

Rising Heat Stress in Six Indian Metros: Study Insights

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What's in today's article?

- Why in News?
- What is Heat Stress?
- What is Urban heat island (UHI) effect?
- Key highlights of the study
- Importance of this study

Why in News?

According to a study by Delhi-based Centre for Science and Environment, India's megacities of Delhi, Mumbai, Chennai, Bengaluru, Kolkata and Hyderabad are experiencing worsening heat stress. This is due to a trend of rising relative humidity over the past two decades. The study also pointed out that these cities are also experiencing warmer nights due to urban heat island effect.

What is Heat Stress?

- **About**

- Heat stress occurs when the body cannot get rid of excess heat. When this happens, the body's core temperature rises and the heart rate increases.
- Basically, it refers to the physiological stress experienced by the body when exposed to excessive heat, particularly in high-temperature environments.

- **Causes**

- High ambient temperatures
- High humidity levels, which reduce the body's ability to cool through sweating
- Physical exertion, especially in hot conditions
- Inadequate hydration
- Poor ventilation in workspaces or living environments

- **Symptoms**

- As the body continues to store heat, the person begins to lose concentration and has difficulty focusing on a task, may become irritable or sick, and often loses the desire to drink.
- The next stage is most often fainting and even death if the person is not cooled down.

What is Urban heat island (UHI) effect?

- **About**

- UHI effect refers to the phenomenon where urban areas experience significantly higher temperatures than their rural surroundings.
- This temperature difference is primarily due to human activities and the specific characteristics of urban environments.

- **Causes**

- **Surface Characteristics**

- Urban areas have more asphalt, concrete, and buildings that absorb and retain heat, unlike rural areas with vegetation that provide cooling through evapotranspiration.

- **Heat Generated by Human Activities**

- Industrial processes, vehicles, air conditioning units, and other machinery generate heat.

- **Reduced Vegetation**

- Less green space and fewer trees mean less shading and cooling from plants.

- **Building Density**

- Tall buildings and narrow streets can trap heat and reduce airflow, limiting cooling.

- **Waste Heat**

- Energy consumption for lighting, heating, and cooling buildings releases additional heat.

- **Mitigation Strategies**

- **Increased Vegetation:** Planting trees and creating green spaces can help cool urban areas through shading and evapotranspiration.
- **Cool Roofs and Pavements:** Using materials that reflect more sunlight and absorb less heat can reduce temperatures.
- **Green Roofs:** Installing vegetation on rooftops can provide insulation and reduce heat absorption.
- **Urban Planning:** Designing cities to include more parks, green belts, and open spaces can improve airflow and reduce temperatures.

- **Energy Efficiency:** Improving the energy efficiency of buildings can reduce the heat generated by human activities.

Key highlights of the study

- **Megacities are experiencing worsening heat stress**

- India's megacities of Delhi, Mumbai, Chennai, Bengaluru, Kolkata and Hyderabad are experiencing worsening heat stress.
- This is due to a trend of rising relative humidity over the past two decades.
 - With the exception of Bengaluru, all the other metros have seen a 5-10 per cent rise in average relative humidity during summer.

- **Impact of high heat and humidity on human body**

- The combination of high heat and humidity can compromise the human body's main cooling mechanism: sweating.
- The evaporation of sweat from skin cools our bodies, but higher humidity levels limit this natural cooling.
- The combination of these two factors makes people sick and, in some cases, can also prove fatal, even at lower ambient temperatures.

- **Urban heat island effect impacting the night temperature**

- These cities are also experiencing warmer nights as land surface temperatures are not falling at the same rate as a decade ago.
- The study has blamed this on the urban heat island effect.
- Hot nights are as dangerous as mid-day peak temperatures. People get little chance to recover from day-time heat if temperatures remain high overnight.

- **Factors leading to increase in the heat index and heat stress**

- The combination of rising air and land surface temperatures and high relative humidity is increasing the heat index and heat stress in these cities.
 - **Heat index** is a measure of discomfort felt due to high heat and humidity.

- **Monsoon period has become hotter**

- The monsoon period has become hotter in Delhi, Mumbai and Kolkata, while in Chennai, the marginal cooling during monsoon has disappeared.
- In Bengaluru and Hyderabad, the monsoon was still a bit cooler than pre-monsoon.

Importance of this study

- **To develop a comprehensive heat management plan for urban centres**

- An assessment of heat trends is necessary to develop a comprehensive heat management plan for urban centres.

- **To protect public health**

- This will help in implementing emergency measures during **heatwaves** to protect public health.

- **To develop longer term strategies to mitigate heat**

- This will also help to develop longer term strategies to mitigate heat by increasing green areas and waterbodies, improving thermal comfort in buildings, and reducing waste heat from vehicles, air conditioners and industries.
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Q.1. What is Centre for Science and Environment (CSE)?

The Centre for Science and Environment (CSE) is a public interest research and advocacy organisation based in New Delhi. CSE researches into, lobbies for and communicates the urgency of development that is both sustainable and equitable.

Q.2. What is the heat index?

The heat index, also known as the apparent temperature, is what the temperature feels like to the human body when relative humidity is combined with the air temperature. This has important considerations for the human body's comfort.

Source: Rising 'heat stress' in six metros as humidity up, nights warmer: Study | IOWA | United States Environmental Protection Agency

Source: <https://vajiramandravi.com/current-affairs/heat-stress/>

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