Sense of Place through Human-Animal Interactions in the Russian Arctic: Internalisation of the Landscape by Non-Indigenous Migrants

Nadia French

The Russian Arctic is largely made up of non-Indigenous first generation immigrants. Where people come from in the context of renewed development of the Russian Arctic is important since little or no lateral migration is taking place, and the Arctic nature would clash with the 'primal landscape' of most. While there are works exploring 'temporary mentality' of migrants onto their attitudes towards their temporary second home, little is known of how these newcomers internalise the Arctic environment, how they use it, and how they interact with its wildlife.

Building on the field work research conducted in Salekhard and Mys Kamenny, Yamal district, Yamal-Nenets-Autonomous Okrug in 2017, the paper is exploring human-animal interactions among settled non-Indigenous residents as well as shift workers. Understanding how people explain and internalise the Arctic provides insight into preparedness of the newcomers for the Arctic, environmental awareness (lay ecological knowledge based on observation, experience and sharing) and shifting perceptions of the Arctic from 'exotic' to familiar. The research found that while settled migrants demonstrate more concern over their natural surroundings than shift workers, both groups are likely to lack environmental knowledge and empowerment to act upon negative ecological dynamics in the area. Responsibility for the environment was ascribed to government and corporations, while individual sense of place was selectively built on particular attributes of the environment.

Introduction

The Russian Arctic represents one sixth of the global Arctic in geographic terms, yet it provides a far less extensive data and internationally citable scientific output on its segment (Aksnes et al., 2016). It is acknowledged by Russian academic opinion leaders that consolidation and development of scientific research in the region has not been relevant for many years and its capacity is inadequate in the face of the recent natural resource extraction boom (Leksin and Porfiryev, 2015: 556). This is especially poignant for the environmental research in areas of restricted access[1], including permanent and temporary settlements within the border zone, licence plots, construction and military sites. With the ongoing industrial colonisation of Yamal, Gydan, Taymyr peninsulas, Chukotka and other greenfield projects in the Russian Arctic, restructuring and repopulating military bases on the Arctic isles (Novaya Zemlya, Alexandra's Land, Kotelny island, Wrangel island) and the effects of climate change, human-animal conflicts are likely to increase. And while anthropogenic pollution transfer, land use change and accelerated warming of the Arctic have been known to affect its fauna indirectly[2,3], population

Nadia French is with the School of Geography, Earth and Environmental Sciences, University of Birmingham.

influx from non-Arctic regions is generally not factored in by environmental and socioecological researchers as an important emerging vector of human-nature dynamic.

The Arctic region bears a long history of human-animal relations with extensive harvesting of bioresources (whaling, polar bear and seal hunting) by foreigners to the region[4] further emphasising the urgency of socioecological inquiry into the effects of migration from the south onto the present human-animal interactions. At the same time, emergent uses of the natural environment by non-Indigenous residents are poorly understood and little is known of values and relations of such immigrants with the landscape and its fauna in the Russian Arctic, which is in the focus of this paper.

Human-animal relations in modern societies have been framed and interpreted through various prisms which would predefine the types of relations as well as species in question:

- colonial/postcolonial (animals as victims of imperialism/ domesticated and consumed species) (e.g. Armstrong, 2002; Hovorka, 2017);
- Indigenous (a society-building role/ consumed and totemic species) (e.g. Gotfredsen et al., 2018; Beach and Stammler, 2006);
- postmodernist/ constructivist (as a mirror, 'autobiography' of humanity/ symbolic and culturally important species) (e.g. Urbanik, 2012; Whatmore and Thorne, 1998);
- geographies of coexistence (space-bound species, e.g. urban wildlife) (e.g. Bull et al., 2017; Haraway, 2008; Buller, 2014).

This study follows the latter view of space-animal-human dynamics (Bull et al., 2017) and non hegemonic understanding of relations between humans and animals. The animals of the Yamal peninsula are seen as materially present while human-animal spatialities emerge through interactions of non-Indigenous people with the Arctic landscape.

While there has been no research on immigrants' interaction with the Arctic wildlife across space and time, some scientists based in the Arctic have picked up on the cultural clash of urban citizens' or newcomers' attitude towards Arctic animals (e.g. polar bears compared to a Russian cartoon character 'Umka', approached and hand-fed)[5]. Such anecdotal evidence suggests that human behaviour, lifestyle and background can inform of multiplied effects of demographic changes onto the environment and should not be ignored.

The scope of this research is twofold: (1) to understand how the influx of migrants from the south is likely to affect their socioecological interactions and (2) to address the extent to which place internalisation is conducive to environmental awareness and safeguarding behaviour. This was achieved through mapping out human-animal interactions in Yamal derived from interviews and publicly sourced data and analysis of the bidirectional impact of human-animal relations in the parts of the Arctic undergoing rapid industrialization, using the conceptual construct of a sense of place. The paper is based on the research conducted for a doctoral thesis in the Yamal-Nenets Autonomous Okrug (YNAO) in 2017. Semi-structured interviews were carried out in Salekhard, the capital of Yamal-Nenets Autonomous Okrug and Mys Kamenny, village of the Mys Kamenskoye municipality of the Yamal district with federal, regional and local officials employed in environmental protection, oversight and licensing (n=7) as well as with non-Indigenous residents of Salekhard (n=7) and Mys Kamenny (n=4). Data on fly-in/fly-out workers has been inferred from self-reported social media and public sources. The Yamal district was chosen as a case study mainly due to its recent and rapid economic development and surge in migrant population. Yamal-Nenets Autonomous Okrug is a well-established extracting province with Nadym-Taz-Pur district holding the position of Russia's gas centre, while the Yamal peninsula (Yamal district) remained poorly developed until recently. With 26 newly discov-

ered fields within the Yamal peninsula, its share in Russian gas extraction is predicted to increase from 0 to 23-24% by 2030.[6] Yamal peninsula's importance was first outlined in the 2009 Energy Strategy[7] and its focal role in gas exports was reiterated in the most recent 2020 Energy Strategy.[8] Yamal district is the fastest growing gas province with major infrastructural and industrial projects recently completed or in progress, including a railway, international airport, deep sea water port, oil loading terminal, a four train-strong LNG plant and more.

The Russian Arctic: Who goes there

With the exception of the Republic of Sakha (Yakutia) and Chukotka Autonomous Okrug, the ethnic composition of the Arctic provinces in Russia is characterised by a non-Arctic majority, among which first and second generation migrants constitute the largest cohort. The renewed interest in northern development saw a significant increase in work migration in almost all Russian Arctic provinces and particularly affected the Yamal-Nenets Autonomous Okrug (YNAO), which in 2014 attracted 50% of all work migrants to the Russian Arctic (Kharlampieva, 2017).

The main historical factor of the population growth in YNAO was migration, which amounted to 1.5 million people (gross migration) between the 1960s and 1980s. Two thirds of the migrants were from other regions of the USSR and the rest were from the Tyumen oblast (Kornilov, 2014). The region experienced a 10-fold rise in population on account of migration with some effects of natural increase over the past 50 years.[9] This demographic shift and other political events of the twentieth century led to urban development in the Arctic region, and the settlement and breakup of traditional nomadism for the majority of the Indigenous population (Tishkov, 2015). While, like in the rest of the Russian Arctic, outmigration has dominated the population dynamic since the 1990s, YNAO has been losing fewer residents since 2013.[10]

The number of shift workers in YNAO doubled between 2010 and 2018 (Silin, 2019) and, according to the YNAO Department of Work, it reached 126,000 in 2021 (around 30% of the region's active workforce).[11] Such a labour structure corresponds with a high level of population turnover and a young demographic.[12]

Yamal district, the newest hotspot of hydrocarbon development, covers 19.2% of the Okrug but includes only 3.1% of YNAO residents (excluding shift workers); 75% of its population are of Indigenous descent. The regional census has no information on numbers of shift workers, which can significantly skew these numbers. For instance, the Yamal district temporary workforce may be as much as twice the registered population of the district, e.g. 20,000 in Sabetta, 5,500 in Kharasavey, 2,500 for the Northern Latitude Railway-2 vs. c. 16,700 residents of Yamal district (Solodovnikov, 2018).

As to where the shift workers are commuting from is less clear, the region attracted more foreign migrants than Russia on average (Kharlampieva, 2017): for instance, residents from 48 countries worked on the Yamal LNG project (Loginov et al., 2020) with the Russian majority.

The low level of environmental culture in Russia in general has been recognised by the government in the Strategy of Ecological Security through to 2025 in 2017[13] and confirmed by a WCIOM poll of 2011 on ecological consciousness, that found that the main characteristic of environmental consciousness of Russians is 'ecological parasitism' and personal distancing from ecological problems[14] resulting from poor ecological education and awareness. A 2014 Levada-Centre poll similarly showed that people's preoccupation with the natural environment was pragmatic (e.g. health, recreational zones) and locational, correlating with low concern for preservation of biodiversity and rare species and demonstrating little to no concern for areas outside of their place of residence, which would not apply to most immigrants to the Arctic due to placeholder mentality and lack of exposure (see also Haliy, 2015).[15]

Ecological education in Russian schools was taken out of the federal secondary school curriculum in 1998, which some link to the general attenuation of political and civil attention to ecological issues (Ivanova, 2017). This measure would have affected the most active workforce in their late 20s to early 40s. Alternative sources of environmental education such as mass media and family have been deemed ineffective due to the fact that these sources themselves lack relevant knowledge and skills (e.g. Novoselova, 2017).

The highly mobile demographics in Yamal indicate that imaginaries of nature and environmental values/educatedness are likely to be imported from the non-Arctic mainland and reflect common misconceptions, lack of knowledge and concern captured by national survey results on ecological and Arctic development issues.[16] With no wider societal exposure to the Russian Arctic, migrants to the North would be faced with a drastically different landscape to interpret and internalise against the dominant political and corporate notions of the Arctic as Russia's resource base. If a process of appropriation[17] of the environment "typically results in a sense of responsibility" (Benages-Albert et al., 2015: 1), understanding how human-animal interactions contribute to environmental sense-making in the Arctic can reveal the emergence of such responsibility.

Out in the cold: Settled immigrants and Arctic fauna

Throughout desk study and field research in Yamal certain human-animal relations emerged; they could be arbitrarily described as direct or indirect, that is unmediated or mediated through infrastructure and other means. Direct would include: legal and illegal hunting and fishing, encounters with wild animals, observation of animals. Indirect would include: subsidised predators; improper food waste management; and pollution.

Hunting

Recreational hunting is generally reserved for Indigenous people and local residents. There are 25 hunters in Mys Kamenny, where the field research took place, referred to as "the last of the Mohicans" [18] by the Senior Specialist of the State Public Institution 'Service for protection, control and regulation of the use of bioresources YNAO, Yamal territorial branch'. He mentioned the number of hunters has fallen significantly compared to the 1990s, as young people are not interested and shift workers would not be able to hunt in view of corporate policy restrictions (they said that if you were found with a gun on Gazprom premises, "you'd rather shoot yourself"). During the 1990s, hunting was providing gastronomic assistance to local families but now it is a matter of habit and pleasure for the remaining old-time residents. In 2017 the spring season hunting licence cost 650 rubles (c.£7), it covered a period of 10 days defined by the regional authority and allowed to harvest 10 geese and 30 ducks. In the autumn season they would hunt partridge, and in the winter Arctic hare. The catch would not be sold but given as a gift to friends, family or others on special occasions, used as payment for a favour, exchanged for a fish ("a goose for a muksun"[19]) or consumed by hunters themselves.

The Service comprised of two people - a senior and a leading specialist, neither of whom had a specialist education at the time but were completing a distance degree in biology and hunting science from Irkutsk University. The Service is responsible for conducting raids and poaching prevention and outreach activities, as among locals so among the nomadic Nenets. They said that all the people were known to them, that they would go around hunters' huts within 50km to the north from the municipality before and after the season making sure that there were no firearms. As there are Red Book [protected] species nesting amongst hunted birds on Yamal peninsula, the hunters should be able to differentiate between them. The specialists of the Service were confident that the few remaining local hunters were very experienced. Studies (Newth et al., 2019) from the Nenets Autonomous Okrug (as well as public sources, e.g. hunters' fo-

rums) suggest that accidental shooting at protected species does take place. The most vulnerable species are Bewick's swan, lesser white-fronted goose and red-breasted goose. The official information for hunters on the YNAO website also indicates that in dim light or with bad optics it is very hard to differentiate between them even for a specialist, particularly if the birds fly in a mixed flock.[20]

During the interview the specialists mentioned that in other areas of the Yamal district (Seyaha, south of Sabetta, an Indigenous majority village), residents hunt aquatic birds in earnest, implying larger quantities. Indigenous people do not require a hunting licence and may not have a licence for a gun (which, for instance, could have been inherited from parents or grandparents and have no serial number). But nomadic Nenets are, according to them, rather opportunistic hunters as they have no time to spare from moving the herd and the camp.

The specialists accumulated some valuable environmental knowledge about the state of local fauna: they observed smaller quantities of geese year on year suggesting that the birds do not come back from overwintering areas, that the heavy traffic of construction vehicles by the lake adjacent to the municipality deterred many birds from the habitual nesting spots. They said that the Arctic fox had increased in numbers explaining it to an extent by a decline in fur crafts among the Nenets. They also noticed larger numbers of ptarmigan, which might also relate to the Arctic fox boom. The attunement of the specialists and presumably other hunters with local wildlife, the developed ability to notice animal presence and absence, demonstrate the immigrants' emplacement in the landscape. While such a disposition may not lead to place attachment or environmental responsibility, it is likely to be determinative for their sense of place.

While the impact of hunting on the Yamal peninsula has a certain degree of uncertainty, due to lack of research and data, it seems the dynamic and scale of recreational and subsistence hunting would be diminishing, partly due to reliability of food supply and income, partly due to corporate policies preventing shift workers from taking up this activity. At the same time, hunting and its oversight plays an important role as a source of environmental knowledge and emplacement for the immigrants (directly and through dissipation in the community), thus dwindling interest in hunting is likely to affect environmental assimilation.

Fishing

Fishing has been a traditional source of subsistence and wealth for local communities. But since 2000s the whitefish and sturgeon declined significantly. The Ob population of Siberian sturgeon had been affected by the industrial development and damming upstream the Ob river and was included in the Russian Red Book in 1997 (EN IUCN). But unlike sturgeon, muksun population decline has, on the one hand, been associated with the hydrocarbon development in the Ob delta and on the other, with local fishing and poaching. The difference in opinions can be generally traced to pro- or anti-extractive narratives with the latter being voiced by scientists as well as locals personally affected by the loss.

The 'disappearance' of muksun and other species of fish from the Ob estuary have been reported by the locals of Indigenous and non-Indigenous descent as well as visiting scientists.[21] The regional authorities went as far as placing a moratorium on muksun fishing by anyone from the Ob estuary in 2014 (leaving catchment from other areas in commercial circulation). Some even guess that the overwintering areas for the fish (Corregonidae and Acipenseridae) will be compromised to such an extent that it will further undermine the fish population already in decline.[22]

While the scale and impact of construction works and compensatory release of fry are not fully understood, they might have an indirect effect by raising the price and boosting the demand.

The value of whitefish as an exchange item as well as a delicacy may further promote illegal fishing and distribution.[23] One of the old-time residents of Mys Kamenny mentioned that in the 1990s you could exchange muksun tail for almost anything.

Fishing behaviour of non-Indigenous locals of YNAO has been compared to 'hogging'. Regardless of whether they were raised in YNAO or not, the attitude towards free recreational fishing is to grab as much as you can and to fill up fridge-freezers, or as one person commented, take as much fish so that grandchildren and the boss and everyone they'd give it to would never be hungry again.[24] In Mys Kamenny, one of the respondents said in the 1990s the fishing was done "by helicopters", alluding to the large amount that was taken out.

In 2018, to address the problem of unregulated catchment volume, a daily allowance was set to 5kg for Russia overall with some regional exceptions, one of which is Yamal-Nenets Autonomous Okrug, where the total daily allowance was not to exceed 20kg for all permitted species of fish per person.[25] One caveat of such a measure would be the case when the less valuable fish is discarded if a bigger fish is caught later. Another is the existing problem of enforcement in remote areas.

While enforcement measures have become more effective compared to the 1990s, the illegal means of fishing are abundant and can be easily accessed while catching a poacher in the act remains problematic due to low population density and territorial vastness. While the import of synthetic nets that have been associated with poaching and fish population decline as a result of their accumulation in waterbodies across all of Russia, were officially banned in 2008[26], they have been widely available as the import of materials that they are made of remained legal and many are found in the Ob estuary by the fishing inspectors. To avoid a fine, poachers tend to ditch them in the river or on the shore, where ghost nets continue to have a negative impact on local fauna. It is difficult to assess such impact on the Ob estuary as there are no state-wide, regional or local studies on the issue.[27] In 2019 some recreational fishermen addressed the government with the request to delegalise the import and distribution of nets.[28] Ironically, in 2020 the use of such nets became illegal in all regions of Russia save the Yamal-Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug and Sverdlovsk regions.

There is no single data source regarding illegal fishing in YNAO, some cases made it to the media and notably a few of them were related to Mys Kamenny where allegedly there is a good fishing spot for muksun. One of the reports dated February 2019 referred to illegal activities (fish salting and smoking) taking place in the garage belonging to the administration of Mys Kamenny, of which the local mayor denied all the knowledge. According to the YNAO government, the number of criminal cases initiated in the first 5 months of 2019 were twice as much as in the whole of 2018.[29]

Detrimental impacts of unregulated recreational fishing and poaching are not confined to means and amounts of fish caught, but are also caused by driving and parking on ice or in the close vicinity to the water bodies, cooking and littering, spillage of fuel and other chemicals, etc. The influx of human population on the peninsula would also mean an increase in food demand, whether purchased directly from Indigenous or non-Indigenous locals or via a network of distributors.

The area of impact of whitefish decline has spread beyond Yamal and is already noticeable among the Indigenous groups of Khanty and Mansi upstream the river. These ethnic groups traditionally used muksun as a form of currency but as of the past three years (2016-2019) they have reported that 'muksun disappeared' and the rumour goes that the fish was "poisoned up above" (in Yamal) by the oil and gas industry (Pivneva, 2019: 89).

There is a subverted media conflict between the oil and gas companies of the region who have been trying to divert the blame for the fish disappearance onto the greed of locals and the locals who blame the industry. And while there is no data on the fish catchment and unbiased ecosystem-based studies on the state of ichtiofauna of the Ob estuary, the moratorium may not be effective and the negative trend is likely to remain unchanged.

Waste

Waste is a growing problem in the developing Arctic region, as a local municipal capacity issue as well as a result of physical limitations of the remote location and its seasonality. Accumulated historical waste poses additional difficulties to effective waste management in the settlements that, like Mys Kamenny, are in the catchment area of oil and gas companies' demographic impact and social responsibility programmes.

According to Grebenets et al. (2019), there are three types of impacts of waste onto the Arctic landscapes: mechanical (change of relief), chemo-physical (leeching of pollutants into soils and groundwater), and thermal (thermoerosion of permafrost). Solid domestic and construction waste, being common amongst all settlements, can pose all three risks to the dumping grounds in the permafrost area. Additionally, ruination of residential buildings and construction of new ones has created more issues related to the disposal of construction and demolition debris.

During the interview, the Mys Kamenny official in charge of waste management lamented that removing waste from the municipality, which takes a large part of the settlement stretching along the river bank as well as other landfill sites, is uneconomic and has to be subsidised, yet the municipality has been solely responsible for this task. The jetty, she said, was 34km from the settlement, so transportation would first be required, then loading machinery, then a barge to Tyumen, unloading and disposal. Waste operators are discouraged to sign a contract due to high costs associated with rubbish handling, shipment and processing. The only way for the municipality to afford to dispose of waste is gratuitous service agreements (e.g. valuable waste such as metal scrap, gas pipe cuttings).

Before industry returned to the area, the problem of domestic waste was not significant, as its proportion to other sources of solid waste was low, even though there was plenty of metal and abandoned machinery. And while Gazprom (and its subsidiaries), similar to Novatek, supposedly have strict regimes on their licence territories, the Head of the Sector of Property Relations, Housing and Utility Infrastructure, and Housing Policies of Mys Kamenny said that 'there were no problems with household solid waste before Gazprom'.[30] Two Russian-made incinerators were, in fact, installed in Mys Kamenny in 2018. These are large installations that can burn 4-8 tons of waste at a time or up to 24 tons a day each, that have been adapted for use in the Arctic. Waste incineration has been considered a controversial method of solid waste management due to emissions of black carbon and other toxic pollutants as well as heat, which is especially relevant in the Arctic; and while the manufacturer claims that the product passed state ecological expertise, is compliant with EU legislation and ISO certified for cleaner emissions, its effects onto the municipal waste dynamic and the local environment may vary throughout its service life. For instance, the shift in consumer goods supply since around 2012 from the 'northern delivery' (*severny zavoz*) to private small-scale helicopter shipments affected the composition of domestic waste with the growing amount of plastic packaging (every item

Domestic waste, May 2017, Mys Kamenny.

in the local shops would be put in an individual plastic bag free of charge) and food waste (especially for products with a short shelf life such as dairy and meat). The increase in domestic and construction waste in Mys Kamenny reflects the Russian trend of the past decade.[31] And while there has been a positive change towards recycling in the country on average, availability of incinerators would undoubtedly discourage it.

While waste management is affected by a combination of socioeconomic and technological factors, the effects of population growth and a changing supply of goods and products in the context of the remote locale underlain with permafrost onto the environment needs further understanding. The incinerators may have a positive effect on the landscape (instant disposal of many years' of waste accumulation) but also create a market to meet the capacity of the equipment from the nearby area (the YNAO Regional Town-Planning Standards set a norm of solid domestic waste generation per person at 550kg/annum which if multiplied by the number of residents of Mys Kamenny would only require around 30 days/year of one incinerator's operation at full load).

Sewage

Sewage effluents also pose a significant problem for the municipality, since 'everything flows into the water', said the official, and nobody knows how to control it. There is no water treatment plant in the municipality, but a cesspool which is emptied by a cistern truck and then discharged onto the relief outside the municipal area. The companies that operate in the area do not discuss anything relating to water intake or sewage with the municipality, hence the local officials have no data relating to water management within the industrial sites and shift-worker camps. The growth of the population within the municipality on account of subcontractors' employees has increased the load on local services; further development of hydrocarbon fields in the vicinity of the settlement is likely to affect the amount of water intake and discharge.

While it is clear that the renewed development has had some effect onto the municipal services, the process of rebuilding seems to have a cyclical pattern while waste management strategy is reliant upon good will of local oil and gas operators. Mys Kamenny is an individual case, but similar effects of recolonisation are noticeable in Novy Port, Seyakha (south of Sabetta), while Kharasavey and Sabetta have been cleared of the legacy waste by Novatek and Gazprom respectively before new construction began.

The impact of poorly managed domestic waste and affluent discharge in the conditions of the Arctic onto its fauna, while unmeasured, can be observed through a sustained feral dog population as well as mechanical and chemical changes to the biological food base of the primary consumers. Plastic waste accumulated on peninsula shores is likely to end up in the Ob estuary and enter the Kara Sea due to wind transport and snow melt. The cold temperatures render plastic more brittle and easily breakable into microplastics; at present there is a gap in understanding the effect of plastics onto the Arctic terrestrial and freshwater systems (Halsband & Herzke, 2019), yet the contamination is likely to have negative mechanical and ecotoxicological effects on the biota. In addition, food waste may attract polar bears and Arctic foxes into the settlements.

Predators

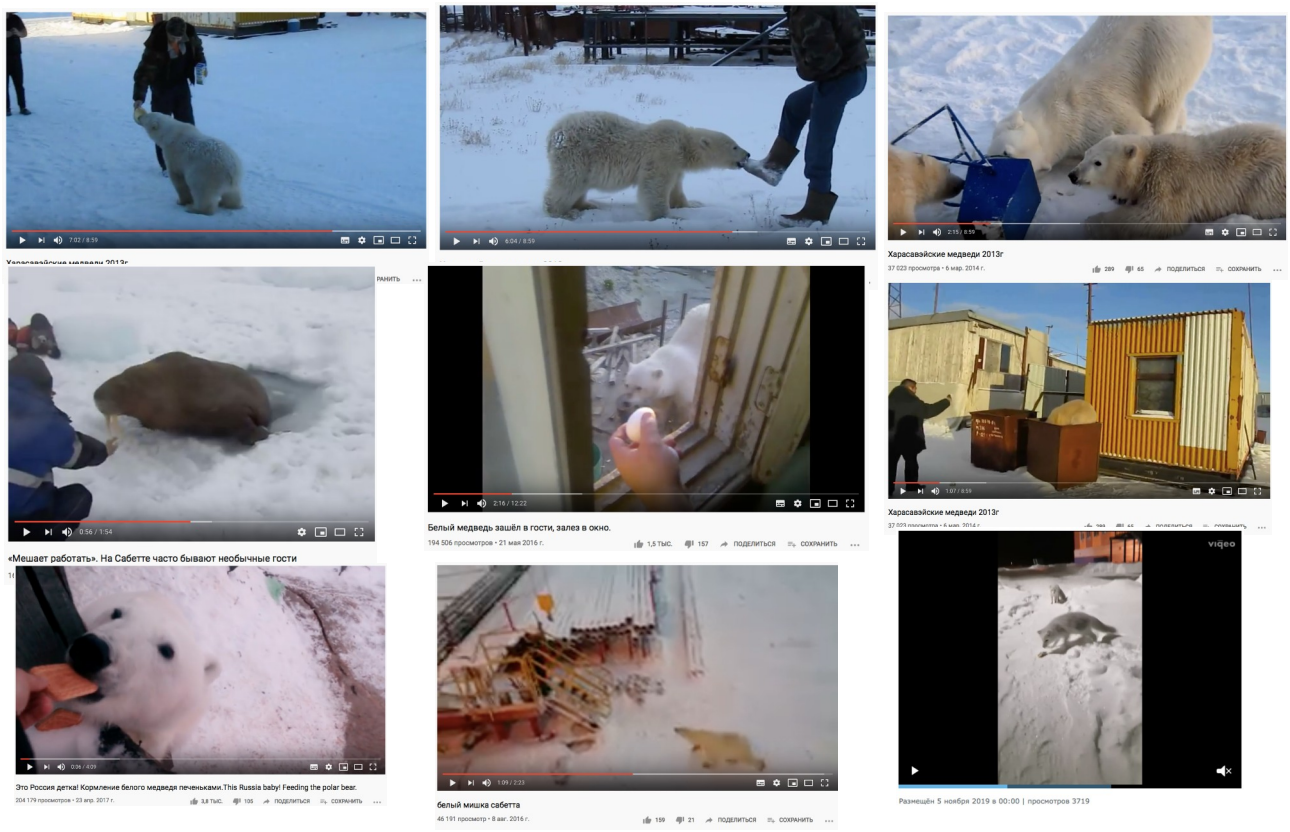
A particular issue that Mys Kamenny and other northern settlements share is the proliferation of subsidised predators, particularly stray or semi-feral dogs that are being left behind during the summer period or abandoned by their owners. According to Mys Kamenny official, there is no legal way of dealing with them. And their environmental impacts, e.g. predation on bird nests; reindeer and other animals; and other wildlife–dog interactions, including transmission of rabies, have not been studied. There is a consensus that dogs can significantly disrupt ecosystems (Young et al., 2011). As Dorothee Ehrich, UIT, who did her fieldwork in Yamal, explained: "Dogs roam in the tundra, and as there are no trees there, all birds nest on the ground. Nests are easily accessible and dogs actively ravage birds' nests around the settlements".[32] Some people bring their own dogs to protect themselves against stray dogs that form

packs and often act aggressively or defensively towards people, which might propel the issue of strays in the long-run. Nenets reported cases of their reindeers being attacked and mauled by dogs in the vicinity of Mys Kamenny.[33] A similar issue has been brought to light in the Canadian Arctic[34] where lethal attacks had been reported. The solution adopted there was to sterilise dogs using volunteer labour. Zelenaya Arktika, an environmental organisation based in Salekhard, put the emphasis in their dog-related campaigns in major cities into educating people, as according to them this problem is primarily a result of irresponsible attitudes towards pets.

There is no evidence or data on other subsidised predators, such as grey crows (one crow sighted in Mys Kamenny), rats and cats in this settlement, but it is possible that these animals, too, survive in the wild.

Polar bears meet gas workers

There have been no studies done assessing environmental awareness amongst shift workers or their impact on the environment, apart from isolated statements that anthropogenic load of shift-type exploration is less compared to setting up villages or towns. Yet there may be incidents of 'barbarian' environmental behaviour associated with the placeholder (*vremenschik*) mentality (e.g. Sorokin et al., 2017; Silin, 2015). In terms of migrants' behaviour and direct ecological impact, one study mentioned 'environmental laxness' ('экологическая распущенность') of 'wild', i.e. those hired without specifying terms of relocation and living conditions, as opposed to 'organised' shift workers (Silin, 2017). While currently it is hard to measure the level of environmental awareness amongst shift workers from the 'south', to an extent it can be drawn out circumstantially. On the one hand, operating companies' report their



Snapshots of videos taken in Sabetta and Kharasavey showing human-animal encounters, 2012-2019

ecological initiatives directed onto cleaning up the rubbish and planting trees[35] in the towns near their operation. Novatek distributes leaflets on precautions of polar bear and Arctic fox encounters, as well as rules of behaviour around marine mammals.[36] Gazprom, too, lists increasing competence on matters related to environmental protection and engaging all its employees in environmental activities as part of their environmental policy.[37]

Despite corporate efforts, there has been an increasing number of inappropriate and sometimes dangerous behaviour during wildlife encounters reported by media and posted online by shift workers. There have been several anonymous reports of polar bear sightings and plenty of amateur videos on social media sites such as YouTube, Vkontakte, etc. in Kharasavey, Bovanenkovo and Sabetta uploaded by shift workers (non-Indigenous locals within licence sites), some depicting feeding (biscuits, eggs, candies, bread and sausage), harassing polar bears and their cubs or

talking about cases when a polar bear was shot.[38] In the book dedicated to the 20th anniversary of the icebreaker *Vaygach* (Suslikov, 2009), on landing in Kharasavey in 2007 local workers compared polar bears to stray dogs, showed a relaxed attitude to polar bear presence in the settlement which would indicate habitual visitation of the predator and lack of informed advice.

A new national standard on managing conflicts when encountering polar bears might get issued in the nearest future[39] but at the moment shift workers' actions are 'regulated' by the employer's health and safety policy and, using the words of Anatoliy Kochnev, the Russian Academy scientist, the polar bear imaginary as if it were a Russian kids' cartoon character Umka.[40] In 2018 WWF Russia issued its own rules on avoiding conflict situations between man and polar bear in the Arctic (WWF, 2018). For working settlements in the Arctic these rules recommended a 3m fence around the perimeter of the whole facility or cooking stations and outdoor recreational areas; it also stated that special safety instructions should be issued to personnel limiting their movement outside of fenced off zones. These measures have not been put in place, and it is possible that people would continue to engage in such behaviour (as some these videos show the disregard for corporate health and safety rules, for which a person could be dismissed).

The sightings of polar bears increased not only at the companies' sites but also further south and inland than would be typical for Yamal peninsula. For instance, in 2019 a polar bear was spotted in Yar-Sale, the district' capital. Scientists explain such behaviour as a result of climate change, but it is possible that recolonisation (e.g. increase in food waste and feeding) may be causing such visits; more data would be required to corroborate this. Similarly, construction sites (e.g. Sabetta) attracted Arctic foxes; several hundred dens have been discovered in the vicinity of Yamal LNG in 2014.[41] There have also been news reporting rabies contracted by shift workers from Arctic foxes in the Yamal district.[42]

In October 2019, around 1000 Atlantic walruses beached on the West coast of Yamal peninsula in the vicinity of Kharasavey, a hydrocarbon field undergoing development; this behaviour is unusual and so far there is no explanation for it. The frequency of encounters between shift workers and walruses can also ensue. The video (clip image above), for instance, showed how several shift workers surrounded the hole in the ice and attempted to touch the walrus preventing it from getting on the ice.

Muksun's tail and immigrants' sense of the Arctic

While 'sense of place' is represented in the scientific literature as a social construct, physical attributes of a place and human uses of the environment have also been acknowledged to affect a person's attachment to it and the constructed meaning of such a place (e.g. Stedman, 2003; Masterson et al., 2017). Here sense of place is understood as a result of "dynamic interaction between people (including their senses) and their environment" (Horlings, 2018: 313).

The interviewees' experiences of the natural environment of Mys Kamenny were varied, yet a certain pattern could be discerned. The interviews in Mys Kamenny showed that duration of stay correlated with a growing sense of place while emotional attitudes ranged from love to hate regardless of the time spent there but rather depended on something else. That is, people that stayed longer felt comfortable outdoors and interacted with nature more (fishing, hunting, berry and mushroom picking, barbecues, snowmobile and boat rides...), yet some openly expressed their desire to leave. Yet, the reason these interviewees gave was surprising: the whitefish (*C. muksun*) disappeared from the Ob estuary which affected their attachment and made it intolerable for those who lived through the 1990s.

According to the residents, a formative role for the old-time immigrants was the 1990s transition when food supply became short and everyone would heavily rely on natural bioresources

for subsistence and trade. Head of the Sector of Property Relations spoke of those who 'survived' the 1990s, they have all the equipment and knowledge (a safe, a gun, etc.), that they would go fishing and hand out their catch to village residents: "Иначе никак не выжить, ели рыбу вместо колбасы и всего на свете. Денег нет..." (trans. "You couldn't survive otherwise, they ate fish instead of sausage and everything else. There was no money...."). So ultimately, the 1990s were a school of nature harvesting for the non-Indigenous locals and a focal point for creating a sense of place albeit associated with trauma. And while subsistence harvesting was important for the place attachment, it also possibly generated a sense of entitlement for those bioresouces. And when in 2014 the regional government placed a moratorium on *C. muksun*, fishing carried on with many reports of poaching coming from the municipality area or in relation to municipality residents.

According to the interviewees, since 2012 several shops in Mys Kamenny started selling a variety of fruits and vegetables, dairy products, meat, chocolate and sweets, and other items available elsewhere in the country without interruption of supply, in contrast to a shipment every three months as was done previously. They could also place an order for delivery with the next shipment. This allows newcomers to retain their food habits, while reducing some gastronomic pressure off the local bioresources. The hunters, too, confirmed that hunting became a recreational activity rather than a source of subsistence.

The newcomers (less than a year) when asked about the reason behind their move to Mys Kamenny all mentioned a higher salary, but were not keen on outdoor activities, and were not motivated to hunt or venture out. The Service regulating hunting also reported that there were no new signees in many years, the most recent one was a son of one of the hunters, which would reflect the lack of continuity and structure of the population with few young people staying or returning. While exposure to nature and its observation increased environmental awareness of the long time immigrants (easy orientation, weather interpretation, observation of local changes, e.g. increase in number of polar foxes or decrease in nests on the nearby lake was observed by the officials), the duration of stay was not a guarantor of accurate environmental knowledge - one hunter, for instance, built and put up a bird box on a light post, but as there are no trees in the tundra birds nest on the ground.

While there are certain events and place associations that can be formative for immigrants' sense of place and attachment, what counteracts or buffers the response of non-Indigenous locals to change will likely include other socioeconomic factors and opportunities that will determine whether they stay or leave the Arctic, sustaining or breaking the continuity of passed on environmental experience.

Conclusion

In terms of the Russian Arctic generally and the Yamal peninsula specifically, the Indigenous population is considerable. Some settlements (e.g. Mys Kamenny, Sabetta) are made up of non-Indigenous residents from Russia or post-Soviet countries as well as expats from Europe and beyond. The majority of work migrants come from other climatic zones and it is safe to presume that they have a limited practical and theoretical knowledge of the Arctic and subarctic tundra. While YNAO government and major hydrocarbon companies organise events to promote environmental enculturation amongst the settled migrants and the employees, as it generally implies picking up rubbish and planting trees[43], it may not necessarily engage the newcomers with the nature in a way that would promote understanding and safeguarding. While settled immigrants would have more freedom to experience and observe the tundra compared to shift workers that live on the corporate premises and are not allowed to fish, hunt or gather berries and mushrooms, what separates these two groups of residents from the Indigenous population of Yamal is that most of them have a family and a home somewhere else and an intention to

return there. That, together with a fairly low level of environmental awareness, could be two major factors affecting how these non-Indigenous communities interact with their adopted, temporary surroundings. Notwithstanding, Mys Kamenny old time residents exhibited a strong emotional reaction to the decline in whitefish, whilst assuming no responsibility over ecological deterioration. While other studies found environmental internalisation to be conducive to a sense of responsibility (e.g. Benages-Albert et al., 2015: 1), in the case of Mys Kamenny, the only environmental action accessible to the 'placeholder' immigrants was voting with their feet. If we assume that sense of place forms through experience and emerges from human interactions with the biophysical environment (Masterson et al., 2018), then limiting such interactions (e.g. in shift work camps) would have a negative effect on immigrants' environmental emplacement but how it would affect immigrants' environmental attitudes is unclear.

The issues that stem from the interactions of immigrants with nature unfamiliar, alien or 'meaningless' relative to their 'prime landscape', and the relations that arise between the native fauna and immigrants as the numbers of the latter scale up can pose a few socioecological issues:

- Dogs and other subsidised predators brought/abandoned by migrants as companies increasingly prefer FIFO over settled workforce could serve as disease vectors and are likely to have other unknown effects on local wildlife and domestic reindeer;
- Ecological knowledge production (e.g. My Kamenny hunters) may be squeezed out by the unopposed corporate ecological surveys (even though the former has no means of feeding back to regional and federal regulation at present, it would still be valuable for the community);
- Increased incidence of unmonitored conflicts between shift workers and Arctic mammals;
- Insensitivity to the Arctic environment as a corporate culture;
- Invisibility of the Arctic animals to the rest of the country's population as a result of corporate secrecy, limited scale and reach of scientific research and media coverage.

Environmental responsibility and ecological awareness at the edge of industrial expansion in the Arctic has never been as prominent an issue, yet the solution is unlikely to be reductionist but rather, as this small study suggests, should be found in the sense-making and extending our understanding of human-nature coexistence (e.g. Morton, 2018).

Notes

1. Russian Arctic coastline is considered a border zone and requires a special permit for entry from the Federal Security Bureau, some areas within it are sectioned off by the private and state-owned oil and gas operators, including industrial and construction sites entry to which necessitate clearance and authorisation from the companies. Moreover, access to Yamal, Gydan and Taymyr, among others, is restricted through absence of permanent roads and through helicopter route map, not to mention harsh weather conditions and polar night.

2. See e.g. Obrist, D., Agnan, Y., Jiskra, M., Olson, C. L., Colegrove, D. P., Hueber, J., ... & Helmig, D. (2017). Tundra uptake of atmospheric elemental mercury drives Arctic mercury pollution. *Nature*, *547*(7662), 201-204. Fyfe, J. C., Von Salzen, K., Gillett, N. P., Arora, V. K., Flato, G. M., & McConnell, J. R. (2013). One hundred years of Arctic surface temperature variation due to anthropogenic influence. *Scientific Reports*, *3*(1), 1-7. Duarte, C. M., Lenton, T. M., Wadhams, P., & Wassmann, P. (2012). Abrupt climate change in the Arctic. *Nature Climate Change*, *2*(2), 60-62. Van Hemert, C., Flint, P. L., Udevitz, M. S., Koch, J. C., Atwood, T. C., Oakley, K. L., & Pearce, J. M. (2015). Forecasting wildlife response to rapid warming in the Alaskan Arctic. *BioScience*, *65*(7), 718-728. Heino, J., Culp, J. M., Erkinaro, J., Goedkoop, W., Lento, J., Rühland, K. M., & Smol, J. P. (2020). Abruptly and irreversibly changing Arctic freshwaters urgently require standardized monitoring. *Journal of Applied Ecology*, *57*(7), 1192-1198. Walker, D. A., Forbes, B. C., Leibman, M. O., Epstein, H. E., Bhatt, U. S., Comiso, J. C., ... & Yu, Q. (2010). Cumulative effects of rapid land-cover and land-use changes on the Yamal Peninsula, Russia. In *Eurasian Arctic land cover and land use in a changing climate* (pp. 207-236). Springer, Dordrecht.
3. Also referred to as 'foreign' and 'native', e.g. native whaling and foreign or specifically European whaling (see e.g. Arctic Whaling: Proceedings of the International Symposium. (1984). University of Groningen, Netherlands.).
4. Egorova, N. (2018, February 2). Ucheny rasskazal ob ugroze populyatsii belyh medvedey (Scientist spoke of the threat to polar bear population). *RIA Novosti.* https://ria.ru/20180227/1515334106.html (in Russian).
5. Pravitelstvo Rossiyskoy Federatsii. (2009). Energeticheskaya strategiya Rossiyskoy Federatsii do 2030 goda (Energy Strategy of the Russian Federation through to 2030). [online] https://minenergo.gov.ru/node/1026 Accessed: 29 September 2021 (in Russian).
6. Ibid.
7. Pravitelstvo Rossiyskoy Federatsii. (2020). Energeticheskaya strategiya Rossiyskoy Federatsii do 2035 goda (Energy Strategy of the Russian Federation through to 2035). [online] https://minenergo.gov.ru/node/1026 Accessed: 29 September 2021 (in Russian).
8. Ponomarev, V. (2014, October 16). *Preobrazheniye Arktiki.* Expert. [online] http://expert.ru/russian_reporter/2014/40/preobrazhenie-arktiki/
9. e.g. Federal Service of the State Statistics of the Russian Federation. (2019, June 18). Migratsionny prirost naseleniya po rayonam Kraynego Severa i mestnostyam, priravnennym k nim (Net migration rate in the districts of the Far North and areas equated to it). [online] https://rosstat.gov.ru/folder/12781 Accessed: 29 September 2021.
10. TASS. (2021, September 13). Chislo vahtovyh vakansiy na Yamale vyroslo na 82% po sravneniyu s proshlym godom (Number of shift work vacancies on Yamal up by 82% compared to last year). [online] https://tass.ru/obschestvo/12370895
11. YNAO migration turnover, according to official sources, exceeded 700,000 people from 2011 to 2020 with an average residence in the region estimated at only 9 years and only 27% of people being born in the region (Government of YNAO. (2021, March 2). Proyekt strategii sotsialno-ekonomicheskogo razvitiya Yamalo-Nenetskogo Okruga do 2035 goda (Draft of the social-economic development strategy of the Yamal-Nenets Autonomous Okrug through to 2035). [online] https://www.economy.gov.ru/material/file/54b0ca97c75f0c789e733191c545aaf5/PROEKT_STRATEGII.pdf p. 38. Accessed: 29 September 2021).
12. President of the Russian Federation. (2017, 19 April). *Decree No. 176 on Environmental Security of the Russian Federation through to 2025*. http://kremlin.ru/acts/bank/41879/print (in Russian)
13. WCIOM. (2011, January 20). *Ekologicheskaya kultura rossiyan (Ecological culture of Russians).* https://wciom.ru/index.php?id=236&uid=1763 (in Russian)

14. Poll results: Levada-centre. (2014, July 10). *Ekologicheskiye problemy i bezopasnost (Ecological problems and security).* http://www.levada.ru/10-07-2014/ekologicheskie-problemy-i-bezopasnost (in Russian)
15. The national poll 'Meaning and value of the Arctic' conducted in 2015 by FOM (lit. Fund of Public Opinion) found low awareness of the Russian Arctic development but positive appraisal of the Arctic extractive development. The poll showed that respondents knew little of the region's ecological problems and only 37% of them expressed an interest of visiting the region, pointing at cognitive distancing as from the region's politics so from its physical environment (FOM. (2015, July 1). Smysl i tsennost Arktiki (Meaning and value of the Arctic). [online] https://fom.ru/Mir/12216).
16. Appropriation here is used not as Marxist critic but rather as a process of affiliation with the place through one's senses, as in literally 'making one's own'. Benages-Albert et al. (2015) use the term 'appropriation of space' to mean emergence of people-place bonds that evolve over time.
17. Alluding to J.F. Cooper's 1757 historical novel, included in the Soviet/Russian secondary school curriculum.
18. *Coregonus muksun* is a freshwater whitefish native to the Siberian Arctic.
19. Service for protection, control and management of bioresources of YNAO. (n.d.). Vnimaniye! Krasnoknizhnye vidy guseobraznyh ptits Rossii! (Attention! Red Book species of anseriformes of Russia!). [online] http://www.obr-yanao.ru/assets/files/informaciya-po-krasnoknizhnym-vidam-guseebraznyh.pdf Accessed: 29 September 2021.
20. e.g. Antropov and Nabiullina, 2018; Bogdanov and Melnichenko, 2016; Forbes et al., 2009.
21. Povarnitsyna, M., Muratov, I., Dadyko, V. and Sivkov, V. (2019, May 25). Demograficheskaya yama dlya muksuna - ob osobennostyah kvesta 'Nerest' v Yugre (Demographic pit for muksun - on the particularities of the 'Nerest' quest in Jugra). [online] https://ugra-tv.ru/news/society/demograficheskaya_yama_dlya_muksuna_ob_osobennostyakh_kvesta_nerest_v_yugre/
22. Egorov, V. (2016, July 5). Na Yamale protsvetayet cherny rynok beloy ryby (Black market of whitefish flourishing in Yamal). [online] https://ura.news/articles/1036268319
23. YamalPro. (2019, April 25). Rosrybolovstvo: zapasov sterlyadi i muksuna v Obi ostalos okolo 7.5 tonn (Rosrybolovstvo: around 7.5 tons of sturgeon and muksun stocks letf in Obe). [online] http://www.yamalpro.ru/2019/04/25/rosryibolovstvo-zapasov-sterlyadi-i-muksuna-v-obi-ostalos-okolo-7-5-tonn/
24. Government of the Russian Federation. (2018, December 25). *Federally zakon o lyubitelskom rybolovstve i o venison izmeneniy v otdelnye zakonodatelnye akty Rossiyskoy Federatsii, N 475-FZ (Federal law on recreational fishing and revision of certain legal acts of the Russian Federation, N 475-FZ).* [online] http://www.consultant.ru/document/cons_doc_LAW_314261/ Accessed: 29 September 2021. (in Russian) Government of YNAO. (2021, August 4). *Svobodno i besplatno: na Yamale 1 sentyabrya 2021 goda vstupyat v silu novye pravila rybalki (Free and gratis: new fishing rules will come into force in Yamal 1 September 2021).* [press release] https://www.yanao.ru/presscenter/news/74776/ Accessed: 29 September 2021. (in Russian)
25. State Duma of the Russian Federation. (2004). Federal Law on Fishing and Protection of Aquatic Biological Resources. [online] http://docs.cntd.ru/document/901918398 Accessed: 29 September 2021.
26. In 2021 the Baikal without Fishnets foundation has secured the sponsorship to investigate the distribution of ghost nets in lake Baikal (see https://baikalfoundation.ru/en/).
27. Gaiva, E. (2019, July 7). Rybaki potrebovali zapretit prodazhu kitayskih setey (Fishermen demanded a ban on Chinese fishnets sales). [online] https://rg.ru/2019/07/07/rybaki-potrebovali-zapretit-prodazhu-kitajskih-setej.html

28. Government of YNAO. (2019, June 19). *Na strazhe sigovyh. Gubernator Yamala provel mezhvedmostvennoye soveschaniye po ohrane tsennyh porod yamalskoy ryby (On whitefish guard duty. Yamal governor held an intradepartmental meeting on protection of valuable Yamal fish breeds).* [press release] https://www.yanao.ru/presscenter/news/11732/

29. Gazpromneft, subsidiary of Gazprom, began construction works of the oil loading terminal Arctic Gates near Mys Kamenny in 2013. Arctic Gates has been in operation since 2016.

30. Volkova, A.V. (2018). *Rynok utilizatsii orhodov (Waste utilisation market).* https://roscongress.org/materials/rynok-utilizatsii-otkhodov-2018-god-/

31. Vesti Yamal. (2014, July 21). *Strannye pestsy i 'plodorodny god'. Uchenye izuchili ekologiu tundry v rayone Sabetty (Strange arctic foxes and a 'fruitful year'. Scientists studied ecology of tundra in the vicinity of Sabetta).* https://vesti-yamal.ru/ru/vjesti_jamal/strannyie_pestsyi_i_plodorodnyiy_god_uchenyie_izuchili_ekologiyu_tundryi_v_rayone_sabettyi142158

32. Znak. (2018, February 12). *Tundroviki YNAO zhaluyutsa na nashestviye sobak kotorye ubivayut ih oleney (Tundra nomads of YNAO complain about the invasion of dogs that kill their reindeer).* https://www.znak.com/2018-02-12/tundroviki_yanao_zhaluyutsya_na_nashestvie_brodyachih_sobak_kotorye_ubivayut_ih_oleney

33. Montgomery, M. (2014, October 17). *Struggle to control dangerous stray dogs across northern Canada.* https://www.rcinet.ca/eye-on-the-arctic/2014/10/17/struggle-to-control-dangerous-stray-dogs-across-northern-canada/

34. Gazprom. (2017). *Ekologicheskiy otchet PAO Gazprom za 2017 god (Ecological report of Gazprom PLC for the year of 2017).* https://www.gazprom.ru/f/posts/85/227737/gazprom-environmental-report-2017-rus.pdf (in Russian) Accessed on 28 September 2021.

35. Novatek. (2020). *Sustainability report 2020.* https://www.novatek.ru/common/upload/doc/NOVATEK_SR_2020_ENG.pdf Accessed on 28 September 2021.

36. Gazprom. (2015, May 25). *Ekologicheskaya politika OAO Gazprom (Ecological policy of PJSC Gazprom).* https://www.gazprom.ru/f/posts/73/278066/environmental_policy.pdf

37. Ivanov. S. (2014, March 6). Kharasaveyskiye medvedi 2013g. (Kharasavey bears 2013). YouTube. https://www.youtube.com/watch?v=rPpInT-dM6I Accessed: 29 Septmeber 2021.

38. The draft of this standard was published online in 2020 (http://docs.cntd.ru/document/437259669) with a disclaimer that it is "not subject to adoption and is for information only".

39. Egorova, N. (2018, February 2). Ucheny rasskazal ob ugroze populyatsii belyh medvedey (Scientist spoke of the threat to polar bear population). *RIA Novosti.* https://ria.ru/20180227/1515334106.html (in Russian)

40. Sever Press. (2018, November 7). *Pesets. Dikiye zhivotnye etoy osenyu teryayut adekvatnost (Arctic fox. Wild animals lose it this autumn)* [video]. YouTube. https://youtu.be/F4_VDcu0LMo

41. Vesti. (2014, January 29). *Beshenye pestsy atakuyut vahtavikov na Yamale (Rabid arctic foxes attack shift workers in Yamal).* https://www.vesti.ru/article/1794488 (in Russian)

42. Government of YNAO. (2019, June 5). *Ekologicheskoye blagopoluchiye v chisle nashih glavnyh prioritetov. 5 iunya - den ekologa (Ecological wellbeing is among our main priorities. June 5 - Day of Ecologist)* [Press release]. https://www.yanao.ru/presscenter/news/11248/)

References

Antropov, D.A. & Nabiullina, F.Z. (2018). Issledovaniye prichin snizheniya chislennosti sigovyh ryb na Yamale. In *Technokongress,* pp. 3-7. (in Russian)

Aksnes, D., Osipov, I., Moskaleva, O., & Kullerud, L. (2016). Arctic research publication trends: A pilot study.

Armstrong, P. (2002). The postcolonial animal. Society and Animals, 10(4), 413-420.

Beach, H., & Stammler, F. (2006). Human–animal relations in pastoralism. *Nomadic peoples*, *10*(2), 6-30.

Benages-Albert, M., Di Masso, A., Porcel, S., Pol, E., & Vall-Casas, P. (2015). Revisiting the appropriation of space in metropolitan river corridors. *Journal of Environmental Psychology*, *42*, 1-15.

Bogdanov, V.D. & Melnichenko, I.P. (2016). Kharakteristika ikhtiofauny poluostrova Yamal (Yamalo-Nenetskiy avtonomny Okrug). *Fauna Urala i Sibiri,* 1. (in Russian)

Bull, J., Holmberg, T., & Åsberg, C. (Eds.). (2017). Animal Places: Lively Cartographies of Human-Animal Relations. Routledge.

Buller, H. (2014). Animal geographies I. *Progress in Human Geography*, *38*(2), 308-318.

Egorova, N. (2018, February 2). Ucheny rasskazal ob ugroze populyatsii belyh medvedey (Scientist spoke of the threat to polar bear population). *RIA Novosti.* https://ria.ru/20180227/1515334106.html (in Russian)

Forbes, B. C., Stammler, F., Kumpula, T., Meschtyb, N., Pajunen, A., and Kaarlejärvi, E. (2009). High resilience in the Yamal-Nenets social–ecological system, west Siberian Arctic, Russia. *Proceedings of the National Academy of Sciences*, *106*(52), pp. 22041-22048.

Gotfredsen, A. B., Appelt, M., & Hastrup, K. (2018). Walrus history around the North Water: Human–animal relations in a long-term perspective. Ambio, 47(2), 193-212.

Haliy, I.A. (2015). Ekologicheskoye soznaniye naseleniya sovremennoy Rossii. *Istoriya i sovremennost,* 1 (21). (in Russian)

Halsband, C., & Herzke, D. (2019). Plastic litter in the European Arctic: what do we know?. *Emerging Contaminants*, *5*, 308-318.

Haraway, D. (2008). *When Species Meet.* Minneapolis, MN: University of Minnesota Press.

Horlings, L.G. (2018). 'Politics of connectivity: the relevance of place-based approaches to support sustainable development and the governance of nature and landscape', in Marsden, T. (Ed.). (2018). *The Sage Handbook of Nature*. SAGE.

Hovorka, A. J. (2017). Animal geographies I: Globalizing and decolonizing. Progress in Human Geography, 41(3), 382-394.

Ivanova, L. Y. (2017). Ekologicheskoye obrazovaniye i obrazovaniye dlya ustoychevogo razvitiya v rossiyskoy shkole: nastoyascheye i buduscheye (Ecological education and education for sustainable development in the Russian school: present and future). *Vestnik Instituta Sotsiologii,* 4 (8). Available at: https://www.vestnik-isras.ru/files/File/Vestnik_2017_23/Ivanova.pdf

Kharlampieva, N.K. ed. (2017). *Etnonatsionalnye protsessy v Arktike: tendentsii, problemy i perspektivy (Ethnonational processes in the Arctic: trends, problems and prospects).* Available at: https://narfu.ru/university/library/books/3214.pdf (in Russian)

Kornilov, G. (2014). Naseleniye Yamala v XX v.: protsess formirovaniya (Yamal population in the 20th century: process of evolution). *Uralskiy istoricheskiy vestnik.* (2), pp. 136-142.

Loginov, V.G., Ignatyeva, M.N., Yurak, V.V., Drozdova, I.V. (2020). Vahtoviy metod privlecheniya rabotnikov k osvoyeniyu neftegazovyh resursov arkticheskih territoriy. *Izvestiya vysshikh uchebnykh zavedenii. Gornyi zhurnal*, 5.

Masterson, V. A., Enqvist, J. P., Stedman, R. C., & Tengö, M. (2019). Sense of place in social–ecological systems: From theory to empirics. *Sustainability Science*, *14*(3), pp. 555-564.

Morton, T. (2018). *Being ecological*. Mit Press.

Novoselova, E.N. (2017). Rol semeynogo vospitaniya v formirovanii ekologicheskoy kultury individa. *Vestnik Mosk. un-ta. Ser. 18. Sotsiologiya i politologiya,* 23(4).

Pivneva, E.A. (2019). «Skolko vesit rybiy hvost?»: etnichnost i byurokratiya v traditsionnom rybolovstve na Obskom Severe. *Herald of Anthropology*, 86. Available at: http://static.iea.ras.ru/news/Vestnikk46.pdf#page=87 (in Russian)

Pravitelstvo Rossiyskoy Federatsii. (2009). Energeticheskaya strategiya Rossiyskoy Federatsii do 2030 goda (Energy Strategy of the Russian Federation through to 2030). [online] Available at: https://minenergo.gov.ru/node/1026 In Russian

Silin, A.N. (2015). Sotsiologicheskiye aspekty vahtovogo truda na territoriyah severa Zapadnoy Sibiri. *Ekonomicheskiye i sotsialnye peremeny: fakty, tendentsii, prognoz*, 4(40), pp. 109-123. Available at: http://esc.vscc.ac.ru/article/683/full (in Russian)

Silin, A.N. (2017). Sotsialnaya transformatsiya vahtovogo truda v Arkticheskom regione. In A.N. Silin, *Dinamika sotsialnoy transformatsii rossiyskogo obschestva: regionalnye aspekty: materialy Tyumenskogo mezhdunarodnogo sotsiologicheskogo foruma*, 5-6 October 2017. Available at: https://elib.utmn.ru/jspui/bitstream/ru-tsu/17085/1/Silin_319_Sbornik_2017.pdf (in Russian)

Silin, A.N. (2019). Tyumen region as placdarm of social-spatial transformation of Russian Arctic. In *Tyumenskaya oblast: istoricheskaya retrospektiva, realii nastoyaschego, kontury buduschego*, pp. 49-54. (in Russian)

Stedman, R. C. (2003). Is it really just a social construction?: The contribution of the physical environment to sense of place. *Society and Natural Resources*, *16*(8), pp. 671-685.

Tishkov, V.A. (2015). Korennye narody Arktiki: istoriya sovremenny status, perspektivy (Native Arctic peoples: history, current status and prospects). *Vestnik Rossiyskoy akademii nauk, 5,* pp. 491-500. (in Russian)

Williams, D. (2018). Spacing Conservation Practice: Place-making, social learning, and adaptive landscape governance in natural resource management. In Terry Marsden (Ed.), *The SAGE Handbook of Nature*.

Suslikov, A. (2009). *Atomny ledokol "Vaygach" 20 let v stroyu* (Nuclear icebreaker Vaygach 20 years in the ranks) Murmansk. (in Russian)

Urbanik, J. (2012). Placing animals: An introduction to the geography of human-animal relations. Rowman & Littlefield.

Whatmore, S., & Thorne, L. (1998). Wild (er) ness: Reconfiguring the geographies of wildlife. *Transactions of the Institute of British Geographers*, *23*(4), 435-454.

Young, J. K., Olson, K. A., Reading, R. P., Amgalanbaatar, S., & Berger, J. (2011). Is wildlife going to the dogs? Impacts of feral and free-roaming dogs on wildlife populations. *BioScience*, *61*(2), 125-132.