



NEWSLETTER no. 6, 2019

ARCTic Marine Resources under Climate Change: Environmental, Socio-Economic Perspectives and Governance

In the Arctic, higher temperatures and retreating sea ice will redefine boundaries of biological life, ecological structure, and commercial and social opportunities. Complex interactions exist, from the physical impacts in terms of temperature, ocean currents, and sea ice, via biological and ecological adaptations in terms of changing habitats, growth, and species interactions, via social and business enterprises in terms of new fishing areas and trade routes, to governance implications in terms of pressure on existing agreements, surveillance, and commercial activity. ARC-Change will study some of these interlinkages while bringing together expertise from an array of disciplines and institutions.

Newsletter no. 6, headlines:

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New publications

ARC-Change researchers have the following articles accepted for publication:

Bioeconomic modeling of seasonal fisheries, by S.F. Kvamsdal, J.M. Maroto, M. Morán, and L.K. Sandal (in *European Journal of Operational Research*, Vol. 281, no. 2, pp. 332-340).

The evolving management of fisheries in the Arctic, by A.H. Hoel (forthcoming in *The Edward Elgar Research Handbook of Polar Law*, edited by K. Scott, D. VanderZwaag).

During the full project period, ARC-Change has contributed to 11 scientific publications, including journal articles, book chapters, a report, and a master's thesis. ARC-Change researchers have also written several popular articles and op-eds, and contributed presentations and poster presentations to scientific conferences, workshops, and meetings. Further, several papers are in progress, including a synthesis that draws on all parts of the project and frames it in a larger context of research on climate change in the Arctic region. A complete overview of project output is available at our homepage (goo.gl/rxMhHP).

Stakeholder workshop

On March 19, ARC-Change teamed up with four other science projects, all focusing on Arctic marine resources and climate change, and together we hosted a stakeholder workshop at the Fram Center in Tromsø. The other projects were RACArctic (the main workshop sponsor) STOCKSHIFT, REGIMES, and the EU-project CERES. Attendees at the workshop represented

various interests, among them management bodies, a fishers association, a fish sales organization, and a vessel owner association. The workshop was the last in a series of stakeholder workshops hosted by the RACArctic project and held in Japan and the U.S.

First on the workshop agenda was a presentation of the current scientific understanding of on-going and predicted climate changes in the Arctic. Subsequently, participants discussed several questions, amongst others on expectations about biological production, fish stock distributional changes, and research priorities. This science session was followed by group discussions on a list of pre-selected questions. These questions included What are the possible threats and opportunities related to climate change and fishing? Are climate change issues considered in short- or long-term fisheries management planning? What changes are needed to the current management frameworks to cope with challenges and conflicts imposed by climate change? What further research is needed by the scientific research community to help fisheries management deal with climate change issues?

An impression that emerged from the discussions was that while the industry acknowledges climate change and observes various environmental changes, these are more considered as a question of adaptation and less as a fundamental problem or threat to their economic activity. Many issues of climate change concern relatively long time periods when compared to the planning horizon of much economic activity. Also, observed changes and related issues vary highly between sectors. For example, expected increases to primary production and invasion of crabs are largely seen as opportunities for development in parts of the industry. From the management side, necessary adaptations in specific cases are usually feasible, while preparations for less specific but possible scenarios of change are more difficult to handle. Also questions of international fisheries agreements were discussed, in particular negotiations regarding pelagic stocks in the Norwegian Sea and the Norway-Russia fisheries cooperation.

Lessons and perspectives from the workshop will be incorporated into the larger context of the RACArctic workshop series. They are also considered in ARC-Change research, particularly in the on-going work with our project synthesis.

Master's thesis by Alexandra N. Stocker

At the University Centre of the Westfjords, Ísafjörður, Iceland, Alexandra N. Stocker has completed her master's thesis entitled "Sea Ice Variability: Implications for the Development of Maritime Activities around Svalbard". ARC-Change researcher Angelika Renner was supervisor for the thesis. The main objective in the thesis was to analyze relationships between sea ice variability and the development of maritime activities, such as cruise tourism and fishing, near Svalbard. Alexandra considered data on sea ice concentrations and Automatic Identification System (AIS) data for ships for the period 2012 – 2018. The analysis shows that maritime activity has increased significantly over the period, both in terms of the number of vessels and in terms of longer seasons of operation.

Alexandra also interviewed decision-makers on maritime activities in Svalbard. Topics were the type of information used to consider risk assessment, management, and planning in waters with sea ice, and how variability in sea ice affect decision-making. Further interviews with captains, a sea ice researcher, and representatives from fisheries and cruise tourism provided additional insight into how sea ice variability affects maritime operations.

Alexandra has presented her thesis work in several meetings and conferences, among them the APECS Research in Svalbard meeting and the Svalbard Science Conference 2019, both held in Oslo. Together with her supervisors, she now works on an article based on her thesis.

Workshops & meetings

NAAFE 2019 Forum On May 22-25, the biannual meeting of the North American Association of Fisheries Economists took place in Halifax, Canada. ARC-Change researcher Nils-Arne Ekerhovd took part and

gave two presentations: "Excess capacity and productivity decline in an evolving rights based fishery: The Norwegian purse seine fishery" and "Managing common species in the Northeast Atlantic".

EAERE 2019 The annual meeting of the European Association of Environmental and Resource Economists took place in Manchester, U.K., on June 26-29. ARC-Change researcher Sturla Kvamsdal participated with a presentation entitled "Ecosystem Wealth in the Barents Sea".

The Impacts of an Ice-Diminishing Arctic On July 17-18, the conference took place in Washington D.C. and was co-hosted by the U.S. Arctic Research Commission, the Wilson Center, and the U.S. National Ice Center. Attending was 600 participants from both academia and the policy world. The focus of the conference was on economic and security implications of reduced sea ice in the Arctic, including perspectives from the US, Russia, China and Japan, and from Alaska locally. There were also sessions on Arctic diplomacy and great power competition in the Arctic. Findings from the ARC-Change project was discussed in a panel on the Arctic Ocean and the blue economy, where ARC-Change researcher Alf Håkon Hoel took part. The role of fisheries in this respect was discussed with a view to how to ensure long-term sustainability.

Arctic Futures 2050 On September 4-6, the National Academy of Sciences in the U.S. hosted the conference in Washington D.C. The event had 400 participants, mainly from academia but also the policy world. The conference was organized by the Study of Arctic Environmental Change programme (SEARCH) of the National Science Foundation and the U.S. Arctic Research Consortium. The focus of the conference was on presenting the status of knowledge on matters addressed by Arctic science and what research that is needed to confront future challenges. ARC-Change researcher Alf Håkon Hoel took part and findings from the ARC-Change project were discussed in a panel that addressed fisheries management in the Barents Sea and explaining its relative success.

Main project partners:



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