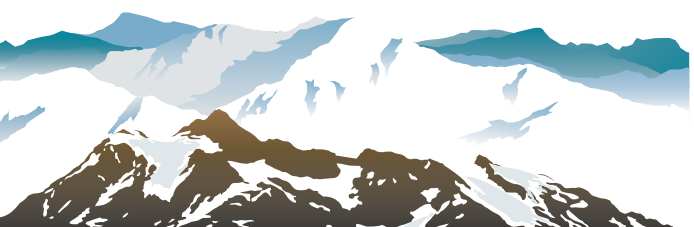
UNEP Year Book 2014 emerging issues update

Rapid Change in the Arctic



A view from the top

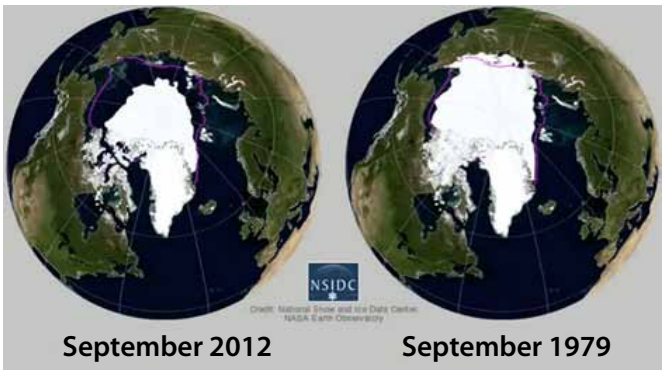
The UNEP Year Book 2013 reported unprecedented loss of summer sea ice in 2012 as a result of warming in the Arctic. At 3.4 million km^2, the minimum sea ice extent that year was 18% below the previous record minimum in 2007. Besides loss of summer sea ice, Arctic warming threatens the region's biodiversity. Arctic warming also could also have far-reaching consequences for global ocean circulation and weather patterns, migratory species that visit the Arctic, and potential greenhouse gas emissions from the thawing of ***permafrost***. Permafrost thawing and the loss of snow and ice on land both contribute to global sea level rise.

Permafrost: long-frozen ground

Permafrost is a layer of frozen soil at some depth below the surface, where the temperature has continuously been below 0°C for at least several years. It has been retreating northwards in many places in the Arctic as the climate warms. Permafrost soils often contain large volumes of organic carbon. As these soils thaw, irreversible releases of some of the carbon in the form of greenhouse gases (CO_2 and methane) will occur, thereby reinforcing climate change.

Global climate change is emerging as the most important stressor for Arctic biodiversity. Rapidly changing ice conditions due to Arctic warming affect life on land and in the sea. In particular, iconic animals that live on the ice such as polar bears, walruses and seals are at risk. The Arctic Ocean is especially prone to ocean acidification, as colder waters can hold more carbon dioxide (CO_2) than warmer ones.

Retreating sea ice offers new opportunities for resource exploitation, trade, and economic development. Use of northern shipping routes is already increasing. Mining and oil, gas and mineral exploitation are expanding, as are commercial fisheries. Such opportunities also present challenges for the region, including environmental risks and social concerns regarding its local and indigenous inhabitants.



Rapid changes in the Arctic require urgent responses within the region and from the wider world. Since climate change dominates the current transformation of the Arctic environment, reducing global greenhouse gas emissions is the most important action that needs to be taken.

Read more about rapid change in the Arctic in the UNEP Year Book 2013.

> "The Arctic is changing twice as fast in terms of warming as the rest of the world. What happens to migratory species in the Arctic will affect what happens in the overwintering grounds of those species, and what happens to the melting glaciers and permafrost thaw will affect sea level rise in the rest of the world."
>
> – Terry Callaghan,
> Royal Swedish Academy of Sciences

Arctic update: science and shipping

In general, rapid warming in the Arctic is continuing. This affects marine and land ecosystems within the region, as well as people and livelihoods. Cooler temperatures across the central Arctic Ocean, Greenland and North Canada in the summer of 2013 helped to moderate the record loss of sea ice and melting of the Greenland ice sheet experienced the previous year. Nevertheless, the extent of summer sea ice was the sixth lowest since observations began in 1979.

New assessments are highlighting the impact of climate change on Arctic marine and terrestrial environments. A comprehensive report on ocean acidification in the region, released by the Arctic Council, confirms that among the world's oceans the Arctic Ocean is one of the most sensitive to ocean acidification, and that Arctic marine ecosystems are highly likely to undergo significant changes as a result.

Another Arctic Council report, the 'Arctic Biodiversity Assessment', confirms that climate change is the most important stressor for Arctic biodiversity and will exacerbate all other threats. Increased human activities such as oil exploration and shipping will place additional stress on the region's biodiversity.

Scientific understanding of ***black carbon*** as a global climate warming agent is advancing rapidly. There is also better understanding of its importance in Arctic warming. When black carbon is deposited on snow and ice, the soot-covered surface absorbs more sunlight, leading to surface warming. Owing to the large amount of snow and ice in the Arctic, this region is likely to be especially sensitive to black carbon. Black carbon emitted within the Arctic has an almost five times greater warming effect than black carbon from outside the region. There are currently few sources of black carbon within the Arctic, but such sources are expected to grow with increased oil and gas production, shipping and other human activities.

Investments and activities for the purpose of extracting oil and gas in the Arctic are growing. For example, interest in exploiting the Barents Sea region north of Norway and Russia was recently stimulated by the announcement of large, previously undiscovered reserves. In some other parts of the Arctic, however, drilling has been postponed or delayed due to safety concerns.

Marine shipping in the Arctic is increasing. As of September 2013, the Northern Sea Route Administration had issued 495 permits to navigate and operate along this route – a nearly four-fold increase compared to 2012. However, most of the 2013 permits were for the western parts of Russian waters rather than for transit routes.

Black carbon: a short-lived climate pollutant

Formed by incomplete combustion of fossil fuels, biofuels and biomass, black carbon is emitted directly to the atmosphere in the form of fine particles. It is a major component of soot (a complex dark mixture) and it contributes to global warming by absorbing heat in the atmosphere and by reducing the ability to reflect sunlight when deposited on snow and ice. Unlike CO_2, which has a long atmospheric lifetime, black carbon remains in the atmosphere only several days to weeks.

Adapting to rapid change

In 2013 the Arctic states, under the auspices of the Arctic Council, signed a new, legally binding Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. It provides a framework for co-operation in the event of an emergency, in order to improve procedures for combating oil spills in the Arctic. This is an important first step towards ensuring the safety of the Arctic environment and its inhabitants. It follows from the Arctic Search and Rescue Agreement, signed in 2011.

The Arctic Council working groups have made an essential contribution to understanding rapid change in the Arctic, in some cases spurring global action. Arctic scientific work as part of the Global Mercury Assessment has been widely recognized for its contribution to the new Minamata Convention on Mercury, which limits harmful mercury emissions. The Task Force on Short-Lived Climate Forcers has been active in developing the scientific agenda and recommendations for reducing black carbon and methane emissions in Arctic states. Moreover, Arctic states have been identifying areas of heightened ecological and cultural significance in light of the changing climate and multiple and growing marine uses – suggesting ways to protect these areas from the impacts of Arctic marine shipping.

The International Maritime Organization (IMO) is currently developing a draft International code of safety for ships operating in polar waters (the Polar Code), which would cover the full range of design, construction, equipment, operational training, search and rescue and environmental protection matters relevant to ships operating in inhospitable waters surrounding the two poles.

Russia has announced the creation of a national park, Beringia, in the remote Far Eastern Region of Chukotka. This new park will touch the United States maritime border in the Bering Strait. The creation of a new national park on the Russian side paves the way for a joint US-Russian nature reserve spanning the Strait.

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Many Indigenous organizations are actively involved in monitoring rapid changes in the environment and are seeking ways to adapt to these changes. All the Permanent Participants of the Arctic Council, as well as many other indigenous organisations, run projects, ranging from strengthening indigenous participation in decision-making processes to documenting and enhancing use of traditional knowledge.

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For video links please go to http://www.arctic-council.org/index.php/en/events/meetings-overview/kiruna-ministerial-2013

Combatting climate change and building resilience

To respond to the rapid change in the Arctic, building ***resilience*** and adapting to inevitable climate change is of great importance. Resilience is the long-term capacity to deal with change and continue to develop and adapt within critical thresholds.

Ecosystem and social resilience

Ecosystem resilience is a measure of how much disturbance an ecosystem can handle (e.g. in the form of storms, fire or pollutants) without shifting into a qualitatively different state. It is the capacity of a system to both withstand shocks and surprises and to rebuild itself if damaged. Social resilience is the ability of human communities to withstand and recover from stresses such as environmental change or social, economic or political upheaval. Resilience in societies and their life-supporting ecosystems is crucial in order to maintain options for future human development.

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In view of the potential for major environmental damage, careful consideration needs to be given to a precautionary approach to economic development. A precautionary approach requires measures such as development moratoriums until full assessments have established risks to the environment and human systems – and until adequate management frameworks are in place. Because of the rapid pace of change in the fragile Arctic region, it is essential to develop strengthened systems for monitoring and for provision of early warnings.

The leading scientific research being carried out in the Arctic, and successful inter-governmental cooperation on protecting the region's environment, provide examples for the rest of the world.

Further information about the Arctic

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