Snowchange Discussion Paper #7

Weather Change Observations of the Puruvesi Winter Seiners 1996-2015

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Summary

The paper examines, in addition to traditions of the region, the contemporary ice and weather knowledge of *nuotta* (seine) fishermen of the region. While this community has interacted, for several hundreds of years, with a larger Indo-European society and is a seamless part of the modern Finnish nation-state, by analysing the oral histories and memories of the fishermen and their icescapes another reading of the Finnish boreal and lake system is revealed. The fishery is impacted by both the open markets of the fish production in Finland and in the European Union in addition to the impacts from the global, and more specifically northern, climate change. Yet, the traditional seiners choose to continue their practices in these times of change.

Markku Tervola takes vendace out of a fish trap, June 2015. Snowchange, 2015

1. Introduction

This Discussion Paper explores the ice fishing cultures of North Karelia, Finland. More precisely attention is given to the lake Puruvesi winter seining[1]. The community, located at the Russian-Finnish borderlands at the very Northeastern corner of Europe, is the one of the ancestral homes of the Finnish-Karelian songs, mythology and spirituality. One of the great masters of this oral knowledge was Juhana Kainulainen (1788–1848), one of the most powerful rune singers in Karelia in 1800s.

The paper examines, in addition to traditions of the region, the contemporary ice and weather knowledge of *nuotta* (seine) fishermen of the region. While this community has interacted, for several hundreds of years, with a larger Indo-European society and is a seamless part of the modern Finnish nation-state, by analysing the oral histories and memories of the fishermen and their icescapes another reading of the Finnish boreal and lake system is revealed.

[1] Mustonen 2009: 139-196

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To get a glimpse of the area, the Region of North Karelia, Province of Eastern Finland was founded in 2000s after the administrational reforms of Eastern Finland, but it is the middle-north part of the ancient Karelian homelands on the Finnish side of the border. It is the easternmost corner of Finland, as well as the European Union, neighbouring Russia.

There are 14 municipalities and five towns. Centre of the Province is the town of Joensuu with about 74,000 people. The territory of North Karelia consists of 21,584 square kilometres with 7.7 people per square kilometre. 166,500 people live in the entire province. The main economic activities are resource production such as forestry and agriculture, as economically used forests cover 70% of the territory.

The nature in North Karelia mostly consists of southern boreal taiga ecosystems with large lakes as a result of the last ice age. It is a part of the Eurasian taiga zone, while the Eastern parts of the province have a more continental climate. However, the ecosystems have witnessed massive human-induced damages over the past 60 years.

The most significant threats to the biodiversity in North Karelia include the fragmentation of continuous, intact ecosystems due to industrial forestry practices, which also contribute to the loss of marshland habitats, impacting on freshwater ecosystems[2]. Up until the late 1800s, and even up to 1939 (at the onset of the Second World War in the region), the ecological systems in North Karelia remained in relatively pristine condition. The livelihoods of local people were mostly centred on small-scale slash-and-burn agriculture, hunting and fishing.

After the Second World War Finland had to pay war damages to the Soviet Union, which meant a rapid industrial revolution and careless use of natural resources also in North Karelia. Most of old-growth forests were clear-cut. Marshlands were transformed into peat production[3]. Waterways, such as River Pielinen, home of the *fresh-water salmon* (salmo salar), a relic of the Ice Age, were harnessed for electricity production. Farming shifted to chemical-driven mass production.

Many communities in the countryside were emptied of people as they left to search for a living in Finnish towns or left for Sweden. The pulp and paper industries polluted the waters. In more recent times, uranium and other large-scale natural resource extractions are planned in the region, which threaten the already damaged ecosystems. Therefore, international attention to this little-known region of Europe is much needed.

The local communities are in a process of latent conflict with these top-down resource extraction plans[4]. Complexity is added due to the fact that several local people have [had] to start to work in the extractive industries to be able to stay in the region or maintain economic

[2] Center of Environment in North Karelia 2007
[3] Mustonen 2009
[4] Mustonen, 2012

income for their families [such as through small-scale clear cut forestry]. Secondly, the proximity of, what I would call, general knowledge producing systems[5], such as schooling, western religions, enforcement of capitalistic intensive resource economies and mass media, to name a few factors, has eroded local ecological knowledge that builds on local traditions. Hence, the winter seiners and ice fishery represent a rare pocket of a surviving, on-going community, still rooted in the unbroken link with the region's past. But this lake-based ecoculture is not a museum piece. Rather, the fishermen strongly argue that their work, knowledge and practice are for today's times and for the preservation of vital, traditional knowledge[6].

The community work presented here mainly took place in the municipality of Kesälahti, around the watershed of Puruvesi where the subsistence fishermen practicing nuotta-style winter seine fishing are located. The information is drawn mostly from the oral history work conducted by the non-profit Snowchange Cooperative from 2005 to 2015. It is on going.

Esa Rahunen and the crew out in 2010. Snowchange, 2010

The community is a border zone – through the centuries it has shifted from Russian to Swedish political control. It is one of the Westernmost Karelian communities. 2333 people live in Kesälahti and the territory of the municipality is 583 square kilometres. It has merged with Kitee, a neighbouring community, in early 2013. Kesälahti is located 92 kilometres south to southeast from Joensuu, the regional centre. A microclimatic feature is Lake Ladoga, the biggest inland lake in Europe, which influences the local weather due to the close proximity to

[5] Mustonen, 2009
[6] Mustonen, 2012

Kesälahti from Russian side. It is worth mentioning that the place names in the community indicate that the Indigenous Sámi used to live in the region in prehistoric times[7].

Six active fishermen and older people were interviewed during various visits to their homes, on the ice and other locations between 2005 and 2015. Nuotta-style seine fishing is in Kesälahti today a cold-based activity – it requires proper lake ice and winter conditions to succeed. The season is usually from November to end of April, even though climate change is now changing this[8].

Topics of the oral history interviews for this article have included land use and fishing area histories, nuotta-style seine fishing styles, locations, construction of the nuotta parts and equipment, changes to the community, role of women in fishing from early 19th century, role, preservation and loss of traditional knowledge regarding weather, ice, snow and fishing, relationship to scientists and authorities, prediction of weather and weather changes, moon and the weather, observations on birds and animals, dream knowledge and spiritual relationship to the land, boat construction, hopes for the future and youth, and the relationship to Russia.

Net fishing, especially under-ice net fishing has been the defining survival method for the Arctic and Circumpolar societies since the last ice age[9]. The knowledge complex surrounding the interactions and relationships with the local lakes where this practice continues is significant, deep and requires much consideration to be appreciated.

[7] Mustonen 2009, 2012
[8] Arctic Council 2005
[9] Mustonen 2009, 2014

Esa Rahunen pulling the ropes in February 2010. Snowchange, 2010.

More specifically in the Eastern Finnish cultural areas, *Savo* and *Karelia,* winter fishing has been a crucial subsistence practice. The oldest archaeological net finding in the world is from Karelia. It is over 10,000 years old[10]. The homelands of the Finno-Ugrian peoples, such as Estonia, Finland and Karelia are the westernmost outposts of a cultural group that begins in Central Siberia and extends from there to the Baltic. It is beyond this article to demonstrate continuations and breaks in these cultures and societies – it is sufficient to say that in the case of Puruvesi, the area has most likely been occupied at least by the Sámi, Karelians [Baltic Finnish culture] and Savo-Karelians [Baltic Finnish culture][11].

Today the people in North Karelia identify themselves as "Karelians" [regionally] or "Savo-Karelians" [nationally] to make the comparison with the ethnicities in the Republic of Karelia, Russia, where the Karelian language is still spoken. The seining cultures of these Finno-Ugric peoples have much in similarity in terms of their traditions, languages and subsistence practices, even though the Sámi are today the internationally and constitutionally recognized Indigenous people of Finland[12]. Some of the words related to the practice, such as *kala*, extend to the Uralic language times, to as far back as at least 10,000 years ago.

[10] Huurre 2001
[11] Mustonen 2009
[12] Mustonen et al. 2010

2. Features of Contemporary Winter Seining in Puruvesi

The place names and oral histories, which have been documented in the region,[13] indicate that the communal seining has been on going since pre-historic times. It used to focus on the coastal zone of the lakes. More recently it has focused mainly on whitefish (*Coregonus lavaretus)* and vendace (*Coregonus albula)*, which are in the deep parts of the lake. All of this harvesting was for subsistence use, for food for the local communities and households up until 1800s. Since the early 20th century the fish has had a place in the markets too.

Winter seining in 2011. Snowchange, 2011.

Huurre (2001) has documented that the skills of making a seine are very old in the region. In those times our people used a 13-moon calendar[14]. The space does not allow here a full account of the seasonal round of Finnish-Karelian traditional economy, but the main events of the fishing year were tied to the spawning times of different fish. For example, for vendace this would be in mid- to late October in Puruvesi just prior to freeze-up.

In the late 1800s the growing markets in St. Petersburg and the bigger towns of then-Grand Duchy of Finland created the markets for vendace and this ushered in the times of commercial vendace harvest since the early 1900s. Some fish had been traded to Russia already in 1300s. This made the seining nets wider and taller.

[13] Mustonen 2009: 138-192
[14] Mustonen 2009: 147

The living seiners remember the time in the 1950s when seines were pulled with horses on the ice and all the work involved only hands, no machines were used[15]. Dozens of crews would be on the ice harvesting vendace in temperatures of - 25 C to -35°C. 42 metre long poles would be used to guide the seines under the ice. Customary rights were respected in terms of the different harvest locations that each crew accessed. Systems of rotation and traditional ownership were, and to certain extent are, practised[16].

Apaja is the word that refers to the place of harvest, the catch place. They have to be known precisely in order for the seining to succeed. Today nets are used that are 300-320 m x 11-14 m in size. The lake space is divided into hundreds of catch places, apaja sites. Certain spots only yield results under certain natural conditions, some only once in a season, some weekly.

Fishermen have to know, among other things, the weather conditions, geographical location on the ice, forms of the underside of the ice on that location, currents, water depth and the formations of the bottom of the lake for the pull to succeed. It means that for each apaja site at least five different 'landscapes' have to be mastered in order for the pull to succeed. A mistake of only a few metres can result in a torn seine net and a loss of thousands of euros. This knowledge of the landscape still survives quite well among the fishermen who are on the ice today.

The knowledge regarding the apaja sites is traditionally known. They do not exist in full in any written form. Most of the apaja sites have names and stories connected to them. Many of the names are ancient and can refer to events from pre-history. The fishermen consider these sites to be *owned*, they are customary properties of certain families and individuals. There are rules of behaviour and conduct on and near them.

It is equally important to remember that not all apajas are the same – they have beings and characteristics, which are very subtle in their details. For example, Esa Rahunen, long-term leader of the contemporary fishermen of Puruvesi community, 'owns' 135 apaja sites[17]. The family customary rights to the different harvest areas survive in the memories of the descendants of the fishermen who still fully practiced them. Some remnants of this system are still in place with stationary ice net fishing spots for different families in the region.

In the contemporary winter seining the work begins on an ice hole of 4 x 2 metres, which is sawn using long-bladed chain saws on the ice. This is done early in the morning around 6.30 am at the chosen site. It is also the time when fishermen observe the ice conditions and the formation of the ice and patterns inside the ice to determine safety issues, weather conditions and other factors.

In order to adjust to the pressures of the food production markets and costs, certain machinery is now used during the seining, which means that the seining crew is only 2-3 people. Special 'ice torpedoes' travel under the ice to spread the pulling ropes open in a 'V' shaped formation. These torpedoes are operated using radio transmitters – in traditional times wooden poles up to 42 metres would be used until the 1970s.

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[15] Mustonen 2009
[16] ibid. 2009: 192-196
[17] Mustonen 2009: 172

Once the first hole is made, then set of smaller holes will be made in a 30-degree direction left and right of the bigger hole for approximately 75 metres in each direction. At the corner fishermen turn, and start to make holes every 50 metres for 400 metres so that the pulling holes are ready for the seining to begin. A feature of modernity, a small diesel engine is installed at the corner 75 metres from the first ice hole, which starts to pull the ropes and net open. Meanwhile one of the fishermen is feeding the 300 m x 11 m seine from the first ice hole under the ice.

The whole apaja site is usually 400 – 500 metres long. Using the torpedoes and small diesel engines the ropes are pulled across the apaja space and then towards the end ice hole, again 4 x 2 metre hole on the ice. Now engines are installed behind the ice hole to pull the remaining ropes up from the water. The crew gathers around the last ice hole to pull the net *by hand* to the awaiting sled. Once the end of the net is arriving the catch of the day is lifted to the ice – it can vary from 200 kgs to 2000 kgs depending on all conditions. The pull is over usually around noon. Then the fish is transported to the local fish harbour by skidoos and sold to the markets from the harbour.

The above process is one way to pull winter seines in contemporary times. There are other mechanisms. The pressures of time and markets have ushered in the time of skidoos and diesel engines as helping hands during the process. This increases the dependency of the fishermen on fossil fuels, machines are vulnerable to break in extreme low temperatures and uncertainty factors increase. However these are still only accessory tools, the knowledge complex required to determine which of the dozens of apaja sites will be pulled today as well as the actual pull with the five different landscapes in place is crucial and only in the heads of the fishermen as experience-based knowledge[18].

The seining crews are today predominantly male. The processing and gutting of fish at the fish harbour is done partly by women. In the 1950s and 1960s some of the Elders in the village recall that women were equally part of the seining crews, but this is not the case any longer. Women contribute to other parts of the fishing process, for example by preparing the meals of the fishermen each day for them on the ice that the men take with them.

[18] Mustonen, 2009

Markku Tervonen at the fish trap, June 2015. Snowchange, 2015

The knowledge regarding fishing has been passed on to the contemporary seiners of Puruvesi from what can be called unbroken traditional cycle of oral and practical transfer. All of the people still on the ice crew up in 1950s and earlier to the previous generations of seiners and have learned the trade by hand on the ice. They represent a unique pool of tradition in the middle of modern Finnish society. This is for example reflected in the knowledge of the apaja sites, which cannot be learned from anywhere else except from practice. One of the greatest identified threats in the community is the lack of people to continue the fishing – there are no young seiners in the community and majority of the fishermen are now in their 50s and 60s[19].

Decisions are made within the seining crews usually in a consultative consensus manner. Every night the weather forecast and weather conditions, especially wind, are observed to determine the place of the apaja site for the following day. Ice conditions are marked very carefully. The situation on the fish markets influences the need and apaja site as well. Some of the people see in dreams the place where they need to pull the nets on that day. In traditional times each crew would have *nuottakuningas*, a traditional chief who would decide things for that crew.

What has transferred from this traditional governance structure to contemporary times is the way all of the fishermen left on the ice decide things. They have chosen one person to represent their interests in their relationship with the authorities, researchers and others who wish to engage with the community. Currently Tero Mustonen holds this position.

[19] Mustonen 2009: 193

3. Climate and Weather Observations 1996-2015

Some of the threats to the ice-based seining have been caused by outside forces in contemporary times[20]. Weather knowledge is at the heart of the decision as to which apaja site is going to be pulled at a given time. This ability to forecast properly the coming conditions is based on many different factors (which climate change is disrupting). For example, in the case of Esa Rahunen this means in theory choosing from 135 different apaja sites on a given day.

Fishermen observe the moon and phases of the moon, stars, winds, rain, sun, water currents and temperatures to decide where to go. Capacity to forecast both seasonal and short-term weather events has been the survival knowledge in the community for centuries.

A review of the catch diaries reveals how the beginning of the ice season has shifted between (1968) 1996 and 2015:

Year	Start of winter seining	End of winter seining
1969	09.11.1968	
1996	28.12.1995	26.4.1996
1998	18.12.1997	19.4.1998
2000	20.12.1999	17.4.2000
2001	**07.01.2001**	**21.4.2001**
2002	26.11.2001	23.4.2002
2005	06.12.2004	19.4.2005
2007	**23.01.2007**	**30.03.2007**
2008	**13.01.2008**	**11.04.2008**
2009	**04.01.2009**	**12.04.2009**
2010	**04.01.2010**	**12.04.2010**
2011	07.12.2010	20.04.2011
2012	**06.02.2012**	**20.04.2012**
2014	**c. 15.01.2014**	**c. 10.04.2014**
2015	**09.01.2015**	**02.04.2015**

The years in **bold** are exceptional or significant change years[21].

The seining began in 1960s even in early November. Towards 1990s the date moved to mid-December. In 2000s the mean start of the season was in early to mid-January. In 2010s some years the start of seining is now in early February. This indicates a loss of a third to a half of the winter seining period.

Spring break-up has remained fairly constant all the way to mid-2000s. Then the warmer winters forced the seasons to close late March to early April.

[20] Arctic Council, 2005

[21] These dates are derived from the catch diaries of Esa Rahunen and Risto Ketolainen as well as notes written by Tero Mustonen. Exceptions include late freeze ups and early spring breakups of ice.

Snowchange Co-op has worked with the Puruvesi seiners also documenting the oral history observations of change[22]. During the oral history work 2005-2015, people generally reported that the weather has become warmer and unstable.

Esa Rahunen, for example, said there used to be longer cold spells during the winter, but now, sometimes in the space of 24 hours, the weather can turn from very cold (25 below zero) to mild (plus degrees). This produces new cracks and leads on the ice. Changes are more rapid now. Seasonal weather patterns are not stable. The summer of 2006 was the warmest in 150 years, according to Rahunen. Then 2010-2011 was even warmer, and the summer of 2012 was the rainiest on record[23].

Markku Tervonen reports that winds have increased significantly. This never used to take place in their youth. Pentti Pöllänen, one of the old fishermen in the community, confirms this on a session on November 20th, 2006. In the past decade from 2005 to 2015 the winds have increased a lot and the strong winds in spring and Summer 2015 prevented the fishermen from accessing their fish traps for days in June 2015.

Asko Karjalainen guides the boats in strong winds, June 2015. Snowchange, 2015.

Ice conditions have been fluctuating in the past as well, but the winter 2006-2007 was the warmest on record, prior to 2010. There was no ice on the lake before the end of January 2007. This cut the fishing season in half, causing economic impacts to the fishermen.

[22] Earlier results have been published previously, for example in Mustonen 2009, Mustonen 2014 and Pretty, Barucha and Böhm 2015.
[23] Mustonen 2012

Tervonen reports that the ice breakup is earlier than usual now. These new conditions are a safety issue for the fishermen. Open new leads on the ice and uncertain travel and fishing conditions are something that needs to be addressed in more detail than before.

That year, the fishing season ended early, already in early April 2007. This prevented the Snowchange school childrens' day from taking place. However, the day with the children was organised in 2008 and proved to be a big success, both with the fishermen and the children. In December 2010 the children who took part in seining in 2008 still reflected on their experience and had a desire to learn more. This could be an early indicator for possibilities to pass the traditional knowledge onwards.

Snowchange Winter Seining Day for School Children, 2008. Snowchange, 2008

Another unusual winter was 2009-2010, with extreme cold weather for weeks (-35 C), but with open water on top of the ice. This phenomenon has not been observed before. The winter was followed by the hottest summer on record, +37.2°C temperature was the highest ever recorded in the region in late July 2010[24]. Very little rain fell in eight weeks of the summer and temperatures were constantly at 25 to 30 °C. So, in the span of six months the temperature fluctuations were 75 ° C degrees, from minus 35 to plus 37 ° degrees Celsius[25].

[24] Whitefish had green roe in the following Autumn, an indicator that they melted the roe back to their system and did not want to spawn.
[25] Mustonen 2012

The strange new conditions of winter 2010 with water on the ice at -25 C. Snowchange, 2010

Many fishermen say that the winter 1986-87 was the 'real proper' winter. Weather changes can be traced back to 1982 – that is the year when they started to happen initially. Usually the solid 'steel' ice depth is 50-60 centimeters. In 1984 there was 80-84 cm steel ice. At the end of February 2007 there was 10 centimeters of steel ice – with the medium of 20-54 cm throughout the season:

Year	**Steel Ice Depth[26] in centimetres in February - March**
1984	84
1980s	Mean 50-60
1990s	Mean 50-60
2007	10 February
2007	54 at the end of the season
2014	25 in early March[27]

Some community adaptation measures have begun to emerge. Steel-reinforced boats are used in December in the middle of forming ice, in order to continue open water seining later in the

[26] Referring to the solid, stable ice that forms without the slush. Slush ice can add another 40-50 cm to the ice depth of poor quality.
[27] Catch diaries and oral histories of Risto Ketolainen and Esa Rahunen

autumn because there is no continuous ice shield. Since 2010 the community has been holding planning sessions to adapt to the new conditions both in the fish markets (profitability), getting their voices heard better (representation in EU and Finland) and finding new forms of fishing (engaging possibly with tourism). In December 2013 the Puruvesi vendace received the 'geographical indicator' status from the EU Commission.

Many of the fishermen have consulted Elders in the community regarding the changing natural conditions to shift apaja catch sites and patterns of harvest in the middle of the rapid changes. Proposals for an integrated ecosystem management and co-management mechanisms have been proposed, even though not yet successfully[28]. These measures indicate that the seiners are trying to adapt to these changes on their own terms.

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[28] Mustonen, 2012. In late 2015 Puruvesi will be a site of a major EU LIFE project to restore habitats and water quality. The seiners wish to participate in this project actively.