



Black Carbon and Glacier Melting

Why in News

The report titled “**Glaciers of the Himalayas: Climate Change, Black Carbon and Regional Resilience**” says that the [glaciers](#) are melting faster than the global average ice mass. However, the strong policy on [black carbon](#) can sharply cut glacier melt.

- The research report is **released by the** [World Bank](#) and covers the [Himalaya](#), **Karakoram**, and [Hindu Kush \(HKHK\)](#) mountain ranges.

Black Carbon

- Black carbon is **a kind of an aerosol**.
 - An **aerosol** is a suspension of fine solid particles or liquid droplets in the air.
- Among aerosols (such as brown carbon, sulphates), Black Carbon (BC) has been **recognized as the second most important anthropogenic agent for climate change** and the **primary marker to understand the adverse effects caused by air pollution**.
- It **gets emitted** from gas and diesel engines, coal-fired power plants, and other sources that burn fossil fuel. It **comprises a significant portion of** [particulate matter or PM](#), which is an air pollutant.

HKHK Mountain Region:

- HKHK Region **spans eight countries**; Afghanistan, Pakistan, India, Nepal, China, Bhutan, Bangladesh and Myanmar and also **has some of the world’s tallest mountains including** [Mt. Everest](#) and [K2](#).
- HKHK Glaciers **feed into river systems** including Ganga, Yangtze, Irrawaddy, and Mekong.
 - The water that runs down from glaciers **feeds the agriculture**, on which nearly 2 billion people are dependent upon.
- HKHK Region, also known as the **third pole**, along with China’s Tien Shan Mountains holds most ice outside the North and the South Pole.

Key Points

- **About 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.

▪ Source of Black Carbon in Himalayan Region:

- **Industry** (primarily brick kilns) and **residential burning of solid fuel** together account for 45-66% of regional anthropogenic (man-made) BC deposition, followed by **on-road diesel fuels** (7-18%) and **open burning** (less than 3% in all seasons) in the region.

▪ Impact of Deposits of BC:

- It **acts in two ways** hastening the pace of glacier melt:
 - By decreasing surface reflectance of sunlight.
 - By raising the air temperature.

▪ Rate of De-glaciation:

- The rate of retreat of HKHK glaciers is **estimated to be 0.3 metres per year in the west to 1.0 metre per year** in the east.
- Full implementation of **current policies to mitigate BC can achieve a 23% reduction** but **enacting new policies** and incorporating them through regional cooperation among countries can achieve enhanced benefits.

- **National Mission on Sustaining Himalayan Ecosystem (NMSHE)** is one such policy adopted in India. It is one of the eight missions under the [National Action Plan on Climate Change \(NAPCC\)](#).

- **BC deposits can be sharply reduced** through new, currently feasible policies **by an additional 50%** from current levels.

▪ Impact of Glacier Melt:

- Glacier melt **produces flash floods, landslips, soil erosion, and glacial lake outburst floods (GLOF)**.
- In the short run, the higher volumes of melt water **could replace receding groundwater downstream**. But in the long run, decreased water availability would **aggravate water shortage**.

▪ Measures to be Taken:

- In the Himalayas, **reducing black carbon emissions from cookstoves, diesel engines, and open burning** would have the greatest impact and could significantly **reduce radiative forcing** and help to maintain a greater portion of Himalayan glacier systems.

- **Radiative forcing is a measure of the change in energy balance** as a result of a change in a forcing agent (e.g., greenhouse gases, aerosol, cloud, and surface albedo) to affect the global energy balance and contribute to climate change.

▪ Steps to be Taken by Regional Governments:

- Review the **policies on water management**, with an emphasis on basin-based regulation and use of price signals (value of a particular action) for efficiency.
- Careful **planning and use of hydropower** to reflect changes in water flows and availability.
- Increasing the **efficiency of brick kilns** through proven technologies.
- There must also be greater **knowledge sharing** in the region.

[Source: TH](#)

