



Decline in Black Carbon Level in Varanasi

Why in News?

According to a study at [Banaras Hindu University \(BHU\)](#), an annual average decline of 0.47 micrograms per cubic metre in [carbon level](#) has been observed in **Varanasi and the central Indo-Gangetic plains**.

Key Points

- The study utilized black carbon data generated under the [Aerosol Radiative Forcing over India \(ARFI\) program](#) of the [Indian Space Research Organisation \(ISRO\)](#).
 - An analysis of a decade-long measurement of **black carbon mass concentration** was conducted at a representative location in the central Indo-Gangetic plain, Varanasi, **from 2009 to 2021**.
 - The **purpose of this analysis** was to understand the **physical, optical, and radiative impact of black carbon in this region**.
- The study recorded an **average annual decrease of 0.47 micrograms per cubic metre in black carbon levels**.
 - Black carbon levels also showed a **consistent seasonal decline**, with a **post-monsoon average decrease of 1.86 micrograms per cubic metre** and a **pre-monsoon average decrease of 0.31 micrograms per cubic metre**.
- The study found that the black carbon in Varanasi and central Indo-Gangetic plains mostly **originates from distant sources, rather than local factors**.
 - These particles are transported over long distances from the lower and upper Indo-Gangetic plains, **Pakistan, the Middle East**, and [southern peninsular regions](#).

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WHAT IS BLACK CARBON

Black carbon, also known as soot, is a black, carbon-rich substance emitted from gas and diesel engines, coal-based power plants, and other sources that burn fossil fuels. It forms due to incomplete combustion of wood and fossil fuels, producing carbon dioxide (CO₂), carbon monoxide, and volatile organic compounds. Black carbon is a significant component of particulate matter (PM-2.5), a harmful air pollutant. It warms the atmosphere by effectively absorbing light

IMPACT ON HEALTH

- PM 2.5 air pollution is linked to lung diseases, stroke, heart attacks, chronic respiratory diseases like bronchitis, asthma, and premature deaths in adults suffering from heart & respiratory conditions
- It also affects children, contributing to premature deaths from acute lower respiratory infections like pneumonia
- These particles have been found in lungs, liver, and brain of unborn babies, potentially affecting early childhood development

- Black carbon is a major environmental cause of poor health & premature deaths
- Particles, which are much smaller than grains of table salt, can penetrate deep into the lungs, and transport toxic compounds into the bloodstream

Black Carbon

- Black Carbon (BC) is a **short-lived pollutant that is the second-largest contributor** to warming the planet behind [carbon dioxide \(CO2\)](#).
- Unlike other [greenhouse gas emissions](#), BC is quickly washed out and can be eliminated from the atmosphere if emissions stop.
- Unlike historical carbon emissions it is also a localised source with greater local impact.
- Black carbon is a kind of an [aerosol](#).

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