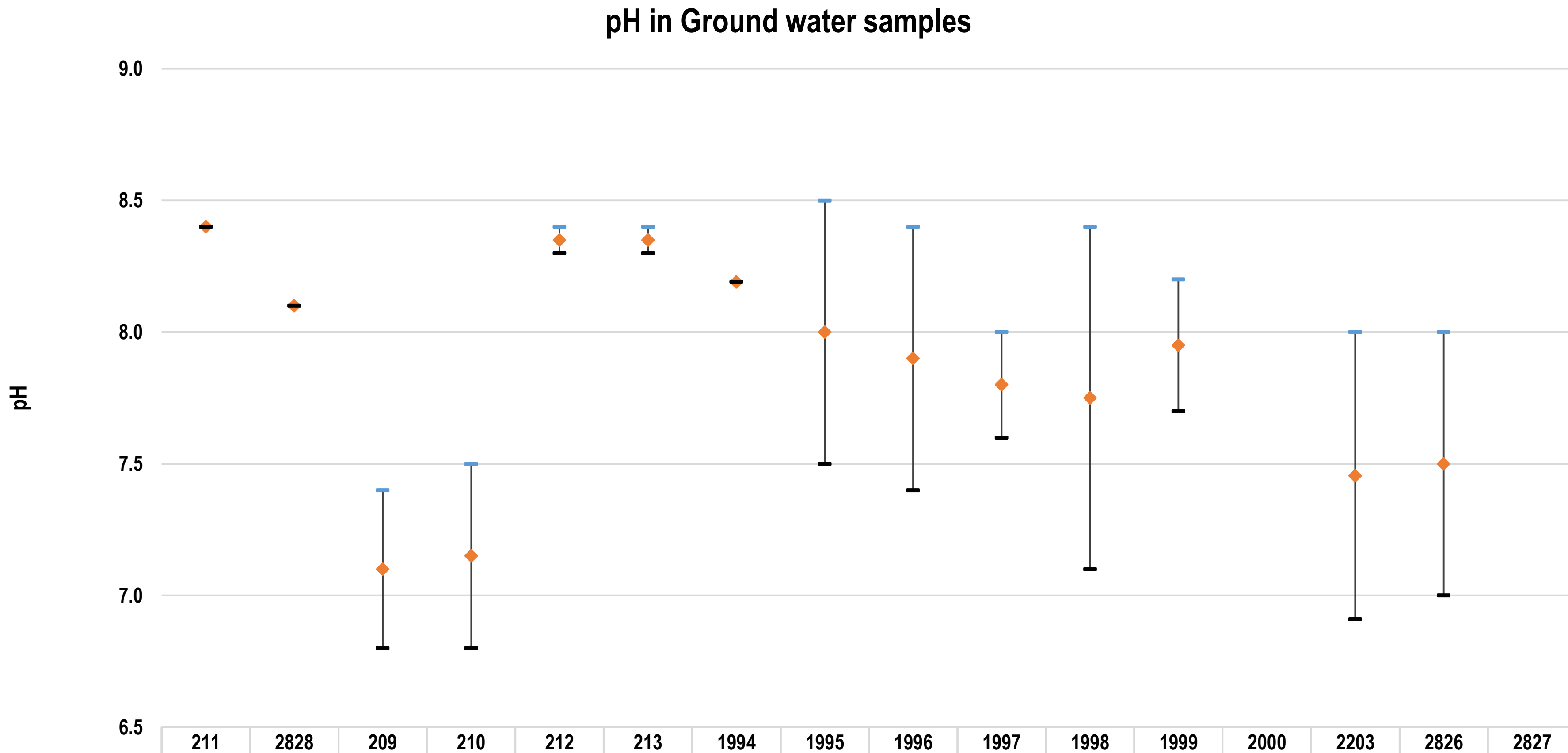
	Kalyan				Navi Mumbai		Raigad			Thane				
	205	206	207	208	214	215	217	218	1989	1984	1985	1986	1987	1988
Max of pH						7.6			7.1		7.8	7.1	7.4	7.0
Average of pH						7.2			7.1		7.7	7.1	7.2	7.0
Min of pH						6.7			7.1		7.6	7.1	7.0	7.0

Figure No. 61: Parametric values of pH recorded at WQMS monitoring ground water at Kalyan, Navi Mumbai, Raigad and Thane.



	Amravati		Aurangabad								Nashik				
	2001	2002	1993	2003	2200	2201	2816	2818	2824	2825	221	1990	1991	2204	2817
Max of pH	7.9	8.0	8.2	8.3	8.5					8.4	7.6				
Average of pH	7.9	7.6	8.2	8.3	8.3					8.1	7.6				
Min of pH	7.9	7.3	8.2	8.3	8.0					7.7	7.6				

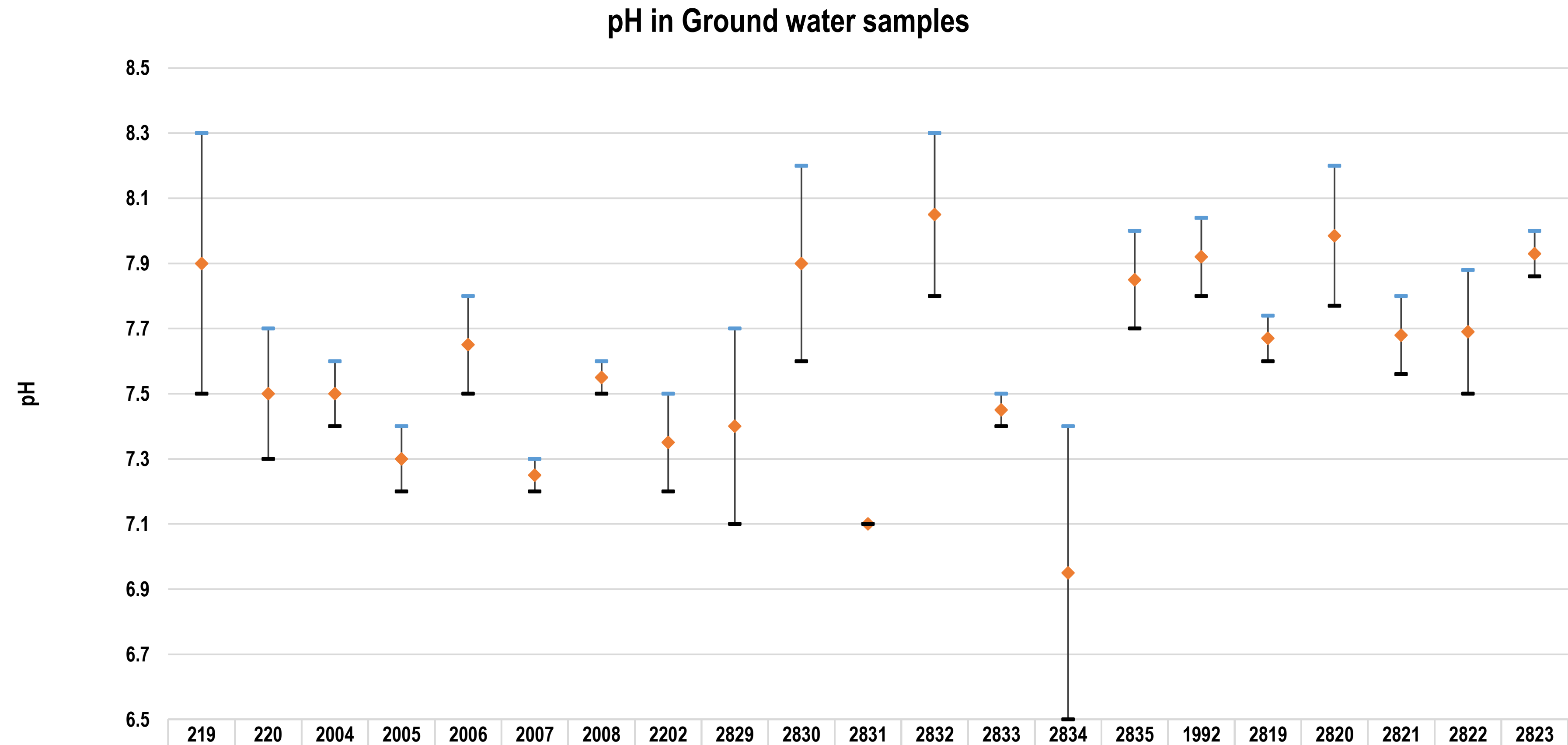
Figure No. 62: Parametric values of pH recorded at WQMS monitoring ground water at Amravati, Aurangabad and Nashik.



	Chandrapur		Nagpur													
	211	2828	209	210	212	213	1994	1995	1996	1997	1998	1999	2000	2203	2826	2827
Max of pH	8.4	8.1	7.4	7.5	8.4	8.4	8.2	8.5	8.4	8.0	8.4	8.2		8.0	8.0	
Average of pH	8.4	8.1	7.1	7.2	8.4	8.4	8.2	8.0	7.9	7.8	7.8	8.0		7.5	7.5	
Min of pH	8.4	8.1	6.8	6.8	8.3	8.3	8.2	7.5	7.4	7.6	7.1	7.7		6.9	7.0	

Max of pH   Average of pH   Min of pH

Figure No. 63: Parametric values of pH recorded at WQMS monitoring ground water at Chandrapur and Nagpur.



	219	220	2004	2005	2006	2007	2008	2202	2829	2830	2831	2832	2833	2834	2835	1992	2819	2820	2821	2822	2823
	Kolhapur															Pune					
Max of pH	8.3	7.7	7.6	7.4	7.8	7.3	7.6	7.5	7.7	8.2	7.1	8.3	7.5	7.4	8.0	8.0	7.7	8.2	7.8	7.9	8.0
Average of pH	7.9	7.5	7.5	7.3	7.7	7.3	7.6	7.4	7.4	7.9	7.1	8.1	7.5	7.0	7.9	7.9	7.7	8.0	7.7	7.7	7.9
Min of pH	7.5	7.3	7.4	7.2	7.5	7.2	7.5	7.2	7.1	7.6	7.1	7.8	7.4	6.5	7.7	7.8	7.6	7.8	7.6	7.5	7.9

Max of pH · Average of pH · Min of pH

Figure No. 64: Parametric values of pH recorded at WQMS monitoring ground water at Kolhapur and Pune.

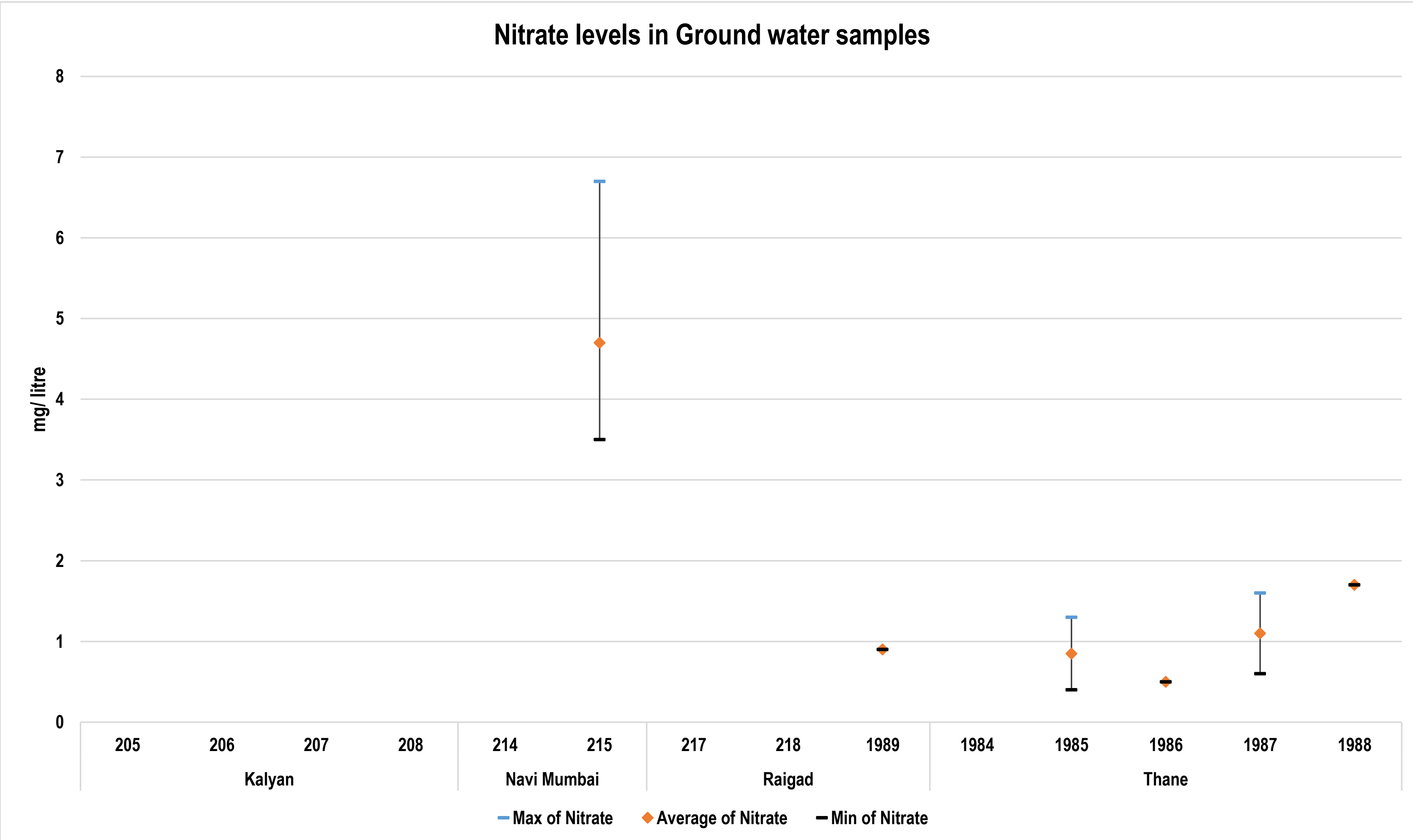


Figure No. 65: Parametric values of Nitrate recorded at WQMS monitoring ground water at Kalyan, Navi Mumbai, Raigad and Thane.

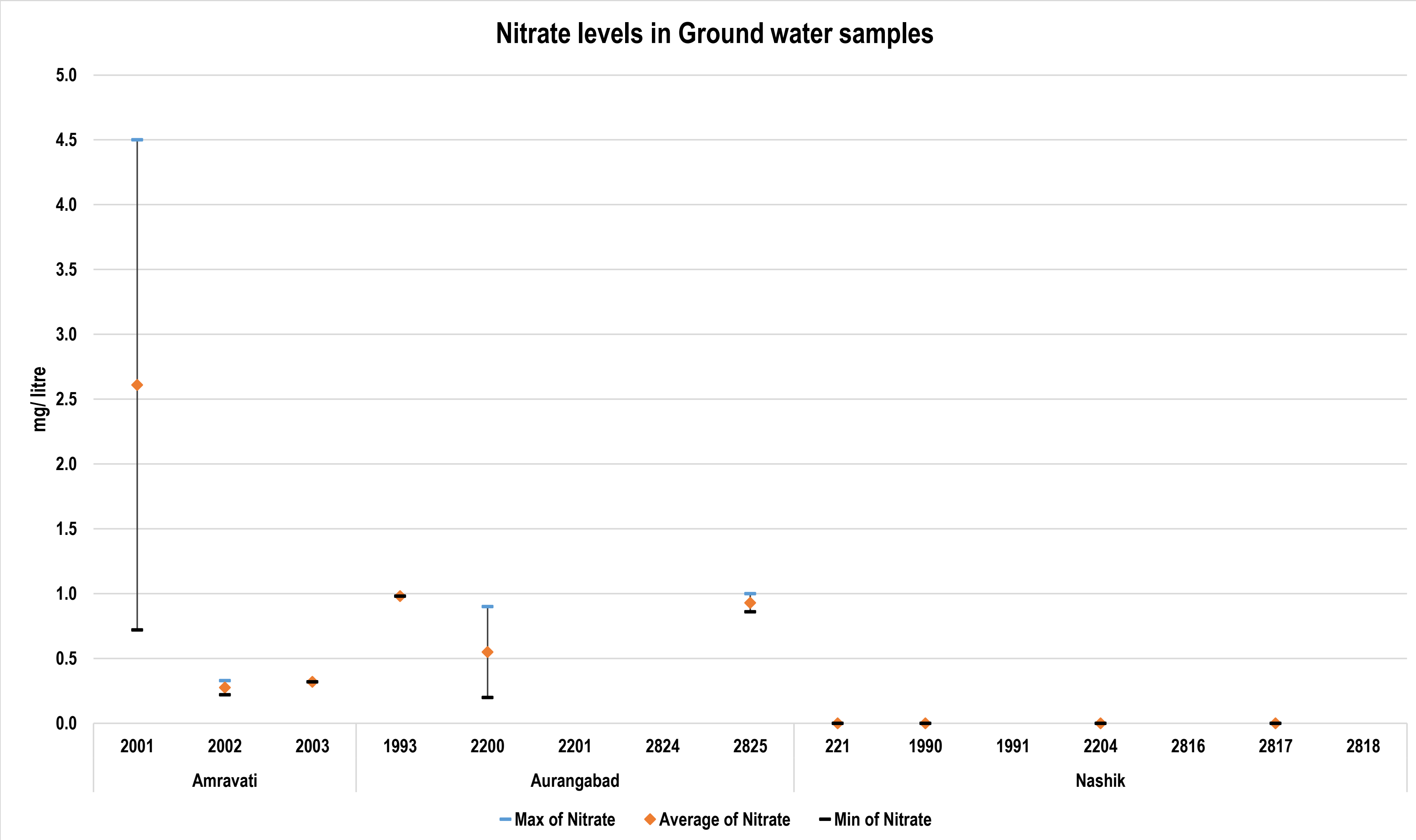


Figure No. 66: Parametric values of Nitrate recorded at WQMS monitoring ground water at Amravati, Aurangabad and Nashik.

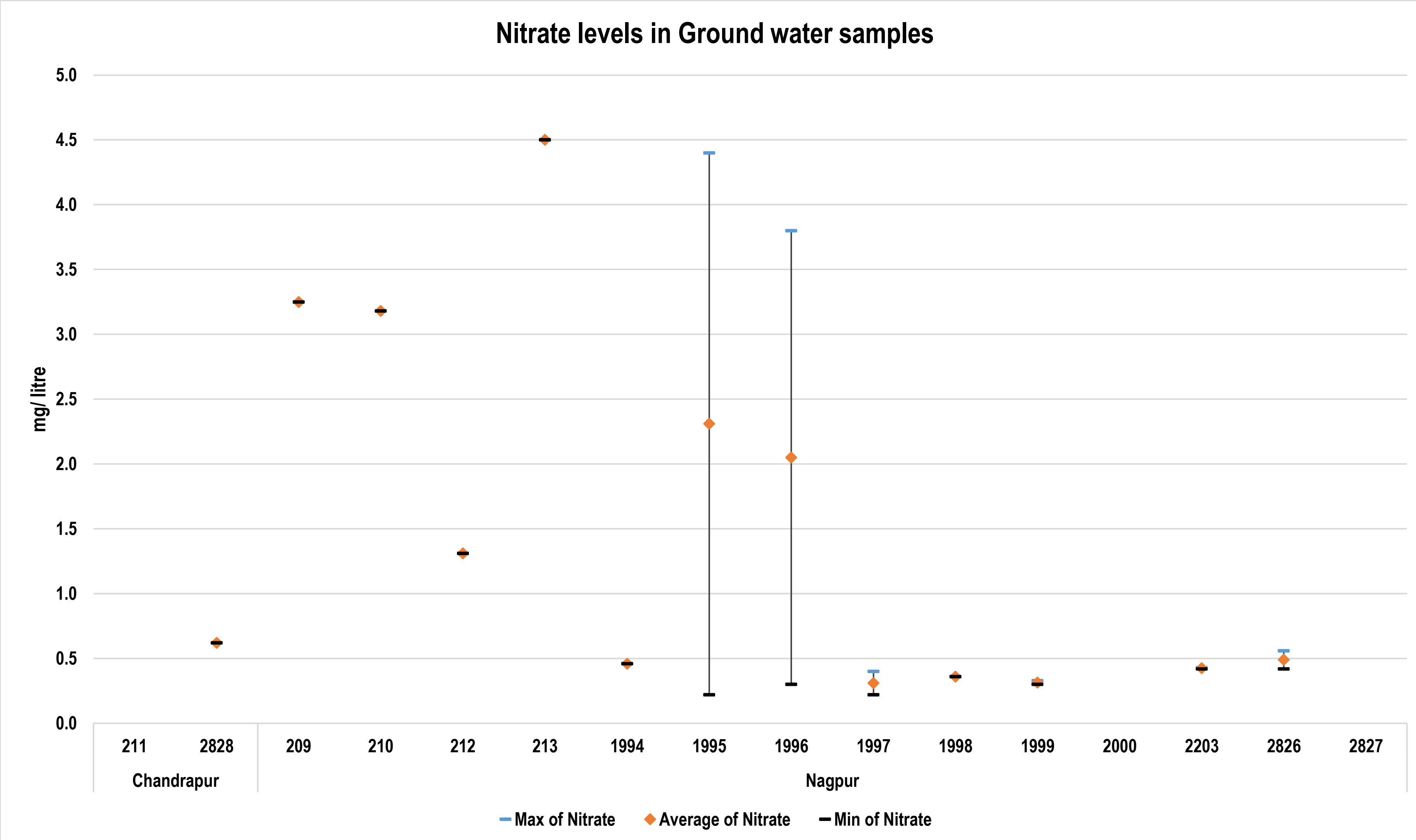


Figure No. 67: Parametric values of Nitrate recorded at WQMS monitoring ground water at Chandrapur and Nagpur.

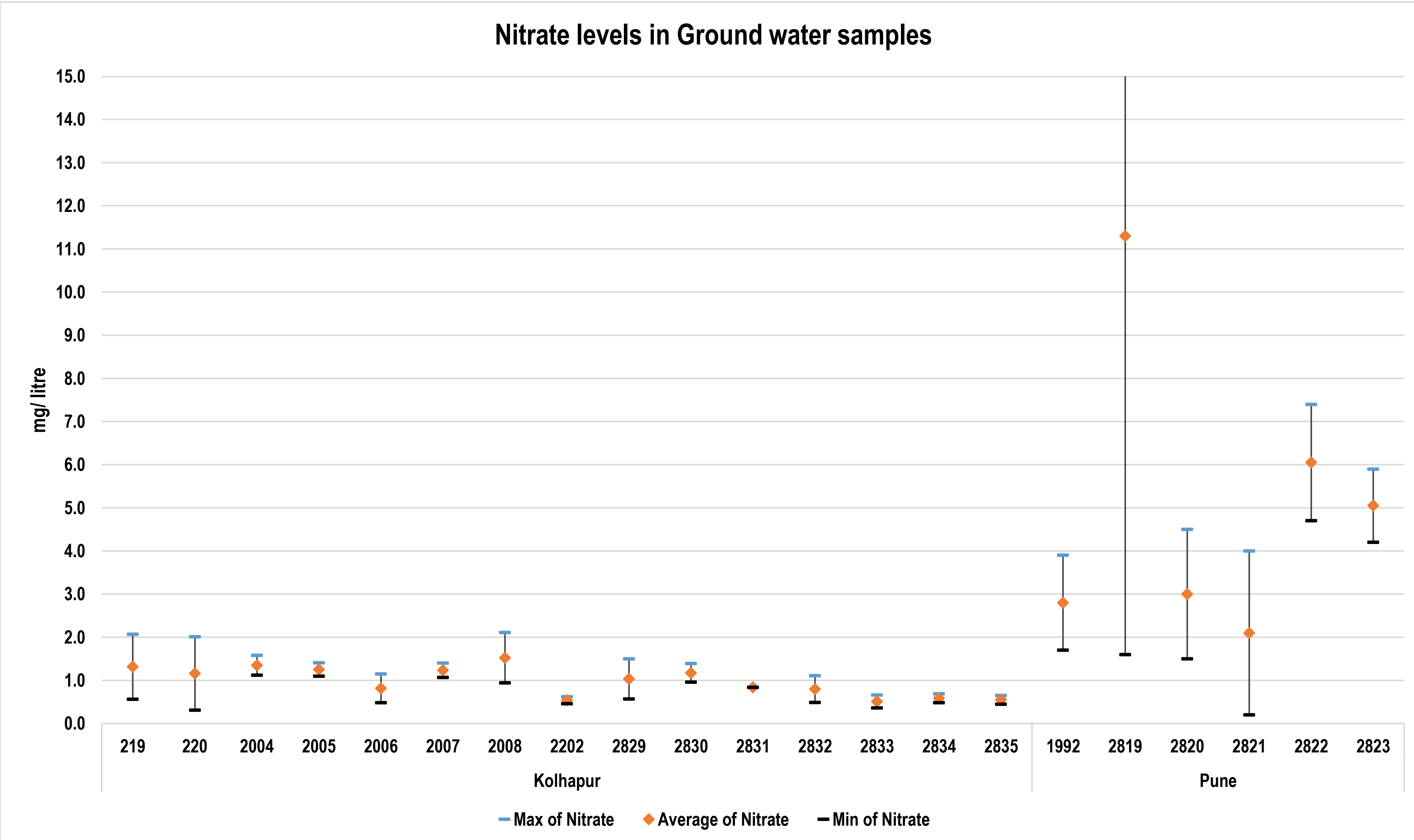


Figure No. 68: Parametric values of Hardness at $CaCo_3$ recorded at WQMS monitoring ground water at Kolhapur and Pune.

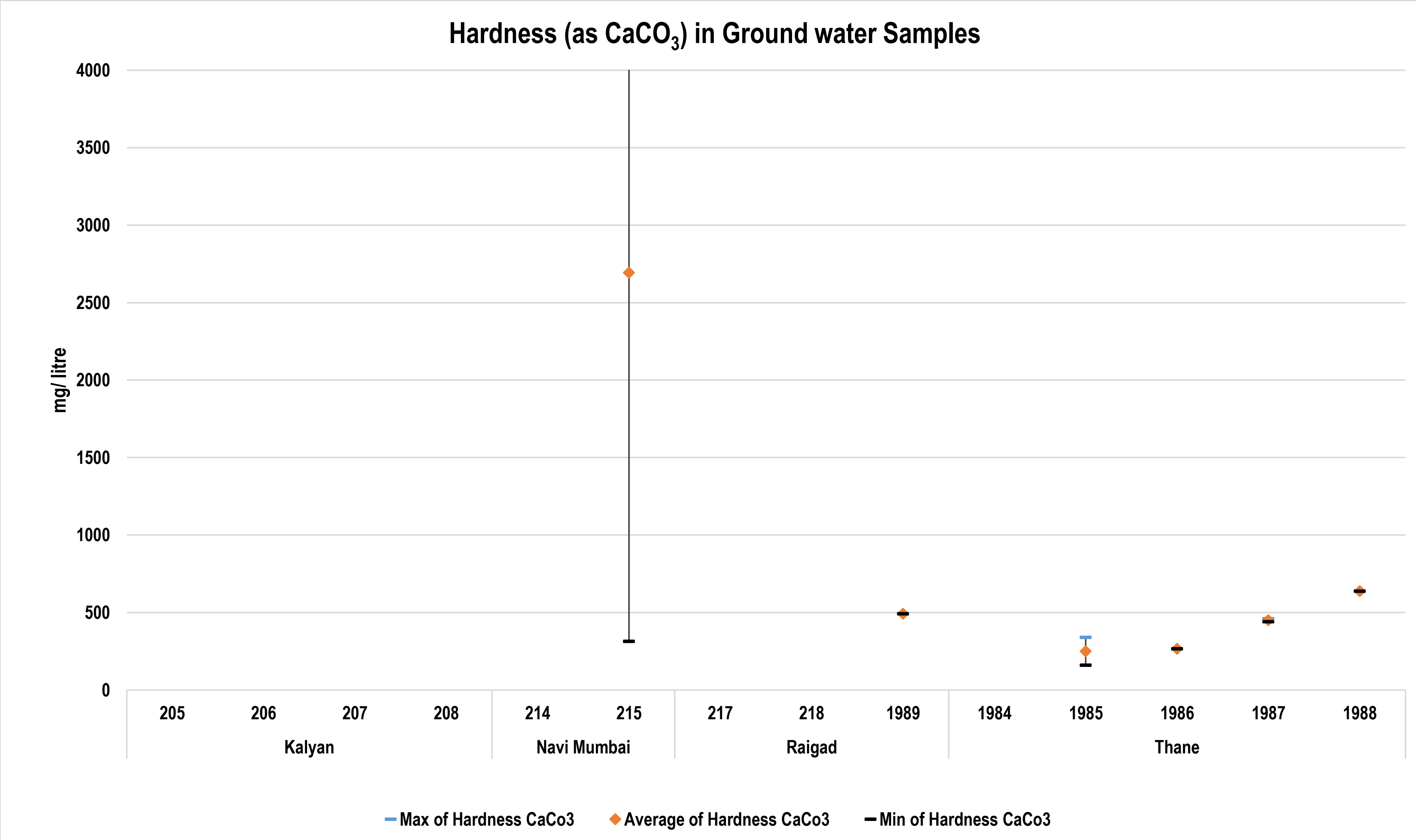


Figure No. 69: Parametric values of Hardness at CaCo3 recorded at WQMS monitoring ground water at Kalyan, Navi Mumbai, Raigad and Thane.

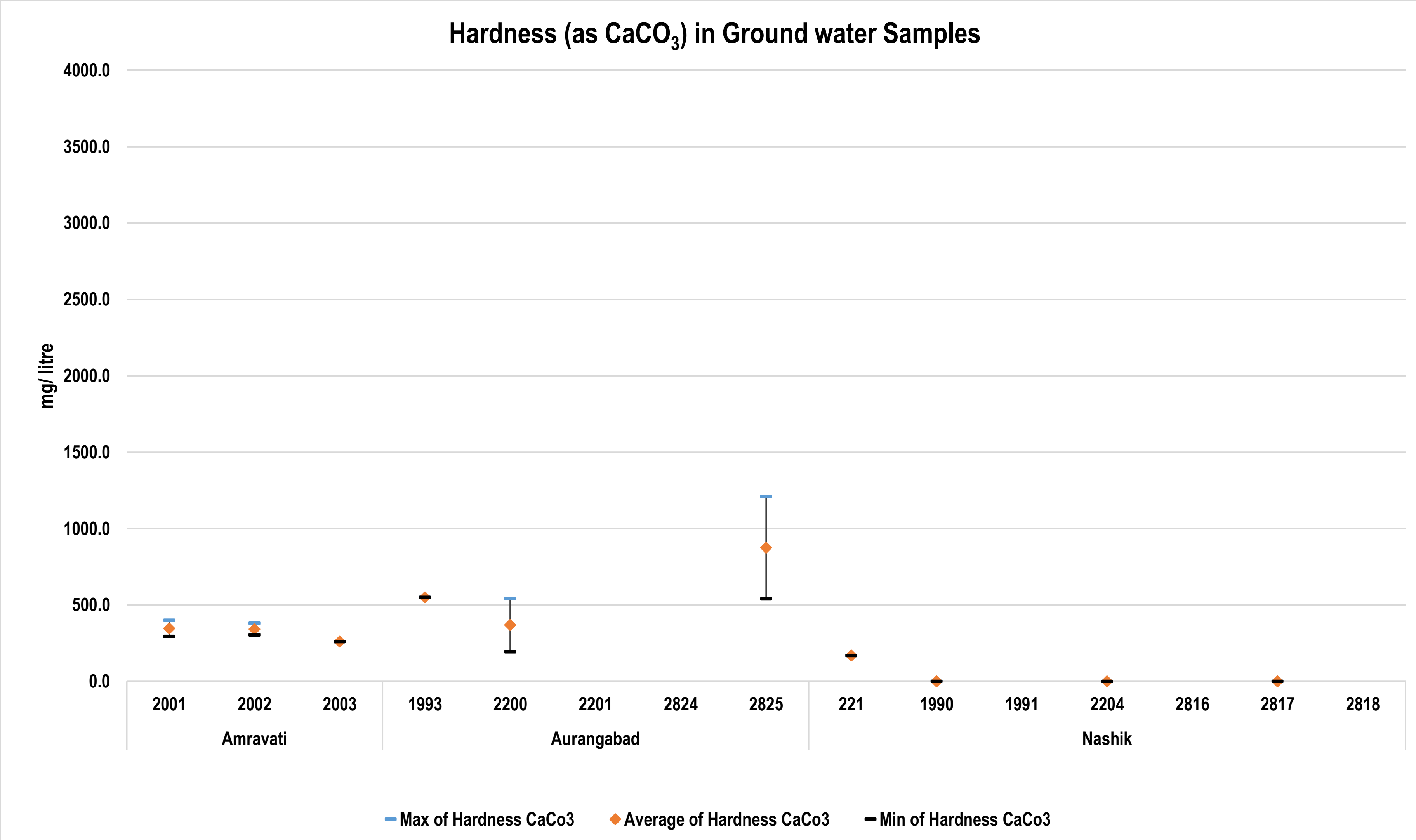


Figure No. 70: Parametric values of Hardness at CaCo3 recorded at WQMS monitoring ground water at Amrawati, Aurangabad and Nashik.

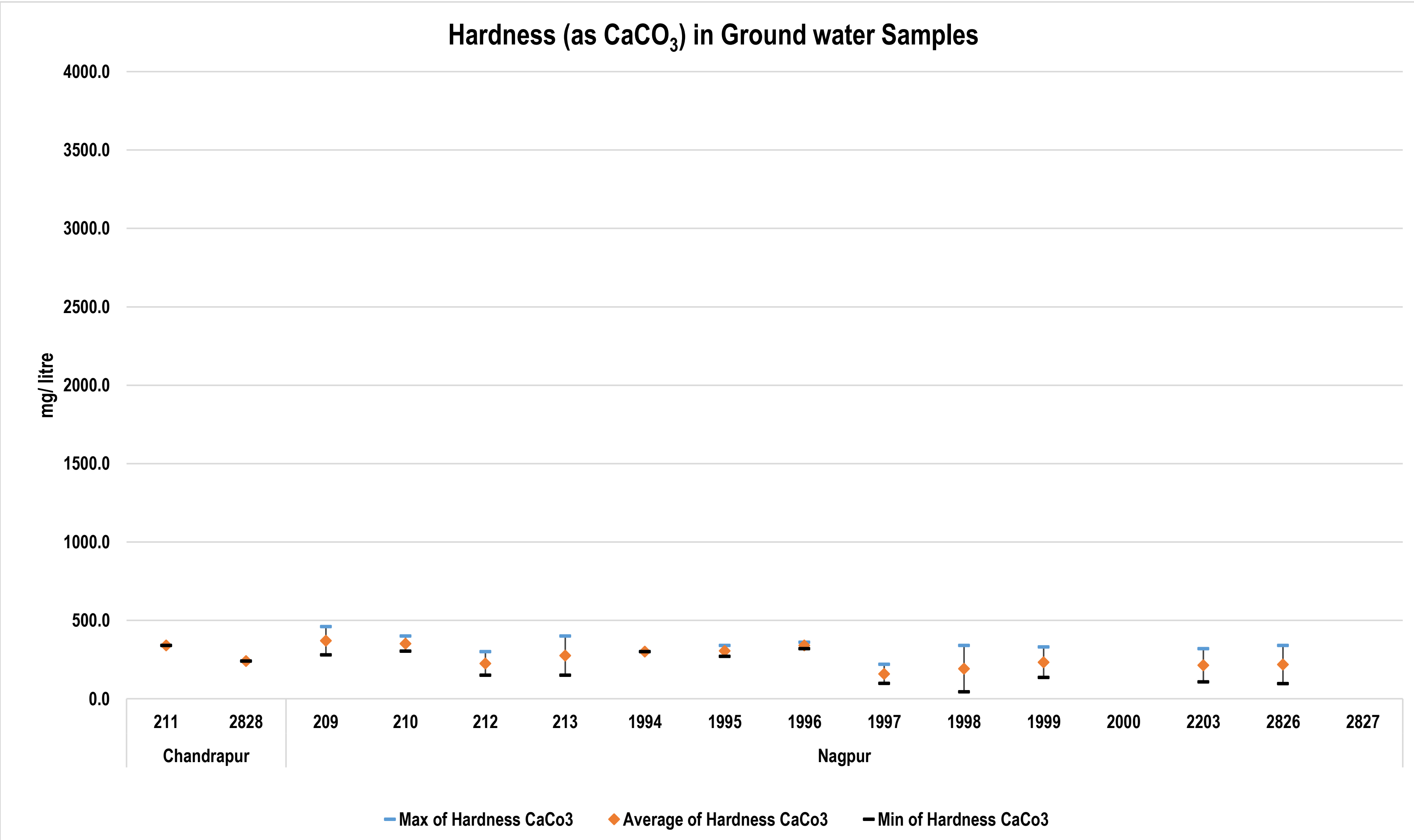


Figure No. 71 Parametric values of Hardness at CaCo3 recorded at WQMS monitoring ground water at Chandrapur and Nagpur

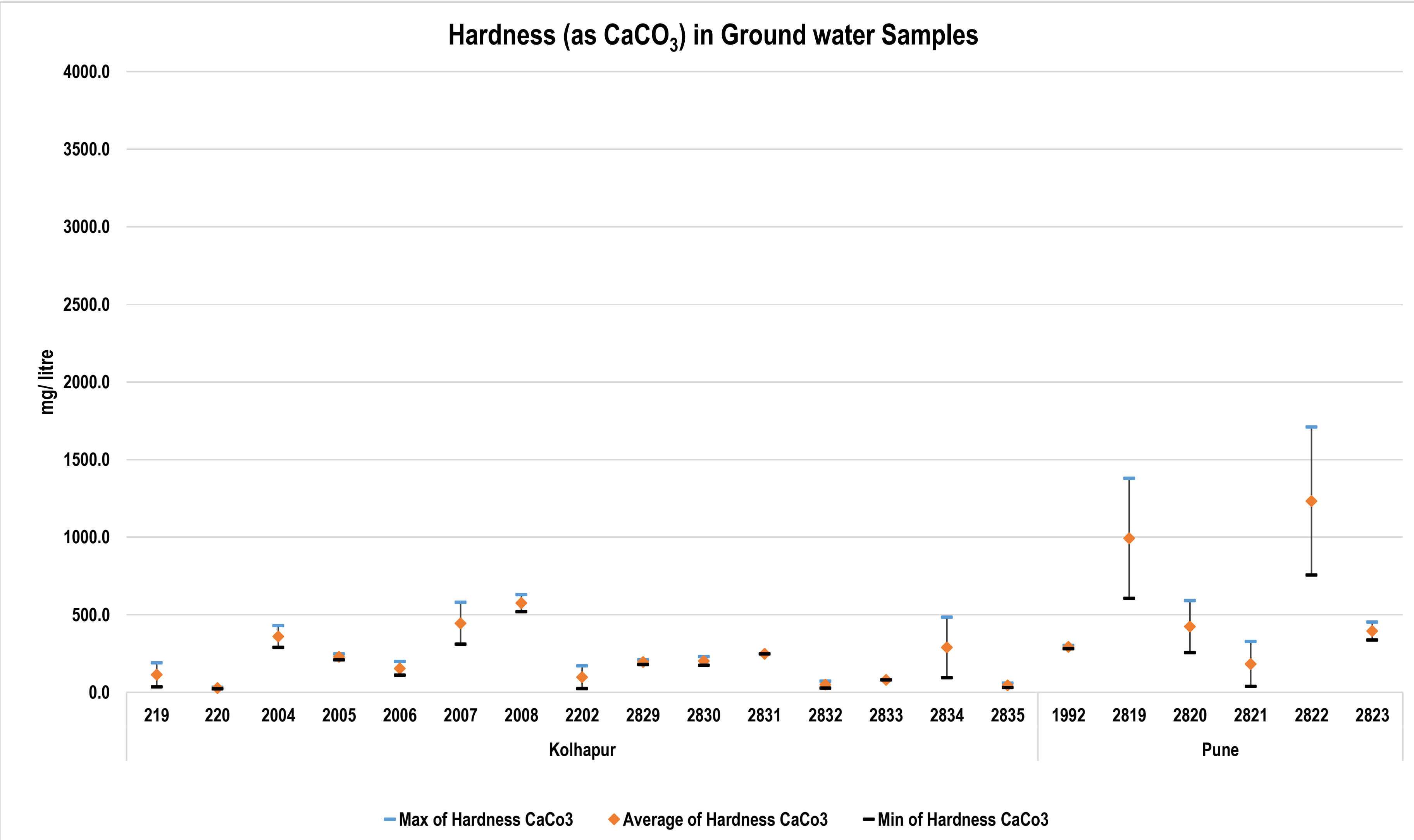


Figure No. 72: Parametric values of Hardness at CaCo3 recorded at WQMS monitoring ground water at Kolhapur and Pune

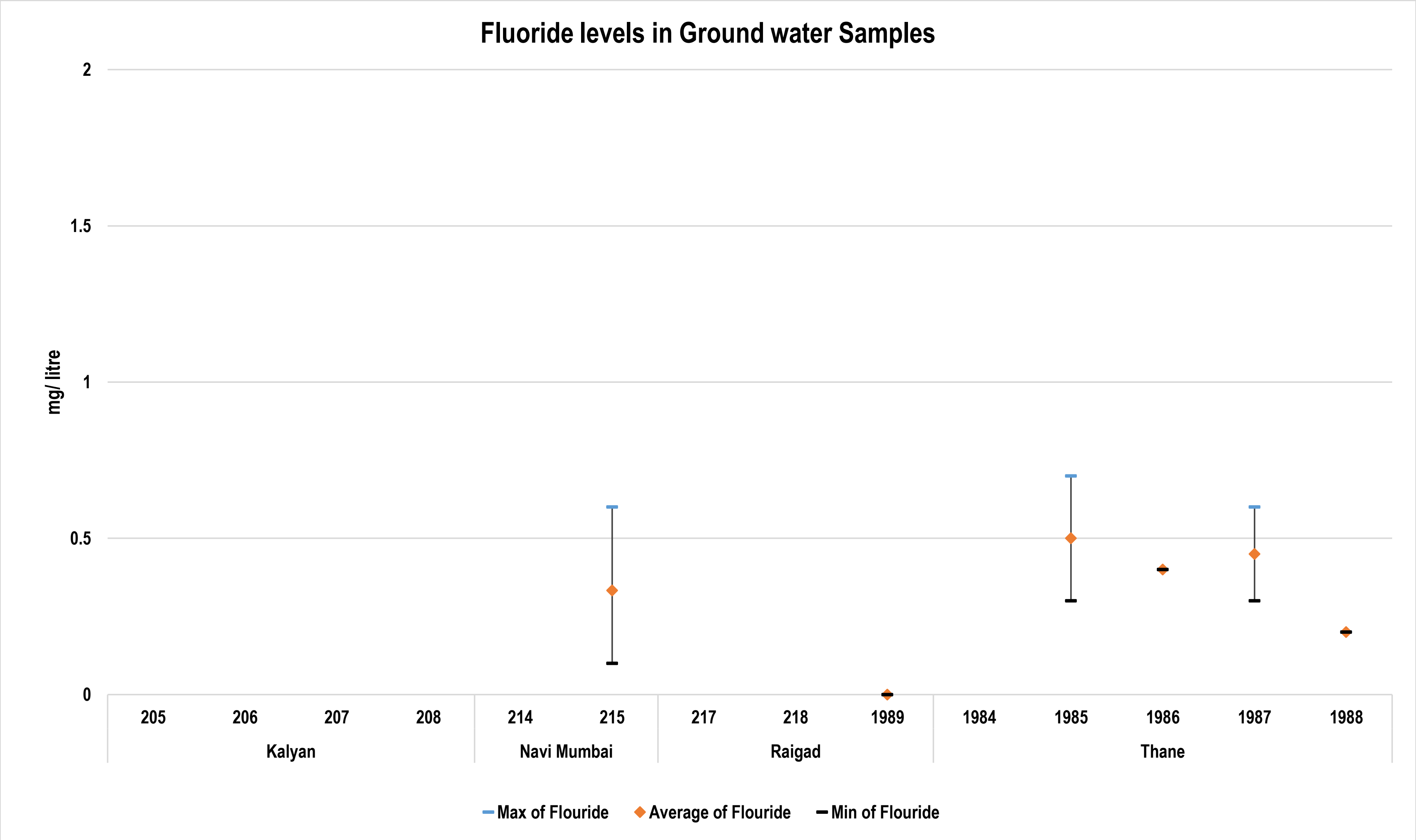


Figure No. 73: Parametric values of Fluoride recorded at WQMS monitoring ground water at Kalyan, Navi Mumbai, Raigad and Thane

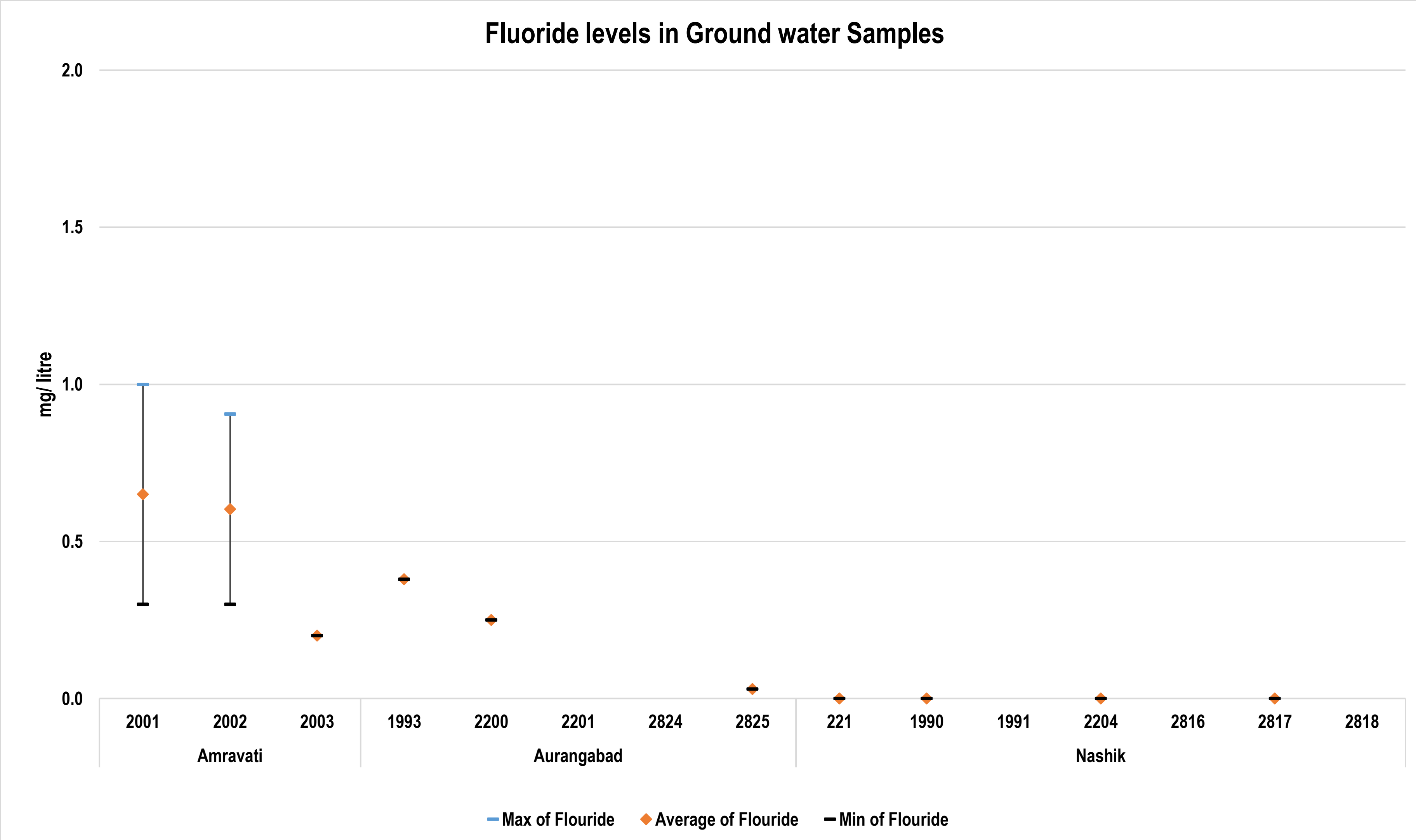


Figure No. 74: Parametric values of Fluoride recorded at WQMS monitoring ground water at Amravati, Aurangabad and Nashik

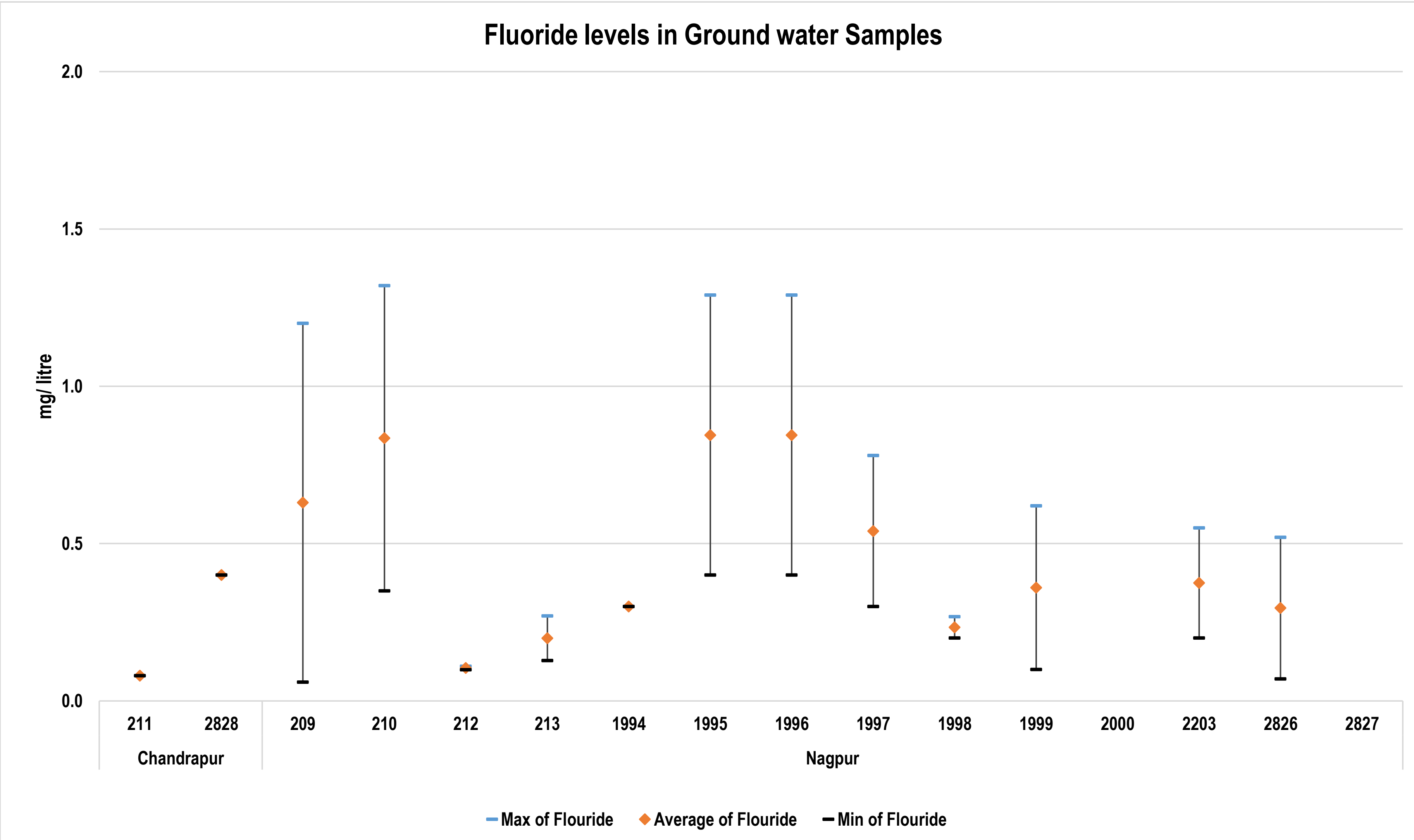


Figure No. 75: Parametric values of Fluoride recorded at WQMS monitoring ground water at Chandrapur and Nagpur.

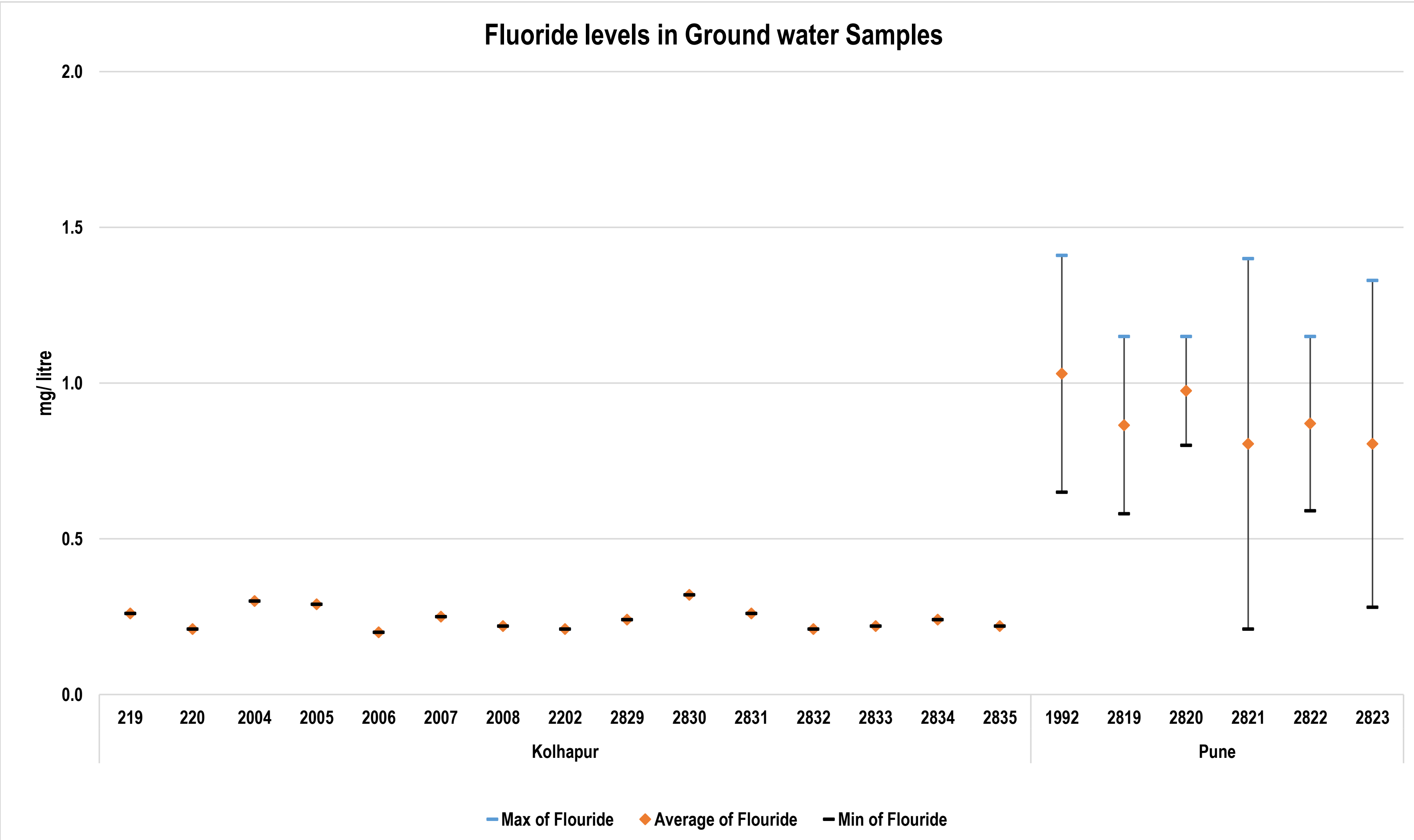


Figure No. 76: Parametric values of Fluoride recorded at WQMS monitoring ground water at Kolhapur and Pune.

Water Quality Index for ground water at Kalyan, Navi Mumbai, Raigad and Thane.

Apr						109			128		324		185	
Oct						94			Dry	Dry	150	83	173	197
Station Code	205	206	207	208	214	215	217	218	1989	1984	1985	1986	1987	1988
RO	Kalyan				Navi Mumbai		Raigad			Thane				

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry	Not Collected	No data

Table No 30: **Ground water quality monitoring stations at Kalyan, Navi Mumbai, Raigad and Thane.**

Programme	Regional Office	Station ID	Station Name	District	Taluka	Type of well	Village
SWMP	Kalyan	205	Dug well opp. KAMA office, MIDC Ph-I, Dombivali	Kalyan	Dombivali	Dug well	MIDC,Dombivali
SWMP	Kalyan	206	Dug well near Mamta Hospital, Milap Nagar, Dombivali	Kalyan	Dombivali	Dug well	MIDC,Dombivali
SWMP	Kalyan	207	Dug well at pimpleshwar Temple, MIDC Ph-II, Dombivali	Kalyan	Dombivali	Dug well	MIDC,Dombivali
SWMP	Kalyan	208	Dug well addjusent to M/S. Altra pure chem., Sr. No. 45, Hissa No. 3, MIDC Ph-II, Dombivali.	Kalyan	Dombivali	Dug well	MIDC,Dombivali
SWMP	Navi Mumbai	214	Borewell at TTCWMA, Mahape	Thane	Thane	Borewell	TTCWMA,Mahape
SWMP	Navi Mumbai	215	Well water at Turbhe Store, Turbhe	Thane	Thane	Well	Turbhe
SWMP	Raigad	217	Borewell water at village Milgaon, Taluka - Khalapur, District - Raigad.	Raigad	Khalapur	Borewell	Milgaon
SWMP	Raigad	218	Borewell water near MSW site, Murud -			Borewell	Murud Janjira

Programme	Regional Office	Station ID	Station Name	District	Taluka	Type of well	Village
			Janjira.				
NWMP	Raigad	1989	Bore well at MWML Site at Taloja	Raigad	Panvel	Bore well	Karawla- Taloja
NWMP	Thane	1984	Bore well at M/s Tata Iron {} Steel Co. Ltd, S-76	Thane	Palghar	Bore well	MIDCTarapur, Industrial Estate, Tarapur
NWMP	Thane	1985	Dug well at 5 Star Industrial Estate	Thane	Mira-Bhayander	Dug well	Kashimira
NWMP	Thane	1986	Bore well at Motapada	Thane	Dahanu	Bore well	Motapada
NWMP	Thane	1987	Bore well at Vasai	Thane	Vasai	Bore well	Gokhiware
NWMP	Thane	1988	Bore well at Gharatwadi, Palghar	Thane	Palghar	Bore well	Aliyali

Water Quality Index for ground water at Amravati, Aurangabad and Nashik.

Apr	98	90			61			295	74						
Oct	138	137	86	170	163	Dry	Dry	153		Dry	Dry	Dry	Dry	Dry	Dry
Station Code	2001	2002	2003	1993	2200	2201	2824	2825	221	1990	1991	2204	2816	2817	2818
RO	**Amravati**			**Aurangabad**					**Nashik**						

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry	Not Collected	No Data

Table No 31: Ground waterquality monitoring stations at Amravati, Aurangabad and Nashik.

Programme	Regional Office	Station ID	Station Name	District	Taluka		Village
NWMP	Amravati	2001	Tube well at water treatment plant of M.C.Achalpur near Post Office.	Amravati	Achalpur	Tube well	Paratwada
NWMP	Amravati	2002	Bore well Opp. Gajanan Maharaj Temple at Anjangaon road.	Akola	Akot	Bore well	Anjangaon
NWMP	Amravati	2003	Dug well at Plot No- 4, Street No. 49-C, at Nehru Bal Udyan Azad Maidan, owned by Yavatmal M.C.	Yavatmal	Yavatmal	Dug well	Nehru Bal Udyan Azad Maidan
NWMP	Aurangabad	1993	Dug well at Pandarpur, Gangapur, Aurangabad	Aurangabad	Gangapur	Dug well	Pandharpur
NWMP	Aurangabad	2200	Bore Well at Katpur, Near Z.P.School	Aurangabad	Paithan	Bore well	Katpur
NWMP	Aurangabad	2201	Dug Well at Ranjangaon	Aurangabad	Gangapur	Dug well	Ranjangaon
NWMP	Aurangabad	2824	Dug Well at Naregaon	Aurangabad	Aurangabad	Dug well	Naregaon
NWMP	Aurangabad	2825	Bore Well at Wahegaon, near Zilla Parishet School	Aurangabad	Paithan	Bore well	Wahegaon
SWMP	Nashik	221	well water of Bappaji, Akolner,	Nashik	Ahmadnag	well	Akolner

Programme	Regional Office	Station ID	Station Name	District	Taluka		Village
			Ahmadnagar, Nashik		ar		
NWMP	Nashik	1990	Bore well at BMW Site , Burudgaon	Ahmadnagar	Ahmednagar	Bore well	Burudgaon
NWMP	Nashik	1991	Bore well at MSW Site, Pathardi, Nashik	Nashik	Nashik	Bore well	Pathardi
NWMP	Nashik	2204	Dug well at Gunjalwadi, Sangamner near Primary Health Care Center.	Ahmadnagar	Sangamner	Dug well	Gunjalwadi
NWMP	Nashik	2816	Dug Well of Mr. Sampat Walunj, near M/s. Mahajeet Clayton	Nashik	Nashik	Dug well	Shinde village
NWMP	Nashik	2817	Bore Well at Chitali near Wagh vasthi	Ahmadnagar	Rahata	Bore well	Chitali
NWMP	Nashik	2818	Bore Well at M/s. Spectron Ethers Rasegaon near Siddeshwar Mahadev Mandir	Nashik	Dindori	Bore well	Rasegaon

Water Quality Index for ground water at Chandrapur and Nagpur.

Apr			121	130	80	78		110	126	48	97	60		44	45	
Oct	108	85	114	124	99	133	97	118	121	75	109	103	Dry	100	97	Dry
Station Code	211	2828	209	210	212	213	1994	1995	1996	1997	1998	1999	2000	2203	2826	2827
RO	**Chandrapur**		**Nagpur**													

Legend

Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry	Not Collected	No data

Table No 32: Ground water quality monitoring stations at Chandrapur and Nagpur.

Programme	Regional Office	Station ID	Station Name	District	Taluka		Village
NWMP	Chandrapur	2828	Dug Well near Jilla Parishad Primary School Visapur	Chandrapur	Ballarpur	Dug well	Visapur
SWMP	Nagpur	209	Bore well near Pardhi House, Bhandewadi, Nagpur	Nagpur	#N/A	Bore well	Bhandewadi
SWMP	Nagpur	210	Bore well near Dearao Kale House, Bhandewadi, Nagpur	Nagpur	#N/A	Bore well	Bhandewadi
SWMP	Nagpur	212	Grampanchayat Mhasala, Dugwell On Nalla At Mhasala, Taluka - Kamptee, District - Nagpur	Nagpur	Kamptee	Dug well	Mhasala
SWMP	Nagpur	213	Grampanchayat Kawtha, Dugwell At Kawtha, Taluka - Kamptee, District - Nagpur	Nagpur	Kamptee	Dug well	Kawtha
NWM	Nagpur	1994	Dug well At TPS Durgapur near Naseeb	Chandrapur	Chandrapu	Dug	Durgapur

Programme	Regional Office	Station ID	Station Name	District	Taluka		Village
P			Kirana {} general Store.		r	well	
NWMP	Nagpur	1995	Gram Panchayath Dug well , Near Balaji Gajbhiye House, Khaperkheda	Nagpur	Saoner	Dug well	Khaperkheda(Ward No.4)
NWMP	Nagpur	1996	Gram Panchayath Dug well , Near Jagadamba G M S Mandir Sahakari Sanstha	Nagpur	Kamptee	Dug well	Koradi
NWMP	Nagpur	1997	Bore well near Primary Health Centre, Raipur(Hingna)	Nagpur	Hingna	Bore well	Raipur
NWMP	Nagpur	1998	Gram Panchayat Dug well near Gram Panchayat Office, Brahmni	Nagpur	Kalmeshwar	Dug well	Brahmni
NWMP	Nagpur	1999	Bore well Near Gram Panchayat, Changera.	Gondia	Gondia	Bore well	Changera
NWMP	Nagpur	2000	Dug well near Sarode Kirana Store, Bhandewadi, Nagpur	Nagpur	Nagpur	Dug well	Bhandewadi
NWMP	Nagpur	2203	Hand Pump in the premises of Z.P.Primary School	Wardha	wardha	Hand pump	Bhugaon
NWMP	Nagpur	2826	Dug Well near Railway Station, Cottaon Market	Wardha	wardha	Dug well	Wardha
NWMP	Nagpur	2827	Bore Well near Railway crossing at Dongi Buzurg	Bandara	Tumsar	Bore well	Dongri-Buzurg

Water Quality Index for ground water at Kolhapur and Pune.

Apr	25	23	131	79	72	231	215	61	64	84		38	37	189	32	117	423	102	42	257	167
Oct	80	21	151	127	44	151	211	22	67	107	119	24	35	37	24	133	243	241	91	647	129
Station Code	219	220	2004	2005	2006	2007	2008	2202	2829	2830	2831	2832	2833	2834	2835	1992	2819	2820	2821	2822	2823
RO	Kolhapur															Pune					

Legend

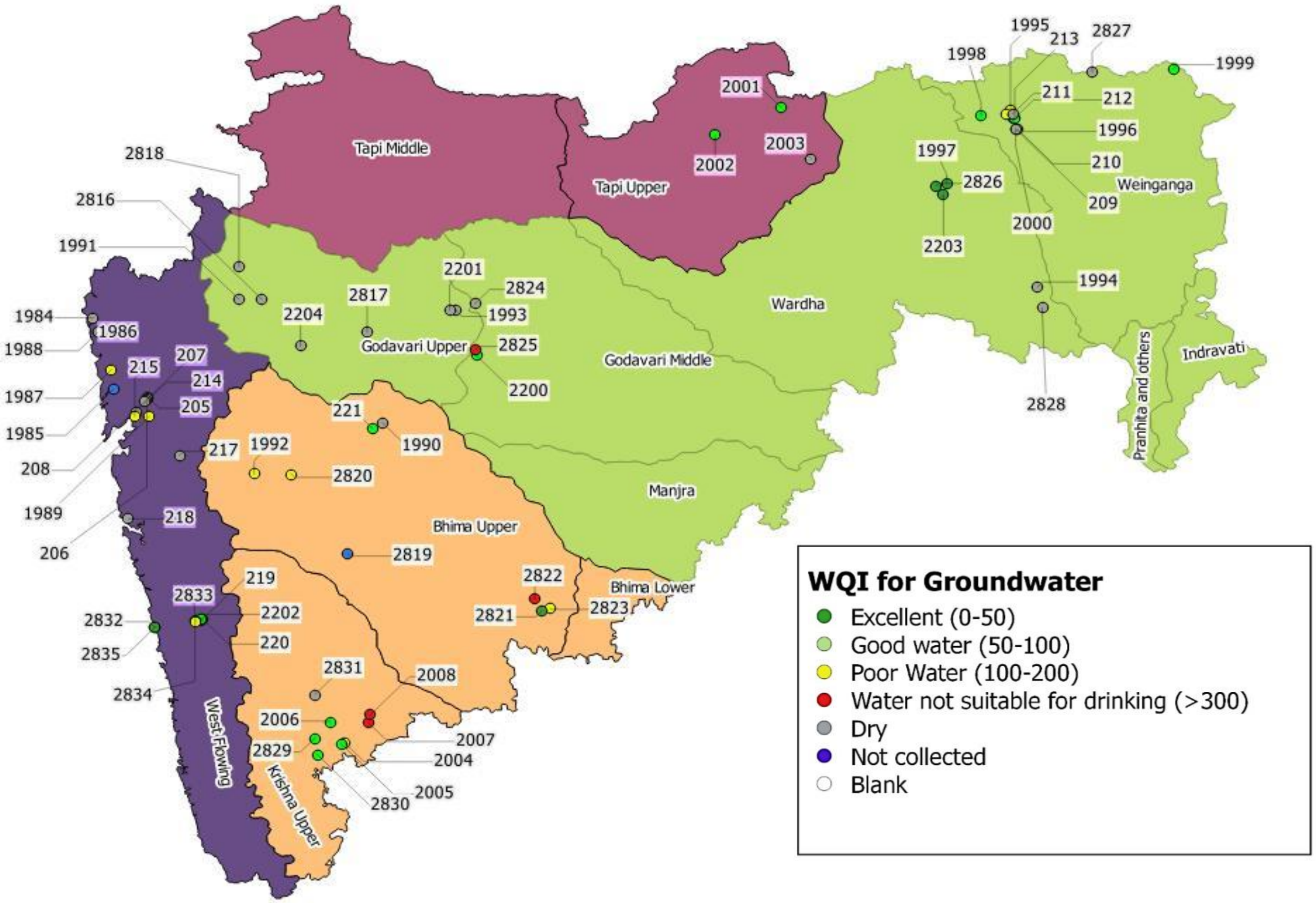
Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry	Not Collected	No data

Table No 33: Ground water quality monitoring stations at Kolhapur and Pune.

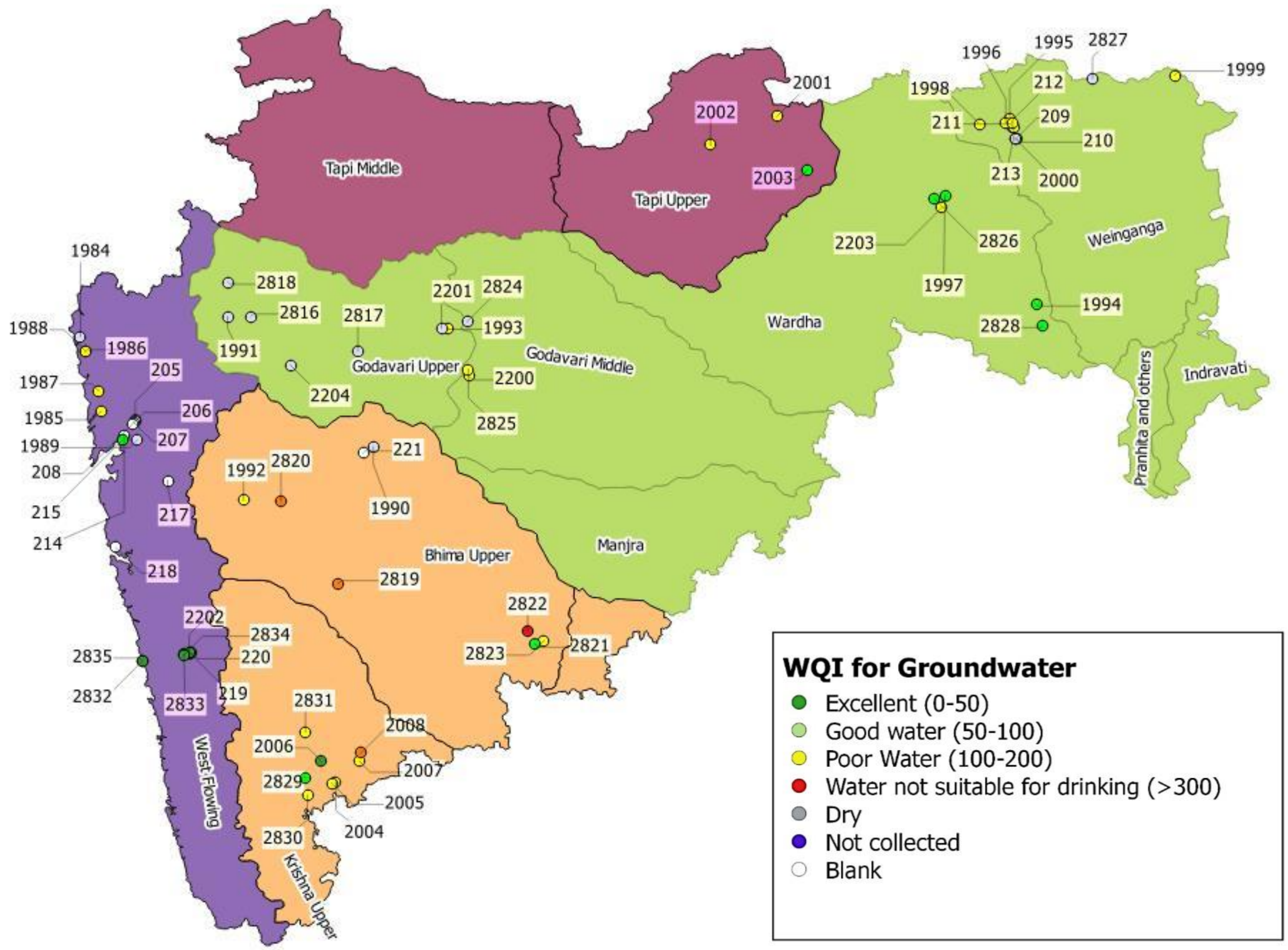
Programme	Regional Office	Station ID	Station Name	District	Taluka		Village
SWMP	Kolhapur	219	Commen well Water At Patwardhan, Lote, Taluka - Khed, District - Rantnagiri	Ratnagiri	Khed	Well	Lote
SWMP	Kolhapur	220	Dugwell backside Excel India At Chalkewadi, Taluka - Khed, District - Ratnagiri.	Ratnagiri	Khed	Dug well	Chalkewadi
NWMP	Kolhapur	2004	Bore well at Parvati Industrial Estate, Yadrav, Kolhapur	Kolhapur	Shirol	Bore well	Yadrav
NWMP	Kolhapur	2005	Bore well at Khanjirenagar, Kolhapur	Kolhapur	Hatkanangale	Bore well	Khanjirenagar
NWMP	Kolhapur	2006	Bore well at Shinoli near M/s Aqua Alloy Steel.	Kolhapur	Chandgad	Bore well	Shinoli
NWMP	Kolhapur	2007	Bore well at Savali, near Gram Panchayat office.	Sangli	Miraj	Bore well	Savali
NWMP	Kolhapur	2008	Dug well at Sambarwadi, owned by Shri. Kishan Hali Rajput.	Sangli	Miraj	Dug well	Sambarwadi
NWMP	Kolhapur	2202	Dug Well at Ghane Kunt, near Awashi, onwed by shri Rajendra Amre	Ratnagiri	Khed	Dug well	Ghane Kunt
NWMP	Kolhapur	2829	Bore Well at MIDC Shiroli near M/s. Pratibha Enterprises	Kolhapur	Hatkanangale	Bore well	Shiroli

Programme	Regional Office	Station ID	Station Name	District	Taluka		Village
NWMP	Kolhapur	2830	Bore Well at MIDC Gokul Shirgaon	Kolhapur	Karvir	Bore well	Gokul-Shirgaon
NWMP	Kolhapur	2831	Dug Well at Sakharali near MIDC Islampur near Krishna Milk Industry	Sangli	Walwa	Dug well	Sakharali
NWMP	Kolhapur	2832	Dug Well No.1 at Brahmanwadi-Anjanwel, owned by Shri Vaidya	Ratnagiri	Guhagar	Dug well	Anjanwel
NWMP	Kolhapur	2833	Dug Well No.1 at Group Gram Panchayat at Arketwadi, near Masjid	Ratnagiri	Khed	Dug well	Arketwadi
NWMP	Kolhapur	2834	Dug Well No.2 at Arketwadi	Ratnagiri	Khed	Dug well	Arketwadi
NWMP	Kolhapur	2835	Dug Well No.2 at owned by Group Gram Panchayat, Brahmanwadi-Anjanwel	Ratnagiri	Guhagar	Dug well	Anjanwel
NWMP	Pune	1992	Dug well at MSW Site, owned by Shri.Dattu Kondiba Borate at Borate Vasthi.	Pune	Haveli	Dug well	Moshi
NWMP	Pune	2819	Dug Well Owned by Shri Deshmukh	Pune	Baramati	Dug well	Malegaon
NWMP	Pune	2820	Dug Well Owned by Shri Shivaji Baban Darekar	Pune	Shirur	Dug well	Sanaswadi
NWMP	Pune	2821	Bore Well at Bale Railway Station premises Owned by Shri Digambar Joshi	Solapur	North Solapur	Bore well	Dahegaon
NWMP	Pune	2822	Bore Well near Chincholi	Solapur	Mohol	Bore well	Chincholi
NWMP	Pune	2823	Bore Well at Shete Vasti near old Tuljapur Road	Solapur	Solapur	Dug well	Shete vasthi, Tuljapur Naka

Spatial map for Ground WQI in Maharashtra 2017-18 (April 2017)



Spatial map for Ground WQI in Maharashtra 2017-18 (October 2017)



Conclusion

Every year, MPCB regularly monitors the water quality across 294 WQMS (Water Quality Monitoring Stations) for both surface (176 on rivers, 36 on sea/creeks, 12 on drains, 4 dams) and ground water (29 Borewells, 34 Dugwell, 1 Handpump, 1 Tubewell, 1 Well) under two programs of NWMP (National Water Quality Monitoring Program) and SWMP (State Water Quality Monitoring Program). Surface water samples are monitored once every month whereas the ground water samples are monitored bi-anually. Water parameters are taken into consideration for calculating WQI.

In term of overall Basins, West Flowing Rivers recorded major portion of the observations (around 84%) in 'Non-polluted' category followed by Godavari basin (>68%) and Krishna basin (>67%) in the year 2017-18. As compared to other sub basins, Manjra sub basin of Godavari Basin recorded reduction in number of observations recorded under 'Good to Excellent' category compared to previous year. Pollution is the major concern in Coastal area (Sea and Creek) of Maharashtra with more than 54% of the observations recorded under 'Polluted' category.

In the year 2017-18, Mithi River is polluted throughout the year. Rivers such as Chandrabhaga, Mor, Patalganga and Waghur which were observed in Priority V last year were recorded under Priority IV in the current year. The Kan River which was recorded under non polluted category in year 2016-17 has shifted to Priority V in the year 2017-18 thus showing decline curve in water quality.It is important to note that the number of non-polluted river has increased to 15 in current year as compared to previous year (which recorded only 5 rivers) thus indicating improvement in water quality.

The number of groundwater WQMS recorded WQI in the category 'Water Unsuitable for Drinking' are reduced from 5 (2016-17) to 2 in 2017-18. These 2 WQMS (2819 and 2822) recorded WQI under category 'Water Unsuitable for Drinking' category due to high levels of TDS, Hardness, Calcium and chlorides.

Annex I – RO wise summary of WQI in 2017-18

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, 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 2017-18 and presents the gist of the water quality index for the respective stations for months of May and December.

RO – Amravati

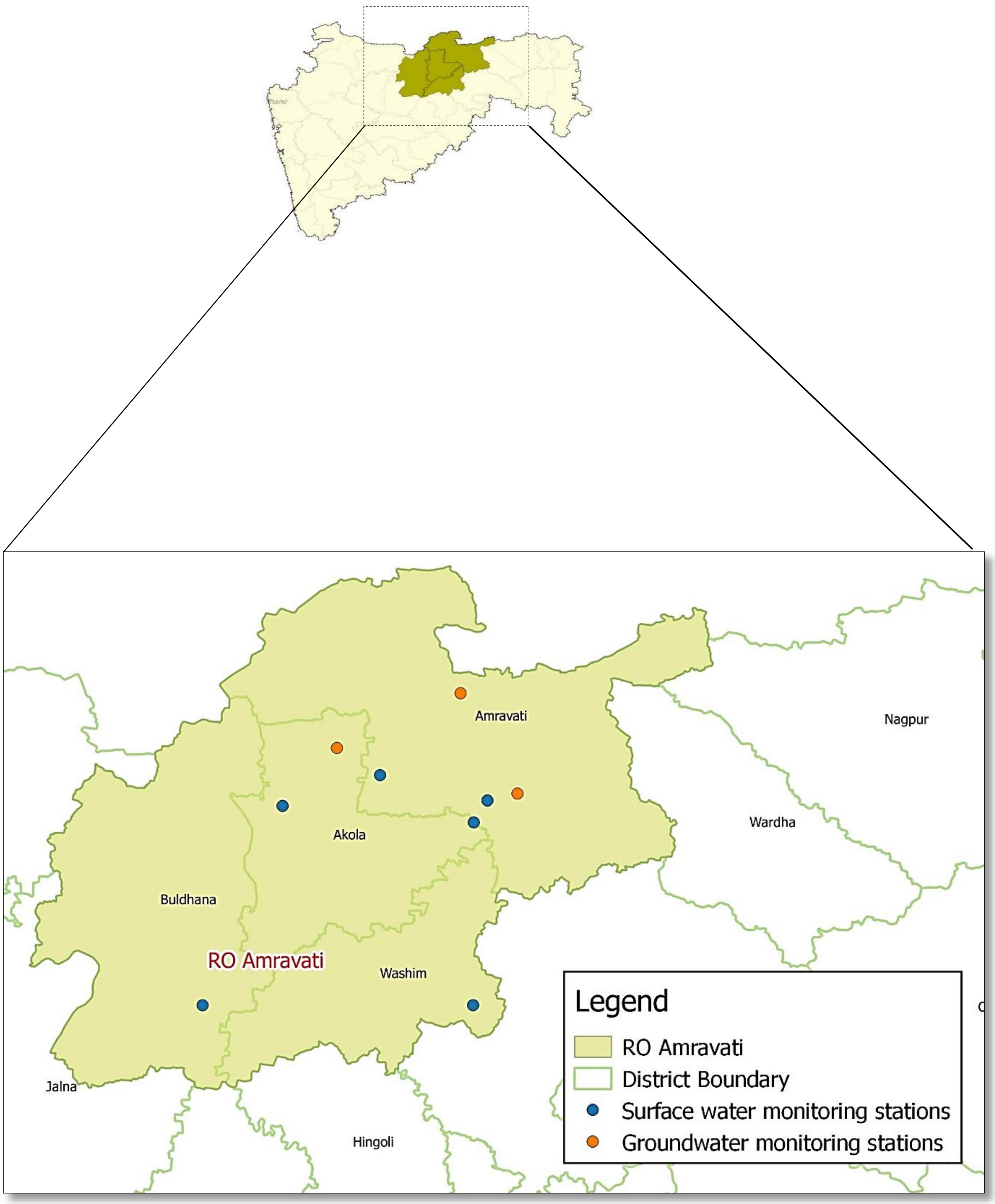

Amravati
Nagpur
Akola
Wardha
Buldhana
RO Amravati
Washim
Jalna
Hingoli
Legend
RO Amravati
District Boundary
Surface water monitoring stations
Groundwater monitoring stations

Table No 34: Water quality Index for surface and ground water monitoring at Amravati-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	1913	Purna River at Dhupeshwar at U/s of Malkapur Water works	59	58	59	Akola	Akola	Malkapur
	2155	Purna River at D/s of confluence of Morna & Purna at Andhura village	No data	No data	57	Akola	Balapur	Andura
	2675	Morna River at D/s of Railway Bridge	34	64	46	Akola	Akola	Akola
	2695	Pedhi River near Road Bridge at Dadhi-Pedhi village	62	39	54	Amravati	Chandur Bazar	Asegaon
	2697	Penganga River near water supply scheme of Umarkhed MC	45	72	58	Yavatmal	Umarkhed	Belkhed
	2698	Penganga River D/s of Isapur Dam	49	76	55	Yavatmal	Pusad	Isapur
	2699	Penganga River at Mehkar-Buldana Road Bridge	No data	No data	58	Buldana	Mehkar	Mehkar
	2700	Purna River near Achalpur-Amravati Road Bridge, Asegaon	No data	No data	64	Amravati	Chandur bazaar	Asegaon
GW	2001	Tube well at water treatment plant of M.C.Achalpur near Post Office.	98	138	118	Amravati	Achalpur	Paratwada
	2002	Bore well Opp. Gajanan Maharaj Temple at Anjangaon road.	90	137	114	Akola	Akot	Anjangaon
	2003	Dug well at Plot No- 4, Street No. 49-C, at Nehru Bal Udyan Azad Maidan, owned by Yavatmal M.C.	No data	86	86	Yavatmal	Yavatmal	Nehru Bal Udyan Azad Maidan

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

RO – Aurangabad

Table No 35: Water quality Index for surface and ground water monitoring at Aurangabad-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	12	Godavari River at Dhalegaon	79	71	73	Parbhani	Pathari	Dhalegaon
	178	Kannad - D/S of Kannad near Bridge	No data	60	66	Aurangabad	Kannad	Kannad
	179	Sillod - D/S of Sillod near bridge at bhavan	No data	No data	38	Aurangabad	Sillod	Sillod
	180	Aurangabad - Near Holly cross bridge	65	42	42	Aurangabad	Aurangabad	Aurangabad
	181	Aurangabad - Near Patoda Village	58	56	53	Aurangabad	Aurangabad	Aurangabad
	182	Aurangabad - Near Chikhalthana Bridge	No data	51	40	Aurangabad	Aurangabad	Aurangabad
	183	Aurangabad - At Sukhna Dam	67	64	58	Aurangabad	Aurangabad	Aurangabad
	184	Aurangabad - Harsool Dam	75	76	64	Aurangabad	Aurangabad	Aurangabad
	1209	Godavari River at Raher	85	66	72	Nanded	Nayagaon	Raher
	1210	Godavari River at Intake of pump house	81	70	72	Nanded	Nanded	Vishnupuri
	1312	Godavari river at Jaikwadi Dam, Paithan	79	77	75	Aurangabad	Paithan	Paithan
	2157	Godavari River at Latur Water intake near pump house	78	75	72	Osmanabad	Kalumb	Dhamegaon
	2158	Godavari River at Paithan U/s of Paithan Intake pump house	78	68	70	Aurangabad	Paithan	Jayakwadi
	2159	Godavari River at D/s of Paithan at Pathegaon bridge	78	70	73	Aurangabad	Paithan	Pathegaon
	2160	Godavari River at U/s of Aurangabad Reservoir Kaigaon Tokka near, Kaigaon Bridge	78	72	72	Aurangabad	Gangapur	Kaigaon
	2161	Godavari River at Jalna Intake water pump house Shahagad	81	74	74	Jalna	Ambad	Shahabad
	2657	Bindusara River at Beed, near Intake water pump house at Dam	78	74	73	Beed	Beed	Paligaon
	2673	Manjra River at D/s of Latur, near Latur-Nanded Bridge	No data	70	69	Latur	Latur	Bhatkheda
GW	1993	Dug well at Pandarpur, Gangapur, Aurangabad	No data	170	170	Aurangabad	Gangapur	Pandharpur
	2200	Bore Well at Katpur, Near Z.P.School	61	163	112	Aurangabad	Paithan	Katpur
	2201	Dug Well at Ranjangaon	No data	Dry	Dry	Aurangabad	Gangapur	Ranjangaon
	2824	Dug Well at Naregaon	No data	Dry	Dry	Aurangabad	Aurangabad	Naregaon
	2825	Bore Well at Wahegaon, near Zilla Parishet School	295	153	224	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

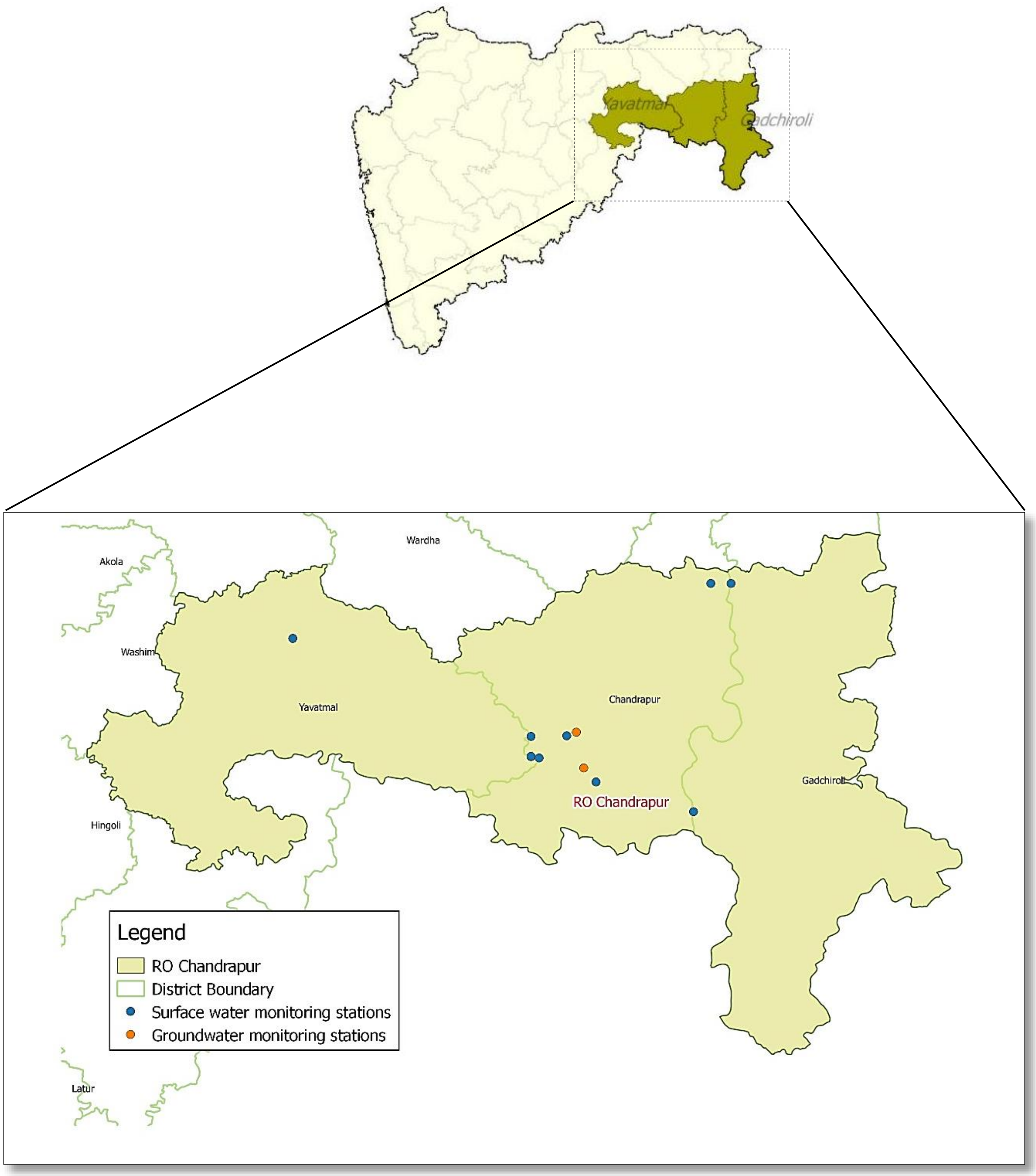


Table No 36: Water quality Index for surface and ground water monitoring at Chandrapur RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	2156	Wardha River at confluence point of Penganga & Wardha	47	74	57	Yavatmal	Wani	Jugad
	11	Wainganga River at Ashti	46	69	57	Chandrapur	Gondpipri	Ashti
	1212	Wardha river at Rajura bridge	45	58	55	Chandrapur	Chandrapur	Rajura
	2174	Wardha River at D/s of ACC Ghuggus	41	62	55	Chandrapur	Chandrapur	Ghuggus
	2175	Wainganga at U/s of Gaurav Paper Mills near Jack Well	40	54	55	Chandrapur	Chandrapur	Bramhpuri
	2176	Wainganga River at D/s of Gaurav Paper Mills Near Jackwell	36	56	54	Chandrapur	Chandrapur	Bramhpuri
	2719	Wardha River at D/s of Erai River	41	49	53	Chandrapur	Chandrapur	Hadasti
	2720	Wardha River at U/s of Erai River	47	54	59	Chandrapur	Chandrapur	Hadasti
	2721	Wardha River at U/s of ACC Ghuggus	45	68	59	Chandrapur	Chandrapur	Ghuggus
GW	2828	Dug Well near Jilla Parishad Primary School Visapur	No data	85	85	Chandrapur	Ballarpur	Visapur
	1994	Dug well At TPS Durgapur near Naseeb Kirana {} general Store.	No data	97	97	Chandrapur	Chandrapur	Durgapur

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

RO – Kalyan

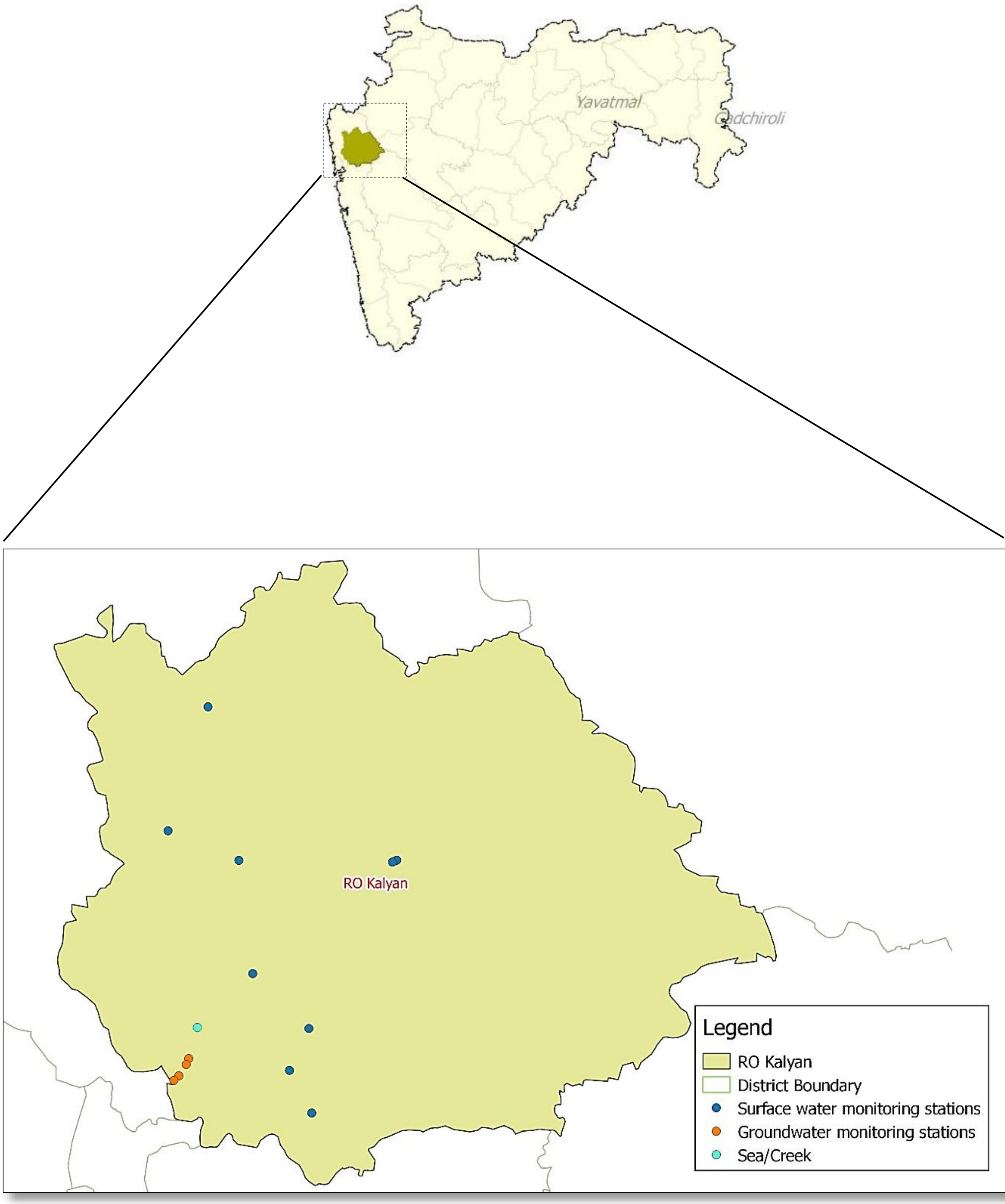

Yavatmal
Gadchiroli
RO Kalyan
Legend
RO Kalyan
District Boundary
Surface water monitoring stations
Groundwater monitoring stations
Sea/Creek

Table No 37: Water quality Index for surface and ground water monitoring at Kalyan-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	1092	Kalu River at Atale village	69	43	60	Thane	Kalyan	Atale
	1093	Ulhas river at U/s of NRC Bund	66	75	74	Thane	Kalyan	Mohane
	1094	Ulhas River at U/s of Badlapur water works	70	72	74	Thane	Ambernath	Kulgaon
	1461	Bhatsa river at D/s of Pise Dam	75	76	73	Thane	Bhiwandi	Pise
	2162	Ulhas River at Jambhul water works	71	74	75	Thane	Ambernath	Jambhul
	2653	Bhatsa River at D/s of Liberty Oil Mills	69	78	72	Thane	Shahapur	Satne
	2654	Bhatsa River at D/s of Liberty Oil Mills	67	77	72	Thane	Shahapur	Satne
	2709	Tansa River near road bridge	No data	79	76	Thane	Wada	Dakewali
	2712	Vaitarna River near Road Bridge	No data	77	75	Thane	Wada	Gandhare
Saline	2791	Ulhas Creek at Reti Bunder, D/s of Kalyan-Bhiwandi Bridge	52	47	53	Thane	Kalyan	Kalyan
GW	205	Dug well opp. KAMA office, MIDC Ph-I, Dombivali	No data	No data	No data	Kalyan	Dombivali	MIDC,Dombivali
	206	Dug well near Mamta Hospital, Milap Nagar, Dombivali	No data	No data	No data	Kalyan	Dombivali	MIDC,Dombivali
	207	Dug well at pimpleshwar Temple, MIDC Ph-II, Dombivali	No data	No data	No data	Kalyan	Dombivali	MIDC,Dombivali
	208	Dug well addjusent to M/S. Altra pure chem., Sr. No. 45, Hissa No. 3, MIDC Ph-II, Dombivali.	No data	No data	No data	Kalyan	Dombivali	MIDC,Dombivali

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

RO – Kolhapur

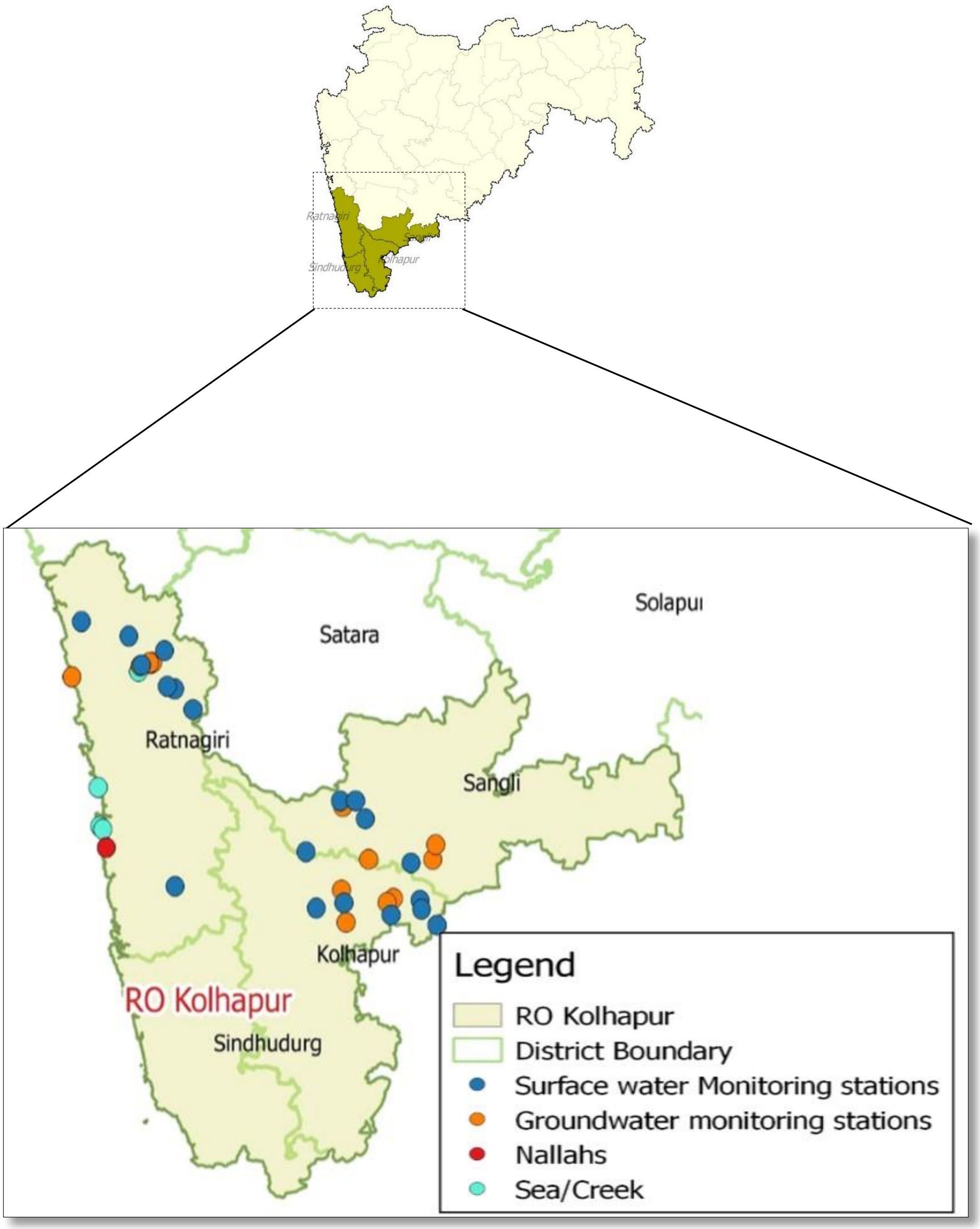

Ratnagiri
Sindhudurg
Kolhapur
Satara
Solapur
Ratnagiri
Sangli
Kolhapur
RO Kolhapur
Sindhudurg
Legend
RO Kolhapur
District Boundary
Surface water Monitoring stations
Groundwater monitoring stations
Nallahs
Sea/Creek

Table No 38: Water quality Index for surface and ground water monitoring at Kolhapur-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	37	Krishna River at Maighat, Sangli	53	77	72	Sangli	Miraj	Gawali gally
	198	Bahe KT Weir, Bahe, Taluka - Walwa, District - Sangli	53	76	69	Sangli	Walwa	Bahe
	199	Borgaon KT Weir, Borgaon, Taluka - Walwa, District - Sangli	53	74	69	Sangli	Walwa	Borgaon
	200	Mangle Bridge, Mangle, Taluka - Shirala, District - Sangli	51	74	69	Sangli	Shirala	Mangle
	201	Sonpatra River At Kotwali Village, Taluka - Khed, District - Ratnagiri	51	78	69	Ratnagiri	Khed	Kotwali
	202	Vashisti River At Khadpoli, Taluka Chiplun, District - Ratnagiri	51	78	71	Ratnagiri	Chiplun	Khadpoli
	203	Jagbudi River, D/S of Khed City, Taluka - Khed, District Ratnagiri	52	75	71	Ratnagiri	Khed	Khed City
	204	Jog river at Dapoli, Taluka Dapoli, District - Rantnagiri	50	77	70	Ratnagiri	Dapoli	Dapoli
	1153	Krishna River at Rajapur Weir	54	58	69	Kolhapur	Shirol	Rajapur
	1310	Krishna River at Kurundwad	54	55	69	Kolhapur	Shirol	Narshingwadi, Kurundwad
	1311	Panchganga River at Ichalkaranji near MIDC intake well	51	56	69	Kolhapur	Hatkanangale	Shiradhwad (Ichalkaranji ghat)
	1904	Panchganga River at U/s of Kolhapur town near Balinga Pumping Station	54	56	68	Kolhapur	Karvir	Balinga
	1905	Panchaganga river at D/s of Kolhapur town at Gandhi nagar near NH-4 bridge and MIDC intake well	50	56	67	Kolhapur	Kolhapur	Uchegaon
	1906	Krishna river at Walwa, D/s of Islampur near Vithal Temple	51	76	72	Sangli	Walwa	Walwa
	2163	Panchganga River at Shirol near Shirol intake well	52	58	68	Kolhapur	Shirol	Shirol
	2164	Vashishti River at U/s of Three M Paper Mills near M/s Multifilms Plastic Pvt Ltd	48	73	72	Ratnagiri	Chiplun	Kherdi
	2676	Muchkundi River at Waked Ratnagiri near M/s Asahi India Glass	50	74	70	Ratnagiri	Lanja	Waked
	2713	Vashishti River at D/s of Three M Paper Mills near Chiplun water intake Jackwell	51	76	72	Ratnagiri	Chiplun	Kherdi
	2714	Vashishti River at U/s of Pophali near Konphansawane Bridge	55	77	74	Ratnagiri	Chiplun	Pophali
Nalla	2790	Pimpal-Paneri Nalla at Ratnagiri near Finolex Industries	54	No data	49	Ratnagiri	Ratnagiri	Yahganigaon
Saline	2804	Karambavane Creek at Chiplun	54	76	69	Ratnagiri	Chiplun	Karambavane
	2813	Sea Water at Ganapatipule	50	64	62	Ratnagiri	Ratnagiri	Ganapatipule
	2814	Sea Water at Bhagwati Bunder, Ratnagiri near Ultra Tech Cement	46	65	61	Ratnagiri	Ratnagiri	Mirkarwada

		Jetty						
	2815	Madvi Sea Water at Ratnagiri near Jodhale Maruti Temple	46	68	60	Ratnagiri	Ratnagiri	Madvigaon
GW	219	Commen well Water At Patwardhan, Lote, Taluka - Khed, District - Rantnagiri	25	80	53	Ratnagiri	Khed	Lote
	220	Dugwell backside Excel India At Chalkewadi, Taluka - Khed, District - Ratnagiri.	23	21	22	Ratnagiri	Khed	Chalkewadi
	2004	Bore well at Parvati Industrial Estate, Yadrav, Kolhapur	131	151	141	Kolhapur	Shirol	Yadrav
	2005	Bore well at Khanjirenagar, Kolhapur	79	127	103	Kolhapur	Hatkanangale	Khanjirenagar
	2006	Bore well at Shinoli near M/s Aqua Alloy Steel.	72	43	57	Kolhapur	Chandgad	Shinoli
	2007	Bore well at Savali, near Gram Panchayat office.	231	151	191	Sangli	Miraj	Savali
	2008	Dug well at Sambarwadi, owned by Shri. Kishan Hali Rajput.	215	211	213	Sangli	Miraj	Sambarwadi
	2202	Dug Well at Ghane Kunt, near Awashi, onwed by shri Rajendra Amre	61	22	41	Ratnagiri	Khed	Ghane Kunt
	2829	Bore Well at MIDC Shiroli near M/s. Pratibha Enterprises	64	67	66	Kolhapur	Hatkanangale	Shiroli
	2830	Bore Well at MIDC Gokul Shirgaon	84	107	95	Kolhapur	Karvir	Gokul-Shirgaon
	2831	Dug Well at Sakharali near MIDC Islampur near Krishna Milk Industry	No data	119	119	Sangli	Walwa	Sakharali
	2832	Dug Well No.1 at Brahmanwadi-Anjanwel, owned by Shri Vaidya	38	24	31	Ratnagiri	Guhagar	Anjanwel
	2833	Dug Well No.1 at Group Gram Panchayat at Arketwadi, near Masjid	36	35	35	Ratnagiri	Khed	Arketwadi
	2834	Dug Well No.2 at Arketwadi	189	37	113	Ratnagiri	Khed	Arketwadi
	2835	Dug Well No.2 at owned by Group Gram Panchayat, Brahmanwadi-Anjanwel	32	24	28	Ratnagiri	Guhagar	Anjanwel

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

RO – Mumbai

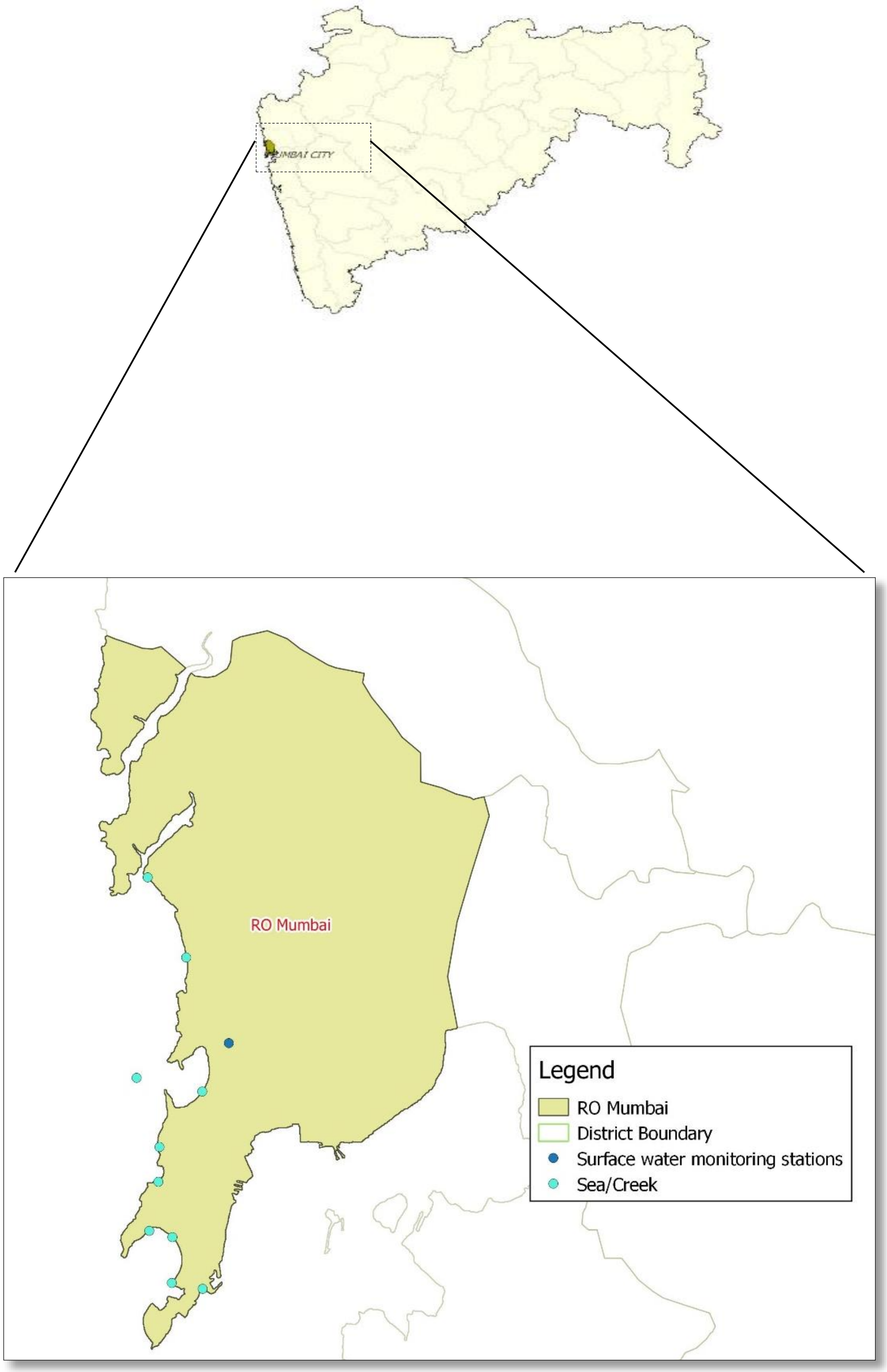
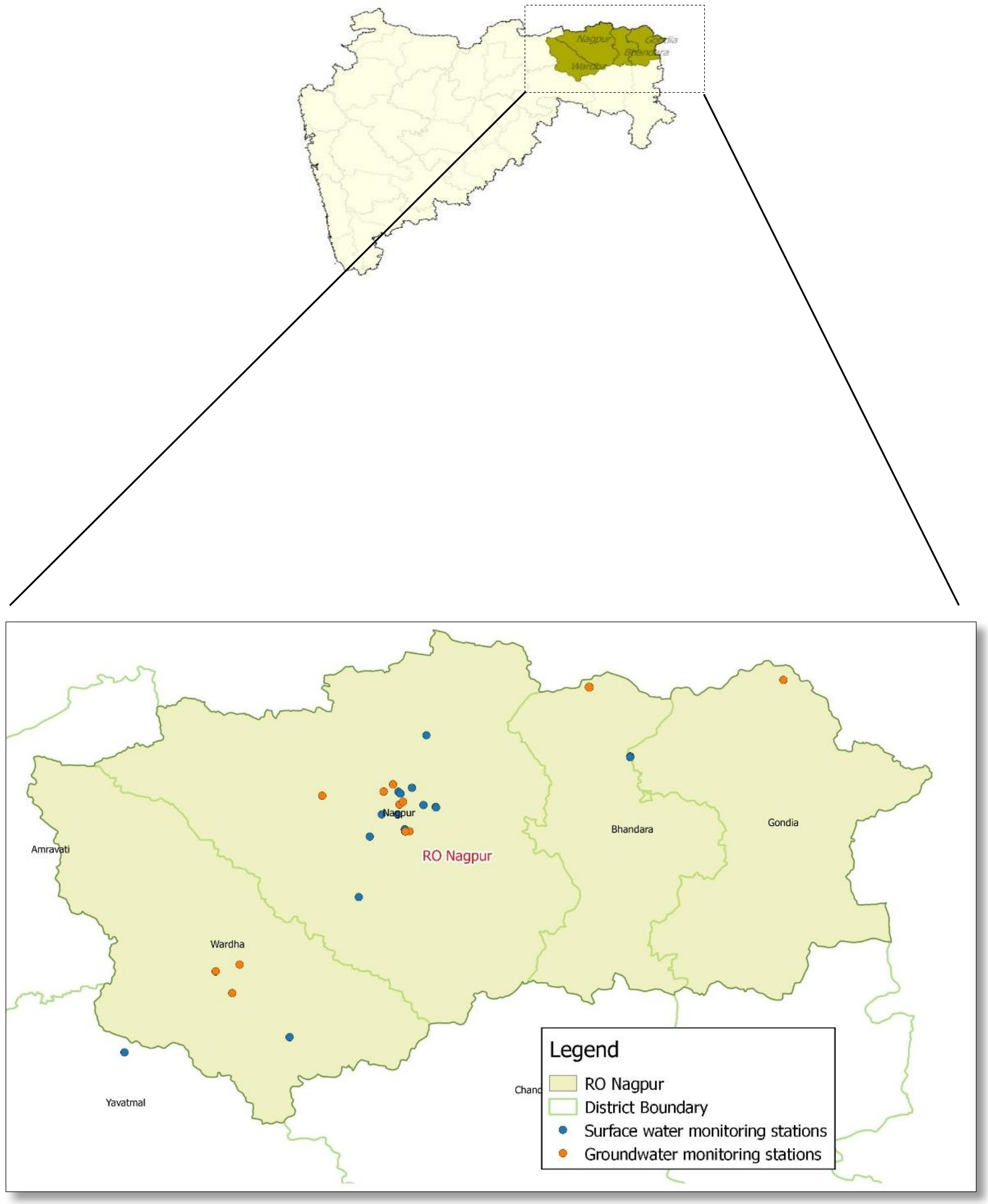

MUMBAI CITY
RO Mumbai
Legend
RO Mumbai
District Boundary
Surface water monitoring stations
Sea/Creek

Table No 39: Water quality Index for surface and ground water monitoring at Mumbai-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	2168	Mithi River at near bridge	34	25	34	Mumbai	Bandra	Mahim
Saline	1318	Mahim creek at Mahim Bay	41	42	46	Mumbai	Bandra	Mahim
	2165	Sea Water at Gateway of India	47	36	44	Mumbai	Colaba	Colaba
	2166	Sea Water at Charni Road Chowpatty	45	39	45	Mumbai	Mumbai	Girgaon
	2167	Sea Water at Worli Seaface	44	39	43	Mumbai	Worli	Worli
	2169	Sea Water at Varsova Beach	46	38	41	Mumbai	Andheri	Versova
	2808	Sea Water at Nariman Point	42	41	44	Mumbai	Colaba	Colaba
	2809	Sea Water at Malabar Hill	46	38	43	Mumbai	Mumbai	Walkeshwar
	2810	Sea Water at Haj Ali	44	39	43	Mumbai	Worli	Worli
	2811	Sea Water at Shivaji Park (Dadar Chowpatty)	45	40	45	Mumbai	Dadar	Dadar
	2812	Sea Water at Juhu Beach	42	36	45	Mumbai	Santacruz	Juhugaon

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

RO – Nagpur



Amravati
Nagpur
RO Nagpur
Bhandara
Gondia
Wardha
Yavatmal
Legend
RO Nagpur
District Boundary
Surface water monitoring stations
Groundwater monitoring stations

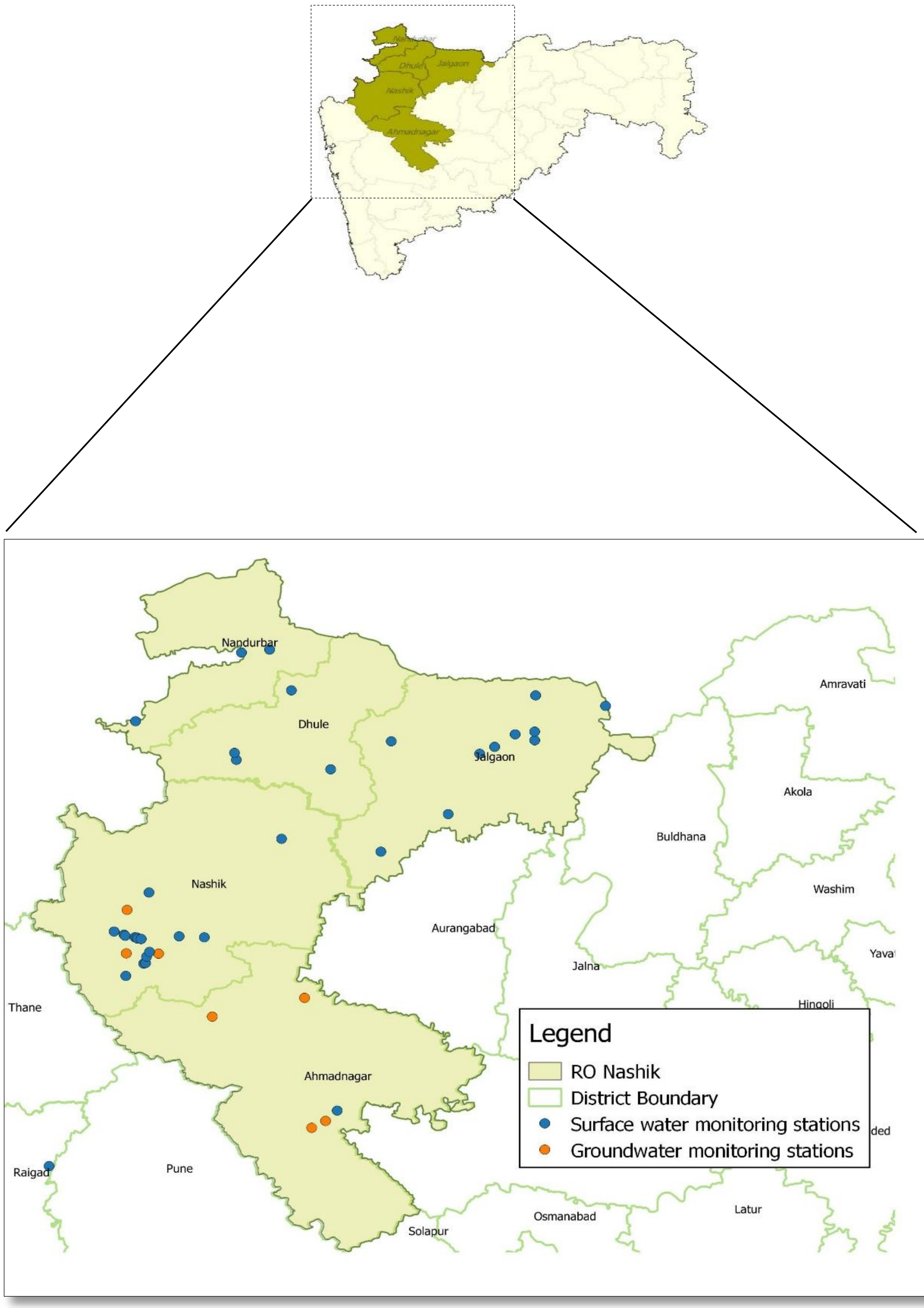
Table No 40: Water quality Index for surface and ground water monitoring at Nagpur-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	185	Nag River Near, Ambazari Lake, Nagpur	64	47	60	Nagpur	Nagpur	Nagpur
	186	Nag River Near, Bhandewadi Bridge, Nagpur	30	24	28	Nagpur	Nagpur	Nagpur
	187	Nag River Near, Asoli Bridge, Bhandara Road, Nagpur	33	29	30	Nagpur	Nagpur	Nagpur
	188	Pill River Near, Wanjra Layout Kamptee Road, Nagpur	26	29	29	Nagpur	Nagpur	Nagpur
	189	Pill River Near, Mankapur on Koradi Road, Nagpur	34	27	31	Nagpur	Nagpur	Nagpur
	1315	Wardha River at Pulgaon Railway Bridge	58	48	57	Wardha	wardha	Pulgaon
	1908	Kolar river before confluence with Kanhan river at Waregaon Bridge	67	63	60	Nagpur	Kamptee	Waregaon
	1909	Kanhan river at D/s of Nagpur	57	64	60	Nagpur	Kuhi	Agargaon
	1910	Wainganga river after confluence with Kanhan river	55	55	59	Nagpur	Kuhi	Ambhora
	2170	Kanhan River (Wainganga basin) at U/s of M/s Vidharba Paper Mill	73	63	66	Nagpur	Parseoni	Sinora
	2171	Kanhan River (Wainganga basin) at D/s of M/s Vidharbha Paper Mills	68	60	61	Nagpur	Parseoni	Sinora
	2172	Wainganga River at D/s of Ellora Paper Mill	63	52	61	Bandara	Tumsar	Tumsar
	2173	Wainganga River at U/s of Ellora Paper Mills	66	57	64	Bandara	Tumsar	Tumsar
	2722	Wena River at U/s of Mohata Mills, nearby Brigde on Hinganghat Wadner Road	68	66	66	Wardha	Hinganghat	Hinganghat
	2723	Wena River at D/s of Mohata Mills, near Bridge on Hinganghat-Wadner Road	58	62	61	Wardha	Hinganghat	Hinganghat
	211	Grampanchayat Suradevi Intake well On Kolar River At Suradevi, Taluka - Kamptee, District -Nagpur	No data	108	108	Nagpur	Kamptee	Suradevi
GW	209	Bore well near Pardhi House, Bhandewadi, Nagpur	121	114	118	Nagpur	#N/A	Bhandewadi
	210	Bore well near Dearao Kale House, Bhandewadi, Nagpur	130	124	127	Nagpur	#N/A	Bhandewadi
	212	Grampanchayat Mhasala, Dugwell On Nalla At Mhasala, Taluka - Kamptee, District - Nagpur	80	99	90	Nagpur	Kamptee	Mhasala
	213	Grampanchayat Kawtha, Dugwell At Kawtha, Taluka - Kamptee, District - Nagpur	78	133	106	Nagpur	Kamptee	Kawtha
	1995	Gram Panchayath Dug well , Near Balaji Gajbhiye House, Khaperkheda	110	118	114	Nagpur	Saoner	Khaperkheda(Ward No.4)
	1996	Gram Panchayath Dug well , Near Jagadamba G M S Mandir Sahakari Sanstha	126	121	123	Nagpur	Kamptee	Koradi

	1997	Bore well near Primary Health Centre, Raipur(Hingna)	48	75	62	Nagpur	Hingna	Raipur
	1998	Gram Panchayat Dug well near Gram Panchayat Office, Brahmni	97	109	103	Nagpur	Kalmeshwar	Brahmni
	1999	Bore well Near Gram Panchayat, Changera.	60	103	81	Gondia	Gondia	Changera
	2000	Dug well near Sarode Kirana Store, Bhandewadi, Nagpur	No data	Dry	Dry	Nagpur	Nagpur	Bhandewadi
	2203	Hand Pump in the premises of Z.P.Primary School	44	100	72	Wardha	wardha	Bhugaon
	2826	Dug Well near Railway Station, Cottaon Market	45	97	71	Wardha	wardha	Wardha
	2827	Bore Well near Railway crossing at Dongi Buzurg	No data	Dry	Dry	Bandara	Tumsar	Dongri-Buzurg

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

RO – Nashik



Nandurbar
Dhule
Jalgaon
Nashik
Ahmadnagar
Amravati
Akola
Buldhana
Washim
Aurangabad
Jalna
Hingoli
Thane
Raigad
Pune
Solapur
Osmanabad
Latur
Legend
RO Nashik
District Boundary
Surface water monitoring stations
Groundwater monitoring stations

Table No 41: Water quality Index for surface and ground water monitoring at Nashik -RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	194	Kadwa River at Awankhed Village, Taluka - Dindori, District - Nashik	57	No data	55	Nashik	Dindori	Awankhed Village
	195	Sina River Bridge At Burudgaon Road, A/P Ahmednagar, Taluka & District Ahmednagar	63	18	44	Ahmednagar	Ahmednagar	Burudgaon
	1095	Godavari River at U/s of Gangapur Dam	48	73	64	Nashik	Nashik	Gangapur
	1096	Godavari River at Panchavati at Ramkund	64	66	68	Nashik	Nashik	Panchavati
	1211	Godavari River at Nashik D/s of near Amardham	40	65	63	Nashik	Nashik	Gadgebaba Maharaj Nagar
	1251	Tapi River at Bhusawal	53	77	66	Jalgaon	Bhusawal	Bhusawal Railway Colony
	1252	Girna river at Jalgaon at intake of Girna pump house	No data	No data	67	Jalgaon	Jalgaon	Girna pump house area
	1253	Girna river at Malegaon at Malegaon road bridge	No data	75	73	Nashik	Malegaon	Malegaon
	1313	Tapi River at Ajnad	52	51	64	Jalgaon	Raver	Ajnad
	1314	Tapi river at Ubad village near Gujrat border	71	57	68	Nandurbar	Shahada	Ubad
	1907	Rangavali river at D/s of Navapur near Rangavali bridge	No data	No data	71	Nandurbar	Navapur	Navapur
	2177	Godavari River near Someshwar Temple	45	74	69	Nashik	Nashik	Someshwar
	2179	Godavari River at Hanuman Ghat	48	72	63	Nashik	Nashik	Nashik city
	2180	Godavari River at near Tapovan	58	59	62	Nashik	Nashik	Tapovan
	2181	Godavari River at Kapila -Godavari confluence point	63	60	58	Nashik	Nashik	Tapovan
	2182	Godavari River at Saikheda	46	78	70	Nashik	Niphad	Saikheda
	2183	Godavari River at Nandur-Madhameshwar Dam	45	74	69	Nashik	Niphad	Nandur
	2652	Amravati River D/s of Dondaicha	No data	No data	No data	Dhule	Dhule	Dondaicha
	2658	Bori River D/s of Amalner	No data	No data	68	Jalgaon	Jalgaon	Amalner
	2659	Burai River before confluece to Tapi River	No data	No data	No data	Dhule	Dhule	Mukudas
	2660	Darna River at Chehedi pumping station	44	77	72	Nashik	Nashik	Chehedi
	2661	Darna River at Aswali (Darna Dam)	48	75	67	Nashik	Igatpuri	Aswali
	2662	Darna River at MES site Pumping station	75	74	69	Nashik	Nashik	Bhagur
	2663	Darna River at Bhagur Pumping station near Pandhurli Bridge	76	75	70	Nashik	Nashik	Bhagur

	2664	Darna River at Sansari	76	74	72	Nashik	Nashik	Sansari
	2666	Gomai River D/s of Shahada	No data	No data	65	Dhule	Dhule	Shahada
	2667	Hiwara River D/s of Pachora	No data	No data	60	Jalgaon	Jalgaon	Pachora
	2670	Kan River near Sakri water works	No data	No data	70	Dhule	Dhule	Sakri
	2674	Mor River near Padalshe	No data	No data	60	Jalgaon	Jalgaon	Padalashe
	2684	Panzara River near Panzarakan SSK Ltd	No data	No data	70	Dhule	Dhule	Panzare
	2689	Patalganga River at Gagangiri Maharaj Temple	53	51	54	Raigad	Khalapur	Khopoli
	2710	Titur River D/s of Chalisgaon	No data	No data	58	Jalgaon	Jalgaon	Chalisgaon
	2718	Waghur River at Sakegaon before Confluence with Tapi River	No data	No data	59	Jalgaon	Jalgaon	Sakegaon
GW	221	well water of Bappaji, Akolner, Ahmadnagar, Nashik	74	No data	74	Nashik	Ahmadnagar	Akolner
	1990	Bore well at BMW Site , Burudgaon	No data	Dry	Dry	Ahmadnagar	Ahmednagar	Burudgaon
	1991	Bore well at MSW Site, Pathardi, Nashik	No data	Dry	Dry	Nashik	Nashik	Pathardi
	2204	Dug well at Gunjalwadi, Sangamner near Primary Health Care Center.	No data	Dry	Dry	Ahmadnagar	Sangamner	Gunjalwadi
	2816	Dug Well of Mr. Sampat Walunj, near M/s. Mahajeet Clayton	No data	Dry	Dry	Nashik	Nashik	Shinde village
	2817	Bore Well at Chitali near Wagh vasthi	No data	Dry	Dry	Ahmadnagar	Rahata	Chitali
	2818	Bore Well at M/s. Spectron Ethers Rasegaon near Siddeshwar Mahadev Mandir	No data	Dry	Dry	Nashik	Dindori	Rasegaon
Nalla	196	Lowki Nalla At Khedi, Taluka & District - Jalgaon	52	No data	45	Jalgaon	Khedi	Khedi
	197	Moti Nalla before Confluence with Panjara river Dhule, Taluka & District - Dhule	65	37	54	Dhule	Dhule	Dhule
	2178	Chikhali Nalla Meets Godavari River	No data	50	59	Nashik	Nashik	Chikhali

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

RO – Navi Mumbai

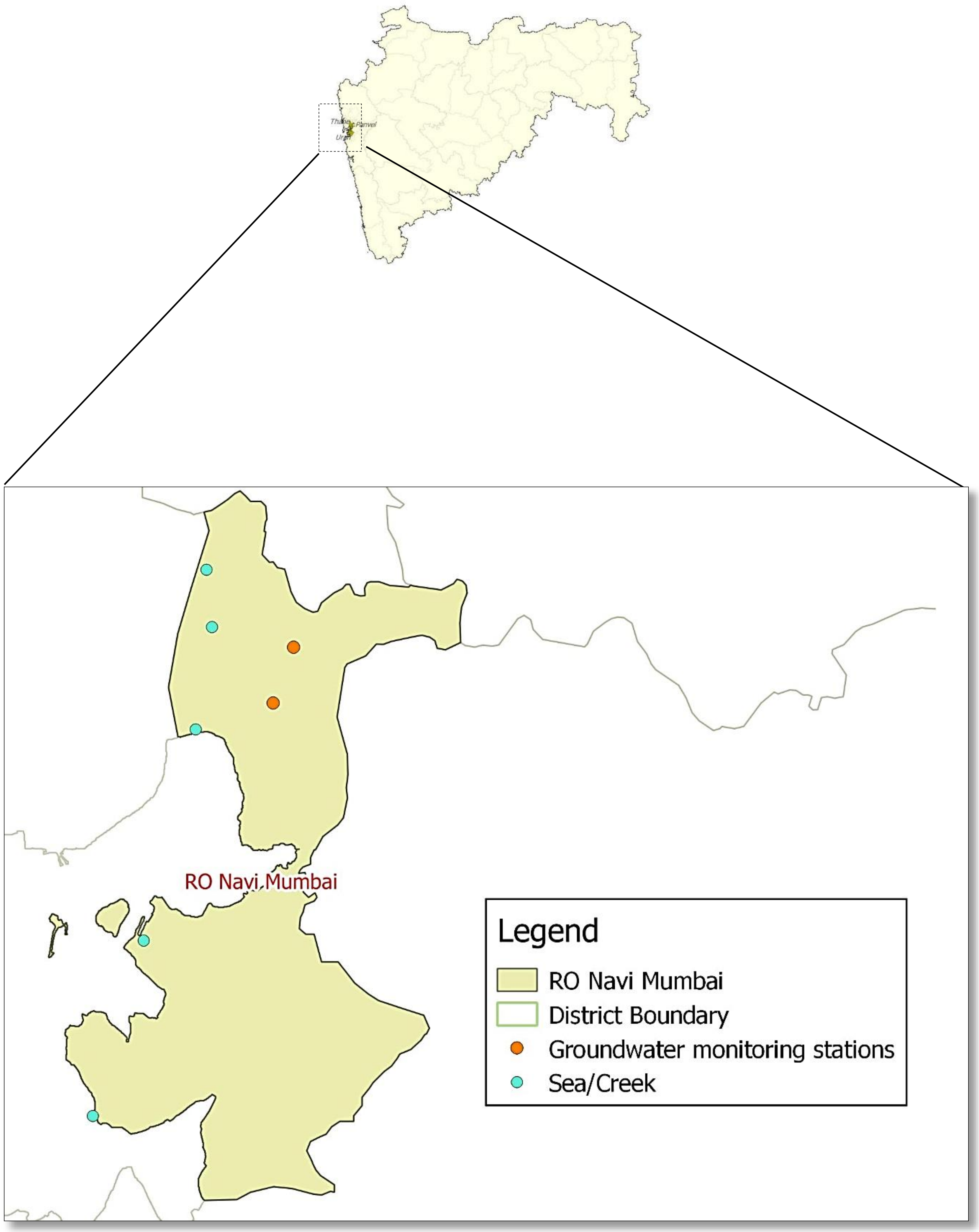
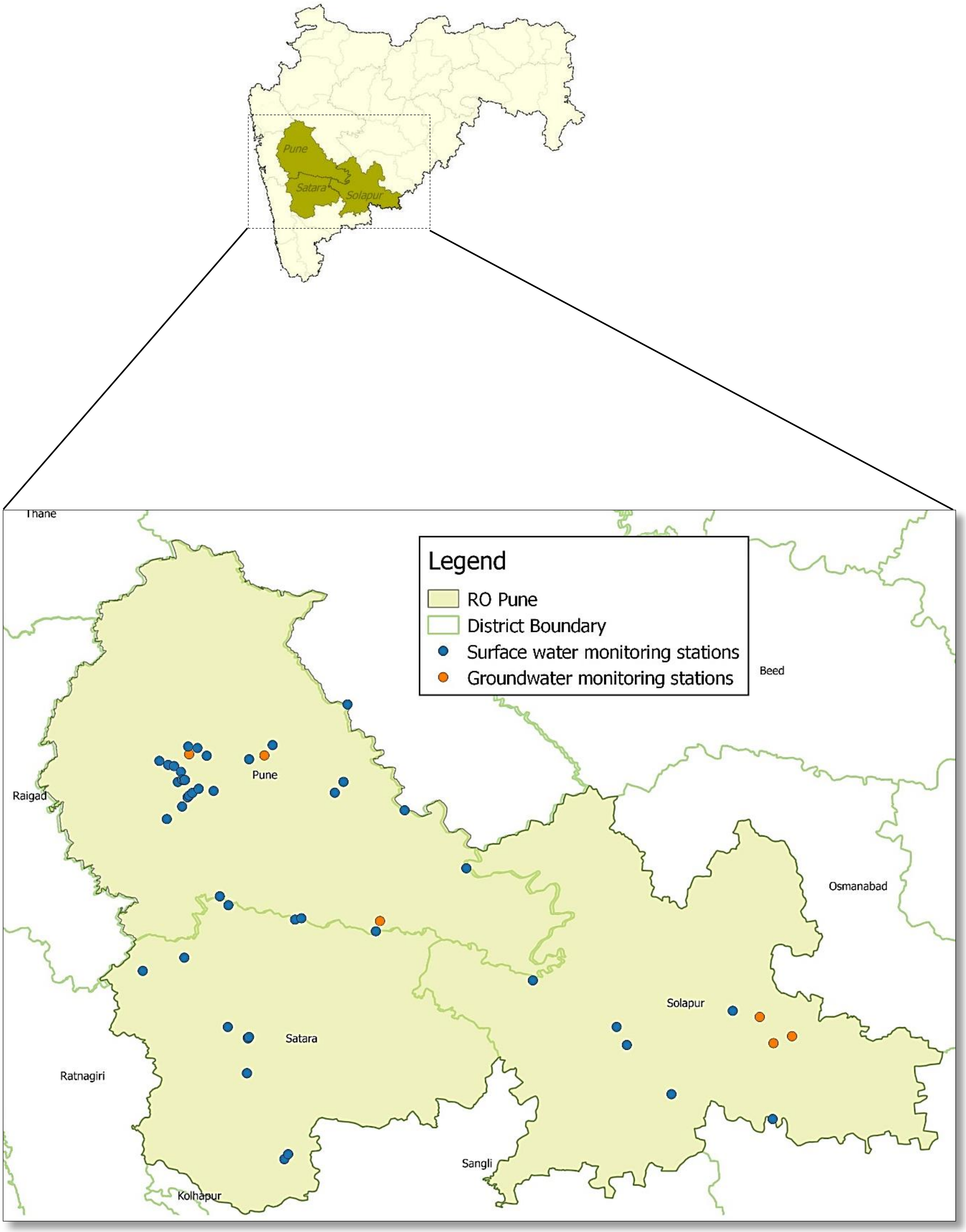


Table No 42: Water quality Index for surface and ground water monitoring at Navi Mumbai-RO – 2017-18`

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	216	Kasardi River near Ganesh Ghat	18	29	34	Raigad	Panvel	Taloja
Saline	190	TTC Creek At Ghansoli Jetty	45	No data	51	Thane	Thane	Ghansoli
	191	Arabian Sea behind ONGC Uran	43	54	46	Raigad	Uran	Uran
	1317	Thane creek at Elephanta Island	44	36	45	Raigad	Uran	Gharapuri, Elephanta Island
	2184	Vashi Creek at Airoli Bridge	49	47	52	Thane	Thane	Airoli
	2185	Vashi Creek at Vashi Bridge	50	63	54	Thane	Thane	Vashi
GW	214	Borewell at TTCWMA, Mahape	No data	No data	No data	Thane	Thane	TTCWMA,Mahape
	215	Well water at Turbhe Store, Turbhe	109	94	102	Thane	Thane	Turbhe

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

RO – Pune



Pune
Satara
Solapur
Legend
RO Pune
District Boundary
Surface water monitoring stations
Groundwater monitoring stations
Thane
Raigad
Pune
Beed
Osmanabad
Solapur
Satara
Ratnagiri
Sangli
Kolhapur

Table No 43: Water quality Index for surface and ground water monitoring at Pune-RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	28	Bhima River at Takli	57	59	56	Solapur	South Solapur	Takali
	36	Krishna River at Krishna Bridge, Karad	66	53	60	Satara	Karad	Karad
	1188	Bhima River at Narshingpur near Sangam Bridge after confluence with Nira	No data	No data	57	Solapur	Malshiros	Narsingpur
	1189	Bhima river at Pune(Mutha river) at U/s of Vithalwadi near Sankar Mandir	50	46	47	Pune	Haweli	Vithalwadi
	1190	Bhima river at D/s of Bundgarden, Pune	40	38	45	Pune	Haweli	Yerwada
	1191	Bhima river after confluence with Mula-Mutha at Pargaon near Vasant Bandara	74	55	59	Pune	Daund	Pargaon
	1192	Bhima river at Daund near Mahadev temple	55	57	55	Pune	Daund	Daund
	1194	Krishna river at Dhom Dam	66	76	73	Satara	Mahabaleshwar	Wai
	1463	Nira river at Sarola bridge	62	65	60	Pune	Bhor	Sarola
	1911	Chandrabhaga river at U/s of Pandharpur town	63	58	56	Solapur	Pandarpur	Gursale
	1912	Chandrabhaga river at D/s of Pandharpur town near Vishnupant Mandir	60	55	51	Solapur	Pandarpur	Gopalpur
	2186	Venna River at Varya, Satara	49	76	65	Satara	Satara	Varye
	2187	Krishna River at Kshetra Mahuli Satara	46	52	54	Satara	Mahuli	Kshetra Mahuli
	2188	Krishna River at Krishna-Venna Sangam, Mahuli	48	58	54	Satara	Mahuli	Mahuli
	2189	Koyna River at Karad	63	56	59	Satara	Karad	Karad
	2190	Krishna River at Wai	61	55	57	Satara	Wai	Wai
	2191	Mutha River at Sangam Bridge Near Ganpathi Ghat	38	42	43	Pune	Pune	Shivaji Nagar
	2192	Mula-Mutha River at Mundhwa Bridge	43	40	46	Pune	Haweli	Mundhawa
	2193	Mula River at Aundh Bridge -Aundgaon	41	51	52	Pune	Haweli	Aundhgaon
	2194	Mula River at Harrison Bridge near Mula -Pawana Sangam	39	44	46	Pune	Haweli	Bopodi
	2195	Nira River at D/s of Jubilant Organosis Pune	46	55	49	Pune	Baramati	Nimbut
	2196	Pawana River at Sangavigaon, Pune	30	44	45	Pune	Haweli	Sangavigaon
	2197	Indrayani River at D/s of Alandigaon, Pune	39	55	51	Pune	Haweli	Alandigaon

	2655	Bhima River at Koregaon near Koregaon Bridge, Pune	41	53	53	Pune	Shirur	Koregaon
	2656	Bhima River Backwater of Ujani Dam near raw water pump house	64	73	67	Pune	Indapur	Kumbargaon
	2665	Ghod River at Shirur, Pune	36	54	54	Pune	Shirur	Shirur
	2668	Indrayani River at D/s of Moshi village	No data	50	51	Pune	Haveli	Moshi
	2669	Indrayani River at U/s of Moshigaon, Pune	No data	54	57	Pune	Haweli	Moshigaon
	2677	Mula-Mutha River at D/s of Theur, Pune	38	48	48	Pune	Haweli	Theur
	2678	Mutha River near Veer Savarkar Bhavan	38	44	44	Pune	Pune	Pune M.C
	2679	Mutha River at Deccan Bridge, Pune	37	43	42	Pune	Pune	Deccan
	2680	Mutha River at Khadakvasla Dam Pune	48	73	69	Pune	Haweli	Kadakvasla
	2681	Nira River at Sangavi	39	55	51	Satara	Phaltan	Sangavi
	2682	Nira River at U/s of Jubilant Organosis Pune	64	61	56	Pune	Baramati	Nira(Datta ghat)
	2683	Nira River at Shindewadi	43	67	58	Satara	Khandala	Shindewadi, Shirwal
	2690	Pawana River at Kasarwadi Pune	29	43	44	Pune	Haweli	Kasarwadi
	2691	Pawana River at Dapodi Bridge at Pawana-Mulla Sangan Pune	27	44	45	Pune	Haweli	Dapodi
	2692	Pawana River at Ravet Weir, Pune	50	79	67	Pune	Haweli	Ravet
	2693	Pawana River at Chinchwadgaon, Pune	42	48	48	Pune	Haweli	Chinchwadgaon
	2694	Pawana River at Pimprigaon, Pune	31	48	43	Pune	Haweli	Pimprigaon
	2705	Sina River near Laboti till naka Solapur	62	55	58	Solapur	Mohal	Laboti
	2711	Urmodi River at Nagthane Satara	66	61	62	Satara	Satara	Nagthane
	2715	Vel River at Shikrapur, Pune	No data	62	57	Pune	Shirur	Shikrapur
	2716	Venna River at Mahabaleshwar	62	67	65	Satara	Mahabaleshwar	Mahabaleshwar
	2717	Venna River at Mahuli	50	52	53	Satara	Satara	Mahuli
Nalla	2789	Nalla at D/s of Alkai Mandir, Solapur	No data	No data	55	Solapur	Malshiras	Aklai
GW	1992	Dug well at MSW Site,owned by Shri.Dattu Kondiba Borate at Borate Vasthi.	117	133	125	Pune	Haveli	Moshi
	2819	Dug Well Owned by Shri Deshmukh	423	243	333	Pune	Baramati	Malegaon
	2820	Dug Well Owned by Shri Shivaji Baban Darekar	102	241	172	Pune	Shirur	Sanaswadi
	2821	Bore Well at Bale Railway Station premises Owned by	42	91	67	Solapur	North Solapur	Dahegaon

		Shri Digambar Joshi						
	2822	Bore Well near Chincholi	257	647	452	Solapur	Mohol	Chincholi
	2823	Bore Well at Shete Vasti near old Tuljapur Road	167	129	148	Solapur	Solapur	Shete vasthi, Tuljapur Naka

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

RO – Raigad

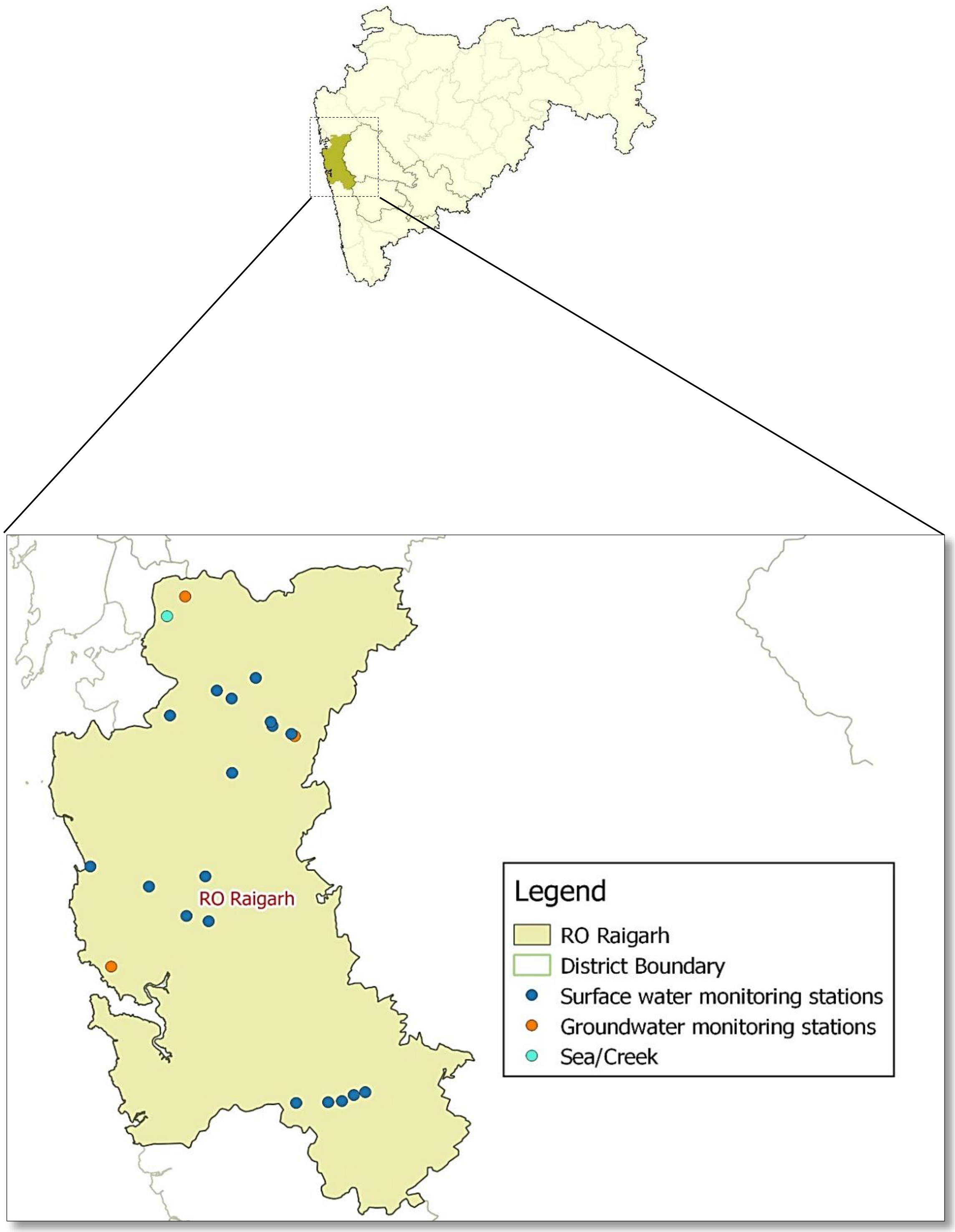

Legend
RO Raigarh
District Boundary
Surface water monitoring stations
Groundwater monitoring stations
Sea/Creek
RO Raigarh

Table No 44: Water quality Index for surface and ground water monitoring at Raigad RO – 2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	192	Morbe Dam, Taluka - Khalapur, District - Raigad	No data	50	55	Raigad	Khalapur	Khalapur
	193	Balganga River, Village Ransai, Taluka - Khalapur, District - Raigad	No data	55	56	Raigad	Khalapur	Ransai
	1151	Patalganga River at Shilphata Bridge	54	55	55	Raigad	Khalapur	Khopoli
	1152	Kundalika River at Roha Bridge	53	52	53	Raigad	Roha	Roha
	1462	Patalganga near intake of MIDC water works(Turade w/w)	56	55	55	Raigad	Khalapur	Turade
	2198	Kundalika River at Are Khurd (Saline Zone)	47	48	48	Raigad	Roha	Are Khurd
	2199	Savitri River at Ovale village	55	56	56	Raigad	Mahad	Ovale
	2651	Amba River at D/s of Waken Bridge	52	54	54	Raigad	Roha	Waken Phata
	2671	Kundalik River near Salav Bridge (Saline Zone)	37	36	38	Raigad	Roha	Salav
	2672	Kundalika River at Dhatav at Jackwell	55	56	55	Raigad	Roha	Dhatav
	2685	Patalganga River at D/s of Kharpada Bridge	54	30	42	Raigad	Khalapur	Kharpada
	2686	Patalganga River at Vyal pump house	51	55	54	Raigad	Khalapur	Vyal
	2687	Patalganga River at Khalapur pumping house	57	56	55	Raigad	Khalapur	Khalapur
	2688	Patalganga River at Savroli Bridge	56	50	55	Raigad	Khalapur	Savroli
	2701	Savitri River Jackwell at Upsa kendra	52	59	56	Raigad	Mahad	Nangalwadi
	2702	Savitri River at Shedav Doh	52	57	56	Raigad	Mahad	Shedav Dov
	2703	Savitri River at Dadli Bridge	51	59	56	Raigad	Mahad	Dadli
	2704	Savitri River at Muthavali village	55	55	57	Raigad	Mahad	Muthavali
Saline	2803	Panvel Creek at Kopra Bridge	59	47	52	Raigad	Panvel	Kopra
GW	217	Borewell water at village Milgaon, Taluka - Khalapur, District - Raigad.	No data	No data	No data	Raigad	Khalapur	Milgaon
	218	Borewell water near MSW site, Murud - Janjira.	Closed					Murud Janjira
	1989	Bore well at MWML Site at Taloja	128	Dry	128	Raigad	Panvel	Karawla- Taloja

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry		No data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for	Dry	Not	No data

RO – Thane

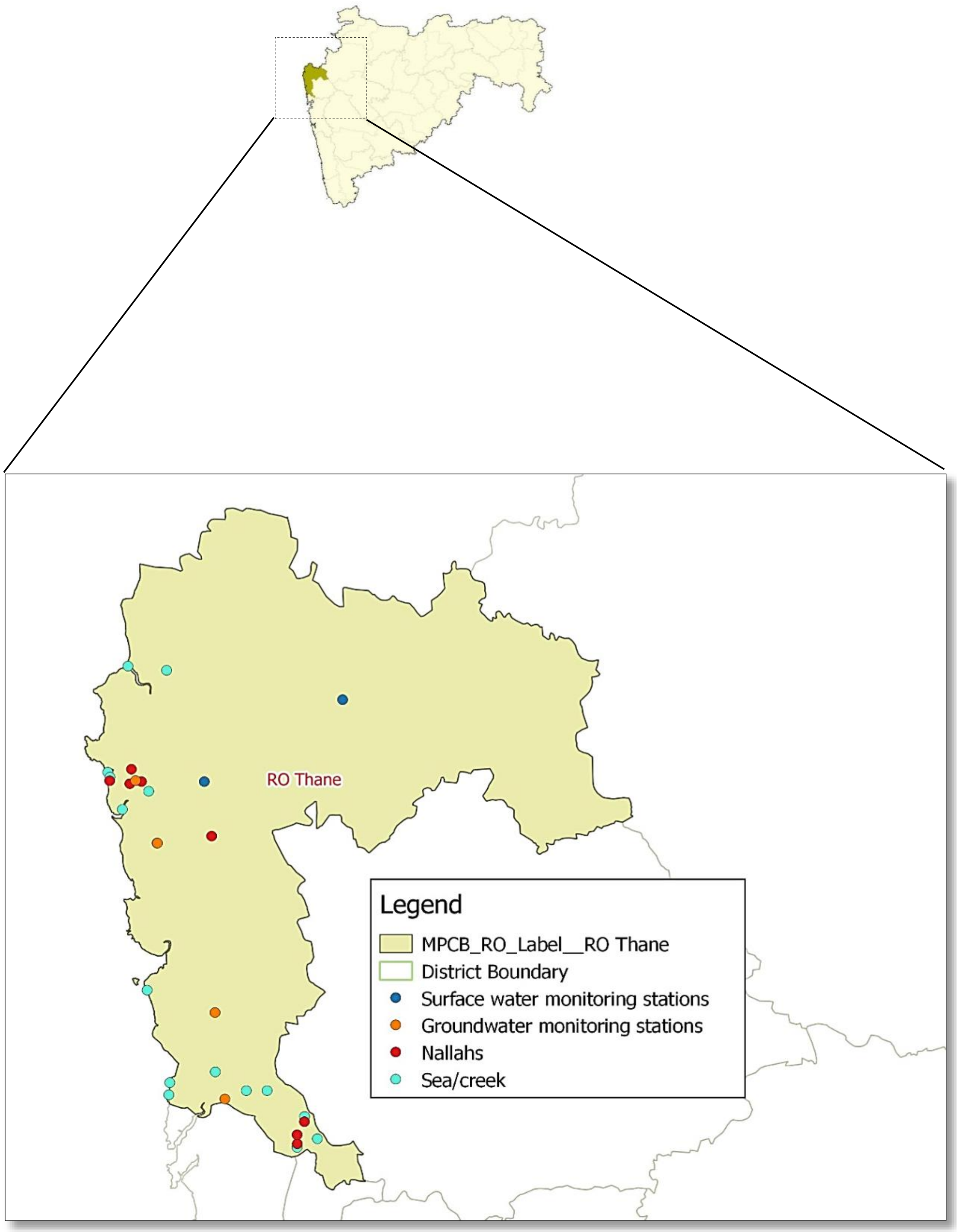

RO Thane
Legend
MPCB_RO_Label__RO Thane
District Boundary
Surface water monitoring stations
Groundwater monitoring stations
Nallahs
Sea/creek

Table No 45: Water quality index for surface and ground water monitoring at Thane RO -2017-18

Type	Station Code	Station Name	Apr	Dec/Oct	Average	District	Taluka	Village
SW	2706	Surya River U/s of Surya Dam	70	70	72	Thane	Vikramgad	Dhamni
	2707	Surya River at MIDC pumping station	71	72	72	Thane	Palghar	Garvashet
	2708	Surya River at Intake of Vasai-Virar water scheme	54	52	54	Thane	Palghar	Masvan
Saline	1316	Bassein creek at Vasai Fort, Thane	44	48	52	Thane	Vasai	Bassein
	2696	Pelhar dam	69	75	73	Palghar	Vasai	Pelhar
	2792	Ulhas Creek at Mumbra Reti Bunder	49	47	54	Thane	Thane	Mumbra
	2793	Thane Creek at Kalwa Road Bridge	53	49	53	Thane	Thane	Kalwa
	2794	Ulhas Creek at Kolshet Reti Bunder	51	52	53	Thane	Thane	Kolshet
	2795	Ulhas Creek at Gaimukh at Nagla Bunder on Ghod Bunder Road	50	52	54	Thane	Thane	Nagla
	2796	Ulhas Creek at Versova Bridge	51	54	53	Thane	Vasai	Versova
	2797	Bhayander Creek at D/s of Railway Bridge at Jasal Park Chowpatty	50	48	54	Thane	Bhayander	Navghar
	2798	Kharekuran Murbe Creek	50	51	49	Thane	Palghar	Kharekuran
	2799	Dandi Creek	50	46	48	Thane	Palghar	Dandi
	2800	Sarwali Creek	51	53	54	Thane	Palghar	Sarwali
	2801	Savta Creek	47	48	52	Thane	Dahanu	Savta
	2802	Dahanu Creek at Dahanu Fort	48	44	52	Thane	Dahanu	Danugaon
	2805	Arnala Sea	44	47	47	Thane	Vasai	Arnala
	2806	Uttan Sea at Bhayander	43	42	48	Thane	Bhayander	Uttan
	2807	Navapur Sea	47	48	48	Thane	Palghar	Navapur
GW	1984	Bore well at M/s Tata Iron {} Steel Co. Ltd, S-76	Dry	Dry	Dry	Thane	Palghar	MIDCTarapur, Industrial Estate, Tarapur
	1985	Dug well at 5 Star Industrial Estate	324	150	237	Thane	Mira-Bhayander	Kashimira
	1986	Bore well at Motapada	No data	83	83	Thane	Dahanu	Motapada
	1987	Bore well at Vasai	185	173	179	Thane	Vasai	Gokhiware

	1988	Bore well at Gharatwadi, Palghar	No data	197	197	Thane	Palghar	Aliyali
Nalla	2782	Rabodi Nalla	30	52	32	Thane	Thane	Rabodi
	2783	Colour Chem Nalla	31	47	41	Thane	Thane	Majiwada
	2784	Sandoz Nalla	26	32	32	Thane	Thane	Sandozbaug
	2785	BPT Navapur	22	14	20	Palghar	Palghar	Navapur
	2786	Tarapur MIDC Nalla, near sump No1	No data	No data	21	Palghar	Palghar	MIDC Tarapur
	2787	Tarapur MIDC Nalla	No data	No data	22	Palghar	Palghar	MIDC Tarapur
	2788	Tarapur MIDC Nalla near sump-III	No data	No data	21	Palghar	Palghar	MIDC Tarapur

Surface Water		Good to Excellent	Medium to Good	Bad	Bad to Very Bad	Dry	Not Collected	No data
Ground Water	Excellent	Good	Poor	Very Poor	Not suitable for drinking	Dry	Not Collected	No data

Annex II – List of Pending Writ petitions

List of Writ Petitions/Public Interest Litigations pending before the Hon'ble High Court of Judicature at Bombay (Mumbai/ Aurangabad/ Nagpur Bench)				
Sr.No.	Name of the Parties	Writ Petition/Public Interest Litigation	Region	Subject matter.
1.	Citizen Circle for Social Welfare & Education v/s State of Maharashtra & Ors.	Public Interest Litigation No.(St.) 80/2017	Mumbai	Regd.coastal water of Mumbai city.
List of Applications/Appeals Pending before Hon'ble National Green Tribunal, Principal Bench, New Delhi /Western Zone, Pune.				
Sr.No.	Name of the Parties	Application/ Appeal No.	Region	Subject matter.
1.	Subhash Ramkrishna Patil v/s MPCB & Ors.	Application No.55/2015	Pune	Regd. Pollution of Mula and Muthi rivers in Pune city.
2.	Paryavaran Suraksha Samiti v/s Union of India & Ors.	Original Application No.593/2017 (Transferred from Hon'ble Supreme Court of India bearing Writ Petition (Civil) No.375/2012	---	Regarding massive pollution particularly in the rivers, water bodies, also in the air and on land in 43 of India's most critically polluted clusters
3.	Arvind P Mhatre V/s. MoEF & Ors	Application No. 163/2017in Original application No. 125/2018	Raigad /New Delhi	Kasardi River and Ghot River by various gross damage to the environment and human habitant due to the discharge of the industrial effluent in the Kasardi River and Ghot river by various industries located in the Taloja MIDC area.

Annex III – List of Polluted Stretches across Maharashtra

Priority wise list of rivers as on April ,2018				
Priority 1 (1 nos.)	Priority 2 (0 nos.)	Priority 3 (3 nos.)	Priority 4 (12 nos.)	Priority 5 (18 nos.)
Mithi		Morna	Chandrabhaga	Bhima Bindusara
		Pawna	Ghod	Girna, Godavari
		Mula-Mutha	Mor	Gomai
			Indrayni,	Hiwara, Kan, Koyna
			Kanhan, Mula,	Kundalika, Manjara,
			Nira, Patalganga	Urmodi
			Pedhi	Penganga
			Purna	Sina, Tapi
			Waghur	Vel, Venna,
			Wardha,	Wainganga, Wena

Note: Fifteen stretches are less polluted, BOD< 3 mg/L of following rivers:

Amravati, Amba, Bhatsa, Darna, Krishna, Mutha, Panchganga, Panzara, Pelhar, Rangavali, Savitri, Surya, Ulhas, Vaitarna, Vashishti

Annex IV – Status of Sewage Treatment of Maharashtra

Municipal Corporations

Sr No.	Name of Municipal Corporation	Class	District	River / creek	Seawage Generation MLD	Sewage Treatment MLD	Percentage Treatment (%)	Disposal	25% provision
1	Amravati Municipal Corporation	D	Amravati	Pedhi/Purna	95	44	46.31%	Pedhi/Purna	Yes
2	Akola Municipal Corporation	D	Akola	Morna \ puna	45	0	0.00%	Morna \ puna	Yes
3	Mumbai Municipal Corporation	A	Mumbai	Arabian sea	2727	1850	67.84%	Arabian sea	Yes
4	Navi Mumbai Municipal Corporation	A	Thane	Divale and Vashi creek	205	205	100.00%	Divale and Vashi creek	Yes
5	Nashik Municipal Corporation	B	Nashik	Godavari	300	270	90.00%	Godavari river	Yes
6	Malegaon Municipal Corporation	B	Malegaon	Mousam	15	0	0.00%	Domestic sewage is released into Mousam river without treatment. This river further merges with Girna river	Yes
7	Ahmednagar Corporation	D	Ahmednagar	Pravara	60	0	0.00%	Pravara	Yes
8	Dhule Municipal Corporation	D	Dhule	Panjara	36	0	0.00%	Panjara	Yes
9	Jalgaon Municipal Corporation	D	Jalgaon	Girna	48	0	0.00%	Girna	Yes
10	Thane Municipal Corporation	C	Thane	Thane creek	336	152	45.23%	Thane creek	Yes
11	Mira-Bhayandar Municipal Corporation	C	Thane	Creek	108	56.5	52.31%	creek	Yes

Sr No.	Name of Municipal Corporation	Class	District	River / creek	Seawage Generation MLD	Sewage Treatment MLD	Percentage Treatment (%)	Disposal	25% provision
12	Vasai-Virar City Municipal Corporation	C	Palghar	Creek	105	0	0.00%	creek	Yes
13	Nagpur Municipal Corporation	A	Nagpur	Nag	450	230	51.11%	Nag	Yes
14	Kolhapur Municipal Corporation	D	Kolhapur	Panchaganga	96	72	52.00%	Agriculture and others.	Yes
15	Kupwad Miraj Sangli Municipal Corporation	D	Sangli	Krishna	82.2	36.2	43.90%	Krishna river	Yes
16	Chandrapur Corporation	C	Chandrapur	Irai and Jharapata River	41	0	0.00%	Irai and Jharapata River	Yes
17	Bhiwandi Municipal nijamapura	D	Thane	Kamavari creek	90	30	33.33%	Kamavari creek	No
18	Kalyan Dombivali Municipal Corporation	D	Thane	Ulhas Creek	216	48	22.22%	Ulhas Creek	Yes
19	Ulhasnagar Municipal Corporation	C	Thane	Salt water area near Ulhas river	64	0	0.00%	Waldhuni	Yes
20	Aurangabad Corporation	A	Aurangabad	Sukhna, Kham	107	107	100.00%	Sukhna, Kham	Yes
21	Nanded Municipal Corporation Waghala	D	Nanded	Godavari	48	48	100.00%	Godavari	Yes
22	Latur Municipal	D	Latur	Manjara	24	0	0.00%	Local nalla to Manjara river	Yes
23	Parbhani Corporation	D	Parbhani	Purna Godavari	10	0	0	Godavari river	Yes
24	Pune Municipal Corporation	B	Pune	Mula-Mutha	1222	567	46.39%	Mula-Mutha	Yes
25	Pimpri-Chinchwad Municipal Corporation cincavda	C	Pune	Mula, Pawana and indrayani	312	265	84.93%	Setup of Domestic sewage treatment system	Yes
26	Solapur Corporation	D	Solapur	Sina	100	100	100.00%	Sina	Yes
27	Panvel Municipal	D	Raigad	Panvel / Kamothe Creek	164	156	95.12%	Panvel / Kamothe Creek	Yes

Municipal Councils

Status of Sewage Treatment in A Class Municipal Council in Maharashtra							
Sr No.	**Municipal Council**	**District**	**River / creek**	**Effluent Generated MLD**	**Effluent Treated MLD**	**% Treatment**	**Disposal**
1	Achalpur	Amravati	Chandrabhagha	2.28	0	0	Chandrabhagha
2	Bhusawal	Jalgaon	Tapi river	11.4	0	0	Tapi river
3	Wardha	Wardha	Dham	18	0	0	Dham
4	Gondia	Gondia	Wainganga	18.28	0	0	Wainganga
5	Ichalkaranji	Kolhapur	Panchaganga	32	14	0.375	Panchaganga
6	Warora	Chandrapur	Wardha river	4.5	0	0	Wardha river
7	Yavatmal	Yavatmal	Chardoha and Nilona Dam	8.69	0	0	Jamwadi pond
8	Ambernath	Thane	----	30	28	0.9333	28 MLD sewage is disposed in Waldhuni Nala.
9	Jalna	Jalna	Godavari	18.5	0	0	Local Nalla
10	Beed	Beed	Bindusara	11	0	0	Local Nalla
11	Satara	Satara	Krishna and Venna	12.8	0	0	No treatment on Sewage
12	Barshi	Solapur	Bhogavati	15	0	0	Lendi Nalla

Status of Sewage Treatment in B Class Municipal Council in Maharashtra							
Sr No.	**Municipal Council**	**District**	**River / creek**	**Effluent Generated MLD**	**Effluent Treated MLD**	**% Treatment**	**Disposal**
1	Anjangaon	Amravati	Sahanur	2.28	0	0	Sahanur
2	Varud	Amravati	Wardha	2.4	0	0	Wardha
3	Washim	Washim	Katepurna	4	0	0	Katepurna
4	Karanja Lad	Washim	Wardha	4	0	0	Wardha
5	Akot	Akola	Purna	0.8	0	0	Purna
6	Buldhana	Buldhana	Painganga	0.62	0	0	Painganga
7	Khamgaon	Buldhana	Purna	0.886	0	0	Purna
8	Shegaon	Buldhana	Mann	4	2	0.5	Mann
9	Malkapur	Buldhana	Nalganga	0.5	0	0	Nalganga
10	Chikhli	Buldhana	Painganga	0.485	0	0	Painganga
11	Sangamner	Ahmednagar	Parvara River	3.8	0	0	Parvara River
12	Kopargoan	Ahmednagar	Darna-Nandur-Madhmeshwar	7	0	0	Darna-Nandur- Madhmeshwar
13	Shrirampur	Ahmednagar	Bhandadara dam	2.5	0	0	Bhandadara dam
14	Pachora	Jalgaon	Girna river	32	0	0	Girna river
15	Amalner	Jalgaon	Bori river	3.15	0	0	Bori river
16	Chalisgoan	Jalgaon	Girna river	7.21	0	0	Girna river
17	Savada	Jalgaon	Tubewell	0.57	0	0	Tubewell

Status of Sewage Treatment in B Class Municipal Council in Maharashtra							
18	Chopra	Jalgaon	Tapi river	3.2	0	0	Tapi river
19	Shirpur	Dhule	Karanvada dam and river Tapi	32	0	0	Karanvada dam and river Tapi
20	Daudai	Dhule	Tapi and Amravati	18	0	0	Tapi and Amravati
21	Nandurbar	Nandurbar	Chivan river and Jharali dam	45	0	0	Chivan river and Jharali dam
22	Dahanu	Palghar	...	4	0	0	Nalla/Creek
23	Palghar	Palghar	...	2.4	0	0	Nalla/Creek
24	Kamthi	Nagpur	Kanhan	8	0	0	Kanhan
25	Hinganghat	Wardha	Vena	1.53	0	0	Vena
26	Umred	Nagpur	Aam	4.5	0	0	Aam
27	Bhandara	Bhandara	Wainganga	13.52	0	0	Wainganga
28	Tumsar	Bhandara	Vainganga	6.35	0	0	Wainganga
29	Chiplun	Ratnagiri	Vashishthi	7	0	0	Vashishthi
30	Vita	Sangli	Krishna	4.87	0	0	Krishna
31	Islamapur	Sangli	Krishna	9	0	0	Krishna
32	Ratnagiri	Ratnagiri	Panavala Lake	8.8	0	0	Arabian sea

Status of Sewage Treatment in B Class Municipal Council in Maharashtra							
33	Ballarpur	Chandrapur	Wardha river	8.4	0	0	Wardha river
34	Bhadravati	Chandrapur	Kondha Nalla	2.1	0	0	Wardha river
35	Pusad	Yavatmal	Puss river	4.02	0	0	Puss river
36	Vani	Yavatmal	Nirguda river	4.11	0	0	Nirguda river
37	Gadchiroli	Gadchiroli	Wainganga	2.8	0	0	Wainganga
38	Kulgaon-Badlapur	Thane	----	18	0	0	Ulhas river
39	Gangakhed	Parbhani	Godavari	2	0	0	Godavari
40	Hingoli	Hingoli	Kayadhu	4.2	0	0	Kayadhu
41	Basmath	Hingoli	Ugadi	2.5	0	0	Ugadi
42	Deglur	Nanded	Lendi	15	0	0	Nalla
43	Udgir	Latur	Lendi	5.4	0	0	Lendi
44	Osmanabad	Osmanabad	Bhogavati	5.3	0	0	Bhogavati
45	Ambajogai	Beed	Manjara	5	0	0	Local Nalla
46	Daund	Pune	Bhima	4.2	0	0	Bhima
47	Baramati municipal	Pune	Karha	4.2	0	0	Karha
48	Karad	Satara	Krishna and Koyna	10.5	7.5	0.4	Farming and gardening

Status of Sewage Treatment in B Class Municipal Council in Maharashtra							
49	Phaltan	Satara	Neera	5	0	0	Sewage water is not Treated
50	Pandharpur	Solapur	Bhima	12	15	1	Agriculture
51	Talegaon	Pune	Indrayani	8.5	0	0	Indrayani

Status of Sewage Treatment in C Class Municipal Council in Maharashtra

Sr No.	Municipal Council	District	River / creek	Effluent Generated MLD	Effluent Treated MLD	% Treatment	Disposal
1	Chandur Railway	Amravati	Wardha	1.8	0	0	Wardha
2	Chilakhadara	Amravati	Chandrabhagha	0.4	0	0	Local nalla to Chandrabhagha
3	Daryapura	Amravati	Chandrabhagha	2	0	0	Local nalla to Chandrabhagha
4	Chandur Bazaar	Amravati	Purna	1.2	0	0	Local nalla to Purna
5	Dhamangaon Railway	Amravati	Wardha	1.8	0	0	Local nalla to Wardha
6	Shedurajana Ghat	Amravati	Wardha	1.6	0	0	Local nalla to Wardha
7	Morshi municipality	Amravati	Wardha	3.2	0	0	Local nalla to Wardha
8	Mangarulapir	Washim	Wardha	2.4	0	0	Local nalla to Wardha

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
9	Risod	Washim	Painganga	1.6	0	0	Painganga
10	Murtizapur	Akola	Purna	0.388	0	0	Purna
11	Patur	Akola	Bordi	0.22	0	0	Bordi
12	Balapur	Akola	Mann	0.39	0	0	Mann
13	Telhara	Akola	Purna	0.18	0	0	Purna
14	Jalgaon - Jamod	Buldhana	Purna	0.26	0	0	Purna
15	Mehkar	Buldhana	Painganga	0.377	0	0	Painganga
16	Deulagaonraja	Buldhana	Amana	1.4	0	0	Amana
17	Sindhkhedraja	Buldhana	Khadakpurna	0.13	0	0	Khadakpurna
18	Nandura	Buldhana	Gyanganga	1.5	0	0	Gyanganga
19	Lonar	Buldhana	Lendi/ Amber lake to Lonar lake	0.2	0	0	Lendi/ Amber lake to Lonar lake
20	Uran	Raigad	-	2.8	0	0	Uran creek
21	Alibaug	Raigad	Amba river	4.4	0	0	Sea
22	Khopoli	Raigad	Patalganga river	5.6	0	0	Patalganga river
23	Matheran	Raigad	Ulhas river	1.1	0	0	Matheran Darikhore
24	Karjat	Raigad	Pej river	4.8	0	0	Ulhas river

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
25	Pen	Raigad	Bhogesvari river	4.8	0	0	Bhogesvari river
26	Murud-janjira city council	Raigad	Garambi dam	1.3	0	0	Sea
27	Roha town Council	Raigad	Kundalika river	2.8	0	0	Kundalika river
28	Mahad town council	Raigad	Kurle Dam	3.3	0	0	Savitri river
29	Srivardhan city council	Raigad	Ranwali Dam	1.09	0	0	Sea
30	Panvel Municipal Council	Raigad	Morbe Dam	18	0	0	Panvel creek
31	Satana	Nashik	Girna	1.47	0	0	Girna
32	Nandagaon	Nashik	Dahegaon / Girna Dam	1.2	0	0	Girna river
33	Sinnar	Nashik	Darna river	4.3	0	0	Darna river
34	Bhagur	Nashik	Darna river	0.87	0	0	Darna river
35	Trimbakeshwar	Nashik	Godavari river	1	0.7	0.7	Godavari river
36	Yeola	Nashik	Palkhed dam	2.8	0	0	Palkhed dam
37	Manmad	Nashik	Wagad dam	6	0	0	Wagad dam

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
38	Igatpuri	Nashik	Darna river	4.2	0	0	Darna river
39	Srigonda	Ahmednagar	Ghod canal	1.9	0	0	Ghod canal
40	Pathardi	Ahmednagar	Jayakwadi dam	2	0	0	Jayakwadi dam
41	Rahata	Ahmednagar	Ajwa-kalwa darna dam	6	0	0	Ajwa-kalwa darna dam
42	Rahuri	Ahmednagar	Moola Dam	2.7	0	0	Moola Dam
43	Deolali Parvara	Ahmednagar	Moola Dam	3	0	0	Moola Dam
44	Erandol	Jalgaon	Anjani and Girna River	9.1	0	0	Anjani and Girna River
45	Parola	Jalgaon	Bori river	3.49	0	0	Bori river
46	Raver	Jalgaon	Tapi river	11	0	0	Tapi river
47	Faizpur	Jalgaon	Suki river	0.7	0	0	Suki river
48	Yawal	Jalgaon	Bore Well	0.28	0	0	Bore Well
49	Dharangoan	Jalgaon	Anjani / Tapi River	8.4	0	0	Anjani / Tapi River
50	Jamner	Jalgaon	Kang river	11	0	0	Kang river

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
51	Bhadaganva	Jalgaon	Girna river	9.5	0	0	Girna river
52	Navapur	Nandurbar	Rangavli	10.02	0	0	Rangavli
53	Shahada	Nandurbar	Gomti river	12	0	0	Gomti river
54	Taloda	Nandurbar	Vihiri	12	0	0	Vihiri
55	Jawhar Municipal Council	Palghar	...	1.5	0	0	creek
56	Municipal Parishad Katol	Nagpur	Nala local	5.6	0	0	Nala local
57	Khapa	Nagpur	Nala local	0.61	0	0	Nala local
58	Municipal Parishad Narkhed	Nagpur	Kolar	1.4	0	0	Kolar
59	Ramtek city Parishad	Nagpur	Nala local	0.835	0	0	Nala local
60	Kalmeshwar Nagar Parishad	Nagpur	Nala local	2.2	0	0	Nala local
61	Municipal Parishad Saoner-	Nagpur	Kanhan	4	0	0	Kanhan
62	Mohapa	Nagpur	Nala local	0.52	0	0	Nala local

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
63	Movad	Nagpur	Kolar	0.56	0	0	Kolar
64	Arvi	Wardha	Bakadi local river	0.41	0	0	Bakadi local river
65	Pulgaon	Wardha	Wardha	0.36	0	0	Wardha
66	Deoli	Wardha	Yashoda	0.15	0	0	Yashoda
67	Sindi (railway)	Wardha	Vena	0.15	0	0	Vena
68	Wadi	Nagpur	Nag	1	0	0	Nag
69	Tiroda	Gondia	Vainganga	3.4	0	0	Vainganga
70	Pavani	Bhandara	Vainganga	3.41	0	0	Vainganga
71	Khed City Council	Ratnagiri	Jagabudi	2.5	0	0	Jagabudi
72	Kurundwad	Kolhapur	Krishna	0.8	0	0	Panchganga
73	Kagal	Kolhapur	Dudhaganga	2.4	0	0	Agriculture
74	Gadhingalaj	Kolhapur	Hiranya keshi	2.4	0	0	Agriculture
75	Murgud	Kolhapur	Piraji Lake	0.64	0	0	Agriculture
76	Malkapur	Kolhapur	Karadvi	0.2	0	0	Agriculture
77	Panhala	Kolhapur	Kasari	0.45	0	0	Agriculture

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
78	Wadgaon	Kolhapur	Varna	0.9	0	0	Agriculture
79	Jaisingapur	Kolhapur	Krishna	4.64	0	0	Agriculture
80	Tasgaon	Sangli	Krishna	2.63	0	0	Nalla/Agriculture
81	Ashta	Sangli	Krishna	2.1	0	0	Krishna
82	Jat	Sangli	Lake	1.5	0	0	Nalla/Agriculture
83	Malvan City Council	Sindhudurg	Dhamapur Lake	0.5	0	0	Sea
84	Vengurla City Council	Sindhudurg	Nisaan Lake	2.5	0	0	Sea
85	Sawantwadi town council	Sindhudurg	Palanekanda Lake	2.5	0	0	Palanekanda Lake
86	Rajapur city council	Ratnagiri	Arjuna	2	0	0	Arjuna
87	Rajur Town Council	Chandrapur	Wardha river	2.1	0	0	Wardha river
88	Mul Town Council	Chandrapur	Mul	1.4	0	0	Mul
89	Bramhapuri city council	Chandrapur	Vainganga	2.8	0	0	Vainganga
90	Umarkhed city council	Yavatmal	Painganga river	2.04	0	0	Painganga river

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
91	Darwha city council	Yavatmal	Kupati river	1.82	0	0	Kupati river
92	Digras Municipal Council	Yavatmal	Nadgaon dam	2.02	0	0	Painganga
93	Pandharkawda Municipal Council	Yavatmal	Khuni river	1.99	0	0	Khuni river
94	Ghatanji city council	Yavatmal	Adan river	1.16	0	0	Adan river
95	Ner - Navabapur	Yavatmal	Patraj dam	1.5	0	0	Patraj dam
96	Wardsa - Desaiganj	Gadchiroli	Vainganga	8.4	0	0	Vainganga
97	Purna	Parbhani	Purna	1.45	0	0	Purna
98	Salou	Parbhani	Dudhana	2.1	0	0	Dudhana
99	Jinntur	Parbhani	Ulti	0.537	0	0	Ulti
100	Pathri	Parbhani	Godavari	2.2	0	0	Godavari
101	Manvat	Parbhani	Jahri laghu lake	0.66	0	0	Jahri laghu lake
102	Sonapeth	Parbhani	Vann	0.3	0	0	Vann

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
103	Kalamnuri	Hingoli	Kayadhu	1.8	0	0	Kayadhu
104	Loha	Nanded	Neeranak	0.5	0	0	Local Nalla
105	Kandahar	Nanded	Manyada	0.5	0	0	Local Nalla
106	Mukhed	Nanded	Mohanavati	1.6	0	0	Local Nalla
107	Dharmabad Council	Nanded	Godavari	2.5	0	0	Local Nalla
108	Bhokar Council	Nanded	Sudha	20	0	0	Local Nalla
109	Hadgaon Council	Nanded	Painganga	0.35	0	0	Local Nalla
110	Mugkhed	Nanded	Seeta	12	0	0	Local Nalla
111	Kinwat Council	Nanded	Painganga	0.3	0	0	Local Nalla
112	Umari Council	Nanded	Kudala	0.3	0	0	Local Nalla
113	Kundalavadi Council	Nanded	Godavari	0.5	0	0	Local Nalla
114	Biloli Council	Nanded	Manjara	1	0	0	Local Nalla
115	Ausa Municipality	Latur	-	3.6	0	0	Local Nalla

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
116	Ahmedpur Municipality	Latur	Manyara	1.8	0	0	Local Nalla
117	Nilanga Municipality	Latur	-	1.7	0	0	Ground
118	Kalamb municipality	Osmanabad	Manjara	1.55	0	0	Manjara
119	Murum Municipality	Osmanabad	Benitura	1.25	0	0	Benitura
120	Naldurg Municipality	Osmanabad	Bori	1.2	0	0	Bori
121	Tujapur Municipality	Osmanabad	Bori	1.9	0	0	Bori
122	Paranda Municipality	Osmanabad	Sina	1	0	0	Sina
123	Bhum Municipality	Osmanabad	Banganga	1.3	0	0	Banganga
124	Umarag Municipality	Osmanabad	Benitura	2.4	0	0	Benitura

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
125	Paithan The Municipality	Aurangabad	Godavari	2.4	1.7	0	Godavari
126	Kannad city Corporation	Aurangabad	Sivana	2.4	1.7	0	Sivana
127	SILLOD	Aurangabad	Dudhana	3	2.2	0	Dudhana
128	Gangapur	Aurangabad	Godavari	1.5	1.1	0	Godavari
129	Vaijapura	Aurangabad	Godavari	2.6	1.85	0	Godavari
130	Khultabad	Aurangabad	Godavari	0.9	0.65	0	Godavari
131	Ambad	Jalna	Godavari	2.5	0	0	Local Nalla
132	Bhokardan	Jalna	Khelna	0.7	0	0	Local Nalla
133	Partur	Jalna	Dudhana	2.3	0	0	Local Nalla
134	Dharur	Beed	Manjara	1.4	0	0	Local Nalla
135	Gevarai	Beed	Godavari	2.2	0	0	Local Nalla
136	Majalagaon	Beed	Sindhaphana	2.8	0	0	Local Nalla

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
137	Indapur	Pune	Bhima	2.4	0	0	Bhima
138	Jejuri municipality	Pune	Karha	2.4	0	0	Karha
139	Sasvad municipality	Pune	Karha	4	0	0	Karha
140	Bor	Pune	Nira river (Bhataghar dam)	0.9	0	0	Nira
141	Wai Council	Satara	Krishna	4.8	0	0	Krishna
142	Mahabaleshwar giristhana	Satara	Koyna and Venna	6	2.5	0.9	For agriculture and for the use of hotel garden
143	Panchgani Municipal Council giristhana	Satara	Krishna and Venna	0.975	1.3	0.9	For agriculture and for the use of hotel garden
144	Rahimatapur Council	Satara	Krishna	0.8	0	0	Sewage not treated
145	Mhaswad Council	Satara	Manganga	2.1	0	0	Sewage not treated
146	Karmala	Solapur	Sina	1.4	0	0	Agriculture
147	Sangola	Solapur	Bhima	1.79	0	0	Local Nalla

Status of Sewage Treatment in C Class Municipal Council in Maharashtra							
148	Akkalkot	Solapur	Bori	0.4	0	0	Agriculture
149	Mangalvedha	Solapur	Bhima	1.22	0	0	Agriculture
150	Kurduwadi	Solapur	Sina	1.45	0	0	Local Nalla
151	Dudhani The municipality	Solapur	Bori	0.56	0	0	Agriculture
152	Maindargi	Solapur	Bori	0.77	0	0	Agriculture
153	Lonavala Municipal Council	Pune	Indrayani	18	3.69	0.205	Indrayani
154	Alandi Municipal Council	Pune	Indrayani	2.5	0	0	Indrayani
155	Shirur Council	Pune	Ghod river	3.5	3.5	1	Ghod river
156	Junnar Council	Pune	Mina river	2.2	0	0	Mina river
157	Chakan municipality	Pune	Bhima river	4	0	0	Bhima river
158	Rajgurunagar municipality	Pune	Bhima river	4	0	0	Bhima river

Nagar Panchyat

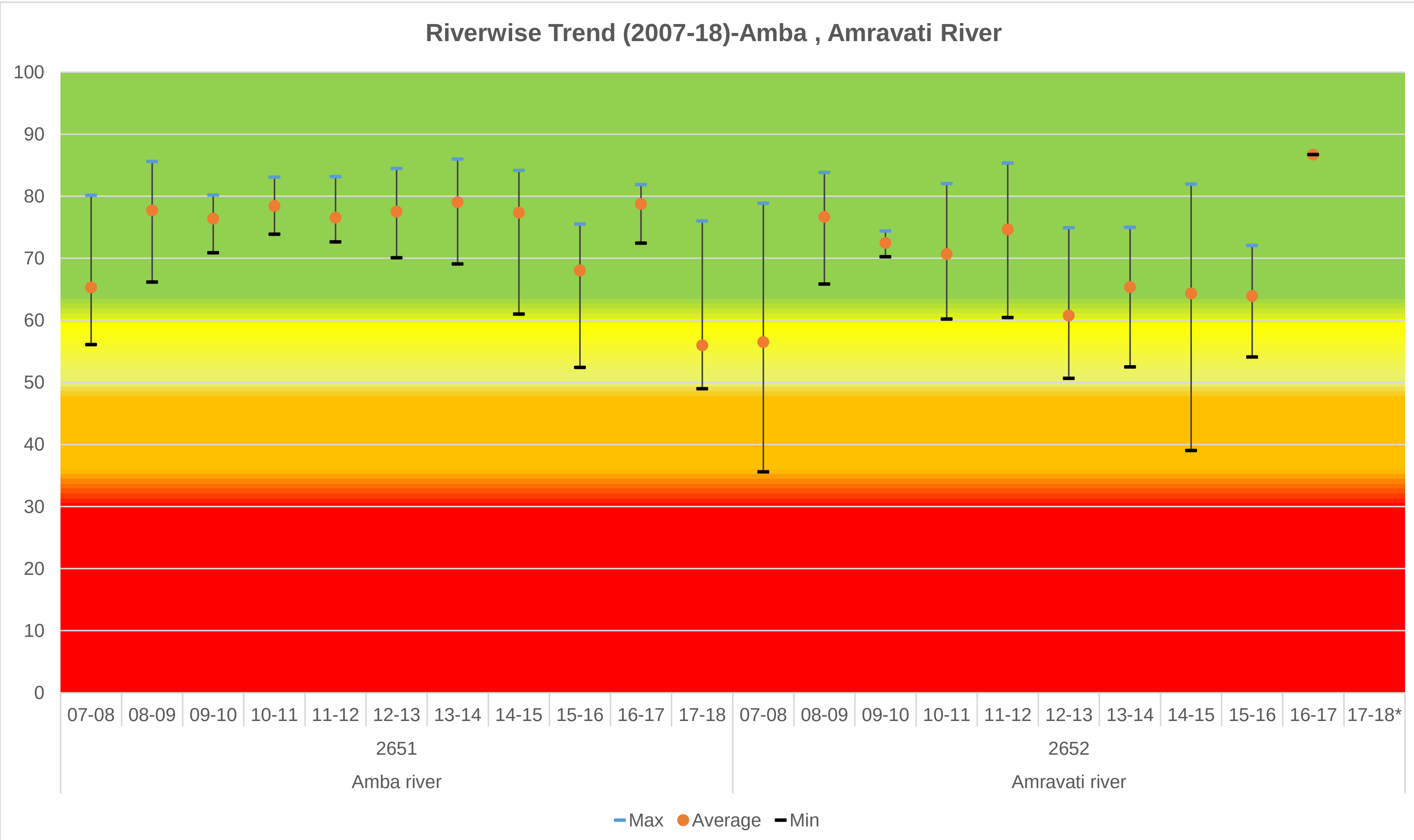
Sr No.	Nagar Panchyat	District	River / creek	Effluent Generated MLD	Effluent Treated MLD	% Treatment	Disposal
1	Shirdi Nagar Panchayat	Ahmednagar	Darna -Gangapur canal	3.8	2.8	0.9	Darna river
2	Guhagar	Ratnagiri	-	0.6	0	0	Sea
3	Dapoli	Ratnagiri	Jog	3	0	0	Jog
4	Kankavli	**Sindhudurg**	Gad	1.2	0	0	Gad
5	Mahar	Nanded	Painganga	0.15	0	0	Local Nalla
6	Malkapur	Satara	Koyna	6.75	0	0	Sewage not treated
7	Shahpur	Thane	Bhatasa river	0.5	0	0	Bhatasa river
8	Murbad	Thane	Murabadi river	2	0	0	Murabadi river

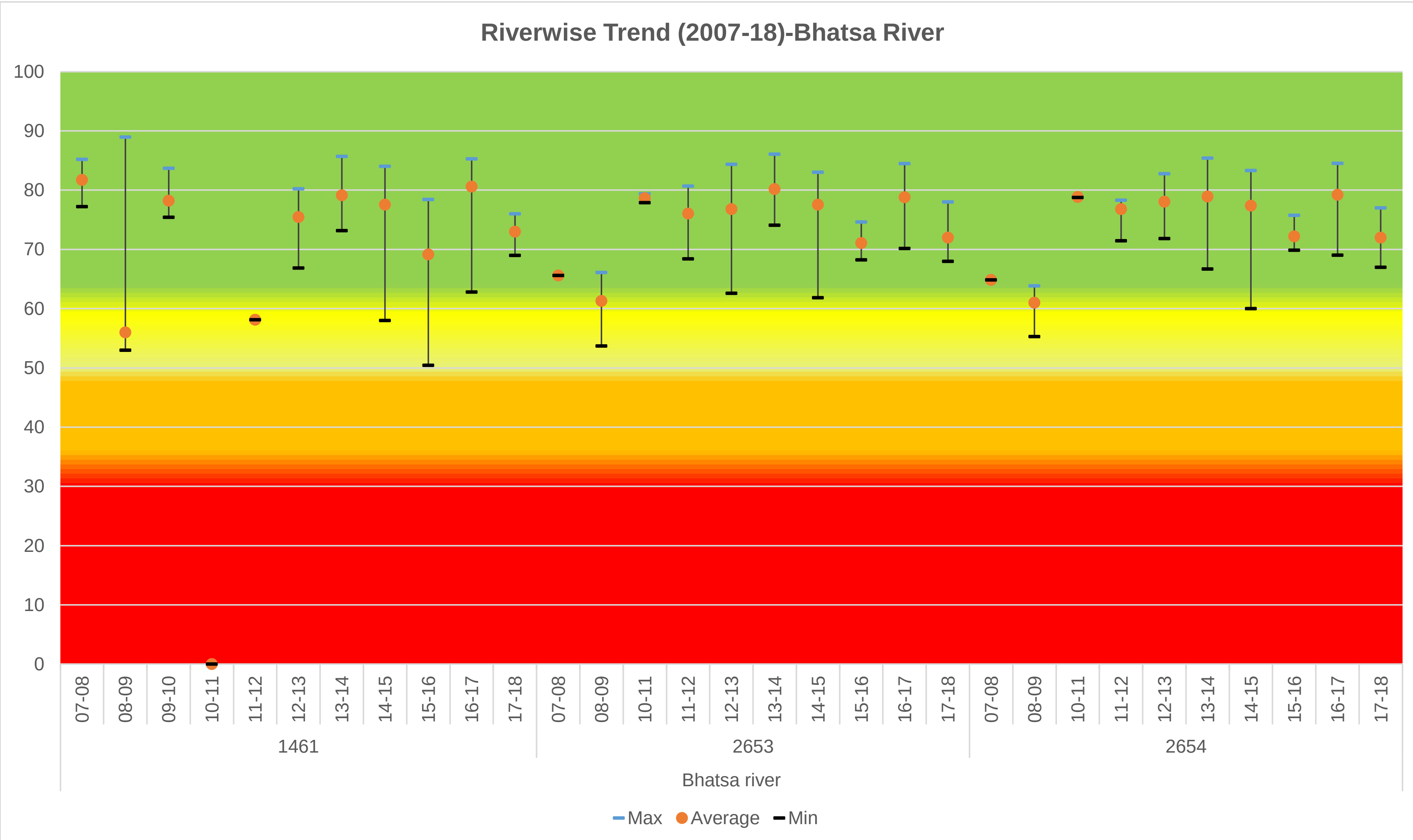
Cantonment

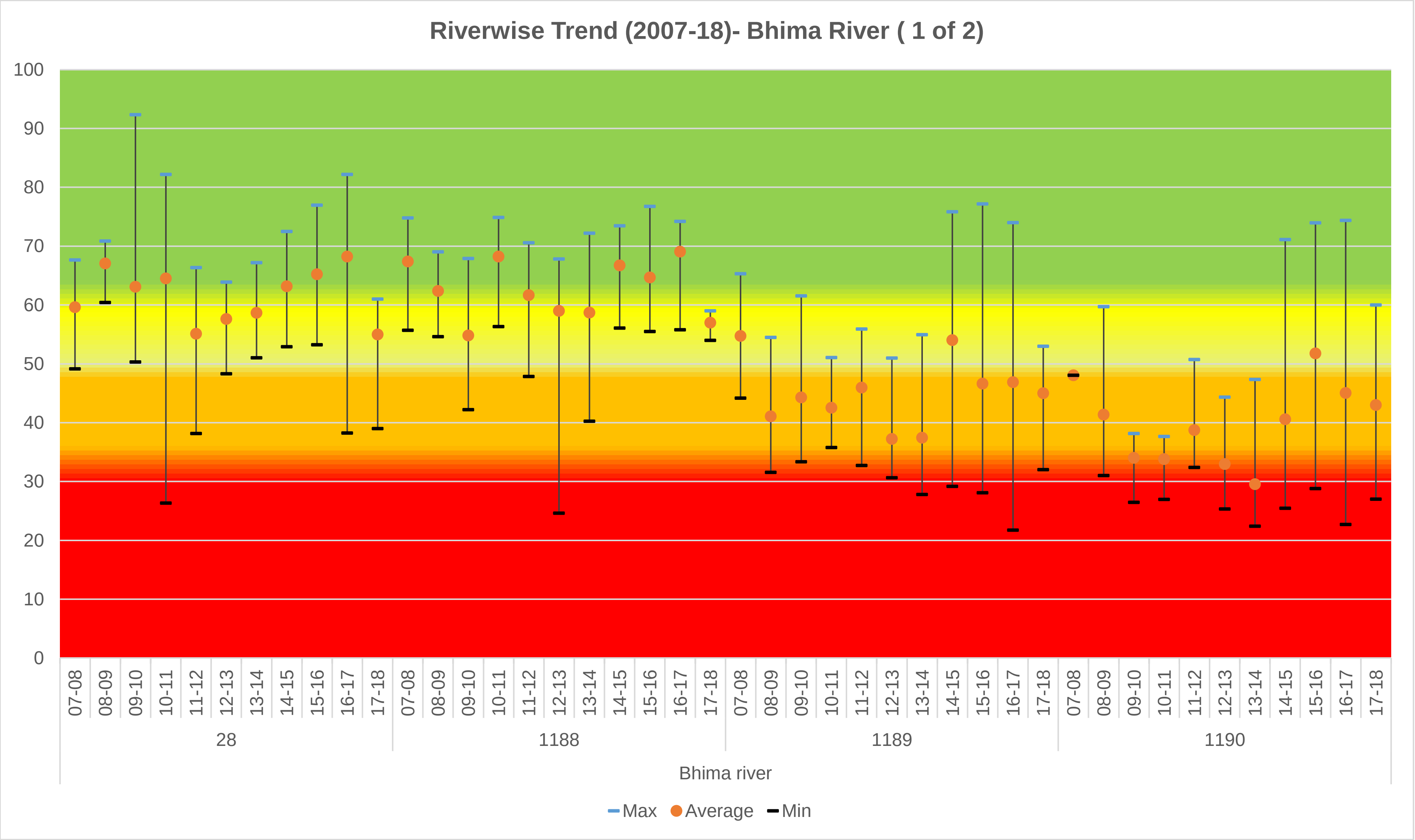
Sr No.	Nagar Panchyat	District	River / creek	Effluent Generated MLD	Effluent Treated MLD	% Treatment	Disposal
1	Deolali	Nashik	Darna river	0.74	0	0	Darna river
2	Bhingar	Ahmednagar	Mul dam	2	0	0	Mul dam
3	Aurangabad camp	Aurangabad	Kham river	1.5	1.1	0	Kham river
4	Dehu camp	Pune	Indrayani	6	0	0	Indrayani
5	Pune camp	Pune	Mula river	22.8	0	0	Mula river
6	Khadaki camp	Pune	Mula river	6	6	1	Mula river

Annex V – Data Sets of Water Quality Monitored in 2017-18

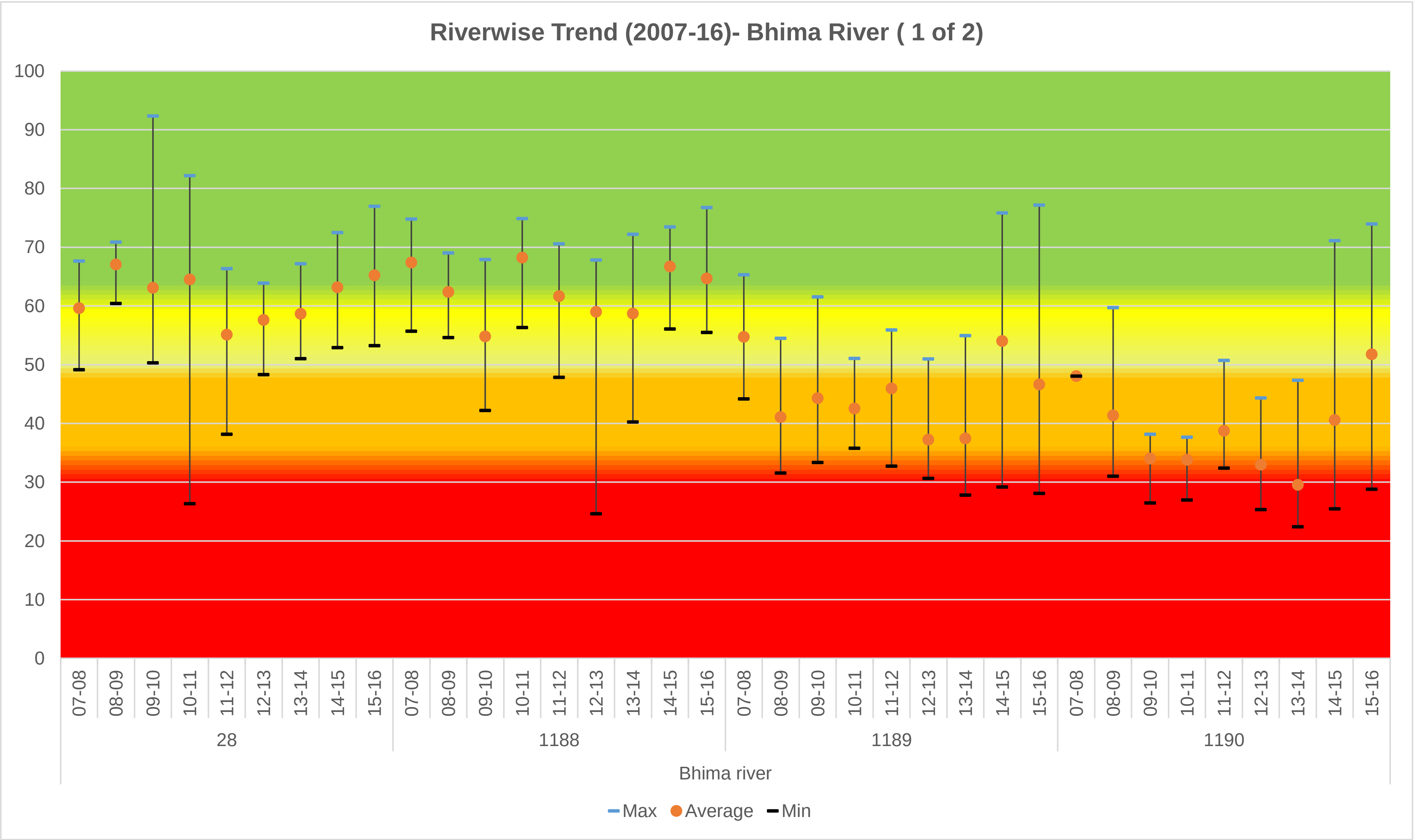
Riverwise Trend in WQI (2007-18)



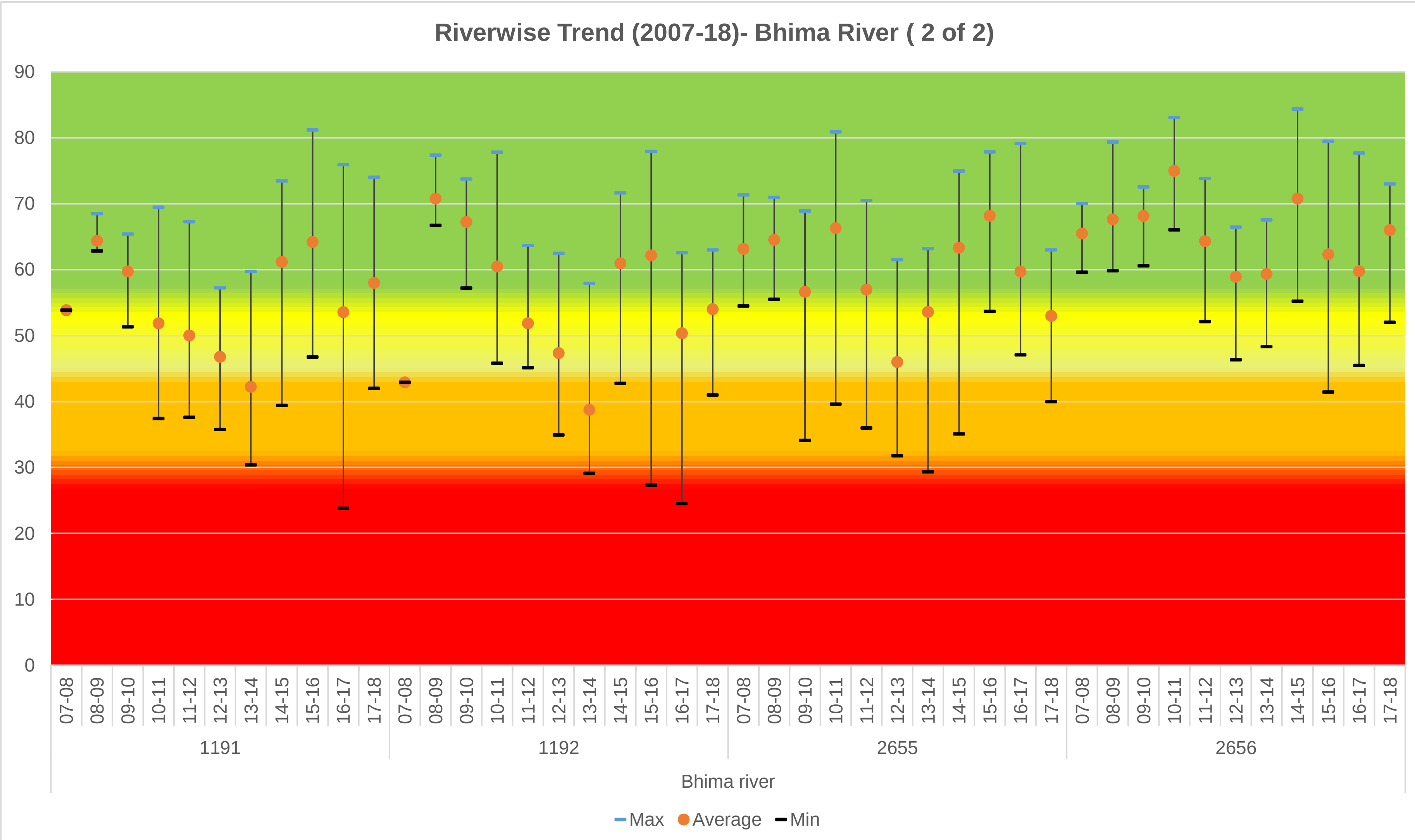

Riverwise Trend (2007-18)-Bhatsa River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1461
2653
2654
Bhatsa river
Max
Average
Min



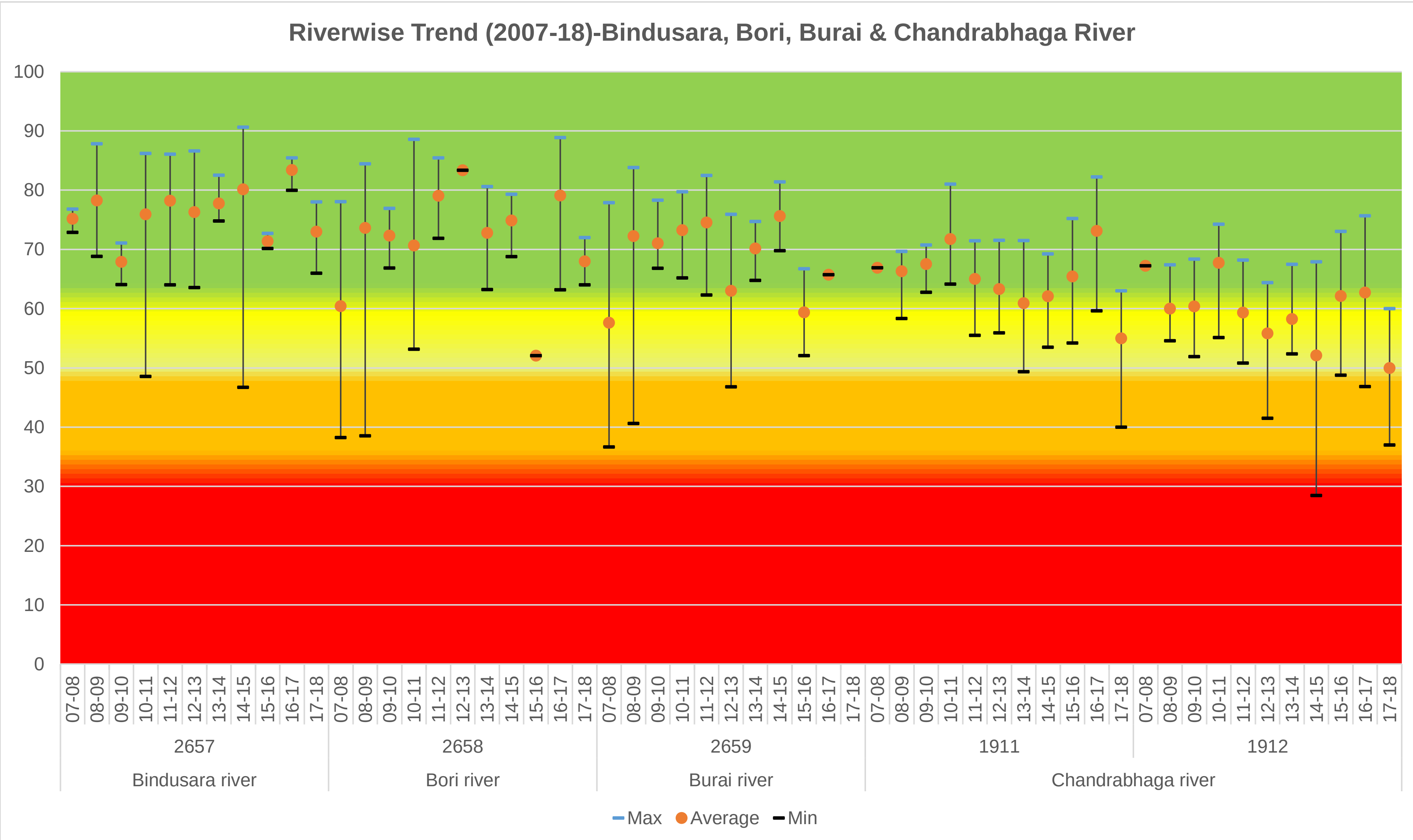
Riverwise Trend (2007-18)- Bhima River (1 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
28
1188
1189
1190
Bhima river
Max
Average
Min

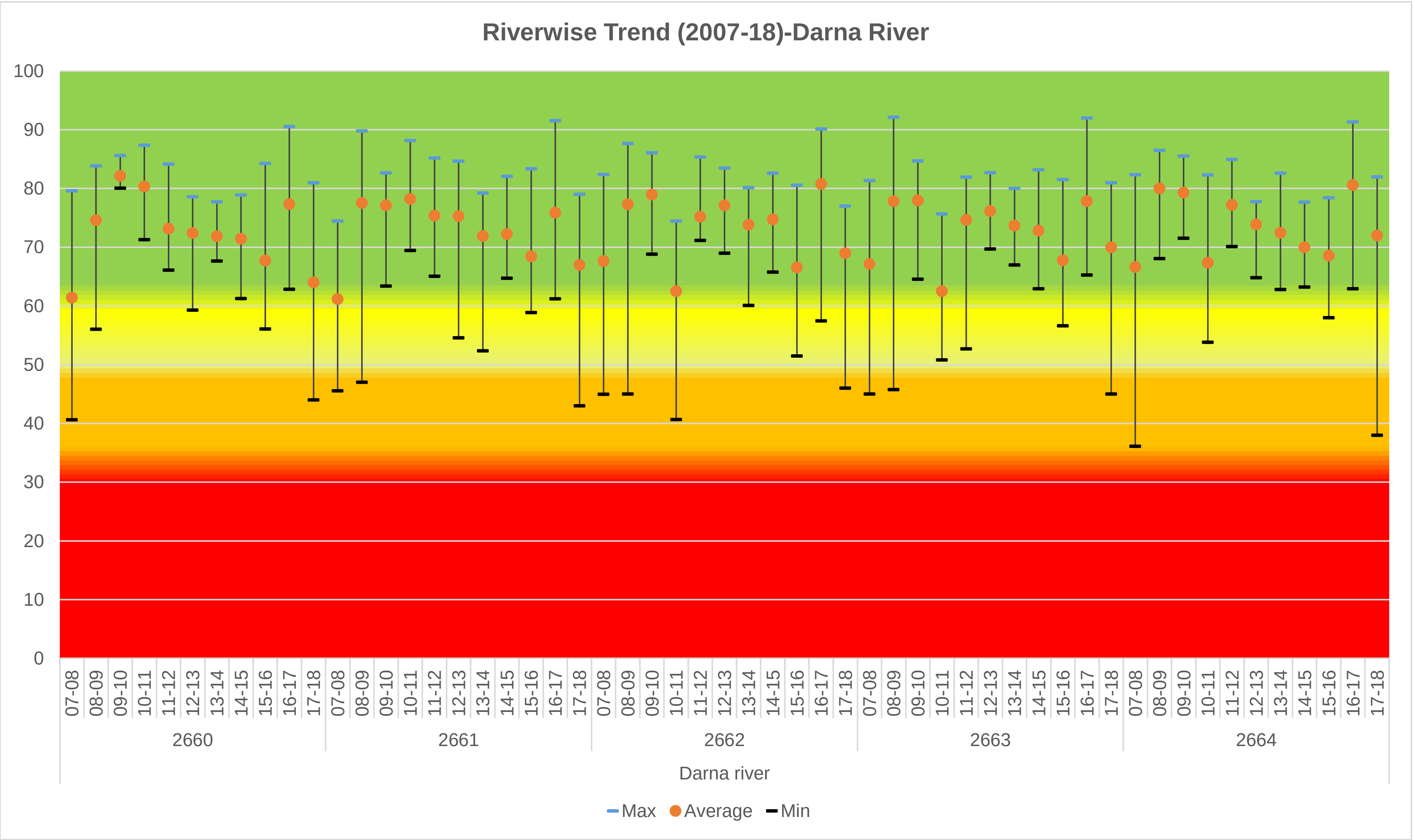


Riverwise Trend (2007-16)- Bhima River (1 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
28
1188
1189
1190
Bhima river
Max
Average
Min

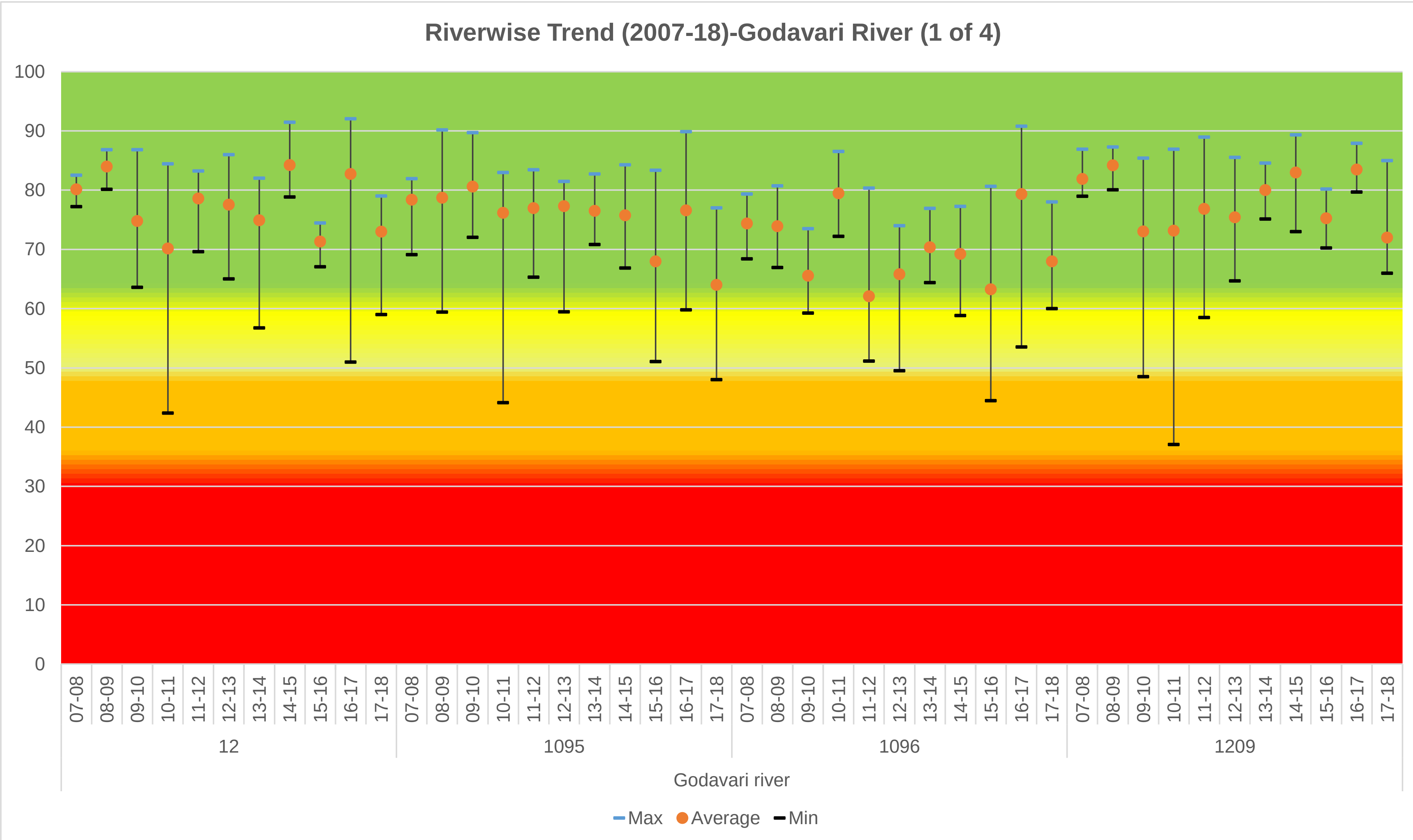


Riverwise Trend (2007-18)- Bhima River (2 of 2)
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1191
1192
2655
2656
Bhima river
Max
Average
Min

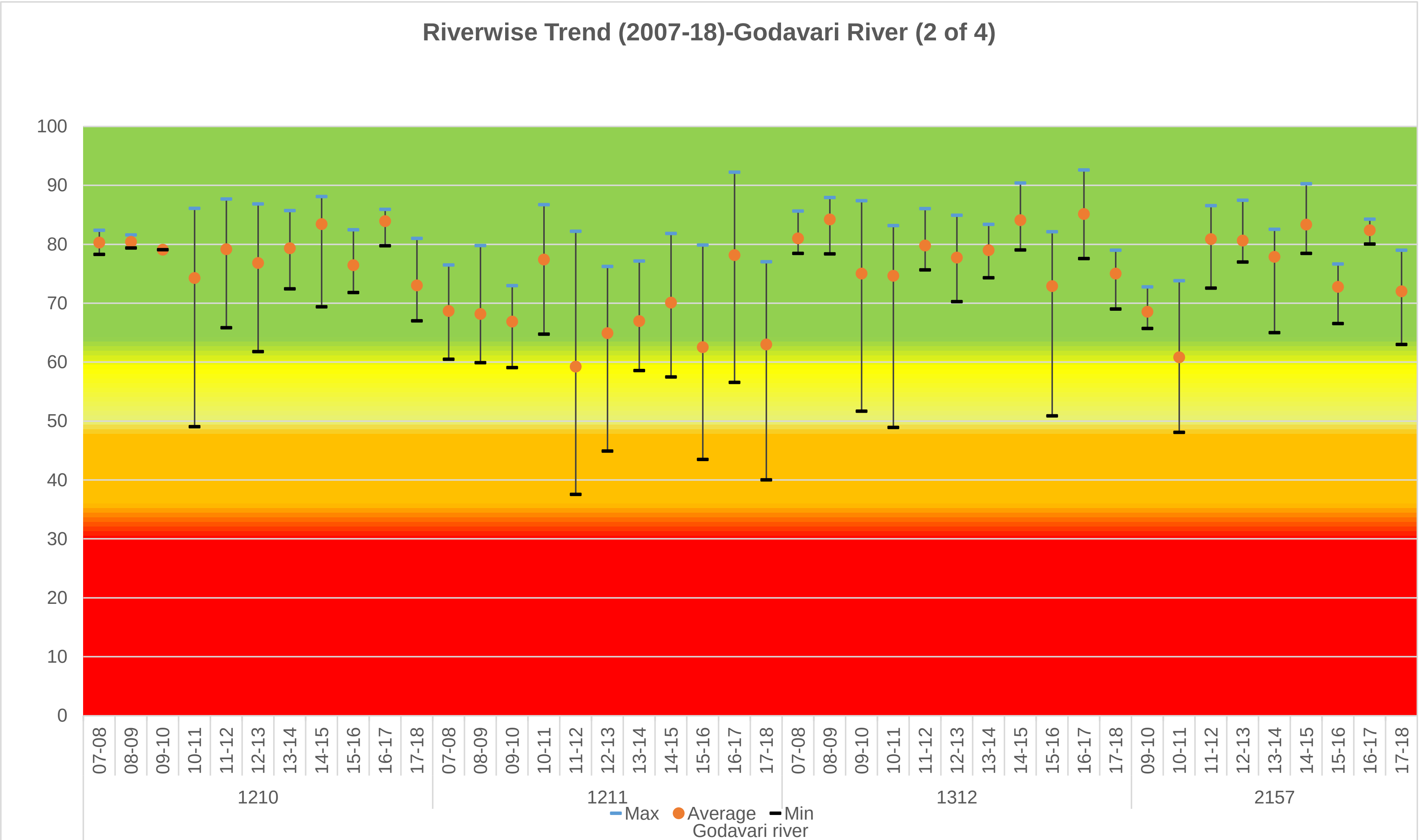

Riverwise Trend (2007-18)-Bindusara, Bori, Burai & Chandrabhaga River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2657
Bindusara river
2658
Bori river
2659
Burai river
1911
1912
Chandrabhaga river
Max
Average
Min


Riverwise Trend (2007-18)-Darna River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2660
2661
2662
2663
2664
Darna river
Max
Average
Min

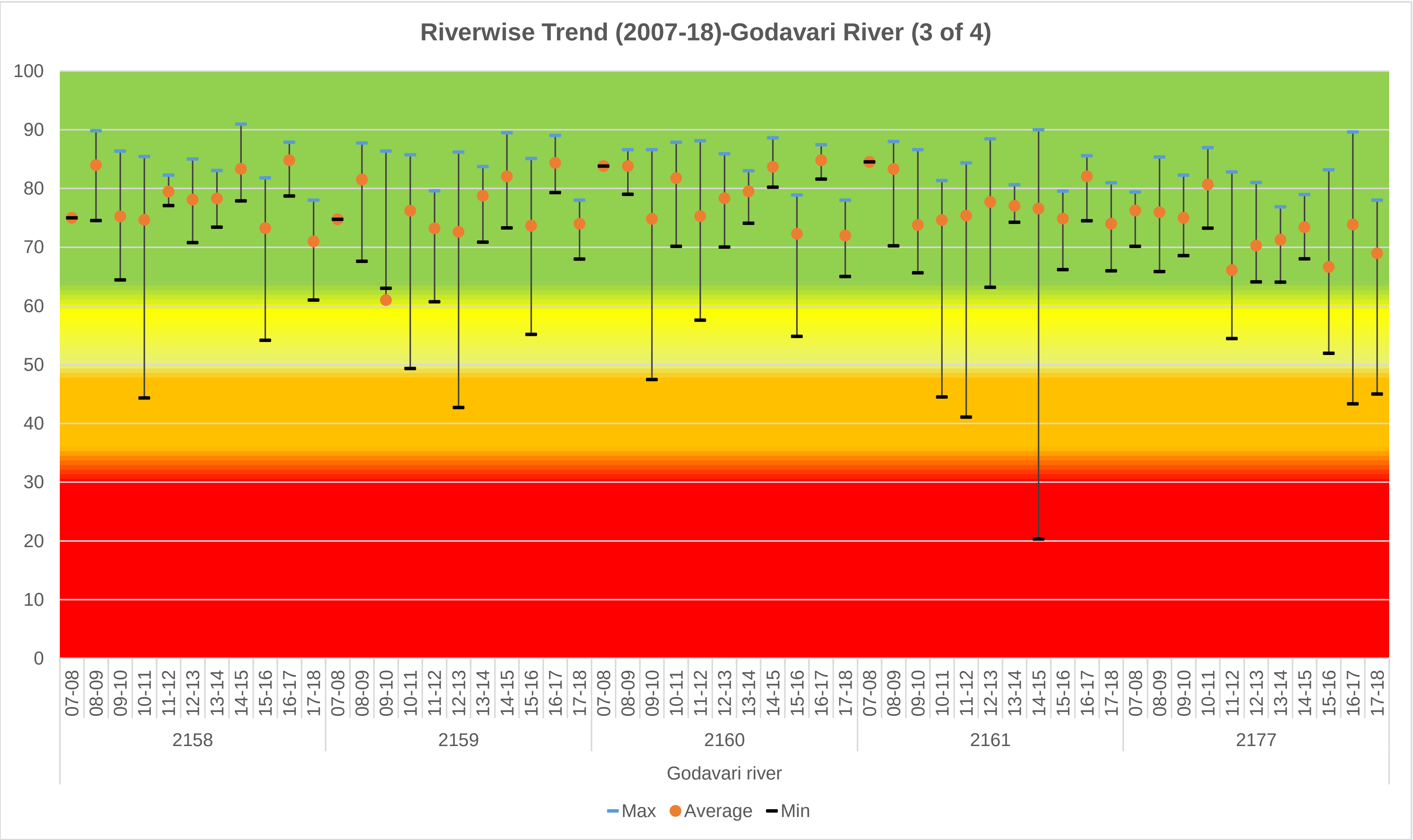

Riverwise Trend (2007-18)-Ghod, Girna & Gomai River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2665
1252
1253
2666
Ghod river
Girna river
Gomai river
Max
Average
Min



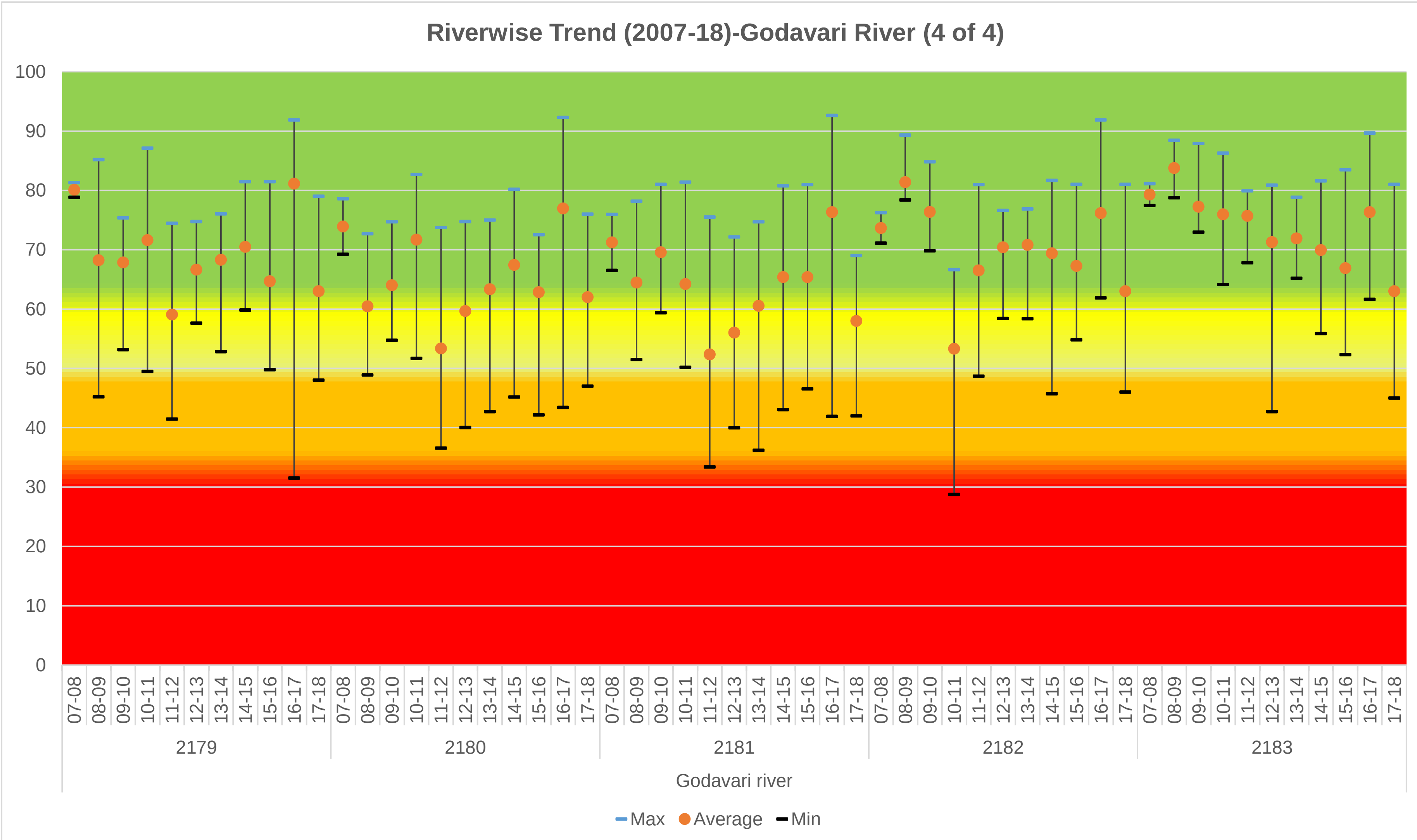
Riverwise Trend (2007-18)-Godavari River (1 of 4)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
12
1095
1096
1209
Godavari river
Max
Average
Min



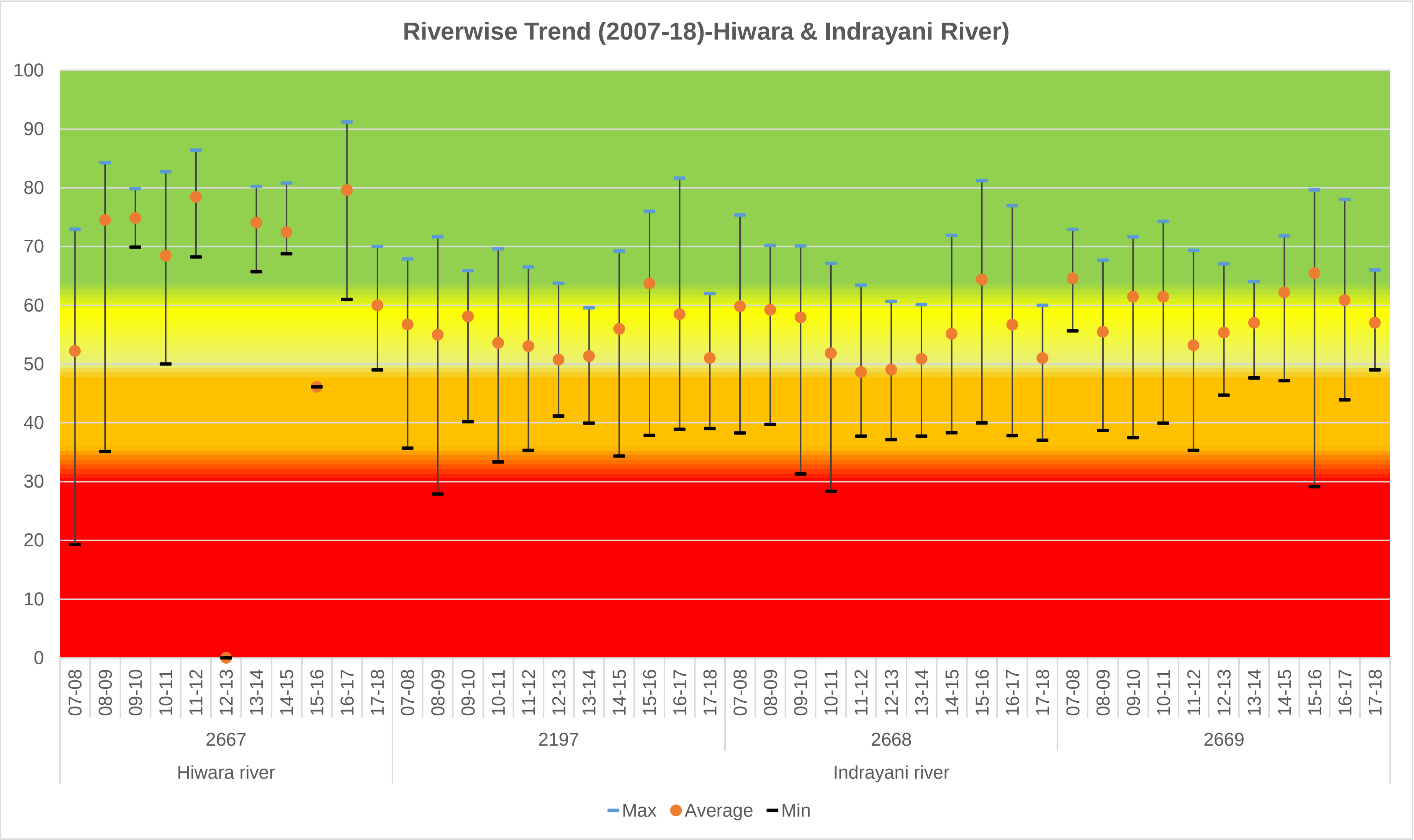
Riverwise Trend (2007-18)-Godavari River (2 of 4)
100
90
80
70
60
50
40
30
20
10
0
07-08 08-09 09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18
1210
07-08 08-09 09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18
1211
07-08 08-09 09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18
1312
09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18
2157
Max Average Min
Godavari river

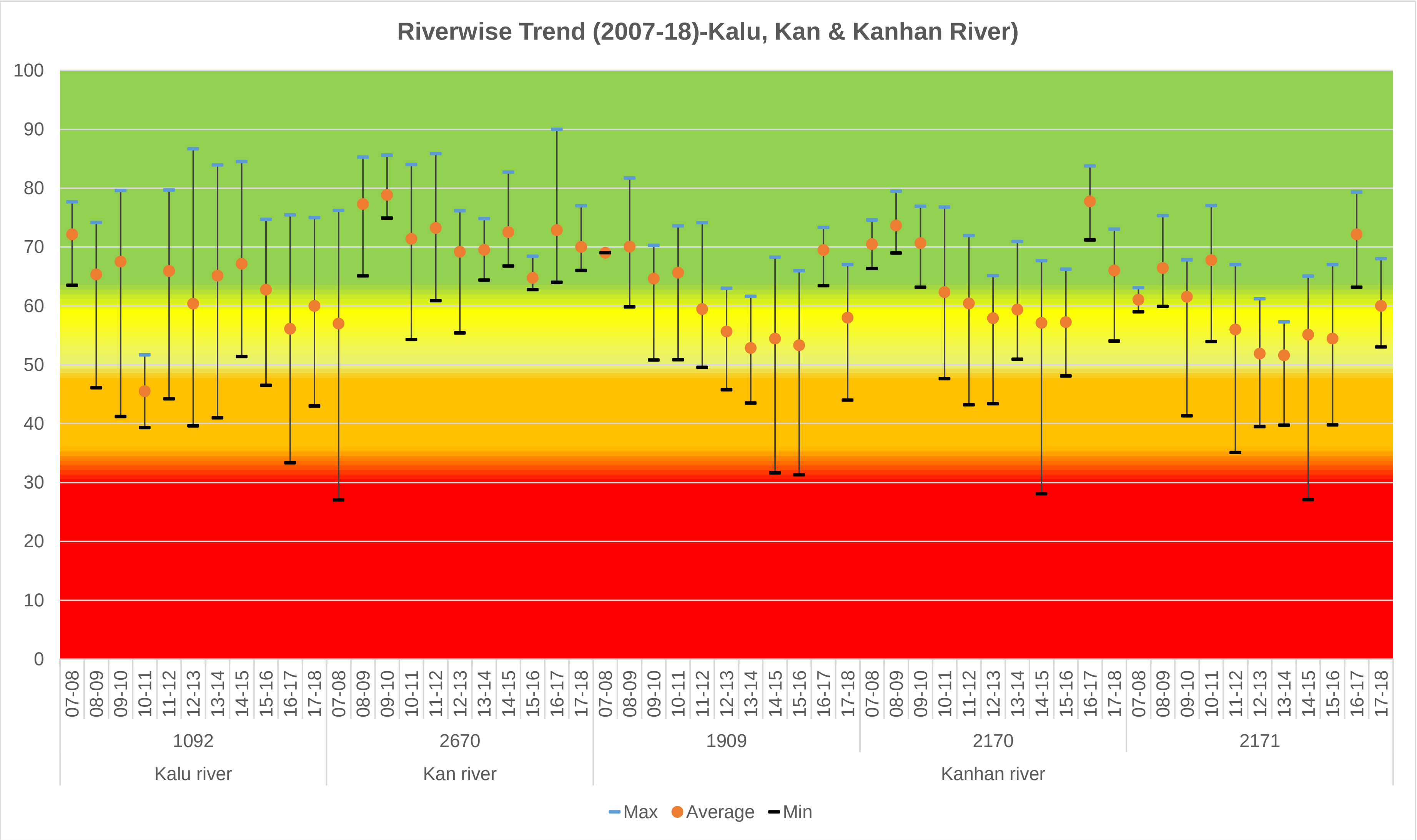


Riverwise Trend (2007-18)-Godavari River (3 of 4)
100
90
80
70
60
50
40
30
20
10
0
07-08 08-09 09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18
2158
2159
2160
2161
2177
Godavari river
Max
Average
Min

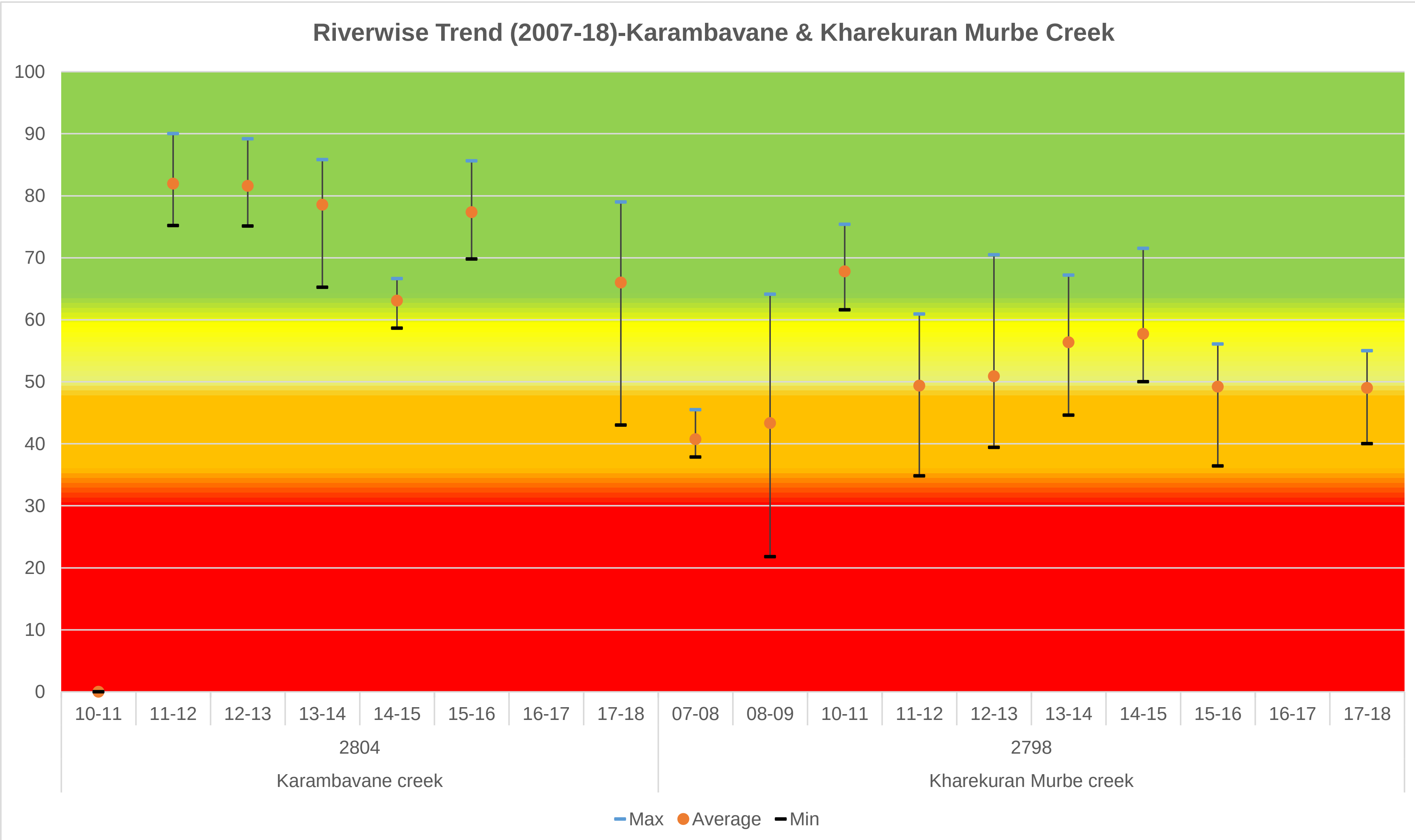


Riverwise Trend (2007-18)-Godavari River (4 of 4)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2179
2180
2181
2182
2183
Godavari river
Max
Average
Min

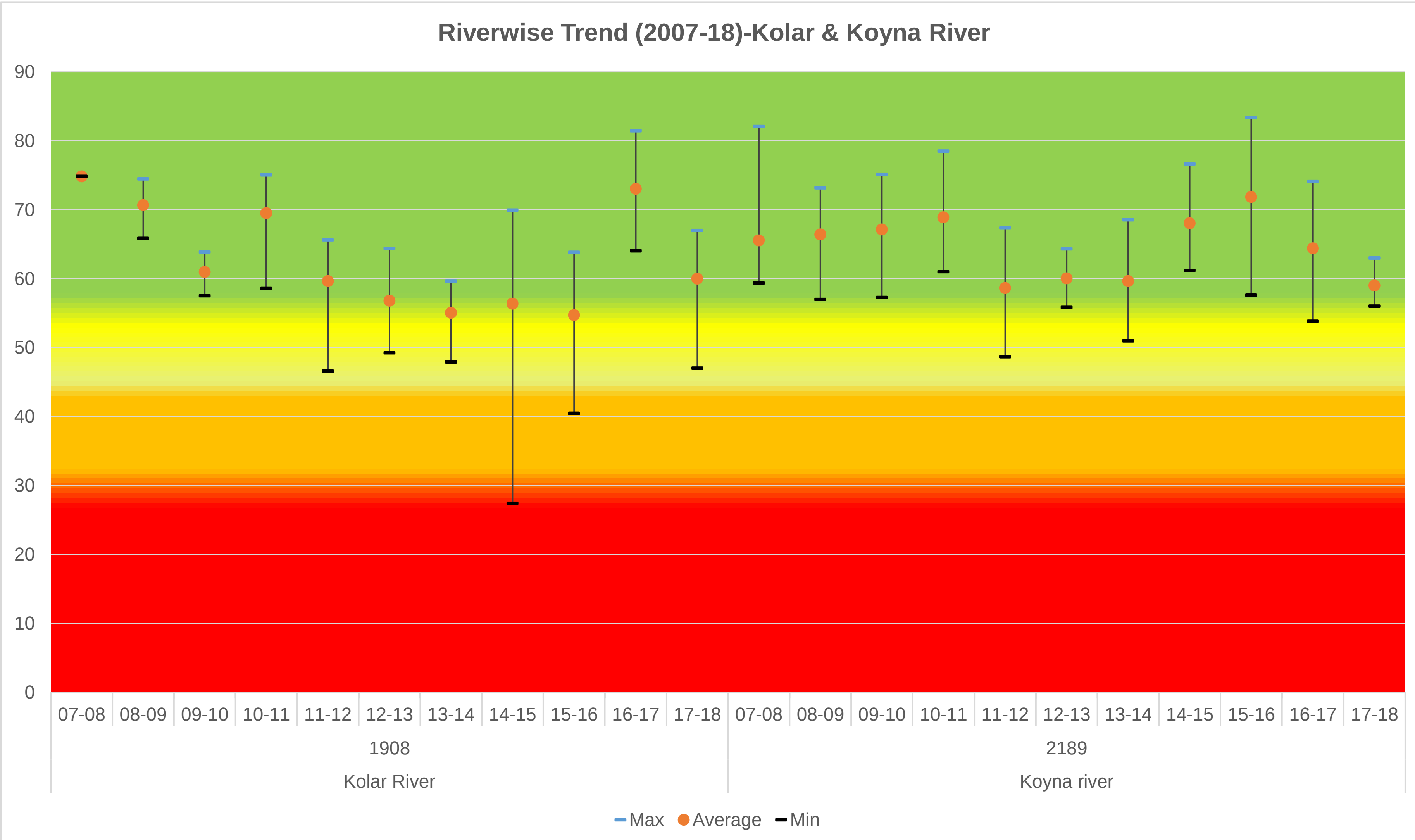

Riverwise Trend (2007-18)-Hiwara & Indrayani River)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2667
2197
2668
2669
Hiwara river
Indrayani river
Max
Average
Min

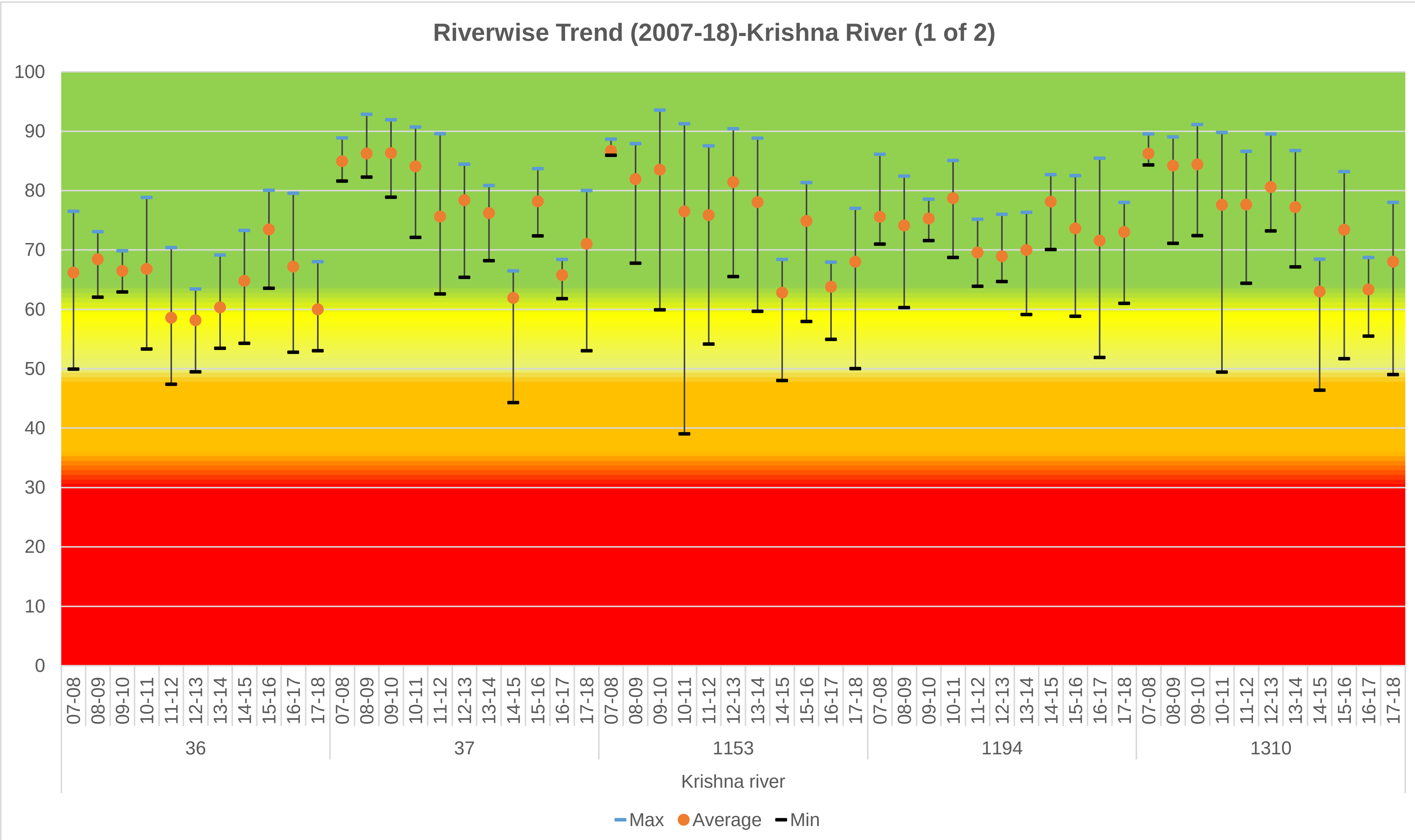


Riverwise Trend (2007-18)-Kalu, Kan & Kanhan River)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1092
2670
1909
2170
2171
Kalu river
Kan river
Kanhan river
Max
Average
Min

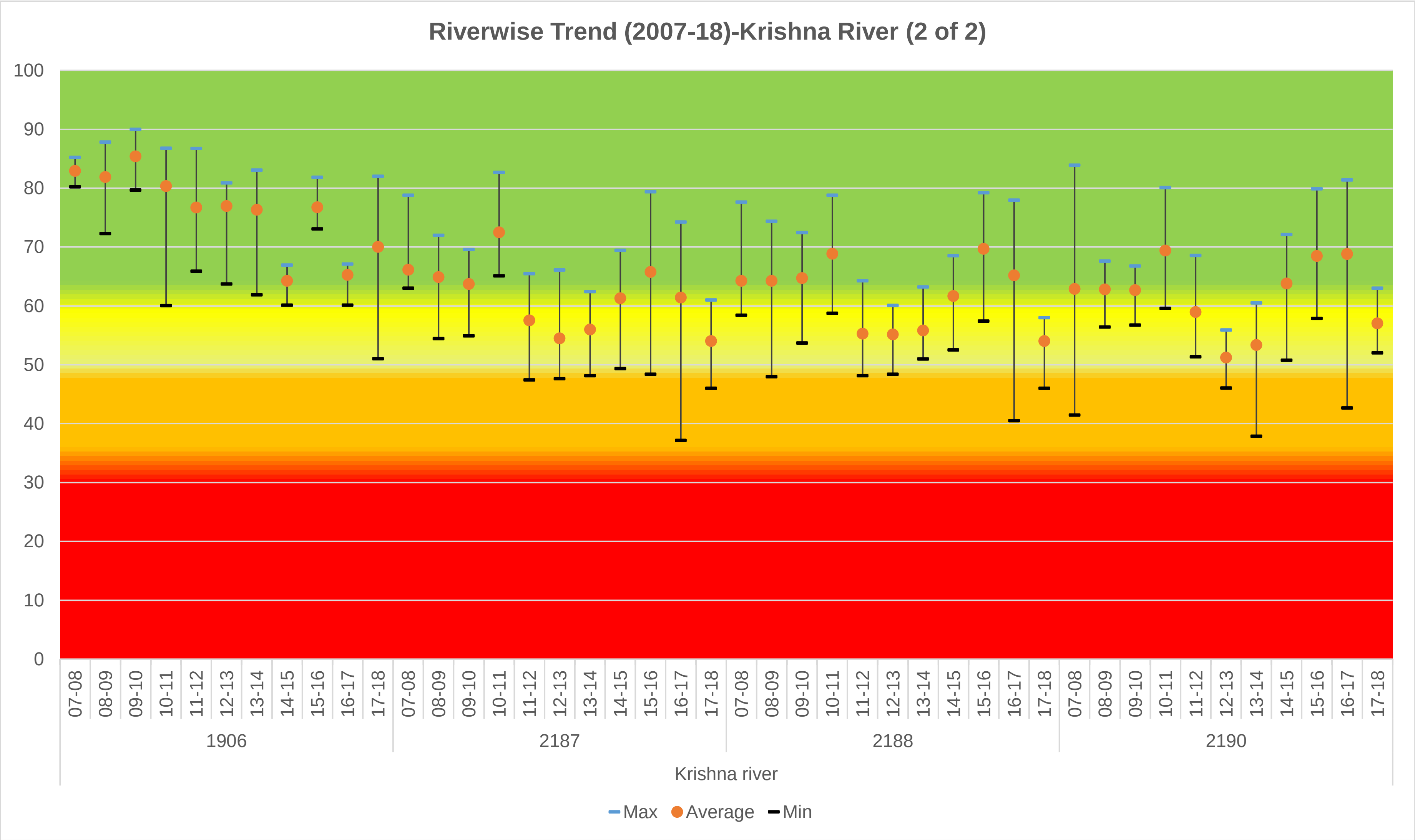


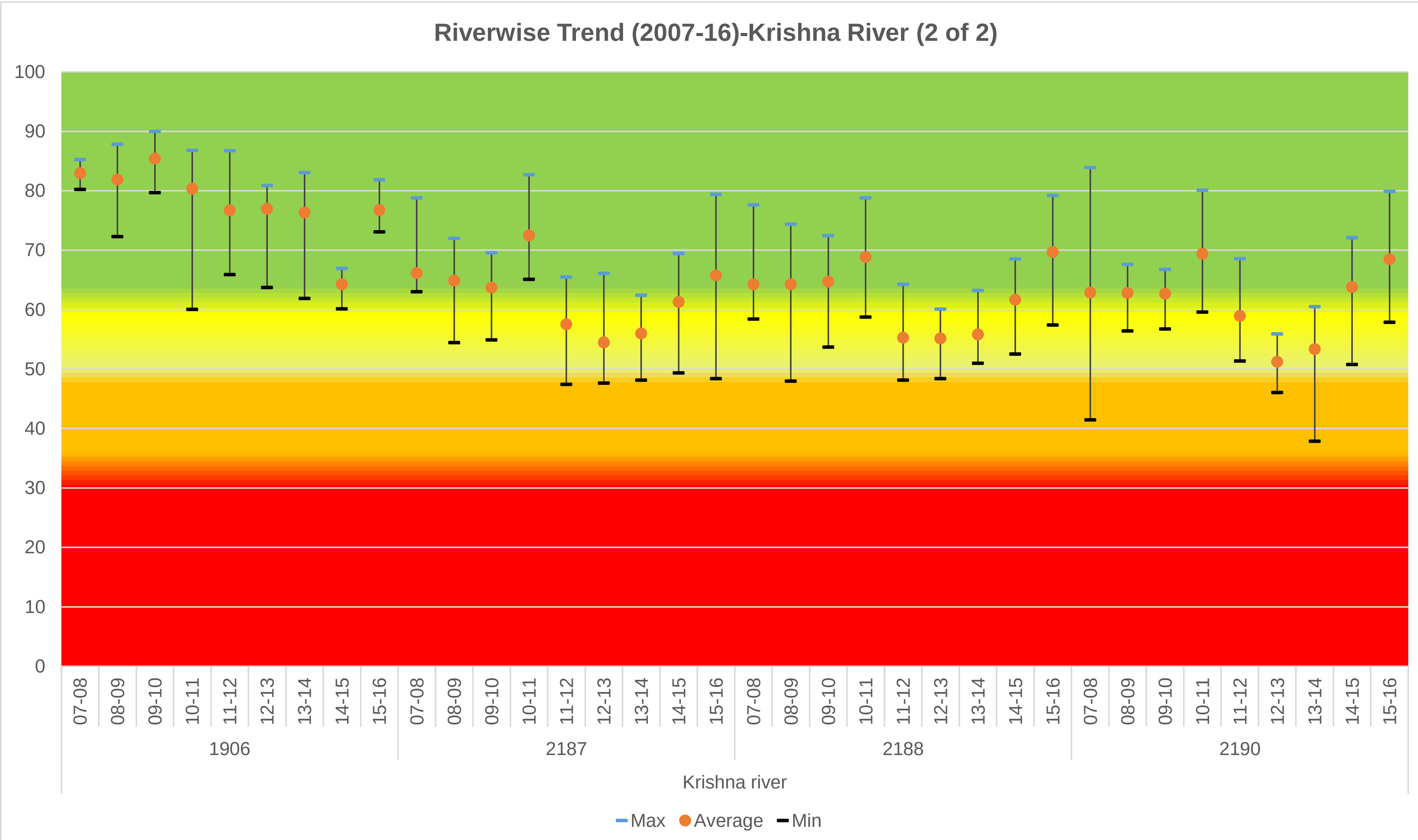
Riverwise Trend (2007-18)-Karambavane & Kharekuran Murbe Creek
100
90
80
70
60
50
40
30
20
10
0
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2804
Karambavane creek
2798
Kharekuran Murbe creek
Max
Average
Min

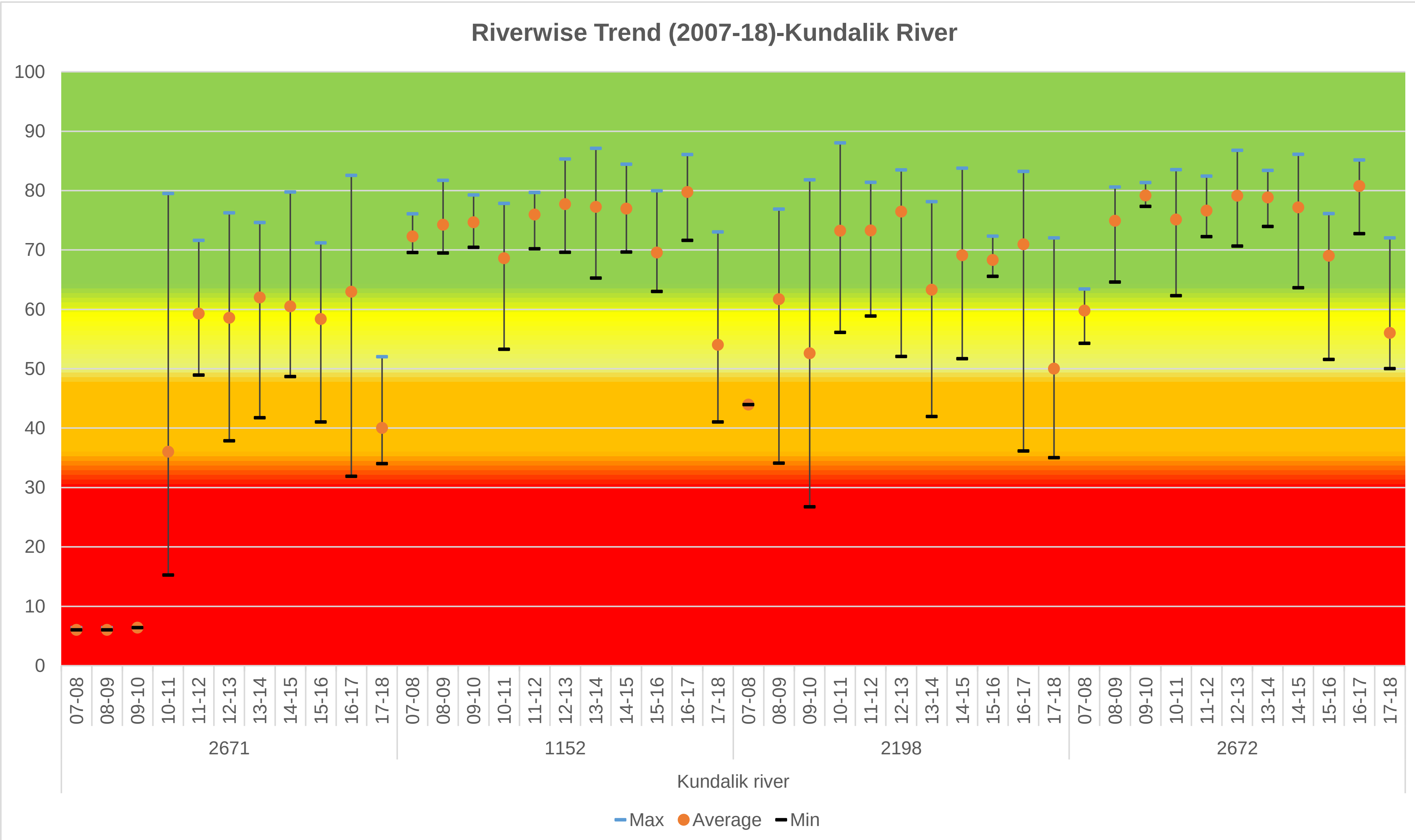

Riverwise Trend (2007-18)-Kolar & Koyna River
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1908
Kolar River
2189
Koyna river
Max
Average
Min

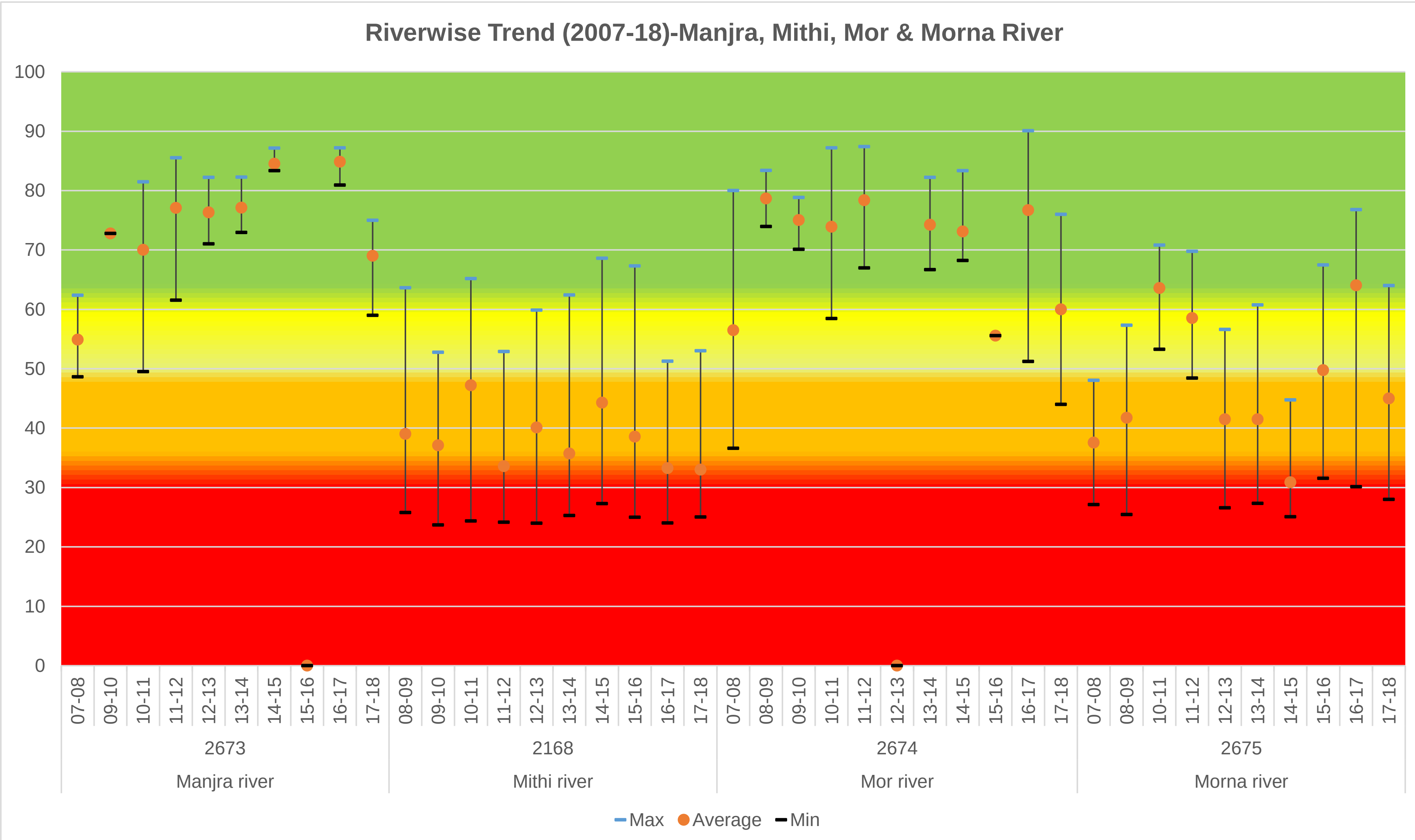


Riverwise Trend (2007-18)-Krishna River (1 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
36
37
1153
1194
1310
Krishna river
Max
Average
Min

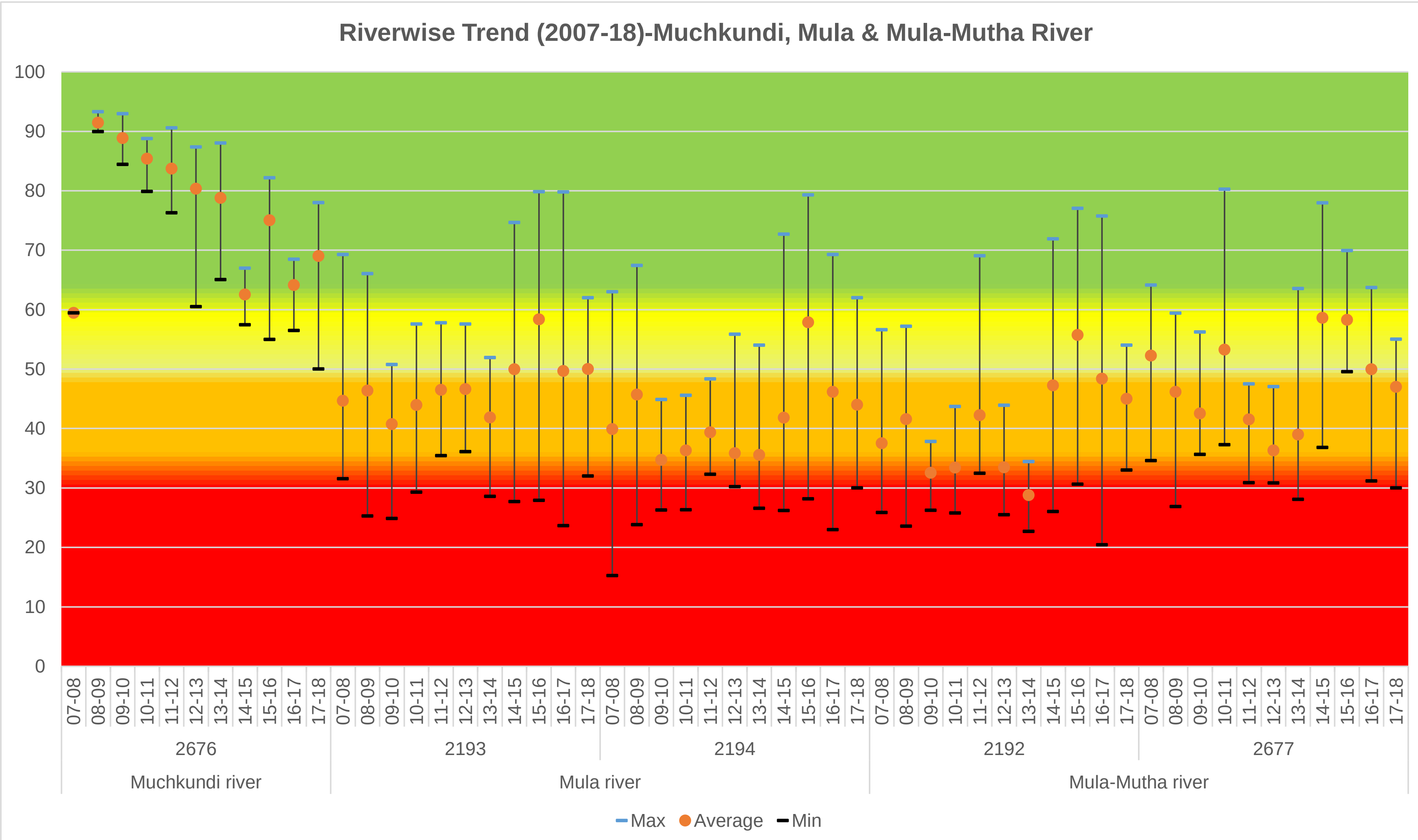

Riverwise Trend (2007-18)-Krishna River (2 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1906
2187
2188
2190
Krishna river
Max
Average
Min


Riverwise Trend (2007-16)-Krishna River (2 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
1906
2187
2188
2190
Krishna river
Max
Average
Min

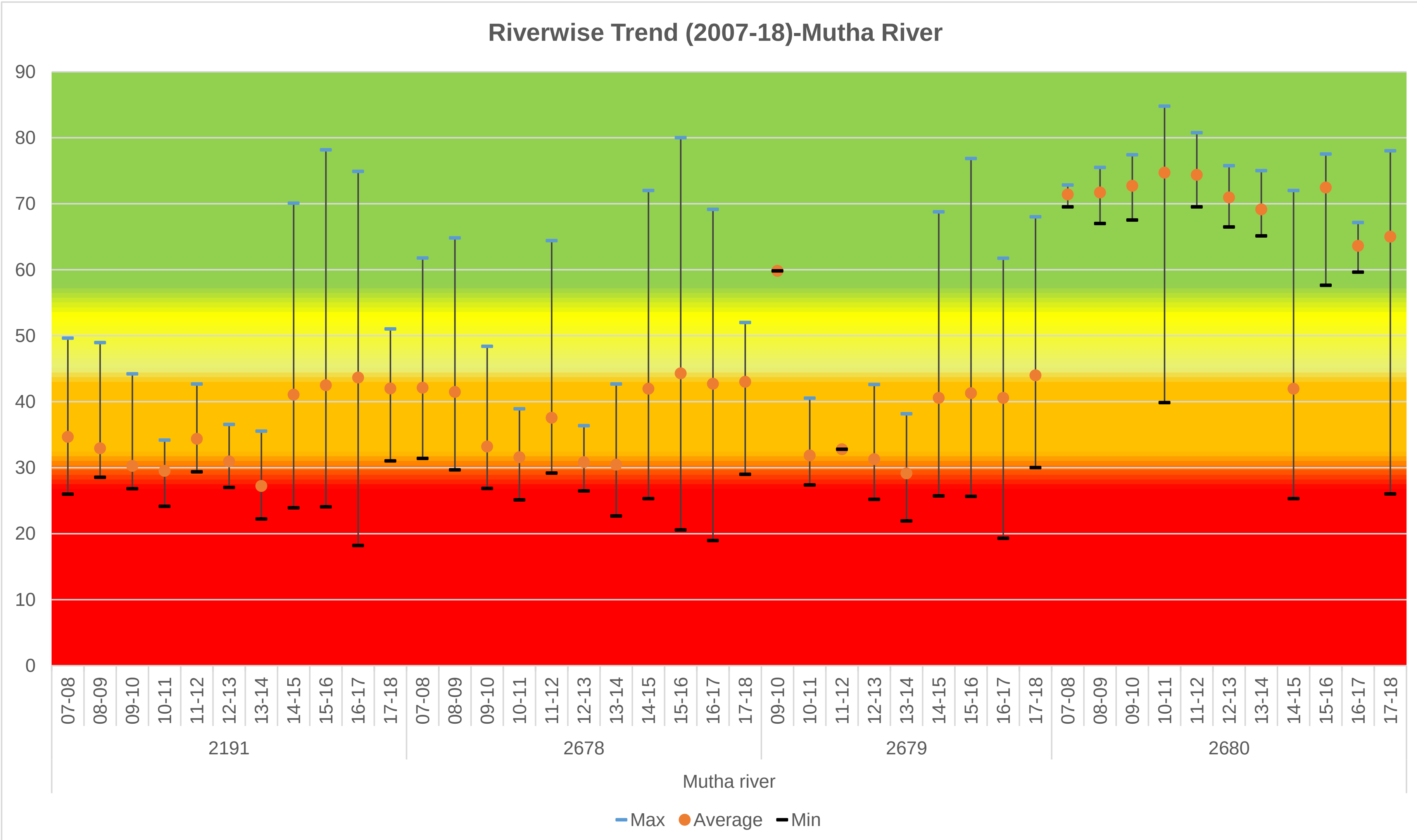

Riverwise Trend (2007-18)-Kundalik River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2671
1152
2198
2672
Kundalik river
Max
Average
Min



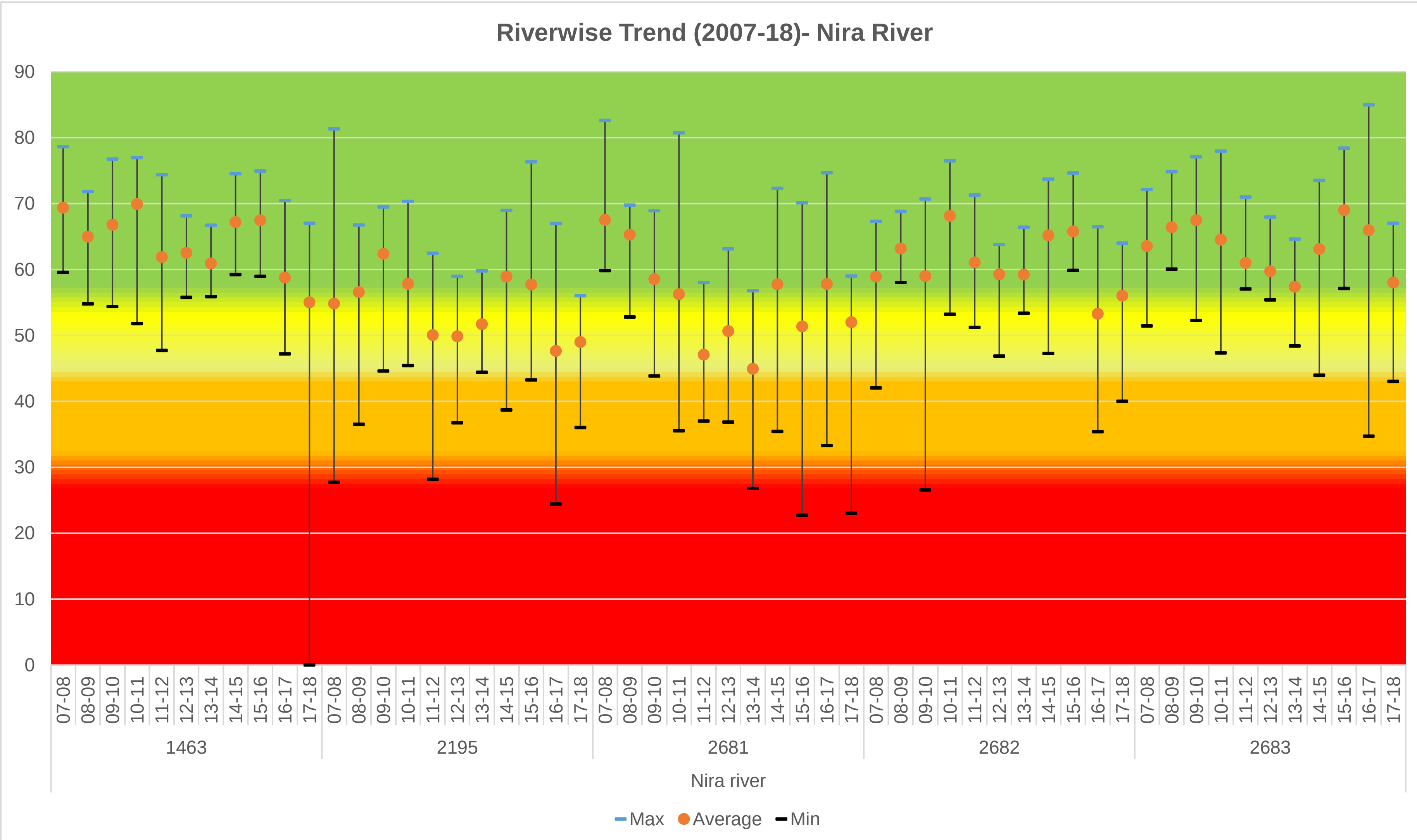
Riverwise Trend (2007-18)-Manjra, Mithi, Mor & Morna River
100
90
80
70
60
50
40
30
20
10
0
07-08
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2673
Manjra river
2168
Mithi river
2674
Mor river
2675
Morna river
Max
Average
Min

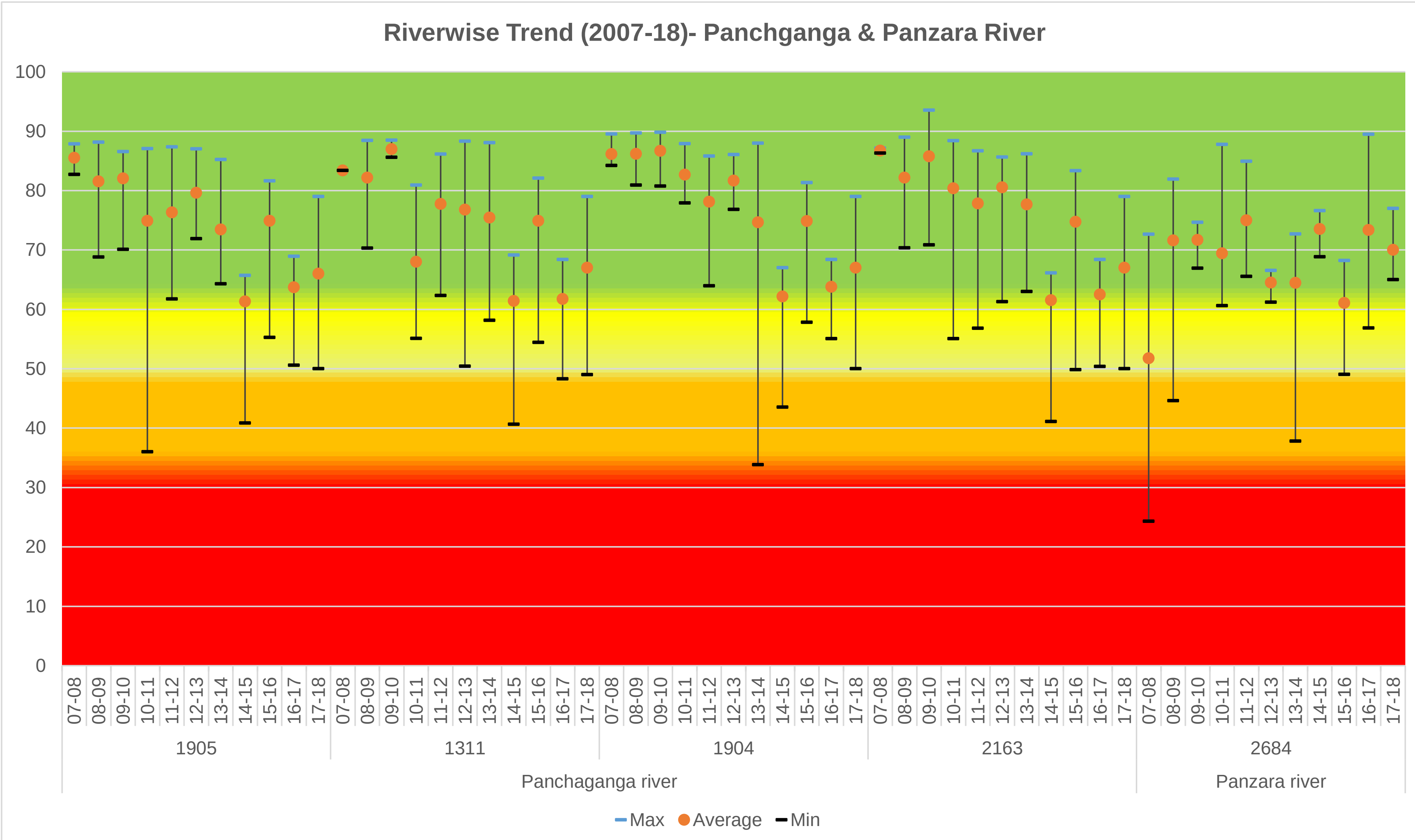


Riverwise Trend (2007-18)-Muchkundi, Mula & Mula-Mutha River
100
90
80
70
60
50
40
30
20
10
0
07-08 08-09 09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18
2676
2193
2194
2192
2677
Muchkundi river
Mula river
Mula-Mutha river
Max
Average
Min

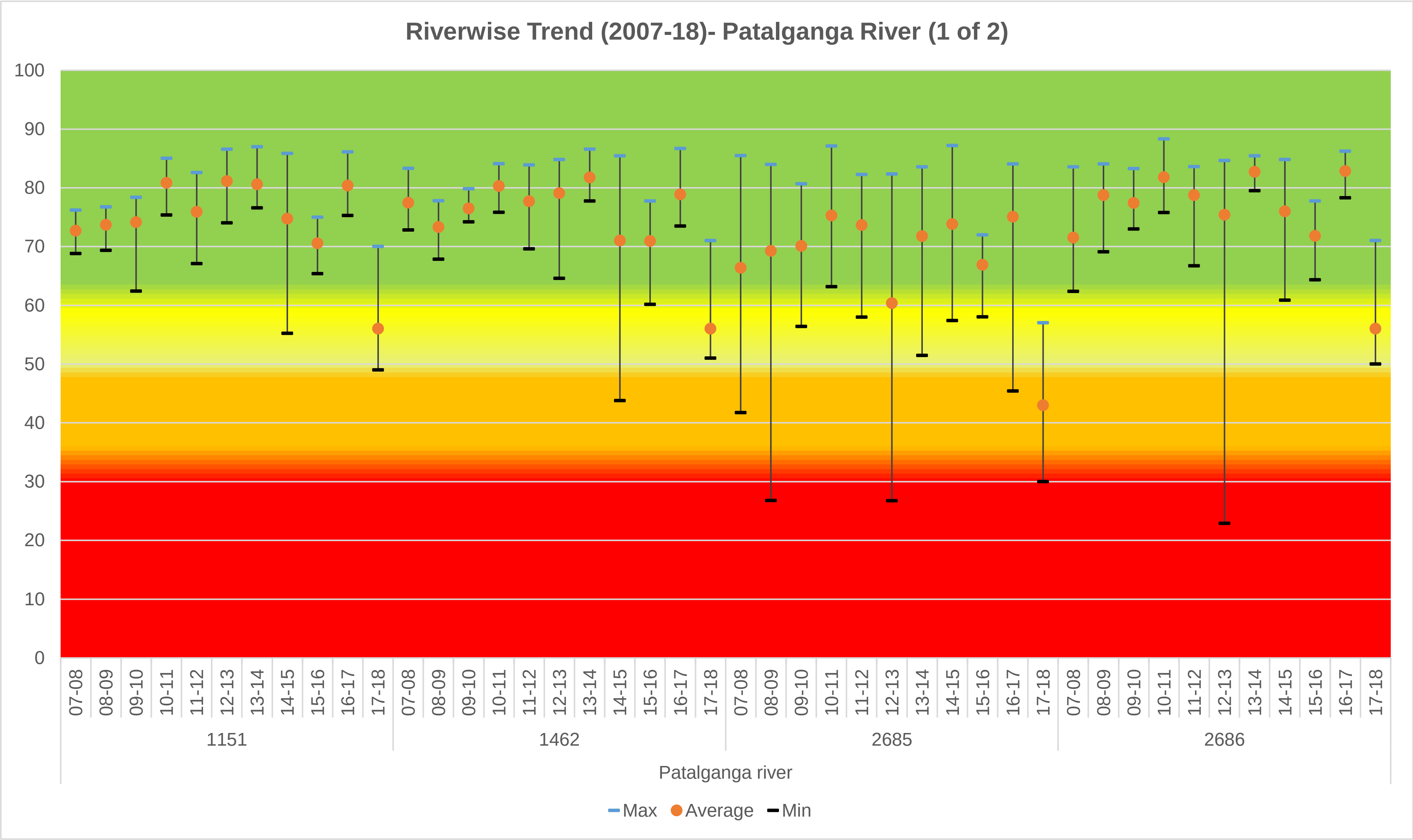


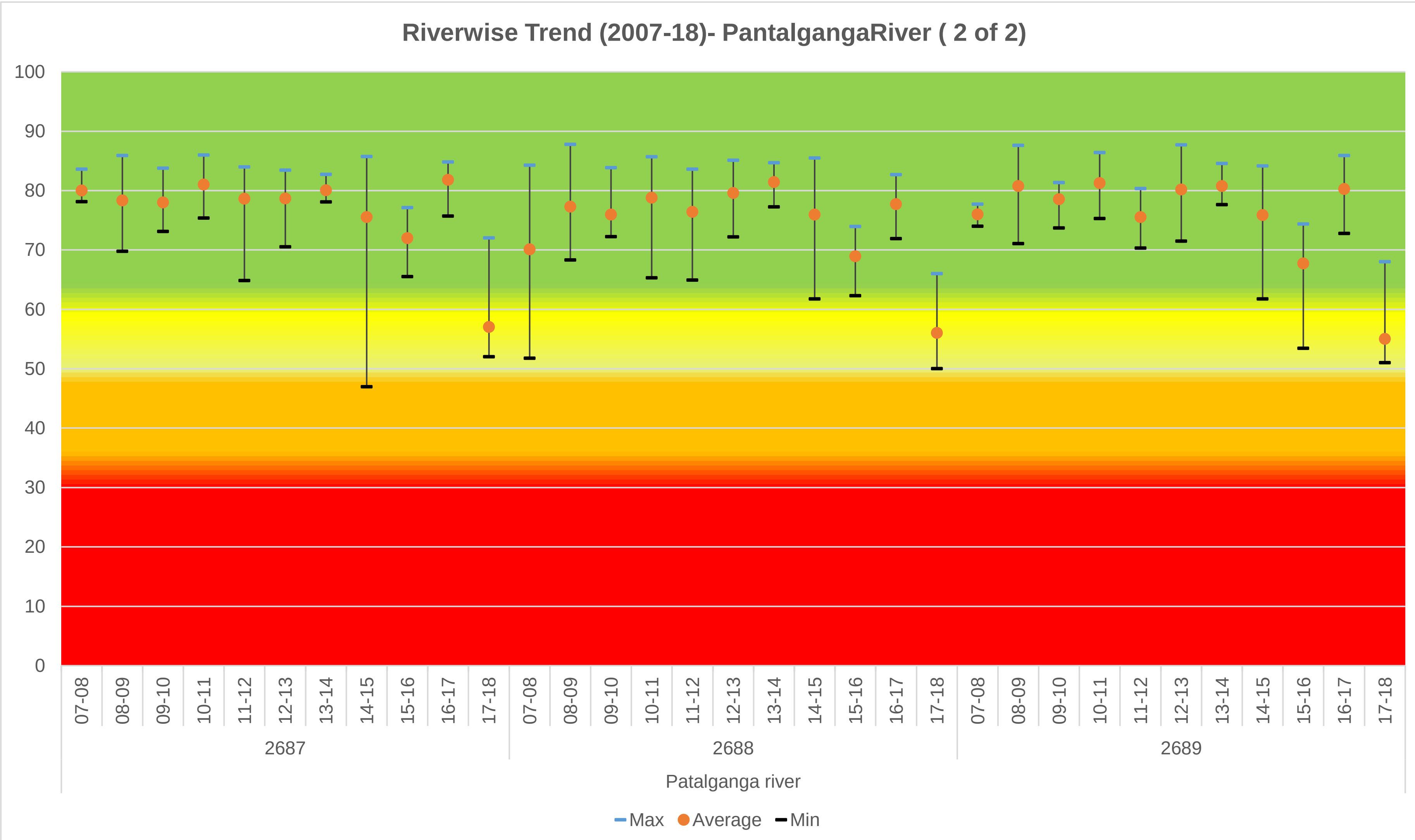
Riverwise Trend (2007-18)-Mutha River
0
10
20
30
40
50
60
70
80
90
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2191
2678
2679
2680
Mutha river
Max
Average
Min


Riverwise Trend (2007-18)- Nira River
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1463
2195
2681
2682
2683
Nira river
Max
Average
Min

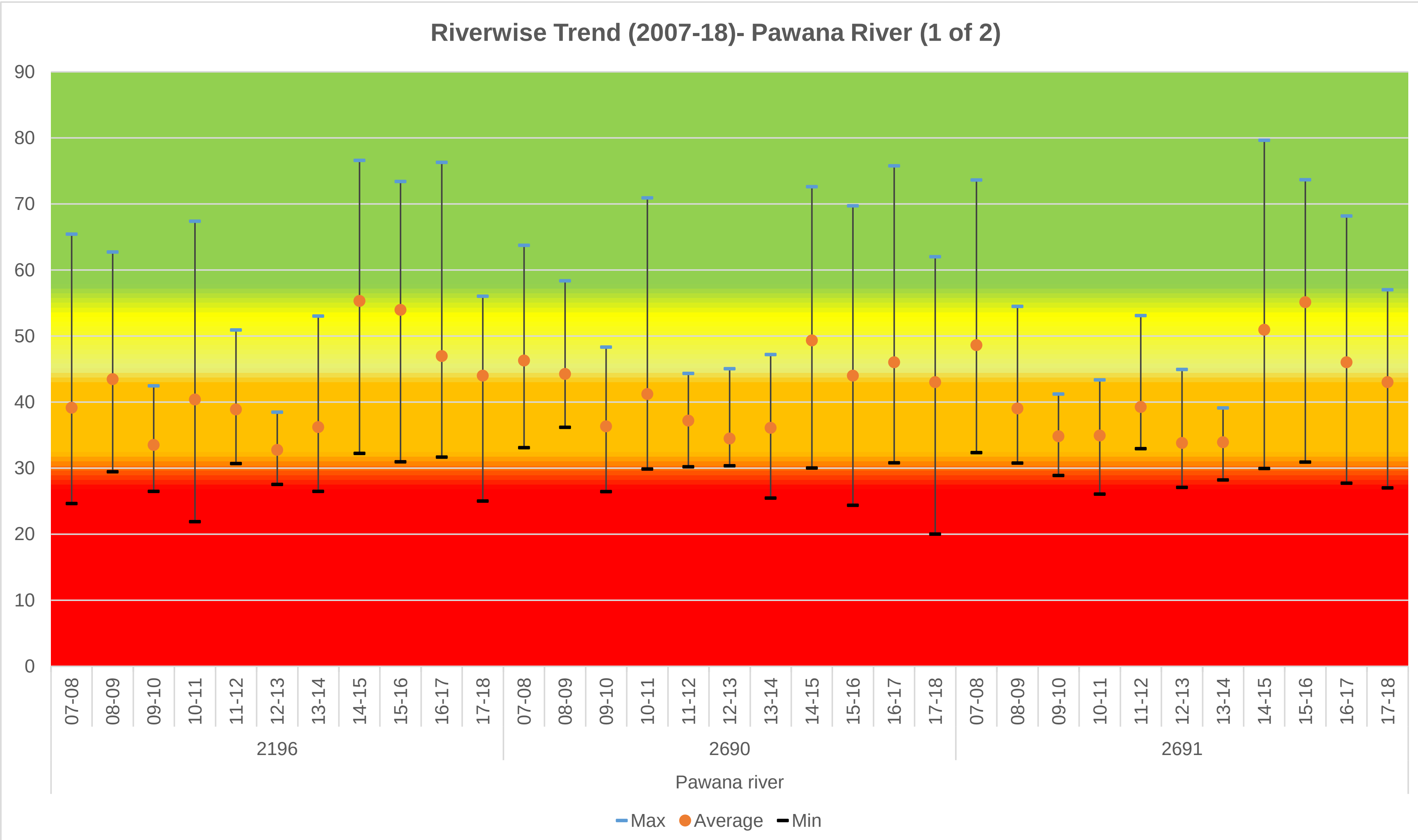


Riverwise Trend (2007-18)- Panchganga & Panzara River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1905
1311
1904
2163
2684
Panchaganga river
Panzara river
Max
Average
Min

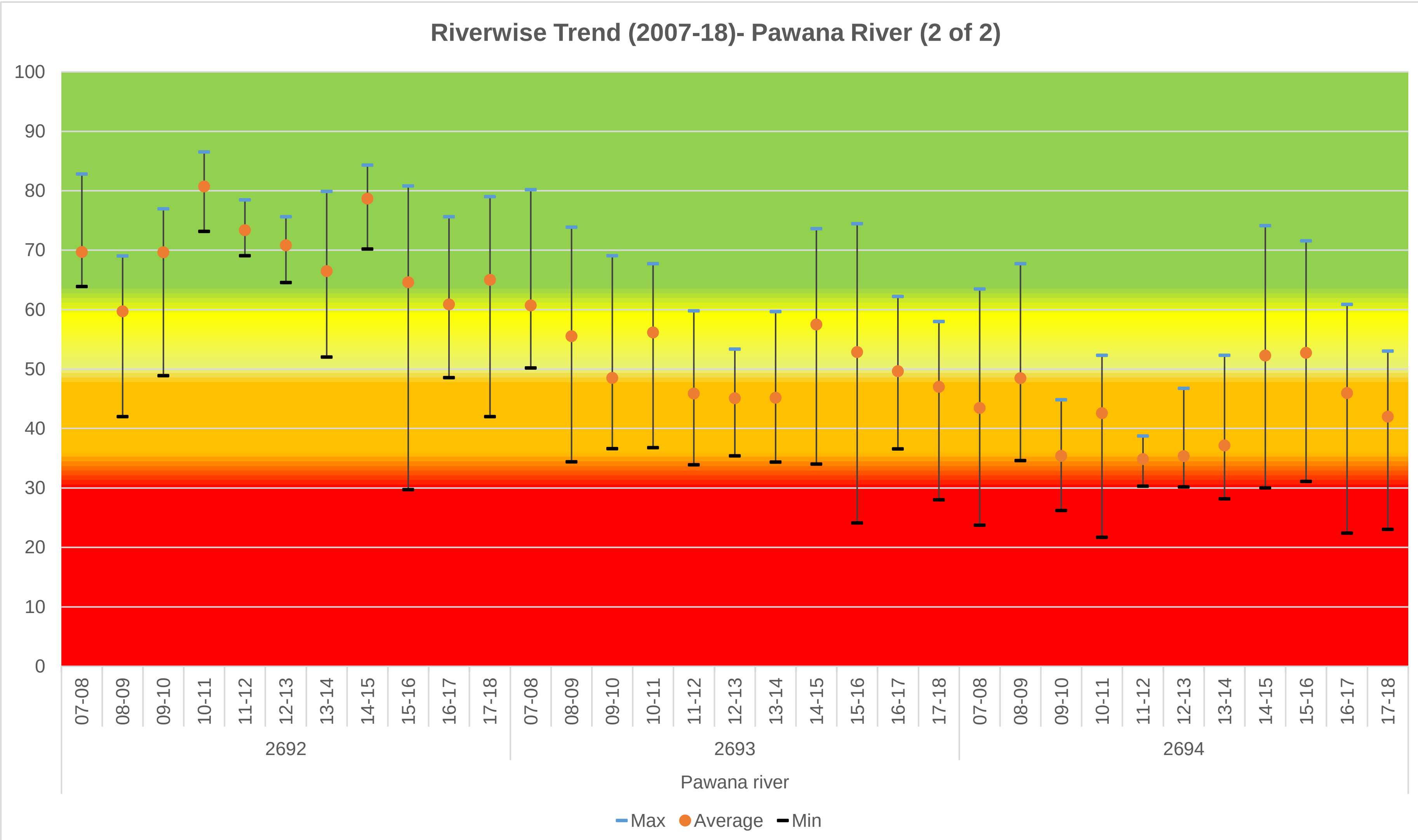

Riverwise Trend (2007-18)- Patalganga River (1 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1151
1462
2685
2686
Patalganga river
Max
Average
Min

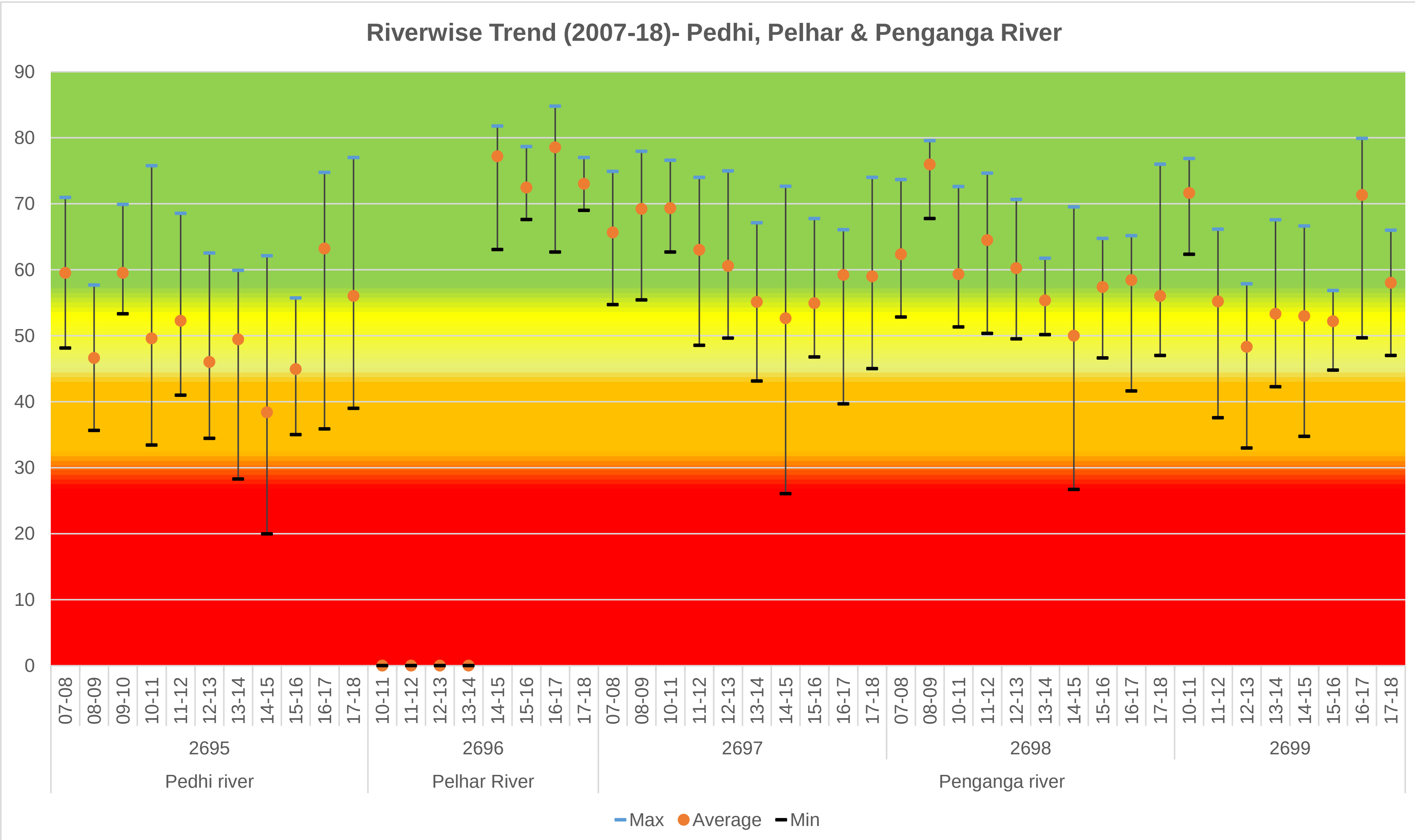


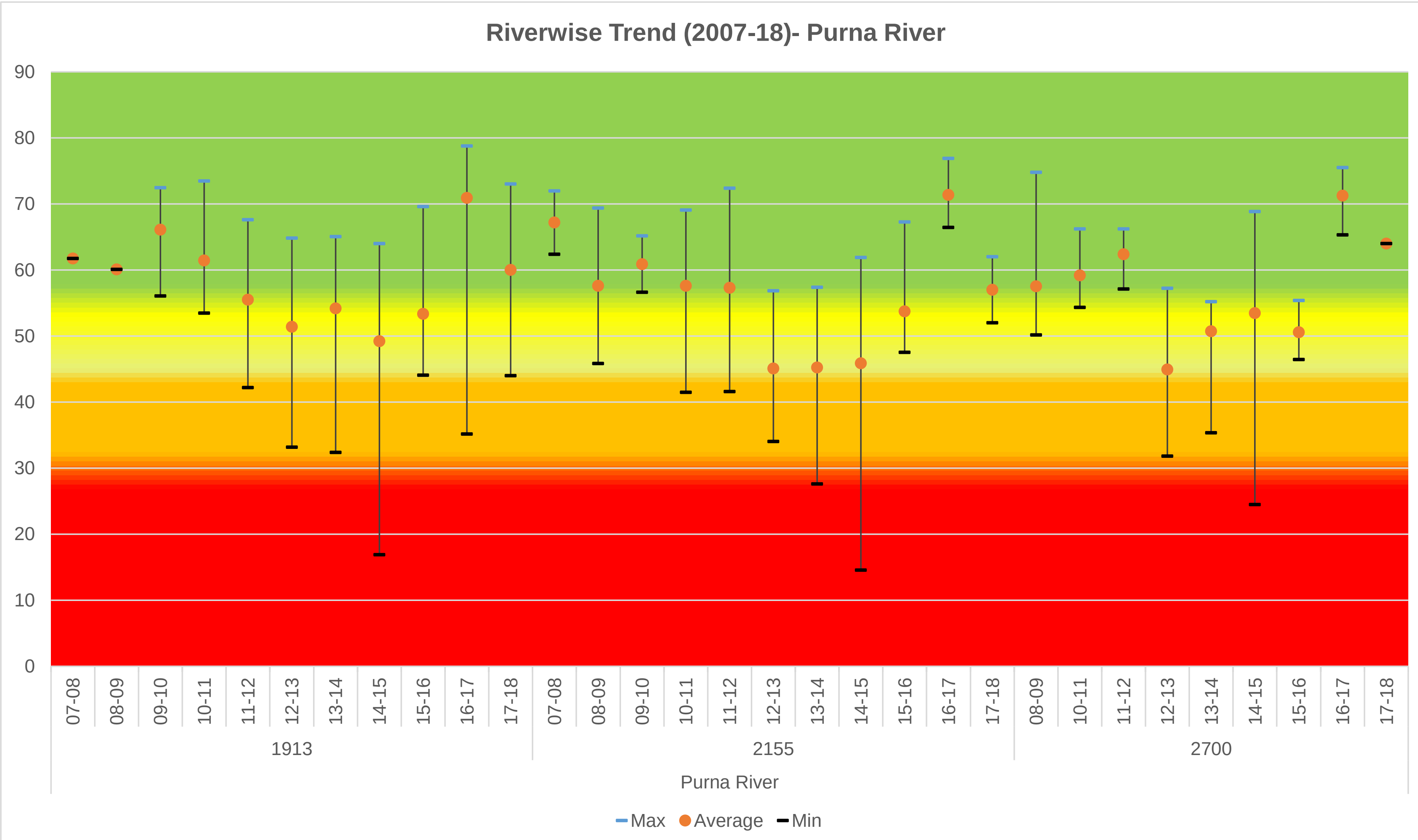
Riverwise Trend (2007-18)- PantalgangaRiver (2 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2687
2688
2689
Patalganga river
Max
Average
Min



Riverwise Trend (2007-18)- Pawana River (1 of 2)
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2196
2690
2691
Pawana river
Max
Average
Min

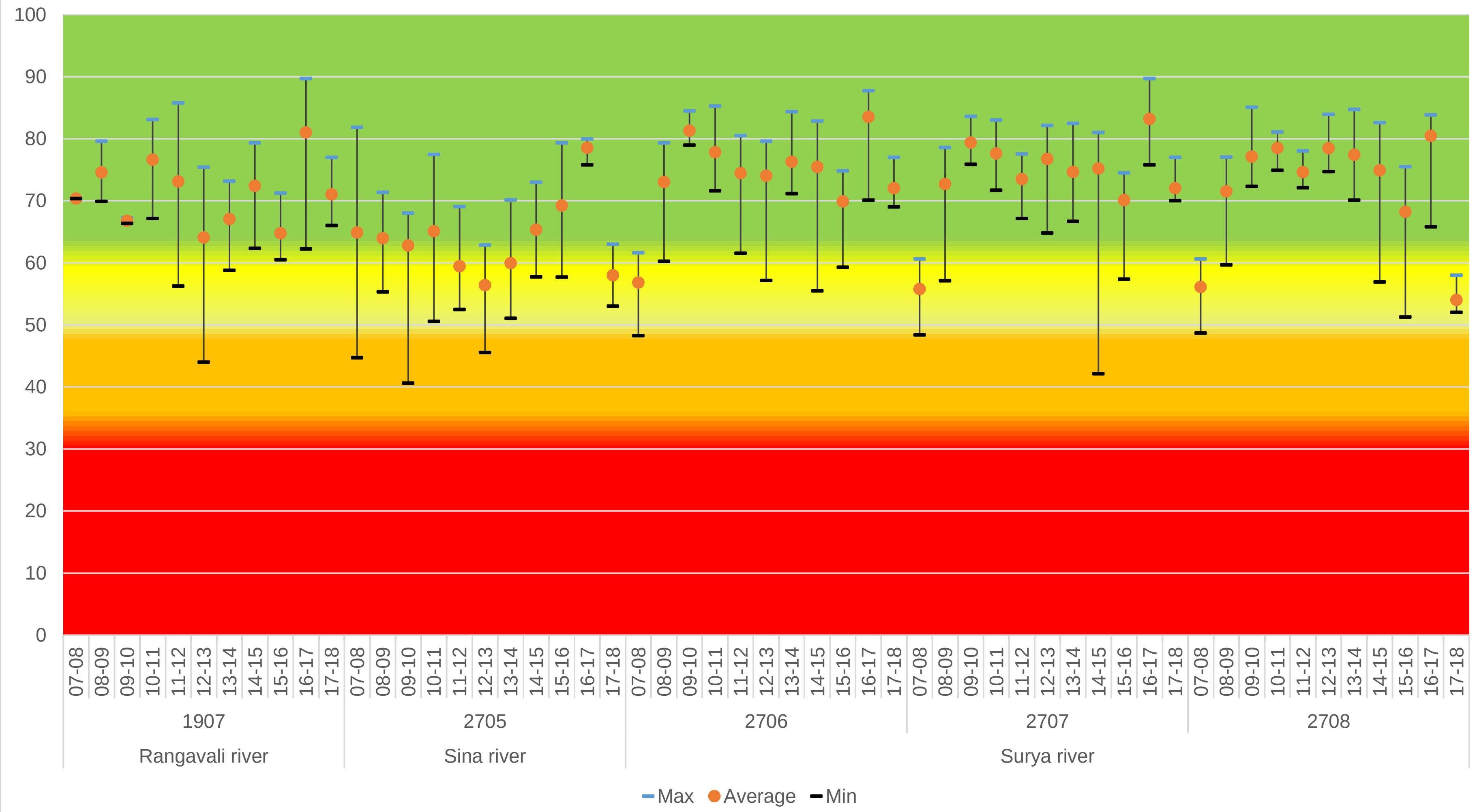

Riverwise Trend (2007-18)- Pawana River (2 of 2)
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2692
2693
2694
Pawana river
Max
Average
Min

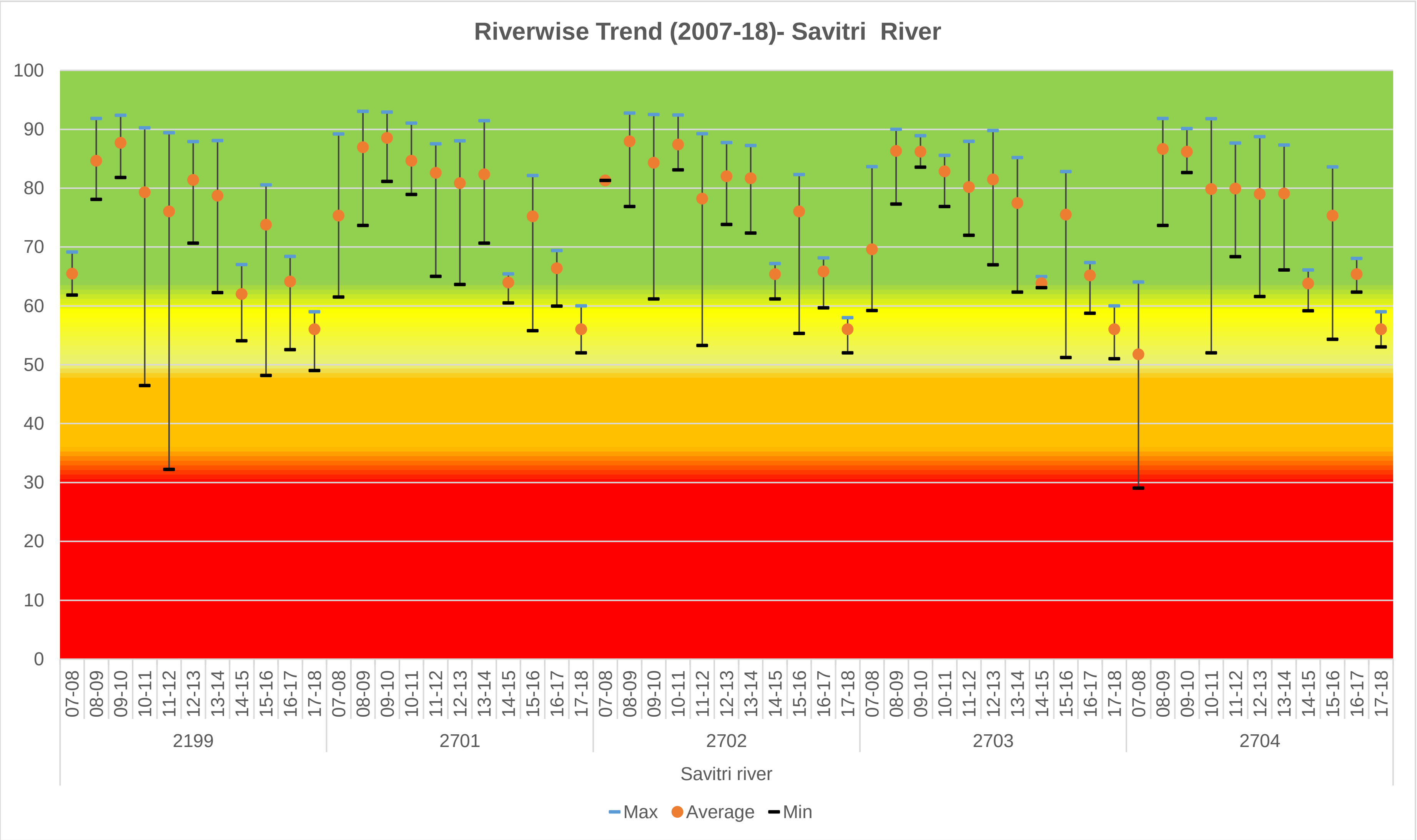

Riverwise Trend (2007-18)- Pedhi, Pelhar & Penganga River
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2695
2696
2697
2698
2699
Pedhi river
Pelhar River
Penganga river
Max
Average
Min



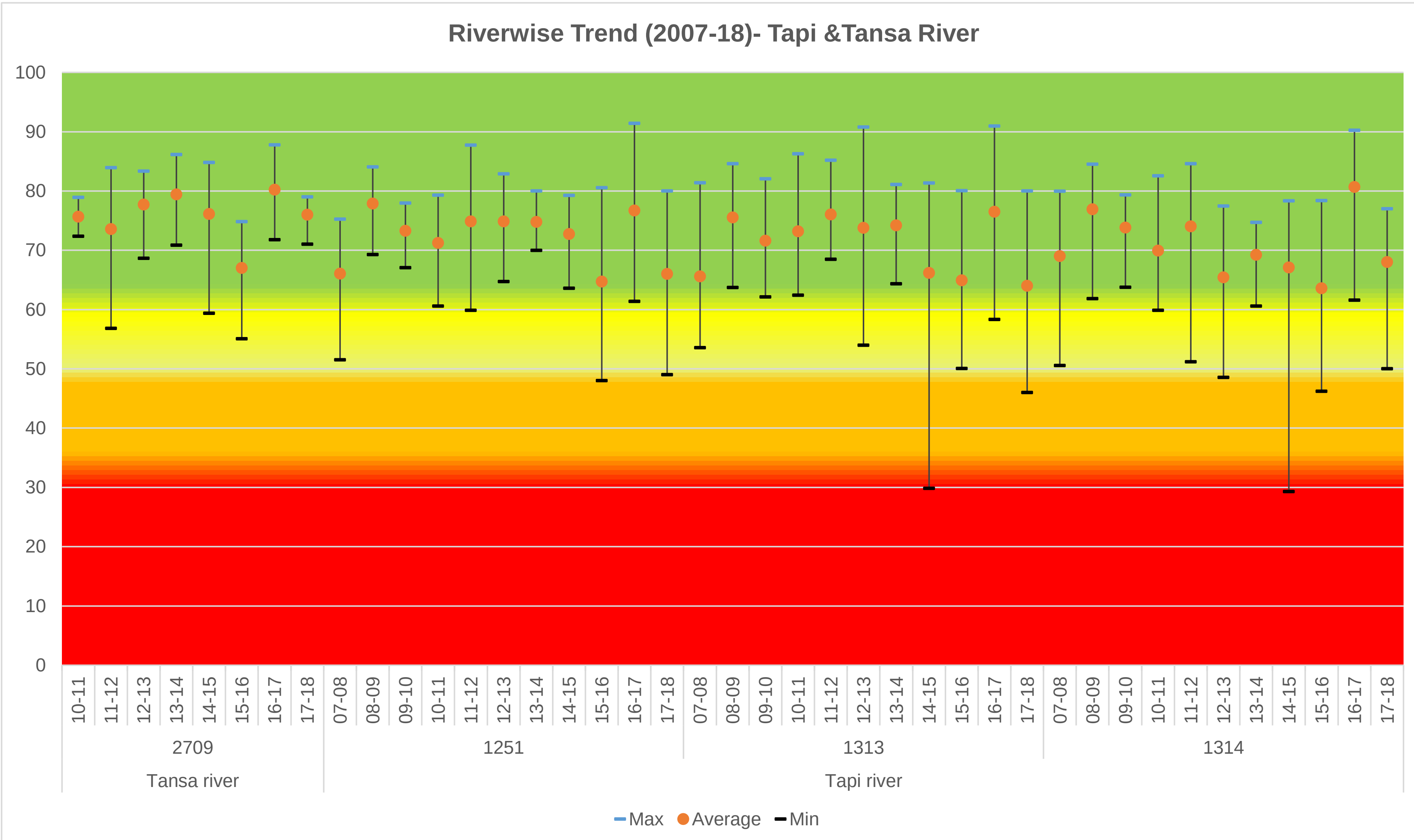
Riverwise Trend (2007-18)- Purna River
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1913
2155
2700
Purna River
Max
Average
Min

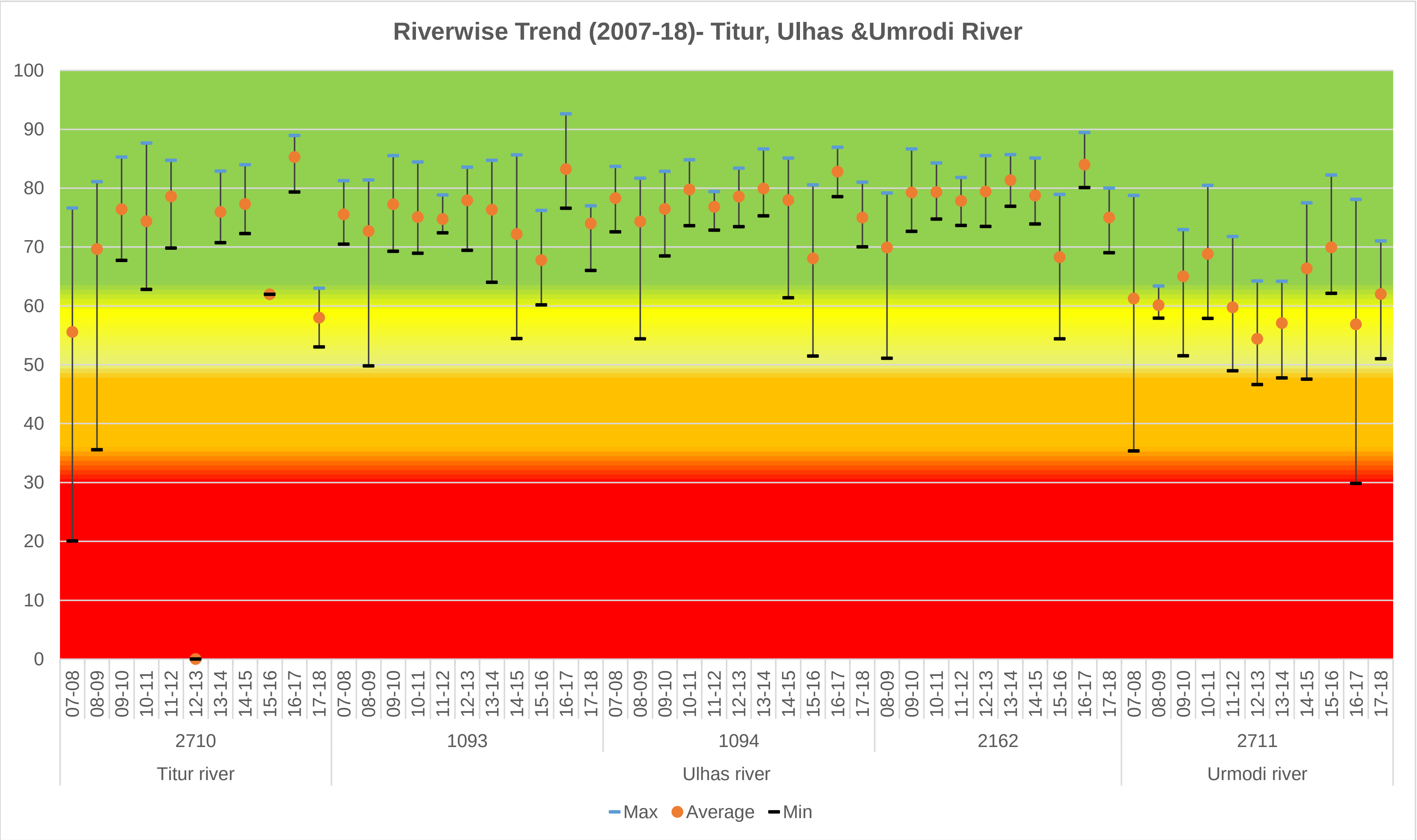
Riverwise Trend (2007-18)- Rangavali, Sina & Surya River



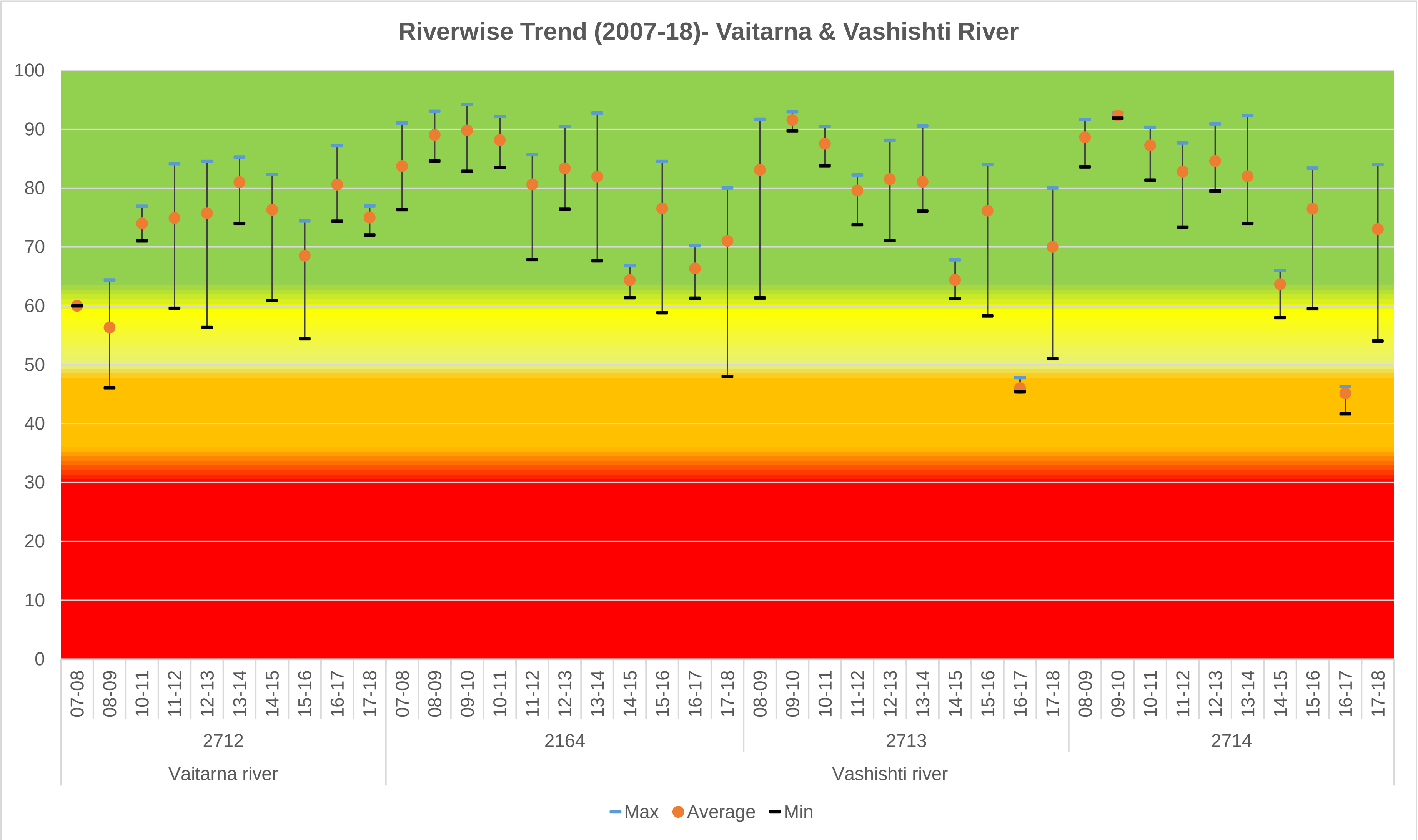


Riverwise Trend (2007-18)- Savitri River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2199
2701
2702
2703
2704
Savitri river
Max
Average
Min

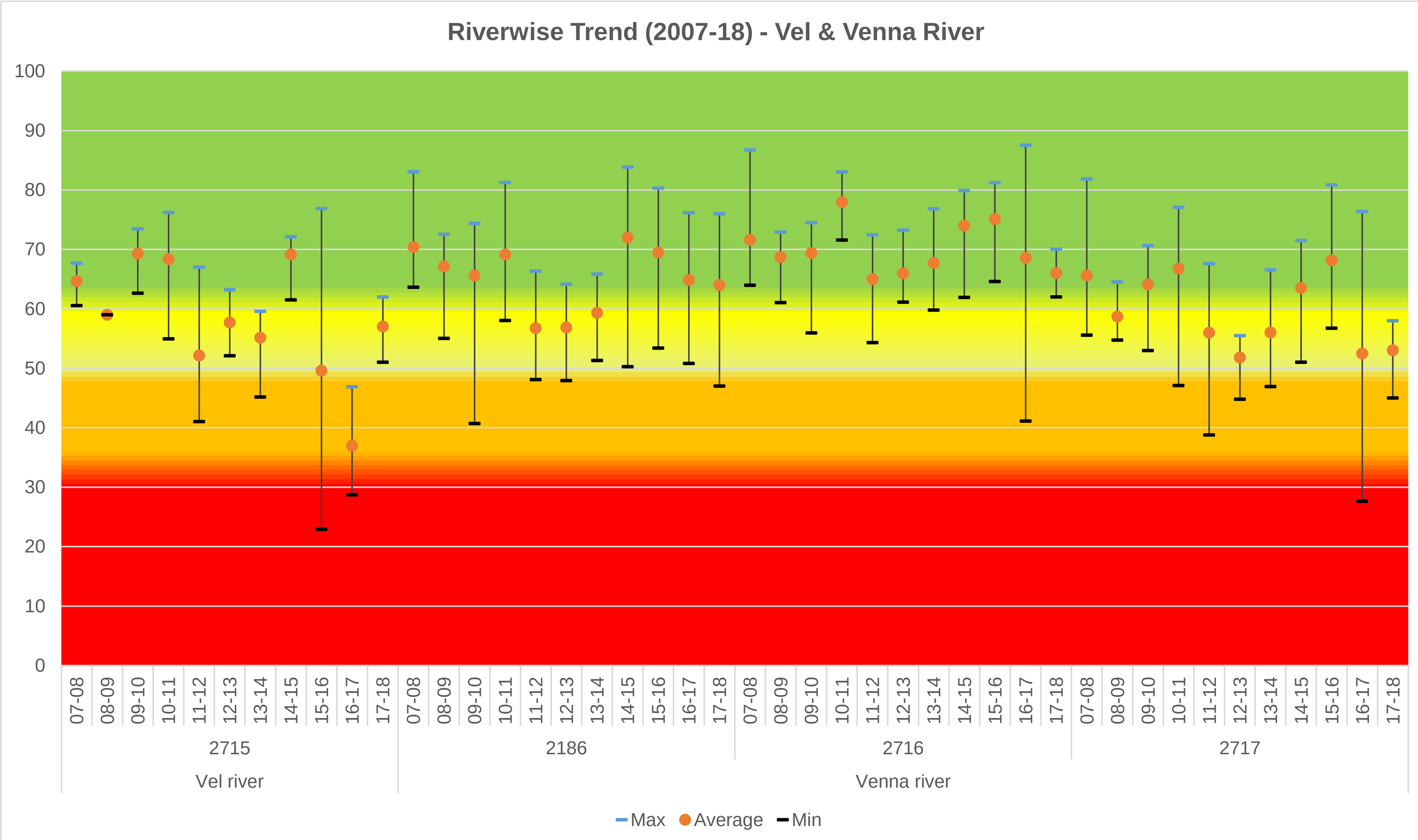

Riverwise Trend (2007-18)- Tapi &Tansa River
100
90
80
70
60
50
40
30
20
10
0
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2709
1251
1313
1314
Tansa river
Tapi river
Max
Average
Min

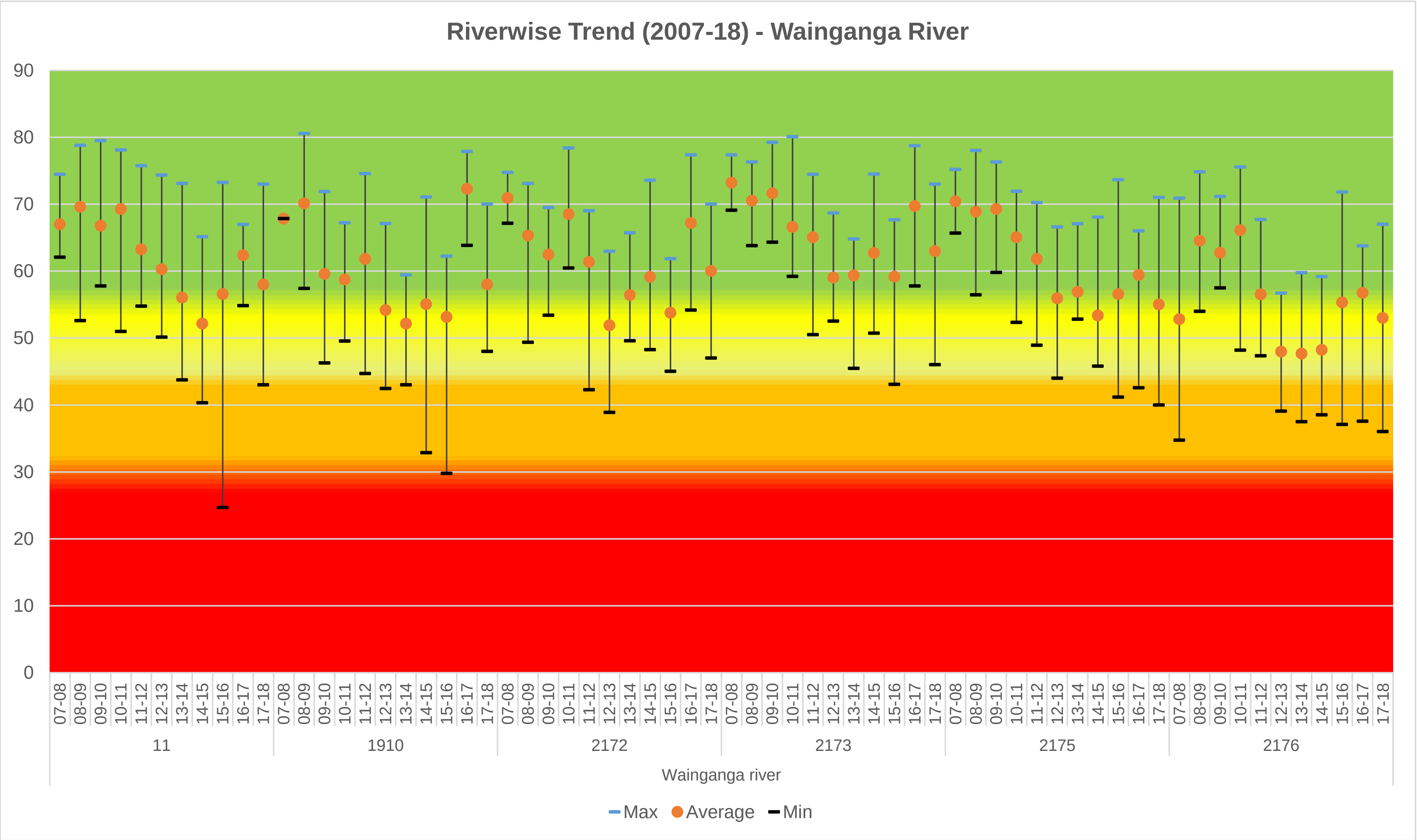


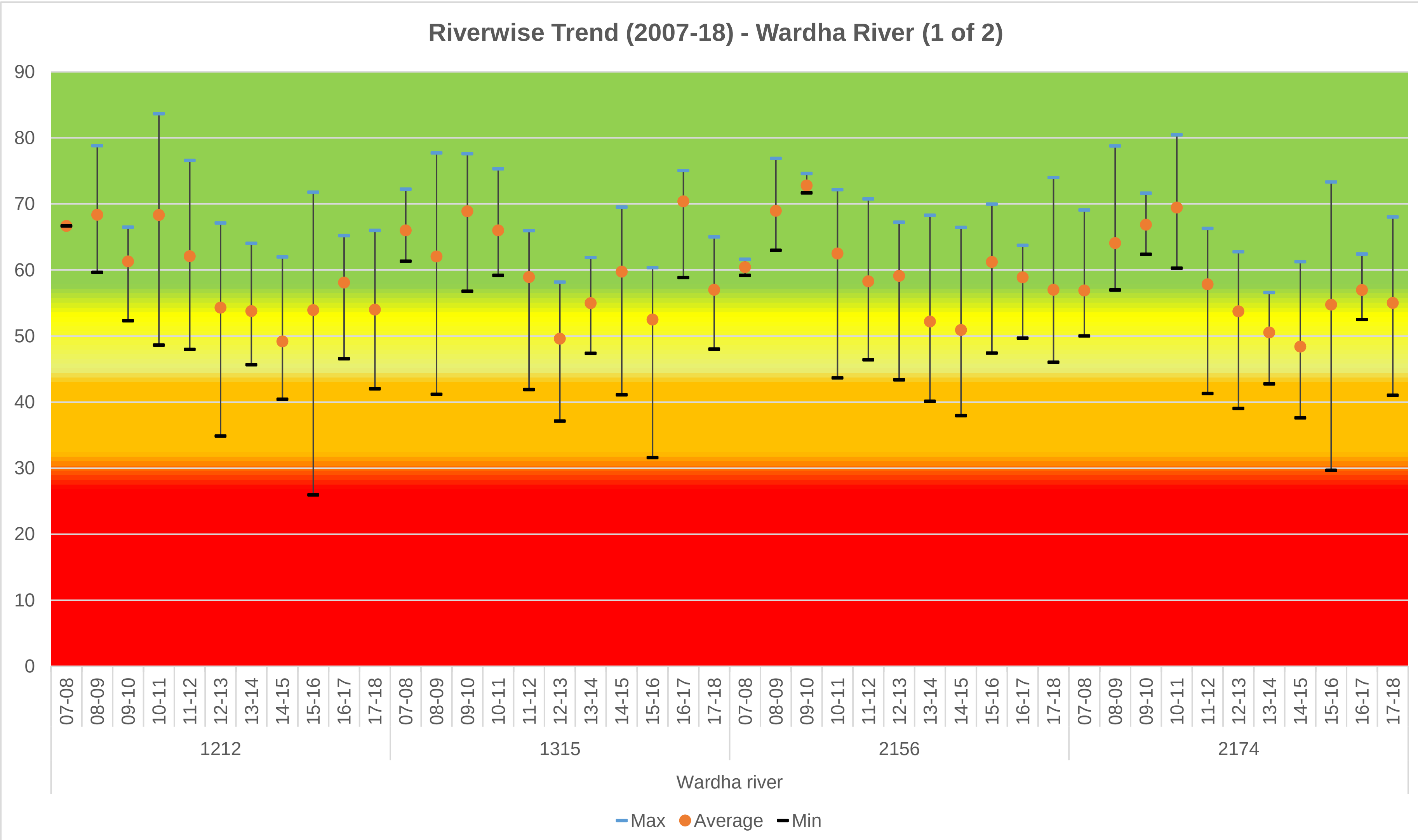
Riverwise Trend (2007-18)- Titur, Ulhas &Umrodi River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2710
1093
1094
2162
2711
Titur river
Ulhas river
Urmodi river
Max
Average
Min

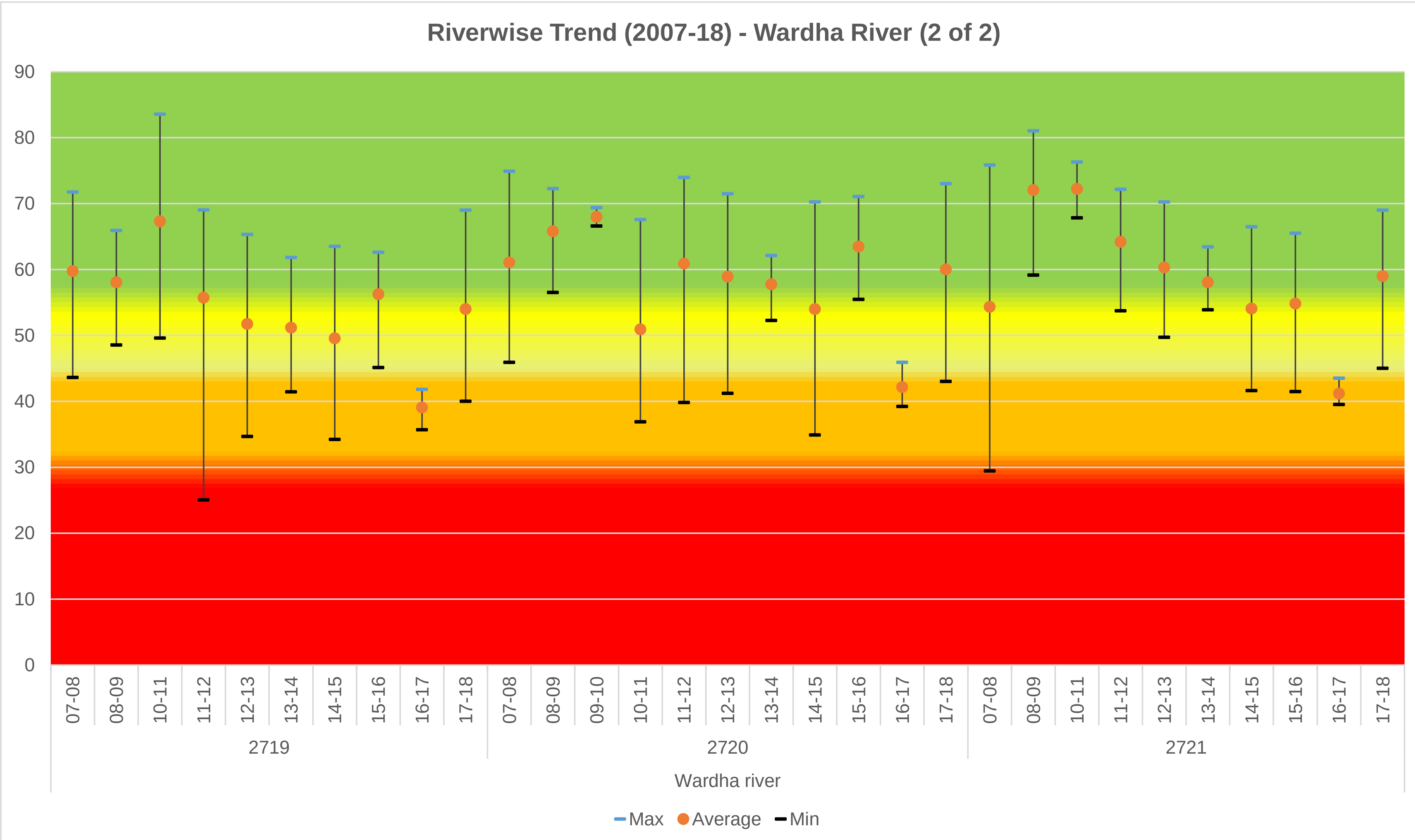


Riverwise Trend (2007-18)- Vaitarna & Vashishti River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2712
2164
2713
2714
Vaitarna river
Vashishti river
Max
Average
Min

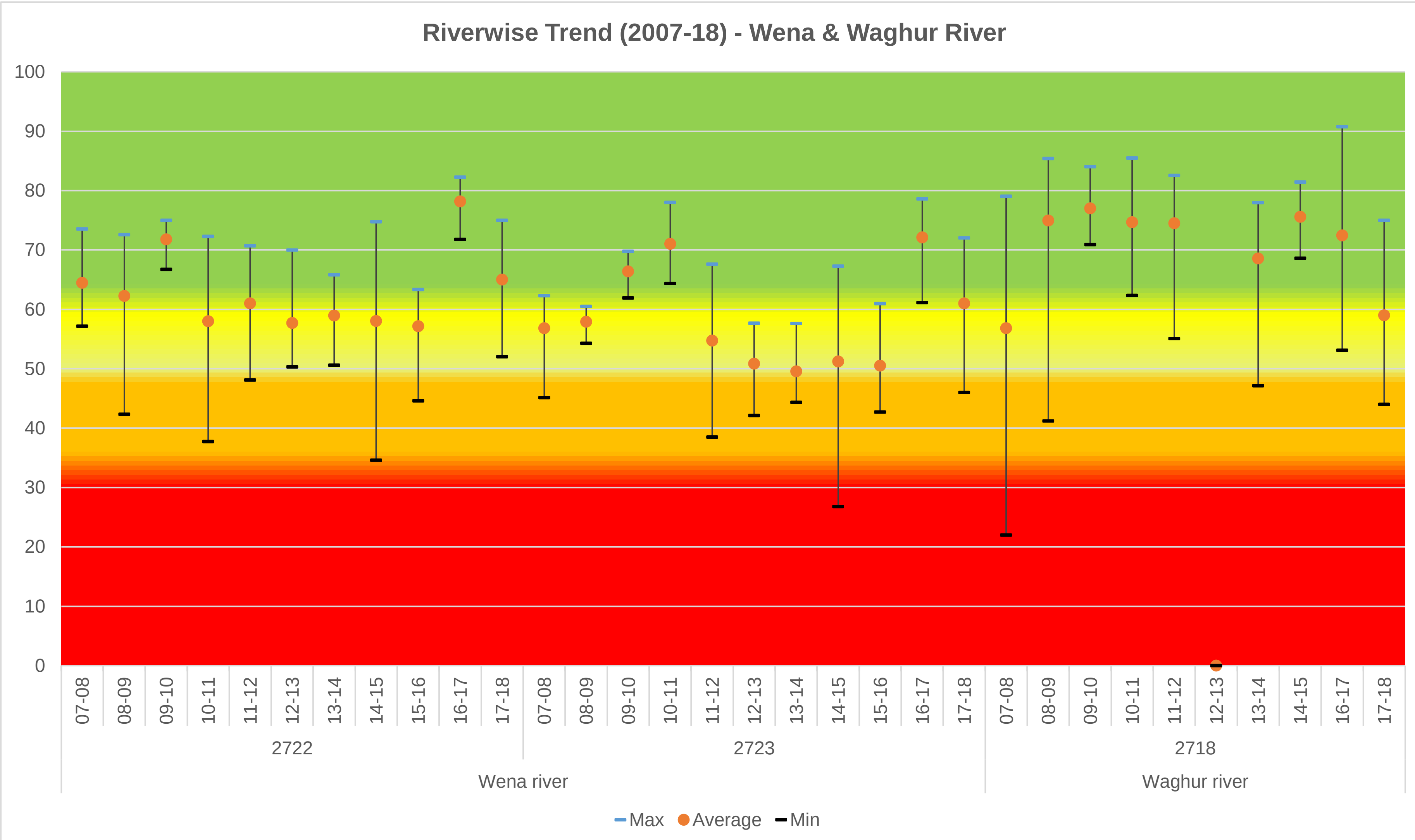

Riverwise Trend (2007-18) - Vel & Venna River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2715
2186
2716
2717
Vel river
Venna river
Max
Average
Min


Riverwise Trend (2007-18) - Wainganga River
0
10
20
30
40
50
60
70
80
90
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
11
1910
2172
2173
2175
2176
Wainganga river
Max
Average
Min


Riverwise Trend (2007-18) - Wardha River (1 of 2)
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
1212
1315
2156
2174
Wardha river
Max
Average
Min



Riverwise Trend (2007-18) - Wardha River (2 of 2)
90
80
70
60
50
40
30
20
10
0
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2719
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2720
07-08
08-09
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2721
Wardha river
Max
Average
Min


Riverwise Trend (2007-18) - Wena & Waghur River
100
90
80
70
60
50
40
30
20
10
0
07-08
08-09
09-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
2722
2723
2718
Wena river
Waghur river
Max
Average
Min

Stationwise Trend in WQI (2007-18)

Saline water

Raigad & Ratnagiri District

District	Station Code	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	Trend	Quality
Raigad	1317	57	56	59	59	49	50	55	57	48	52	45		Quality Deteriorated
Raigad	2803		56		47	55	55	70	69	58	58	52		No Significan Change
Raigad	191									48	48	46		No Significan Change
Ratnagiri	2804					82	82	79	63	77	64	69		Quality Deteriorated
Ratnagiri	2813	75	79	87	83	75	77	76	62	74	60	62		Quality Deteriorated
Ratnagiri	2815	76	83	86	85	78	73	76	53	72	58	60		Quality Deteriorated
Ratnagiri	2814	75	81	86	83	74	76	75	54	71	59	61		Quality Deteriorated

CAGR: Compound Annual Growth Rate= ((End value/Start value) ^ (1/Number of intervals)) - 1
Number of intervals = (Number of observations)-1 *100

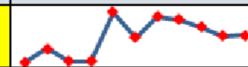
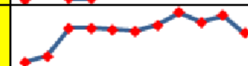
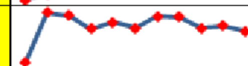
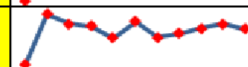
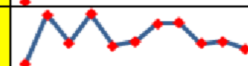
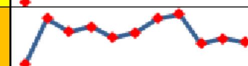
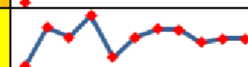
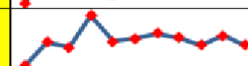
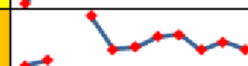
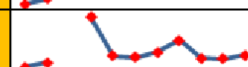
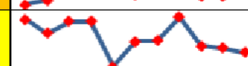
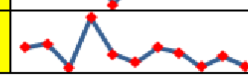
Calculation:
Station code: 1317
WQI of 2017-18 (End value) → 48; WQI of 2007-08 (Start value) → 57; Number of intervals→ 08
CAGR %= ((End value/Start Value) ^1/Number of intervals)) - 1 X 100
= ((48/57) ^ (1/8)-1 *100
= -2.29%
=Quality Deteriorated

Mumbai District

District	Station Code	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	Trend	Quality	CAGR %
Mumbai	2809	41	53	46	54	51	48	55	55	45	48	43		No Significant Change	0.69
Mumbai	2811	36	52	47	60	49	50	51	52	48	48	45		Quality Improved	2.97
Mumbai	2810					51	49	54	51	47	48	43		Quality Deteriorated	-2.00
Mumbai	2167	0	53	54	59	48	51	53	55	48	47	43		Quality Deteriorated	-2.45
Mumbai	2165	55	50	60	60	46	49	55	54	47	47	44		Quality Deteriorated	-2.78
Mumbai	2169		54	57	58	45	46	55	50	45	47	41		Quality Deteriorated	-3.32
Mumbai	2166	54	52	60	60	46	49	54	55	45	47	45		Quality Deteriorated	-2.10
Mumbai	1318	53	44	49	48	47	51	54	49	50	50	46		Quality Deteriorated	-1.71
Mumbai	2812	44	57	47	58	45	48	52	53	46	47	45		No Significant Change	0.16
Mumbai	2808	46	52	49	60	49	51	54	55	46	47	44		No Significant Change	-0.45

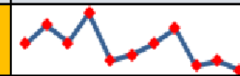
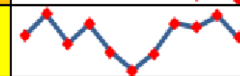
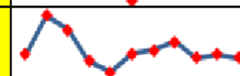
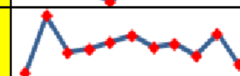
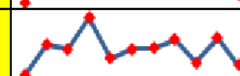
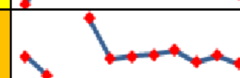
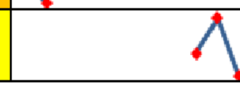
For calculation of CAGR refer to Pg No.270

Thane District (1 of 2)

District	Station Code	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	Trend	Quality	CAGR %
Thane	2791	43	48	43	43	63	52	61	60	57	53	53		Quality Improved	2.77
Thane	2800	44	46	56	56	55	55	56	61	57	60	54		Quality Improved	2.44
Thane	2795	44	60	59	55	57	55	59	59	55	56	54		Quality Improved	2.52
Thane	2185	44	59	56	55	52	56	52	53	54	56	54		Quality Improved	2.56
Thane	2796	48	62	54	63	53	55	60	60	54	55	53		Quality Improved	1.06
Thane	2806	38	59	53	55	50	52	59	61	47	49	48		Quality Improved	2.99
Thane	2797	43	58	55	63	47	54	58	58	52	54	54		Quality Improved	2.74
Thane	2802	42	53	50	66	53	55	57	55	52	56	52		Quality Improved	2.46
Thane	2798	41	43		68	49	51	56	58	49	54	49		Quality Improved	2.46
Thane	2807	41	43		69	47	46	49	56	46	45	48		Quality Improved	1.99
Thane	2184	61	57	60	60	49	55	55	61	54	53	52		Quality Deteriorated	-1.87
Thane	1316	58	59	51	67	55	53	57	56	52	55	52		Quality Deteriorated	-1.29

For calculation of CAGR refer to Pg No.270

Thane Ditrict (2 of 2)

District	Station Code	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	Trend	Quality	CAGR %
Thane	2805	56	62	56	65	50	52	55	60	48	50	47		Quality Deteriorated	-2.07
Thane	2793	53	57	52	55	50	47	50	55	54	56	53		No Significant Change	-0.11
Thane	2792	55	63	60	54	51	55	56	57	54	55	54		No Significant Change	-0.16
Thane	2794	52	61	55	55	57	58	56	56	54	58	53		No Significant Change	0.31
Thane	2801	49	57	56	64	54	56	56	58	52	59	52		No Significant Change	0.56
Thane	2799	52	42		72	51	52	53	55	49	52	48		No Significant Change	-0.93
Thane	190									52	53	51		No Significant Change	-0.21

For calculation of CAGR refer to Pg No.270

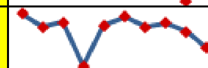
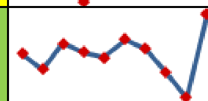
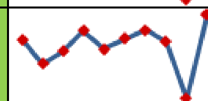
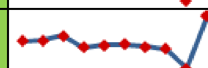
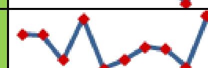
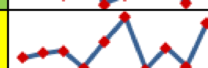
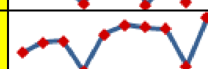
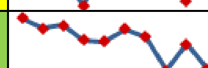
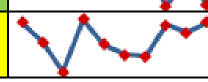
Surface water

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
11	68	70	67	69	63	61	56	52	57	62	57		Quality Deteriorated	-2.02
12	80	84	75	70	79	78	75	84	71	81	73		Quality Deteriorated	-1.24
28	80	68	63	65	55	58	59	63	65	67	56		Quality Deteriorated	-4.48
36	81	68	66	67	59	58	51	65	73	66	60		Quality Deteriorated	-3.68
37	70	86	86	84	76	78	76	62	78	66	72		No Significant Change	0.33
178									68	82	66		No Significant Change	-0.43
179										81	38			-8.95
180									60	67	42		Quality Deteriorated	-4.21
181									62	65	53		Quality Deteriorated	-1.96
182									63	68	40		Quality Deteriorated	-5.48
183									58	76	58		No Significant Change	0.20
184									66	81	64		No Significant Change	-0.37
185									51	71	60		Quality Improved	2.12

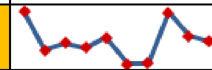
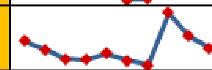
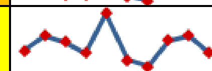
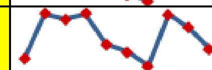
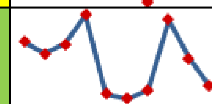
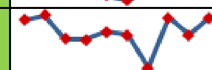
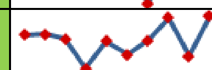
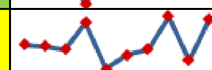
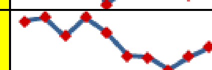
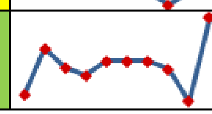
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
186									32	38	28		Quality Deteriorated	-1.73
187									33	40	30		Quality Deteriorated	-1.16
188									38	41	29		Quality Deteriorated	-3.28
189									47	45	31		Quality Deteriorated	-5.36
192									72	83	55		Quality Deteriorated	-3.36
193									71	81	56		Quality Deteriorated	-2.95
194									62	88	55		Quality Deteriorated	-1.64
195									48	60	44		Quality Deteriorated	-1.05
196									59	65	45		Quality Deteriorated	-3.30
197									50	54	54		Quality Improved	1.11
198									78	64	69		Quality Deteriorated	-1.52
199									78	64	69		Quality Deteriorated	-1.44
200									77	64	69		Quality Deteriorated	-1.37
201									79	65	69		Quality Deteriorated	-1.68
202									79	65	71		Quality Deteriorated	-1.35
203									79	66	71		Quality Deteriorated	-1.38
204									78	65	70		Quality Deteriorated	-1.41
216									65	62	34		Quality Deteriorated	-7.96

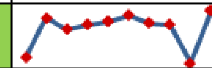
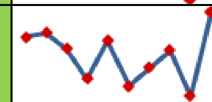
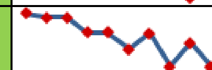
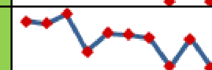
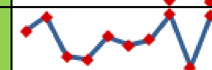
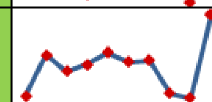
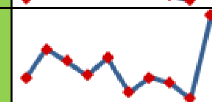
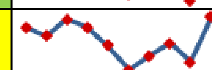
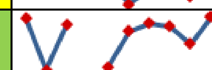
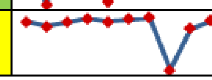
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
186									32	38	28		Quality Deteriorated	-1.73
187									33	40	30		Quality Deteriorated	-1.16
188									38	41	29		Quality Deteriorated	-3.28
189									47	45	31		Quality Deteriorated	-5.36
192									72	83	55		Quality Deteriorated	-3.36
1092	72	65	68	45	66	70	65	67	63	54	60		Quality Deteriorated	-2.27
1093	76	73	77	76	75	78	76	72	68	82	74		No Significant Change	-0.31
1094	78	74	76	80	77	79	80	78	68	82	74		No Significant Change	-0.63
1095	78	79	81	76	77	77	77	76	69	88	64		Quality Deteriorated	-2.49
1096	74	74	66	79	63	66	70	69	63	80	68		Quality Deteriorated	-1.04
1151	73	74	74	71	76	81	70	75	71	80	55		Quality Deteriorated	-3.43
1152	72	74	75	69	76	78	77	77	70	79	53		Quality Deteriorated	-3.87
1153	87	82	84	76	76	81	78	63	75	63	69		Quality Deteriorated	-2.75
1188	67	62	55	68	62	59	59	67	65	67	57		Quality Deteriorated	-2.13

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
1189	55	42	44	43	46	37	37	54	47	45	47		Quality Deteriorated	-1.99
1190	48	41	34	34	39	33	30	70	52	43	45		Quality Deteriorated	-1.05
1191	54	64	60	52	81	47	42	61	64	52	59		Quality Improved	1.20
1192	43	71	67	71	52	47	39	70	62	49	55		Quality Improved	3.05
1194	76	74	75	79	70	69	70	78	74	70	73		No Significant Change	-0.48
1209	82	84	73	73	77	75	61	83	75	83	72		Quality Deteriorated	-1.67
1210	80	80	80	74	79	77	79	83	76	84	72		Quality Deteriorated	-1.32
1211	69	68	67	77	59	65	67	80	63	79	63		Quality Deteriorated	-1.15
1212	67	68	61	68	63	54	54	49	54	57	55		Quality Deteriorated	-2.38
1251	66	78	73	71	75	75	75	73	65	86	66		No Significant Change	0.02

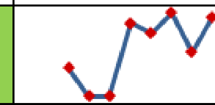
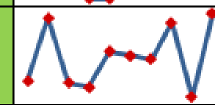
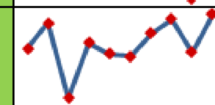
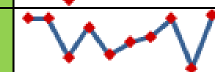
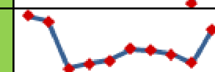
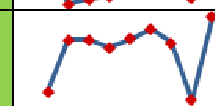
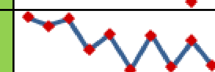
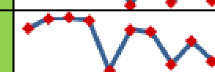
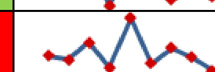
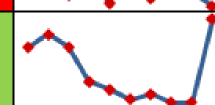
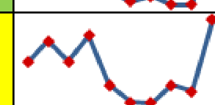
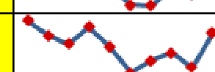
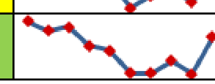
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
1252	53	77	70	73	74	78	74	73	50	81	67		Quality Improved	3.08
1253	78	79	75	67	77	65	70	74	63	84	73		No Significant Change	-0.79
1310	86	84	84	78	78	70	77	63	73	63	69		Quality Deteriorated	-2.71
1311	83	82	87	69	78	77	75	61	75	61	69		Quality Deteriorated	-2.33
1312	81	84	75	75	80	78	79	85	73	85	75		Quality Deteriorated	-1.03
1313	66	76	72	73	76	74	74	66	65	85	64		No Significant Change	-0.29
1314	69	77	74	70	75	65	69	68	64	86	68		No Significant Change	-0.13
1315	66	62	69	66	59	50	55	60	52	70	57		Quality Deteriorated	-1.77
1461	82	57	78		58	75	79	78	69	82	73		Quality Deteriorated	-1.38
1462	77	73	76	81	78	80	82	31	71	78	55		Quality Deteriorated	-4.25

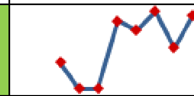
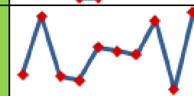
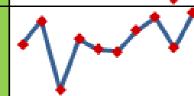
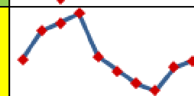
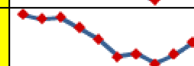
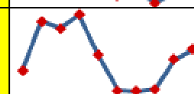
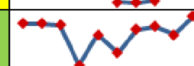
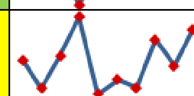
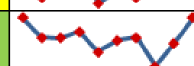
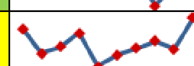
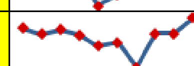
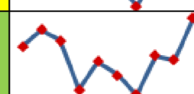
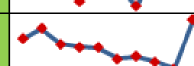
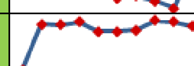
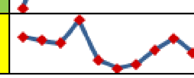
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
1463	69	65	67	70	62	63	71	67	67	58	60		Quality Deteriorated	-1.77
1904	86	86	87	83	78	82	75	62	75	63	68		Quality Deteriorated	-2.87
1905	86	82	82	75	76	80	73	61	75	63	67		Quality Deteriorated	-2.92
1906	83	82	85	80	77	77	76	64	77	65	72		Quality Deteriorated	-1.80
1907	70	75	67	77	73	65	67	72	65	88	71		No Significant Change	0.14
1908	75	71	61	70	60	57	55	56	55	72	60		Quality Deteriorated	-2.64
1909	69	70	65	66	59	56	53	54	53	69	60		Quality Deteriorated	-1.87
1910	68	70	60	59	62	54	52	55	53	72	59		Quality Deteriorated	-1.82
1911	67	66	68	72	65	63	80	62	65	72	56		Quality Deteriorated	-2.30
1912	67	60	60	68	59	56	58	52	62	62	51		Quality Deteriorated	-3.50
1913	62	60	67	61	55	51	54	49	53	70	59		No Significant Change	-0.58
2155	67	58	61	58	57	46	45	46	54	70	57		Quality Deteriorated	-1.94
2156	60	69	73	62	58	59	52	51	61	58	57		No Significant Change	-0.71

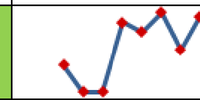
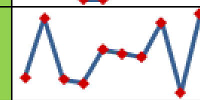
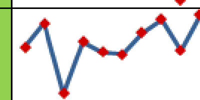
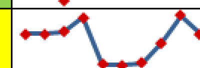
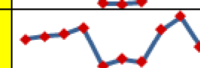
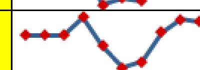
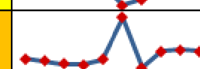
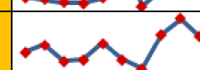
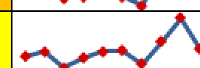
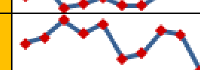
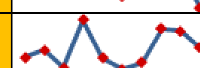
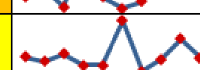
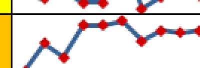
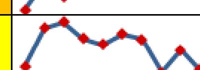
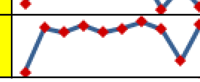
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2157			69	61	61	81	78	83	73	82	72		No Significant Change	0.59
2158	76	84	75	75	79	79	78	83	73	85	70		No Significant Change	-0.91
2159	75	82	61	76	73	73	79	83	74	84	73		No Significant Change	-0.25
2160	84	84	75	82	75	78	80	84	72	85	72		Quality Deteriorated	-1.85
2161	85	83	74	75	75	78	77	77	75	82	74		Quality Deteriorated	-1.65
2162		70	79	79	78	79	81	79	68	84	75		No Significant Change	0.85
2163	87	82	86	70	78	60	78	62	75	62	68		Quality Deteriorated	-2.95
2164	84	89	90	88	61	83	82	64	77	66	72		Quality Deteriorated	-1.83
2168		40	38	47	34	61	36	44	39	32	34		Quality Deteriorated	-2.11
2170	70	74	71	62	60	58	59	57	57	77	66		No Significant Change	-0.89
2171	61	66	62	68	56	52	52	56	54	72	61		No Significant Change	-0.18
2172	71	65	62	69	61	52	56	59	54	66	61		Quality Deteriorated	-1.77
2173	73	71	72	67	65	59	59	63	59	69	64		Quality Deteriorated	-1.75

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2157			69	61	61	81	78	83	73	82	72		No Significant Change	0.59
2158	76	84	75	75	79	79	78	83	73	85	70		No Significant Change	-0.91
2159	75	82	61	76	73	73	79	83	74	84	73		No Significant Change	-0.25
2174	57	65	67	69	58	54	51	48	55	57	55		No Significant Change	-0.43
2175	70	69	69	66	62	56	57	53	57	61	55		Quality Deteriorated	-3.06
2176	53	65	63	66	57	48	48	48	55	58	54		No Significant Change	0.20
2177	76	76	75	40	67	51	71	73	67	83	69		Quality Deteriorated	-1.19
2178	61	51	62	76	49	54	51	68	59	72	59		No Significant Change	-0.46
2179	80	68	68	72	60	67	68	51	65	80	63		Quality Deteriorated	-2.89
2180	74	60	64	72	53	60	63	67	63	80	62		Quality Deteriorated	-2.26
2181	71	64	70	64	52	56	30	65	65	82	58		Quality Deteriorated	-2.49
2182	74	81	76	53	66	60	51	69	67	87	70		No Significant Change	-0.65
2183	79	84	77	76	76	71	72	70	67	87	69		Quality Deteriorated	-1.67
2186	7	67	66	69	57	57	59	72	69	64	65		Quality Improved	31.27
2187	66	65	64	72	58	54	56	61	66	60	54		Quality Deteriorated	-2.44

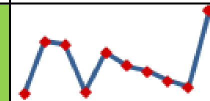
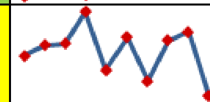
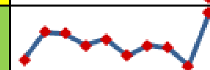
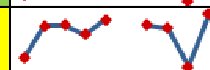
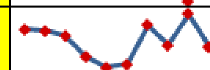
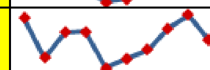
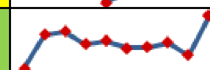
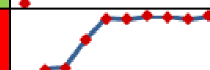
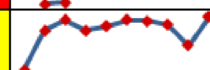
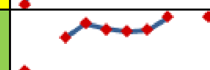
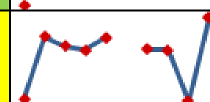
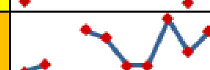
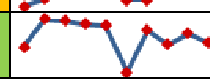
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2157			69	61	61	81	78	83	73	82	72		No Significant Change	0.59
2158	76	84	75	75	79	79	78	83	73	85	70		No Significant Change	-0.91
2159	75	82	61	76	73	73	79	83	74	84	73		No Significant Change	-0.25
2188	64	64	65	69	55	55	56	62	70	64	54		Quality Deteriorated	-2.08
2189	66	66	67	69	59	60	60	68	72	64	59		Quality Deteriorated	-1.28
2190	63	63	63	69	59	51	53	64	68	68	57		Quality Deteriorated	-1.18
2191	35	33	30	29	34	71	27	41	42	41	43		Quality Improved	2.87
2192	38	42	33	33	42	33	29	47	56	46	46		Quality Improved	2.45
2193	45	46	41	44	46	47	42	50	58	47	52		Quality Improved	1.90
2194	40	46	35	36	39	36	36	42	58	44	46		Quality Improved	1.69
2195	55	57	62	58	61	50	52	59	58	46	49		Quality Deteriorated	-1.27
2196	39	43	33	60	39	33	36	55	54	45	45		Quality Improved	1.75
2197	57	55	58	54	54	71	51	56	64	57	51		Quality Deteriorated	-1.25
2198	44	62	53	73	73	76	63	70	68	70	48		Quality Improved	1.11
2199	65	85	88	79	76	81	79	63	74	64	56		Quality Deteriorated	-1.89
2651	65	78	76	78	77	78	80	77	69	78	54		Quality Deteriorated	-2.30

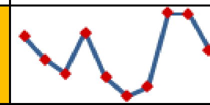
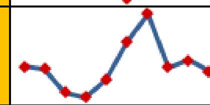
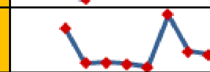
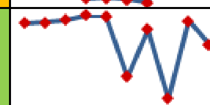
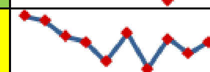
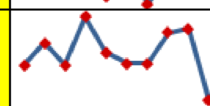
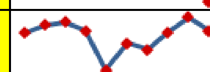
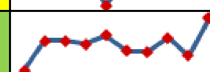
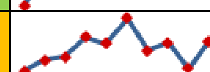
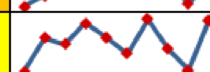
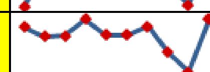
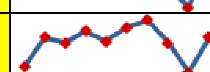
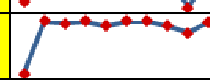
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2652	56	77	72	80	75	31	65	64	64	87	No data		Quality Improved	5.50
2653	66	61		79	76	77	61	78	72	78	72		Quality Improved	1.16
2654	65	61		79	77	78	79	77	72	79	72		Quality Improved	1.28
2655	63	65	57	66	57	46	54	63	68	58	53		Quality Deteriorated	-2.13
2656	65	68	68	75	64	59	59	41	62	58	67		No Significant Change	0.33
2657	75	78	68	76	78	76	78	41	71	83	73		No Significant Change	-0.44
2658	60	74	72	80	80	83	73	75	53	83	68		Quality Improved	1.43
2659	58	72	72	73	75	63	40	76	59	90	No data		Quality Improved	5.74
2660	61	75	82	8	73	72	72	71	68	89	72		Quality Improved	1.92
2661	61	78	77	78	75	75	72	72	68	89	67		Quality Improved	1.22
2662	68	77	79	63	75	77	74	75	67	88	69		No Significant Change	0.30
2663	67	78	78	62	75	76	74	73	68	87	70		No Significant Change	0.54

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2664	67	80	79	67	77	74	72	70	69	88	72		No Significant Change	0.92
2665	57	59	60	67	54	61	51	60	62	48	54		No Significant Change	-0.74
2666	59	78	77	69	73	62	69	67	55	90	65		Quality Improved	1.19
2667	52	75	75	68	78		75	72	46	83	60		Quality Improved	1.65
2668	60	59	58	52	49	49	61	55	64	55	51		Quality Deteriorated	-1.99
2669	65	55	61	61	53	55	57	62	65	59	57		Quality Deteriorated	-1.55
2670	57	77	79	71	73	69	70	73	65	89	70		Quality Improved	2.53
2671		5	6	36	59	59	62	61	58	61	38		Quality Improved	30.17
2672	60	75	79	75	77	79	79	77	69	80	55		Quality Deteriorated	-1.05
2673	55		73	81	78	76	77	85		85	69		Quality Improved	2.96
2674	56	79	75	74	78		74	74	56	86	60		No Significant Change	0.73
2675	38	42		64	59	41	41	71	50	63	46		Quality Improved	2.47
2676	59	91	89	85	84	31	79	63	75	64	70		Quality Improved	2.11

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2677	52	46	43	53	42	36	39	59	58	49	48		No Significant Change	-0.97
2678	42	41	33	32	38	51	60	42	44	40	44		No Significant Change	0.52
2679			60	32	33	31	29	71	41	39	42		Quality Deteriorated	-4.34
2680	71	72	73	75	74	51	69	42	72	63	69		No Significant Change	-0.44
2681	68	65	59	56	48	60	45	58	51	56	51		Quality Deteriorated	-3.37
2682	59	63	59	68	61	59	59	65	66	52	56		No Significant Change	-0.58
2683	64	66	67	65	50	60	57	64	69	64	58		Quality Deteriorated	-1.20
2684	52	72	72	69	75	65	64	74	62	87	70		Quality Improved	3.76
2685	66	69	70	75	74	81	72	74	67	74	42		Quality Deteriorated	-5.67
2686	72	79	77	82	79	75	83	76	72	83	54		Quality Deteriorated	-3.35
2687	80	78	78	82	79	79	80	76	72	82	55		Quality Deteriorated	-4.48
2688	70	77	76	79	76	80	81	76	69	77	55		Quality Deteriorated	-3.07
2689	23	81	79	81	76	81	81	76	68	80	54		Quality Improved	11.24

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2690	46	44	36	41	37	34	37	49	44	44	44		No Significant Change	-0.53
2691	49	40	35	35	39	34	34	60	55	44	45		Quality Deteriorated	-1.09
2692	70	60	70	80	73	60	66	79	65	60	67		No Significant Change	-0.44
2693	61	55	49	56	46	46	45	57	53	49	48		Quality Deteriorated	-2.80
2694	43	48	35	43	35	35	37	52	53	45	43		No Significant Change	-0.10
2695	60	47	60	50	52	46	49	38	45	62	54		Quality Deteriorated	-1.15
2696								77	72	80	73		No Significant Change	-0.73
2697	66	69		69	63	30	55	53	55	60	58		Quality Deteriorated	-1.47
2698	62	76		59	64	21	55	50	57	59	55		Quality Deteriorated	-1.46
2699				72	55	48	53	53	52	70	58		Quality Deteriorated	-2.59
2700		58		59	62	45	81	53	51	70	64		Quality Improved	1.43
2701	75	87	89	85	83	40	82	64	75	66	56		Quality Deteriorated	-3.55
2702	81	88	84	87	78	82	82	65	76	66	56		Quality Deteriorated	-4.52

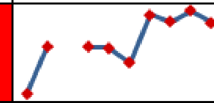
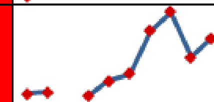
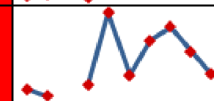
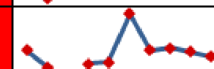
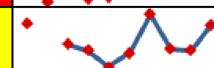
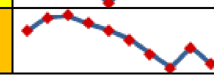
For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2703	70	86	86	83	50	81	77	64	75	65	56		Quality Deteriorated	-2.68
2704	52	87	86	80	80	79	80	64	75	65	57		Quality Improved	1.12
2705	65	64	63	66	59	56	60	65	69	78	58		Quality Deteriorated	-1.41
2706	57	73	81	78	74	74	76	75	70	83	72		Quality Improved	2.99
2707	56	73	79	78	73	77	75	75	70	83	72		Quality Improved	3.29
2708	57	72	77	78	75	78	77	75	68	82	54		No Significant Change	-0.65
2709				76	74	78	79	76	67	79	76		No Significant Change	0.00
2710	56	70	76	74	79		76	77	62	84	58		No Significant Change	0.54
2711	61	60	66	69	60	54	58	66	70	63	62		No Significant Change	0.22
2712	60	56		74	75	76	81	76	69	80	75		Quality Improved	2.81
2713		83	92	88	80	82	82	64	76	66	72		Quality Deteriorated	-1.80
2714		89	92	87	83	85	82	64	77	65	74		Quality Deteriorated	-2.17

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2715	65	59	69	68	52	58	55	69	50	49	57		Quality Deteriorated	-1.53
2716	72	69	69	78	65	66	68	74	75	74	65		Quality Deteriorated	-1.12
2717	66	59	65	67	56	52	56	64	68	59	53		Quality Deteriorated	-2.55
2718	57	75	77	75	74		69	76	51	86	59		No Significant Change	0.52
2719	60	58		67	56	52	51	50	56	58	53		Quality Deteriorated	-1.44
2720	62	66	68	51	80	59	58	54	63	61	59		No Significant Change	-0.58
2721	54	73		72	64	81	58	55	55	60	59		Quality Improved	1.14
2722	64	62	72	58	81	58	59	59	57	78	66		No Significant Change	0.32
2723	57	58	66	71	55	80	50	51	50	71	61		No Significant Change	0.84
2782	21	33	41	24	30	28	26	42	38	35	32		Quality Improved	5.01
2783	21	42	58	28	32	33	29	43	36	36	41		Quality Improved	8.50
2784	55	44	56	26	41	60	27	42	33	30	32		Quality Deteriorated	-6.50

For calculation of CAGR refer to Pg No.270

Station Code	07--08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		Quality	CAGR %
2785	19	24		24	24	22	27	26	28	26	20		No Significant Change	0.91
2786	19	20		18	23	26	39	46	31	37	21		No Significant Change	0.77
2787	20	18		21	43	24	35	39	31	24	22		No Significant Change	0.97
2788	34	13		16	19	80	33	36	32	26	21		Quality Deteriorated	-5.78
2789	71		52	46	30	43	80	47	46	70	55		Quality Deteriorated	-3.12
2790	79	87	88	83	79	73	65	56	69	59	49		Quality Deteriorated	-5.67

For calculation of CAGR refer to Pg No.270

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