



Editorial

Dear Readers,

As the year 2022 dawns, one can feel and witness the break neck speed with which the world is changing. Unnatural disasters happening due to a changing climate along with new technologies promising to bring a whole new paradigm shift in the way we live and think along with political actions and reactions makes this pace of change really exciting but also disorienting due to the vexing challenges and unprecedented opportunities that it brings along. Renewable energy is leading the race for cleaner air and creating new hope for preventing the worst impacts of climate change. Our country is working hard to accelerate our transition away from fossil fuels by creating appropriate policies. If every state in India encourages citizens to install solar panels on their homes or at least mandate installation of solar panel on every new home through appropriate policies, India could well be on its way to not only greatly increase its solar energy capacity but also cut its CO₂ emissions significantly which would be equivalent to taking millions of cars off the road. Another key priority area should be to create smart energy policies that would allow flow of more clean energy into the grid. A large cause of GHG emissions in our country is its dependence on the IC engine-based transportation system which is also a major source of air pollution. Encouraging Retrofit EVs along with a battery charging infrastructure through forward looking policies can help in faster transition to electric vehicles in India. Investing more resources in transport electrification, land use change including safe biking and walking infrastructure in cities can help clean and decarbonize India. Time has come for all of us to recognise in our common future that action on air pollution and climate change is a key step for achieving meaningful progress towards Sustainable Development Goals (SDGs). Clean air delivers high returns in terms of health, climate, and the economy and should be accorded top priority in all development activities & programmes including clean air reporting. Investment prioritization in clean & carbon-free technologies vis-à-vis fossil-fuel based will bring immediate benefits and save many lives. After all, everyone gets a better chance to flourish in a world with clean air !



Wishing all our readers a very happy, healthy and a cleaner New year 2022!

Hemant Kaushal
(Pr. coordinator)
Arun Duggal Centre of Excellence for Research in Climate
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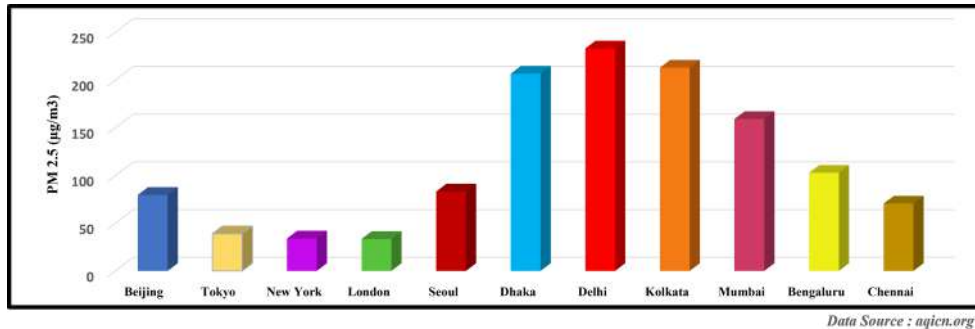


Air Quality Trends



Indian & International Cities- December 2021

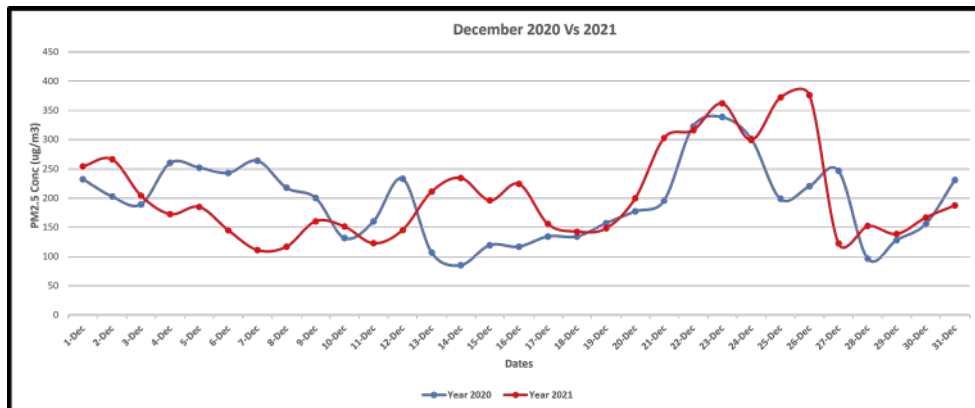
Delhi is found to be the highly Polluted city



Data Source : aqicn.org

The graph above shows the daily average PM_{2.5} for the month of December 2021. Amongst the popular cities worldwide, Delhi has shown the highest concentration of PM_{2.5} followed by Kolkata and Dhaka. Delhi and Kolkata within India rank amongst the topmost polluted cities worldwide while the other Indian cities in the graph are amongst the top 10 metropolitan cities.

Delhi PM_{2.5} (24 hr. daily average) Trend December 2020 Vs December 2021



Data Source : CPCB

December in 2021 recorded the air quality that ranged from poor to severe. The meteorological conditions like low temperature, low ventilation rate and light winds impacted the dispersion of pollutants and resulted in trapping the local pollutants. In addition to these, a long-running decline in COVID-19 cases resulted in an increase of social gatherings and anthropogenic activities whose impact is visible on the Delhi Air Quality, which can be clearly correlated and observed in the graph. Hence, PM_{2.5} has increased by 9.33 µg/m³ on an average in December 2021 as compared to December 2020 with slight variation.



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.



CERCA IIT Delhi Expert Talk Series



Pallavi Pant

Senior Scientist, Health Effects Institute (HEI), USA

Date and Topic
Will be announced soon

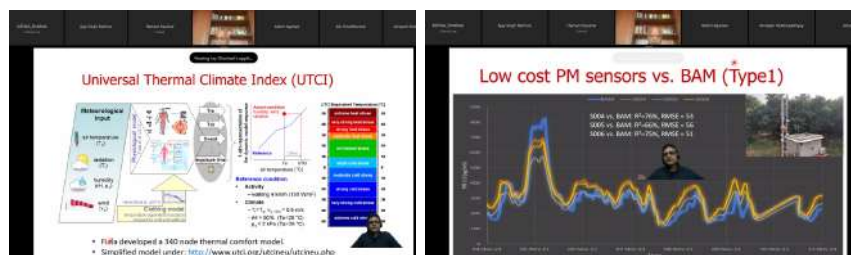
Hosted by:- Arun Duggal Centre of Excellence for Research in Climate Change and Air Pollution, IIT Delhi

To register for this January 2022 Talk Series, [Click here](#)



Expert Talk delivered by [Professor Jay Dhariwal](#) on 30th December, 2021

Prof. Jay Dhariwal delivered a talk on "A Breath of Fresh Air" on December 30th, 2021. In recent times of air pollution, covid-19, we spend most of our life in indoor spaces, in the light of this recent change, he discussed the indoor air quality and thermal comfort related trade-offs and the universal thermal climate index. He stressed on the need for adequate ventilation due to high CO₂ levels in the indoor spaces. He threw some light on existing IAQ guidelines and highlighted the learnings from the existing body of work, results from some recent pilot studies and future research directions to update the ventilation guidelines for the country for our and our planet's better health.



If you have missed this event, the link below will direct you to the recorded video.

[Watch the complete Expert Talk Series Here.!](#)

Shudh Vayu Deergh Aayu: "Fighting Air pollution through Innovation"

AIM-iLEAP conducted a panel discussion from eminent industry experts in the Environment sector on December 2nd, 2021. **Mr. Arun Duggal, Founder** of Arun Duggal Centre of Excellence for Research in Climate Change and Air Pollution (CERCA), was also among one of the **panelists**, and shared his views and opinions on fighting the Air Pollution through Innovation. AIM-iLEAP, a series of Enterprise and Investor Demo Days is organized by Atal Innovation Mission, NITI Aayog in partnership with Startup Réseau and VISA to support its various initiatives, programs, and beneficiaries through a structured program.



[Watch the complete Panel Discussion Here.!](#)



CERCA Expert Opinion and Research Outcomes

Ambient air pollution and acute respiratory infection in children aged under 5 years living in 35 developing countries

Daniel B. Odo, Ian A. Yang, Sagnik Dey, Melanie S. Hammer, Aaron van Donkelaar, Randall V. Martin, Guang-Hui Dong, Bo-Yi Yang, Perry Hystad, Luke D. Knibbs

- The study investigates the cross-sectional associations between annual average exposure to ambient PM_{2.5} and acute respiratory infection (ARI) in children aged under 5 years living in 35 LMICs (low- and middle- income countries).
- They combined Demographic and Health Survey (DHS) data from 35 countries with gridded global estimates of annual PM_{2.5} mass concentrations.
- They used multivariable logistic regression models that were adjusted for child, maternal, household and cluster-level factors and fitted multi-pollutant models (adjusted for nitrogen dioxide [NO₂] and surface-level ozone [O₃]), among other sensitivity analyses.
- Annual average ambient PM_{2.5}, as an indicator for long-term exposure, was associated with greater odds of maternal-reported ARI in children aged under 5 years living in 35 LMICs

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Evolution of air pollution management policies and related research in India

Sunil Gulia, Nidhi Shukla, Lavanya Padhi, Parthaa Bosu, S.K. Goyal, Rakesh Kumar

- This article discusses the evolution of air quality management policies in India collating data from a virtual repository called IndAIR (Indian Air Quality Studies Interactive Repository).
- It also highlights the research gaps in the past studies and spatial distribution over the country map using the Geographical Information Systems (GIS).
- Eastern, Southern, and the Central States are the least researched regions of the country with respect to IGPs (Indo-Gangetic Plains) and metro cities.
- The spatial distribution of PM_{2.5} and NO_x concentrations are analyzed and found that highly polluted cities are studied more and vice versa.
- One of the least studied areas of various air quality domains is the socioeconomic effects of air pollution. It revealed several gaps, classified into three categories: research, policies, and economics.

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Association between ambient air pollution and perceived stress in pregnant women

Dirga Kumar Lamichhane, Dal-Young Jung, Yee-Jin Shin, Kyung-Sook Lee, So-Yeon Lee, Kangmo Ahn, Kyung Won Kim, Youn Ho Shin, Dong In Suh, Soo-Jong Hong & Hwan-Cheol Kim

- The researchers used data from a prospective cohort study conducted on pregnant women.
- Average exposures to particulate matter were estimated at maternal residential addresses using land-use regression models. Linear regression models were applied to estimate associations between PSS (Perceived Stress Scale) scores and exposures to each air pollutant.
- These associations were more evident in women with child-bearing age and a lower level of education.
- Their findings support the relationship between air pollution and prenatal maternal stress.

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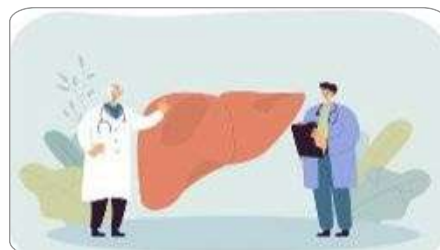


CERCA in Circulation



'Warrior Moms' to spread the word on perils of climate change, air pollution

A Jharkhand district has launched "Warrior Moms", a band of women who will be the



Air pollution is linked to fatty liver disease, finds study

According to a large-scale epidemiologic study, links have been identified between long-term exposure to ambient air pollution

flag-bearers of a campaign to build awareness on climate change and fight air pollution with the express intention of building a better future for children. Warrior Moms is a national level mother's movement, where women have come together to advocate for their children's future as there is insufficient action from decision makers on the issue.

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Environment ministry finalizes coal thermal power plant categories: What does it say about emission norms compliance

The Union ministry released a list of coal thermal power plants and their categorisation in line with its April 2021 notification. Coal thermal power plants contribute to over half sulphur dioxide (SO₂) concentration, 30 percent oxides of nitrogen (NO_x), 20 percent particulate matter (PM) in the ambient air. It is clear from the categorisation list and compliance status given by CEA for December 2021 that 35 percent of the total coal power capacity belonging to all three categories is going to miss their respective deadlines. Of this, 19 per cent would be category A; 11 per cent from Category B and 70 per cent from Category C. Nearly 78 per cent of the coal power capacity in India is not liable to meet emission norms before 2024

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Plastic production accounts for much larger carbon footprint than previously thought

Plastic production accounted for 96 per cent of the particulate matter health footprint, according to a new study led by ETH Zurich, a public research university published in Nature Sustainability. Half of this was attributed to combustion of coal. This was due to growth in plastic production in coal-based economies. Due to the increased reliance on coal, the fossil resource footprint of plastics, including fossil resources used as fuel and feed-stock for plastics production, has tripled since 1995. Fossil fuels combusted for global plastics production released a total of 1.7 GtCO_{2e} in 2015, the study found. The researchers found that the impact of plastic on climate and health is greater than previously thought due to the increased use of coal. China, Indonesia and South Africa, were among the major drivers of the increasing carbon footprint from plastics.

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and metabolic-associated fatty liver disease (MAFLD) that poses a substantial global burden. The research has been published in the 'Journal of Hepatology'. Researchers found that long-term exposure to ambient air pollution may increase the odds of MAFLD, especially in individuals who are male, smokers, and alcohol drinkers, and those who consume a high-fat diet.

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67 degrees in Alaska: Climate change continues to topple temperature records

According to the National Oceanic Atmospheric Administration, Alaska is warming faster than any other U.S. state and twice as quickly as the global average since the middle of the 20th century. Alaska's Changing Environment notes that, since 2014, there have been 5 to 30 times more record-high temperatures set than record lows. A 2019 analysis by the Associated Press found that new global high temperature records were outpacing new low records by a ratio of 2 to 1. That finding was corroborated by the Environmental Protection Agency. While many locations in Alaska set record-low temperatures in November, it is the ratio that will help decide where 2021 will ultimately rank in terms of warmer overall temperatures.

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Ozone-destroying greenhouse gas emissions from China increased significantly: Study

Emissions of industrially produced chlorocarbons, dichloromethane (CH₂Cl₂), increased in China from 2011-2019, a new study established. The overall increase in CH₂Cl₂ emissions from China has the same magnitude as the global emission rise of 354 Gg per year over the same period. If global dichloromethane emissions remain at 2019 levels, they could lead to a delay of around five years in Antarctic ozone recovery compared to a scenario with no dichloromethane emissions, the report published in Nature Communications noted. The increase in emissions from China plays an important role in the global emissions growth, and these increases have the potential to impact the recovery of the stratospheric ozone layer.

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