



Permafrost Dynamics and Indigenous Land Use

Helsinki, 6-7 April 2014 (in connection with the Arctic Science Summit Week)



Final Report for the IASC Secretariate

The IASC Workshop "Permafrost Dynamics and Indigenous Land Use" took place on the afternoon of Sunday, 6 April, and the morning of Monday, 7 April, as a fringe meeting of the Arctic Sciences Summit Week in Helsinki.

Attached to this final report are three slides. For the purpose of additional documentation, the organisers will send a DVD with participants' powerpoint presentations to the IASC Secretariate.

The organisers of the workshop, Joachim Otto Habeck and Hiroki Takakura, thank IASC sincerely for the generous support of this activity.

Part 1: Workshop Agenda

SUNDAY, 6 APRIL 2014

14:00 h – 15:30 h: SESSION 1

14:00 h

Short Introduction (J. Otto Habeck and Hiroki Takakura)

14:15 h

Fedorov Alexander Nikolaevich

Melnikov Permafrost Institute, Russian Academy of Sciences, Yakutsk, Russia

"Permafrost response to recent climate change in Central Yakutia"

14:40 h

Crate, Susan

George Mason University, Fairfax VA, United States

"Addressing Adaptive Challenges: Viliui Sakha Perceptions, Understandings and Responses to Permafrost Change"

15:05 h

Hiyama Tetsuya

Research Institute for Humanity and Nature, Kyoto, Japan

"Social adaptation to the changing water environment under recent climate warming"

15:30 h – 16:00 h: COFFEE/TEA BREAK

16:00 h – 17:30 h: SESSION 2

16:00 h

Desyatkin Alexey Romanovich

Institute for Biological Problems of the Cryolithozone, RAS, Yakutsk, Russia

"Thermokarst ecosystem cycles depending on climate change"

16:25 h

Desyatkin Roman Vasil'evich

Institute for Biological Problems of the Cryolithozone, RAS, Yakutsk, Russia

"Retrospective analysis and forecast of alar landscapes development in Central Yakutia"

16:50 h

Ksenofontov Stas

Dept of Geography, University of Zurich, Switzerland

"Climate change and its impact on rural population of Central Yakutia"

17:15 h

General discussion and wrap-up of the first day

MONDAY, 7 APRIL 2014

09:00 h – 10:30 h: SESSION 3

09:05 h

Iijima Yoshihiro

Research Institute for Global Change, JAMSTEC, Tokyo, Japan

"Fine scale mapping of permafrost and forest degradation using ALOS images"

09:30 h

Habeck, Joachim Otto

Max Planck Inst for Social Anthropology, Halle, Germany

Social-scientific approaches to studying the history and future of land use in alar regions

09:55 h

Takakura Hiroki

Center for Northeast Asian Studies, Tohoku University, Sendai, Japan

"The interaction of permafrost dynamics with the arctic adaptation in Siberia: some thoughts on the historical possibilism and the environmental constraints"

10:20 h: GROUP PICTURE

10:30 h – 11:00 h: COFFEE/TEA BREAK

11:00 h – 12:30 h: SESSION 4

11:00 h

Lantuit, Hugues / Romanovsky Vladimir

Presentation by representative(s) of the International Permafrost Association

11:25 h

Mészáros Csaba

Hungarian Academy of Science, Budapest, Hungary

"Alaas or hayfield? Changes in the use and perception of alaases in Central-Yakutia"

11:50 h

Ulrich, Mathias

Dept of Geography, Leipzig University, Germany

"What is the history and the future of thermokarst in Central Yakutia?"

12:15 h: WRAP-UP OF THE WORKSHOP, PROSPECTS (approx. 25 minutes)

Part 2: Workshop Report

To assess the outcome of the workshop, it is apposite to briefly repeat its initial aims: (i) bring together expertise on how local communities have made use and are making use of permafrost dynamics for subsistence activities; (ii) assess how climate change is likely to change permafrost dynamics and indigenous land use in this part of the Sub-Arctic; (iii) explore to what extent humans have appropriated and actively shaped the thermokarst landscapes of Northeast Siberia both in the short range of the current period and in the mid-term, i.e., over several centuries.

Significant progress was made with regard to these three aims:

(i) Documenting indigenous land use in permafrost ecosystems

Alexey Desyatkin, Roman Desyatkin, Alexander Fedorov and others reported about the conditions of landscape formation in Central Yakutia. The development of thermokarst depressions – in their mature state, these are areas of open land with lakes and meadows – provided "islands" for horse and cattle keeping in a region generally ill-suited for animal husbandry. Locally, these areas are known as "alaas". Yakut (Sakha) migrated from the steppes of Inner Asia to this region some 800 years ago. They were able to continue, with some alterations, their traditional activities of horse and cattle breeding. Susan Crate, Csaba Meszaros and Hiroki Takakura reported on the economic and cultural significance of this livelihood, which was further sustained yet also substantially modified under Soviet rule, with the result that the land-use system shrank in terms of space and workforce involved. Nonetheless, the economic well-being and cultural integrity of rural communities in the Central Yakutian lowlands depends on cattle breeding. On these grounds, local inhabitants pay particular attention to all aspects of environmental change and explicitly formulate their thoughts about how these changes will influence their land-use system.

(ii) Climate change and its likely impact on permafrost dynamics and indigenous land use

Susan Crate and Stas Ksenofontov gave ample illustrations how local inhabitants observe extreme meteorological conditions, short-term and mid-term environmental changes, and their consequences on the local economy. For example, Stas Ksenofontov reported:

"The most considerable change in environment according to rural people observation was [the] drastic variability in air temperature. Winters became milder, though summers colder. If in the past temperature went down [to] -60, nowadays minimum would be -50 [to] -55. In some respondents' opinion hydrological conditions became worse: more floods, wet ground, high level of rain. During [the] last decades people observe changes in biodiversity. Many wild animals have disappeared and many insects have arrived, a lot of trees have died because of fires, cutting, insects and other reasons. Environmental changes obviously have definite effect on rural people's livelihoods [...]: The main sufferer of climate change is cattle. Heavy rainfalls during summer mowing time are bad for villagers' cattle-breeding. Land [inundation] because of river and soil water level [is] increasing, spring floods [are] harmful for hay harvesting. Due to this reason many households quit keeping cattle. Housing is also affected by climatic variabilities. Houses get deformed due to permafrost degradation, ice cellars get watered and it becomes impossible to store food there in winter time. Climate change affect hunting and fishing."

These local observations were complemented by scientific observations on environmental change, notably alterations in air and soil temperature (from the 1880s to the present) with a marked trend of warming since c. 1980; modifications in the vegetation cover as a consequence of temporary flooding / overwet conditions; small- and medium-scale geomorphological changes, some of which can be detected easily within a period as short as twenty years (Alexander Fedorov, Mathias Ulrich, Yoshihiro Iijima and others). Tetsuya Hiyama and Hiroki Takakura reported on the consequences of summer floodings and offered some ideas on how to secure cattle breeding under the conditions of repeated events of severe flooding, to be expected in future years.

(iii) To what extent do humans actively appropriate and shape thermokarst landscapes?

Owing to the speed of geomorphological, hydrological and vegetation-cover changes in thermokarst landscapes, we may assume that local inhabitants are aware of the "plasticity" of the landscape and occasionally even try to induce certain changes in order to shape certain parts of the area that they inhabit. Workshop participants did not provide any direct evidence of indigenous attempts to *create* thermokarst depressions (through clearing, forest fires, etc.) with the prospect of obtaining more meadow areas. However, a quite widespread technique of *alaas* alteration consists in draining, i.e. changing the hydrological conditions of the thermokarst depression. Notably in the Soviet period, draining and other strategies of improvement were promoted. Effects of the post-WWII Soviet policy to expand crop-growing into the Far North can also be detected in this region. What we witness today is not an expansion but rather a contraction of the land-use system: many of the more remote *alaas* are being abandoned, while production in more centrally located *alaas* is being intensified (according to Roman Desyatkin, Csaba Meszaros, Mathias Ulrich and others).

What future research should pay particular attention to:

1. The study of hydrological conditions is key to understanding the ecological system of thermokarst regions in their full complexity. As of now, hydrology is one of the domains of *alaas* development least understood.
2. Detailed information of settlement and land use history at specific *alaas* sites should be compiled in order to understand possible human-induced landscape changes.
3. In rural communities of the Republic of Sakha (Yakutia) we need to examine the decisions of members of different generations whether to leave or stay. Who will work in the *alaas* in the future?
4. The challenge of integrating data of different time-scales (e.g. soil profiles that document a period of c. 8500 years versus biographical accounts that rarely extend beyond 1940)
5. Comparison of this example of land use in permafrost conditions with other cases throughout the circumpolar North

To summarise, the workshop dealt with a particular setting of permafrost dynamics and indigenous land use, notably the *alaas* in Central Yakutia. This is a unique case and yet also an exemplary one: the analysis of this particular system serves as a first step in examining other systems of indigenous land use in permafrost landscapes across the circumpolar North. As part of the workshop programme, representatives of the International Permafrost Association (IPA) were asked to provide their recommendations for further action. The workshop organisers are grateful for the enthusiasm and assistance they received from IPA. Through the support of IASC, the commitment of three IASC Working Groups and the encouragement of IPA, this workshop has not only fulfilled its initial aims but also laid the ground for a broader synthesis of land use in permafrost regions. To this end, IPA has created an action group on "Permafrost and Culture" (from July 2014 to June 2016).

Part 3: Powerpoint Slides (attached)

Part 4: Half-Page Summary for the IASC Website

Permafrost Dynamics and Indigenous Land Use

The idea for this workshop on "Permafrost Dynamics and Indigenous Land Use" was owed to a conspicuous gap between different disciplines' research agendas: there is substantial expertise on permafrost (and related hydrological and soil processes) on the one hand, and on indigenous forms of land use that utilise thermokarst, on the other hand; but the two have thus far rarely been integrated. The workshop, organised as a fringe event of the Arctic Science Summit Week 2014 in

Helsinki, attracted remarkably strong attention and interest among the Arctic research community as it was felt that a new level of integration was being achieved.

On the example of thermokarst regions in the central Yakutian lowlands, social and natural scientists explored the preconditions and dynamics of indigenous resource use -- notably, cattle breeding -- in a permafrost landscape. The indigenous Sakha population has actively put to use the diversity of ecological conditions in this highly dynamic setting. Over a period of 800 years they have developed a livelihood based on thermokarst grass lands in an otherwise densely forested area. Sometimes, they sought to modify landscape features in order to increase productivity. Temperature shifts since the 1980s, hydrological and other conditions indicate that the ecological basis of this land-use system is now under threat. Social and economic processes are likely to aggravate the environmental changes, probably leading to a short- and mid-term spatial contraction of the system.

Joint publications of the workshop participants are underway. As an outcome of this workshop, IPA (International Permafrost Association) has established an Action Group on "Permafrost and Culture", to further pursue this topic with a broader agenda in this and additional parts of the circumpolar North.
