



Rapidly Melting Antarctic Ice

For Prelims: Ocean overturning circulation, India's Initiatives in Antarctica's Context

For Mains: Impact of melting of ice on global ocean, India's Initiatives in Antarctica, Deglaciation and Impacts, Rapid Ice-Melting and Sea-level Rise.

Why in News?

A study published in Nature has revealed that **rapidly melting Antarctic ice** is dramatically **slowing down the flow of water through the world's oceans**, and could have a **disastrous impact on global climate, marine food chain** and on the **stability of ice shelves**.

What are the Key Highlights of the Report?

- **Impact on World's Ocean:**
 - As temperatures rise and freshwater from Antarctica's melting ice enters the ocean, the salinity and density of the surface water are reduced, **diminishing the downward flow to the sea's bottom**.
 - The study showed that **warm water intrusions in the western Antarctic ice shelf would increase**, but it did not look at how this might create a feedback effect and generate even more melting.
 - The report found **deepwater circulation in the Antarctic could weaken at twice the rate of decline in the North Atlantic**.
 - **Also, deep ocean water flows from Antarctica could decline by 40% by 2050.**
- **Impact on Global Climate:**
 - The findings also suggest the ocean would not be able to absorb as much carbon dioxide as its upper layers become more stratified, leaving more CO₂ in the atmosphere.
- **Impact on Food Chain:**
 - **Ocean overturning** allows nutrients to rise up from the bottom, with the Southern Ocean supporting about **three-quarters of global phytoplankton production**, the base of the food chain.
 - Slowing the sinking near Antarctica **slows down the whole circulation** and hence also **reduces the amount of nutrients that get returned from the deep ocean** back up to the surface.

What are India's Initiatives in Antarctica's Context?

- **Antarctic Treaty:** India officially acceded to the Antarctic Treaty System on **1st August 1983**. On 12 September 1983, India became the fifteenth Consultative Member of the Antarctic Treaty.
- **Research Stations:** The [Dakshin Gangotri station \(decommissioned\)](#) and the [Maitri station, Bharti](#) were established to carry out research in Antarctica.
- **Establishment of NCAOR:** The [National Centre for Antarctic and Ocean Research](#)

(NCAOR) was established to conduct the country's research activities in the Polar and Southern Ocean realms.

- **Indian Antarctic Act 2022:** It envisages regulating visits and activities to Antarctica as well potential disputes that may arise among those present on the continent.
 - Other provisions of the act involve **protecting mineral resources, protecting native plants, prohibition on introducing birds not native to Antarctica and provisions for Indian tour operators.**

What about Deglaciation in the Rest of the World?

- **Melting of Thwaites Glacier:** Thwaites Glacier is 120 km wide, **fast-moving glacier located in Antarctica.**
 - Because of its size (1.9 lakh square km), **it contains enough water to raise the world sea level by more than half a metre.**
 - Its melting already contributes 4% to global sea-level rise each year.
- **Ice Melting at Mt. Kilimanjaro:** The ice cap on Africa's biggest peak, Tanzania's Mount Kilimanjaro, is **among the famous glaciers predicted to melt by 2050 because of climate change.**
 - It has **melted more than 80% since 1912.**
- **Retreating Himalayas:** The Himalayan glaciers form the largest body of ice outside the polar caps and are the source of water for the innumerable rivers that flow across the Indo-Gangetic plains.
 - Glaciers in the Himalaya are **receding faster than in any other part of the world.**
 - The glaciers have been **losing the equivalent of more than a vertical foot and half of ice each year since 2000;** double the amount of melting that took place from 1975 to 2000.

UPSC Civil Services Examination, Previous Year Question (PYQ) :

Q. With reference to the water on the planet Earth, consider the following statements:

1. The amount of water in the rivers and lakes is more than the amount of groundwater.
 2. The amount of water in polar ice caps and glaciers is more than the amount of groundwater.
- (2021)

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (b)

Source:IE

