

Comparative Study on Reduction of Fireworks in Delhi and Hyderabad and Implementation of Innovative Ideas to Reduce Air Pollution in India

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Abstract: India is a vast country where the people are identified based on the culture they follow and Indian culture is exposed based on the festivals, cloths, food, languages they use. India is also considered as the most beautiful country in its natural green appearance where other country people choose it has a travel spot only to see its beautiful greenery cities, people's culture, food etc. But due to increase in the lifestyles of people the establishment of new industries, adoption of large number of own transport facilities, involvement of firecrackers in place offirelights has brought the country to fall under the crisis of air, water, sound pollution. The primarily objective is to compare the two Indian cities Delhi and Hyderabad in reduction of fireworks secondarily to provide eco-friendly fireworks and thirdly the aspiration of the paper is concentrating on the innovative ideas to prevent air pollution in India.

Keywords: Air pollution, Fireworks, Innovative Ideas, Reduction.

I. INTRODUCTION

Air pollution is a type of environmental pollution that affects the air and is usually caused by smoke or other harmful gases, mainly oxides of carbon, sulphur and nitrogen. In other words, air pollution is the contamination of air due to the presence or introduction of a substance which has a poisonous effect.

Air pollution in India is a serious health issue. Of the most polluted cities in the world, 21 out of 30 were in India in 2019. Air pollution in India both indoor (household) and outdoor, has had a significant impact on the health of citizens as well as the economy. The adverse effects of air pollution are not just restricted to the urban areas but also impact rural areas, where a majority of the population relies on kerosene and burning of biomass for lighting and cooking purposes respectively. (Ravindra et al., 2003; Wang et al., 2007). These firecrackers when burnt can release various gaseous and particulate air pollutants and toxic metals to significant quantity and degrades the air quality as a whole. In California, USA a study following the Fourth of July holiday reveals significant increase in the levels of ambient air magnesium, aluminium, potassium lead, barium, strontium, and copper. The study also reports the original chemical composition and particle size of typical firework mixtures (Liu et al., 1997).

OBJECTIVE OF THE STUDY:

1. To compare the two Indian cities Delhi and Hyderabad in reducing of fireworks.
2. To study and examine the eco-friendly fireworks.

3. To concentrate on the innovative ideas to prevent air pollution in India.

NEED OF THE STUDY:

As the human being is a social person the happiness is shared equally among all in the society. Nowadays for every event burning of firecrackers becoming a trend to highlight the event, but burning of these firecrackers though gives the short-term satisfaction for the people but it causing it impact on others in the negative way the burning of firecrackers leads to air, water, sound pollutions. The study concentrates on the reduction of harmful environment damage fireworks to the eco-friendly fireworks. And encouraging for utilization of innovative ideas for reducing the harmful effect of fireworks to the environment.

II. RESEARCH METHODOLOGY

This study contains the data which is a secondary data collected from different websites, papers, books, newspapers, magazine. And also, data related to reduction of fireworks the present scenario of two states of India i.e., Delhi and Hyderabad have been collected from the secondary source and compared.

COMPARATIVE STUDY:

Firecrackers are used in the Indian festival of light (Diwali), and also for certain ceremonies. Shivakasi, a city located in South India supply Firecrackers to all over India. In October 2017 Supreme Court banned firecrackers in Delhi, Industry says it stares at Rs 1,000-crore loss and layoffs. A firecracker (cracker, noise maker, banger, is a small explosive device primarily designed to produce a large

amount of noise, especially in the form of a loud bang, usually for celebration or entertainment; any visual effect is incidental to this goal. They have fuses, and are wrapped in a heavy paper casing to contain the explosive compound. Firecrackers, along with fireworks, originated in China. Firecrackers are commonly used in celebration of holidays or festivals, such as Halloween, Independence Day (also known as the Fourth of July) in the United States, Diwali in India, Eid al-Fitr in Southeast Asia, Tihar in Nepal, Day of Ashura in Morocco, Guy Fawkes Night or Bonfire Night in the United Kingdom, Halloween in Ireland, Bastille Day in France, Spanish Fallas, in almost every cultural festival of Sri Lanka (e.g. Sri Lankan New Year), New Year's Eve and New Year's Day, and in the celebration of Chinese New Year by Chinese communities around the world. In Wales the slang term for a firecracker, typically used on Guy Fawkes Night, is a "jacky-jumper"

HOW ARE FIREWORKS HARMFUL TO THE ENVIRONMENT?

Fireworks cause extensive air pollution in a short amount of time, leaving metal particles, dangerous toxins, harmful chemicals and smoke in the air for hours and days. Some of the toxins never fully decompose or disintegrate, but rather hang around in the environment, poisoning all they come into contact with.

ECO-FRIENDLY FIREWORKS:

Environmentally-friendly fireworks have been developed to reduce the amount of atmospheric pollution produced.

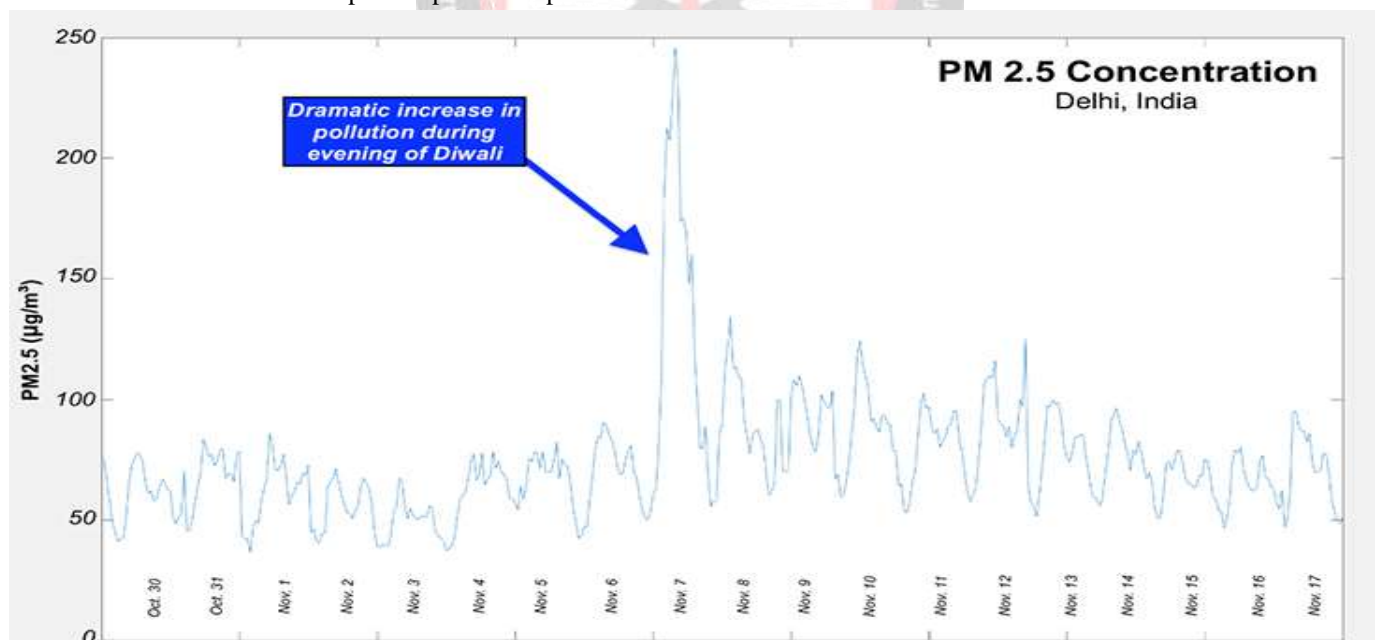
Traditional fireworks are normally made using a charcoal and sulphur fuel, a perchlorate oxidiser to help with burning, plus binders, colourants and propellants. When ignited, the pyrotechnics are spectacular, but they emit large amounts of smoke, unused perchlorates and metal by-products from the colourants, all of which are contaminants.

Eco-friendly fireworks have a clean burning, nitrogen-based fuel. This means a perchlorate oxidiser is not needed and because there is little smoke, only small amounts of metal salts are needed to produce the brilliantly coloured flames.

The regular firecrackers pose high degree of pollution and health risks. The green crackers or eco-friendly crackers are manufactured from alternative raw materials to leave lesser impact on the environment and pose lesser health risks.

DELHI FIREWORKS:

A study that came out last August turned up a recent, consistent trend. It linked Diwali fireworks in the Indian capital to short term — but extreme — air pollution. Indeed, the authors of that study concluded: "To our knowledge this is the first causal estimate of the contribution of Diwali firecracker burning to air pollution." India found it hard to enforce the ban. Many people still set off firecrackers. And air monitoring stations around New Delhi. Amounts of the smallest and most risky particles, known as "fines," topped out at nearly 250 $\mu\text{g}/\text{m}^3$ — a whopping 150 $\mu\text{g}/\text{m}^3$ above normal.



With Delhi's air quality reaching dangerous levels around Diwali every year, the Supreme Court had in 2018 banned polluting firecrackers and ordered that only green crackers - which are said to cause 30 per cent less pollution- can be manufactured and sold. It also set a two-hour time limit for setting these off.

"The air becomes heavier as winter approaches and pollutants like PM 2.5 and smaller particles - which are very harmful not only for humans but for the entire ecosystem - can remain trapped in it for days. If it doesn't rain or the wind doesn't blow it away, these can hang in the air close to the ground for days and eventually it end up in

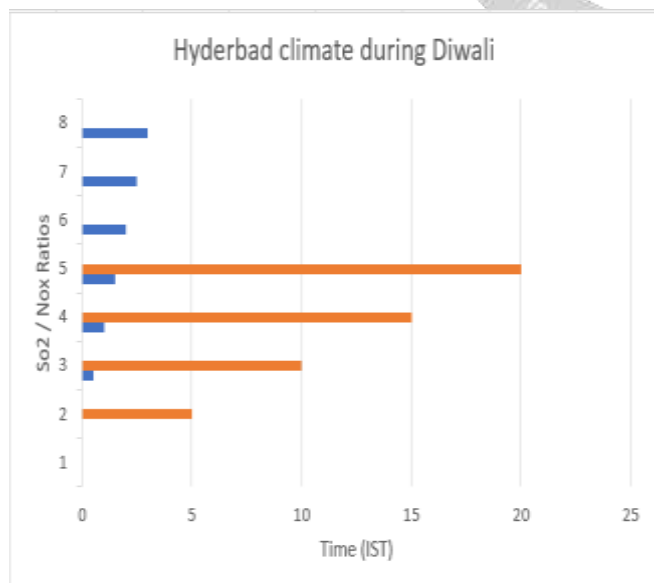
our lungs," said Ashish Sharma, a city-based environment activist.

According to the WHO, India has 14 out of the 15 most polluted cities in the world in terms of PM 2.5 concentrations. Other Indian cities that registered very high levels of PM2.5 pollutants are Delhi, Patna, Agra, Muzaffarpur, Srinagar, Gurgaon, Jaipur, Patiala and Jodhpur, followed by Ali Subah Al-Salem in Kuwait and a few cities in China and Mongolia.

Air Quality Index (AQI) is a number used to communicate the level of pollution in the air and it essentially tells you the level of pollution in the air in a given city on a given day. The AQI of Delhi was placed under the "severe-plus category" when it touched 574, by the System of Air Quality and Weather Forecasting and Research. In May 2014 the World Health Organization announced New Delhi as the most polluted city in the world. In November 2016, the Great smog of Delhi was an environmental event which saw New Delhi and adjoining areas in a dense blanket of smog, which was the worst in 17 years.

HYDERABAD FIREWORKS:

The experimental site was located at 17.47° N and 78.58° E and at an altitude of 536 m above mean sealevel, at Tata Institute of Fundamental Research—Balloon Facility (TIFR-BF), Hyderabad, Telangana India. The climate of this region is semiarid with a total rainfall amount of ~ 700 mm occurring mostly during the monsoon season in the period June–October. The climatology of this area experiences four dominant seasons, winter (December–February), pre-monsoon (March–May), monsoon (June–September), and post-monsoon (October–November) (Badrinath et al. 2010).



Pre Diwali day

Post Diwali day

Telangana government has not completely taken the step to ban the firecrackers but the state has implemented the specific time limit for burning the crackers on the festival Diwali and mostly it is not accepted by the people of Hyderabad.

Air pollution data from World Health Organisation

PM₁₀ 79

PM_{2.5} 59

PM₁₀ pollution level: High

Index

Pollution Index: 76.60

Pollution Exp Scale: 134.49

As part of an ongoing case in the National Green Tribunal (NGT) regarding the NCAP, the CPCB on Friday submitted a compliance report of various directions issued by the NGT in August 2019. It may be mentioned here that the CPCB had identified 122 cities where city action plans have been prepared as part of NCAP to bring down air pollution levels. In Telangana, three cities were identified, namely Hyderabad, Nalgonda and Sangareddy.

The CPCB prepared an environmental compensation regime for the non-attainment cities, based on their population, and a timeline of commitments. As part of this regime, Hyderabad falls in the category of cities having population above 50 lakhs.

The environmental compensation set by CPCB for this category of city is Rs 35 lakh per month (if a target set to be achieved within six months is not achieved in the committed timeline) or Rs 55 lakh per month (if a target set to be achieved within five years is not achieved before the set timeline).

RECENT COMPARISON OF POLLUTION IN DELHI AND HYDERABAD

Index	Delhi	Hyderabad
Pollution Index:	91.31	76.6
Pollution Exp Scale:	166.39	134.49

Air Pollution data from World Health Organisation

	Delhi	Hyderabad
PM ₁₀	229	79
PM _{2.5}	122	59

Pollution Delhi vs Hyderabad

Air Pollution
 Drinking Water Pollution and Inaccessibility
 Dissatisfaction with Garbage Disposal
 Dirty and Untidy
 Noise and Light Pollution
 Water Pollution
 Dissatisfaction to Spend Time in the City
 Dissatisfaction with Green and Parks in the City
 Contributors:
 Last Update:

Delhi	Hyderabad
Very High 88.75	High 69.22
High 63.03	Moderate 55.00
High 75.04	High 66.83
High 72.00	High 65.68
High 64.49	High 60.13
High 77.35	High 70.15
High 79.38	High 63.53
Moderate 51.69	Moderate 56.21
633	324
March 2020	March 2020

Purity and Cleanliness Delhi vs Hyderabad

Air quality
 Drinking Water Quality and Accessibility
 Garbage Disposal Satisfaction
 Clean and Tidy
 Quiet and No Problem with Night Lights
 Water Quality
 Comfortable to Spend Time in the City
 Quality of Green and Parks

Delhi	Hyderabad
Very Low 11.25	Low 30.78
Low 36.97	Moderate 45.00
Low 24.96	Low 33.17
Low 28.00	Low 34.32
Low 35.51	Low 39.87
Low 22.65	Low 29.85
Low 20.62	Low 36.47
Moderate 48.31	Moderate 43.79

III. FINDINGS

The study shows that Delhi is in the greater danger as compared to Hyderabad not only in fireworks related air pollution, but in general comparing the states it has been highlighted that Delhi took the first place showing it as a high polluted city compared to Hyderabad. Fireworks has been banned in Delhi, but Hyderabad as reduced the time limit for entertaining the firecrackers. Government of Delhi in the present scenario concentrating more on the reduction of air pollution issues in the state as compared to Hyderabad.

digit cars could be driven on the remaining days of the week.

❖ Innovations to Monitor and Fight Air Pollution in India

When confronted with the evidence, it's difficult to minimize the effects of our polluted environment. According to the WHO, air pollution is now considered to be the world's single largest environmental health risk, with an estimated 7 million deaths linked to the problem each year. Most of the issues lie in urban areas of the world, where populations are often exposed to pollution levels that are 2.5 times higher than recommended.

IV. RESULT

Because this has become a global problem, many of best innovative minds have set out to develop solutions. Here are just few of the most inspiring innovations that are helping economy both monitor and reduce air pollution.

1. A Revolution from Pollution

Delhi-based Chakr Innovation curbs air pollution with the world's first retro-fit emission control device for diesel generators. It captures ~90% of particulate matter emissions from the exhaust air without reducing energy efficiency. The diesel soot captured from the exhaust is converted into inks and paints.

2. Solar Ferry

ADITYA, India's first solar ferry, built by NavAlt Solar & Electric Boats, brings together innovation in naval design and engineering, solar power and advanced controls. It is India's first commercially viable solar-powered ferry. The 75-seater ferry gets over 80% of its energy from the sun and can cruise over 6 hours on a sunny day.

- I. A decreasing trend has been observed in sulphur dioxide levels in residential areas of many cities such as Delhi, Mumbai, Lucknow, Bhopal during last few years. The decreasing trend in sulphur dioxide levels may be due to recently introduced clean fuel standards, and the increasing use of LPG as domestic fuel instead of coal or fuelwood, and the use of CNG instead of diesel in certain vehicles.
- II. Of the four major Indian cities, air pollution was consistently worse in Delhi, every year over 5-year period (2004–2018). Kolkata was a close second, followed by Mumbai. Chennai air pollution was least of the four.
- III. The government in Delhi launched an Odd-Even Rule in November, 2017 which is based on the Odd-Even rationing method: This meant that cars running with number plates ending in Odd digits could only be driven on certain days of the week, while the Even

3. Cleantech for Health and Clean Air

Cell zyme Biotech from Coimbatore uses an engineered enzyme to make antibiotics at room temperature without using solvents – a main contributor to air quality. The novel production process reduces the environmental footprint by replacing harsh industrial chemicals and conserving energy.

4. Cooking with Radiant Heat

Inspired by the traditional Indian method of cooking on charcoal, Agnisumukh manufactures commercial kitchen equipment driven by innovative, energy efficient radiant heat gas burners. These ultra-efficient cooking stoves save 30% on gas, improve cooking and help beat indoor air pollution in commercial kitchens.

Some goals set for future are:

1. Reduce Carbon Emissions: "According to Inter-governmental Panel on Climate Change, to limit warming well below 2 degree Celsius, CO2 emissions should decline by about 20 per cent by 2030 and reach net zero around 2075; to limit warming below 1.5 degree Celsius, CO2 emissions should decline by 50 per cent by 2030 and reach net zero by around 2050.
2. Analyse health data and study the efficiency of different room filtration systems in areas where indoor air pollution is highest.
3. Provide farmers with a machine called a Happy Seeder which converts agricultural residue to fertilizer.
4. Clean up the transportation sector by introducing 1,000 electric public transport buses to its 5,50-string feet.
5. Meet a goal of 25% of private vehicles to be electricity powered by 2023.
6. Identify effective ways to inform the public about air pollution data.
7. Launch new citizen science programs to better document exposures.

V. CONCLUSION

The study gives the brief view regarding two cities overview about the fireworks causing air pollution. The paper concentrated on the causes and implementations taken by both the cities. The paper shows that Delhi is more into the way of air pollution compared to Hyderabad. And the study highlighted the recent inventions taken place in the country for the reduction of air pollution. Ther cities and states should concentrate on future scope of eco-friendly fireworks so that it can be in safe zone. The study shows how government taken step forward on concentrating on air pollution. And how individuals came forward with innovations to present a eco – friendly environment. Create a eye spark with natural fire which not gives the sound but skips the darkness with its light.

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