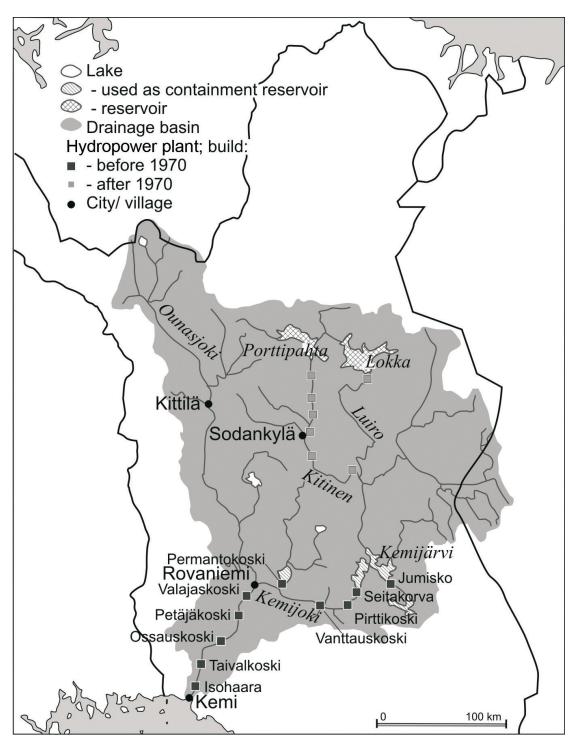
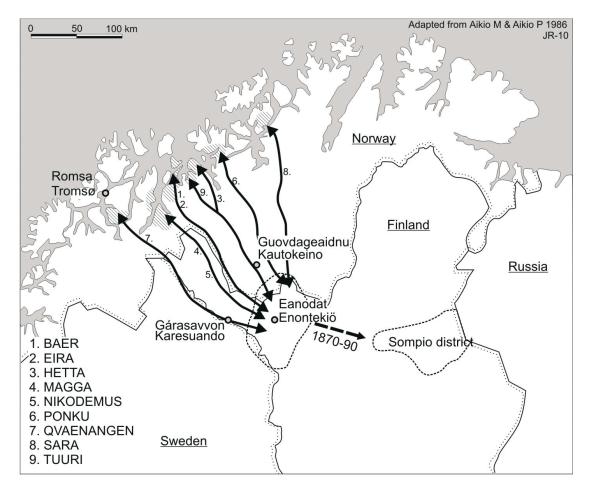
Drowning Reindeer, Drowning Homes

Indigenous Sámi and Hydroelectricity
 Development in Sompio, Finland

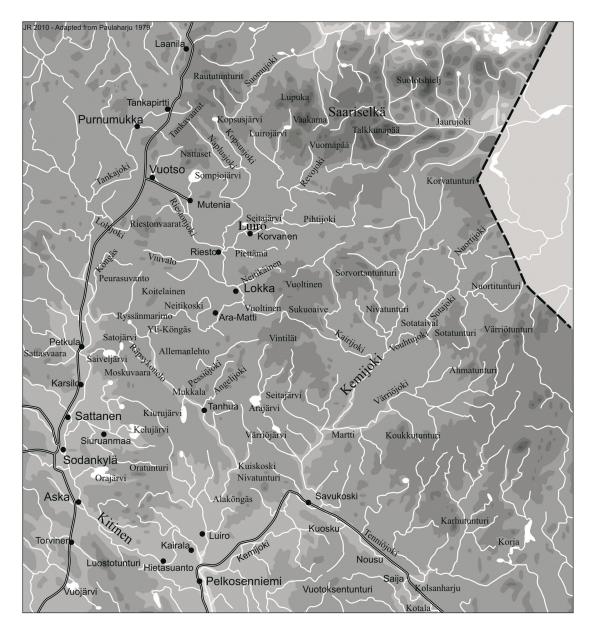
Kaisu Mustonen and Tero Mustonen
in cooperation with
Antti and Pekka Aikio



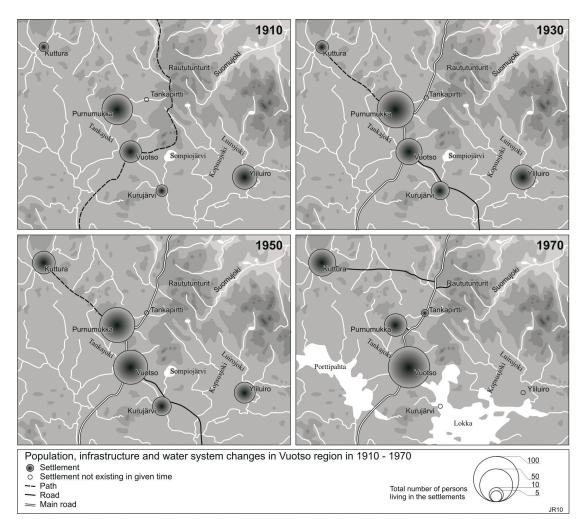
1. Map indicating the region discussed in the book and major hydropower plants, dams and reservoirs. map: JR



2. Nomadic routes and seasonal reindeer pastures of the Sámi families from Kautokeino and Enontekiö prior to the move to Sompio in the latter part of the 19th Century. The arrow from west to east indicates the direction of the move of the nomadic Sámi families between 1870 and 1890 to Sompio. The families that moved and routes from 1800s are mentioned on the left. map: JR



3. Map of communities of Sompio region prior to flooding. map: JR



4. This map indicates the changes, which took place in the communities between 1910 and 1970. Population, infrastructure and community changes are indicated. Circles indicate population strengths in a given time. The last map shows the newly created reservoirs. Adapted from Aikio (1988: 71). map: JR

"The dominant economic model, with its emphasis on market forces, growth, high-profit and excessive consumption by the few, has completely ignored the rhythm of nature, ethical and spiritual values and even the basic survival needs of vast majority of population; and has created widening gaps between nations and within nations."

-Indian Convener of the Citizens' Global Platform, Y. David

Citizens' Global Platform is a joint effort by civil society organizations from Finland, Brazil, India and Tanzania. It is coordinated by the United Nation's Association of Finland and rooted in the Helsinki Process on Globalization and Democracy, which was jointly coordinated by the governments of Finland and Tanzania. After the Helsinki Process ended in 2008, the Citizens' Global Platform started a three-year project "Making marginal voices heard in the UN processes".

The aim of this project is to empower marginalized groups and to create new mechanisms for citizen participation in the international political processes. The project focuses on combating climate change and strengthening the appreciation of sustainable lifestyles.

Marginalized groups have restricted power to decide on the use of the material and immaterial resources that are crucial for their cultural, economic and social well-being - and even their existence. These groups include indigenous peoples such as the Sámi in the North, Adivasis in India and the indigenous people in the Amazon region. Other marginalized groups include the poor, who live in areas vulnerable to the negative impacts of the climate change.

It is often that women and children are the most vulnerable and have least influence on decision-making. The climate has already changed in many areas where the indigenous peoples live. Since their livelihoods are often directly dependent on the use of natural resources and the weather patterns, the impacts are severe. The traditional markers for harvesting, fishing or moving of the rein-



deer herds do not hold true anymore due to the unpredictable changes. However, climate change is just one additional burden. Many indigenous people have suffered long from having been denied of their land rights and/or the rights to use the natural resources. They also lack political and economic power to influence the decision-making both at the national and international level.

A research process documenting the actors working on climate change, their assets and challenges, as well as the impacts of climate change to the marginalized groups in each of the four countries is under way. The results from all the countries show that there are significant negative impacts to the marginalized groups due to the climate change. This book illustrates complexities of changes that Sámi people have witnessed in the community of Sompio (modern day Vuotso) in the southern part of their homeland, Sápmi, in Finland. The work here links the past misuses of power into the current discussions on weather changes and sustainability. It allows the histories of the Lokka and Porttipahta reservoirs to be told for the first time in international arenas from the Sámi viewpoint. It addresses the fundamental questions of sustainability by bringing into the light the voices and experiences of the Sámi and other local people.

The experiences of the marginalized groups in India, Brazil and Tanzania are illustrated in the videos and reports that are available on the project's web page http://www.globalplatform.fi.

Ecological and climate changes threaten to widen the gap both between and within nations, because the negative impacts hit hardest on those, who are already marginalized. However, the climate crisis offers a powerful incentive to change the status quo. In the quest for a transition towards a more sustainable and equitable world, let us make sure that the marginalized voices are heard and make a difference!

Jenni Kauppila, Citizens' Global Platform, Coordinator



Contents

Part I	10
Tero and Kaisu Mustonen: One River, Many Damages	
1. Introduction	10
2. Lokka and Porttipahta Reservoirs: Locations, Histories, Decisions	14
2.1. Short Cultural History of the Area Until the Time of Reservoirs	15
2.2. Time of the Reservoirs	18
2.3. Province of Disputes	19
2.4. Man-made Reservoirs in Finland	20
2.4.1. Problems of Artificial Lakes	22
2.5. Birds of Lokka Reservoir	22
2.6. Fish in Lokka and Porttipahta Reservoirs and Their Waterways	24
2.7. Salmon	28 29
3. One River, Many Damages	30
3.1. "Lapland – A Land of Great Opportunities": Kemijoki Ltd is Created	31
3.2. Drowning Begins 3.3. Evacuation	32
	36
3.4. "To us, Kemijoki River is totally dead. It is no longer a river."	36
3.5. Cultural Landscape	39
4. Decision Making and Power Relations in the Lokka and Porttipahta Cases	41
4.1. The Role of River Kemijoki in Finnish Electricity Production	41
4.2. Consequences to (Sámi) Reindeer Herding in the 1970s4.3. Linguistic Impacts	41
5. Environmental and Weather Change Related Concerns from the Community	45
of Purnumukka and the Vuotso Region in the 2000s	
5.1. Weather, Rain and Extreme Events	49
5.2. Ice Rain	50
5.3. Snow, Rivers, Ice	52
5.4. Animals	53
5.5. Birds	53
5.6. Wolverine	57
5.7. Squirrel	57
5.8. Insects	57
5.9. Traditional Calendar and Knowledge	58
5.10. Reindeer and Reindeer Herding in the 2000s	59
5.11. Arrival of New Species	60
5.12. Erosion	61
5.13. Other Concerns and Perspectives for the Future	61
6. Conclusion to Part I	63

Part II Pekka Aikio: When Electricity Was Sown	67
How It Was Experienced What Oula Aikio Is Telling Us Through His Diaries Lokka and Porttipahta as Man-made Lakes in Nature and As Human Communities	67 73 84
 4. Reindeer and Reindeer Herding in the World 5. Formation of Lapin Paliskunta Reindeer Herding Municipality 6. The Breakdown of the Sámi Ecosystem and the Defeat of Reindeer Herding 7. Science and Research at the Service of Exploitation of the Area and Local Population 	87 88 92 98
8. Study of Reindeer Pastures 9. Conclusion to Part II	99 100
Part III Antti Aikio: Drowning of Sámi Lands - A Conflict Between Customary and Statutory Laws	102
 Introduction Customary vs. Statutory Law? On Sámi Customary Law Customary Law and Legal Pluralism The Two Laws in Lokka and Porttipahta Case Possibilities For the Future 	102 104 104 105 106 107
Part IV Pekka Aikio and Tero Mustonen: Conclusions	109
Afterword – October 2011	113
References	116

Part I

Tero and Kaisu Mustonen:

One River, Many Damages

1. Introduction

This is a book regarding violence that was done against land, nature and people. It tells a globally little-known story of an Indigenous people, the Sámi and other local people living in the Vuotso region of Province of Lapland, Finland. The Indigenous peoples of Finland, especially those Sámi living in the south-central part of Sápmi have received little attention. Yet events have taken place there which are relevant to the Arctic and global discussions on climate and ecological changes. This book shows the darkness that underlies the nation state of Finland. It tells about the price that local communities and northern nature have paid for modernity.

This book traces the histories and cultural landscape of southern part of Finnish Sápmi. A central theme, which runs through the book, is the River Kemijoki that was harnessed for hydroelectric power in 1948. By late 1960s the construction of the dams and the electricity industry had reached the headwaters of the river, an area where the Sámi and other local people were living and had their subsistence economies and age-old traditional cultures. In the span of a few years a whole culture was destroyed, flooded. Process bears the hallmark of a cultural and linguistic genocide (Kulonen et al. 2005: 198).

In recent years the questions of climate and weather changes have received great amount of attention. In the United Nations the recently launched 'Indigenous Peoples Climate Change Assessment' (www.ipcca.net) under the Permanent Forum of the Indigenous Peoples at UN is one mechanism in which these questions are addressed. In the Arctic region the Arctic Climate Impact Assessment (Arctic Council 2005) allowed the Indigenous peoples of the North to share their knowledges with the western scientists in an unparalleled inquiry into the changing North. Other inquiries have investigated the climate histories of the region but the ACIA report included for the first time the time Sámi view. Some of this work is (re)presented in this volume.

The global answers and adaptation plans of the industrial societies regarding climate change have included uses and renewed interest towards hydroelectric power. Governments wish to call this 'green energy'. In the Global South the Clean Development Mechanisms and Joint Implementation projects under the Kyoto Protocol have focused on construction of hydroelectricity on Indigenous homelands.

If we look at the power structures of the international climate change machinery, we can see how the old stereotypes of 'clean technologies' of the West are still present in the discourses of sustainability. This book wishes to address these misnomers in part.

By tracing the events of River Kemijoki since 1948 with the focus on creation of two of the largest reservoirs in Europe – Lokka and Porttipahta – and their impacts on the local and Indigenous peoples through the last 40 years, we expose the misleading rhetoric and hidden truths behind the 'clean' uses of technology.

Instead the image, which emerges, is a portrayal of greed, total destruction of local cultures and denial of human rights inside the European and Finnish systems of governance.

While the voices of the local peoples have been heard often in Finnish media and discussions since 1960s international attention to the matters has not surfaced. The national and local discussions have had no impact on the governmental direction or plans. Local people have been totally ignored. International attention to the questions of Lokka and Porttipahta reservoirs has been in waiting since 1970s. In the 2010s none of the questions have disappeared in Finland. This book arrives in a very timely situation regarding energy production questions in Northern Finland.

The Vuotos reservoir further south from Vuotso region is being planned. There exists a lot of suspicion and opposition against those plans based on the previous example of Lokka and Porttipahta in the same region.

Hannu Perälä, a reindeer herder from Pelkosenniemi community still discusses the impacts of Lokka and Porttipahta, almost 30 years after: "It takes at least ten years for the reindeer to learn a new pasture. When it has once started to use a route to go someplace, it will go there all its life. When they built Lokka and Porttipahta, we had to use trucks to move reindeer when they got lost, and we never got all of them back, not even close. There they go to the reservoir area in the early spring and come back just before the ice breakup to calf. We are starting to lose a lot of our pastures otherwise too; the Finnish Forest and Park Service is logging so much in our area. Those old-growth spruce forests can't recover from that destruction" (Junninen 1995: 34).

Paavo Soppela, a reindeer herder from Kemijärvi community shares his feelings: "We don't believe in Kemijoki Ltd. at all anymore, we have seen its methods too many times. When they started to regulate lake Kemijärvi our well dried up and the fish started to disappear. We got nothing in place. Logging in the planned Vuotos basin area will be vast, like they'd be creating a massive field. With those old-growth spruce forests we will lose winter pastures of reindeer and we will have to start to feed them ourselves. The thing that makes me most angry is that nothing that is promised, is kept. A state company can traditionally do anything in Finland. It can steal all natural resources and buy off people's livelihoods. Money is the greatest power of all" (Junninen 1995: 32).

Linguistic genocide has been defined in the following way: "it prohibits the use of the language of the group in daily intercourse or in schools or the printing and circulation of publications in the language of the group" (Kulonen et al. 2005: 198). The draft of the United Nations' Convention on the Prevention and Punishment of the Crime of Genocide, Articles 2a and 2b define genocide as "forcibly transferring children from the group to another group and causing serious bodily or mental harm to the members of a group" (ibid. 2005: 198). The events in Sompio fill all these definitions all too well.

It is only now that the United Nations under the auspices of the UN Association of Finland through the well-coordinated 'Global Citizens Platform' Project has teamed up with the independent non-profit Snowchange Cooperative and the local Sámi of Vuotso to offer an international assessment of the situation. It comes 40 years after the events that are discussed took place. The artificial lakes have been built, villages burned and reindeer pastures flooded.

Yet the magnitude, relevance and on-going social, cultural and environ-

mental damages resulting from the catastrophe of Lokka and Porttipahta reservoirs need to be addressed. Construction process resulted in system shifts in the whole ecological complex of the region. The reservoirs changed the local weather system for example regarding the crucial arrival times of snow, which is relevant in the events of the reindeer year (Snowchange Vuotso Oral History Archive 2002).

This book offers mechanisms for discussion on the local level, on national level and as well on the international level so that the little-known situation in Finland becomes more widely exposed. Connected with this publication brochures, public events, lectures, media outreach and activities of an international network in four other countries will take place.

The book is divided into four parts. Part I tells of the events and situation in the region using western scientific assessments, Indigenous and local oral histories documented in 2000s and literature that is relevant to the themes at hand. Our aim is not to provide an extensive literature review of all materials and publications of the topics at hand but to highlight the main events in the region. The larger recount of events will be left for future inquiries.

At first the histories and cultures of the area are explored. The concept of Sápmi and Sámi peoples as well as the Finnized Sámi and settlers is explained. Geographical locations and major weather, ecological and geological features of the Vuotso area and Kemijoki River are described.

Then the events of construction of Lokka and Porttipahta are discussed followed by a short overview of major environmental impacts of the reservoirs, including views on the reindeer, birds, salmon and other fish. The position of Lapland as the colonial project of Finnish nation-state emerges through the histories of hydroelectric build-up. This is contrasted with the cultural landscape of the local peoples.

Then we move to the impacts of the situation in 1970s. Reindeer herders, fishermen, politicians and others share their views on the situation. Juridical and power-related issues are named as key factors in the process. We move through the 1980s and 1990s to 2000s when documentation of oral histories regarding traditional knowledge and weather changes brings the events and impacts of the reservoirs back to the centre of attention. Now the living herders have to cope with the environmental destruction and impacts from the reservoirs under new regimes of subsistence life ways.

Part I concludes with a view that positions the events since 1940s and especially after 1960s into the Arctic and international Indigenous experience. Comparative views from Siberia, Sweden and Canada are offered. While the issues are unique to each country, a picture emerges where we can see that the genocide against Indigenous peoples bears similarities across the North and hydroelectric development and harnessing of northern rivers has been an instrumental part in this process.

Part II allows the local Sámi experts to submit their contributions. Pekka Aikio shares with us the views from the communities as the hydroelectric plans developed. The chapter opens with a short story "How it was experienced" by Pekkas father, the late Sámi leader and reindeer herder Oula Aikio aka "Kotapoika" ("Turf hut boy"). He used this pseudonym when he wrote the story for Poromies ("Reindeer herder) magazine in 1968. This indicates the storytelling and oral traditions that survived in the Sompio community far into the 20th Cen-

tury and beyond. Following this powerful story Pekka shares the diary entries of Oula Aikio from 1960s as the situation worsens in the community.

The impacts to the local ecosystems, waters and people emerge into view from inside the community. Then Pekka Aikio turns to the formation of Lapin Paliskunta reindeer herding municipality (also known as association) and traces the Sámi histories from late 1800s to the modern situation in the region. Pekka Aikio describes what happened to open range reindeer herding. Furthermore he explains how science was made to serve development in the reservoir case. His chapter concludes to show how the Finnish state and society completely ignored the existence of nomadic Sámi with their highly developed reindeer herding.

In Part III Antti Aikio explores the legal processes bringing the Sámi customary law bit by bit to an equal footing with the legal framework of the statutory law.

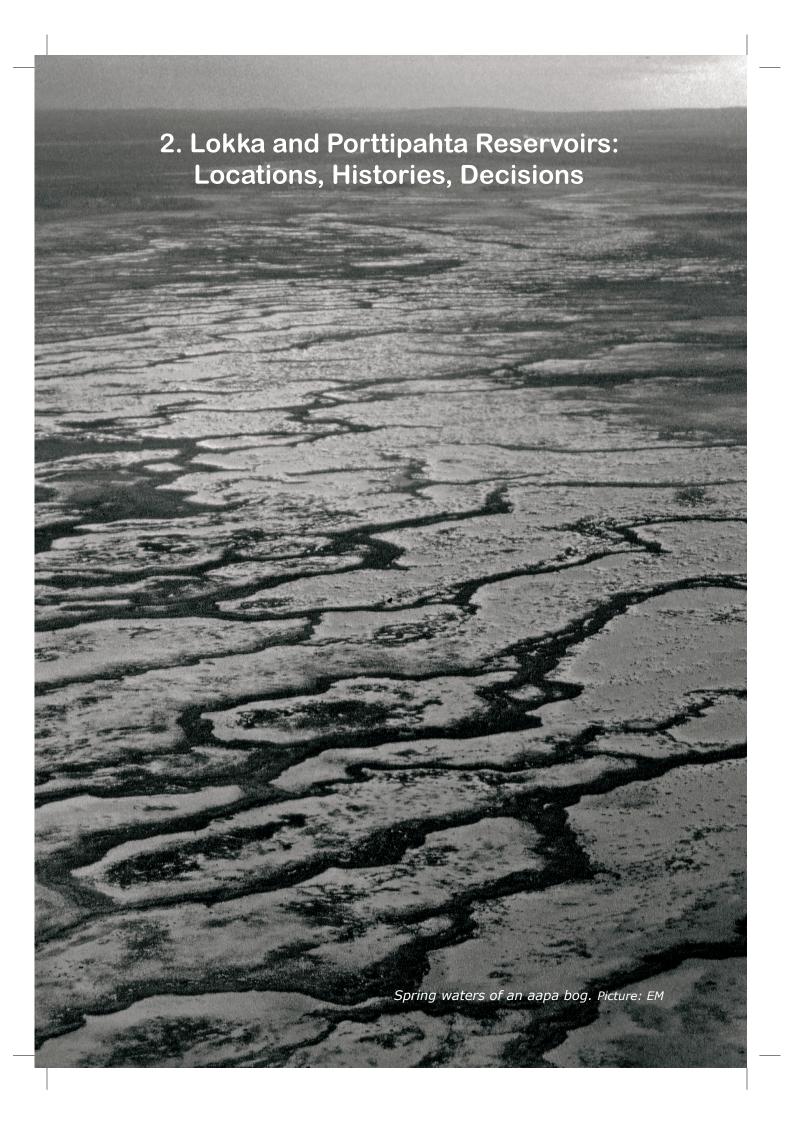
In Part IV, the conclusions, solutions and models are offered as next steps to start the long and difficult process of healing and decolonisation.

We hope that this small inquiry, cases of Lokka and Porttipahta as a part of the cultural genocide and destruction of Sámi areas will be a start of a much wider societal and science-based assessment regarding the topics at hand. This book can only offer a view, small view into these issues and with this comes all the limitations such space creates. Great care has been taken to check the materials well and engage with the representatives of the community of Vuotso at all steps during the writing process. However all possible mistakes that we may have made are the sole responsibility of the authors and we are sorry for any misrepresentation or misunderstandings.

Authors wish to several people for making this work available over the years. These people include Mika Nieminen, Pentti Nikodemus, Mikko Lamminpää, Tiina Salin, Saija Lehtonen, Hanna Eklund, Eero Murtomäki, Rita Lukkarinen, Jenni Kauppila and the whole staff of the UN Association of Finland and Riitta Savikko.



In early summer globeflowers are in full bloom on the riverbanks and in the wilderness villages of Sompio. Picture: EM



2.1. Short Cultural History of the Area Until the Time of Reservoirs

This chapter provides a view of the cultural history of the region, traces the developments and events regarding the reservoir flooding and provide a framework for understanding the human societies of the Sompio area.

The area that is discussed in the book has a rich and long cultural history and human presence. It has been inhabited since the end of the last ice age (Huurre 2001). For the sake of clarity the region is called Sompio. Sompio refers to a geographical area and a human space. Communities of Sompio since 1300s have included at first the Forest Sámi, then the arriving Finnish settlers who mixed with the Forest Sámi and in the 1880s the arriving North Sámi (Map 2). Since Second World War Finns have moved into the community too and it can be referred to as 'modern Sompio'.

The reservoirs of Porttipahta and Lokka that were constructed in 1960s and 1970s destroyed the communities of Sompio. They do not exist anymore. Vuotso is the central village of the modern Sompio. Other villages such as Mutenia and Tanhua are discussed later in the text.

The area that is under discussion here is called 'Sápmi', a Sámi homeland from the Sámi viewpoint, an area within four nation states where the Sámi live today (for example Kulonen et al. 2005: 186). Outsiders have allocated many toponyms for the area, including Lapland, but the Sámi who are the Indigenous peoples of Sápmi have not used them.

The earliest known people in the region can be called 'Forest Sámi' – little is known of them. Already in the 1600s when the earliest records were created the Swedish King who 'owned' these areas fostered and encouraged settlers to move from the southern parts of Finland

to the region.

Matti Luostarinen, a geographer describes the area: "The outstanding natural characteristics of the landscape in this area, with its vast aapa bogs surrounded by fjells, its varying belts of forest and spruce mires and the river system which cuts majestically through the whole district, provided the basis for village communities which had molded and adapted themselves over the centuries in accordance with the opportunities which this environment offered. Nature may thus be regarded as having directly dictated the conditions for life, fusing the various forms of culture reaching the area so as to develop the forms of social life and economic structure best suited to the circumstances. The social foundation for this Sompio culture lay in the interchange of cultural elements between the original Finnish settlers and the Lapps (Sámi) who had been forced to move there later, while its economic foundation was supplied by reindeer herding, an activity well-suited to conditions in Forest Lapland, and the utilization of the natural riverside meadow" (Luostarinen 1982: 12).

Marjut Aikio (1991: 88) mentions that the Sámi or Lapp village of Sompio consisted of four taxation communities, Sompiojärvi, Arajärvi, Luirojärvi and Kiurujärvi in 1600s. She argues that already in 1340s in Finnish Lapland the borders of these communities were adhered to for example in taxation by the Swedish Crown (ibid. 1991: 89). In 1600s Sompio was governed from the southern Swedish community of Härnösand.

This period between 1600s and 1800s is a time when the arriving Finns mixed with the Forest Sámi population and the villages of Sompio were created. For example Paavali Pelkonen was among the settlers who forced their way into the Sámi world of Sompio (Paulaharju 1979: 32). Eight settlers lived and approximately 30 Sámi gammis or traditional shelters existed in Sompio at the end of the 17th

Century. Families intermarried and mixed. The Finnized Sámis maintained many of the life ways of the Forest Sámi until the 20th Century (Paulaharju 1979: 255).

The priests brought with them their own religion, Christianity. The first priest to arrive in Sompio was Esaias Mansveti Fellman in 1648 according to Paulaharju (1979: 28). This new religion was at war with the local traditional beliefs and ways of knowing. Fellman used the pow-

another strong-willed priest worked in the area. However the continued subsistence practices and lack of a church in the community preserved many features of the older civilization that existed in Sompio. The closest church was in Sodankylä community and it had been constructed in 1689. This time represents the first documented use of power from outside to change the situation in the Sompio area (Paulaharju 1979: 28-30).



A traditional Sámi dwelling, a turf hut gammi with pine logs in 1800s in Sompio.

Picture: KG, University of Oulu Library Archives.

ers of the state and church to convert the locals officially into Christianity. Once the local chief Suas converted, many of the local people followed in 17th century (ibid. 1979: 28).

Recent scholarship (Aikio 1991: 88, 94) has been critical of Paulaharjus descriptions of the region but they do contain essential sources of information from the earlier periods. Aikio has documented the influence of the priests to the spiritual life of the community in the early Christian times (ibid. 1991: 89-90, 94).

The Christian missionary activities were increased when Gabriel Tuderus,

Aikio (1991: 90) says that the first documented family names in Sompio from church records include family names of Curisia, Keitsa, Arapää, Sakkanen, Sufva, Vuolappa and Musta. Especially the Musta family descendents have formed the contemporary Sompio region 'Forest Sámi' families.

Over centuries many of the descendants of the Forest Sámi settled down and were known as 'Finns' of Sompio. The Sámi language had been lost among this local population about 100 years ago in the late 1800s (Aikio 1988: 65). They have a mixed identity in terms of the relation-

ship with contemporary Sámi population. In order to understand the dynamics and events of the communities in the region the events of the past 150 years need to be discussed.

The nation-states of Sweden, Norway and Russia started to exercise their powers in the region with more might in the 18th and 19th Centuries. Sweden and Norway underwent various border disputes with Russia and as well among themselves. These had impacts to the migration lifestyle of the North Sámi living in the summer on the coast of the Arctic Ocean and in the wintertime in the highlands of the border area of Finland, Sweden and Norway. Aikio (1988: 65) reports that families of these North Sámi moved to Sompio region in 1870-1890s due to the problems that border closures had caused to their reindeer life and migrations (Map 2). Rosberg (1891) provides us with information that makes the case more complex. According to him the people in Sompio had invited some of the North Sámi to their home areas to herd and manage their reindeer during this period, which also contributed to the migration.

This meant that the Sompio region received totally new Sámi population at the end of 19th Century. These Sámi started to establish their own seasonal rounds in the community and navigated the social and political challenges that arose from the land use of the descendants of the Forest Sámi of the region. Aikio (1991: 92-93) mentions that the North Sámi had their first use areas in lakes Sompiojärvi and Kopsusjärvi and on Riestovarsi, which is the location of the contemporary Vuotso community. Permanent gammis and households were constructed there in 1883-1886. Even today in 2010 there is a clear separate identity for these North Sámi or 'reindeer Sámi' as they are known, and the other local people in the area (Aikio 1988: 65).

Between 1880s and 1940s the communities and the villages of the area had

relatively good capacities to exercise their own Indigenous governance and land use decisions. The seasonal rounds of the reindeer people who mostly migrated with their herds and the settled small-scale hunter-farmers used different resources of the ecosystem and could co-exist on relatively good terms. However towards the end of this period big changes were underway.

Aikio (1988: 71) identifies Vuotso as the central village of the region because the road went through it. Originally it had been fully a Sámi village. First official Finns arrived in 1920s in larger numbers working as the border guard troops for the recently (1917) founded nation-state of Finland. Forestry workers and others arrived there too.

Other villages in the region, especially the remote ones, preserved their ethnic North Sámi component better. Kurujärvi village was founded by the Vuotso Sámi village in 1911 and remained to the end as a wilderness village without a road. Their closest neighbour was the Mutenia village 10 kilometres away. Purnumukka was a North Sámi village as well which had been constructed out of the way on purpose (Aikio 1988: 71).

Spanish flu arrived in the Sompio area in 1930s with horrible consequences - 29 people passed away in the epidemic (Seppälä 1976: 153). The old way of life sustained a direct hit with the larger events of the Second World War. Several of the wilderness villages had to be evacuated, sometimes due to arriving Soviet soldiers and sometimes due to the German Army that fought the Finns in the War of Lapland in 1944. There was a German POW camp in Purnumukka during the war. 27 men were lost from Sompio in the war. Russian guerrillas shot 24 women, children and elders in the community (Seppälä 1976: 153).

After the war ended 1944 many of the local people had mixed feelings, some still rebuilt their homes and houses after

damages, others let the old houses remain in ruins and moved to Vuotso or to other areas.

In order to understand the histories and experiences of the local people, it is relevant to contextualize the Sompio community as a part of a larger tapestry of events, most of which have been decided far away from the region or the communities. The small subsistence communities of the North and Forest Sámi and other local people have been targets of uses and misuses of power for over 300 years now. Yet at all times the people endured. They were able to absorb even the damages brought by the WWII and the arrival of new settlers and the roads into the region. But there was a development on the way that they could not stop or adapt to - the creation of the Lokka and Porttipahta reservoirs.

2.2. Time of the Reservoirs

Lokka and Porttipahta, the largest reservoirs in the European Union, are located in the northern part of the municipality of Sodankylä, along the tributaries of river Kemijoki in Central Lapland. Lokka reservoir is situated in the upper reaches of river Luiro and Porttipahta upstream of river Kitinen. The maximum level of water for both is 245 meters above sea level, and the lowest permitted level of water is 240 meters for Lokka and 234 meters for Porttipahta. Due to their shallowness, lowering of water levels diminishes the sizes of the basins significantly (Järvikoski 1979: 84).

In year 1981 Porttipahta was connected with Lokka through the Canal of Vuotso. The regulating dam in Lokka reservoir is situated in the southern tip of the basin, its height of drop is 30 meters, and in its connection there is a power station of 35 MW.

When the locations for the reservoirs were chosen, there was naturally an ob-

jective to minimize the building costs as well as the compensations to the land-owners. Järvikoski notes that the location of Lokka seemed especially favorable from this point of view. The area was mostly marshland, the largest continuous bog, Posoaapa, was to be drowned, and there were "a just few small villages" surrounded by the marshes (Järvikoski 1979: 84).

Of the 417 km² which went under Lokka reservoir, 45 % were owned by private people, over 18 000 hectares. Of Porttipahta basin area 13 % was privately owned, about 2 750 hectares. In the reservoir area there lived altogether 640 people, and 560 people had to leave their homes. Most families got compensated for a whole farm (in some cases the farms were not bought but expropriated), but some lost homes that were built on rented lands (Järvikoski 1979: 87).

The construction of the reservoirs was planned early on. Already in October 1953 newspaper reports indicated the construction of Lokka and Porttipahta (Seppälä 1976: 151). The official permits for the construction of Lokka were applied for in 1964 and they were issued in December 1966 and early 1967. Porttipahta was approved in 1968 (Seppälä 1976: 164). The construction ended in Porttipahta in 1971.

In 1964 the clear-cuts at the location of Lokka and Porttipahta proceeded. Timber which was valued at the time, such as pine and spruce trees were logged but birch trees, that were considered worthless, were left standing. This caused them to decompose under the waves and they affected both water quality and fishing for years to come. Nets were caught often in the birch trees and spruce and pine tree tops which had been left behind. It has been estimated that 150 000–200 000 cubic metres of birch trees were left under the waters (Seppälä 1976: 163).



Birch trees swamped by rising reservoir waters. Picture: PA

2.3. Province of Disputes

This chapter provides an overview of the environmental, social and other impacts of the reservoirs. The oral histories and observations that the local people make mostly focus on the 1970s. Later more recent observations are shared.

Lapland is a province of many disputes. Sámi rights, reindeer, berry picking, natural resources and nature conservation have raised strong feelings for a long time, writes Mikko Niemelä in his report in 2010 of the death of the salmon in river Kemijoki (Niemelä 2010: 42-49). This is clear, but what lies behind that? Why did the salmon die in river Kemijoki? What happened almost 60 years ago and why is it still important?

"In Finland, Lapland has been a target of national colonial project and exploitation. This exploitation can be seen at its most clearest in the way, how without any consideration, the people and the interests of Lapland were ignored when Kemijoki River was harnessed to produce electricity" writes Esko Juhani Tennilä, Finnish MP in his defence of Vuotos, an area under a reservoir plan in 1998 (Tennilä 1998: 5).

Laukkanen (1981: 21) describes the situation in northern Finland in early 1980s, roughly 15 years after finalization of Lokka and Porttipahta reservoirs. He claims that "especially in the northern areas the basic question remains the same. Economical forces penetrate to areas where traditional livelihoods based on nature's resources have great significance for the local population; it has become the basis of life, a necessity. This creates a conflict. Looking at things from the ecological viewpoint does not solely mean that nature should be preserved in its original state. It means first and foremost taking the local people and their needs into account".

Further, he reminds us of the basic problem of developed industrial societies, which are based on wasteful spending of natural resources. Such a process can only be continued so far. There will

be a time when the underlying basis of all operations of a society needs to be rethought. In the usage of hydropower we have already reached that point. We know, that each function that suppresses nature, also suppresses people (Laukkanen 1981: 22).

2.4. Man-made Reservoirs in Finland

Järvenpää et al. (2004: 144) write that the reservoirs of Lokka and Porttipahta stand out when compared with other man-made reservoirs in Finland, due to their large size and northern location.

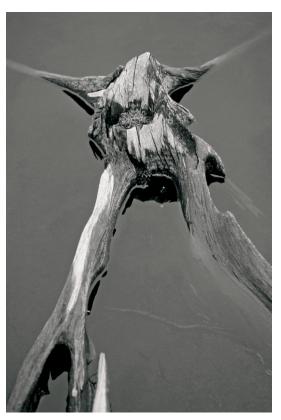
There are many different kinds of man-made artificial lakes in Finland, varying from small fishponds to large water reservoirs. Altogether there are about 30 artificial lakes, depending on the criteria of definition. Artificial lakes have been mainly constructed in Finland from the middle of 1950s to the beginning of 1980s.

In Ostrobothnia, artificial lakes mostly serve the needs of flood protection, whereas the reservoirs of Lapland have been constructed solely for the purposes of electricity production.

Artificial lakes have certain common characteristics: rather strong regulation and thus great fluctuations of water level, smaller volume and surface area at the lowest limit of water regulation, shallowness and a location at the upper course of a water system.

There are great seasonal variations in the quality of water in man-made lakes, and this seasonal variation is more significant than long-term changes in the water quality. Water is of poorest quality during summer, when there is only a small amount of water in the basin, and of the best quality during spring and fall when the volume of water is high. Water quality varies also in different parts of the lake. Humus, iron and nutrient levels are

usually higher in the artificial lakes when compared with natural lakes in the area. Artificial lakes are acidic and either rich or average in nutrients. In the classification of usability artificial lakes are positioned in the poorer levels due to for example high concentration of mercury in fish or lack of oxygen in the water and large amounts of organic material (Järvenpää et al. 2004: 142-144).



When the waters of the reservoirs are at their lowest the tree roots of the bottom emerge into view. Picture: EM

2.4.1. Problems of Artificial Lakes

Low oxygen levels during the winter season, low visibility, unsuitable alteration of the water level and lack of good fishing places are common problems of artificial lakes. Oxygen is one of the most important factors impacting the state of an artificial lake. In most man-made lakes the waters close to the bottom of the basin and in stranded shore areas are devoid

of oxygen during the winter season. Under the ice cover water is layered, and its quality can be very poor especially close to the bottom. In early spring the water level is lowered to its minimum before the spring floods begin, whereupon the amount of low quality water accumulates in the basin.

In Lokka Reservoir the lowering ice-cover presses material out of peat which uses a lot of oxygen. This creates lack of oxygen, which increases the dissolving of nutrients in the bottom of the basin. During winter season the lack of oxygen weakens the living conditions of fish and bottom animals (Järvenpää et al. 2004: 147-149).

Wahlström et al. (1996) note that when the ground is churned up, and especially when it is then covered by water, mercury that has been earlier tied in the ground is released into the water system. It has been observed that this happens especially when artificial lakes have been built. Mercury changes into organic methyl mercury and it is enriched into the fish even more efficiently (Wahlström et al. 1996: 159).

There are usually many stress factors affecting the littoral zone of an artificial lake. At least a part of the shore zone consists of man-made structures, such as dams. Especially in the reservoirs, damming structures hinder the possibility for animals and sediments to move freely.

Variations in the water level have a great impact on the shore zone. In artificial lakes the productivity of this zone is weak. There are no vegetation zones in the littoral, which is caused by the strong changes in the water level and the unfavourable quality of the bottom. Shores that are impacted by water regulation are unfavourable in their conditions due to the freezing of the bottom and higher waterside vegetation is scarce and few in numbers of species. Low productivity of the littoral zone is partly causing the narrow composition in stocks of fish and bottom

animals (Järvenpää et al: 2004: 147-149). In general it can be said that the living organisms in Finnish waters and shores are not adapted to short-term strong changes in the water level.

Ecological monitoring of the situation has continued in the Lokka and Porttipahta in late 2000s. Nutrients regulate the productivity of a lake, impact the fish production and thus also the amount of catch. The most important nutrients are phosphorus and nitrogen. Usually in inland waters phosphorus is the limiting nutrient, but in the artificial man-made lakes also nitrogen can be the limiting factor in the shallow shore waters. In the development of man-made lakes change towards barrenness is a common phenomenon. The amount of nutrients diminishes with time and state of artificial lakes resembles more and more that of a natural lake. This has happened also in the case of Lokka and Porttipahta (Leinonen et al. 2009: 10).

Quality of water in the reservoirs has improved, the nutrient levels have lowered and the reservoirs have started to resemble natural lakes in the area. The improvement in the water quality manifests for example in the lowering of total nutrient levels and chemical spending of oxygen. In the same time Lokka and Porttipahta differ more clearly from each other.

In the European Union water policy directives water bodies are classified according to their chemical and ecological state. In the ecological classification, state of Porttipahta is artificial good and the state of Lokka is artificial satisfactory (Leinonen et al. 2009: 24).

Fish production in artificial lakes is mainly based on plankton production. Animal plankton is the principal source of nutrients for fish in artificial lakes and regulation does not have much impact on the animal plankton production in the middle of the basin. After the initial phase in the development of an artificial lake

the amount of animal plankton clearly decreases, but it usually remains higher than in natural lakes due to the difference in luxuriance.

Lokka and Porttipahta have reached a certain balance in water quality already in 1980s. Still the amounts of nitrogen and phosphorus have further decreased in Lokka whereas in Porttipahta the amount of nutrients has been more stable. Lokka is shallow, rich in humus and satisfactory in its water quality and thus suitable for fish such as pike and whitefish. Porttipahta is deeper and barer in its water quality than Lokka so also salmon-related predator fish come into question.

From the standpoint of bottom nutrients the situation has not improved and the bottom animal production is low when compared with natural lakes. The littoral zone has an important role in bottom animal production and in regulated waters bottom animal production is low because regulation strongly erodes the shore zone. Bottom animals are important source of nutrients for example for the migratory whitefish and perch. The condition of rivers connected with the reservoirs has improved from the initial years and the spawning of migratory whitefish succeeds (Leinonen et al. 2009: 24).

2.5. Birds of Lokka Reservoir

The changed and changing avifauna in Lokka Reservoir area is one example of the ecological impacts in the region. The surface area of Lokka Reservoir in average water level is 317 km², but it varies according to water regulation from 216 km² to 417 km² The regulation interval is five meters (Jokimäki & Kaisanlahti-Jokimäki 2004: 148).

Studies of avifauna have been carried out in the region since 1950s. Before the construction of Lokka Reservoir, the area was an aapa bog divided by river Luiro and its smaller branches. At that time,

there used be 111 nesting bird species, altogether approximately 40 000 pairs of birds. In the area where the reservoir was to be built there nested particularly many species of bog birds. 17 species of waterfowl would nest in the area, the most plentiful nesting ducks being goldeneye and teal. There were 19 species of nesting shorebirds, and the estimate for number of pairs was over 10 000. Indicator species for good bird bog areas, jacksnipe and broad-billed sandpiper nested there in hundreds, but gulls would nest in the region only occasionally (Jokimäki & Kaisanlahti-Jokimäki 2004: 148).

More than ten species of birds of prey were observed in the area, the most common being hen harrier. The estimate for nesting passerines in the area was 25 000. Lokka Reservoir drowned aapa bogs, forests, rivers, ponds and lakes as well as villages and their fields, and so the birds in those biotopes either decreased in number or disappeared altogether. However sea eagles were attracted to the reservoirs early on in the 1970s due to the increased winter fishing. There were two nesting couples at the time there (Murtomäki 2010) (Jokimäki & Kaisanlahti-Jokimäki 2004: 148).

Waterfowl stock in the area in the beginning of 21st century is half of what it used to be before the construction of the basin. Especially the numbers of bean geese, mallards, pintails and goldeneyes decreased in the mid-1990s and this development has continued in the early 2000s. The reason for this can be found in the decline of suitable nesting places, destruction of nests by the changing water levels and strengthened predator stocks in the area (Jokimäki & Kaisanlahti-Jokimäki 2004: 148).



White-tailed eagle (top).



Whooper swans and bean geese meet in the open spaces and rivers of the aapa bogs in the spring time (middle).



Crane nesting (bottom). Pictures: EM

2.6. Fish and Fishing in Lokka and Porttipahta Reservoirs and Their Waterways

Fish was a crucial subsistence food source for centuries in the Sompio region (Paulaharju 1979: 133). The salmon that came from the Baltic Sea and the local fish provided the Forest Sámi, North Sámi and the Finns of the area with means of survival in the northern ecosystems. The local people have oral histories regarding the times when their spirit men, such as Akmeeli, were able to transform into a fish and how the people and fish had close relationships (Paulaharju 1979: 133). During the seasonal round of the community different kinds of fishing nets and fish traps were used to catch the spawning fish in the lakes and rivers of the region (ibid. 1979: 135).

Many of the fish had several names in the local dialects. Whitefish had at least four different names depending on the kind of fish and the season (ibid. 1979: 137). Paulaharju reports that in addition to whitefish, salmon, grayling, lake trout, brook brown trout, roach, ide, burbot, perch and many other fish species were utilized in the traditional times. All of these traditional systems were destroyed with the reservoirs.

Timo Järvikoski has pondered the meaning of fishing as a source of livelihood for the local people in the reservoir area. He notes that in the time before reservoirs people very seldom mentioned fishing as a part of their livelihoods, it seems that fishing and the possibility to fish was self-evident (Järvikoski 1979: 132).

Today Lokka and Porttipahta are significant professional fishing areas in Northern Finland. Locally, fishing and fish processing industry are important livelihoods. In 1980s and 1990s there has been significant investments in the infrastructure of professional fishing in the reservoirs. Problems have been caused



Peled whitefish has been caught in nets. Picture: EM

by great variations in the amount of the catch even though peled whitefish has been artificially introduced into the reservoirs. (Mutenia et al. 2006).

Lauri Peippo, a fish biologist shared his views on fish of Lokka and Porttipahta in the early years after the finalisation of the reservoir project: "Whitefish was the most important fish species in the reservoir basins. Then pike, burbot and ide stocks became stronger. These four species are still (in late 1970s) the most important fish species, but in Lokka perch and roach have the largest stocks in numbers. In Porttipahta, the more valuable fish species have persisted better. In Lokka, the stock of whitefish has declined. This may have been caused by the large number of whitefish in the basin during the very first years of the reservoir, and it was easy to catch it with nets from the spawning rivers. On the other hand, it may be that the stock would have declined in any case because the spawning

rivers were full of roach and burbot. The young fish would not have had enough possibilities to survive. During the last few years so-called coarsefish has spread from the basins also into rivers Kopsusjoki and Luiro, which used to be important spawning areas for whitefish earlier. Now the character of these rivers has changed. Roach stock has exploded in Lokka and spread to all waterways connected to it. At the time when Lokka was built, people could not predict the impacts on fish stocks. People were not aware that the impacts would not be confined on the immediate reservoir basin, but spread all over, to all directions from both reservoirs. Now we know this. This is an important piece of information, when decisions are being made concerning other reservoir plans."

Peippo adds that it is obvious that the exact same thing that happened in Lokka and Porttipahta would happen in other places in Lapland. Basins would become waters for roach breeding. However he also notes that the results for introducing peled whitefish into Lokka have been impressive (Seppälä 1976: 211).

The fishermen in the region seemed to have somewhat contradictory views on fishing in Lokka and Porttipahta and in the surrounding waterways. Seppälä collected a few statements in year 1975. He was involved in the documentation of contemporary views of the people for a book regarding the harnessing process. Therefore the materials presented by Seppälä are not research inquiries. They have been used in this book to provide a view of the opinions of the people affected by the reservoirs immediately after the flooding.

Aate Lokka, a farmer from Madetkoski in Sodankylä thought that fishing had become more profitable in Porttipahta and river Kitinen. Fish stocks had become more variable, but not greater in numbers. Lokka also notes that the quality of fish was better and fish grew up faster.

The numbers of burbot and perch had increased too much to the liking of Aate Lokka (Seppälä 1976: 211).

Many of the fishermen reported early on that good places for the nets for fish harvest could be only located on the former river courses which were now under the waters. This was because many of the tree trunks, stumps and branches had never been removed prior to the flooding and nets would tear apart in these places. The former river courses could be spotted from boats because the dead birch trees line them underwater. In the 1970s the winter fish trapping of burbot became an important source of livelihood to many people because then there was a good price on burbot fry. After some time the burbot and other fish started to dwarf (Murtomäki 2010).

Burbot liver was a local delicacy among the fishermen. Occasionally there was so much of burbot that they could not be sold so they were left on the ice to be devoured by ravens and sea eagles. Only liver and fry had been taken from the fish (Murtomäki 2010). Sulo Tanhua and other local people had a good harvest spot with their fish traps close to the drowned river course of Luirojoki in 1970s. Pike markets collapsed quickly after the word got around of high levels of mercury in the pike, which is a predatory fish that accumulates this chemical.

Lake Sompio on the northern tip of Lokka reservoir aroused some debate among the fishermen, however many seemed to agree that the quality of fish in lake Sompio before the reservoir was unequalled. Juho Korva explained the situation: "There has been a lot of fish in the basin, but the quality cannot be compared with the whitefish that used to be in lake Sompio, or with the fish in old river Luiro. Whitefish that lives in the bottom remained in the basin, but it was overharvested and its numbers are now very low. There's also pike in the basin, but if you compare the taste with the pike from Lui-



Sulo Tanhua and the regional director for Radio Lapland Jukka Häyrinen had fish traps for burbot in the former River Luiro stream (which was flooded) in 1970s (top left).



People from Riesto village observe as the trap is lifted on ice (middle left).



There is plenty of fish in the burbot trap (bottom left).







There are frozen burbot fishes on the wall of a fish hut. Liver and fry has been removed (right). Pictures: EM

ro or Sompio, it is different, unpleasant.

There is a lot of coarsefish: burbot, roach and ide. I won't downplay burbot, when it is fresh, it's tasty. Whatever they say about the fish stock in Lokka, it cannot be compared with the stock of old Sompiojärvi lake. I used to salt 400-500 kilos of very tasty whitefish from Sompio lake and I also sold it. Now I can barely get enough whitefish from Lokka for my own use" (Seppälä 1976: 211-212).

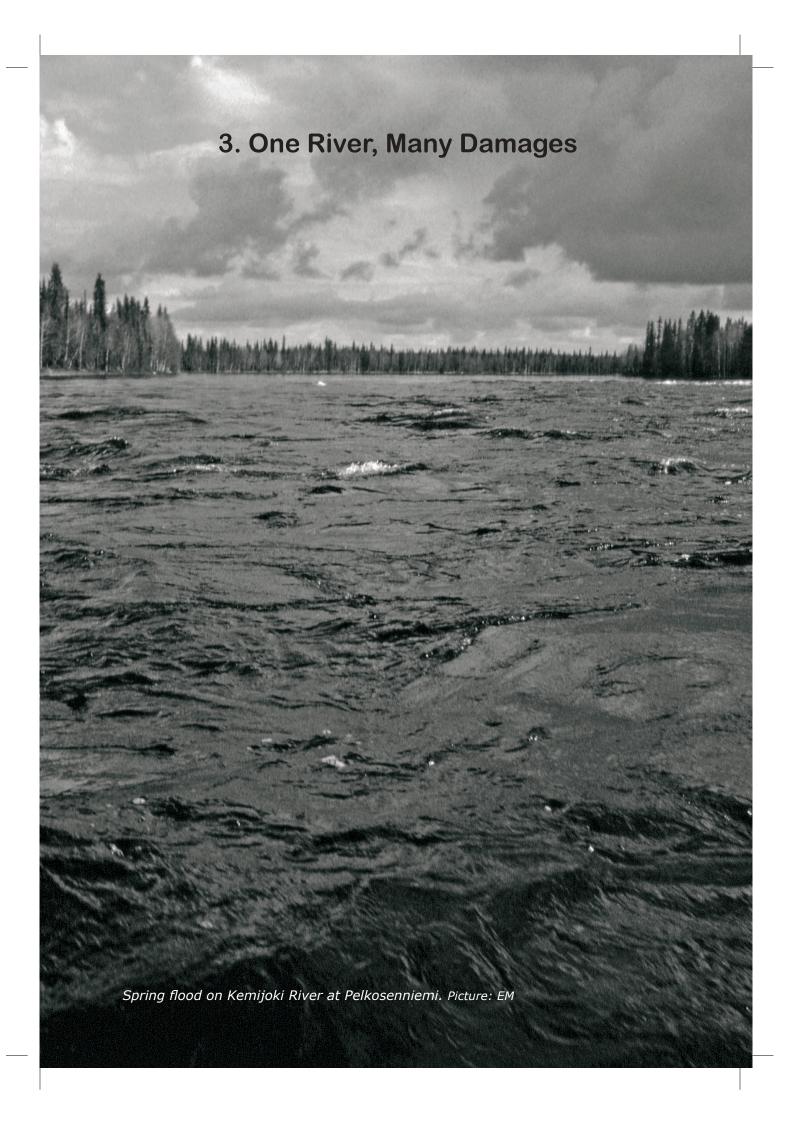
In recent times the situation of fishing and fish in the reservoirs has been debated. The municipality of Sodankylä is concerned about fish and fishing in Lokka and Porttipahta. The amounts of catch have decreased significantly.

In summer 2010 fishing with large fish traps has been targeted towards the roach species (cyprinid fish). The objective is to improve the possibilities of survival for the whitefish. Of all fish in Lokka reservoir up to 70 % is roach. Fishing in the reservoirs has suffered especially due to dwarfing whitefish. All fish have had also increases of parasites. Strong growth of roach stock has lead to the phenomenon of dwarfing. Whitefish and roach compete for same nutrients. Fishing has been targeted towards whitefish and in practice roach has been left untouched. The fish stock in large Lokka basin is massive. In June 2010 the roach catch caught by the fish traps was 50 to 60 tonnes (Antikainen et al. 2010).

2.7. Salmon

In summer 1947 salmon swam freely upriver in river Kemijoki, as it had for thousands of summers before in search of clean and oxygen-rich spawning waters in its birthplaces. In 1948 the Isohaara dam closed the waterway from the salmon. Eeva Piirainen, a local resident living along the river remembers that summer: "They closed the Isohaara dam. I saw how the salmon was jumping against it, and came back downriver crushed along with the logs. That was such a sad sight that I don't care to remember it" (Niemelä 2010: 44).

That summer 1948 sealed the faith of a unique salmon in river Kemijoki. That salmon is now extinct. "The salmon in the region is now of foreign stock, imported. It comes as eggs from river Tornio, li or Skellefteå. Salmon always returns to its birth river to spawn. This is how a unique salmon stock was also created in river Kemijoki. Its genetic formation differed so much from the salmon of the neighbouring rivers that a professional fisherman was able to identify each salmon according to their birth rivers. The salmon of river Kemijoki cannot be caught anymore. It is dead" commented fish biologist Lauri Peippo in the 1970s (Seppälä 1976: 207).



Story of construction of Lokka and Porttipahta reservoirs begins in year 1948, when the biggest river in Finland, river Kemijoki was harnessed for electricity production. Laukkanen et al. (1981) describe the situation in Finland at the time. In the war with the Soviet Union Finland lost a third of its built hydropower capacity and very quickly the national interests were directed towards northern Finland (Laukkanen et al. 1981: 22). The standard of living in general was on the rise and forest industry played a key role in this development.

A company Pohjolan Voima Ltd was created based on the needs of Finnish forest industry and the large forest companies in (Northern) Finland at the time (Seppälä 1976: 12). German soldiers had been driven out of Lapland, and northwards from town Kemi many towns and villages were in ashes and ruins. While retreating, the Germans had blown up the bridges in river Kemijoki, and thus separated North from South in terms of efficient accessibility. A plan for Isohaara dam began to form. Instead of rebuilding the bridges, a dam and a power plant ought to be built in the spot, and the dam would also act as a bridge.

Laukkanen et al. (1981) claim that in the province of Lapland people would only talk about a bridge construction site. When the construction began, not even the workers were aware that they were actually building a power plant (Laukkanen et al. 1981: 23). The state was active in supporting the construction of the dam. This was done not only financially but politically as well. The national parliament either approved of changes in the water legislation when there was a conflict, or ignored the malpractices in the process of constructing Isohaara dam.

Kustaa Vilkuna has studied widely the Finnish salmon fishing in river Kemijoki, and in his book about the salmon he outlines the events of 1948. Vilkuna offers explanation for what he describes as 'destruction of eternal nature and total neglect of people living from salmon fishing and small-scale farming along the river Kemijoki'. He states that the facts that lead to the events combine the consequences of the war, the private profit and power seeking which was using the crisis for its own benefit, and the proud will of engineers to demonstrate to the full capacity of modern technology despite the consequences (Vilkuna 1974: 385).

3.1. "Lapland – A Land of Great Opportunities": Kemijoki Ltd is Created

After the war Lapland was seen as a land of great opportunities. People returned to the burnt villages and towns and Lapland was rebuilt very quickly. In order to pay war reparations to Soviet Union, largescale forestry began in the whole region and more new people moved to the province than had been living there before. In the beginning of 1950s the state administration took an active part in purposefully investing in the economic life of the province. Simultaneously with the logging activities wood processing and mining industries were created and the power plant construction began. All was based on the rich natural resources and the incomparable exploitation of those resources (Laukkanen et al. 1984: 28-29).

There continued to be great interest in River Kemijoki at the time. Finland needed a lot of electricity and many saw the free rapids in the river only as 'non-utilized surges of energy' (Seppälä 1976: 19). Private companies and the state were competing hard on the rapids. Prime Minister Urho Kekkonen saw that the only possible solution would be to found a statelead company, which would take care of all construction along river Kemijoki.

In year 1952 Kekkonen stated that "We need a centralised company with an

ability to manage large capital, which is able to complete this monster task with long term objectives and wide enough program. As an indication of the fact that private companies do not have the capacity to carry out the hydropower plan in River Kemijoki, it needs to be notified that in the plan there is included a construction of such large artificial reservoirs that will come close to the size of Lake Oulujärvi in their total area. When a large part of this forest area to be flooded is owned by the state, it seems clear that the state must come to rescue. It's only the state which can harness the rapids in river Kemijoki with the efficiency and speed that is in the best interests of Northern Finland and the whole country" (Seppälä 1976: 19-20). Kemijoki Ltd was founded in 1954 and the shares of the rapids that were under state ownership were transferred under the title of Kemijoki Ltd.

The following chart demonstrates the construction of the dams in the rapids of river Kemijoki and the advance of the process:

Petäjäskoski rapid 1957 Pirttikoski rapid 1959 Valajaskoski rapid 1960 Permantokoski rapid 1961 Seitakorva rapid 1963 Ossauskoski rapid 1965 Vanttauskoski rapid 1972 Taivalkoski rapid 1975-76

(adapted from Seppälä 1976: 100, Map 1)

Since the beginning of the construction of Isohaara dam, a planning process for Lokka and Porttipahta Reservoirs had been ongoing. There needed to be water storages for the hydropower to ensure steady electricity production despite the seasonal changes in water level in the river Kemijoki.

The Lokka dam was built in 1967. In the same year houses in the reservoir villages were torn down and taken away, boundary marks were removed and clearing of forest took place on 2115 hectares of land. According to Raimo Seppälä this is how it was told in the official annual report. However, he notes, there is a reason for many stories in the creation of Lokka reservoir (Seppälä 1971: 160).

3.2. Drowning Begins

"Ville Karanta and Aapo Karppinen were the first buyers for Kemijoki Ltd in the area. They fetched each farmer on their turn to a hut in the village of Vuotso, where they would drink for few days and negotiate for the compensation. Then they would go to the town of Rovaniemi, and once they came back, the whole farm had been sold to the company. Only those who could resist alcohol were able to cope in that system. Getting money was depended on each farmer's skills and persistence to bargain. There was absolutely no consistency in the sales, and that is why those things are still not openly discussed. Buying was most intense in 1958, when the buyers would scare people with the possibility of expropriation. Only a few would get substitute farms as compensation, mostly it was money" recalls a former resident of Mutenia, a village that is now under Lokka Reservoir (Laukkanen et al. 1981: 30).

Compensation was organised mainly through "voluntary purchases", under duress. Laukkanen et al. (1981) state that there were no tariff prices, but each sale and price was decided separately. The company bought as cheaply as was possible, and in cases taking advantage of the distress of the seller (Laukkanen et al. 1981:175). Pekka Aikio explores the process of compensations further in his chapter below.

Laukkanen et al. (1981) describe the situation in the region in 1960s as such that people were mostly relieved when the reservoir construction in the area began. Those were the heaviest years of changing structures of economic life, and there were quickly growing numbers of young

people without work in the area who could not find jobs in forestry or agriculture anymore. Municipalities and provincial interest groups were strongly supporting the continuation of construction work along the river. The experiences had been positive in dealing with the unemployment issue (Laukkanen et al. 1981: 30).

In public, there was a lot of discussion of the vast sizes of Lokka and Porttipahta reservoirs, and the great demands of the job. Also, it was known that Lokka reservoir would drown the largest marshland area in Finland, Posoaapa bog. But no one seemed to worry about the people and the means of livelihood in the area. Money would take care of that problem, or so it was believed (Laukkanen et al. 1981: 30). Researcher Paavo Havas (1991: 56) writes in hindsight that the studies and inquiries about the situation in Lokka and Porttipahta had very little if any impact on the decisions regarding the construction of the reservoirs. "The decisions had been made already prior to any investigations" Havas (1991: 56) concludes.

3.3. Evacuation

Laukkanen et al. (1981) have described the features of the villages in the reservoir area. They argue that due to weak communication connections the villages were relatively isolated systems. Ways of living and the whole culture had adapted to the conditions of the surrounding environment. Those systems were very stable, since there was little outside influence.

The region produced reindeer meat, some milk and wood, and provided workforce for forestry. Some consumer goods were sold in the area. Self-sufficiency in foodstuffs was very high. The most important sources of livelihood were reindeer herding, small-scale farming and cattle keeping, but fishing, hunting, berry picking and forestry had great significance for the local people. It was very typical that many of these activities were carried out simultaneously (Laukkanen et al. 1981: 176).

From the beginning of the reservoir project, it was clear that carrying out the plans would mean evacuating dozens of



Buildings of the Mutenia village in 1970s. Picture: EM

families from their homelands. However, it was unclear who should be responsible for the task of resettlement, the state or the water regulator needing and constructing the basins.

Already in 1954 The Rovaniemi Housing Bureau had sent a memorandum to the Ministry of Agriculture where it was stated that the resettlement of the evacuees could begin in 1958 (it was then believed that the construction of the basins would be quickly completed). In the memorandum it is recommended that the best solution as compensation for the evacuees would be to offer them farms in exchange for their homes (Järvikoski 1979: 88).

The first farms were bought in 1958, and soon people started to move away from the basin area. By 1960 about 67% of the land purchases had been completed and about 39% of the people concerned had already moved away from the area. However, some people stayed in their homes as long as it was possible according to the agreements. For example a few families, who had sold their farms among the first ones in 1958, were still living in the basin area in 1962 (Järvikoski 1979: 90).

Apart from the preparatory work carried out by the Rovaniemi Housing Bureau, no other significant progress was made for some years. Kemijoki Ltd. was buying up the farms in the area one by one, without entering into any commitment as to the re-housing the inhabitants, who were by then expected to solve their own migration problems using the money they had gained from the sale of their farms (Luostarinen 1982: 32).

This procedure was against the wishes of the local people. In a meeting of the reservoir villages, people demanded farms, not money as compensation. This demand had no effect, even if the State Committee for Water Power was notified (Järvikoski 1979: 90).

The legislation to support evacuation

measures came into force only in 1960, when a law was promulgated granting the State the right to regulate the flow of water in the Kemijoki river system. This law (Law collections 62/60) also authorized the government to reserve areas of State land to be used as compensation for those suffering from the construction of the reservoirs (Luostarinen 1982: 32).

Timo Järvikoski notes however that this law had no meaning from the point of view of the reservoir evacuees since the Water Power Committee never took action. The measures that were made possible by the law were not taken. A formal impediment was that the law was never submitted for parliamentary approval. When a part of the population of the reservoir area still wanted to stay around Vuotso to be able to carry on reindeer herding in their old pastures, and those lands were state-owned by Metsähallitus (National Board of Forestry), no progress took place in resettling this part of the population. Also, many people trying to resettle on one's own initiative failed in the process (Järvikoski 1979: 94).

According to Järvikoski the whole resettlement process was continuously under discussion and demands, since no progress was to be seen. The reindeer herding municipality of Lapland expressed a need for urgent action to organize lands for all those who had suffered in the process and had a wish to resettle in the area of their own reindeer herding municipality (Järvikoski 1979: 94).

In 1963 there was an effort once again to solve the question through legislation. Finally, the most extensively used solution to the problem of resettlement proved to be the Reservoir Area Law, an extension of the Land Utilization Act. This law made it possible for any private person who had relinquished land to a power station owner in the interests of regulation or hydro-electric power construction aimed at or connected with the exploitation of the Kemijoki river system to be awarded

land, credit and other benefits under the Land Utilization Act even if he did not otherwise fulfil all the stipulations set down in that act (Luostarinen 1982: 33).

Thirteen years after the first resettlement plan, and almost ten years after the first sales of land, the willing evacuees were finally able to move to Vuotso to an area reserved for the purpose. Practical organization of resettling should have started already in 1954 so that such unnecessary delays could have been avoided. The Housing Bureau was ready to act at the time, but the other parties, especially the Water Power Committee, were not. These delays in the resettling process bring forth, in a very negative form, the fact that the whole process was institution-led and things were seen from the national, or rather from the point of view of a power centre (Järvikoski 1979: 99).

The waiting period had caused problems to pretty much all who moved to the area provided in Vuotso. People brought up the facts that the process had been very slow and the waiting had caused them considerable financial losses and insecurity (Luostarinen 1982: 33).

A group of reindeer herders had to wait for even longer. The law did not concern their cases since they did not own land in the reservoir area. A committee was set up in 1964 to tackle the problem of compensating the landless reindeer herders. Finally in 1969 the Reindeer Farming Act was accepted (Järvikoski 1979: 100). This new legislation fundamentally altered the principles of reindeer herding in Finland and was not consistent with the traditional herding practices of the region. The full exploration of this event is beyond this inquiry.

In early 1970s Raimo Seppälä (1976) studied the process of harnessing River Kemijoki, how a free-flowing river was changed and became an electricity producer. He also paid some interest in the people of the drowned villages and their experiences. Out of the 640 people im-

pacted by the flooding in Lokka and Porttipahta, 560 had to relocate to a totally new living area (Seppälä 1976: 159). 2074 hectares of private lands were lost with Lokka reservoir and 930 hectares with Porttipahta (ibid. 1976: 193).

Seppälä (1976) describes how the village of Lokka has experienced a lot. Log floating strike in 1928, the Spanish influenza epidemic in 1930s, the war and rebuilding of the village after the war. A community of 12 families had been re-established in the village when the rumours began. Antti Lokka shares his feelings about the reservoirs: "This basin was a bitter, harrowing experience for us. I even felt it as a personal touchstone. I am the third Antti Lokka in my family and lineage. Every generation has had their own hardships but they have always risen and rebuilt their homes in this very place. I am now asking myself whether it is me who is to become the weakest link in that chain." (1976: 184)

Home of Antti Lokka survived. Of 12 families in the village, 8 homes were drowned. The whole of Korvanen village was drowned. It had 26 families, school of 50 pupils and a hall of residence for 32 pupils. There was a phone centre. There was a road from Vuotso to Lokka via village of Korvanen. People had vehicles; there was even a taxi service. All built from the ashes of the war.

Senior juryman Juho Korva recounts the destiny of his home village Korvanen: "During the war we were all evacuated from the village. In the bombing we lost a lot, my house and cowshed were destroyed. And then the Germans finished it off by burning everything in our village. Only one old sauna and a windmill remained. Rebuilding began in 1945 when people returned to their homes. When the houses were repaired, a word started to go around, that a reservoir will be built and water will flood everything. This information stagnated all farming and keeping of cattle. Why should anyone bother

with anything anymore? Kemijoki Ltd sent their men, and they bought all farms with money. Those were voluntary trades." (Seppälä 1976: 153-154).

Veikko Mutenia was born in the village of Mutenia in year 1935. He was four years old when he was evacuated for the first time because of the Winter War. He was six years old when he was evacuated for the second time because of the Continuation War. Veikko Mutenia was 20 years old when he participated in the destruction of his home village because of a reservoir. He has explained that the third and final departure was the easiest for many; they had been practicing it already twice (Seppälä 1976: 154).

But not everybody left. Jussi Tapio was born in Mutenia and in the 1970s he was adamant that he will stay in Mutenia for all his life with his siblings. He remembers that there were 12 families in the village when the departure order came "Mutenia was populous village along the banks of River Mutenia. We had a shop here, a school and a daily postal car connection. Mutenia is a beautiful village. All houses in one cluster on a river bank." (Seppälä 1976: 153-154)

Seppälä (1976) describes that Mutenia differs from all other drowned villages in many ways. It was originally built on such a high place, that water did not reach it, even when the Lokka reservoir was filled. Still the buildings were torn down since almost all of the people left.

The village of Riesto was a village in the wilderness, isolated by vast areas of marshland. The only access to the village was in the summertime along River Luiro and in the wintertime with reindeer or on skis. Today nothing remains of that village. Only the waves of Lokka reservoir billow there. Like they billow on top of Kurujärvi (Pilliranta) Sámi community.

Pilliranta consisted of three houses, and was also totally isolated during all of its existence. People were evacuated during the war, but even the Germans would not bother to go there to burn down the houses, and the families could return there, and live in peace for couple of centuries. But in December 1966 the Water Rights Court of Northern Finland granted a permission to build the Lokka Reservoir in the municipality of Sodankylä and 560 people relocated to totally new areas. Building of the dam had begun already in September (Seppälä 1976: 185-191).



The last of the Sompio "timberjack" loggers at Kopsusjoki river in Silmävaara just prior to flooding in 1967. Picture: PA

Aikio (1988: 72-73) reports that the reservoir construction caused "immense damages" to the Sámi and their way of life. Reservoirs came on top of a highway, clear-cut forests and herbicides such as the "Agent Orange" which had been employed in the Vietnam War. Herbicides had been used to accelerate forest growth. Lokka and Porttipahta are the largest reservoirs in Western Europe,

620 square kilometres. Vuotso Channel, which is between the reservoirs, stays open even during the winters and therefore cuts the reindeer herding territories of Lapin paliskunta in half. Magga (2005: 3) indicates that the whole Indigenous governance structure of reindeer herding, tokkakuntapaimennus, was destroyed with the reservoirs.

Kopsusjoki and Luiro river valleys have become empty and the Kurujärvi village was totally flooded. The buildings in Kurujärvi and other villages were burned to the ground prior to flooding (Aikio 1988: 72-73, 284).

Vuotso has transformed into a mostly Finnish village. Due to the construction of the reservoirs the Finns living in Sompio and the Sámi of Luiro and Kurujärvi have moved to Vuotso. Others went to Inari and Sodankylä towns. Purnumukka emptied by 1980s, even though in late 1990s and 2000s the village has received newly returned inhabitants, Sámi and Finns who are the descendants of the Sámi who left (Aikio 1988: 72-73, Salin et al. 2004).

3.4. "To Us, Kemijoki River Is Totally Dead. It Is No Longer a River."

What do they think, the people of the reservoirs? Raimo Seppälä (1976) has collected experiences of the relocated people shortly after the reservoirs were finished and in use. In 1970s, people had very contradictory ideas and feelings of Lokka and Porttipahta. Some say that it was the saving grace for the whole region, despite of all the bad talk. Seppälä claims that one thing is clear: the reservoirs have changed the lives of the people in the region. Some are content, some are bitter. It may be difficult for someone who does not know the local conditions, to understand why a person who has seemingly good life in a busy community, in a new

house with a steady job still grieve about the destiny of a small isolated village.

Onni Poikela, an operator of the dam in Porttipahta, shared some of his thoughts: "The reservoir has most likely not worsened the living standards of relocated people. However, they are unhappy, almost all of them. Even if economically they have better lives, they feel that they have been put into a pen, which is always the same kind. They have modern houses and steady jobs, but now their neighbours are right next to them, there's orders, prohibitions and restraints, closed national parks and guards everywhere. They have lost their freedom. That is love for one's home area. That is a feeling that an urban person cannot have, not even imagine. But someone who has been born and raised in an open space, always wants to go back" (Seppälä 1976: 184).

Another dam operator, Kauko Pyhäjärvi, lost his home in the village of Lokka. He was in his 40s in 1970s. "I have gotten a steady job and an income from the dam. But I would give away my job and a lot of other things, if only river Luiro would flow free like it used to. It used to be such a grand sight. This is a feeling, which is hard to explain with common sense. Here somewhere inside it just feels strongly that way" (Seppälä 1976: 185).

3.5. Cultural Landscape

Laukkanen et al. (1981: 163) reflect upon the question of cultural landscape in the Finnish North. For them the problem of Lapland is a problem of diminishing. Benefits and grievances have been going hand in hand. Depopulation of the province has meant a lessening of all human actions. After all, great alterations of nature did not create long-term job opportunities.

More so, they furthered the change,

quickened the changes in the economic structures and removal of people from the riverbanks, where the possibilities for making a living had been altered and weakened by the construction work. The future is full of pressures on the cultural landscapes of the North. Hydropower production breaks the landscape permanently. Even if all the reservoirs and power plants would be built in the most environmentally friendly manner, the basic damage is irreparable.

As of now the cultural landscape of River Kemijoki can never be restored. What used to be the reality of the river with its free rapids and the people living along its banks is history. Despite of the good work of respecting and restoring the old culture, there can never be a whole cultural system there anymore. There is no need to talk about 'returning to nature', but of living with the nature in accordance with each person's needs.

It is not a matter of indifference how the Northern nature is being used. In Lapland the scars in nature heal slowly. The most valuable thing Lapland has to offer is based on its relatively untouched forests, free rivers, clean air and the ancient cultural landscape, which is still alive today (Laukkanen et al. 1981: 163).

Paulaharju (1939, 1979: 9) documented the old lifeways and community that existed in Sompio until the Second World War. He reports that the place names of the territories used by the Forest Sámi, the Finns and the North Sámi indicate the rich and deep layers of connections that these people had with their landscape (ibid. 1979: 9). Many of the old families such as Riesto had their connections with place names such as Riestonaapa (ibid. 1979: 12).

The old villages of the headwaters of Luiro River included Mutenia (Mutaniva), Korvanen, Riesto and Lokka. Further down the river was the village of Tanhua (Paulaharju 1979: 18, 39). The place

names tell of the times when the local Forest Sámi and the settled Finns met with the officials, traders and other visitors. *Kyläselkä* site for example was the place where decisions were made, taxes collected and meetings held (ibid. 1979: 24). *Venäjänmarimo* was a place were the locals fought invading Russians in the centuries past (ibid. 1979: 45).

Luiro River was a crucial trade and migration route from southern reaches of Finnish Lapland to Murmansk and Kola Peninsula (Paulaharju 1979: 104-105). It served both as a local and regional transportation route.

The whole drowned Sompio landscape was considered to be alive and filled with different beings and powers by the local people (Paulaharju 1979: 49). Several sacred and spiritual places were drowned when the reservoirs were constructed. Paulahariu describes for example the Pyhäkivi stone of Mutenia River, Akankivi stone on lake Sompiojärvi, fjell Kussuolinkivaara, cape Seitaniemi close to Korvanen, Keevitsa stone and the mighty Nattanen fiells (ibid. 1979: 25, 49). These place names and the oral histories connected with the sites indicate that the landscape was filled with myriad meanings and connections that were fully ignored when the decision was made that the area will be flooded.

One of the most important sites in the local cultural landscape are the resting places and stories connected with powerful spiritual people, such as Turvainen and Akmeeli – the Evermind. These powerful shamans are remembered by the local people even today and have been documented by outsiders (Paulaharju 1979: 26). According to the oral histories of the region Akmeeli who is a descendant from the Musta family used to live at *Vanhakotasuvanto* along the Luiro river and sometimes on *Korvasenniemi* area. Aikio (1991: 89-90) documents the colonial attack by Härnösand superintendent

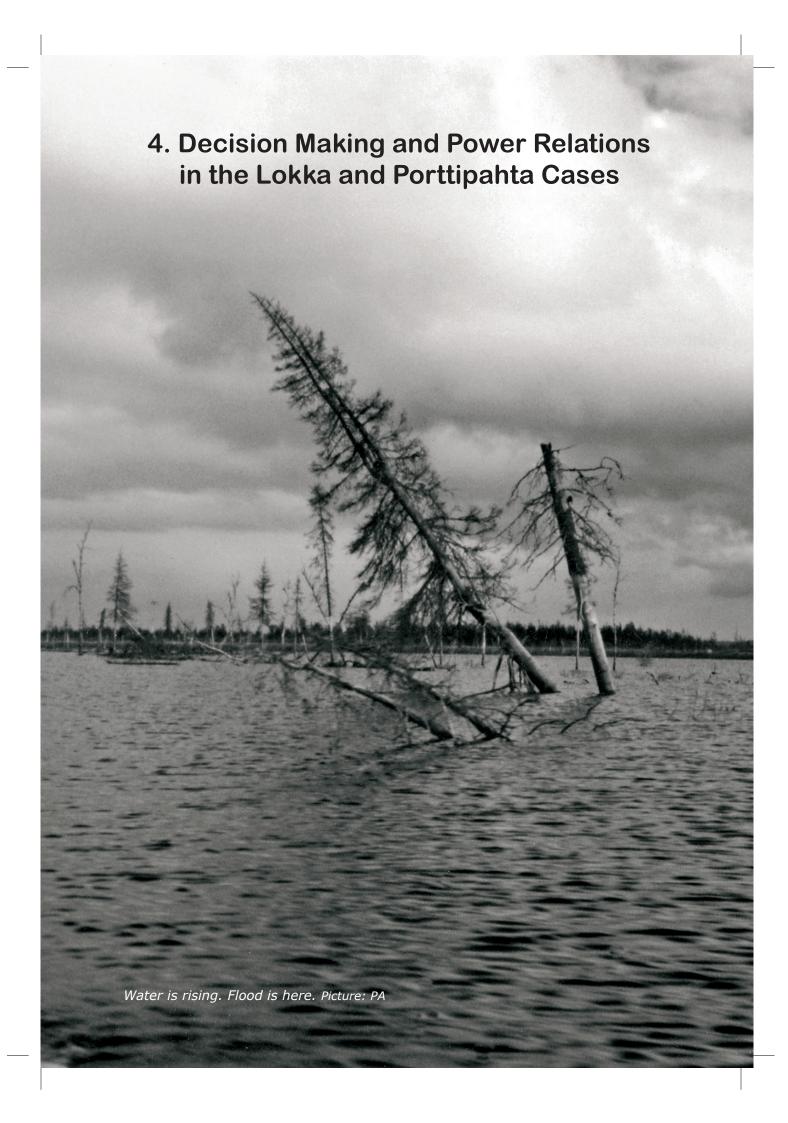
and his priests against these spiritual people in 1600s and 1700s.

Akmeelis grave is said to be on the shores of the lake Sompiojärvi (Paulaharju 1979: 26-27). The supposed gravesite has been a target of a modern monument in Juikenttä and archaeologists have tried

to find evidence of the events and lifeways of Akmeeli (Aikio 1991: 89). Paulaharju (1979: 254-255) reports how local people would visit the graves of the old spiritual people for help and assistance. Today they can be called sacred places.



Sacred stone of Akankivi in lake Sompiojärvi. Picture: PA



In early 1980s Pentti Vuento, a departmental head in the National Water Board publicly criticised the decision-making process of harnessing river Kemijoki. Even if he eventually took a stand for hydro construction in general, he specifically pointed out and criticised the fact that such projects are very much lead by institutions. According to his assessment, the malcontent of people is mainly due to mismanagement of compensation issue. Vuento also recommended a new kind of decision-making process for hydro construction projects.

He claims that "in future the forthcoming large projects should be considered not only as technical and economical, but first and foremost as societal decisions at the regional level, and they should be assessed as such with adequate care and time before beginning to carry out such project. The experiences from Lokka and Porttipahta show that there should be approximately five years in between the decision and the actual construction work. In that time the legislation needed for compensating the lands and farms should be organised, the lands should be acquired and farms established so that the surrogate farms would be ready to be delivered at the same time as the sales are being made. The other observation is that the decision-making has to be turned upside down when compared with the present system. The sad consequence of the present system is that the regions providing the resources play a role of a mere resource periphery, as the more developed areas in the country enjoy the benefits. Large hydro construction projects should not be carried out against the will of the province and the impacted regions. There is an essential demand for a change in the decision-making process. It should begin in the impacted area by negotiating an agreement ready with reindeer herders, fishermen, evacuees and other affected parties. Municipality comes next, then the province and lastly the government to the extent that it is needed. This proposal is nothing new" (Laukkanen et al. 1981: 81).

Timo Järvikoski is on the same lines as Vuento. He claims that in the case of Lokka and Porttipahta there was a conflict between centre and periphery, and the impacts were felt strongest in the periphery. But no matter how significant these impacts were, they were not being assessed, since they were only partially evaluable in monetary terms.

After the war state had taken over the task of securing the energy supply. Due to its regulable nature, hydropower is more suitable in following the variations in the use of electricity than nuclear power or thermal energy, that are more economic as basic sources of energy. The usefulness of hydropower is explicitly based on the possibility of regulation and its development. In the case of Finland the uses of thermal energy are not often possible.

The need for artificial regulating reservoirs was acknowledged already in 1930s, and the search for suitable areas for the reservoirs began in 1940s (Järvikoski 1979: 71). Timo Järvikoski describes the planning as a process, which was clearly led by institutions. The people in the basin area had no possibility to take part in the process. Also, local people were very little informed about the plans (Järvikoski 1979: 72).

The challenges and problems of the local communities were not taken into account in the planning or in the implementation of the project. Only questions considering technical, economical or legal issues were assessed in the process.

Järvikoski argues that local people had no other possibilities to influence the process than through the sales of the land or the juridical process. There was very little activity within the local people; there were no organisations that the people could have used in the area at the time (except reindeer herding municipalities). Also the fact that people lived far

apart from each other made it harder for them to work together. The local reindeer herding municipality of Lapland was most active, mainly in the issues concerning reindeer herding. But in general, the planners of the process were not interested in the local appeals (Laukkanen et al. 1981: 176).

4.1. The Role of River Kemijoki in Finnish Electricity Production

There are altogether 21 power plants in river Kemijoki, of which Kemijoki Ltd. owns 16. Pohjolan Voima Ltd, Rovakaira and Keski-Lapin Voima Ltd own the rest. At the time when the harnessing of the river began, in late 1940s, the role of the river was to produce electricity nationally. But the role has changed during the years. Now the energy that is produced by the river goes to the electricity regulation. With this regulative energy it is possible to control the amounts of electricity according to the needs of the society. Kemijoki produces electricity mainly during the week and in the daytime when the demand for electricity is at its highest (Niemelä 2010: 46).

4.2. Consequences to (Sámi) Reindeer Herding in the 1970s

Reindeer herding suffered extensively from the reservoir construction. Consequences to the (Sámi) reindeer herding in the 1970s were immense. Pekka Aikio discusses these processes at length and in full in his chapter.

The oral histories of the region identify the impacts to the herding in many ways. One of them is weather change. Sakari Keskitalo and lisakki Magga, reindeer herders and elderly people from Vuotso commented on the impacts of the reservoirs in 2002: "Snow used to fall first time in September in earlier times but nowadays the reservoirs have changed that. The massive clear cuts for the reservoirs have affected this for sure. They have caused incredible damages to reindeer herders. We had 2000-3000 reindeer here in Tankajoki river and we could take them to the now flooded Luiro, but no longer. When the reservoir came, we needed to move 5000 reindeer away and (forcibly slaughter some of them). Many reindeer died because of the reservoirs." (Snowchange Vuotso Oral History Archive 2002).

In the observations that Magga and Keskitalo share, we arrive at the core of the problem regarding the reservoir impacts. Social, cultural and linguistic impacts have to do with damages to the human systems and they need to be discussed. But it is equally relevant to identify a key marker.

This marker has to do with a system change the local ecology had to go through in a rapid process. The changed water system in the region caused shifts in the micro-climatic conditions of the area and changed the arrival time of snow in the autumn. Additionally the channel connecting the two reservoirs caused changes to the moisture of the air during colder months and it cuts the reindeer pastures in half for the local herders. These observations identify how deeply the very fundamentals of the natural system were affected by the forced flooding in the region. Additionally the effects from the clear cuts and herbicides influence the situation.

4.3. Linguistic Impacts

Marjut Aikio (1988), a Finnish linguistic scholar who lived in the community of Vuotso from 1970s to 1980s has paid attention to the impacts of the reservoirs to the linguistic and social networks in the region.









The reindeer of Lapin paliskunta reindeer herding municipality were moved from the corralling and roundup site in Raja-Jooseppi across the highway Europe4 to the pastures west of the road. Pictures: EM

She (1988: 209) writes that among the North Sámi living in Sompio (Vuotso) men abandoned the Sámi language in the region first. She offers us a history of the cultural change prior to the reservoirs. This enables us to see the accumulative impacts of Finnish power and rule that started to be exercised over the region through the decades. One of the tools for this process of cultural genocide was assimilation through forced schooling and disapproval of Sámi languages. Finnization of the women began in Yliluiro village in 1930s and in Vuotso among the North Sámi women in 1930s. The road that goes through Vuotso influenced and speeded up this process.

Aikio (1988: 211) confirms that the forced education system intensified in Vuotso after the Second World War and this contributed further to the loss of Sámi as a spoken language. Dormitory was constructed to Vuotso during this time for the Sámi students. Speaking Sámi became forbidden and punishable. If the young Sámi spoke their language at school, they were beaten, humiliated and otherwise damaged.

Aikio (1988: 284, 300) states that the arrival of the reservoirs in 1960s speeded up the assimilation process. In remote wilderness village of Kurujärvi all the buildings were burned to the ground before the flooding. Most of the people from Kurujärvi had to move to Vuotso as "reservoir refugees". Pekka Aikio, using the concept of forced relocation will explore this in his chapter.

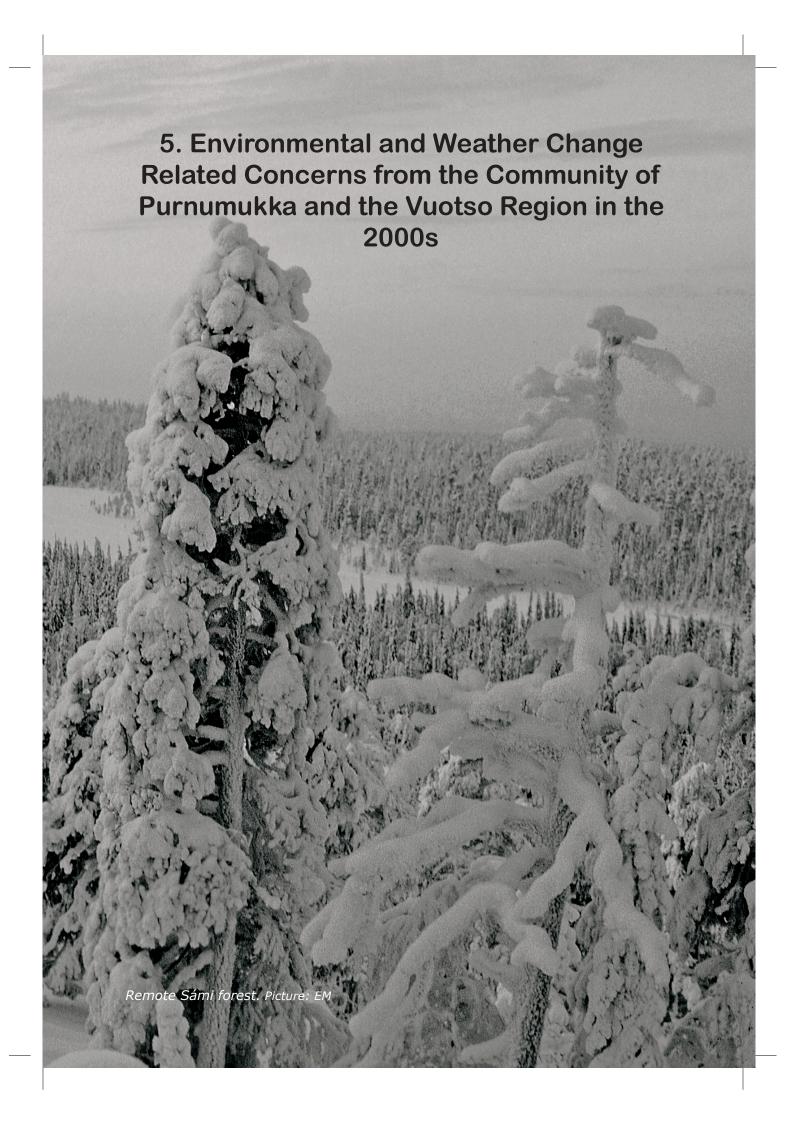
Kurujärvi had preserved the spoken Sámi well because there was no road there. With the arrival of the reservoir the social networks that had been acting as cultural buffers and survival mechanisms until late 1960s were torn apart in Kurujärvi (Aikio 1988: 300).

North Sámi linguistic contact networks were closely-knit and intense. Closed and dense social networks in the villages protected the spoken Sámi for a long time, but once the networks were opened, changed or torn apart as with the Kurujärvi Sámi with the flooding process, language was lost quickly (Aikio 1988: 307).

Aikio (1988:309-311) writes that when linguistic networks get to be born naturally and are maintained in a healthy environment, they foster an ethnic upbringing so that young Sámi identify to be Sámi and Finns identify to be Finns. These networks carry the traditions and social codes associated with the culture.

If these networks are damaged, so is the whole cultural fabric. The North Sámi migration to Sompio area was caused by nationstate border closures (Map 2). People responded by changing territories and adapted over time on their own terms to the imposed changes. With the creation of the reservoirs no time was given for adaptation. Houses had to be left behind. In Kurujärvi they were burned. Dominant society allocated the areas of living for the survivors. The Sámi were evicted from their lands.

Aikio (1988: 310) concludes her multiyear community based study of Vuotso by saying that the reason why Finnish language prevailed in this region was the result of the flooding and creation of the reservoirs. These acts destroyed the social and cultural networks of the local North Sámi. Vuotso as a central village received a large number of reservoir refugees which in its turn destroyed the established networks in Vuotso village. The forced shift into a reindeer farms was the final blow in this matter.





Northern lights. Picture: EM

This chapter provides a view of more recent observations made by the local people of the region in the 2000s. Damages and their impacts have continued for 40 years and new issues have emerged. The topic of climate and weather change has entered into the local discussions. The reservoirs have caused changes to the microclimate of the region.

The creation of Porttipahta and Lokka Reservoirs and the different subsequent processes linked to them remain a defining event in the lives of the Sámi and other local people of Vuotso. However in the past 20 years the reindeer herders and other local people have started to notice changes in the ecosystem and weather patterns which have been a source of concern to many.

The local Sámi partnered with the ACIA – Arctic Climate Impact Assessment by the Arctic Council in 2001 to document the observations and concerns that they had regarding these changes. The Snowchange Cooperative carried out the practical documentation of observations, oral histories and traditional knowledge. In order to get a view of the situation in the 2000s in the community these ob-

servations are shared here. A shortened version of the text has been published as well in the ACIA – Arctic Climate Impact Assessment by the Arctic Council, which is an intergovernmental body of cooperation in the northern regions (Huntington et al. 2005: 84-86). A variant of these themes has been published previously as well in Salin et al. (2004: 273-283).

The topic of climate change is a complex theme in the community of Vuotso. Many of the local people reserve the right to have their own opinions and conclusions related to the changes. The surviving knowledge in the community is a mixed system of Western knowledge, remnants of the Forest Sámi knowledge and the incorporation of the North Sámi traditions that the arriving reindeer people brought there in 1800s. Some of the traditional views in the community are very old and can be considered unique in Fennoscandia (Paulaharju 1979: 70-71).

The Sámi had their own knowledge of stars, heavens, northern lights and other phenomenon in the world. The ways of predicting seasonal and short-term weather are based on the markers in nature (Paulaharju 1979: 70-71). These sys-

tems of traditional knowledge have been under attack for a century in the colonial process that has impacted the region. Clearly the construction of the reservoirs affected in many ways the whole fabric of the knowledge structures and ways of knowing.

There are many sceptics in the community regarding so-called 'global climate change' as an all-explaining answer to the changes that have been reported. Moreover the knowledge of the reindeer herders who are every day in the forest conducting subsistence activities is practice-oriented. 'Climate change' as a phenomenon that the mainstream media, scientists and politicians argue about is something that they are forming a relationship with on their own terms. Therefore it is important to allow them to express their own views and approach the complex situation of Vuotso with care.

The creation of Lokka and Porttipahta reservoirs are linked with the global discourse of climate change. They have as well local impacts regarding the changes in the wind, snow and ice and other weather events.

For example the channel that connects the two new water bodies stays ice free through the winter, which means that there is more moisture in the village area. This makes the sub zero temperatures even colder than the previous colddry conditions. Armas Sieppi, an elderly person from the community thinks that the reservoirs "have made the autumns milder" (Snowchange Vuotso Oral History Archive 2002).

By looking at the long view since the 1948 when the planning of these reservoirs began in Finland and then linking this with the events of the 2000s we can trace back many relevant questions regarding power, change, status and survival of Indigenous peoples during the Cold War and in contemporary times.

Documentation of ecological, climatic and other changes in the Vuotso region

and in the small Sámi reindeer community of Purnumukka took place in two stages. The initial community contacts, networking and first interviews took place in September 2001. Following that, during March and April 2002, Mika Nieminen, a staff member of Snowchange project spent time in the region, living and practicing reindeer herding in Purnumukka with Pentti Nikodemus and Riitta Lehvonen.



Two Sámi herders, Pentti Nikodemus (on the right) and an Elder have a talk in Purnumukka. Picture: RL



Home of a reindeer herder in Purnumukka in 2005. Picture: TM

Since the active documentation period there was community-monitoring 2003-2005. Members of the community had a chance to express their views on international Indigenous forums in Russia, Finland and Alaska. After 2005 regular communications have been kept with the community and Snowchange while the main body of documented oral histo-

ries has been digitalized and presented in a number of forums across the Arctic.

During this process Nieminen spoke with active reindeer herders, hunters, Elders and fishermen in the region. The community concerns of changes taking place were present. We chose to present a mix of Elders comments, as they carry the most extensive knowledge with additions from the younger generation of Sámi living in the region.

Sakari Keskitalo, a 72-year-old (in 2002) described himself as follows: "this is where I have lived since my youth, my village was flooded under the reservoir [construction of Lokka and Porttipahta reservoirs in the 1970s] so I moved here in Vuotso 35 years ago. As a young man I used to be a horseman, for ten or so years I rode logs from the cutting areas. Then in the 60s I began as a reindeer herder, bought a skidoo and spent 30 years doing that. Then I retired and started fishing, for there was so much whitefish in the summers. Then that went under tax, the tax got so big that there was no point anymore. It's been three years since I last fished. And I gave my reindeer to my son, he is continuing, a professional reindeer herder." (Snowchange Vuotso Oral History Archive 2002).

lisakki Magga is another reindeer herder, aged "only 63" (in 2002) as he says. "Since a school boy I've been with the reindeer. It was hard work; moving the male reindeer used for pulling sledges, I had 30 of these to look after, reindeer of three houses. In the morning I had to move them; I had to start at seven so that I could make it to school at nine. And after school I took my school bag home and went out to move the reindeer again. That was hard work." (Snowchange Vuotso Oral History Archive 2002).

These two men reflected the overall changes that have taken place in the region. By far the biggest ecological disaster that they have experienced has been the construction of the Lokka and Port-

tipahta reservoirs and the massive clear cuts preceding the construction. Best lichen areas were flooded and they had to transport 5 000 reindeer away from the grazing grounds because of the construction. These specific grounds were excellent grazing areas for the reindeer.

In the local river Tankajoki the salmon used to migrate all the way to Tankapirtti area. This was before the reservoirs came. The Isohaara Powerplant connected to the reservoirs blocked the salmon from entering upstream. However, there is some talk of re-opening the access for salmon in the future. Sakari and Iisakki both fondly remembered the times when even 17-kilogram salmon could be caught from the river Tankajoki.

The oldest reindeer herder in the community of Purnumukka is an 86-yearold Niila Nikodemus (in 2002). Sadly he passed away in 2009. He reflected the local weather by saying, "during summers it used to be warmer for longer. Now it is about three days and everything changes during summertime. Changes used not to be so rapid in the past. It used to be so warm in the summertime that when I could not sleep at night I would go sleeping on the concrete floor of the sauna at my cabin! But this was decades ago. Things have slowly changed here. They are putting some kind of 'buzzers' to the air. Nowadays no two days are alike." (Snowchange Purnumukka Oral History Archive 2002).

A reindeer herder for life, Heikki Hirvasvuopio is now retired. His son continues the profession. Heikki recalls starting the herding with his late father sometime before he turned ten years. He reflected on the overall observations of changes and said that winds have grown stronger and they can be very fierce these days. "This is special when you consider things to the past. For example we never had this kind of storms and falling of trees then. The biggest changes in weather and nature started very sharply in the 1970s. Then

we really observed that for the first time. During springtime rains would come and sometimes red snow would fall. I wonder if it came from the Kola Peninsula or whatever place. We drove skidoos on the fells herding reindeer and when a new snow would fall it would be red! For example it seemed in the 1980s and early 1990s that horsehair lichen will disappear altogether. Now it has made a comeback. We can see them hanging from the trees again!" (Snowchange Vuotso Oral History Archive 2002).

5.1. Weather, Rain and Extreme Events

Veikko Magga is a reindeer herder for over 50 years and he is a member of the reindeer herders association of Lapin paliskunta. He stated that the Finns and the Sámi practice reindeer herding in the same fashion locally. Veikko put the blame for the changes he has seen on air pollution. Extreme weather events had been noticed but they were rare. Four years ago massive storms felled vast areas of forest in the region according to Veikko. He sees that the changes in nature date back to some 20 years. "It has been about twenty years that the changes have been visible. We ran out of horsehair lichen and everything from trees then and even areas where reindeer did not go lost their lichen cover. Summers used to be much hotter before. In the forest we could sleep outside without any cover. This has changed. During autumn time a mild weather has been unusual. But this might be because of the presence of the two reservoirs, Lokka and Porttipahta." (Snowchange Vuotso Oral History Archive 2002).

Heikki Hirvasvuopio talked a lot about the seasonal changes, mostly of summer and fall. "The summers used to be like standard. It was dry weather and these lasted quite long in the early summer. We had then the marking of calves in the beginning of summer and we had all the reindeer up on those big fells because especially the start of summer was so hot. It was the hot weather that drove the reindeer on the fells, and insects too of course. Now the summers have changed, it is very unstable nowadays. The reindeer cope here in the woods now. They don't move up on the fells anymore like they used to do. The falls have gotten longer now. Before it used to be well below zero temperatures and winter set in at once when it did. It wasn't like today that falls are mild for longer. The fall has been prolonged, there's sleet and rain and such. But it used to snow." Hans Kitti of Purnumukka claims that thunderstorms have decreased in the area. "Nowadays there are no real thunder rains anymore!" (Snowchange Vuotso Oral History Archive 2002).

Armas Sieppi from Purnumukka has been a reindeer herder all his life and he has now 70 years of experience. He talked about winter and reindeer herding. "Sure they [winters] have stayed on the same system that they have been always. Here the snow has come in early sometimes and a little later other time. Now it has been a couple of years so that there's been less snow in the autumn than what it used to be." (Snowchange Vuotso Oral History Archive 2002).

Veli-Matti Mutenia is a local Sámi who works for the Kemijoki Powerplant and has had a tourist business of his own prior to that. He remembers how in Purnumukka it "snowed 30 centimeters on the midsummer week [the last part of June] in 1977! Birch trees had leaves on but twigs snapped as snow covered them. This was extremely bizarre event in the local weather." (Snowchange Vuotso Oral History Archive 2002).



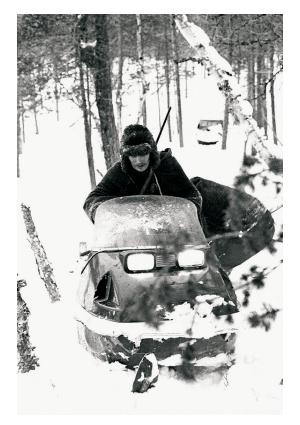
On some winters there is little snow, Picture: FM

5.2. Ice Rain

During the interviews many members of the community voiced one of the most important concern to be the icy rain that falls in the autumn time. Pentti Nikodemus who is a reindeer herder in Purnumukka expressed his concerns vocally about the impacts the icy rain in fall 2001 had caused in the sense that the reindeer were unable to access the lichen through the frozen ground during that fall.

Veikko Magga explained that for decades the area had good frost in the fall time; it created proper conditions. Now the icy rain freezing on top of the ground causes more work for the reindeer herders. As the reindeer cannot get enough food, there are more and more reindeer deaths occurring. "Over the past few years we have lost thousands of reindeer," says Magga (Snowchange Vuotso Oral History Archive 2002).

Niila Nikodemus remembered how the ground used to freeze. "Before there used to be proper rains in the fall and then there would be frost and the ground would freeze. The frost was really good; it dried the lichen before it snowed on top of everything. With snow on the lichen it preserved well there. Nowadays there is no proper ground freezing. The snow can melt on the ground. Now it rains and still when it is wet, there's frost and everything freezes and that is bad for the reindeer. It can't get to it. And the reindeer will ruin the lichen, trying to dig it out. It [the lichen] is stuck in the ice, and it will come all up. When the lichen is frozen it will detach with the ice. I have seen this when the melt takes place in the spring. There have been massive amounts of lichen clawed out. The lichen is loose; not in the ground and it will no longer grow but dry out." (Snowchange Purnumukka Oral History Archive 2002).



Reindeer herder Veikko Magga drives the snowmobile in sleet snow conditions in 1970s (upper left). Picture: EM



Passing time in reindeer cabin by playing games and telling stories. On the right Veikko Magga and Jouko Alakorva (upper right). Picture: EM



Wilderness cabin in the middle of a blizzard (bottom). Picture: EM

5.3. Snow, Rivers, Ice

The amount and consistency of snow has fluctuated in Purnumukka and in the Vuotso region. Veikko Magga recalls that nowadays the snow sets in the spring. "Some falls in autumn but there is no proper freezing, only so that the lowermost snow freezes. The lichen freezes solid into this layer and the reindeer cannot get proper food because of this. For a couple of years in row there has been less snow in the autumn than previously. But I think sometimes it falls earlier, sometimes later. It has always been this way." (Snowchange Vuotso Oral History Archive 2002).

Armas Sieppi thought that the snow and snow consistency is much harder these days. "Nowadays snow is much harder than before. And yes we have ice; at least in the reservoirs the ice is thick. We've had these reservoirs for 30 years now." (Snowchange Vuotso Oral History Archive 2002).

Niila Nikodemus discussed the snow and ice covers based on his experience of lifelong local observations. "There is normal fluctuation in the amount of snow. However, snow falls later; it used to be permanent snow cover always in October. Now it can be November or middle of November. Ice has thinned, especially on the small rivers and ditches here. I wonder if the reservoirs affected this? It used to be that we could just easily drive our skidoos on the ice. There used to be a proper ice cover on the small rivers." (Snowchange Purnumukka Oral History Archive 2002).

According to Heikki Hirvasvuopio, the thickness of snow has changed significantly. There are no thick layers anymore. The year 2002 however seemed to be an exception. "Now we have enough snow; like we used to have before. Before the winter used to come all at once. The ground conditions were good and decent freezing took place. Nowadays it can be after Christmas before the winter really

sets in. Weather today is very mild and it fluctuates much." (Snowchange Vuotso Oral History Archive 2002).

Sakari Keskitalo and lisakki Magga remember the time before skidoos. They used skies and only after 1964 the herding was carried out with the help of skidoos. They both feel that the ice is thinner now. Autumn times are wetter today. In the olden times it used to be so that the ground dried properly before it snowed and the lichen was accessible for the reindeer. Now the wet rains "freezes the lichen so that is very difficult for the reindeer to access it". (Snowchange Vuotso Oral History Archive 2002).

More reindeer have died because of this. They recall that "it used to snow on 17th September but now it can be December before snowfall". (Snowchange Vuotso Oral History Archive 2002). Sakari and lisakki stressed that the time of predictable early snowfall came to an end when the reservoirs were filled. Later snowfall became evident after the reservoirs were filled.

Absence of proper long and cold winter these days made Veli-Matti Mutenia pleased. "Cold spells are a lot shorter but I can tell you I don't miss the minus-35-degree weather!" (Snowchange Vuotso Oral History Archive 2002).

In the autumn of 2000 there was extremely little snow in the region according to Veli-Matti. He remembers the winter in 1998 to have been very snowy. During the 1950s it used to snow so much "that the road to Sompio was cut back for two weeks. We couldn't go anywhere by car. They used horses and reindeer at that time." (Snowchange Vuotso Oral History Archive 2002).

Veli-Matti recalled the year 1985 as follows: "There was a very cold spell in the fall but no snow! Even on the ice the wind would blow off what little snow remained. Fishermen could use cars to travel on the ice for there was no snow. In 1998 or 1999 there was only sleet but

no frost on the ground. We were bush-whacking and harvesting one of the birch groves and the ground was totally unfrozen and it snowed almost 40 centimetres. We could not go to the lake at all, as the ice was only able to carry the snow, not more. Last year [2001] the snow came in February!" (Snowchange Vuotso Oral History Archive 2002).

5.4. Animals

In addition to the reindeer herding, many people in the community also hunt and fish. There have been changes over the years in the regulations regarding these activities as well as changes in the value of the catch. The community members have also observed changes in occurrences of several non-profitable species. A part of the interviews were thus concentrated on the perceived changes in the local animal populations and their fluctuations.

5.5. Birds

Veikko Magga stressed that small birds seem to have disappeared and have not been seen for "many summers now". (Snowchange Vuotso Oral History Archive 2002).

Niila Nikodemus, an Elder, voiced his observations: "There used to be more birds, such as capercaillie, ptarmigan and others. We needed not go far to hunt them. We trapped ptarmigans here on the riverbank. They used to come sit on the field and on the nearby birch trees. But I have not seen them like that for decades. Yeah, I don't know why this has happened. It is not because of hunting. It could be that as there are now more roads winding here, more hunters have arrived, massive amounts. As it was only locals hunting before; the numbers were stable. We used

to hunt everything; pine martens, squirrels, ermines -everything!" (Snowchange Vuotso Oral History Archive 2002).

Heikki Hirvasvuopio talked about the disappearance of birds in Kakslauttanen. "Especially the ground birds, we could be talking about almost extinction levels when compared to the past amounts. I used to hunt quite much alongside reindeer herding back in those days so I have a good idea of the stocks. We cannot even talk about the same amounts during the same day. This is true especially with ptarmigans, capercaillie and ground birds. With small singing birds the same trend is noticeable. Nowadays it is silent in the forest - they do not sing in the same way anymore. It used to be that your ears would get blocked, as the singing was so powerful before. They [singing birds] have disappeared completely as well." (Snowchange Vuotso Oral History Archive 2002).

In Vuotso Sakari Keskitalo and Iisakki Magga agree with Heikki Hirvasvuopio's words. Birds have disappeared almost completely particularly in the last 20 to 30 years of time. They remember that in the 1950s you just needed to select the bird to shoot while going outside. There was no need to wander even to the forest. Nowadays you have to walk many kilometres to see them. There used to be hundreds of birds in a flock during fall time. Sakari and lisakki felt that especially gallinaceous birds have diminished in numbers.

Veli-Matti Mutenia sees the crash in bird stocks as a sum of various factors. "First of all it is affected by hunting itself and the efficiency of the hunting. For example capercaillie and wood grouse have been protected even for some time to get the stock on the rise again. Then there is all forest cutting adding up. Affecting are also all issues related to small predators; all hawks are now under protective measures and people are allowed to hunt the fox only with a foot snare; iron traps are for-



Redwing. Picture: EM



Bluethroat. Picture: EM

bidden. Guns used for hunting have improved and dogs have developed; they are better these days. And there are so much more people hunting now." According to Veli-Matti one thing has not been studied enough in relation to diminishing numbers of ground birds. "There are hundreds of kilometres of wire-netting fence spread out in the nature, also here in our area. How much are ground birds dying because of that? A bird cannot see it too well; the loops are so big in the fence. It is known that even moose get caught in those fences. And reindeer have been seen stuck on them." (Snowchange Vuotso Oral History Archive 2002).



Capercaillie male in courtship. Picture: EM



Goshawk. Picture: EM



Great grey owl. Picture: EM



Male black grouse. Picture: EM



Trapped willow grouse. Picture: EM



Wolf. Picture: EM



Wolverine. Picture: EM



Fox. Picture: EM



Lynx. Picture: EM



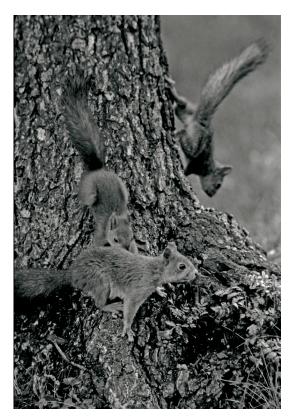
Bear. Picture: EM

5.6. Wolverine

Large predators have an impact on the reindeer stocks. Wolf, bear, fox and wolverine are common to the region. Armas Sieppi said that there are different kinds of predator animals present but mostly he talked about wolverine. "We have predators here in our herding area. They decrease the standard of living by quite a bit. Every year tens of percents is cut off from the calves. Wolverines are among the predators. They are coming from the neighbour's side [Russia] now. Yeah, they kill. One can kill more than ten a day. The best figure I have heard is over 60. One wolverine, [catching] a little herd. When wolverine has had its pups it hunts so that it bites a reindeer and leaves it alive but marked. When a bad day comes, it will track and hunt the marked one. It's ready-made food for it. It hurts the reindeer so that it cannot move too far. That's what it is like. [The amount of wolverines] depends always on the weather. In a good weather they can travel from far. It migrates long distances." (Snowchange Vuotso Oral History Archive 2002).

5.7. Squirrel

Squirrels used to be hunted in the Vuotso region. The main reason was the fur and the price that was paid for it. Now the squirrels have grown less in number. Niila Nikodemus portrays the old times and the change: "We don't see squirrels anymore. Before we used to hunt them all fall. We got the permit in November when the fur had come clean. All the time we hunted and there were [squirrels] every fall. I wonder the reason now that we don't hunt them anymore but still their numbers don't increase. If it were like before, we hunted them continuously. The skin was good and we got a fair price on it too. Great fur." (Snowchange Purnumukka Oral History Archive 2002).



A family of squirrels. Picture: EM

5.8. Insects

In the past summers in the Vuotso region there has been a very small number of insects, which is a drastic change to the previous times. The insect time lasts from the end of June through July. Different stinging and biting insects, such as mosquitoes, gadflies, black flies and the smallest; biting midges, appear all at the same time. This causes the reindeer to gather in herds and move up on the fells where wind and air fluctuations make it easier for the reindeer.

"Last summer was such that there were no mosquitoes nor gadflies during the whole summer" stated Veikko Magga (Snowchange Vuotso Oral History Archive 2002). Niila Nikodemus on the other hand pointed out that the number of insects is depended on a particular summer. "If it is a rainy spring time, they will be plenty but if it turns out to be a dry spring; hardly any will come." (Snowchange Purnumukka

Oral History Archive 2002). Heikki Hirvasvuopio had similar observations as Veikko Magga. According to Heikki both mosquitoes and gadflies have disappeared. "Especially this is true with gadflies, nowadays they are very few. Back then when the vermin were aplenty, that was what made the reindeer move up on those big fells." (Snowchange Vuotso Oral History Archive 2002).

5.9. Traditional Calendar and Knowledge

The traditional knowledge of the Sámi people has shown a great adaptation capacity and this has been true with both ecological and social changes that have taken place and thus affected the people, society or the reindeer. In reindeer herding the traditional weather reading skills and knowledge of the weather are very important factors. During the community visits, the observed changes were linked to questions on traditional knowledge and how its use has changed.

According to Veikko Magga both reindeer herding and traditional knowledge have changed to the negative direction. "We have to feed the reindeer with hay and fodder quite much today. But I would not advocate that the traditional Sámi calendar would be mixed up yet. But traditional weather reading skills cannot be trusted anymore. In the olden times one could see beforehand what sort of weather it would be. These signs and skills hold true no more. Old markers don't hold true anymore; the world has changed too much now. We can say the nature is mixed up now." (Snowchange Vuotso Oral History Archive 2002).

Hans Kitti agrees on the issue of traditional weather forecasting not withstanding anymore. "They [weather patterns] used to hold, my mother and her uncle, they used to follow the weather. And it

was true then, but not anymore... since 1968 when they started building that reservoir. I remember that after the reservoir came, it [weather pattern] was mixed up." (Snowchange Vuotso Oral History Archive 2002). Hans believes that changes in weather have caused confusion in use the traditional knowledge. Niila Nikodemus reflected on the traditional weather reading skills in the following way. "Winters used to be windier. Blizzards always followed cold spells in the past. Old markers do not hold anymore! Climate can change so suddenly now; there is no stability. It used to be good weather for a longer period but now the changes occur already after a day or two. Marked, special days vary too much now, they don't hold steady anymore. However, the Sámi calendar has remained true. It is always dependent on the year, they are not the same." (Snowchange Purnumukka Oral History Archive 2002).

In Kakslauttanen, Heikki Hirvasvuopio discussed the traditional forecasts and argued that the weather periods are not a standard these days. "We had certain stable decisive periods of the year that formed the traditional norms. These are no longer at their places. Specific calendar days, like Kustaa Vilkuna [a Finnish folk historian of weather and culture] wrote, held really true. But it is no longer so. Today we can have almost 30 degrees of variation in temperatures in a very small time frame. In the olden days the Sámi would have considered this almost like an apocalypse if similar drastic changes had taken place so rapidly. Before I spent all of my winters in the forest and was at home for maximum of one week. Nowadays the traditional weather forecasting cannot be done anymore as I could before. Too many significant and big changes have taken place. Certainly some predictions can be read from the way reindeer behave and this is still a way to look ahead in weather-wise. But for the markers in the sky we look now at vain.

Long term predictions can not be made anymore." (Snowchange Vuotso Oral History Archive 2002).

Veli-Matti Mutenia remembers that during a full moon a circle around it meant blizzards. "I feel to some degree this is still true today." (Snowchange Vuotso Oral History Archive 2002). Sakari Keskitalo and lisakki Magga had the same rule of thumb. "When the moon had a big ring around it, yeah, for sure that meant a terrible blizzard within two days. It is still like that. A circle around the sun used to mean bad weather as well." (Snowchange Vuotso Oral History Archive 2002).

These men had fond memories of Anselmi Pokuri, a 100-year-old Sámi Elder, who used to observe the moon with great accuracy. "If the moon was sort of hanging on its sharp edges it meant snow to come, and if it was all straight up; there was no snow in that month. And it was so. It still is, I've been watching it. And if the moon looked like a half a flat bread it meant there was only little snow in the month. They sure didn't have any books to look at, it all originated in experience." (Snowchange Vuotso Oral History Archive 2002).

5.10. Reindeer and Reindeer Herding in the 2000s

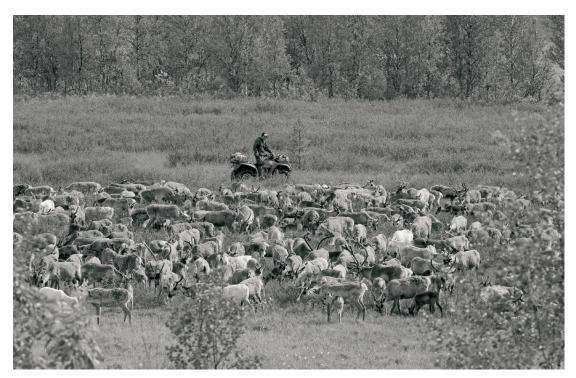
The reindeer are the key species for the community of Purnumukka and Vuotso in many ways: cultural, social, economic and ecological. The issues of climatic and ecological changes in the region have impacts on the reindeer and their herding. Reindeer herding is faced with a lot of difficulties all the time with pressure coming from different political, social and economic fronts. The hardships are concrete as the way of living that was supporting everything in the past, is going through changes and causing increasing unemployment.

Armas Sieppi expressed his opinion

on reindeer herding by saying that "reindeer herding has become more difficult in every way. Forestry and clear cuts are the number one of the affecting factors. There is no more food for the reindeer in the forest; almost all must be taken into home feeding. And now so much snow in the springtime. Just today it has snowed 20 centimetres. And the later snowfall in the fall is having an impact too. Now the reindeer herding is changed into motorized job. We have always been waiting for the snow to come but now we can't use the skidoos. Motorbikes would go but that is not really working; the terrain is too difficult." (Snowchange Vuotso Oral History Archive 2002).

Sakari Keskitalo and lisakki Magga reflected the changes that the modern time has brought to reindeer herding. "In the past it was that who had reindeer, made a good income in a winter. There was so much less of expenses then. Skiis don't cost that much. And the forests were pristine. Being a reindeer herder back then; it was all you had to do. The expenses were so little and there was no tax. Now it is all sorts of money holes; you have to buy skidoos, all-terrain vehicles and cars. Gasoline costs and everything. So many things have changed now..." (Snowchange Vuotso Oral History Archive 2002).

Heikki Hirvasvuopio outlined the impacts of climate change on the reindeer herding. He said the weather fluctuates too much in the fall time with rain and mild temperatures. "This ruins the lichen access for the reindeer. In some years this has caused a massive loss of heads. It is very simple; when the bottom layer freezes reindeer cannot access the lichen [that is frozen on the ground]. This is extremely different from the previous years. This is one of the reasons why there is less lichen. The reindeer must dig the lichen out with force and the whole plant comes completely off, with roots. It takes, as you know, extremely long for lichen to



Reindeer are collected for calf marking. Picture: EM

regenerate when you remove the roots of it. This current debate of loss of grazing grounds is not therefore connected with the larger number of reindeer, no, this is not the case. In the past the herds were much larger. The main reason for the loss of grazing lichen areas is the bad weather conditions that contribute to the bigger impact on the area. I don't think many have observed this reason in their thinking." (Snowchange Vuotso Oral History Archive 2002).

5.11. Arrival of New Species

There are new species in the Vuotso region nowadays that were not common to the area in the past. Different sorts of plants, hay species and animals have migrated to areas where they were not seen before. Heikki Hirvasvuopio talked about the arrivals: "Well, yes we have new species in the area. For example a kind of white boletus has appeared here. I haven't seen it before and now it is fairly

common already. It has spread. And then there are many hay species. They have moved up here from the more southern latitudes. We have minks now too. They have come during my lifetime; in the past we didn't have them at least in the nature. Now it is pretty common here. The first wild mink that I saw was in the mid-1960; it was in the Eastern Kaira area. Apparently it had escaped from the Russian side. It is not longer than that; to have mink here." (Snowchange Vuotso Oral History Archive 2002).

Armas Sieppi has seen some new bird species in the area that were not common in the past. Sakari Keskitalo recalled seeing a roe deer. "Five years ago I saw two in Vassama. Last fall one was circling around right next to the border [to Russia]. It was going around the hill using the road; it was coming toward us. It is twice I have spotted a roe-deer." (Snowchange Vuotso Oral History Archive 2002).