Page 1887 - 1894 **DOI:** *https://doij.org/10.10000/IJLMH.119280*

INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES

[ISSN 2581-5369]

Volume 8 | Issue 2

2025

Study on the Ways Delhi has Adopted to Fight Air Pollution

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ABSTRACT

In the majority of cities worldwide, air pollution is a major issue. It happens when substances that are toxic to people, animals, and plants are released into the atmosphere, such as gases, dust particles, fumes (or smoke), or scents. Air pollution has greatly increased as a result of human activity. While there is no way to completely eradicate air pollution, there are ways to lessen it. To limit emissions, the government has created and is still creating legislation and standards for air pollution. To reduce air pollution, communities all around the country are changing land use and passing legislation that limits emissions. By carpooling or taking public transit, every one of us can lessen our impact on the pollution issue. Replacing outdated, energy-inefficient appliances and light bulbs with more energy-efficient models is the simplest method to break negative energy habits. In addition to saving money on power, you will also lessen the pollutants generated during the electricity generation process, which accounts for most industrial air pollution.

Keywords*: Air, Pollution, Gas.*

I. INTRODUCTION

India's capital, New Delhi, has the most polluted air in the world. The Union Territory of Delhi has a high level of air pollution. Air pollution has a terrible impact on people's health, the environment of the city, and economic prosperity, but India's legislative solutions are still inadequate despite the overwhelming evidence of its severity and repercussions. It highlights the most important policy gaps and provides a framework for developing more focused goals that will enhance Delhi's air quality. India is home to 21 of the 30 cities with the poorest air quality in the world, six of which are in the top ten, according to IQAir Air Visual's 2019 World Air Quality Report. Unquestionably, air pollution is a major issue for the environment and public health in many regions of India. Fossil fuel air pollution alone contributes to over 5.4 percent of India's annual GDP and results in 980,000 premature births and one million fatalities annually. The air quality in Delhi, India's capital territory, is incredibly poor. Both the environment and public health are severely impacted. Vehicle emissions, large enterprises like

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 [ISSN 2581-5369]

power generating, small-scale businesses like brick kilns, dust on the roads from construction and vehicle activity, open burning of rubbish, and fuel combustion for heating, cooking, and lighting are the main sources. The air quality index rebounded to the "satisfactory" level after pollution levels sharply dropped after Delhi was placed under lockdown following the outbreak. Before this, on September 29, 2019, Delhi's air quality was at its best, with an AQI of 60, or "satisfactory." Particulate matter (PM2.5) in Delhi decreased from 165µg/m3 on March 21, 2020, which was deemed unhealthy for everyone, to 64µg/m3 on March 29, 2020, which was deemed "moderate" or "acceptable," according to the Real-Time Air Quality Index. This represents a significant decrease in air pollution in Delhi, which typically has "poor" to "severe" air quality, with an AQI between 100 and 300, and much higher during the winter.

During the government-imposed lockdown last month, when industrial activity ceased and millions of drivers were urged to stay off the roads, the city's air quality was comparatively clearer. Vehicles are returning to the road, work is resuming, and firms are reopening as Delhi has reopened. Regretfully, air pollution is increasing once more after dropping to half of what it usually is at this time of year. Delhi lacks the benefits of hill stations and seaside cities due to its landlocked location. Due to a combination of industrial pollution, vehicle emissions, and extensive building, it experiences a lethal wintertime smog cycle every year.

According to the Global Burden of Disease Report (GBD), outdoor air pollution was India's sixth most common cause of death in 2017. For 660 million Indians residing in urban agglomerations, a high concentration of particulate matter (PM) is the cause of a 3.2-year decrease in life expectancy out of a population of 1.3 billion. Despite making up 16.4% of the world's population, air pollution causes 25% of all DALYs worldwide. In 2016, ambient air pollution caused 1887.6 DALYs per 100,000 people in India, compared to 1088.62 in China and 419.59 in the US. The air pollution was responsible for 38•7 million (34•5–42•4) or 8•1% (7•1–9•0) of the 480•7 million (441•7–526•3) DALYs that occurred in India in 2017.

Between 1995 and 2015, the average number of DALYs in Delhi caused by particulate matter concentration rose from 339296.03 to 750320.60. Between 1995 and 2015, the projected economic cost of PM 10 pollution in Delhi, at constant 2005 prices, grew from USD 2.714 billion to USD 6.394 billion. Furthermore, lowering pollution to World Health Organization (WHO) standards might extend the life expectancy of Delhi people by 9.4 years. North India, which has a high dual load of residential air pollution and ambient particulate matter, would have had the largest potential increase in life years.

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The key factors that are affecting Delhi's air quality

In an effort to address the problem, the Indian government is taking a number of actions to reduce air pollution in Delhi. Delhi's landlocked location, the burning of crops in nearby states (Punjab, Haryana, and Rajasthan), vehicle emissions, industrial pollutants, and extensive building activity are the main causes of the city's concerning air pollution levels.

(A) Crop Burning

Fire is frequently used to manage agricultural fields, particularly in developing nations. Farmers utilize slash-and-burn methods to clean the soil before planting since they have little funds for fertilizer. Farmers no longer need to purchase seeds frequently throughout the year because fire can be used to clear fields and eliminate agricultural trash from past harvests. One of the most frequent causes of air pollution is the burning of crop leftovers. The local and regional environment is impacted by the burning of crop leftovers. The soil's ability to hold nutrients is also negatively impacted. About 48 million tons of straw are produced annually from 10.5 million hectares (26 million acres), of which about 39 million tons are burned.

(B) Industrial Pollution

Due to their release of airborne pollutants, industries are referred to as pollution sources. The most pollutants are released into the atmosphere and dispersed over the surrounding areas by factories that depend on one another. The majority of these facilities are found in cities and pose health hazards to the local population. Approximately 18.6% of the bad air quality in the Delhi-National Capital Region (NCR) is caused by industrial pollutants. Near the busiest thoroughfares, industrial zones emit between 200 and 1000 tons of emissions annually.

(C) Vehicular Emissions

The release of hazardous materials into the environment by motor vehicles is known as vehicular pollution. These substances, referred to as pollutants, have some detrimental impacts on the environment and human health, such as the creation of particulate matter, acid rain, and ground-level ozone. Heart disease, pulmonary conditions, and other problems may result from this. In March 2018, Delhi had 10.9 million cars, including more than 7 million two-wheelers. The number of automobiles per thousand inhabitants rose from 317 to 598 throughout this time, even though the annual growth rate of vehicles decreased from 8.13 percent in 2005–06 to 5.81 percent in 2017–18. As of March 31, 2018, 10.986 million motor vehicles were operating on the national capital territory's highways.

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(D) Construction

Reducing the adverse effects of construction operations on the environment is a crucial component of being a responsible global citizen. Pollution from industrial manufacturing operations, such as mining and quarrying, is referred to as manufacturing pollution.

(E) Impact of Ozone

The majority of the UV light from the Sun is absorbed by the ozone layer, which is a layer in the Earth's stratosphere. While it has a low concentration of other gases in the stratosphere, it has a high concentration of ozone (O3) compared to other sections of the atmosphere. Earth's "sunscreen" is the stratospheric ozone layer, which shields life from the sun's excessive UV rays. However, the ozone layer is being weakened by dangerous chemicals like CFCs, which can affect those who are susceptible to UV rays.

At the moment, the ozone layer is lessening its harm, and because of global action, it should completely recover by 2065. Ozone at ground level might be harmful to your health. Chest pain, coughing, throat inflammation, and congestion are just a few of the health issues it can cause. It can exacerbate asthma, emphysema, and bronchitis. Ozone can also irritate the lining of the lungs and impair lung function. Lung tissue may become irreversibly scarred by repeated exposure. Both natural and human activities produce ozone. Ozone provides Earth's inhabitants with a barrier of protection in the upper atmosphere. However, it can be hazardous to both persons and plants when it oxidizes at ground level.

Ozone inhalation triggers an inflammatory reaction that, in sensitive people, can result in wheezing, coughing, chest tightness, and shortness of breath. Ozone exposure can reduce the amount of air that enters the lungs. Breathlessness and shortness of breath may result from it. Additionally, it causes lung cells to open up, increasing the lungs' susceptibility to contaminants and microbes. After a brief exposure to low amounts of ozone, some persons might suffer short-term impacts, while others might not have any symptoms at all.

Children are no more or less likely than adults to experience negative health effects, according to research. However, children who engage in more outdoor physical activity run a higher risk of injury because their faster metabolisms cause them to breathe up to 20 times as much air per kilogram of body weight as adults. However, some scientific research have suggested that youngsters can be more vulnerable to contaminants like ozone. According to studies, kids spend almost twice as much time outside doing active things as adults do. Every year, millions of kids get sick from breathing air that contains high concentrations of ground-level ozone, a pollutant mostly released by electric power plants, gasoline-powered vehicles, and industrial buildings.

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VOCs and nitrogen oxides in the air combine chemically to produce ozone as well. Exposure to ozone can have disastrous long-term impacts on plants. When ozone strikes plants, the leaf surface is burned and destroyed, which hinders the plant's ability to create adequate nourishment for itself.

Stunted leaves, plant wilting and yellowing, and ultimately death are possible outcomes of this. Plants decrease the amount of stored carbohydrates in their roots and stems in response to shifting weather patterns. Plants become weaker as a result, leaving them vulnerable to drought, disease, pests, and cold.

II. ANTI-POLLUTION POLICY MEASURES: AN EVALUATION

(A) Graded Response Action Plan (GRAP)

o Depending on the present level of pollution, state governments must implement a series of actions known as the Graded Response Action Plan (GRAP) to reduce air pollution. Following orders from the Supreme Court, the Union Environment Ministry announced the recommendations in 2017. To address the increasing pollution levels throughout the year, the government has implemented an emergency GRAP (Graded Response Action Plan). The plan calls on various state governments to take annual action to address combustion, vehicle, and industrial emissions. The plan is designed to be implemented gradually.

- Therefore, when the air quality moves from ‘Poor’ to ‘Very Poor’, the measures listed under both sections have to be followed. Severe+ or Emergency (PM 2.5 over 300 µg/cubic metre or PM10 over 500 µg/cu. m. for 48+ hours).
- Stop entry of trucks into Delhi (except essential commodities)
- Stop construction work
- Introduce odd/even scheme for private vehicles and minimize exemptions
- Task Force to decide any additional steps including shutting of schools
- Severe (PM 2.5 over 250 µg/cu. m. or PM10 over 430 µg/cu. m.)
- Close brick kilns, hot mix plants, stone crushers
- Maximize power generation from natural gas to reduce generation from coal
- Encourage public transportation with varied prices.
- Increased frequency of mechanical road cleaning and watering.
- Very poor (PM2.5 121-250 µg/cu. m. or PM10 351-430 µg/cu. m.)

- Reduce use of diesel generators. - Increase parking fees by 3-4 times.
- Increase bus and metro services.
- To prevent winter fires, apartment owners should provide electric heaters. People with respiratory and cardiac disorders should be advised to limit outdoor activity. The air quality is moderate to bad (PM2.5 61-120 µg/cu. m. or PM10 101-350 µg/cu. m.).
- Implement substantial fines for garbage burning. - Close/enforce pollution control measures in brick kilns and industries. - Implement automated sweeping and water sprinkling on high-traffic roads. - Strictly implement a prohibition on fireworks.

(A) National Clean Air Program

The National Clean Air Program (NCAP), which began in 2019, is India's main effort for breathing cleaner, healthier air. The program aims to clean up the urban and rural environments by reducing emissions from point sources and raising awareness of best practices. To strengthen existing climate change-related legislation, they evaluated the plans' robustness using information on pollution sources and their contributions, background information on pollution sources and their contributions, legal backing for the clean air action plan, measuring costs, and an existing institutional accountability regime.

They employed the Tally Chart Method (TCM) to estimate city- and sector-specific mitigation measures, actions required by various implementation agencies to achieve different results, and promotional and institutional interventions administered by various organizations. Transportation and road dust account for 50% of action points, followed by industrial actions. Domestic cooking and heating are specified as a source in only 42 plans, accounting for 2% of all action points.

The current Economic Survey conducted by the Government of India emphasized the Union government's spending to minimize agricultural crop burning, as well as initiatives in Delhi to recycle building and demolition wastes. Furthermore, there are important questions to be raised concerning this policy endeavor. The lack of clarity on financial provisions, non-legal obligations, and a lack of a legal framework may reduce the program's efficacy.

(B) Odd Even Scheme

The Odd-Even road rationing program, which allows vehicles to run on alternate days based on whether the final digit of their license plates is odd or even, went into effect in Delhi at 8 a.m. on Monday, as the national capital remained blanketed in dense, deadly fog. The Delhi government has implemented a traffic rationing plan to reduce pollution in the capital. Pollution

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from vehicles has been related to respiratory ailments and other health concerns. According to government estimates, 1.2 million of Delhi's over 11 million registered vehicles will be off the road each day for the 12-day drive.

Delhi Chief Minister Arvind Kejriwal tweeted, urging people to support the odd-even system and make it a success. The odd-even plan exempts twenty-nine categories of vehicles, including those of the President and Prime Minister, emergency and enforcement vehicles, and cars transporting schoolchildren in uniform. This excludes electric vehicles. The government anticipates pollution levels to drop by 15% by the end of 2017. According to the report, automotive pollution accounts for around 20% of all pollution in India.

(C) Benefits of the odd-even scheme

- Reduced road congestion and pollution levels.
- Increased public transportation options, including buses and metros, have been implemented in tandem with car restrictions.
- The concept reduces the number of cars on the road by half, hence reducing traffic.
- It raises public awareness of the dangers of air pollution and its effects on human health, and it encourages people to take action to safeguard the environment.
- It observed an entirely different level of passion in order to generate business for private enterprises, which had a positive impact on the system.
- Delhi has several enterprises that emit dangerous pollution, thus, traffic limitations are insufficient.
- Rich households possess multiple cars and drive one with an odd registration number on odd days and another with an even registration number on even days. It will be difficult to implement the strategy since traffic police lack sufficient staff and resources, especially for blatant violations of basic traffic laws.
- The Monopoly of auto rickshaw drivers and cab operators allows them to charge high fares to passengers.
- An effective public transportation system, cleaner autos, and a reduction in other sources of pollution would all help to reduce air pollution.
- It encourages sustainable transportation options.

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III. CONCLUSION

Air pollution, on the other hand, is a chronic issue that necessitates long-term, comprehensive solutions. If the lockdown demonstrated anything, it was that air pollution levels can be significantly reduced if India shifts its energy into a green recovery strategy that is less emissions-intensive. The number of automobiles in the country is the leading cause of pollution. The most prevalent types are diesel and gasoline-induced.

An investigation of Delhi's air quality indicated that particulate matter and nitrogen oxide are the predominant components, although other pollutants like as sulphur dioxide, carbon monoxide, and ozone are within allowed levels. Pollution can have negative consequences for both our lives and the environment. However, with the help of adequate control mechanisms, it is feasible to reduce emissions and contaminated gases in the air. There are several approaches for solving your problem with air filters, absorption, and adsorption. It depends on your specific situation. Chemically specialized filters and scrubbers clean air from a wide range of gases, including difficult odor management, greener solvents, and 99.9999% dust and vapor removal.

Due to the presence of black carbon, Delhi is already experiencing dimming effects (Ramanathan and Carmichael, 2008).To address climate change in Delhi, it is necessary to limit activities such as vehicle traffic, crop residue burning, and industrial pollutants. While current ambient PM2.5 monitoring in Delhi shows high levels in urban areas, remote sensing, complete air quality modeling, and emission inventories indicate a large-scale excess above the NAAQS in rural areas.

It is critical to coordinate urban-rural and interstate actions since emissions from urban and rural areas compound one another. While the Union and state governments have taken steps to address many of the primary factors associated to Delhi's poisonous air, the challenge is complicated and will necessitate long-term, multi-sectoral solutions.

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 [ISSN 2581-5369]