

Nitrous Oxide Emissions and Climate Change

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In News

Nitrous oxide (N₂O) is the **third most important long-lived greenhouse gas, after carbon dioxide (CO₂) and methane.** Nitrous oxide is also one of the main **stratospheric ozone depleting substances** and we are releasing more of it into the atmosphere than previously thought. Dinitrogen oxide occurs naturally and also as a result of man's activities. In environmental conditions it is a **colourless, sweet smelling gas.**

Impact of Nitrous Oxide on Climate Change

- The anaesthetic and analgesic properties of nitrous oxide have been **used in medicine and dentistry since the late nineteenth century**, when it was also used as a recreational drug.
- Now, it is used in the **dairy industry** as a mixing and foaming agent, in motor sports to **speed engines** and by deep sea divers to avoid nitrogen narcosis. Increasing use of **nitrogen fertilizers** is leading to higher N₂O levels in the atmosphere.
- Nitrous oxide is **released naturally from soils and water bodies as part of the microbial processes of nitrification and denitrification.** The two major **man-made sources** are from **agriculture** (application of fertilisers to soils and subsequent leaching to water bodies) and the **manufacture of acids and nylon.** It is also **released from power stations and road transport** (particularly since the introduction of catalytic convertors).
- Although relatively small amounts are released, it has a

high “global warming potential” (310 times that of carbon dioxide). Like other greenhouse gases, nitrous oxide **absorbs radiation and traps heat in the atmosphere**, where it can live for an average of 114 years.

- While in the stratosphere, nitrous oxide is exposed to sunlight and oxygen which **converts the gas into nitrogen oxides**. Nitrogen oxides can **damage the ozone layer**, thus reducing the protection offered from harmful UV sun rays.
- Depletion of the stratospheric ozone layer (in which nitrous oxide plays a part) means that humans may be exposed to high doses of UV sunlight which might cause skin cancers.
- At normal environmental concentrations, nitrous oxide is not harmful to humans. Inhalation of higher concentrations in an enclosed space could however exclude oxygen, causing **dizziness, nausea and eventually unconsciousness**.
- **The United Nations Framework Convention on Climate Change** (Kyoto Protocol, 1997) introduced measures designed to achieve reduction of greenhouse gas releases (including nitrogen monoxide).
- A 2013 report by the United Nations found that since the pre-industrial era, nitrous oxide emissions from human activities have increased 20%. At the time, the authors wrote that if nothing was done, those **emissions were expected to double by 2050**.
- Despite nitrous oxide’s role depleting the ozone layer, it is **not included in the Montreal Protocol on Substances that Deplete the Ozone Layer**, an international treaty that aims to restore the ozone layer by phasing out certain substances.