# Executive summary

Greenland and its surrounding marine waters comprise a unique arctic and fairly undisturbed ecosystem of global significance. 85% of Greenland is covered by a continuous icecap, and the population of less than 60,000 lives in small towns and settlements along the coast. The population is traditionally highly dependent on the marine ecosystems, and also today, the economy of Greenland is strongly related to the productivity of the marine waters. In the 20th century, Greenland has experienced two major transitions, from seal hunting to cod fishery, then from cod to shrimp fishery. Both affected the human population centers of West Greenland and the economy. The economic transitions reflected large-scale shifts in the underlying marine ecosystems, driven by interactions between climate and human impacts.

Accordingly, the coastal and marine waters hold by far most of the international environmental aspects in relation to the Global International Water Assessment, whereas land and river issues are of minor or no importance. The eastern waters are characterized by southern currents from the Arctic basin, and in the spring and summer large amounts of sea ice drifts south. The western waters are influenced by a northern current, mixed by the cold eastern current and the warmer waters from the Irminger current. The oceanographic and sea ice conditions are closely linked to climate variability. The last decades warming of the northern hemisphere has reduced summer ice cover and increased open-water periods in East Greenland. But in the same period regional lower temperatures has increased ice cover, and reduced open-water periods in West Greenland. The arctic ecosystems are fragile and their stability is closely related to ocean temperature and to changes in ice cover.

A major environmental concern of the marine waters around Greenland have been identified to be chemical and toxic pollutants. Long-range transport of toxic contaminants reach the coastal waters of Greenland, where they are bioaccumulated in tissues of animals. Because these are important local diet items, both animals and human health might be affected. Over the next 20 years, environmental and human health impacts from pollution are expected to increase, unless strict regulations and internationally adopted environmental protection measures are implemented.

With the large importance of the fishing sector (locally as well as internationally), unsustainable exploitation of fish has also been identified as a key concern in both East Greenland Shelf and West Greenland Shelf. Southern Greenland waters are moderately impacted, and – due to the remoteness –, the Northern waters are not affected at all.

In the Northern and eastern waters, changes in ice cover and water temperature due to climatic heating cause increasing impacts on these unique ecosystems, in particular the habitats of endangered species like the polar bear.

The key causes for the toxic pollution are related to toxic emissions to water and air in industrial areas in Northern Asia, Europe and America. These sources are outside the control of the Greenland authorities and can be controlled by international agreements only.

The issue of overexploitation is caused by inappropriate management, due to a lack of understanding of how the marine resources react to the combined pressures of fisheries and climate change. The disappearance of the cod and the replacement by shrimp has been related to changes in water temperature, but the actual impact of the fisheries are difficult to determine. Accordingly, there is a need to improve the scientific understanding of the marine ecosystems around Greenland, and to use these results in an ecosystems approach to fisheries management.

It is also apparent that the potential future impacts of global warming on the fragile arctic ecosystems can be mitigated only by control of the release of greenhouse gasses by the larger consumers of fossil fuels in the developed world. A continued international effort to control these sources is mandatory to save the ecosystems of the Northern waters, including the large mammals like the polar bear and the walrus.