

!! Greetings from IIT Kharagpur!!

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IIT Kharagpur Researchers Develop a Novel Urban Heat–Pollution Index for Sustainable Cities and Health Assessment

Kharagpur, India, 02 June 2026: Researchers from the Indian Institute of Technology Kharagpur have developed a first-of-its-kind scientific framework integrating urban heat and air pollution exposure into a single health-risk metric to support sustainable urban planning and climate-resilient city development.

The study, titled “*An Integrated Heat and Pollution Index for Sustainable Urban Planning: Evidence from Delhi*”, has been led by Prof. Jayanarayanan Kuttippurath and VK Patel from the Centre for Ocean, River, Atmosphere and Land Science (CORAL), IIT Kharagpur. The research introduces the **Urban Heat and Pollution Index (UHPI)**, a pioneering framework that jointly assesses the combined impacts of multiple air pollutants and Urban Heat Island (UHI) effects on human health and urban sustainability.

Published in *Case Studies in Chemical and Environmental Engineering* (<https://doi.org/10.1016/j.cscee.2026.101387>), the study addresses a critical gap in conventional urban assessments, where air pollution and urban heat have largely been evaluated independently despite their interconnected impacts on urban population.

The study highlights that rapid urbanisation, increasing anthropogenic emissions, and warming climatic conditions are intensifying the interaction between heat and pollution in cities, creating compounded environmental stress and public health risks.

“The newly developed UHPI framework offers a comprehensive and scalable scientific tool to identify urban hotspots vulnerable to simultaneous pollution and heat exposure, which was not done before and therefore, the health risk was highly underestimated.” **said Prof. Kuttippurath, the author of the study.**

Using Delhi as a case study, the research reveals significant spatial disparities in pollution–heat stress across the city. Densely urbanised and industrial regions, particularly

central, eastern, and parts of northwestern Delhi, exhibit elevated UHPI values, indicating greater environmental stress and higher public health vulnerability. In contrast, greener and less densely built peripheral regions demonstrate relatively lower UHPI values and may offer more sustainable pathways for future urban expansion.

The study further demands the urgent need for integrated urban policy interventions such as expansion of green infrastructure, sustainable transportation systems, reduction of vehicular and industrial emissions, preservation of open spaces, enhancement of urban ventilation corridors, and adoption of climate-sensitive urban planning strategies. The researchers note that approaches focusing solely on either pollution or temperature may significantly underestimate cumulative urban exposure risks.

“With growing global concerns over climate change, urban heat stress, and deteriorating air quality, the UHPI framework is expected to serve as an important decision-support tool for policymakers, public health authorities, urban planners, and environmental agencies worldwide” added, Prof. Kuttippurath

The new UHPI framework is adaptable for cities across both developing and developed nations and has the potential to contribute significantly toward climate-resilient and sustainable urban futures.



Prof. Jayanarayanan Kuttippurath

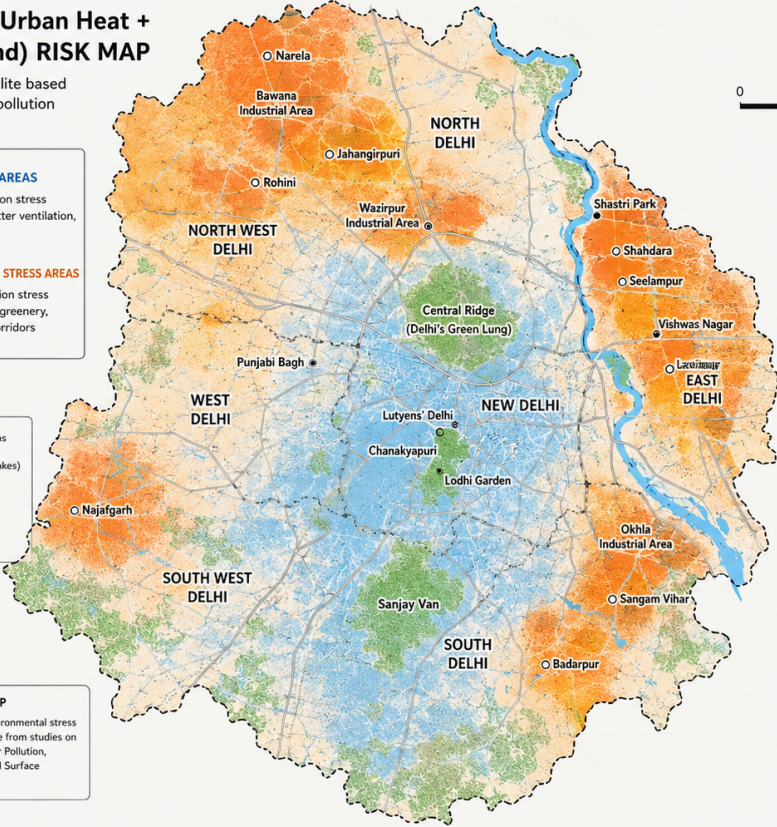
DELHI UHPI (Urban Heat + Pollution Island) RISK MAP

Interpreted from satellite based studies, NDVI, LST & pollution analyses

- SAFER / COOLER AREAS**
Lower heat & pollution stress
Higher greenery, better ventilation,
lower built density
- DANGEROUS / HIGH STRESS AREAS**
Higher heat + pollution stress
Dense built-up, low greenery,
industrial / traffic corridors

- Major Green / Forest Areas
- Water Bodies (Yamuna, Lakes)
- District Boundary
- Major Roads
- Yamuna River

HOW TO READ THIS MAP
This map shows relative environmental stress based on combined evidence from studies on Urban Heat Island (UHI), Air Pollution, Vegetation (NDVI) and Land Surface Temperature (LST) in Delhi.



HIGH RISK (DANGEROUS) AREAS

- Shahdara
- Seelampur
- Shastri Park
- Wazirpur Industrial Area
- Jahangirpuri
- Bawana Industrial Area
- Narela
- Najafgarh
- Okhla Industrial Area
- Sangam Vihar
- Badarpur
- Vishwas Nagar
- Laxmi Nagar
- Outer East Delhi dense built-up belts

LOWER RISK (SAFER) AREAS

- Central Ridge
- Lutyens' Delhi
- Chanakyapuri
- Lodhi Garden & surroundings
- Sanjay Van
- South Delhi green areas
- Yamuna floodplain green belt (stretches)

KEY TAKEAWAY

Greener areas (blue) are cooler and have lower pollution exposure. Dense built-up and industrial areas (orange) experience higher heat and pollution stress.

Sources: Landsat LST studies, NDVI analyses, CPCB pollution data, Delhi Govt. heat hotspot mapping (2024), Multiple Research Publications (2014–2024)

Note: This is an interpreted map for awareness based on published scientific studies. Not an official government map.