



## WMO's Greenhouse Gas Bulletin 2023

**For Prelims:** [World Meteorological Organization \(WMO\)](#), [Greenhouse Gas \(GHG\) Bulletin](#), [WMO Global Atmosphere Watch \(GAW\)](#), [Methane \(CH<sub>4</sub>\)](#), [Nitrous Oxide \(N<sub>2</sub>O\)](#), [El Niño](#), [carbon Sink](#), [La Niña](#), [Nationally Determined Contributions](#), [UNFCCC](#), [Paris Agreement](#), [Ozone](#), [UV Radiation](#), [Greenhouse Gases](#), [Aerosols](#), [World Meteorological Congress](#).

**For Mains:** Role of greenhouse gases in global warming, Role of World Meteorological Organization (WMO) in addressing global warming.

**Source:** [IE](#)

### Why in News?

Recently, the [World Meteorological Organisation \(WMO\)](#) released its annual [Greenhouse Gas \(GHG\) Bulletin](#) for the year 2023.

- The GHG Bulletin provides the latest analysis from the [WMO Global Atmosphere Watch \(GAW\)](#) on atmospheric concentrations of GHGs.

### Greenhouse Gas (GHGs)

- GHGs are atmospheric gases that **trap heat from the sun**, keeping Earth's surface warm.
  - However, **human activities**, such as burning fossil fuels, deforestation and industrial processes, have **significantly increased the concentration of these gases**, amplifying the greenhouse effect and leading to global warming and subsequent climate change.
- **Key GHGs:**
  - **Carbon Dioxide (CO<sub>2</sub>):** It enters the atmosphere through **burning fossil fuels** (coal, natural gas, and oil), solid waste etc.
  - **Methane (CH<sub>4</sub>):** Human activities like **cattle farming, landfill waste, rice farming, and fossil fuel extraction** have increased methane levels in the atmosphere.
  - **Nitrous oxide (N<sub>2</sub>O):** It is emitted during **agricultural, land use, and industrial activities**, combustion of fossil fuels and solid waste.
  - **Water Vapour (H<sub>2</sub>O):** It is the **most abundant** GHG. It exists in the atmosphere for only a few days.
  - **Industrial Fluorinated Gases:** These include **hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>)** having high **Global Warming Potential (GWP)**.
    - E.g., SF<sub>6</sub> has a GWP **23,000 times greater than CO<sub>2</sub>**, making these gases extremely potent contributors to global warming.
    - GWP indicates how much heat a GHG traps in the atmosphere over a specific period relative to CO<sub>2</sub>.

## What are the Key Findings of the GHG Bulletin?

- **GHG Levels and Trends:**
  - **Historical Warming:** Since 1990, the warming effect from **GHGs** increased by **51.5%**, with **CO<sub>2</sub>** accounting for approximately **81% of this effect**.
  - **Record Highs in 2023:** GHG levels, including **carbon dioxide (CO<sub>2</sub>)**, **methane (CH<sub>4</sub>)**, and **nitrous oxide (N<sub>2</sub>O)**, reached record levels globally in 2023.
    - CO<sub>2</sub> rose by 2.3 parts per million (ppm) from 2022, reaching **420 ppm**.
  - **Highest Radiative Forcing: 2023** was recorded as the **warmest year**, surpassing the previous record set in 2016. **Global temperatures were 1.48°C** above the 1850-1900 pre-industrial average.
    - Radiative forcing is the **warming effect on the climate** caused by GHGs.
  - **Historical Comparison:** The current CO<sub>2</sub> concentration is comparable to levels **3-5 million years ago** when global temperatures were **2-3°C higher**, and sea levels were **10-20 metres higher** than today.
    - This marks the **12th consecutive year** with an annual CO<sub>2</sub> rise exceeding 2 ppm.
- **Causes of Increased CO<sub>2</sub> Levels:**
  - **Human Activities:** Persistent high CO<sub>2</sub> emissions from **fossil fuel** use, alongside **industrial activities**, are major contributors to the increase.
  - **El Niño Impact:** The **El Niño** phenomenon, which brings warmer weather and drier conditions, particularly in **South Asia**, caused **drier vegetation** and **forest fires**, which released more GHGs into the atmosphere and affected the efficiency of land **carbon sinks**.
- **Climate Concerns:**
  - **Vicious Cycle Warning:** Rising CO<sub>2</sub> levels and **climate change** risk turning natural ecosystems into GHG sources, as warming could lead to **increased carbon release** from **wildfires** and reduce CO<sub>2</sub> absorption by oceans.
  - **Methane Surge:** Methane saw the largest three-year increase from 2020 to 2022, particularly from natural **wetlands** responding to warmer and wetter **La Niña** conditions.
  - **Reduced Carbon Sink:** It highlighted that **warming oceans** and frequent wildfires could diminish natural GHG absorption.
- **Policy Responses:**
  - **Nationally Determined Contributions (NDCs):** According to the **UNFCCC's 2023** assessment, **NDCs** can reduce global emissions by 2.6% from 2019 to 2030, which falls significantly short of the **43% reduction needed** to limit warming to 1.5°C as per the **Paris Agreement**.
  - **UNFCCC's Call for Stronger NDCs:** Countries are required to submit updated NDCs by February 2024, with the UNFCCC urging this as a critical moment to bridge the gap in global emission reduction efforts.

## What is Global Atmosphere Watch?

- **About:** GAW is a **collaborative programme** involving **100 countries**, providing critical scientific data on **atmospheric composition** and **changes** due to both natural and human influences.
- **Purpose:** It aims to enhance understanding of the interactions between the **atmosphere, oceans, and biosphere**, and supports data collection to inform air pollution and climate change research.
- **Core Monitoring Targets:** The GAW programme focuses on **six key atmospheric variables** namely **ozone, UV radiation, GHGs, aerosols, selected reactive gases and precipitation chemistry**.
- **Governance:** GAW expert groups provide leadership and coordinate key activities in the GAW program.
  - GAW expert groups are overseen by the **WMO Research Board** and its **Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee (EPAC SSC)**.
- **Publications:** State of the Global Climate, Greenhouse Gas Bulletin, GAW Reports, Ozone Bulletins.

## World Meteorological Organisation

- **About:** WMO is the UN's **leading authority** on atmospheric sciences, covering Earth's atmosphere, weather, climate, water resources, and their interaction with land and oceans.
  - WMO is the **specialised agency** of the United Nations.
- **Global Cooperation:** It has a membership of **193 Member States and Territories**. **India** is a member of **WMO**.
- **Structure:** WMO is structured with the [World Meteorological Congress](#), the Executive Council, regional associations, technical commissions, and the Secretariat.
  - **World Meteorological Congress: Highest decision-making body** and is responsible for setting overall policies and directions.
  - **Executive Council:** Implements the decisions of the Congress.
  - **Regional Associations: 6 regional associations** that coordinate meteorological, hydrological, and related activities within their specific regions.
- **Climate Advocacy:** WMO supports **UNFCCC** and other environmental conventions. It **advises governments** on climate-related issues to foster sustainable development.
- **Headquarters:** WMO's Secretariat is based in **Geneva, Switzerland** which is overseen by the **Secretary-General**.

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# UN SPECIALISED AGENCIES

UNSAAs are 15 autonomous international organizations working with the UN

Part IV  
WIPO, WMO  
and IMO

## WIPO

- Estd. - 1967 (joined UN in 1974)
- Headquarters - Geneva, Switzerland

*World Intellectual Property Day - 26<sup>th</sup> April*

- Functions -
  - » Encourage creative activity, promote the protection of intellectual property (IP) throughout the world
  - » Shape balanced intl. IP rules
- Members - 193 (India joined in 1975)

- WIPO Treaties that India has ratified/acceded-
  - » Paris Convention (industrial property)
  - » Berne Convention (for Literary and Artistic Works)
  - » WIPO Performance and Phonograms Treaty
  - » Budapest Treaty
  - » Madrid Protocol for the International Registration of Marks
  - » Marrakesh Treaty (for Published Works by Visually Impaired Persons)
  - » WIPO Copyright Treaty
  - » Washington Treaty (IP for Integrated Circuits)
  - » Nairobi Treaty (for Olympic Symbol)
- Publication - Global Innovation Index



## WMO

- Estd. - 1873 (originated from Intl. Meteorological Organization - Vienna International Meteorological Congress)
- » Became a UNSA by WMO Convention 1950

*WMO is a UNSA for meteorology, operational hydrology & geophysical sciences*

- Headquarters - Geneva, Switzerland

- Functions -
  - » Coordinate activities of National Meteorological/Hydrological Services in Member States
  - » Predictions concerning locust swarms, transport of pollutants (nuclear, toxic substances, volcanic ash)
- Member States - 193 (incl. India)

*World Meteorological Day - 23<sup>rd</sup> March*

## IMO

- Estd. - 1948 (Convention on International Maritime Organization held in Geneva)
- Headquarters - London, United Kingdom
- Functions -
  - » Improve safety and security of intl. shipping
  - » Prevent pollution from ships
  - » Also involved in legal matters (liability, compensation issue)

- Member States - 174 (India joined in 1959)
- Important Treaties India has Ratified:
  - » MARPOL (1973) and its Protocols
  - » International Convention for the Safety of Life at Sea (SOLAS, 1974)

*IMO lists India among the 10 states with the largest interest in intl. seaborne trade*



## What are the Key Initiatives to Curb Greenhouse Gas Emission?

- Global:
  - [Kyoto Protocol](#)
  - [Paris Agreement](#)
  - [International Solar Alliance](#)
  - [Global Biofuel Alliance](#)
- India:
  - [Bharat Stage-VI \(BS-VI\) Emission Norms](#)
  - [National Action Plan on Climate Change \(NAPCC\)](#)
  - [Energy Conservation \(Amendment\) Act 2022](#)

- [India's Intended Nationally Determined Contributions \(INDCs\)](#)
- [Panchamrit Goal](#)

## Conclusion

The WMO's 2023 Greenhouse Gas Bulletin reveals **alarming increases in GHG levels** and highlights the urgent need for **stronger policy responses**. As climate change escalates, collaboration through the **Global Atmosphere Watch** and enhanced national contributions are essential to mitigate environmental impacts and safeguard global sustainability.

### **Drishti Mains Question:**

What are greenhouse gases? How have human activities influenced the concentration of greenhouse gases?.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### **Prelims**

**Q. “Momentum for Change: Climate Neutral Now” is an initiative launched by (2018)**

- (a) The Intergovernmental Panel on Climate Change
- (b) The UNEP Secretariat
- (c) The UNFCCC Secretariat
- (d) The World Meteorological Organisation

**Ans: (c)**

**Q. What is ‘Greenhouse Gas Protocol’? (2016)**

- (a) It is an international accounting tool for government and business leaders to understand, quantify and manage greenhouse gas emissions
- (b) It is an initiative of the United Nations to offer financial incentives to developing countries to reduce greenhouse gas emissions and to adopt eco-friendly technologies
- (c) It is an inter-governmental agreement ratified by all the member countries of the United Nations to reduce greenhouse gas emissions to specified levels by the year 2022
- (d) It is one of the multilateral REDD+ initiatives hosted by the World Bank

**Ans: (a)**

**Q. The term ‘Intended Nationally Determined Contributions’ is sometimes seen in the news in the context of (2016)**

- (a) pledges made by the European countries to rehabilitate refugees from the war-affected Middle East
- (b) plan of action outlined by the countries of the world to combat climate change
- (c) capital contributed by the member countries in the establishment of Asian Infrastructure Investment

Bank

**(d)** plan of action outlined by the countries of the world regarding Sustainable Development Goals

**Ans: (b)**

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**Mains**

**Q.** How do the melting of the Arctic ice and glaciers of the Antarctic differently affect the weather patterns and human activities on the Earth? Explain **(2021)**

**Q.** 'Climate change' is a global problem. How will India be affected by climate change? How Himalayan and coastal states of India be affected by climate change? **(2017)**

PDF Refernece URL: <https://www.drishtias.com/printpdf/wmo-s-greenhouse-gas-bulletin-2023>

