Arctic-FROST ANNUAL MEETING 2014

"Sustainability and Sustainable Development in the Arctic: Meanings and Means"

SEPTEMBER 18-19, 2014

UAA Consortium Library Room 307, Anchorage Alaska

Prepared by Andrey N. Petrov

Cedar Falls, 2014

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
Arctic-FROST Principal Investigator
Cedar Falls, Iowa, USA

NSF Arctic-FROST Research Network: First Year in Review

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 Social and Environmental Systems Research (ARCSES) center.

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 wellbeing 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.

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 approximately 250 members from the 20 countries including all Arctic jurisdictions with 55% coming 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; coordination and sponsorship of side meetings on different aspects of sustainability at the April Association of American Geographers meeting in Tampa, Florida; convening of sessions, a plenary panel, and a networking event at the International Congress of Arctic Social Sciences in Prince George, British Columbia, Canada in late May; co-sponsored sessions and round table on Arctic sustainability at the European Regional Sciences Association in St. Petersburg, Russia in August. 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. Hosted by the University of Alaska Anchorage the meeting featured 35 presenters from USA, Canada, Russia, Austria, Germany, Finland, and Australia, including 12 early career scholars, who also participated in the follow-up workshop. Future meetings will take

place in various locations across the Arctic. Community workshops will be organized in Alaska and northern Russia.

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 will 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.

Arctic-FROST actively collaborates 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.

Information on how to become an Arctic-FROST member is available at www.uni.edu/arctic/frost.

For more information about Arctic-FROST, contact Andrey Petrov (andrey.petrov@uni.edu).

Arctic-FROST Annual Meeting participants pose with Alaska Lt. Governor Mead Treadwell (far right), Anchorage, September 19th 2014

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Arctic-FROST: Arctic FRontiers Of SusTainability: Resources, Societies, Environments and Development in the Changing North is a new NSF-funded international interdisciplinary collaborative network that teams together environmental and social scientists, local educators and community members from all circumpolar countries and beyond to enable and mobilize research on sustainable Arctic development, specifically aimed at improving health, human development and well-being of Arctic communities while conserving ecosystem structures, functions and resources under changing climate conditions. This is a major initiative that builds on IPY knowledge base in order to shape the future of sustainability science in the Arctic.

Over the next five years Arctic-FROST will fund multiple meetings and workshops on various subjects pertaining to sustainability and sustainable development in the Arctic**. Now we invite everyone with academic or practical interests in these areas to become Arctic-FROST members and join our community. Arctic-FROST membership is free and open for all.**

Membership benefits:

- Opportunity to connect to dozens of researchers in the network and receive interdisciplinary and international collaboration experience.
- Eligibility for funding to participate in Arctic-FROST activities and events.
- Access to special workshops and funding for Early Career Scholars.
- Ability to receive members-only research updates, announcements, teaching materials, calls for papers and proposals and other network-related information.
- Priority in submission of papers and abstracts for Arctic-FROST sponsored publications and activities.

Please, register at www.uni.edu/arctic/frost

Please, direct your questions to Andrey N. Petrov, Arctic-FROST Director at andrey.petrov@uni.edu

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"Sustainability and Sustainable Development in the Arctic: Meanings and Means"

SEPTEMBER 18-19, 2014
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September 18th
Arctic Sustainabilities in the Global Context

8:00-8:30 Registration

8:30-9:15 **Session 1.1 Opening and Introductions**
Chair: Diane Hirshberg (UAA, USA)
George Kamberov, Associate Vice Provost for Research, UAA
Fran Ulmer, Chair, U.S. Arctic Research Commission
Andrey Petrov, Arctic-FROST PI

9:30-10:15 **Plenary I: Global sustainability science and the Arctic**
Chair: Jessica Graybill
Speaker: Shauna BurnSilver (ASU, USA), Senior Sustainability Scientist, Julie Ann Wrigley Global Institute of Sustainability and Assistant Professor, School of Evolution and Social Change, Arizona State University
From East Africa to the Arctic: Comparative Analyses to Explore Sustainable Arctic Livelihoods

10:15-10:30 Coffee break

10:30-12:30 **Session 1.2: Unraveling Arctic Sustainabilities**

Chair: Lee Huskey

- Andrey Petrov (UNI, USA*) From Patchwork to Framework: the Contours of the Arctic Sustainability Science*
- Peter Schweitzer (University of Vienna, Austria) *Unraveling Meanings of Sustainability in the Arctic*
- Vera Metcalf (USA) (Eskimo Walrus Commission/ICC, USA) *Sustainable Development and Indigenous Peoples*
- Matthew Berman (UAA, USA) *Community Adaptive Capacity in the North*
- Jessica Graybill (Colgate U, USA) *The Role of Policy-making for Adaptive Capacity Building in the North*

12:30-2:00 Lunch

2:00-4:00 **Session 1.3 Unraveling Arctic Sustainabilities II**

Chair: Diane Hirshberg
Discussant: Peter Schweitzer

- Robin Bronen (UAF, USA) - *Climate-induced community relocation: community-based adaptation strategies to protect human rights and promote sustainable communities*
- Julia Loginova (U of Melbourne, Australia) - *Sustainability and livelihood in the Arctic*
- Dawn Magness (Kenai NWR, USA) - *Ecosystem Stewardship as a Framework for Federal Agencies to Manage Ecological Trajectories for Sustainability in the Kenai Peninsula, Alaska*
- Malgorzata Smieszek (U of Lapland, Finland) - *Sustainability in the Arctic in the Eyes Of Actors From Outside Of The Region*
- Katrin Keil - *Politics of Arctic sustainable development*
- Heather Gordon (U of Wisconsin, USA) - *Building Sustainable Research Relationships in the Arctic: Indigenous Communities and Scientists*

4:00-4:15 *Coffee break*

4:15-5:30 Session 1.4: Discussion
Participants: day's presenters, ECS, other Arctic-FROST members
Chair: Petrov & Graybill

6:00-6:30 Optional tour of the UAA prototype masonry heater designed for rural Alaska (and other remote northern communities)

7:00 *Dinner – Lucy's Fine Dining Room, Lucy Cuddy Hall, UAA*

September 19th
Regional Sustainabilities and Community Sustainable Development in the Arctic

9:00-10:30 **Session 2.1: Regional sustainabilities and communities I: Alaska**
Chair: Doug Causey

- Amy Lovecraft (UAF, USA) *Scenario Thinking in the Arctic: Uncertainty, Rapidity, Complexity*
- Chanda Meek (UAF, USA) *Mapping the Past for Sustainable Futures*
- Jeffrey Hoffman and Jennifer Brock (UAA, USA) *Sustainability in Practice: Masonry Heater Designed for Rural Alaska*

10:30-11:00 *Coffee break*

11-12:30 **Session 2.2: Regional sustainabilities and communities II: other Arctic regions**

Chair: Lee Huskey

- Chris Southcott (Lakehead U, Canada) *Resources and Sustainable Development in Canadian Arctic*
- Nikolay Shiklomanov (GWU, USA) *Arctic Cities and Climate Change: Stability of Russian Urban Infrastructure Built on Permafrost*
- Tatiana Vlasova (RAS, Russia) *Socially-oriented observations for Sustainability and Resilience Assessment in the Russian North: Benefits from Sustainability and Resilience Concepts Integration*
- Varvara Korkina (Polar Academy, Russia) *Sustainability and Indigenous Cultures in The Russian North*

12:30-2:00 *Lunch*

2:00-4:00 **Session 2.3 Regional sustainabilities and communities**
Chair: Timothy Heleniak
Discussant: Gail Fondahl

- Doug Cost (UAF, USA) *Deliberative Democracy and Scenarios Planning for the Future in Arctic Communities*
- Kim Jochum (UAF, USA) *Sustainability of human-wildlife systems in northern urbanizing regions*
- Rudolf Riedlsperger (Memorial U, Canada) *Sustainability in an Inuit context: An example from Nunatsiavut, northern Labrador*
- Colleen Strawhacker (U of Colorado, USA) *Advanced Cooperative Arctic Data and Information Service*
- Ryan Toohey (USGS, USA) *Using a participatory research model to develop climate adaptation strategies based on contaminant monitoring and Aboriginal Knowledge.*
- Adrienne Davidson (U of Toronto, Canada) *Beyond a Conventional Federalism: Dynamics of Governance and the Politics of Extractive Resource Development in Northern Canada and the United States*

4:00-4:15 *Coffee break*

4:15-5:00 **Plenary II: Sustainability and Resilience in the Arctic**
Chair: Andrey Petrov
Speaker: Gary Kofinas (UAF, USA), Professor of Resource Policy and Management: *Exploring the Relationship Between Resilience Thinking and Sustainable Development*

5:00-5:45 Session 2.4: Discussion
Chair: Petrov & Graybill

5:45-6:15 Wrap up
Participants: day's presenters, ECS, other Arctic-FROST members

AHDR II Sneak Preview Event

6:30-7:00 Reception

7:00-9:00 Welcome: Dr. Helena S. Wisniewski, Vice Provost for Research and Graduate Studies, UAA
Chair: Dr. Douglas Causey
Discussant: Lt. Gov. Mead Treadwell

- Gail Fondahl (UNBC) *Overview of AHDR II report*
- Peter Schweitzer (UAF) *Cultures and Identities*
- Lee Huskey (UAA) : *Economic Systems*
- Gary Kofinas (UAF) : *Resource Governance*
- Diane Hirshberg (UAA) and Andrey Petrov (UNI*) Education & Human Capital*

September 20th, 2014
Arctic-FROST Early Career Scholars Workshop
8 am-6:30 pm

Early Career Scholars and Mentors Match List

ECS name	Mentor	Topic
Bronen	Meek	Climate-induced community relocation: community-based adaptation strategies to protect human rights and promote sustainable communities
Cost	Fondahl	Deliberative Democracy and Scenarios Planning for the Future in Arctic Communities
Jochum	Graybill	Sustainability of human-wildlife systems in northern urbanizing regions
Loginova	Vlasova	Sustainability and livelihood in the Arctic
Magness	Kofinas	Ecosystem Stewardship as a Framework for Federal Agencies to Manage Ecological Trajectories for Sustainability in the Kenai Peninsula, Alaska
Davidson	Huskey	Beyond a Conventional Federalism: Dynamics of Governance and the Politics of Extractive Resource Development in Northern Canada and the United States
Riedlsperger	Schweitzer	'Sustainability' in an Inuit context: An example from Nunatsiavut, northern Labrador
Smieszek	Southcott	Sustainability in the Arctic in the Eyes if Actors from Outside the Region
Strawhacker	Heleniak	Advanced Cooperative Arctic Data and Information Service
Toohey	Hirshberg	Using a participatory research model to develop climate adaptation strategies based on contaminant monitoring and Aboriginal Knowledge.
Keil	Huskey	Politics of Arctic sustainable development
Gordon	Metcalf	Building Sustainable Research Relationships in the Arctic: Indigenous Communities and Scientists

Workshop Program

9 am-6:30 pm

9:00 Opening: (Re)-introduction and workplan

9:30-10:30 am "Authors meet the critics": Meetings with mentors=paper reviewers

10:30-11:00 Coffee break

11-12:30 Panel 1: Visions of Arctic sustainability science and community scholarship
Moderator: Gordon
Panelists: Gary Kofinas (prospects of Arctic sustainability science and emerging research needs), Fondahl (place of Arctic sustainability science among social sciences), Shiklomanov (place of Arctic sustainability science among natural sciences), Chris Southcott (Arctic sustainability sconce and northern communities)
This panel will focus on both summarizing the outcomes of the conference, discussion about the nature of sustainability science in the Arctic and its role in making Arctic communities sustainable.

12:30-2:00 Lunch

2:00-3:30 Panel 2: Arctic sustainability science as a career
Moderator: Smieszek
Panelists: Graybill (interdisciplinarity), Heleniak (publishing), Meek (post-PhD career management), Southcott & Schweitzer (getting funded)

3:30-4:15 Work in groups (Gordon, Smieszek)
Arctic-FROST's strategy to build new generation of Arctic sustainability scholars

4:15-4:30 Coffee break

4:30-6:00 Reports and reflections
Conference highlights (2 pager or 4-5 slides from each) – what are the most important things you learned at this meeting?

6:00-6:30 Wrap up

Q & A and Discussion

2:00-3:30 **Work in groups & reporting**:
Conference highlights (2 pager or 4-5 slides from each)

> *Q: what are the most important things you learned at this meeting? Further directions? Ideas?*

Arctic-FROST Steering Committee

Arctic-FROST Steering Committee	Institution, Country, and Bio
Andrey Petrov (PI) 	**Assoc. Prof., University of Northern Iowa, USA** Associate Professor of geography and geospatial technology. Directs the ARCSES Lab and the Program in Research and Outreach in Geography between Russia and the United States (PROGRUS) at the University of Northern Iowa in Cedar Falls, IA.
Jessica Graybill (Co-PI) 	**Assoc. Prof., Colgate University, USA** Associate Professor of various Human and Physical Geography courses including, former Soviet Union area studies, and Arctic area studies. Also the winner of a Science and Innovation Fulbright award.
Timothy Heleniak (Co-PI) 	**Research Prof., George Washington University, USA** Dr. Heleniak is a human geographer with regional expertise in Russia and other countries of the former Soviet Union and the Arctic.

Peter Schweitzer (Co-PI)

Prof., University of Vienna, AUSTRIA
Has taught social and cultural anthropology at universities in Alaska, Austria, and Russia. Has served as Director of Alaska EPSCoR (Experimental Program to Stimulate Competitive Research).

Gail Fondahl

Prof., University of Northern British Columbia, CANADA
Professor of Geography at the University of Northern British Columbia, and has served as Vice-President of Research there from 2008 to 2012. Focuses research on indigenous land rights and legal geography in the Russian North. Has also served as President of the International Arctic Social Sciences Association.

Diane Hirshberg

Local Organizer

Prof., University of Alaska, Anchorage, USA
Professor of Education Policy at the Institute of Social and Economic Research, part of the University of Alaska Anchorage, as well as the Director of the Center for Alaska Education Policy. Research has included effects of boarding schools on Alaska Native students, and turnover of Alaska's school teachers.

Lee Huskey

Prof. Emer., University of Alaska, Anchorage, USA

Economics professor, with courses including The Alaska Economy and Alaska Economic Issues. Has also been Co-Principal Investigator of two National Science Foundation funded projects, Migration in the Arctic and Understanding Migration in the Circumpolar North.

Joan Nymand Larsen

Prof., University of Akureyri, ICELAND

Professor, University of Akureyri; and senior scientist, Stefansson Artic Institute. Leads international indicators and quality-of-life projects – Arctic Social Indicators (ASI – I and II) and AHDR-II (Arctic Human Development Report: Regional Processes and Global Linkages).

Vera Metcalf

Director, Eskimo Walrus Commission/ Inuit Circumpolar Council, USA

Director of the Eskimo Walrus Commission (EWC), a Commissioner on US Arctic Research Commission, Advisory Panel member on North Pacific Research Board, a Steering Committee member on Alaska Center for Climate Assessment & Policy, and lastly, an ICC (Inuit Circumpolar Council) Executive Council Member for Alaska.

Rasmus Ole Rasmussen

Prof., Roskilde University, DENMARK
Senior Research Fellow, Nordregio, SWEDEN
Currently, a Senior Research Fellow at Nordregio (Nordic Centre for Spatial Development), as well as a geography professor at Roskilde University. Research includes focuses of regional development, GIS and Arctic and Northern regions.

Chris Southcott

Prof., Lakehead University, CANADA
Professor of sociology at Lakehead University and Yukon College. Currently, Leader of the UArctic's Knowledge and Dialogue programs. He is the Principal Investigator for the Resources and Sustainable Development in the Arctic (ReSDA) project.

Nikolay Shiklomanov

Assoc. Prof., George Washington University, USA
Associate Professor of Geography at the George Washington University. Research interests include Arctic environment, development, and climate change.

Tatiana Vlasova

Senior Scientist, Russian Academy of Sciences, RUSSIA

Researcher at the Institute of Geography, RAS, in Russia, and has served as co-chair to the International Geographical Union Cold Regions Environment.

Ann Crawford

Administrative Assistant

University of Northern Iowa

USA

Selected Abstracts

Advanced Cooperative Arctic Data and Information Service
Coleen Strawhacker, University of Colorado, Boulder, USA

Scientists and policymakers are realizing the importance of social science research to fully understand how the rapid environmental and social changes in the Arctic will affect human populations living in the Artic and beyond. To document and analyze these changes, millions of dollars are invested in scientific research, including in the social sciences, on the changing Arctic every year, and with that investment, scientists and policymakers have begun stressing the importance of preserving and curating these collected data for future research and analysis. These already collected datasets can be used to perform new and creative analyses and visualizations at a number of different scales, but data can be quickly lost due to a variety of factors, including the inability to use outdated file formats, the failure of the hard drive or server where the data are stored, or the loss of information concerning data collection and methodology. This loss compromises the ability to perform research on sustainability in the Arctic at different spatial and temporal scales. It is clear that maintaining, preserving, and managing these data effectively is essential to understand the long-term sustainability of the Arctic.

To assist researchers with this massive task, organizations specializing in data management, like the National Snow and Ice Data Center at the University of Colorado, are emerging around the world. These data centers are frequently supported by public funds, are designed to create reliable ways to preserve and curate data for the long-term, and have made significant advances in how to manage data in the face of rapidly changing technological standards. Many of these centers have developed strong cyberinfrastructure systems, including the Advanced Cooperative Arctic Data and Information Service (ACADIS), to manage and curate data from the physical sciences, such as sea ice thickness, permafrost, biodiversity, and marine resources. With the increased recognition of the importance of social science data, however, these data centers face numerous challenges and obstacles to effectively managing and curating data from the social sciences, including traditional and local knowledge from the Arctic. Data from the social sciences, for example, frequently take a very different form from data from the physical sciences and can be highly dependent on context.

This paper will address the challenges of managing data from the social sciences, including maintaining privacy of subjects, preserving context of the data, and ensuring the data are preserved for the future. To understand the context of how social scientists are currently managing their data and best practices for a new cyberinfrastructure system for social science data, we performed a brief, pilot survey of social scientists at the International Congress of Arctic Social Scientists. This paper will present initial results of this survey, ongoing research on social science data management, and next steps to develop an effective system for managing data from the social

sciences. It is the hope that this paper will not only present ongoing research on social science data management, but also to inspire researchers to take an active role in the management of their data and to build a community around data management of the social sciences in the Arctic.

Sustainability in the Arctic in the Eyes if Actors from Outside the Region

Malgorzata Smieszek, Arctic Centre, University of Lapland, Finland

As apparent with the increasing number of political statements of both Arctic and non-Arctic actors, media coverage and growing investments in exploitation of natural resources as well as shipping opportunities, the Arctic is no longer a 'frozen desert' in the realm of international relations as it was still only three decades ago. In result of globalization, consequences of climate change and thawing ice the Arctic has moved from peripheries of the international relations closer to the center of global political and commercial interests. These processes certainly do not remain without influence also on the modes of sustainable development in the region which, along with environmental protection, has been the core objective of the Arctic Council (AC) since the Ottawa Declaration from 1996.

At present however the notion of sustainable development has been put more and more often in the context of economic opportunities arising with the opening of the Arctic Ocean. In the 'Vision for the Arctic' presented during the Kiruna Ministerial Meeting the economic cooperation has been put on the top of the Arctic Council's agenda as reflected also in the AC's efforts aiming at engagement of business partners into constructive dialogue via the Arctic Economic Council. Yet, interest and development of Arctic's commercial potential is to great extent driven by demand from non-Arctic states and actors who therefore seek to enhance their position in the region. Along with a number of Asian countries which obtained the AC Observer status in 2013 and have been actively engaging in the Arctic matters, also the 'old' Observer states to the Arctic Council have begun to set out their overall Arctic policies detailing their interests and capacities in the North, to make sure their voice is being heard in various forums where issues pertaining to the Arctic are debated. As the main question of this conference focuses on local, regional, and global meanings of sustainable development in the Arctic, this paper aims at examining how this concept is embraced by first non-Arctic actors which have released their respective Arctic policy documents in fall 2013, namely the United Kingdom and Germany. In addition, as France is said to issue its Arctic roadmap in November 2014, it is also included in the group along with the European Union which, even though not a full Observer to the Arctic Council, has been particularly active in its approach towards the region as mirrored by the number of its Arctic-related policy documents. So what are interests and objectives, stakes and goals of these actors in the Arctic? What does sustainability in the Arctic mean to them and what is their potential impact and means of influence on it? Finally, how do these states and entities see the future development of the region? This papers intends to elaborate on these questions because the heightened connectivity between the Arctic and the global system means that sustainable development of the North is no longer to be

defined merely by Arctic states and inhabitants of the region. Rather on the contrary, it is to be to great extent affected by processes and actions taken by actors well from below the line of the Arctic Circle. Since conduct and policies of countries like Britain, China, France, Germany or entities like the European Union are essential to efforts to regulate global processes with profound consequences to the Arctic, understanding these actors' visions of and for sustainability of the Arctic is in opinion of the author of this paper of high relevance to debates on the future of the region.

Ecosystem Stewardship as a Framework for Federal Agencies to Manage Ecological Trajectories for Sustainability in the Kenai Peninsula, Alaska

Dawn Robin Magness, Kenai National Wildlife Refuge, Alaska, USA

Climate change and other large scale, directional forces are altering ecosystems in irreversible ways. Until recently, natural resource management theories and practices were developed under the assumption of a stable climate. Resource managers could look to historic baseline conditions to guide their vision of how the ecosystems should be. Ecosystem stewardship is a new management framework developed to shift management focus away from a historic baseline and provide strategies to manage directional change. Ecological systems are considered path dependent and inseparable from social systems. Ecosystem stewardship uses proactive strategies to shape future conditions to sustain ecosystem services and support human well-being. These proactive strategies include enhancing resilience, embracing uncertainty, and actively managing ecological transformation. I explore the barriers and opportunities for the Kenai National Wildlife Refuge (NWR) to effectively and justly manage ecological trajectories on the Kenai Peninsula.

Managing ecological trajectories in a complex social-political context is a new and daunting challenge. Traditional practice for researchers has been to transfer findings to managers who take action. In our changing world, scientists need to move from singleway communication and mechanistic policy implementation to full collaboration through adaptive management and colearning. Likewise, the role of the resource manager is shifting from that of the decisionmaker who sets the course for sustainable management to a facilitator who engages stakeholder groups and works across professional and cultural boundaries to respond to, and shape, socialecological change. This will require managers to have the institutional flexibility to move away from some concepts, such as natural condition and ecological integrity, which rely on stable environmental conditions and notions that nature can be separated from humans.

The 24,300 km2 Kenai Peninsula is connected to the mainland of south-central Alaska by a 16km isthmus. The Kenai Peninsula straddles the northwestern extent of the temperate costal rainforest biome and southwestern extent of the boreal forest biome. Landscape diversity is also enhanced by the 1600m elevation gradient imposed by the Kenai Mountains. Three federal land management

agencies administer approximately 75% of the lands. Nearly 60,000 people reside on the Kenai Peninsula.

Many climate change impacts have been observed and documented on the Kenai Peninsula. In this case study, I focus on the potential for ecological transformation from spruce forest to grassland savanna north of the community of Homer. White and Lutz spruce stands across nearly 1 million acres of the peninsula were killed as the result of an unprecedented spruce bark beetle outbreak coupled with drought stress. *Bluejoint reedgrass* cover increased as the tree mortality reduced canopy cover. Thick grass mats and lack of seed trees have limited sapling reestablishment. A qualitative shift in the fire regime has shifted from canopy fires in late summer to grass fires in spring in recent years. Spring, grass fires would signify a change in disturbance that would reinforce grassland savanna because grass fires occur more frequently and result in increased sapling mortality. Climate envelope forecasts suggest that the future climate could be suitable for either herbaceous/grassland ecosystems or forested ecosystems suggesting that management actions have the potential to tip the balance toward a preferred ecological state.

Building on past research, the Kenai NWR has begun build a science agenda to understand the ecological possibilities and management actions required to manage divergent ecological trajectories. For, example, common garden experiments to understand the potential for alternative tree species to colonize, some of which would need to undergo assisted migration. Remote sensing and other field techniques can flesh out whether the grassland ecosystem is truly an ecological transition or a successional stage. However, before active management can occur, managers will need to engage in social processes to ensure that communities are empowered to choose between divergent, possible ecological conditions. Next steps include using a natural resource policy process framework to address the social and decision processes that, along with resources, influence human values and interests. Several methods, such as participatory scenario development or participatory socio-economic impact assessment could be integrated with current understandings about possible ecological trajectories to build consensus about acceptable future conditions.

Sustainability of human-wildlife systems in northern urbanizing regions

Kim A Jochum, University of Alaska Fairbanks, USA

Wildlife management is challenged with managing human resource needs and simultaneously ensuring wildlife conservation. Along with global changes and a growing human footprint, conflicts between humans and wildlife have increased noticeably across countries. Lack of information exists about reasons for such occurrences. Northern regions where vast undisturbed wildlife populations still exist are becoming concerned with the human impact including development and land-use change on wildlife systems. This study analyzes ecosystem resilience in northern coupled human-wildlife systems through an interdisciplinary social-ecological framework. Social and ecological factors are evaluated to contribute to negative and positive

perception development toward human-bear (Ursus spp.) encounters in urbanizing regions of south Sakhalin Island, in the Russian Far-East, and southcentral Alaska, USA. Qualitative interviews gathered information on perceptions of local people held toward current bear management in their region. Network analysis and emergent coding were applied to analyze interview content. Quantitative data was collected via structured surveys, which included specific information about the spatial location of, and perceptions toward, bear encounters in the wild. Spatial perception mapping and generalized linear models were applied to understand impacts of social versus ecological variables to trigger positive and negative perception development toward bear encounters in people. Kernel densities were generated in ArcGIS displaying positive and negative encounter hot spots whereas generalized linear models were conducted with the program R. Model reduction applied stepwise elimination of AIC values. Case studies facilitate an analysis of perception development across spatial and social scales while incorporating approaches of both, social and ecological sciences.

Hunting, tourism and overall anthropogenic impacts are central to bear management, whereas cultural and social interests are perceived to lack consideration in bear management decision-making across study regions. In Alaska political interests, on Sakhalin economic interests including illegal animal trade and poaching, are perceived to be prevalent factors shaping bear management. Across study regions, perceived positive and negative bear encounters are dependent on the socio-economic situation of the individual having the encounter. The higher people's socio-economic status, the higher their probability to perceive bear encounters as positive. Further, spatial and social scale interfaces across which perceptions vary are identified. Interfaces include urban–nonurban and wildland-urban interfaces, along with a recreation-subsistence interest divide. Outside of urban areas, people's interests in recreation versus subsistence affect their perceptions toward bear encounters. Subsistence collectors of fish, game or plants are more likely to have negative encounters and subsistence interests coincide with a long-term residency. Positive encounters outside of urban areas however are most likely to be experienced by people not in possession of a hunting license, higher education and short residency. Within urban areas, increased experience with encountering bears and length of residency are associated with positive encounters, whereas closeness to residences while not in sheltered environments increases negative encounters.

These findings constitute spatial and social barriers and benefits to individualistic perception formation during human-bear encounters. Their identification advances resilience in researched human-wildlife systems and helps identify adaptive capacities existent within and across communities. The successful spatially explicit integration of social and ecological variables advances the opportunities for integrating human dimensions in applied wildlife management. Understanding social-ecological relationships and accomplishing their methodological integration are crucial to achieve sustainability in northern human-wildlife systems under increasing human pressures and global change.

Deliberative Democracy and Scenarios Planning for the Future in Arctic Communities

Douglas Cost, International Arctic Research Center, University of Alaska Fairbanks, USA

The scenarios process has been a tool of business for several decades now. When done well companies gain the capacity to think ahead in rapidly changing complex competitive environments and make crucial decisions in absence of complete information about the future. Currently, at many regional scales of governance there is a growing need for democratically legitimate tools that enable the actors at local-scales (e.g., counties, boroughs, parishes) to address pressing concerns in the midst of uncertainty. This is particularly true of areas experiencing rapidly changing environments (e.g., drought, floods, diminishing sea ice, erosion) and complex social-environmental problems (e.g., remote societies, resource extraction, threatened cultures). Recently, two literature streams have grappled with such problems but with little overlap. Resilience theory and deliberative democracy both promote governance by informed actors in an effort to produce decisions that avoid social-environmental collapse. The former focusing on resilient ecosystems, the latter on legitimate societies. They intersect in the normative streams of their scholarship when proposing that multiple actors can and should be involved in decision-making that respects multiple perspectives on the system in question (e.g., traditional ecological knowledge, the perspectives of the marginalized). However, resilience theory has little in the way of tools and deliberative democracy, while many tools have been proposed and used, generally lacks a long-view and capacity to account for uncertainty. Scenario exercises produce neither forecasts of what is to come nor are they visions of what participants would like to happen. Rather, they produce pertinent and accurate information related to questions of "what would happen if…" and thus provide the possibility of strategic decision-making to reduce risk. Scenarios can combine the best attributes of a participatory democratic process with the need to make decisions about adaptation in order to develop policies of resilience. This paper represents the early phase of a research project to bring the scenarios process to Northern Alaska, specifically the Northwest Arctic and North Slope Boroughs to answer the question "What is needed for healthy sustainable communities by 2040?"

The research is tied to a multi-year grant project, the North Slope Arctic Scenarios Project (NASP): Envisioning Futures and Strategizing Pathways for Healthy Communities. My focus is the deliberative engagement of stakeholders in the public education systems of the North Slope and Northwest Arctic Boroughs - educators, administrators, and students. I am most interested in understanding how the different stakeholders view the multi-decade approach to planning for healthy sustainable communities from their standpoint. For example, what values do they think should persist, and when they consider problems in advance, what they anticipate should be avoided or at least mitigated? What key uncertainties are most important to those in the education

system and are they the same for each borough? Additionally how will other actors (non-education) perceive the participation of students and school staff? How and from what do students consider and express their priorities and visions for the future? This research develops expected outcomes from the "planning" literatures and compares them to education research related to critical rural, indigenous, minority, and economic thinking.

Beyond a Conventional Federalism: Dynamics of Governance and the Politics of Extractive Resource Development in Northern Canada and the United States

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The state of regional circumpolar governance has changed rapidly in the last 40 years, with the transformation of political institutions and policy regimes increasingly favouring forms of subnational regional autonomy. Indigenous political mobilization in the United States and Canada has resulted in land-claims and self-government agreements that have moved policy authority over land and resource management into the hands of regional Indigenous administrative bodies. The settlement of land claims in both countries has included the creation of indigenous development corporations responsible for overseeing land and resources. In some regions in Canada, these institutions ofland claims have strong links to Indigenous institutions of self-governments (there are no examples of state-recognized self-government in Alaska), while in others cases they are kept very separate. Since 1971, over 30 sub-national Indigenous administrative regions-with some variation in subsequent institutional development-have been created via negotiated agreements throughout northern Canada and Alaska.

As northern Indigenous populations work to reconcile the preservation of their culture with contemporary economic trends in resource development, the recognition and implementation of Indigenous land rights and self-governance holds significant potential. Theoretically, the transfer of responsibility for environmental and resource management to Indigenous governments has been predicated on the idea that "sovereignty" is key to securing growth. Devolution to the site of natural resource development is posited to create the governing stability necessary to attract firms to invest regionally, creating incentives and spurring local economic development. In this new governance paradigm, however, resource development firms and foreign investors are also presented with multiple entry points with which to engage decision makers; nested models of governance introduce overlapping and competing interests that can impede resource development by affecting short- and long-range strategies for firms and governments alike. Moreover, the incentives for and capacities of Indigenous governments to oversee such projects are not evenly distributed throughout the circumpolar north, and institutional history matters to the prospects and politics of resource development today.

Indigenous regional corporations, in particular, have significant implications for regional governance. Regional corporations are institutions embedded in land claims agreements to oversee

their implementation, with the specific role of managing the expected economic benefits that flow from modem treaties. In this way, the regional corporation contends with one of the most complex political realities of the north: balancing economic development in relation to traditional cultural economies and practices. Corporations are expected to spur the production and distribution of wealth, either through corporate activities, payments to community members (shareholders), or through the delivery of programs and services. However, this form of corporate governance has, in some cases, come into conflict with the maintenance of cultural and subsistence practices in the north, as the corporate structure incentivizes non-traditional use of the land and opening the region to exploration by natural resource companies. Certainly this has been the case in the Alaska North Slope, where the Arctic Slope Regional Corporation has pursued increased oil and gas activity; this activity has not been without conflict, and other groups in the region have initiated litigation against some industry activity. Similarly in Canada, the Inuvialuit, who have a strong and highly institutionalized corporate model of governance, have reversed policy following the introduction of their land claim in 1986. Indeed, two issues that catalyzed Indigenous protest in the 1970s (the Mackenzie Valley Pipeline and the Dempster Highway extension) have been reimagined and reinitiated under an Aboriginal lens. The Gwich'in, Sahtu, and Inuvialuit are today 33.3% shareholders in the "Aboriginal Pipeline Initiative" which exactly replicates the project over which they protested in the 1970s; meanwhile, the highway extension to Tuktoyaktuk broke ground this past winter with significant regional support.

In light of new institutional dynamics and incentives, questions regarding the ability of institutions to encourage inclusive processes and ensure regional sustainability run paramount. To date, little research has been done comparing the intra- and inter-jurisdictional trends in growth, resource development, and emergent politics and political discourse. With the rapid, though varied, devolution of power to sub-national indigenous governance structures, the question ultimately remains: how do differences in the models of governance, and in their institutionalization, affect the politics of extractive resource development? Using an analytical framework of historical and rational institutionalism, my research will compare northern Canada and Alaska to test theories of devolution and governance. The paper presented at the Arctic-FROST Workshop will create measures for the policy autonomy of sub-national regions in the north, before exploring theories of institutional change and the implications for the development of sustainable regions and economies in the face of perverse incentives and competing interests.

Climate-induced community relocation: community-based adaptation strategies to protect human rights and promote sustainable communities

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Climate change is transforming Arctic ecosystems and threatening the way of life of the indigenous peoples who live along the navigable waters of Alaska's coasts and rivers. Disaster relief and

hazard mitigation have been the traditional humanitarian responses to extreme environmental events. Yet government agencies are no longer able to protect communities despite spending millions of dollars on erosion control and flood relief.

In two reports published in 2003 and 2009, the US Government Accountability Office (GAO) found that flooding and erosion affect 184 out of the more than 220 of Alaska Native villages, with 31 of these imminently threatened, and 12 communities planning to relocate. Despite government spending millions of dollars to try to protect coastal communities from erosion by building rock walls and using sandbags to keep land from falling into the ocean, the government has not been able to provide long-term protection.

In Kivalina, an Inupiat Eskimo community located north of the Arctic Circle. In September 2006, after finalizing the construction of a multi-million dollar seawall, federal government leaders arrived to celebrate its completion. But before the celebrations could begin, a storm came in, and damaged 160 feet of an 1800 foot seawall. The celebration was cancelled. A year later, 250 Kivalina residents self-evacuated in the face of a storm with forecasted twelve- to fourteen-foot ocean surges that threatened this community that lives at a tenfoot elevation level.

The understanding that traditional methods of erosion and flood control has caused several Alaska Native communities to decide that relocation is the only adaptation strategy that will protect them from the combination of climate-induced ecological changes caused by rising temperatures, thawing permafrost, and loss of arctic sea ice. Yet complex governance issues must be resolved in order to facilitate relocation. No U.S. federal or state government agency has the authority to relocate communities, no governmental organization exists that can address the strategic planning needs of relocation, and no funding is specifically designated for relocation. Despite these challenges, one Alaskan indigenous community, Newtok, is relocating.

Climigration is the word that best describes this type of population displacement. Communities, rather than individuals, will be forced to migrate. Permanent relocation will be mandated because there will be no ability to return home because home will be under water or sinking in thawing permafrost. Determining which communities are likely to encounter displacement requires a sophisticated assessment of a community's ecosystem vulnerability to climate change, as well as the vulnerability of its social, economic and political structures.

The policy and practical challenges to relocate Newtok are enormous and clearly demonstrate the need for new governance institutions that specifically respond to climate-induced relocation and protect the human rights of community residents. Severe economic, social, and environmental consequences can occur in the relocation process. Relocation can unravel the fabric of a community, weaken community institutions and social networks, disrupt subsistence and economic systems, and impact the cultural identity and traditional kinship ties within a community. A relocation policy framework based in human rights doctrine is essential in order to avoid or minimize these adverse impacts and to ensure a community's resilience after relocation. This paper proposes the design and implementation of a unique adaptive governance relocation framework based in human rights doctrine.

‘Sustainability’ in an Inuit context: An example from Nunatsiavut, northern Labrador

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Canada chairs the Arctic Council until 2015 under the slogan “Development for the people of the North.” Priorities focus on natural resource development, Arctic shipping, and sustainable communities. In this context it seems especially relevant to gain a better understanding of what sustainability means for people who are affected by decisions surrounding it. Currently, a diverse body of literature discusses the importance and application of concepts related to sustainability in the Arctic and Subarctic. Examples range from limited integration approaches focusing on economic or environmental conceptualizations of sustainability, to integrative frameworks emphasizing equal consideration of environmental, social, cultural, and economic dimensions, among others.

A considerable portion of scholarship related to sustainability has been developed outside of Northern regions, however. This may lead to potential disconnects and contradictions between Northern and Southern understandings of sustainability. While on a general level disconnects and contradictions can be due to ambiguity in terms of meanings and definitions, more specifically they can also relate to scale (local and regional sustainability vs. global sustainability), capacity (who is able, who is in charge, who is responsible?), and goals (what are we working towards?), to name only a few.

Importantly, rather than viewing concepts of sustainability as something to be introduced to Arctic and Subarctic parts of the world, an argument can be made that aboriginal communities including Inuit in northern Canada have been living inherently sustainable lifestyles for millennia. It is important, therefore, to highlight the relevance of locally grounded concepts and strategies to achieve or restore sustainability. Hence, the first part of the presentation explores Inuit based concepts or understandings of sustainability.

Examples include subsistence activities, networks of sharing and teaching, and holistic philosophies regarding individual and community livelihoods. The second part of the presentation focuses on strategies to mobilize knowledge and skills related to sustainability and apply them to current lifeline issues surrounding modern and sustainable Northern communities. Inuit based sustainability strategies are discussed on specific examples of the SakKijânginnatuk Nunalik (Sustainable Communities) initiative (SCI), which is located in the autonomous Inuit region of Nunatsiavut, northern Labrador. The SCI is a co-creation for sustainability project including partners from governmental, academic, and private sectors. The SCI informs best practices and provides guidance for community sustainability in the coastal Subarctic under changing environmental, social, and economic conditions. Based on community needs it prioritizes themes

related to housing, community mapping, planning and development, energy security, and food security. Specific examples of locally grounded strategies include the application of bottom up, community based sustainability indicators which may be used to assess and track the direction of SCI programs or policies; to ensure responsiveness to the needs, priorities, and visions for the future of community members; and to enable interactive and integrative pursuit of complex questions related to achieving or restoring sustainability. The presentation will conclude with a more general outlook on sustainability research based out of Arctic and Subarctic regions, discussing their (potential) connections to non-Northern sustainability research and concepts. In other words: Where can we turn to when we want to achieve sustainability not only for, but also with people of the North?

Using a participatory research model to develop climate adaptation strategies based on contaminant monitoring and Aboriginal Knowledge.

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The public health of First Nations depends on water resources to provide safe drinking water, recreation opportunities, and high quality fish and wildlife habitat necessary for subsistence livelihoods. Exposure, release and transport of contaminants depend on the hydrological pathways of the watershed. Climate change, through permafrost degradation, may be altering the overall hydrology of the Yukon River Basin, thus creating new exposure pathways and sources of contaminants. This project involved investigating water biogeochemistry at sites identified through interviews, focus groups, and participatory Geographic Information Systems (GIS) methods. Over two years, more than 100 community members from the First Nations of Selkirk, Tr'ondëk Hwëch'in, Kluane, White River and Carcross/Tagish contributed to identifying greater than 50 sites thought to be historical or current sources of contamination. A smaller subset of these sites were prioritized and monitored for two years. Several themes were identified that were important within the prioritization such as use, severity of contamination, and remoteness of location. In addition, several important themes regarding climate change and adaptation were identified over the two years of the project. Climate change had affected subsistence activities, vegetation migrations, transportation routes and activities among others. The project is entering its third year to attempt to formalize many of these themes and sources of information into a regional Water Action Plan that addresses these five First Nations concerns and plans for sustainability in the face of climate change.

Building Sustainable Research Relationships in the Arctic: Indigenous Communities and Scientists

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This paper addresses how to build sustainable research relationships from the perspectives of Greenlandic community members and North American Arctic researchers. Literature shows that Arctic researchers need to work with and/or in communities[1] but lack a model for how to build research relationships. Community-based participatory research, indigenous methodologies, and collaborative research provide examples of research partnerships and methodologies but do not explain the initial steps of building relationships that are necessary in making the relationships sustainable. This paper addresses that, creating a relationship building model for Arctic research. I examined results from 15 interviews with Arctic researchers I conducted while interning at the National Science Foundation-Office of Polar Programs (OPP), 19 interviews with self-identified Inuit Greenlanders collected in Greenland, and two focus groups for women and two for men—working with 14 of the original Greenlandic interviewees. Through coding the data in NVivo, utilizing a grounded theory approach, I found the central theme was trust, surrounded by eight prominent actions necessary to create, build, and sustain trust. Strategies to build trust include: knowing extensive community history, developing strong local contacts, communicating through the entire project, behaving respectfully, having manners associated with the culture, acting ethically beyond the academic world, exchanging knowledge for mutual gain, and giving back project results beyond just a presentation.

[1] Community: According to MacQueen et al. (2001) there are five main elements that make up a community. These include a locus/ place, sharing interests and perspectives, joint action/cohesion, social ties, and diversity/ social complexity. Brown (2004) combines these five with the three given by Patrick and Wichizer (1995), community as social interaction, place, and social and political responsibility. Brown ends up with four elements to his definition. These communities have geographic groupings, social networks, collective social action, and continually changing definitions. Greenlanders often define community through geography, language, municipality, etc. (Rink et al. 2013).When looking at these definitions I define community using Greenlandic ideas and MacQueen et al. The community I am working with in Greenland is geographically isolated; under 1,300 people that are a large majority Inuit; tied together by language, culture, survival needs, subsistence activities, and family ties; and lastly have diversity of subgroups within the communities, eg. elders, youth, the few Danes, men, women, etc.