

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

Mahad

Post-Monsoon (December 2023 to February 2024)



Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

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ABBREVIATIONS

CPCB	Central Pollution Control Board
MPCB	Maharashtra Pollution Control Board
CEPI	Comprehensive Environmental Pollution Index
EPA	Environmental Protection Act, 1986
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
CETP	Common Effluent Treatment Plant
VOCs	Volatile Organic Compounds
MIDC	Maharashtra Industrial Development Corporation
NWMP	National Water Quality Monitoring Program
NAAQS	National Ambient Air Quality Standard
ZLD	Zero Liquid Discharge
CPA	Critically Polluted Area
SPA	Severely Polluted Area
OPA	Other Polluted Area

1. Executive Summary

Mahad 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 locations of sampling 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 by NAAQS. Six locations each for surface water and ground water were monitored for the study. Concentration of Total Kjeldahl Nitrogen was found above the standard limits in one of the surface water sample. Land index is represented by ground water in the CEPI. Ground water parameters were found to be within the permissible limits, except Iron and Selenium, when compared with IS10500:2012 drinking water standards.

Based on the study conducted by CPCB during the period January 2018, the CEPI score of Mahad region as per the revised guidelines of CEPI (2016) was 47.12 (Air Index-41, Water Index-35.75 and Land Index-47.12). However, the present study reports aggregated CEPI score of Mahad region of post-monsoon season (March, 2024), the present CEPI score is 41.5 (Air Index-19.00, Water Index-31.00 and Land Index-37.80). 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 past few years to mitigate the pollution. As 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 reduced the CEPI score of the region over the years.

The analysis of the aggregated CEPI score shows that the CEPI score of Mahad industrial cluster is decreased approximately 12% from 47.12 of 2018 to 41.5 in the present study.

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 Chembur in Mumbai, Maharashtra. The present CEPI study includes Mahad city in Raigad district situated in the North Konkan region of Maharashtra state, India. It is located 108.5 km from District's Headquarter Alibag. Savitri river is the main river which originates from Savitri Point in Mahabaleshwar and flows through Mahad. Mahad receives the highest rainfall in Raigad district because of the rain catcher forest of Raigad Fort Natural Reserve. Mahad accounts for lots of industrial units of various category engaged in the manufacturing of chemicals, dyes, dye-intermediates, Bulk drugs, pharmaceuticals, Textile auxiliaries, Pesticides, Petrochemicals, Textile processors, Engineering units etc. Besides the industries, there are other sources which are major contributors of pollution like emissions by transport and construction activities etc.

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 Mahad.

The present report is based on the revised CEPI version 2016. The results of the application of the Comprehensive Environmental Pollution Index (CEPI) to selected industrial cluster or areas are presented in this report. The main objective of the study is to identify polluted industrial clusters or areas in order to take concerted action and to centrally monitor them at the national level to improve the current status of their environmental components such as air and water quality data, ecological damage, and visual environmental conditions. 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.

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 Mahad, 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 MAHAD

Sampling Criteria	Total Sites	Monitoring Parameters
Ambient Air Quality	08	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , NH ₃ , O ₃ , C ₆ H ₆ , CO, BaP, Pb, Ni, As
Volatile Organic Compounds (VOCs)	02	Dichloromethane, Chloroform, Carbon Tetrachloride, Trichloroethylene, Bromodichloromethane, 1,3-Dichloropropane, 1,4-Dichlorobenzene, 1,3-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-Chloropropane, Napthalene, 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-Dichloroethylene, Trans-1,2-Dichloroethylene, 1,1-Dichloroethane, CIS-1,2-Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane

Sampling Criteria	Total Sites	Monitoring Parameters
Water Quality Monitoring	Surface water - 06	<p>(i) Simple Parameters</p> <p>Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological</p> <p>(ii) Regular Monitoring Parameters</p> <p>pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical Conductivity, Total Dissolved Solids, Nitrite-Nitrogen, Nitrate-Nitrogen, (NO₂+NO₃) total nitrogen, Free Ammonia, Total Residual Chlorine, Cyanide, Fluoride, Chloride, Sulphate, Sulphides, Total Hardness, Dissolved Phosphates, SAR, Total Coliforms, Faecal Coliform</p> <p>(iii) Special Parameters</p> <p>Total Phosphorous, TKN, Total Ammonia (NH₄+NH₃)-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</p> <p>(iv) Bio-assay (zebra Fish) Test – For specified samples only.</p>
	Ground water - 06	

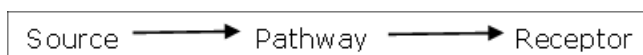
Table 3.2 Frequency of Sampling

	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 hr
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

	Parameter	Round of Sampling	Frequency in Each Round
6.	Ozone (O ₃)	03	24 Shifts of 1 hr each
7.	Benzene (C ₆ H 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 of Source, Pathway and Receptor.



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 potentially 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.

AIR ENVIRONMENT

5. Air Environment

For studying the Air Environment of Mahad 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 Mahad eight locations have been monitored of checking the Ambient Air Quality (AAQ) in triplicate from 8th Jan., 2024 to 12th Jan., 2024. Concentration of all the parameters at all studied locations was observed well within the limits. VOCs were monitored at 2 locations namely Sequent Scientific Ltd. and Prasol Chemical Ltd.

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.	Nearby Piramal Healthcare Ltd.	N18°06'43.50"	E73°31'10.72"	08.01.2024	10.01.2024	12.01.2024
2.	Akzo noble India Ltd. (Nouryon Chemical) Mahad	N18°05'56.99"	E73°29'3.62"	08.01.2024	10.01.2024	12.01.2024
3.	Vinati Organics Ltd Mahad	N18°06'2.01"	E73°29'21.38"	08.01.2024	10.01.2024	12.01.2024
4.	Sandoz India Pvt. Ltd, Mahad	N18°05'55.13"	E73°27'49.53"	08.01.2024	10.01.2024	12.01.2024
5.	Pidilite Industries Ltd	N18°06'26.38"	E73°28'21.46"	08.01.2024	10.01.2024	12.01.2024
6.	CETP, Mahad	N18°05'50.58"	E73°27'59.89"	08.01.2024	10.01.2024	12.01.2024
7.	MIDC Office Mahad	N18°05'54.00"	E73°28'0.86"	08.01.2024	10.01.2024	12.01.2024
8.	Hikal Ltd	N18°05'43.45"	E73°27'53.50"	08.01.2024	10.01.2024	12.01.2024

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.	Sequent Scientific Ltd	N18°40'00.9"	E73°17'34.3"	08.01.2024	10.01.2024	12.01.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
2.	Prasol Chemical Pvt Ltd.	N18°44'01.1"	E73°19'17.2"	08.01.2024	10.01.2024	12.01.2024

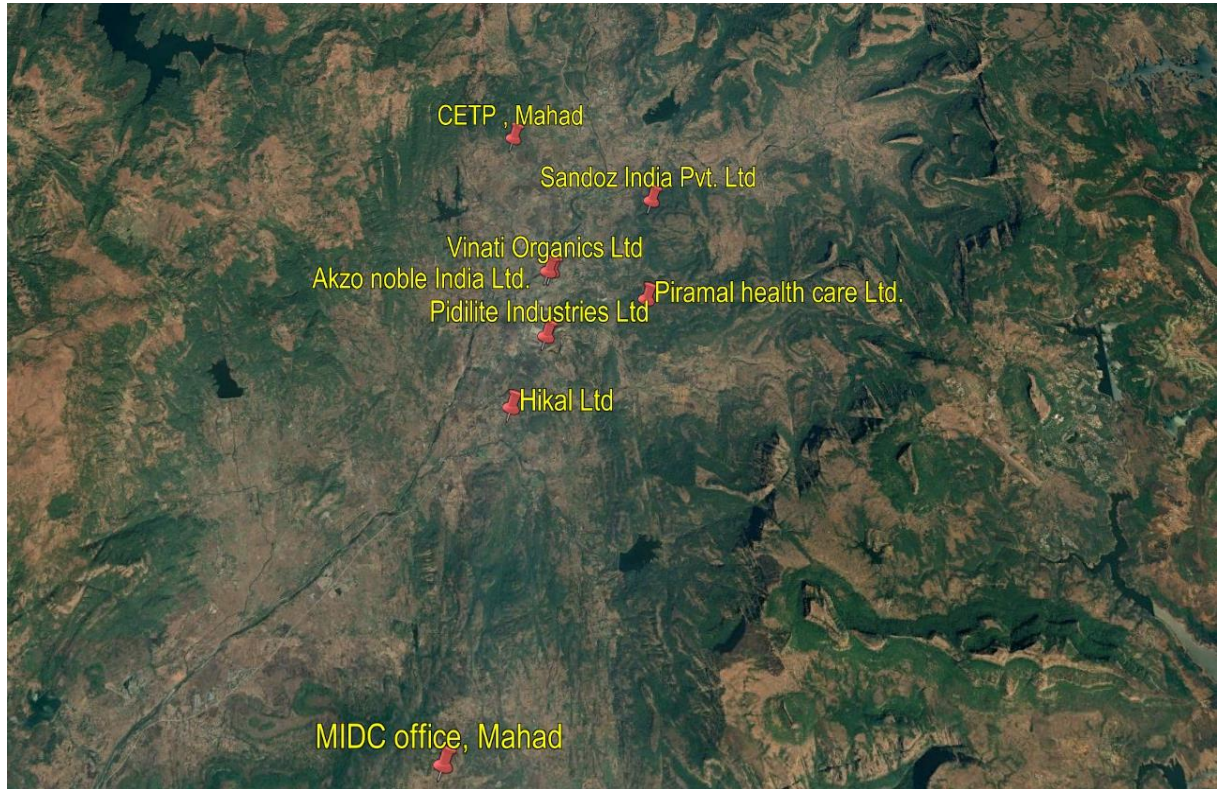


Fig: Geographical Locations of Ambient Air Sampling



Fig: Geographical Locations of VOCs Monitoring

Table 5.3 Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Piramal health care Ltd.	Akzo noble India Ltd. (Nouryon Chemical)	Vinati Organics Ltd.	Sandoz India Pvt. Ltd.
Sulphur Dioxide (SO ₂)	µg/m ³	BLQ	BLQ	BLQ	BLQ
Nitrogen Dioxide (NO ₂)	µg/m ³	8.16	12.05	12.2	8.39
Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	71	74	79	80
Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	19	21	22	21
Ozone (O ₃)	µg/m ³	26.3	24.8	63.9	34.40
Lead (Pb)	µg/m ³	BLQ	BQL	0.03	0.03
Carbon Monoxide (CO) (1h)	mg/m ³	1.23	1.19	0.90	1.08
Carbon Monoxide (CO) (8h)	mg/m ³	1.57	1.71	1.32	1.47
Ammonia (NH ₃)	µg/m ³	50.45	55.47	30.7	105.30
Benzene (C ₆ H ₆)	µg/m ³	3.09	2.60	2.46	2.33

Parameters	Unit	Results			
		Piramal health care Ltd.	Akzo noble India Ltd. (Nouryon Chemical)	Vinati Organics Ltd.	Sandoz India Pvt. Ltd.
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m ³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m ³	1.80	1.88	1.12	BLQ
Nickel (Ni)	ng/m ³	BLQ	3.5	BLQ	BLQ

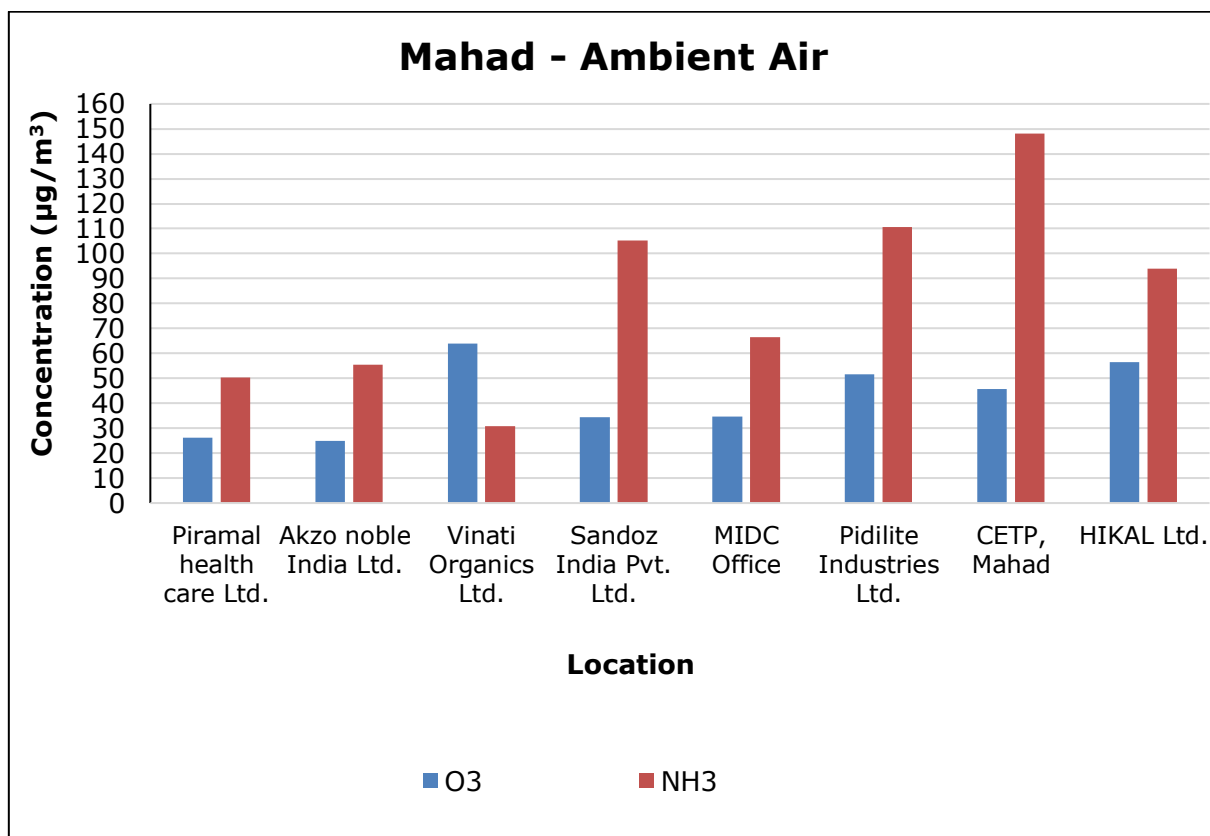
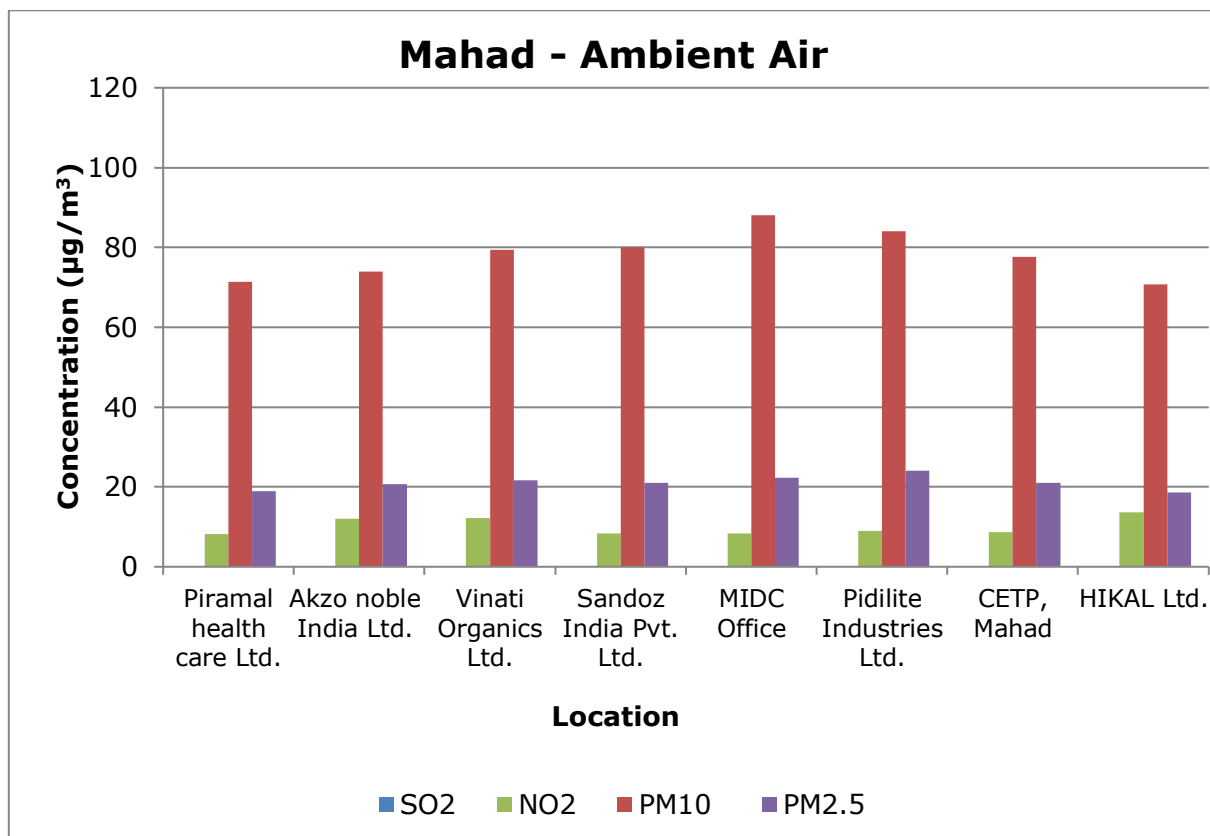
Parameters	Unit	Results			
		MIDC Office	Pidilite Industries Ltd.	CETP, Mahad	HIKAL Ltd.
Sulphur Dioxide (SO ₂)	µg/m ³	BLQ	BLQ	BLQ	BLQ
Nitrogen Dioxide (NO ₂)	µg/m ³	8.725	8.27	8.95	13.57
Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	78	88	84	71
Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	21	22	24	19
Ozone (O ₃)	µg/m ³	45.65	34.77	51.6	56.45
Lead (Pb)	µg/m ³	0.04	BLQ	BLQ	BLQ
Carbon Monoxide (CO)-1h	mg/m ³	1.14	0.9	1.12	0.87
Carbon Monoxide (CO)-8 h	mg/m ³	1.84	1.34	1.57	1.27
Ammonia (NH ₃)	µg/m ³	148	66.57	110.55	93.95
Benzene (C ₆ H ₆)	µg/m ³	2.29	2.85	2.10	3.12
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m ³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m ³	0.647	0.797	1.118	0.59
Nickel (Ni)	ng/m ³	BLQ	4.43	5.15	BLQ

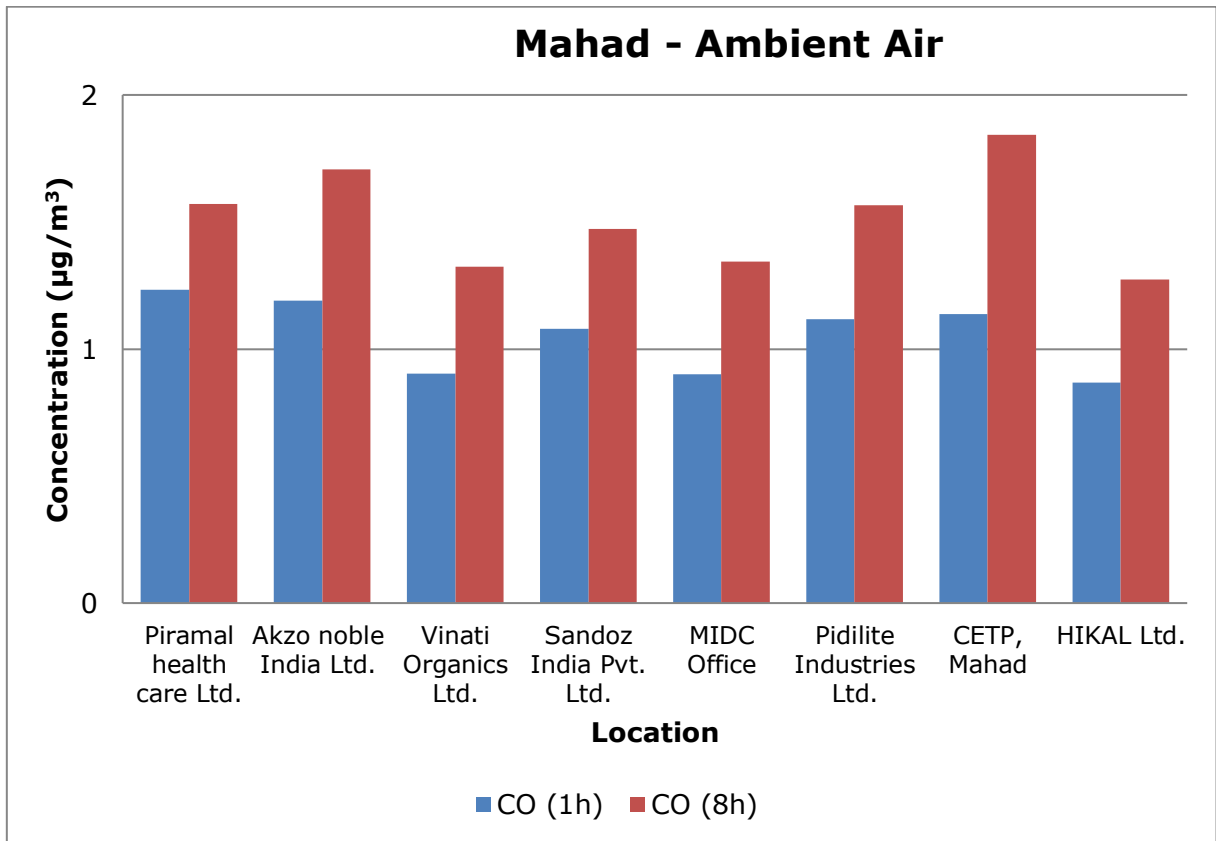
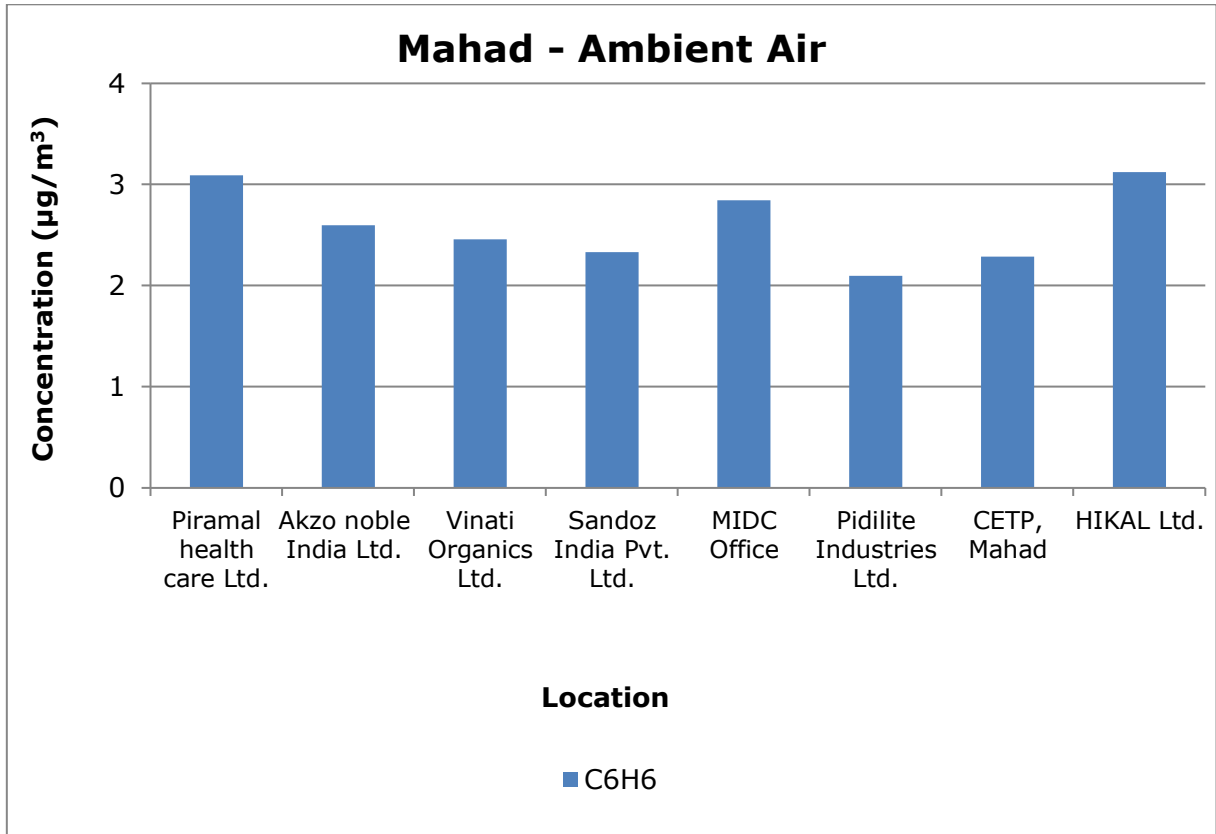
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

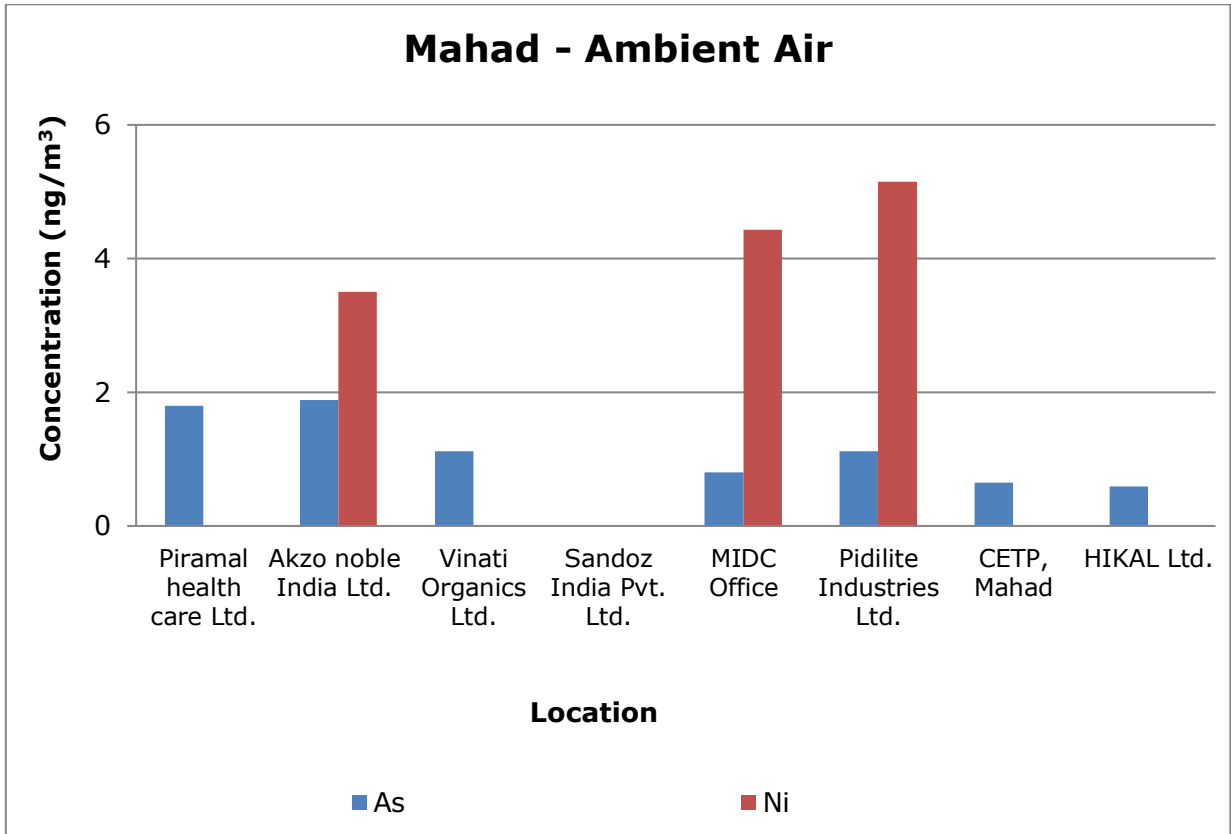
Parameters	Unit	Results	
		Sequent Scientific Ltd.	Prasol Chemical Pvt Ltd.
Dichloromethane	µg/m ³	1.327	2.06
Chloroform	µg/m ³	1.01	1.13
Carbon Tetrachloride	µg/m ³	0.53	2.44
Trichloroethylene	µg/m ³	BLQ	BLQ
Bromodichloromethane	µg/m ³	BLQ	0.564
1,3-Dichloropropane	µg/m ³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m ³	8.54	15.01
1,3-Dichlorobenzene	µg/m ³	1.72	11.57
1,2-Dichlorobenzene	µg/m ³	BLQ	0.56
1,2-Dibromo-3-Chloropropane	µg/m ³	BLQ	BLQ
Napthalene	µg/m ³	BLQ	BLQ
Bromobenzene	µg/m ³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m ³	BLQ	BLQ
2-Chlorotoluene	µg/m ³	BLQ	BLQ
Tert-Butylbenzene	µg/m ³	BLQ	BLQ
SEC-Butylbenzene	µg/m ³	BLQ	BLQ
P-Isopropyltoluene	µg/m ³	BLQ	BLQ
M-Xylene	µg/m ³	BLQ	BLQ
P-Xylene	µg/m ³	BLQ	3.70
Styrene	µg/m ³	BLQ	BLQ
Cumene	µg/m ³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m ³	BLQ	BLQ
N-Propylbenzene	µg/m ³	BLQ	BLQ
Dibromochloromethane	µg/m ³	BLQ	BLQ
1,2-Dibromoethane	µg/m ³	BLQ	BLQ
Chlorobenzene	µg/m ³	2.21	BLQ
1,1,1,2-Tetrachloroethane	µg/m ³	BLQ	BLQ
Ethylbenzene	µg/m ³	BLQ	BLQ
1,1-Dichloropropylene	µg/m ³	0.53	2.23
1,2-Dichloroethane	µg/m ³	0.74	0.52
1,2-Dichloropropane	µg/m ³	BLQ	BLQ

Parameters	Unit	Results	
		Sequent Scientific Ltd.	Prasol Chemical Pvt Ltd.
Trans-1,3-Dichloropropene	µg/m ³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m ³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m ³	BLQ	BLQ
Tetrachloroethylene	µg/m ³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m ³	BLQ	BLQ
N-Butylbenzene	µg/m ³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m ³	BLQ	BLQ
Hexachlorobutadiene	µg/m ³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m ³	BLQ	BLQ
2,2-Dichloropropane	µg/m ³	BLQ	BLQ
Dibromomethane	µg/m ³	BLQ	BLQ
Toluene	µg/m ³	1.02	0.54
O-Xylene	µg/m ³	BLQ	1.39
Bromoform	µg/m ³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m ³	BLQ	BLQ
4-Chlorotoluene	µg/m ³	BLQ	BLQ
1,1-Dichloroethylene	µg/m ³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m ³	BLQ	BLQ
1,1-Dichloroethane	µg/m ³	BLQ	BLQ
CIS-1,2-Dichloroethylene	µg/m ³	BLQ	BLQ
Bromochloromethane	µg/m ³	0.64	BLQ
1,1,1-Trichloroethane	µg/m ³	BLQ	0.95

Graphs - Ambient Air Quality Monitoring of Mahad







WATER ENVIRONMENT

6. Water Environment

For studying the water environment of Mahad area, six samples of Effluent Treatment Plant (ETP) outlet were collected from different industries. The quality of waste water was determined by determining various parameters as per standards and corresponding results are discussed below:

Six surface water samples are collected from Mahad region.

- All six water samples collected are found acceptable in general appearance, colour, smell and transparency.
- General parameters like pH, electrical conductivity, suspended solids, BOD, and COD are also observed well within the limits in all the samples.
- In fish bioassay, 100% survival of fishes was achieved in three of the water samples.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. are also observed either below detection limit or below their standard limits.
- Parameters like Total Residual Chlorine, Fluoride, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB except Total Kjeldahl Nitrogen, which is found to exceed the permissible limit in one of the water samples.
- 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.	Savitri river, Dadli bridge, Arvind nagar	N18°04'30.54"	E73°25'15.35"	09.01.2024	11.01.2024	13.01.2024
2.	Savitri river, savitri river near visva hotel	N18°05'12.17"	E73°26'40.04"	09.01.2024	11.01.2024	13.01.2024
3.	Savitri river, Nadgaon tarf Birwad	N18°06'50.10"	E73°28'39.17"	09.01.2024	11.01.2024	13.01.2024
4.	Savitri river, Kamble tarf	N18°04'32.86"	E73°28'26.38"	09.01.2024	11.01.2024	13.01.2024
5.	Kall river, Akale village, Near Borao	N18°10'30.05"	E73°29'54.37"	09.01.2024	11.01.2024	13.01.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
6.	Siddharth Colorchem Pvt. Ltd	N18°05'47.14"	E73°28'14.45"	09.01.2024	11.01.2024	13.01.2024

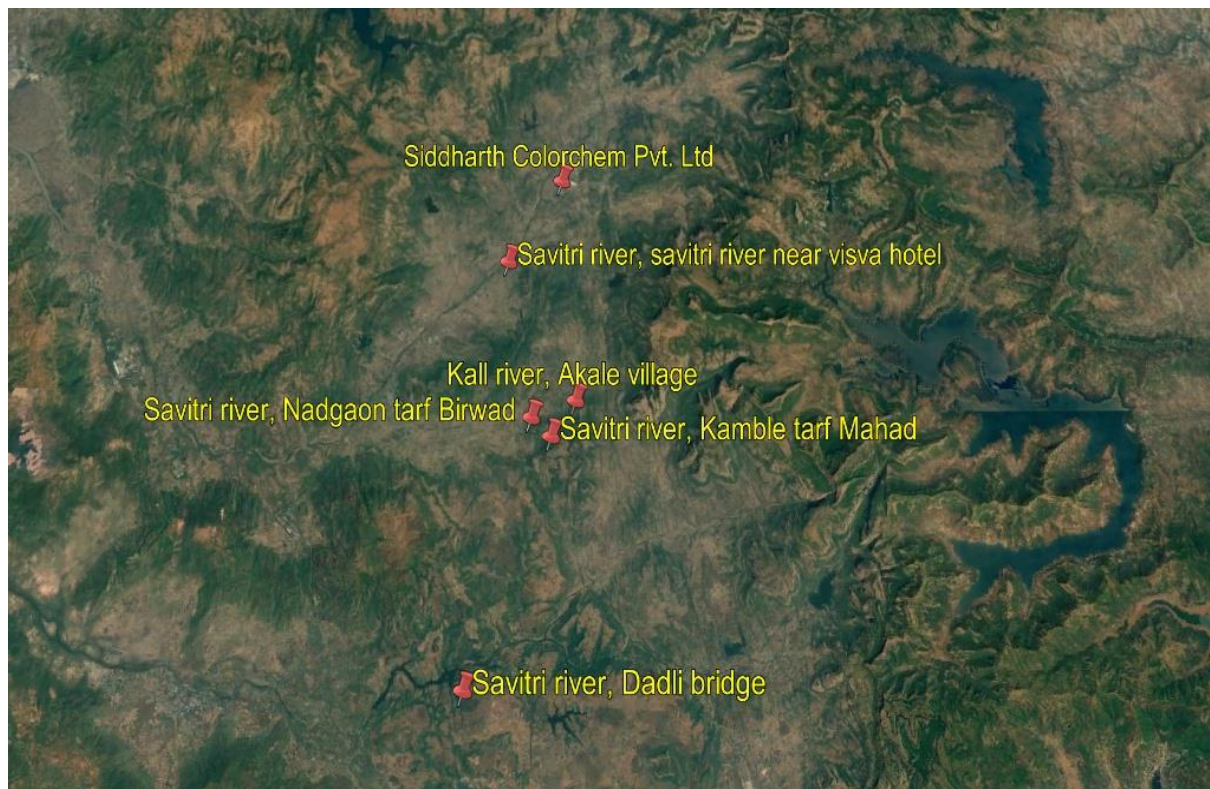


Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

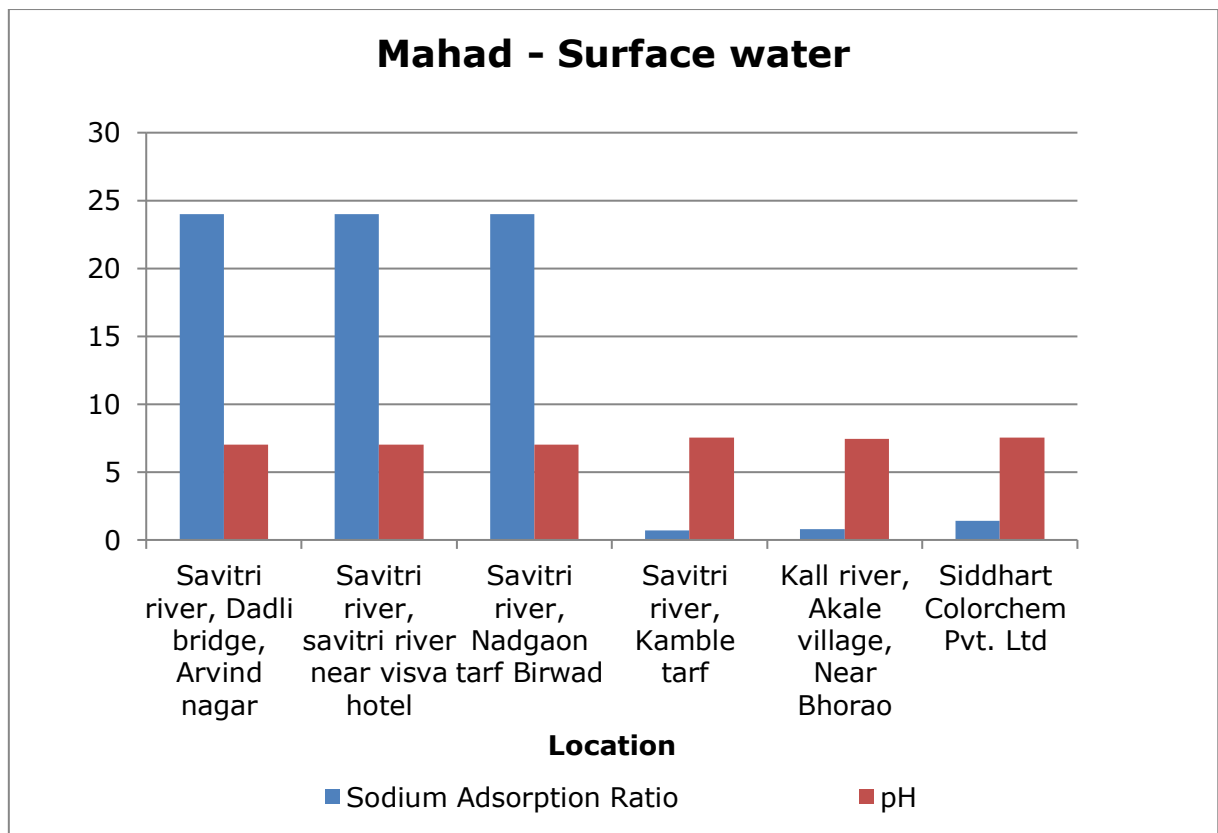
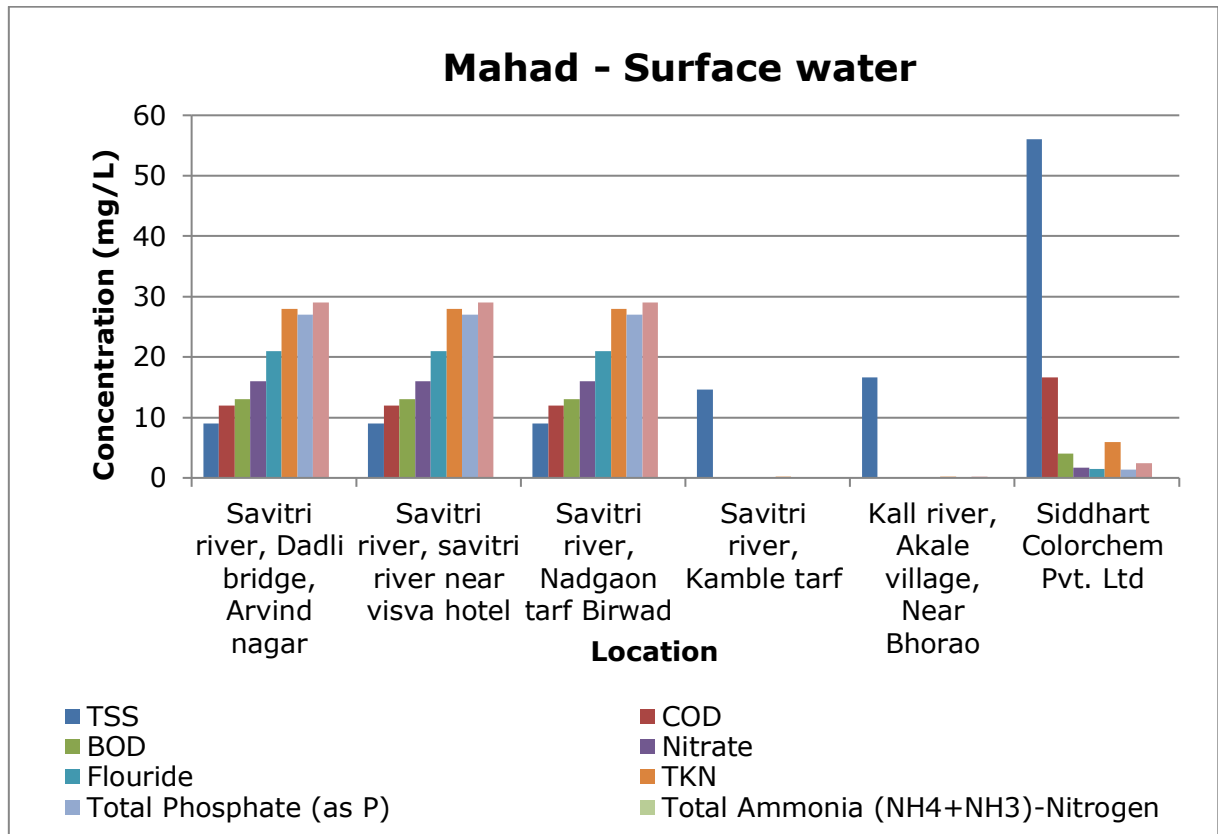
Parameters	Unit	Results					
		Savitri river, Dadli bridge	Savitri river near visva hotel	Savitri river, Nadgaon tarf Birwad	Savitri river, Kamble tarf Mahad	Kall river, Akale village, Near Bhorao	Siddhart Colorchem Pvt. Ltd.
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No Floating Matter	No Floating Matter	No Floating Matter	No Floating Matter	No Floating Matter	No Floating Matter
Transparency	m	0.5	0.1	0.3	0.2	0.3	0.2
Temperature	°C	28.47	29.37	28.73	28.97	29.27	29.17

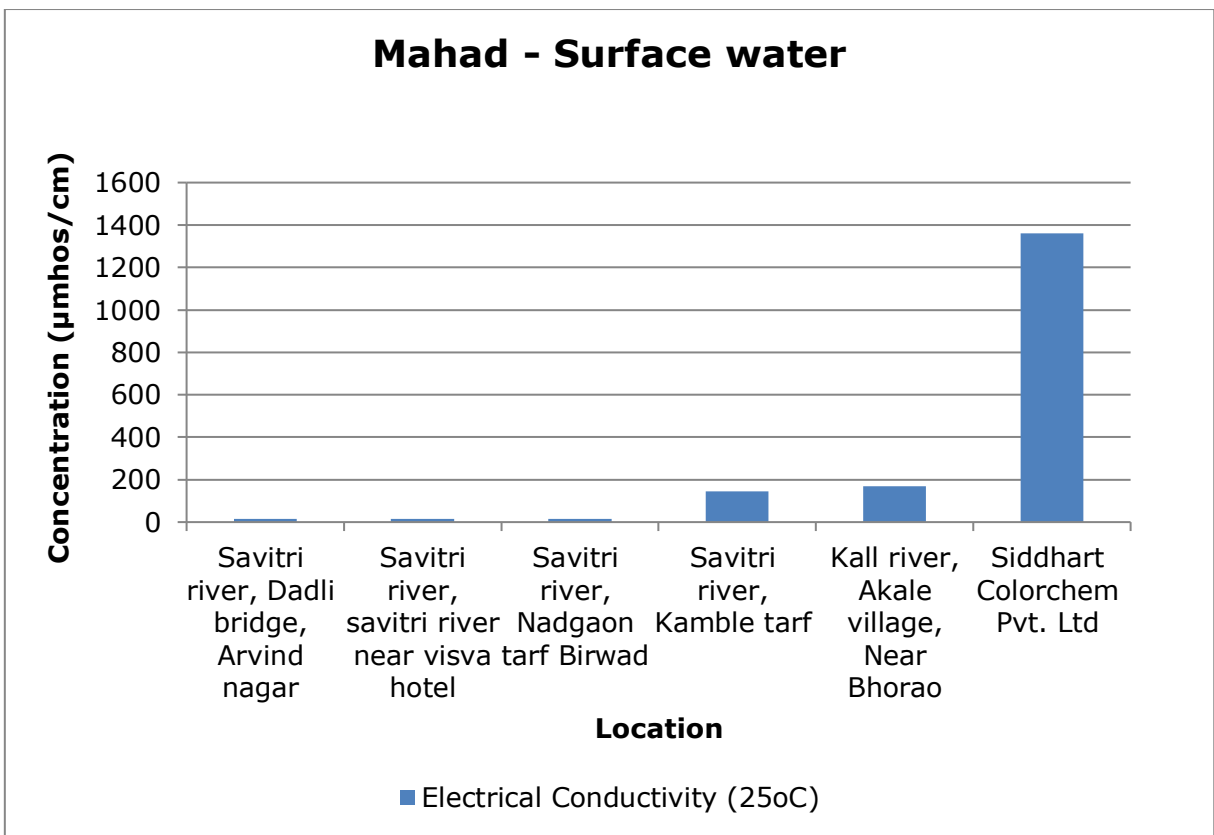
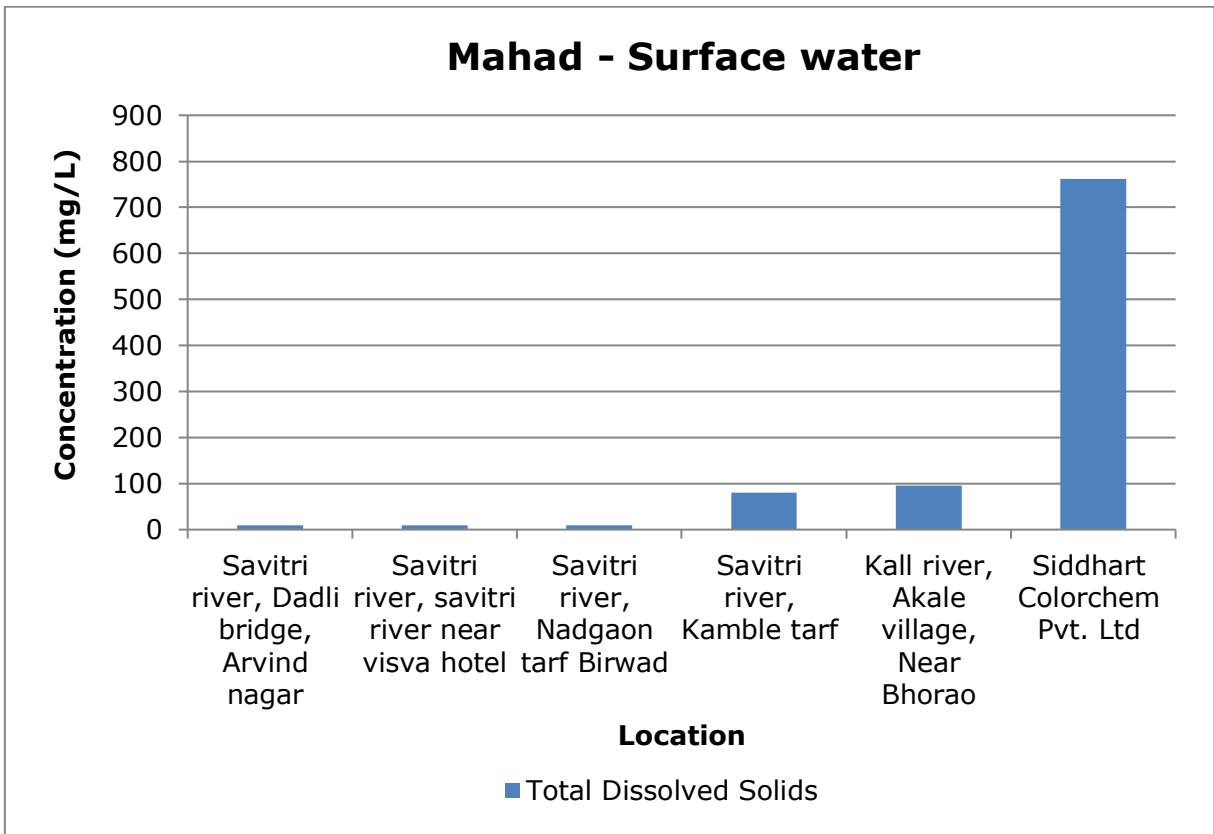
Parameters	Unit	Results					
		Savitri river, Dadli bridge	Savitri river near visva hotel	Savitri river, Nadgaon tarf Birwad	Savitri river, Kamble tarf Mahad	Kall river, Akale village, Near Bhorao	Siddhart Colorchem Pvt. Ltd.
Colour	Hazen	1	1	1	1	1	6
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.42	7.61	7.59	7.56	7.46	7.53
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	11	8	12	15	17	56
Total Dissolved Solids	mg/L	1985	120	131	81	96	762
Dissolved Oxygen (% Saturation)	%	79	73	79	81	81	76
Chemical Oxygen Demand	mg/L	6	BLQ	BLQ	BLQ	BLQ	16.67
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	2	BLQ	BLQ	BLQ	BLQ	4
Electrical Conductivity (at 25 °C)	µmho/cm	3365	180	234	145	170	1361
Nitrite Nitrogen (as NO ₂)	mg/L	0.02	BLQ	BLQ	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO ₃)	mg/L	1.18	BLQ	BLQ	BLQ	BLQ	1.73
(NO ₂ + NO ₃)-Nitrogen	mg/L	0.76	0.51	0.43	BLQ	BLQ	1.47
Free Ammonia (as NH ₃ -N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.27	0.20	0.20	0.10	0.10	1.43
Sulphide (as H ₂ S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	1.28
Sodium Adsorption Ratio	-	1.27	0.82	0.94	0.69	0.78	1.42

Parameters	Unit	Results					
		Savitri river, Dadli bridge	Savitri river near visva hotel	Savitri river, Nadgaon tarf Birwad	Savitri river, Kamble tarf Mahad	Kall river, Akale village, Near Bhorao	Siddhart Colorchem Pvt. Ltd.
Total Coliforms	MPN Index/100 ml	11	1600	566	22	16	1373
Faecal Coliforms	MPN Index/100 ml	5	280	320	BLQ	10	1247
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	1.34
Total Kjeldahl Nitrogen (as N)	mg/L	1.01	1.07	0.63	0.22	0.22	5.92
Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	0.25	0.25	0.16	0.15	0.16	2.43
Phenols (as C ₆ H ₅ OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.11	0.21	0.06	BLQ	BLQ	0.06
Nickel (as Ni)	mg/L	BLQ	0.06	BLQ	BLQ	BLQ	0.02
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr ⁶⁺)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	0.022	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

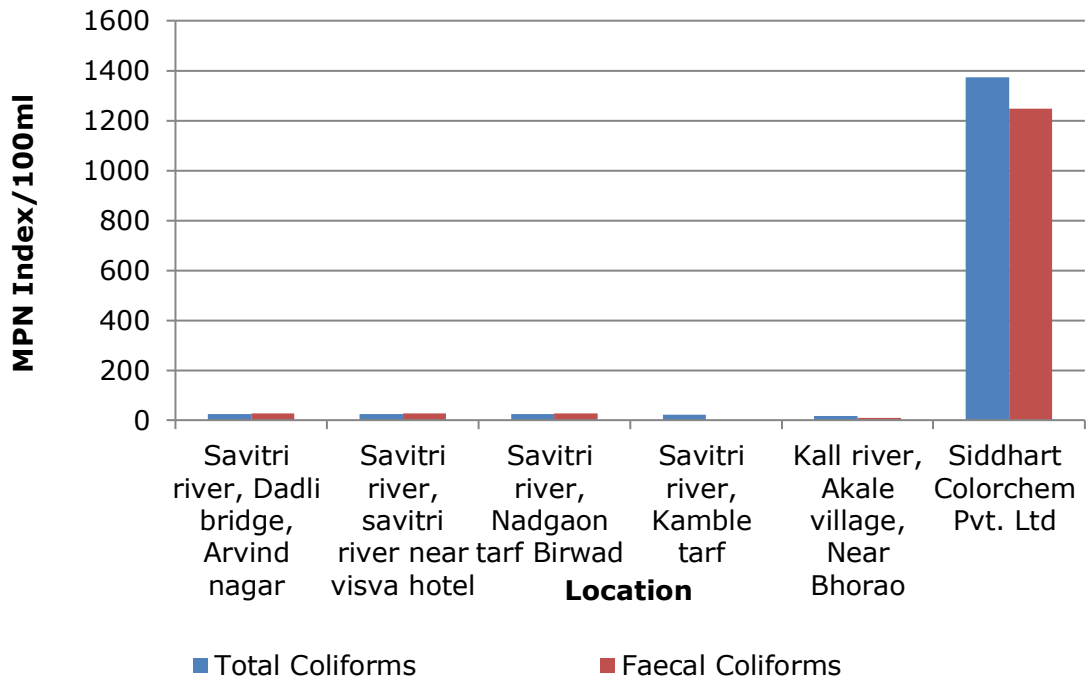
Parameters	Unit	Results					
		Savitri river, Dadli bridge	Savitri river near visva hotel	Savitri river, Nadgaon tarf Birwad	Savitri river, Kamble tarf Mahad	Kall river, Akale village, Near Bhorao	Siddhart Colorchem Pvt. Ltd.
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	BLQ	0.04	BLQ	BLQ	BLQ	0.04
Iron (as Fe)	mg/L	BLQ	0.50	0.12	0.26	0.13	0.22
Vanadium (as V)	mg/L	0.016	BLQ	BLQ	BLQ	0.02	BLQ
Selenium (as Se)	mg/L	0.02	0.01	0.01	0.01	0.01	0.02
Boron (as B)	mg/L	BLQ	BLQ	1.99	0.39	BLQ	BLQ
Total Nitrogen	mg/L	1.88	1.33	1.63	BLQ	BLQ	7.37
Bioassay Test on fish	% survival	100	100	97	100	97	97

Graphs - Surface Water Quality of Mahad

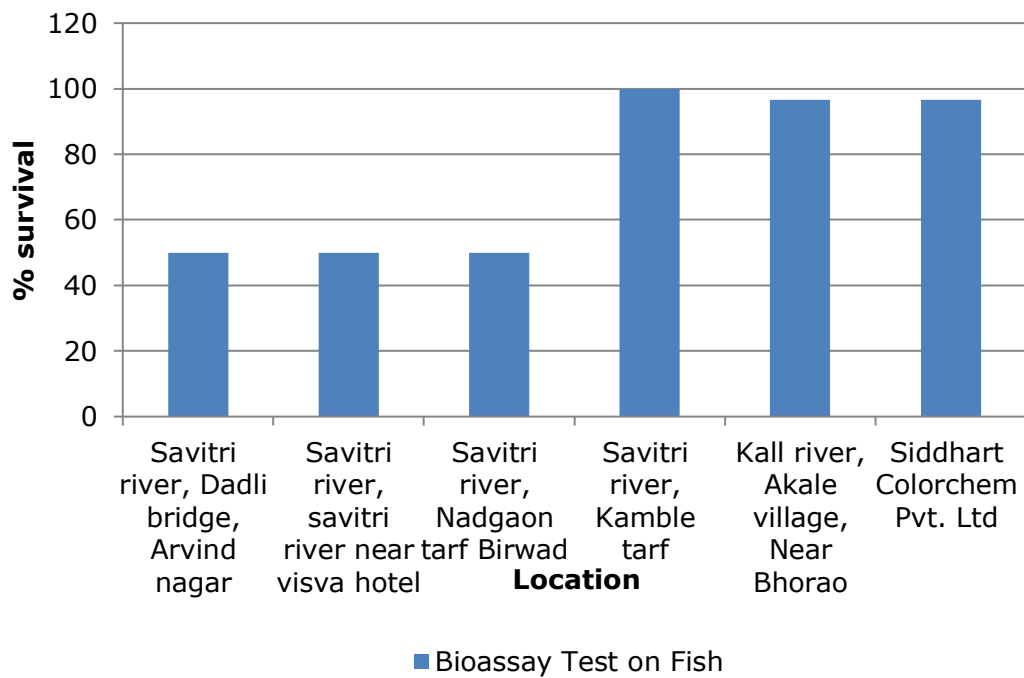




Mahad - Surface water



Mahad - Surface water



LAND ENVIRONMENT

7. Land Environment

For studying the land Environment of Mahad area, ground water was collected from Bore well, Dug well, and Hand Pump. A total of 6 samples were collected from (i) Borewell at Mr. Anand Nayan farm house (ii) Well at Mr. Jadhav House Aasanpoi (iii) Hand Pump near Baudhabari Village (iv) Handpump near Navi Nagar Village Near Mahad Police Station (v) Hand Pump near Akole Village (vi) Well at Deshmukh Kamble Village.

Analysis results obtained from the six ground water samples collected from MIDC Mahad region are following:

- All the water samples collected are found acceptable in general appearance, colour, smell and transparency.
- General parameters like pH, suspended solids, BOD, and COD are also observed well within the limits in all the collected samples.
- All metals like Arsenic, Nickel, Copper, Hexavalent Chromium (Cr⁶⁺) etc. are also observed either below detection limit or below their standard limits.
- However, concentration of Iron is found higher than the standard limit in one of the water samples.
- concentration of Iron is found higher than the standard limit in two of the water samples.
- Out of six, 5 water samples of achieved 100% survival in Fish Bioassay. Only the water sample collected from the well at Kamble Village showed 97% fish survival.
- Also, concentration of Selenium is also found higher than the standard limit in one of the water samples (Well water at Mr. Jadhav House in Aasanpoi).
- Parameters like 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.	Borewell at Mr. Anand Nayak farm house Aasanpoi	18°05'52.89"N	73°29'7.24"E	09.01.2024	11.01.2024	13.01.2024
2.	Well at Mr. Jadhav House Aasanpoi	18°05'55.43"N	73°29'11.39"E	09.01.2024	11.01.2024	13.01.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
3.	Hand Pump near Baudhabari Village Aasanpoi	18° 5'47.40"N	73°29'13.90"E	09.01.2024	11.01.2024	13.01.2024
4.	Handpump near Navi Nagar Village Near Mahad Police Station	18° 5'56.85"N	73°27'47.04"E	09.01.2024	11.01.2024	13.01.2024
5.	Hand Pump near Akole Village	18° 6'1.91"N	73°27'45.27"E	09.01.2024	11.01.2024	13.01.2024
6.	Well at Deshmukh Kamble Village	18° 4'52.09"N	73°28'14.24"E	09.01.2024	11.01.2024	13.01.2024

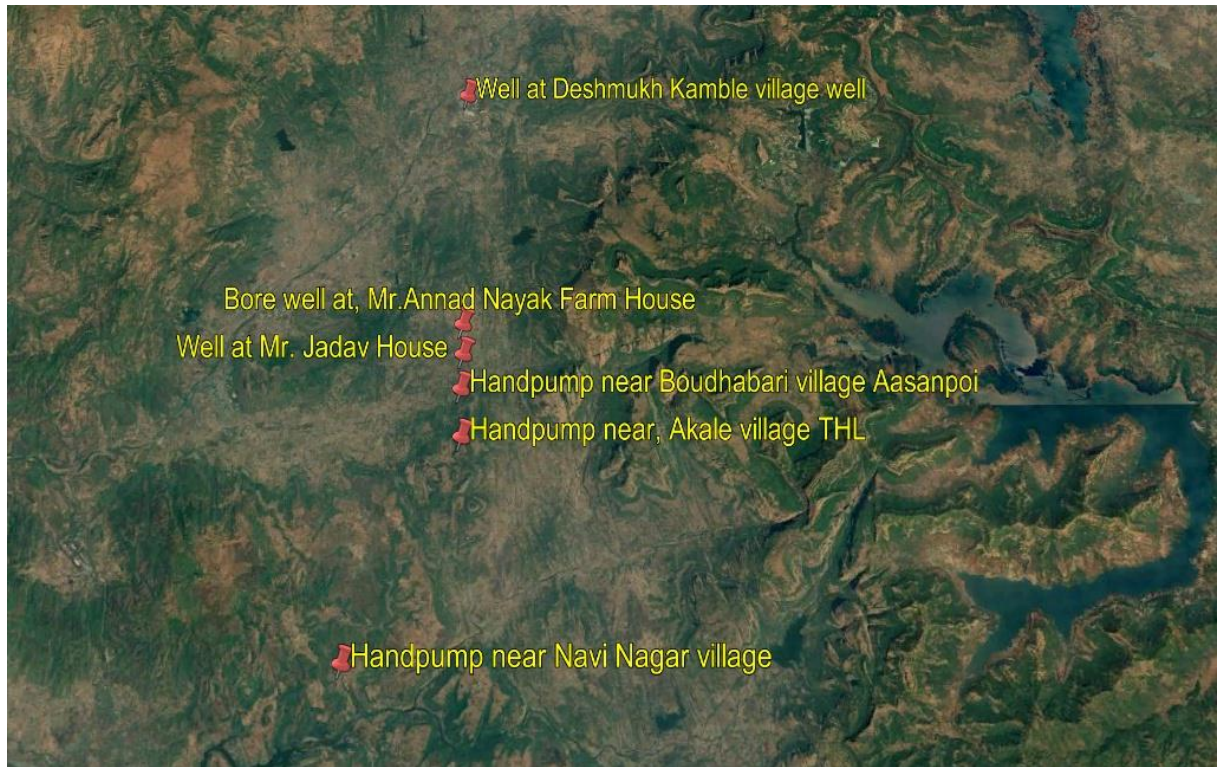


Fig: Geographical Locations of Ground Water Sampling

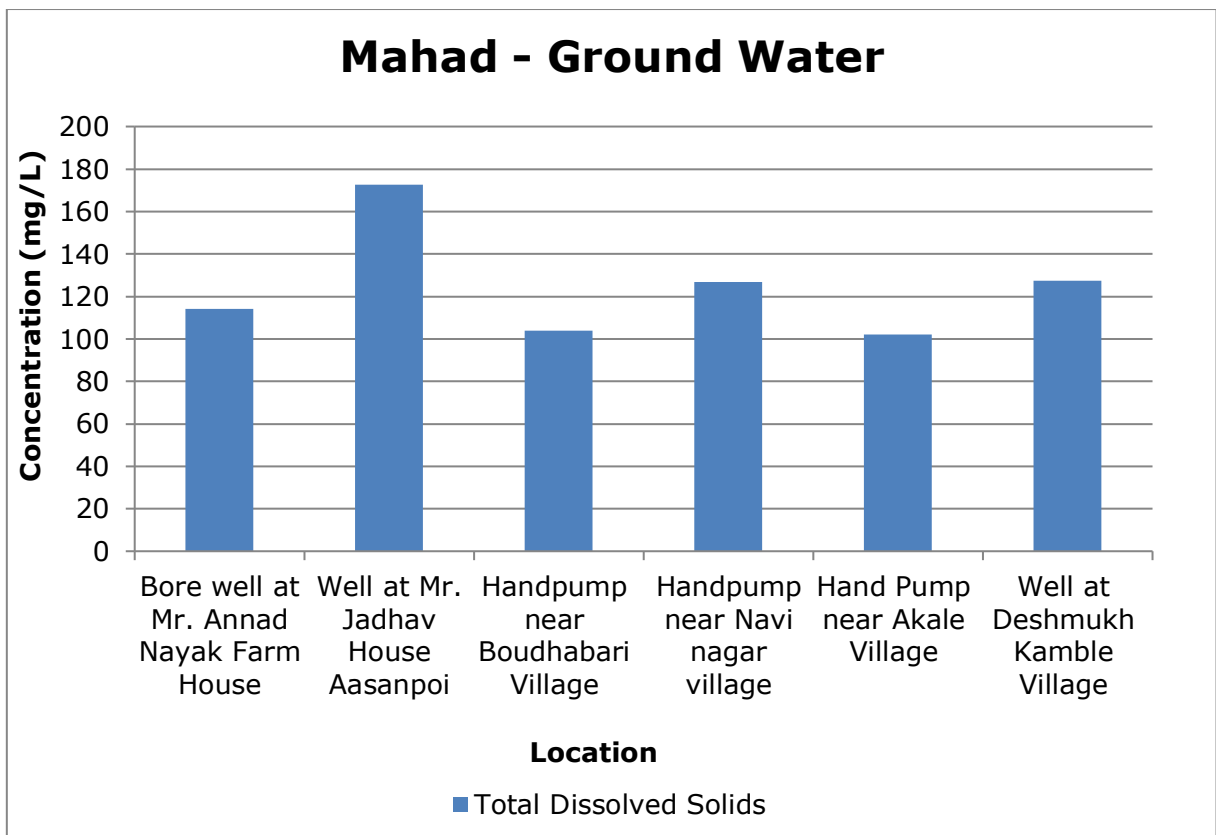
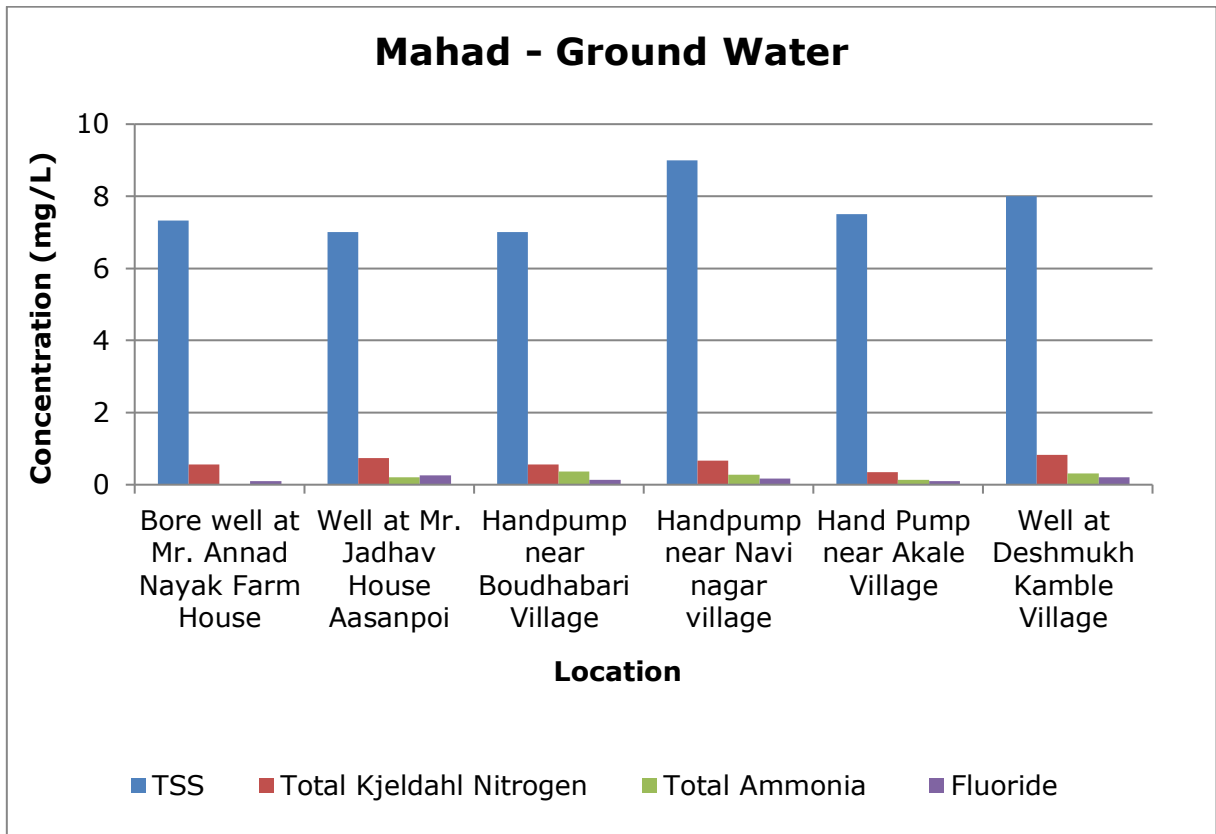
Table 7.2 Results of Ground Water

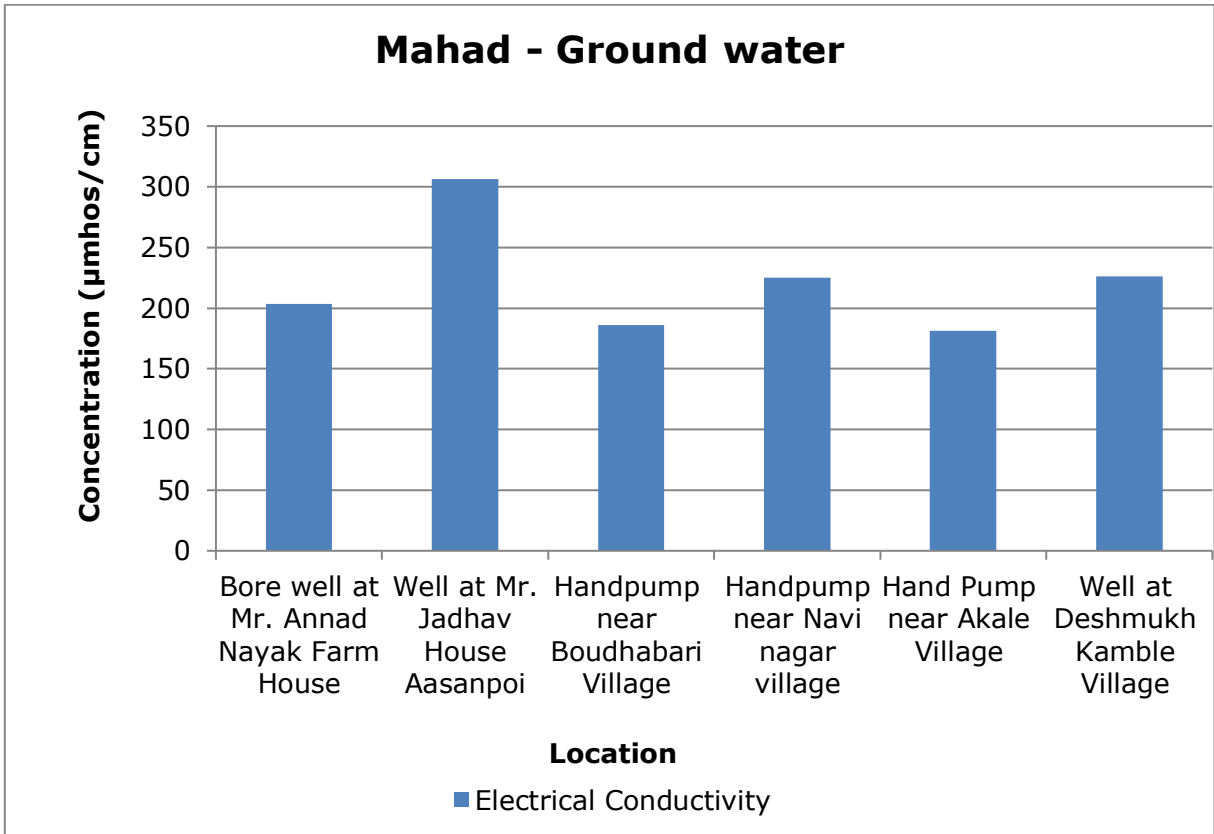
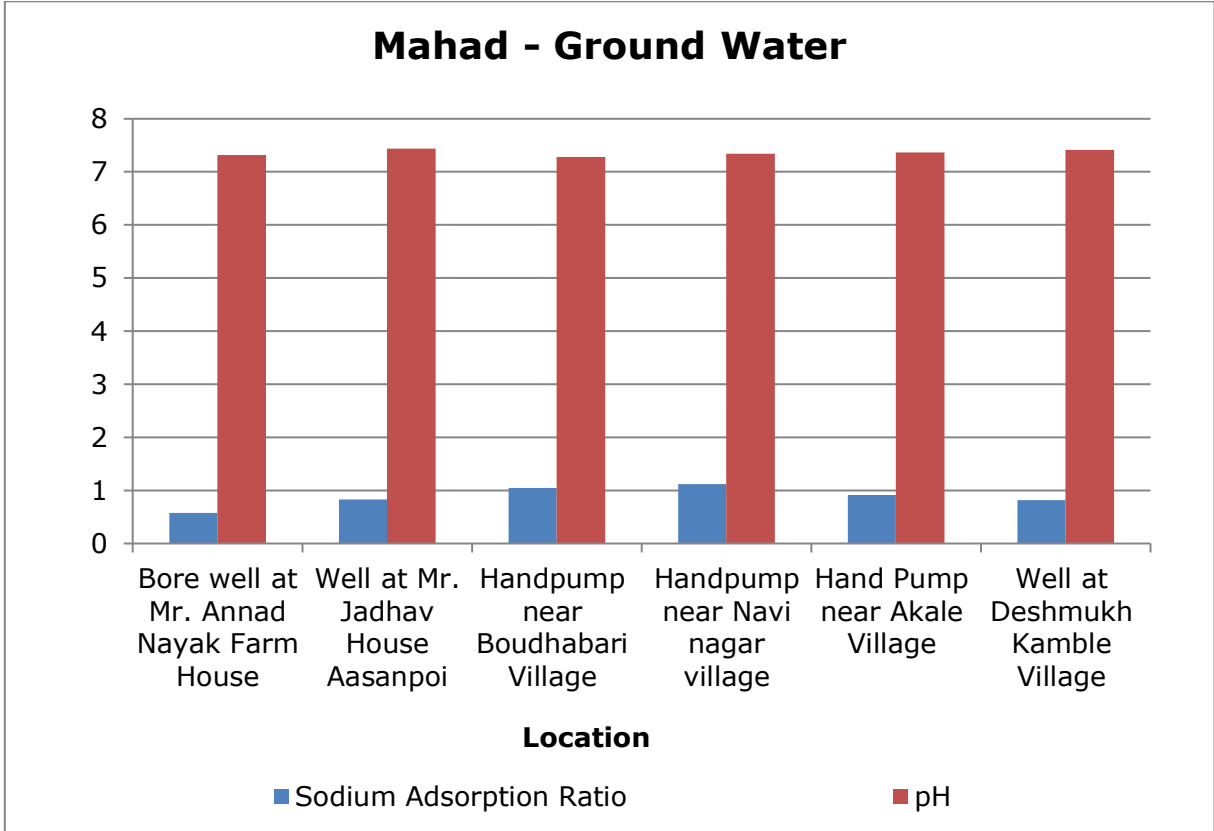
Parameters	Unit	Results					
		Bore well at Mr. Anand Nayak Farm House, Aasanpoi, Mahad	Well at Mr. Jadav House, Aasanpoi, THL, Mahad	Handpump near Boudhabari village Aasanpoi, THL Mahad	Handpump near Navi Nagar village, Near Mahad Police Station Mahad	Handpump near, Akale village THL, Mahad	Well at Deshmukh Kamble village well, THL Mahad
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter
Transparency	m	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Temperature	°C	29	30	30	30	30	29
Colour	Hazen	1	1	1	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.32	7.44	7.28	7.35	7.37	7.42
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	16	13	17	11	11	20
Total Dissolved Solids	mg/L	114	173	104	127	102	127
Chemical Oxygen Demand	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Electrical Conductivity (at 25 °C)	µmho/cm	203	306	186	225	181	226
Nitrite Nitrogen (as NO ₂)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO ₃)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	1.17
(NO ₂ + NO ₃)-Nitrogen	mg/L	0.53	0.41	BLQ	0.8	BLQ	1.18
Free Ammonia (as NH ₃ -N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

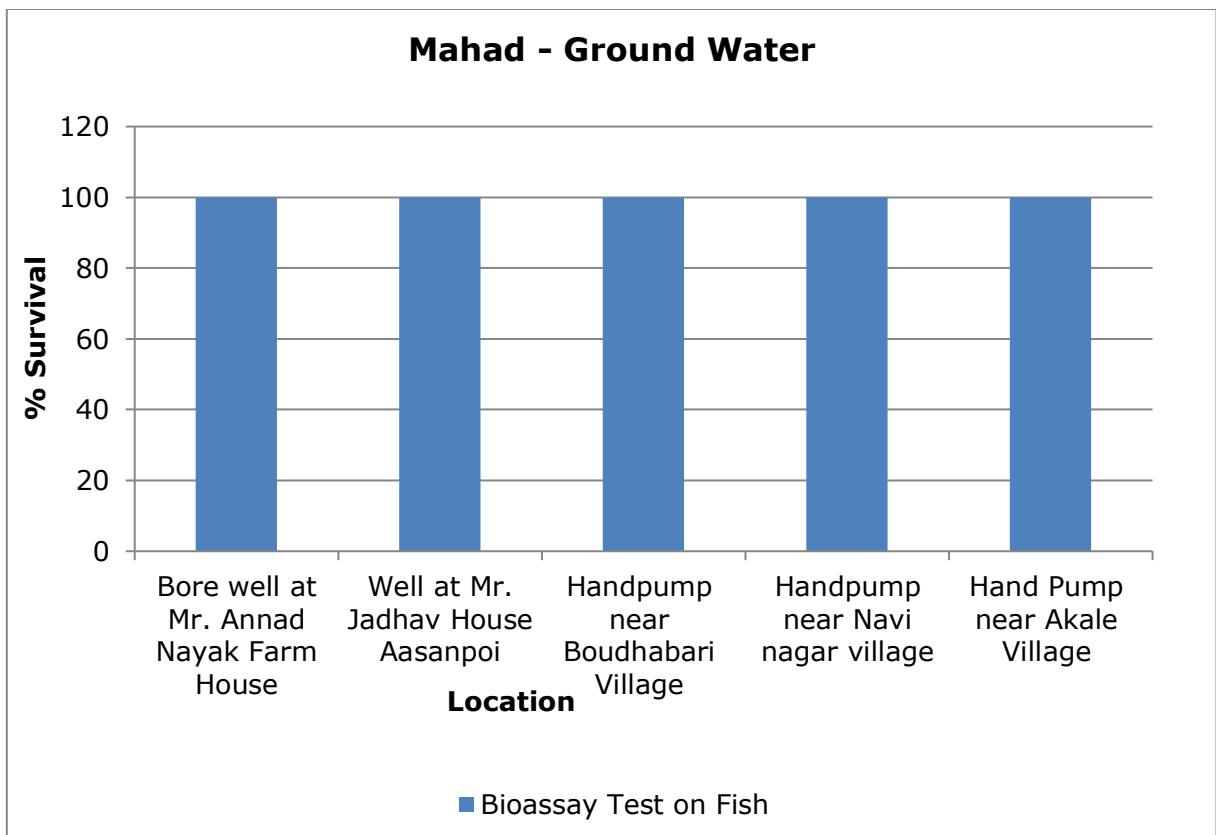
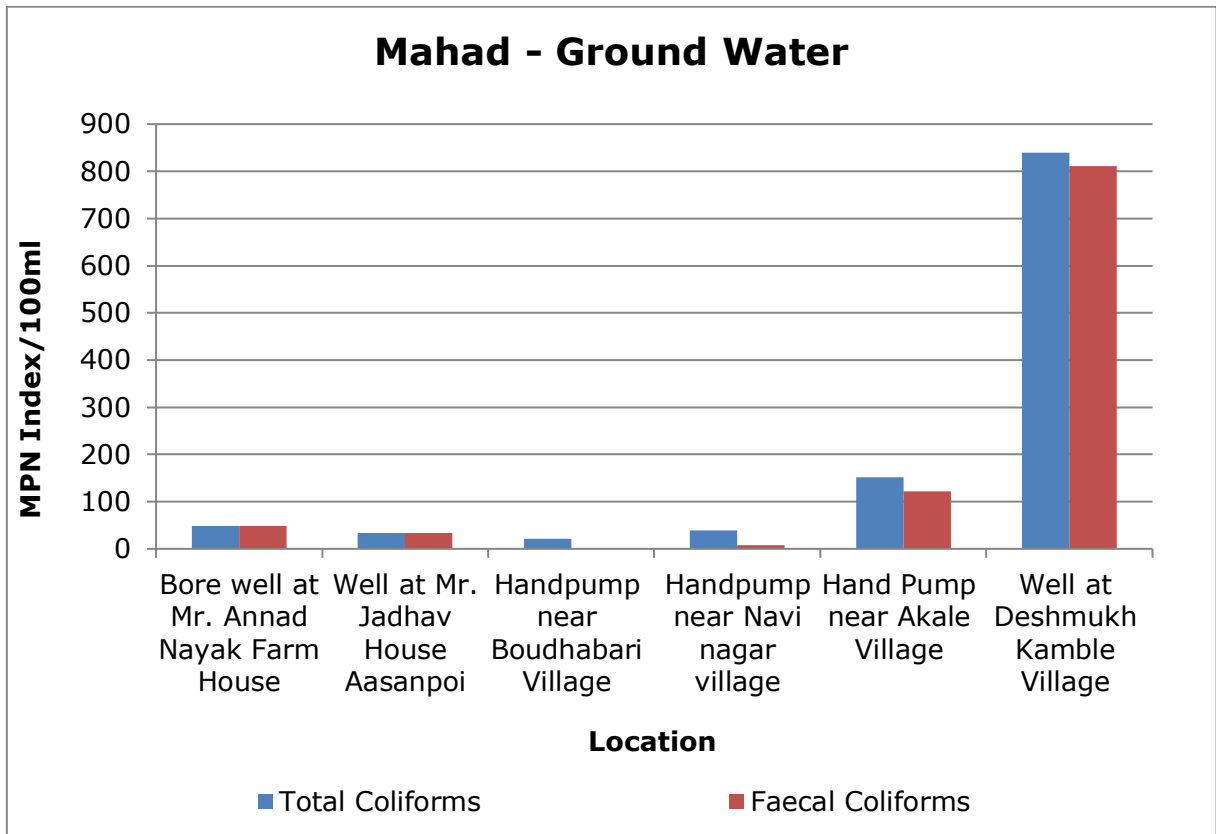
Parameters	Unit	Results					
		Bore well at Mr. Anand Nayak Farm House, Aasanpoi, Mahad	Well at Mr. Jadav House, Aasanpoi, THL, Mahad	Handpump near Boudhabari village Aasanpoi, THL Mahad	Handpump near Navi Nagar village, Near Mahad Police Station Mahad	Handpump near, Akale village THL, Mahad	Well at Deshmukh Kamble village well, THL Mahad
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.10	0.27	0.13	0.17	0.10	0.20
Sulphide (as H ₂ S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Sodium Adsorption Ratio	-	0.57	0.83	1.05	1.12	0.92	0.82
Total Coliforms	MPN Index/100 ml	49	33	22	39	152	840
Faecal Coliforms	MPN Index/100 ml	49	33	BLQ	7.8	122	811
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	0.56	0.73	0.56	0.67	0.34	0.82
Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	BLQ	0.21	0.37	0.28	0.13	0.32
Phenols (as C ₆ H ₅ OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

Parameters	Unit	Results					
		Bore well at Mr. Anand Nayak Farm House, Aasanpoi, Mahad	Well at Mr. Jadav House, Aasanpoi, THL, Mahad	Handpump near Boudhabari village Aasanpoi, THL Mahad	Handpump near Navi Nagar village, Near Mahad Police Station Mahad	Handpump near, Akale village THL, Mahad	Well at Deshmukh Kamble village well, THL Mahad
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	0.15	BLQ	0.05	BLQ	BLQ
Nickel (as Ni)	mg/L	BLQ	0.085	BLQ	BLQ	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr ⁶⁺)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	0.006	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	0.01	0.002	BLQ
Manganese (as Mn)	mg/L	BLQ	0.03	BLQ	BLQ	BLQ	BLQ
Iron (as Fe)	mg/L	0.14	0.32	0.31	0.20	0.14	BLQ
Vanadium (as V)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	0.01	0.02	0.01	BLQ	BLQ	0.01
Total Nitrogen	mg/L	1.09	1.15	BLQ	1.48	BLQ	1.99
Boron (as B)	mg/L	BLQ	BLQ	BLQ	0.11	2.02	BLQ
Bioassay Test on fish	% survival	100	100	100	100	100	97

Graphs - Ground Water Quality of Mahad







8. Health Related Data

C: Receptor

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 groundwater in & around the industrial cluster and health related statistics.

Table 8.1 CEPI score of the Post monsoon season (March, 2024)

	A1	A2	A	B	C	D	CEPI
Air Index	3	4	12	2	0	5	19.00
Water Index	1.75	4	7	9	10	5	31.00
Land Index	1.75	4	7	15.75	10	5	37.80
Aggregated CEPI							41.50

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI Score March 2024	19.00	31.00	37.80	41.50
CEPI Score June 2023	26.00	33.00	30.80	38.40
CEPI Score March 2023	29.00	35.25	33.00	41.45
CEPI Score June 2021	21.50	20.00	41.00	43.54
CEPI Score March 2021	21.50	39.00	37.25	43.89
CEPI score March 2020	41.80	20.30	23.30	44.60
CEPI score June 2019	30.50	51.50	50.00	58.90
CEPI score march 2019	34.75	45.00	45.00	53.60
CEPI score June 2018	26.00	39.25	45.00	50.61

	Air Index	Water Index	Land Index	CEPI
CEPI score March 2018	32.50	38.50	45.00	51.88
CPCB CEPI score March 2018	41.00	35.75	29.00	47.12

CEPI Score Calculation:

Mahad, Maharashtra - CEPI - March 2024

Ambient Air Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
PM ₁₀	B	2	Large	
PM _{2.5}	B	0.5		
CO	B	0.5		
		3	4	12

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}	21.04	60	0.35	0	8	0.00	L	0	
CO	1.51	2	0.76	0	8	0.00	L	0.5	
B score = (B1+B2+B3)								B	2

C	0	<5%
D	5	A-IA-A

Air CEPI	(A+B+C+D)	19.0
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Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
TKN	A	1	Large	
BOD	B	0.5		
Zn	A	0.25		
		1.75	4	7

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)		
TKN	1.51	3	0.50	1	6	0.08	M	9	
BOD	3.00	8	0.38	0	6	0.00	L	0	
Zn	0.07	0.3	0.23	0	6	0.00	L	0	
B score = (B1+B2+B3)								B	9

C	10	>10%
D	5	A-IA-A

Water CEPI	(A+B+C+D)	31.0
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Ground Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
Fe	A	1	Large	
Se	B	0.5		
F	A	0.25		
		1.75	4	7

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	0.22	0.3	0.74	2	6	0.25	M	12
Se	0.01	0.01	1.26	1	6	0.21	M	3.75
F	0.16	1.5	0.11	0	6	0.00	L	0
B score = (B1+B2+B3)							B	15.75

C	10	>10%
D	5	A-IA-A

Land CEPI	(A+B+C+D)	37.8
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Land CEPI Score (im) 37.80

Water CEPI Score (i2) 31.00

Air CEPI Score (i3) 19.00

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 41.5

10. Conclusion

Ambient Air Quality

- In the present study, 08 AAQ stations were identified in the CEPI impact area to cover both upwind and cross wind directions and AAQ survey was conducted.
- All air quality parameters are observed well within the limits as per NAAQS.
- Concentration of PM₁₀ is observed in the range of 71.00µg/m³ to 88.00µg/m³ and PM_{2.5} in the range of 19.00 to 24.00µg/m³ at the studied locations, which are less than the limits laid down in NAAQS, 2009. However, in CPCB CEPI report (2018), out of 24 samples, 10 of PM₁₀ and 7 of PM_{2.5} are found to exceed the standards limits of NAAQS.
- In the CEPI score calculated for Air Environment by CPCB in March 2018, the concentration of PM₁₀ has exceeded at all the studied locations and which contributed to higher air index (41.00). However, in the present report, concentration of both PM₁₀ and PM_{2.5} are found below permissible levels resulted in less exceedance factor, this time air index is calculated as 19, which is approximately 53% lower than the CPCB report.

Surface Water Quality

- To understand the quality of treated effluent, samples were collected from six industries
- All the parameters in the collected water samples are found below the permissible limit, except few parameters like Total Kjeldahl Nitrogen. Also, in Mahad region, industries are reusing either the treated trade effluent as sewage in their process or gardening.
- In the present report CEPI score calculated for Water Environment is calculated as 31.0.

Ground Water Quality

- Six ground water samples were collected from different Dug well, well and Bore well in the region.
- Higher concentration of Iron and Selenium in the ground water sample of Asanpoi and Boudhabari respectively was observed. This may be due to Chemical processes such as carbonate/phosphate dissolution, oxidation/reduction, and agricultural practices involving fertilizers, irrigation and anthropogenic activities may primarily be responsible for contamination of groundwater, which need to be addressed.
- In the present report CEPI score calculated for Water Environment is calculated as 37.8.

CEPI Score

- The CEPI Score post monsoon season is 41.5.

- During calculation of CEPI score, Land Index is calculated highest with 37.8, followed by the water Index 31 and Air index as 19. Most of the parameters of surface water and ground water in Mahad region are observed well within the limits. Hence, aggregated CEPI score is calculated as 41.5.
- In CEPI score of CPCB 2018, the Air index was higher as compared to the present (March, 2024) indices.
- Collective efforts of regional office of MPCB, NMMC, administration and environmental organizations are resulting in control of pollution level in this region.
- Efforts taken to reduce the pollution level is represents factor D in CEPI Calculation, which also lowered the overall CEPI score.
- The present study is the compilation of post monsoon season, which results in dilution of environmental samples resulting in lower pollution load, hence also affects the total score.
- In conclusion, the CEPI score of post monsoon season (March, 2024) in the Mahad region is observed as 41.5, which is approximately 12% lower than the CEPI score (47.12) observed in 2018 by CPCB.

11. Efforts Taken by MPCB to Control and Reduce Environmental Pollution Index

- Waste collection and segregation centres:
 - a) **Domestic Solid Waste:** MMC has provided on site waste collection and segregation facility for residential area.
 - b) **Industrial Non-Hazardous waste:** Recyclable waste is sent to authorized segregation facility for residential area.
 - c) **Hazardous waste:** industrial hazardous waste sent to common hazardous treatment and disposal facility by industries.
- One Common Effluent Treatment plant (CETP) of 7.5 MLD capacity is installed for the treatment of wastewater.
- Continuous Emission Monitoring System (CEMS) are installed for Air and Water in 30 Large and Medium scale RED category industries.
- Arrangement of scientific collection and treatment of sewage generated by each industry: -65 no of Industries.
- Installation of CAAQMS station: 01 no.
- Establishment of Monitoring stations under National Water Quality Monitoring Programme (NWMP): 05 no.
- Steps are taken for industrial area/other units to recycle 100%% treated effluent to achieve zero liquid discharge (ZLD):18 nos.
- Steps taken to reduce dust emission: - Industry have changed their F.O. to low Sulphur fuel and Green Fuel like LPG, PNG, and Electricity.
- Tree plantation in last one year (2021-2022): 14056
- Various awareness programs are conducted regularly in coordination with TBIA, TTCWMA, CETP & other industries.



Continuous Ambient Air Quality Monitoring Station (CAAQMS)



Ambient Air Quality Monitoring (AAQM) Van

12. Photographs



Ambient Air Sampling at Hikal Ltd



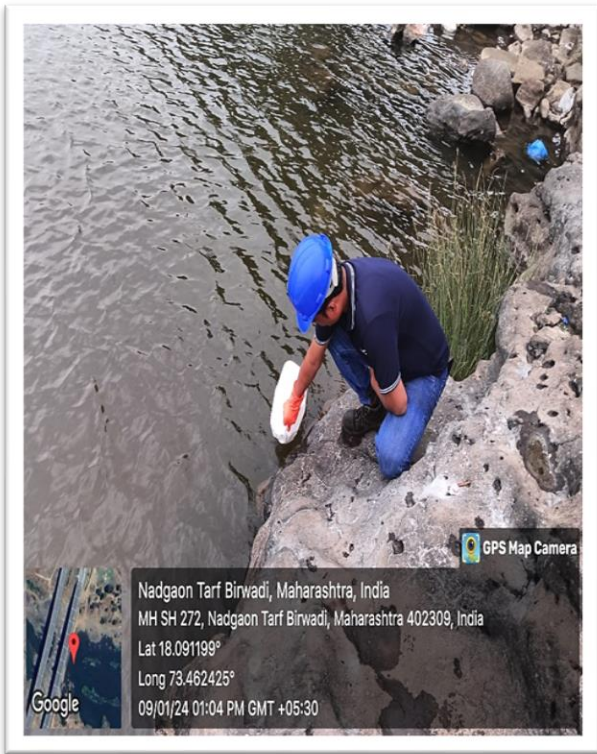
Ambient Air Sampling at MIDC Office Mahad



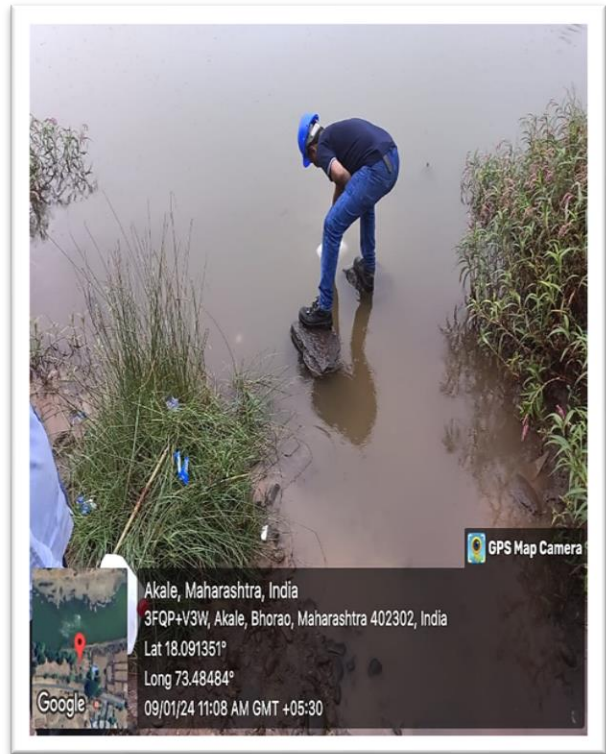
Ambient Air Sampling at Piramal Healthcare Ltd.



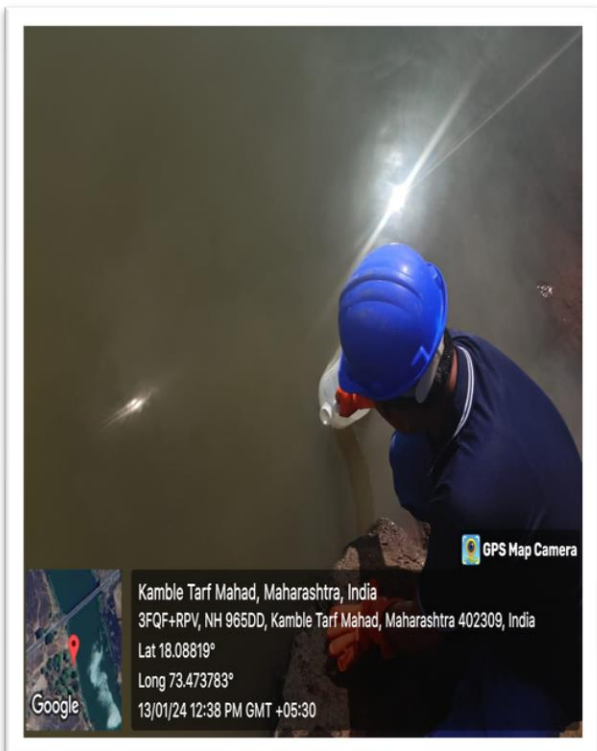
Ambient Air Sampling at Vinati Organics Ltd



Surface water sampling at Savitri river, MIDC Pumping



Surface water sampling at Kall river, Akale village



Surface water sampling at Savitri river, Kamle tarf



Surface water sampling at Siddharth Colorchem Pvt. Ltd



Groundwater sampling at Asanpoi, THL



Groundwater sampling at Akale village THL



Groundwater sampling at Asanpoi



Groundwater sampling at Boudhabari

Annexure – I Health Related Data

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Post-monsoon Season (December 2023- February 2024) Study by
Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	MAHAD
Name of the major health center/ organization	phc birwadi
Name and designation of the Contact person	Dr.bhavesh pophale Medical officer birwadi
Address	Birwadi

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	28	34
2.	Acute Respiratory Infection	234	284
3.	Bronchitis	162	274
4.	Cancer	02	02
WATERBORNE DISEASES			
1.	Gastroenteritis	340	418
2.	Diarrhea	278	371
3.	Renal diseases	54	108
4.	Cancer	0	0

Date: 23/1/2024




Signature

वैद्यकिय अधिकारी
प्राथमिक आरोग्य केंद्र बिरवाडी
ता. महाड, जि. रायगड

HEALTHSTATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Post-monsoon Season (December 2023- February 2024) Study by
Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area(PIA)	MAHAD
Name of the major health center /organization	T.H.O Mahad
Name and designation of the Contact person	Dr. Ramesh Naik Medical Superintendent MMA Hospital
Address	P/42, Near Telephone Exchange, At. Po. Nangalwadi, MIDC, Tal. Mahad, Dist. Raigad Pin.402309

SNo.	Diseases	No.ofPatients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	25	05
2.	AcuteRespiratoryInfection	1250	300
3.	Bronchitis	—	—
4.	Cancer	—	—
WATERBORNE DISEASES			
1.	Gastroenteritis	—	—
2.	Diarrhea	100	15
3.	Renaldiseases	—	—
4.	Cancer	—	—

Date: 16/01/2024



HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Post-monsoon Season (December 2023- February 2024) Study by
Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	MAHAD
Name of the major health center/ organization	THO Mahad
Name and designation of the Contact person	Dr. N.B Bavdekar.
Address	THO office, Panchayat samiti Mahad.

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	112	132
2.	Acute Respiratory Infection	676	734
3.	Bronchitis	421	601
4.	Cancer	07	08
WATERBORNE DISEASES			
1.	Gastroenteritis	789	965
2.	Diarrhea	697	889
3.	Renal diseases	120	224
4.	Cancer	--	--

Date: 23/1/2024


Signature
Tatuka Health Officer
Mahad Dist Raigad