



BLACK CARBON EMISSIONS - GS III MAINS

Q. The challenge of black carbon emissions presents a complex but surmountable obstacle in the fight against climate change. Discuss (15 marks, 250 words)

News: *India's need to curb black carbon emissions | Explained*

What's in the news?

- According to a 2016 study, the residential sector contributes 47% of India's total black carbon emissions.

Black Carbon:

- It is the dark, sooty material emitted alongside other pollutants when biomass and fossil fuels are not fully combusted.
- It comprises a significant portion of particulate matter or PM, which is an air pollutant.
- It is a short-lived climate pollutant with a lifetime of only days to weeks after release in the atmosphere.

Rising Impacts of Black Carbon:

1. Climate Change:

- Black carbon contributes to climate change causing changes in patterns of rain and clouds.
- It has recently emerged as a major contributor to global climate change, possibly second only to CO₂ as the main driver of change.

2. Global Warming:

- Black carbon warms the Earth by absorbing sunlight and heating the atmosphere and by reducing albedo when deposited on snow and ice (direct effects) and indirectly by interaction with clouds.
- Per unit of mass, black carbon has a warming impact on climate that is 460-1,500 times stronger than CO₂.

3. Precipitation:

- Black carbon causes changes in patterns of rain and clouds.
- Black carbon, like all particles in the atmosphere, affects the reflectivity, stability and duration of clouds and alters precipitation.

4. Rise in Sea Level:

- It could accelerate the amount of freshwater Greenland loses and raise sea levels due to the warming effect.



5. Impact on Vegetation and Ecosystems:

- Black carbon can affect the health of ecosystems in several ways like by depositing on plant leaves and increasing their temperature, dimming sunlight that reaches the earth and modifying rainfall patterns.
- Changing rain patterns can have far-reaching consequences for both ecosystems and human livelihoods, for example by disrupting monsoons.

6. Air Pollution:

- It comprises a significant portion of particulate matter or PM, which is an air pollutant.

7. Health Problems:

- Inhalation of black carbon is associated with health problems including respiratory and cardiovascular disease, cancer, and even birth defects.

Challenges in Addressing Black Carbon Pollution:

- One of the main challenges in mitigating black carbon emissions lies in addressing the diverse sources and sectors responsible for its production. Household cooking and heating, transportation, and industrial activities are major contributors to black carbon emissions, each requiring tailored solutions to achieve significant reductions.
- The transboundary nature of black carbon emissions, which can travel long distances and affect regions far from the source of emission. This highlights the importance of international cooperation and coordination in tackling black carbon pollution effectively.

Government Initiatives to Curb Black Carbon:

1. Pradhan Mantri Ujjwala Yojana (PMUY):

- It provides free liquefied petroleum gas (LPG) connections to households under the poverty line.
- The primary goal of PMUY is to make easy cooking gas available to rural and poor households and reduce their dependence on conventional cooking fuels.
- It has as a consequence been able to play an essential function in decreasing black carbon emissions, as it offers a cleanser alternative to traditional fuel consumption.

2. Introduction of Cleaner/Alternate Fuels:

- The government has added cleaner/trade fuels like gaseous fuel (CNG, LPG and etc.), ethanol blending.

3. Sustainable Alternative Towards Affordable Transportation (SATAT):

- It has been released to set up 5000 Compressed Biogas (CBG) production plants and make CBG to be used in the market.



4. Promotion of Agricultural Mechanization:

- It is the Central Sector Scheme on 'Promotion of Agricultural Mechanization for in-situ management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi', agricultural systems and gadget for in-situ crop residue control are promoted with 50% subsidy to the person farmers and 80% subsidy for the establishment of Custom Hiring Centres.

5. National Clean Air Programme:

- The Central Government is imposing the National Clean Air Programme as a long-term, time-bound, national-level strategy to tackle the air pollution problem across the country in a comprehensive manner with targets to achieve 40% reduction in particulate matter concentrations by 2025-26.

6. Faster Adoption and Manufacturing of Electric Vehicles (FAME):

- FAME phase-2 scheme has been rolled out to promote the adoption of electrical and hybrid vehicles in the country.

Measures Needs to be Taken to Reduce Black Carbon:

1. Reducing Emission:

- Black carbon has a short atmospheric lifetime. Thus, targeted strategies to reduce emissions can provide climate and health benefits within a relatively short period of time.

2. Household Energy:

- It is important to replace traditional cooking to clean burning modern fuel cook stoves. The Ujjwala scheme is an important initiative in this direction.

3. Transport:

- Fast transition to Bharat 6 vehicles and soot-free buses and trucks is needed. Eliminating high-emitting diesel vehicles should be a priority.

4. Agriculture:

- It is important to ban open-field burning of agricultural waste and formulate a policy to develop a market for the agricultural waste procurement.

5. Waste Management:

- Municipalities must handle waste efficiently. A ban on open burning of municipal waste should be there.

The challenge of black carbon emissions presents a complex but surmountable obstacle in the fight against climate change. By implementing targeted mitigation strategies, promoting international cooperation, and leveraging co-benefits for air quality and public health, we can effectively reduce black carbon emissions and mitigate its impacts on the climate and environment. As India and other nations pursue their climate goals, addressing black carbon emissions must remain a priority to achieve a sustainable and resilient future for all.