Technology and Action for Rural Advancement (TARA)

PRESS BRIEF

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Citizen Science and Low-Cost Sensors Empower Hyperlocal Air Pollution Mapping in Gurugram and Patna

Today, the national capital faces one of its worst air pollution crises in decades, attributed to multiple factors such as stubble burning, firecracker usage, and emissions from the automobile industry.

The 2021 Air Quality Report published by IQAir has exposed the alarming reality that 35 Indian cities are ranked among the top 50 most polluted cities in the world. While Delhi often captures headlines for its worsening air quality, many Tier-2 cities across northern and eastern India are facing equally critical health hazards due to compromised air quality. Over 500 million Indians are regularly exposed to severe air pollution, particularly during the winter months when the Air Quality Index (AQI) consistently surges beyond the hazardous threshold of 300. Identifying the sources of air pollution is a complex task, but common contributors include vehicular emissions, industrial discharges, construction dust, waste burning, and agricultural practices like stubble burning.

In response to the growing air quality concerns, Development Alternatives (DA), in collaboration with the United Nations Development Programme (UNDP India), Bihar State Pollution Control Board (BSPCB), and Gurugram Metropolitan Development Authority (GMDA), with support from Lacuna Fund for Climate and Energy, launched a hyperlocal air pollution mapping project in Gurugram and Patna in June 2024.

This initiative aims to generate a detailed dataset on both point and non-point sources of air pollution by engaging local communities in environmental monitoring. The project leverages advanced, affordable Internet-of-Things (IoT) technology to provide precise, hyperlocal pollution data.

Local volunteers, trained as Citizen Scientists, are equipped with low-cost air quality sensors to monitor key pollutants, including Carbon Monoxide, Nitrogen Dioxide, Methane, Particulate Matter (PM2.5, PM10), and Carbon Dioxide. This initiative not only aids in data collection but also fosters community engagement.

By blending cutting-edge technology with citizen participation, the project seeks to deliver real-time, actionable insights, identifying pollution hotspots and informing targeted solutions to address air quality challenges.

A Citizen-Led Solution to Air Pollution

More than 50 volunteers across Patna and Gurugram have been trained in the deployment and use of low-cost air quality sensors, as well as the interpretation of the data they collect, further enhancing their appreciation of the critical issue. The project methodology emphasises the strategic placement of sensors across various city-level hotspots, ensuring comprehensive coverage of pollution sources such as industrial emissions, vehicular emissions, biomass burning, and solid waste burning. The collected data will include over 1 million data points, providing a detailed look at the air quality in these cities.

So far, 50 Internet of Things (IoT) sensors have been installed in Patna and an equal number deployed in Gurugram. These devices transmit data every minute to an app, offering real-time updates on air quality conditions. The data, supplemented by geotagged photographs collected by trained citizen scientists, will help create an intricate map of pollution hotspots, enabling local authorities to take targeted action and develop use-case pathways for mitigating air pollution. The data will be collected throughout the day and throughout the year. This will enable us and policy makers to understand the pollution status across all seasons and formulate mitigation actions accordingly.

Driving Impact and Change

The next phase involves data validation through field assessments and working closely with local authorities to ensure swift action is taken where pollution is most severe. Additionally, the team plans to collaborate with key stakeholders, suggest mitigation strategies, and develop use case pathways, helping to mainstream the project's methodology into broader governance frameworks.

"Our goal through this project isn't just to collect data but to understand how this data can improve Patna's air quality. We aim to translate this information into actionable implementation strategies. Long-term partnerships are essential for identifying and implementing effective solutions in the state," stated Dr. Soumen Maity, Vice President of Development Alternatives Group, Citizen Scientist Training on Air Quality Monitoring, Patna June 10, 2024.

"Hyperlocal mapping of air pollution in our city is crucial for identifying the sources that deteriorate Patna's air quality. With real-time data collection and validation efforts, we can derive immediate actionable insights to mitigate these issues effectively," added Dr. D.K. Shukla, Chairman of the Bihar State Pollution Control Board (BSPCB) at the Citizen Scientist Training on Air Quality Monitoring, Patna, June 10, 2024.

TARA
Scalable Solutions for People and Our Planet

The hyperlocal air pollution mapping project in Gurugram and Patna is more than just a data collection initiative—it's a transformative step towards cleaner air and healthier communities through a data-informed and collaborative approach. As the project advances, the collected data will play a crucial role in shaping effective recommendations and interventions, ensuring long-term improvements in air quality and public health. By integrating pollution data into regulatory frameworks, creating a centralised digital platform for emissions monitoring, and addressing specific pollution hotspots with targeted solutions, this project paves the way for actionable, real-world impact.

The project's success lies in its ability to bring communities together around a common cause—improving air quality and tackling greenhouse gas emissions. As citizens scientists, and local authorities unite in their efforts, the long-term goal remains clear: to not only map pollution sources but to inspire effective, grassroots-driven solutions that can be scaled nationwide.

For more information about Hyperlocal Air Pollution Mapping and TARA's efforts in promoting sustainable construction practices, visit https://www.tara.in/ and https://vayu.undp.org.in/.

About Technology and Action for Rural Advancement (TARA)

The Society for Technology and Action for Rural Advancement (TARA) is a social enterprise of the Development Alternatives Group, set up in 1985 at New Delhi, India. TARA's vision is to create sustainable livelihoods on a large scale, in pursuit of which, it develops and promotes "scalable solutions for people and the planet". As an 'incubation engine', TARA's organisational objectives have been defined around impact in the areas of Employability, Entrepreneurship, Clean Technology, Basic Needs, Natural Resource Management, and Institutional Strengthening. A mix of projects and revenue-based activities deliver a range of replicable enterprise-based business models, community development packages and capacity building solutions in five sectors - Renewable Energy, Water Sanitation and Hygiene, Affordable Housing, Livelihood Support and Recycling.

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Some photographs:

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