

The area is exposed to both local and global influences, which can have negative impacts on the natural environment. Influences like:

- Local pollution from the Russian smelters and from industry on the Norwegian side
- Long-range transported air pollutants
- Regulation of the Pasvik watercourse with extensive hydro power utilisation
- Climate change and effects like increased temperatures and changes in the precipitation regimes
- New and introduced species in the Pasvik river system, such as the vendace

The border areas between Norway, Russia and Finland have unique natural features and natural resources. The Pasvik river flows from the great Finnish lake, Lake Inari, and on its way to the Barents Sea subsequently it forms parts of the border between Norway and Russia. Besides being a remote northern wilderness area, the area is also heavily influenced by large emissions from industries and extensive hydro power utilization. As a result, the Pasvik river is a shared resource and a shared responsibility for the three neighbouring countries.

The fragile northern nature and the many pressures make it necessary to establish a specific monitoring programme for this region, which enables us to follow changes over time.

The purpose of environmental monitoring in the border areas is to follow the state of the environment and thus also reveal effects of various stressors, such as emissions from the Pechenga-nickel enterprise. Harmonization of monitoring methods, equipment and data sets is central to the work, including broad dissemination of information. In addition, it is important to obtain more knowledge about the nature and the amounts of heavy metals and other pollutants in locally harvested food, and what consequences this may have for human health.

In the years 2013-2015 two EU projects was implemented "Environmental challenges in the joint border area between Norway, Russia and Finland" and "Food and health security in the Norwegian, Russian and Finnish border regions: linking local industries, communities and socio-economic impacts".



Photos: Alexey Dudarev, Pekka Räsänen, Rolf Sch. Kollström, Paul E. Aspholm, Jürdimilia Isaeva, Eldbjørg Heimstad, Guttorm Christensen, Geir Rudolfsen, Esko Jaskari, Helén J. Andersson, County Governor of Finnmark and NILU Map: Riku Elo, Adjustments: Hamu Tikkanen. Print: Palmotolo Seiska Oy 2016

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Russia: Murmansk hydro metrological Institute, Institute for northern ecological problems, Kola science centre (INEP) and Pasvik zapovednik/ Pasvik Nature Reserve

Finland: Centre for Economics, Transport and the Environment in Lapland (ELY-centre) and the Finnish Environment Institute (SYKE)

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Environmental monitoring in the border areas between Norway, Russia and Finland

Main findings

Environmental challenges in the joint border area

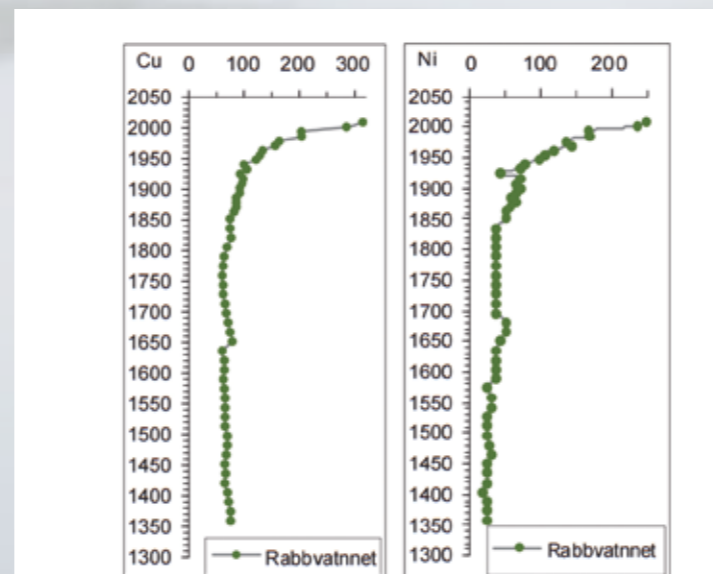
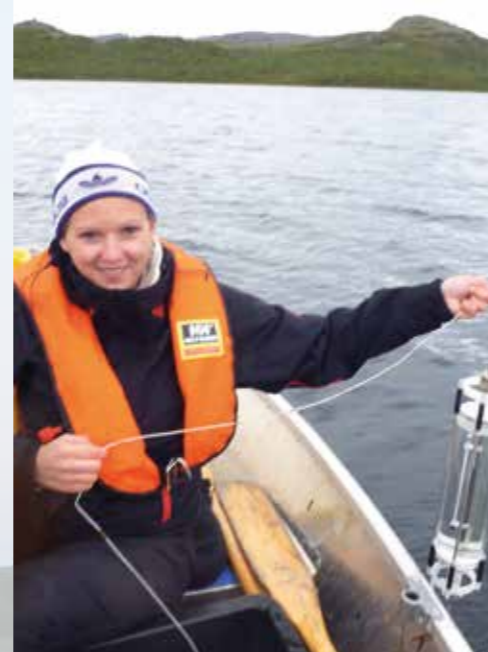
Food and health security in the Norwegian, Russian and Finnish border regions



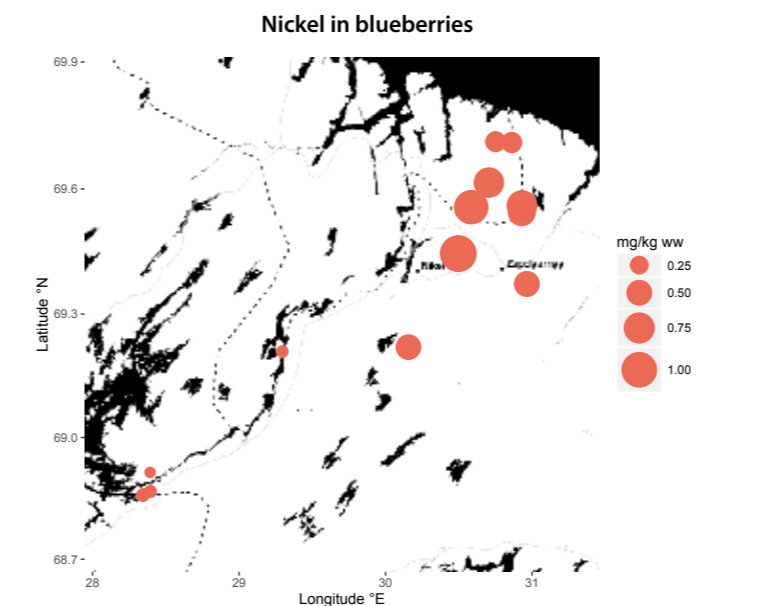


Main findings of the project Environmental challenges in the joint border area between Norway, Russia and Finland

1. Lake Inari is the main reservoir for the five Russian and two Norwegian hydropower plants in the Pasvik river. The regulation of the lake and river has affected the environmental conditions and monitoring of long-term effects is important.
2. Pasvik river, downstream the Pechenga-nickel plant, is strongly affected by pollution, both emissions from the city of Nikel and the emissions from the smelter. Nickel and copper are the substances discharged to the greatest extent.
3. Environmental status in small lakes on the Norwegian side is clearly affected by emissions from the metal industry. This is especially for lakes in Jarfjord area where we find increased levels of the heavy metals nickel, copper and mercury in both sediments and fish.
4. Earlier also acidification was a problem in the small lakes, as a result of large emissions of sulphur dioxide from the metal smelting industry. Acidification had a negative effect on both fish populations and biodiversity in general. The acidification situation is currently improved because sulphur dioxide emissions are reduced.
5. Increased levels of nickel and copper are found in air, water and sediments in the cross-border area. Increasing levels of mercury are found in both lake sediments and in fish. Some organic pollutants, including PCBs occur in elevated levels.
6. Fish in some Russian lakes show signs of abnormalities and shortened life span, due to high and prolonged exposure to heavy metals.
7. Freshwater pearl mussel is a Red List species that is found in several rivers in Sør-Varanger. Annual rings are formed in the shell of the freshwater pearl mussel and it can live to be over 250 years old. The mussel is well suited to study climate change and changes in the environmental state.
8. The water temperature in the Pasvik river has increased by approximately 2° C for the past 40 years. Warmer water affects fish communities. Results from studies in all three countries shows a tendency for trout to disappear and perch to prevail.



Concentration of copper (Cu) and nickel (Ni) (µg/g dry weight) in dated sediment cores from the Lake Rabbvatnet.



Main findings of the project Food and health security in the Norwegian, Russian and Finnish border regions

1. The levels of contaminants, including radioactivity, are generally low in locally harvested food. There are a few exceptions:
 - Levels of mercury exceed maximum limit for human consumption in pike and perch from lakes northeast and southwest of Nikel city. This should be followed up by long-term monitoring of mercury in fish.
 - Elevated levels of dioxins in reindeer meat from Pasvik area have been verified. This was already indicated in a previous study and the need for a follow up is evident.
 - The levels of the metals nickel, cobalt, arsenic, and at times also copper, in berries and mushrooms are higher close to Nikel and in the north-eastern direction when compared to other areas in the border area.
2. It is unlikely that the measured quantities of pollutants in locally harvested foods are harmful for humans, but an assessment of the total amount of pollutants the local population is exposed to should be performed.
3. Average levels of pollutants in the blood of pregnant women in the border area are generally low, but the levels of some persistent organic pollutants are higher on the Russian side.
4. Surveys show that the local population in Nikel area are more concerned about the local pollution situation, than people living in Inari and Sør-Varanger areas. Due to this concern they harvest less food from the nature than they otherwise would have done.
5. The majority of the local population in the region, in all three countries, clearly wants more information about and increased awareness of the local pollution situation.
6. There is a clear correlation between an individual's perception of the state of the environment in the area and whether they want their children to grow up there. The state of the environment appears to be important for the selection of settlement and possible relocation.
7. Majority of the population in the area do not have knowledge about the environmental status or the pollution situation for various contaminants, including nickel and sulphur. This pinpoints the need for better and more accessible information on this topic.

