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AN EXPERIMENTAL STUDY ON AIR QUALITY INDEX & HOW TO EFEECTIVE SOLVE AIR POLLUTION PROBLEM IN VIDISHA, (M.P.)

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***Abstract*—** Policymakers can reduce the negative impacts of air pollution on health by following the WHO air quality recommendations. For the four most prevalent air pollutants—particulate matter, ozone, nitrogen dioxide, and sulfur dioxide—this book gives updated guideline levels.
It also offers a full review of the issues affecting how the guidelines—which are presently applicable everywhere—are used for risk assessment and policy development. To use the air quality level (AQI) or the air pollution index, the public is regularly notified of the intensity of air pollution (API). Over the years, a variety of scholars and environmental organizations have developed a number of methods for estimating AQI or API, although there isn't one popular method that can be applied in every situation.

When determining the AQI or API, several methods take into account various types and quantities of contaminants as well as different aggregation functions. Identification of areas with poor air quality and public reporting of the degree of exposure to poor air quality are the intended purposes of AQI or API. The majority of AQI or API indices fall into one of two general categories: single pollutant indices or multi-pollutant indices with various aggregation techniques. Each indexing technique has distinct advantages and disadvantages that influence whether it is appropriate for a given application. This essay makes an effort to provide a survey of all the important air quality indices created across the world. **(*Abstract*)**

Keyword—Air Quality Index, Health of Environment, Literature Review.

❖ INTRODUCTION

1.The Environmental Protection Agency (EPA) created the Air Quality Index (AQI) table to offer reliable, current information to the average citizen. Provides information on daily air pollution levels that is simple to grasp.

2. It was created in the US in 1968. According to the Swachh Bharat Abhiyaan, the Ministry of Environment, Forests, and Climate Change described the AQI in India on September 17, 2014. Additionally, include the disclaimer "ONE NUMBER, ONE COLOR, ONE DESCRIPTION."

3. Particulate matter, Nitrogen dioxide (NO2), Sulfur dioxide (SO2), Ammonia (NH3), Lead (PPB), Ozone (O3), and Carbon monoxide (CO) are some of the contaminants that are considered in the air quality index (AQI) (PM2.5, PM10).

Since the 1987 publication of the first version of the WHO Air quality recommendations for Europe, scientific understanding of the consequences of exposure to air pollution and the scope of its public health impact has dramatically grown. The first version provided national agencies responsible for defending people against the harmful effects of air pollution with a consistent framework for risk assessment. It compiled scientific information on the health risks connected to the 28 most frequent air contaminants. The expanding knowledge base allowed WHO to start the revision process in the early 1990s, and the second edition was published in 2000 in both a hard copy with a summary of the score compared of 37 pollutants (1) and an enlarged electronic version with all of the review's background information. Air quality indicators are a common component of public information dissemination in many nations. The indices summarized the condition of the air quality by combining a variety of contaminants into one figure that the general public can readily grasp, other than a colored image or a number. The concentration data needed to calculate the air quality index is often restricted to those contaminants for which concentration data is available.

Air Quality Index Level of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	50-100	Air quality is acceptable; however some people unusually sensitive to air pollution may have moderate health concerns.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. General public are largely unaffected.
Unhealthy	151-200	Everyone may begin to experience health effects, severe effects in sensitive groups.
Very Unhealthy	201-300	Health alert; everyone may experience severe health effects
Hazardous	301-500	Emergency situation. The entire population is under threat.

(Table 01: - Air Quality Index Inferences**)**

Design Criteria for an Ideal Air Quality Index: -

Any air quality index's fundamental goal is to use an appropriate aggregation process to convert the observed concentrations of each atmospheric pollutants it in to a single number index. Every index should, in theory, represent both the observed and widely perceived ambient air quality for the time frame it covers. As a corollary, air quality indices work to organize and synthesis data on air pollution, enable easy comparisons, and meet the public's desire for precise, understandable statistics. The following factors should be applied while designing air quality indices:

1. Be readily comprehensible by the public;

2. List the principal criterion pollutants and their interaction;

3. Be able to be expanded for new pollutants, and the average periods should be tied to the Ambient Air Quality Standards utilized in each province.

4. Include the main criterion harmful emissions and their synergisms.

5. Prevent "eclipsing," which is when an air pollution index indicates good air quality despite the presence of one or even more air pollutants at unacceptable high quantities.

6. Prevent "ambiguity" (alter when a poor air quality index raises an alert even while concentrations of all pollutants, with the exception of one, are under the allowable level).

7. Function as an alerting system; 8. be founded on reliable air quality data acquired from monitoring sites positioned to accurately reflect the community's overall air quality;

AQI System of U.S. EPA

The five primary common pollutants that make up the U.S. EPA's air quality index (AQI) are carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), particulate matter (PM10 and PM2.5), and Sulphur dioxide (SO2). Using preceding speed estimation equation, pollutant concentration data, and reference concentration, the individual pollutant index as in equation (1) is first calculated. The National Air Quality Standards (NAAQS), as indicated in Table 1, and the findings of epidemiological research that discuss the impact of individual pollutants on human health served as the foundation for the EPA's definition of the breakpoint level.

$$I_P = [\{(I_{HI} - I_{LO}) / (B_{HI} - B_{LO})\} * (C_P - B_{LO})] + I_{LO}$$

Where

B_H = Breakpoint concentration greater or equal to given Concentration.

B_{LO} = Breakpoint concentration smaller or equal to

Breakpoints								
O_3 (ppm) 8-hour	O_3 (ppm) 8-hour	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	CO (ppm)	SO_2 (ppm)	NO_2 (ppm)	AQI	Category
0-0.064	-	0-54	0-15.4	0-4.4	0-0.034	(2)	0-50	Good
0.065-0.084	-	55-154	15.5-40.4	4.5-9.4	0.035-0.144	(2)	51-100	Moderate
0.085-0.104	0.125-0.164	155-254	40.5-65.4	9.5-12.4	0.145-0.224	(2)	101-150	Unhealthy for sensitive groups
0.105-0.124	0.165-204	255-354	65.5-150.4	12.5-15.4	0.225-0.304	(2)	151-200	Unhealthy
(0.155-0.404)4	0.205-0.404	355-424	150.5-250.4	15.5-30.4	0.305-0.604	0.65-1.24	201-300	Very unhealthy
(3)	0.405-504	425-504	250.5-350.4	30.5-40.4	0.605-0.804	1.25-1.64	301-400	Hazardous
(3)	0.505-0.604	505-604	350.5-500.4	40.5-50.4	0.805-1.004	1.65-2.04	401-500	Hazardous

given Concentration

I_{HI} = AQI value corresponding to B_H

I_{LO} = AQI value correspond to B_{LO}

Finally; AQI=Max (Ip) (where p=1, 2, 3…n; denotes n pollutants)

(Table 02: - Breakpoint Concentration of air pollutants defined by U.S. EPA.**)**

Types of sources

It is important to think about the different sources that produce emissions of air pollutants before discussing how catalogs of emissions are built. There are several methods to group source materials, and this section examines some of the major divisions and attributes of each. The difference between fixed and mobile sources is one of the key ones that is usually made. Road cars, railroad trains, ships, etc. fall under the category of mobile sources, whereas industrial emissions, residential emissions, etc. go under stationary sources. In reality, however, air pollution research is more often concerned with aggregate impacts, such as those of all the cars using a route over a specific period of time, than individual mobile sources. This is a rather evident contrast between ships, railroad trains, and other conveyances on land. In reality, however, air pollution research is more often concerned with aggregate impacts, such as those of all the cars using a route over a specific period of time, than individual mobile sources.

Consequently, a more useful categorization of sources is;

- point sources
- line sources
- area sources.

Properties of some types of sources

Road transport

Road transportation is one of the main sources listed in any emissions inventory. Regardless of the size or purpose of the vehicle, all traffic congestion emissions are referred to by this word. Although this is only a portion of the story, emissions from road vehicles are usually considered of in terms of the sources 16 Ambient Air GUIDELINES of the exhaust (see below). When gasoline or diesel is burned, exhaust gas is created that contains a variety of potentially dangerous contaminants. Before being released into the environment, this goes via a control mechanism in many contemporary automobiles, including a three-way catalytic converter. Carbon monoxide, nitrogen oxides, volatile organic compounds (VOC), and suspended particles are the most common pollutants released during the burning of gasoline or diesel fuel. Some nations continue to add lead to gasoline, which results in a significant discharge of air pollutants.

Stationary combustion sources

Another significant source of pollutant emissions in the majority of nations is the utilization of fossil fuels in stationary emission facilities. If Sulphur is present in the fuel, high-temperature combustion can produce Sulphur dioxide as well as nitrogen oxides. VOC are frequently released during fuel combustion, especially during the difficult-to-completely-combust fuels like coal and oil.

While household heating and cooking emissions are typically thought of as coming from below ground sources, emissions from combustion facilities can occur at a variety of altitudes, from below ground for the majority of family stoves to elevations of more than 300 meters for huge power station chimneys. Because of this, the effect on ground-level quantities is quite different per kilogram of pollutants emitted: the ground-level source results in far greater local quantities than the raised emitter, but the elevation source has an impact on regions much further away because to the extensive emission dispersion.

Other industrial sources

Air pollution is emitted by a very broad spectrum of enterprises and industrial processes, including both common pollutants and less common ones that may be unique to a particular manufacturing environment or result from the release of a precursor or products from a chemical plant. It is often quite simple to quantify emission levels from chimneys and specified process vents, however it could take several measurements to get representative data. However, many industrial processes also produce fugitive emissions in addition to the defined process emissions.

Intermittent and poorly defined sources

Intentional biomass burning and forest fires are two main global sources of combustion emissions, which include PM, VOC, CO, and NOx. These are frequently sporadic and unscheduled events that are exceedingly challenging to factor into any inventory. These sources also come in smaller sizes, which national inventories may find to be rather substantial. A highly strict control of known sources, particularly the incineration of waste, is the result of anxiety over the health effects of dioxin emission. This has highlighted the importance "SOURCES OF AIR POLLUTION 18 AIR QUALITY GUIDELINES" of other sources, however, such are unintentional fires and even deliberate activities, including gatherings with bonfires, as significant sources of dioxin releases. Although such sources are included in emissions inventories, it is unclear how much of a contribution they make because of their irregular and highly variable character as well as the difficulties in quantifying emissions.

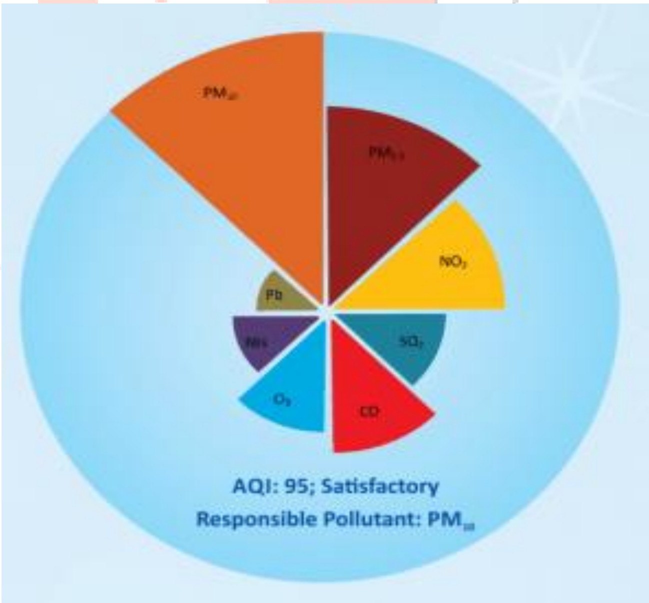
Natural sources

Most trace gases and atmospheric particles come from the natural world. The emission of heterotrophic VOC from trees and other flora is one of the most well-known natural causes of air pollution. These compounds, which include isoprene, terpenes, and other components, contribute to the creation of secondary organic PM and tropospheric ozone, which has a significant effect on air quality due to secondary pollutant development. Salty air and wind-blown dirt naturally occur all across the world, although their significance to air pollution occurrences and human health is probably significantly lower.

Dust storms may significantly increase PM concentrations in dry regions, and tornado soils and fumes make up one of the main particle pollutants.

❖ AIM & OBJECTIVE

- Examining the air contaminants in Vidisha city is the project's goal and purpose. We determined which contaminants are heavily concentrated in the air of Vidisha.
- Because of the state of the environment and rising pollution, the subject is futuristic.
- Air pollution is a problem, and AQI regulation is the answer.
- It facilitates decision-making.
- When we use the AQI to identify the pollution, we can then decide which controls to put in place and how to minimize the pollutants so that we can monitor the air quality in an efficient manner.
- AQI educates the public on the state of the environment.
- Correct methods for reducing air pollution. We wish to protect the ecosystem for coming generations.
- Although there is a smart city project underway, air pollution is rising as a result of building.



(Figure 01: - Air Quality Index PM_{10} Concentration**)**

❖ LITERATURE REVIEW

1. Frank de Leeuw (2005)

Topic: - "Air Quality and Air Quality Indices: a world apart?" National Institute for Public Health and the Environment (RIVM).

Bilthoven, Netherlands, Netherlands Environmental Assessment Agency (MNP). The present Ozone web is being expanded by the European Environment Agency (EEA) into a more mature sharing platform for (near real-time) air pollution data. It has been recommended that the data be presented using an AQI. There may result in inconsistent or at least unclear signals to the public if done at both the European and local levels using various AQI methodologies. There will be a requirement for AQI normalization.

2. Prakash Mamta (2010)

Topic: - "Analysis of Ambient Air Quality Using Air Quality Index – A Case Study" At three separate locations in Delhi—industrial, commercial, and residential—the AQIs were computed to evaluate the ambient air quality in 2009. The Indian Air Quality Index was used to determine the AQIs (IND-AQI). Suspended particle matter (SPM), according to the AQI research, was the leading cause of the worst air quality at all sites in Delhi.
The bulk of SPM's AQI readings fell into the extremely bad category. At the majority of locations in Delhi, SPM has been found as the dominant contaminant in the value by Sharma et al. (2003b) and Goyal.P (2001).

3. Shivangi Nigam (2015)

Topic: - "Air Quality Index – A Comparative Study for Assessing the Status of Air" Actual time From May to October 2014, Environment S. A.'s CAAMQS analyzer continuously monitored the levels of PM10, PM2.5, SO2, and NO2 in the air at the residential site NEERI in Nagpur.
According to the CPCB break point concentration, the AQIs were determined. According to the AQI investigation, particulate matter (mostly PM10) was primarily to blame for the majority of the time in the residential site NEERI, Nagpur. These have also revealed that PM10 is the pollutant that dominates the index value. (pipalatkar et. al. 2012).

4. Amit Kumar Gorai (2015)

Topic: -"A Review on Air Quality Indexing System" The discovered The Pollutant Standards Index (PSI), which rates air quality, was created by the U.S. EPA in 1976. They offered a method for combining contaminants to calculate PSI. The index ranged from zero to five hundred, with one hundred representing the National Ambient Air Quality Standards (NAAQS). Every contaminant with an NAAQS has its PSI determined. 2. The INTERREG IIIC and INTERREG IVC programs in Europe jointly sponsored the Cite air project, which created the CAQI, in 2008. All precise measurements are combined into a single relative number called the Common Air Quality Index in order to compare and make clear the air quality status in European cities (CAQI).

5. Ankita Kulshreshtha (2019)

Topic: - "Recent Status of Ambient Air Quality of Bhopal City, Madhya Pradesh, India" The notable comparison of the Air Quality Index among 18 monitoring sites in Bhopal throughout the 2017–18 academic year. They determine the AQI for 18 locations and assign names like A1, A2, A3, ... A18. Although the AQI at all sites is moderate and satisfactory, it is discovered to be in bad condition at the A2 (202.26) and A6 (218.05) locations. There are industrial areas, large and small industries, vehicles, public transportation, anthropogenic activity, residential areas, and commercial areas at both of these locations.

❖ STUDY AREA

The districts of Ashoknagar to the northeast, Sagar to the east, Raisen to the south, Bhopal to the southwest, and Guna to the northwest form the borders of the district. Away from the main Vindhyachal Range, the Vidisha district is located on the Vindhyachal Plateau. The Betwa, the Bina, and the Sindh rivers all drain the plateau, which slopes from south to north. The Vindhyachal Range, which extends over the Malwa Plateau, has spur fans that these rivers pass between. The district is located between latitudes 230 20' and 240 22' north and longitudes 77016' and 78018' east. It encompasses 7,371 km2. The historical city of Besnager and the Buddhist stupa at Sanchi are both located in this area.

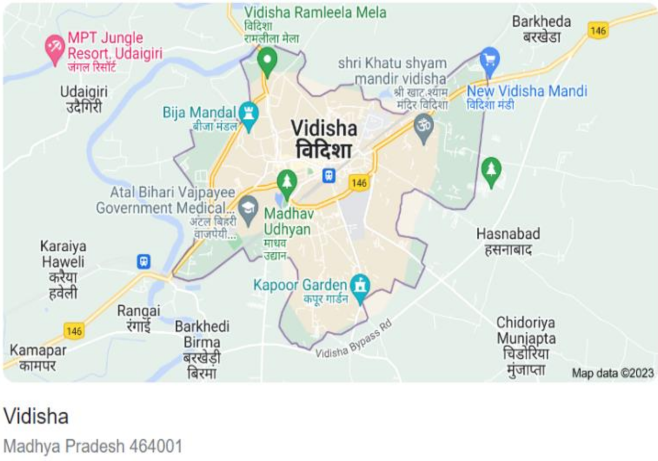
The population of Vidisha city is now projected to reach 214,000 in 2023. Below are the city's literacy rate, sex ratio, and density. The most recent census was carried out in 2011, and because to Covid, the scheduled census for Vidisha city in 2021 was postponed. Near the capital city of Bhopal sits Vidisha, a historical town with structures that date back to the second century.

The Vidisha region has a large **Sharbati wheat** crop. The vidisha region has excellent black and alluvial soil that is ideal for growing Sharbati wheat. The Vidisha district of Madhya Pradesh has the highest yield of **Gram (Chana)**. The state is the first in the nation for the production of Gram (Chana). 37% of India's entire production of gramme (chana) comes from Madhya Pradesh. In the area around the city of

Vidisha, **Vegetable** cultivation is also practised as a supplementary crop.

Area	Total Area 7,371 Sq.Km.
Population	14,58,875 • **Male:** 769,568/- • **Female:** 689,307/-
Villages / Tehsil	1524 / 12

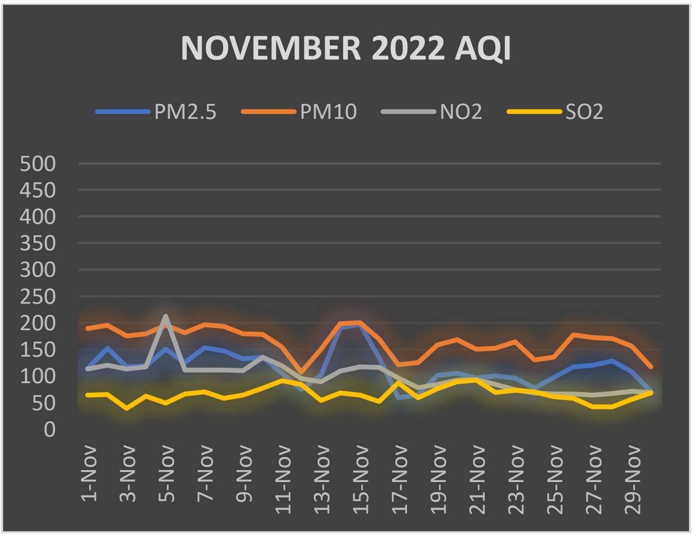
(Table No.3.1: - District at a Glance**)**



(Figure 3.1: - Monitoring Area of Vidisha City**)**

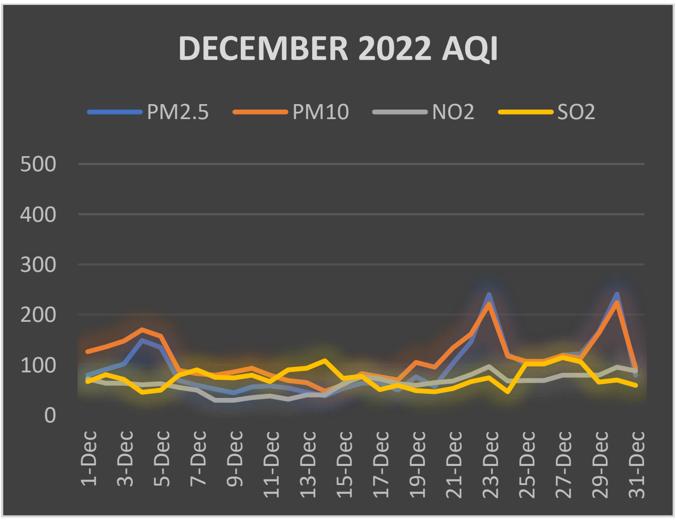
Analytical Data of Vidisha City: -

This data is adapted from satellite monitoring source which is provided in the programing manner in APP which is available in play store. And its name is **AirVisual**.



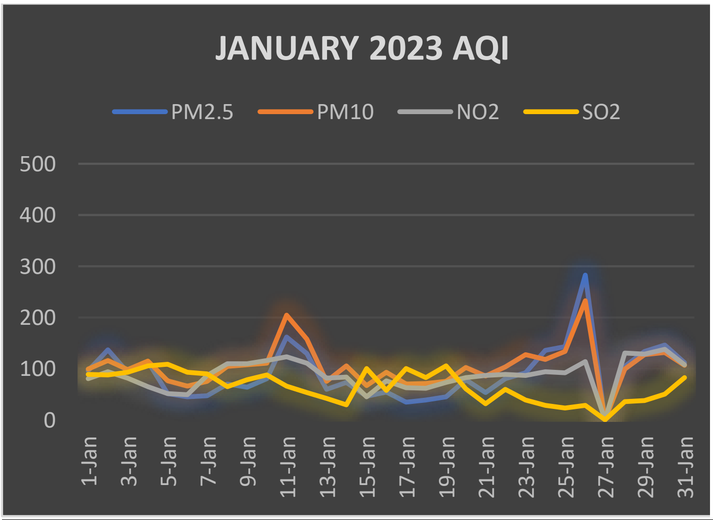
Date	AQI VALUE/PRIMARY POLLUTANT
01-Nov	189/PM10
02-Nov	195/PM10
03-Nov	175/PM10
04-Nov	179/PM10
05-Nov	195/PM10
06-Nov	212/NO2
07-Nov	196/PM10
08-Nov	193/PM10
09-Nov	179/PM10
10-Nov	178/PM10
11-Nov	154/PM10
12-Nov	107/PM10
13-Nov	150/PM10
14-Nov	198/PM10
15-Nov	200/PM10
16-Nov	169/PM10
17-Nov	121/PM10
18-Nov	125/PM10
19-Nov	158/PM10
20-Nov	168/PM10
21-Nov	150/PM10
22-Nov	152/PM10
23-Nov	164/PM10
24-Nov	130/PM10
25-Nov	135/PM10
26-Nov	177/PM10
27-Nov	172/PM10
28-Nov	170/PM10
29-Nov	156/PM10
30-Nov	117/PM10

(Table 03: -November 2022 Primary Pollutant in Specific date.**)**



Date	AQI VALUE/PRIMARY POLLUTANT
01-Dec	126/PM10
02-Dec	136/PM10
03-Dec	147/PM10
04-Dec	170/PM10
05-Dec	157/PM10
06-Dec	89/PM10
07-Dec	90/SO2
08-Dec	80/PM10
09-Dec	86/PM10
10-Dec	93/PM10
11-Dec	80/PM10
12-Dec	90/SO2
13-Dec	93/SO2
14-Dec	108/SO2
15-Dec	73/SO2
16-Dec	83/PM10
17-Dec	76/PM10
18-Dec	70/PM10
19-Dec	105/PM10
20-Dec	95/PM10
21-Dec	134/PM10
22-Dec	161/PM10
23-Dec	240/PM2.5
24-Dec	121/PM2.5
25-Dec	107/PM10
26-Dec	107/PM10
27-Dec	120/PM2.5
28-Dec	122/PM2.5
29-Dec	166/PM2.5
30-Dec	241/PM2.5
31-Dec	93/PM10

(Table 04: -December 2022 Primary Pollutant in Specific date.**)**



Date	AQI VALUE/PRIMARY POLLUTANT
01-Jan	99/PM10
02-Jan	137/PM2.5
03-Jan	98/PM10
04-Jan	115/PM10
05-Jan	109/SO2
06-Jan	93/SO2
07-Jan	90/SO2
08-Jan	110/NO2
09-Jan	110/NO2
10-Jan	116/NO2
11-Jan	204/PM10
12-Jan	158/PM10
13-Jan	82/NO2
14-Jan	106/PM10
15-Jan	100/SO2
16-Jan	93/PM10
17-Jan	109/SO2
18-Jan	84/SO2
19-Jan	106/SO2
20-Jan	102/PM10
21-Jan	87/NO2
22-Jan	103/PM10
23-Jan	121/PM10
24-Jan	136/PM2.5
25-Jan	143/PM2.5
26-Jan	283/PM2.5
27-Jan	0
28-Jan	131/NO2
29-Jan	134/PM2.5
30-Jan	146/PM2.5
31-Jan	112/PM2.5

(Table 05: - January 2023 Primary Pollutant in Specific date.**)**

❖ RESEARCH METHODOLOGY

High volume samplers (HVS) and respirable dust samplers were used for sampling (RDS). The sampling was placing twice a week, for a total of 104 samples every year. Various parameters from the obtained samples were assessed using established procedures outlined by the Central Pollution Control Board (CPCB) and first explained by APHA (1977). The gravimetric approach was used to estimate the amount of SPM and RSPM particulate matter. For a period of 24 hours, a known volume of air is pulled through pre-weighed glass fiber filter paper, GF/A, at a fluid velocity of 0.8–1.3 m3/min. By pulling air at a rate of 1L/min for 24 hours, the gaseous pollutants SO2 and NO2 were gathered and then evaluated.

There is some common methods by we can calculate The air quality index;

Method I : The geometric mean of the ratio of the concentration of a pollutant to its reference value, such as PM10, PM2.5, NO2, and SO2, is used to compute the air quality index (AQI). The AQI index is then calculated by multiplying the average by 100. AQI and rating scale were then compared (Kaushik et al., 2006). For individual pollutant AQI was calculated by the following formula; -

$$AQI = (C/C_S) \, x \, 100$$

Where
AQI = Air Quality Index
C= the observed value of the air quality parameters pollutant (PM10, PM2.5, NO2 and SO2)
Cs= CPCB standard for residential Area (CPCB, 2009)

Method II : Using this method, the average values of the ratio between the concentration of pollutants and their standard value, such as PM10, PM2.5, NO2, and SO2, is used to determine the air quality index (AQI). The AQI and rating scale were then compared. In 2014, Ravikumar et al.

Method III : The relative rating of an overall air quality status is determined by the Oak Ridge National Air Quality Index (ORNAQI). The mathematical equation below, which was created by the Oak Ridge National Laboratory (ORNL), USA, was used to estimate the overall AQI. Air quality Index then measured and compared with relative ORAQI values (Bhuyan et al. 2010).

$$AQI = [39.02 \sum C/C_S]^{0.967}$$

Method IV : The creation of the Air Quality Index aimed to combine qualitative measurements with a qualitative understanding of the environment. The independent air quality index is determined using the following formula;

$$AQI = (C{*}W/C_S)$$

Where
AQI = Air Quality Index
W= Weighted of Pollutant
C= the observed value of the air quality parameters pollutant (PM10, PM2.5, NO2 and SO2)
Cs= CPCB standard for residential Area (CPCB, 2009)

Method V : To calculate the break point concentration, the Air Quality Index was based on concentration - response relationships of the contaminants. EPA (2006) and CPCB (2014). According to the linear segmentation approach, the individualized air quality index for a given pollutant quantity (Cs) is determined as,

$$I_P = [\{(I_{HI} - I_{LO}) / (B_{HI} - B_{LO})\} * (C_P - B_{LO})] + I_{LO}$$

Where
B_H = Breakpoint concentration greater or equal to given Concentration.
B_{LO} = Breakpoint concentration smaller or equal to given Concentration
I_{HI} = AQI value corresponding to B_H
I_{LO} = AQI value correspond to B_{LO}

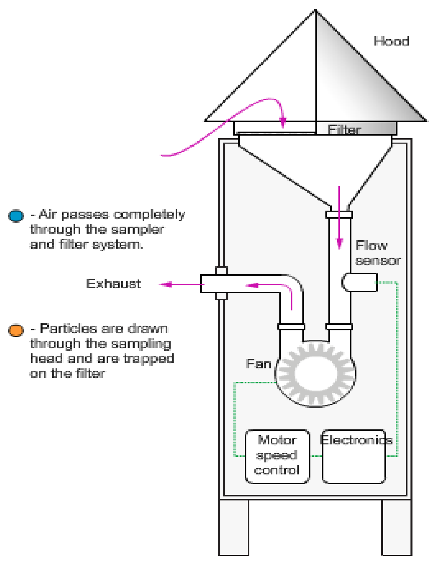
Finally; AQI=Max (Ip) (where p=1, 2, 3…n; denotes n pollutants)

- The sampling was placing twice a week, for a total of 104 samples every year.
  Using the central pollution control board's recommended standard methodology, the obtained samples were examined for a number of criteria (CPCB).
- Sampling of dust was carried out by these methods;
  1. High volume samplers (HVS)
  2. Respirable dust samplers (RDS)

1. High Volume Samplers (HVS): - TSP samples are obtained using a device known as a high-volume air sampler. For 24 hours, the high-volume air sampler sucks a significant amount of known air through it with a pre-weighed filter.

The sampler filter, which is seen in the figure, captures TSP particles when air flows past the device.

- In order to regulate the pollution, it is required to regularly monitor the air in order to assess the level of pollution and pinpoint the source of emission.
- This model complies with Central Pollution Control Board regulations.



(Figure 02: - High Volume Samplers for Total Suspended Solid Particulates**)**

2. Respirable Dust Samplers (RDS): - The method of assessing pollutants in the amount of air that may be breathed by employees at a certain workplace is known as respirable dust sampling. To ensure that workers' health is not in danger, a variety of dust sampling techniques are employed to measure the number of tiny particles and gaseous pollutants.

(Figure 03: - Respirable Dust Samplers)

Sr.No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Area
1.	Sulphur Dioxide (SO2), µg/m³	Annual	50	20
		24 hours	80	80
2.	Nitrogen Dioxide (NO2), µg/m³	Annual	40	30
		24 hours	80	80
3.	Residual Suspended Particulate Matter or PM10, µg/m³	Annual	60	60
		24 hours	100	100
4.	Suspended Particulate Matter or PM2.5, µg/m³	Annual	40	40
		24 hours	60	60

(Table 6: - National Ambient Air Quality Concentration**)**

Air Pollutant Separation Methods: -

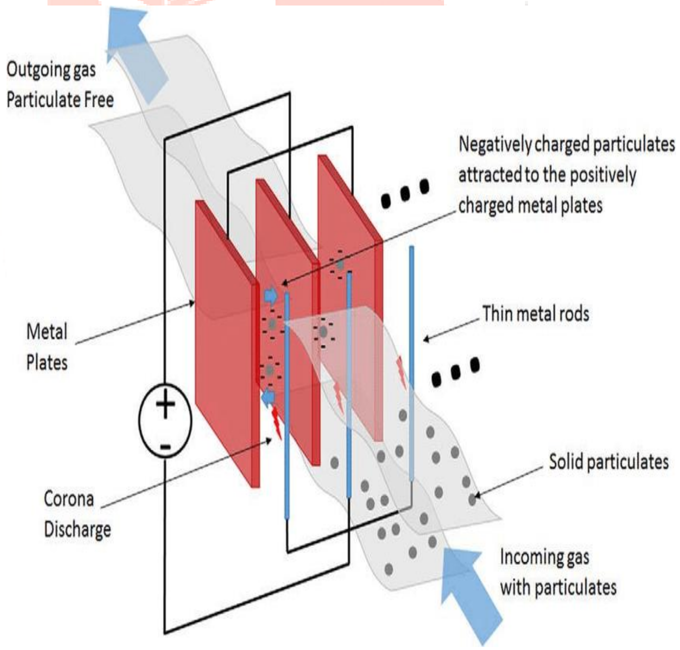
- Electrostatic Precipitators
- Wet Scrubbers
- Venturi Scrubbers
- Baghouse Filters
- Distillation Equipment & Purification by Distillation System, As Well As Oxidizers.

1. Electrostatic Precipitators: - An electrostatic precipitator is a filter less device that uses the force of an acquired electrostatic charge to remove tiny particles from flowing gases like dust and smoke while very slightly obstructing the passage of the gases through the unit.

1. An electrostatic precipitator, also known as an electrostatic air purifier, is a device that employs an electric charge to remove certain contaminants from or other gases in smokestacks and other flues.

2. These impurities can be solid particles or water vapor condenses.

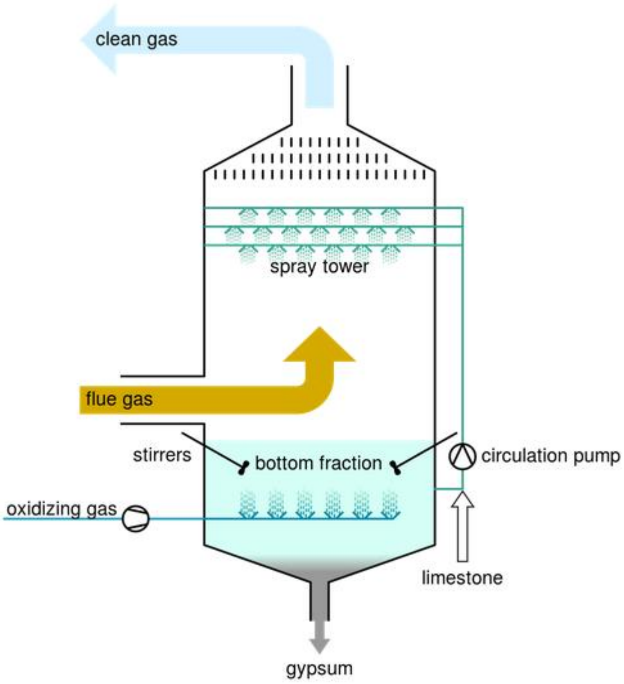
Diagram: -



(Figure: - Electrostatic Precipitators**)**

2. Wet Scrubbers: - By encapsulating the particle matter in liquid droplets, wet scrubbers can remove it. Following the collection of the droplets, the polluting gases are dissolved or absorbed by the liquid. A mist eliminator must be used to remove any droplets from the output gas stream that are present in the scrubber's incoming gas.

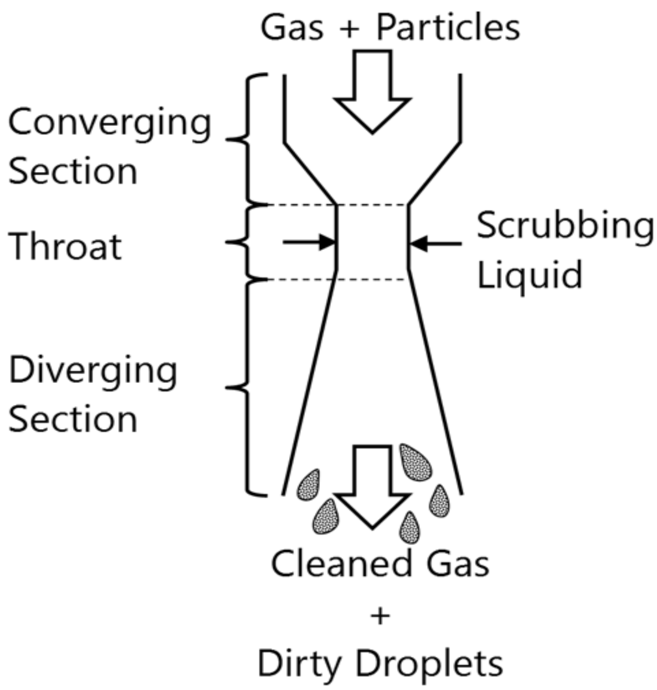
Diagram: -



(Figure: - Wet Scrubbers**)**

3. Venturi Scrubbers: - A venturi scrubber is made to efficiently volatilize the liquid being used to clean the gas stream using the energies out of a high-velocity inlet gas stream. This kind of equipment is a component of the wet scrubber's category of air pollution treatments. Whereas the aqueous surface area offered by venturi is rather wide, they are more successful at eliminating particulate pollutants than gaseous ones because particulate pollutants could be caught by contact whereas gaseous pollutants must be captured through absorption during the comparatively brief exposure duration.

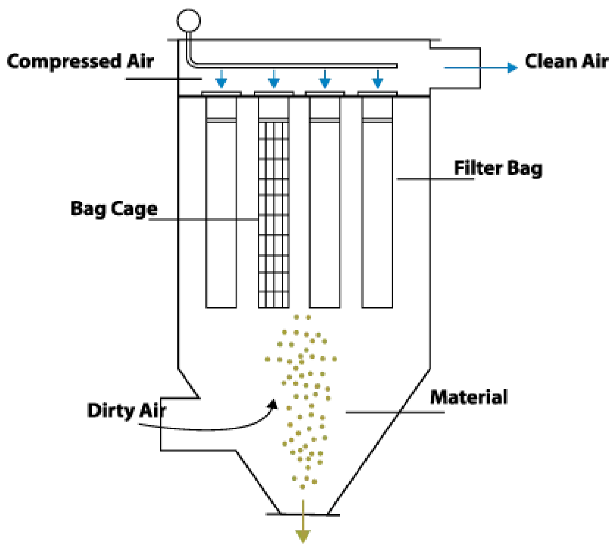
Diagram: -



(Figure: - Venturi Scrubbers**)**

4. Baghouse Filters: - A baghouse, often referred to as a baghouse filter, bag filter, or fabrics filter, is a dust collector and air pollution control equipment that filters particles or gas emitted into the air by industrial operations. Baghouses are frequently used by power plants, steel mills, pharmaceutical companies, food manufacturers, chemical makers, and other industrial businesses to reduce air pollution emissions. Following the development of high-temperature textiles (for use as a filter medium) able to endure temperatures exceeding 350 °F (177 °C), baghouses began to be used extensively in the late 1970s.

Diagram: -



(Figure: - Baghouse Filters**)**

❖ SUMMARY & CONCLUSIONS

The air quality index can provide a clear picture of the surrounding environment and the primary pollutants that are responsible for the air's quality. According to the CPCB break point concentration, the AQIs were determined. According to the AQI study, particle matter (mostly PM10 & PM2.5) was primarily to blame for peak hours. The second major pollutant, SO2 and NO2, was to blame. For the improvement of civic life, we must seek for suitable pollution control and management plans, such as plantations and green belts. Because it does not specifically address the temporal AAQ variation due to weather forecasting, land use, ecosystem geology.

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