

Project information

Keywords

Global change, extractive industries, tourism, socio-ecological dynamics, accessibility, land use, wildlife, reindeer/caribou, ecosystem services

Project title

RConnected - The impact of extractive industries and tourism on socio-ecological dynamics in the Arctic

Year

2018

Project leader

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Geographical localization of the research project in decimal degrees (max 5 per project, ex. 70,662°N and 23,707°E)

pan-Arctic

Participants

Per Fauchald, Norwegian Institute for Nature Research (NINA),

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Else Grete Broderstad; Center for Sami Studies, UiT.

International partners (funded by CONNECT). Jennifer Irene Schmidt; University of Alaska, Anchorage; Konstantin Klokov, SPSU

Flagship

MIKON

Funding Source

Funding 2018

Own financing (UIT): 308,000 NOK

Fram Centre: 500,000 NOK

Funding from NINA 50,000: NOK

Summary of Results

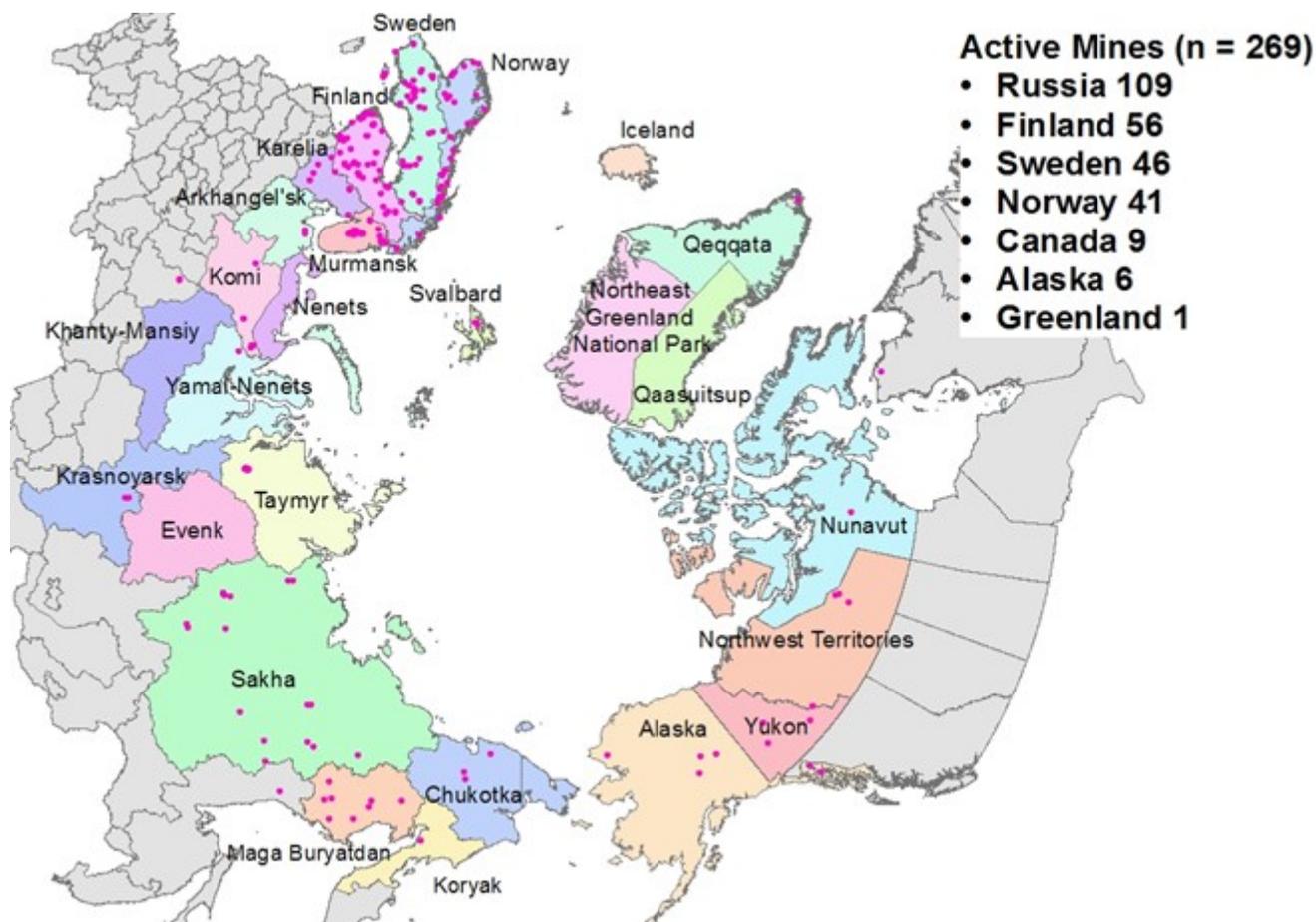
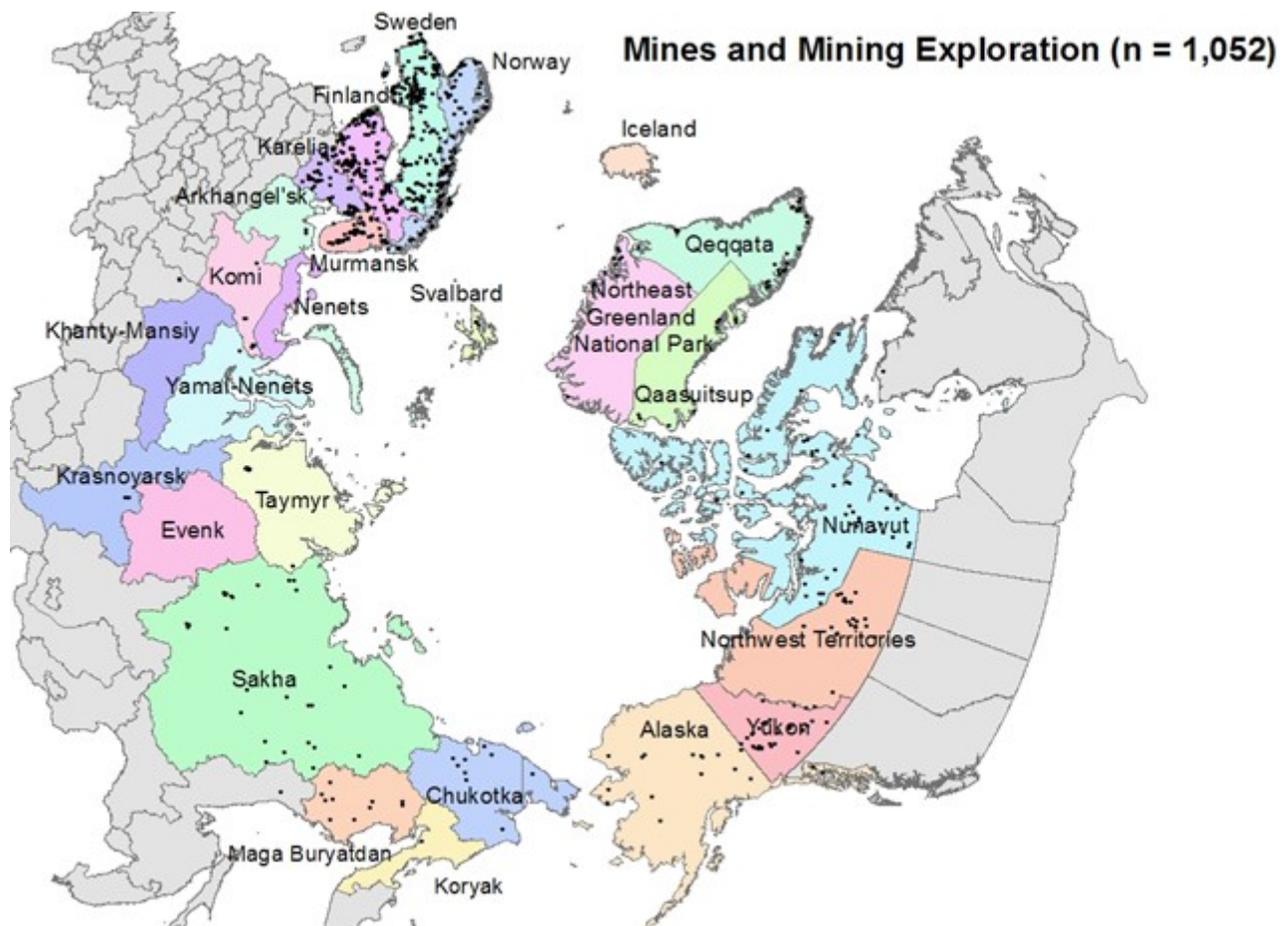
The rapid melting of sea-ice in the Arctic Ocean could increase the accessibility and change the prospects of resource development and tourism in the most sparsely settled areas in the Arctic. In RConnected we asked: “how does the development of extractive industries and tourism influence socio-ecological dynamics in different regions surrounding the Arctic Ocean”. Our aim was to contrast the socio-ecological dynamics in the more accessible and ice-free areas in the northern periphery of Europe with the more remote areas in Arctic Russia, Alaska and Canada (data from the Belmont funded CONNECT).

Highlights

- Arctic change. The past two decades have been a time of change in Arctic industries, but this change has been localized to a few areas. International, domestic and cruise tourism continues to increase across Iceland, Scandinavia, and southern Alaska, and looks to be starting to boom in the Canadian Arctic and Archangelsk, albeit from a very low base. Arctic waters around Iceland, Norway and western Russia are increasingly busy, and the distance sailed by shipping vessels has increased over the past 5 years. Despite attention on melting sea ice other Arctic waters remain relatively free from shipping. With the exception of western Russia where resource extraction continues to increase, the touted boom in mining and oil and gas exploration and development is yet to be realized in the majority of the Arctic. Similarly, fisheries remain stable, and in most Arctic waters fish catches are a small proportion of their peak during the 1950s (Runge et al., forthcoming).
- Broad-scale transitions have changed subsistence systems in the western Arctic. The status of fish- and wildlife resources largely depend on exogenous drivers such as climate- and previous industrial overharvest. On a broad scale, harvest has declined per capita, but commercialization of fish and wildlife resources, has in some cases created incentives to increase the harvest (Fauchald et al, IJC, 2017).
- Arctic greening from warming has promoted declines in caribou populations. Thus, a greener Arctic seem to have detrimental effect on caribou populations. This is possibly due to a climate induced vegetation shift to increased cover of non-edible shrubs on the Arctic tundra (Fauchald et al. Sci Adv. 2017).
- Land development/use: Socioeconomic development is associated with more local land use across the Arctic. This pattern persists despite of large regional differences (Ehrich et al., 2017).
- Regional differences: Circumpolar regions differ with respect to high population densities, low natural growth rate, and low unemployment (Russia, Norway and Iceland) and regions with high unemployment rate and high natural growth rate (mainly North American regions)

(Schmidt et al., 2015).

- Tourism Fine-scale mapping of tourism from social media data (Flickr) combined with automated image analysis (Google Cloud Vision) indicates that both the intensity and the spatial footprint of tourism on Arctic ecosystems has expanded over the past 15 years. Nature is important to Arctic tourists, with 95% of visitors photographing some aspect of nature. The majority of human-nature interactions occur outside protected areas, and tourists value a wide variety of taxa and ecosystems. (Runge et al., forthcoming)
- Science: Topic modelling of web of science records (N=20 880) demonstrate that there are large gaps between science focusing on broad-scale transitions and drivers of Arctic change and local case studies of socio-ecological dynamics (Hausner & Rebich et al., forthcoming).
- Resource governance: The inuit subsistence users in North America generally have a positive attitude to public institutions, with the exception of Churchill where the port and a hydroelectric power plant have caused dissatisfaction with the governing institutions. Organizations that deal with fish and wildlife issues, have no legal enforcement rights, and that were associated with Indigenous peoples were more trusted by the local residents (Schmidt et al., 2018).
- Wildlife co-management: The increased presence of polar bears in coastal villages have caused dissatisfaction among subsistence users in Nunavut, but these specific attitudes towards polar bears do not affect the support to the wildlife co-management system (Lokken et al., 2018).
- Land tenure: Norwegian residents generally trust public institutions, but there is generally low trust to the new land tenure arrangement in Norway, the Finnmark Estate. Residents are not dissatisfied with specific policies, but lack of support is related to the perception of the tenure as a Sámi institution (Broderstad et al., in review).
- Extractive industries: One of the assumptions in the local resource curse theory predicts that extractive industries could erode relationships between locals and public institutions over time. We found that in resource rich regions in Arctic Russia, the resource curse could be counteracted by the social benefits provided by companies or the government. We will include Norway, Canada and Alaska in our analysis before submitting the ms.



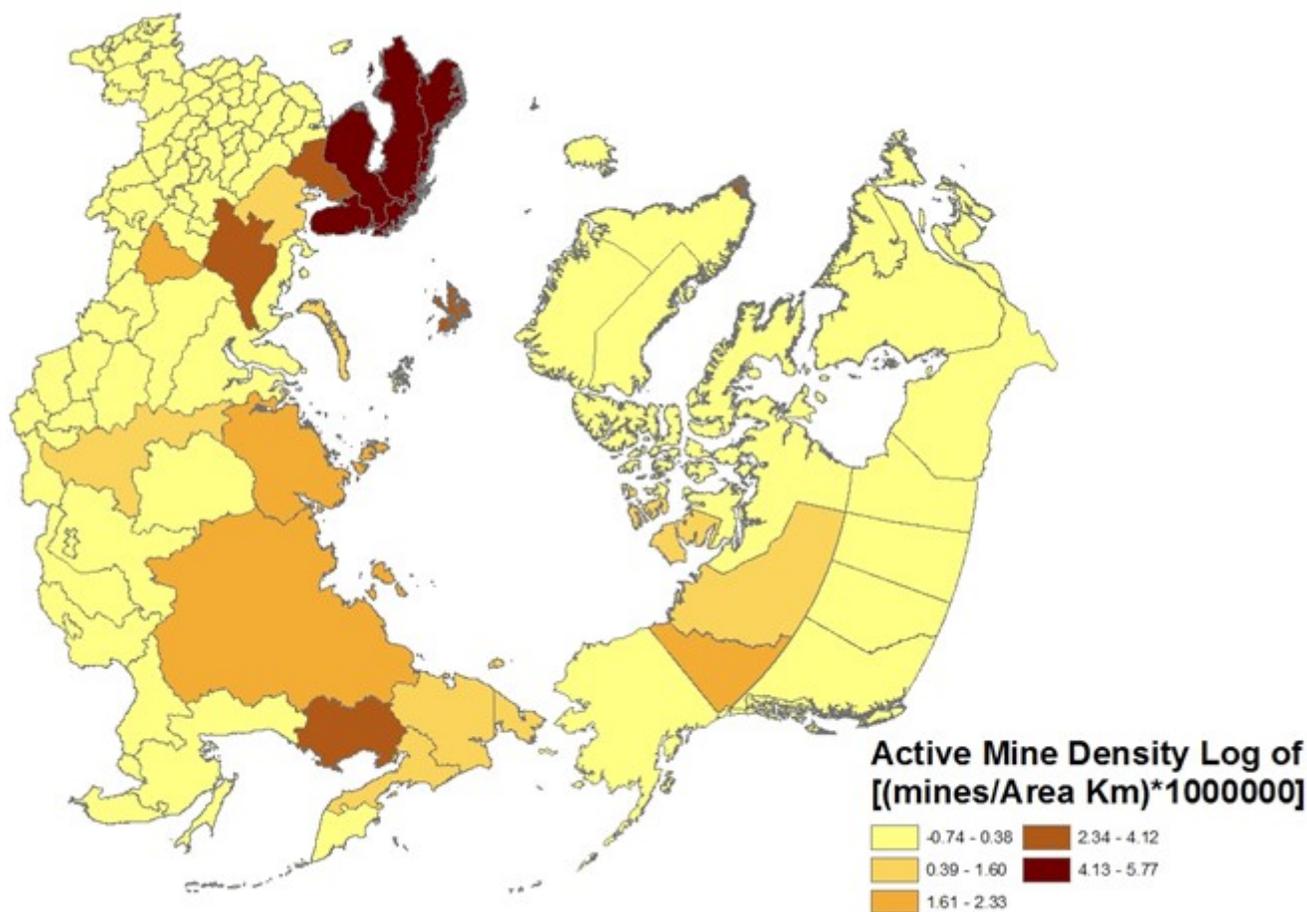


Table 1. Number of active mines in the database, sorted in increasing order.

Country	Region	# of active mines
Finland	Finland	57
Russia	Murmansk	46
Sweden	Sweden	46
Norway	Norway	39
Russia	Sakha	18
Russia	Komi	9
Russia	Karelia	8
Russia	Maga Buryatdan	8
Russia	Taimyr	8
Canada	Northwest Territories	4
USA	Alaska	4
Russia	Chukotka	3
Canada	Yukon	3
Russia	Arkhangel'sk	2
Russia	Krasnoyarsk	2
Norway	Svalbard	2
Russia	Sverdlovsk	2
Russia	Khabarovsk	1
Russia	Koryak	1
Greenland	Kujalleq	1
Canada	Nunavut	1
Canada	Quebec	1
Russia	Yamal-Nenets	1

Students have only been involved as assistants in the project. An intern has worked for 5 months with the collection of data for the Arctic Change paper.

For the Management

In the western Arctic (Greenland, Canada, Alaska) food security, naturally declining populations and the permit to selling fish-and wildlife resources are among the most important governance challenges. In the western Arctic we find that harvest has declined the last 50 years. One of the reasons for the decline is increased wage labor and importation of food. The harvest impact is generally low, but in several cases governance challenges aroused because of declining resources due to e.g., climate change or because of commercialization of the fish-and wildlife resources. Our study show how SES transitions fundamentally alter the governance challenges. In particular, Arctic warming is an intensifying exogenous driver that is threatening many important Arctic wildlife resources inflicting increased appropriation challenges to the governance of local harvest.

Extractive industries are relevant for several indigenous and remote communities in Russia. The academic literature is discussing whether the industry is a curse or a blessing for the local host communities. The resource curse build on two predictions i) the extractive industry could impact traditional livelihoods, reduce the welfare, and the economic productivity of local communities on the long run, and ii) resource governance may lose legitimacy due to the higher differences in welfare that industrial development may cause, where some elites will reap the benefits of industrial development while others are left with the costs. This will in turn erode trust in the government in charge. We explored this latter assumption by comparing 14 different communities, and found that investments in community development by either the companies or the government (primarily local and regional) could in some cases counteract the resource curse and maintain local trust in government. In North America and Norway resource extraction has less importance for the local attitudes to fish-and wildlife management.

Tourism booms are happening throughout the Arctic. Scandinavian tourism numbers have leveled off since their boom starting a decade ago, but numbers in Iceland continue to rise. The Canadian Arctic and Archangelsk show the early signs of an upcoming tourism boom. Accessibility (road, air, sea) explains the distribution of visitors in the pan-Arctic region, with air access particularly important in winter. The inaccessibility of most Arctic

protected areas means most touristed sites are outside protected areas, though protected areas are visited more than expected given their inaccessibility. Tourists value a wide variety of nature, particularly wilderness areas near water and mountains. The intensity and spatial footprint of tourism on natural environments has increased, presenting potential challenges for sustainable management. 41% of visitors photograph wildlife, though such photos make up a small proportion of their photographs. This suggests that there is an unmet opportunity for ecotourism that offers tourists the chance to interact with Arctic wildlife. Remote Arctic communities differ significantly from the European Arctic, and it is important to avoid causing tourism dependency that could stifle diversification, threaten the resilience of rural communities and create boom-and-bust SES dynamics.

Published Results/Planned Publications

RCONNECTED papers only

Runge C.A., Fauchald, P. Hausner, V.H. 2019. Localised trends in Arctic industries over the past two decades. In prep.

Runge, C.A., Daigle, R., Hausner, V.H., Monz, C. 2019. Mapping tourist interactions with nature: A pan-Arctic analysis. In prep.

Runge, C.A., Daigle, R., Hausner, V.H. Lee, Y.S. 2019. High resolution mapping of spatial and temporal trends in Arctic tourism. In prep.

Runge, C.A., Hausner, V.H. 2019. Ecosystem services hotspots in the Arctic. In prep.

Kidd, A., Monz, C., Hausner, V. H., Schmidt, J. I. & Clark, D. 2018 Nature-based tourism, resource dependency, and resilience of Arctic communities: Framing complex issues in a changing environment, submitted J of Sustainable Tourism.

Hausner, V.H. Klokov, K., Ehrich, D., Schmidt, J., Runge, C.A., Fauchald, P., Clark, D. Broderstad, E. 2019. Extractive industries and the role of governance for avoiding the local resource curse, in prep).

Hausner, V.H. & Rebich, S. 2018. Advancing the analysis of socio-ecological research in the Arctic, ms to be submitted to GEC.

In collaboration with CONNECT

Fauchald, F. Hausner, V.H Schmidt, J., Clark, D. (2017). Transitions of socioecological subsistence systems in the Arctic. *International Journal of the Commons*, 11 (1),

Fauchald, P.; Park, T.; Tømmervik, H.; Myneni, R. B.; Hausner, V. H. Arctic greening from warming promotes declines in caribou populations. *Science Advances* 2017; Volum 3:e1601365 (4). doi: 10.1126/sciadv.1601365.

Ehrich, D., Thuestad, A. E., Tømmervik, H.; Fauchald, P.; Hausner, V. H.. Local land use associated with socio-economic development in six arctic regions. *Ambio* 2018.s 1 - 12.s

Schmidt, J. I., Aanesen, M., Klokov, K. B., Khrutshev, S., & Hausner, V. H. (2015). Demographic and economic disparities among Arctic regions. *Polar Geography*, Volume 38, Issue 4

Broderstad, E. G., Hausner, V.H., Josefsen, E., & Sørensen, S. U. 2017. "Local support among arctic residents to a land tenure reform in Finnmark, Norway, In review *Land Use Policy*.

Schmidt, J., Clark, D. Lokken, N., Lankshear, J. and Hausner, V.H. 2018. The Role of Trust in Sustainable Management of Land, Fish, and Wildlife Populations in the Arctic, *Sustainability* 2018, 10(9), 3124.

Lokken, N. A.A., Clark, D. A., Broderstad, E-G., and Hausner, V.H. 2019. Inuit attitudes towards co-managing wildlife in three communities in the Kivalliq Region of Nunavut, Canada, Accepted Arctic.

Conferences:

Fauchald, P. and Hausner, V. H. (2017) Adaptive management of dwindling herds of Arctic caribou under climate change, 28th International Congress for Conservation Biology, Cartagena, Colombia, 23.-27th July, 2017

Lennert, A. E. and Hausner, V. H. (2017) Connecting cultures of knowledge, -enhancing adaptive and flexible management of marine resources in a time of global and environmental change., 24th International Symposium on Society and Resource Management; Umeå, Sweden, June 19-22, 2017

Ehrich, Dorothee; Thuestad, Alma Elizabeth; Tømmervik, Hans; Fauchald, Per; Hausner, Vera Helene (2016). A circumpolar comparison of visible land use associated with socioeconomic conditions in six Arctic regions. *Arctic Frontiers* 2016-01-24 - 2016-01-29 2016.

Hausner, Vera Helene (2016). Global changes in local ecosystem services in Alpine and

Arctic regions in Europe (introduction to session). European Ecosystem Services 2016 conference 2016-09-19 - 2016-09-23 2016.

Hausner, Vera Helene; Rebich Hespanha, Stacy (2016). Identifying research gaps and needs in arctic ecosystem services research by modelling of large textual data sets. European Ecosystem Services 2016 conference 2016-09-19 - 2016-09-23 2016

Communicated Results

Ehrich, D. Inhouse meeting at UiT about local land use in the Arctic, 2016.

Presentation of RConnected at the MIKON, FRAM center meeting, 2015 & 2018.

Hausner, Vera Helene. What kind of science do we need to create sustainable pathways in the Arctic?. Roundtable An information-sharing forum for the NCEAS community, 2015

Hausner, V. H. 2017. Global connectedness and changing resource use systems in the Arctic, Klimaforsk møte, 9. Juni 2017.

Interdisciplinary Cooperation

Interdisciplinary cooperation benefit from using models/theories for answering interdisciplinary research questions An “agreed upon” design is also preferable. We have developed conceptual models of SES dynamics (Fauchald et al., 2017 Kidd et al., in review; Hausner et al.) that has guided our work in RConnected/Connect that are cross-disciplinary. Pan-Arctic synthesis of SES is challenging as datasets across countries are not always comparable and interpretation need to be based on a broad range of expertise. To address some of the challenges we used quasi-experimental designs for data collection and remote sensing (Ehrich et al., 2017, Hausner

et al., Schmidt et al., 2018). A wide range of expertise has been involved in CONNECT/RCONNECTED including ecologists, economic geographers, anthropologists, political scientists, and people skilled in biostatistics and sustainable science.

Budget in accordance to results

The funding from the FRAM Centre allowed us to combine funding from CONNECT and MIKON to examine drivers of arctic change and to use new approaches to analyze tourism and ecosystem services at pan-Arctic scale (Runge et al in prep). In RConnected we have coupled new layers of data with our existing databases. Topic modelling, socioeconomic data on accessibility, tourism, extractive industries, and costs of travelling/transporting goods to the Arctic are datalayers that could be added as a result of RCONNECTED. Funding from the FRAM centre also provides extra incentives for university researchers to focus on issues of relevance for MIKON; that is, to prioritize research on industrial development.

Could results from the project be subject for any commercial utilization

No

Conclusions

While human activities are expected to increase in the Arctic, our results show that increased shipping, tourism and resource extractions are localized to a few areas. Both shipping and tourism has increased in Scandinavia and Iceland, while oil, gas and mineral extraction have mainly increased in western Russia. Given the large regional economic differences between the remote Arctic areas and the Eurasian Arctic, the implication for local socio-ecological dynamics need to be analyzed separately for each regions. We need to work further with sustainable criteria for tourism in Scandinavia/Iceland to avoid adverse impacts on nature and communities. In western Russia responsible resource development is most relevant, including community benefits that could mitigate local impacts. In western Arctic, food import and urbanization are key broad-scale drivers of decline in harvest, while commercialization of wild food has increased harvest in specific locations. Such broad-scale drivers need to be understood when comparing SES across countries.