Monitoring, Sampling and Analysis for Ambient Air Quality, Surface Water Quality and Ground Water Quality in Critically/Severely/Other Polluted

PIMPRI-CHINCHWAD

Post-Monsoon (December 2023 to February 2024)

Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

Index

ABBREVIATIONS

APHA	American Public Health Association
ASTM	American Society for Testing and Materials
BIS	Bureau of Indian Standards
BLQ	Below the Limit of Quantification
CAAQMS	Continuous Ambient Air Quality Monitoring Station
CEMS	Continuous Emission Monitoring System
CEPI	Comprehensive Environmental Pollution Index
CETP	Common Effluent Treatment Plant
CPA	Critically Polluted Area
CPCB	Central Pollution Control Board
EPA	Environmental Protection Act, 1986
GDP	Gross Domestic Product
MIDC	Maharashtra Industrial Development Corporation
MPCB	Maharashtra Pollution Control Board
NAAQS	National Ambient Air Quality Standard
NWMP	National Water Quality Monitoring Program
SPA	Severely Polluted Area
VOCs	Volatile Organic Compounds
WHO	World Health Organisation
ZLD	Zero Liquid Discharge

1. Executive Summary

Pimpri-Chinchwad was monitored for Ambient Air Quality, Ground and Surface Water quality. Based on the data collected by monitoring, a Comprehensive Environmental Pollution Index (CEPI) Score [as per latest directions 120 of Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016 of Central Pollution Control Board (CPCB)] was calculated. Maharashtra Pollution Control Board (MPCB) has carried out monitoring at CPCB location with the additional location of samplings for ambient air, surface and ground water in consideration with the previous CEPI monitoring and covering the entire CEPI Impact Zone. The post monsoon monitoring was carried out during the period of December 2023 to February 2024 to assess the ambient air quality, surface water quality and ground water quality.

The Ambient Air Quality stations were identified considering the upwind and cross wind direction in the CEPI impact area. Ambient Air Quality was monitored at eight locations. The concentration of all the ambient air parameters was found well within the limits prescribed in NAAQS 2009, at all locations. Biochemical Oxygen Demand, Total Phosphate, Copper, Total Chromium and Iron are also found above the standard limits in few locations of surface water monitoring. Land index is represented by groundwater in the CEPI. Ground water parameters were found to be within the permissible limits, except Total Phosphate, Iron and Total Chromium when compared with IS 10500:2012 drinking water standards.

Based on the study conducted by CPCB during the period January 2018, the CEPI score of Pimpri-Chinchwad region as per the revised guidelines of CEPI (2016) was 52.16 (Air Index–52, Water Index-6.25 and Land Index–5.25). However, the present study reports aggregated CEPI score of Pimpri-Chinchwad region of post-monsoon season (March, 2024), the present CEPI score is 32.52 (Air Index–20.25, Water Index-29.63 and Land Index–20.25). The CEPI score is the combination of A, B, C and D factors. Here, C factor represents the health data and D factor represents the initiatives taken by MPCB in the past few years to mitigate the pollution. The regional office of MPCB has taken various initiatives like installation of CAAQMS, CETPs, etc. in the past few years to control and mitigate the air and water pollutants. This has contributed to the factor D, hence reducing the CEPI score of the region over the years.

2. Introduction

In the vibrant tapestry of India's industrial landscape, the state of Maharashtra stands as a testament to both the promise and perils of rapid economic development. With countless number of industrial clusters, Maharashtra has witnessed unprecedented growth and prosperity in recent decades. However, this surge in industrial activity has come at a significant environmental cost, with pollution emerging as a pressing concern in many regions across the state.

Simultaneously, the Comprehensive Environmental Pollution Index (CEPI) has emerged as a beacon of assessment and action in India's environmental landscape. Introduced as a standardized methodology for evaluating and addressing pollution in industrial clusters across the nation, the CEPI represents a significant step towards achieving the delicate balance between economic growth and environmental sustainability. Developed through collaborative efforts between environmental scientists, regulatory authorities, and community stakeholders, the CEPI serves as a vital instrument for identifying, prioritizing, and mitigating pollution in industrial areas. By systematically monitoring, sampling, and analyzing pollution parameters such as ambient air quality, surface water quality, and groundwater quality, the CEPI empowers policymakers and regulators to make informed decisions and allocate resources effectively.

In Maharashtra, where industrial activities drive economic growth and employment opportunities, the importance of the CEPI cannot be overstated. Through strategic monitoring, sampling, and analysis efforts, the CEPI aims to provide a comprehensive assessment of pollution levels and their impacts on environmental health in critically, severely, and other polluted industrial areas across the state.

Moreover, the application of the CEPI extends beyond mere assessment, serving as a catalyst for targeted interventions and regulatory enforcement in polluted industrial areas. By identifying pollution hotspots and vulnerable communities, the CEPI enables authorities to implement remedial measures, enforce pollution control norms, and monitor progress towards environmental sustainability.

In the following sections, we delve into the methodology, findings, and implications of both the CEPI assessment and the Monitoring, Sampling, and Analysis for Ambient Air Quality, Surface Water Quality, and Groundwater Quality in Polluted Industrial Areas of Pimpri Chinchwad, Maharashtra., Pimpri Chinchwad situated in is the north western city limits of Pune Maharashtra state, India. Industrialization in Pimpri-Chinchwad started in the year 1954, Pimpri Chinchwad has a rapid growth in terms of industries and most of the major Indian automobile companies and its headquarters were located in Pimpri Chinchwad. The popular automobile industries in Pimpri Chinchwad includes Kinetic Engineering, Tata Motors, Mahindra & Mahindra Ltd, Bajaj Auto etc., Apart from automobile industries there are many industries in Pimpri Chinchwad, among these one of the industry with rapid growth is software and IT.

The present report is also based on the revised CEPI version 2016. The index captures the various dimensions of environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI), which is a rational number to characterize the environmental quality at a given location following the algorithm of source, pathway and receptor have been developed. The CEPI reports serve as a roadmap for targeted interventions, regulatory enforcement and community engagement aimed at mitigating pollution and safeguarding public health in the area. Despite the persistent challenges, ongoing initiatives guided by the CEPI action plan reports offer hope for addressing environmental concerns and fostering sustainable development in Pimpri Chinchwad.

3. Scope of Work

The major scope of work includes:

I. The scope of the present study is to perform three (3) rounds of "Monitoring, Sampling and Analysis for Ambient Air Quality, VOCs in Ambient Air, Surface Water Quality & Ground Water Quality in selected Pollution Industrial Areas (PIAs) of Pimpri-Chinchwad, Maharashtra" with a gap of one or two days. The analysis of the collected samples was carried out by the standard methods (CPCB, BIS, APHA, USEPA).

II. To Collect health-related data in the CEPI region.

III. To calculate the Comprehensive Environmental Pollution Index (CEPI) Score as per Revised CEPI-2016 issued by Central Pollution Control Board (CPCB).

The sampling details and frequency of sampling in Ambient Air, VOCs, Surface Water and Ground Water are given in Table 3.1 and Table 3.2 respectively.

Table 3.1 Sampling Details of Pimpri-Chinchwad

Sampling Criteria	Number of sites	Total Sites	Monitoring Parameters
Ambient Air Quality	08	**08**	PM_{10}, $PM_{2.5}$, SO_2, NO_2, NH_3, O_3, C_6H_6, CO, BaP, Pb, Ni, As
Volatile Organic Compounds (VOCs)	02	**02**	Dichloromethane, Chloroform, Carbon Tetrachloride, Trichloroethylene, Bromodichloromethane, 1,3-Dichloropropane, 1,4-Dichlorobenzene, 1,3-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-Chloropropane, Naphthalene, Bromobenzene,1,2,4-Trimethylbenzene, 2-Chlorotoluene, Tert-Butylbenzene, SEC-Butylbenzene, P-Isopropyl toluene, M-Xylene, P-Xylene, Styrene, Cumene 1,2,3-Trichloropropane, N-Propyl benzene, Dibromochloromethane, 1,2-Dibromoethane, Chlorobenzene, 1,1,1,2-Tetrachloroethane, Ethylbenzene, 1,1-Dichloropropylene, 1,2-Dichloroethane, 1,2-Dichloropropane, Trans-1,3-Dichloropropene, CIS 1,3-Dichloropropene, 1,1,2-Trichloroethane, Tetrachloroethylene, 1,3,5-Trimethylbenzene, N-Butylbenzene, 1,2,3-Trichlorobenzene, Hexachlorobutadiene, 1,2,4-Trichlorobenzene, 2,2-Dichloropropane, Dibromo methane, Toluene, O-Xylene, Bromoform, 1,1,2,2-Tetrachloroethane, 4-Chlorotoluene, 1,1-

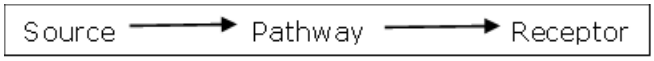
Sampling Criteria	Number of sites	Total Sites	Monitoring Parameters
			Dichloroethylene, Trans-1,2-Dichloroethylene, 1,1-Dichloroethane, CIS-1,2-Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane
Water Quality Monitoring	**Surface water** 06	**06**	**(i) Simple Parameters** Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological **(ii) Regular Monitoring Parameters** pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical Conductivity, Total Dissolved Solids, Nitrite–Nitrogen, Nitrate-Nitrogen, (NO_2+NO_3) total nitrogen, Free Ammonia, Total Residual Chlorine, Cyanide, Fluoride, Chloride, Sulphate, Sulphides, Total Hardness, Dissolved Phosphates, SAR, Total Coliforms, Faecal Coliform **(iii) Special Parameters** Total Phosphorous, TKN, Total Ammonia (NH_4+NH_3)-Nitrogen, Phenols, Surface Active Agents, Anionic detergents, Organo-Chlorine Pesticides, PAH, PCB and PCT, Zinc, Nickel, Copper, Hexa-valent Chromium, Chromium (Total), Arsenic (Total), Lead, Cadmium, Mercury, Manganese, Iron, Vanadium, Selenium, Boron **(iv) Bio-assay (zebra Fish)** Test – For specified samples only.
	Ground water 06	**06**	

Table 3.2 Frequency of Sampling

	Parameter	Round of Sampling	Frequency in Each Round
A	**Ambient Air Quality Monitoring**		
1.	Particulate Matter (size less than 10 µm) or PM_{10}	03	3 Shifts of 8 hrs each
2.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	03	1 Shift of 24 hrs
3.	Sulphur Dioxide (SO_2)	03	6 Shifts of 4 hrs each
4.	Nitrogen Dioxide (NO_2)	03	6 Shifts of 4 hrs each
5.	Ammonia (NH_3)	03	6 Shifts of 4 hrs each
6.	Ozone (O_3)	03	24 Shifts of 1 hr each
7.	Benzene (C_6H_6)	03	1 Shifts of 24 hrs
8.	Carbon Monoxide (CO)	03	24 Shifts of 1 hr each
9.	Benzo (a) Pyrene (BaP) – particulate phase only	03	3 Shifts of 8 hrs each
10.	Lead (Pb)	03	3 Shifts of 8 hrs each
11.	Arsenic (As)	03	3 Shifts of 8 hrs each
12.	Nickel (Ni)	03	3 Shifts of 8 hrs each
B	**Volatile Organic Compounds (VOCs)**		
	As mentioned in Table 3.1	03	3 Shifts of 24 hrs each
C	**Ground Water**		
	As mentioned in Table 3.1	03	01 sample at each round
D	**Surface Water**		
	As mentioned in Table 3.1	03	01 sample at each round

4. Methodology

The present report is based on the revised Comprehensive Environmental Pollution Index (CEPI) version 2016. The index captures the various dimensions of the environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI) is a rational number, which is used to characterize the environmental quality at a given location. It is three-step process based on the algorithm:



Ambient air stations, Surface water locations and Ground water locations were decided by the respective regional officers. The sampling was done in 3 rounds with an interval of one or two days at each location. Sampling has been done at the potential polluted areas so as to arrive at the CEPI. This will further help the authorities to monitor the areas in order to improve the current status of their environmental components such as air and water quality data, ecological damage and visual environmental conditions.

Methodology for sampling, preservation and analysis have been done according to the CPCB/ EPA/ APHA/ IS/ ASTM standard methods for the samples.

5. Air Environment

For studying the Air Environment of Pimpri-Chinchwad area, monitoring stations were identified considering the upwind and cross wind direction and all 12 parameters as per the notification of National Ambient Air Quality Standards (NAAQS) were carried out.

**Kindly note: Volatile Organic Compounds (VOCs) concentration is not detected in most of the Air samples collected; hence it is not shown in the graphs.*

In Pimpri-Chinchwad eight locations have been monitored of checking the Ambient Air Quality (AAQ). The concentration of all the ambient air parameters was found well within the limits prescribed by NAAQS.

Table 5.1 Details of Sampling Location of Ambient Air Quality Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Thergaon Near Puduji Industries	18°62'20.21"N	73°72'27.37"E	02.01.2024	04.01.2024	06.01.2024
2.	Akurdi Near Force Motor	18°65'13.19"N	73°78'37.25"E	02.01.2024	04.01.2024	06.01.2024
3.	MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall	18°64'10.96"N	73°81'97.94"E	02.01.2024	04.01.2024	06.01.2024
4.	Pimpri Chinchwad Municipal Corporation	18°62'83.79"N	73°80'33.78"E	02.01.2024	04.01.2024	06.01.2024
5.	MIDC Bhosari Near Amphenol Area Pune	18°61'10.96"N	73°80'33.78"E	03.01.2024	05.01.2024	07.01.2024
6.	Moshi Municipal Solid Waste Disposal Site	18°65'77.29"N	73°85'75.64"E	03.01.2024	05.01.2024	07.01.2024
7.	Charoli Moshi Crusher Area	18°65'79.49"N	73°86'49.35"E	03.01.2024	05.01.2024	07.01.2024
8.	Moshi RR Scrap	18°68'03.20"N	73°83'55.38"E	03.01.2024	05.01.2024	07.01.2024

Table 5.2 Details of Sampling Location of Volatile Organic Compounds (VOCs) Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	MIDC Bhosari Near Amphenol Area Pune	18°61'10.96"N	73°80'33.78"E	02.01.2024	04.01.2024	06.01.2024
2.	Moshi Municipal Solid Waste Disposal Site	18°65'77.29"N	73°85'75.64"E	03.01.2024	05.01.2024	07.01.2024

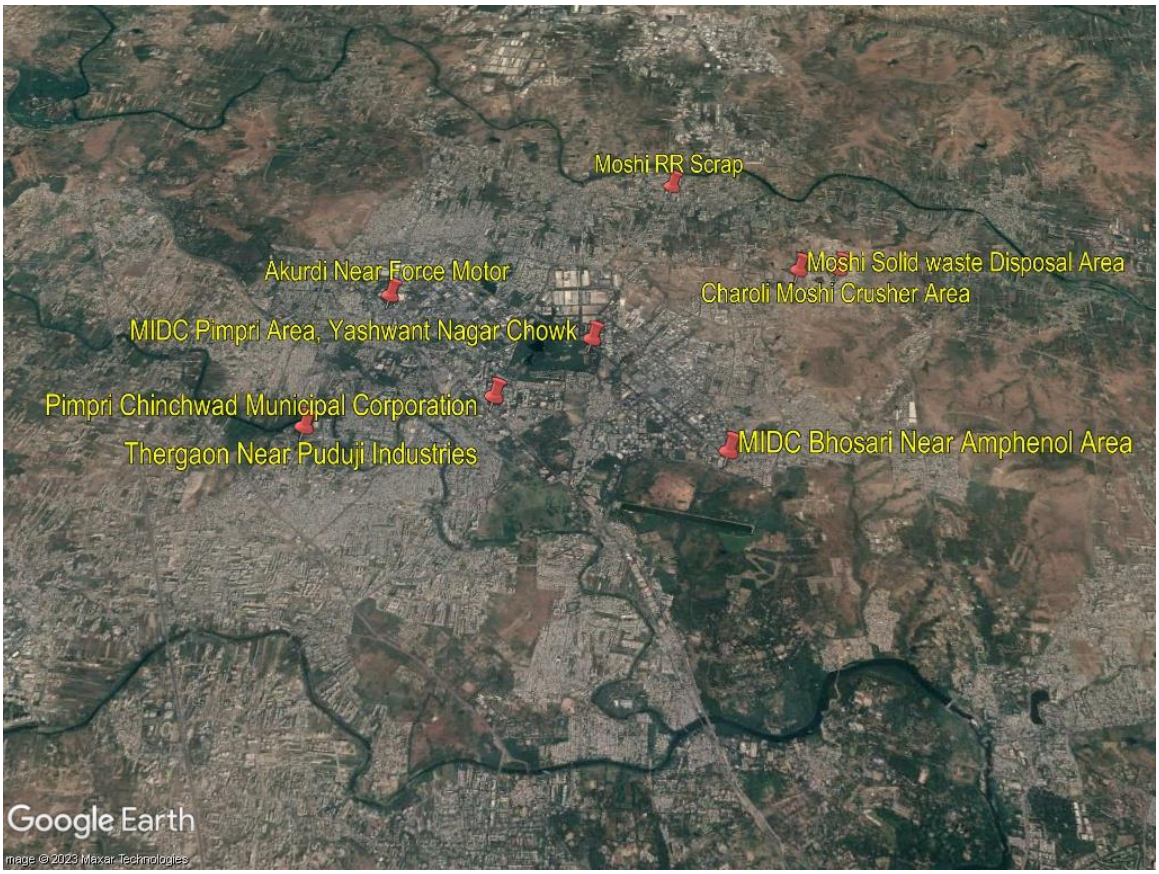


Fig: Geographical Locations of Ambient Air Quality Monitoring

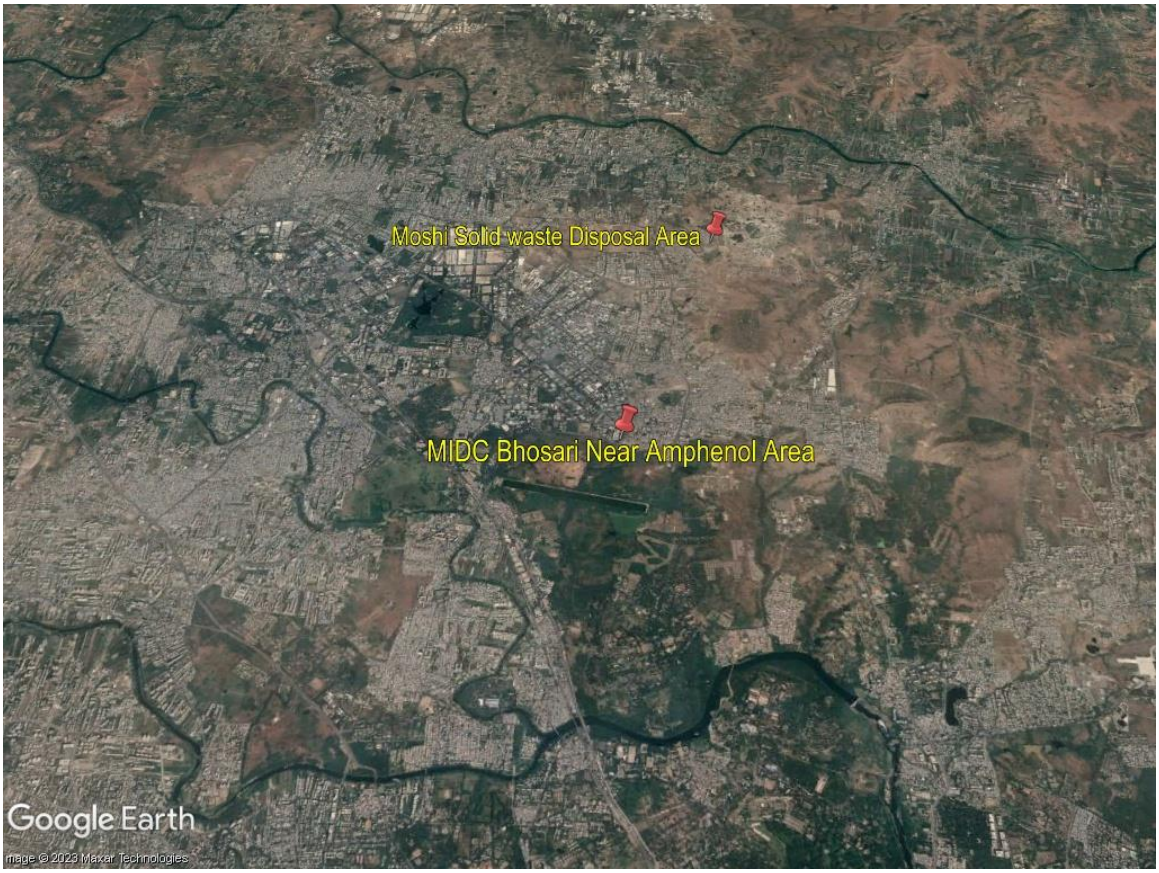


Fig: Geographical Locations of VOCs Monitoring

Table 5.3 Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Thergaon Near Puduji Industries	Akurdi Near Force Motor	Pimpri Chinchwad Municipal Corporation	MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall
Sulphur Dioxide (SO_2)	µg/m^3	BLQ	BLQ	BLQ	BLQ
Nitrogen Dioxide (NO_2)	µg/m^3	9.88	16.10	10.80	9.81
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m^3	81	85	91	75
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m^3	22	22	24	20
Ozone (O_3)	µg/m^3	51.4	42.25	38.2	48.05
Lead (Pb)	µg/m^3	BLQ	0.024	0.022	BLQ
Carbon Monoxide (CO) (1 h)	mg/m^3	1.35	1.18	0.93	1.24
Carbon Monoxide (CO) (8 h)	mg/m^3	1.78	1.69	1.98	1.57
Ammonia (NH_3)	µg/m^3	40.5	44.8	40.95	46.35
Benzene (C_6H_6)	ng/m^3	1.87	2.74	2.28	2.71

Parameters	Unit	Results			
		Thergaon Near Puduji Industries	Akurdi Near Force Motor	Pimpri Chinchwad Municipal Corporation	MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.439	BLQ	0.676	0.345
Nickel (Ni)	ng/m^3	BLQ	4.305	BLQ	BLQ

Parameters	Unit	Results			
		MIDC Bhosari Near Amphenol Area Pune	Moshi Municipal Solid Waste Disposal Site	Charoli Moshi Crusher Area	Moshi RR Scrap
Sulphur Dioxide (SO_2)	µg/m^3	BLQ	BLQ	BLQ	BLQ
Nitrogen Dioxide (NO_2)	µg/m^3	10.50	7.59	9.37	6.87
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m^3	74	72	69	78
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m^3	20	19	20	21
Ozone (O_3)	µg/m^3	55.35	50.4	48.5	58.55
Lead (Pb)	µg/m^3	BLQ	BLQ	BLQ	BLQ
Carbon Monoxide (CO) (1 h)	mg/m^3	0.92	1.13	1.31	1.25
Carbon Monoxide (CO) (8 h)	mg/m^3	1.51	1.92	1.6	1.74
Ammonia (NH_3)	µg/m^3	50	43.45	48.85	50.55
Benzene (C_6H_6)	µg/m^3	2.70	2.67	2.56	2.5
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	1.14	0.43	0.9	BLQ
Nickel (Ni)	ng/m^3	3.78	BLQ	BLQ	BLQ

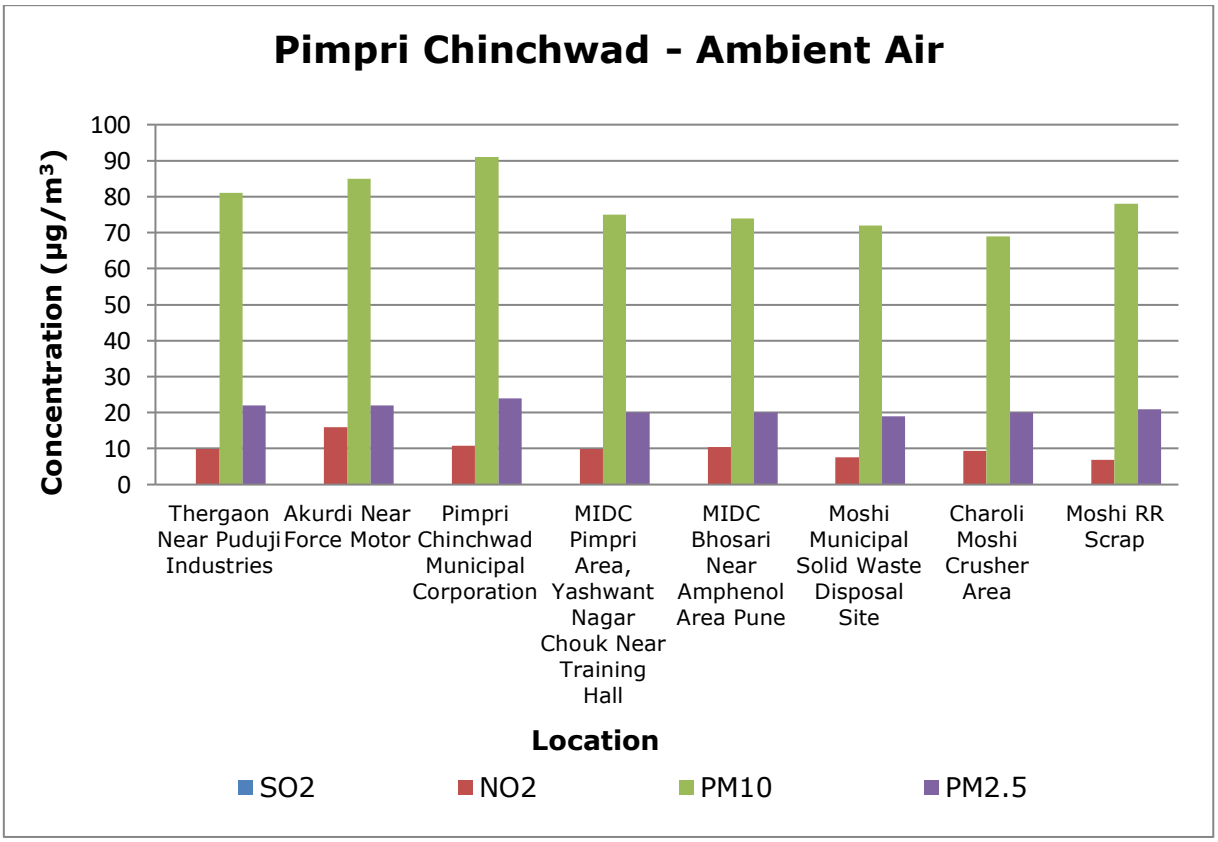
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

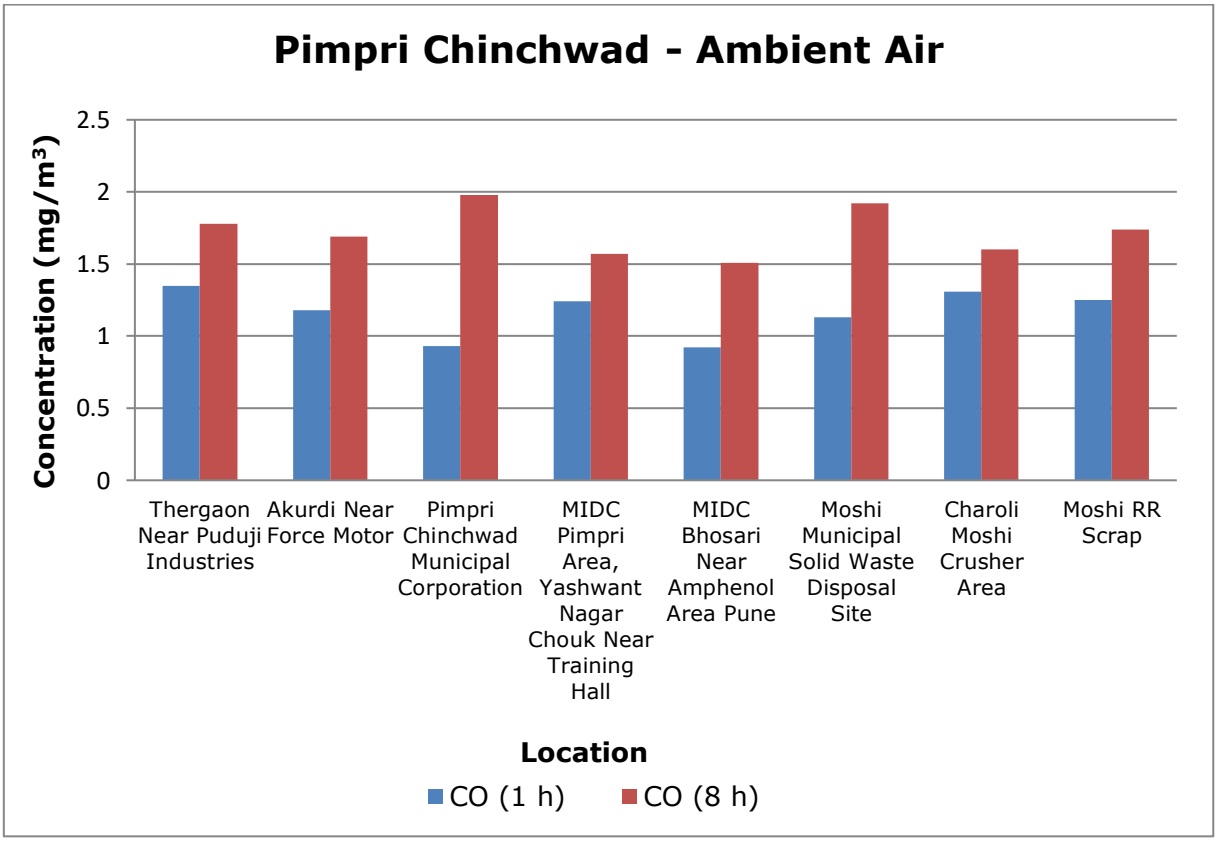
Parameters	Unit	Results	
		MIDC Bhosari Near Amphenol Area Pune	Moshi Municipal Solid Waste Disposal Site
Dichloromethane	µg/m^3	2.80	1.17
Chloroform	µg/m^3	0.92	0.70

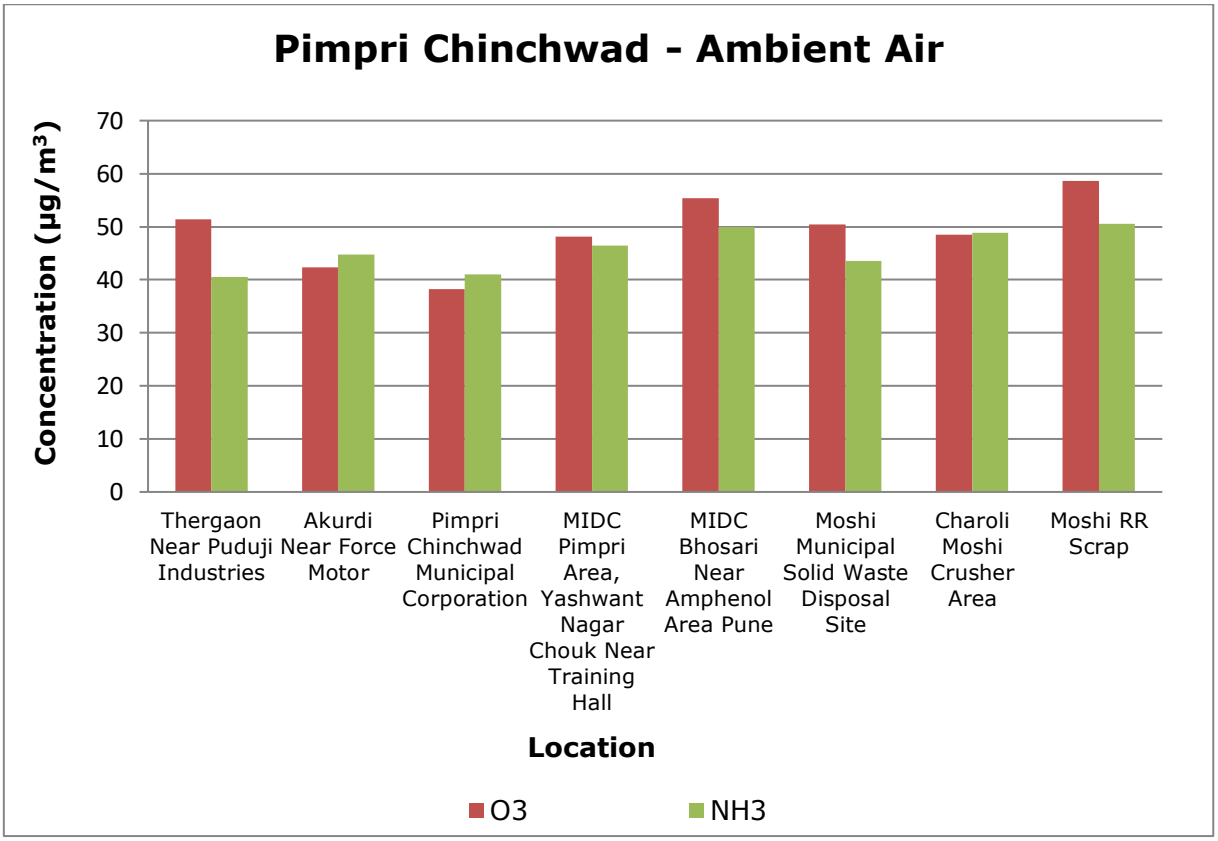
Parameters	Unit	Results	
		MIDC Bhosari Near Amphenol Area Pune	Moshi Municipal Solid Waste Disposal Site
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	21.8	3.98
1,3-Dichlorobenzene	µg/m³	15.3	7.05
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Naphthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	BLQ
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	1.75
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	BLQ
Dibromochloromethane	µg/m³	BLQ	BLQ
1,2-Dibromoethane	µg/m³	BLQ	BLQ
Chlorobenzene	µg/m³	2.10	1.61
1,1,1,2-Tetrachloroethane	µg/m³	BLQ	BLQ
Ethylbenzene	µg/m³	0.84	BLQ
1,1-Dichloropropylene	µg/m³	BLQ	0.94
1,2-Dichloroethane	µg/m³	1.87	0.53
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ

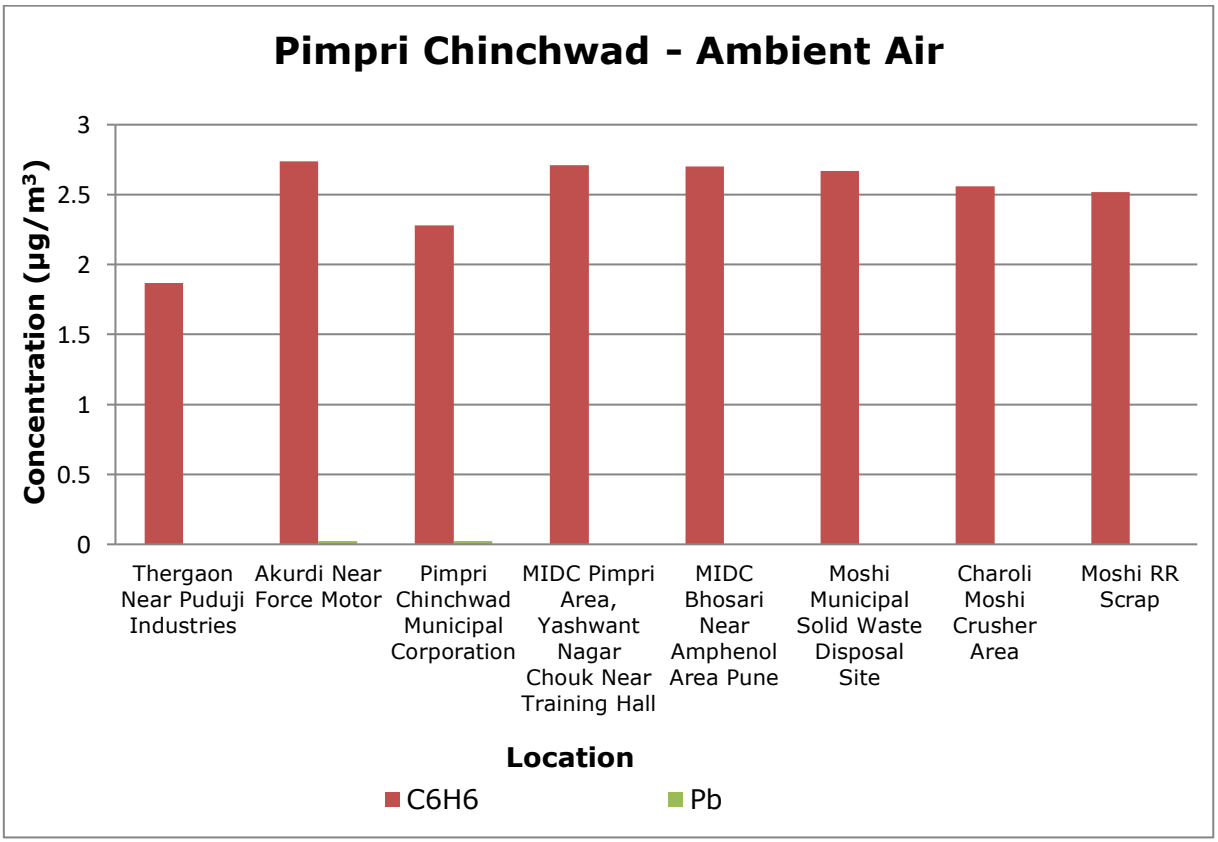
Parameters	Unit	Results	
		MIDC Bhosari Near Amphenol Area Pune	Moshi Municipal Solid Waste Disposal Site
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	2.58	2.16
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	µg/m³	BLQ	BLQ
CIS-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
Bromochloromethane	µg/m³	0.58	0.51
1,1,1-Trichloroethane	µg/m³	BLQ	BLQ

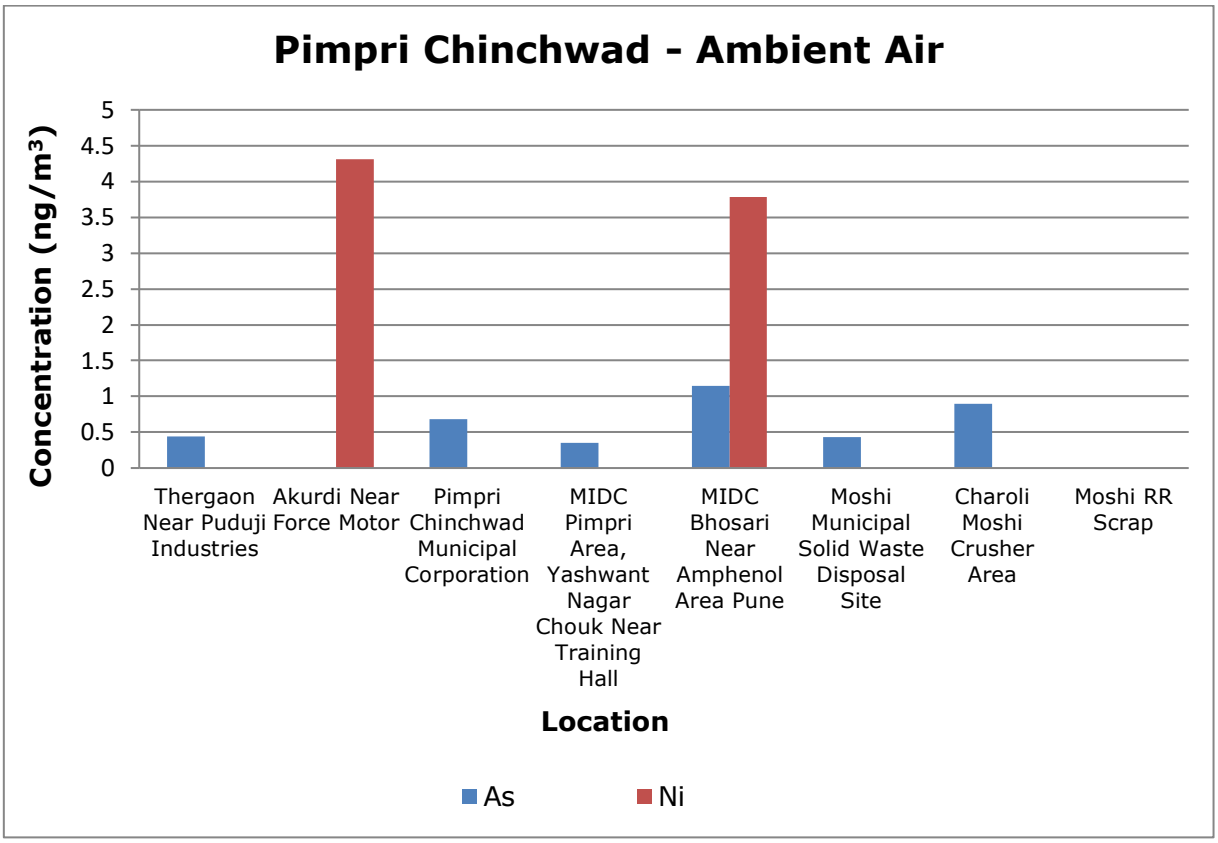
Graphs - Ambient Air Quality Monitoring






Pimpri Chinchwad - Ambient Air
Concentration (µg/m³)
70
60
50
40
30
20
10
0
Thergaon Near Puduji Industries
Akurdi Near Force Motor
Pimpri Chinchwad Municipal Corporation
MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall
MIDC Bhosari Near Amphenol Area Pune
Moshi Municipal Solid Waste Disposal Site
Charoli Moshi Crusher Area
Moshi RR Scrap
Location
O3
NH3


Pimpri Chinchwad - Ambient Air
Concentration (µg/m³)
3
2.5
2
1.5
1
0.5
0
Thergaon Near Puduji Industries
Akurdi Near Force Motor
Pimpri Chinchwad Municipal Corporation
MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall
MIDC Bhosari Near Amphenol Area Pune
Moshi Municipal Solid Waste Disposal Site
Charoli Moshi Crusher Area
Moshi RR Scrap
Location
C6H6
Pb


Pimpri Chinchwad – Ambient Air
Concentration (ng/m³)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Thergaon Near Puduji Industries
Akurdi Near Force Motor
Pimpri Chinchwad Municipal Corporation
MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall
MIDC Bhosari Near Amphenol Area Pune
Moshi Municipal Solid Waste Disposal Site
Charoli Moshi Crusher Area
Moshi RR Scrap
Location
As
Ni

WATER ENVIRONMENT

6. Water Environment

For studying the water environment of Pimpri-Chinchwad area, six samples of Surface water were collected from different industries.

- All six water samples collected are found acceptable in sanitary survey, smell and Colour is observed in acceptable limit.
- General parameters like pH, electrical conductivity, suspended solids, and total dissolved solids are also observed well within the limits in all the samples except BOD at the location Indrayani River–Moshi Bridge, Pawana River- Pimpri and Pawana River-Kasarwadi.
- In fish bioassay 100% survival of fishes was observed in all the water samples except location Pawana River- Ravet and Indrayani River-Moshi.
- The presence of faecal coliform was also well within the acceptable limits.
- All metals like Nickel, Hexavalent Chromium (Cr^{6+}), Total Chromium, Total Arsenic, Lead, Cadmium, Mercury, Vanadium, etc. are also observed either below the limit of quantification or below their standard limits except Zinc exceeds at Pawana River-Pimpari location, Iron exceeds at Indrayani River-Moshi and Selenium exceeds at Pawana River-Chinchwad location.
- Parameters like Cyanide, Sulphide, Fluoride, Total Ammonia and Phenolic compounds are found within acceptable limit.
- Total Kjeldahl Nitrogen and Total Phosphate also observed well within the limits.
- Organo Chlorine Pesticides, Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are also observed below the detectable limit in all the studied samples.

Table 6.1 Details of Sampling Location of Surface Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Pawana River-Chinchwad	18°62'42.41"N	73°76'88.62"E	02.01.2024	04.01.2024	06.01.2024
2.	Pawana River-Ravet	18°64'08.31"N	73°74'72.67"E	02.01.2024	04.01.2024	06.01.2024
3.	Indrayani River - Chikhali	18°65'51.44"N	73°81'87.27"E	02.01.2024	04.01.2024	06.01.2024
4.	Indrayani River – Moshi Bridge	18°68'84.5"N	73°84'56.27"E	02.01.2024	04.01.2024	06.01.2024
5.	Pawana River-Pimpri	18°62'32.06"N	73°78'85.44"E	02.01.2024	04.01.2024	06.01.2024
6.	Pawana River-Kasarwadi	18°60'21.78"N	73°82'17.1"E	02.01.2024	04.01.2024	06.01.2024

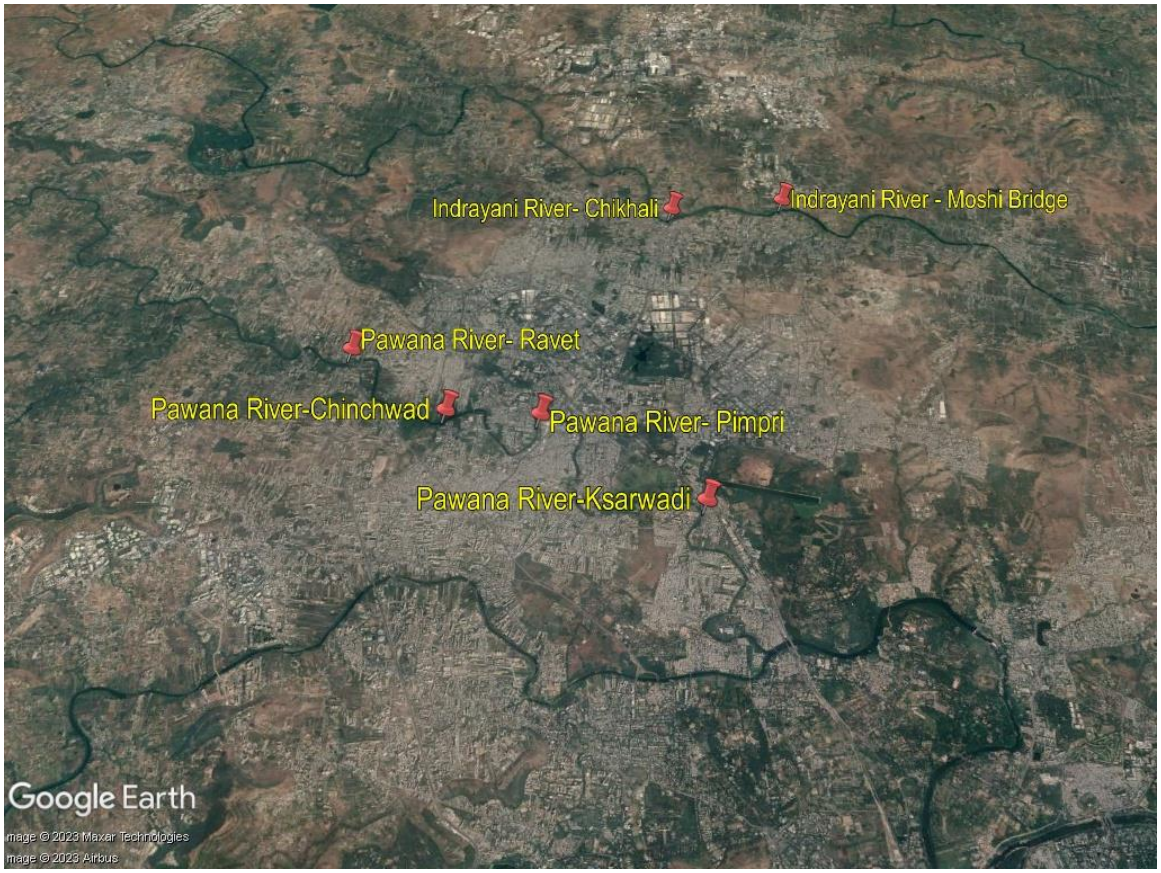


Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

Parameters	Unit	Results		
		Pawana River- Chinchwad	**Pawana River- Ravet**	**Indrayani River- Chikhali**
Sanitary Survey	-	Generally clean neighbourhood	Generally clean neighbourhood	Generally Clean neighbourhood
General Appearance	-	Floating Matter Evident	Floating Matter Evident	No Floating Matter
Transparency	m	0.6	0.7	0.4
Temperature	°C	28	28	27
Colour	Hazen	1	1	2
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	7.58	7.67	7.88
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	17	14	15
Total Dissolved Solids	mg/L	300	79	329
Dissolved Oxygen (% Saturation)	%	72	75	68
Chemical Oxygen Demand	mg/L	14	BLQ	15
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	4	BLQ	4

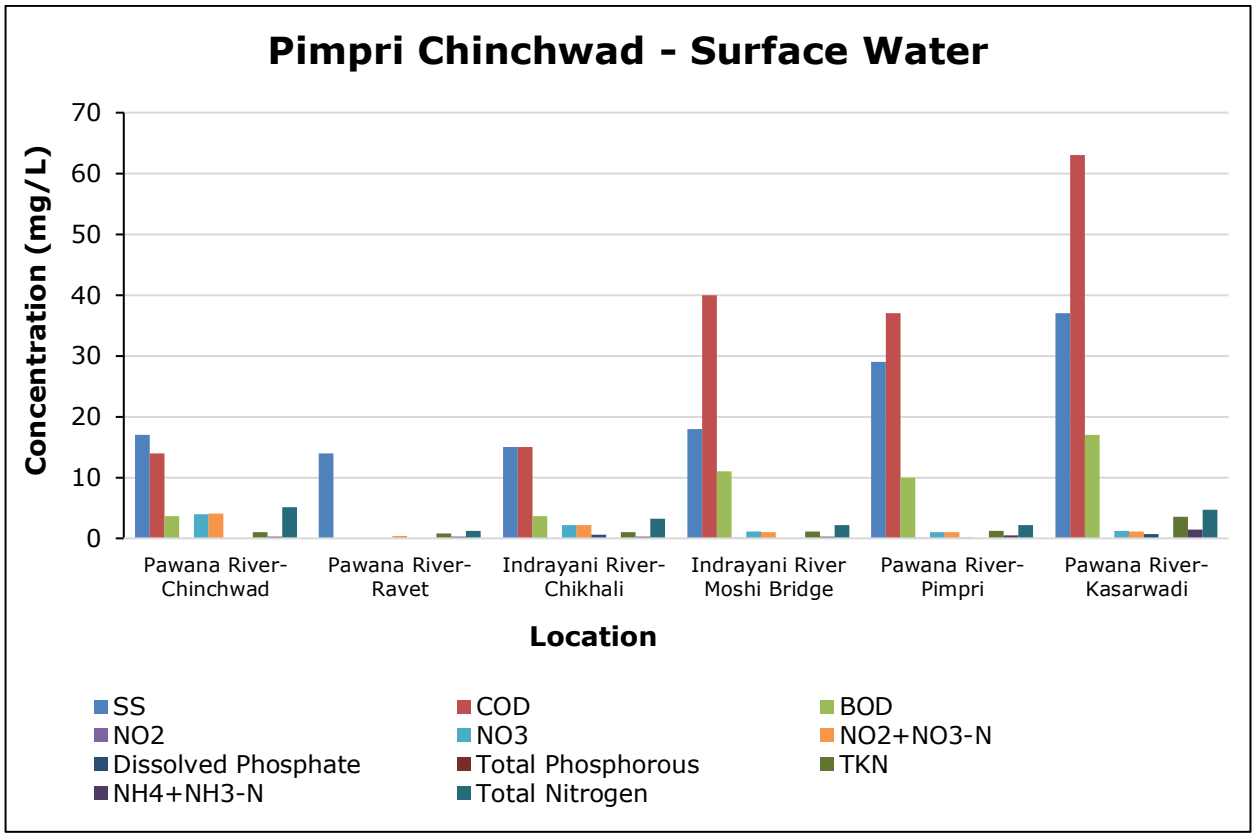
Parameters	Unit	Results		
		Pawana River- Chinchwad	Pawana River- Ravet	Indrayani River- Chikhali
Electrical Conductivity (at 25°C)	µmho/cm	533	139	567
Nitrite Nitrogen	mg/L	0.12	BLQ	0.11
Nitrate Nitrogen	mg/L	3.96	BLQ	2.14
(NO_2 + NO_3)-Nitrogen	mg/L	4.08	0.41	2.18
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Free Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.5	0.1	0.5
Sulphide (as S^{2-})	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	0.59
Sodium Adsorption Ratio	-	1.53	0.95	1.26
Total Coliforms	MPN Index/ 100 ml	630	1123	1373
Faecal Coliforms	MPN Index/ 100 ml	145	716	700
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	1.05	0.84	1.01
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.24	0.3	0.28
Total Nitrogen	mg/L	5.13	1.27	3.19
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS)	mg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	0.05
Nickel (as Ni)	mg/L	BLQ	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	BLQ	BLQ	0.12
Iron (as Fe)	mg/L	BLQ	BLQ	0.10

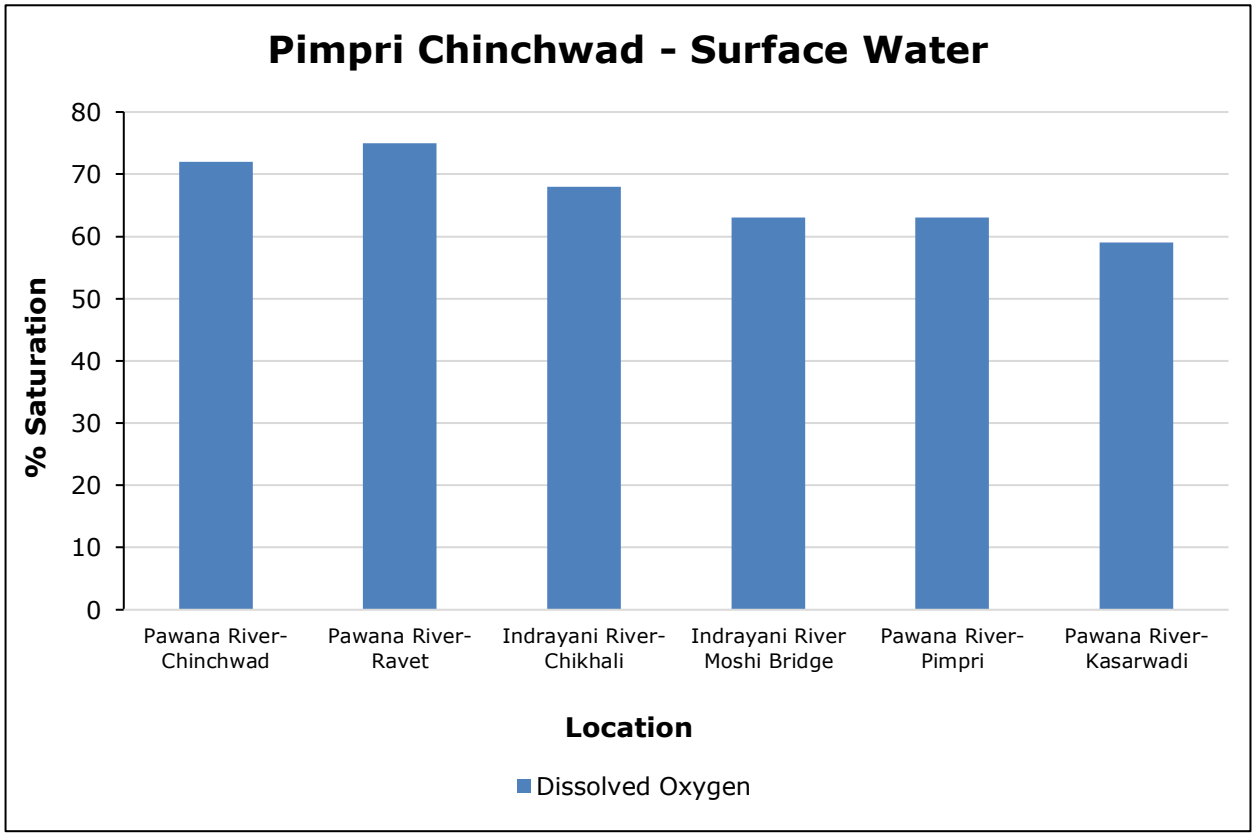
Parameters	Unit	Results		
		Pawana River- Chinchwad	Pawana River- Ravet	Indrayani River- Chikhali
Vanadium (as V)	mg/L	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	0.027	0.006	0.012
Boron (as B)	mg/L	0.10	BLQ	BLQ
Bioassay Test on fish	% survival	100	73	100

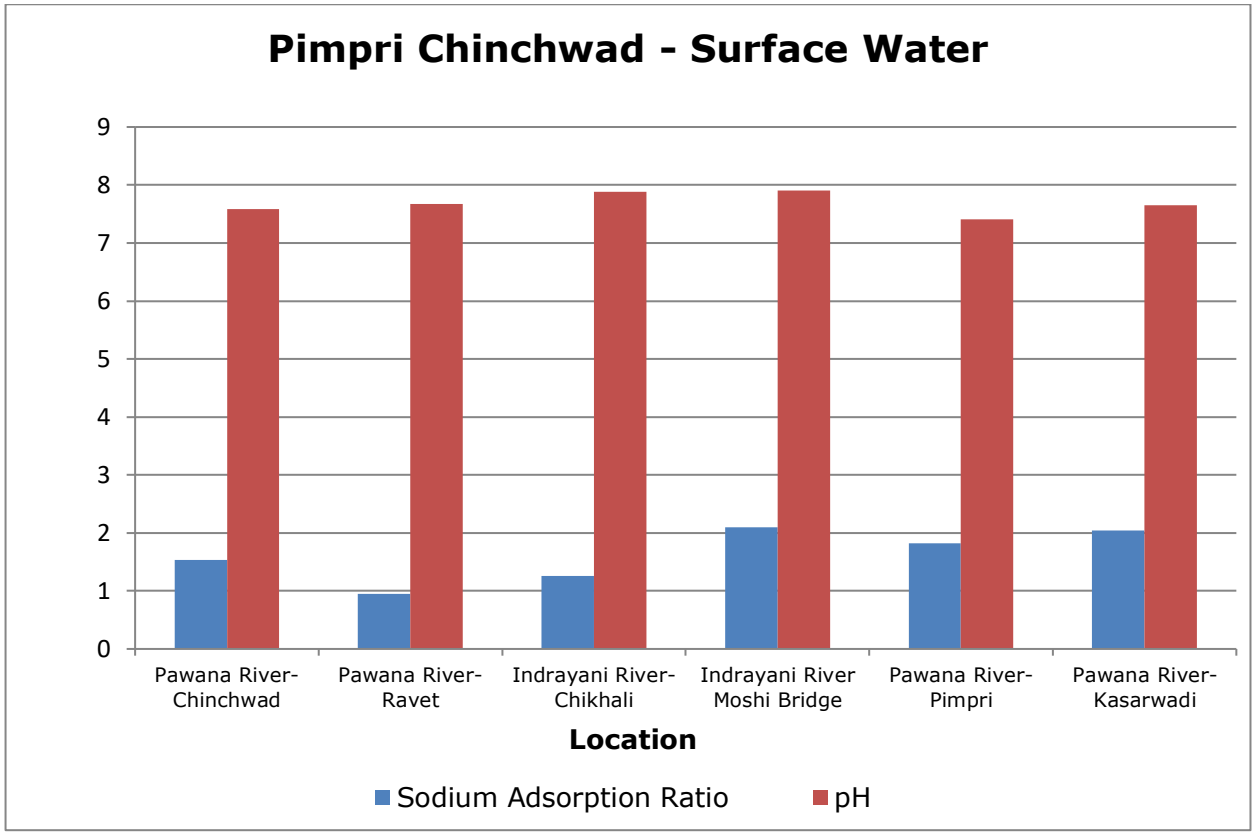
Parameters	Unit	Results		
		Indrayani River – Moshi Bridge	Pawana River- Pimpri	Pawana River- Kasarwadi
Sanitary Survey	-	Generally Clean neighbourhood	Generally clean neighbourhood	Generally clean neighbourhood
General Appearance	-	Floating Matter Evident	Floating Matter Evident	Floating Matter Evident
Transparency	m	0.4	0.6	0.7
Temperature	^{o}C	28	28	27
Colour	Hazen	3	3	6
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	7.90	7.41	7.65
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	18	29	37
Total Dissolved Solids	mg/L	460	359	421
Dissolved Oxygen (% Saturation)	%	63	63	59
Chemical Oxygen Demand	mg/L	40	37	63
Biochemical Oxygen Demand (3 days, 27^{o}C)	mg/L	11	10	17
Electrical Conductivity (at 25^{o}C)	µmho/cm	820	639	750
Nitrite Nitrogen	mg/L	0.06	0.08	BLQ
Nitrate Nitrogen	mg/L	1.14	1	1.2
(NO_2 + NO_3)-Nitrogen	mg/L	1.07	0.97	1.08
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Free Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.8	0.6	0.7
Sulphide (as S^{2-})	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	0.1	0.72
Sodium Adsorption Ratio	-	2.1	1.82	2.04
Total Coliforms	MPN Index/ 100 ml	1160	1097	957

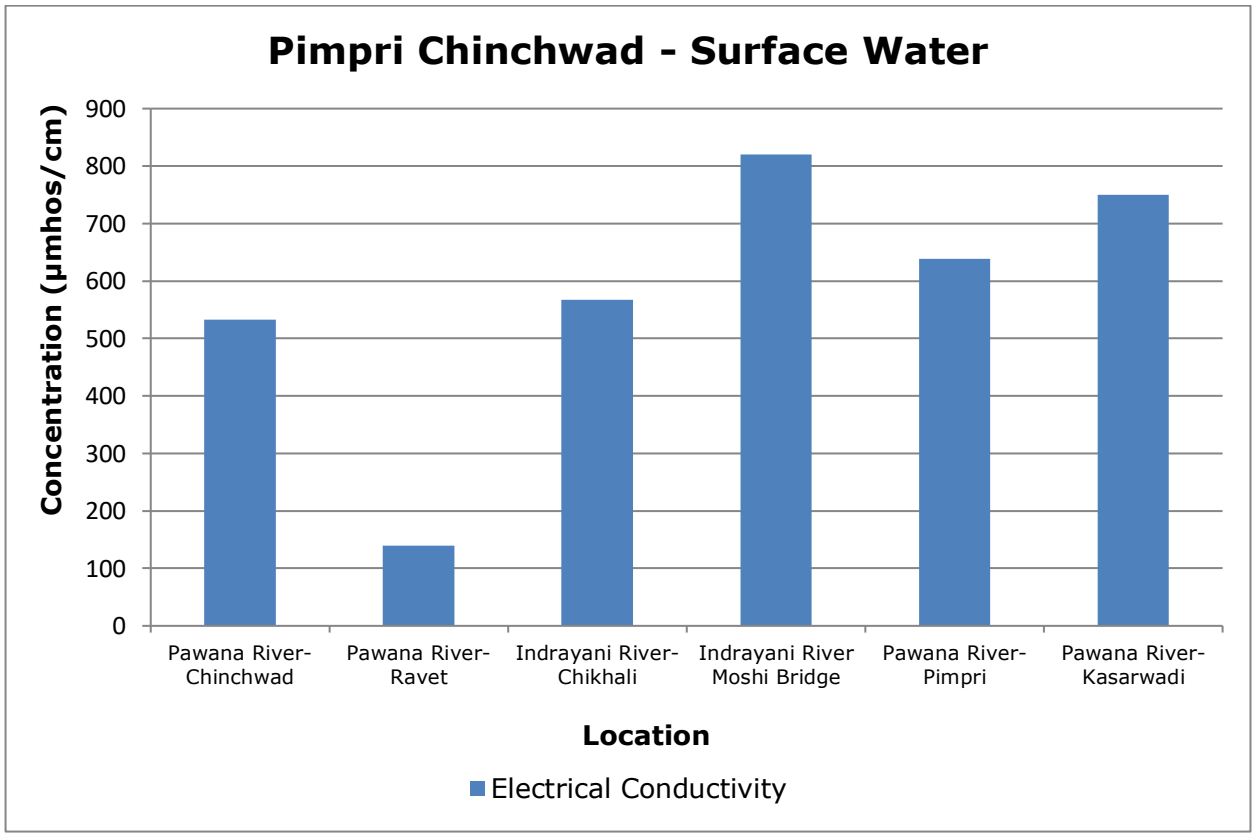
Parameters	Unit	Results		
		Indrayani River – Moshi Bridge	Pawana River-Pimpri	Pawana River-Kasarwadi
Faecal Coliforms	MPN Index/ 100 ml	140	721	186
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	1.08	1.19	3.58
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.29	0.53	1.45
Total Nitrogen	mg/L	2.15	2.16	4.66
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS)	µg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	mg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	1.92	0.051
Nickel (as Ni)	mg/L	0.016	BLQ	0.017
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	0.01	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.57	0.11	0.099
Iron (as Fe)	mg/L	0.41	0.21	0.1605
Vanadium (as V)	mg/L	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	0.013	0.006	0.008
Boron (as B)	mg/L	0.98	2.52	1.317
Bioassay Test on fish	% survival	97	100	100

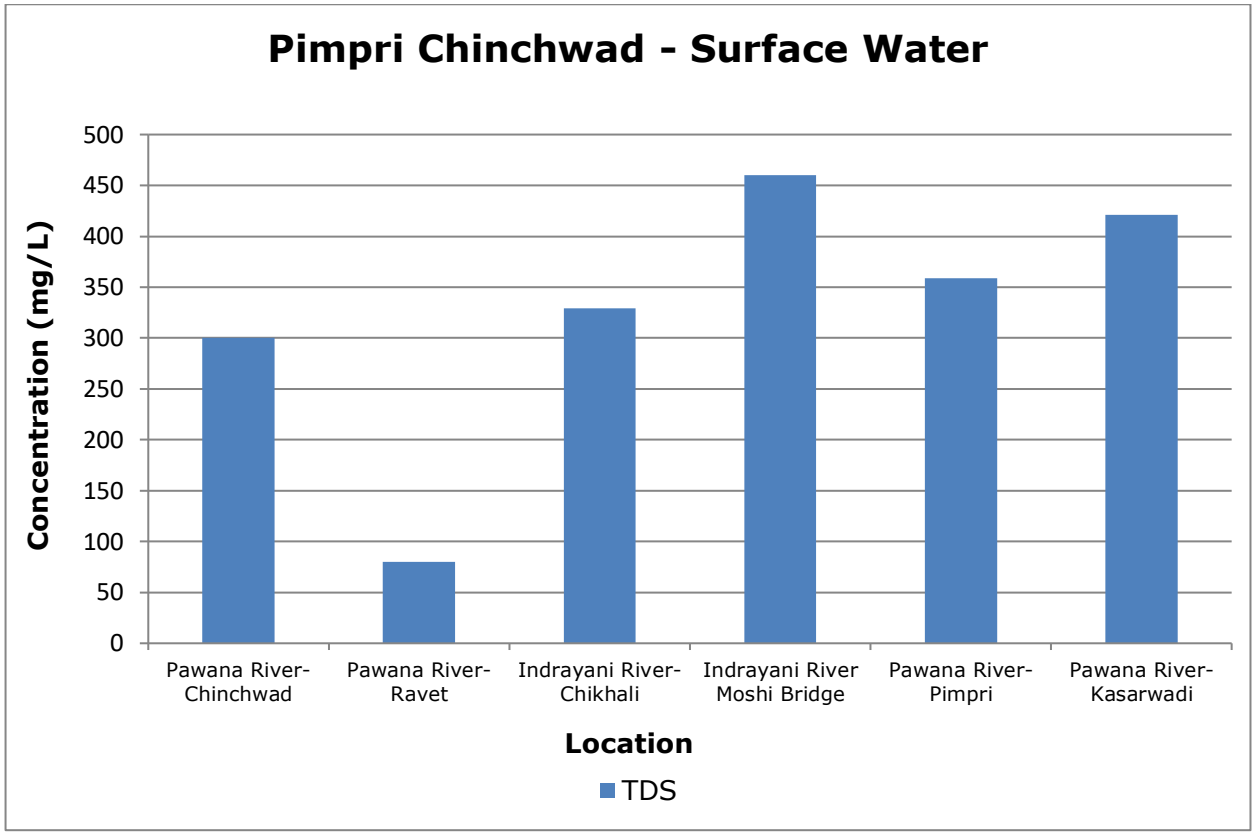
Graphs - Surface Water Quality

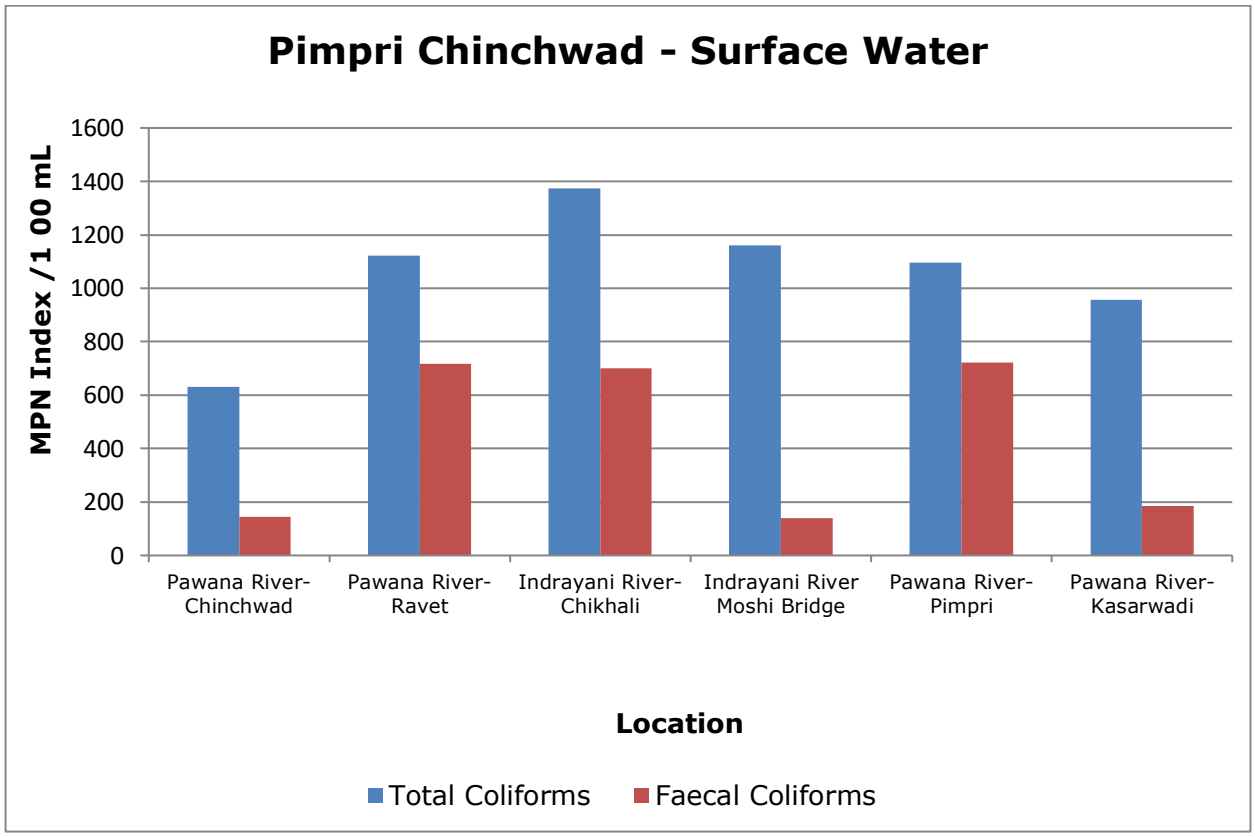


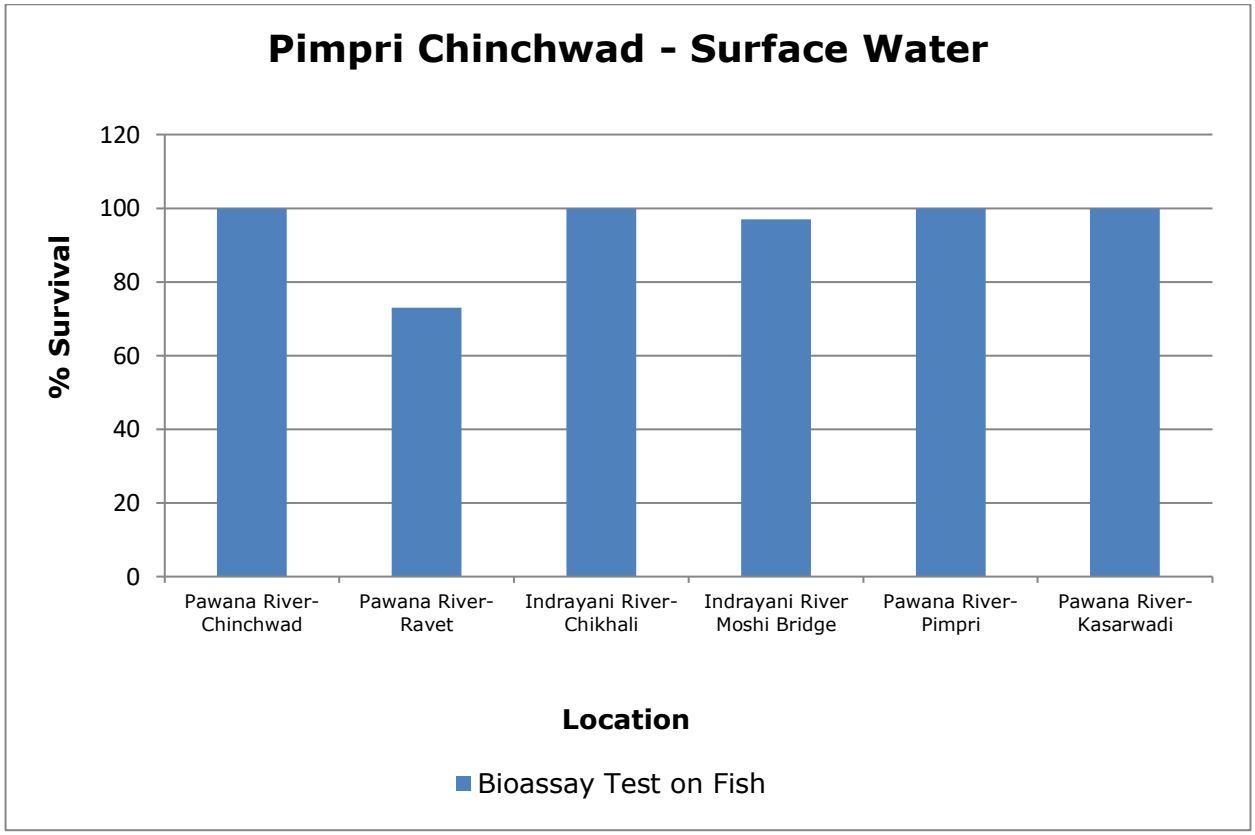



Pimpri Chinchwad - Surface Water
9
8
7
6
5
4
3
2
1
0
Pawana River-Chinchwad
Pawana River-Ravet
Indrayani River-Chikhali
Indrayani River Moshi Bridge
Pawana River-Pimpri
Pawana River-Kasarwadi
Location
Sodium Adsorption Ratio
pH


Pimpri Chinchwad - Surface Water
Concentration (µmhos/cm)
900
800
700
600
500
400
300
200
100
0
Pawana River-Chinchwad
Pawana River-Ravet
Indrayani River-Chikhali
Indrayani River Moshi Bridge
Pawana River-Pimpri
Pawana River-Kasarwadi
Location
Electrical Conductivity


Pimpri Chinchwad - Surface Water
Concentration (mg/L)
500
450
400
350
300
250
200
150
100
50
0
Pawana River-Chinchwad
Pawana River-Ravet
Indrayani River-Chikhali
Indrayani River Moshi Bridge
Pawana River-Pimpri
Pawana River-Kasarwadi
Location
TDS


Pimpri Chinchwad - Surface Water
MPN Index /1 00 mL
1600
1400
1200
1000
800
600
400
200
0
Pawana River-Chinchwad
Pawana River-Ravet
Indrayani River-Chikhali
Indrayani River Moshi Bridge
Pawana River-Pimpri
Pawana River-Kasarwadi
Location
Total Coliforms
Faecal Coliforms


Pimpri Chinchwad - Surface Water
120
100
80
60
40
20
0
% Survival
Pawana River-Chinchwad
Pawana River-Ravet
Indrayani River-Chikhali
Indrayani River Moshi Bridge
Pawana River-Pimpri
Pawana River-Kasarwadi
Location
Bioassay Test on Fish

LAND ENVIRONMENT

7. Land Environment

For studying the land Environment of Pimpri-Chinchwad area, 6 ground water samples were collected from Borewell, Open well and Hand pump.

- All the water samples collected are found acceptable in general appearance, colour and smell.
- General parameters like pH, suspended solids, BOD, COD and Total Kjeldahl Nitrogen (TKN) are also observed well within the limits in all the collected samples.
- Concentration of and Iron is found higher than the standard limits in two water samples.
- The presence of faecal coliform was also well within the acceptable limits.
- All metals like Arsenic, Nickel, Copper, Manganese, Selenium, etc. are also observed either below the limit of quantification or below their standard limits.
- Parameters like Total Phosphate, Hexavalent Chromium (Cr^{6+}) Total Residual Chlorine, Cyanide, Fluoride, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB.
- Organo Chlorine Pesticides, Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the detectable limit in all studied samples.

Table 7.1 Details of Sampling Location of Ground Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Patil Niwas Near Keshav Nagar School Chinchwad Gaon	18°62'47.65"N	73°78'13.17"E	03.01.2024	05.01.2024	07.01.2024
2.	Rohit Park-I Tapkir Nagar Kalewadi	18°61'04.59"N	73°78'63.11"E	03.01.2024	05.01.2024	07.01.2024
3.	Near Kashiba Shinde Sabhagruha Pimprigaon	18°61'05.16"N	73°79'74.63"E	03.01.2024	05.01.2024	07.01.2024
4.	Near Saritakunj Building Kasadwadi	18°60'15.7"N	73°82'18.63"E	03.01.2024	05.01.2024	07.01.2024
5.	Sai Dham Landewadi Bhosari	18°61'97.68"N	73°84'34.23"E	03.01.2024	05.01.2024	07.01.2024
6.	Gandharve Nagari Moshi	18°66'06.2"N	73°84'94.91"E	03.01.2024	05.01.2024	07.01.2024

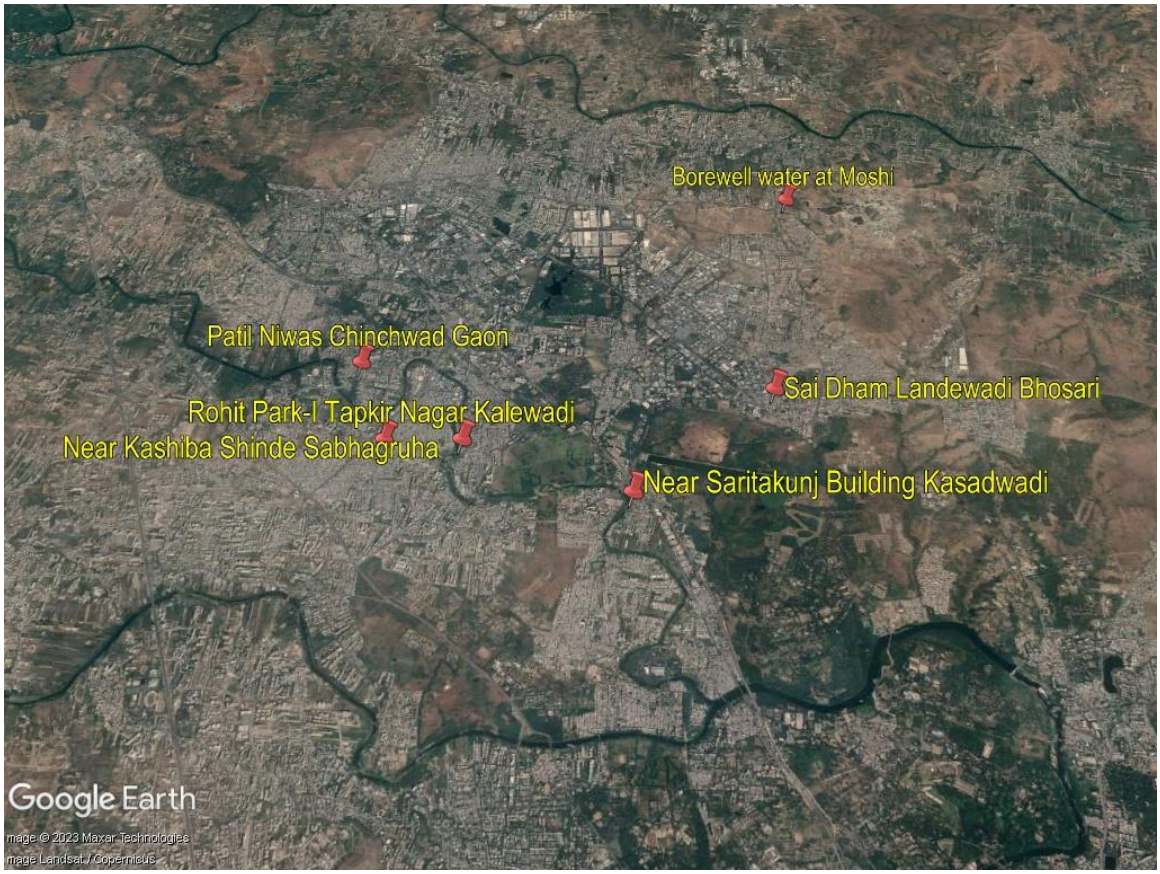


Fig: Geographical Locations of Ground Water Sampling

Table 7.2 Results of Ground Water

Parameters	**Unit**	**Results**		
		Patil Niwas Near Keshav Nagar School Chinchwad Gaon	**Rohit Park-I Tapkir Nagar Kalewadi**	**Near Kashiba Shinde Sabhagruha Pimprigaon**
Sanitary Survey	-	Generally clean neighborhood	Generally clean neighborhood	Generally clean neighborhood
General Appearance	-	No floating matter	No floating matter	No floating matter
Transparency	M	Not Applicable	Not Applicable	Not Applicable
Temperature	^{o}C	27	26	28
Colour	Hazen	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	8.29	8.10	8.17
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	11	9	11
Total Dissolved Solids	mg/L	473	459	664
Chemical Oxygen Demand	mg/L	6	5	9
Biochemical Oxygen Demand (3 days, 27^{o}C)	mg/L	2	1	2

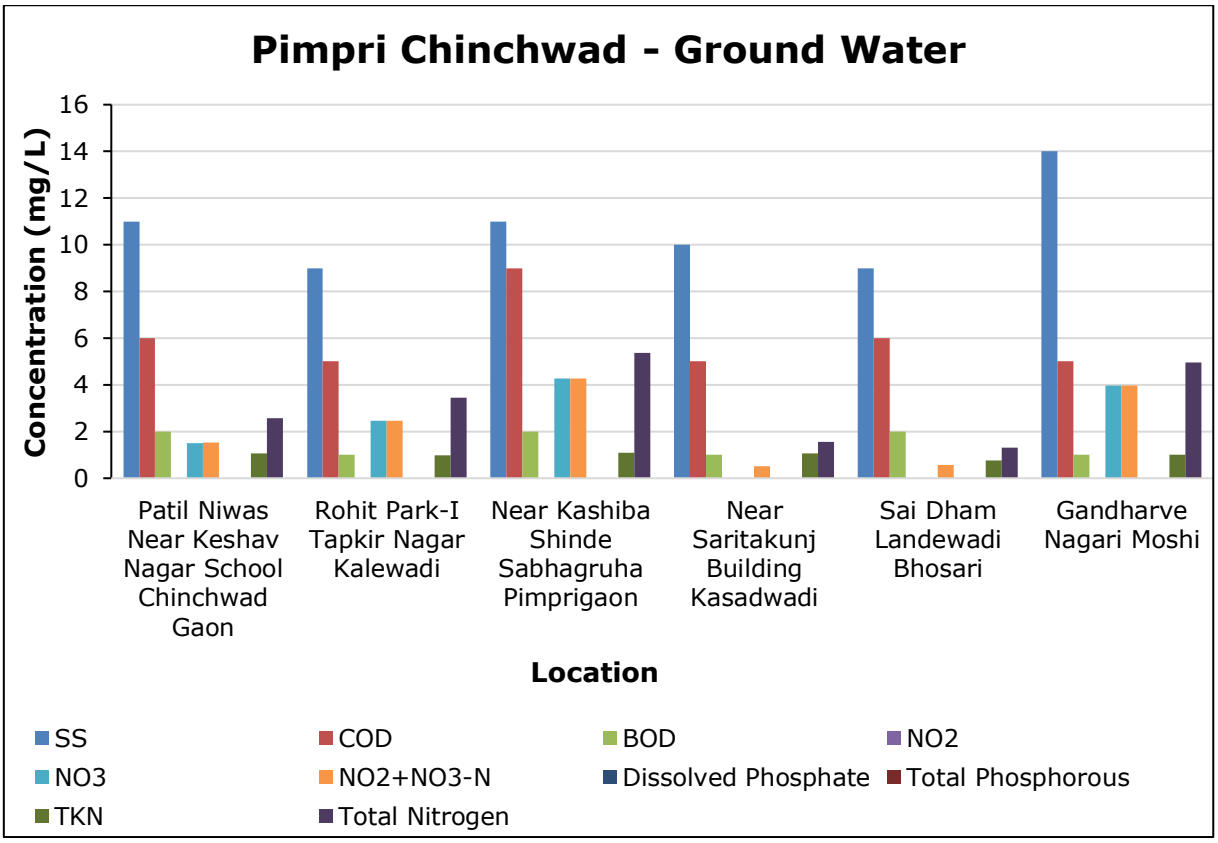
Parameters	Unit	Results		
		Patil Niwas Near Keshav Nagar School Chinchwad Gaon	Rohit Park-I Tapkir Nagar Kalewadi	Near Kashiba Shinde Sabhagruha Pimprigaon
Electrical Conductivity (at 25 °C)	µmhos/cm	843	818	1184
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	1.51	2.47	4.28
(NO_2 + NO_3)-Nitrogen	mg/L	1.52	2.47	4.28
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.8	0.8	0.9
Sulphide (as S^{2-})	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ
Sodium Adsorption Ratio	-	1.68	1.85	1.50
Total Coliforms	MPN Index/100 ml	1600	28	593
Faecal Coliforms	MPN Index/100 ml	240	20	48
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen	mg/L	1.05	0.97	1.08
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.18	0.19	0.18
Total Nitrogen	mg/L	2.56	3.45	5.36
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS, Calculated as LAS, mol.wt. 288.38)	mg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	0.139
Nickel (as Ni)	mg/L	BLQ	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	0.007	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ

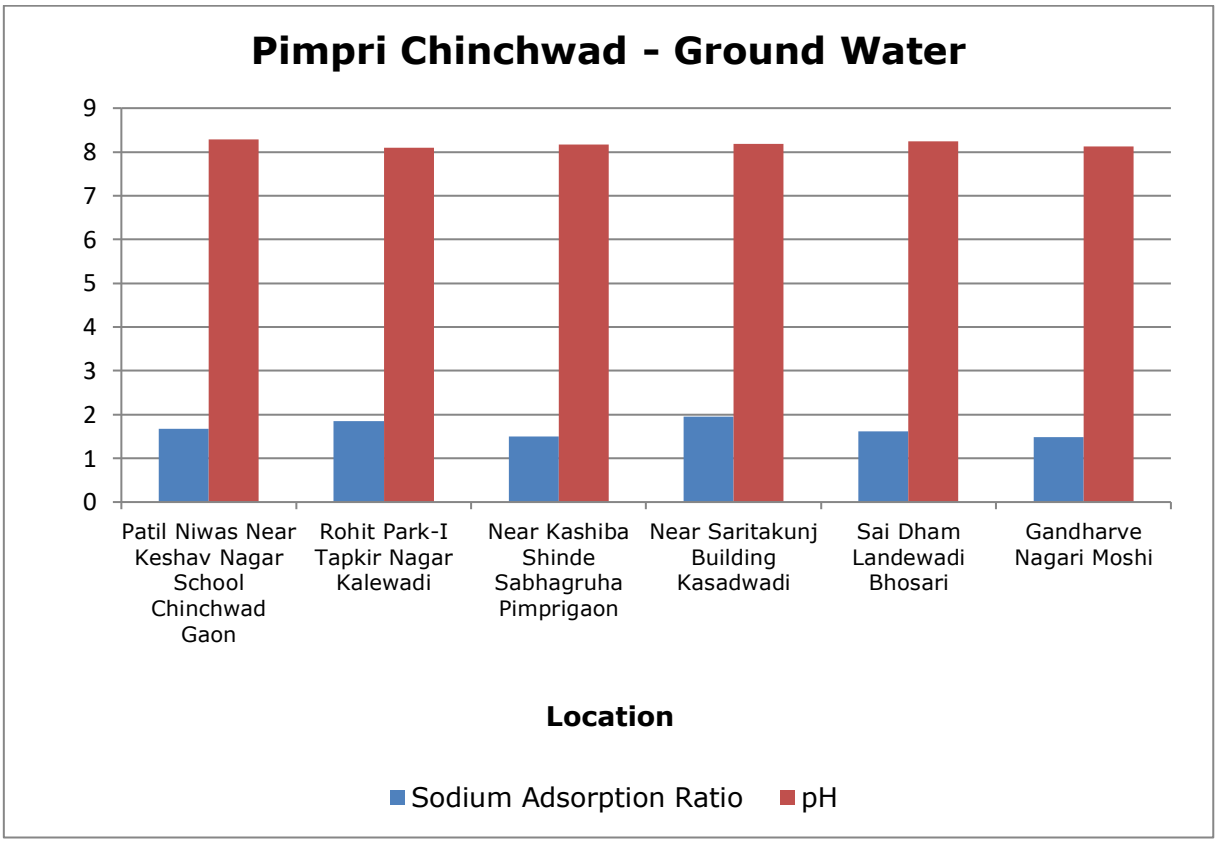
Parameters	Unit	Results		
		Patil Niwas Near Keshav Nagar School Chinchwad Gaon	Rohit Park-I Tapkir Nagar Kalewadi	Near Kashiba Shinde Sabhagruha Pimprigaon
Manganese (as Mn)	mg/L	0.389	BLQ	0.042
Iron (as Fe)	mg/L	0.60	0.12	0.07
Vanadium (as V)	mg/L	0.031	0.038	0.016
Selenium (as Se)	mg/L	0.007	0.012	0.013
Boron (as B)	mg/L	BLQ	BLQ	BLQ
Bioassay Test on fish	% survival	100	100	100

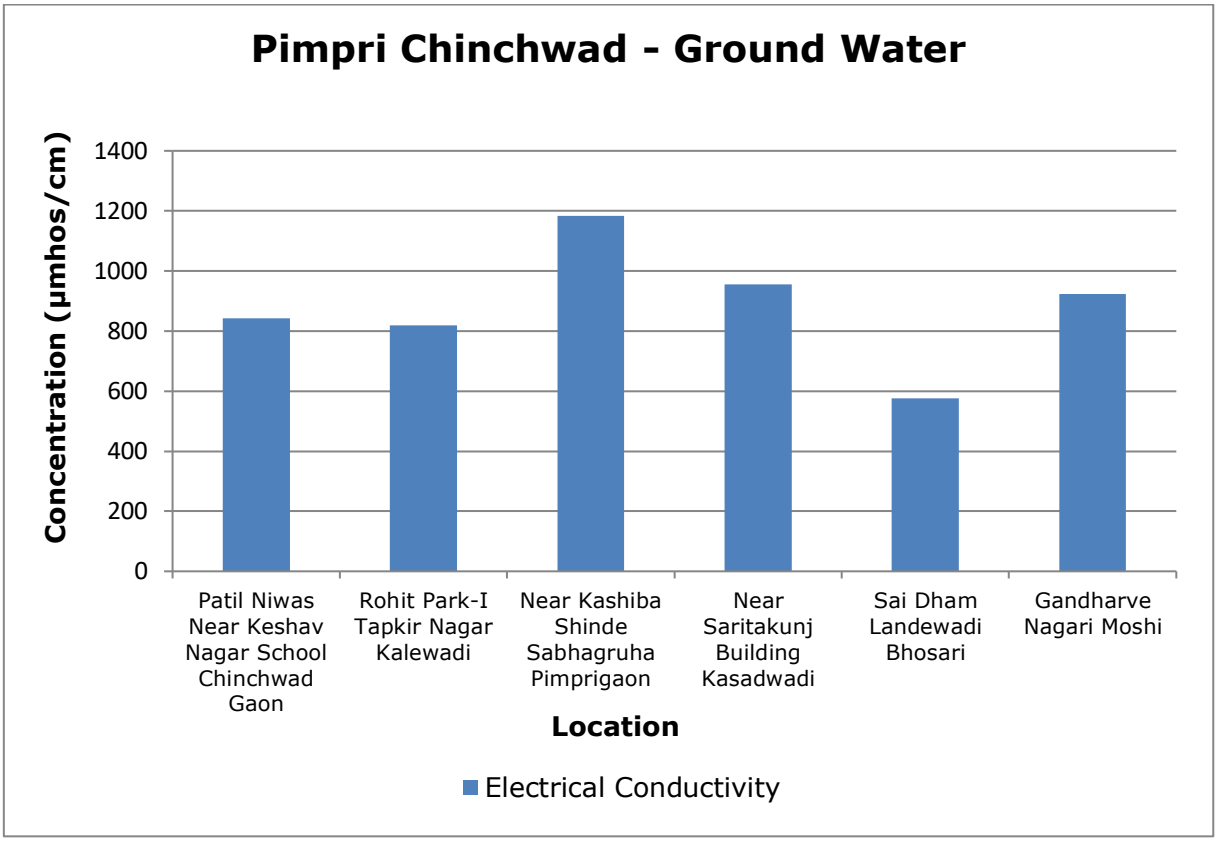
Parameters	Unit	Results		
		Near Saritakunj Building Kasadwadi	Sai Dham Landewadi Bhosari	Gandharve Nagari Moshi
Sanitary Survey	-	Generally clean neighborhood	Generally clean neighborhood	Generally clean neighborhood
General Appearance	-	No floating matter	No floating matter	No floating Matter
Transparency	M	Not Applicable	Not Applicable	Not Applicable
Temperature	^oC	27	27	28
Colour	Hazen	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	8.19	8.24	8.13
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	10	9	14
Total Dissolved Solids	mg/L	536	323	518
Chemical Oxygen Demand	mg/L	5	6	5
Biochemical Oxygen Demand (3 days, 27^oC)	mg/L	1	2	1
Electrical Conductivity (at 25 ^oC)	µmhos/cm	956	575	924
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	BLQ	BLQ	3.96
(NO_2 + NO_3)-Nitrogen	mg/L	0.51	0.57	3.96
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.9	0.5	0.9
Sulphide (as S^{2-})	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ

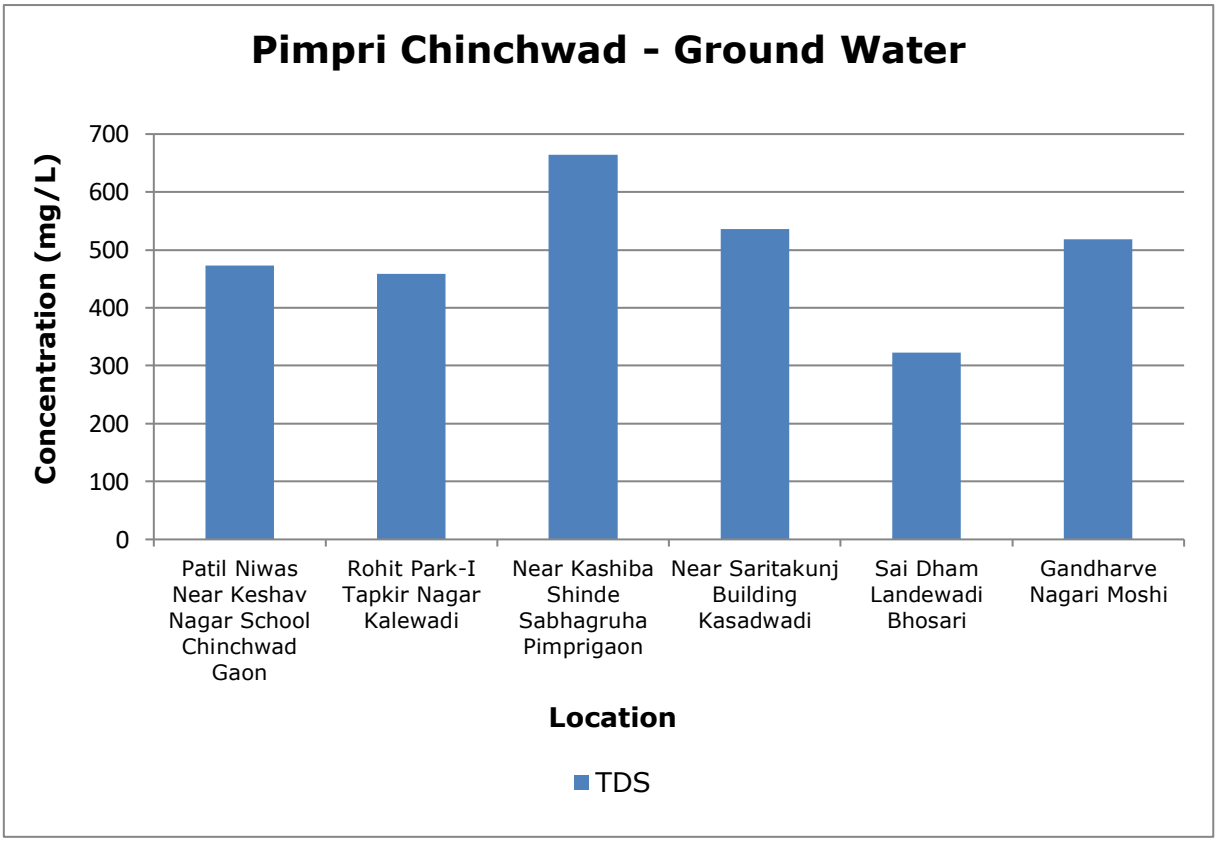
Parameters	Unit	Results		
		Near Saritakunj Building Kasadwadi	Sai Dham Landewadi Bhosari	Gandharve Nagari Moshi
Sodium Adsorption Ratio	-	1.95	1.61	1.48
Total Coliforms	MPN Index/100 ml	654	188	16.2
Faecal Coliforms	MPN Index/100 ml	336	122	8.67
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen	mg/L	1.05	0.75	1.01
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.21	0.16	0.3
Total Nitrogen	mg/L	1.55	1.32	4.97
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS, Calculated as LAS, mol.wt. 288.38)	µg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	mg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.052	BLQ	0.138
Nickel (as Ni)	mg/L	0.018	BLQ	0.017
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.306	0.163	0.189
Iron (as Fe)	mg/L	0.41	0.27	0.18
Vanadium (as V)	mg/L	0.026	BLQ	0.019
Selenium (as Se)	mg/L	0.008	0.01	0.009
Boron (as B)	mg/L	BLQ	0.1	BLQ
Bioassay Test on fish	% survival	97	100	100

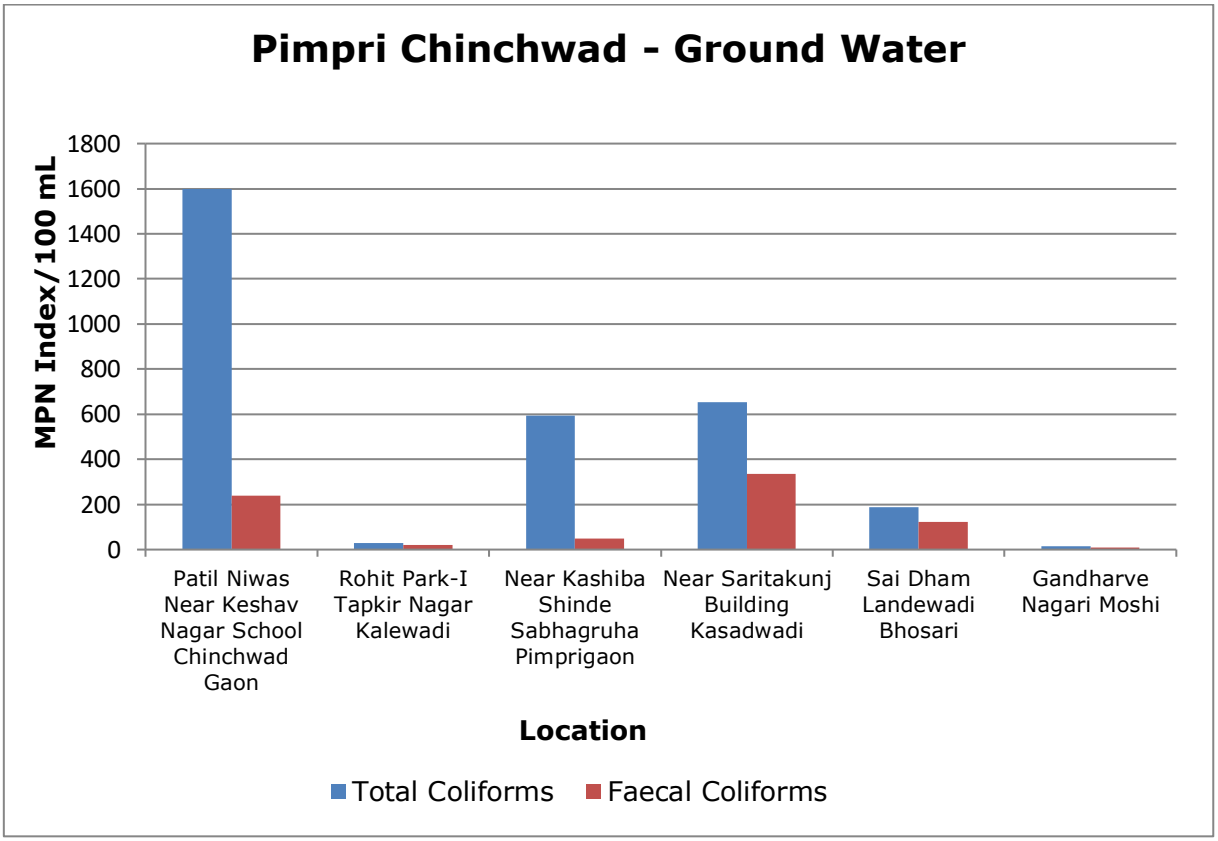
Graphs - Ground Water Quality

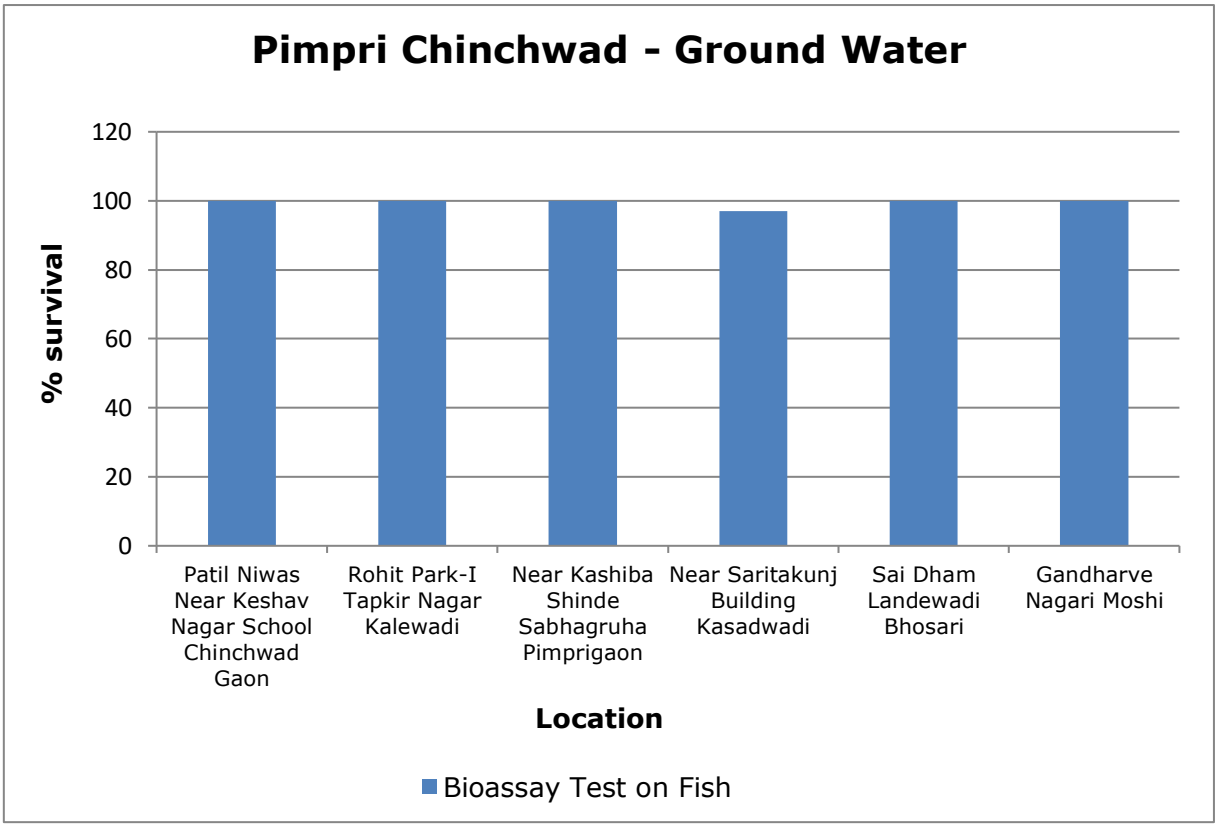





Pimpri Chinchwad - Ground Water
Concentration (µmhos/cm)
1400
1200
1000
800
600
400
200
0
Patil Niwas Near Keshav Nagar School Chinchwad Gaon
Rohit Park-I Tapkir Nagar Kalewadi
Near Kashiba Shinde Sabhagruha Pimprigaon
Near Saritakunj Building Kasadwadi
Sai Dham Landewadi Bhosari
Gandharve Nagari Moshi
Location
Electrical Conductivity


Pimpri Chinchwad - Ground Water
Concentration (mg/L)
700
600
500
400
300
200
100
0
Patil Niwas Near Keshav Nagar School Chinchwad Gaon
Rohit Park-I Tapkir Nagar Kalewadi
Near Kashiba Shinde Sabhagruha Pimprigaon
Near Saritakunj Building Kasadwadi
Sai Dham Landewadi Bhosari
Gandharve Nagari Moshi
Location
TDS


Pimpri Chinchwad - Ground Water
MPN Index/100 mL
1800
1600
1400
1200
1000
800
600
400
200
0
Patil Niwas Near Keshav Nagar School Chinchwad Gaon
Rohit Park-I Tapkir Nagar Kalewadi
Near Kashiba Shinde Sabhagruha Pimprigaon
Near Saritakunj Building Kasadwadi
Sai Dham Landewadi Bhosari
Gandharve Nagari Moshi
Location
Total Coliforms
Faecal Coliforms


Pimpri Chinchwad - Ground Water
% survival
120
100
80
60
40
20
0
Patil Niwas Near Keshav Nagar School Chinchwad Gaon
Rohit Park-I Tapkir Nagar Kalewadi
Near Kashiba Shinde Sabhagruha Pimprigaon
Near Saritakunj Building Kasadwadi
Sai Dham Landewadi Bhosari
Gandharve Nagari Moshi
Location
Bioassay Test on Fish

C: Receptor

Table 10.1 Details of Component C

Component C (Impact on Human Health) 10	
Main - 10	
% increase in cases	**Marks**
<5%	0
5-10%	5
>10%	10

- % increase is evaluated based on the total no. of cases recorded during two consecutive years.
- For Air Environment, total no. of cases related to Asthma, Bronchitis, Cancer, Acute respiratory infections etc. are to be considered.
- For surface water/ ground water Environment, cases related to Gastroenteritis, Diarrhoea, renal (kidney) malfunction, cancer etc are to be considered.
- For the above evaluation, the previous 5 years records of 3-5 major hospitals of the area shall be considered.

Annexure – I Health Related Data enclosed.

9. CEPI Score

Comprehensive Environmental Pollution Index (CEPI) is intended to act as early warning tool which helps in categorization of industrial clusters/ areas in terms of priority of needing attention. The CEPI score have been calculated based on CPCB Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016. The scoring system involves an algorithm that considers the basic selection criteria. It is proposed to develop the CEPI based on Sources of pollution, real time observed values of the pollutants in the ambient air, surface water and ground water in & around the industrial cluster and health related statistics.

Table 8.1 CEPI score of the Post monsoon season 2024

	A1	A2	A	B	C	D	CEPI
Air Index	3.5	2.5	8.75	1.5	10	0	**20.25**
Water Index	3.25	2.5	8.125	21.5	0	0	**29.63**
Land Index	2.5	2.5	6.25	15.25	0	0	**21.50**
						Aggregated CEPI	**32.69**

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI score March 2024	20.25	29.63	21.50	**32.69**
CEPI score June 2023	9.88	46.25	34.00	**48.06**
CEPI score March 2023	19.9	36.3	43.8	**47.9**
CEPI score June 2021	17.5	34.9	43.8	**47.2**
CEPI Score March 2021	20.5	34.9	32.6	**39.3**
CEPI score March 2020	43.1	7.5	38.1	**44.7**
CEPI score June 2019	33.1	30.2	30.5	**39.26**
CEPI score March 2019	36.3	32.9	29.2	**42.4**
CEPI score June 2018	37	25.15	26.99	**40.82**
CEPI score March 2018	34.45	37.4	36.91	**43.49**

CPCB CEPI score March 2018	52	6.25	5.25	**52.16**

CEPI score calculation:

Ambient Air Analysis Report

Pollutant	**Group**	**A1**	**A2**	**A (A1 X A2)**
PM_{10}	B	2	Moderate	
$PM_{2.5}$	B	0.5		
Benzene	C	1		
		3.5	**2.5**	**8.75**

Pollutant	**Avg (1)**	**Std (2)**	**EF (3) [(3)=(1)/(2)]**	**No. of samples Exceeding (4)**	**Total no. of samples (5)**	**SNLF Value (6) [(6)=(4)/(5)x(3)]**	**SNLF score (B)**	
PM_{10}	78.13	100	0.78	0	8	0.00	L	1.5
$PM_{2.5}$	21.00	60	0.35	0	8	0.00	L	0
Benzene	2.50	5	0.50	0	8	0.00	L	0
B score = (B1+B2+B3)							**B**	**1.5**

C	**10**	**<5%**
D	**0**	**A-A-A**

Air CEPI Score	**(A+B+C+D)**	**20.25**

Water Quality Analysis Report

Pollutant	**Group**	**A1**	**A2**	**A (A1 X A2)**
BOD	B	2	Moderate	
TKN	A	0.25		
Se	A	1		
		3.25	**2.5**	**8.125**

Pollutant	**Avg (1)**	**Std (2)**	**EF (3) [(3)=(1)/(2)]**	**No. of samples Exceeding (4)**	**Total no. of samples (5)**	**SNLF Value (6) [(6)=(4)/(5)x(3)]**	**SNLF score (B)**	
BOD	7.67	8	0.96	3	6	0.48	M	15
TKN	1.46	3	0.49	1	6	0.08	M	3
Se	0.01	0.01	1.20	1	6	0.20	M	3.5
B score = (B1+B2+B3)							**B**	**21.5**

C	**0**	**>10%**

D	**0**	**A-A-A**

Water CEPI Score	**(A+B+C+D)**	**29.63**

Ground Water Quality Analysis Report

Pollutant	**Group**	**A1**	**A2**	**A (A1 X A2)**
Fe	A	1	Moderate	
Se	B	0.5		
BOD	C	1		
		2.5	**2.5**	**6.25**

Pollutant	**Avg (1)**	**Std (2)**	**EF (3) [(3)=(1)/(2)]**	**No. of samples Exceeding (4)**	**Total no. of samples (5)**	**SNLF Value (6) [(6)=(4)/(5)x(3)]**	**SNLF score (B)**	
Fe	0.28	0.3	0.92	2	6	0.31	M	12.75
Se	0.01	0.01	0.99	0	6	0.00	L	2.5
BOD	1.50	8	0.19	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**15.25**

C	**0**	**>10%**
D	**0**	**A-A-A**

Land CEPI Score	**(A+B+C+D)**	**21.50**

Water CEPI Score (im) **29.63**

Land CEPI Score (i2) **21.50**

Air CEPI Score (i3) **20.25**

Aggregated CEPI Score = **im + {(100-im)*i2/100)*i3/100)}**
where, im = maximum sub index; and i2 and i3 are sub indices for other media

CEPI Score = **32.69**

10. Conclusion

Ambient Air Quality

- The AAQ stations were identified in the CEPI impact area to cover both upwind and crosswind directions and AAQ survey was conducted.
- All parameters are well within the limits as per NAAQS.
- In the CEPI score calculated for Air Environment by CPCB in March 2018, PM_{10} and $PM_{2.5}$ have exceeded which may also be due to the vehicular emissions.

Surface Water Quality

- There is marginal reduction observed in the BOD and COD as compare to the previous CEPI report for month of March 2023
- All the industries in the Pimpri-Chinchwad region are either reusing / recycling the treated trade effluent for internal process or gardening or are disposing of as per consent norms.

Ground Water Quality

- Ground water samples were collected from different Bore well in the region.
- Concentration of Iron is found higher than the standard limits in two water samples.

CEPI Score

- The CEPI Score pre monsoon season is 32.69.
- It seems that there is a reduction in the CEPI score by 15.11 as compared to the CEPI score of March 2023. Which is 31.62% considering previous year post monsoon CEPI Score 47.80.
- In comparison with the CEPI score March 2023 a marginal increase observed in the Air Index whereas reduction is observed in the Water Index and Land Index.

11. Efforts taken by MPCB to control and reduce Environmental Pollution Index

- Drive against open burning of biomass, crop residue, garbage, leaves, etc.: Follow up with PCMC authority for not to allow open burning of biomass garbage.
- **Organic Waste Compost machines**: All construction project have provided organic waste compost machines for treatment of wet waste.
- **Waste collection and segregation centres**:
  - ✓ **Domestic Solid Waste**: PCMC has provided door to door waste collection and segregation facility for residential area.
  - ✓ **Industrial Non-Hazardous Waste**: Recyclable waste is sent to authorized waste recyclers and other waste collected by corporations.
  - ✓ **Hazardous Waste:** Industrial hazardous waste sent to common hazardous treatment and disposal facility by industries.
- **Construction of Common Effluent Treatment plant (CETP)**: Small Scale Industrial Association and MCCIA has formed Special Purpose Vehicle (SPV) for provision of CETP. Accordingly, MIDC has allotted Plot No. 188/1 T Block, Bhosari MIDC for proposed 0.5 MLD in Phase I and 0.5 MLD in Phase II CETP. The preparation of DPR is in progress. M/s SAM Consultech has been selected for preparation of DPR. As per the submission of MCCIA, the project will be completed within one and half year.

  The estimated cost of setting up the proposed CETP is Rs. 15 Corers. Out of which MIDC contribution is 20%, MPCB 5 %, Industrial Association 10% and 65% from Pimpri-Chinchwad Municipal Corporation.
- **Installation of CEMS installed for Air and Water in Large and Medium scale RED category industries**: 02 no.
- Arrangement of scientific collection and treatment of sewage generated: Pimpri-Chinchwad Municipal Corporation has provided 14 nos of STP. Due lack to lack of drainage network 32 MLD domestic effluent dispose into River Pawna, Mula and Indrayani. Proposes to provide 8 no of STPs out of which installation work of 2 no of STPs is in progress. PCMC has prepared Plan for rejuvenation of river Pawna and Indrayani.
- Installation of CAAQMS station: 3 no of CAAQM stations provided at Rose Garden, Gavali Matha, Bhosari, PCMC garden, Jagtap Dairy, Pimple Nilakh and Chhatrapati Shivaji Maharaj Garden Dange Chowk, Pune and all in CAAQM stations are in operation for monitoring of air quality.
- Establishment of Monitoring stations under National Water Quality Monitoring Programme (NWMP) are 06.
- Steps are taken for industrial area/other units to recycle 100% treated effluent to achieve zero liquid discharge (ZLD): Directions were issued to the unit to provide ZLD and use 100% treated water for the secondary purpose. About 60 units have been provided by ZLD system.
- Steps taken to reduce dust emission:
  1. Conservation of traditional crematorium to electric based technology.
  2. Conversion 100% city transport bus in to CNG.
  3. Conversion of Auto into PNG and CNG based fuel.

4. RTO has started the implementation of Policy for discarding old vehicles. Also recently started online PUC certification for all vehicles. During their regular survey 2388 vehicles found defaulter and fine of Rs. 5,94,000/- were collected and from 01.04.2020 to 29.09.2020. 603 no. of vehicles found defaulter and fine of Rs. 67,000/- were collected.
5. The industries have changed their fuel F.O. to low Sulphur fuel and Green fuel like LPG, PNG and Electricity.
6. Regular cleaning of roads and traffic diversions and signals shall be installed by the corporation.
7. Road swiping machine provided.

- Tree plantation in last one year (2021-2022): 10,000 nos.
- Other initiatives taken to control and reduce pollution in air, surface water and ground water in last one year (2021-2022):
  a) Presently 03 CAAQM stations are installed at Rose Garden, Gavali Matha, Bhosari, PCMC Garden, Jagtap Dairy, Pimple Nilakh and Chhatrapati Shivaji Maharaj Garden Dange Chowk, Pune.
  b) PCMC has prepared plan for rejuvenation of river Pawna and Indrayani.
  c) Tree Plantation drive in MIDC area.
  d) Awareness programme has been carried out for ban of Single Use Plastic with Plastic Manufacturing Associations and with PCMC are ward wise. Also, survey has been caried out on regular basis with PCMC officials to seize the ban of Single Use Items and also imposed fine to the establishments.

Continuous Ambient Air Quality Monitoring Station

Ambient Air Quality Monitoring Van

12. Photographs

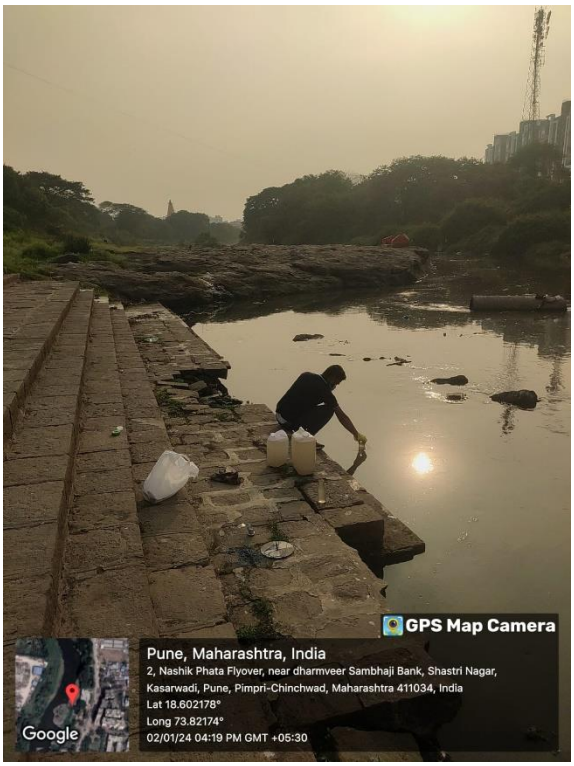
Ambient Air Sampling at Pimpri Chinchwad Municipal Corporation

Ambient Air Sampling at Thergaon Near Puduji Industries

Ambient Air Sampling at MIDC Pimpri Area, Yashwant Nagar Chouk Near Training Hall

Ambient Air Sampling at Akurdi Near Force Motor

	
Surface water sampling at Pawana River-Chinchwad	**Surface water sampling at Pawana River-Ravet**
	
Surface water sampling at Indrayani River-Chikhali	**Surface water sampling at Indrayani River – Moshi Bridge**



Surface water sampling at Pawana River-Ksarwadi

Ground water Sampling at Gandharve Nagari Moshi

Ground water Sampling at Patil Niwas Near Keshav Nagar School Chinchwad Gaon

Ground water Sampling at Rohit Park-I Tapkir Nagar Kalewadi

	
Ground water Sampling at Sai Dham Landewadi Bhosari	**Ground water Sampling at Near Saritakunj Building Kasarwadi**

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	PIMPRI-CHINCHWAD
Name of the major health center/ organization	Yashwantrao Chavan Memorial Hospital
Name and designation of the Contact person	Dr. Rajendra N. Wabale
Address	YCM Hospital RD, Sant Tukaram Nagar, Pimpri Colony, Pune, Maharashtra 411018

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2023 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	156	213
2.	Acute Respiratory Infection	224	692
3.	Bronchitis	64	243
4.	Cancer	-	12
WATERBORNE DISEASES			
1.	Gastroenteritis	290	603
2.	Diarrhea	24	273
3.	Renal diseases	3775	630
4.	Cancer	-	19

Date: 23-01-2024

Signature
DEAN
PG Institute
PCMC' S YCM Hospital
Pimpri, Pune-411018

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	**PIMPRI-CHINCHWAD**
Name of the major health center/ organization	**Niramaya hospital,Chinchwad**
Name and designation of the Contact person	**Dr.Mihira Patade Head operations 9049994193**
Address	**Behind chinchwad post office,Chinchwad Station ,Pune 411019**

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2023(Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	12	33
2.	Acute Respiratory Infection	42	149
3.	Bronchitis	89	125
4.	Cancer	289	203
WATERBORNE DISEASES			
1.	Gastroenteritis	370	226
2.	Diarrhea	1	3
3.	Renal diseases	63	63
4.	Cancer	-	-

Date: 05/3/24

Signature

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	**PIMPRI-CHINCHWAD**
Name of the major health center/ organization	**Yashwantrao Chavan Memorial Hospital**
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