

## **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 chlorofluorocarbons, 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 hydrofluorocarbons, 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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