



Abstracts for DurhamARCTIC Spring School, 13-14 April 2022

All sessions to be held in Room 007 in the Geography (West) Building

[Note: Titles are students' thesis titles and might not be identical to the titles of the papers that they submit for discussion at the conference.]

For remote access:

<https://durhamuniversity.zoom.us/j/96331999061?pwd=RGYyWFkxclpMSGRmTTRiU0hhQ2ZlZz09>

The Changing Arctic Environment (Bruce Forbes [Lapland], Discussant)

Beth Gillie (*"Biodiversity Colonisation of the Arctic under Climate Change: Impacts on Land, Sea and People"*)

Title: Changes to Holarctic species distributions with climate change: emerging winners and losers

Climate change is threatening global biodiversity, with particularly severe impacts at Northern latitudes and within the Arctic. The Arctic is warming at over twice the rate of the global average which will likely have profound impacts on ecological communities in the Arctic. Which species might be able to cope with the changing climate and therefore shift their ranges is still poorly understood. Species that could shift their ranges north into Arctic and Boreal ranges are likely to impact recipient communities and potentially disrupt functioning ecosystems. Understanding what factors might limit or exacerbate species shifts will be key to helping conserve biodiversity. Here, we use species distribution models to explore the potential for the Arctic region to become climatically suitable for southern colonists, and also the likely impacts on Arctic species. We further investigate how species-specific dispersal capabilities and the availability of suitable habitat impact the ability of species to keep pace with shifting climate. By 2070, we identified 233 mammals and 283 birds that are projected to have suitable climate available across all Arctic regions but saw spatial variation in which areas of the Arctic novel communities might form. Range contractions were predicted for almost all resident Arctic species, with range expansions seen for novel colonisers. We further provide evidence that, especially for mammals, there will be suitable climate available in the future, but species may not have the dispersal ability or availability of suitable habitat to keep pace with climate. Our findings stress the importance of understanding how ecosystems and vulnerable communities are likely to change in the future. We advocate for the results of such models to be incorporated into impact assessments and conservation management plans when working with the people impacted by such changes.



Ellie Ward (*"Predicting risk against regional impacts from climate change on populations of Arctic charr (*Salvelinus alpinus*)"*)

Title: The evolutionary and plastic drivers of phenotypic diversity between Arctic charr (*Salvelinus alpinus*) ecotypes in Lake Ellasjøen, Bjørnøya

Arctic charr (*Salvelinus alpinus*) is the most northerly distributed freshwater fish on the planet. Across its circumpolar range they are found to be highly polymorphic, often represented by several discrete ecotypes within a single lake. These ecotypes may be variable in morphology, behaviour, colouration, life history and genetics, contributing significantly to the diversity of northern ecosystems. Arctic charr, therefore, provides a model system for exploring the genomic and plastic drivers of phenotypic expression. In this study, ecological and genetic analyses are used to assess phenotypic divergence between two sympatric ecotypes of Arctic charr at the northern edge of their biogeographic range. Traditional morphometric measures and geometric morphometrics are applied to explore the divergence in morphological traits relating to resource and habitat use between the Robust littoral (n=38) and Delicate pelagic (n=21) ecotypes in Lake Ellasjøen, Bjørnøya. Restriction associated DNA sequencing (RADseq) enables the identification of adaptive and neutral variation in the form of single nucleotide polymorphisms (SNPs) across the genome. This will be used to highlight adaptive differences and signals of selection that might indicate a genetic basis to observed phenotypic variation. Comparative transcriptome-wide gene expression enables the identification of differentially expressed loci that may be associated with phenotypic expression. This research aims to further our knowledge of the roles of phenotypic plasticity and adaptive evolution in the divergence of Arctic charr ecotypes. Understanding the mechanisms behind this diversity is important for predicting the potential for geographically isolated species to adapt to rapid climate change in situ.

David Jarrett (*"Monitoring breeding productivity of shorebirds using acoustic recorders, sound localisation and machine learning"*)

Title: Generalist predator monitoring in sub-arctic tundra

Arctic species are likely to be more severely by climate change than species of other biomes because of the magnitude of change in the Arctic and the inability of high latitude species to shift northwards to cooler climates. High densities of shorebirds breed at higher latitudes in tundra habitats, where the potential nest predator community is more limited. However, in the sub-arctic tundra of northern Fenno-Scandia, there is evidence that breeding wader populations are declining, although long-term datasets are limited. A contributing factor to these declines is likely to be the spread of boreal generalist predators into tundra habitats. The population dynamics of tundra ground-nesting birds and meso-predators are driven by small rodent cycles - in recent years the frequency and amplitude of these cycles has



become less predictable, with impacts on the annual variability in predation pressure. Additionally, larger herds of semi-domesticated reindeer are overwintering in tundra areas, and the associated carrion has also been shown to support higher densities of generalist predators in tundra habitats. As such, the structure of tundra food webs is fundamentally shifting in northern Fenno-Scandia. In this context, there is a need to improve monitoring of meso-predator abundances in sub-Arctic tundra, to better understand drivers of colonisation, the effectiveness of potential mitigation measures, and produce robust evidence on the strength of the relationship between increased meso-predator abundance and ground-nesting bird breeding productivity. In northern Norway, there is significant potential to engage the engaged and well-informed hunting community to record encounters with meso-predators to improve our understanding of meso-predator abundance. This dataset could, in time, facilitate a more robust understanding of the drivers of increased meso-predator abundance in tundra habitats, and produce landscape-scale evidence on the relationship between meso-predators and shorebird productivity.

Katy Iverson (*"How climate change and biotic interactions affect invasive plant success in Norway"*)

Title: Testing enemy release of non-native plants across time and space using herbarium specimens in Norway

1. The enemy release hypothesis predicts that invasive plant success is in part due to the absence of natural enemies in the invaded range. However, few studies have assessed how enemy release may vary over time or space.
2. Norway has seen a large increase in non-native plant species over the past few decades. We used historical herbarium records to test whether ten non-native plant species in Norway have suffered less from natural enemies (foliar herbivores) at different latitudes and over the past 195 years, compared to closely related (congeneric) native species.
3. We analysed over 2,200 specimens over 26 species. Chewing herbivory was lower at higher latitudes for both non-native and native species. However, there was no evidence of change over time in overall chewing herbivory for either native or non-native species on average. Chewing herbivory of native and non-native species differed within the genera *Centaurea*, *Epilobium* and *Salix* across latitudes, and in the genera *Acer*, *Barbarea*, *Campanula* and *Epilobium* across time.
4. Synthesis: Our results suggest that enemy release is unlikely to facilitate non-native plants in Norway since herbivory levels are similar between both non-native and native plant species. Herbivory is also unlikely to increase over time and, due to lower levels of herbivory at higher latitudes, is unlikely to limit non-native plants further north. This suggests that climate change is not yet impacting herbivory rates, but that herbivory is likely to increase at higher latitudes as the climate warms.

Arctic Encounters through Science and Exploration (Nina Wormbs [KTH], Discussant)

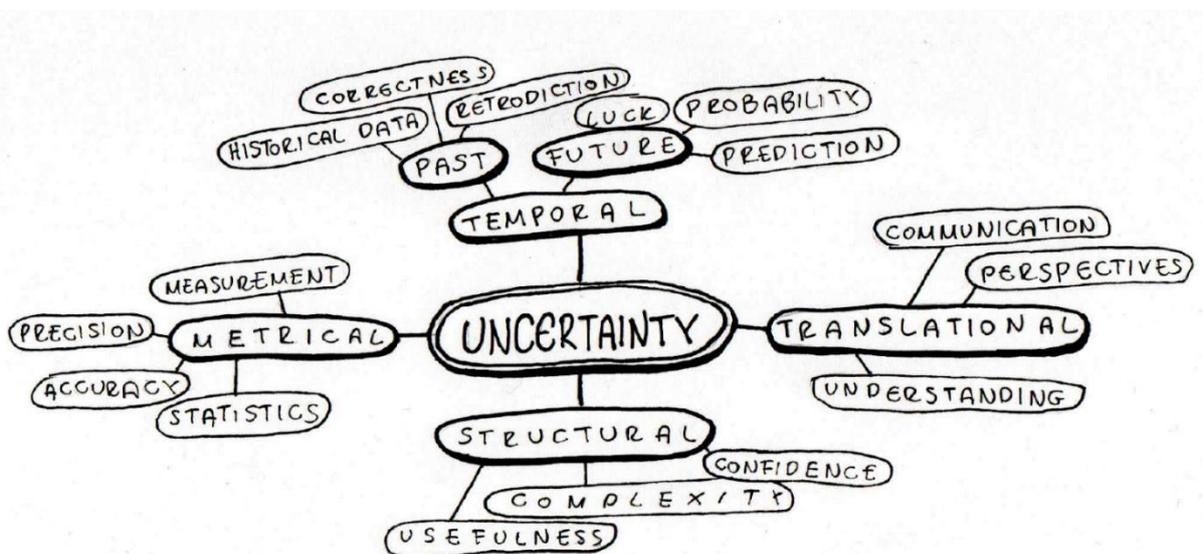


Danae Kontou ("*Spatiotemporal analysis and mapping of environmental change in the Arctic*")

Title: Cartographic Arctic Uncertainties

A map will never represent reality as it is; to be readable and practical, it will be illustrating distortions, selective and simplified information, and translating natural elements into symbols, and sometimes it will not be objective. Therefore, every map carries a level of uncertainty. Even though methods and techniques have been proposed for visualising uncertainty for more than three decades now, most of them cannot be adapted to all cartographic disciplines. Moreover, uncertainty depiction on maps is not often represented even if the data used are not characterised by high certainty.

Taking as a case study the Arctic Region, Uncertainty is categorised in (a) **temporal** –due to past and future uncertainty -, (b) **structural** –due to complexity-, (c) **metrical** –due to data accuracy-, and (d) **translational** –due to communicational uncertainty -. Unlike other geographic regions, the Arctic is characterised by all four uncertainties due to its complex ecosystem, geopolitical and historical background, and extreme weather conditions. In conclusion, the proposal of different representations of uncertainty for each type can be helpful to the map users and readers not only because the map seems more truthful but is also a way to emphasise the need for further research, avoid wrong decisions and policymaking lower risk-taking. Moreover, the mapping techniques which will be explored during this thesis in respect of the uncertainty in the Arctic will be collected in an Atlas form. This "Atlas of the Uncertain Arctic" can be used in the future as an educative collection of thematic maps for a broad audience, but also as a tool for exploring and experimenting with various creative and innovative mapping techniques.





Paul Burgum (*“Investigating Resilience in Extreme Environments Using Broad Theories in Psychological Science”*)

Title: Resilience and Well-being in the Polar Regions

The Polar Regions represent some of the most inhospitable places on earth, with extreme conditions that make human survival incredibly challenging. These include cycles of prolonged light or darkness, extreme cold, and unexpected violent storms (Nicolas, Martinet, Suedfeld, & Gaudino, 2019). Living and operating in such conditions has been found to have a direct effect on the psychophysiology of a person and make psychosocial resistance factors paramount (Kirillova & Zabegalina, 2019). Antarctica is only inhabited by temporary populations, whilst many permanent populations live and work in the Arctic region. This means there are very different contextual challenges, however, the concept of resilience is considered important throughout the regions (Arctic Council, 2016). Furthermore, this knowledge is relevant to groups living in other parts of the world where catastrophic climatic events and population displacement are rising exponentially (Sturgess & Sparrey, 2016). This paper will begin with a review of the general resilience literature. First, outlining key components of psychological resilience and defining the construct, then reviewing the literature from the perspective of three main approaches; across the human lifespan; traumatic life events; and what has been considered the trait vs process perspective. This will be followed by a brief explanation of Basic Psychological Needs Theory (BPNT) and how it may offer a theoretical basis for the construct of resilience. Finally, resilience in the Polar regions from both temporary and permanent resident's perspectives will be reviewed using the BPNT and a social-ecological perspective to interpret this work. The use of this joint theoretical approach will be proposed as offering potential for understanding what is most important for resilience for those living and working in the Polar regions.

Laura Seddon (*“Measurement, knowledge, and representation: A sociological study of Arctic sea-ice science”*)

Title: Measurement, Knowledge, and Representation: The partialities of contemporary sea-ice science

Today, satellites technologies and their associated practices of knowledge production are the primary means through which Arctic sea-ice is encountered, measured, and reported in



sea-ice science. The knowledge obtained through satellites provides crucial insights into long-term and large-scale sea-ice variability and its interactive role in the global climate system. It also influences how Arctic environments are perceived, shapes the problems and solutions regarding sea-ice decline, and influences and constrains possibilities for socio-political and cultural engagements. This article explores the partialities of contemporary sea-ice science. Situated within a broader historical context, it examines how interactions between sea ice, science and technology, and social conditions have shaped the production of scientific knowledge about sea ice through time, and how the practices and technologies of contemporary sea-ice science have emerged to inform our understanding of the region today. Through this analysis, the article contends that contemporary scientific knowledge of sea ice is not inevitable nor universal. Rather it is the situated product of complex entanglements between societal interests, shifting idealisations of the Arctic, environmental changes, and developments in science and technology. The article concludes that understanding these entanglements is necessary for fostering more equitable and socially responsible forms of scientific knowledge production, circulation, and application.

Christian Drury (*“British narratives of Arctic travel and exploration, 1875-1940”*)

Title: “Smoother for the Adventurer”: British Travel Writing from Norway in the Late Nineteenth Century

Norway was a popular destination for British travellers in the latter half of the nineteenth century, attracted by spectacular landscapes, cultural connections and the promise of escape from urban modernity. Moreover, Norway was seen as a place where the traveller could have Arctic experiences: of snow and northern lights, the midnight sun and the polar night. Norway, however, was far more accessible than the High Arctic and therefore open to tourists from across Europe.

Looking at the travel writing produced by these travellers, especially those from Britain, allows us to consider how Norway was represented, as well as their depictions of their own travel. British travellers saw certain key places they visited, such as Nordkapp, as particularly “Arctic” and their descriptions reflect that, from descriptions of hostile weather to mentions of explorers such as Fridtjof Nansen. However, we can also see their connections to modernity in places such as Nordkapp, where the Arctic sublime meets bourgeois mass leisure.

Infrastructure was crucial for enabling the Norwegian Arctic to be accessible, from cruise ships travelling more frequently and quickly up the Norwegian coast to new hotels, roads and railways. Tourist infrastructure was established for the increased number of travellers, who also made use of new Norwegian networks as well. Transnational connections were made through organisations like Den Norske Turistforening (The Norwegian Trekking Association), which supported British travellers, as well as shaping how they saw Norway. As such, organisations and journeys that look simply national were often constructed through



transnational networks, cooperation and imaginings. Space, place and time in the British imagination were co-constructions, whether the travellers knew it or not.

Human-Environment Adaptations and Transformations (Ivar Bjørklund [UiT], Discussant)

Ilona Kater (*"Reindeer ecology in a changing Arctic: Snow, vegetation, and traditional ecological knowledge"*)

Title: Ownership and usership: Relating to the land

As we decide over the next few decades how we respond to the various crises around us, including climate change, dwindling resources, unequal access to resources, and disputes over territory, it is vital for us to reflect on what ontologies underlie our relationship to land. In this piece I suggest there are two key concepts of land and resource use worth considering. The first, ownership, is underpinned by attitudes of control, excess leading to inequality, and disconnection from individualism. The second, usership, is underpinned by responsibility to the land and land users, adaptive dynamism, and assignment of agency to that which is other-than-human. Examples from various cultures and points in history are used to explore these concepts, whilst other examples highlight that ownership and usership are not neatly binary categories, rather existing on somewhat of a spectrum. When interacting with one another, ontologies of ownership have tended to supplant usership, partially due to the power provided by its characteristic of excess, especially seen in the colonisation of Australia and North America. Today however, a growing number of examples exist of usership ontologies coming to the fore, from the granting of rights to rivers, to the communal reclamation of the Isle of Eigg. Having traced the history of these two concepts, I discuss briefly how we may draw on them when looking to the future, deciding how we wish to interact with the resources on this one planet that we share.

Eric Boyd (*"Deforming ontologies: The immanence of extractive resources during the relocation and redevelopment of Kiruna, Sweden"*)

Title: "But there are lights in the windows" - Uncanny Ruination in Kiruna's Deformation Zone

Presented here is a rough draft of a chapter section on the materiality of living within Kiruna's deformation zone. Kiruna is an iron mining town that is currently undergoing a mining-development induced resettlement (MIDR) to accommodate the eastward expansion of the mine that sits on the city's western margin. The resettlement will displace approximately 2/3's of Kiruna's built environment and up to 1/3 of the city's inhabitants



(Kirunabor) over approximately eighteen years (2017 – 2035). The intention of this section is to use the methodological rationale from Weizman’s *Forensic Architecture* (2017, 2021) coupled with Sarah Pink’s (2009) sensorial ethnography to highlight and discuss how the built environment exists as a recording object for not only physical mutations, but social and political shifts and upheavals as well. This section draws attention to the tensions between formal and informal designations of the zone being resettled, and the creation of a spectral doubling of the built environment that juxtaposes contemporary interactions and historical encounters. This ‘time out of joint’ gives rise to an uncanny hauntology that permeates and subsumes technocratic narratives that emphasise the merits of LKAB’s policies and plans for resettlement.

Sal Kellett (*“The Impact of Human Agriculture on Pristine Arctic Landscapes: A Multi-Isotope Investigation into the Environmental Impact of Norse Landnam in Iceland”*)

Title: Investigating the long-term impacts of Norse settlement on the pristine environment of Iceland using archaeobotany and stable isotope analysis

The purpose of this research project is to apply carbon and nitrogen stable isotope analysis ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) to charred botanical remains from Norse charcoal production pits to establish if archaeological birch charcoal retains the original isotopic signature, as has been demonstrated in cereals and grains. This methodology may be applied to investigate the impact of human settlement processes and past subsistence practices on pristine environments such as Iceland, where the initial agricultural activities of early Norse settlers caused rapid changes to flora, fauna and soil. These changes resulted in a subsequent environmental legacy, with the future sustainability of natural resources affected and compromised by early agricultural practices. Archaeological sites offer a wealth of information regarding past resource usage and anthropogenic impacts on ecosystems, and this research aims to highlight the importance of including archaeological data in modern discussions regarding environmental change.

Indigenous Lives, Indigenous Rights (Timo Koivurova [Lapland], Discussant)

Giuseppe Amatulli (*“Cumulative effects, anthropogenic changes and modern life paths in Northeastern British Columbia: the case of the Doig and BlueBerry River First Nation”*)

Title: Cumulative Effects of Industrial Development and Treaty 8 Infringements in Northeastern British Columbia: The Litigation *Yahey v. BC* (S151727) – Case Comment

On June 29, 2021, the BC Supreme Court issued the verdict of the *Yahey v. British Columbia* litigation (S151727). For the first time in Canadian legal history, a First Nation Band (BRFN – BlueBerry River First Nation) sued a provincial Government for the cumulative effects of



industrial development intertwined with Treaty 8 infringements. The proceeding lasted for six years (2015– 2021), with more than 160 days of trials and dozens of hours of affidavits sworn, and it resulted in a ground-breaking verdict. The Court recognised that in authorising industrial development, the Province had been unable to consider and deal with the cumulative impacts that projects had on the traditional lifestyle of BRFN members, besides breaching its obligation to BRFN under Treaty 8. This comment argues that by recognising that the Province cannot continue to authorise activities that breach Treaty 8 and Section 35 of the 1982 Constitution, the verdict may pave the way to a real implementation of the FPIC (Free, Prior and Informed Consent) in the BC legal framework. The ruling provides that the BC Government and the Band engage in meaningful consultation and negotiation to enforce mechanisms to assess and manage cumulative effects on the BRFN traditional territory. The parties were given six months to negotiate based on the litigation outcomes. On October 7, 2021, a preliminary agreement between the BRFN and the BC Province was signed. Important issues had been addressed throughout the trial. From confidentiality and the duty to consult in good faith to the constitutionality of Court hearing fees and the possibility to obtain other kinds of injunctions until the trial; the outcomes of this litigation may well be considered as a milestone to advance the Canadian legal framework, further recognising essential rights of Canadian Indigenous peoples in terms of Constitutional, social, and environmental justice.

Mikael Lundmark (*“Access to land, access to justice - The divergence of legal protection: Cultural protection for Sami access to land and water under Swedish law in light of the European Convention on Human Rights and Fundamental Freedoms”*)

There is no indicative ruling from the European Court on Human Rights that truly explain how the situation of indigenous peoples fits within the scope of the European Convention. On the contrary, as the European Court has a performance record that can deter its most positivist advocates, it is reasonable to ask whether this institution is the right forum for Indigenous Peoples. This presentation will discuss how to understand the convention in an indigenous peoples’ context from existing case law. By highlighting the right to respect for private life and property protection as two primary bases of legal protection, this presentation explains how the compatibility between national legislation on indigenous peoples and the European Convention can be tested. This presentation also discusses the right of access to cultural heritage as a patronizing new area against which national legal protection must be weighed in order to assess whether there is effective and practical protection of human rights and fundamental freedoms contextually.

Romain Chuffart (*“Harmonizing impact assessments: Implementing Indigenous rights through environmental law processes and mechanisms in the Arctic”*)

Title: Arctic Indigenous Environmental Sovereignty Beyond Rights



Indigenous and human rights have often been thought of as a tool for emancipation. They offer a language of resistance in international law. However, the advances of human rights and Indigenous rights have also been made at the expense of anti-state discourse. In the Arctic as much as elsewhere, while mitigating state sovereignty on the one hand, human rights, especially economic, social, and cultural rights, require state intervention. Even Indigenous rights, which aims to promote Indigenous internal self-determination, fail short of challenging state-centric narratives, which have become essential in laying the legal framework to protect the environment. International human rights, both as an international normative system and a social movement, have opened the space for more autonomy. However, their implementation only offers tactical victories in the struggle for decolonisation and environmental justice. As an alternative to a rights-based approach, this paper argues that Indigenous sovereignty, rooted in Indigenous ontologies, responsibility, and laws offers a vision of environmental protection that transcends the state. As such, by looking at international law beyond the state, Indigenous sovereignty has the potential to transform current international obligations and infuse them with Indigenous perspectives.

Greta Ferloni (*“Moving matters: Understanding mobilities in, of, and around sea ice in the Bering Strait”*)

Title: Notes from the field: Western science, Indigenous science and reflections on knowledge production

This paper is a work-in-progress of reflections halfway through my fieldwork in Alaska. I have spent the last three months at the International Arctic Research Centre (IARC) at the University of Alaska Fairbanks (UAF). I have been observing researchers in their involvement with projects working alongside Indigenous communities, and I have been analysing vessel traffic data.

The first section focuses on the concept of ‘science’ to trace core aspects of Western and Indigenous processes of knowledge production. The discussion is centred around first, how these knowledge systems achieve a sense of shared validation for the knowledge being produced. Second, science takes place at specific sites of knowledge production which influence the ways in which knowledge is structured. Third, this raises questions regarding to what extent science is directly related to reality, and whether it risks becoming detached from the reality that it studies, producing knowledge that might be prone to quickly becoming abstracted and irrelevant to reality. Finally, considering the complex relationship between science and place raises questions regarding the final intended purpose of knowledge being generated. The section concludes by suggesting some of the ways in which these knowledge systems can co-exist through efforts of knowledge co-production. The second section is a reflection on my time at UAF and how some of the issues discussed surrounding knowledge co-production come through in my fieldwork experiences.