



WMO's Greenhouse Gas Bulletin 2023

For Prelims: [World Meteorological Organization \(WMO\)](#), [Greenhouse Gas \(GHG\) Bulletin](#), [WMO Global Atmosphere Watch \(GAW\)](#), [Methane \(CH₄\)](#), [Nitrous Oxide \(N₂O\)](#), [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 (CO₂):** It enters the atmosphere through **burning fossil fuels** (coal, natural gas, and oil), solid waste etc.
 - **Methane (CH₄):** Human activities like **cattle farming, landfill waste, rice farming, and fossil fuel extraction** have increased methane levels in the atmosphere.
 - **Nitrous oxide (N₂O):** It is emitted during **agricultural, land use, and industrial activities**, combustion of fossil fuels and solid waste.
 - **Water Vapour (H₂O):** 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 (SF₆)** having high **Global Warming Potential (GWP)**.
 - E.g., SF₆ has a GWP **23,000 times greater than CO₂**, 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 CO₂.

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 **CO₂** accounting for approximately **81% of this effect**.
 - **Record Highs in 2023:** GHG levels, including **carbon dioxide (CO₂)**, **methane (CH₄)**, and **nitrous oxide (N₂O)**, reached record levels globally in 2023.
 - CO₂ 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 CO₂ 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 CO₂ rise exceeding 2 ppm.
- **Causes of Increased CO₂ Levels:**
 - **Human Activities:** Persistent high CO₂ 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 CO₂ levels and **climate change** risk turning natural ecosystems into GHG sources, as warming could lead to **increased carbon release** from **wildfires** and reduce CO₂ 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 - 26th 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 - 23rd 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)

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>

