Arun Duggal Centre for Clean Air (CERCA)

Indian Institute of Technology Delhi
Research on Air Pollution and Climate Change

Monthly Newsletter **October 2021**

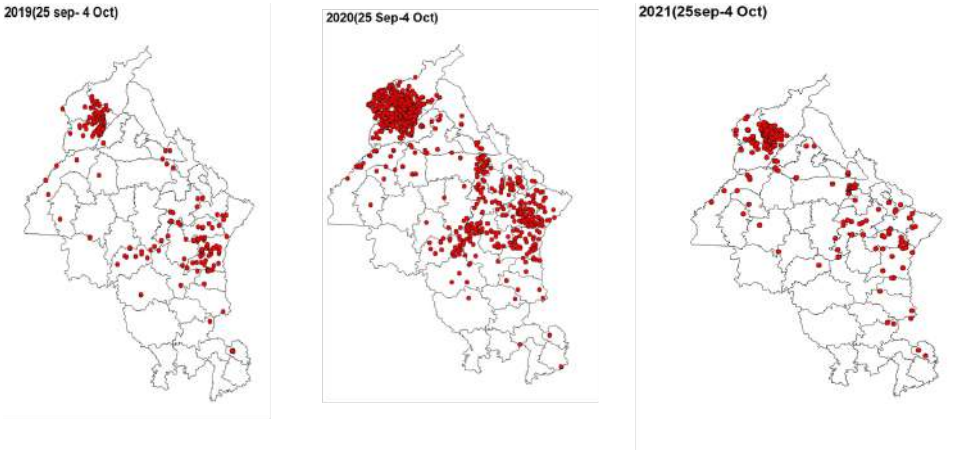
Editorial

The economic and health cost of Air pollution

Dear Readers,

Air pollution takes its toll on the economy in several ways like loss of human lives, reduced productivity, damage to food & monuments, and reduced functional ability of ecosystems to perform vital societal functions that in turn cost lots of money for remediation. India's score on air pollution indexes over the past several years has been rather unfavorable and according to Greenpeace, it costs the nation, on average $150 billion per year. According to a study done by the India State-Level Disease Burden Initiative in Dec 2020 on the health and economic impact of air pollution published in Lancet Planetary Health, air pollution alone was accountable for 18% of the total deaths in India (1.7 million) in 2019 resulting in an economic loss of 1.4% of the GDP equivalent to US$ 36.8 billion. The substantial adverse impact of air pollution in India on output could retard the country's overall economic development unless the issue is addressed on priority and investments are made in state-specific air pollution control strategies. Introduction of improved technology & additional measures to reduce air pollution will result in loss of jobs in some sectors such as the fossil fuel sector but it would be offset by the gain in jobs in some other sectors like the building and equipment sectors resulting in more efficient use of resources and increased health benefits leading to increase in national GDP. When air quality improves, the market costs of air pollution will decrease, with resulting macroeconomic benefits. A larger and efficient clean technologies market will reduce production costs of required equipment thereby further reducing the cost of other abatement measures. As our nation gears up to reduce emissions from its coal-fired power plants by retrofitting them with Flue Gas Desulphurization technology, none of which is currently manufactured in India, hence it definitely presents a huge opportunity for India to expand its possibilities for growing clean technology industry, thereby resulting in economic and health benefits from improved air quality in the longer term.

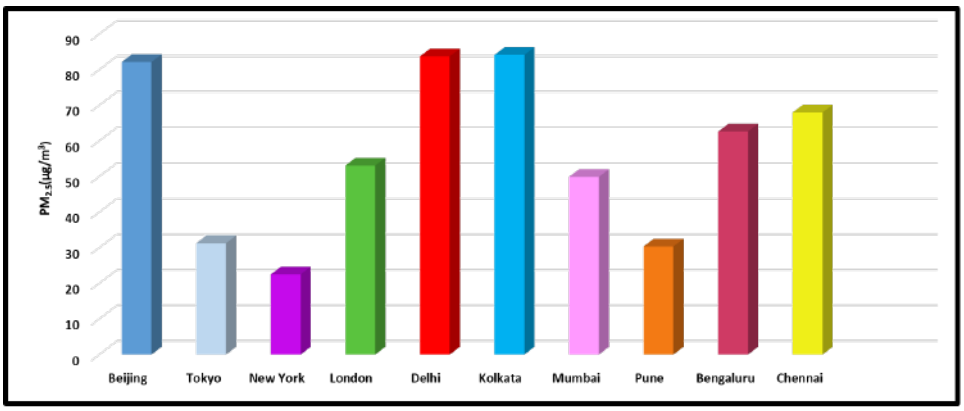
Regards,
Hemant Kaushal
Pr. Coordinator
Arun Duggal Centre for Clean Air (CERCA)
Indian Institute of Technology Delhi



Crop Residue Burning (CRB) over northern India is a major air quality and human health issue. This concern has resurfaced again as farmers have resumed the crop residue burning. The figure above shows the status of CRB in Punjab and Haryana. This analysis has been performed for three consecutive years for a time period of 10 days (25 Sep -4 Oct). The number of incidents reported in Punjab in 2021 came out to be 244, significantly lower than the last year(1198 in 2020) but slightly higher when compared to 2019(it was 120). Most of these incidents were reported in Amritsar and Taran tarn as a similar pattern is observed every year for these places

Additionally, in Haryana, 37 incidents have been reported this year, quite lower than 2020 and 2019(250 in 2020 and 104 in 2019) Overall, this year, the number of fire counts has decreased significantly as compared to 2020 in both states but air pollution concerns have now resurfaced in northern India.

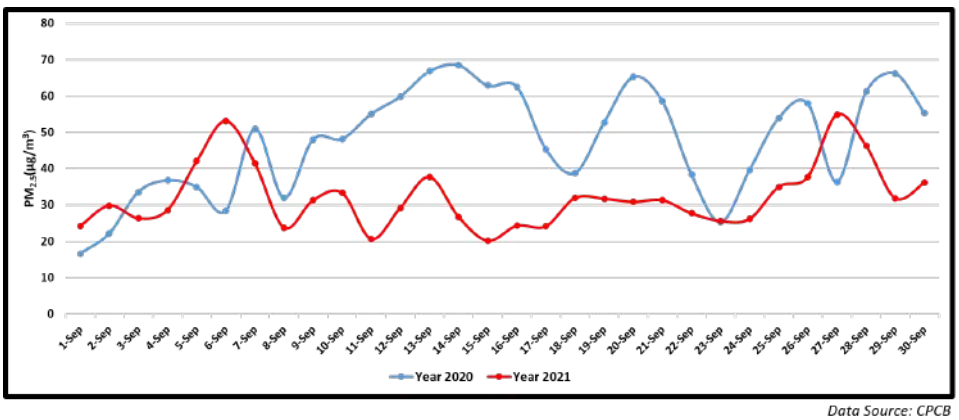
Air Quality Trend September 2021: Kolkata is found to be the highly polluted city among different Indian & International Cities



Data Source: aqicn.org

The graph shows the daily average $PM_{2.5}$ for the month of September 2021. Amongst the popular cities worldwide, Kolkata has shown the highest concentration of $PM_{2.5}$ followed by Delhi and Beijing. Delhi and Kolkata rank amongst the topmost polluted cities worldwide while the other Indian cities in the graph are amongst the top 10 metropolitan cities. Since April 2021, Delhi and Kolkata have been constantly topping the list of most polluted cities on an international scale.

Air Quality Trend for Delhi: One of the Most Polluted Cities



Data Source: CPCB

As Covid-19 cases in September 2021 are on a steep decline, almost negligible, Delhi has been fully unlocked. The impact of more rainfall in this month is quite evident with the decrease in $PM_{2.5}$ levels relative to the last year and the increase of social gatherings and anthropogenic activities on the Delhi Air Quality can be clearly correlated and observed in the graph with some jumps in the levels. $PM_{2.5}$ has decreased by 15.26 $\mu g/m^3$ on average in September 2021 as compared to September 2020.

CERCA Monthly Lecture Series

From Air pollution to Climate change, CERCA virtual **Expert Monthly Talk series** spotlights a range of contemporary issues while providing a platform for renowned speakers from around the world to share their knowledge and views.

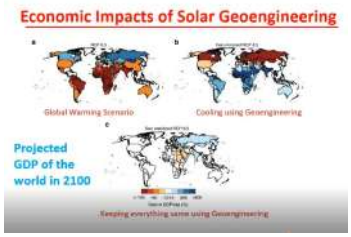
UPCOMING EVENT

To register for this Talk Series, click here

CERCA Events

Expert Talk delivered by Dr. Vikram Singh **on September 30, 2021**

Dr. Vikram Singh delivered a talk on “Climate Change Air Quality Nexus” on September 30th, 2021. He discussed the impact of Air Pollution, black carbon, and methane on climate. Earlier, global warming was quantified by just CO_2. Now, even black carbon and other pollutants play an essential role in determining the permissible levels of CO_2. He also discussed the mitigation strategies and the concept of solar geoengineering. If you have missed this event, the link below will direct you to the recorded video.



Watch the complete Expert Talk Series Here.!

CERCA Expert Opinion and Research Outcomes

“Decoding new WHO air quality guidelines for India” - An Opinion Paper by Arun Duggal **and** Dr. Sagnik Dey

Arun Duggal is the founder of CERCA and Dr. Sagnik Dey is an Associate Professor, Centre for Atmospheric Sciences, Indian Institute of Technology-Delhi, and coordinator of CERCA, IIT-D.

The authors penned their opinion on the interpretation of new air quality guidelines (AQGs) issued by the World Health Organization (WHO) with respect to India. The annual AQG levels for particulate matter smaller than 2.5 ($PM_{2.5}$) and 10 (PM10) µm are lowered to 5 and 15 µg/m^3 from the existing levels of 10 and 25 µg/m^3, respectively. The epidemiological studies in the literature have guided the WHO in setting the new AQG. The authors decoded the new AQGs for India and the steps that India should come forward with, in order to meet the goal of providing clean air to the public as well as to achieve their goal of sustainable development.

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Performance evaluation of air pollution control device at traffic intersections in Delhi
S. Gulia, S. Kaur, S. Mendiratta, R. Tiwari, S. K. Goyal, P. Gargava & R. Kumar

- CSIR-NEERI developed WAYU (Wind Augmentation and purifying Unit) to remove particulate and gaseous pollutants from urban hot spots such as traffic locations.
- Two different designs of WAYU at different traffic locations in Delhi were evaluated.
- It showed that the current design of WAYU removes PM10 and PM2.5 concentrations in the range of 34–49% and 19–25%, respectively from the inlet air.
- The total PM collected from all WAYU devices was 34.19 kg from 120,557 operating hours at all the sampling sites.

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Global assessment of tropospheric and ground air pollutants and its correlation with COVID-19
H.R. Naqvi, G. Mutreja, M. Hashim, A. Singh, M. Nawazuzzoha, D.F. Naqvi, M.A. Siddiqui, A. Shakeel, A.A. Chaudhary, A.R. Naqvi

- This study evaluates the global impact of lockdowns on air pollutants using tropospheric and ground-level indicators over a five-month period.
- The relationship between air pollution and COVID-19 cases and mortalities was examined.
- Significant reductions were observed in the global tropospheric and ground-level AP post-lockdown.
- Transient reduction in pollutants followed by restoration towards pre-lockdown levels.
- NO2 and O3 positively correlated with SARS-CoV-2 cases and mortalities.

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Air pollution could cut life expectancy by 9 years in north India, in Maharashtra, M.P. by additional 2.5 years: study

The University of Chicago's Air Quality Life Index (AQLI) report studied how much longer a person can live if they breathe clean air and found residents of northern India are on track to lose more than nine years of life expectancy if pollution levels of that of 2019 persist as India's average particulate matter concentration was 70.3 microgram per cubic meter (µg/m^3) in 2019, the highest in the world and seven times the World Health Organisation's (WHO's) guideline of 10 µg/m^3.

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India's indigenous air quality forecasting model gets international peer-review

The first official, an indigenous framework to forecast air quality in four Indian metro cities, namely Mumbai, Pune, Ahmedabad, and Delhi by the System of Air Quality and Weather Forecasting And Research (SAFAR), was published in the international peer-reviewed Elsevier Journal of Environmental Modelling and Software. SAFAR's forecasting model is comparable to the framework by the United States Environmental Protection Agency (US-EPA) and this forecasting model consists of six different verticals

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WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide

WHO issues the first air quality guidelines since 2005, WHO has now revised recommendations for air quality standards, although they are not legally binding for countries, but may represent a turning point in the way we approach air pollution globally. It slashed recommended limits for emissions linked to fossil fuels, as air pollution is a threat to health also alongside climate change. Exposure to air pollution results in 7 million deaths a year. Although the burden of air pollution is heterogeneous, its impact is ubiquitous. These guidelines come at a time of unprecedented challenges, in the face of the ongoing COVID-19 pandemic and the existential threat of climate change

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New real-time air pollution exposure calculator boosts the quality of air quality monitoring

The UN Environment Programme (UNEP), in collaboration with IQAir, a Swiss air quality technology company, has developed the first real-time air pollution exposure calculator. This calculator combines global governmental, crowd-sourced, and satellite-derived air quality data with population data and applies artificial intelligence to calculate – every one hour – country population exposure to air pollution, specifically to the fine particulate matter (PM2.5) that is largely responsible for deaths and illnesses linked to air pollution. This real-time air pollution exposure calculator is an important step in our efforts to utilize technology to support cleaner air and, in turn, improved health and a healthier environment.

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