

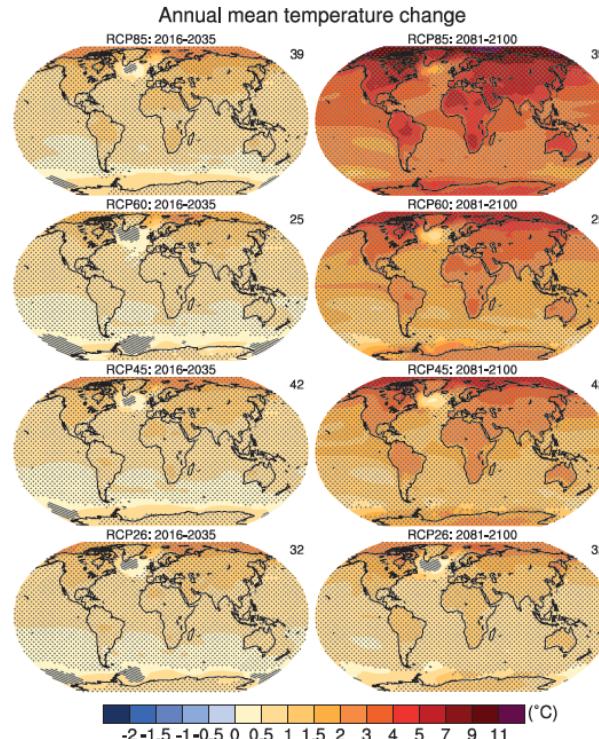
Climate change: challenges in the Arctic

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IPCC 2014

IPCC WGI: Warming is expected to be strongest in the Arctic



Polar Regions

<p>Snow & Ice, Rivers & Lakes, Floods & Drought</p>	<ul style="list-style-type: none"> • Decreasing Arctic sea ice cover in summer (<i>high confidence</i>, major contribution from climate change) • Reduction in ice volume in Arctic glaciers (<i>high confidence</i>, major contribution from climate change) • Decreasing snow cover extent across the Arctic (<i>medium confidence</i>, major contribution from climate change) • Widespread permafrost degradation, especially in the southern Arctic (<i>high confidence</i>, major contribution from climate change) • Ice mass loss along coastal Antarctica (<i>medium confidence</i>, major contribution from climate change) • Increased river discharge for large circumpolar rivers (1997–2007) (<i>low confidence</i>, major contribution from climate change) • Increased winter minimum river flow in most of the Arctic (<i>medium confidence</i>, major contribution from climate change) • Increased lake water temperatures 1985–2009 and prolonged ice-free seasons (<i>medium confidence</i>, major contribution from climate change) • Disappearance of thermokarst lakes due to permafrost degradation in the low Arctic. New lakes created in areas of formerly frozen peat (<i>high confidence</i>, major contribution from climate change) <p>[28.2, Tables 18-5 and 18-6; WGI AR5 4.2 to 4.4, 4.6, 10.5]</p>
<p>Terrestrial Ecosystems</p>	<ul style="list-style-type: none"> • Increased shrub cover in tundra in North America and Eurasia (<i>high confidence</i>, major contribution from climate change) • Advance of Arctic tree-line in latitude and altitude (<i>medium confidence</i>, major contribution from climate change) • Changed breeding area and population size of subarctic birds, due to snowbed reduction and/or tundra shrub encroachment (<i>medium confidence</i>, major contribution from climate change) • Loss of snow-bed ecosystems and tussock tundra (<i>high confidence</i>, major contribution from climate change) • Impacts on tundra animals from increased ice layers in snow pack, following rain-on-snow events (<i>medium confidence</i>, major contribution from climate change) • Increased plant species ranges in the West Antarctic Peninsula and nearby islands over the past 50 years (<i>high confidence</i>, major contribution from climate change) • Increased phytoplankton productivity in Signy Island lake waters (<i>high confidence</i>, major contribution from climate change) <p>[28.2, Table 18-7]</p>
<p>Coastal Erosion & Marine Ecosystems</p>	<ul style="list-style-type: none"> • Increased coastal erosion across Arctic (<i>medium confidence</i>, major contribution from climate change) • Negative effects on non-migratory Arctic species (<i>high confidence</i>, major contribution from climate change) • Decreased reproductive success in Arctic seabirds (<i>medium confidence</i>, major contribution from climate change) • Decline in Southern Ocean seals and seabirds (<i>medium confidence</i>, major contribution from climate change) • Reduced thickness of foraminiferal shells in southern oceans, due to ocean acidification (<i>medium confidence</i>, major contribution from climate change) • Reduced krill density in Scotia Sea (<i>medium confidence</i>, major contribution from climate change) <p>[6.3, 18.3, 28.2, 28.3, Table 18-8]</p>
<p>Food Production & Livelihoods</p>	<ul style="list-style-type: none"> • Impact on livelihoods of Arctic indigenous peoples, beyond effects of economic and sociopolitical changes (<i>medium confidence</i>, major contribution from climate change) • Increased shipping traffic across the Bering Strait (<i>medium confidence</i>, major contribution from climate change) <p>[18.4, 28.2, Tables 18-4 and 18-9, Figure 28-4]</p>

Small Islands

IPCC WG II: Observed impacts attributed to climate change

The Conservation of Arctic Flora and Fauna working group of the Arctic Council (CAFF)

- Arctic Biodiversity Assessment (2013)



The Conservation of Arctic Flora and Fauna working group of the Arctic Council (CAFF)

Box 2: Key findings of the Arctic Biodiversity Assessment

1. Arctic biodiversity is being degraded, but decisive action taken now can help sustain vast, relatively undisturbed areas of land, mountains, fresh water and seas and the valuable services they provide.
2. Climate change is by far the most serious threat to Arctic biodiversity and exacerbates all other threats
3. Many Arctic migratory species are threatened by overharvest and habitat alteration outside the Arctic, especially birds along the East Asian flyway
4. Disturbance and habitat degradation can diminish Arctic biodiversity and the opportunities for Arctic residents and visitors to enjoy the benefits of ecosystem services.
5. Pollution from both long-range transport and local sources threatens the health of Arctic species and ecosystems
6. There are currently few invasive alien species in the Arctic, but more are expected with climate change and increased human activity.
7. Overharvest was historically the primary human impact on many Arctic species, but sound management has successfully addressed this problem in most, but not all, cases.
8. Current knowledge of many Arctic species, ecosystems and their stressors is fragmentary, making detection and assessment of trends and their implications difficult for many aspects of Arctic biodiversity.
9. The challenges facing Arctic biodiversity are interconnected, requiring comprehensive solutions and international cooperation.



Consequences of climate change

Examples:

- Decreased survival and body condition in some polar bear populations
- Declines in populations of muskoxen and caribou
- Changes in frequencies and amplitude of lemming cycles
- Northward expansion of the red fox at the expense of the Arctic fox
- Primary production and vascular plant biomass have increased rapidly → expansion of tall shrubs; mosses and lichens have declined in abundance
- Expecting increasing number and abundance of invasive alien species

Consequences of climate change

- The stress of climate change does not act in isolation, but works in conjunction with other stressors!

Recommendations from ABA

“The following recommendations are aimed primarily at the Arctic Council, its member states and Permanent Participants. Success in conserving Arctic biodiversity, however, also depends upon actions by non-Arctic states, regional and local authorities, industry and all who live, work and travel in the Arctic. These recommendations may, therefore, also provide a guide for action for states, authorities, and organizations beyond the Arctic Council. Some of the ABA recommendations directly encourage cooperation with those outside the Arctic Council process.”

Box 1: ABA Recommendations

Climate change

1. Actively support international efforts addressing climate change, both reducing stressors and implementing adaptation measures, as an urgent matter.
2. Incorporate resilience and adaptation of biodiversity to climate change into plans for development in the Arctic.

Ecosystem-based management

3. Advance and advocate ecosystem-based management efforts in the Arctic as a framework for cooperation, planning and development.

Mainstreaming biodiversity

4. Require the incorporation of biodiversity objectives and provisions into all Arctic Council work and encourage the same for on-going and future international standards, agreements, plans, operations and/or other tools specific to development in the Arctic.

Identifying and safeguarding important areas for biodiversity

5. Advance the protection of large areas of ecologically important marine, terrestrial and freshwater habitats, taking into account ecological resilience in a changing climate.
6. Develop guidelines and implement appropriate spatial and temporal measures where necessary to reduce human disturbance to areas critical for sensitive life stages of Arctic species that are outside protected areas, for example along transportation corridors.
7. Develop and implement mechanisms that best safeguard Arctic biodiversity under changing environmental conditions, such as loss of sea ice, glaciers and permafrost.

Addressing individual stressors on biodiversity

8. Reduce stressors on migratory species range-wide, including habitat degradation and overharvesting on wintering and staging areas and along flyways and other migration routes.
9. Reduce the threat of invasive alien/non-native species to the Arctic by developing and implementing common measures for early detection and reporting, identifying and blocking pathways of introduction, and sharing best practices and techniques for monitoring, eradication and control.
10. Promote the sustainable management of the Arctic's living resources and their habitat.
11. Reduce the threat of pollutants to Arctic biodiversity.

Improving knowledge and public awareness

12. Evaluate the range of services provided by Arctic biodiversity in order to determine the costs associated with biodiversity loss and the value of effective conservation in order to assess change and support improved decision making.
13. Increase and focus inventory, long-term monitoring and research efforts to address key gaps in scientific knowledge identified in this assessment to better facilitate the development and implementation of conservation and management strategies.
14. Recognize the value of traditional ecological knowledge and work to further integrate it into the assessment, planning and management of Arctic biodiversity.
15. Promote public training, education and community-based monitoring, where appropriate, as integral elements in conservation and management.
16. Research and monitor individual and cumulative effects of stressors and drivers of relevance to biodiversity, with a focus on stressors that are expected to have rapid and significant impacts and issues where knowledge is lacking.
17. Develop communication and outreach tools and methodologies to better convey the importance and value of Arctic biodiversity and the changes it is undergoing.

The Conservation of Arctic Flora and Fauna working group of the Arctic Council (CAFF)

- Arctic Biodiversity Assessment (2013)
- Actions for Arctic Biodiversity, 2013-2021:
Implementing the recommendations of the
Arctic Biodiversity Assessment (2015)



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Challenges

- Few Arctic countries parties of the Bern Convention (e.g. not Russia)
- Bern Convention, at present, does not apply to Svalbard and Jan Mayen
- Central species such as the polar bear, not on the Bern Convention Lists
- Many Arctic species have not been evaluated for threat status according to IUCN criteria



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