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Editorial

The importance of sustainable education for next generation

Dear Readers,

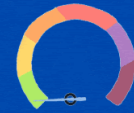
The need for eco-innovation and sustainable focus in society is being felt more than ever before in today's changing environmental climate. One way to push environmentalism a step higher to the forefront of our world is through innovative initiatives & social movements but a better tool is by teaching students how to live sustainably. Schools are the perfect place to begin sustainable education and awareness from an early age is essential. The aim is to generate environmental awareness, lower ecological footprints, and develop respect for nature by taking steps that help preserve the environment. But it's the teachers who could play a huge role in generating the required awareness amongst school kids and nurture them to develop more respect and responsible behavior towards the environment. Teachers create an immediate and long-lasting impression on a child's mind and with proper education, students become aware of how to lead a more sustainable life. Teachers can guide students to become conscious of the relationship between climate change and clean air and encourage them to proactively take steps to become climate action champions. An important initiative of CERCA is Environmental Education workshops for school teachers with an aim to convert several real-life problems such as climate change and air pollution into pedagogical tools for effective education. Effective environmental education also enhances the young generation's capacity to adapt to harsh climate change impacts by building important knowledge and green skills. CERCA is organizing the second such workshop on Nov 7 & 8th for school teachers who teach air quality and climate change to 7-12 grade students along with Delhi Effective Education & Pedagogy Cluster (DEEP-C) managed by Delhi Research Implementation and Innovation (DRIIV), established by the Office of the Principal Scientific Advisor (PSA) to the Government of India. The workshop aims to connect educators with air quality experts, technology partners, regulators, and scientists and help schools in establishing a network of their own for information and awareness pertaining to air quality. The workshop will also benefit schools in building inclusive resources accessible to all and learning about sustainable solutions to control air pollution. Only Effective sustainable education can help people become critically aware of environmental issues, effectively respond to challenges and make informed decisions.



Hemant Kaushal
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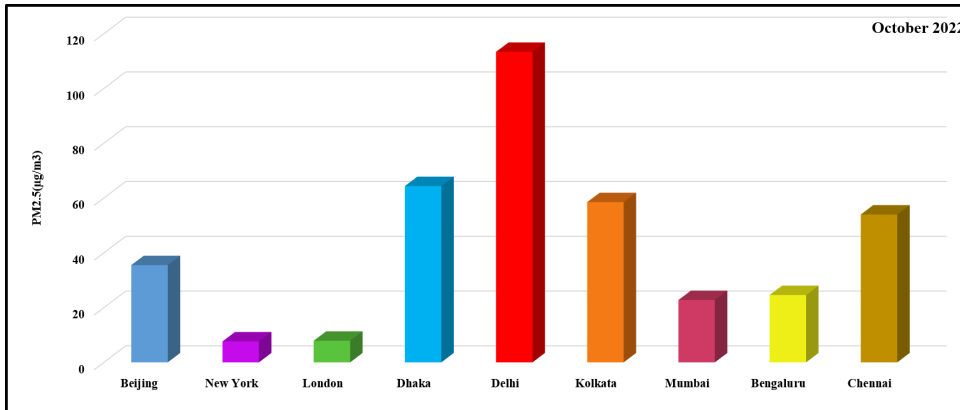


Air Quality Trends



Indian & International Cities- October 2022

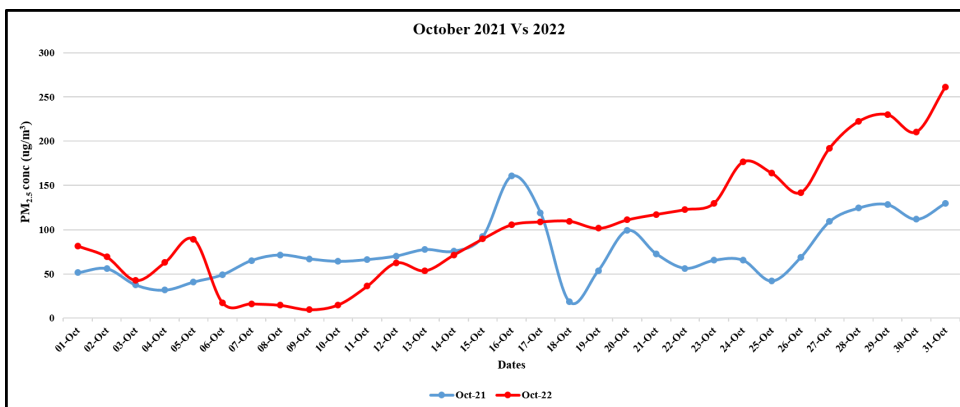
Delhi has the highest pollution levels



Data Source: berkeleyearth.org

The graph above shows the daily average PM_{2.5} for the month of October 2022. Amongst the major metros worldwide, Delhi has shown the highest concentration of PM_{2.5} followed by Dhaka and Kolkata. Delhi and Kolkata, within India, rank among the topmost polluted cities worldwide.

Delhi PM_{2.5} (24 hr. daily average) Trend October 2021 Vs October 2022



Data Source: CPCB

As winter conditions set in, air quality deteriorated dramatically in the second half of the month of October 2022, and it was linked to an increase in instances of stubble burning, and also low temperatures, and calm winds. All these factors have impacted air quality and pollutant dispersion leading to a significant rise in pollution levels. Last year, Diwali fell in early November, and the prolonged rain in October pushed most of the stubble burning into November. However, following rain in the first half of October, farm fires increased in the second half of October, coinciding with Diwali, as well as the development of inversion conditions. Hence, PM_{2.5} was increased by 28.86 µg/m³ on average in October 2022 as compared to October 2021



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AIR QUALITY
ACTION FORUM



The Air Quality Action Forum (AQAF) was launched by UNEP with assistance from the Paytm Foundation with the aim of improving collaboration within the national community concerned with air quality. In order to fulfill India's national mandate, support the alignment of the AQAF with the vision of MoEFCC, raise awareness of the work being done in various sectors by various organizations, and establish the "Solution Center" as part of its immediate goals, the Forum has been set up to become an inclusive platform that aims to give all the participating stakeholders a common gathering place to interact, learn from, and share with one another.

Arun Duggal's Centre of Excellence for Research in Climate Change and Air Pollution (CERCA), is collaborating with UNEP as a lead expert institution to provide expert technical advice through data and analysis to the forum for devising concrete work plans. CERCA has been entrusted with conducting the stakeholder consultation by bringing together all the AQAF members on a common platform.

As part of its first phase, after AQAF's launch in December 2021, consultations with the stakeholders for all six (6) pillars of AQAF were carried out. Separate meetings were held in hybrid mode with Indian Expert Institutions (non-Government), Indian Expert Institutions (Government), International Philanthropic Organizations, Corporate, and National Philanthropic Organizations, UN Agencies and development partners, and International Development Agencies and Embassies. Besides the core consultations under the 6 pillars of the AQAF, a separate consultation was also organized for all the pollution control boards (PCBs) through hybrid mode. The AQAF team hosted the very first AQAF Quarterly Meeting in July 2022 which was aimed at exploring solutions for reducing air pollution. For this meeting, four core domains were identified for discussion — namely science, policy, technology, and capacity building. Four parallel sessions were held, with each having participants who discussed action-oriented solutions for addressing the gaps in air quality management under each of the four domains. The First Quarterly Meeting also saw overwhelming participation from over 80+ organizations that came together to make this event a documentable success.

All the valuable suggestions & inputs gathered from all four groups on challenges, gaps, needs, and possible solutions are being compiled into a report. This report will be brought out at the Forum Convention, which is tentatively scheduled to take place in December 2022.

CERCA Expert Opinion and Research Outcomes

Crop Residue Burning in India: Potential Solutions

Kawaljeet Kaur and Preetpal Singh

- As India produces a lot of agricultural waste, including crop residues, and lacks effective sustainable management methods, an estimated 92 million metric tons of crop waste is burned each year, causing excessive particulate matter emissions and air pollution.
- Burning crop residue has grown into a serious environmental problem that threatens human health and causes global warming.
- Composting, making biochar, and mechanization are a few effective sustainable solutions that can assist in resolving the issue while maintaining the nutrients found in the agricultural residue in the soil.

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Association of air quality parameters and socio-demographic towards the human health in India using regression analysis

Stephen Chellakan, Muhammad Abrar Ul Haq, Farheen Akram, Gazi Md Nurul Islam and Vinodh Natarajan

- This study investigated the socio-economic impact of air pollution on human health in India.
- The data on vehicle emissions and health effects are obtained from secondary sources, and data relating to the source of fuel, type of kitchen, household income, age, education, respondents' social class, and air-related diseases were collected through a primary source.
- Face-to-face interviews were conducted to collect primary data from selected 300 households using a structured questionnaire in rural and urban areas in India.
- The study results showed that higher-income households use alternative clean fuels like Liquefied Petroleum Gas (LPG) and electricity.

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Correlating Volcanic Emissions from Andaman-Sumatra region to Atmospheric pollution in Delhi: A possible scenario

Hans Orru, Henrik Olstrup, Jaakko Kukkonen, Susana López-Aparicio, David Segersson, Camilla Geels, Tanel Tamm, Kari Riikonen, Androniki Maragkidou, Torben Sigsgaard, Jørgen Brandt, Henrik Grythe & Bertil Forsberg

- The current study investigated the possible causes of whale stranding and Delhi pollution using integrated data based on the analysis of available seismological and GPS data.
- Stranding of whales coincided with the time of the earthquake and underwater volcanoes.
- Toxic materials from volcanic eruptions lead to increased air and ocean pollution.
- Prominent cyclonic events are also intimately connected to volcanism. Volcanism-related air pollution affected human health in the Indian subcontinent.

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Post-Diwali air pollution levels highest in eight years in Mumbai: SAFAR

According to data from the System of Air Quality Forecasting and Research (SAFAR) of the Indian Institute of Tropical Meteorology (IITM), the post-Diwali air quality in Mumbai was the worst in eight years. Numerous respiratory and cardiovascular conditions might develop over time as a result of exposure to such low air quality. This year, the monsoon completely left Maharashtra around the time of Diwali, leading the wind to abruptly become calm and still, the boundary layer of airborne pollutants to settle significantly closer to the surface, and severe foggy conditions throughout the Mumbai Metropolitan Region.

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Stubble Burning Remains 'Significant Contributor' To Delhi's Unbreathable Air In Oct, Nov: CREA Study

According to a study by the Centre for Research on Energy and Clean Air (CREA), stubble burning continues to be a "major contribution" to Delhi's unbreathable air in October and November, even if the national capital's air quality is above the NAAQS during the winter. The lack of "emission control systems" in the significant sources of pollution, vehicle emissions, and sporadic incidents of stubble burning, are the main factors contributing to Delhi's unbearably toxic air. Air will continue to deteriorate as the winter season sets in.

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Delhi, Kolkata, and Ahmedabad are Among World's "Most Unsustainable" Megacities

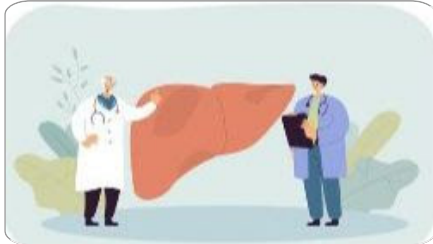


Mediterranean warming more rapidly than anywhere else on the planet

The Mediterranean is warming more quickly than the rest of the world,

By 2050, each of these expanding cities will have a population of more than 10 million, joining the 33 already-existing megacities. However, a report released by the international think tank Institute for Economics and Peace cautions that their development - and the high pace of urban expansion generally - is unsustainable due to ecological risks and a lack of societal resilience. All of the megacities in South Asia, meanwhile, will see their populations grow by at least 50%. At least eight are listed by the report as being among the most unsustainable, including Dhaka, Bangladesh; Lahore, Pakistan; and Kolkata and Delhi.

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Radioactivity in air pollution linked with cardiovascular harms

Researchers found an association between particle radioactivity in air pollution and an increased risk of death from cardiovascular disease, myocardial infarction, or stroke, and from all non-accidental causes. The study looked at mortality data in Massachusetts from 2001–2015 as well as radioactive particle concentrations in the air by zip code and month, which enabled the scientists to estimate individuals' exposure to radioactive particles during their last year of life. The authors speculated that radioactivity attached to PM2.5 particles can penetrate deep into people's lungs, enter the circulation, and lead to systemic inflammation and oxidative stress.

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according to The Lancet Countdown's eighth annual worldwide study on health and climate change. The paper claims that between the first and second decades of the twenty-first century, there was an average increase of 57% in exposure to heat waves, with increases of more than 250% in some regions. As a result, between 2000 and 2020, the yearly rate of heat-related deaths per million people increased by 15 per year. The occurrence of heat waves and extremely high temperatures will also increase. The rise in temperatures is facilitating the transmission of infectious diseases that in the last century had little presence in Europe.

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Neoplants Hopes to Curb Indoor Air Pollution with Bioengineered House Plants

The Paris-based company, Neoplants, uses bioengineering and directed evolution to create "plants with a purpose." Their first product—the Neo P1—is a houseplant designed to fight air pollution by capturing and recycling volatile organic compounds (VOCs) such as formaldehyde, benzene, toluene, and xylene from indoor air. The team chose the popular houseplant Pothos (*Epipremnum aureum*) to create the Neo P1 which, they say, is thirty times more effective than common houseplants at removing VOCs from the air.

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