

UPSC PREPARATION

What is Permafrost? Impact of Global Warming on Permafrost

The latest Intergovernmental Panel on Climate Change (IPCC) report has warned that increasing global warming will result in reductions in Arctic Permafrost and the thawing of the ground is expected to release greenhouse gases like methane and carbon dioxide.

What is Permafrost?

Permafrost is a permanently frozen layer below Earth's surface. It is any ground that remains completely frozen for at least two years straight. Permafrost is most common in regions with high mountains and in Earth's higher latitudes (North and South Poles).

Almost a quarter of the land area in the Northern Hemisphere has permafrost underneath. It is spread across an area of over 23 million square kilometres, covering about 15% of the land area of the globe.

Effects of Climate Change on Permafrost

Climate Change results in an increase in global temperatures, which effects the permafrost in the following ways.

- Permafrost and frozen ground around the world may eventually thaw and disappear. The amount and thickness of seasonally frozen ground would decrease.
- More Taliks (an area of unfrozen ground surrounded by permafrost) would form, and eventually, very little permafrost would be left.
- The active layer, where the ground freezes and thaws each year, would get thicker. As the active layer becomes thicker, the permafrost layer underneath it gets thinner.
- Scientists have found that there is now 10 per cent less frozen ground in the Northern Hemisphere than in the early 20th century.
- The ground is not freezing as deeply as it used to in winter, and the ground is not staying frozen as long.

Effects of Thawing Permafrost

- Thawing permafrost will affect countries where roads or buildings were constructed on permafrost. Example: Russian railways.
- Without permafrost, water would drain away or evaporate into the air, wetlands would dry up, and fewer plants would grow.
- In some areas, thawing changes the landscape, creating slumping ground, unstable forests, and shallow lakes. In hilly areas, thawing can cause landslides.
- With reduced resources, fewer animals would be able to survive. People may also find it harder to find water and food in regions where permafrost has disappeared.
- Many northern villages are built on permafrost. When permafrost is frozen, it's harder than concrete. However, thawing permafrost can destroy houses, roads and other infrastructure.
- Permafrost is one of the earth's great stores of global warming gases. The total quantity of carbon that is now buried in the permafrost is estimated at about 1500 billion tonnes. A warming climate may release these gases into the atmosphere, further increasing global temperatures.

- If all the permafrost in the world thawed, it could release enough water to raise global sea levels.
- When permafrost thaws, so do ancient bacteria and viruses in the ice and soil. These newly-unfrozen microbes could make humans and animals very sick. Scientists have discovered microbes more than 400,000 years old in thawed permafrost.
- Researchers estimate that fires along with abrupt thawing events could increase carbon emissions up to 40% by the end of the century unless fossil fuel emissions are drastically reduced.

Way Forward

- **Reducing our carbon footprint:** The world's seven billion people consume varying amounts of the planet's resources. Understanding your [carbon footprint](#) can help limit the impact of your consumption on the environment.
- **Investing in energy-efficient products:** But we must also reduce greenhouse gas emissions by investing in energy-efficient products, otherwise, these same people will suffer the most on a hothouse Earth.
- **Supporting climate-friendly businesses:** Running an environmentally friendly business helps you reduce your impact on the environment and preserves natural resources, reducing a carbon footprint.
- Research shows that the world needs to cut its emissions at least in half by 2030 and reach net-zero by mid-century to prevent the worst effects of climate change. Policymakers should focus on deeper emissions cuts.
- Funding for developing cheap and clean energy production must be increased.

Every country has to implement eco-friendly policies and laws to mitigate climate change and [global warming](#). If implemented now, a lot of the costs and damage that could be caused by changing climate can be mitigated.