



Editorial

Dear Readers,

Happy New Year 2024

In the tapestry of modern living, the air we breathe is increasingly tainted, woven with invisible threads of peril that threaten not only our environment but the very essence of life itself. Air pollution, a silent and pervasive adversary, has entrenched itself in our daily lives, compromising the health of our planet and the well-being of its inhabitants. The sources of air pollution are diverse and addressing the issue of air pollution requires a concerted effort at the national and international levels. Combating air pollution requires a comprehensive and multifaceted approach. Technological innovations, regional cooperation, economic diversification, international commitments, advocacy campaigns, community outreach programs, media engagement, and education are all vital components of a sustainable strategy that can help transition towards methods that protect both the environment and public health. Countries facing similar challenges can share knowledge, best practices, and technologies to collectively combat air pollution.



As we navigate the challenges of the 21st century, a collective and unwavering commitment to environmental stewardship is essential. The fight against air pollution is not an abstract concept; it is a tangible and an urgent necessity. As we inhale the consequences of our past actions, the responsibility to mend our ways rests upon our collective shoulders. Only through concerted efforts, guided by an unwavering commitment to a cleaner and healthier future, can we hope to dispel the shadows that

threaten to engulf us. The time to act is now, for the air we breathe today will shape the legacy we leave for generations to come.

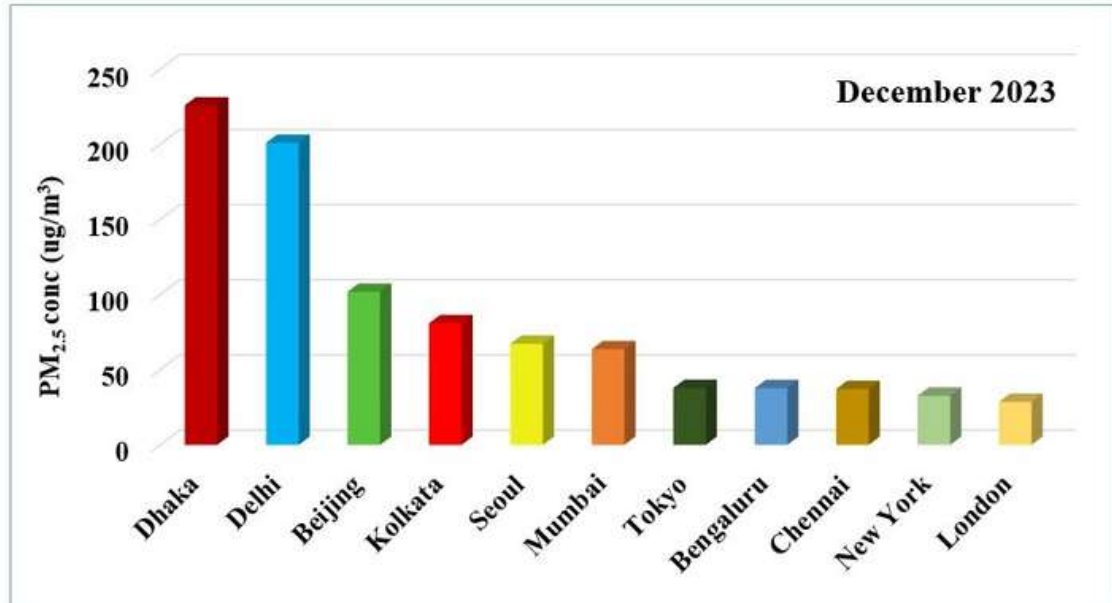
Yours sincerely

Hemant Kaushal
Pr Coordinator,
Arun Duggal Centre of Excellence for research in climate change and air pollution



Indian & International Cities- December 2023

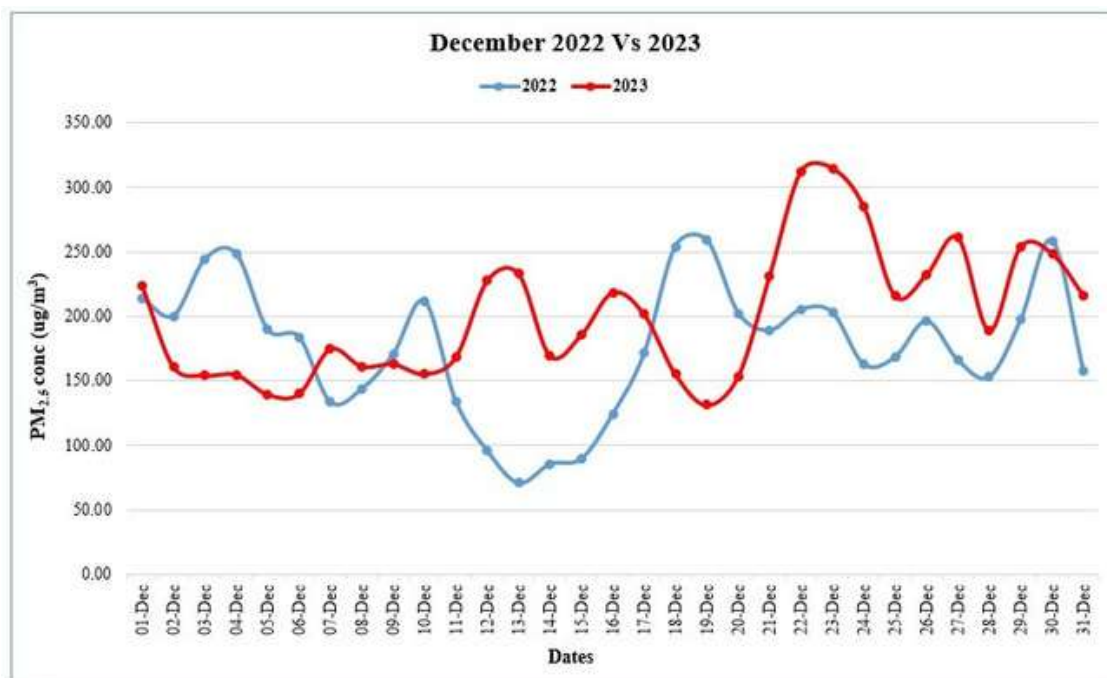
Dhaka has the highest pollution levels



Source:
CPCB (Indian Cities)
aqicn.org (Other Cities)

The graph above shows the daily average PM_{2.5} for the month of December 2023. Amongst the major metros worldwide, Dhaka has shown the highest concentration of PM_{2.5} followed by Delhi and Beijing.

Delhi PM_{2.5} (24 hr. daily average) Trend



Source: CPCB

In December, the average PM_{2.5} concentration was 200.93 ug/m³ for the current year 2023 as compared to the previous year (176.74 ug/m³ for December 2022). The amount of PM_{2.5} has fluctuated in some days and increased in others.

***Stations with missing values for more than 15 days have been excluded*



The CERCA virtual Expert Monthly Talk series spotlights on various pressing issues, including air pollution and climate change. It serves as a platform for distinguished speakers from across the globe to impart their knowledge and perspectives.

CERCA IIT DELHI EXPERT TALK SERIES

What would it mean to centre health in air pollution policy?

**06 Dec, 2023
03:00 PM, IST**

Dr. Bhargav Krishna
Fellow, Sustainable Futures Collaborative

Scan to Register

Arun Duggal Centre of Excellence for Research in Climate Change and Air Pollution

Watch here: [Click this link](#)



Sustainable Air Quality Workshop

The Sustainable Air Quality Workshop, a collaborative effort between CERCA IIT Delhi and DRIIV (Effective Education Vertical), held on 1st December 2023, was an impactful continuation of the previous workshop targeted at school teachers. Last year, we hosted a workshop on Sustainable Air Quality specifically for School Teachers of Grades 7-12 in collaboration with DRIIV and DEEP-C. It was a privilege for CERCA to have CERCA founder Mr Arun Duggal, inaugurate the workshop and interact with school teachers. Our primary goal was to connect educators with air quality experts, technology partners, regulators, and scientists. The workshop encompassed practical activities to offer a deeper understanding of air quality, group conversations on the health impacts of air pollution, and interactive sessions aimed at constructing lesson plans to enhance classroom readiness for educators.



The day-long event on 1 December built upon this foundation, aiming to deepen the knowledge imparted during the prior engagement. Hosted at the Senate Room, IIT Delhi, this year's workshop continued to bridge the gap between theoretical understanding and practical application regarding sustainable air quality practices. Throughout the day, participants were treated to presentations by school team leads, informative talks by experts like Prof. Yama Dixit on climate change's interplay with air quality, and hands-on sessions led by Prof. Jay Dhariwal. The event culminated in an interactive feedback-sharing session, paving the way for future endeavors, as highlighted in the concluding remarks by Prof. Jyoti Sharma. The day concluded with gratitude expressed through a vote of thanks and group photographs, marking a successful and enlightening gathering dedicated to sustainable air quality education.



With a vision to support India's commitment to combat climate change and air pollution, CERCA is delighted to announce a collaboration with Clean Air Fund. Prof. Sagnik Dey, faculty coordinator in CERCA is the PI of the project, along with Prof Dilip Ganguly, co-PI, from IIT Delhi will be leading this project.

India's strong commitment to combat climate change and air pollution requires an interdisciplinary and evidence-based approach. This project aims to generate India-specific evidence on the health and climate impacts of air pollution. By linking clean air and climate actions seamlessly, the project will provide

strategic knowledge to Indian policymakers, aiding in prioritizing emission reduction sectors for maximum health and climate benefits.

The Arun Duggal Centre of Excellence for Research in Climate Change and Air Pollution (CERCA) at IIT Delhi will assist in implementing various outreach activities envisaged under the project. At CERCA, we have always been dedicated to creating positive change, and this new partnership takes our commitment to a whole new level. With a shared vision and aligned goals, we are confident that this project will bring about transformative results. As we embark on this exciting journey, we invite all stakeholders to register for our newsletter subscription and know more about its future activities. Stay tuned for regular updates on the progress and impact of this project.

Kindly use this button below to register:

[Register here](#)



CERCA Expert Opinion and Research Outcomes

Net-Zero Energy Campuses in India: Blending Education and Governance for Sustainable and Just Transition

Balaji Kalluri, Vishnupriya Vishnupriya, Pandarasamy Arjunan and Jay Dhariwal

This study addresses the urgent need for comprehensive climate education amid a climate emergency. Human (energy) behaviors are developed from childhood and early adulthood. This study hypothesizes that transcending a nation's net-zero energy ambition can be accomplished through experiential education. An Urban Governance Lab plus net-Zero Energy league model is introduced. Various behavioral interventions are designed based on the principles of serious games. Discussions provide rich narratives on how a nation with so many diverse communities can forge a rapid net-zero transition. The blended multi-disciplinary STEM education can drive energy citizenship in campus-like communities. A scenarios-based analysis demonstrating the potential of the proposed model in shaping energy behavior in young citizens leading to net zero is presented. The results from the scenario analysis present optimistic evidence underlining how campus-like communities driven by bottom-up initiatives can realize net-zero ambition beyond hope.

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Analysis of aerosol liquid water content and its role in visibility reduction in Delhi

Umer Ali, Mohd Faisal, Dilip Ganguly, Mayank Kumar, Vikram Singh

Aerosols undergo significant changes due to water uptake under high RH conditions, leading to changes in physical, optical, and chemical properties. Detailed assessment and investigation are needed to understand better aerosol liquid water content (ALWC) characteristics in highly polluted regions like Delhi.

Therefore, in this study, we examined the mass concentration and the factors governing the ALWC associated with PM_{2.5} in Delhi for two winters (Dec 2019 to Jan 2020 and Dec 2020 to Feb 2021) using the real-time measurements of NR-PM_{2.5} from Aerodyne aerosol chemical speciation monitor (ACSM) and the application of thermodynamic modeling (ISORROPIA II). The average NR-PM_{2.5} mass concentration in the 2020–2021 winter was 152 µg/m³, about 50 % higher than the average mass concentration of 102 µg/m³ in 2019–2020. Consequently, the ALWC was also 60 % higher during 2020–2021.

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How will climate change affect ambient air pollution and what can policy-makers do now? Lessons from India

Avraham Ebenstein, Sangeeta Bansal, Sagnik Dey, Tanya Gupta, Kshitij Abhay Kakade, Avi Simhon

Air pollution is a growing concern in India, and its adverse health effects are well documented. Climate change is likely to exacerbate this problem by altering weather patterns and increasing the frequency and severity of extreme events. This paper examines the potential impact of climate change on ambient air

pollution in India and its implications for policy design. Our analysis reveals that pollution in India is highly sensitive to variation in weather, particularly in the densely populated Indus-Gangetic Plain. Using our estimated relationship between weather and pollution, we predict that changing weather patterns will increase average PM_{2.5} concentrations by 3.1 µg/m³, leading to a loss of 364 million years of life expectancy. To address this challenge, we propose an emissions fee calibrated to be highest in regions most vulnerable to persistently high levels of pollution and most sensitive to future.

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India's per capita emissions in 2022 were less than half of the global average

India's per capita carbon dioxide emissions increased by around 5% in 2022 to reach 2 tonnes, but these were still less than half of the global average, according to a report by the Global Carbon Project. The US topped the per capita emissions chart, followed by Russia, Japan, China, and the European Union. India has emitted 15 Gt C since 1850, making it just 3% of the world's total. CO2 emissions in China are estimated to have increased 4% in 2023, while the EU and US declined by 7.4% and 3% respectively. The Global Carbon Budget team estimates a 50% chance that global warming will consistently exceed 1.5 degrees Celsius in about seven years.

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Climate Change Made 2011-2020 Decade Wetter, Warmer For India: World Body

The World Meteorological Organisation (WMO) has released a report stating that climate change has made the 2011-2020 decade wetter and warmer for India. The report, titled Decadal State of the Climate 2011-2020, reveals that the rate of climate change surged alarmingly during this period, which was the warmest decade on record. The report also highlights the significant impact of extreme warm days and extreme cold days on global temperatures. India experienced the worst single flooding episode in a monsoon season in 2013, with over 5,800 people killed. The report also highlights the severe socioeconomic and humanitarian impacts of droughts, with severe food and water insecurity in 11 of India's 28 states. The report also highlights the global warming of oceans and sea level rise, with the Antarctic continental ice sheet losing 75% more ice between 2011-2020 than in 2001-2010. The WMO warns that climate change is affecting the likelihood of many extreme events, with heatwaves causing the highest number of casualties and tropical cyclones causing the most economic damage.

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World Bank launches comprehensive programme to combat air pollution crisis in India

India's air pollution crisis, affecting 1.4 billion people, has led the World Bank to launch a multifaceted program to combat PM2.5. The initiative includes the introduction of airshed management tools, the development of State-wide Air Quality Action Plans, and the creation of the first extensive Regional Airshed Action Plan for the Indo-Gangetic Plains (IGP). PM2.5 emissions in India come from various sources, including fossil fuel combustion, biomass burning, and windblown dust from construction sites and industrial plants. The World Bank advocates for an "airshed" approach, focusing on the densely populated Indo-Gangetic Plain, where pollution intensity is high. The initiative introduces tools for airshed management, facilitates the creation of State Air Quality Action Plans, and develops the first extensive Regional Airshed Action Plan for the IGP. The World Bank emphasizes the importance of airshed-wide coordination and the potential for co-benefits from focusing on air pollution. The goal is to reduce air

pollution within a generation, drawing on successful strategies from other countries facing similar challenges.

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Nearly 1B people don't have access to real-time air pollution data, but a small global investment could help reverse this

Particulate air pollution (PM2.5) is the world's greatest external risk to human health, taking more years off average life expectancy than HIV/AIDS, malaria, and tuberculosis combined. This significant health burden has been severely underfunded, leading to many parts of the world lacking basic information on the extent of the air pollution problem. A new report evaluates which countries could benefit the most from small, strategic investments in air pollution monitoring and open data platforms. The report identifies 46 countries where there are the largest opportunities for small, well-supported efforts to effect national-level policy changes and pollution reductions by monitoring local pollution and providing data access.

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Catalysing Climate Action in Asia: Unlocking the Power of Philanthropic-Public-Private Partnerships

The Asia-Pacific region faces a 35% GDP loss by 2050 due to climate change and natural hazards. The report emphasizes the importance of philanthropic-public-private partnerships (PPPPs) for sustainable outcomes. It calls for enhanced climate resilience, nature protection, and emissions reduction, and calls for increased awareness, financing, and implementation of effective climate solutions. The report emphasizes the importance of philanthropic-public-private partnerships (PPPPs) in driving sustainable, nature-positive outcomes, and advancing policy, finance, technology, and cultural changes for a greener future.

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Air pollution deaths attributable to fossil fuels: observational and modelling study

Globally, fine particulate and ozone air pollution causes 8.34 million excess deaths per year, with 52% related to cardiometabolic conditions. An estimated 5.13 million deaths per year are attributable to ambient air pollution from fossil fuel use, which could be avoided by phasing out fossil fuels. This

represents 82% of the maximum number of air pollution deaths that could be averted by controlling all anthropogenic emissions. A large reduction in emissions related to fossil fuels can decrease the number of attributable deaths substantially.

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Air Pollution Linked to Errors in Corporate Decision-Making

Air pollution impacts decision-making- A new study investigates the impact of air pollution, particularly fine particulate matter (PM2.5), on corporate workers. Unlike blue-collar workers in sectors like agriculture, construction, and factory production, white-collar workers make multiple decisions daily, often making high-stakes decisions that affect their company and employees. The researchers studied this through the world of chess players, who often think like managers in terms of making high-frequency decisions, performing under pressure, and using strategic powers. They installed sensors in closed-door chess tournaments to measure exposure to tiny particles, linking this to players' decisions in a game.

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