ARCTIC-FROST

Resources and Sustainable Development in the Arctic:

Can, Should and Will Resource-Based Development Be Sustainable?

Materials from the NSF Arctic-FROST ANNUAL NETWORK MEETING

ST.PETERSBURG, RUSSIA, AUGUST 15-17, 2015

Prepared by:

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ARCTICenter
Cedar Falls

2015

Acknowledgements

This meeting represents an annual activity of the Research Coordination network (RCN-SEES) Arctic-FROST supported by the National Science Foundation PLR #1338850. We would like to thank all workshop speakers and participants. In particular we are thankful to the members of the program and organizing committee.

Andrey N. Petrov, PhD
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INTRODUCTION

Arctic-FROST Research Network in 2015

Andrey N. Petrov,
Arctic-FROST PI and Director, ARCTICenter, University of Northern Iowa

The National Science Foundation (NSF) recently awarded a five-year Research Coordination Network (RCN) Science, Engineering and Education for Sustainability (SEES) grant to the University of Northern Iowa (UNI) for support of the project entitled "RCN-SEES Arctic-FROST: Arctic FRontiers Of SusTainability: Resources, Societies, Environments and Development in the Changing North." Under the direction of Dr. Andrey Petrov, Arctic-FROST is based at the UNI Arctic, Remote and Cold Territories Interdisciplinary Center (ARCTICenter).

Arctic-FROST is an international, interdisciplinary, and collaborative network of environmental and social scientists, local educators, and community members from all circumpolar countries. Its primary purpose is to enable and mobilize research on sustainable Arctic development. The network aims to support improved health, human development, and well being of Arctic communities while conserving ecosystem structures, functions and resources. The intellectual goal of the project is to contribute to conceptual, applied, and educational aspects of Arctic sustainability science by supporting the dissemination of knowledge and exchange of methodologies across the four Arctic-FROST themes: sustainable regions, economies, cultures, and environments.

Arctic-FROST address three overarching questions: What does sustainable development in the Arctic mean, locally, regionally, and globally? How is sustainable development attainable in a changing Arctic? What are the best ways of measuring achievements towards adaptation, thrivability and sustainable development in the Arctic?

It does so by creating (1) knowledge synthesis about Arctic sustainable development; (2) new theoretical frameworks providing integrated views of sustainability in remote resource regions; (3) spatial understandings of sustainability at multiple geographical scales and in divergent Arctic contexts; and (4) future research directions for Arctic sustainability and sustainable development, focusing on ways to maximize resource development benefits and minimize economic, social, cultural and environmental costs.

Membership in Arctic-FROST is open to anyone with interests in sustainability and sustainable development in the Arctic. Since its inception in September 2013, the network has attracted approximate**ly 250 members from the 20 countries including all Arctic jurisdictions with 55% co**ming from the U.S., 29% from Europe and Russia, and 15% from Canada. Alongside seasoned academics and community members more than half of the RCN members are early career scholars or graduate students. The network also involves Indigenous scholars and members of underrepresented groups.

The network has an extensive plan of activities for 2014-2018 consisting of annual meetings, early career scholar workshops, community workshops, the first Arctic Sustainability Education Forum in 2018, and multiple smaller theme-based conferences throughout each year. First-year events include the inaugural Arctic-FROST meeting was held in late 2013 at the University of Northern Iowa and the first annual meeting and early careers scholars workshop entitled "Sustainability and Sustainable Development in the Arctic: Meanings and Means" took place in Anchorage, Alaska on September 18-20, 2014.

In 2015 ARCTIC-Frost held its second annual meeting in St. Petersburg, Russia. It gathered a diverse group of researchers representing multiple disciplines, demographic groups and countries. The meeting was followed by the early career scholars workshop. In addition to St. Petersburg meetings, Arctic-FROST hosted and co-sponsored many domains and side meetin**gs, as well as workshops. These include: five "Polar Geographies" sessions at the Association of American Geographers Meeting (Chicago, IL); ASSW 2015/International Conference on Arctic Research Planning III (Toyama, Japan), where Arctic-FROST held a special session on Arctic sustainability and ICARP III session/panel; "Sustainable development in the Arctic" sessions at the International Geographical Union Meeting (Moscow, Russia) "Arctic Sustainability Research: Agenda 2025" ICARP III white paper workshop (Charleston, SC); "Canada and U.S.: Allies and Partners in the Arctic" symposium (Cedar Falls, IA), and "Resources and sustainab**le development" northern community workshop co-sponsored with ReSDA (Kuujjuaq, QC), as well as multiple public events in Iowa to raise awareness about environmental and social change in the Arctic.

Arctic-FROST members are committed to deliver a number of key products, including two edited volumes devoted to sustainable development in the Arctic, a textbook on Arctic sustainability, other educational materials, academic publications, and a research plan for Arctic sustainability science for the next decade. The initial version of this plan was be presented at the Third International Conference on Arctic Research Planning (ICARP III) on April 23-30, 2015, where Arctic-FROST is co-organizing two panels. The Arctic-FROST members also contributed to the "Northern Sustainabilities" volume edited by Gail Fondahl and gary Wilson (forthcoming).

In 2015 Arctic-FROST actively collaborated with other research networks and organizations, such as Resources and Sustainable Development in the Arctic (ReSDA), Research Coordination Network in Arctic

Urban Sustainability, International Arctic Science Committee (IASC), International Arctic Social Sciences Association (IASSA), Association of Polar Early Career Scientists (APECS), and others.

Some 2015 highlights:

Published proceedings and white papers from annual meetings and workshops. Published abstracts were produced for the Annual meeting and made freely available on Arctic-FROST's website. Abstracts and selected paper for side and domain workshops were published by respective conferences.

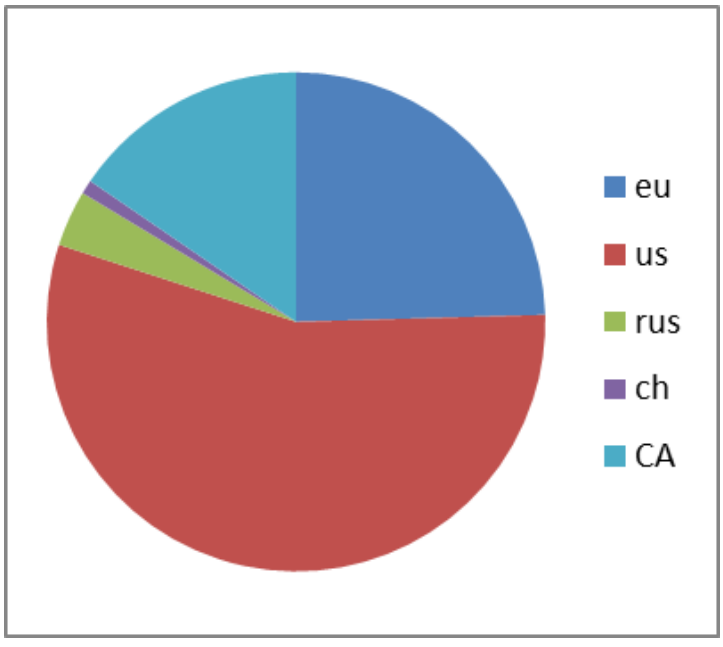
Peer-reviewed publications. A book "Northern Sustainabilies" with chapters written by Arctic-FROST members (annual meeting participants) is in print by Springer. Selected members published peer-reviewed articles and book chapters.

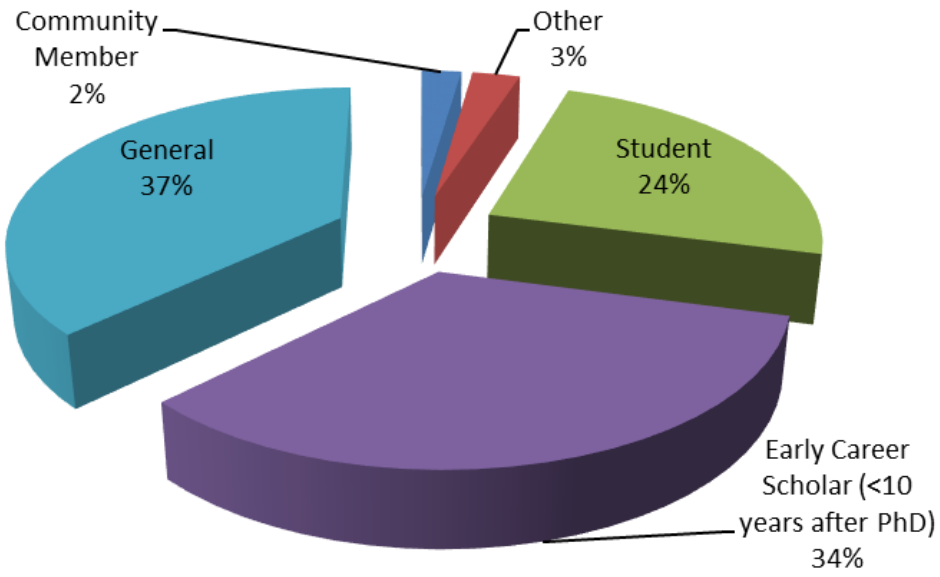
White paper "Arctic Sustainability Research: Agenda 2025." Presented at ICARP III and prepared for publication.

Peer-reviewed volumes. Work has begun on the first peer-reviewed volume "Arctic Sustainability: A Synthesis of Knowledge". Established writing team, developed plan and started negotiations with Taylor & Francis to publish the manuscript

Arctic-FROST web portal is operational. Facebook base was launched. These are primary tools for publication, rapid circulation and dissemination of network activities. www.uni.edu/arctic/frost

Collaborative research proposals. Arctic-FROST members developed a number of successful collaborative interdisciplinary and international proposals, which directly benefited from Arctic-FROST activities in 2014-2015: Belmont Arctic call (NSF/Nordfosk/RFBR/RCN) synthesis project "Arctic Sustainability: A Synthesis of Knowledge" (PI Petrov), IASC Arctic Sustainability Workshop (PI petrov, Fondahl and Schweitzer), Foreign Affairs Canada Arctic Symposium funding (PI Petrov and Cruz). Finally, a group of Arctic-FROST members collaborated with RCN in Russian Arctic Urban Sustainability to develop a successful NSF grant "PIRE: Promoting Urban Sustainability in the Arctic" (PIs Orttung, Heleniak, Laruelle, Streletskiy and Shiklomanov).





Arctic-FROST membership by region (top) and by type (bottom) (2014)

CONFERENCE PROGRAM

NSF Arctic-FROST ANNUAL NETWORK MEETING AND EARLY CAREER SCHOLARS WORKSHOP:

Resources and Sustainable Development in the Arctic:

Can, Should and Will Resource-Based Development Be Sustainable?

ST.PETERSBURG, RUSSIA, AUGUST 15-17, 2015

European University in St. Petersburg, RUSSIA

August 15th

8:00-8:30 Registration

8:30-9:15 Opening and Introductions

Chair: **Nikolay Vakhtin**, European University at St. Petersburg

Nikita Lomagin, Vice Rector for Governmental Relations, European University at St. Petersburg

Andrey Petrov, Arctic-FROST PI, University of Northern Iowa, USA

9:30-10:15 Townhall/Plenary Session 1.1: Arctic Sustainability Science: Past, Present and Future

Chair: **Tatiana Vlasova**, Russian Academy of Sciences

Andrey Petrov, University of Northern Iowa & **Peter Schweitzer**, University of Vienna

Arctic Sustainability Research: Past, Present and Future

Discussion

10:15-10:30 Coffee break

10:30-12:30 **Resources and sustainable development in the Arctic: lessons and possibilities**

Chair: **Yuri Gladky**, Herzen State Pedagogical University of Russia (Russia)

Alexander Pelyasov, Council for Productive Forces, Russia

Resources and sustainable development in the Arctic: lessons and possibilities

Chris Southcott, Lakehead University, Canada

Resources and Sustainable Development in the Arctic Project: Initial Findings

Florian Stammler, University of Lapland, Finland

Confrontation, co-existence or co-ignorance? Determinants of relations between industry and local people

Discussion

12:30-2:00 Lunch

2:00-4:00 **Mineral resources and sustainable communities: impacts, contestations and complementarities** (Illustrated paper session)

Question: What is the role (if any) of non-renewable resources in sustainable development of the Arctic?

Chair/Discussion lead: Jessica Graybill, Colgate University, USA

Elena Kluchnikova,

Mining projects and local communities in the Russian Arctic: join development

Rasmus Ole Rasmussen, Nordregio, Sweden

TITLE

Gerald Zojer, University of Lapland, Finland

Finland Arctic hydrocarbon resources: Curse or blessing for societal security in the Arctic?

Scott Stephenson, University of Connecticut, USA

Embedded Firms, Transport and the State: A Brief Examination of Yamal LNG

Mia Bennett, University of California, Los Angeles, USA

The Last Frontier? Long-Term Perspectives on Arctic Natural Resource Extraction

Victoria Hermann, University of Cambridge, UK

Frozen Assets: Moving Arctic Investment from Resource Extraction to Human Development

Discussion

4:00-4:15 Coffee break

4:15-5:30 **Resources and Indigenous communities** (Illustrated paper session)

Question: Resources and indigenous communities: is there a way to achieve sustainability?

Chair/Discussion lead: **Florian Stammler**, University of Lapland, Finland

Peter Schweitzer, University of Vienna, Austria

Lessons from the Never-Ending ANWR Debate

Chris Southcott, Lakehead University

Using non-renewable resources to enhance renewable resource development in Indigenous communities

Anna Varfolomeeva, Central European University, Hungary

Past Experiences Forming Present Interactions: Indigenous Peoples and Extractive Industry Development in the North-West of Russia

Alexey Pristupa, Wageningen,University. Netherlands.

Information as legitimacy broker in zoning efforts in the Numto nature park in the Russian Arctic: Planning for sustainability versus vested interests

Andrew Hodgkins, University of Calgary, Canada

Examining Sustainable Communities through Vocational Education and Training Partnership Programs in the Canadian North

Vera Kuklina, Sochava Institute, Russia/George Washington University, USA

Resource extraction and infrastructural networks in the North of Irkutsk Oblast

Discussion

August 16th

8:30-10:30 Resources, cities and sustainable development (Illustrated paper session)

Question: Can resource-based cities and towns be drivers of sustainable development?

Chair/Discussion lead: **Gertrude Saxinger**, University of Vienna, Austria

Gertrude Saxinger, University of Vienna, Austria

We also want to mine 100 years – let's safe the deposits!" local Ideas about Sustainability

Nadezhda Zamyatina, Moscow State University, Russia

Current Migration Trajectories of Young Talents to Russian Arctic cities: the Role of Universities

Yulia Zaika, Moscow State University, Russia

Socio-economic and environmental challenges and problems of single-industry cities of Murmansk region, Russia

Tuomas Suutarinen, University of Helsinki, Finland

Resource-based development and the socio-economic sustainability of resource communities of the Murmansk region

Julia Loginova, University of Melbourne, Australia

Institutional Factors of Community Resilience to Natural Resource Development in the Timan-Pechora Province

Elena Kuznetsova, Norwegian University of Science and Technology, Norway

Aggregate sustainability in Arctic and Sub-Arctic: challenges and possibilities

Sigrid Schiesser, University of Vienna, Austria

The development of railroad infrastructure in the Russian North (Sakha Republic): ecology, symbolics and sociality

Discussion

10:30-11:00 Coffee break

11-12:30 **Renewable resources and sustainability in the Arctic**
(Illustrated paper session)

Question: Can renewable and traditionally-used resources and be deployed in order to achieve sustainable development?

Chair/Discussion lead: Diane Hirshberg, University of Alaska Anchorage, USA

Nathaniel Trumbull, University of Connecticut, USA

Marine Protected Areas and the Russian North

Catherine Chambers, *Blönduós Academic Center, Iceland*

University of Alaska Fairbanks, USA

The Icelandic lumpfish fishery as a case study to illustrate the multiple goals of sustainable fisheries management

Egor Ivanov, Sochava Institute of Geography, Russia

Sociocultural potential of glacier landscapes of Near-Baikal mountains

Emily Francis, University of Northern Iowa, USA

Wild Reindeer dynamics and Sustainability of Social-Ecological Systems in Taimyr

Konstantin Eidemiller, Herzen State Pedagogical University of Russia (Russia)

The interests of environmental safety in the development of the Arctic resources as an imperative

Discussion

12:30-2:00 Lunch

2:00-2:45 Sustainable development and Arctic governance
(Illustrated paper session)

Question: What are the governance mechanisms for sustainable development in the Arctic?

Chair/Discussion lead: Natalia Loukacheva, University of Northern British Columbia, Canada

Natalia Loukacheva, University of Northern British Columbia, Canada

Arctic Energy Resources and 'Legal' Sustainability

Klaus Georg Hansen, Greenland.

Large scale industrial projects and political sustainability in Greenland

Nengye Liu, University of Dundee, UK.

The European Union and Sustainable Management of Fisheries in the Arctic

Genevieve Parente, University of British Columbia, Canada

Sustainable Governance in Alaska

Alla Fedorova, Galina Gnatiuk and **Viktoria Filippova**, M.K. Ammosov North-Eastern Federal University, Yakutsk, Russia

Problems of Legal Regulation of Traditional Land Use (Case of Bellet Evenk National Nasleg, Sakha (Yakutia)

Discussion

3:00-5:00 **Discussion groups/round table**

Chair: **Timothy Heleniak**, Nordregio, Sweden

5:00-5:15 Coffee break

5:15-6:00 **Synthesis session and wrap-up**

Chair: **Andrey Petrov,** University of Northern Iowa & **Jessica Graybill,** Colgate University, USA

Early Career Scholars Workshop

ANNUAL MEETING PAPERS

Arctic Sustainability Research: Past, Present and Future

Andrey Petrov, University of Northern Iowa, USA and Peter Schweitzer, University of Vienna, Austria

Co-authors: Shauna BurnSilver, Arizona State University, Terry Chapin, University of Alaska Fairbanks, Gail Fondahl, University of Northern British Columbia, Jessica Graybill, Colgate University, Kathrin Keil, Institute for Advanced Sustainability Studies Potsdam, Annika Nilsson, Stockholm Environment Institute, Rudy Riedlsperger, Memorial University of Newfoundland

This presentation reports the main findings of the ICARP III White Paper "Arctic Sustainability Research: Agenda 2015" authored by an interdisciplinary international group Arctic researchers. The paper, a collaborative effort by IASC's Social and Human Working Group, the International Arctic Social Sciences Association and the US NSF's Research Coordination Network Arctic-Frost (Arctic Frontiers of Sustainability), elaborates on the current state of sustainability and sustainable development in the Arctic, while identifying related knowledge gaps and research priorities for the next decade. It will include a historical overview of the concepts of sustainability in global and Arctic contexts, a progress report on research related to Arctic sustainability, and recommendations regarding key priorities for Arctic sustainability research for the next decade.

Paper content is based on the interactive workshop was organized around group discussions and breakout sessions identified relevant literature and projects, and fleshed out and refined the outline of the white paper's sections. In order to evaluate the state of research on sustainability in the Arctic, the paper reviewed science plans released by ICARP-II. Of particular interest were Science Plans 1, 2, 10 and 11, focusing on economic development, indigenous considerations, social-ecological change, and research processes and research communication. The paper considers the progress accomplished in addressing research questions and priorities relevant to sustainability and sustainable development that were laid out in these science plans, and where further research was needed. Given both the advancements made (or lack thereof) in sustainability and sustainable development in areas identified by ICARP-II, and new areas of concern that have arisen over the past decade, workshop participants identified numerous future research areas, then assessed these in terms of a set of criteria to develop a smaller set of priority research areas. These include a special focus on methodology, synthesis, indicators, governance, and ecological dimensions.

Preliminary findings for the first draft of the white paper have been discussed at the ICARP III conference in Toyama, Japan.

Key findings include:

o Arctic sustainability research has deep historical roots and most recently evolved as a part of the emerging sustainability science

o Much of the ICARP II science plans (most specifically 1, 2, 10 and 11) have seen some progress, but many of the tasks remain relevant at present and will be relevant in the future

o Arctic sustainability research has substantially advanced in the last decade:

· Development of theoretical frameworks, such as social-ecological systems, resilience, adaptation and sustainable development placed within the context of Arctic communities and environments

· Epistemological transitions to (1) more integrated trans/interdisciplinary research, to (2) mixed method

research (including modeling), (3) development of indicators and (4) co-production of knowledge, including community-based approaches to research design, execution, assimilation and dissemination.
· Growing focus on global-local linkages and multiple scales of sustainability and sustainable development

Gaps and agenda items for 2025:

o Improve historical understandings of sustainable development in respect to the Arctic
o Continuing enhancement of trans/interdiciplinarity, further advancement of coupled social-ecological systems theory and related conceptual frameworks
o Focus on synthesis of various case studies and disciplinary contributions
o Focus on understanding sustainability as a process
o Incorporate modeling in interdisciplinary mixed-methods knowledge-co-production methodologies
o Continue developing community-based and community-relevant indicators and monitoring frameworks of sustainable development
o Focus on longitudinal studies, especially through applying long-term, generational timeframes
o Advance our knowledge about scales of sustainability and equity in the context of sustainable develop

The ReSDA Project: Initial Findings

Chris Southcott, Lakehead University, Canada

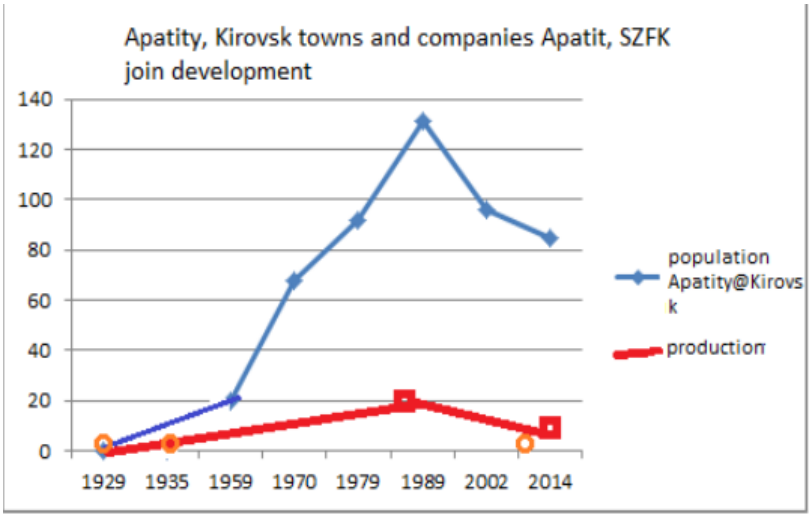
Resource exploitation remains the primary source of potential economic and social sustainability of northern communities. Yet while Arctic resources have the potential to produce great wealth in the future, past experience has showed that most of these communities have benefited little from extractive industries. Arctic communities have experienced enormous social and economic challenges over the past century linked to impacts of past resource exploitation. There is some indication that the worst aspects of resource dependence can be countered through the introduction of new policies and models of development that increase local control and ensure a higher share of resource rents are passed on to communities. New land claim agreements, impact-benefit agreements, and co-management boards offer the potential for the development of natural resources in the Arctic in a manner that increases the benefits of these developments for communities. The Resources and Sustainable Development in the Arctic (ReSDA) project brings together researchers and community representatives to conduct and mobilize research aimed at the sustainable development of Arctic natural resources in a manner that will improve the health and well-being of northern communities while preserving the region's unique environment. This presentation will discuss the initial findings of this international multi-disciplinary project.

Mining projects and local communities in the Russian Arctic: joint development

Elena Klyuchnikova, Institute of the Industrial Ecology Problems of the North of the Kola Science Center of the Russian Academy of Sciences, Apatity, Russia

According to the growth strategies of the Arctic zone of the Russian Federation as a whole and its regions the mining industry has been and is now the backbone of the economy of the Russian Arctic. In this regard it is important to define mechanisms how to cope with the threats and challenges related to the fact that the urban and rural population becomes a victim of mining enterprises and together with them has to cope with the challenges related to fluctuations of the raw material market, fear of irreversible environmental changes because of negative effect of mining projects, fear before decreased opportunities to receive means of existence in another way.

Mining companies also face the challenges from market fluctuations and strictness of nature-related legislation, they face the risks of reputational and consequently economic losses which may arise after



conflicts with local population.

Within the framework of Kolarctic ENPI CBC Program a project "Sustainable mining local communities and environmental regulation» (SUMILCERE)" was implemented and the expectations of local communities were studied. The interviews showed that the population expects from mining projects first of all economic well-being and high salaries and social guaranties. The mining industry is perceived as a savior, which can bring to life the economic development of peripheral regions of the North of Russia and Europe which suffer from out migration and other negative demographic processes.

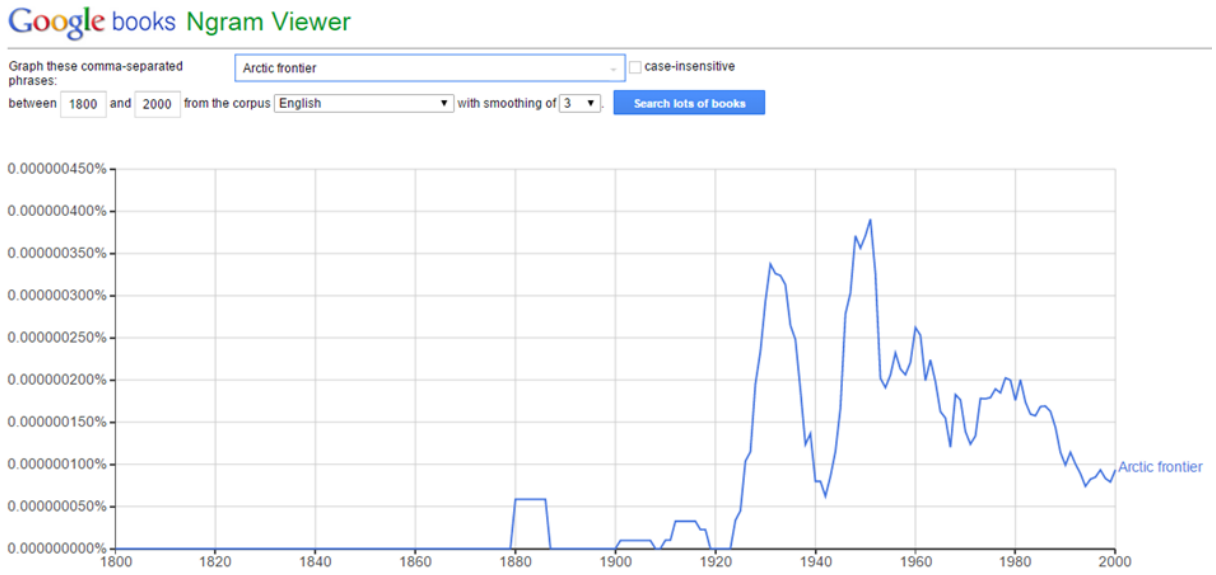
The attitude of local population to fly-in-fly-out workers is extremely negative. People are afraid of high competitions for work places, changes of cultural landscape and increase of crime. There are certain concerns about the preservation of sensitive northern nature, which is the area of living for northern people. First of all this has to do with the indigenous minority peoples engaged in traditional economy (reindeer breeding, fishing) and with tourism.

In order to escape the expenditures related to conflicts with local communities we recommend to the companies to apply a concept "social license to operate" in the North during the development of their social policy. Such approach will not only decrease the reputational losses of the company but bring additional profits related to more reasonable use of the potential of the local communities in the company's activities. To receive the social license to operate the companies should take care of the social sustainability of the local communities, which is provided by the standard of living and favorable environment. That's why the companies should follow the environmental requirements, search for new environmentally friendly technologies of production, processing and waste treatment. The company should set such a long term goal as real assessment of environmental expenditures of the company and include them into the value of the final product. Self-regulation of the companies should be based upon the strive for a real dialog with the local communities and the regard for the interest of the local business. The opinion and interests of indigenous peoples should be taken into consideration during the development of new mining projects at the earliest stages, because in case of potential risks they will actively protect their interests.

The Last Frontier? Long-Term Perspectives on Arctic Natural Resource Extraction

Mia Bennett, University of California, Los Angeles, USA

Humans have always made use of the non-renewable resources within their natural environment. Yet it has been a long journey from the first human who rubbed together two pieces of flint to light a fire to the transnational corporations today exploiting gas reserves in remote frontiers like the Arctic offshore. Whereas prehistoric campfires could be spotted for a few miles away, gas flares – the wasteful result of burning off excess, unsellable gas – can be seen from outer space, exemplifying the exponential rate of growth of resource exploitation. In the past five hundred years and particularly since the Industrial Revolution, the pace of development of resource frontiers – spaces not yet incorporated into the networks of global production and consumption – has quickened. This acceleration has been realized through political, financial, technological, and environmental arrangements that have become increasingly complex in order to extract resources from ever more challenging peripheries.



The Arctic offshore is one of the most difficult regions into which human activity has yet penetrated. Although companies and governments often call the Arctic the "last frontier" or a "new frontier," the region has actually been subject to centuries of exploitation, generally for the export of natural resources to urbanized cores in more southern parts of the world. In this paper, I examine the longue durée of Arctic natural resource extraction – a process that I argue is best typified as a series of waves, with each wave bigger and more complex than the last. This framework helps highlight the progression over time of Arctic natural resource development despite intermittent periods of disinvestment better than the usual "boom-and-bust" characterization. I argue that resource frontiers like the Arctic offshore can serve as a crucible for forging new extraction and transportation technologies along with social, economic, and political arrangements that can then be used to open up the next resource frontier, wherever it may be.

The current wave of Arctic development is without a doubt the most complex yet, involving complicated transnational financial and governmental arrangements and globespanning logistics. One clear example is the journey of the Dockwise Vanguard – the world's largest float-on/float-off ship. On April 17, 2015, after traveling from a Hyundai shipyard in South Korea, it reached its Arctic destination: the port of Hammerfest in northern Norway. Onboard this vessel was a floating production storage and offloading vessel (FPSO) built in the Hyundai shipyard in South Korea. The FPSO, owned by Italian multinational oil and gas company Eni, will become the second platform in the world to extract offshore oil north of the Arctic Circle

following Russia's Prirazlomnaya, which came onstream in late 2013. Dockwise Vanguard and its cargo were together so large that they could not have sailed through the Northern Sea Route to its Arctic destination, even if it had been sailing in summertime. Instead, the vessel sailed around the Cape of Good Hope. Dockwise Vanguard's current voyage, its most northern ever, epitomizes the extension of humans and their financial and technological instruments into ever harder-to-tackle frontiers like the Arctic offshore. Importantly, the current round of development in the Arctic is unique in that it is facilitated by anthropogenic climate change. Oil and gas corporations and states alike cite melting sea ice and more open water as reasons for developing farther out into the Arctic Ocean. As such, this paper additionally attempts to contextualize Arctic development in the 21st century – and global resource frontiers in general – within the Anthropocene. This concept of a proposed geological epoch also allows broader consideration of the other ways in which humans have irrevocably altered the environment apart from climate change. NASA recently featured a satellite image over Norilsk, a nickel mining city in the Russian Arctic, on its website with the caption: "Heavy metal pollution near Norilsk is so severe that it is now economically feasible to mine the soil, which has been polluted so severely that it has economic grades of platinum and palladium."1 In this paper, I accordingly reflect on this city as a place where a resource frontier has been recreated out of the detritus of previous exploitation in order to see what lessons this might hold for other parts of the world. Though the Arctic is often called the "Last Frontier," such framings serve to erase past memories of exploitation and turn the region into a clean slate ripe for "discovery" when in fact, each wave of exploitation is built upon the last.

1 http://www.nasa.gov/multimedia/imagegallery/image_feature_1124.html

Diversifying resource-based communities: understanding the role of mobilities in path dependence

Doris Carson, Umea University, Sweden

Many rural and remote communities affected by a decline in traditional resource-based industries have turned to 'attractive' industries, such as tourism, retirement and lifestyle development, to combat socio-economic decline. Yet, reality has shown that such diversification strategies often fail to deliver the expected outcomes and thus do not help sustain communities in the absence of a strong resource sector. Reasons for this are usually related to issues of path-dependence, 'lock-in' and a lack of local capacity and capital, which prevent communities from developing new socio-economic pathways without the help of external leadership and investment.

This presentation discusses the example of Nhulunbuy, a remote company town in the Northern Territory of Australia, to understand the challenges in transitioning from 'extractive to attractive' forms of development. Nhulunbuy has recently experienced severe socio-economic decline due to the closure of its alumina refinery, resulting in the loss of more than half of its workforce. Using a path-dependence perspective, the presentation traces the historic development path of the company town since the 1970s and identifies the various factors that are currently hindering the formation of new 'attractive' development paths for the town. The case study is based on extensive desk-based research and secondary data analysis,

as well as observations from a fieldtrip to Nhulunbuy in 2014.

The findings suggests that a lock-in of population mobilities – i.e. the 'flows' of people, skills and capital – has become one of the major reasons why Nhulunbuy struggles to develop the local capabilities required to stimulate new path creation. This lock-in is the result of a range of inter-related endogenous and exogenous forces which include, for example: the entrenched dominance of the company in the local job and housing market; an embedded export addiction within the wider political economy that continues to prioritise large-scale external investment over smaller-scale local development; the reliance on external network connections for labour and skills import; the cementation of long-distance air travel to a small number of destinations as the dominant form of transport; and an embedded temporariness within the wider Northern Territory mobility culture. As a result, new population mobilities (e.g. entrepreneurs, lifestyle migrants, tourists) that would be critical in the process of new path creation are currently not existing. More importantly, Nhulunbuy would require substantial infrastructure and institutional change to attract the sorts of people, skills and capital that is needed for the sustainable local development of new attractive industries.

The findings emphasise that desired alternative development paths must be identified, planned for and gradually implemented while the resource industry is still going strong, so that communities have enough time to develop the required type of infrastructure, institutions and community capital. Though this case study is from northern Australia (a somewhat 'non-arctic' environment), its lessons are highly relevant for analysing path dependence and path creation in remote resource communities of the Arctic. In particular, considering the role of mobilities in socio-economic path-dependence, and the ways in which these mobilities can become locked-in, is relevant for understanding the prospects of diversification strategies beyond boom and bust resource dependence. Thus, this presentation offers an interesting contribution to the main conference themes 'sustainable economies' and 'sustainable communities.

The Icelandic lumpfish fishery as a case study to illustrate the multiple goals of sustainable fisheries management

Catherine Chambers, Blönduós Academic Center, Iceland / University of Alaska Fairbanks, USA

This research uses a mixture of qualitative and quantitative methods from social and natural sciences to explore the interplay of factors affecting participation in and management of the small-scale lumpfish fishery in Iceland. Commercial fisheries are host to multiple complex social, ecological, and economic factors that can influence how management schemes are designed. A "sustainable" fishery can have different definitions and therefore different end goals. Management scenarios that maximize biological end goals (e.g., ensure ample fish resources for the future while minimizing negative environmental impacts) may not satisfy socio-economic goals (e.g., provide income opportunities for rural communities) or cultural goals (e.g., allow equitable access to fisheries with historical and cultural significance), and vice versa.

Small-scale fisheries in particular have specific cultural and historical factors that often take precedence

over economic or biological goals. The small-scale Icelandic lumpfish roe gillnet fishery developed commercially in the 1970s as replacement for caviar, but lumpfish had been fished seasonally for many centuries long before the growth of the commercial fishery. Fishery participation fluctuates greatly annually but lumpfish remains a central part of the cultural identity of many rural villages in Iceland. The fishery is different from the majority of Icelandic fisheries - which are managed by Individual Transferrable Quotas (ITQs) - and is regulated by length of season, net length, number of nets, area closures, and number of permits.

First, I describe the lumpfish fishery using data collected from ethnographic fieldwork including a mailed survey of fishermen conducted in 2011-2013 exploring themes of familial connection to lumpfish fishing, the involvement of youth and newcomers, the importance of lumpfish to rural coastal communities, and the involvement of fishermen in the management process. Lumpfish can be extremely important to the cultural and economic fabric of rural communities, as one informant put it: "Lumpfish is different; everybody wants to have fun, and I want to be around people after the winter. It's nice, everybody gets excited and they hire more people during this time. They say that people invented the lumpfish fishery here." Survey results show that of those lumpfish license holders who fished in 2013, 30% fished only lumpfish, while 35% combined lumpfish with non-ITQ coastal fishing, and 35% combined with quota fisheries, suggesting it can be financially straining to be a smallboat fisherman, particularly outside the quota system. Furthermore, survey results confirm interview data suggesting that lumpfish fishermen feel disengaged from the management process and wish to have their ecological knowledge and their opinions on how to manage the fishery included in management decisions.

Next, I describe the intra-seasonal dynamics of lumpfish fishing in its developing years using detailed logbook information from 1977-1979 as the fishery was growing in market importance. A concern over an increasing lumpfish catch alongside a decreasing total population biomass estimation is particularly troubling for managers because there is a lack of data regarding basic fishermen behavior and historical catch numbers. Official catch records only go back to 1984, but logbooks from 1977-1979 recorded a variety of information that can be used to describe the first few years of the commercial lumpfish fishery. Finally, I explore the interplay of social and environmental factors as they relate to the sustainable management of the lumpfish resource by correlating fluctuations in participation and landed catch with explanatory variables such as the price of roe and bad weather.

The changing Arctic brings new opportunities and challenges to Iceland's marine socio-ecological systems, such as new shipping routes and increased cruise tourism, as well as many other environmental changes. This research is therefore timely in that it addresses the varying scales of a fishery, from in-depth knowledge on constraints and opportunities for individuals most closely engaged in and reliant upon marine natural resources, to the larger social patterns in national politics and international markets. Sustainable resource development is contingent upon multiple factors, and through this case study we are able to look at the ability of the current lumpfish fishery management based primarily on biological goals to respond to social and/or environmental changes. Understanding the interplay of social and environmental factors and their related management end goals is crucial in supporting truly sustainable development and management of complex socio-ecological marine systems.

Problems of legal regulation of traditional land use of indigenous peoples (case of Bellet Evenk National Nasleg, Sakha (Yakutia)

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The municipal unit named ‘Bellet Evenk National Nasleg’ is located in western part of Aldan District. It includes Khatystyr and Ugoyan villages. The total area of the municipal unit named ‘Bellet Evenk National Nasleg’ is 2512.2 thousand hectares. Most of the inhabitants of nasleg are indigenous peoples of the Sakha republic known as small-numbered peoples of Russia - the Evenki. Nasleg is a place of traditional residence of small-numbered peoples at the legislative level. The main traditional occupations in the Nasleg are reindeer herding, fishing, berry gathering and hunting. There are 34 obshchinas (tribal communities) in Khatystyr. Territory Belletskogo nasleg also is a territory of traditional nature use of local value "Bellet". There are 28 obshchinas are situated on the territory of nasleg. The total area of reindeer pastures of these obchshinas is 6 348.7 thousand hectares. Category of forest land occupy almost the whole territory of the Bellet nasleg, therefore land is given to obchshinas on a long-term lease.

There are four protected areas of local value are situated on Bellet nasleg territory. Their total area is 902.3 thousand hectares. The territory of traditional land use "Bellet" is almost completely overlapped by the protected areas of local value, which were founded before 2008. In this case the same territory of Bellet nasleg has different protection regimes and is regulated by legal documents of federal and republican levels.

It should be noted that the protected areas are created for the protection of natural objects, systems and landscapes. Territories of traditional nature use are aimed at protecting traditional nature and traditional economic activities of indigenous peoples. The Head of nasleg has to solve the problem of conflict of protected areas of local value and the territory of traditional nature use. There are two ways to solve this conflict. The first way -the border of the territory of traditional nature use shall be located outside the previously founded protected areas of local value. The second way - to eliminate protected areas of local value, which are situated on the territories of traditional nature use "Bellet".

Now these two options do not resolved. The local administration does not want to change the border the territories of traditional nature use. The administration of Aldan region does not agree to the elimination of local protected areas in order to unite these lands with the territories of traditional nature use.

In recent years, there are many issues related to indigenous peoples' rights to traditional land use in connection with an active industrial development of the South Yakutia. Federal and republican projects such as oil pipeline "Eastern Siberia - Pacific Ocean" (ESPO) pipeline "Power of Siberia", carrying power lines and others occupy the territories of traditional nature use. In this regard, the regulation of issues related to the organization territory of traditional nature use "Bellet" becomes more urgent and acute. The territories of traditional land use previously prescribed in existing laws and aimed at the preservation and development

of small-numbered peoples is withdrawn now.

Territories of traditional land use were excluded from the Protected Areas on the basis of the Federal law adopted December 28, 2013 №406-FZ "On Amendments to the Federal Law "On Specially Protected Natural Areas" and some legislative acts of the Russian Federation." This deprived the territory of traditional land use of legal protection.

In accordance with these changes, the Republic of Sakha (Yakutia) as a subject of the Russian Federation amended on the republican law about protected areas. Thus, if previously the territory of traditional land use were protected under federal and republican legislation on protected areas, now it is regulated only by the laws of the territories of traditional land use.

The interests of environmental safety in the development of thew Arctic resources as an imperative

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The transformation of the marine environment and marine hydrocarbon resources of the Arctic to the most important object of the global natural management and intergovernmental relations promises not only to further aggravate explicit or latent processes "division" of the riches of the Arctic, but also to present a presumptuous Board the mankind harsh bill for not always justified environmental risks by the underwater extraction of oil. Dangerous clashes of geopolitical and economic interests of individual States, on the one hand, and the interests of "environmental security" around the world, acquiring in the beginning of XXI century is not hypothetical, but quite visible.

Some authors believe that the effects of known environmental tragedy that occurred in 2010, 80 km from the coast of Louisiana in the Gulf of Mexico on the Deepwater Horizon oil rig is somewhat exaggerated. However important the fact that "thanks" was she aware of potential disasters already "universal" scale, especially if it happens in the Arctic. The increased scope of subsea production of oil, literally, "lifted up" the ecological community of the world, triggering a protest reaction of the most influential ecologists of the world.

Unfortunately, to date there is still no guarantee that the collision of geopolitical, economic and environmental interests, preference will be given to the latter. This is due to the fact that oil is becoming a critical component of geopolitics, finding the functions not only of goods, but also a powerful leverage that can significantly change the geopolitical balance of the world map. Assessment of hydrocarbon resources of the Arctic are constantly changing as, for objective reasons (known difficulties of exploration operations), and widely practicing Xia the privacy of the data oil companies. But in any case, these huge resources, remained intact and played the role of "spare tank", are now becoming a tool for the management of the global environment facility and bilateral relations.

It is clear that the Arctic hydrocarbon reserves, with high probability, will become a strategic resource base for circumpolar States (Russia, USA, Norway, Denmark, Canada) and will be involved in the world market

of hydrocarbons. The question remains about the role in this process other influential countries far from the Arctic coast: Western Europe, Japan, China and India - the world's major energy consumers. (By the way, given the long-standing and sustained interest of Chinese companies in offshore projects Beijing granted observer status in the Arctic Council, which allows him to influence policy in the circumpolar region rich in minerals).

The role of the Arctic in global positioning global, continental and regional powers is one of the most urgent problems of modernity in the formation of the "Novus ordo mundi" postmodern (New World Order). The situation is complicated by the fact that in conditions of emerging new coordinate post-Yalta-Potsdam system of international relations remains unclear legal status of the Arctic. The dominance of the sectoral approach, under which it is divided between adjacent circumpolar States and in which the North pole is the boundary of all interested States in the early twenty-first century has been widely criticized.. Yes, and the border of the Arctic is still not precisely defined – it is conditional. We photograph the telescope "Hubble" in high resolution remote galaxies that are millions of light years away, but have a very vague idea about the physical space of the Arctic, its geomorphology and Geocryology.

In this regard, the beginning of large-scale oil production in the Arctic borders on recklessness.

Paper Abstract: "Frozen Assets: Moving Arctic Investment from Resource Extraction to Human Development"

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Climate change and socio---economic shifts present Arctic policymakers and residents with the opportunity to sustainably reinvent circumpolar development for the 21st Century. This paper will offer an analysis of that opportunity in the context of Alaska ahead of the US Arctic Council Chairmanship. It will argue that the prospect of stranded assets in oil and gas provide a chance to redefine how America conceptualizes, and realizes, Arctic investment – a chance to turn economic growth into sustainable human development.

First, this research aims to identify and analyze the prospects for stranded assets in oil and gas development in Alaska's Arctic region. The impetus for such an analysis will be rooted in path dependence theory, recognition of the significant amount of capital already invested in Arctic hydrocarbon development and its effects on current action. It is based on a growing body of scholastic literature in the field of Arctic resource development, which suggests that the variability in the lifecycle of greenhouse gas emissions associated with different global petroleum resources is greater than traditionally assumed. With this theoretical framework, part one of the paper will examine the potential triggers – both proximate and

systemic – of asset stranding in Alaska's Arctic hydrocarbon resources. It will consider (i) the recent decline in global oil prices; (ii) the ecological impacts of climate change on Arctic landscapes; and (iii) extant or anticipated regulatory action on climate change, including those that would impinge significantly upon concomitant fossil fuel infrastructure development. Such regulatory action will be inclusive of environmental directives like President Obama's recent executive proposal for the allotment of more designated wilderness in the Arctic National Wildlife Refuge. These risks will be considered from the perspective of the American federal government's Arctic investment, which has been given more attention as the US Arctic Council Chairmanship tenure begins in April 2015.

The paper will then turn to examine the socioeconomic effects of asset stranding for communities in Alaska. Using existing data on declining petroleum production, it will evaluate the consequences of stranded oil assets for the state economy, budget, and various public services like education and healthcare. This section will focus on the repercussions of a projected $3.5 billion shortfall in state spending for 2015 due to low oil revenue as a reflection of the potential economic repercussions of stranded oil assets in the decades to come.

Part three of the paper will contend that stranded oil assets provide an opportunity for Alaska to sustainably invest in other sources of value creation in the North. Rather than declining oil production and the potential for stranded petroleum assets being a crisis for Alaska, this paper will argue that, through the upcoming US Chairmanship, the American government can refocus circumpolar investment towards sustainable economic diversification and human---centric infrastructure. Through Nordic case studies of strategies for and investment in the circumpolar north, like Innovation Norway, the research will explore the utility of different policies that promote diversification to improve Alaska's economic performance and, in turn, its social wellbeing. This section will focus on the opportunities of urbanization for policies and investment that promote sustainable entrepreneurship and economic ingenuity.

Human development ultimately rests on the provision of choices. Extractive industries do not foster an environment for local residents to develop their full potential and lead productive, creative lives once the wells dry up. While path dependence theory indicates that the US government and Alaska have a limited number of choices today due to past investment in petroleum, it still has the option to create new, non---resource based value in the North by supporting sustainable economic development like innovation and entrepreneurship. As Alaska may face a quicker---than---expected transition to a less oil dependent economy, this research provides a valuable analysis of the opportunities stranded assets in Arctic petroleum development present for more sustainable investments in human development

Examining sustainable communities through vocational education and training partnership programs in the Canadian North

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This paper examines vocational education and training (VET) partnership programs that have been developed in the Arctic and sub-Arctic regions of Canada. These private-public partnerships are often brokered between non-renewable resource extractive industries and various levels of state and aboriginal

governments through what is termed Impact and Benefit Agreements (IBAs). IBAs constitute de facto, quasi-legal contractual arrangements that do not fall under the purview of the state, and are designed to establish formal relationships between mining companies and local indigenous communities (Caine and Krogman 2010; Sosa and Keenan 2001). Ostensibly, IBAs address the adverse effects of commercial mining activities on local communities and their environments, and ensure that communities receive benefits from the development. Employment opportunities are usually a central focus of IBAs, and include provisions for preferential hiring policies, flexible work schedules, and training and apprenticeship programs (Cameron and Levitan 2014). Training programs may be either the sole responsibility of the mining company, or developed in partnership with government and training institutions, and include government funds (Kennett 1999). It is perceived that these provisions can assist a community in meeting short-term and often urgent needs to fund services such as housing, health, and education, as well as providing a degree of autonomy from the state in deriving income separately from mines (O'Faircheallaigh 2008).

Despite representing common practice since the 1970s, there is little analysis of the factors that determine the success or failure of IBAs, the extent to which they have been enforced, or the effects these agreements have on other options and strategies available to indigenous groups (O'Faircheallaigh 2008; Sosa and Keenan 2001). Using a political economy approach, and drawing from research on VET partnership programs, I examine the degree to which programs emerging out of IBAs have the capacity to either promote or undermine notions of sustainability. Key questions this paper considers include: 1) How do new resource governance regimes impact sustainable economies and communities, as measured by long-term employment outcomes and community participation in decision-making?; 2) How have IBAs impacted the provision for vocational education and training, and more generally the state provision for education?; and, 3) What are some of the best practices that can be shared between communities with respect to establishing sustainable employment programs? The intention of raising these questions is to contribute further understanding concerning the central question: "Can, should, and will resource-based development be sustainable?"

I begin by examining the history of vocational education programs in the Canadian North, followed by policy changes that have resulted in agreements being channelled through the private-public partnership approach as a means of promoting social and economic development in northern indigenous communities. This analysis includes examining the settlement of land claims and the concomitant restructuring of resource governance regimes emerging from the brokerage of these settlements.

From this context, I present doctoral research findings from case site analysis of an industry-funded training program in northern Alberta, and a federally-funded program in the Beaufort Delta region of the Northwest Territories. This longitudinal research includes extensive interviews conducted with training participants and program stakeholders, and occurred over a year while participants were being trained and later on when they were in the world of work (Hodgkins, 2013). In addition to these findings, I also share initial thoughts on my present project that examines training programs for local communities impacted by mining developments in Baffin Island, Nunavut, and Labrador, Newfoundland.

Sociocultural potential of glacier landscapes of Near-Baikal mountains

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Today, the recreational resource of the North and the hard-to-reach areas develops by active tourism. People are not more interested to just view the nature objects, but they want to footprint on it, touch the Nature, and participate in ascensions and expeditions, particular in hard-to-reach places.

Hard-to-reach areas are areas where transport is trouble or absent. Nowadays, the category of hard-to-reach areas decreases due to technical progress. Practically, it is possible to get the any geographical object at the presence of one's wishes and the funds. However, there are categories of the geographical systems, in which tourist can't visit without the special transport schemes and professional level of preparation. It is feasible to visit these objects on foot. For example, these are a swamp, caves, and mountains.

Hard-to-reach areas in the Near-Baikal are generally presented by mountain areas: the Kodar ridge, the Baikalskiy and the Barguzinskiy ridges, and the Eastern Sayan.

More than the half of these glaciers has been never visited by researchers. It is especially related to the main glaciers of the Barguzinskiy ridge (the most hard-to-reach mountain body from listed above). There is no data about their visit by tourists also.

Glacier's geosystems reflect local impact on environmental as well as global climate changes.

The tendency of thickness loss while little retreating is referred to general features and dynamics of the all listed plots of glacier's. It was observed a cold spell in the last decade. After inertial period the glaciers will accumulate of material. It begins the creation of more interesting and unstudied landscape forms and phenomena in real time.

South part of Near-Baikal mountains enters in Altay-Sayans ecoregion in the "Global-200" system, including territories which are the traditional places of inhabitance and economic activity of nations of Tofa, Toju, Duha and Soyots of Mongolia and Russia. All Near-Baikal territories with modern glaciations are conservation areas of different ranks.

People, who interested active cognitive tourism in these areas should to do it that way:

- Ecological volunteer groups
- Self development of the plan and route, it can be with local guide consultation
- Accession to athletic performance group
- Joining to science expedition

Science expedition in hard-to-reach areas are the most balanced ways in "cognitive-extreme". As one of potential perspective direction of active-cognitive tourism it can be chosen the Near-Baikal Mountains with modern glaciations. It is unique factor for sharp continental climate. More and more sport and scientific expeditions perform annually in these areas.

Significance of the glaciers as sustainment hydrological factors rises. Little glaciers of Eastern Sayan on the board Russia and Mongolia play the role of the climate indicators and the touristic objects. Glaciers of Mongolian Altay on the board with China supply the watersheds and perform life function for population.

Global climate changes bring about the aridization of river watersheds, which are generally fed up by big glacier source.

Culture and historical features of the region are also interesting. It was possible to cultivate the reindeers in steppe south slopes and taiga north slopes. Different native peoples often migrated for stock raising and hunting.

In addition, the unique life echoes of ice-snow systems are presented in these areas: moraines, troges, glaciers lakes, cirques, ice blisters, and icings and besides the virgin nature and the crystal clear water. It is the highest esthetic value of these landscapes. And we should to see the nature systems changes in real time. Evidently, active tourism should be regulated by not only governmental structures, but scientific and educational organizations including collaboration with industrial companies, which operate in mountain areas with modern glaciations.

Resource extraction and infrastructural networks in the North of Irkutskaia oblast

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Sustainable development is a challenging task for planners and communities relied on resource extraction. In order to extract rich natural resources of Siberia the network of cities, roads and transportation hubs was built in its remote parts in the Soviet time. With significant amount of northern provision, wage benefits, and use of propaganda many young and active people were attracted to the North. After the collapse of Soviet system and subsequent out-migration construction of pipeline “East Siberia - Pacific ocean” in 2006-2009 was presented as an impetus for social and economic development of Siberia. Although current industrial development is mostly provided by commuting workers, as it was proposed by Hill and Gaddy (2003) and the recent strategies of economic development of Siberia. Such practice does not take into account neither the long history of inter-mix and mutual assimilation of indigenous peoples and “starozhils”, nor existing from the Soviet time urban infrastructure. Moreover, in case of Irkutskaia oblast and Republic of Sakha (Yakutiia) new private infrastructure is more in use.

Development and maintenance of urban infrastructure, its informational, waste, sewage, food and energy flows are becoming the main challenges for cities and especially in conditions of remoteness. Increasing complexity of informational systems and software requires recruitment of the specialists with higher qualification, who have higher demands on quality of life.

In order to achieve balance between social, economic, and environmental concerns the local communities might develop more advanced sociotechnical networks. According to ANT-theory these networks might include practices, things, technologies, and animals (Latour, 2012). The authors will discuss additional efforts and technologies that are needed to achieve sustainability in these remote regions? The theoretical framework is provided by B. Latour (Latour, 2005), S. Graham (Graham, 2000), and C. Humphrey (Humphrey, 2005).

Data gathered from participant observation and 16 interviews with local authorities, representatives of small

businesses, and ordinary people are supplemented with quantitative information from censuses, community and government records.

Infrastructural networks of extractive companies now are catching up with highly developed parts of the world offering previously assumed public goods – roads, airports, electricity and gas services, and telecommunication links. It is interesting that in remote areas of Siberia such process is outpacing more economically developed and populated areas of the southern parts of Russia. Especially it is evident in case of roads and telephone connection.

AT the same time irregularity and limited access of local dwellers to public transportation lead to occupation of houses in the margins of the cities, where less resources are needed for housing and the prices for apartments are lower than in the central parts. Staying for several weeks with relatives or former neighbors they reproduce the rural ways of life (use of water from the rivers, absence of sewers, food from village or forest).

Such practices change the notion of urbanism in different directions: in man camps and among tourists in Irkutsk region urban practices spread beyond the city limits, while in the outskirts of small towns rural practices penetrate in the cities. As a result, the prospects of development of a new approach to the notion of urban sustainability are needed to be discussed.

Aggregate sustainability in Arctic and Sub-Arctic: challenges and possibilities

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The Arctic is on the rise. The Arctic is becoming important by its ever-growing impact on global political and economic configuration. The continuous melting of the Arctic ice sheets has effectively placed the issues of the High North on the global agenda. The transformation of the Arctic's ecosystem has created substantial concerns over the implications of climate change on the Arctic ecosystems. In the meantime, new windows of opportunities are opening. The Arctic is becoming increasingly accessible, especially for transportation and exploration of natural resources (Beckmann-Dierkes et al. 2014).

It has been identified that access to materials will be one of the major global drivers in the years to come. This will also apply to natural aggregates – sand, gravel and crushed stone – which are essential resources for use in construction and by far the most used materials worldwide, second only to water (Langer et al. 2004). Despite the fact that natural aggregate is widely distributed throughout the world, it is not necessarily available for use. For example, some areas do not have sand or gravel, and in other areas, natural aggregate does not meet the quality requirements (Langer et al. 2004; Langer, 2009). In addition to the harsh environment in Arctic and sub-Arctic areas, the lack of sufficient local building and road material poses another challenge to the building and construction sector. Innovative methods which enable the construction to use local material for building have to be developed. Since the Arctic environment is extremely sensitive, all "imported" material must be chosen carefully and tested before using. Detailed knowledge about the environment, the ecologically friendly handling of natural resources, and sustainable building is required.

Presently, some 90% of the overall aggregates production in Europe comes from naturally occurring

resources, in quarries and pits. The consumption of sand/gravel as construction aggregates accelerated a generation ago, at the beginning of the post-war era of major construction and infrastructure projects. In Norway the construction of large offshore structures, bridges, dams and office buildings in concrete resulted in a rapid reduction of the glaciofluvial sand/gravel deposits.

With natural (fluvial, glaciofluvial) sand/gravel resources being rapidly depleted in many countries, the last decade has seen a significant trend towards using more alternative materials for construction purpose. In Norway the development and implementation of crushed aggregate technology has been the most important way to get around the problem with increased resource scarcity. Today Norway is one the European countries with the highest percentage of crushed/manufactured aggregates.

Aggregates from these sources were also to a large degree exported for use in European infrastructure projects. As a result of this it has been estimated that as much as 80% of all Norwegian, glaciofluvial sand/gravel ever extracted from nature may have been taken out during the last generation (Danielsen & Kuznetsova, 2015). Depletion of resources, new alternative materials, environmental impacts, land-use and neighbour conflicts, and transport pollution all call for a holistic concept for production and use, and tools for choosing and prioritizing, which incorporate many

more factors and issues than simply the mechanical criteria that normally alone rule the materials standards.

Future standards and specifications should be based on a broad sustainability valuation, taking into account – along with the traditional technical criteria – economic considerations as well as environmental impact and resource management.

Institutional factors of community resilience to natural resource development in the Timan-Pechora province

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The Russian North has always been recognized as important target for economic growth, especially for the development of natural resources. Such trends have created short- and long-term opportunities and risks for local communities. Although oil, gas and coal development potentially strengthens local economies with income and jobs, the industry may pose direct and indirect environmental risks, lead to land transformation and create resource and land use issues. All these trends represent significant sources of uncertainty for communities who develop strategies to cope with and adapt to changing conditions and sustain their livelihoods in order to stay resilient to natural resource development. Literature within sociology, anthropology, geography and institutional theory currently supports that institutions remain important for the analysis as critical sources of flexibility and resilience for groups grappling with change. Gómez (2013) suggests that analysis can be implemented from understanding of institutions as the agents in charge of creating and processing information. Further, Cheong (2012) argues that dependence on the knowledge about a risk and possible adaptation strategies shapes resilience of society. As such, the positive and negative effects of dependence are important to assess and understand as well as the community capacity to absorb resources and information. Referring to the research, a better understanding can be achieved from

identifying where and how the truth of a threat and risk is produced, and how the knowledge of available sources of adaptation is constructed.

Case study on community response to oil development in Timan-Pechora province informs the analysis. The province occupies a vast territory of the Republic of Komi and the Nenets Autonomous District of Arkhangelsk region and contains reserves located in relatively shallow and a well-studied geological complex. More than 70 oil and gas fields are operating in the region constituting the third most important oil-producing region in Russia (Kuemmerle et al., 2014).

A mix of ethnicities and livelihoods can be observed in the region. They exercise a mixed economy combining reindeer herding with small-scale farming, gathering and fishing. Others are occupied in resource extraction, construction, public services, and recreational activities. Well-being of local communities is closely linked to the natural environment since their livelihoods rely heavily on the quality of water and land.

Studies show that communities in Timan-Pechora province face increased stresses from cumulative effects of natural resource development. The socio-ecological landscape displays signs of degradation, such as heavy contamination of soil and rivers (AMAP, 2011). Several researchers classified the region as severely damaged and certain areas have been described as 'industrial deserts' (Forbes, Ebersole, & Strandberg, 2001; Kuemmerle et al., 2014). Oil spills in the region involves the release of the unknown levels of oil into the land and water, causing uncertain amounts of environmental damage. The rapid development of industries potentially lead to oil spills found in new areas and of larger scales (Habeck, 2005; Hoogensen et al., 2009). The Pechora region may be also affected by climate change since general models predict temperature increases at high latitudes (IPCC, 2014). Warming may accelerate permafrost collapse and may cause rupture of oil pipelines increasing risks of environmental pollution (Walker et al., 2006). Moreover, there are tension between ethnical groups for indigenous versus nonindigenous resource rights and land use (Freeman, 2000).

Given these multiple stresses what avenues exist for community members and decision makers to cope with and adapt to consequences of changing community landscape? What are the formal and informal means and critical channels of resilience in circumpolar communities affected by natural resource development in Russian north? The specific focus is on how formal and informal rules create and distribute information about a threat and how ontological knowledge, ecological and livelihoods uncertainties stimulate or constrain institutional response. The research draw on the literature on the risk society and concepts of resilience science. The paper is drawn from the author's personal experience and fieldwork in the Timan-Pechora Province and based on interviews with local and regional NGOs leaders, authorities and representatives of local peoples, policy analysis, media analysis, archival research and observations. The primary findings illustrate local proactive risk management strategies that build on community members rationalities on the trade-offs or risks and opportunities. Such resilience building strategies are important to understand since following trends of globalization, geopolitics and climate change, Russia has been planning to develop northern resources further and more communities may be affected (IPCC, 2014; Kuemmerle et al., 2014; Walker, Crittenden, Young, & Prystina, 2006).

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Zoning efforts for coexistence of oil exploration and indigenous activities in the Numto nature park in the Russian Arctic: Planning for sustainability versus vested interests

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Creation of protected areas in the Arctic has been an important element of protection of valuable ecological systems. It is particularly important when nature conservation priorities match the efforts for preservation of indigenous people lifestyles. Combination of both is problematic when industrial activities, such as oil extraction, arrive to such areas. This paper presents the case of the Numto nature park in the oil-rich Russian Khanty-Mansi Autonomous Okrug situated in the subarctic climate. The park was created in the late 1990s to preserve the unique region with high ecological, historical and ethnographic value, as well as to protect the habitat and reindeer herding activities of indigenous Khanty and forest Nenets peoples. Shortly after the creation of the park different claims were put on various use of nature area. Original zoning of the park has

been challenged by the ongoing operations of the oil company, Surgutneftegas, that has undertaken attempts to rezone the park areas in order to accommodate expanding oil actives. The most recent zoning attempt endorsed by the oil company in 2014-2015 has involved researchers from different Russian regions that introduced "wise use" principle pioneered by the Ramsar Convention. Next to valuation and mapping of ecologically valuable areas by natural scientists, social scientists were involved for charting socio-economic and cultural properties of the lands used by the indigenous population. The case employs informational governance framework to analyse how and to what extent zoning, as an informational tool, accommodates different priorities and claims. Through the literature analysis, interviews with the stakeholders and surveys, this study concludes that zoning is used to legitimize practices driven by the vested interests. It does not necessarily lead to more sustainability, but rather serves as an additional leverage for powerful actors to exercise authority over other engaged stakeholders. However, inclusion of wide variety of parties and application of the best internationally accepted standards and practices can counterbalance the dominant players vis-à-vis less-powerful actors on the way to finding the middle ground.

The development of railroad infrastructure in the Russian North (Sakha Republic): ecology, symbolics and sociality

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The Ph.D. project explores the (unintended) social, political, economic and ecological transformations in connection to the current realization of the Amur-Yakutsk railroad in Central Yakutia (Sakha Republic). My research is focusing on the actual finishing point of the railroad, which is the village Nizhniy Bestyakh on the Lena River on the opposite side of Yakutsk. My project is engaging in the daily life of the community in Nizhniy Bestyakh, where people face tremendous changes as a consequence of the railroad development. In my paper at the Arctic FROST workshop I will discuss the results of my first field stay in Nizhniy Bestyakh in spring 2015.

In the next 1, 5 years my research will explore the manifold ways individuals experience the current situation triggered by this state-planned infrastructural development in Nizhniy Bestyakh. Furthermore, I will analyze how people express their relations to the state and the changing environment. The question of 'sustainability' and 'sustainable development' is crucial for my project and considers cultural, ecological, social and economic sustainability in the region.

While extensive resource extraction and the development of industrial zones have long shaped the reality of Yakutia´s south, Central Yakutia – the homeland of the Sakha (Yakut) nation – has so far not been a locality of large-scale industrial activities. This is about to change now due to the railroad connection. The installation of the "zolotoe zveno", the golden link in 2011 and the arrival of the first freight train in 2014 in Nizhniy Bestyakh were significant steps towards the start of the exploitation of the natural resources in Central Yakutia. Nizhniy Bestyakh plays an outstanding role for the industrial and economic development of the Sakha Republic (Yakutia) and the Russian Federation.

Currently, Nizhniy Bestyakh has got 3600 inhabitants and is very multicultural. The village is situated at the junction of roads, on the railroad and on the Lena River. It serves as a hub town and logistical heart, not

only for the region, but for the whole Russian Far East. Although it is still a small village, the symbolic, political and infrastructural significance of the village is clear to everyone. The infrastructural developments in the regions have led to cultural and spatial competitions: recently the Sakha have opened a cultural center on the main junction. Nizhniy Bestykah has never had an orthodox church, at the moment one is under construction, next to the Sakha cultural center.

Infrastructures are the built and implemented reality of state practices and political decisions, which result in an everyday condition. My project does not only study the railroad development itself, but especially engages in the economic, ecological and social situation that it creates. The realization of infrastructure is highly emotional and is accompanied by hopes, doubts and fears. Furthermore, the railroad development serves as a trigger for further infrastructural implementations: large logistical depots were created and currently the planned construction of three chemical factories near Nizhniy Bestyakh attracts a lot of attention and mistrust against the state and the republic. Many people have protested against the planned chemical factories, because they worry about their kid´s health, ecological destruction and pollution. So far, the region was only marked by small-scale agricultural activities and people have lived in a fairly pure, industry-free environment. Hunting and gathering in the taiga and fishing on the Lena River are very popular and play a great role in the local identity.

On the one hand, many people seem to support the idea of the development of infrastructures for people, meaning all the positive effects of infrastructural development, including a decrease of prices and the creation of jobs as well as the soon-to-be passenger rail connection to Moscow. On the other hand, infrastructures for the state, meaning large scale industrial developments connected to environmental destruction and pollution as well as the in-migration of workers (priezhie), are rejected by many community members. These two infrastructural categories seem to be widely incongruent.

My methods include participant observation, semi-structured narrative interviews, expert interviews, media and archival research as well as informal talks with community members.

My research will provide a detailed ethnography of the implementation of a railroad in the central part of the Sakha Republic (Yakutia). My goal is to understand the effects of massive state planned infrastructural projects on small communities. My research will contribute to the anthropological literature of the interface of infrastructures and communities.

Resource-based development and the socio-economic sustainability of resource communities of the Murmansk region

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Natural resource extraction forms the backbone of the Russian economy. The role of the natural resources is being emphasized in local and regional economies in the Russian North where they play a key role in the economic development as their extraction characterizes the majority of regions and communities in the Russian North. However, the resource-based development of the Russian North, which has reached its current extent majorly during the centrally-led industrial policies of the Soviet era, is unsustainable in the market economy where it is vulnerable to external forces, such as global volatilities of resource prices.

Hence, in the changed socio-economic environment after the collapse of the Soviet Union, resource peripheries and single-industry communities of the Russian North have faced significant socio-economic problems. This has required them to engage in restructuring and economic diversification in their search for sustainable local development because natural resource extraction cannot alone promote the long-term socio-economic sustainability of resource peripheries.

My paper is based on my recently published articles related to problematics of resource-based development in the resource communities of the Russian Arctic. I approach sustainable socio-economic development by the following criteria: (1) the utilization of local resources is based on long-term planning and diverse visions of the local economic potential; (2) the utilization of local natural resources do not damage the long-term potential of local alternative industries and local living environment; and (3) the utilization of local resources respects the social aspects of local sustainable development. In my paper I analyse the challenges of economic diversification in three arctic single-industry resource communities of the Murmansk region; Kovdor, Kirovsk and Revda, whose post-Soviet economic development has followed different historical development paths. Tourism has developed in Kirovsk alongside the mining industry since the 1930s, while mining has been the only significant industry in Revda and Kovdor. However, recently both Kirovsk and Revda have adopted tourism as the main target of their economic diversification. For theoretical approach of the unsustainability of the local economic development I have developed a local resource curse theory that is based on the basic idea that there are negative consequences to sustainable socio-economic development as a result of the resource curse. The theory targets to explain how the current use of natural resources presents obstacles to the sustainable socio-economic development of resource communities. The local resource curse theory approaches the unsustainability of local resource-based development using eight elements, which define the structural and attitudinal consequences of resource-based development for resource communities. Moreover, in my paper I discuss the unsustainability of local development from viewpoint of concepts of paternalism and path-dependency. In addition, in my paper I reflect the findings of my previous papers with a new theoretic model that shows the development path and position of the resource communities from Soviet era to present. The theoretical framework shows the structural, institutional, economic, positional and cognitive difficulties for sustainable economic development of Russian resource communities.

The empirical data of the study was collected in 2010–2012 in fieldworks in the Murmansk region. It consists of survey in Kovdor, focus group interviews and semi-structured interviews with town, region and enterprise representatives in Kovdor, Kirovsk, Revda and Murmansk. Moreover, newspaper articles from regional and local newspapers concerning the diversification efforts of the three communities were used. Both interviews and articles were analyzed using qualitative methods while the Kovdor survey produced quantitative material.

The problems discussed in my paper are not specific in Arctic, but majorly specific for remote communities in general. In addition, some of the problems are specific for Russia in general. According to findings, the obstacles to economic diversification and sustainable socio-economic development are not only related to obvious issues, such as the lack of realistic alternatives, remoteness but also to deeper structural hindrances to the use of local potential and human capital to create diversified local economies in the Russian Arctic. The study demonstrates that structural and attitudinal consequences of resource-based development are important for understanding about the negative consequences of resource-based development for sustainable long-term local socio-economic development.

Past Experiences Forming Present Interactions: Indigenous Peoples and Extractive Industry Development in the North-West of Russia

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The objective of my research project is to study how traditional historical connections of indigenous peoples to extractive industries operate in contemporary negotiations for natural resources in the Russian North. I will explore comparatively two groups - Sami of the Murmansk Region and Vepses of the Republic of Karelia. These two cases, despite the small number of actors involved and their close geographical location, represent different scenarios of indigenous interactions with extractive industries.

Indigenous peoples are in most cases defined as groups possessing strong ties with their territories and environments. However, when it comes to landscape modification or natural resources extraction, their voices are rarely heard. They are not often incorporated into program and project design as it would mean a significant change in the existing frameworks and even foundational assumptions (Escobar 2008). However, it is difficult to challenge the current practices of extractive industry development on indigenous peoples' territories when in many cases indigenous communities are viewed within the dominant discourse of "traditional" versus "industrial", "indigenous economic activities" versus "mineral extraction", "indigenous person" versus "industrial worker" and so on. As the studies of Pringle (1997), Cameron (2011), Cooper (2011), Dudeck (2008), Bolotova (2012) show, these dichotomies could be rethought and re-analyzed. Indigenous groups may be involved into resource extraction in the past, industrial workers not only conquer nature but also feel attached to it, and reindeer herders may be employed by oil industry and become industrial workers.

Through the analysis of case studies I want to show the differences in indigenous perceptions of industry - not just as an alien force, but also as a source of positive changes for the local community, or even as a part of ethnic identity and a traditional occupation (especially in the case of Vepses, whom I see as an example of an indigenous minority possessing "mineral identity").

The projects aims to tackle the following questions:

1) How have historical and contemporary encounters with mining industry transformed the interactions between indigenous communities and landscape in Karelia and the Murmansk region?

2) How the historical experiences of indigenous peoples with mineral extraction shape their current perceptions of extractive businesses in the regions of study?

My presentation at Arctic FROST workshop will discuss the case study of Vepses, a small Finno-Ugrian minority residing in the Republic of Karelia, North-West of Russia. The Vepses are an example of an indigenous people possessing a "mineral identity". Already in the 18th century they were famous as skilled stoneworkers. Two extremely rare minerals, raspberry quartzite and gabbro-diabase, that could be found in Karelia, have been used in the decoration of several Russian cities. Mining has been considered a traditional Vepsian occupation, a source of pride and a part of their daily life.

In the post-Soviet time the mining deposits of quartzite and gabbro-diabase were partly closed, partly sold to private non-local companies. Many local people see it as the loss of the traditional connection with their land and environment. This situation brings a whole range of themes related to indigenous "mineral identity" and the place of industry in the local environment of indigenous communities. Through the

analysis of the case study I will show the differences in indigenous perceptions of industry - not just as an alien force, but also as a source of positive changes for the local community, or even as a part of ethnic identity and a traditional occupation.

Arctic hydrocarbon resources: Curse or blessing for societal security in the Arctic?

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In the last decade, the Arctic appeared on the international agenda, mainly due the huge amounts of natural resources that are believed to be found in the region. In particular, the melting sea ice brought the estimated vast hydrocarbon resources into the focus of international attention. While utilizing these resources creates the threat of major environmental harms, the main policy instruments in the Arctic highlight its economic potentials, and argue for an acceleration of human development in the region through the extraction of these resources. Although the current high oil prices have lessened this attention to some extent, there is good reason to believe that hydrocarbon development in the Arctic will continue to play a prominent part in Arctic politics. From a policy perspective, the Arctic Council is perceived as the main intergovernmental forum in the region. In recent years the Council has clearly shifted its focus from environmental protection to a human centered approach, in order to satisfy a 'sustainable development' which focuses on economic aspects. The extraction of hydrocarbon resources has been identified as an important factor that could contribute to such an aspired development. Also the Council's member states claimed in their respective national Arctic strategies that human development, based on an economization of the region and on expanding natural resource extraction, is of prioritized consideration regarding Arctic policies.

Despite the severe environmental impacts hydrocarbon extraction may cause, the Arctic states are willing to take the risks to extract these resources, while some efforts are made to reduce the most harmful impacts of such a development. Thus it is important to analyze why the states are willing to accept the associated risks rather than considering alternative ways of development, based on strong communities and on renewable resources: Fossil fuels are not only the driver of engines, but much more the driver of the capitalistic society. Only by utilizing dense energy carriers, such as fossil resources or by utilizing nuclear power, the productivity of industrial manufacturing can be high enough for stimulating the big growth rates that are inherent to the capitalistic ideology. Moreover, our society has become addicted to fossil resources and the so called 'developed world' has established an industrial-fossil way of life. Since conventional hydrocarbon resources are getting scarce, new frontiers need to be explored, whereas the Arctic has been identified as one of them.

However, what often is left out in discussions about natural resource management in the Arctic is the interplay between the global and the local as it is related to power. The currently ongoing integration of the Arctic's communities into the global markets is challenging the societal security of the Arctic's inhabitants in many ways, which have however a long history of sustainably inhabiting the North. The fossil-industrial way of life, however, appears to be a major threat to maintaining societal security in the Arctic. On the other hand, the predominant global elites depend on a continuation of the prevailing capitalistic system in order to maintain their power, which goes along with an environmentally harmful and non-sustainable way of life, based on non-renewable resources. While a disruption of the supply with fossil resources would be

detrimental to the interests of the global elites, it may support empowerment and strengthening of communities in the Arctic, as well as in many other regions in this world.

This paper follows the hypothesis, that the interest of the Arctic states in developing the assumed vast amounts of hydrocarbon resources in the Arctic are rather an attempt in prevailing the predominant capitalist and economy centered ideology than on developing a sustainable society in the Arctic. Moreover, discussions about economic aspects versus environmental impacts in the Arctic region often leave out the important question, if the supposed mass scale resource extraction is a project in order to develop the Arctic region or rather to maintain prevailing global power relations. Following approaches from the school of political ecology, this paper argues that Arctic hydrocarbon development is a capitalist project favoring predominant elites in the South and is detrimental to a sustainable future of the Arctic region.