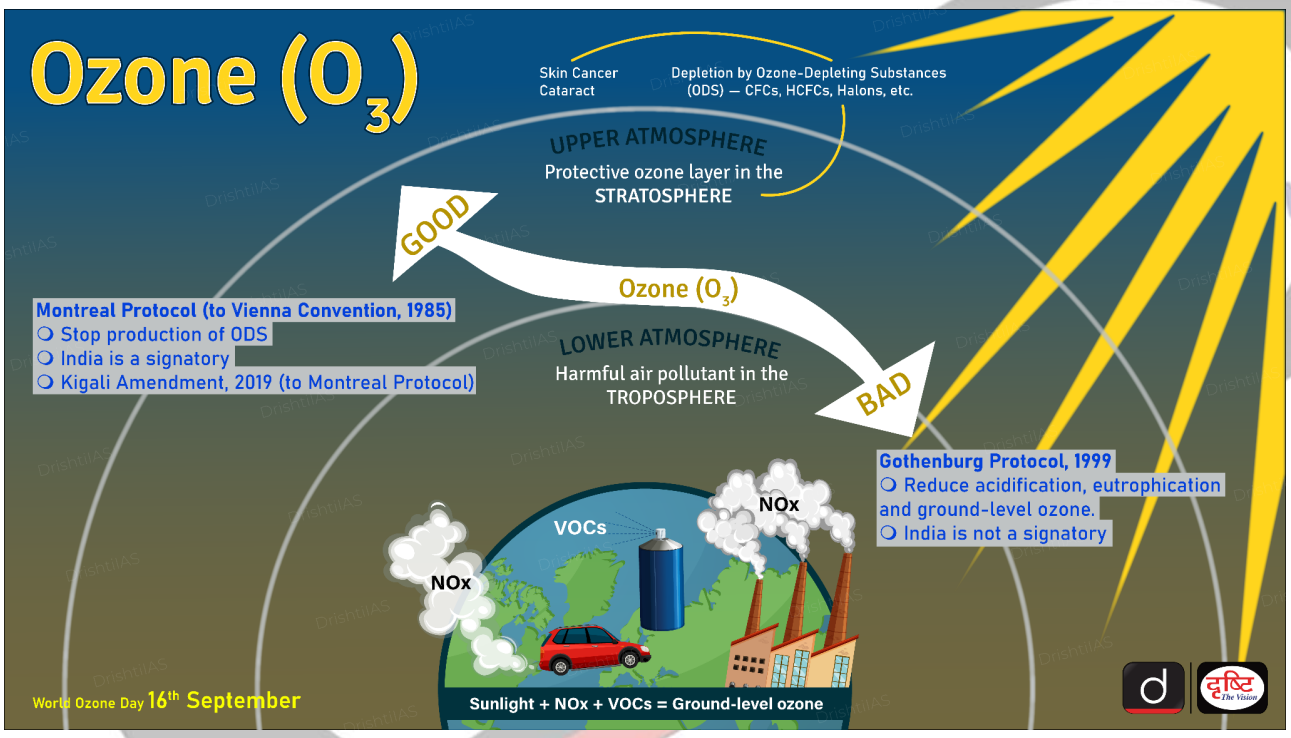
Ground Level Ozone Pollution

Source: PIB

Why in News?

Recently, the Ministry of Environment, Forest and Climate Change (MoEF&CC) highlighted the **steps being taken to control Ground Level Ozone Pollution(GLOP) in India.**



What is Ground Level Ozone Pollution?

- **Ground Level Ozone Pollution:** Ground-level **ozone (O_3)** pollution refers to the excess presence of **ozone at the Earth's surface,** which is formed through chemical reactions in the atmosphere.
    - Unlike the ozone layer in the stratosphere, which protects life from harmful ultraviolet radiation, ground-level ozone is a harmful pollutant that poses significant health risks and environmental damage.
- **Formation of Ground Level Ozone:** Ground-level ozone is a **secondary pollutant,** meaning it is not directly emitted but **formed through chemical reactions between nitrogen oxides (NOx) and volatile organic compounds (VOCs).**
    - NOx (emitted by vehicles, power plants, and industrial processes) and VOCs (emitted from vehicles, petrol pumps, solvents, and waste burning).
    - These reactions occur in the **presence of sunlight,** making ozone formation more significant during sunny days and warmer seasons.
- **Regulation:** The **Central Pollution Control Board (CPCB**) in India has set **National Ambient**

Air Quality Standards (NAAQS) for ozone, including an **8-hour average limit of 100 µg/m³ and a 1-hour limit of 180 µg/m³.**
    - Ground-level ozone is monitored under the **National Air Quality Monitoring Programme (NAMP),** managed by CPCB in collaboration with **State Pollution Control Boards (SPCBs)** and the **National Environmental Engineering Research Institute (NEERI).**
- **Impact:**
    - **Health Effects:** Ground-level ozone causes **respiratory issues** and worsen conditions like **asthma and heart disease.** Chronic exposure may reduce lung capacity, cause permanent damage.
    - By 2050, ozone exposure could lead to over a million deaths in India if emissions are not controlled.
    - **Environmental Impact:** Ozone damages crops, reducing agricultural productivity, and harms forests by inhibiting growth and photosynthesis.
- **Measures to Control GLOP:**
    - **Ozone Depleting Substances (ODS):** MoEF&CC has notified the **Ozone Depleting Substances (Regulation and Control) Rules, 2000,** to regulate the use, import, and export of ODSs in India.
        - ODS, like **Chlorofluorocarbons (CFCs)**, harm the ozone layer. They are **stable in the troposphere** but break down under UV light in the **stratosphere**, leading to ozone depletion.
    - **Cleaner Fuels**: The government has encouraged the use of **Compressed Natural Gas, Liquefied Petroleum Gas,** and **ethanol-blended fuels** to reduce vehicular and industrial emissions.
    - **Vapour Recovery Systems (VRS)**: Installation of VRS at petrol pumps, particularly in Delhi-NCR, to minimize VOC emissions during refueling operations.
    - **PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM-E Drive)**
    - **Electric vehicles (EVs)**
    - **National Clean Air Programme (NCAP**
    - **Bharat Stage - VI(BS-VI) compliant vehicles**

Air Pollutants

Sulphur Dioxide (SO_2)

It comes from the consumption of fossil fuels (oil, coal and natural gas). Reacts with water to form acid rain.

Impact: Causes respiratory problems.

Ozone (O_3)

Secondary pollutant formed from other pollutants (NOx and VOC) under the action of the sun.

Impact: Irritation of the eye and respiratory mucous membranes, asthma attacks.

Nitrogen Dioxide (NO_2)

Emissions from road transport, industry and energy production sectors. Contributes to Ozone and PM formation.

Impact: Chronic lung disease.

Carbon Monoxide (CO)

It is a product of the incomplete combustion of carbon-containing compounds.

Impact: Fatigue, confusion, and dizziness due to inadequate oxygen delivery to the brain.

Ammonia (NH_3)

Produced by the metabolism of amino acids and other compounds which contain nitrogen.

Impact: Immediate burning of the eyes, nose, throat and respiratory tract and can result in blindness, lung damage.

Lead (Pb)

Released as a waste product from extraction of metals such as silver, platinum, and iron from their respective ores.

Impact: Anemia, weakness, and kidney and brain damage.

Particulate Matter (PM)

PM10: Inhalable particles, with diameters that are generally 10 micrometers and smaller.

PM2.5: Fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

Source: Emitted from construction sites, unpaved roads, fields, fires.

Impact: Irregular heartbeat, aggravated asthma, decreased lung function.

Note: *These major air pollutants are included in the Air quality index for which short-term National Ambient Air Quality Standards are prescribed.*

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Consider the following: (2019)

1. Carbon monoxide
2. Methane
3. Ozone
4. Sulphur dioxide

Which of the above are released into atmosphere due to the burning of crop/biomass residue?

(a) 1 and 2 only
(b) 2, 3 and 4 only
(c) 1 and 4 only
(d) 1, 2, 3 and 4

Ans: (d)

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