



Why are Ice and Snow Important to Us?

- Ice and snow are important factors in global processes
 - Climate
 - Carbon balance
 - Sea level




Introduction | Snow | Ice on sea | Ice on land | Frozen ground | River & lake | Permafrost

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Why are Ice and Snow Important to Us?

- Ice and snow affect the global distribution of heat
 - Ocean currents distribute heat: thermohaline circulation depends on deep, cold water formed in the polar regions.
 - Melting ice weakens this process.




Introduction | Snow | Ice on sea | Ice on land | Frozen ground | River & lake | Permafrost

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Snow: impacts

- Changes in snow cover have a dramatic impact on water resources. Snow in mountain regions contributes to water supplies for almost one-sixth of the world's population.
- Snow is an important ecological factor and changes in snow affect plants and animals



Introduction | Snow | Ice on sea | Ice on land | Frozen ground | River & lake | Permafrost

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Sea Ice: trends

Ice extent anomaly (million km²)

March
September

- Arctic sea-ice cover is shrinking by 8.9% per decade in summer and 2.5% per decade in winter. It is also becoming thinner and there is less multi-year ice.
- Antarctic sea-ice cover is not decreasing.

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Greenland: recent changes

Yellow = no or little change
Blue = snow accumulation
Red = less mass (melting and discharge of ice)

Ice Sheets: trends

- Annual total loss of mass from the Greenland Ice Sheet more than doubled in the last decade of the 20th century and may have doubled again by 2005.
- Warmer summers are increasing melting and ice discharge.

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Glaciers: trends

Over the past 100 years, and particularly since the 1980s, there has been worldwide and dramatic shrinking of glaciers, closely related to global warming.

Jürg Alean, SwissEduc (www.swisseduc.ch)/Glaciers online (www.glaciers-online.net)

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Glaciers: *outlook*

Projected increases in global air temperatures will ensure the continuing shrinkage of glaciers and may lead to their disappearance from many mountain regions in the coming decades.

2006

1933 1976

Glacier, Tajikistan

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Glaciers: *impacts*

Disappearance of glaciers will have major consequences on water resources, especially in the Himalayas – Hindu Kush, the Andes, Rocky Mountains and European Alps.

Himalayas – Hindu Kush:
major rivers draining glaciers
and populations in their basins

River	Total population
Tarim	8 067 000
Syr Darya	20 591 000
Amu Darya	20 855 000
Indus	178 483 000
Ganges	407 466 000
Brahmaputra	118 543 000
Yangtze	368 549 000
Huang He (Yellow river)	147 415 000
Salween	5 982 000
Mekong	57 198 000

Introduction | Snow | Ice on sea | **Ice on land** | Frozen ground | River & lake | Policy

Sea Level Rise: *trends*

Sea level is rising now by 3.1 mm per year, double the average rate of the 20th century.

cm
+20

0

1880 1940 2000

Introduction | Snow | Ice on sea | **Ice on land** | Frozen ground | River & lake | Policy

Sea Level Rise: impacts

Magnitude of the issue

Rising sea levels, combined with increased extreme events, will potentially affect millions of people on small islands and at and near coasts world-wide.

Asia: a one metre sea-level rise would affect

- Land: 900,000 km²
- People: over 100 million
- Economic activity: over US\$400 billion in GDP



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Introduction | Snow | Ice on sea | Ice on land | Frozen ground | River & lake | Policy

Policy: regional



Falk, Kienast/Stock

- **Himalayas – Hindu Kush:** a key policy focus: changes in snowfall and glaciers potentially increasing floods and leading to water shortages affecting hundreds of millions of people: strategies for water management and land use planning to reduce vulnerability.

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Policy: regional



A. Taubert/veer

- Adaptation policy must be tailored to regions and this requires regional scientific knowledge and impact assessment.

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Introduction | Snow | Ice on sea | Ice on land | Frozen ground | River & lake | Policy

Perspectives

Indigenous communities say "all things are connected" - the land to the air and water, the earth and the sky, the plants to the animals, the people to the spirit.

If marine mammal populations are no longer accessible to our communities, what can replace them?

ARCTIC

Pacific Island countries are some of the most vulnerable communities in the world and are already experiencing the effects of climate change.

SMALL ISLANDS

What happens to the snows that feed these rivers due to global warming will determine the future of the billion people who live downstream. Think of that next time you stop at a petrol station.


HIMALAYAS



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Introduction | Snow | Ice on sea | Ice on land | Frozen ground | River & lake | Poll
