

6 ASHES OF UNFULFILLED DREAMS: MODELING A SUSTAINABLE INDIGENOUS SETTLEMENT IN SAKHA REPUBLIC (YAKUTIA) IN A TIME OF CHANGES

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Introduction

Adapting to rapid climate change has become a critical part of the long-term strategy to reduce vulnerability and increase resilience of local communities facing the negative effects of climate change. To develop such place-specific adaptation policies, applied interdisciplinary research is needed to identify current and future environmental threats. This paper introduces an attempt by a team of Sakha specialists to apply the knowledge gained from their experience of living and working around the world to help a small Indigenous community in Sakha Republic (Yakutia) build a sustainable life. The project seemed promising until the war put it on hold.

The idea of engaged and activist research and of modeling a Sustainable Indigenous Settlement (MSIS) for a vulnerable Indigenous community in Sakha Republic (Yakutia) was a logical continuation of my earlier research, conducted in 2015–2016. During my Ph.D. fieldwork, I studied Indigenous ecological knowledge and local adaptation strategies to the negative impacts of climate change in Oymyakon *ulus* (district) of Sakha Republic (Yakutia). Oymyakon is widely known as the “coldest inhabited area on Earth,” because of its extremely cold winter temperatures (average -50°C/-58°F in January).¹ Indigenous people there talked openly about their contemporary problems, which were rooted in the colonial past and the recent historical events, such as the downfall of the Soviet Union and collapse of local economies in the post-perestroika era. They shared ideas and thoughts about healthy living style and the sustainable development of their communities. Their opinions became the foundation for our “sustainable settlement model,” making it place-specific and relying on Indigenous needs.

For this project, we built a multidisciplinary STEM team of Indigenous scholars and activists who grew up in Sakha Republic (Yakutia) and relocated abroad in the past decades.² In their new countries of residence, they became experts in STEM-related fields, including in energy-efficient heating systems, wind and solar renewable

1 Oymyakon's lowest known winter temperature was minus 71.2°C (minus 96.16°F) calculated in 1924.

2 Their names and countries of their current residence are not listed in this paper due to the current geopolitical situation.

energy, internet technologies, Indigenous banking, micro-credit financing, and more. They also had first-hand experience of the Indigenous lifestyle since the most grew up in rural areas of our homeland. We all had strong connections with our relatives and friends still living in Sakha Republic (Yakutia). I also had established connections and trust with Indigenous communities in the village of Oymyakon (population ca. 500) and in the nearby areas, including during my dissertation research there.

Being born and raised in Sakha Republic (Yakutia), and communicating with our relatives and friends on an everyday basis, our team members understood the problems and challenges that our compatriots face under climate change pressure, and we all wanted to help. We decided to use an Indigenous Research Framework (IRF) as the theoretical framework for our project, to ensure that the purpose, research questions, and significance of the study would be relevant to the Indigenous people (Drawson et al. 2017). Within this framework, the team raised concerns “about the questions that matter to us” (Simpson 2007), that is, questions that matter to our people in the Sakha Republic and, therefore, to us.

The time seemed appropriate since there was an ongoing preparation for the first “international forum of compatriots” (*Forum sootchestvennikov Respubliki Sakha*) organized by the Government of Sakha Republic (Yakutia), which was supposed to take place in Yakutsk in the Summer of 2022. This forum was to celebrate the 100th anniversary of the Republic (formerly *Yakutskaiia ASSR*, established in April 1922) and was aimed at uniting fellow Sakha living abroad and establish ties between them and the Republic’s administration. At that forum, the (former) Sakha residents living abroad would have had the opportunity to speak to the republic’s government officials and share ideas about the future of their home area. We had planned to present our project idea at that forum. We had already found supporters at many levels of republican administrative system and had collaborators in the relevant fields of our future activity, including local universities and institutions, non-governmental organizations, architectural bureaus, and other organizations in Sakha Republic (Yakutia). Our partners in Oymyakon *ulus* were representatives of local village administrations, as well as keepers of traditional ecological and Indigenous knowledge. Permanent residents of Oymyakon *ulus*, they were occupied in traditional livelihood activities, such as horse breeding and reindeer herding. We also found respected cultural and craft practitioners who agreed to serve as our partners.

The project area

The area for our project was selected within Oymyakon *ulus* located in the east of Sakha Republic (Yakutia), bordering the nearby Magadan *oblast* (province) and the Khabarovsk *krai* (territory), in the northeastern part of Russia.



Fig. 1 Location of Oymyakon *ulus*, Sakha Republic (Yakutia), the Russian Federation.

Oymyakon *ulus* is surrounded by the Cherskii and Verkhoyanskii mountain ranges. In winter, dense cold air moves down the mountains' sides to the valleys and plateaus, making the lowland temperature even colder (Takahashi et al. 2011). These conditions are favorable for the formation of extremely cold still air in the winter (Obruchev 1928). Indeed, known as the "Pole of Cold," Oymyakon is considered the coldest place in the Northern Hemisphere.

The climate in Oymyakon is continental. The *average* temperature drops to -50°C in winter, often much lower. The winters have relatively light snow, with snow cover lasting from early October to late April/mid-May. Although most precipitation falls in the summer (Reglament 2018), summers are short and arid (Gerasimov 2017).

Climate change

Increased levels of atmospheric greenhouse gases (GHGs) have a more substantial effect on the Arctic climate than for the rest of the globe. Temperatures have increased throughout Sakha Republic (Yakutia)'s entire territory (Kirillina 2017; Arzhakov 2018; Danilov and Degteva 2018; Gorokhov and Fedorov 2018; Foy 2019; Solovyeva et al. 2022). The impacts of contemporary environmental changes multiply the existing problems of local Indigenous communities, especially those that maintain a traditional lifestyle and depend on agricultural and livestock production (ILO 2017; 2019).

During previous research, Indigenous people shared with me that the weather had become highly unpredictable. Summers are colder, winters are milder, and the land constantly changes now due to permafrost thawing – swelling in some places, collapsing in others. Floods happen more often, submerging houses and hay-gathering fields.

According to the local residents, it is more challenging now to care for horses, cattle, and reindeer. Indigenous people in the Oymyakon ulus have over centuries adapted well to the extreme conditions of the North. However, stressing factors rooted in their recent history and current politics hinder their ability to adjust to changing conditions (cf. Solovyeva 2021a,b). These problems force Indigenous communities to adapt to more challenging conditions – and disproportionately increase their vulnerability (Solovyeva 2022; Vinokurova et al. 2022).

Oymyakon as a tourist destination

Oymyakon is one of the popular tourist destinations in the Republic due to its natural wonders, such as the frigid temperature, and the availability of hot springs (which don't freeze despite the extremely low temperature), where the bravest tourists can take a dip even at -50°C .

Other local “attractions” include ice fishing, viewing the majestic northern lights (*aurora borealis*), and special tourist “destinations,” including visiting the residence of Chys Khan (the mythological “Keeper of the Cold”), a “Permafrost kingdom” (a cave in a mountain with ice figures), horse breeding farms, and local reindeer herds (Balders 2015; Bayeva 2022; Kaspersky 2022; WBB 2023).

Another “coldest inhabited region” – a second “Pole of the Cold” – is the town of Verkhoyansk, also in Sakha Republic (Yakutia). However, fewer tourists visit that area, because the roads serving Verkhoyansk are poorer, and traveling there is more expensive. Verkhoyansk can only be reached by air. Flights are irregular and cancelled



Fig. 2 Hot springs in winter. Oymyakon ulus, 2015.

frequently (Bayeva 2022; Madelyan 2024). Unlike Verkhoyansk, the Oymyakon *ulus* has a developed transportation scheme, including air and land transportation.³ Its annual “Pole of Cold” festival with Indigenous food, reindeer racing, and greetings from Chys Khan attracts tourists from Sakha Republic (Yakutia), the Russian Federation, and around the world (Solovyeva 2021a,b).



Fig. 3 Pole of Cold festival in Oymyakon, 2012.

Presently, Oymyakon *ulus* has very limited accommodation options for visitors. There are no hotels; while a few guest houses can be found, travelers sometimes have to rely on local residents' hospitality.

Therefore, it is not surprising that proposals to advance the tourist infrastructure in the area have been submitted from all Russian regions to a republic competition. These proposals aimed at increasing the flow of tourists to Oymyakon and to provide for comfortable accommodations. For example, a tourist cluster “A Pole of Cold” was proposed by the Bureau of Architecture ASADOV, located in Moscow, Russia together with Knight Frank (Russia, UK), LSTK-Proekt (Yakutsk, Russia), and Russia Discovery (Moscow, Russia). This project argued for the modern development of the town (village) of Oymyakon by creating extensive public space, and developing engineering infrastructure and some facilities for residents and tourists. This included a multifunctional complex with a hotel, restaurant, museum, and a theme park. The project planned to design an updated “Oymyakon brand” based on images of ice, snow, the mythical “Bull of Cold,” and the northern lights.

3 The road connecting Yakutsk and Magadan, the infamous “Kolyma highway” (*Kolymskaiia trassa*), was built by GULAG prisoners in the 1930s and 1940s.



Fig. 4 A proposed tourist cluster “A Pole of Cold” in the village of Oymyakon.
Fig. 5a,b The project Modernity Pole: winter view and summer view.

Another submitted proposal called “*Oymyakon : p(o)lus so-vremennosti*” (Oymyakon: The Modernity Pole) was developed by the MLA+ architectural bureau from Saint-Petersburg (MLA+ 2019), together with TC-Center (Yakutsk, Russia), and Promokod (in Moscow). This project recognized climate change impacts on Oymyakon’s environment and offered some solutions to mitigate those impacts. For example, the project authors consider permanent pontoon parks in the flooding zones. To mitigate the effects of permafrost thawing, the project offered to build boardwalks. To access remote tourist locations and transport goods and waste, the authors suggested using airships and buggies.

Several other proposals had been developed prior to 2021 with the goal of transforming Oymyakon into a popular tourist destination with comfortable accommodations. However, none advanced beyond planning boards, due to their very high cost and uncertain outcomes. Since the outbreak of the war between Russia and Ukraine in 2022, no new proposals have been submitted.

Weaknesses of proposed projects

All these development proposals had a common weakness: They were developed outside of the Sakha Republic (Yakutia) and did not consider local environmental features and Indigenous peoples’ needs (and rights). The idea of sustainability, for example, was frequently proclaimed, but no solutions were presented to overcome the current vulnerabilities of local Indigenous communities. The focus was always more on commercial tourism. Other projects did not account for changes induced by climate change. In terms of climate change the proposals only considered one facet of change – permafrost thawing. Therefore, the only offered solution to climate change impacts was to build boardwalks around the village as an adaptation strategy.

Several proposals also offered to build infrastructure and modern houses in the community. However, constructing new infrastructure in Oymyakon village would be very expensive, and with many uncertain outcomes due to the thawing permafrost. Furthermore, the varied types of permafrost in Oymyakon *ulus* respond differently to global warming, a factor which nobody mentioned.

The difference between those projects and our team’s proposal was that the latter was based on the results of the field research that I conducted in 2015–2016, in which I brainstormed with Indigenous Sakha persons, who had the practical skills needed for aspects of our project. Born and raised in the Sakha Republic, these persons now reside in other countries, where they have successfully worked in industries related to our and the Oymyakon residents’ interests.

Findings of earlier research and our proposal's recommendations

Permafrost degradation

The village of Oymyakon administratively includes the communities of Oymyakon and neighboring Bereg Yurdeh and Khara Tumul. The small settlements of Bereg Yurdeh and Khara Tumul were built as agricultural clusters near Oymyakon, when it used to be the center of Oymyakon *ulus*, before the administrative center was moved to the town of Ust-Nera in 1954.

In the territory that now constitutes Oymyakon *ulus*, the first Sakha people settled in the area of Khara Tumul, where the land is flat and rocky. The well-known Sakha merchant and philanthropist, Nikolai Osipovich Krivoschapkin (1832–1926) lived in Khara Tumul; his descendants still reside there to this day. Krivoschapkin initiated the entire Oymyakon *ulus* education program, and also actively helped scientific expeditions, assisting them with horses, money, food, and guides (Vasilyeva 2011).

During the GULAG period (1930s–1950s), under NKVD⁴ control, Indigenous people were relocated from their home communities in Khara Tumul to the area where the administrative center, the village of Oymyakon, was built. The soil where Oymyakon village now stands is rich in ice layers that are degrading rapidly now due to climate change processes. Thawing and degrading permafrost resulted in water “lenses,” called *taliks* (unfrozen areas in the continuous permafrost), and *thermokarst* lakes. Melting accelerates the release of GHGs, providing positive feedback for CO₂ and methane flow into the atmosphere (Christensen et al. 2004; Myers-Smith et al.



Fig. 6 A lake forming in the middle of the town of Oymyakon is an example of the thermokarst processes, 2016.

4 People's Commissariat for Internal Affairs (*Narodny komissariat vnutrennih del*), the USSR's Ministry of the Interior, 1934–1946; predecessor to the KGB.

2007; Karlsson et al. 2010; Parazoo et al. 2018; Walter et al. 2018; Turetsky et al. 2019). Recently, a lake of this kind began to form in the middle of the village of Oymyakon.

The appearance of such lakes disrupts the ground temperature balance, because water contributes to the soil temperature rise. It also results in a positive feedback mechanism, which further increases permafrost thawing during the warm season. In the area of abruptly-formed *thermokarst* lakes, the permafrost may thaw up to 8–15 meters deep, which is 30-fold greater than the usual seasonal thaw of the permafrost active layer (Walter et al. 2018). It is projected that the lake will expand, covering almost the entire area where Oymyakon village is currently located. Consequently, all development projects include building boardwalks around the village and constructing new infrastructure and houses on artificially elevated places, and/or on piles.

Our team's proposal: Instead of building new infrastructure in Oymyakon village, where permafrost is rich in ice, degrades fast, and where the construction of new buildings and infrastructure would be extremely expensive, and results would be uncertain due to permafrost degradation, we proposed moving a community-centered tourist complex to the village of Khara Tumul, the place where the first local Sakha people historically lived. The soil in that area is rocky, with little or no ice. Therefore, changes in the land's surface due to the permafrost thawing have been much less severe than in other places. For example, the historical house of Nikolai Krivoschapkin has remained stable for more than 100 years.



Fig. 7 Krivoschapkin's house in Khara Tumul, 2016.

In contrast, some modern houses in the nearby village of Oymyakon are sinking or leaning, due to permafrost thawing (Solovyeva 2021a,b).

Increased difficulty of harvesting firewood for winter

In Oymyakon *ulus*, even houses connected to the central heating system still have wood-heated stoves, because the local heating system is old and not reliable. It can freeze and break during the winter. Also, when the winter temperature drops below -60°C there is not enough heat coming from the heating radiators to warm the houses. Therefore, people are forced to heat their houses with the wood-heated stoves. There are also many houses with private heating in the villages of Oymyakon *ulus*, including in Khara Tumul.



Fig. 8 Firewood, prepared for winter, 2017.

Each household needs to prepare and bring from the forest about 30–40 cubic meters of firewood to heat a private house during the winter season. It is essential that the wood is of high-quality. Quality firewood must be from trees that have been dead and dry for at least five years. Firewood made from damp trees does not burn well. No one is involved in restoring felled forests. However, even if there were forest restoration work, in the harsh climatic and permafrost conditions of the north trees grow very slowly. Each year, people go farther into the forest, because suitable firewood trees are not available near the village. With further distance and more work, the price of firewood also increases. According to a survey I carried out, Sakha Indigenous people are interested in new technologies that could help them use less wood for heating their residencies (Solovyeva 2021a,b).

Our team's proposal: We proposed applying passive house construction technology, and zero carbon emission design approaches in cold climate settlements and places, where all stages of technical design development would reflect the Indigenous philosophy and concept of our project. Thus, together with our architect partners from Sakha Republic (Yakutia), we aspired to create an “ideal” model of a sustainable creative settlement that respects Sakha culture and heritage and remains flexible enough to adapt to newly developing circumstances.

Khara Tumul is experiencing a deep crisis

After the *sovkhos* (old Soviet rural production unit) was liquidated in Khara Tumul in the early 1990s, its farms, the local clubhouse (“House of Culture”), and the grocery store were closed. All local enterprises are currently operating from the town (village) of Oymyakon. Khara Tumul residents continue to live self-sufficiently and by bringing store products from Oymyakon. They heavily rely on subsistence activities, such as farming, hunting, cattle and horse breeding, fishing, and gathering. These activities, if primarily for economic and dietary purposes, have traditional, cultural, and societal importance. Many people at their most productive age are unemployed. Financial shortages contribute to their vulnerability and reduce their options to adapt to climate change, as observed widely across the Arctic (Vinokurova 2010). Unemployment has forced some to move, especially the young people. Currently, the community is literally balancing on the edge of abandonment, if not extinction (Solovyeva 2021a,b).

Our team’s proposal: This team’s proposal involved creating a model of a sustainable Indigenous Settlement (MSIS) based on the ideas and thoughts that members of vulnerable Indigenous communities shared with me in 2015–2016. The MSIS would prioritize community resilience, cultural and social sustainability, sustainable housing, and Indigenous livelihoods. It would incorporate concepts of capacity building, technology innovation, and risk and hazard management. The idea followed the concept of *duodji* (the Sámi word for handicrafts/applied art), that views Indigenous peoples’ craft, art, and design as the process of interconnection with Indigenous and traditional ecological knowledge, and as a way of living (Guttorm 2015; Mellegård and Boonstra 2020).

We proposed combining a creative local economy and tourism for the sustainable development of the Khara Tumul community. In Suciú’s (2008) view, a creative economy is based on a relationship between creativity and economics. The United Nations Conference on Trade and Development (United Nations 2018), which measured creative industries’ economic impact, concluded that: “The creative economy is recognized as a significant sector and a meaningful contributor to national gross domestic product [...]” and that “[it] helps create new opportunities, particularly for small and medium-sized enterprises.” We also wanted to use the MSIS proposal as a scientific base to help organize an observation network of climate change impacts and to test adaptation strategies toward sustainable development in one of the coldest inhabited areas on Earth.

In Sakha Republic (Yakutia), creative projects and innovation centers commonly receive government funding. There are continuous investments in artistic industries and creative-minded specialists’ training (Mikhailova 2021; Mikhailova and Vinokurova 2017). However, all innovation centers, like the Arctic Innovation Center,⁵ the

5 [https://www.s-vfu.ru/en/research/Arctic_Innovation_Center\(AIC\)/](https://www.s-vfu.ru/en/research/Arctic_Innovation_Center(AIC)/) [accessed 17.06.2024]

Technopark Yakutia,⁶ and other innovation training projects are concentrated in big cities, such as Yakutsk. Almost none exists in rural areas.

Project implementation

We intended for our project to have three phases:

In **PHASE I (2022)**, we planned to research and review already implemented sustainable and energy-efficient technology projects in North America, specifically in Alaska and the Canadian North. During this phase, our team planned to develop documentation with sustainable architectural and construction components, best practices of energy-efficient technology in heating, ventilation, indoor climate automation, plumbing and drainage, electrical, fire protection, communication aligned with severe climate conditions.

During this phase, we also planned to present the MSIS to Sakha Republic government representatives, including to the Department of Agriculture and the Department of Entrepreneurship, in order to investigate prospective sources of administrative support. We also wanted to explore what actions would be needed to achieve the goals laid out by the MSIS, given that the Government of Sakha Republic (Yakutia) has expressed interest in tapping the knowledge and expertise of its citizens who lived abroad, to create better practices and strategies for development.

In **PHASE II (2023)**, our collaborative multidisciplinary team would have explored what features would be needed to make the chosen Indigenous community of Khara Tumul sustainable. We considered the settlement's social, historical, political, and economic characteristics and the current pressures of climate change. During this phase, I would have made a trip to Oymyakon to collect data in the same villages where my earlier research was conducted, to discover what environmental and social changes have occurred since 2015. With the participation of Indigenous students from local universities, we wanted to collect data using focus groups, interviews, surveys, and mapping.

These findings would have helped us to co-produce detailed knowledge about environmental and social changes that occurred over the past decade, and to assess risk and hazard. Additionally, this knowledge would have assisted in the finalizing our MSIS. Results of survey and interview data in Khara Tumul could have helped to understand what specific features of MSIS we could apply in Khara Tumul. Based on these findings, we planned to apply, together with the non-profit organizations and charity associations located in Sakha Republic (Yakutia), for socially-oriented grants available in the Republic, the Russian Federation, and worldwide.

6 <https://tpykt.ru/main-page-english/> [accessed 17.06.2024]

During this phase we also wished to study examples of establishing sustainable Indigenous villages in Canada, to explore successful cases, as well as the difficulties Indigenous people have faced in other countries with similar climate conditions. We wanted to establish future partnerships among Indigenous people in polar countries to promote and implement healthy lifestyles. We also wanted to exchange Indigenous therapeutic psychology methods used in Canada, Alaska, and Sakha Republic (Yakutia) to treat anxiety, depression, and addiction issues in local communities.

PHASE III (2024) would have covered the analysis of the data collected on the research trip to Oymyakon. We would have analyzed these data to clarify the challenges Indigenous communities in Oymyakon face in their efforts to live a sustainable life during climate change. Best adaptive strategies would be studied and recommendations for sustainable living based on Indigenous knowledge and values were to be developed for local implementation.

During this phase, we would have organized workshops for Indigenous peoples in Oymyakon *ulus*, as well as for students and faculty in the city of Yakutsk. At these meetings, we wanted to share our findings on environmental and social change trends in Oymyakon *ulus*, make public presentations about the MSIS, describe sustainable settlement projects implemented in similar conditions in Canada, and define steps that could improve the quality of living. We would also have assessed the local government's willingness to establish sustainable settlements in rural areas of Sakha Republic (Yakutia), on which further steps in our project development would depend.

During this phase, we also would have developed recommendations for professional associations and organizations in Sakha Republic (Yakutia) about international and national building and energy codes, industry codes, and references, and created guidance regarding building construction in severe cold climate regions.

* * *

These plans were not to happen. After 24 February 2022, our work on modeling sustainable Indigenous communities in Oymyakon *ulus* ended abruptly. While the "Forum of Compatriots" was hosted in the city of Yakutsk by the Ministry of Foreign Relations of Sakha Republic (Yakutia) (on June 23–24, 2022) with the declared goal of "strengthening the ties between the Sakha Republic and fellow compatriots living abroad," it ended up being a politicized propaganda show. It became a platform for the creation of the Yakut (Sakha) branch of the "World Congress of Russian Compatriots" that is widely known for following the official Russia's point of view and its support of the war. Consequently, there was a sharp polarization among our positions. Those who opposed the war did not attend the Forum, leaving only those who supported it or declared "neutrality" at the officially sponsored meetings.

Conclusion

As widely acknowledged, Indigenous communities are among the most vulnerable groups to the impacts of global climate change. Our project was centered on increasing the adaptive capacities and improving the resilience and wellbeing of a vulnerable Indigenous community, as a model of sustainable living in the North, by developing practical tools for implementing new technologies. We aspired to build a new toolkit needed for such sustainable living and for advancing stewardship of the environment, based in part on the learnings of our team members while working with the new technologies in Canada, Europe, and the USA. We were eager to find mechanisms for working with administrative, economic, civic, and political organizations at various levels in Sakha Republic (Yakutia), the Russian Federation, and, possibly, internationally in order to support the path for Indigenous communities to live a sustainable life. We wanted to engage Indigenous students, the future generation, in research, analysis, and discussion of environmental and social changes in Sakha Republic (Yakutia). These younger colleagues needed to be a part of our efforts toward developing sustainable models.

We chose Khara Tumul, a remote Indigenous community in the eastern portion of Sakha Republic (Yakutia), with all the features of a weak and depressed rural economy common to many small Indigenous settlements across Russia's northern territories, as our pilot project for sustainable development of northern communities. We proposed that the combination of science and a "bottom-up" approach that drew on Indigenous knowledge and values could re-build communities that could effectively adapt to the negative impacts of climate change. In developing our proposal, we relied on collaboration between citizens living in and outside of Sakha Republic (Yakutia). We believe that traditional knowledge, Indigenous livelihoods, and practices combined with a creative economy and new technologies can bring new perspectives to Indigenous rural settlements. This would contribute to making such places more resilient in this time of environmental uncertainty and economic instability. Our team hoped that the project could help create a foundation for international collaboration and partnership among Indigenous artists, academic scholars, and policy-makers. This would enable the development of successful climate change adaptation strategies for sustainable development. Our Indigenous methodology emphasized environmental stewardship, culturally relevant education, and preservation of Indigenous language, ecology, and healing practices specific to that place.

The Russian-Ukrainian war, however, prevented our project from developing, despite the good intentions of our partners to change the situation, the interest and support we received in Sakha Republic (Yakutia), and the criticality of the idea itself. However, we still hope that someday there will be a possibility to revisit and re-set the project, in order to improve the quality of life of Indigenous people in the Arctic and across other northern areas.

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References

- Arzhakov, A. 2018. Expert: izmeneniye klimata povishaet riski pavodkov i lesnikh pozharov, interview for the *Russian News Agency*. <https://tass.ru/obshchestvo/5211901> [accessed 17.06.2024]
- ASADOV 2019. *A Pole of Cold, Project proposal*. https://totalarch.com/tourist_cluster_oymyakon/asadov [accessed 18.06.2024]
- Balders, S. 2015. *-56°C (-69°F) from Yakutsk to Oymyakon in Winter – The Movie*. [HD] <https://www.youtube.com/watch?v=3KInXvWoq9U> [accessed 18.06.2024]
- Bayeva, S. 2022. Fishki kholoda: kak vizhit v Oymyakone i samikh moroznikh gorodakh mira, *RIA News*. <https://ria.ru/20220112/yakutiya-1765947254.html> [accessed 18.06.2024]
- Christensen, T., T. Johansson, J. Akerman et al., and B. Svensson 2004. Thawing Sub-arctic Permafrost: Effects on Vegetation and Methane Emission. *Geophysical Research Letters* 31 (4). doi: 10.1029/2003GL018680.
- Danilov, Yu., Zh. Degteva 2018. Modern Dynamics of Climate Change Eastern Economic Zone of Yakutia. *Vestnik SFVU, Series “Nauka o zemle”* 2(10). <https://new.nlrs.ru/open/81139> [accessed 18.06.2024]
- Drawson, A., E. Toombs, and C. Musquash 2017. Indigenous Research Methods: A Systematic Review. *The International Indigenous Policy Journal*, 8(2). <https://ir.lib.uwo.ca/iipj/vol8/iss2/5> [accessed 18.06.2024]
- Foy, H. 2019. *Russian Arctic Leader Warns of “Dramatic” Climate Change Impact*. Interview of the Head of the Republic of Sakha (Yakutia) Aysen Nikolaev with Financial Times. <https://www.ft.com/content/d855d522-cefc-11e9-99a4-b5ded7a7fe3f> [accessed 18.06.2024]
- Gerasimov, I. 2017. The Recent Nature of the Siberian Pole of Cold. *Journal of Glaciology*. <https://www.cambridge.org/core/journals/journal-of-glaciology/article/recent-nature-of-the-> [accessed 17.06.2024]
- Gorokhov, A. and A. Fedorov 2018. Current Trends in Climate Change in Yakutia *Geography and Natural Resources* 39(2): 153–161. <https://doi.org/10.1134/S1875372818020087>
- Guttorm, G. 2015. Contemporary Duodji – A Personal Experience in Understanding Traditions. *Relate North: Art, Heritage and Identity*. Jokela, T. and G. Coutts (eds.) 60–76. Rovaniemi: Lapland University Press.
- International Labor Office ILO 2017. Indigenous Peoples and Climate Change:

- From Victims to Change Agents Through Decent Work / International Labour Organization. <https://www.ilo.org/publications/indigenous-peoples-and-climate-change-victims-change-agents-through-decent> [accessed 18.06.2024]
- 2019. Decent Work for Indigenous and Tribal Peoples in the Rural Economy, Policy Guidance Notes. https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_601067.pdf [accessed 18.06.2024]
- Karlsson, J., T. Christensen, P. Crill, J. Foster and et al. 2010. Quantifying the Relative Importance of Lake Emission in the Carbon Budget of a Subarctic Catchment. *Journal of Geophysical Research, Biogeosciences* 115 (G3). <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2010jg001305> [accessed 18.06.2024]
- Kasperskiy, E. 2022. *The World's Coldest Village*. <https://eugene.kaspersky.com/2022/04/21/the-worlds-coldest-village-check-ver-2022/> [accessed 18.06.2024]
- Kirillina, K. 2017. *Razrabotka regionalnoi klimaticheskoi programmi dlia Respubliki Sakha (Yakutia)*. Dissertatsiia na sosiskanie uchenoi stepeni kandidata geograficheskikh nauk. <http://www.rshu.ru/university/dissertations/files/217/Диссертация%20Кириллина%20K.C.pdf> [accessed 18.06.2024]
- Madelyan, N. 2024. *Son belego olenia*. [Dream of a white reindeer] <https://takiedela.ru/2024/02/son-belogo-olenya/> [accessed 18.06.2024]
- Mellegård, V. and W. Boonstra 2020. Craftsmanship as a Carrier of Indigenous and Local Ecological Knowledge: Photographic Insights From *Sámi Duodji* and Archipelago Fishing. *Society & Natural Resources* 33(10): 1252–1272, DOI: 10.1080/08941920.2020.1729911
- Mikhailova, A. 2021. Creative Economy in the Republic of Sakha (Yakutia), XXIII International Conference Culture, Personality, Society in the Conditions of Digitalization: Methodology and Experience of Empirical Research Conference. *KnE Social Sciences* 5(2), 107–116. <https://doi.org/10.18502/kss.v5i2.8342>
- Mikhailova, A. and U. Vinokurova 2017. Kreatosfera of the Arctic: From Idea to the Concept. *SGEM 2017 Conference Proceedings* (5): 583–590.
- MLA+. 2019. Oymyakon : : p(o)lus so-vremennosti,” The Modernity Pole Project. <https://unit4.io/en/oymyakon> [accessed 18.06.2024]
- Myers-Smith, I., B. Forbes, M. Wilmking, M. Hallinger, T. Lantz, D. Blok, K. Tape, M. Macias-Fauria, U. Sass-Klaassen, E. Levesque, S. Boudreau, P. Ropars, L. Hermanutz, A. Trant, L. Collier, S. Weijers, J. Rosema, S. Rayback, N. Schmidt, G. Shaepman-Strub, S. Wipf, C. Rixen, C. Menard, S. Venn, S. Goetz, L. Andreu-Hayles, S. Elmendorf, V. Ravolainen, J. Welker, P. Grogan, H. Epstein, and D. Hik 2011. Shrub Expansion in Tundra Ecosystems: Dynamic, Impacts and Research Priorities. *Environmental Research Letters* 6. <https://iopscience.iop.org/article/10.1088/1748-9326/6/4/045509/pdf> [accessed 18.06.2024]
- Obruchev, S. 1928. Verkhoysk ili Oymyakon? *Meteorologicheskii vestnik* 10: 231–232.
- Parazoo, N., Ch. Koven, D. Lawrence, V. Romanovskiy, and Ch. Miller 2018. Detecting the Permafrost Carbon Feedback: Talik Formation and Increased Cold-Season

- Respiration as Precursors to Sink-to-Source Transitions, *The Cryosphere* 12:123–144. <https://tc.copernicus.org/articles/12/123/2018/tc-12-123-2018.pdf> [accessed 18.06.2024]
- Reglament Indigirskoye lesnichestvo, RIL. 2018. Report (Regulations of the Indigirka Forestry Division – in Russian). http://213.189.208.206/hcvf/files/reg_1159_1_1.zip [accessed 18.06.2024]
- Simpson, A. 2007. On Rthnographic Refusal: Indigeneity, “Voice” and Colonial Citizenship. *Junctures*, 9 December 2007, 67–80. 2007. https://pages.ucsd.edu/~rfrank/class_web/ES-270/SimpsonJunctures9.pdf [accessed 18.06.2024]
- Solovyeva, V. 2021a. Climate Change in Oymyakon: Perceptions, Responses and How Local Knowledge May Inform Policy; Ph.D. Dissertation, Department of Environmental Science and Policy, George Mason University: Fairfax, VA.
- 2021b. Einschätzung der Klimaauswirkungen auf die traditionelle Wirtschaft der indigenen Völker (Sacha und Evenen) im Ojmjakonskij ulus, Republik Sacha (Jakutien), Russland. In *Mensch und Natur in Sibirien: Umweltwissen und nachhaltige Naturbeziehungen in Zeiten des Klimawandels*. E. Kasten (ed.), 69–91. Fürstenberg/Havel: Kulturstiftung Sibirien. <https://bolt-dev.dh-north.org/files/dhn-pdf/mnsoloveva-de.pdf> [accessed 18.06.2024]
- Solovyeva, V., L. Vinokurova, and V. Filippova 2022. Fire and Water: Indigenous Ecological Knowledge and Climate Challenges in the Republic of Sakha (Yakutia). *Anthropology & Archeology of Eurasia* 59:3–4: 242–266.
DOI: 10.1080/10611959.2020.2139543
- Suciu, M.-Ch. 2008. Creative Economy and Creative Cities. *Romanian Journal of Regional Science* 3(1): 82–89. <https://EconPapers.repec.org/RePEc:rrs:journl:v:3:y:2009:i:1:p:82-91> [accessed 18.06.2024]
- Takahashi, S., K. Sugiura, T. Kameda, H. Enomoto, Y. Kononov, M. Ananicheva, and G. Kapustin 2011. Response of Glaciers in the Suntar–Khayata Range, Eastern Siberia, to Climate Change. *Annals of Glaciology* 52: 182–192. doi:10.3189/172756411797252086
- Turetsky, M., B. Abbott, M. Jones, K. Anthony, D. Olefeldt, E. Schuur, Ch. Koven, D. McGuir, G. Grosse, P. Kuhry, G. Hugelius, D. Lawrence, C. Gibson, and B. Sannel, 2019. Permafrost Collapse is Accelerating Carbon Release. *Nature* 30 (April 2019) 569:32–34. <https://www.nature.com/articles/d41586-019-01313-4#ref-CR3> [accessed 18.06.2024]
- United Nations. 2018. Creative Economy Outlook. Trends in International Trade in Creative Industries (2002–2015). *Country profiles* (2005–2014): 445. https://unctad.org/system/files/official-document/ditcted2018d3_en.pdf [accessed 18.06.2024]
- Vasilyeva, T. 2011. *Polyus kholoda – Oymyakon i ego nerazgadannie taini*. Oymyakon ulus Administration, the Republic of Sakha (Yakutia): Dani-Almas.
- Vinokurova, L. 2010. Yakutia’s Men Today: Widowing Wives and Longing for Life? *Anthropology of East Europe Review* 28(2):140–164. <https://scholarworks.iu.edu/>

- journals/index.php/aeer/article/download/935/1043/ [accessed 18.06.2024]
- Vinokurova, L., V. Solovyeva, and V. Filippova 2022. When Ice Turns to Water: Forest Fires and Indigenous Settlements in the Republic of Sakha (Yakutia). *Sustainability* 14(8): 4759. DOI: 10.3390/su14084759
- Walter, K., T. Schneider von Deimling, I. Nitze, S. Frolking, A. Emond, R. Daanen, P. Anthony, P. Lingren, B. Jones, and G. Grosse 2018. 21 st– Century Modeled Permafrost Carbon Emissions Accelerated by Abrupt Thaw Beneath Lakes. *Nature Communications* 9: 3262. <http://www.nature.com/articles/s41467-018-05738-9> [accessed 18.06.2024]
- Wander Beyond Boundaries (WBB) 2023. *Pole of Cold. Oymyakon*. <https://wanderbeyondboundaries.com/pole-of-cold-siberia> [accessed 18.06.2024]
- Weather Atlas 2014. *Climate and Monthly Weather Forecast Oymyakon, Russia*. <https://www.weather-atlas.com/en/russia/oymyakon-climate> [accessed 18.06.2024]

Figures

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