

## Total Recovery of Ozone Layer

### Why in news?

*A scientific assessment by the U.N.-backed scientists has suggested that the ozone 'hole' is now expected to be completely repaired.*

### What is ozone layer?

- Ozone (O<sub>3</sub>) is found mainly in the stratosphere between 10 and 50 km from the Earth's surface.
- It is critical for planetary life, since it absorbs UV rays coming from the Sun.

*UV rays are known to cause skin cancer and many other diseases and deformities in plants and animals.*

### What is ozone hole?

- The problem of depletion of the ozone layer is commonly referred to as the emergence of a 'hole' in the ozone layer.
- It is actually just a **reduction in concentration of the ozone molecules** in the stratosphere.
- Even in the normal state, ozone is present in extremely low concentrations in the stratosphere.
- Where the 'layer' is supposed to be the thickest, there are no more than a few molecules of ozone for every million air molecules.
- This thinning of the ozone layer over Antarctica came to be known as the ozone hole.

*The depletion of the ozone layer was first noticed in the early 1980s. It used to be the biggest environmental threat before climate change came along.*

### What is the level of damage to the ozone layer?

*Dobson Unit is the measure of the total amount of ozone in a vertical column of air above the Earth's surface.*

- Prior to 1979, scientists had not observed atmospheric ozone concentrations below 220 Dobson Units.
- In the early 1980s, scientists began to notice a sharp drop in the concentration of ozone.

- This drop was much more **pronounced over the South Pole**, which was later linked to the unique meteorological conditions - temperature, pressure, wind speed and direction - that prevail over Antarctica.

*The ozone hole over Antarctica is the biggest during the months of September, October, and November.*

- **Chief cause** - By the middle of 1980s, scientists had figured out that the chief cause of ozone depletion was the use of a class of industrial chemicals that contained chlorine, bromine or fluorine.
- The most common of these were the chlorofluorocarbons (CFCs) - used extensively in the AC, refrigeration, paints, and furniture industries.

### **What did the new assessment reveal?**

- The new assessment revealed that the ozone 'hole' is now expected to be completely repaired by 2066.
- If current policies continued to be implemented, the ozone layer was expected to recover to 1980 values
  - by 2066 over Antarctica,
  - by 2045 over the Arctic, and
  - by 2040 for the rest of the world.

*An UN-backed scientific panel has reported that the ozone layer is expected to be back to where it was in 1980 by 2040 itself.*

- The ozone hole has been steadily improving since 2000, thanks to the effective implementation of the **Montreal Protocol 1989**.
- The Montreal Protocol made possible the successful elimination of harmful industrial chemicals, referred to as Ozone Depleting Substances (ODSs). This led to the recovery of the ozone layer.
- The assessment has reported that nearly 99% of the substances banned by the Montreal Protocol have been eliminated from use, resulting in a slow but definite recovery of the ozone layer.

### **What is the climate change co-benefit from the Montreal Protocol?**

- Elimination of ODSs has an important climate change co-benefit as well.
- These substances also happen to be powerful greenhouse gases (GHGs), several times more dangerous than carbon dioxide.
- The report said that global compliance to the Montreal Protocol would ensure the avoidance of 0.5 to 1 degree Celsius of warming by 2050.
- This means that if the use of ODSs had continued to grow the way it did before they were banned, the world would have been 0.5 to 1 degree Celsius warmer than it already is.

- With this climate change objective in mind, the Montreal Protocol was amended in 2016 to extend its mandate over hydrofluorocarbons (HFCs) that have replaced the CFCs in industrial use.
- **Kigali Amendment** to the Montreal Protocol seeks to eliminate 80-90% of the HFCs currently in use by the year 2050.
- This is expected to prevent another 0.3 to 0.5 degree Celsius of global warming by the turn of the century.

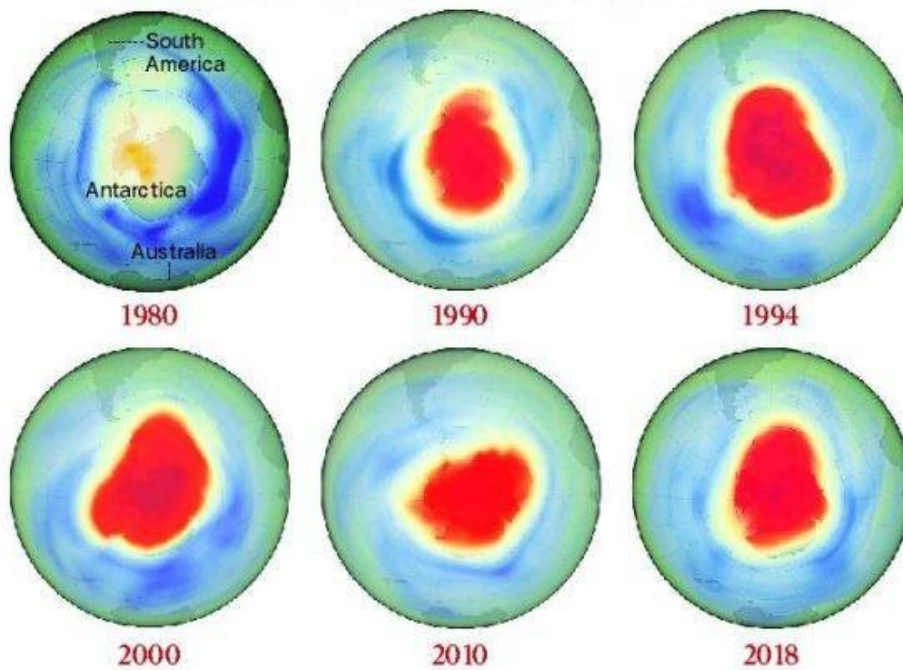
### Why Montreal Protocol is a precedent for climate action?

- This is because of the reason that the success of the Montreal Protocol in repairing the ozone hole can also be used to curtail emissions of GHGs to arrest rapidly rising global temperatures.
- However, the parallels of elimination of ODSs with GHGs are limited.

### What are the limitations?

- The use of ODSs, though extensive, was restricted to some specific industries. Their replacements were readily available.
- The impact of banning these ODSs was limited to these specific sectors.
- But, the case of fossil fuels is very different. Emission of carbon dioxide is inextricably linked to the harnessing of energy.
- Almost every economic activity leads to carbon dioxide emissions.
- Even the renewable energies have considerable carbon footprints right now, because their manufacturing, transport, and operation involves the use of fossil fuels.
- The impact of restraining GHG emissions is not limited to a few industries or economic sectors, but affects the entire economy.
- It also has implications for the quality of life, human lifestyles and habits and behaviours.
- So, climate change, no doubt, is a far more difficult and complex problem than dealing with ozone depletion.

## THINNING NATURAL SUNSCREEN OVER ANTARCTICA



*Pictures and caption: NASA Earth Observatory*

### Reference

1. [The Indian Express | Ozone hole, filling up now: What this means for climate action](#)
2. [The Washington Post | Ozone layer continues to heal, a key development for health, food security and the planet, U.N. study says](#)



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