

Air Quality Monitoring System

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ABSTRACT: *Air contamination impacts everyday life. It is a threat to the world's ecosystem and living standard. The terrible need to control air efficiency is quite evident due to intensified manufacturing operations in recent years. Air contamination is one of the most extreme and important public safety and the environmental problems in most of the developed world. The goal of this paper is to include details on the current air quality situation in various areas, cities in India, as well as numerous air pollution sources and results. There is an attempt to inform people about different types of airborne gases and particulate matter and their environmental effects along with specific directions to solve this. The rate at which urban air pollution has grown in India in recent years was perceived to be alarming due to the severe insecure web of particulate matter (PM) and dreadful gases in the air which in turn breathes a living organism. The levels of the particulate matter in all cities of India are far higher. Few cities can be illuminated where Air Quality Monitoring (AQM) has begun and have shown some improvement in air quality but mainly affected areas are small towns and medium towns that are extremely critically affected by phenomenal pollution.*

KEYWORDS: - Air Quality monitoring, eco-system, gaseous pollutants, National Air Quality Index, Particulate matter

INTRODUCTION

Air is one of the main components of the human environment. The climate on the planet includes plenty air including oxygen, ammonia, monoxide and other traces elements that are uncommon. Every change in the natural air composition can contribute to severe injury to terrestrial life forms. The existence of one or more pollutants is air pollution in the environment, for example, these gases can trigger chemical, animal and plant harm [1].

Air pollution has an enormous impact on human health, farming activities in developed countries such as India. Climate changes and ecosystem changes overall. Nearly six lakh Indians die every year because of these side effects resulting in the fifth leading countrywide mortality for certain purposes, like air pollution [1]–[3]. Nearly every city is suffering due to improved particulate matter content (PM) of gaseous contaminants such as oxides in the soil nitrogen, arsenic and other poisonous compounds which cause serious environmental damage already. Only a few towns can be highlighted where monitoring of air quality (AQM) has began due to which the quality of air is improved. However, small and medium areas are mainly affected with cities of massive emission spurts in an extremely critical way.

Pollution in the air is very deadly as it accounts 7 million deaths worldwide or one in eight early deaths annually in the world. Nearly 570,000 children under five are dying of respiratory infections annually. A high likelihood of recurrent respiratory conditions like asthma is large with these emissions [3]. A variety of scientists worldwide have built models for air quality control to

track many of the waste pollutants such as Sulphur Dioxide (SO_2), Carbon Monoxide (CO), carbon dioxide, oxides (NO), etc. carbon dioxide. Much has been done on existing monitoring systems for air pollution. For starters, are advised a home air quality control system. The machine sends Wireless sensor data through the use of the protocol "quest and answer" combination of protocols based on address and data. The machine ensures efficiency of the indoor air home and the sensor on a screen reads.

The central control board for pollution has begun National monitoring program for air quality since 1984 that contains various air pollutants such as sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) and matter of particulates with a thickness under 10 microns (PM_{10}), covering 254 towns, 29 states and 5 union territories, it operates 612 existing monitoring stations in numerous towns in separate countries. From continuity monitoring 46 Indian cities were observed population over one million are overly polluted [4]. The aim of this paper is to provide comprehensive review of air quality monitoring practices in India with:

To recognize places of urgent interest from extreme air pollution by unbiased assessment condition of practice and recommendation of appropriate actions ever applied for improvement. In this report 10 main cities for air quality were taken into account. These cities were thus chosen to monitor quality, taking into account that they are the main center of trade, industry and tourism activities which are responsible for environmental deteriorating at high rate [5].

RESOURCES AND PROCEDURES

1. Contaminants in Air

Wide pollution contaminants are primarily graded in corresponding types:

- Carbon compounds: carbon oxides (Carbohydrates (CO_2)), mainly released carbon monoxide (CO) in all fossil fuel cars and combustion.
- Compounds of sulphur: SO_2 , NO_2 , HNO_3 , NO_2 , HNO_2 . Freed from the power stations and other components of manufacturing.
- Ozone: (O_3) Ozone due to the change in its air level.
- Chlorofluorocarbon: sprays, etc. emitted unnecessarily from manufacturing.
- Hydrocarbons: benzene, etc. Mostly out of vehicles produced.
- Pollutants: in excess of tobacco, nickel and arsenic beryllium, tin, vanadium and titanium, current as solid, liquid or in all three fundamental states.

2. Roots

Toxic emissions from various vehicles are the major air pollution sources. With globalization and fast development use of personal cars instead of commercial vehicles not only has the market for automobiles increased considerably along with vehicle oil but the concentration has also increased air particulate matter. This continuous shift has also occurred and has led to a transmission transition as citizens today rather than using railways, they prefer highways. At the end in 2010, India had been projected to be over 5 million cars with 65% of vehicles pulling out two petroleum wheelers.

A broader transition is taking place. Private vehicles of preference are preferred as the majority people prefer big, typically compact cars, medium size and high fuel usage[4]–[6]. By the end of 2030-31 it was determined that if 50% Fuel performance of India is achieved through a analysis then India will save 65% of its energy policies, total energy use and CO₂ emissions reduction which results same as 7 million four wheelers withdrawn. 15% of the overall carbon dioxide emissions into the air in India, through the transport business. It was noticed that 6 percent increase in quantity of CO₂ emissions occurs per year.

The average data is shown in Table 1 regarding emissions from vehicles of metropolitan Towns:

Type of Pollutant	Percentage Value
Hydrocarbons	45-50%
Carbon monoxide	70-72%
SPM	26-30%
Oxides	35-40%

Table 1:- Average pollutant Percentage released from various metropolitan cities

THERMAL AND INDUSTRIAL WASTE

Owing to accelerated growth and progress different manufacturers, other businesses from the past release chief pollutant gas like SO₂ and NO₂, respectively. Other monuments like Taj Mahal is damaged by oil refineries. In addition to this, many thermal power plants operate in industries where the output of energy is in tons of millions and fly ash, hydrocarbons, SO₂ are the major contaminants emitted with some gases linked. The data seen in Table 2 includes specific thermal contaminants emitted from 200 MW Power station, which absorbs cumulative coal of 1400 tons every day.

Components	Emission factor Kg/ton of coal	Emitted Quantity (tones per day)
Carbon monoxide	0.26	0.38
Oxides of Sulphur	19 (S)	13.36
Particulate Matter	8 (A)	370.02
Aldehydes	0.0026	0.0037
Ash	2 (A)	92.64
NOX	0.01	0.16

Table 2:- Pollutants emitted out from 200 MW thermal plant

In addition to the aforementioned relevant references, the following also help In triggering air pollution:

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- Setting on fire the crop waste by farmers.
 - Incinerators and stoves.
 - Aerosol drying and spraying operations.
 - Production of methane due to accumulation of waste in fields.
 - Strategic arsenal testing by military officers
 - Decomposition of animals which lead to production of animal's carbon.

3. Air Pollution Results

Air pollutants emission has a wide spectrum of side effects both on the climate and on the specific species dwelling in that area. In that setting sure of these side effects are listed below:-

- Confirmed lung aging and lung injury
- Capacity and short-term organ discomfort.
- Asthma, bronchitis, emphysema etc. primary source.
- Lifetime contraction.
- Firing damage to upper vegetative plant cover because of rain acid.
- Changes in the vegetative due to presence of Sulphur dioxide and ozone intake (sulphurisation, Bled or tanned)
- River and other bodies of water eutrophication.
- Acid rain damage to building structures.

4. Air Pollution Research Facts in India

India has been labeled worldwide as the 7th unsafe country for the environment by the recent 2015 survey.

- The vehicles affect three sections of overall emissions emitting about 40 separate runs on a regular basis pollutant types.
- In India it is so popular to offer adulterated gasoline, learn that the air quality is in fact paying the purchase price?
- The city of Bangalore has a 30% asthma static as asthma induced by children in that position of air emissions and of noise pollution.
- In India, too, cancer patient numbers increase, as per Global Monitoring System on Cancer (NCCP) about 1.4 million people will suffer from this by the year 2026.

5. Indian Control on present air quality standards

Announced by the National Air Quality Index (NAQI), a federal agency that a public requirement to assess air quality levels in order to equate specific communities to implement new initiatives in order to reduce the sum of pollution pollutants in those places[5], [7], [8]. NAQI

has adequately demonstrated that in 23% of workstations, there are more than 70 percent of worrying concentrations rising beyond acceptable thresholds to pollute the environment as a regional disaster in various cities around India. Indian emission rates have been measured with China, regardless of China's population growth more than India.

Comparing rates of emissions it was noticed that amongst Indian and Chinese cities Indian emission rates are more widely increased clearly, in contrast with China. We find these rates are 10 times more than the WHO criteria as illuminated. As a big problem in India, its air pollution that makes a way of victory. According to Green Peace India, the air quality detected on the NAQI interface not only its national capital's big worry, but it is also citizens that should always concentrate on places other than land as the scale of emissions in different countries is worrying India areas [9]–[11].

6. Present Air Quality Situation in different towns

Agra:

It is around 140 sq.km distributed area. With 9.5 lakh people dwelling and the shifting nation of 20,000 in 1991. The key sources of air pollution in this area is Foundry businesses that use coal as a source, as vehicle development is high, vehicle discharges are small [10]. In compliance with the laws state requirements for Air Quality (NAAQS) in all tracked times, states that SO₂ was found to be lower, and it has been found that NO₂, RSPM and SPM levels are cooperating excess. Pollutant levels have been found excessive as illustrated in table 3. In winter they were larger, but in summer they were lower.

Pollutants	Concentration in microgram per meter cube
NO ₂	26
SO ₂	11
SPM	435
RSPM	192

Table 3:- Concentration of pollutants found in Agra

Bangalore

It is considered as the largest manufacturing, commercial and educational group, and center for Knowledge and Biotechnology. Along with that the largest diesel generator sets in India are a permanent emission center here. Similar to regional climate SO₂ rates developed by Air Quality Standards (NAAQS) found to be very weak and NO₂ in all tracked was found to be mild. Periods of RSPM and SPM were considered to be overriding cooperatively. Pollutant accumulation in winter and summer was found to be higher as illustrated in table 4, but during monsoon seasons it has been weaker [11].

Pollutants	Concentration in microgram per meter cube
NO ₂	46
SO ₂	13
SPM	142
RSPM	70

Table 4:- Concentration of pollutants in Bangalore

Delhi

It is the filthiest city in Asia. India with a lot of thermal and automotive pollution emission releases SPM extract bacteria, CO, chlorine, oxidation bacteria, Carbon monoxide and nitrogen. Loads of air emissions from thermal plants. As per country's Standards for Ambient Air Quality SO₂ (NAAQS) and NO₂ in all controlled cycles was found to be lower. However, rates of RSPM and SPM were found to be cooperative overwhelmingly as represented in table 5.

Thermal Capacity	1085
NO _X	92
SO _X	65
PM (with control device)	160
PM (without control device)	3250

Table 5:- Concentration of pollutants in Delhi

Lucknow

It's named as the money, gold, and the most populated society of India. With large to medium manufacturing from brass to cotton. In compliance with regional standards for air quality SO₂ and NO₂ (NAAQS) amounts were observed lower levels but RSPM and SPM were shown strong in partnership clearly depicted in table 6. Concentration according to the 2005 NAAQS report table accounts for contaminants detected.

Pollutants	Concentration in microgram per meter cube
NO ₂	30
SO ₂	12
SPM	412
RSPM	186

Table 6:- Concentration of pollutants in Lucknow

Ahmedabad

It is also known as Manchester of the East as it is also renowned for the existence of broad variety of products of textiles. To be an industrialist, India's major emission causes are urban cities vehicles and oil fuelled hearth outlets bakery and slum cells. Similar to Air Quality Levels (NAAQS) regional climate SO₂ level and NO₂ level in all monitored times it was found lower than RSPM and cooperatively, the levels of SPM have been found to be above as showed in table 7. The pollutant content was considered to be higher but in summer and monsoon winter seasons were lower. Pollutant concentration seasons as per NAAQS 2005 survey is shown in the below table.

Pollutants	Concentration in microgram per meter cube
NO ₂	27
SO ₂	13
SPM	365
RSPM	152

Table 7:- Concentration of pollutants recorded in Ahmedabad

CONCLUSION

Thus one can estimate from the specified data across all regions in India, that RSPM and SPM are far larger.

- The key source of pollutant production was recurrent in all areas under control, i.e. trucks and buses.
- In the past, Indians have taken several initiatives. Significant work also needs to be made to further increase the control on air pollutant emission.
- Air emissions would be avoided instead of required. It continues to evolve and learn the welfare of proverb. We must understand the causes of home 'suits here, pollution reduction effects and measures then only we will control the rising emissions rates in order to enhance the atmosphere for centuries to come.
- Efficient electricity services must be utilized everywhere, as they appear to conserve electricity along with low adverse effects.
- There is a need to strengthen existing policies and strategies to allow more successful outcomes.
- Mass transit would be superior to that of using cars for your own personal needs.
- More frequent vehicle inspection requires.

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