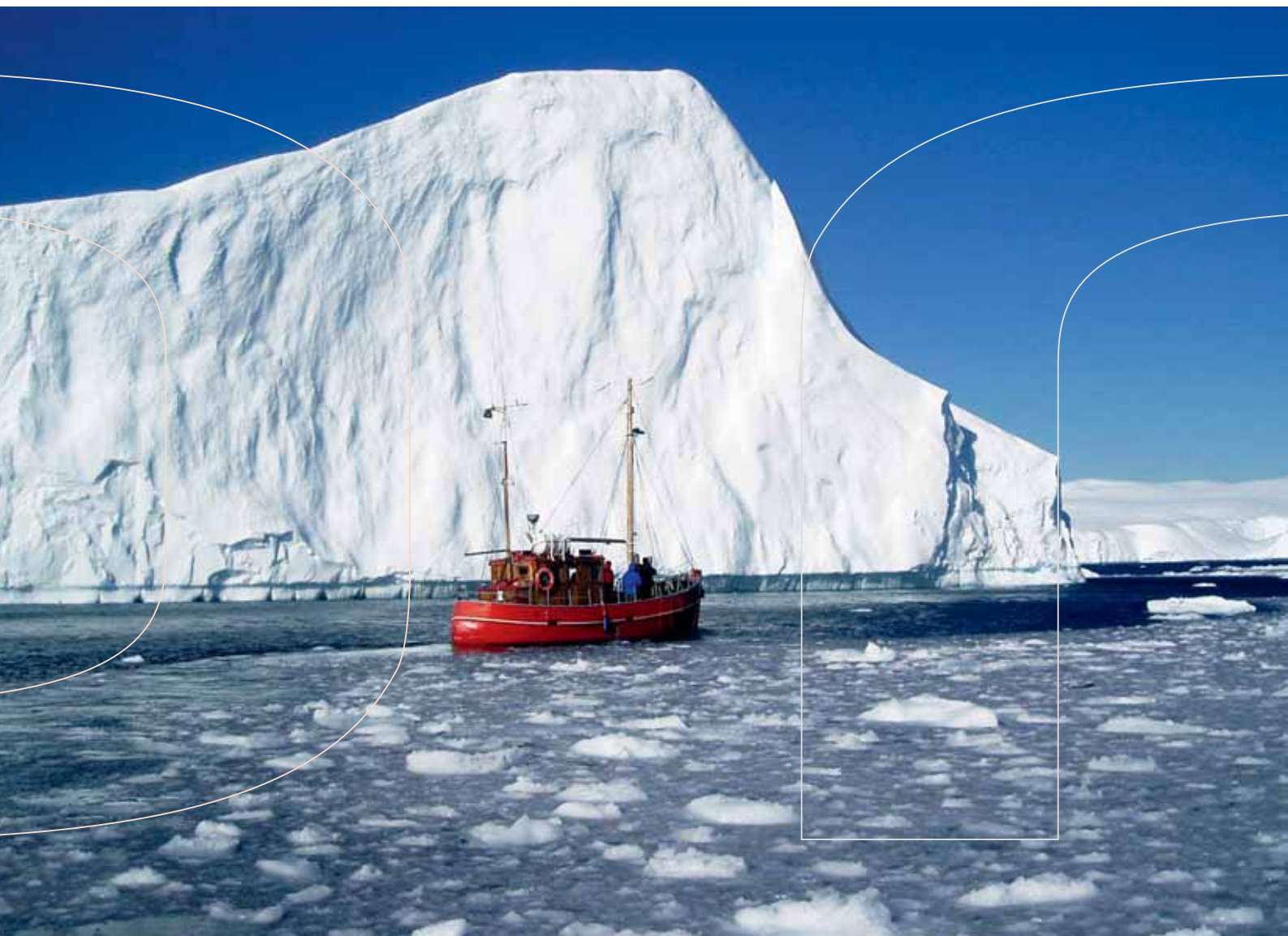




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Nordic Council of Ministers

Nordic Research Cooperation:
**Climate Change and its
Consequences in the Arctic**



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The Nordic Council, at the end of 2005, expressed a wish to survey the need for research on climate change and its consequences for the societies in the Nordic Arctic areas. Indications of melting glaciers and shrinking sea ice cover in the region were alarming and represented convincing evidence of a major scheme shift. Decision-makers in the Nordic countries were sincerely concerned and consequently requested a mapping of existing Nordic knowledge and research on climate change processes with an aim to identify knowledge gaps and positions of Nordic strength in the field.

The assignment of coordinating the so-called ARKUFO process was given to NordForsk by the Nordic Council of Ministers in February 2007.

The ARKUFO report presents an analysis of the preconditions for Nordic research collaboration on climate change

and its consequences in the Arctic. It includes expert analysis of the research status, knowledge gaps, overlaps and potential synergies. On the basis of this analysis, thirteen priority initiatives where the Nordic region can take an international lead have been identified. These fall within five main themes – *Climate models and scenarios, The effects of climatic processes, The vulnerability of society and adaptive strategies, Monitoring and General climatic issues*.

The thirteen initiatives identified are initiatives with a clear need for action and where Nordic collaboration is likely to offer particular benefits for its member countries. On the basis of this overview, researchers and decision-makers will be able to discuss which research issues should be prioritised for long-term Nordic climate research collaboration in the Arctic.

I. Climate models and scenarios		
	Initiative	Brief description
<i>Ia</i>	<i>A Nordic Centre for climate modelling</i>	<i>Pooled Nordic resources with broad interdisciplinary expertise collected in a Nordic centre can contribute to the development of more advanced climate models and scenarios.</i>
<i>Ib</i>	<i>A Nordic special group for natural climate variations at high latitudes</i>	<i>Modelling of climate variations over the last 1,000-10,000 years can improve understanding of how they may develop over the next 100 years.</i>
<i>Ic</i>	<i>Integrated scenarios for the Nordic region</i>	<i>Integrated scenarios (including atmospheric composition, pollution and other environment and social changes) with help in the development of more realistic climate models.</i>

II. Effect of climatic processes		
	Initiative	Brief description
<i>IIa</i>	<i>The role of climate change and man in the abrupt change of the ecosystem</i>	<i>Research will contribute to better understanding of the combined effects on the Arctic ecosystem of climate changes plus other factors which can be surprisingly fast and large.</i>
<i>IIb</i>	<i>The effect of climate change on biodiversity</i>	<i>Better understanding of biodiversity (including changes to vegetation zones and the variety of vegetation) help to identify weaknesses and to plan ways to protect biodiversity.</i>
<i>IIc</i>	<i>Permafrost changes</i>	<i>Pan-Nordic research can boost understanding of the effects of climate changes on permafrost, with consequences for infrastructure and the balance of greenhouse gases.</i>

III. The vulnerability of society and adaptive strategies

	Initiative	Brief description
IIIa	<i>Analysis and identification of effective adaptive processes</i>	<i>Through evaluation of adaptive measures and strategies, critical analysis of decision-making, intra-sector synergies, consequences and reconnection mechanisms can be linked to measures.</i>
IIIb	<i>Complex vulnerability analyses</i>	<i>Complex and integrated vulnerability analyses on a Nordic scale can provide a practical picture of society's adaptation in the Nordic region, and improve the theoretical understanding of the problem.</i>
IIIc	<i>Risk perception and climate changes</i>	<i>Studies on what constitutes a risk or vulnerability can critically analyse risk issues and what risk for whom (depending on age, sex, relationship, rural/urban, sector, income etc.).</i>
III d	<i>Society adaptation</i>	<i>Research on adaptation aspects which will mostly occur on local level to explain why certain societies and groups cope with the risks better than others, who will adapt best and why.</i>

There are several alternatives as how to plan and implement the priority initiatives identified – depending on such factors as availability of financial resources, interest from the national research community and the political determination of Nordic decision-makers. As several of the initiatives are closely related, correlation and synchronisation can create considerable synergies and benefits.

The initiatives can be broken down into two main categories:

- initiatives aimed at developing in-depth knowledge of climate development in the Arctic through modelling and observations of atmospheric, marine and terrestrial climate parameters; and
- initiatives aimed at developing in-depth knowledge of climate change impact on ecosystems and society, developed through risk analyses, measures and adaptation strategies. Overall, the analysis emphasises the relationships between various climate processes and the growing need for multidisciplinary and inter-sector work which integrates local know-how.



Photo: Nikolaj Bock



IV. Monitoring		
	Initiative	Brief description
<i>IVa</i>	<i>Observations for better understanding of climate systems</i>	<i>Continual monitoring helps society understand climate change in the Arctic, identify early warning signals and make well-informed decisions on adaptation and mitigation.</i>
<i>IVb</i>	<i>Nordic data programs on climate change</i>	<i>Nordic collaboration to improve the availability and cost effectiveness of monitoring products, i.e. use of climatic data for comparison of research.</i>

Partnerships with Arctic research initiatives in countries such as the U.S., Canada, Russia and within the EU should be carefully evaluated before any final decisions on implementation are made. The International Polar Year (2007-2008) also offers an interesting and timely opportunity to build on existing initiatives.

The next step is to initiate a debate on how selected initiatives can be carried forward, with particular focus on such aspects as i) what partnerships (national, regional, international) can research or monitoring initiatives be linked to; ii) at what policy level of Nordic collaboration should initiatives be realised; and iii) which instruments should be used and what is the timescale for their implementation and financing.

Certain steps can be taken with relatively limited resources, but accordingly only limited results can be expected. Long-term collaboration on the other hand can yield major results but requires considerable investments and a clear commitment from national research financing institutions in the Nordic countries.

V. General		
	Initiative	Brief description
<i>Va</i>	<i>Nordic pilot research for holistic climate research</i>	<i>Holistic research on changes in the Arctic to stimulate local participation will create social capital and faith in the future in areas adversely by climatic issues the impact of climate change.</i>

Whilst measures for stabilising the anthropogenically caused climate change will require long-term international effort, parallel systematic measures must be initiated to improve the capacity of society and the ecosystem to adapt to the consequences. The latest research gives regular warnings of such consequences which are developing rapidly in the Arctic area. Through carefully chosen research and monitoring initiatives, the Nordic countries can contribute to a sustainable development of the Arctic society and ecosystem.