Smallest Annual Ozone Hole

Why in news?

An “ozone hole”, which builds up over the Antarctic region this time of the year, has been found to be the smallest since it was first discovered in the 1980s.

Why is ozone important?

- Ozone is, chemically, a molecule of three oxygen atoms.
- It is found mainly in the upper atmosphere, an area called stratosphere, between 10 and 50 km from the earth’s surface.
- Though it is talked of as a layer, ozone is present in the atmosphere in rather low concentrations.
- Even at places where this layer is thickest, there are not more than a few molecules of ozone for every million air molecules.
- Nevertheless, they perform a very important function.
- By absorbing the harmful ultraviolet radiations from the sun, the ozone molecules eliminate a big threat to life forms on earth.
- Notably, UV rays can cause skin cancer and other diseases and deformities, in plants and animals.

What is the concern with depletion?

- During experiments in Antarctica in the early 1980s, it was noticed that during September-November, the concentration of ozone fell considerably lower to what was recorded in the 1950s.
- Studies and satellite measurements confirmed the depletion.
- Given its significance, the ozone layer’s depletion was considered as grave a threat to the planet in the 1980s and 1990s as climate change is now.
- By mid-1980s, scientists narrowed down on a class of industrial chemicals like chloroflurocarbons, or CFCs, as the likely culprits.
- So, over the years, the threat has largely dissipated.
- This is largely because the world has banned the production and consumption of most of the “ozone-depleting substances”.
- However, it will take another 15-45 years for the ozone layer to be fully restored.

What causes the ozone hole?

- It is to be understood that the ‘ozone hole’ is not really a hole.
- It is a region in the stratosphere, directly above Antarctica, where the ozone concentration is measured to become extremely low in certain months.
- Notably, depletion has happened in other regions of the stratosphere as well but the problem is more acute in Antarctica.
- This is due to a set of special meteorological and chemical conditions that arise there in the months of September, October and November.

What is the recent discovery?

- NASA recently reported that the ozone hole, which usually grows to about 20 million sq km in September, was less than half that size in this year (2019).
- This is the smallest it has ever been during this time of the year, after being discovered.

What are the possible reasons for this?

- There was an extraordinarily high temperature in the stratosphere this year.
- The NASA said that the less depletion could have happened because of this rather than the ongoing human efforts to contain the ozone depletion.
- Temperatures in some areas of the stratosphere, which is usually over 100 degrees below zero, were 30° to 40°C higher than normal in September.
- At least two such extraordinary warming of the stratosphere has been observed in the past.
- On both such occasions, the ozone hole was also measured to be smaller than usual.
- However, the reason why this warming happens is uncertain.
- The warming has no observed connection with the warming in lower atmosphere that leads to climate change.
- Given all, it should be noted that this gain is temporary, and persistent human efforts are essential.

How effective are global efforts in this regard?

- The depletion in the ozone layer is consistently being contained with global efforts to ban the use of harmful chemicals that destroy ozone.
- CFCs and similar chemicals were being widely used in industrial applications like refrigeration, air-conditioning, foams, fire-extinguishers and solvents.
- The 1989 global agreement (Montreal Protocol) organised international consensus on phased elimination of these chemicals.
- In subsequent years, the agreement has ensured the phase-out of over 90% of these chemicals.
- Two years ago, an amendment to the Montreal Protocol cleared the way for a

faster elimination of another set of similar compounds.

- These are hydroflurocarbons, or HFCs, which were being used as temporary replacements for CFCs.
- With these, the impact on the ozone layer has been encouraging.
- In September 2019, the UN Environment Programme said that the ozone layer was on track to be completely restored within “our lifetime” itself.
- It said that the ozone layer over some areas in the northern hemisphere could be completely restored to their pre-1980 levels by as early as the 2030s.
- It said that the Antarctica ozone hole could be completely healed by the 2060s.
- Parts of the ozone layer had recovered at the rate of 1 to 3% every 10 years since 2000.

What does it mean for climate protection efforts?

- With its success in eliminating ozone depleting substances, the Montreal Protocol is often cited as a model for the problem of climate change.
- The example, however, is not very suitable.
- The chemicals that were dealt with by the Montreal Protocol were used in only some specific sectors.
- So, their replacements were readily available, even if at a higher cost differential at that time.
- Also, the economic impact of banning these chemicals, and the disruption it caused, was limited to these sectors.
- Over the years, these industrial sectors have managed a relatively smooth transition.
- On the other hand, climate change, caused by greenhouse gas emissions, is a much more complex, and all-pervasive, problem.
- The emission of carbon dioxide happens from the most basic of all activity - production and consumption of energy.
- All other activities require energy to drive them, and therefore there is no escaping carbon dioxide emissions.
- Even the so called renewable energies have a carbon footprint.
- Also, reduction in carbon dioxide emissions affects economic activity and, in turn, the living standards of people.
- This is also partly why climate change agreements like the Kyoto Protocol could achieve very little till now, and Paris Agreement, a challenging task.

Source: Indian Express



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