



Editorial

Improving citizen science through low-cost air quality monitoring

Dear Readers,

Traditional real-time air quality monitoring instruments are quite costly to install and maintain resulting in their sparse deployment which lacks the measurement density to develop high-resolution air pollutant maps. Currently, in India, there is one air pollution monitoring station available for every two million people and only 24 cities out of the 5000 cities in India have the potential and means to perform real-time monitoring with the rest relying on manual air quality monitoring. Air quality varies across relatively small spans even between and within city blocks primarily due to local emissions and ambient conditions. Low-cost sensors have emerged as a viable alternative to collect high-resolution spatial and temporal air pollution data in real-time within close proximity since many of these sensors do not require specialized knowledge which encourages public participation thereby paving the way to community-based monitoring driven by local information needs and community values.

Education and involvement of communities through citizen science projects are not only important for improving public health but also for building awareness on air pollution sources and exposure pathways. Low-cost air quality sensors offer new opportunities to collect local air quality data in an individual home while traveling, or in the various neighborhoods, parks providing immediate feedback and serve as a useful tool to improve conversation with communities and build citizen capacity to understand air pollution and exposure patterns relevant to their community.

For the time being, low-cost air-quality sensing is a compliment, not a replacement for high-end sensing but technologies and scientific investigations are still evolving. Currently, government regulations for use of low-cost sensors are absent or vague as there are concerns around the accuracy and reliability of these low-cost sensors which are still subject to interference by ambient conditions. Guidelines are being developed for air quality sensor technology standards in the EU, US, and China. In India, CSIR-National Physical Laboratory (NPL) has been made the nodal agency to come up with guidelines to certify air quality monitoring instruments.

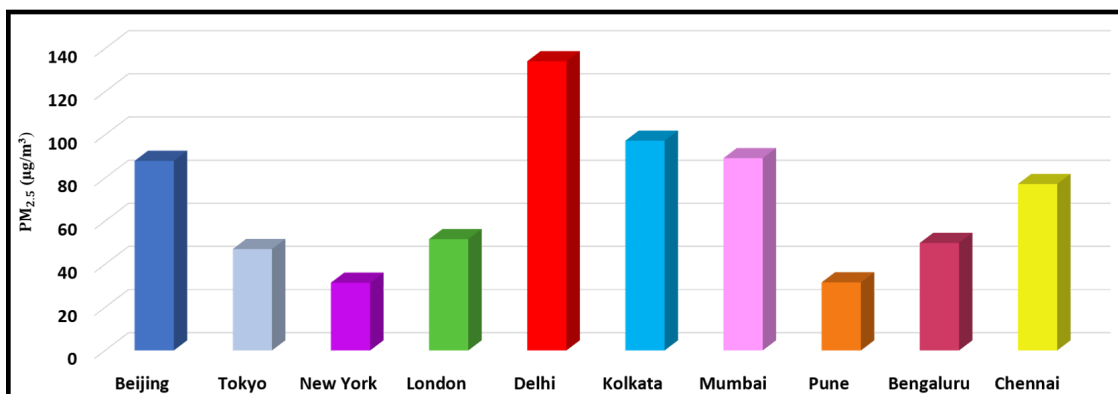
However, common people have already started owning them to understand what is happening in the air around them as these low-cost sensors help the citizens to demystify and connect more deeply with the problem of air pollution.



Dr. Sagnik Dey

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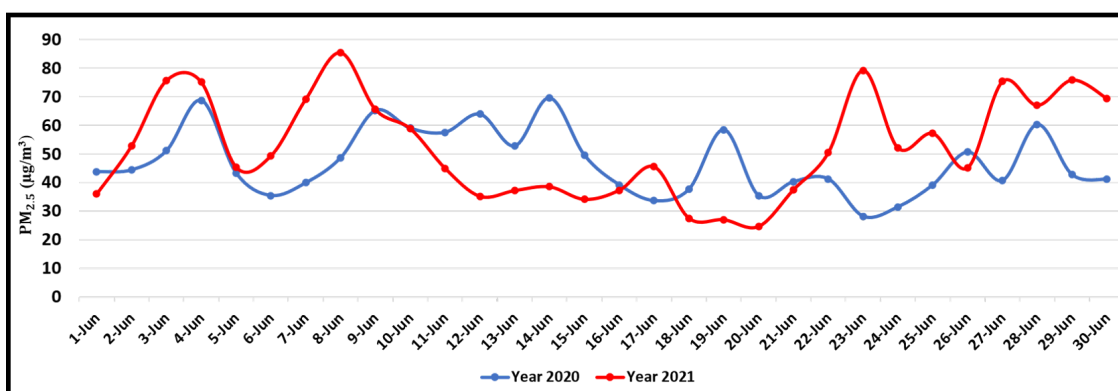
Air Quality Trend June 2021: Delhi continues to be the highly polluted city among different Indian & International Cities



Data Source: aqicn.org

The graph shows the daily average PM_{2.5} for the June month of 2021. Amongst the popular cities worldwide, Delhi has shown the highest concentration of PM_{2.5} followed by Kolkata and Mumbai. Delhi and Kolkata rank among the top most polluted cities worldwide while the other Indian cities in the graph are among the top 10 metropolitan cities.

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



Data Source: CPCB

As the Covid-19 cases declined in June 2021, Delhi has been under a phase-wise unlockdown process. On average, PM_{2.5} has increased by 5.36 µg/m³ in June 2021 as compared to the previous year i.e., June 2020. The impact of increasing anthropogenic activities on the Delhi Air Quality can be clearly correlated and observed in the graph.



Panel Discussion on June 05, 2021

Panel discussion in collaboration with the Department of Law, Maharaja Agrasen Institute of Management Studies, and ICMR- NIIRNCD, Jodhpur, was organized on June 05, 2021. The title of this discussion was "Delhi's Air Quality Control- A QUEST FOR VIABLE SOLUTIONS!". Former Chairman NGT, Justice Swatantra Kumar, and sitting Judge NGT, Justice S K Singh also participated in the panel discussion. If you have missed this seminar, the link below will take you to the recorded video.

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“Need for the Indoor Air Quality Standards” - An Opinion Paper by Mr. Deepak Dixit

Mr. Deepak Dixit is a Senior Manager at Engineers India Limited, (CPSE, under MoP&NG), New Delhi.

Air Pollution is a public health emergency and this fact is of common knowledge for a considerable time. However, the term ‘Air Pollution’ in common discourse is largely associated with Ambient Air Quality i.e., outdoor air. This association instinctively leads to the notion that indoor spaces are much safer than outdoors, especially in highly polluted urban cities. Further, of the many lifestyle changes brought about by increasing urbanization, one important change is the time spent indoors.

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Impact of acute exposure to ambient PM_{2.5} on non-trauma all-cause mortality in the megacity Delhi

Pallavi Joshi, Santu Ghosh, Sagnik Dey, Kuldeep Dixit, Rohit Kumar Choudhary, Harshal Ramesh Salve, Kalpana Balakrishnan

- PM_{2.5} exposure impacts are relatively higher on men than on women.
- The impact on all-cause mortality is two-fold higher in winter than in summer.
- Spatially disaggregated exposure of PM_{2.5} exhibits a higher effect on mortality.

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Crop burning & forest fires: Long-term effect on adolescent height in India

Prachi Singh & Sagnik Dey

- Adolescents exposed to high levels of biomass burning during early life are shorter in height.
- Poor households and North Indian states are most vulnerable to the problem posed by vegetation fires.
- Effective policymaking is needed to reduce crop burning and for better management of forest fires.

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Calcutta to introduce 400 E-buses to curb the air pollution issue

The fleet of diesel-powered government buses in Calcutta will be replaced by electric buses to curb the rising levels of air pollution, as said by transport minister Firhad Hakim. Initially, 400 buses will be replaced by E-buses & the remaining fleet of nearly 800 buses will be replaced subsequently in phases. Growing levels of air pollution in the city remains one of the biggest causes of concern for residents.

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India's contribution to climate change in last 200 years is minuscule

Unbridled carbon emissions especially by Europe and the US over the last 200 years, and in the last 40 years by China have caused the climate change disaster, Union Environment Minister Prakash Javadekar said. Developed nations owe USD 1.1 trillion to developing nations as a part of climate change mitigation under the Paris Agreement, and this was discussed at the G7 Summit.

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Fighting climate change is both an urgent global imperative & a massive business

Nearly every major activity that humanity engages in today contributes to our carbon footprint to some extent: building things, moving things, powering things, eating things, computing things. Of these, there is a subset of decarbonization initiatives to which artificial intelligence can productively be applied. And of these, there is a subset for which compelling startup business models exist. Many billions of dollars of enterprise value will be created in the coming years as entrepreneurs chase down these opportunities.

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How heat waves form, and how climate change makes them worse?

Extreme heat might not seem as dramatic as hurricanes or floods, but the National Weather Service has deemed it the deadliest weather phenomenon in the US over past 30 years, on average. June 2021 brought early, record-setting heatwaves across the US & other parts of the Northern Hemisphere. Even before summer officially began, [roads buckled](#) in the Midwest, heat emergency calls spiked in the South. Scientists say these [record highs](#) align with their expectations for climate change & warn about future scorchers.

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