



REXSAC Coordination board and program wide meeting, University of Copenhagen, 2017-03-13 – 2017-03-15

The following is the schedule for the REXSAC coordination board and program wide meeting at the University of Copenhagen, 2017-03-13 – 2017-03-15.

Monday March 13

Arrivals: this is the day when we expect meeting participants to arrive in Copenhagen.

Meeting opportunities: from 08.00-17.00 this day, REXSAC participants have the opportunity to meet, plan and discuss ongoing activities and future plans at the University of Copenhagen. We have booked four different meeting rooms at the University. REXSAC researchers who wish to join meetings in their research tasks and/or teams should contact their research task or team leaders for details on planned meetings.

Evening program: at 18.00 we meet at the hotel lobby and walk together to a nearby Restaurant where we will have a joint dinner and welcome talk by Sverker Sörlin and Ninis Rosqvist.

Tuesday March 14

The program for this day is to have two plenary sessions, one before and one after lunch, with researchers within REXSAC and affiliated networks. PhD students participate as part of the PhD course. The sessions are devoted to ongoing or planned work by researchers within REXSAC and affiliated networks. Please submit titles and short abstracts on the presentations you intend to give. After the afternoon coffee break we will conduct separate meetings within the research task groups or other collaborations forming within REXSAC.

Plenary sessions March 14

Session 1 – Research centers and networks

09.00-09.15 REXSAC – Resource Extraction and Sustainable Arctic Communities (Sverker Sörlin, KTH, Sweden)

- 09.15-09.30 MinErAL – Mining and Indigenous Livelihood: Cross perspectives from Canada, Melanesia, Australia and Fennoscandia (Thierry Rodon, Université Laval, Sweden)
- 09.30-09.45 ARCUM – Arctic Centre, Umeå University (Peter Sköld, UmU, Sweden)
- 09.45-10.00 Discussion

Session 2 – Indicators and assessment: Defining sustainable development

- 10.00-10.10 A framework for analyzing indicators, risks, and sustainable futures: the case of South Greenland (Joan Nymand Larsen)
- 10.10-10.20 Arctic Youth and Sustainable Futures: Focus group interviews in Greenland, Iceland and Northern Norway (Jon Haukur Ingimundarson)
- 10.20-10.40 Discussion
- 10.40-11.00 Coffee break

Session 3 – Multiple pressures on Arctic environments and societies

- 11.00-11.10 Combining traditional knowledge and natural science to understand recent climate change impacts on reindeer husbandry (Ninis Rosqvist & Pia Eriksson from Stockholm University and Niila Inga from Laevas Sami village)
- 11.10-11.20 Assessing Arctic mining impacts under different hydrogeologic, geochemical and hydroclimatic conditions (Jerker Jarsjö, Stockholm University).
- 11.20-11.30 Anthropology of overlapping land-use interests – case of scenario exercise on Changing North and Challenges of Environmental Governance (Hannu Heikkinen, University of Oulu)
- 11.30-11.40 Elise Lépy & Vesa-Pekka Herva (preliminary title, project name) “Understanding the Cultural Impacts and Issues of Lapland Mining: A Long-Term Perspective on Sustainable Mining Policies in the North”
- 11.40-12.00 Discussion

12.00-13.00 Lunch

Plenary sessions

Session 4 – Mining companies and indigenous communities

- 13.00-13.10 Institutional Development and Resource Development: The Case of Canada’s Indigenous Peoples (Thierry Rodon, Université Laval)
- 13.10-13.20 Sami-State collaboration in the governance of cumulative effects assessment: a critical action research approach (Rasmus Kløcker Larsen from Stockholm)

Environment Institute, Kaisa Raitio from Swedish University of Agricultural Sciences, Marita Stinnerbom from Vilhelmina norra reindeer herding community and Jenny Wik-Karlsson from the Swedish Sami Association).

- 13.20-13.30 The making of Arctic resources (Marianne Lien, University of Oslo)
- 13.30-13.40 Transnational companies, indigenous peoples – the politics of Arctic mining in Greenland (Peder Roberts, KTH)
- 13.40-14.10 Discussion

Session 5 – Mining legacies in post mining futures: recoding natural resources for future livelihoods

- 14.10-14.20 Stories of hope: Enacting art, science and travelling in/across Russian Norwegian borders (Britt Kramvig, University of Tromsø)
- 14.20-14.30 Constructing the past of Arctic Futures: politics of memory in mining towns in transition (Dag Avango, KTH)
- 14.30-14.40 Doing tourism at the Russian mining towns at Svalbard (Albina Pashkevich, Dalarnas Högskola)
- 14.40-15.00 Discussion

15.00 – 15.30: Coffee break

15.30 - 17.00: Research task meetings: planning of research within the different research tasks. Will take place in separate rooms.

18.00: Dinner

Wednesday March 15

Before lunch we continue with a third plenary session, with researchers within REXSAC and affiliated networks. PhD students participate as part of the PhD course. After lunch, the REXSAC coordination board will have a general meeting to plan and decide future activities of the center within research, PhD student training, coming workshops, field work and outreach activities. PhD students do not participate in the afternoon activities.

After the coordination board meeting, meeting participants can enter on their journey home.

Plenary sessions

Session 6 – Contested pasts and futures: extractive industries in Greenland

- 09.00-09.10 Affective economies in the North Atlantic – Greenland, Iceland, Faroe Island, Denmark (Kirsten Thisted, University of Copenhagen)

- 09.10-09.20 Partnerships in mining: How to become, find and keep a good partner? (Lill Rastad Bjørst, Aalborg University)
- 09.20-09.30 'Brokers of Hope' in the extractive industries in Greenland (Frank Sejersen, University of Copenhagen)
- 09.30-09.50 Discussion
- 09.50-10.10 Cofee break

Session 7 – REXSAC PhD projects in the making

- 10.10-10.20 Synthesis of available environmental data with initial focus on northern Sweden (Sandra Fischer, Stockholm University)
- 10.20-10.30 Global change and Animal movements – Towards a socio-ecological predictive framework (Christian Foringer, Navinder Singh, Göran Ericsson, SLU)
- 10.30-10.40 Increasing exploitation pressure from mining and wind power within the Swedish reindeer husbandry area complicates the possibility to reach the environmental objective Magnificent Mountains (Carl Österlin, Stockholm University)
- 10.40-10.50 Mining and environmental risk governance in the circumpolar North – a quest for social justice? (Jasmiini Pykkänen, University of Oulu)
- 10.50-11.00 Assessing tourist's Arctic representations and their implications for local environments and societies (Alix Varnajot, University of Oulu)
- 11.00-11.10 Mining legacies in post-industrial futures in the Arctic (Camilla Winqvist, KTH)
- 11.10-11.20 Arctic mining companies in historical perspective (Jean Sebastien Boutet, KTH)
- 11.20-11.30 Governing Reindeer Husbandry – economy, colonization, and Sami mobilization (Corinna Röver, KTH)
- 11.30-12.00 Discussion

12.00-13.00 Lunch

Coordination board meeting

- 13.00-13.30 Research project mapping exercise. The objective of this exercise is to create an inventory of research projects of relevance to REXSAC that members of REXSAC, Mineral and Resda are part of. We kindly ask the participants to prepare a list of such projects in advance of the meeting,

with information on title, PI, web link, time frame, main partners and a project abstract.

13.30-15.00

- Outreach priorities
- Coming REXSAC meetings, Akureyri sept 2017 and beyond in 2018
- PhD training, upcoming courses
- PhD student rotation (including information on researcher mobility)
- Plan for interacting between the networks (Resda, Mineral, Arcum etc)

End of meeting. Possibilities for continued discussions. Departures.

Thursday March 16 – Tuesday March 21: PhD student course

From March 16 and over the following days until March 21, PhD students participate in the REXSAC course, Interdisciplinary introduction to Arctic studies.

Abstracts

Plenary sessions Tuesday-Wednesday march 14-15 2017, REXSAC program-wide meeting at the University of Copenhagen.

Abstracts for the sessions on March 14

1. REXSAC – Resource Extraction and Sustainable Arctic Communities

Sverker Sörlin, KTH

This presentation introduces the program for the Program wide workshop of REXSAC. REXSAC is a Nordic Centre of Excellence in Arctic research, funded by Nordforsk for 5 years starting in 2016. REXSAC studies extractive resource industries in the Arctic as cultural, social, economic, and ecological phenomena – from analysis of why resource extraction commences, to what consequences it has for communities in the Arctic and beyond, and what opportunities exist for transitioning toward post-extractive futures. REXSAC uses a number of case studies, principally from Sweden, Greenland and Svalbard, to understand how lessons from the past can inform decision-making today as well as to compare Arctic experiences with other parts of the world. The center is led by KTH Royal Institute of Technology in collaboration with Stockholm University and Stockholm Environment Institute, and includes 12 partner institutions in the Nordic countries, Canada and Russia. The researchers involved work across the humanities, the natural and social sciences. In addition several communities in the Arctic are involved. Researchers in REXSAC cooperate in 10 different research tasks, which will be briefly described in the presentation.

2. Mining and Indigenous Livelihood: Cross perspectives from Canada, Melanesia, Australia and Fennoscandia (MinErAL)

Thierry Rodon: Université Laval, Québec Canada, Thierry.rodon@pol.ulaval.ca

Mineral exploration and extraction are being undertaken on a global scale by multinational corporations that operate in different countries. Even though Indigenous peoples have been developing a global network with the UN Working Group on Indigenous Populations, when it comes to specific mining projects, it is usually local or regional Indigenous representatives who are responsible for negotiating with the global mining corporation, who participate in environmental impact assessments, and who manage the positive and negative consequences of development, thus creating a "glocal" situation. Despite their diverse geographic settings, political contexts and cultural distinctions, when Indigenous communities encounter mining, they tend to experience very similar consequences for their livelihoods. There is thus a need for an international network to share indigenous experience towards mining development, to develop collaborative research projects that address the priorities of indigenous communities. By studying the impacts of mining development at multiple (national, regional and local) scales and from a multidisciplinary perspective and across political boundaries, The MinErAL network will co-produce new and much needed knowledge for scholars and indigenous communities.

3. Assessing Arctic mining impacts under different hydrogeologic, geochemical and hydroclimatic conditions.

Jerker Jarsjö, Dept of Physical Geography, 106 91 Stockholm University, Sweden.

Potential mining-related contamination of water, sediments and biota can have profound effects on settlements, including their water and food security. Most environmental and societal impacts result from complex interactions between many natural and anthropogenic factors. For example, metal(oid)s found in rivers and streams are more bioavailable when they are dissolved in water than when they are attached to particles in suspension (sediment). We acknowledge that, in order to test hypotheses regarding why mining impacts can differ across the Arctic depending on e.g. hydrogeologic, geochemical and hydroclimatic conditions, systematic observations are needed from several different regions. In collaboration with researchers from Lobonosov Moscow State University, we plan to extend the Nordic investigations to include mining sites from the Kola Peninsula, Russia. Thereby, we anticipate that we can test more general hypotheses regarding governing processes for spreading of metal(oids) from Arctic mining areas, including investigation of their potential effects on the environment and society.

4. Anthropology of overlapping land-use interests – case of scenario exercise on Changing North and Challenges of Environmental Governance

Hannu I. Heikkinen, University of Oulu. Work group; Karoliina Vanhanen, University of Helsinki, Mari Partanen, University of Oulu, Teresa Komu, University of Oulu, and Simo Sarkki, University of Oulu

This presentation is based on administration focused workshop Changing North and Challenges of environmental Governance which was arranged as part of Primary Industries and Transformational Change (PITCH) research project. Workshop was arranged in Rovaniemi, Finland, 27th of May 2016. All together 20 experts took part to the workshop representing various levels of environmental governance and research organizations. Participants provided expertise from various sectors, from key ministries to regional planning and municipalities, on the challenges and opportunities related to coping with social, economic and environmental change in the Finnish Lapland. The aims of workshop were 1) to discuss information flows and needs enabling adaptation to climate change at different governance levels, and

2) to use a scenario exercise to discuss how to reconcile the interests, values, and concerns of multiple land users in a sustainable way in the future. Discussions on information flows emphasised the needs for targeted, concrete, traditional, localized, and tacit knowledge that could be used by governance actors to cope with environmental change. Particularly more information was considered to be needed on accumulating and overlapping influences of different sectors on local livelihoods and environment. In this presentation we show how we arranged our scenario exercise and major points of workshop discussions. Finally we discuss of normative scenario that we build based on workshop deliberations regarding reconciling of forthcoming changes, needs and land uses. New scenario emphasise long-term collaboration for finding synergies and mutually agreed decisions between diverse local land users. However, common benefits with stakeholders outside Lapland, such as large scale extractive industries, were also foreseen on the condition that local cultures would be respected and local concerns acknowledged in decision-making processes at different governance levels.

5. Institutional Development and Resource Development: The Case of Canada's Indigenous Peoples

Thierry Rodon, Université Laval

There is an ongoing academic debate around the so-called "resource curse", one camp argues that resource development corrupts economies and institutions, the other camp considers that institutions can mediate the impact of resource development. In this paper, using the case of the Canadian Arctic land claim agreements, we assess to what degree these agreements have helped the Indigenous people in the Canadian Arctic improve resource development outcomes for their communities? Through four case studies, the Cree of Eeyou Istchee, the Inuit of Nunavik, the Inuit of Nunavut and the Inuit of Nunatsiavut, we analyze the institutional framework created by the different LCAs in relation to the capacity of Indigenous communities to control resource development and to benefit from it. We conclude that at least in the case of the Cree of Eeyou Istchee, their institutional capacity allows them to better control resource development.

Key words: Resource curse, Indigenous People, Canadian Arctic, Land Claims Agreements

6. Sami-State collaboration in the governance of cumulative effects assessment: a critical action research approach

Rasmus Kløcker Larsen¹, Kaisa Raitio², Marita Stinnerbom³, Jenny Wik-Karlsson⁴

¹Stockholm Environment Institute, Postbox 24218, 104 51 Stockholm, Sweden, rasmus.klocker.larsen@sei-international.org, +46737078564. ²Swedish University of Agricultural Sciences, Department of Urban and Rural Development, Unit for Environmental Communication, Box 7012, 75007 Uppsala, Sweden, kaisa.raitio@slu.se. ³Vilhelmina norra reindeer herding community, Slingan 45, 923 94 Dikanäs, Sweden, marita.stinnerbom@biegga.com. ⁴Swedish Sami Association, Formvägen 16, 906 21 Umeå, Sweden, jenny@sapmi.se,

Indigenous-state collaboration in the governance of cumulative effects assessment (CEA) is often hampered not only by legacies of colonialism and inequality but also disagreement on what the 'CEA governance problem' is in the first place. In this paper, we draw on critical theories on dialogue, conflict

management and agonistic pluralism to present a novel approach to collaborative problem analysis between Sami reindeer herders and civil servants in Swedish permitting authorities on mining, wind energy and forestry. We discuss process design choices as well as insights on CEA governance and identify ways to tackle these barriers in practice. We argue that indigenous-state collaboration may play a constructive role in-so-far as the process carves out a new space for exploring divergent problem definitions and supports the participants in challenging institutionalized inequalities within their positioned realities.

Keywords: Cumulative effects, impact assessment, reindeer herding, Sami, action research, conflict management

7. Transnational companies, indigenous peoples – the politics of Arctic mining in Greenland

Peder Roberts, KTH-Royal Institute of Technology, Stockholm

What responsibility does a mining company have to a community? The case of Maamorilik Between 1973 and 1990 a company called Greenex operated the Black Angel lead-zinc mine at Maamorilik in Greenland. Strikes and environmental contamination are perhaps the mine's best-known legacies — and rightly so. But the mine also serves as an important window into two other issues. First, it was the first new mine to open under revised regulations geared toward creating a more congenial commercial climate for mining, an opportunity seized by the Canadian mining company Cominco (which took the leading role initially in Greenex). Second, the highly contentious closure of the Qullissat coal mine in 1972 had sharpened a sense that mines were responsible to communities in addition to shareholders. I am hesitant to specifically call this a concept of social and environmental responsibility as understood today, but I nevertheless believe it is worth exploring how Cominco argued for its operations as beneficial to communities in the immediate vicinity of Maamorilik and to Greenland as a whole, and how this was undermined by both industrial unrest and increasingly also contamination of adjacent waters.

8. Stories of hope: Enacting art, science and travelling in/across Russian Norwegian borders

Britt Kramvig, University of Tromsø

Dark Ecology can be considered as multiple expeditions and new travel practices with the aim to investigate polluted tundras, natural and manmade mountains, lakes and rivers, military and mining zones, as well as settlements in the border-area of Northern Norway and Russia above the Arctic Circle. Dark Ecology initiated theoretical lectures, artist-talks, discussions, curated walks and field notes as well as commissioned art installations, soundwalks, concerts and performances through three Dark Ecology Journeys held in 2014, 2015 and 2016.

The concept Dark Ecology is borrowed from Timothy Morton (2013), who argues that ecology is 'dark', because it invites us to think about our intimate interconnections with plankton and snowflakes, as well as iron ore and radiation. In the paper it's argued, inspired by Haraway (2016), that these journeys offer examples of science art worlding for living on a damaged planet. Haraway is in companionable friction with Morton, agreeing with Morton that we need to become aware that we live on a damaged planet, still the friction appears when Haraway urges us not only to rethink these relationships but more importantly we need to participate in changing the story. She offers ongoing multispecies stories and

practices of becoming interconnected, in the time that remains at stake [...] in which the world is not finished and the sky has not fallen – yet (op.c: 55). We take on this challenge and will add to changing the story by offering stories of productions performed at different sites in Norway and Russia. In all these research-art stories, humans are not the only important actors and through art-pieces as storytelling events, the resurgence of people-places can be nurtured with ragged vitality, in which mourning, memory, resilience, reinvention of what it means to be are embedded in differing appearances (Haraway 2016.:87). These are stories that refuse to disengage from living and dying well in the present and the future. Furthermore, can the Dark Ecology Journeys be a source of inspiration on how travelling allows for moments of friction and experience of epistemic disconcertments?

9. Constructing the past of Arctic Futures: politics of memory in mining towns in transition

Dag Avango, KTH

One of the characteristics of the mining industry, in the Arctic and elsewhere, is its sensitivity to fluctuations in world markets prices and demand. After boom periods comes bust and eventually all mines come to an end. De-industrialization pose a great challenge for Arctic communities based on extractive industries and few alternative economies, not only because of lost income opportunities but also the need to deal with the material legacies that mining leaves behind, from infrastructures and transformed landscapes to local identities. Legacies of mining are interpreted differently in different contexts though. While some will understand them as unwanted imprints of an unjust past, others may appreciate them as cultural heritage, resources for tourism or as structures that can be used for new purposes. In this paper I will present results from case studies within two closely related research projects, exploring under which circumstances mining legacies can become a resource for post-mining futures in Arctic communities – Norrbotten and Svalbard. What role do material and immaterial legacies of past and ongoing mining operations play in different future visions for the Svalbard archipelago and why? Can the legacies of mining become a resource for a post-mining future in Norrbotten and Svalbard and in that case how, for whom and why? Which lessons can be drawn from Norrbotten and Svalbard for other parts of the Arctic?

10. Doing tourism at the Russian mining towns at Svalbard

Albina Pashkevich, Dalarnas Högskola

Svalbard is a destination with the constantly increasing tourist flows. For the past twenty years the number of visitors arriving on cruises ships has tripled. The remote character and natural beauty, combined with the high possibility of encountering wildlife are features acting as a magnet for visitors. However, the history of coal mining and its importance for the survival of Svalbard communities is also increasingly utilized, but ill-researched, aspect in the process of destination development. Tourist visits to the operational and abandoned coal mines represent an alternative to the wildlife tours. Since very recently Svalbard also represent an arena for a joint tourism development from Norway and Russia. The current state of Russian tourist operations, management practices and future plans are largely unknown by stakeholders from the rest of Svalbard, such as Svalbard Tourism, which represents an uncertainty in the development plans of 'Svalbard Destination 2025'. Understanding the role the role played by 'Arcticugol' as the principle stakeholder in the tourism development center in Barentsburg and the

comparison of the activities and infrastructure in the Russian settlements with those in Norwegian settlements and sites lies in a focus of this paper. Steps taken by “Arcticugol” in investing into the tourist infrastructure on the base of the two Russian settlements Barentsburg and Pyramiden is certainly considered as a claim onto the position in the dynamic tourism market of Svalbard as destination operated by Norwegian tourist companies. Does these claims representing efforts towards further cooperation between the Norwegian and Russian counterparts? How this cooperation proceeds is important in order to come closer to understanding if current Russian tourism development on Svalbard is inline of the Norwegian frameworks applied onto all actors acting on the territory of Svalbard. Several research questions are posed: Why and how have the Russian settlements on Svalbard become involved in tourism? What tourism activities occur, how are they organized, who are the visitors participating, and how do their practices compare to activities in the rest of Svalbard.

Abstracts for sessions on March 15

11. Affective economies in the North Atlantic – Greenland, Iceland, Faroe Island, Denmark

Kirsten Thisted. Associate Professor, University of Copenhagen, Department of Cross-Cultural and Regional Studies, Minority Studies Section.

Within natural and social sciences, there is a long tradition for a hierarchy between reason and emotion, and emotions are rarely in the focus of analysis. This has changed with the so-called “emotional turn”, following the earlier narrative and discursive “turns”. The analysis of emotions investigates how emotions through the work of repetitive practices get patterned together with narratives and discourses, creating the sort of emotional and interpretative repertoires, which give order and meaning to the community. Hence, the concept ‘emotional communities’, launched by social psychologist Margaret Wetherell. Also in the theory of Sara Ahmed, who works at the intersection of feminist and queer theory, critical race studies and post-colonialism, emotions are studied as cultural practices, rather than as individual psychological states = something to be located in the interaction between people rather than within the individual itself. Ahmed has coined the term emotional economies, borrowing from Marxism the idea of circulation and accumulation. Just as money accumulate through circulation, so do emotions circulate and create emotional or affective value. So, in her analysis Ahmed ask questions like: “How are practices clumped, who gets to do what when, what relations does an affective practice make, enact, disrupt or reinforce? Who is emotionally privileged, who is emotionally disadvantaged and what does this privilege and disadvantage look like?” The paper is a short introduction to the theory of emotions – and an even shorter introduction to emotional economies in the North Atlantic.

12. Partnerships in mining: How to become, find and keep a good partner?

Lill Rastad Bjørst, Associate Professor, CIRCLA, Aalborg University, Kroghstræde 3, Room: 5-216, 9220 Aalborg Ø, Denmark.

This study aims to understand the Inuit (Greenlanders) relationship building with the mining industry. Greenland, being a site of social change, makes local governments curious about what a potential “partnership” could make possible. In this presentation the inner logic of partnerships between the local governments (and communities) and the mining industry are being analysed. The primary data is collected at multi-sites both in and outside Greenland (e.g. the Danish Parliament, PDAC 2016,

demonstrations in both Greenland and Denmark, the Future Greenland Conference 2015, in reports and newspapers and social media platforms). Since Greenland achieved self-government in 2009 they have been “flirting” with the global mining industry. Greenland being a state in formation looking for economic independence, has affected their position - but the quest for stable relationships in the mining sector conflict and create tension between the future partners to be. Additionally, a resistance movement in Greenland and Denmark has gained momentum and been successful in identifying ‘objects of fear’ towards mining (especially the mining of Greenland’s uranium). What is at stake in the affective economies related to mining in Greenland? The study indicates that understanding and analysing the language and culture of mining is of utmost importance when coping and building relationships with the mining industry. The theoretical framework is a combination of Ahmed’s (2004) interpretation of affective economies and Andersen’s (2008) theory on partnerships.

13. ‘Brokers of Hope’ in the extractive industries in Greenland

Frank Sejersen, Associate Professor, University of Copenhagen, Department of Cross-Cultural and Regional Studies, Section of Eskimology and Arctic Studies. Sejersen@hum.ku.dk

During the heydays of extreme optimism in Greenland with respect to the potentialities of extractive industries, a group of people stood out as particularly important: Chinese investors and political middlemen entered the scene and were welcomed by Greenland as the leverage to initiate the liberation of resources which were just waiting to be released from the ground. The presentation will focus at the roles and positions ascribed to the Chinese and how they were used to infuse a particular kind of hope into the political debate and how they demarcated a new Danish-Greenlandic scene.

14. Increasing exploitation pressure from mining and wind power within the Swedish reindeer husbandry area complicates the possibility to reach the environmental objective Magnificent Mountains

Carl Österlin, Department of Physical Geography, Stockholm University

Exploitation in the form of industrial development within the reindeer husbandry area impacts possibilities to conduct traditional reindeer husbandry. The character of reindeer grazed mountain areas from this traditional type of land use is also a cornerstone in the national environmental objective Magnificent Mountains. This paper will explore how the land use of mining and wind power has changed over time. Methods for the study are a combination of systems dynamics for environmental objectives and a GIS analysis of pressure from land use change. Areas used for mining purposes and wind power within the reindeer husbandry area has increased dramatically. With an environmental objective very closely linked to an ecosystem service delivered by reindeer husbandry, it is thus paramount that the effects of pressures on the reindeer husbandry is fully understood in order to be able to better manage the environmental objective. And the development of such indicators for cumulative effects from pressures must be done in collaboration with the reindeer husbandry. Increased pressure from escalating industrial development within the system will over time make it more and more difficult to manage the mountain area. Which in turn will make delivery of the agreed objective increasingly more complicated.

15. Synthesis of available environmental data with initial focus on northern Sweden

Sandra Fischer, Dept of Physical Geography, 106 91 Stockholm University, Sweden

As part of my PhD studies within the REXSAC framework I will investigate the potential metal pollution spreading from mines to the surrounding environment and society. Key questions are: What are the pollutant transport pathways and under what conditions can contaminants become harmful to plants, animals and humans? More specifically, in order to investigate the present day and potential future impacts from mining we need to understand both mining-disturbed systems and natural systems (i.e., systems under pre-mining or baseline conditions). The availability of historical and present quantitative environmental data is therefore governing what type of in-depth analyses we can do further on. Present work therefore focuses on synthesis of available data on hydroclimate and hydrology (e.g. streamflow, precipitation, temperature) and geochemical data (e.g. water quality, contaminants in sediments) for northern Scandinavia and Greenland, with initial focus on northern Sweden. From this data review we aim to identify essential monitoring gaps, and define regions and study focus for field measurement campaigns that are planned to start in spring-summer 2017.

16. Global change and Animal movements – Towards a socio-ecological predictive framework

Navinder Singh, Göran Ericsson, Christian Fohringer

Global changes driven by resource extraction, energy and infrastructure development in areas that are prone to accelerated climate change are dramatically affecting animal populations and their movements. Since animals are an important component of the natural world due to their crucial ecological, social, and economic role in ecosystems, land-use and climate change ultimately result in challenges for management, driving human wildlife conflicts as well as hindering the sustainable development and use of natural resources. In such transformed landscapes, the vital questions are, 'how', 'where', 'when' and 'why' do animals move and how do these altered movements transform the landscapes as well as human societies (ecologically, socially and economically) that depend upon these animals? Using case studies of two large mammal species (reindeer and moose) that are ecologically, socially and economically important in the northern/arctic ecosystem, the project aims to answer these questions in ways that include the perspectives of reindeer herders.

Identifying major movement corridors and impediments to reindeer and moose movement in terms of resource selection and various proxies of animal fitness will thus be the basic criteria for successive steps of analysis. By incorporating local weather station data and up-to-date terrain model data into a cumulative mapping system we want to determine important life-history traits and events, demographics and population dynamics. Specifically, we will investigate the degree of metabolic expenditure animals experience due to multiple social and environmental pressures. Another goal aims at identifying the pathways and potentially chronic effects of heavy metal contamination due to resource extraction activities. Our ultimate objective is to develop a socio-ecological movement modelling approach that goes beyond correlative or species distribution models and provides a predictive tool that can be used in developing diverse future land use scenarios, developed with and for community users and geared toward adaptation strategies in a changing world.

The results will provide new best practices and processes for scientifically robust impact assessments of extractive industries that add value to political decision-making processes and enhance the adaptive capacity of communities to respond to change.