

Countries and regions

Arctic region



Brief introduction

The Arctic region consists of the partly ice-covered Arctic Ocean and land areas of the surrounding eight Arctic states; Canada, Denmark (including the Faroe Islands and Greenland), Finland, Iceland, Norway, Russian Federation, Sweden and the US (Alaska) as well as their shallow sub-regional seas. The Arctic is home to and provides livelihoods for four million people, most of whom live in northern Scandinavia and Russia. This includes three indigenous peoples; the Sami, the Inuit and the Nenets in the European part of the Arctic^[1]. The Arctic region is an area of growing strategic importance in terms of increasing access to natural resources and new transport routes as ice and snow conditions are undergoing rapid change. Economic developments are accelerating which can be beneficial for the region and the global economy, yet they will also have repercussions on the Arctic's fragile environment if not managed with care. The Arctic has therefore been identified as a focus region for the European Union (EU) in the 7th Environment Action Programme (7th EAP)^[2]. In the Arctic context, the EU maintains strategic partnerships with Canada, Russia and the USA, and has close partnerships with Greenland, Iceland and Norway^[3].

The region is varied in many aspects and many parts are characterised as being relatively clean and remote. The high Arctic has an extreme environment and many areas lack infrastructure. An exception to this can be found in the more populated and developed parts of northern Scandinavia and northwest Russia. The overall level of economic activity is still relatively low although it has been increasing in recent decades in certain areas. The region's economy and resources now play a role in a global perspective^[4]. This role could increase if the region's potential in natural resources, shipping and tourism are exploited further. This may lead to improved local living conditions and create growth and jobs^[5]. Arctic states and international partners are working to ensure a prudent development that limits further Arctic warming or jeopardizing ecosystem resilience. The sensitive Arctic environment is already challenged by rapid changes such as climate change, biodiversity loss and hazardous substances transported over long distances that influence human health. Arctic warming affects traditional ways of life of indigenous peoples, puts stress on ecosystems and can have global implications. Climate change is therefore a threat in terms of Arctic ecosystem resilience and functions^[6]. It is also a challenge with regards to ensuring timely adaptation measures, while mitigation efforts are strengthened at a global scale. The EU has increasingly recognised that European activities affect the Arctic environment and that Europe in turn will be influenced by the changes that occur in the region.

In 1991, environmental cooperation in the region was formalised in the Environmental Protection Strategy for the Arctic^[7] which in 1996 became the Arctic Council, composed of the eight Arctic states and six Permanent Participants that represent indigenous peoples. It has six working groups coordinating assessments and studies which contribute towards the overall vision of promoting sustainable development in the region. Five member countries of the European Environment Agency (EEA) are members of the Council and seven are observers^[8]. The EU is allowed to observe proceedings in the Council until a final decision is made on its application to become an observer^[9]. The key challenges facing the region, which are also reflected in the 7th EAP and the EU's Arctic policy (currently under development) can be summarised as follows:

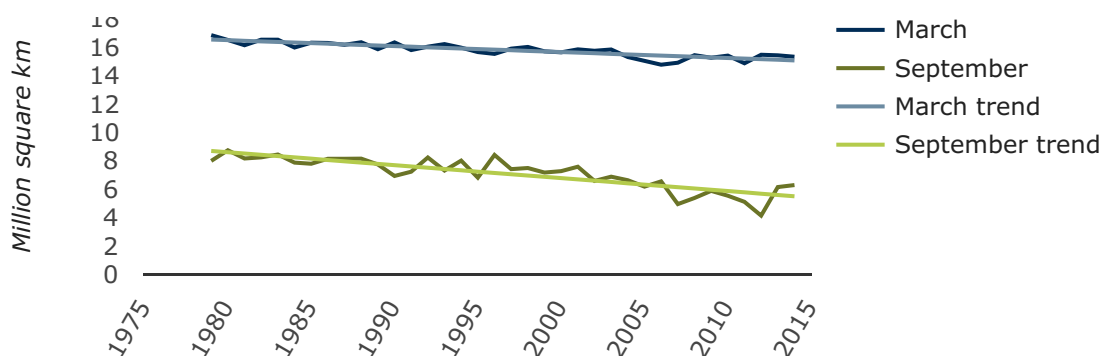
- increasing economic development of the Arctic;
- global climate change and its rapid effects on the Arctic;
- policy developments and international cooperation related to the Arctic.

What are the main problems/threats related to the Arctic region?

Major economic activities take place in the region. Sub-regional Arctic seas now represent more than 10% of global marine fisheries, including large catches in the European part^[10]. Similarly, the production of hydrocarbons has increased, including in the Barents and Norwegian seas^[11], and about 22% of the world's natural gas and 10% of oil are produced in the Arctic^[12]. In 2012, Russia and Norway alone provided more than half of the EU's oil and gas imports^[13], much of which was produced in the Arctic region. Arctic shipping is increasing, most significantly to and from Arctic ports but also in trans-Arctic voyages. The Northern Sea Route along the Russian coast has seen an increase from four trips in 2010 to 71 in 2013^[14]. Meanwhile, the Northwest Passage through Canadian waters increased from two trips in 2009 to 18 in 2013^[15]. In certain areas, Arctic cruise passenger ships are also increasing in numbers and size. These ship numbers are small when comparing globally but with retreating sea ice, there is potential for an increase in trips with shorter travel routes for parts of the year. Sea-based activities in the Arctic are challenging due to waters with varying ice-cover, lack of sea charts, light conditions in winter and remoteness in case of accidents. Remoteness is also a problem when tackling potential pollution incidents.

The region plays a vital role in the Earth's climate system and energy balance. As reflective snow and ice diminish, due to Arctic warming or black carbon deposits^[16], solar energy is increasingly absorbed in the ocean and land area. The Arctic is experiencing rapid warming compared to other parts of the globe^[17] causing extensive loss of sea ice^[18] (see Figure 1) which in addition to ocean warming has implications for ice-dependant species^[19] and for ocean acidification since open waters absorb more CO₂ from the atmosphere^[20]. The increase in average temperatures since 1980 has been twice as high over the Arctic as it has been over the rest of the world^[21]. As a consequence, snow cover has been declining up to 53% in summer^[22] and the Greenland ice sheet has been losing mass at an accelerated rate (almost tenfold in the past two decades)^[23]. This massive loss of ice from the Greenland ice sheet contributes to global sea-level rise^[24] which over the next century will leave coastal areas at risk with regards to people, economic assets and coastal ecosystems, including in Europe^[25].

Figure 1: Arctic sea-ice extent



Note: Between 1979 and 2014, the Arctic lost on average 42 000 km² of sea ice per year in winter and 91 000 km² per year at the end of summer. The decline in summer sea ice appears to have accelerated since 1999. Trend lines and observation points for March (the month of sea-ice extent maximum) and September (the month of sea-ice extent minimum) have been indicated. This figure does not reflect the loss of sea ice thickness, which has also been declining over the same period. Data delivered through [MyOcean](#).

Data sources: a. EUMETSAT OSI SAF. [Sea ice extent](#) b. CryoClim. [Sea ice extent](#)
c. EEA – [Indicator CLIM010](#)

Warming conditions thaw permafrost damaging infrastructures and transport systems. Melting permafrost is also a significant source of CO₂ and methane to the atmosphere and these emissions can be of significance with regard to keeping global temperature change below a 2 °C increase, as agreed under the UN Framework Convention on Climate Change (UNFCCC)^[26].

The region is home to a number of sensitive marine and terrestrial ecosystems^[27], some of global importance, as the Arctic is a breeding ground for a number of migrating species. More than half of the world's wetlands are in the Arctic and sub-Arctic region^[28]. Climate change is the most serious threat to Arctic biodiversity, not least as the UNFCCC upper limit of 2 °C global warming is projected to result in a temperature increase of 2.8 to 7.8 °C in the Arctic, with severe impacts to biodiversity^[29]. Arctic species and ecosystems are also affected by pollution (especially persistent organic pollutants (POPs)^[30] and mercury^[31]) and marine litter from long-range transport and local sources. Some pollutants accumulate in the food web^[32], as cold conditions slow down the degradation processes, while others are absorbed in fatty tissues and released into the animals during the natural seasonal starvation. Local communities with a diet derived mainly from local marine food items are exposed to these pollutants with subsequent health implications.

International efforts have been made in Arctic observation and monitoring, such as the ongoing Circumpolar Biodiversity Monitoring Programme (CBMP)^[33] and the Trends and Effects Monitoring Programme^[34], along with the associated pollution assessments under the Arctic Council and the recent International Polar Year^[35]. However, there are still many unknowns when it comes to growth in economic activities, forecasting the rate of change, assessing ecosystem responses or understanding the interactions between various drivers of change and their cumulative impacts.

What are the main policy responses to key challenges?

Nationally, Arctic states already have legislation in place to regulate economic developments taking place on their territories. Regionally, the Arctic Council has adopted legally binding agreements regarding search and rescue^[36] and oil spills^[37] and is making recommendations for policy responses on the basis of scientific assessments. Internationally, a number of conventions and protocols have been put in place to regulate harmful substances such as POPs or mercury^[38], to regulate economic activities like shipping^[39] or provide guidelines for activities including off-shore oil and gas^[40].

In an EU context, the 2014 Council Conclusions for the Arctic^[41] call for strengthened EU environmental protection in the Arctic. The EU has demonstrated willingness to contribute actively towards such efforts. Investments in satellite observations in the region^[42] and the EU Framework Programme for Research and Innovation (Horizon 2020^[43]) will significantly contribute to a better understanding of relevant developments and processes. This includes improved knowledge on the resilience of Arctic ecosystems and identifying potential tipping points which can have large-scale impacts. Such work will help the EU and its partners address some of the potential serious impacts on Europe from a changing Arctic such as from sea-level rise and extreme weather events from climate change. International scientific cooperation has increased, promoting free and open access to data and avoiding costly duplication, thereby reducing costs while strengthening the knowledge base. The Sustaining Arctic Observation Networks (SAON) initiative^[44] and the CBMP are positive steps in that direction.

The Council of the European Union has requested that an integrated and coherent EU Arctic policy be presented by December 2015 building on three overarching objectives proposed by the Commission, namely; i) strengthening the knowledge base to address the challenges from environmental and climate changes; ii) contributing responsibly towards a sustainable development in the region; and iii) intensifying constructive engagement with Arctic states, indigenous peoples and partners regarding challenges that require an international response^[45]. This policy will complement existing EU environmental and climate policies which are of relevance in addressing Arctic challenges. The size of any future EU Arctic footprint will be lower if EU Member States are able to adhere to agreed targets, such as reducing greenhouse gases by 40% before 2030 and 80% before 2050 (global emission reductions are also needed)^[46], phasing out long-range polluting substances, or moving towards a more resource-efficient and circular economy.

The importance of the Arctic to Europe's environment has been recognised by the EU for some time. The EEA has published a number of reports dedicated to the Arctic^[47] and in 2010 the EU produced an EU Arctic footprint report^[48] as a response to the geopolitical and environmental changes in the region. Most recently, in 2014, the EU funded a strategic assessment of development in the Arctic^[49] with recommendations on how the EU could respond to challenges identified in the assessment. At national level, a dozen EEA member countries are involved in ongoing environmental monitoring and assessment work in the region. These efforts, together with the work of the Intergovernmental Panel on Climate Change (IPCC)^[50] and other Arctic partners, have raised the level of understanding of the processes, changes and drivers at play as well as providing data, including some used in EEA indicators^[51].

What are the main challenges ahead?

One of the societal challenges will be to balance global energy demands with the need for environmental protection of a sensitive area while not dismissing local and indigenous communities the opportunity for jobs, development, improved living conditions and health standards. Estimates indicate that 13% of undiscovered oil and 30% of undiscovered gas can be found in the Arctic^[52]. Utilising these resources would challenge the transition to a low-carbon society, as outlined in the 7th EAP, since it is recommended that two-thirds of known global fossil resources must remain in the ground if the UNFCCC 2 °C target is to be achieved^[53]. An important step in the right direction will be if an ambitious global legally binding agreement on mitigation and adaptation is reached at the UNFCCC's 21st Conference of the Parties (COP 21) meeting in Paris in 2015. Addressing black carbon emissions in and beyond the Arctic similarly requires an international and regional response, and steps are being taken under the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants^[54], where a number of countries and the EU have committed to mitigate short-lived climate pollutants including black carbon.

Regarding Arctic shipping, further international cooperation is needed to ensure it is safe and clean. Preventing and responding to potential oil spills or search and rescue operations still remain major challenges. An agreement on marine oil spill prevention in the Arctic is expected to be adopted by the Arctic Council and full implementation of such an agreement can address some of the concerns. It remains essential to ratify and implement the International Maritime Organisation's Convention on ballast water management^[55] by all coastal states to reduce the risk of introducing alien species in the ecosystems in the Arctic Ocean and sub-regional seas. With increased Arctic shipping, the establishment of support infrastructures, including icebreakers and port facilities, along the northern shipping routes will be needed as well as addressing use and carrying of heavy fuel oils in the Arctic.

It will be a challenge for local and indigenous communities in the region to adapt to climate change. The Arctic Council is currently developing a knowledge base^[56] on how drivers interact with and affect people and nature. Adaptation actions, including in the Barents region, are being explored as a key component. Adaptation strategies and best practices are being collected and shared in the EU Climate-Adapt platform^[57] as part of the EU strategy on climate change adaptation. The establishment of more protected areas to conserve the region's unique and climate-sensitive wildlife and culturally historic sites, while allowing for local growth and development, is also needed. If appropriate strategies with prudent and integrated management plans are implemented at an early stage, the region can contribute significantly towards the 2050 vision of environmental sustainability as outlined in the 7th EAP.

SOER 2015 regional briefings provide an overview of state of the environment across three regions, identified as priority areas in the EU's 7th Environmental Action Programme. They are part of the EEA's report SOER 2015, addressing the state of, trends in and prospects for the environment in Europe. The EEA's task is to provide timely, targeted, relevant and reliable information on Europe's environment.

For references, see www.eea.europa.eu/soer or scan the QR code.

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