

Title

"Analysing of Water Quality in Vasai – Virar Municipal
Co – orporation. (VVMC)"

By

Ms. Shreya Vimal Shah

A DISSERTATION

Submitted To

Department of PG Geography,

Nagindas Khandwala College of Commerce, Arts and
Management Studies, Mumbai- 400064

In partial fulfilment of the requirements for the degree
of

Master of Arts- Geography

Academic Year – 2023-24

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MALAD KANDIVALI EDUCATION SOCIETY'S

**NAGINDAS KHANDWALA COLLEGE OF COMMERCE, ARTS &
MANAGEMENT STUDIES and
SHANTABEN NAGINDAS KHANDWALA COLLEGE OF SCIENCE
AUTONOMOUS**

DEPARTMENT OF PG GEOGRAPHY

Certificate

This is to certify that **Ms. Shreya Vimal Shah** has successfully completed the Dissertation as a part of the MA-II- Semester IV titled "**Analysing of Water Quality in Vasai – Virar Municipal Co – orporation. (VVMC)**"

during the Academic Year 2023-24.



Guiding Teacher



Asst. Prof. Ashley Fernandes

Co-ordinator



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Principal



College Seal

Date: 16-03-2024

DECLARATION

I wish to state that the work embodied in this dissertation titled “**Analysing of Water Quality in Vasai – Virar Municipal Co – orporation. (VVMC)**” is my own contribution. The dissertation is carried out in the academic year 2023-2024.



SIGNATURE OF THE CANDIDATE

PLACE : MUMBAI

DATE : 16-03-2024

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Lastly I would like to thank my family and friends who constantly encouraged and motivated me to complete my dissertation paper.



Ms. Shreya Vimal Shah

ANALYSE OF WATER QUALITY IN VASAI - VIRAR MUNICIPAL CO - ORPORATION. (VVMC)



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3. INTRODUCTION:

Vasai – Virar is a part of Palghar District that is located towards the north of greater Mumbai. **Vasai – Virar Sub-Region** is situated to the north-western part of the Mumbai Metropolitan Region. The Vasai-Virar subregion is separated from Greater Mumbai and Mira-Bhayander by the **Vasai Creek**.

The research area included entire Vasai Virar Municipal Corporation. This research analysed water quality level of different places of Vasai – Virar region.

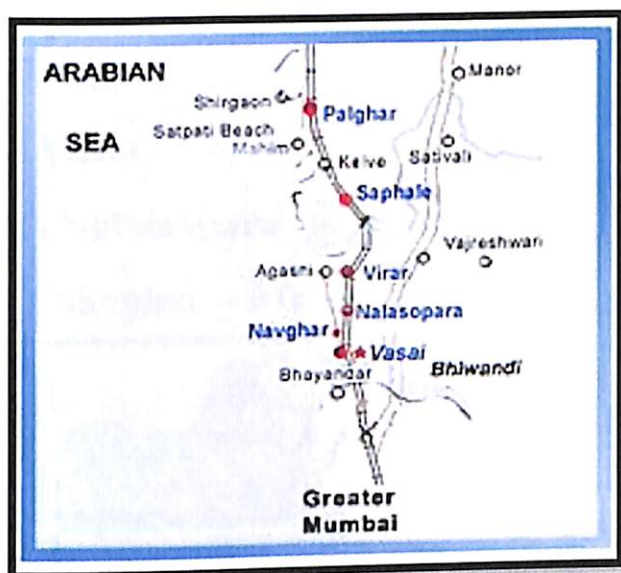


Figure : 1



Figure : 2

Source : <https://images.app.goo.gl/vcCw5u2JTs9YAmtV9>

4. VASAI – VIRAR MUNICIPAL CO – ORPORATION:

Vasai – Virar has a significant growth potential as well as the satellite city due to its close proximity to Brihan Mumbai and is currently experiencing rapid urban growth.

VVMC has been identified as one of the growth centers around Mumbai as it is well connected with the metropolis by the suburban commuter rail and Mumbai Ahmadabad National Highway.

This region includes **4 Municipal Councils** and **53 villages**.

4 Municipal Council –

i) Virar

ii) Vasai

iii) Nallasopara

iv) Navghar – Munikpur

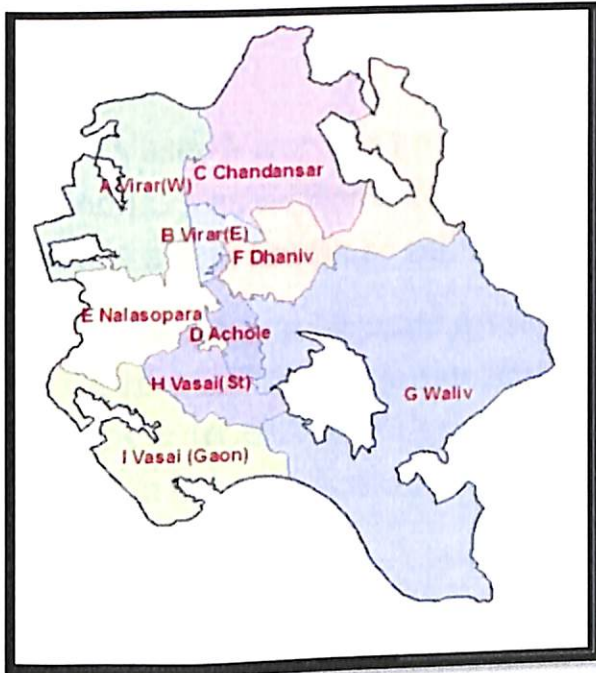


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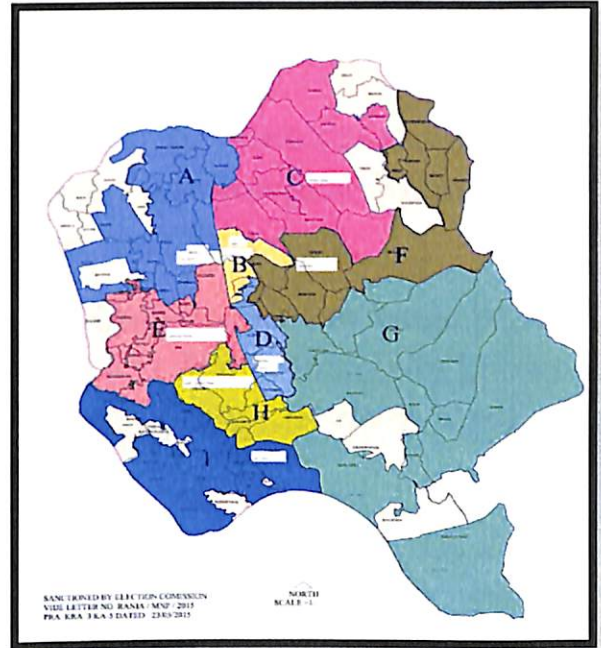


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4.1 BACKGROUND:

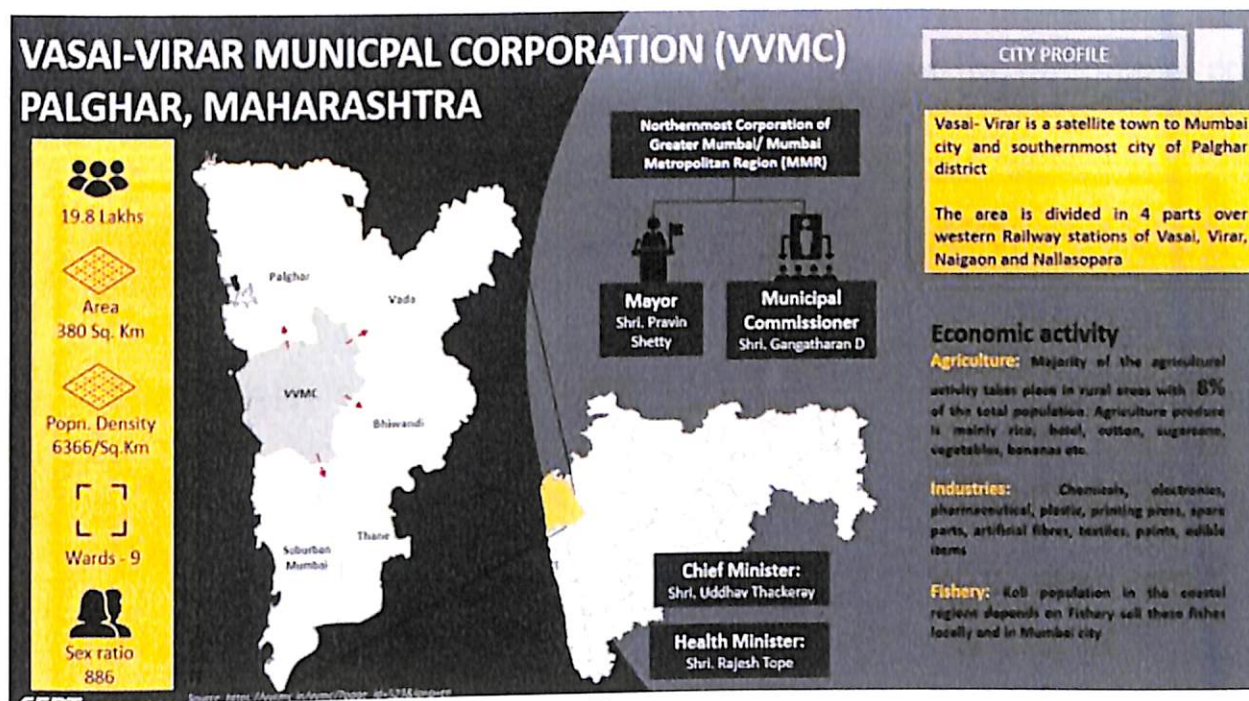


Figure : 5

Vasai-Virar is a group of four previously governed municipal councils: Vasai (Bassein), Virar, Nallasopara and Navghar-Manikpur, as well as a few towns to the east and west of the urban area.

Vasai town became a seaport for the Gujarat Muslim kings post 1317. In 1526 the Portuguese established a fort that is famously known as Bassein Fort or Vasai Fort. They also started trading station at Vasai, and the town became famous for its shipbuilding industry.

4.2 DEMOGRAPHICS:

The population of Vasai-Virar city comprises many different religions. Among them, **943,165 people** practicing **Hinduism** that makes up to **77.16%** of the total population, which is below the national average of 80.5%.

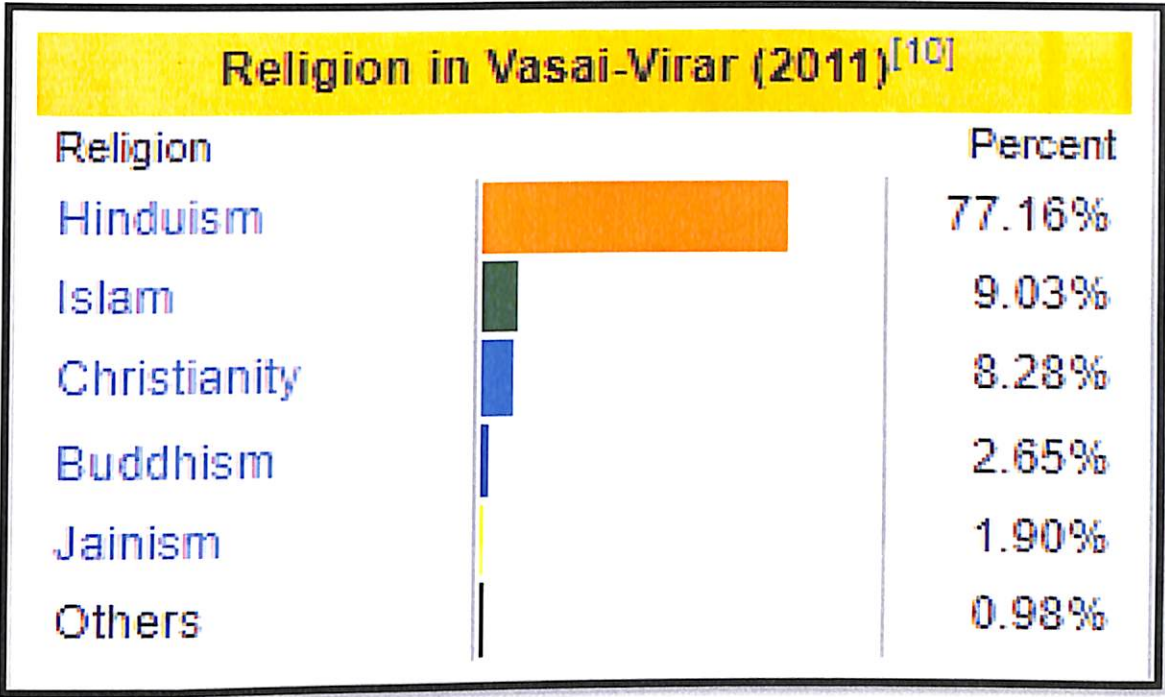


Figure : 6

Source :

<https://www.census2011.co.in/census/city/363-vasai-virar.html>

The urban areas of VVMC including 4 Municipal Councils and Waliv – Gokhivare Industrial Complex are **40.30 sq. km**. It has its population density as 124 persons per hectare.

The rural area of VVMC is **339.10 sq. km**. It has its population density as 6 persons per hectare.

The larger villages are located along the coastal belt towards the west of the railway line is the settlement pattern of this region.

The settlement observed here were combination of nucleated and linear settlements. Areas like Santosh Bhuvan, Alkapuri, Goraipada, Dhaniv bag, Bhoipada, Sainath nagar, Narangi nagar, etc. were observed with nucleated settlements as they are covered under slum areas. Areas like Madhuban, Yashwant Township, Reliable, etc were observed with linear settlements.

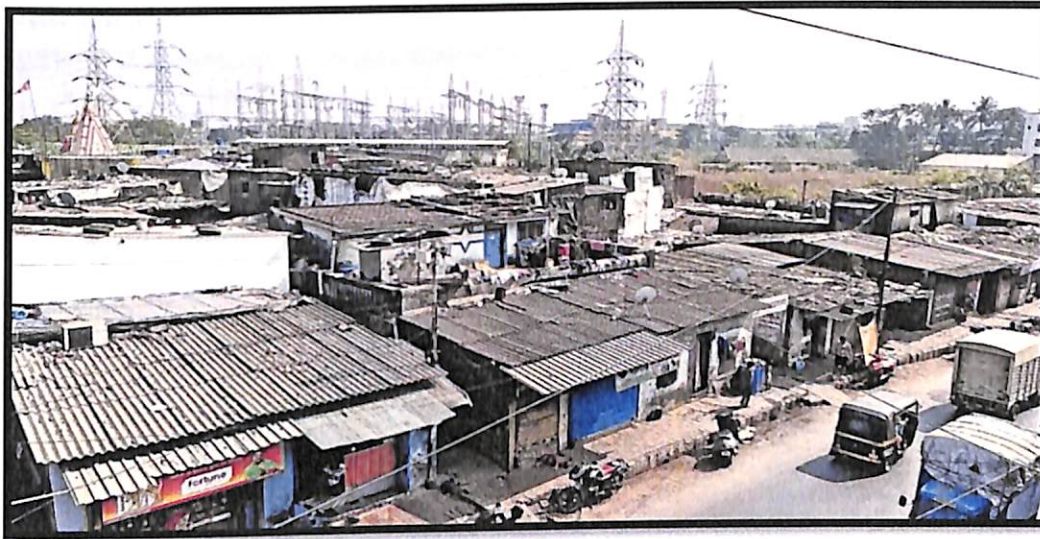


Figure : 7

Source : <https://images.app.goo.gl/yMvsW7wo3gs7yj4X8>



Figure : 8

Source : <https://images.app.goo.gl/bc73Sz5vSjxrtnL>

4.3 LOCATION:

Vasai-Virar City Municipal Corporation (VVCMC) is the governing all the areas and villages in Vasai – Virar taluka of Maharashtra, India.

It comprises the most populated part of Palghar district. The study area included slums, commercial, industrial, residential, natural and artificial waterbodies of Vasai-Virar Region.

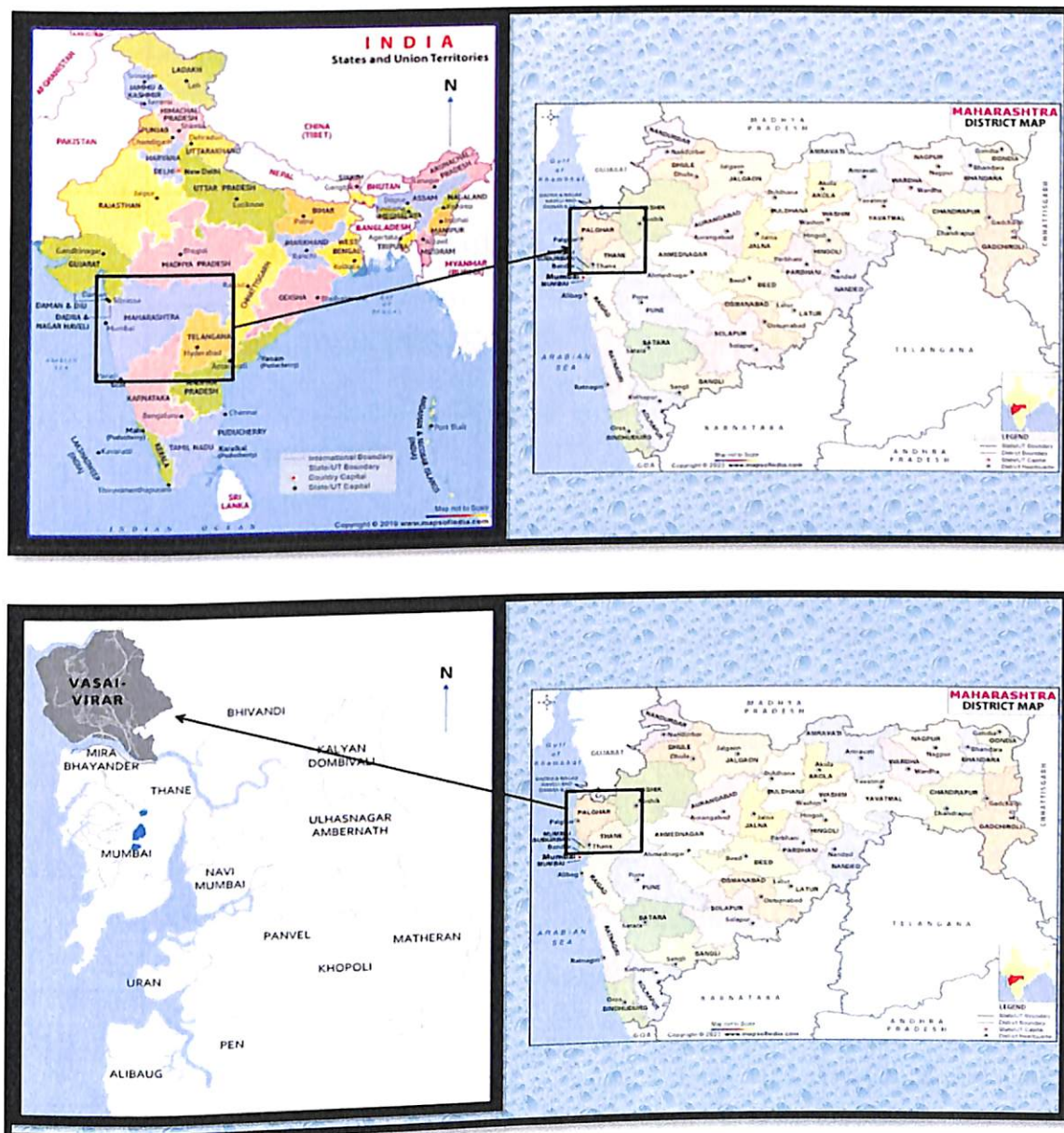


Figure : 9

Source : <https://images.app.goo.gl/mv3yHcsZCuPrKepf6>

Sr, No.	Content	Information
1.	Location	North Mumbai (North-western periphery of Mumbai.)
2.	District	Palghar
3.	Area	311 sq.km.
4.	Total Green Cover	43.93 %
5.	VVCMC Establishment	3rd July 2009
6.	Population as per census 2011	12.22 Lakhs
7.	Projected Current population	19.85 Lakhs
8.	No. of Municipal Councils	4
9.	No. of Villages	53
10.	Total number of electoral wards	115
11.	Total Number of administrative wards	9 (A TO I)
12.	No. of Villages declared as Special Planning Authority	21
13.	Latitude Extent	19°28'N – 19°47'N
14.	Longitude Extent	72°48'E – 72°8'E

Table : 1 (By the Researcher)

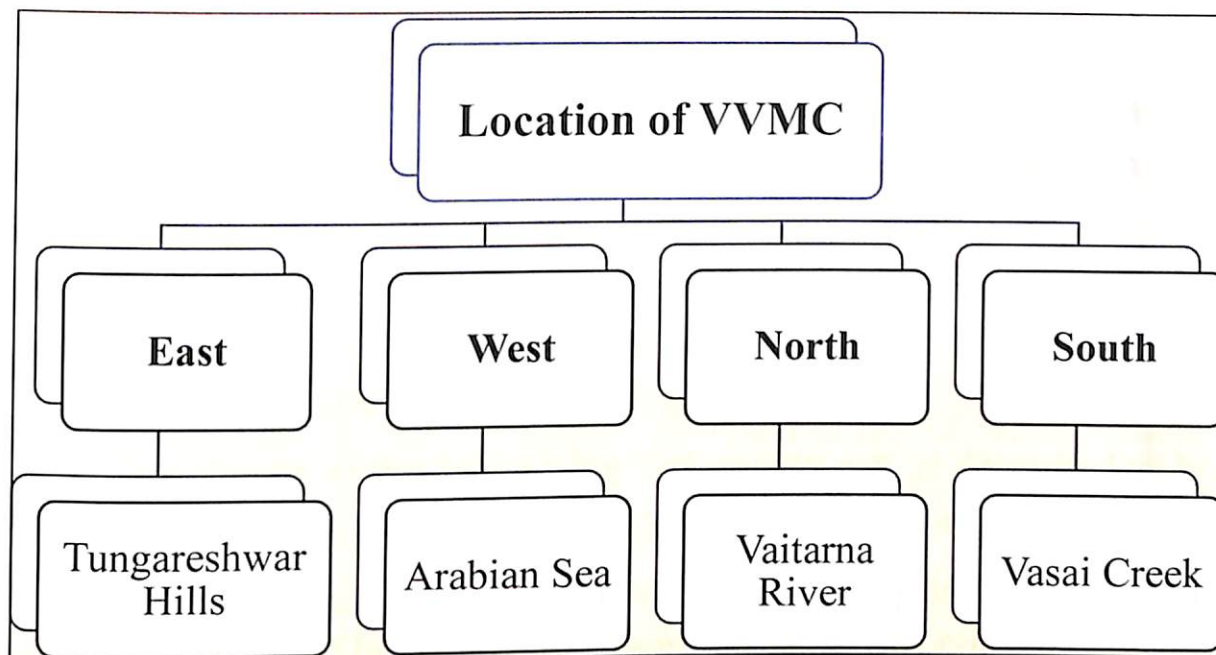


Figure : 10 Tabular Chart of Location of VVMC by the Researcher

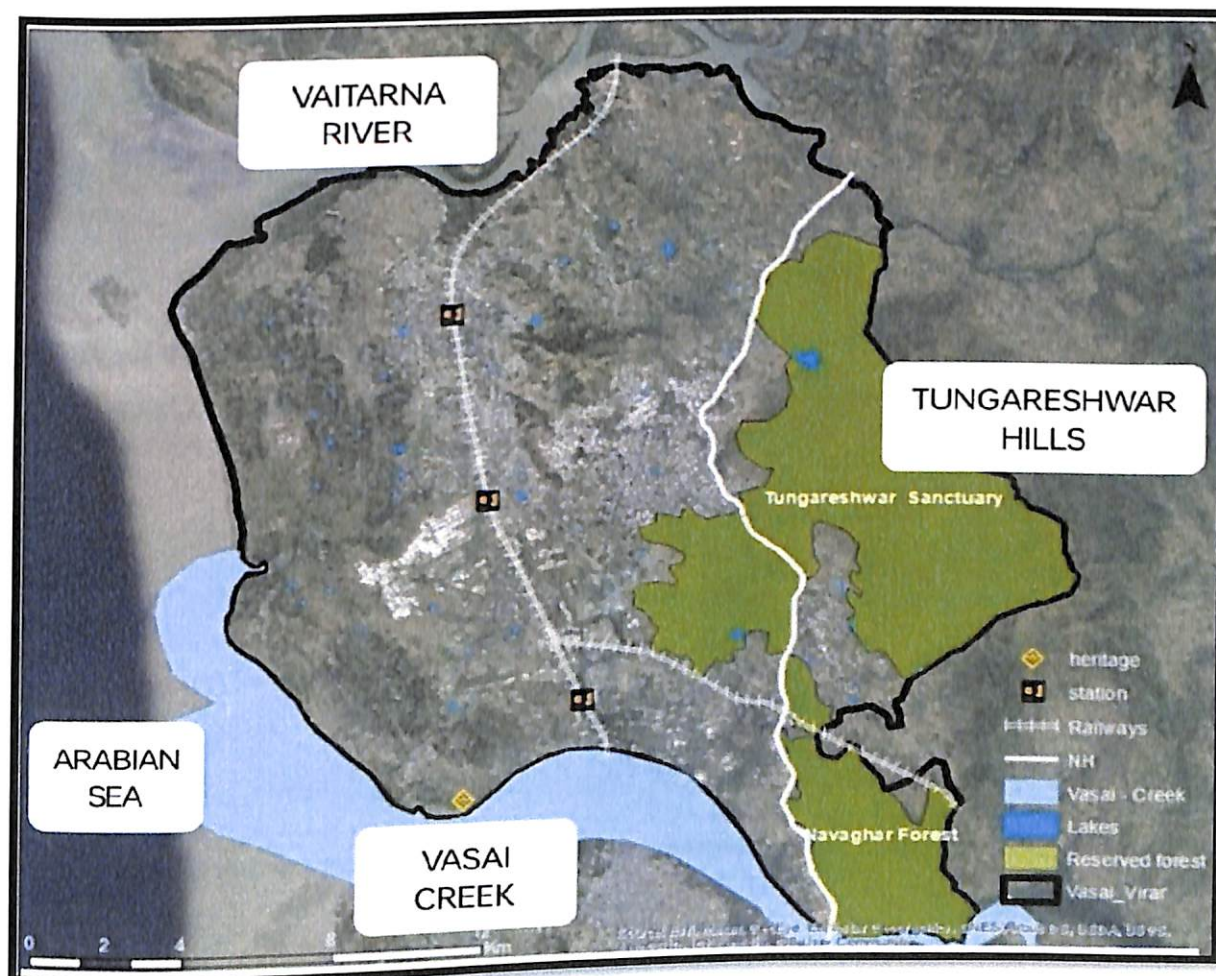


Figure : 11 (Location Extent on the Map)

4.4 CLIMATIC CONDITIONS:

Vasai-Virar usually experiences a **tropical wet and dry climate (Köppen: Aw)**. This moderate climate here is proper combination of high rainfall and very few days of extreme temperatures.

During the month of **June to October** 80% of total rainfall has been experienced. In **winter** they experience the driest days, while during **July** they experience the wettest days

The climate of the Vasai Virar Sub-region can be described as **hot humid with moderate** seasonal temperature fluctuations.

The variations are not significant, due to a long coast-line and high relative humidity. The Vasai Virar Region is a narrow coastal belt fringed with dense thickets of coconut trees.

Climate data for Vasai-Virar												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean daily maximum °C (°F)	28.5 (83.3)	29 (84)	31 (88)	32.5 (90.5)	33.2 (91.8)	32 (90)	29.7 (85.5)	29.5 (85.1)	29.8 (85.6)	32.1 (89.8)	32 (90)	30.3 (86.5)
Daily mean °C (°F)	23.2 (73.8)	23.7 (74.7)	26.3 (79.3)	28.3 (82.9)	29.8 (85.6)	29 (84)	27.4 (81.3)	27.1 (80.8)	27 (81)	27.8 (82.0)	26.6 (79.9)	24.6 (76.3)
Mean daily minimum °C (°F)	17.9 (64.2)	18.5 (65.3)	21.6 (70.9)	24.2 (75.6)	26.5 (79.7)	26.1 (79.0)	25.1 (77.2)	24.7 (76.5)	24.3 (75.7)	23.6 (74.5)	21.2 (70.2)	18.9 (66.0)
Average precipitation mm (inches)	0 (0)	1 (0.0)	1 (0.0)	0 (0)	10 (0.4)	486 (19.1)	870 (34.3)	531 (20.9)	350 (13.8)	71 (2.8)	6 (0.2)	1 (0.0)

Source: Climate-Data.org (altitude: 5m)^[9]

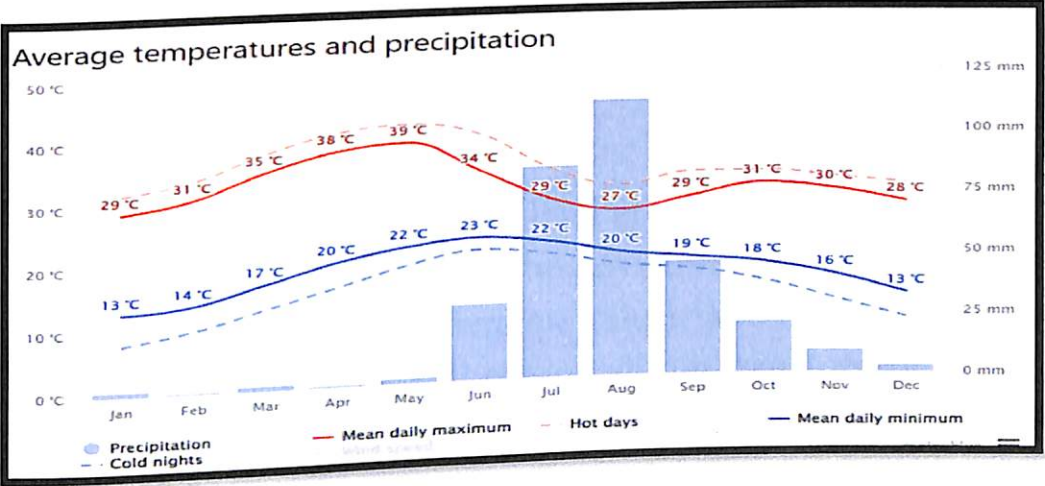


Figure : 12

Source : <https://en.m.wikipedia.org/wiki/Vasai-Virar>

5. DEVELOPMENT IN VVMC:

The development in Vasai Virar Municipal Corporation (VVMC) encompasses various sectors.

The development included with respect to infrastructure, education, healthcare, and public amenities.

This development aims to improve the quality of life for the residents and support the region's growing urbanization.

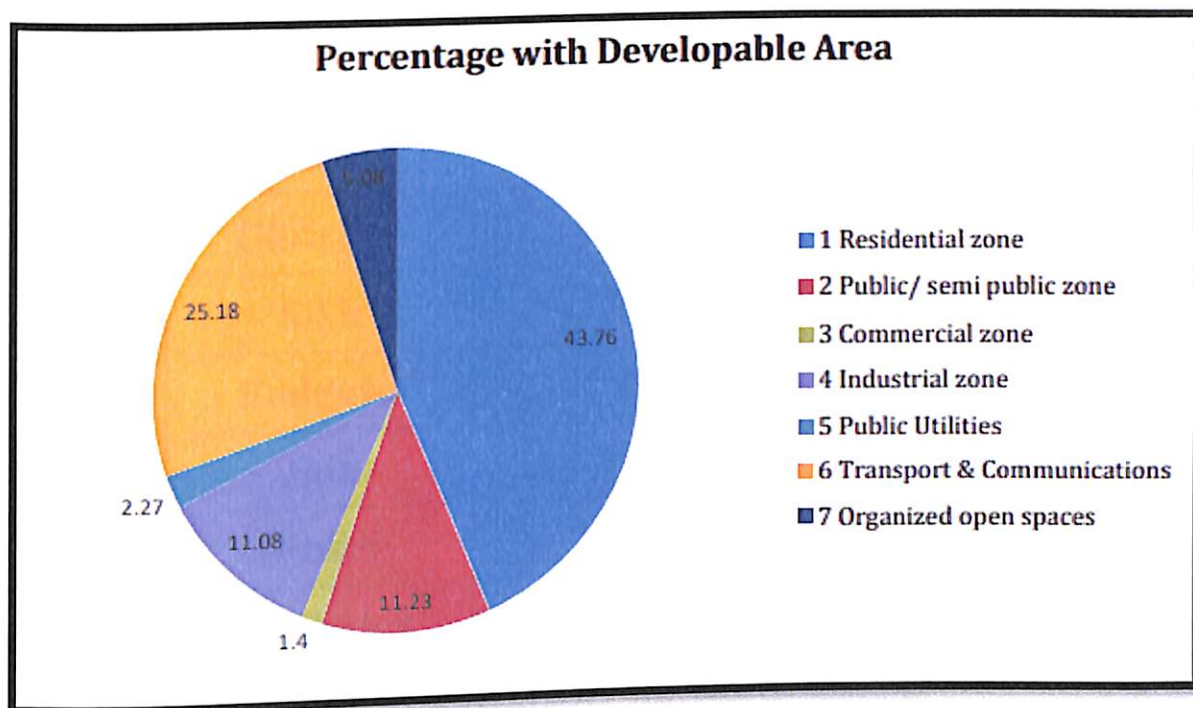


Figure : 13 (Pie Chart by the Researcher)

As per the above pie chart figure the land area of VVMC is mainly used by the residential zone i.e. 43.76% The development is observed in every sector whether residential, commercial, industrial or public. Each zone was being development with well equipped infrastructure and amenities.

5.1 POPULATION GROWTH:

The current estimated population of Vasai Virar for the year 2024 is approx.1,735,000. The last census was scheduled in the year 2021 but it got postponed due to Covid. So the last census was being conducted in the year 2011.

Population according to Religions		
Religion	Percentage	Total
Hindu	77.16%	9,43,165
Muslims	9.03%	1,10,384
Christian	8.28%	1,01,193
Sikh	0.21%	2,616
Buddhist	2.65%	32,380
Jain	1.90%	23,274
Others	0.17%	2,066
Not Stated	0.60%	7,312

Table : 2 (Data by the Researcher)

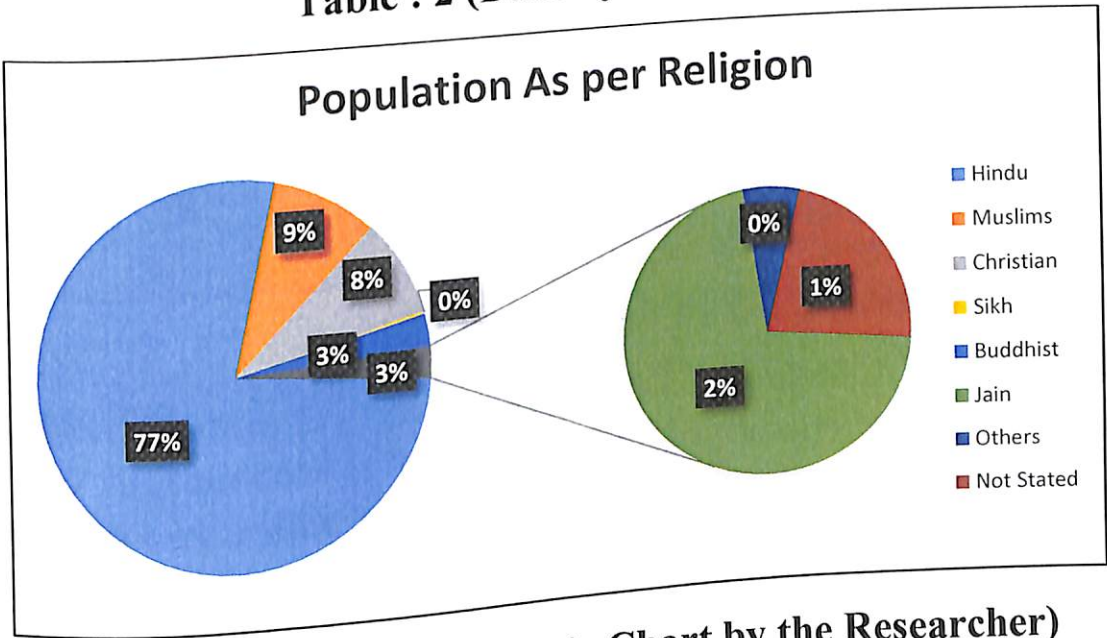


Figure : 14 (Pie Chart by the Researcher)

Population of VVMC	
Year	Population
2011	12,22,390
2021	15,89,000
2022	16,36,000
2023	16,85,000
2024	17,35,000

Table : 3 (Data by the Researcher)

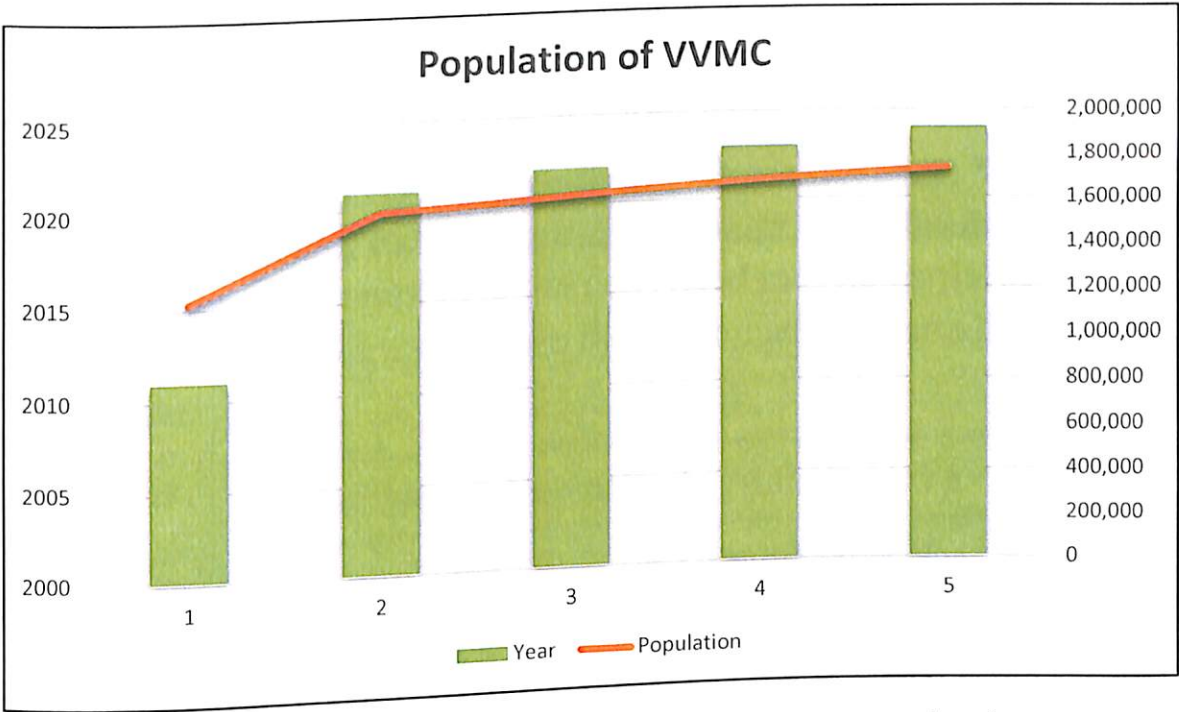


Figure : 15 (Graph by the Researcher)

Above figure clearly states the population growth in VVMC from the year 2011 till now. It is observed that drastically the population growth has kept increasing 2022. If we compare the population of each year we can see that in 2021 the approx population was 15,89,000 but currently in the year 2024 the population has rise to 17,35,000.

5.2 INDUSTRIAL GROWTH:

Areas like Valiv, Gokhivare and Sativali villages between the western railway track and Mumbai – Ahmedabad National Highway were proposed as an industrial complex by the MMRDA by covering approx. 200 hectares of land.

The rapid growth in Vasai Virar has made the city a prime region for industrial and commercial growth. The potential destination for new and innovative startups was observed to be certain upcoming projects in this area.

Vasai Virar City Municipal Corporation has also developed its own small – scale industrial estate.

The growth of small scale industries were also observed due to the permission provided regarding Industries allowed in Residential Areas. This allowed all the non – polluted industries to grow rapidly like gems, jewellery processing, assemble of goods, etc.

Areas of Vasai (East) i.e **Sativali, Dhumal Nagar, Waliv, Gokhivare, Golani, Fatherwadi, Boidapada, Goraipada, Naikpada, Chinchpada**, etc. completely got converted into industrial zones. Industries that are set up here are the combination of small scale and large scale.

Registered Factories in Maharashtra	
Year	No. of factories
2020	37,304
2021	38,693
2022	37,972
2023	38,479

Table : 4

Source of data :

https://mahadish.in/statistical_info_registered_factories

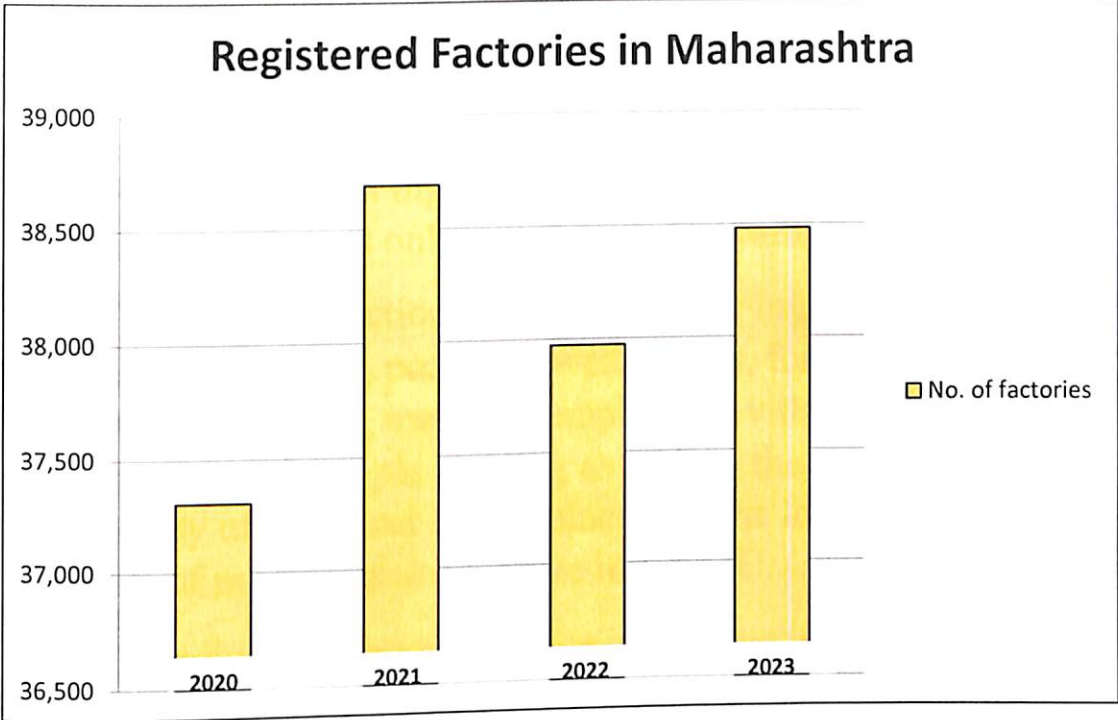


Figure : 16 (Graph by the Researcher)

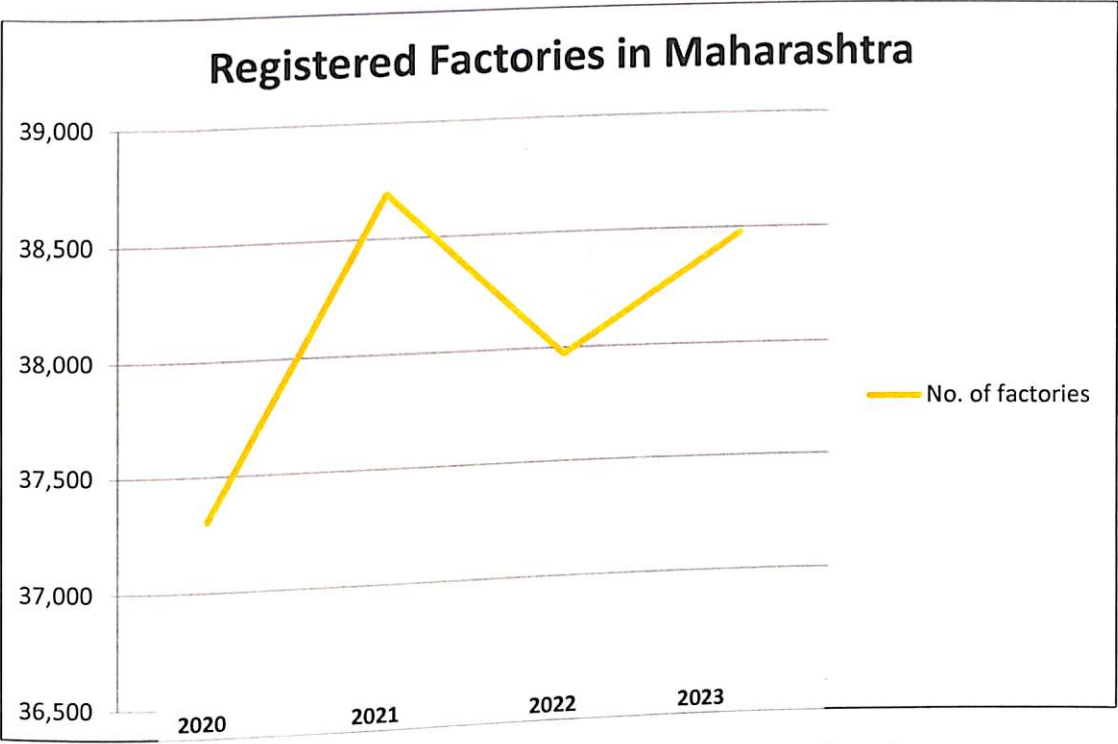


Figure : 17 (Graph by the Researcher)

5.3 TOURISM :

The Tourism potential of the region was improved by developing the infrastructure facilities, heritage installations and maintaining the scenic beauty through proper cleanliness. Reduction of the crowd on adjacent highly urbanized areas like Mumbai and Thane during weekends was only possible due to various tourist amenities.

Tourist attractions in Vasai – Virar region included sea, trees, churches, bungalows, ponds, groves, creeks, forts, and many famous monasteries, temples, masjids, temples and villages that gave a different excitement to the people residing as well as the once who visit. Availability of weekend outing places for the local people as well as residents of nearby areas are there in VVMC.

As the population has kept increasing in Vasai – Virar region even people have started exploring places in this areas. The only drawback to this scenario is places remain overcrowded especially during the weekends and holidays.

The following is the compiled list of the places that enhanced the tourism of VVMC.

Sr. No.	List of Tourism in VVMC	Location
1.	Bassein Fort / Vasai Fort	Vasai (W)
2.	Suncity Garden	Vasai (W)
3.	Bhuigaon Beach	Vasai (W)
4.	Navapur Beach	Virar (W)
5.	Rajodi Beach	Nallasopara (W)
6.	Madhuban – Box Street	Vasai (E)
7.	The Capital Mall	Nallasopara (E)

8.	Hedavde Mahalaxmi Temple	Virar (E)
9.	Tungareshwar Temple	Vasai (E)
10.	Tungareshwar Wildlife Sanctuary	Vasai (E)
11.	Rangaon Beach	Vasai (W)
12.	Suruchi Beach	Vasai (W)
13.	Chinchoti Waterfalls	Vasai (E)

Table : 5 (By the Reseacher)



Figure : 18 – Vasai Fort



Figure : 19 – Suncity Garden

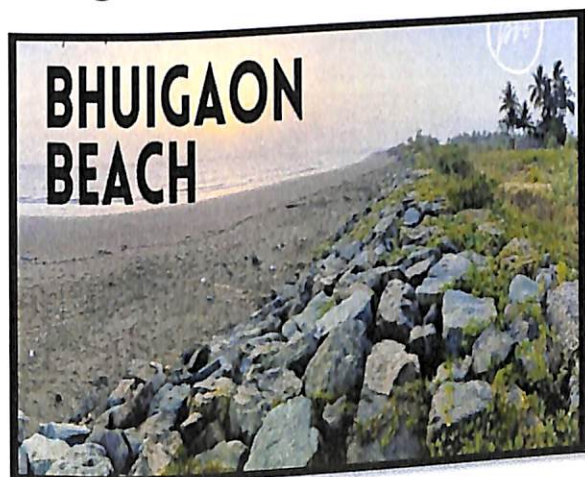


Figure : 20 – Bhuigaon Beach



Figure : 21 – Navapur Beach

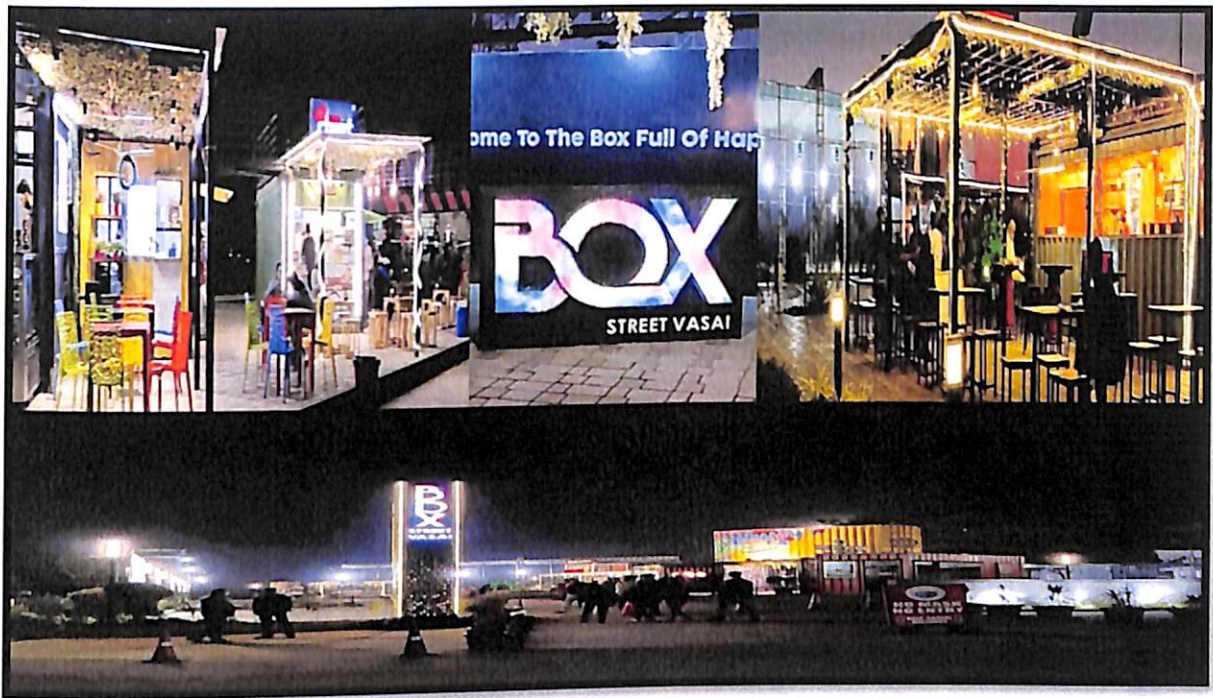


Figure : 22 – Box Street, Madhuban



Figure : 23 – The Capital Mall

5.4 URBAN INFRASTRUCTURE:

As per Table no. 3 the population growth of VVMC has been stated that it has rapidly kept on increasing. If the population is increasing automatically the demand for well-equipped infrastructure will also increase. Infrastructure development has not only taken place in housing but also availability of schools, colleges, offices, etc. This development had led to the economic growth of the areas in Vasai - Virar.

Regional Office	Residential Properties	Commercial Properties	Total Properties
Virar	72777	8371	81148
Vasai	15000	1286	16286
Nallasopara	111081	15653	126734
Navghar Manikpur	41224	10967	52191
Total	240082	36277	276359

Table : 6 – Total No. of properties in 2001

Source : Data from <https://vvcmc.in/budget-2024-25/>

The above table no. 6 states that apart from the total commercial properties in VVMC the residential properties are much more due to increase population. But this table consisted of the data of the year 2001. In the year 2021 it was completely changed.

Regional Office	Total Properties in 2001	Total Properties in 2021
Virar	81148	113248
Vasai	16286	77536
Nalla Sopara	126734	197695
Navghar Manikpur	52191	84095
Total	276359	472574

Table : 7 – Total No. of properties in 2001- 2021

Source : Data from <https://vvcmc.in/budget-2024-25/>

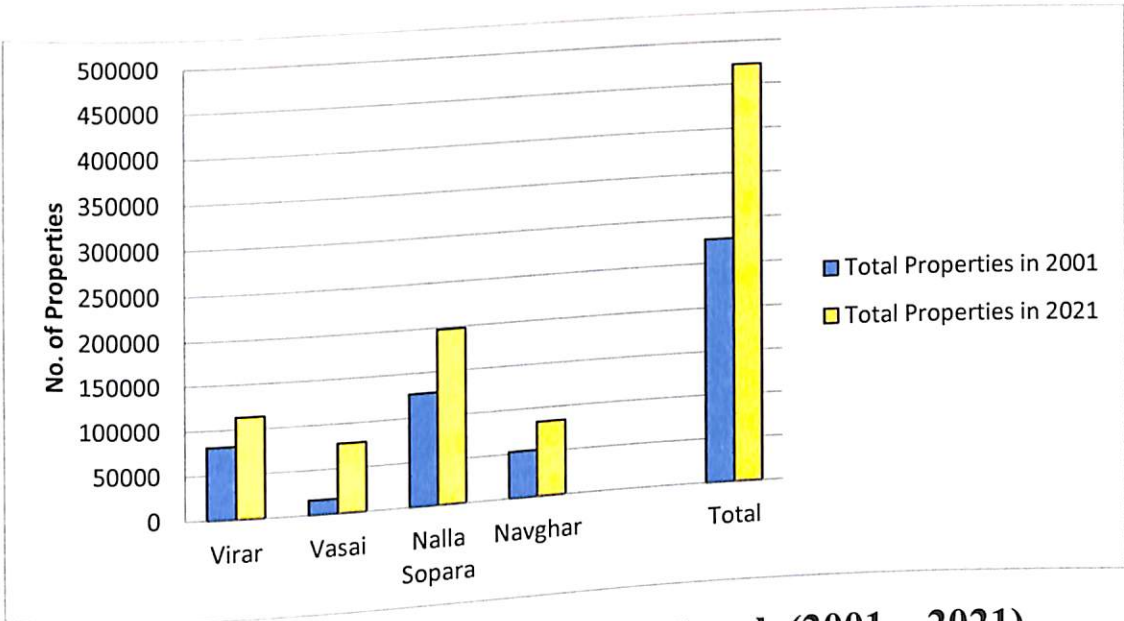


Figure : 24 – No. of Properties Graph (2001 – 2021)

Source : Graph by the Researcher.

The above figure 22 states the drastic rise in the total no. of properties from the year 2001 till 2021.

5.5 TRANSPORT CONNECTIVITY:

As per the growth of population even the transport connectivity had increased. Earlier the only way of transport was local trains or private vehicles. About 10 years back people were dependent on the local trains or public buses as the mode of transport. People used to wait for more than 1 hour for trains or buses as the frequency of the train routes was too less.

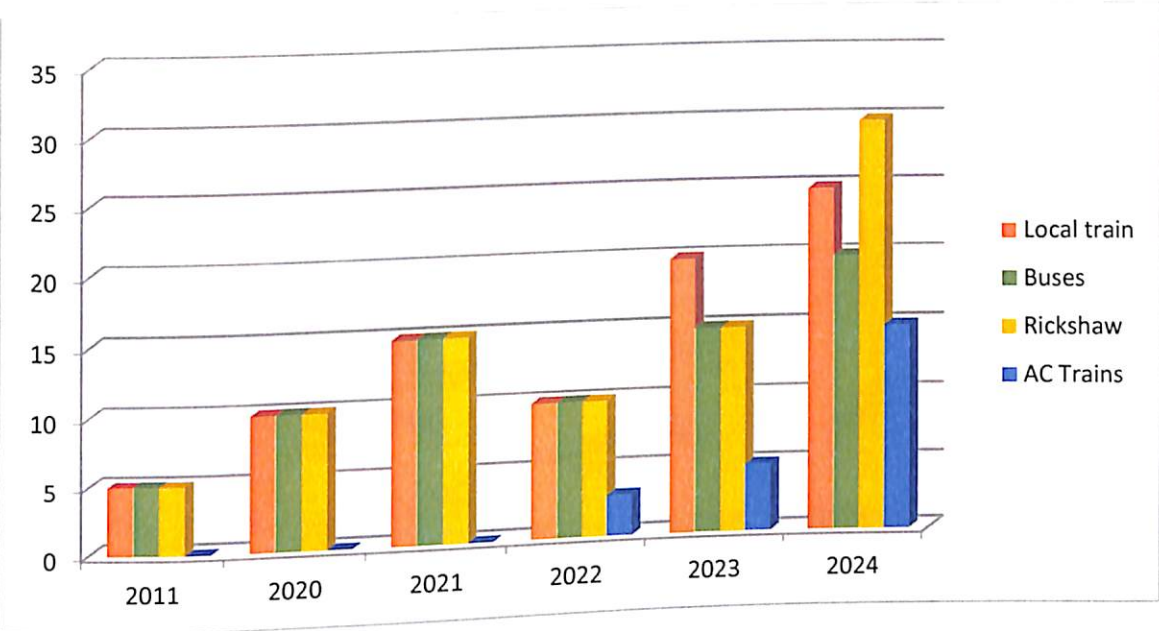


Figure : 25 – Mode of transports frequency.
(Graph by the Researcher)

The above graph states the frequency of transportation of local trains, buses, rickshaw and AC trains. It is observed that the frequency was too low in the year 2011. It had increased till the year 2021 but reduced in 2022 due to the lockdown of COVID. Again from 2023 till now the frequency rate has increased and made transportation services easier and convenient for the people.

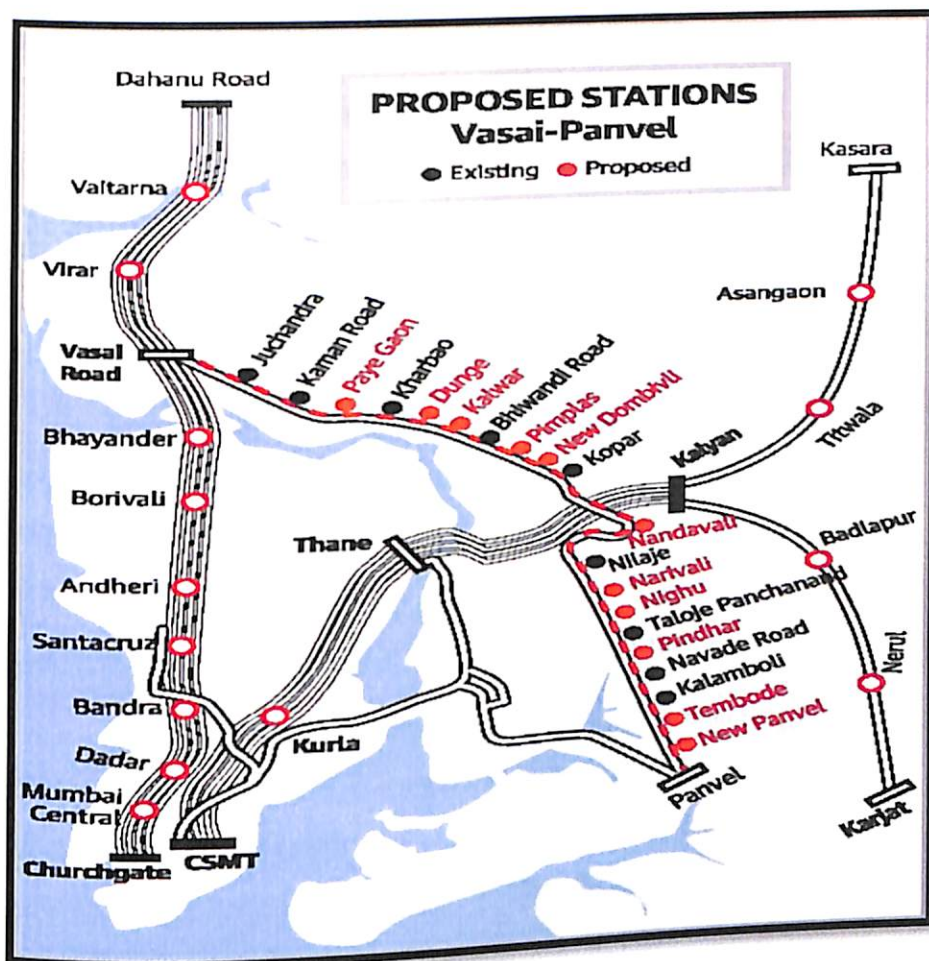


Figure : 26

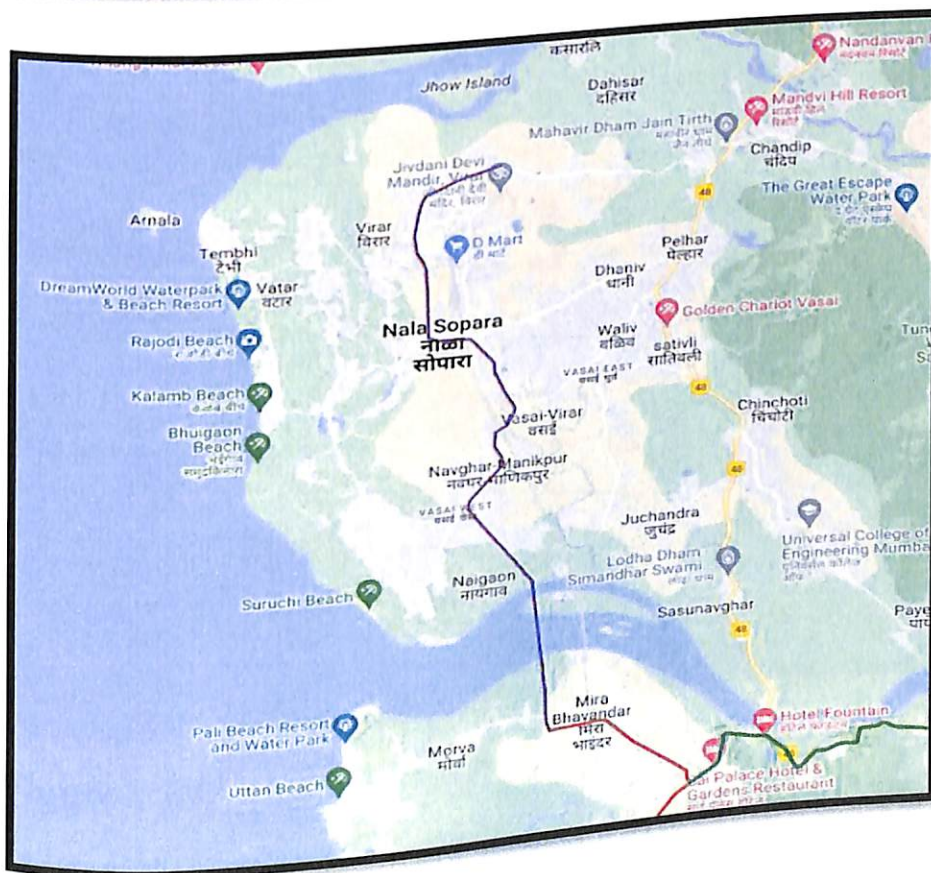


Figure : 27

6. ENVIRONMENTAL APPROACH :

Mainly the southern part especially both the sides of the Western Railway Line is considered as low – lying region. The settlements that are situated near the coastal belt are slightly on a higher level and moderately plains.

36 ft is the average elevation of this region above the sea level.

There are certain small hillocks that are scattered in the eastern and north-eastern part of Vasai - Virar region that are caused due to various local variation.

Hilly area that is covered with thick forests has been observed towards the east of the National Highway.

A natural barrier has been created by the hill ranges of the **Tungar** that separates the sub-region of VVMC from the rest of the **Mumbai Metropolitan Region**.

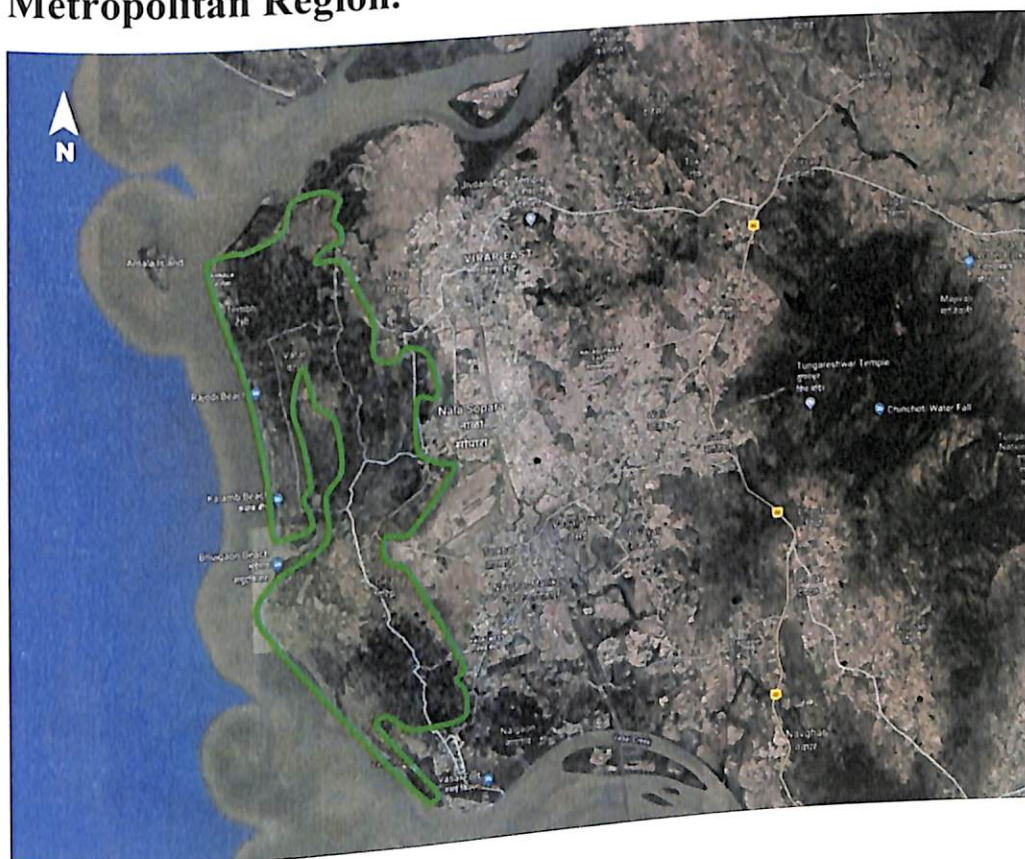


Figure : 28

Source : <https://images.app.goo.gl/gTXxdLhEwqrX9DGT7>

6.1 AIR ENVIRONMENT :

The atmosphere of the Earth is a complete layer of gases surrounded to it.

Approximately **78 % of Nitrogen & 21% of Oxygen** is present in the air and it is considered to be **Pure Air**, while other gases such as Argon, Carbon dioxide, Methane and so on are too present in a lesser amount.

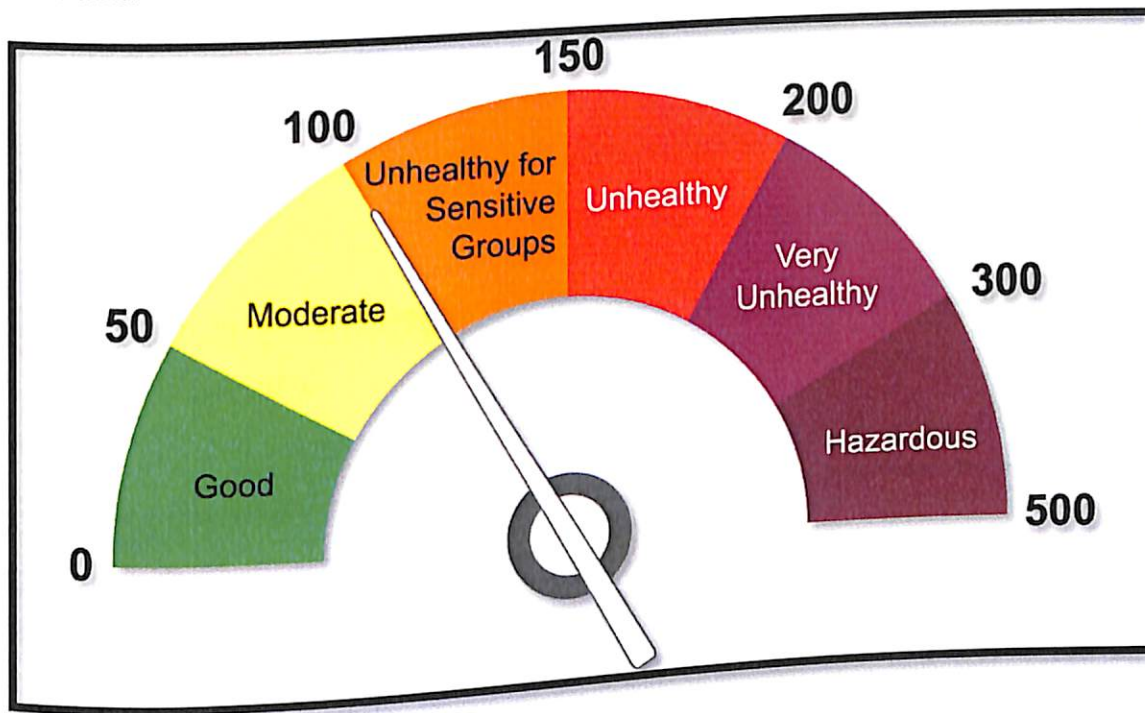


Figure : 29

Source : <https://images.app.goo.gl/FFTgDRtjWqM48U129>

As per the above figure it states that it may be harmful to human beings, plants, animals, environment and other living creatures if the air pollutants are having higher concentration. The major diseases that may occur due to bad air quality index are heart diseases, lung diseases, asthma, breathing problems, etc.

The Central Pollution Control Board has started comparing the status of Ambient Air Quality Parameters at the national level.

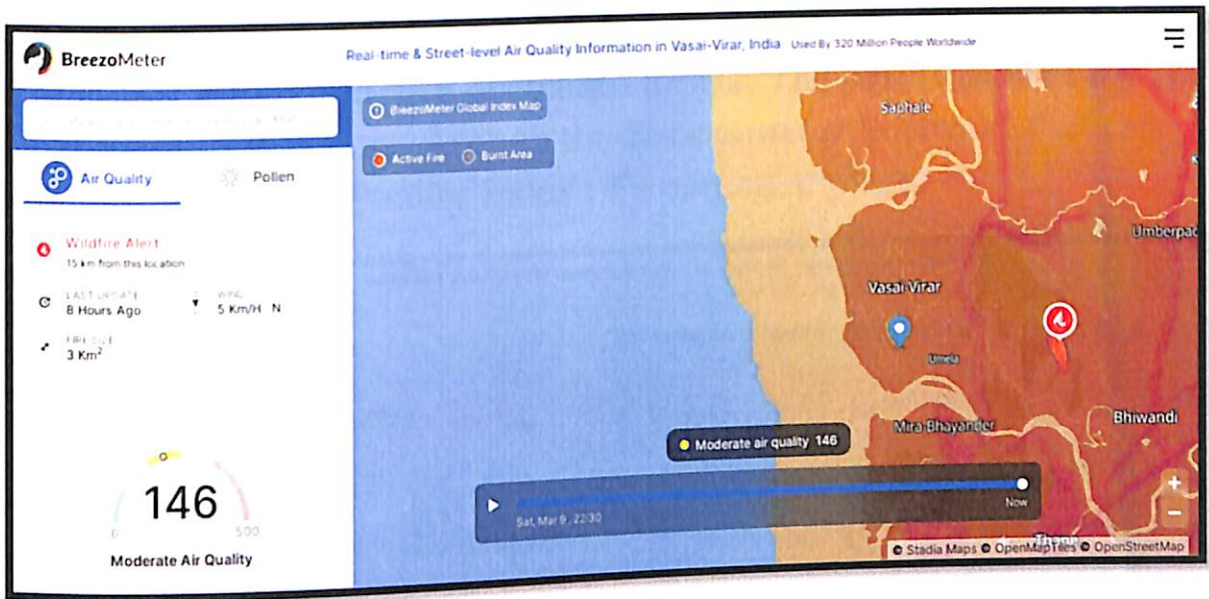


Figure : 30

Source : <https://www.breezometer.com/air-quality-map/air-quality/india/vasai>

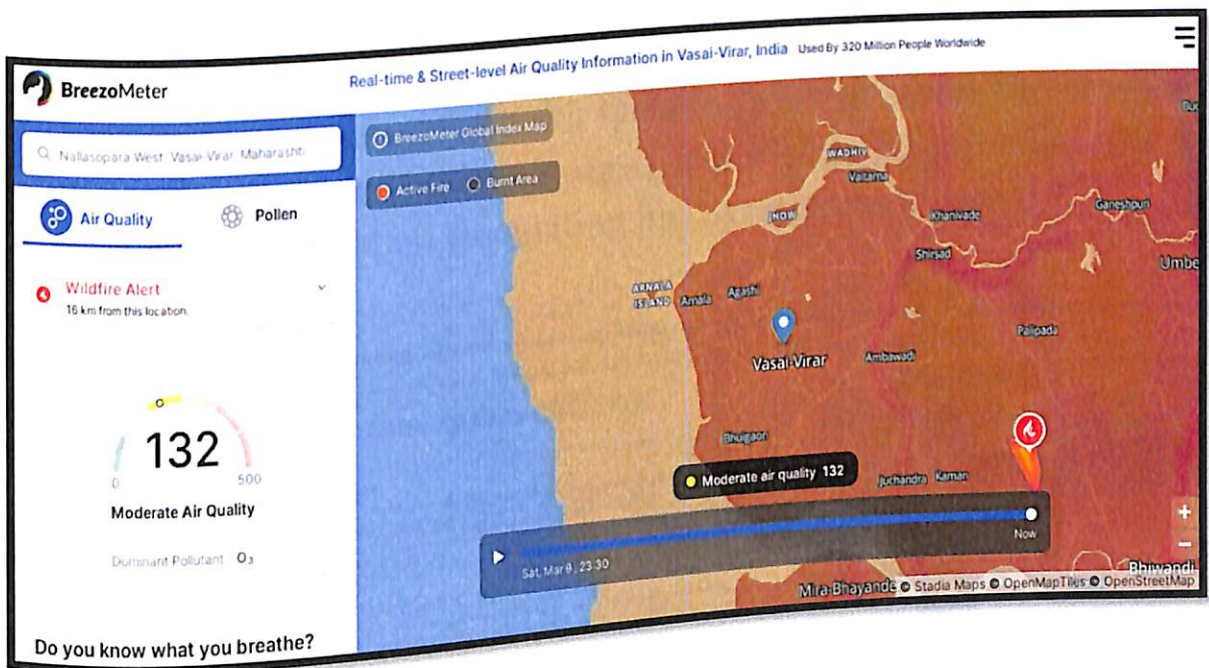


Figure : 31

Source : <https://www.breezometer.com/air-quality-map/air-quality/india/vasai>

The above figure has enhanced the air quality level of Vasai – Virar that is 146 earlier and then decreased to 132. The observation of the Air Quality Index was done through the **Breezometer Software** that can provide current Air Quality Index of a particular place.

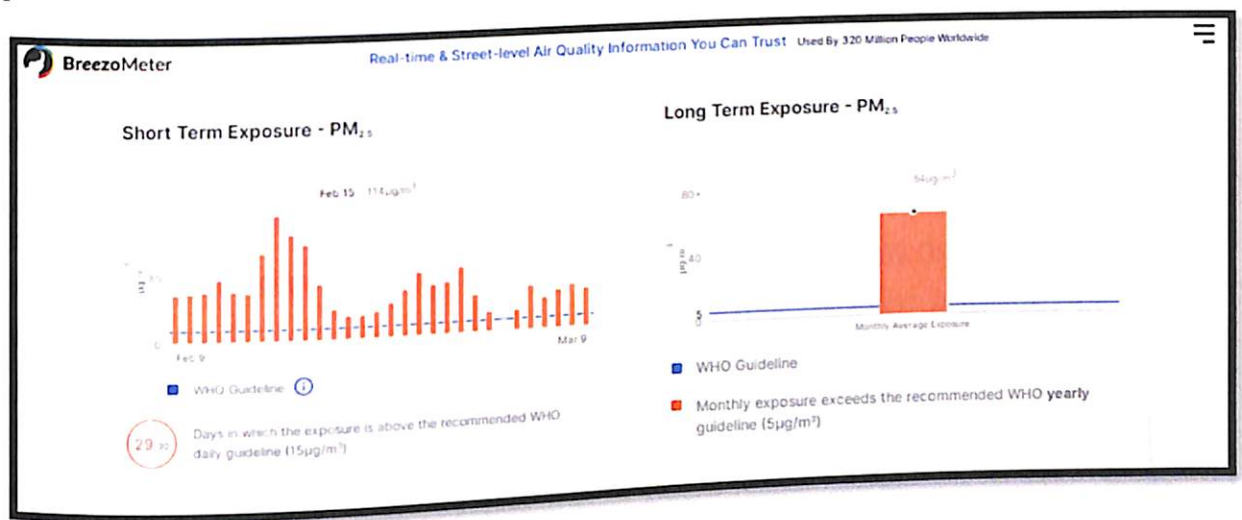


Figure : 32

Source : <https://www.breezometer.com/air-quality-map/air-quality/india/vasai>

The above figure has the Air Quality Index of 30 days to compare its short term and long term exposures. It is clearly seen that the air quality index has kept on fluctuating but has decreased after 17th February, 2024

AQI	Quality Classification	Remarks	Colour Code
0-50	Minimal Impact	Good	
51-100	Minor breathing discomfort to sensitive people	Satisfactory	
101-200	Breathing discomfort to the people with lung, heart disease, children and older adults	Moderate	
201-300	Breathing discomfort to people on prolonged exposure	Poor	
301-400	Respiratory illness to the people on prolonged exposure	Very Poor	
> 401	Respiratory effects even on healthy people	Severe	

Figure : 33

6.2 SOUND ENVIRONMENT :

Various natural and man – made sources like oceans, construction, industries, transportation, etc. are responsible for the increase in noise pollution. One of the major drawback for environmental pollutants is noise pollution that directly affects the daily performance of humans.

The sound level that is less than 70 dBA are not damaging the living organisms even if the exposure of it remains for a longer period of time. If the sound level goes beyond 85 dBA for continues more than 8 hours than it might be hazardous for human life.

Category of Area	Limit in dB (A), L_{eq}	
	Day Time	Night Time
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silent Zone	50	40

Table : 8 – Noise Level as per Areas.

If we observe the above table the highest noise pollution during the day and the night time is from the industrial area only. Due to this staying beside industrial area becomes difficult not only it affects the environment through the noise pollution but also through the air pollution.

7. REVIEW OF LITERATURE:

Design of Sewage Treatment Plant of VVMC – Akshay Bholte – May, 2020

This report was prepared to analyse the sewage level and its discharge treatment. The sewage level was being analyzed in detail as per the physical, chemical and biological condition of the drainage.

Supplier Selection and Material Management of VVMC using QGIS – Jimit Chotai (Volume 5) –February, 2019

The report only dealt with the usage of QGIS software for supplier selection, material/products inquires, its location, etc. It focussed on the procedure of QGIS software and its advantages to analyze the availability of material as per the appropriate location.

Saving Traditional Water Ponds from Vasai Taluka – Yuwa Vikas Sanstha – June, 2019.

This research was done by an organization that only deals with environmental issues. This report focussed only on Traditional Water Ponds in Bhuigaon Village, Vasai. Existence of old water system was revealed with the ways and time spent by the people to keep the water ponds clean.

Preparation of Action Plan for conservation of Heritage for Agashi Talav – Kirtida Unwalla (Volume 3) – March, 2011.

This report has researched in detail about heritage assets and issues faced by Agashi Talav, Virar. Maximum heritage assets were the temples from the Maratha Period due to which Agashi Talav is being used for religious period. The condition of the Talav is observed to be fair.

VVMC – Environmental Status Report – 2022-23 (Volume 8) – Dr. Abhishek Chakraborty – March, 2023.

In this report all environmental aspects have been reviewed about VVMC. Highlighting the condition of biophysical environment of VVMC was the only purpose of this study. The report was also maintained as per the development, education, transport connectivity, public participation, water supply & sewage, etc.

Tree Census of VVMC – Terracon Ecotech Pvt. Ltd. – Dr. Ninad Raut & Dhananjay Rawool – 2016.

This report stated detailed information about the different types of trees that are planted in different wards of VVMC. Not only the types of trees were observed but also the botanical names of each species of trees were specified. This report focused on the plantation of trees count and its uses in various aspects like medical, aesthetic, social & cultural. Even the quality check of trees grown in different areas were shown.

Vasai Virar Sub-Regions – CIDCO

This report was based on the land use of the urbanisation in Vasai – Virar sub- regions. It also focused on the session conducted for drafting the development plan.

8. RESEARCH GAP:

- ❖ Analyse the water quality by collecting water samples through pH paper and Universal indicator.
- ❖ Collection of water samples included all beaches, lakes, ponds, wells, slum areas, industrial areas and household areas of Vasai – Virar.
- ❖ Each research of water quality was done only covering 1-2 areas of Vasai –Virar region.
- ❖ Major research on VVMC were done with respect to environment and issues faced by the people.
- ❖ Certain research work highlighted on the growth of industries but not on the pollution caused by it.
- ❖ Population growth was observed but what about the over crowded transport services through which people are still struggling.
- ❖ Number of waterbodies were observed without identifying impurity of water.
- ❖ Even if water samples were collected survey among people wasn't conducted.
- ❖ Practical approach about the actual issues faced were not covered in detail.

9. RESEARCH OBJECTIVE:

- To analyse the water quality of VVMC.
- To analyse certain changes in the environment and also identify the causes of these changes in VVMC.
- To understand the issues faced by the people regarding water impurity and water shortage.
- To acquire knowledge about the major source of water supply.
- To discover the storage techniques of people in VVMC.
- To interpret the pH level of the drinking water at different areas of VVMC.

10. RESEARCH METHODOLOGY:

The study area included slums, commercial, industrial, residential, natural and artificial waterbodies of Vasai-Virar Region.

The research was done through the collection of water samples and testing them through pH paper as well as Universal Indicator.

Survey was conducted through the questionnaire that was asked to the people who were residing beside various waterbodies as well people away from the waterbodies.

10.1 COLLECTION OF WATER SAMPLES:

Various water samples were being collected to identify the water quality of different areas of Vasai- Virar region.

Water Samples were being collected from the natural waterbodies, artificial waterbodies, households (Slum, villages, chawls, buildings), industrial areas, etc.

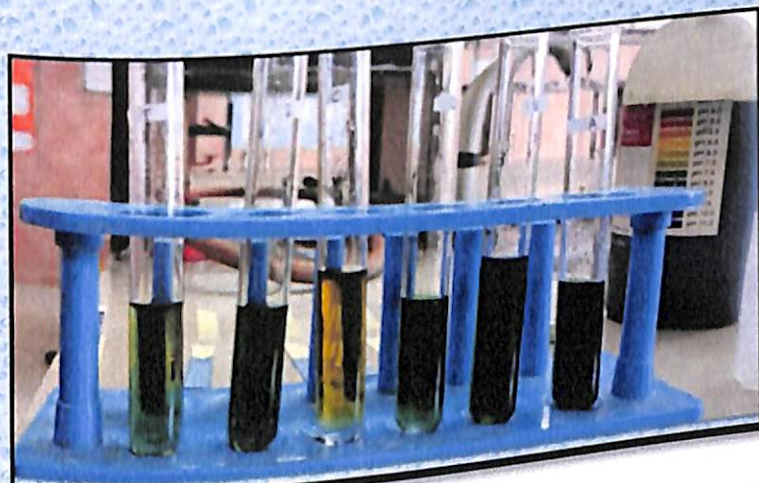
- Sample of water were being collected in small 5 – 10 bottles.
- Those bottles were being cleaned and sterilized after the testing of the water samples. This helped in reusing the same bottles for collection of water samples.

10.2 TESTING OF WATER SAMPLES:

After the collection of water samples of different areas those samples were being tested through pH paper and Universal Indicator to identify the purity level of drinking water.

The testing of water samples were done in the Chemistry Lab of Gundecha Education Academy, Kandivali (East) with assistance of the HOD of Chemistry.

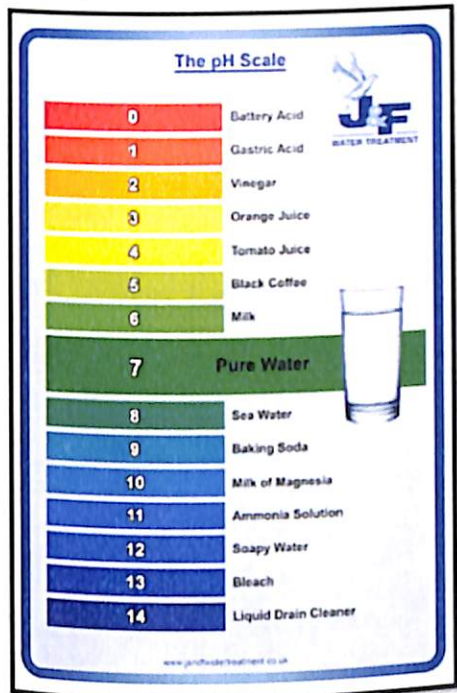
WATER SAMPLE TESTING THROUGH UNIVERSAL INDICATOR



WATER SAMPLE TESTING THROUGH PH PAPER

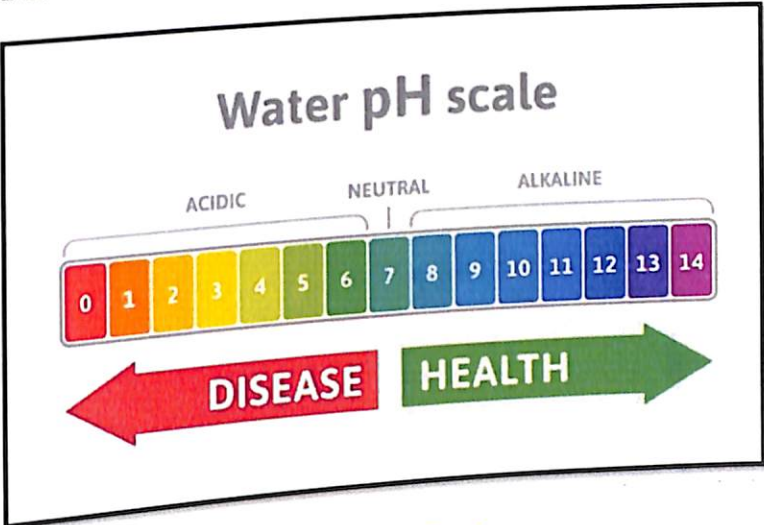


10.3 ANALYSING THE WATER PURITY LEVEL:

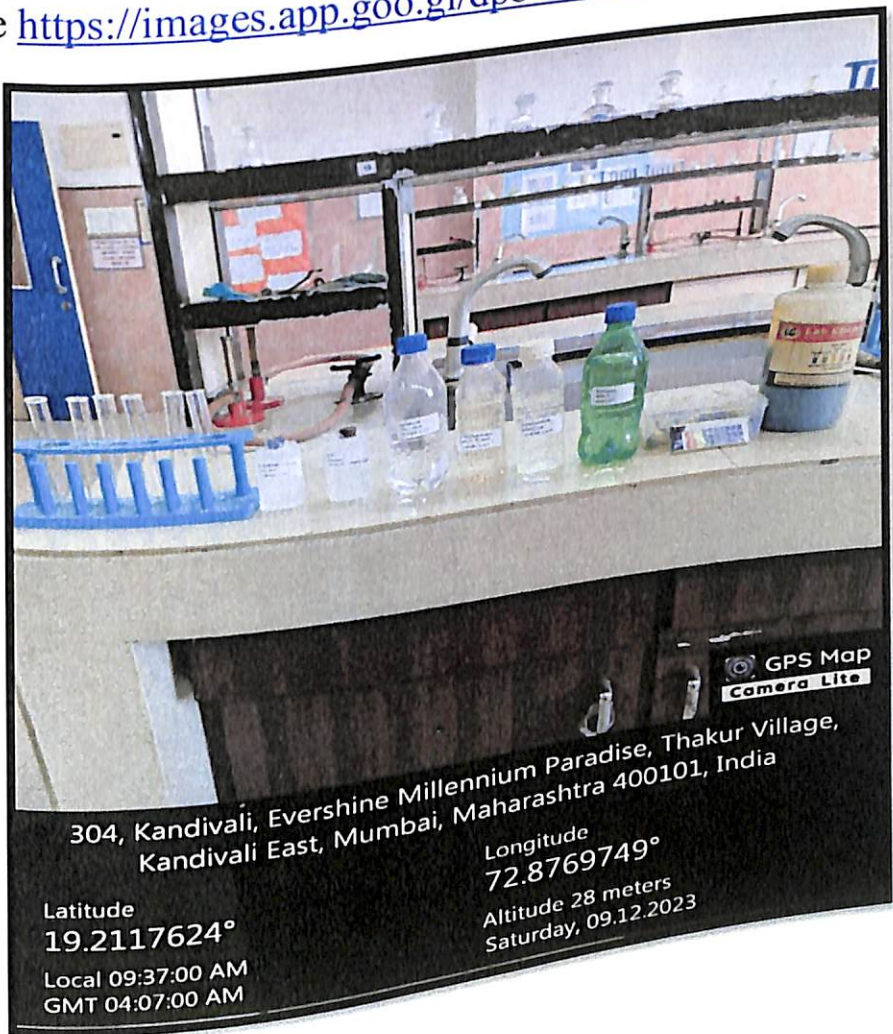


The pH scale ranges from 0 to 14:

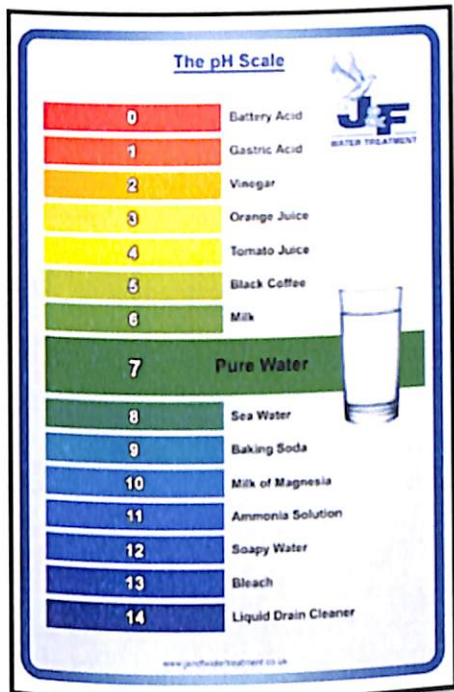
- Acidic water has a pH lower than 7. Strongly acidic substances can have a pH of 0.
- Alkaline water has a pH of 8 or above. Strongly alkaline substances can have a pH of 14.
- Pure water has a pH of 7 and is considered “neutral”



Source <https://images.app.goo.gl/dpbGueCA446LL6Qg6>

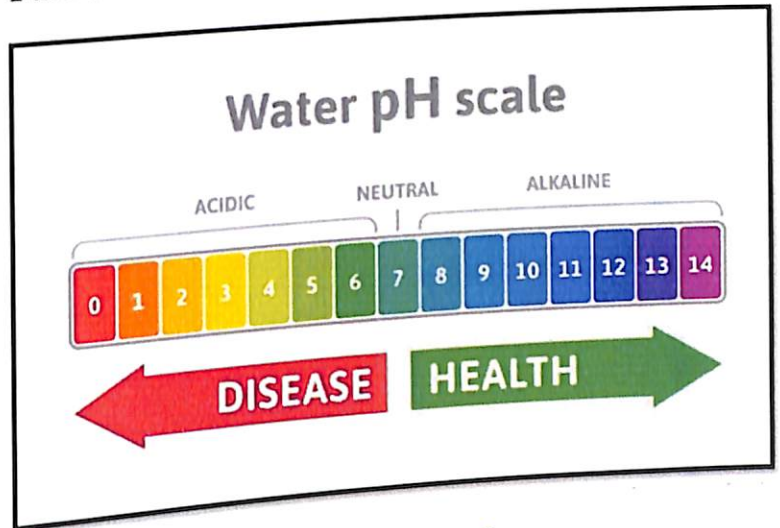


10.3 ANALYSING THE WATER PURITY LEVEL:

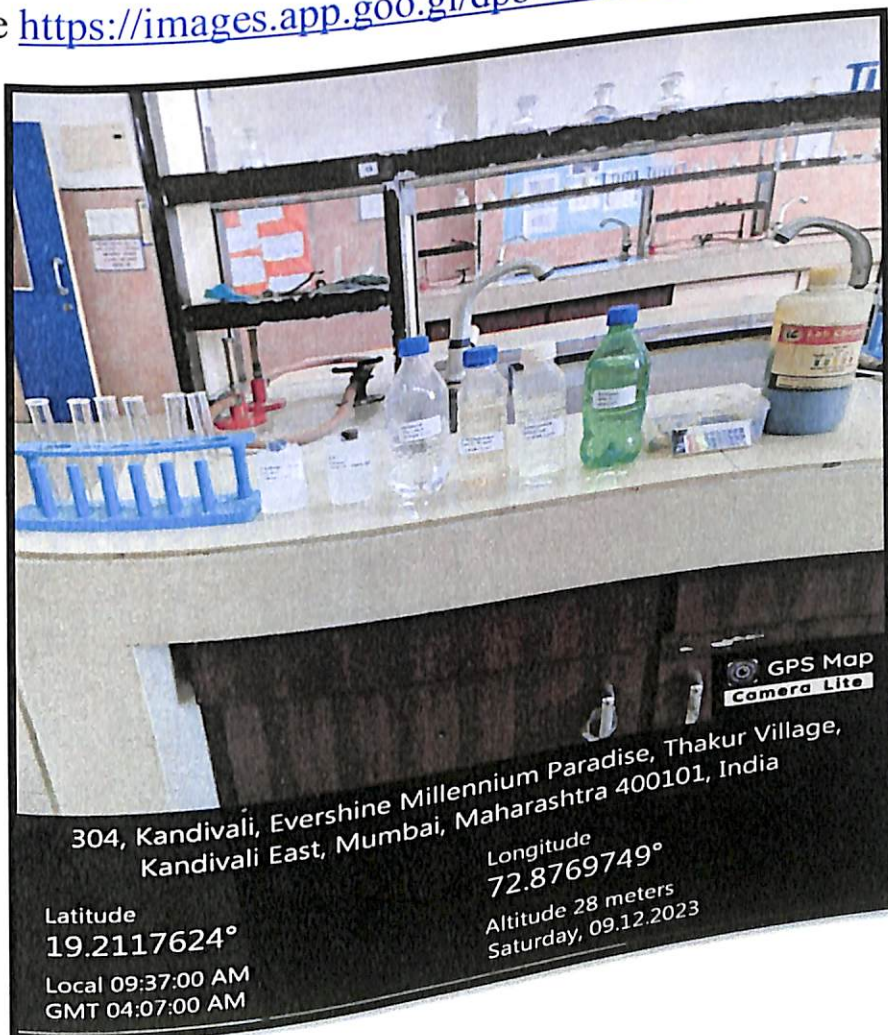


The pH scale ranges from 0 to 14:

- **Acidic water** has a pH lower than 7. Strongly acidic substances can have a pH of 0.
- **Alkaline water** has a pH of 8 or above. Strongly alkaline substances can have a pH of 14.
- **Pure water** has a pH of 7 and is considered “neutral”



Source <https://images.app.goo.gl/dpbGueCA446LL6Qg6>



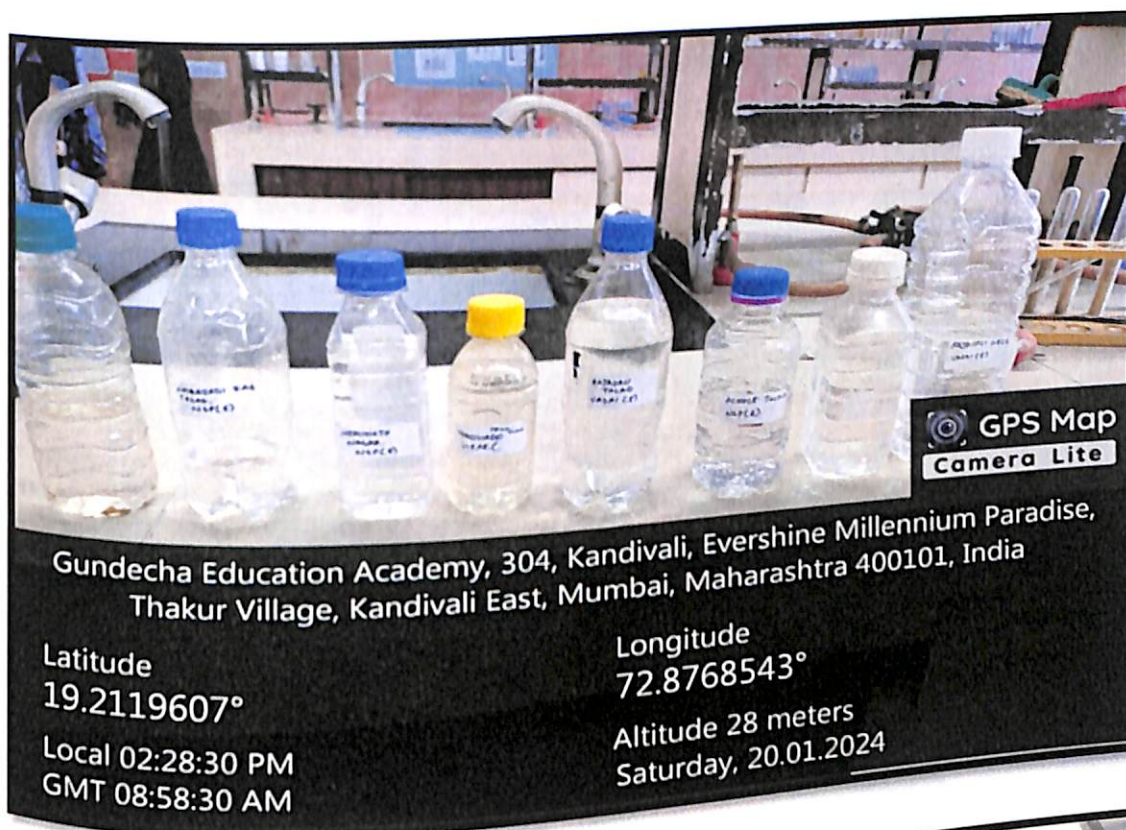
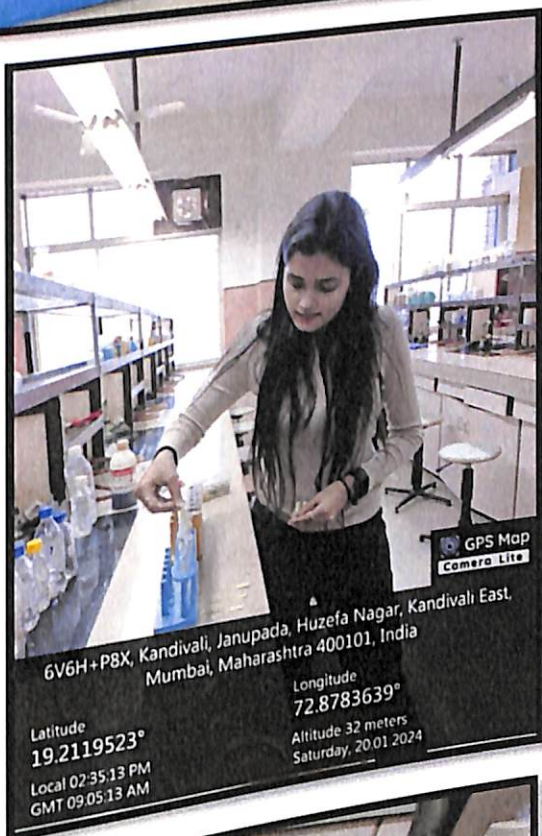


Figure : 34 – Clicked by the Researcher.



10.4 QUESTIONNAIRE:

A detailed survey through the questionnaire had provided with certain comparison and drawbacks actually faced by the people residing in Vasai – Virar region.

The following questionnaire was being used :

1. Gender :

- Male
- Female
- Other

2. Location:

3. Age :

- Below 18
- 19 – 29
- 30 – 45
- 46 – 60
- Above 60

4. Education:

- Illiterate
- Primary (1 – 5)
- Secondary (6 – 10)
- Higher Secondary (11 – 12)
- Graduate
- Post Graduate

5. Area :

- Slum
- Chawls
- Buildings / Towers
- Commercial
- Industrial

6. Do you have water pipelines available at your home?

- Yes
- No

7. If yes, which type of water flows through the pipelines at your home?

- Boring water
- Municipal Drinking Water
- Both
- None

8. If no, then how do you manage with the water supply?

- Through hand pumps
- Through wells
- Water Tankers
- Other

9. How frequently do you have drinking water supply at your home?

- Half an hour in a day
- 1 hour in a day
- 2 hour in a day
- Depending on the water tankers
- 24 hours
- Other

10. How much litre is the approximate consumption of drinking water by you?

- 1 – 2 litres
- 3 – 4 litres
- Above 4 litres

11. What is the scope of storing water at your home?

- Steel vessels
- Pots
- Bottles
- Drums

12. Do you filter water before drinking?

- Yes
- No

13. Which method do you use to filter water?

- Boiling
- Alum
- Water Purifier
- Cloth Filtration
- None

14. What kind of water do you drink?

- Warm water
- Cold Water

15. Which source of water is available in your locality?

- Natural Waterbodies
- Artificial Waterbodies

15. What is the major source of water at your place?

- Dam
- Well
- Lake
- Beach
- Unaware

16. Do you feel the natural or artificial waterbody in your locality clean?

- Yes
- No

17. According to you, what are the reasons for polluted waterbodies?

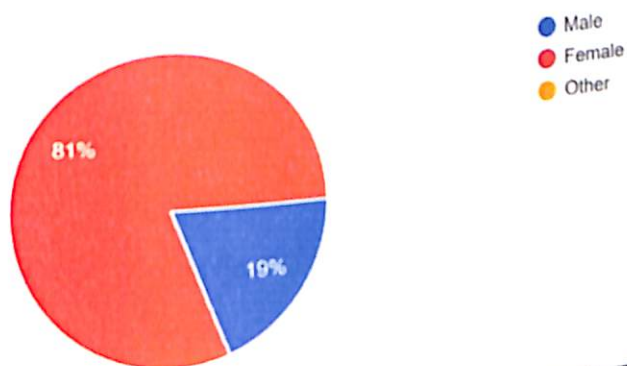
- Idol Immersion
- Rituals
- Washing Clothes
- Throw of Garbage
- Drainage of Waste

18. Did you observe any change in the water quality post COVID?

- Yes
- No

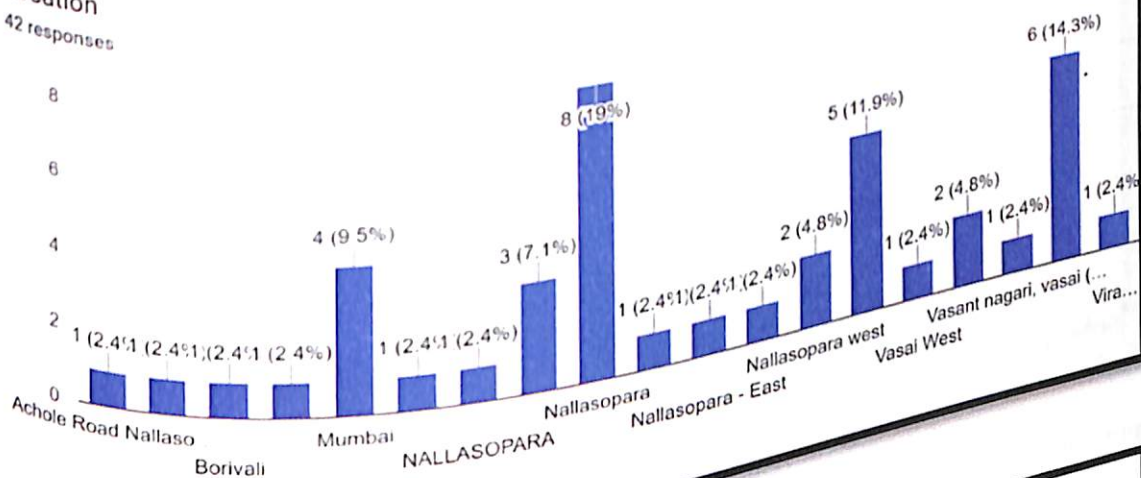
i) Gender :

Gender
42 responses



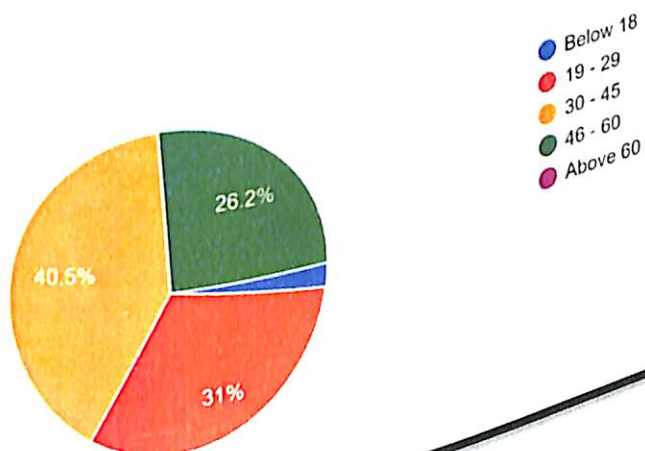
ii) Location :

Location
42 responses



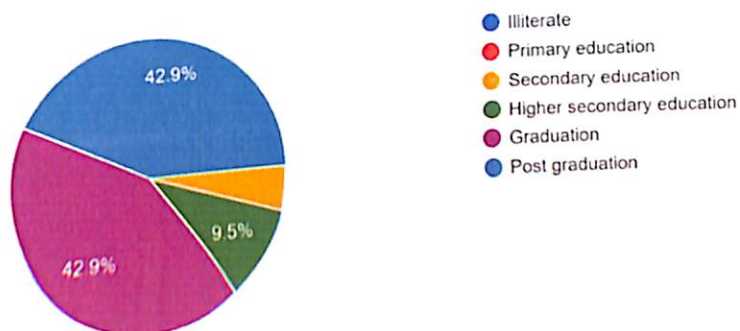
iii) Age :

Age
42 responses



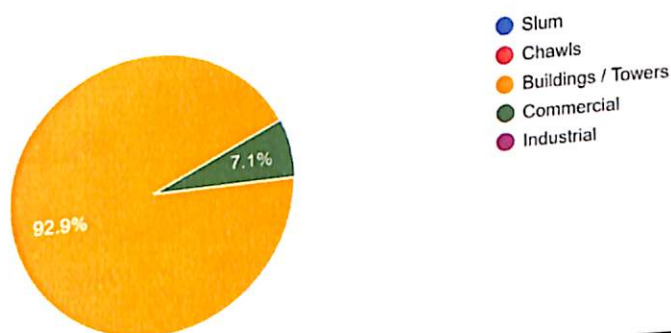
iv) Education :

Education
42 responses



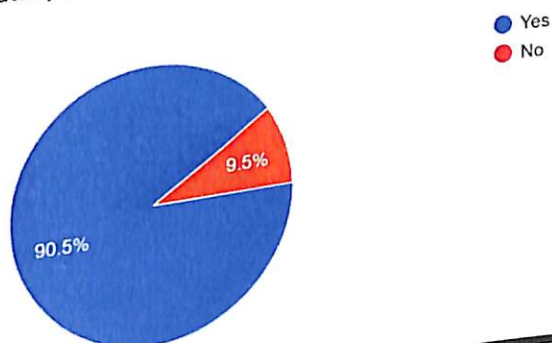
v) Area :

Area
42 responses



vi) Availability of water pipelines :

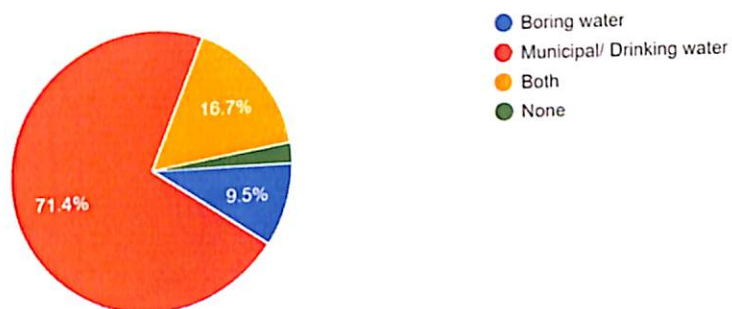
1. Do you have water pipelines available at your home?
42 responses



vii) Type of Water Flow in the pipelines :

2. If yes, which type of water flows through the pipelines at your home?

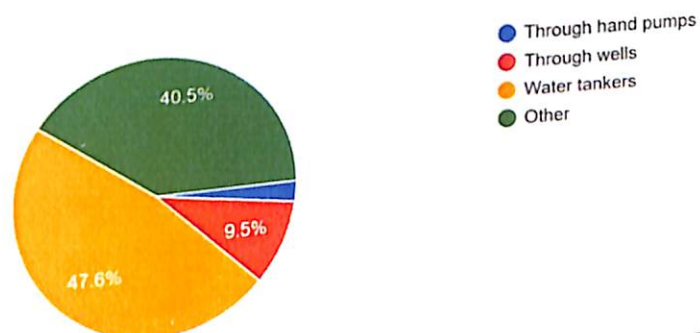
42 responses



viii) Management of Water Supply :

3. If no then how do you manage with the water supply?

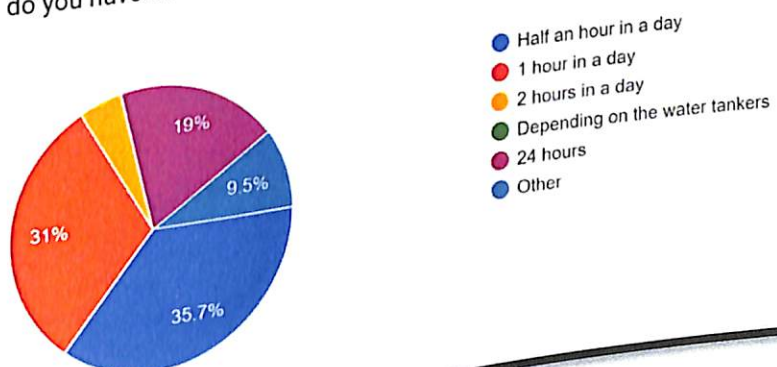
42 responses



ix) Frequency of Drinking water supply :

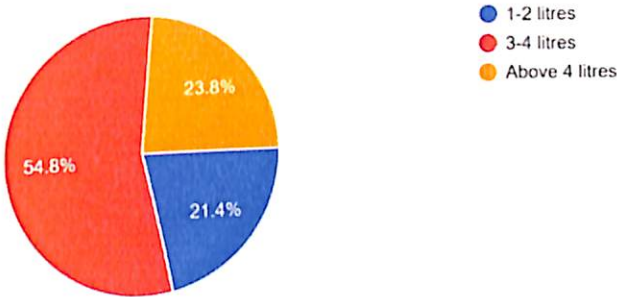
4. How frequently do you have drinking water supply at your home?

42 responses



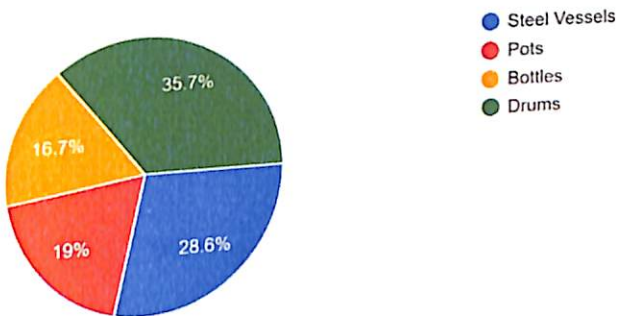
x) Consumption of Drinking Water :

5. How much litre is the approximate consumption of drinking water by you?
42 responses



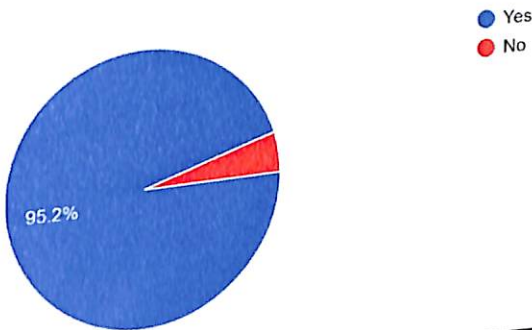
xi) Storage of Water :

6. What is the scope of storing water at your home?
42 responses



xii) Filtration of Water :

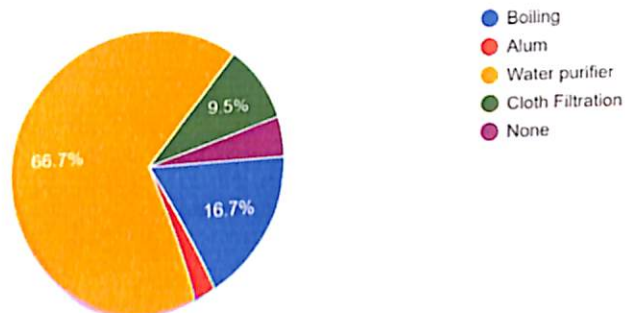
7. Do you filter water before drinking?
42 responses



xiii) Method of Filtration :

8. Which method do you use to filter water?

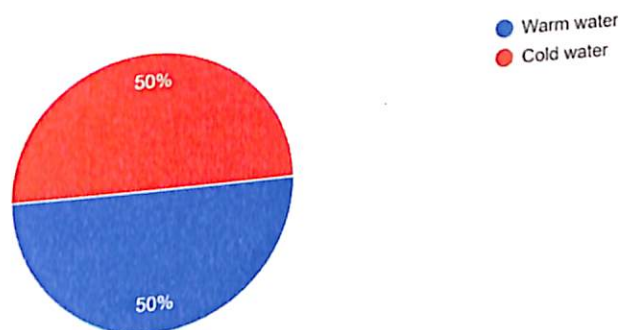
42 responses



xiv) Kind of drinkable water:

9. What kind of water do you drink?

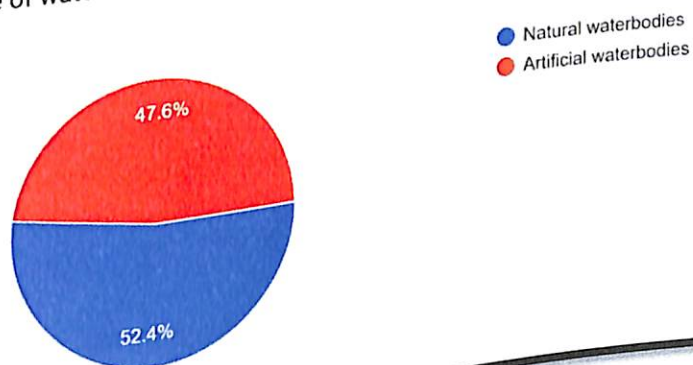
42 responses



xv) Source of Water – Natural / Artificial Waterbodies :

10. Which source of water is available in your locality?

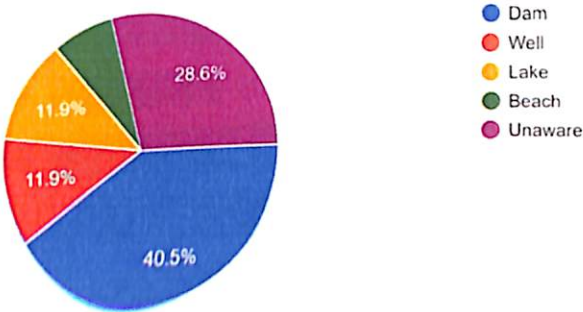
42 responses



xvi) Major Source of Water :

11. What is the major source of water at your place?

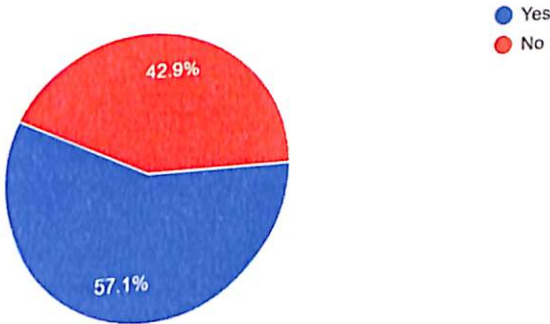
42 responses



xvii) Cleanliness in Waterbodies :

12. Do you feel the natural or artificial water body in your locality clean?

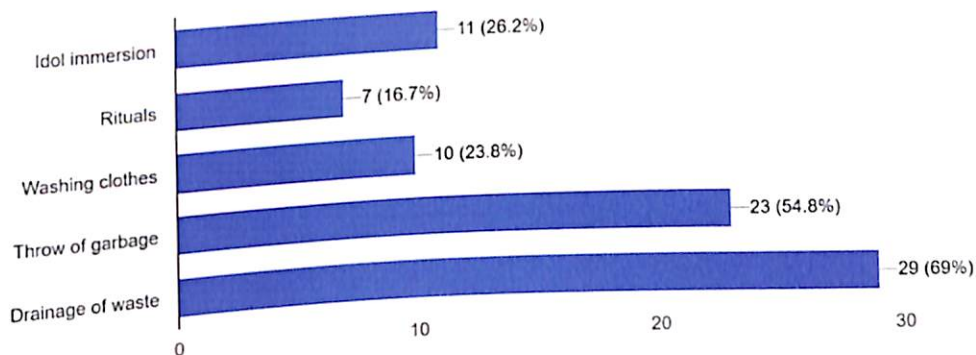
42 responses



xvii) Reason for polluted waterbodies :

13. According to you, what are the reasons for polluted waterbodies?

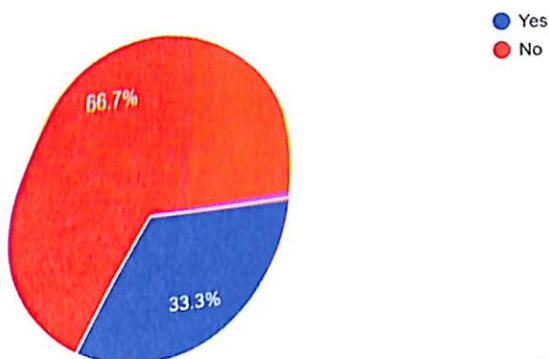
42 responses



xviii) Change in water quality post Covid :

14. Did you observe any change in the water quality post COVID?

42 responses



Link used as a Questionnaire while surveying :

<https://docs.google.com/forms/d/e/1FAIpQLSdKcICKbVVO0rYDh9vhVMWzvXNIpwNNGSPhMgI2yiVcgPJpEA/viewform>

11. NATURAL / ARTIFICIAL WATERBODIES:

Sr. No.	Natural / Artificial Waterbodies	Location
1.	Vasai - Nallasopara Salt Plant	Nallasopara (West)
2.	Bhuigaon Beach	Nallasopara (West)
3.	Lake at Hedavde Village	Virar (West)
4.	Tanasa River Dam	Kashikopar, Virar (West)
5.	Heart of Earth	Vasai (East)
6.	Rajawali Talao	Vasai (East)
7.	Ambavadi Talao	Nallasopara (East)
8.	Achole Talao	Nallasopara (East)
9.	Gokhivare Talao	Vasai (East)
10.	Chinchpada Water tank	Vasai (East)
11.	Pelhar Dam	Vasai (East)
12.	Pelhar Well	Vasai (East)
13.	Rajawali Well	Vasai (East)

Table : 9 = List of Natural / Artificial Waterbodies.
(Prepared by the Researcher)

1. VASAI – NALLASOPARA SALT PLANT:



Figure : 35 (Clicked by the Researcher)

Vasai – Nallasopara Salt Plant is located between Nallasopara and Vasai to its eastern part. The water here was too salty that even the survival of aquatic plants and animals is not possible. The testing of the water was done through the pH paper but the results were 7.

2. BHUIGAON BEACH:

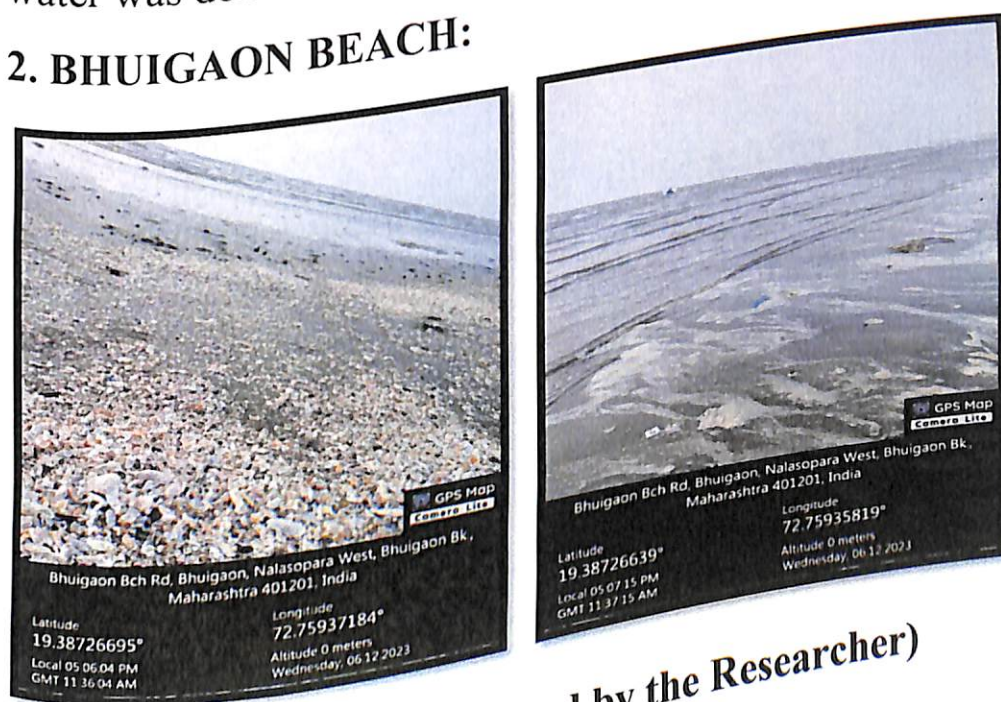


Figure : 36 (Clicked by the Researcher)

Bhuigaon Beach is situated near Vasai gaon and it's a picnic spot for the people surrounded to it. The beach water stays to be clean but it remains salty and many sediments are observed on the shore of the beach. Those shells and stones of different colours are attraction for the geology lovers.

3. LAKE AT HEDAVDE VILLAGE :

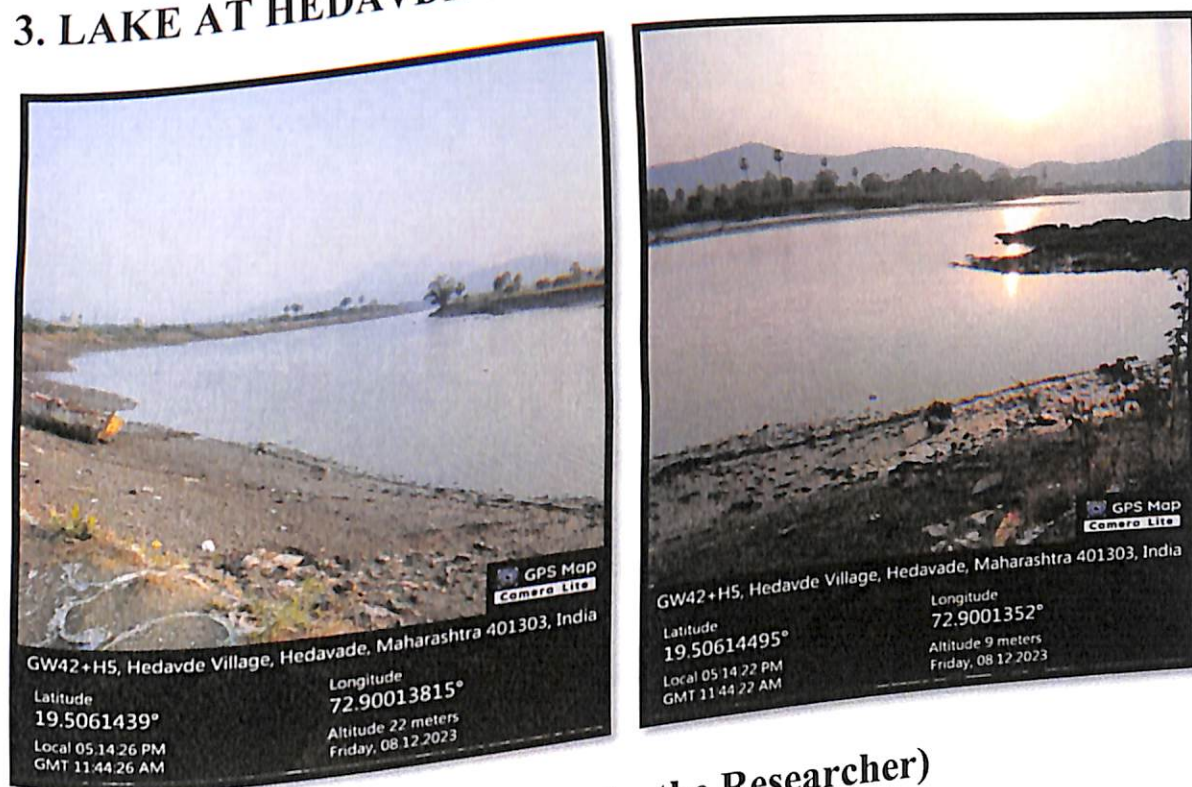


Figure : 37 (Clicked by the Researcher)

Hedavde Village is a small village at Virar. Its main speciality is the existence of the Mahalaxmi Temple which is open only on Friday. People in huge amount do visit here on every Friday. The open lake of Hedavde Village that later adjoins Tanasa River is observed to be clean enough to be consumed.

4. TANASA RIVER DAM:

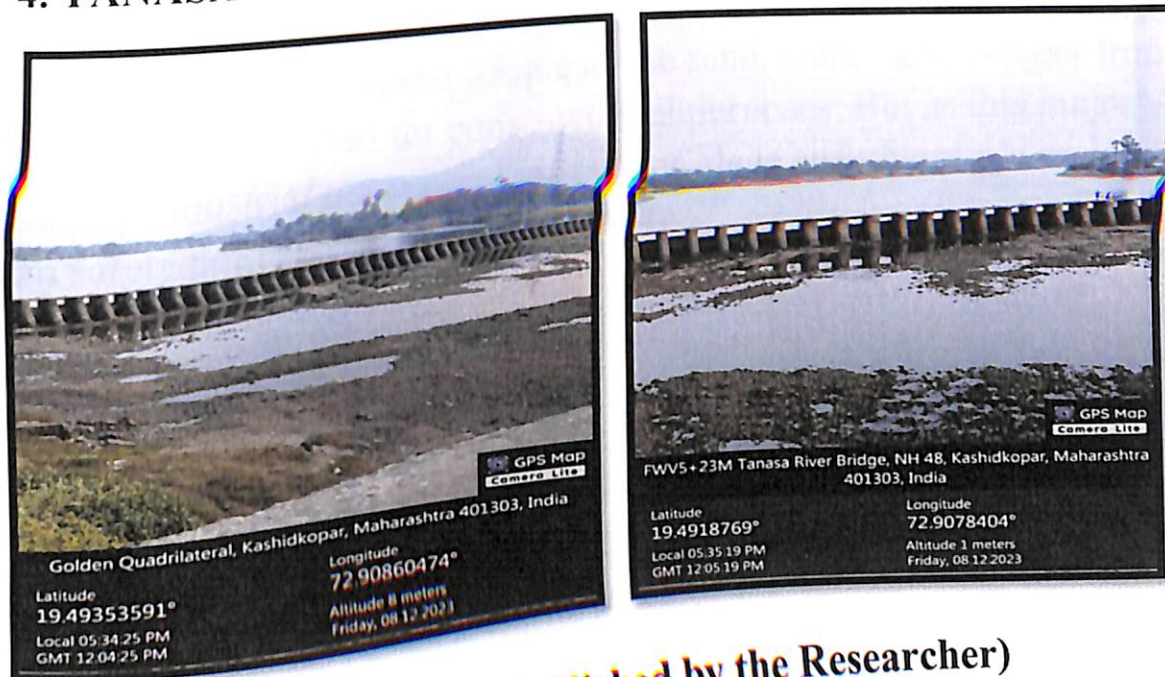


Figure : 38 (Clicked by the Researcher)

Tanasa Dam is located in Virar where the water adjoins from The River Tanasa. The picture was being clicked around December, 2024 so its observed that the water level has completely reduced and even repairing work of the dam was being seen. The water from this dam is the source for the small villages and areas of Virar.

5. HEART OF EARTH:

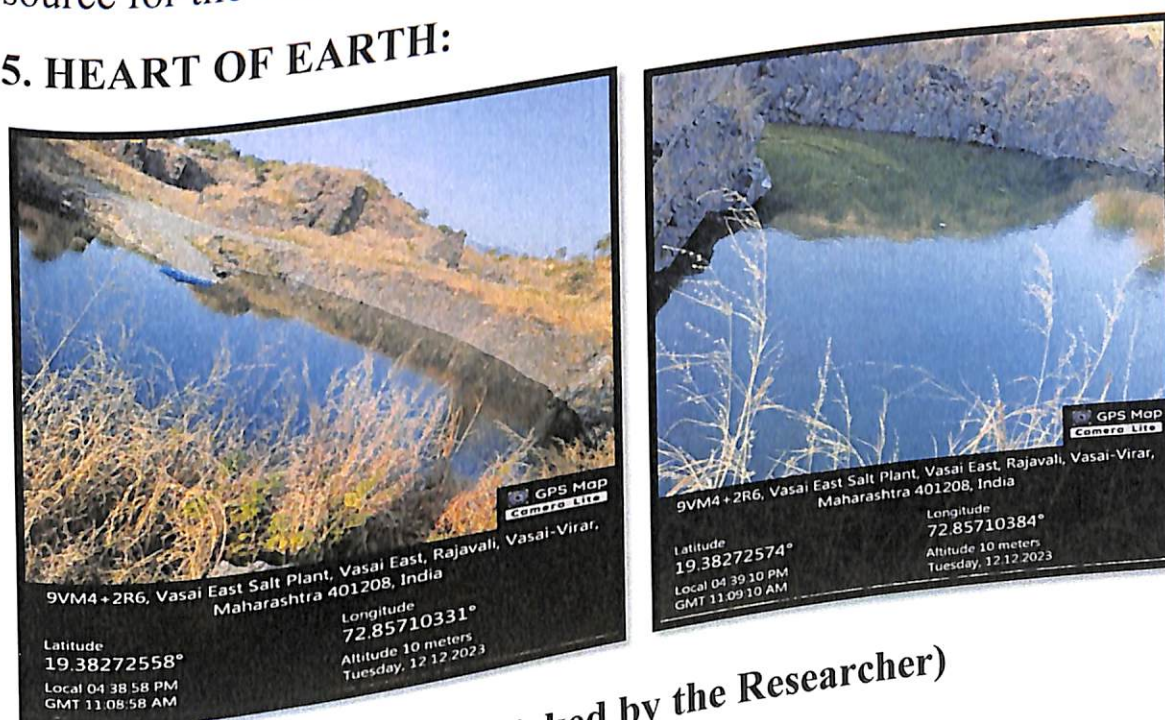


Figure : 39 (Clicked by the Researcher)

This place has been explored as the Heart of Earth due to the location of waterbody as well as the mines. This place is till now only explored by the industrial people as the sand, stones and cement from the mines are being used for constructional purposes. But as this majorly used by industrial the water has layer of algae and chemicals on it which can surely not usable for any consumer.

6. RAJAWALI TALAO

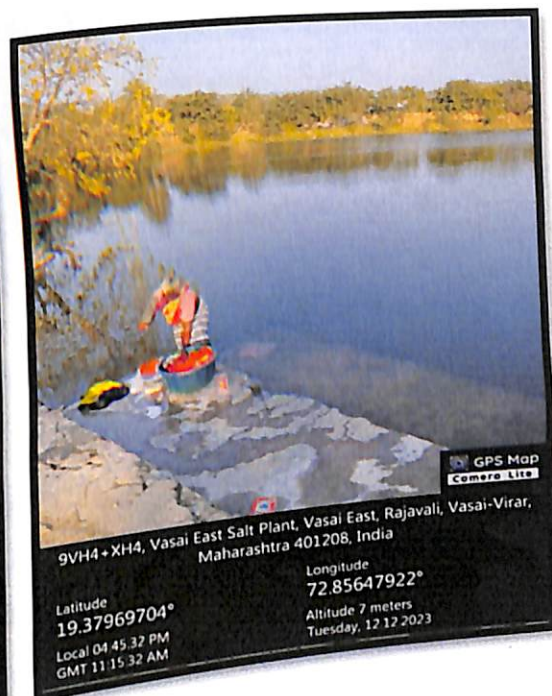
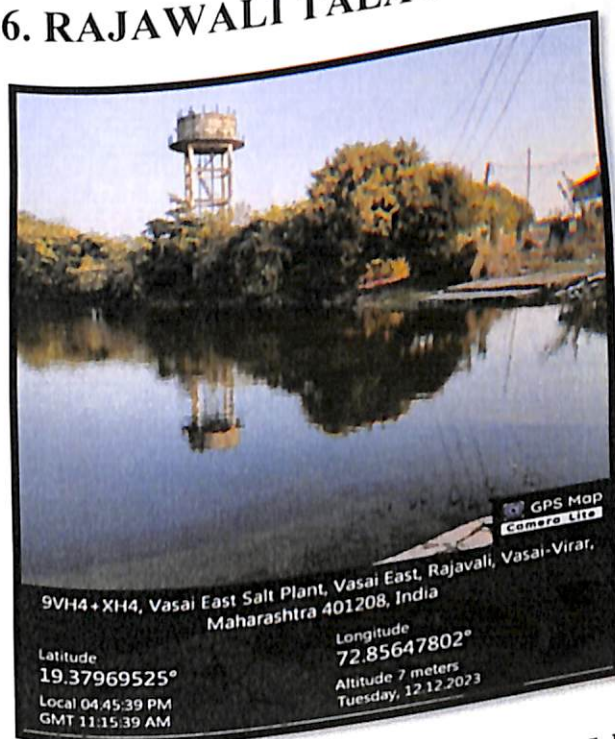


Figure : 40 (Clicked by the Researcher)

Rajawali is a small village at Vasai. The water from the Talao is being used by the people for cleaning purpose. Even people use this talao for fishing purpose. The water is not suitable for drinking as its used for cleaning but still few people tend to use the water for drinking.

7. AMBAWADI TALAO:

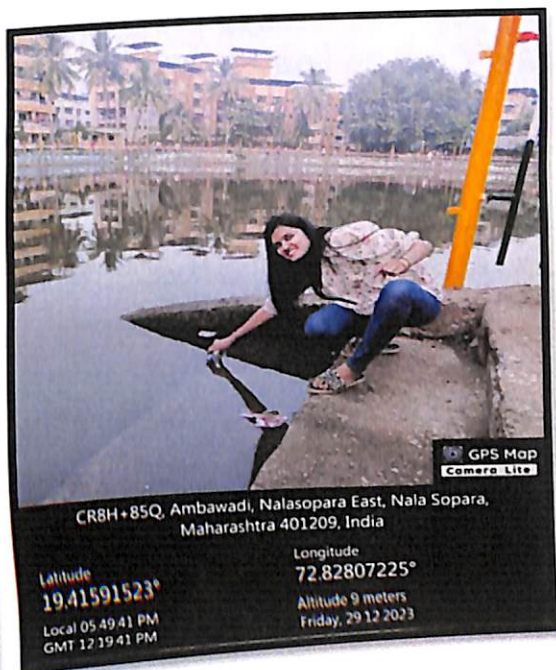
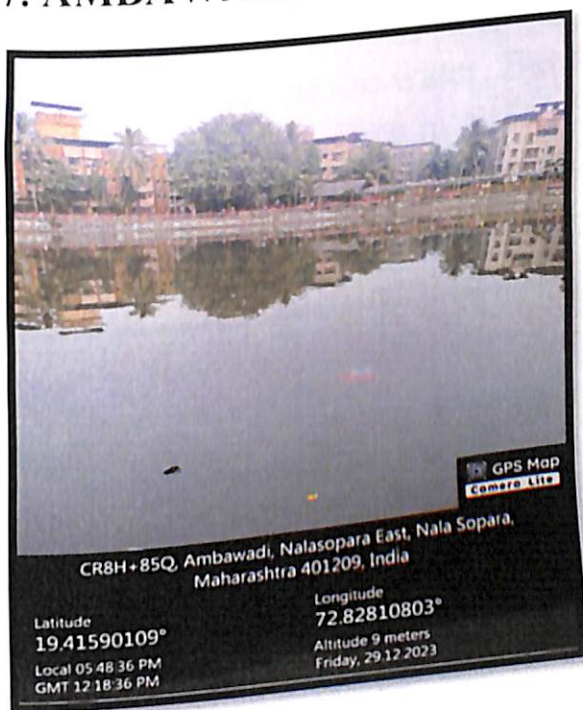


Figure : 41 (Clicked by the Researcher)

Ambawadi Talao is situated in Nallasopara. It is place where people do visit for regular walk especially during evening. People are observed enjoying fishing as well as performing rituals and offering left over flower garlands, coconut in the water; that made the water polluted.

8. ACHOLE TALAO:

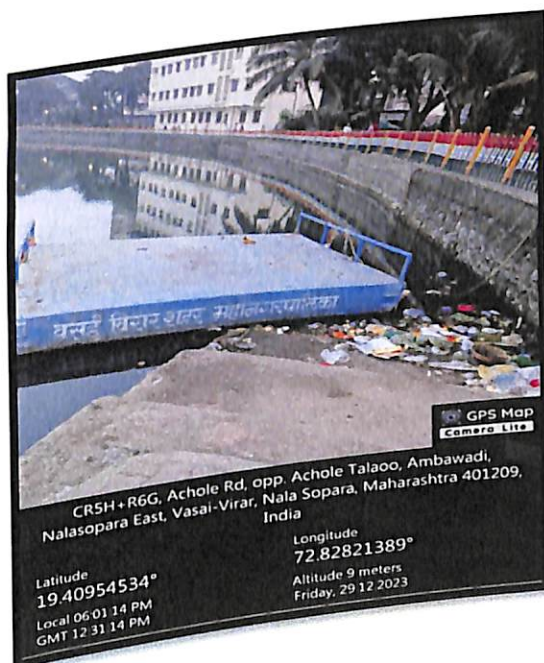
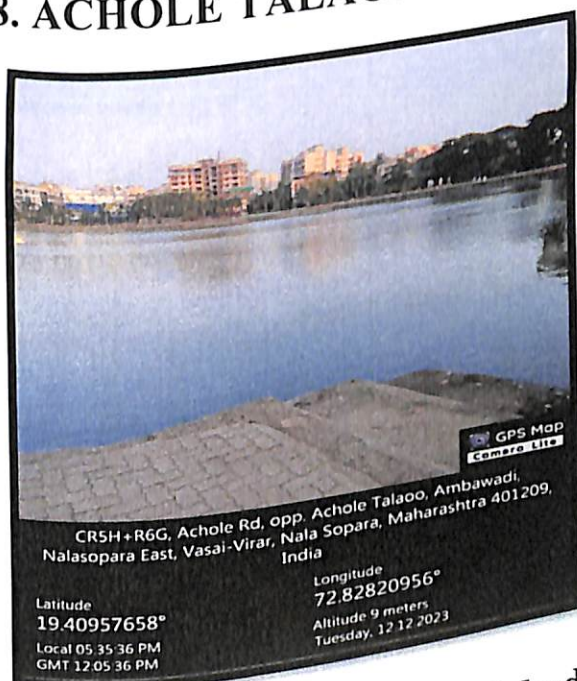
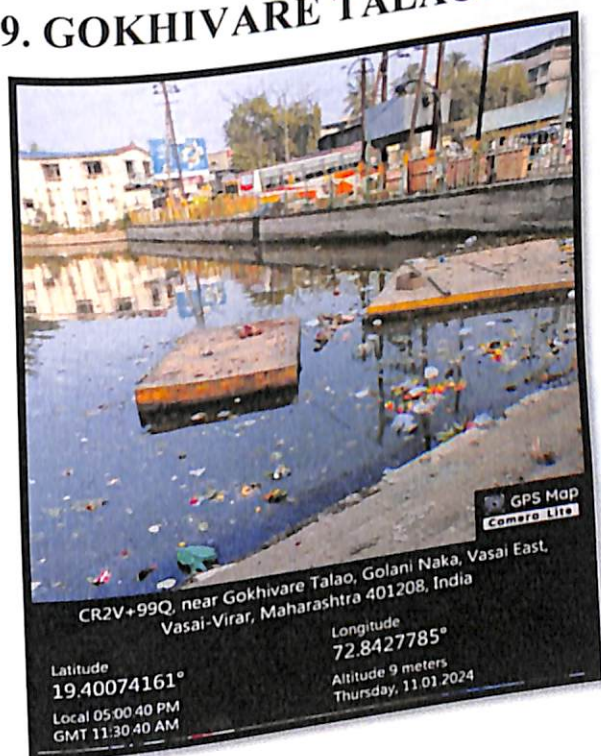


Figure : 42 (Clicked by the Researcher)

Achole Talao situated just beside Achole Gaon at Nallasopara. This talao is handled by the government of VVMC. People are seen throwing flower garlands in the water. But this talao gets cleaned by the VVMC department atleast once in a month. Even medicine is sprinkled in the water for the survival of fishes

9. GOKHIVARE TALAO:

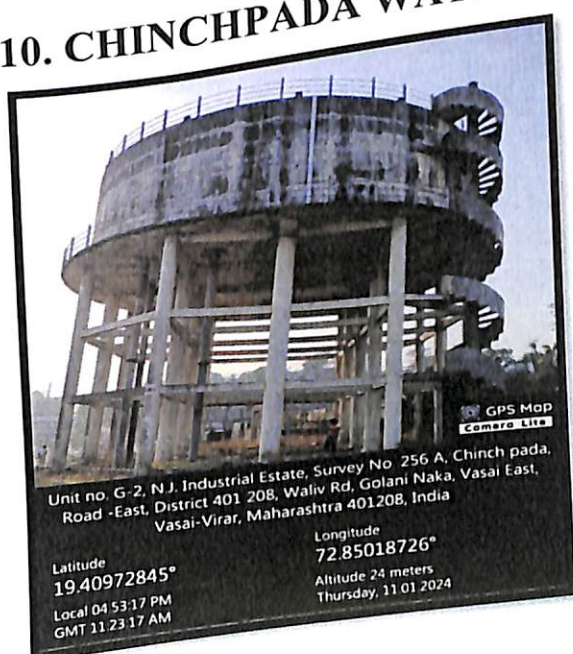


Gokhivare Talao is observed to be the most unclean talao of Vasai. It was completely dumped by the garbage, flowers, plastics, etc. Even after it people were observed cleaning their vehicles and washing clothes using the water of the Talao.

Figure : 43

(Clicked by the Researcher)

10. CHINCHPADA WATER TANK:



Chinchpada is located in Vasai East just between the industrial areas. The water from this tank was being used by the people living in the industrial area for their household chores.

Figure : 44

(Clicked by the Researcher)

11. PELHAR DAM :

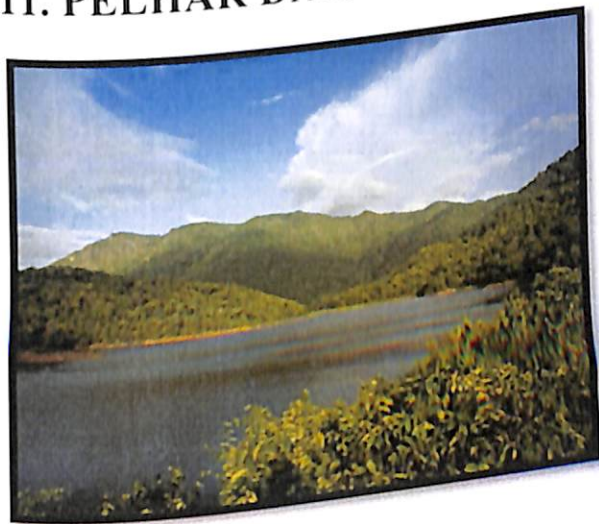
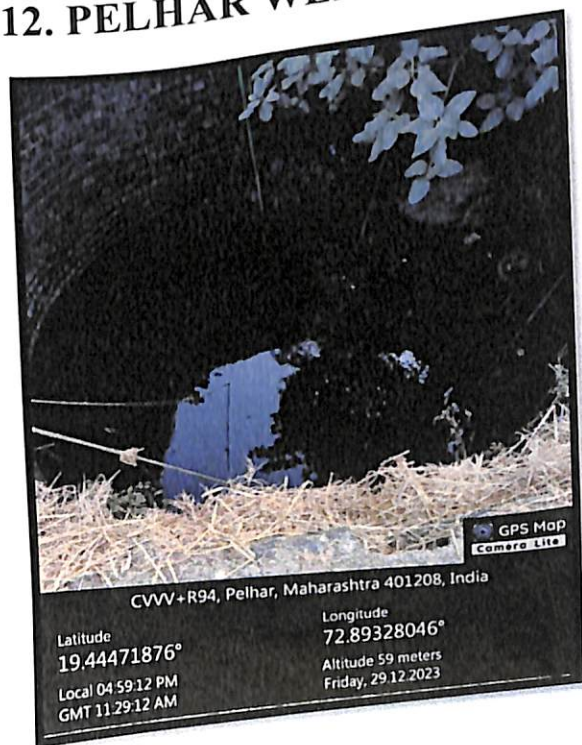


Figure : 45

Source : <https://images.app.goo.gl/UEyUFVEmJacnbZQJ6>

Pelhar Dam is one of the tourist attraction especially during the rainy season where people can enjoy the scenic beauty of the nature. The water from the dam is being used by the households of Vasai – Virar.

12. PELHAR WELL :



Pelhar Well which is constructed by the people, it is located just beside Pelhar Dam. The water from the well is being used by the people for their buffaloes as they have a huge buffalo stable just opposite to it.

Figure : 46

(Clicked by the Researcher)

13. RAJAWALI WELL :

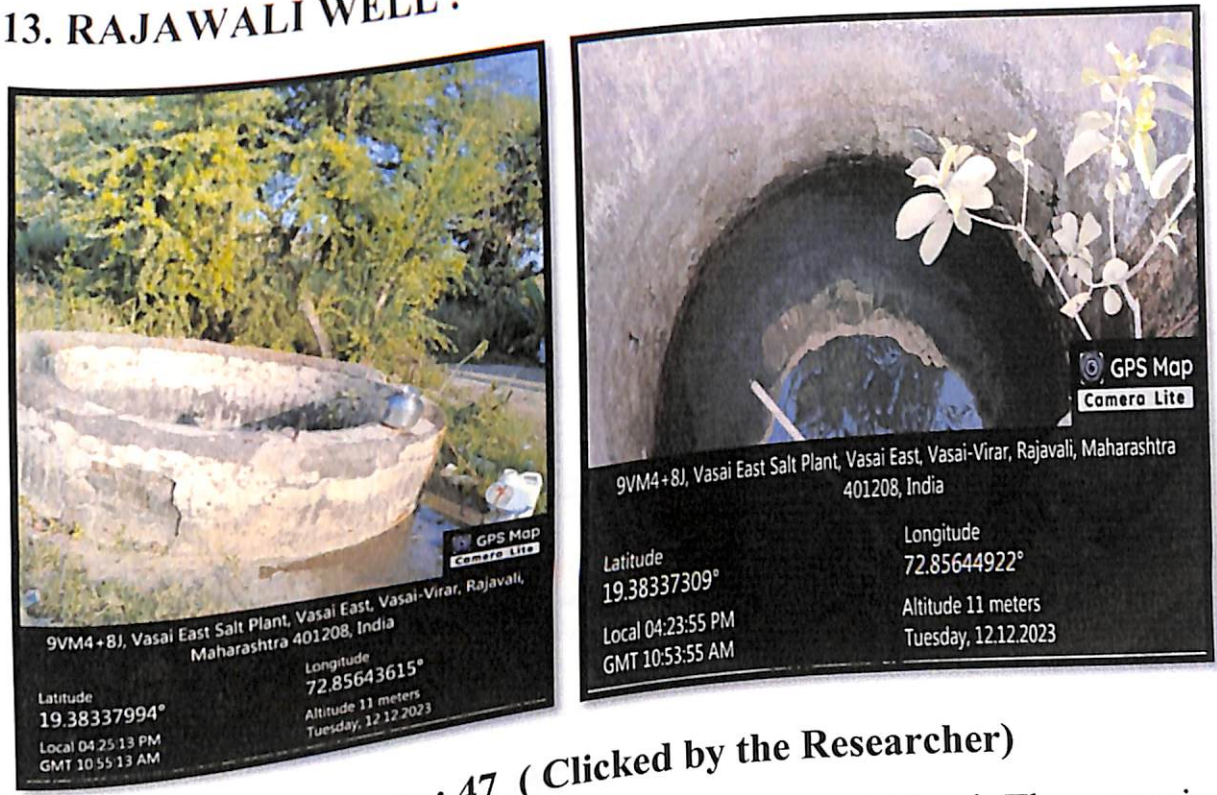


Figure : 47 (Clicked by the Researcher)

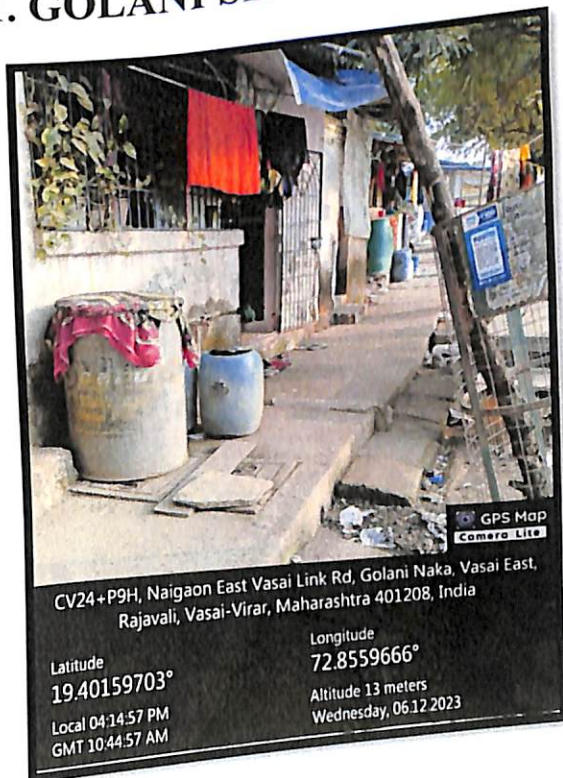
This well is situated in the Rajawali Village at Vasai. The water is not clean and pure to drink as it consist of fishes in it. The water was even stinking badly but still people were seen using the water for drinking as they don't have any water pipelines at their home and are even uneducated to understand the importance of consuming clean drinking water.

12. HOUSEHOLD & INDUSTRIAL AREAS:

Sr. No.	Household / Industrial Area	Location
1.	Golani Slum Area	Vasai (East)
2.	R. P. Plastics	Vasai (East)
3.	Hedavde Village	Virar (West)
4.	Rajawali Village	Vasai
5.	Neminath Nagar	Nallasopara (East)
6.	Khanivade Village	Virar

Table : 10 – List of Household / Industrial Areas.
(Prepared by the Researcher)

1. GOLANI SLUM AREA :

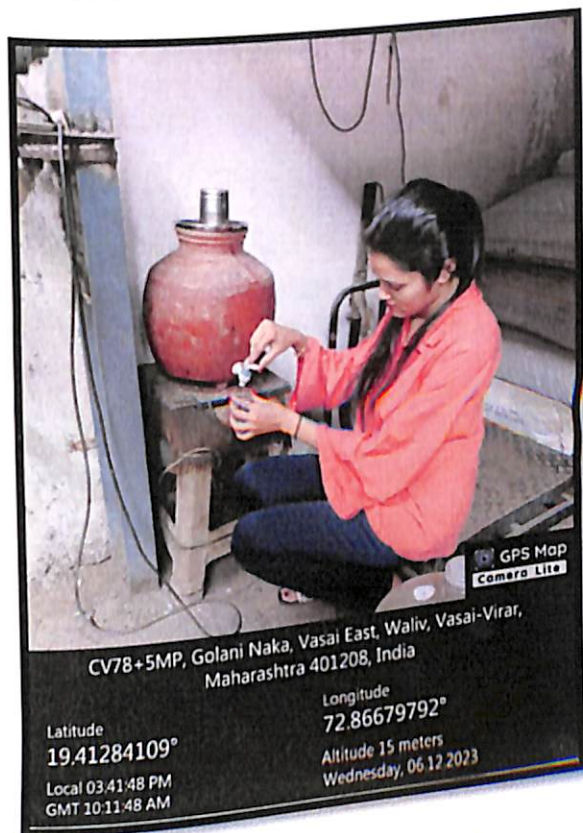


Golani is a completely industrial area. The people working in the industries are residing in the slums here. They don't have any water pipelines available. They have installed one tap for more than 10 houses where water in the tap comes for only half an hour. People are observed storing water in drums.

Figure : 48

(Clicked by the Researcher)

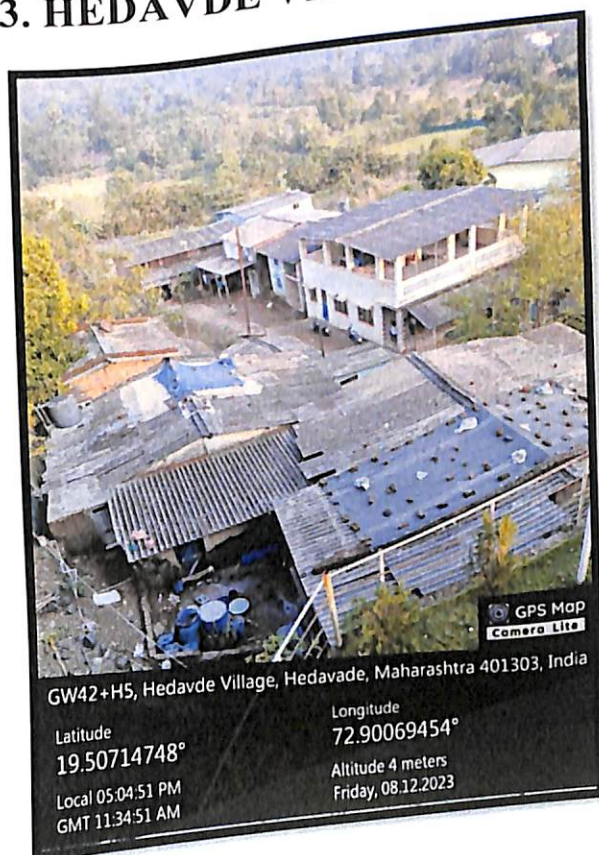
2. R.P. PLASTICS :



R.P. Plastics is a known plastic moulding industry situated at Vasai. Drinking water pipelines are not available here but it was observed that the water is stored in pots and they get drinking water from the private water tanks.

Figure : 49
(Clicked by the Researcher)

3. HEDAVDE VILLAGE :



This village is too small with the population less than 200 but still they don't have any water pipelines. They are carrying water from the lake and Tanasa River that flows along their village and store the water in drums or vessels.

Figure : 50
(Clicked by the Researcher)

4. RAJAWALI VILLAGE :

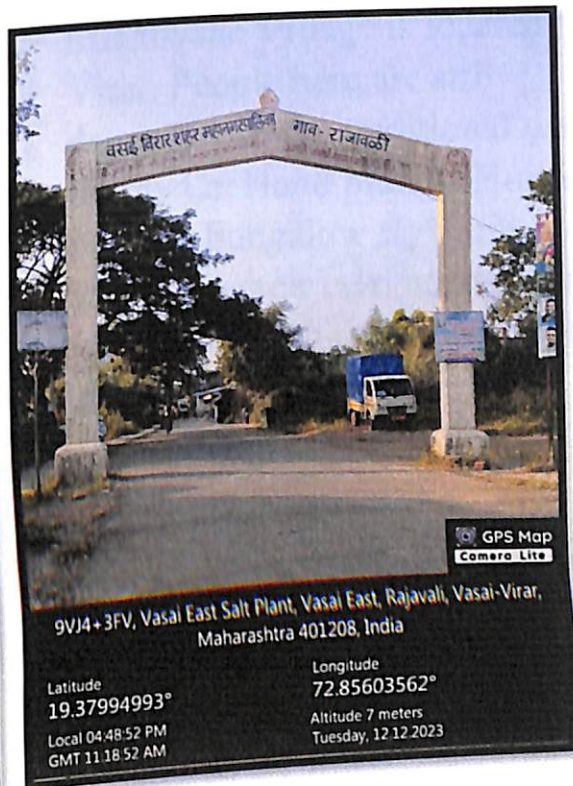
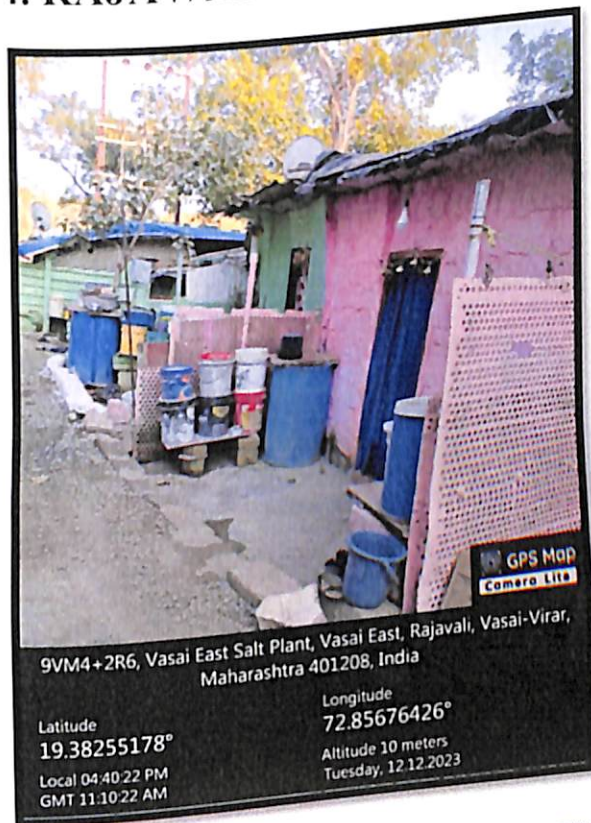
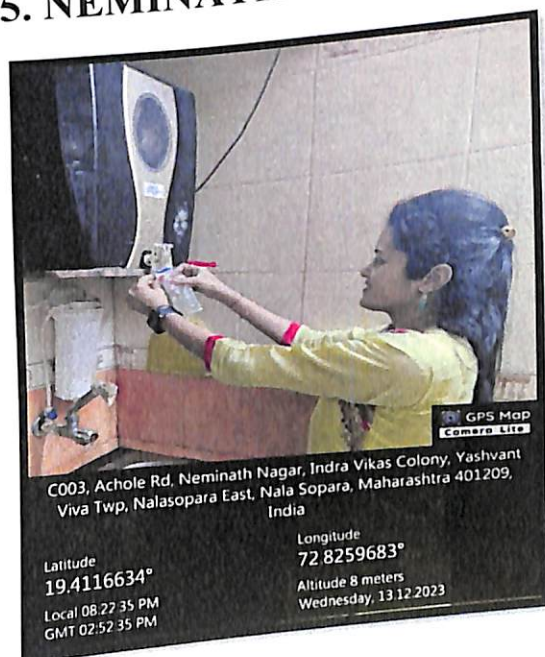


Figure : 51 (Clicked by the Researcher)

Rajawali Village is located in the interior part of Vasai. The village is seen to be clean but lacks in the water pipelines. People here are depended on the Rajawali talao and well as their direct source of water.

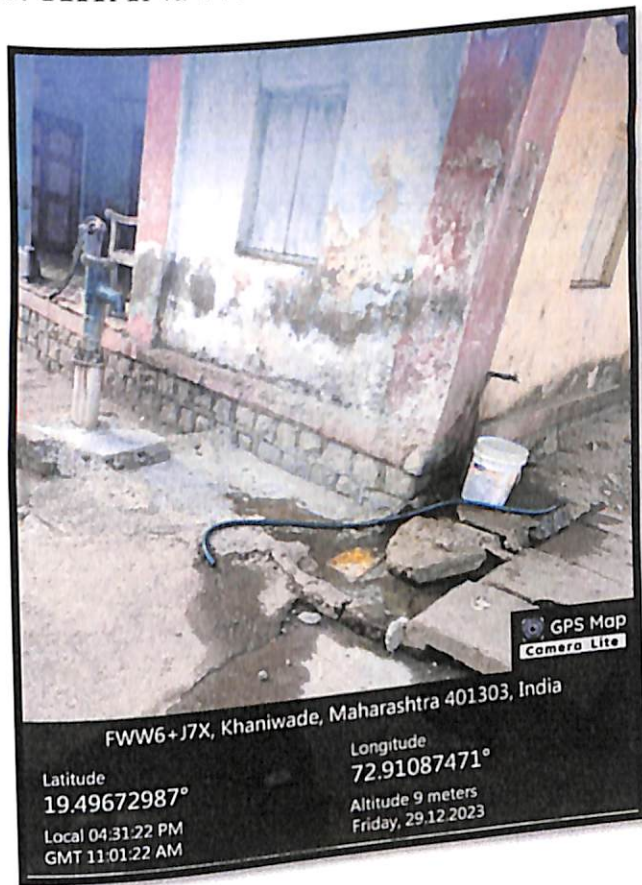
5. NEMINATH NAGAR :



Neminath Nagar is a complex situated in Nalloasopara. People experience adequate supply of water twice a day. Proper water pipeleines are available.

Figure : 52
(Clicked by the Researcher)

6. KHANIWADE VILLAGE :



Khaniwade Village is located in Virar. People here are still depended on the traditional water supply i.e. Hand pumps. Houses here are bungalow style but each house has their own handpump and a tap which they use a source of water.

Figure : 53
(Clicked by the Researcher)

13. DRAINAGE :

Sr. No.	Drainage Areas	Location
1.	Tarkhad Drainage	Vasai (West)
2.	Navghar Drainage	Vasai (West)
3.	Dhaniv baug Drainage	Nallasopara (East)

Table : 11 – List of Drainage Areas
(Prepared by the Researcher)

1. TARKHAD DRAINAGE:

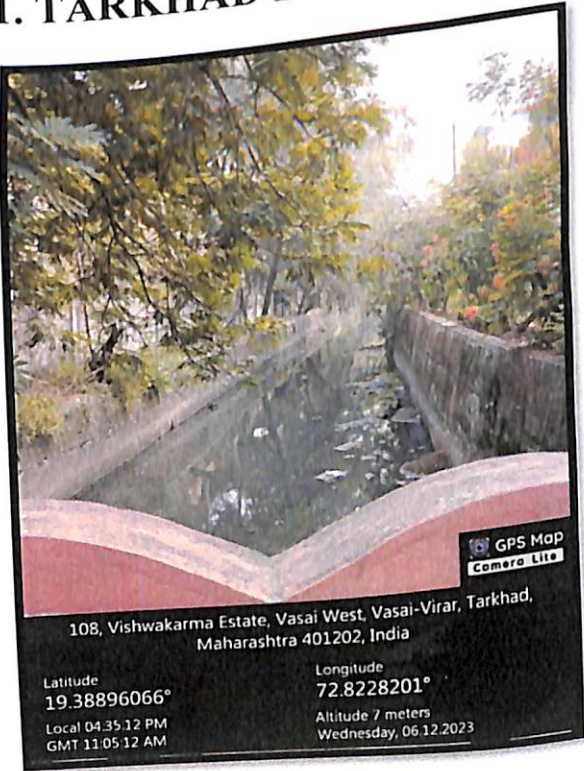


Figure : 54

(Clicked by the Researcher)

2. NAVGHAR DRAINAGE:

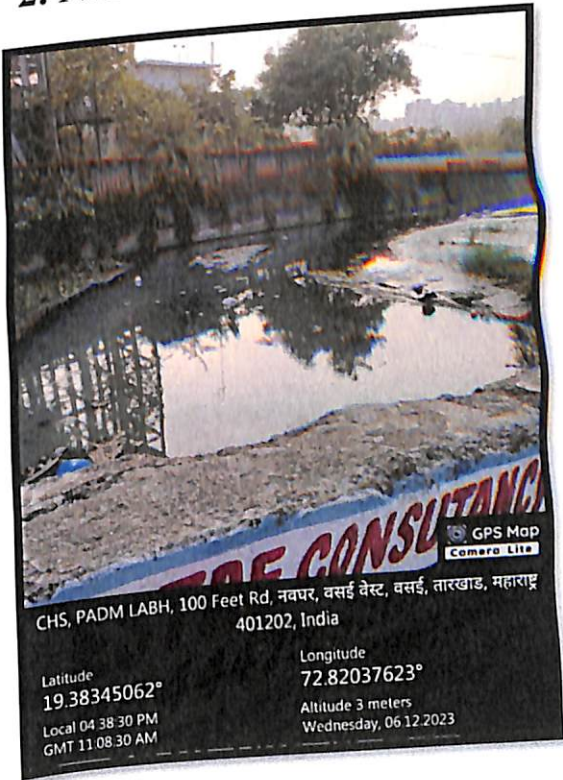


Figure : 55

3. DHANIV BAUG DRAINAGE:

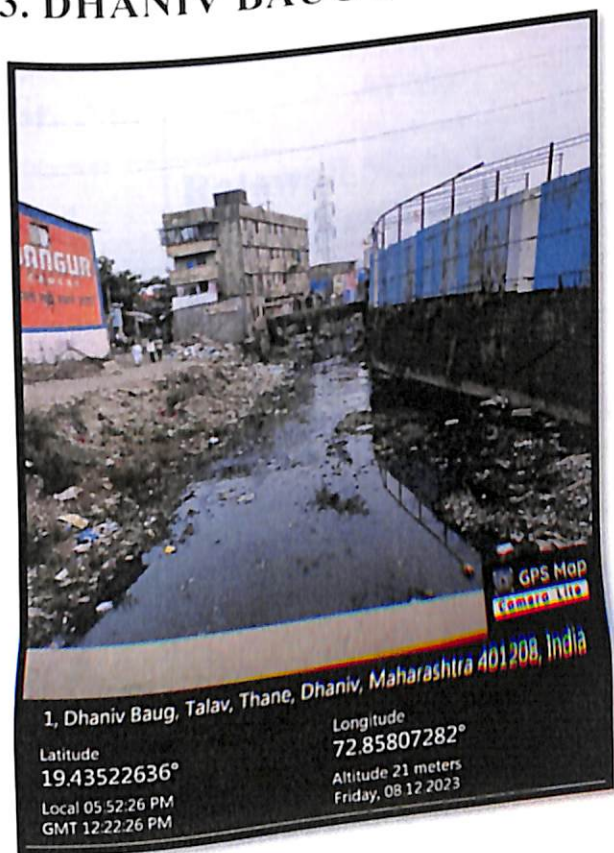


Figure : 56
(Clicked by the Researcher)

The drainage line is there and maintained at various areas of Vasai – Virar. The drainage are being cleaned by the VVMC locals regularly atleast once in a week. The drainage consisted not only the waste of industrial areas but also the residential areas.

14. RESULTS & ANALYSIS:

Sr. No.	Areas	PH Level	Universal Indicator Solution
1.	Rajawali Slum, Golani, Vasai (East)	4.5	8
2.	R.P. Plastics, Waliv, Vasai (East)	8	8.5
3.	Hedavde Village, Virar (East)	8	6
4.	Nallasopara Salt Plant, Vasai (West)	7	5
5.	Khaniwade Village, Virar (East)	9	7
6.	Bhuigaon Beach, Nallasopara (West)	8	6
7.	Ambavadi Talao, Nallasopara (East)	8	6.5
8.	Neminath Nagar, Nallasopara (East)	5	6
9.	Khaniwade Hand Pump, Virar (East)	5	4
10.	Rajawali Talao, Vasai (East)	6	7
11.	Achole Talao, Nallasopara (East)	8	7
12.	Shiv Ashish, Nallasopara (East)	5	6.5
13.	Rajawali Well, Vasai (East)	5	7.5

Table : 12

(Prepared by the Researcher)

As per the water sample testing that is done through the pH paper as well as the Universal Indicator the drinking water index was being identified.

❖ It is observed that the pH of the water was ranging from 4.5 – 9.

❖ The lowest pH as per the pH paper was found of Rajawali Slum Area at Vasai i.e. 4.5, whereas the highest pH was found of Khaniwade Village at Virar i.e. 9.

❖ The lowest pH through the Universal Indicator was found of Khaniwade Hand pump at Virar i.e. 4, whereas the highest pH was found of R.P. Plastics at Vasai i.e. 8.5.

15. SUGGESTIONS:

- ✓ Cleanliness drive to be planned for artificial talavs and ponds of Vasai - Virar.
- ✓ People should be made aware about drinking clean water.
- ✓ Proper water facilities should be provided.
- ✓ Installation of water pipelines in the interior parts of Vasai – Virar region.
- ✓ People should be warned for using water for cleaning purposes beside the waterbodies by certain rules or fines applied on it.
- ✓ Dumping of any kind of garbage in the waterbodies should be completely prohibited.
- ✓ Government should provide proper water pipelines even in the slum areas.
- ✓ People residing in small villages and slums need to be aware that consumption of water directly from the waterbodies can affect their own health.
- ✓ Artificial waterbodies like ponds, talavs should be cleaned atleast once in a month.

16. CONCLUSIONS:

- People are still depended on natural water bodies directly.
- People are observed using water from ponds, wells, lakes and talav for their household purpose.
- Water in this waterbodies are partially polluted.
- No water pipelines are available at Hedavde Village.
- Drainage System is available in many areas.
- A layer of algae has been created at top of Vasai Salt Plant.
- The water level of Tanasa River Bridge has completely reduced.
- People in Hedavade Village are depended on a general tap water outside houses. (1 tap for more than 10-15 houses)
- Wells near Pelhar Dam are observed as a garbage dump and full of algae on it.
- Storage of water is done by people in the vessels or drums.
- People are still dumping garbage as well as flowers in the waterbodies for their own rituals.

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