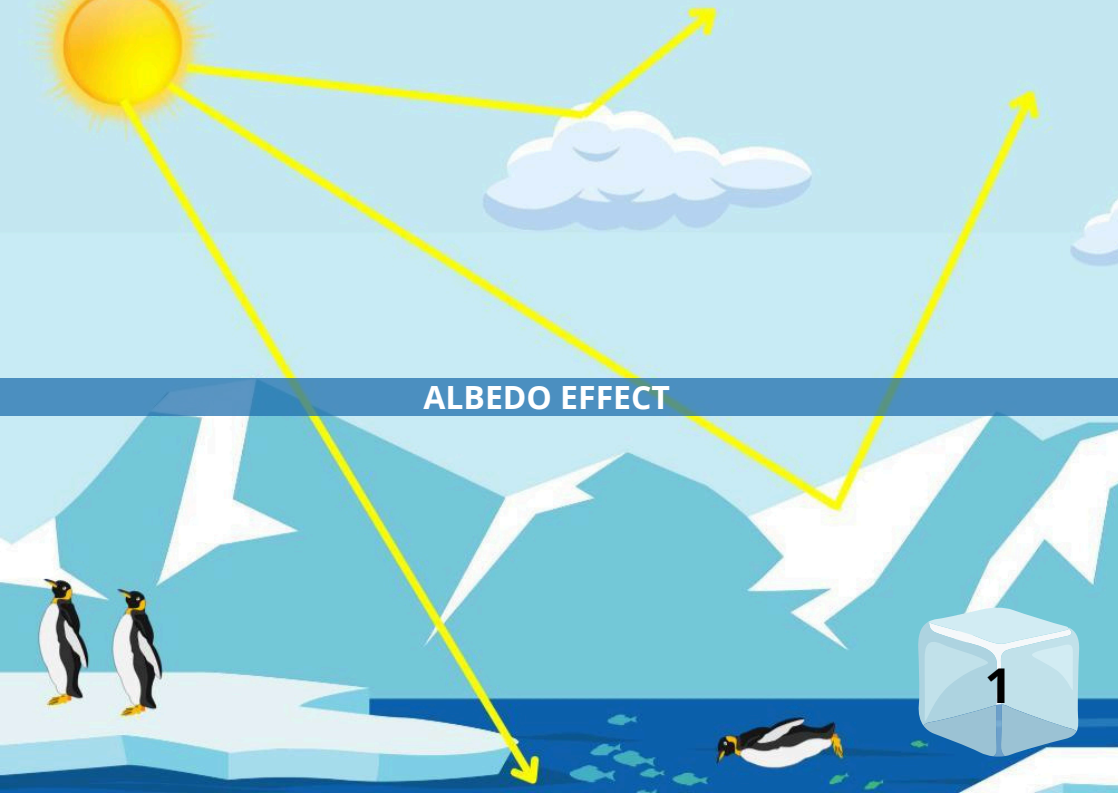
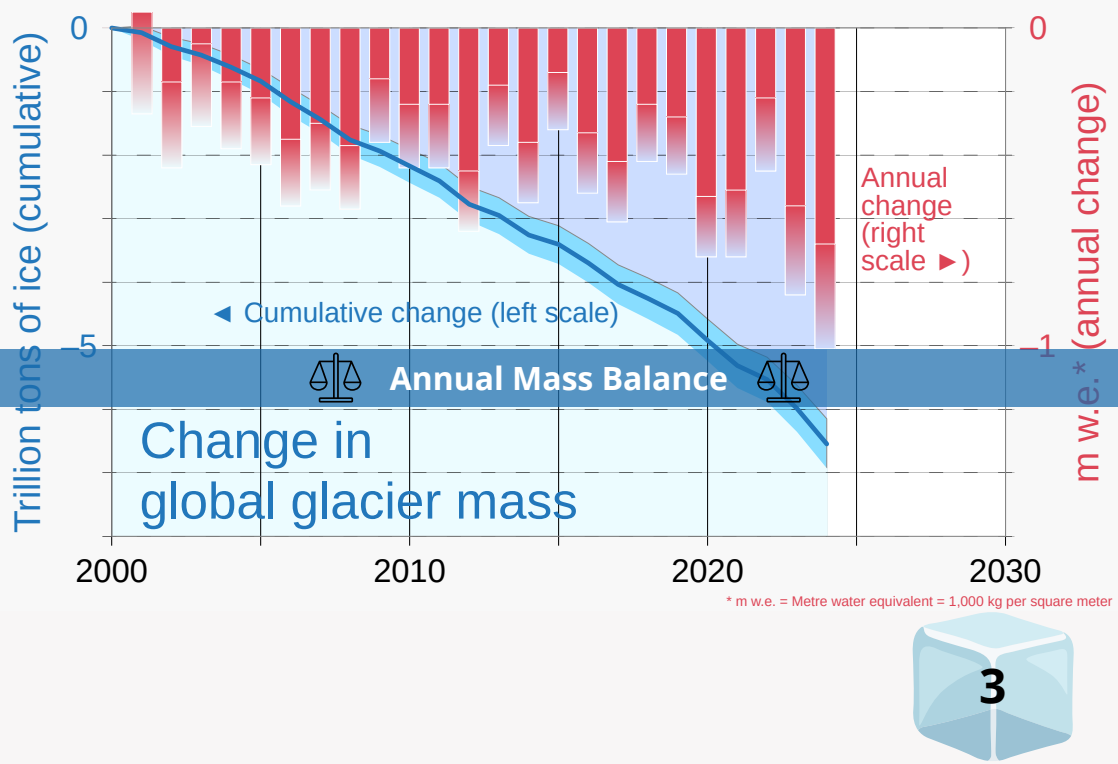

ALBEDO EFFECT
1

The albedo effect is the Earth's ability to reflect sunlight. Ice and snow reflect heat, but when they melt, they reveal darker surfaces that absorb more heat. This makes the area warmer, causing even more melting. This positive feedback loopspeeds up glacier melting, contributing to rising sea levels and climate change.

Glacial Lakes & Outburst Floods

As glaciers melt, glacial lakes form when meltwater accumulates behind natural ice or moraine dams. These lakes are often unstable and poorly monitored, especially in remote regions. A sudden breach of these dams can trigger a Glacial Lake Outburst Flood. GLOFs can unleash millions of cubic meters of water in a matter of hours. They can destroy villages, roads, bridges, and ecosystems downstream. With climate warming, both the number and size of glacial lakes are increasing worldwide. Glacial lakes are ticking time bombs, created by the very ice that's vanishing.



* m w.e. = Metre water equivalent = 1,000 kg per square meter

The annual mass balance of a glacier is calculated as the difference between snow accumulation (mass gain) and melt of ice and snow (mass loss) over a year, and reflects the prevalent atmospheric conditions. When measured over a long period, trends in mass balance are an indicator of climate change. The global net loss of glacier mass contributes to sea level rise, whereas seasonal melting of ice and snow contributes to runoff, even in years with a positive annual mass balance.


Economic & Geopolitical Consequences
North Pole
OCEAN
4

Melting opens new sea routes and access to fossil fuels and minerals. This raises geopolitical tensions in the Arctic and sparks debates over sovereignty, environmental protection, and global responsibility.

Arctic population in difficulty

5

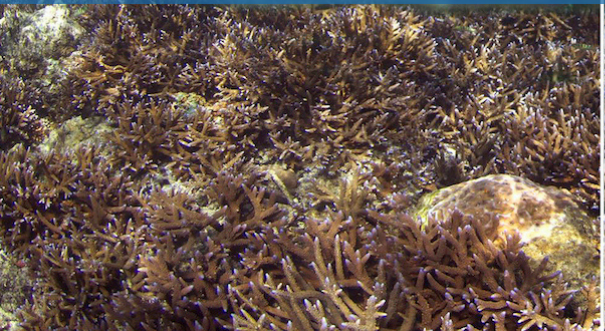
Around 4.2 million people live in the Arctic region, many from Indigenous communities (e.g., Inuit, Sámi, Chukchi).
They face: Thinning sea ice, making traditional hunting and travel dangerous or impossible. Changes in animal migration, disrupting access to food sources. Permafrost thaw, damaging homes, infrastructure, and cultural heritage. Increased presence of industry and outsiders, challenging cultural autonomy and land rights. Climate change is not just an environmental issue—it is a human and cultural crisis for Arctic peoples, whose ways of life are deeply connected to ice and cold.

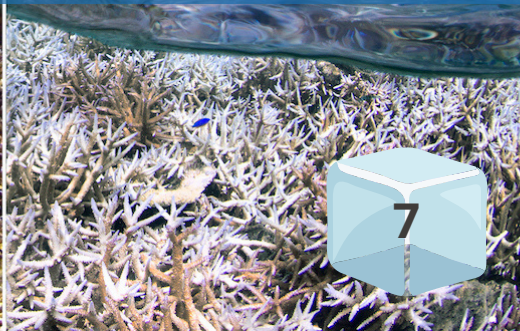
Ecosystem

6

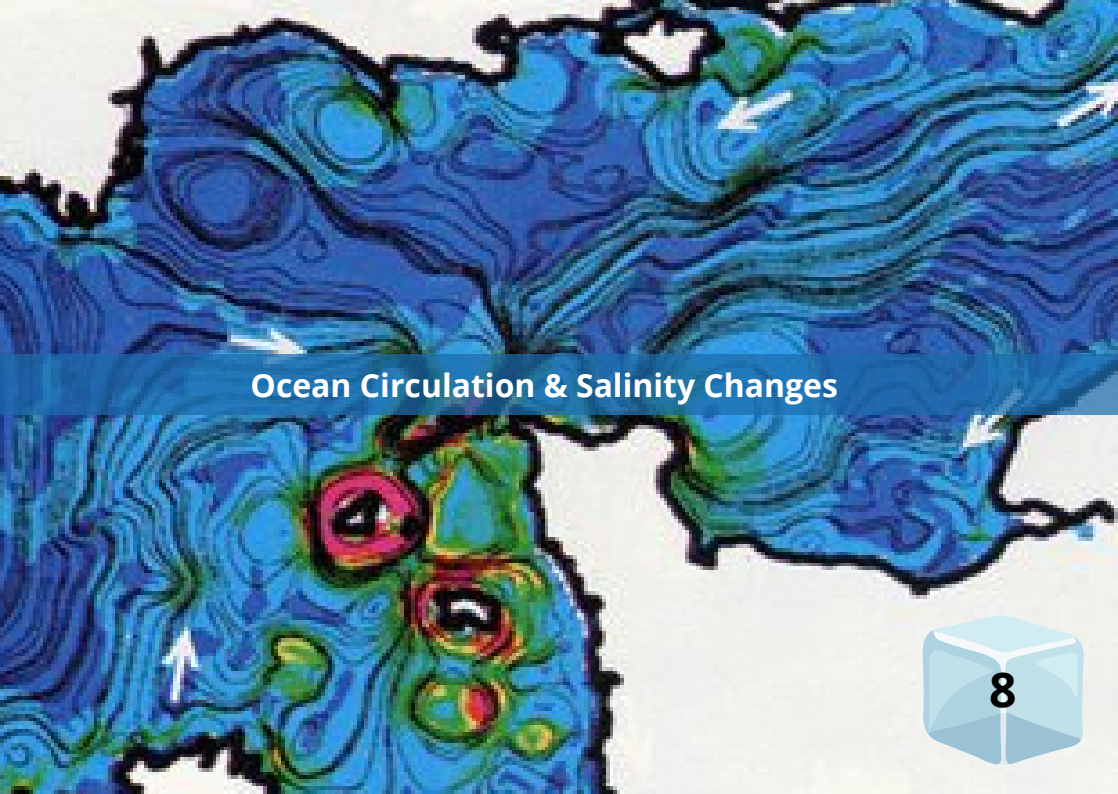
Melting ice drastically alters the Arctic and sub-Arctic ecosystems. As sea ice disappears: Marine species like polar bears, walruses, and seals lose critical hunting and breeding grounds. Plankton blooms shift in timing and location, affecting the entire marine food web, from fish to whales. New species may migrate into warming waters, causing competition and displacement. Permafrost thaw releases methane and disturbs soil ecosystems, changing vegetation and microbial life.
The balance between species is being disrupted, threatening biodiversity and ecosystem services.

Ocean acidification





Melting ice exposes more ocean water to the atmosphere, allowing it to absorb more CO_2. At the same time, freshwater input dilutes carbonate ions in seawater, reducing the ocean's buffering capacity and increasing acidity.



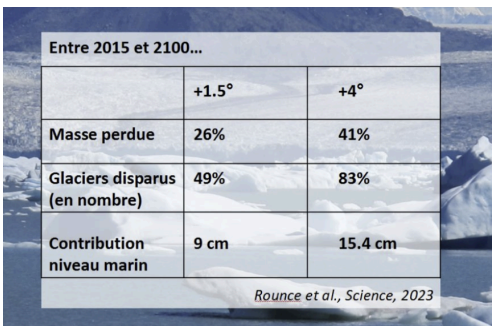
Ocean Circulation & Salinity Changes

8

Ice melt adds freshwater to the oceans, reducing salinity. This affects the density of water and can disrupt ocean currents like the thermohaline circulation. These changes impact global weather and climate systems.

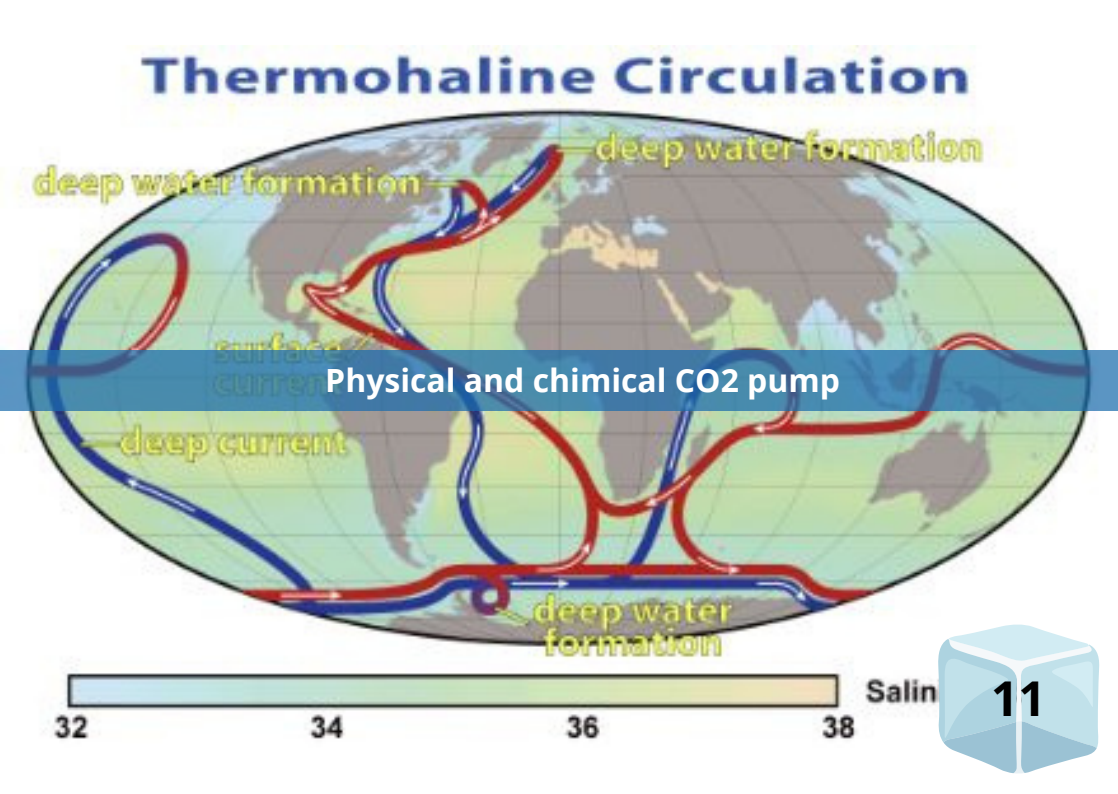
Submersion / rising sea level

Melting land-based ice (like glaciers and ice sheets) adds freshwater to the oceans. Combined with the thermal expansion of warmer seawater, this causes global sea level rise, threatening coastlines.* from 9cm to 15,4cm (*Science,* ed. 2013)



Ice melting

Glaciers, ice sheets, permafrost, and sea ice are all melting. Ice mass loss happens when melting exceeds snow accumulation. This is a key signal of climate change and alters Earth's energy balance.



Physical and chimical CO2 pump

Thermohaline circulation is a global ocean current driven by temperature and salinity. In cold polar regions, dense water sinks, carrying absorbed CO_2 into the deep ocean. This process stores carbon for centuries, acting as a natural carbon pump.
But melting ice adds freshwater, slowing the circulation and reducing CO_2 storage.

Biological CO_2 pump

12

The biological pump is how plankton help store carbon in the ocean.
Phytoplankton absorb CO_2 during photosynthesis at the surface.
When they die or are eaten, the carbon sinks to the deep ocean in the form of waste or dead matter.
This process helps remove CO_2 from the atmosphere for long periods.