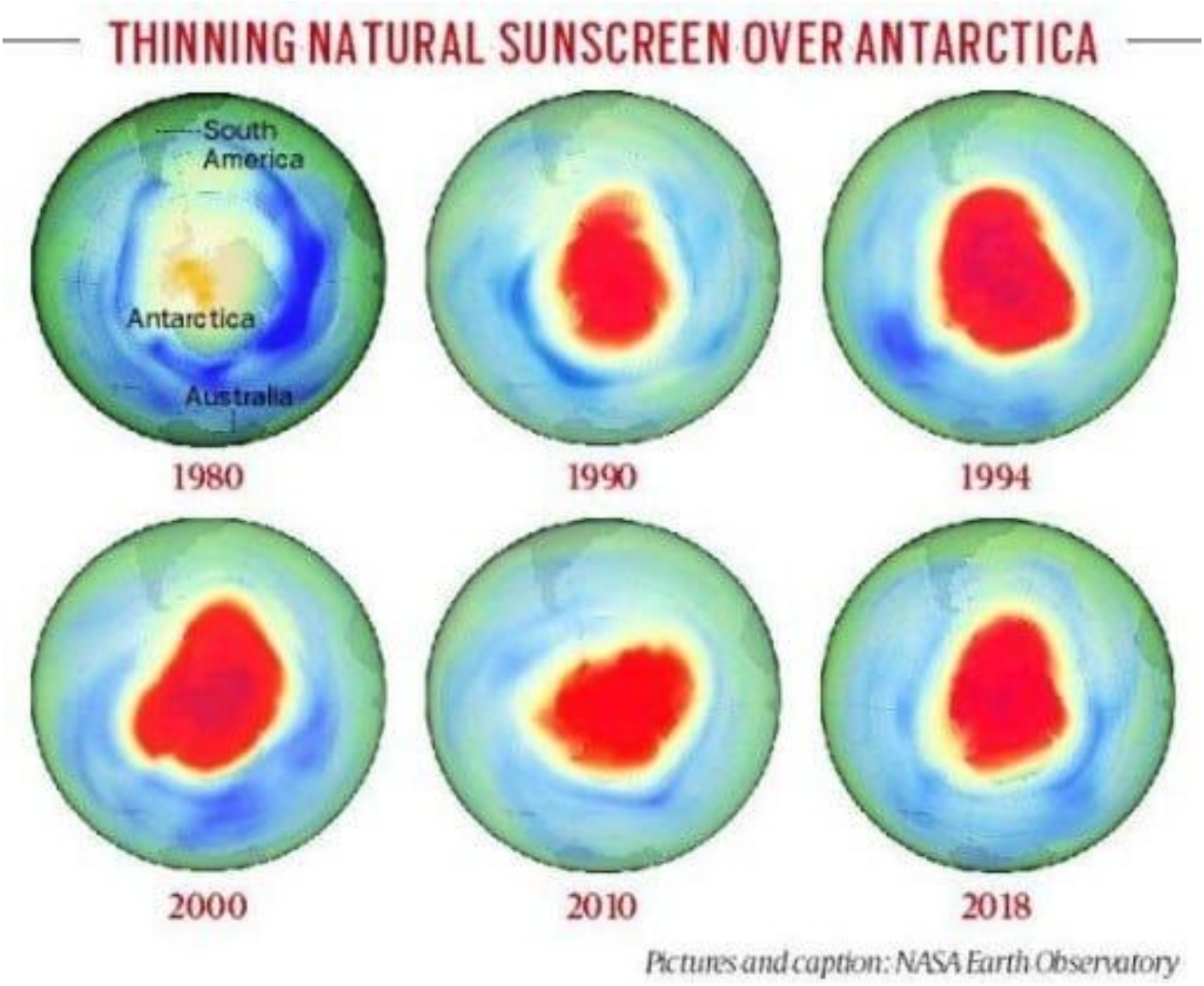
Ozone Hole is Filling Up

January 11, 2023 • vajiramandravi.com



What's in today's article?

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- **What exactly is the ozone layer, and how crucial is it to life on Earth?**
- **What is the ozone hole?**
- **What is the timeline of efforts taken to repair the ozone hole?**
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Why in News?

According to the **Scientific Assessment of Ozone Depletion 2022**, an UN-backed scientific panel report, the ozone hole, which was once believed to be the most serious threat to planetary life, is now expected to be totally repaired by 2066.

What exactly is the ozone layer, and how crucial is it to life on Earth?

- **Ozone** is a naturally occurring molecule and an ozone molecule is made up of 3 oxygen atoms (chemical formula – **O3**).
- **The ozone layer** is the common term for the high concentration of ozone that is found in the **stratosphere** around 15-30 km above the earth's surface.
    - **The Dobson Unit** (DU) is the most common unit for measuring ozone concentration (1 DU = no. of molecules of O3 required to create 0.01 millimeters thick ozone layer at 0 degrees Celsius and 1 atm pressure).
- It covers the entire planet and **protects life on earth by absorbing harmful ultraviolet-B** (UV-B) radiation from the sun.
- **The long-term UV-B radiation exposure** causes skin cancer, genetic damage, and immune system suppression in humans and animals, as well as lower yielding agricultural crops.

What is the ozone hole?

Image Caption: Ozone Depletion Process

- Chemicals containing **chlorine and bromine** atoms are released to the atmosphere through human activities.
- These chemicals combine with certain weather conditions to cause reactions in the ozone layer, leading to **ozone molecules being destroyed**.
- Depletion of the ozone layer occurs globally, however, the severe **depletion of the ozone layer** over the Antarctic is often referred to as the **ozone hole.**
- This is linked to the unique **meteorological conditions** (temperature, pressure, wind speed) that prevail over Antarctica. Increased depletion has recently started occurring over the Arctic as well.

What is the timeline of efforts taken to repair the ozone hole?

- 1974: Chemists in the USA discover the link between chlorofluorocarbons (CFCs) and the breakdown of ozone in the stratosphere
- 1985: British scientists publish results of abnormally low ozone concentrations above the Antarctic
- 1985: **Vienna Convention** for the Protection of the Ozone Layer agreed
- 1987: **Montreal Protocol** on Substances that Deplete the Ozone Layer agreed. It sets binding obligations for countries to phase out production of all the major ozone depleting substances.
- **2016:** The Kigali Amendment to the Montreal Protocol seeks to eliminate 80-90% of the hydrofluorocarbons (HFCs) currently in use by the year 2050, which is expected to prevent another 0.3 to 0.5 degree Celsius of global warming by the turn of the century.
    - The Montreal Protocol was amended to extend its mandate over HFCs that have replaced the CFCs in industrial use.
    - HFCs do not cause much damage to the ozone layer – the reason they were not originally banned, but are very powerful greenhouse gases (GHGs).

News Summary with respect to the findings of the report

- According to the latest scientific assessment, 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**.
- The ozone hole has been steadily improving since 2000, thanks to the effective implementation of the **Montreal Protocol,** which resulted in the successful elimination of some harmful industrial chemicals, together referred to as **Ozone Depleting Substances** (ODSs).
- The assessment has reported that nearly 99% of the substances banned by the Montreal Protocol have now been eliminated from use, resulting in a **slow but definite recovery of the ozone layer.**
- The elimination of ODSs has an **important climate change co-benefit as well**, as these substances also happen to be powerful GHGs and several of them many times more dangerous than CO2 – the most abundant GHG and the main driver of global warming.
- 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.
- The Montreal Protocol’s achievement in repairing the ozone hole is frequently **cited as a paradigm for climate action,** which can be utilised to reduce the GHG emissions to slow the rate of global warming.

Q1) Why was Montreal Protocol amended?

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

Q2) Why when the ozone hole is predicted to recover?

According to the latest scientific assessment, 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.

Source: Ozone layer is filling up | Department of Environment Australia | UN

Video: https://www.youtube.com/watch?v=6BUT16jfoKk