A COMPARATIVE STUDY OF AIR POLLUTION CONTROL POLICIES IN DELHI AND MUMBAI

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ABSTRACT

This research paper titled "A Comparative Study of Air Pollution Control Policies in Delhi and Mumbai" aims at studying in detail the concepts of Air Pollution Control Area as defined by the Air (Prevention and Control of Pollution) Act, 1981 and Air Quality Index (AQI).

The topic of this paper is related to the curriculum of Environmental Law as well as delves deeper into understanding the mechanism of declaring an area as air pollution control area and the role AQI plays in it. I chose this topic for these aforementioned reasons as well as to explore more available information through research and case studies.

In this research based paper, I have used the following research methods: secondary research through referring to available sources like books, research papers, statistics, newspaper articles, and journals, and case laws for supporting the arguments in favour of the powers conferred on the State governments and the State Pollution Control Boards to declare air pollution control areas.

Further, this paper aims to compare the air pollution control policies implemented in two of India's major cities, Delhi and Mumbai. The study examines the effectiveness of these policies and identifies the factors that contribute to the differences in the air quality levels in these cities. Through a comprehensive review of government reports, research articles, and data analysis, the study finds that while both cities have implemented similar policies, Delhi has made greater strides in improving air quality due to its more stringent implementation and enforcement of regulations.

The research helps in highlighting the need for concocting meticulous policies for tackling the issue of air pollution and concludes with recommendations for policymakers to adopt best practices and collaborate with other cities to reduce air pollution levels across India.

STATEMENT OF PURPOSE

I feel that if we closely study the reasons behind the constant degradation of environment, we would be able to gather enough information to reach a consensus and then start looking for suggestions and solutions to move forward with the situation at hand as to how it can be improved.

This paper focuses on the worsening Air Quality Index in all the states of India, with a special focus on Delhi and Mumbai and the environmental policies that have been incorporated in these two states by their respective state governments.

Numerous sources release air pollutants into the atmosphere, and the amount of pollutants in the ambient air relies on both the quantity released and the environment's capacity to either absorb or distribute the pollutants.

Through this research, I intend to gain some knowledge that will aid NGOs and State/Central Pollution Control Boards in their efforts to promote stricter regulations to reduce air pollution.

INTRODUCTION

The attempt at achieving sustainable development is still in its young stage. The popularization of the concept of a holistic and ecological view of the world started in 1972 with initiation of the Green movement and since then the idea has only progressed.

The Green Movement is a collective effort that puts forward the ideas and concerns of environmentalists, that is, those people who care about the preservation and integrity of the environment for our own benefit and the generations to follow. The major concern of the organization has been global climate change along with others like organic agriculture, pollution, preservation of both wild places and multi-use undeveloped landscapes, protection of endangered species, resistance to genetic modification of crops and livestock, and opposition to nuclear power.

The movement has been quite a success having won many legal victories, heightening awareness among the general population regarding environmental issues and having significant influence on government policies, especially in Europe. In the US, Greenpeace and national Green Parties were able to persuade a number of governments to accept, at least in theory, the

idea that action is required to combat global warming. Public and private transportation, air quality, switching to non-plastic products, eco-friendly practises, waste management, the adoption of renewable sources of energy, and strict legislation for the protection of forests and animals are the main areas of concentration for the movement in India, which is still in its infancy.

It has tugged at the human conscience that there is a growing need for us to stop taking the gift, that is nature, for granted and start working like a team, towards a better future for the generations to come. As 'environment' and 'climate change' become the 'buzz' words amongst youngsters and netizens, it is for time to tell if the young activism and mainstream "Don't be mean, Go Green" attitude will last long enough save the planet!

Air Pollution, Air Pollution Control Area, Air Quality Index (AQI)

Air Pollution, as per the Air (Prevention and Control of Pollution) Act, 1981 can be defined as "the presence in the atmosphere of any air pollutant." Air pollutant means "any solid, liquid or gaseous substance (including noise pollution) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment."[1]

The State Government has been conferred, under the Air Pollution Act, 1981, with the power to declare any area or areas within the State as '*Air Pollution Control Areas*' in consultation with their respective State Pollution Control Boards, which also have to be formulated by each state as per section 4 of Act 6 of 1974. The authority to establish requirements for the treatment and discharge of effluents into water bodies, including body corporate compliance, has been given to the State Pollution Control Boards.

In order to prevent and regulate water pollution and to maintain the water's purity, the Central Pollution regulate Board was established. It is able to give the State Pollution Control Boards instructions. By virtue of its legal authority, the Board may order the cessation of any industry, operation, or process, as well as the restriction or regulation of the supply of energy, water, or any other services to the polluting or violating industry. Additionally, the Central Pollution Control Board has the authority to gather, consolidate, and publish technical and statistical

[1] Air (Prevention and Control of Pollution) Act, 1981

information related to water pollution as part of its role in Water Quality Monitoring and Surveillance.

Governmental organisations use an *Air Quality Index* (AQI) to inform the general public of how polluted the air is now or is expected to become. By averaging readings from an air quality sensor, which can rise owing to traffic, forest fires, or other factors that can increase air pollution, the air quality index (AQI) is determined. Particulates, ozone, nitrogen dioxide, carbon monoxide, and sulphur dioxide are only a few of the pollutants that are analysed.

As the AQI rises, there are more dangers to the general public's health, particularly for young children, the elderly, and people who already have respiratory or cardiovascular conditions. Governmental organisations typically advise citizens to limit or even eliminate outdoor physical exercise during certain times. It may also be advised to wear a face mask, such as a fabric one.[2]

Major Causes of Air Pollution

Air pollution is caused by a combination of natural and human activities that release harmful substances into the Earth's atmosphere. These substances, known as pollutants, can have detrimental effects on human health, ecosystems, and the overall quality of the air we breathe. The causes of air pollution can be categorized into two main sources: anthropogenic (human-made) and natural.

Anthropogenic Sources:

a. Industrial Emissions: Industries and manufacturing processes emit a significant amount of pollutants into the air. Combustion of fossil fuels, such as coal, oil, and natural gas, in power plants, factories, and refineries releases pollutants like sulfur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter (PM).
b. Transportation: Vehicles, including cars, trucks, buses, and airplanes, emit pollutants through the combustion of fossil fuels. These emissions contribute to high levels of nitrogen dioxide (NO2), carbon dioxide (CO2), carbon monoxide (CO), and particulate matter, especially in urban areas with heavy traffic.[3]

[2] AQI India
[3] National Institute of Environmental Health Sciences, Air Pollution and Your Health, NIH

c. Residential and Commercial Emissions: The burning of fossil fuels for heating, cooking, and lighting in residential and commercial buildings releases pollutants, particularly in areas without access to clean energy sources. Solid fuels like coal and biomass contribute to indoor air pollution, while heating oil and natural gas combustion release pollutants outdoors.
d. Agricultural Activities: Farming practices such as the use of synthetic fertilizers, livestock production, and crop residue burning emit pollutants like ammonia (NH3), methane (CH4), and nitrous oxide (N2O). Agricultural emissions also include the release of volatile organic compounds (VOCs) from pesticides and other chemicals used in farming.
e. Waste Disposal: Improper disposal of waste, including solid waste in landfills and open burning of garbage, releases toxic gases and particulate matter into the air. Incineration of waste materials also contributes to air pollution, especially when inadequate emission control measures are in place.
f. Industrial Processes: Various industrial processes release pollutants into the atmosphere, such as volatile organic compounds (VOCs), toxic chemicals, and heavy metals. Examples include chemical manufacturing, mining operations, and cement production.

Natural Sources:

a. Volcanic Activity: Volcanic eruptions release large amounts of gases, ash, and particulate matter into the atmosphere. These emissions include sulfur dioxide (SO2), hydrogen sulfide (H2S), carbon dioxide (CO2), and other volcanic gases. While volcanic activity is a natural phenomenon, it can have temporary but significant effects on air quality, especially in the vicinity of active volcanoes.

b. Dust and Wildfires: Dust storms, desertification, and wildfires contribute to air pollution by releasing large amounts of particulate matter into the air. Wind erosion of soil, particularly in arid regions, can generate dust storms, which can travel long distances and affect air quality in populated areas. Wildfires produce smoke, ash, and pollutants like carbon monoxide (CO) and nitrogen oxides (NOx).

c. Pollen and Mold: While not directly harmful pollutants, pollen and mold spores can cause respiratory issues and allergic reactions in susceptible individuals. These

natural sources can impact air quality, especially during specific seasons or in areas with high vegetation.

It is important to note that the intensity and impact of these sources can vary depending on factors such as geographical location, population density, climate, and regulatory measures in place to control emissions. Efforts to reduce air pollution involve a combination of technological advancements, stricter regulations, adoption of cleaner energy sources, improved waste management practices, and public awareness about the importance of air quality.

Repercussions of Air Pollution

Air pollution has wide-ranging consequences that affect human health, ecosystems, climate, and the overall quality of life. The consequences of air pollution can be divided into several categories[4][5]:

Human Health Effects:

a. Respiratory Issues: Air pollution, especially high levels of particulate matter (PM) and toxic gases, can lead to respiratory problems such as asthma, bronchitis, and other chronic obstructive pulmonary diseases (COPD). It can also aggravate existing respiratory conditions and reduce lung function.

b. Cardiovascular Problems: Prolonged exposure to air pollution increases the risk of cardiovascular diseases, including heart attacks, strokes, and high blood pressure. Fine particulate matter and pollutants like nitrogen dioxide (NO2) and carbon monoxide (CO) can contribute to the development of cardiovascular issues.

c. Cancer: Some air pollutants, such as benzene, formaldehyde, and polycyclic aromatic hydrocarbons (PAHs), are known to be carcinogenic. Prolonged exposure to these substances in polluted air can increase the risk of developing lung cancer and other types of cancer.

d. Impaired Immune System: Air pollution can weaken the immune system, making individuals more susceptible to infections, respiratory illnesses, and allergies. It

[4] National Geographic Society, Air Pollution, Education, 1 July 2022
[5] World Health Organisation, Health consequences of air pollution on populations, 15 November 2019

can also have adverse effects on the development of children's immune systems, leading to long-term health consequences.

e. Premature Death: The combination of various health effects from air pollution can result in premature death. Studies have shown that exposure to high levels of air pollution is associated with an increased mortality rate, particularly due to respiratory and cardiovascular diseases.

Environmental and Ecosystem Consequences:

a. Acid Rain: Air pollutants such as sulfur dioxide (SO2) and nitrogen oxides (NOx) can react with water vapor and form acidic compounds. These compounds can then fall back to the ground as acid rain, causing damage to soil, water bodies, vegetation, and aquatic ecosystems.

b. Ozone Depletion: Certain air pollutants, including chlorofluorocarbons (CFCs) and halons, contribute to the depletion of the ozone layer in the Earth's upper atmosphere. This depletion allows more harmful ultraviolet (UV) radiation from the sun to reach the Earth's surface, increasing the risk of skin cancer, cataracts, and other health issues.

c. Biodiversity Loss: Air pollution can harm ecosystems and contribute to the decline of plant and animal species. High levels of pollutants can damage vegetation, reduce crop yields, disrupt pollination, and contaminate water bodies, leading to ecosystem imbalances and loss of biodiversity.

d. Atmospheric Haze: Particulate matter and pollutants in the air can cause atmospheric haze, reducing visibility and impacting scenic landscapes. This haze not only affects the aesthetics of natural and urban areas but also has economic implications for tourism and outdoor activities.

Climate Change and Weather Patterns:

a. Greenhouse Gas Emissions: Air pollution from the burning of fossil fuels contributes to the release of greenhouse gases, such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). These gases trap heat in the Earth's

atmosphere, leading to global warming and climate change.

b. Altered Weather Patterns: Air pollution can affect weather patterns by influencing cloud formation and precipitation. Certain pollutants can inhibit cloud droplet formation or alter the size and duration of rainfall events, leading to changes in local and regional climates.

c. Melting of Glaciers and Polar Ice: The warming effects of air pollution contribute to the melting of glaciers and polar ice caps. This leads to rising sea levels, coastal erosion, and the loss of critical habitats for marine and terrestrial species.

d. Disruption of Ecosystem

Steps taken at International Level to tackle Air Pollution

International organizations play a crucial role in addressing air pollution and implementing measures to mitigate its effects. Here are some steps taken by international organizations in tackling air pollution[6]:

World Health Organization (WHO):

a. Establishing Air Quality Guidelines: The WHO develops and promotes guidelines and standards for air quality, including recommended limits for pollutants. These guidelines help countries set targets and regulations to protect public health.

b. Monitoring and Research: The WHO conducts research and collects data on air pollution and its health effects worldwide. This information helps in understanding the impacts of air pollution and developing evidence-based policies.

c. Technical Support: The WHO provides technical assistance to countries in assessing and improving air quality monitoring systems, developing national air pollution control strategies, and implementing effective interventions.

[6] UN Environment Programme, A Global response to Pollution, BEAT Pollution, 6 September 2022

United Nations Environment Programme (UNEP):

a. Global Environment Outlook: UNEP publishes the Global Environment Outlook report, which provides comprehensive assessments of the state of the environment, including air pollution. The report highlights the impacts of air pollution and suggests policy recommendations for countries.

b. International Collaboration: UNEP facilitates international cooperation on air pollution by bringing together governments, scientific experts, and other stakeholders. It promotes the exchange of best practices, knowledge sharing, and capacity building among countries.

c. Implementing Multilateral Environmental Agreements: UNEP supports the implementation of multilateral environmental agreements related to air pollution, such as the Stockholm Convention on Persistent Organic Pollutants and the Minamata Convention on Mercury.

United Nations Framework Convention on Climate Change (UNFCCC):

a. Reducing Greenhouse Gas Emissions: UNFCCC aims to reduce greenhouse gas emissions, including those from sources that contribute to air pollution. The Paris Agreement, under the UNFCCC, sets targets for countries to limit global warming and combat climate change, which indirectly helps reduce air pollution.

b. Clean Development Mechanism (CDM): The UNFCCC's CDM promotes projects in developing countries that reduce greenhouse gas emissions and promote sustainable development. These projects often include measures to address air pollution, such as clean energy initiatives and improved industrial processes.

International Energy Agency (IEA):

a. Promoting Clean Energy Technologies: The IEA supports the development and deployment of clean energy technologies to reduce air pollution. It provides analysis, policy advice, and best practices on renewable energy, energy efficiency, and low-carbon technologies.
b. Tracking and Reporting: The IEA collects data on energy-related emissions and air pollution levels, providing insights into the sources and trends of pollution.

This information helps policymakers and stakeholders make informed decisions to address air pollution.

Regional and Bilateral Collaborations: International organizations facilitate regional and bilateral collaborations between countries to address air pollution collectively. These collaborations involve sharing experiences, knowledge, and resources to develop regional air pollution control strategies, exchange technologies, and implement joint initiatives.

It is important to note that international organizations primarily play a supportive and advisory role, as the responsibility for implementing air pollution control measures lies with individual countries. However, these organizations provide guidance, coordination, and technical expertise to support countries in their efforts to tackle air pollution on a global scale.[7]

Laws related to Air Pollution in India

Following are some key laws related to air pollution in India

The Air (Prevention and Control of Pollution) Act, 1981:

This is the primary legislation that addresses air pollution in India. It provides a framework for the prevention, control, and abatement of air pollution. The act empowers the central and state pollution control boards to take measures to mitigate air pollution and enforce emission standards.[8]

The Environment (Protection) Act, 1986:

This act serves as a comprehensive framework for environmental protection, including air pollution. It authorizes the central government to take necessary measures to protect and improve the quality of the environment and prevent environmental pollution.[9]

National Ambient Air Quality Standards (NAAQS):

The Central Pollution Control Board (CPCB) has set NAAQS, which provide the permissible limits for various pollutants in the ambient air. These standards aim to regulate and maintain

[7] UN Environment Programme, A Global response to Pollution, BEAT Pollution, 6 September 2022
[8] Air (Prevention and Control of Pollution) Act, 1981
[9] Environment (Protection) Act, 1986

the quality of air in different regions of the country.[10]

Motor Vehicles Act, 1988:

This act regulates motor vehicle-related issues, including emission norms for vehicles. It sets standards for vehicle emissions and mandates the use of pollution control devices, such as catalytic converters.[11]

The Environmental Impact Assessment (EIA) Notification, 2006:

The EIA process is followed for assessing the potential environmental impacts of developmental projects. It includes provisions for evaluating the potential air pollution impact of industrial, infrastructure, and other projects.

The Plastic Waste Management Rules, 2016:

These rules focus on the management and reduction of plastic waste, which contributes to air pollution when incinerated. The rules lay down guidelines for plastic waste collection, segregation, and recycling.

The Graded Response Action Plan (GRAP):

GRAP was implemented by the Central Pollution Control Board in the National Capital Region (NCR) to combat severe air pollution episodes. It outlines specific actions to be taken based on the severity of air pollution, such as implementing traffic restrictions, controlling industrial emissions, and promoting cleaner fuels.[12]

It's important to note that several state governments and local authorities in India have also implemented additional measures and regulations to address air pollution based on their specific needs and challenges.

[10] Central Pollution Control Board, National Ambient Air Quality Standards, Notification, 18 November 2009
[11] Motor Vehicles Act, 1988
[12] Ministry of Environment, Forest and Climate Change, GOI, Graded Response Action Plan for Delhi & NCR, In Pursuit of Clean Environment, CPCB, 12 January 2017

DELHI AND MUMBAI

OVERVIEW - DELHI

The capital city of Delhi has become a pollution hub. The severe winters experienced by Delhiites along with vast amount of pollution and smog does not help their situation either.

The AQI (Air Quality Index) of some places in Delhi is higher than many severely polluted countries. Every winter is masked with disease. Breathing problems like asthma, lung problems like bronchitis along with irritation in eyes and accidents due to low visibility on roads plague Delhi with no escape in sights.

Smoke from burning of 'parali' (farm waste) in states of Punjab and Haryana also chokes Delhi with poison filled air.

The northern continuation of the Aravalli Range, known as Delhi Ridge, is located in the nation's capital city. As the city's "lungs," Rajasthan's desert shields Delhi from the hot winds with the help of its lush vegetation. It also serves as the only factor in containing pollution to some extent and maintaining the groundwater level along with amelioration of environment.

With the incapacity of the government agencies to protect the land from being used up for development purposes and lack of awareness among the people being displaced, industrialists keep exploiting the site so crucial to Delhi and its people for personal greed and advantage. Awareness among local people and tough steps taken by government as well as non-government organizations is the only way out of this tragic misery.

OVERVIEW - MUMBAI

Mumbai, the bustling metropolis on the western coast of India, is often hailed as the financial, commercial, and entertainment capital of the country. While the city thrives in various aspects, it also faces challenges related to air pollution. Mumbai has witnessed an increase in air pollution levels in recent years, though it is not as severe as the situation in Delhi. The city's growing population, vehicular emissions, industrial activities, and construction projects contribute to the overall pollution load. While Mumbai may not experience severe smog like Delhi, the air quality remains a cause for concern.

The deteriorating air quality in Mumbai has led to health issues among its residents. Prolonged exposure to pollutants can result in respiratory problems, such as asthma, bronchitis, and allergies. Vulnerable populations, including children, the elderly, and individuals with pre-existing respiratory conditions, are particularly affected.

The local government has initiated measures to address air pollution in Mumbai. These include promoting the use of public transportation, implementing emission standards for vehicles, and encouraging the adoption of cleaner technologies in industries. Additionally, periodic monitoring of air quality is carried out to assess pollution levels and take necessary actions.

Awareness about air pollution and its consequences is increasing among the residents of Mumbai. Environmental organizations, citizen groups, and individuals are actively advocating for cleaner air and pressing for more stringent measures to combat pollution. Public awareness campaigns, tree plantation drives, and discussions on sustainable practices contribute to the collective efforts to improve air quality.

While Mumbai's air pollution situation is not as severe as Delhi's, it remains a significant concern for the city's residents. Continued efforts to reduce emissions, promote sustainable practices, and raise awareness can help in mitigating the adverse effects of air pollution and ensuring a healthier environment for all.

POLLUTION IN DELHI AND MUMBAI - A COMPARISON

Delhi is known to experience high levels of air pollution, especially during the winter months. Factors such as vehicular emissions, industrial pollution, construction activities, and agricultural residue burning in neighbouring states contribute to poor air quality in the region. Delhi's AQI often reaches "Very Poor" or "Severe" levels, particularly during the winter months when temperature inversions trap pollutants close to the ground.[13]

Mumbai generally has better air quality compared to Delhi, but it is still affected by pollution due to various sources such as industrial emissions, vehicular traffic, and construction activities. However, Mumbai's coastal location and relatively better wind dispersion compared to Delhi help in mitigating pollution levels to some extent. The AQI in Mumbai typically ranges

[13] AQI India

from "Moderate" to "Unhealthy" levels, with occasional spikes during unfavorable conditions.

Pollution Comparison Between Mumbai and Delhi

Index	Mumbai	Delhi
Pollution Index:	83.65	90.71
Pollution Exp Scale:	148.81	165.23

Air pollution data from World Health Organization

	Mumbai	Delhi
PM_{10}	104	292
$PM_{2.5}$	64	143
PM_{10} Pollution Level:	Very High	Extremely High

[Source: NUMBEO]

Pollution Mumbai vs Delhi

	Mumbai (Improve Data)	Delhi (Improve Data)
Air Pollution	High 75.40	Very High 88.28
Drinking Water Pollution and Inaccessibility	Moderate 56.26	High 62.08
Dissatisfaction with Garbage Disposal	High 73.84	High 74.14
Dirty and Untidy	High 75.95	High 71.07
Noise and Light Pollution	High 70.26	High 64.50
Water Pollution	High 75.87	High 77.65
Dissatisfaction to Spend Time in the City	High 67.35	High 78.59
Dissatisfaction with Green and Parks in the City	High 66.03	Moderate 50.98
Contributors:	*515*	*698*
Last Update:	*March 2023*	*April 2023*

[Source: NUMBEO]

Purity and Cleanliness Mumbai vs Delhi

	Mumbai Improve Data	Delhi Improve Data
Air quality	Low 24.60	Very Low 11.72
Drinking Water Quality and Accessibility	Moderate 43.74	Low 37.92
Garbage Disposal Satisfaction	Low 26.16	Low 25.86
Clean and Tidy	Low 24.05	Low 28.93
Quiet and No Problem with Night Lights	Low 29.74	Low 35.50
Water Quality	Low 24.13	Low 22.35
Comfortable to Spend Time in the City	Low 32.65	Low 21.41
Quality of Green and Parks	Low 33.97	Moderate 49.02
Contributors:	*515*	*698*
Last Update:	*March 2023*	*April 2023*

[Source: NUMBEO]

Delhi is known to experience high levels of air pollution, especially during the winter months. Factors such as vehicular emissions, industrial pollution, construction activities, and agricultural residue burning in neighboring states contribute to poor air quality in the region. Delhi's AQI often reaches "Very Poor" or "Severe" levels[14], particularly during the winter months when temperature inversions trap pollutants close to the ground. Mumbai generally has better air quality compared to Delhi, but it is still affected by pollution due to various sources such as industrial emissions, vehicular traffic, and construction activities. However, Mumbai's coastal location and relatively better wind dispersion compared to Delhi help in mitigating pollution levels to some extent. The AQI in Mumbai typically ranges from "Moderate" to "Unhealthy" levels, with occasional spikes during unfavourable conditions.

INITIATIVES TAKEN BY THE DELHI GOVERNMENT

The government of Delhi has taken significant steps in order to avoid the precarious condition of pollution across Delhi and build a better environment. They are as under[15]:

Implementing Environment Compensation Charge (ECC):

In 2016, Delhi became the first state to levy an ECC of 1% for the registration of diesel cars above 2000 cc.

[14] Numbeo
[15] Dialogue Development Commission of Delhi, Public Consultations for Winter Pollution Action Plan, DDC Delhi, 20 March 2023

Subsidizing the E-Rickshaws:

Delhi has created the largest network of e-rickshaws in the country By making e-rickshaws available at a subsidized rate of Rs. 30,000. This is to promote clean last-mile connectivity.

Increasing green cover by 1,100 hectares:

As per the Forest Survey of India Report 2009- 2017, Delhi's green cover has increased from around 20.2% in 2015 to 20.6% in 2017. Thus, an increase of about 1100 hectares is observed.

Banning coal completely:

Delhi is the first modular state without any coal-based power facilities thanks to a total prohibition on coal consumption.

Appointment of Environment Marshalls:

These appointed Environment Marshalls keep a strong vigilance on garbage burning in Delhi.

Planting tree saplings and shrubs across Delhi:

On an average, 3-5 lacs saplings are planted every year in Delhi. Ordinary citizens too zealously participate in planting the saplings.

Smog Guns:

At all of the city's major building sites, anti-smog weapons have been installed to reduce pollution.

Red Light On, Gaadi Off Campaign:

Under this campaign, volunteers held placards requesting commuters to switch off their car engines when the signal is red. This has been one of the city government's most intriguing air pollution management projects.

PUSA Decomposer:

Researchers at PUSA's Indian Agricultural Research Institute have come up with a simple, cost-

effective solution to the problem of burning straw and stubble. A remedy has been developed for spraying in fields to control agricultural residue decay. Additionally, the residue is eventually converted into manure.

Banning of Diesel Generators:

Under the guidance of Environment Pollution Authority, Delhi has put a ban diesel generator. The only exception to this rule is emergency and essential services.

INITIATIVES TAKEN BY THE MUMBAI GOVERNMENT

The government in Mumbai, like other cities in India, has undertaken several initiatives to tackle air pollution. Here are some key measures taken by the government in Mumbai to address air pollution[16]:

Improved Public Transportation:

The government has focused on improving and expanding the public transportation system in Mumbai. Initiatives include the development of new metro lines, the introduction of electric buses, and the promotion of shared mobility options like carpooling and bike- sharing. These efforts aim to reduce the reliance on private vehicles and promote sustainable modes of transportation.

Emission Standards and Vehicle Regulations:

The government has implemented stricter emission standards for vehicles in Mumbai. The Bharat Stage VI (BS-VI) emission norms were introduced in April 2020, mandating the use of cleaner fuels and more advanced emission control technologies in vehicles. The government has also introduced periodic vehicle inspections to ensure compliance with emission norms and roadworthiness.

Phasing Out Old and Polluting Vehicles:

The government has implemented measures to phase out old and highly polluting vehicles in Mumbai. This includes imposing higher taxes on older vehicles, restricting their entry into

[16] Ministry of Environment, Forest and Climate Change, Various Initiatives undertaken by Government for mitigation of Air Pollution, PIB Delhi, 22 November 2019, Press Release Page

certain areas or during specific times (such as the "No Entry" rule for commercial vehicles during peak hours), and incentivizing the scrapping of old vehicles to promote the adoption of cleaner and more fuel-efficient vehicles.

Controlling Industrial Emissions:

The government has set up strict regulations and monitoring systems to control industrial emissions in Mumbai. Industries are required to comply with emission standards and adopt pollution control measures. Regular inspections and enforcement actions are carried out to ensure compliance. Efforts are also made to promote cleaner production processes and the use of cleaner fuels in industries.

Waste Management Initiatives:

Proper waste management is crucial to reduce air pollution in urban areas. The government has implemented waste management initiatives in Mumbai, including the segregation of waste at source, promotion of recycling and composting, and the establishment of waste treatment and disposal facilities to minimize the open burning of waste.

Awareness and Education:

The government has initiated awareness campaigns and educational programs to educate the public about the causes and effects of air pollution. These campaigns aim to promote behavior changes, such as reducing vehicle idling, conserving energy, and minimizing the burning of waste.

It's important to note that these initiatives are not exhaustive, and the government continues to explore and implement additional measures to tackle air pollution in Mumbai. Regular monitoring of air quality, research on pollution sources, and stakeholder engagement are also part of the ongoing efforts to address this critical issue.[17]

RELEVANT CASE LAWS

Following are a few notable case laws related to air pollution in India:

[17] Maharashtra Pollution Control Board, Revised Action Plan for Control of Air Pollution in non-attainment cities of Maharashtra, CPCB, 18 September 2019, ActionPlan/Mumbai

M.C. Mehta v. Union of India (1986)[18]

This landmark case, also known as the Oleum Gas Leak case, addressed the release of hazardous gases from an industrial unit in Delhi. The Supreme Court of India, in its judgment, laid down several guidelines for the prevention and control of industrial pollution, including the need for industries to obtain necessary environmental clearances, comply with emission standards, and undertake regular monitoring of pollution levels.

This case is often regarded as a landmark in environmental jurisprudence in India. The Supreme Court of India issued a series of directives to control air pollution in Delhi, including the implementation of the "polluter pays" principle and the conversion of public transport vehicles to Compressed Natural Gas (CNG).

M.C. Mehta v. Union of India (1996)[19]

In this case, the Supreme Court addressed vehicular pollution in Delhi and issued directions to control pollution caused by commercial vehicles. The court ordered measures such as phasing out old commercial vehicles, imposing restrictions on the entry of non-compliant vehicles, and mandating the use of Compressed Natural Gas (CNG) as a cleaner fuel for public transport in the city.

Vellore Citizens Welfare Forum v. Union of India (1996)[20]

This case dealt with pollution caused by tanneries in the town of Vellore in Tamil Nadu. The Supreme Court, in its judgment, emphasized the principle of "polluter pays" and held that industries must bear the cost of remediation and compensation for environmental damage caused by their operations. The court also stressed the importance of the "precautionary principle" and the need for industries to adopt appropriate pollution control measures.

Indian Council for Enviro-Legal Action v. Union of India (1996)[21]

In this case, the Supreme Court addressed the issue of vehicular pollution in the National Capital Region (NCR) of India. The court directed the implementation of the "Polluter Pays" principle,

[18] 1987 SCR (1) 819; AIR 1987 965
[19] 1996 SCC (4) 750, JT 1996 (6) 129
[20] AIR 1996(5) SCC 647
[21] AIR 1996(5) SCC 647

making it mandatory for vehicle owners to pay an environmental cess while purchasing high-end luxury cars with larger engine capacities. The proceeds from this cess were to be used for funding pollution control measures.

M.C. Mehta v. Kamal Nath (1997)[22]

This case focused on pollution caused by industries in the Taj Trapezium Zone (TTZ), which surrounds the Taj Mahal in Agra. The Supreme Court directed the closure of polluting industries in the TTZ and ordered the adoption of pollution control measures by remaining industries. The court emphasized the importance of preserving the Taj Mahal as a national heritage and protecting it from the damaging effects of pollution.

M.C. Mehta v. Union of India (2002)[23]

In response to a PIL filed by M.C. Mehta, the Supreme Court ordered the closure of polluting industries located in residential areas in Delhi and issued directions to prevent unauthorized industrial activities and regulate industrial pollution.

People's Union for Civil Liberties (PUCL) v. Union of India (2003)[24]

This case highlighted the issue of vehicular pollution and led to the introduction of stricter emission standards (Bharat Stage norms) for vehicles across the country, similar to Euro norms.

Subhash Kumar v. State of Bihar (1991)[25]

This case dealt with the issue of air pollution caused by stone crushing units in the state of Bihar. The Supreme Court directed the closure of the stone crushing units and laid down guidelines to prevent air pollution from such activities.

These cases played a significant role in shaping environmental jurisprudence and the legal framework to combat air pollution in India. It's important to note that there have been numerous other cases and ongoing legal proceedings addressing air pollution at various levels in different

[22] (1997) 1 SCC 388
[23] AIR 2002 SC 1696
[24] AIR 1997 SC 568
[25] 1991 AIR 420, 1991 SCR (1) 5

states across the country.

CONCLUSION

The recent claim that Mumbai's air pollution is greater than Delhi's infamous pollution has received a lot of attention. Arvind Kejriwal, the chief minister of Delhi, even tweeted a list of the world's most polluted cities, with Mumbai coming in second. He claimed that this was the first time in a while that the nation's capital was not on the list.

Mumbai's air quality has undoubtedly gotten worse, but new data indicates other, alarming trends regarding the true situation. The national capital has constantly had pollution levels twice as high as Mumbai, the financial capital of India. And it hasn't only happened recently. In comparison to Mumbai, Delhi has had an average annual PM 2.5 concentration of 45 micrograms per cubic metre for the past four years.

The sea breeze typically helps the coastal city by removing pollution, primarily from traffic, construction, and road dust. However, over the winter, doctors have noticed an increase in patients with respiratory infections, particularly among children.

For the months of November and December of last year, Mumbai and Delhi both had air quality levels that were far higher than the WHO's recommended threshold, posing serious health risks.

The findings of the research suggest that while both cities have implemented similar policies, Delhi has shown greater progress in improving air quality due to its stricter implementation and enforcement of regulations. The study underscores the importance of formulating meticulous policies to address air pollution and recommends that policymakers adopt best practices and foster collaborations with other cities to combat air pollution across India.

In conclusion, this research paper sheds light on the significance of air pollution control policies in Delhi and Mumbai, comparing their implementation and outcomes. The study emphasizes the need for stringent regulations, effective enforcement, and continuous efforts to reduce air pollution levels. The findings contribute to the body of knowledge in environmental law and provide valuable insights for policymakers, advocating for the adoption of comprehensive strategies to mitigate air pollution and improve air quality in Indian cities.

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