Arctic Frontiers

By Reinhold Fieler and Chris Emblow

Balancing human use and ecosystem protection

The Arctic is one of the few frontiers left on Earth for scientific exploration, economic opportunity and social and political development. Human activity and resource use are expanding into the Arctic domain, while the potential consequences of climate change in this sensitive area are unknown.

It is crucial to establish a balance between human economic interests and the protection of Arctic ecosystems, Arctic Frontiers Tromsø will offer an annual meeting place for stakeholders to define priorities in multiple areas of development and research, and establish strategies through which to achieve this balance.

The first annual Arctic Frontiers conference will take place in Tromsø, Norway, on 21-26 January 2007. It is being organised by the international research network ARCTOS (http://www.nfh.uit.no/arctos/) and hosted by the University of Tromsø. The conference will provide an up-to-date view of the state of the Arctic environment as well as the developing economical and political trends within the region. The conference also contributes to the International Polar Year period 2007-2008.

Policy-making conference

During Part 1 of the conference, invited keynote speakers will provide reviews of the current status of Arctic science; introduce current social, economic and political issues; and identify challenges facing these disciplines in the coming years.

Resources and environment, opportunities and challenges

Demand for reliable supplies of energy, and the expectation of new petroleum and gas resource finds, are major driving forces behind the current political interest in the Arctic. Presently, national and business interests share an interest in the forthcoming opportunities that the Arctic will hold for energy, fisheries and shipping. However, new questions arise from many voices, both public and private:-

- Who decides the course of development in the Arctic?
- What is the framework for sharing of responsibilities among the involved nations and stakeholders?
- How can resources be developed while protecting vulnerable ecosystems for future generations?

At Arctic Frontiers, stakeholders will be identified with their interests in Arctic development, opportunities that are attracting developers will be described, and areas of potential conflict among interested parties identified.

Both development and conservation efforts must be based on sound scientific research. Thus, science is essential to provide a foundation upon which to build sustainable development strategies in the Arctic.

Despite having some unique properties, the European Arctic has much in common with other arctic regions, and it is only with a pan-arctic perspective that development decisions should be made.

At Arctic Frontiers, keynote speakers from across the Arctic will provide the most current knowledge on biology, physics, climate and geochemistry.

Lessons of good governance

Governments are responsible for providing safety, security and opportunity for their citizens, and stewardship of their territories. Local, national and international governments may find themselves in conflict as to the extent of these responsibilities, and the limitations to their ability to fulfil them. Impact analysis, permitting, and monitoring procedures, are areas where governmental entities can coordinate efforts to achieve mutual goals, but they require transparent, inclusive procedures in developing standard practices.

Arctic Frontiers will explore some of the perceived differences in responsibility among regulators and some of the efforts underway to achieve mutual understanding.

Taking responsibility while dreams are shared

Natural resources are a shared heritage. The public voice must be heard before decisions on resource use can be made. These decisions are not simple, and they come with great responsibility if the dual priorities of development and conservation are to be fulfilled.

Arctic Frontiers will hold a round-table discussion with international journalists, allowing issues to be raised that concern the general public.

Scientific conference

The science section of Arctic Frontiers Tromsø will focus on timely topics in arctic environmental science in order to understand this least-known ocean and to promote pan-arctic comprehension and integration.

The science section will focus on food-web dynamics and biogeochemical fluxes in the Arctic Ocean, and three international research programmes focused on the European Arctic will present their findings. The focus will be on the marginal ice zone of the northern Barents Sea and the deep, permanently ice-covered, adjacent Arctic Ocean.

This will be supplemented by presentations from two complimentary international investigations – in the Bering Sea/Chukchi Sea

The crinoid *Heliometra glacialis*.

region (SBI) and the Canadian Archipelago (CASES) – that extend the Norwegian findings across the pan-arctic region. This will be supplemented by a full programme of invited and submitted presentations.

Social events

In addition to the formal discussions, various social events are planned to provide opportunities for further dialogue in a more relaxed atmosphere. These include a reception in the Polar Environmental Centre and Tromsø Town Hall, a trip on the coastal steamer *MS Polarlys* (i.e. 'polar light'), including dinner, and also an opportunity to have dinner and go dog-sledging at the Tromsø Wilderness Centre. All week, the conference will have exclusive use of Ølhallen, the oldest pub in Tromsø.

You may also wish to extend your stay either side of the conference, to visit the Tromsø Film Festival, the largest film festival in Scandanavia, or the Northern Light Festival, a week of music and theatre.

Participation

Arctic Frontiers is a MarBEF-supported event. Further details on the conference can be found on the website **www.arctic-frontiers.com**.

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Global warming-driven biodiversity change

Pelagic versus benthic domain [Arctic 79°N case study]

By Monika Kędra and Wojciech Walkusz

Increasing interest in the consequences of global warming has motivated the current trend of research in the Arctic, an area particularly vulnerable to climate change. Our study focuses on the fjord Kongsfjorden 79°N (Spitsbergen, Svalbard Archipelago). Although it is located in the Arctic, this fjord seems to be more characteristic of a sub-Arctic rather than an Arctic fjord, mainly due to warm Atlantic water carried with the West Spitsbergen Current. As it receives variable input of both Arctic and Atlantic influence, Kongsfjorden can function as a climatic indicator on a local scale. It represents a transitional area between Atlantic and Arctic biogeographic zones and its fauna is composed of both arctic and boreal species. Subsequently, increased input of Atlantic waters into Kongsfjorden could change its environment toward a more boreal ecosystem.

Kongsfjorden, the fjord opening (Out station).

The location of Kongsfjorden on the border of different climatic and biogeographic zones makes it particularly ideal for studying how the zooplankton communities tackle the consequences of climate change. There is high local variability in the zooplankton and it is strongly dependent on the balance between the input of Arctic and Atlantic water masses, which is most likely sensitive to climate changes. The marine macrozoobenthos is commonly regarded as a good indicator for long-term ecosystem changes. However, as it is well known that many marine benthic populations exhibit periodic variations at different temporal scales, it is therefore important to treat the short-term data series with appropriate caution.

Kongsfjorden hosts the most active tidal glacier of Svalbard Archipelago, Kongsbreen, which is retreating at a rate of up to 0.5km per year. The glacier activity has a direct influence on the benthic communities' diversity and its variability with the scale and magnitude of the impact, depending on the activity of the glacier. Since Kongsfjorden is an open fjord with no sill at the entrance, the exchange across shelf and fjord boundary has a direct impact on biological and physical variation of the benthic system. During the four years of our study, both "cold" (2004 – a large volume of Arctic waters were present at the surface, characterised by lower temperature and salinity and the presence of ice) and "warm" (2002 – where a vast amount of Atlantic water was present in the main fjord, which penetrated into the glacial bay) seasons occurred and different amounts of relatively warm Atlantic waters were observed to have a direct impact on the Kongsfjorden hydrography.

Benthos and zooplankton samples were collected at two stations in the Arctic fjord, Kongsfjorden. The outer station (Fig. 1) was set at the fjord mouth in the deep water basin, while the bay station (Fig. 2), was located in the inner basin situated at the end of the fjord. Both benthos and zooplankton samples were collected from *RV Oceania* in the last week of July during four consecutive years (2001-2004).