

4. Global Carbon Project – Environment

New research by the Global Carbon Project was released during COP30 in Belem, Brazil

Introduction and Background

The Global Carbon Project (GCP) is an international scientific initiative established in 2001 to study the global carbon cycle and provide high-quality, policy-relevant information on greenhouse gas (GHG) emissions. It emerged from collaboration among four major international research programmes–

- A. International Geosphere–Biosphere Programme (IGBP)
- B. International Human Dimensions Programme (IHDP)
- C. World Climate Research Programme (WCRP)
- D. DIVERSITAS (global biodiversity research network)

It is currently a Global Research Project of Future Earth and a partner of WCRP, integrating climate, environment, and human systems research.

Purpose and Mandate

The GCP was created to build a shared and robust scientific knowledge base on carbon budgets, carbon fluxes, and emission trajectories. Core objective – Provide actionable insights for governments, climate negotiators, and international bodies to curb global GHG emissions. It focuses on quantifying and analysing global biogeochemical cycles related to –

- A. Carbon dioxide (CO₂)
- B. Methane (CH₄)
- C. Nitrous oxide (N₂O)

The project investigates –

- D. Natural carbon fluxes from oceans, forests, soils, and atmosphere, and
- E. Human-driven emissions from fossil fuels, industry, land-use change, and agriculture.

GCP's research directly supports global climate governance systems under the UNFCCC, including the Kyoto Protocol, the Paris Agreement, and global stocktake processes.

Role in Global Climate Governance

Provides the authoritative annual “Global Carbon Budget” report widely used by IPCC, governments, research institutions, and climate think tanks. Helps assess progress towards long-term climate goals such as limiting warming to 1.5°C or 2°C. Offers early-warning signals on weakening natural sinks, rising atmospheric CO₂ concentrations, and risks of carbon cycle instability. Informs national climate strategies through data on fossil fuel emissions, land-use contributions, and carbon absorption by oceans and forests.

Key Findings from Recent GCP Research

Global Emission Trends – Global carbon emissions are projected to increase by 1.1% in 2025, reaching approximately 38 billion tonnes of CO₂. This indicates that global mitigation efforts are not yet aligned with pathways required to limit warming to 1.5°C.

Regional Emission Patterns

China – Emissions expected to grow by 0.4% in 2025.

United States – Emissions projected to rise by 1.9%, driven by rebound in transport and industry.

European Union – Emissions anticipated to grow at 0.4%, following economic recovery patterns.

Land-Use Change and Natural Sinks – Reforestation and forest restoration efforts globally are offsetting nearly half of emissions from deforestation and land clearing. Despite these efforts, the overall annual growth rate of CO₂ emissions has slowed only to 0.3%, indicating persistent fossil fuel dependency. Evidence suggests that climate change is weakening natural carbon sinks, particularly oceans and tropical forests, due to warming, droughts, and biodiversity loss.

Carbon Budget and Climate Targets – Remaining global carbon budget to keep warming under 1.5°C is estimated at 170 billion tonnes of CO₂. At current emission levels, this budget is expected to be fully exhausted before 2030, underscoring the urgency for deep emission cuts.

India-Specific Trends and Observations

Emission Growth – India's emissions are projected to rise by 1.4% in 2025 – a slowdown from the 4% rise in 2024. Key reasons for slower growth –

- A. Strong performance of the renewable energy sector,
- B. Favourable monsoon improving hydroelectric output, and
- C. Moderation in coal-based power demand.

India's Position in Global Emissions – India is the third-largest emitter globally at 3.2 billion tonnes per year (2024). Emission ranking –

- A. China – ~12 billion tonnes
- B. United States – ~4.9 billion tonnes
- C. India – ~3.2 billion tonnes

Despite being a top emitter in absolute terms, India's per capita emissions remain among the lowest worldwide, reflecting development-stage and population size.

Sectoral Contributors

Emission rise in India is led by –

- A. **Coal** – +0.8% (still dominant in power generation)
- B. **Oil** – +1% (transport and industrial fuel use)
- C. **Natural gas** – +1.3% (city gas, fertiliser, industrial feedstock)

Rapid growth in solar and wind energy, along with adoption of cleaner technologies, is reducing the relative share of fossil fuels.

Broader Implications

Persistent global emission increases highlight the widening gap between current efforts and required decarbonisation pathways. Weakening natural sinks may accelerate the pace of warming, making carbon removal technologies and forest protection more urgent. Countries like India face a dual challenge –

- A. Sustaining economic growth, and
- B. Reducing emissions intensity through renewable expansion, efficiency improvements, and low-carbon infrastructure.

Source – <https://www.thehindu.com/sci-tech/energy-and-environment/indias-2025-carbon-emissions-rise-lower-than-last-year-says-report/article70275808.ece# ~ ~ ~ text=While%20global%20carbon%20emissions%20are,of%20global%20fossil%20fuel%20emissions.>