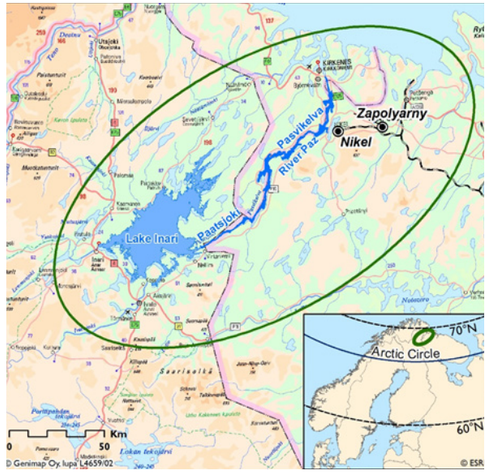
Project background

The joint border area of Norway, Finland and Russia has unique nature and rich natural resources. Industrial activities in the area are rapidly developing, creating the need to enhance the monitoring of environmental effects in order to predict and reduce any harmful impacts of the growing activity. Global climate change also represents a challenge in the northern areas.

The project *Trilateral cooperation on environmental challenges in the joint border area* was implemented in years 2011–2015 as a collaboration between Finnish, Norwegian and Russian environmental researchers and authorities. The project was partially funded nationally and by the European Union (Kolarctic ENPI). The project continues and promotes cross-border cooperation between the countries in the North Calotte and northeast Russia.

The areas of Finnish Lapland, Kola Peninsula and Finnmark County are under growing economic interests due to their mineral resources and the proximity to the Arctic region.



Project partners

- Centre for Economic Development, Transport and the Environment for Lapland
- Finnish Environment Institute (SYKE)
- Murmansk Administration of Hydrometeorology and Environment Monitoring
- Institute for North Industrial Ecology Problems, Kola Science Center (INEP)
- Pasvik Zapovednik
- County Governor of Finnmark
- Norwegian Institute for Air Research (NILU)
- Akvaplan-niva AS
- UIT the Arctic University of Norway

Materials

- Reports detailing the state of the environment and environmental challenges in the joint border area
- Implementation guidelines for monitoring of aquatic environment
- Book for teachers, pupils and nature lovers *Study and preservation of nature in the joint border region of Pasvik-Inari*
- www.pasvikmonitoring.org

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Centre for Economic Development, Transport and the Environment for Lapland • Layout: Elli Jelkänen • Juvenes print • 05/2015

Centre for Economic Development, Transport and the Environment

Trilateral Cooperation on Environmental Challenges in the Joint Border Area

Photos: Jukka Ylikörkkö, Helén Johanne Andersen, Sergey Kotov, Thomas Nilsen. Map: Riku Elo.

Aims of the project

The aims of the studies were to develop tools to assess the impacts of harmful substances, water level regulation and climate change and to illustrate their effects on different aquatic environments. The project area covered mainly the waterways of Lake Inarijärvi in Finland and the Pasvik River flowing along the Norwegian-Russian border. The Pasvik River is regulated with seven hydropower plant dams and it forms a continuum of lakes and reservoirs before finally flowing into the Arctic Ocean. Also researched were isolated lake groups, which are affected by long-range airborne pollution by heavy metals and acidifying sulfur compounds.

The main threat to aquatic environments is the Pechenganikel mining and metallurgical industrial complex in the Kola Peninsula. Emissions from this complex include high levels of sulfur dioxide, dust and a wide range of toxic heavy metals, primarily copper and nickel. In addition, the regulation of the Pasvik River for hydropower has affected the natural state of the waterways and the climate change is bound to have an effect in the future.

Project results

1. The water quality of Lake Inari is excellent and there are no large, direct emissions. However, regulation of the water level has affected the natural state. Monitoring has to be continued because the yearly differences can be large.
2. The chemical state of the Pasvik River is seriously affected by the copper and nickel emissions from the Pechenganikel industry and wastewater from the Nikel city downstream from Lake Kuetsjarvi in Russia. This, along with regulation, also impacts the ecological state.
3. Among the small lakes, largest effects were observed in Jarfjord, Norway, in the prevailing wind direction from Nikel. Jarfjord area has suffered from acidification and the low diversity of animal communities indicates at least some level of pollution.
4. Several classifications of ecological state and environmental health were evaluated for their usability in the study area.
5. The most important heavy metals in the area are copper and nickel and the concentrations of some harmful organic substances are elevated. Highest concentrations are measured near the smelters and, for instance, malformations and shortened lifespan due to heavy metal exposure can be observed in the fish community of several Russian lakes.
6. The effect of climate change in the border area was assessed. The mean air temperature and precipitation are rising in the whole Kola Peninsula and climatic extremes are increasing.
7. Hydrological modelling was used to estimate the effect of climate change on Lake Inarijärvi and the Pasvik River hydrology and water level fluctuations. Water level fluctuations are smaller in the future, which would have mainly positive effects, for example better nesting success of waterfowl.
8. Climate change is already thought to affect the ecology of the area by, for example, causing changes in the species communities. The proportion cold-water fish (valuable salmonids, whitefish) declines as water temperature rises.
9. An environmental monitoring programme taking into account all the factors affecting the Pasvik River and the small lakes was developed to be implemented in the future.

Environmental monitoring

Environmental monitoring is important for impact assessment. Well-planned, long-term monitoring of chemical and biological variables illustrates the environmental changes, their cause and rate and can help in salvaging the sensitive waterways.

A monitoring programme for both the Pasvik River and the small lakes was developed to be implemented in the future. The programme was based on project results: monitoring and evaluation of water quality, sediments and several biological variables (phytoplankton, zoobenthos, fish etc.).

It is crucial to follow the environmental changes in the joint border area in a cost-effective and economically realistic way.

This publication has been produced with the assistance of the European Union, but the contents of this publication can in no way be taken to reflect the views of the European Union.