KOLARCTIC CBC PROJECTS

Stories of Kolarctic Cross Border Cooperation 2014-2020 programme








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Co-funded by the European Union

About Kolarctic CBC

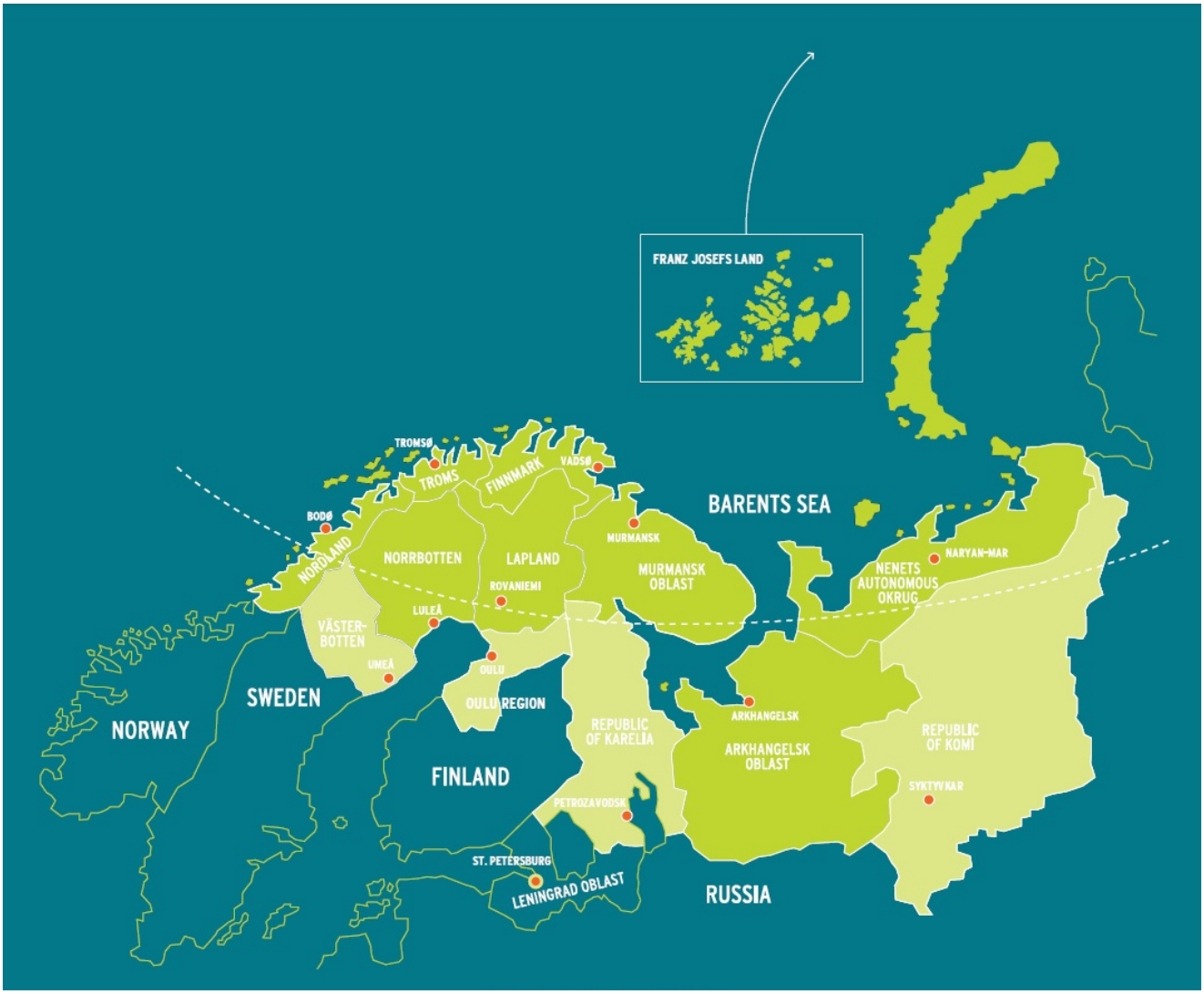
Kolarctic Cross Border Cooperation 2014-2020

Kolarctic Cross Border Cooperation Programme (Kolarctic CBC) is one of the ENI programmes implemented during the programme period 2014-2022. It had four thematic objectives, into which all funded projects could be categorised:

- Business and SME development
- Environmental protection, climate chenge adaptation and mitigation
- Improvement of accessibility to the regions, development of sustainable and climate-proof transport and communication networks and systems
- Promotion of border management and border security, obilit and migration management

The budget of the programme was 63,4 Million euros, and the financing was provided by the European Union, Norway, Sweden, Finland, and the Russian Federation.

Besides being part of the EU cooperation with partner countries, Kolarctic CBC was also a chance to complement, continue and strengthen their cross-border cooperation.



Kolarctic Cross Border Cooperation 2014-2020 programme area

BRIDGE between learning and doing

How to make potential employees and employing companies meet each other? It is a challenge. BRIDGE has been a project which has tackled this challenge in a fresh way and bold, upbeat tone.

University candidates need to practically combine their specific theoretical knowledge with insight into business problems. Both education institutions and companies know this. Companies have high expectations: they expect well educated first-time employees to be fully operable from day one. On the other hand, interviews done by BRIDGE reveal that young university graduates are hardly aware of valuable job opportunities in rural areas.

BRIDGE project approached this challenge by organising interaction of small industry units and higher education institutions.

BRIDGE carried out six semester-long sessions, which culminated in brokering days on differents locations on the Kolarctic area. More than 250 students worked on cases of 58 companies. Teams of students have done innovation work, producing business solutions for problems addressed by companies: B2B and B2C interaction across borders, new products, new or improved and environment-friendly services, new regional and global customer segments etc. While the groups have worked in solving business challenges, the brokering days have at the same time brought together students and local job opportunities.

Feedback of some participating companies:

"While working on the case, all team members showed interest in the work, and were focusing on the result. The team conducted an analysis of the company, proposed specific measures to promote it, and compiled a list of potential partners." (Varanger View)

"Originally low expectation due to the complicated case; yet, the Bridge project in general turned out to be a big and valuable event for a small place like Vardø. Some new thoughts for recruitment workshops and meetings for vocational education." (Seafood Center, Vardö)

BRIDGE project won an Arctic Award in 2020. Arctic Awards – competition was open to projects funded by programmes Kolarctic CBC, Northern Periphery and the Arctic (NPA), Interreg Botnia-Atlantica, Interreg Nord, Kolarctic CBC and Karelia CBC programmes. The competition highlights good practice projects focused on topics of particular relevance to the Arctic area. In the competition, BRIDGE was assessed by the jury as having demonstrated:

- focus on enhancing young people's entrepreneurial skills and employability, as well as creating networks between potential employees and employers,
- the ability to tackle relevant day-to-day demands of both universities and SMEs,
- concrete potential to produce a permanent impact on the practices of the participating higher education institutions and the SMEs, such as improvement in employment rates and quality of the workforce.

Project: Barents Region Initiative for Developing Growth and Employability (BRIDGE)

Website: kolarcticbridge.com/

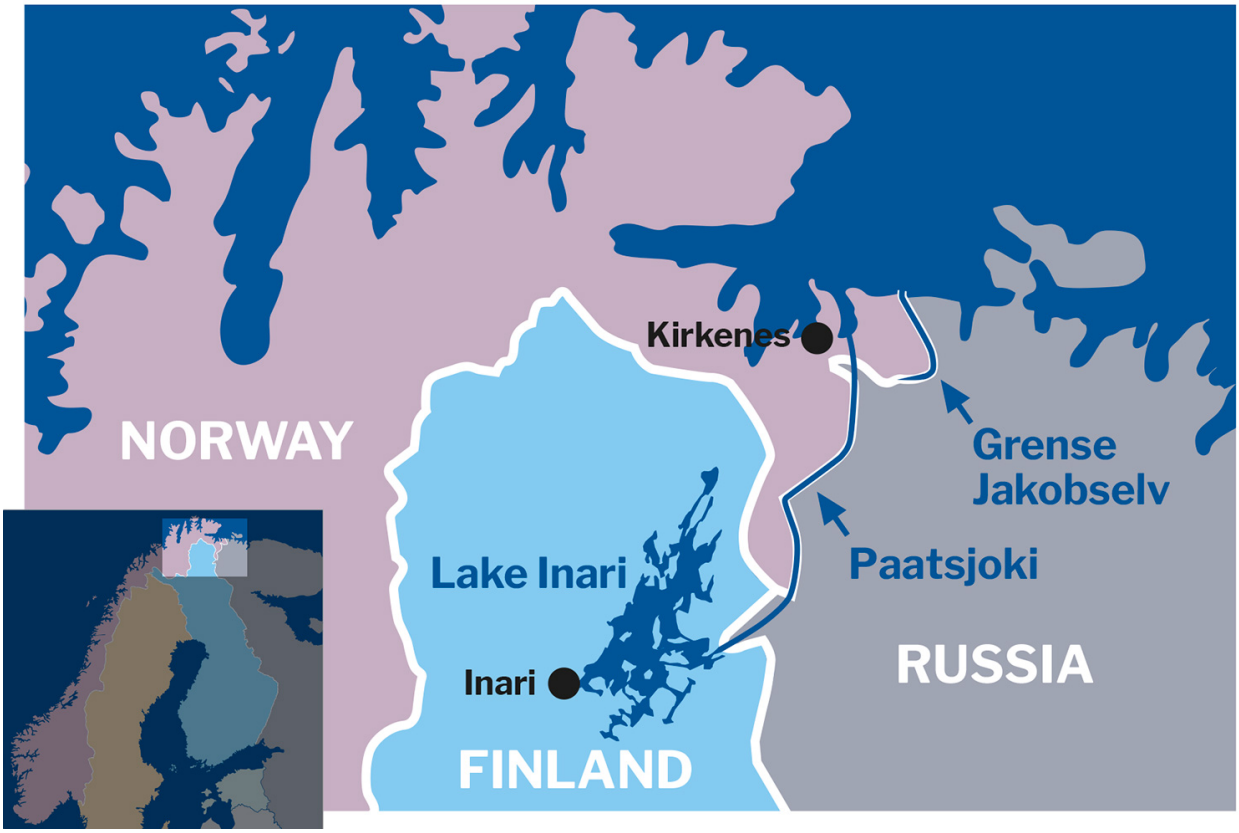
Lead partner: UiT – The Arctic University of Norway, Alta

Other partners:

- Murmansk Arctic State University, Murmansk
- Petrozavodsk State University, Petrozavodsk
- ITMO University St Petersburg, St. Petersburg
- Lapland University of Applied Sciences, Rovaniemi

Project information in KEEP database

A delicate river catchment area in the Arctic



The Pasvik River flows in Finland, Norway and Russia, from Lake Inari to the Barents Sea. Grense Jakobselv runs along the border between Norway and Russia, to the Barents Sea. Both rivers are located in the extensive Pasvik river catchment area, where, for example, Lake Inari is an important nature destination, and the rivers in Norway and Finland are important fishing destinations. This area and its nature cannot be taken care of without co-operation between the three countries. This is especially true for water bodies, and industry in the region has also set its own challenges for air quality, soil and plants.

In the video below, Tiia Kalske from the Finnmark County Governor's offive, and Natalia Polikarpova from Pasvik State Nature Reserve, have a boat trip in river Paatsjoki, and discuss the project and the area.

Samarbeider om naturvern langs Pasvikelva from Statsforvalter Troms og Finnmark on Vimeo.

The overall objective of this project has been to sustain and improve the state of the environment within Pasvik and Grense Jakobselv cross-border river basins, to the benefit of local people, and to increase the viability of the local economy.

The project has facilitated a planning process resulting in a new, joint Multi-Use Plan for Pasvik and Grense Jakobselv river areas. The planning process has involved regional authorities and the municipalities of Pechenga (Russia), Sør-Varanger (Norway) and Inari (Finland), local enterprises and industry, hydropower companies, research- and monitoring institutions, non- governmental organisations (NGO's) as well as other representatives of the local population in the area. The target groups turned out to be very motivated.

> It is a substantial achievement to write and agree on a text of total 66 pages, along with a total of 48 measures, taking into account that 39 institutions from three different countries have been involved.

The plan is available on the website of the Lead Partner: Multi-use Plan of Pasvik and Grense Jakobselv river basins

The plan includes a Programme of Measures (PoM) for the years 2021-2030. The PoM includes trilateral goals and measures within the following planning topics:

1) Industrial pollution
2) Water regulations
3) Waste water (sewage) from households
4) Ecological enlightenment, environmental information and citizen science
5) Land fills
6) Gold panning
7) Forestry
8) Tourism- environmental effects
9) Nature protection
10) Pink salmon
11) Changes to the river environment: erosion control structures and canalization

The new plan is meant to be a tool for the joint, environmental management of the transboundary catchments within a time span until year 2030. The plan also gives recommendations for future monitoring of the environmental status in the border area, and guidelines for follow-up of the PoM.

Project: Cross-border dialogue and Multi-Use Planning in the Pasvik and Grense Jakobselv catchments (Multi-Use Plan)

Lead Partner: The Office of the Finnmark County Governor, Vadsø

Other Partners:

- Centre for Economic Development, Transport and the Environment in Lapland, Rovaniemi
- Pasvik State Nature Reserve, Nikel

Project information in KEEP database

Ecological restoration of Arctic rivers

Ecological restoration is being done in various parts of the world, where Man has earlier modified the water flow in rivers. Ecological Restoration of Arctic Rivers (ReArc) is the first time when Finland, Sweden, Russia and Norway cooperate in this. Cooperation is beneficial because many of the watercourses of the area are border-crossing, and they have similarities in terms of biotopes, vegetation, land types, animal species etc.

The project works for getting a number of arctic rivers back to their natural state. River flow has been channelized because of timber floating. Forests and agricultural land have been drained. Construction of a road or railway crossing a river may have meant a change in the water flow. This has in many cases led to migration barriers for many aquatic species, nutrients and heavy metals released from the ground to the river, and erosion of the ground.

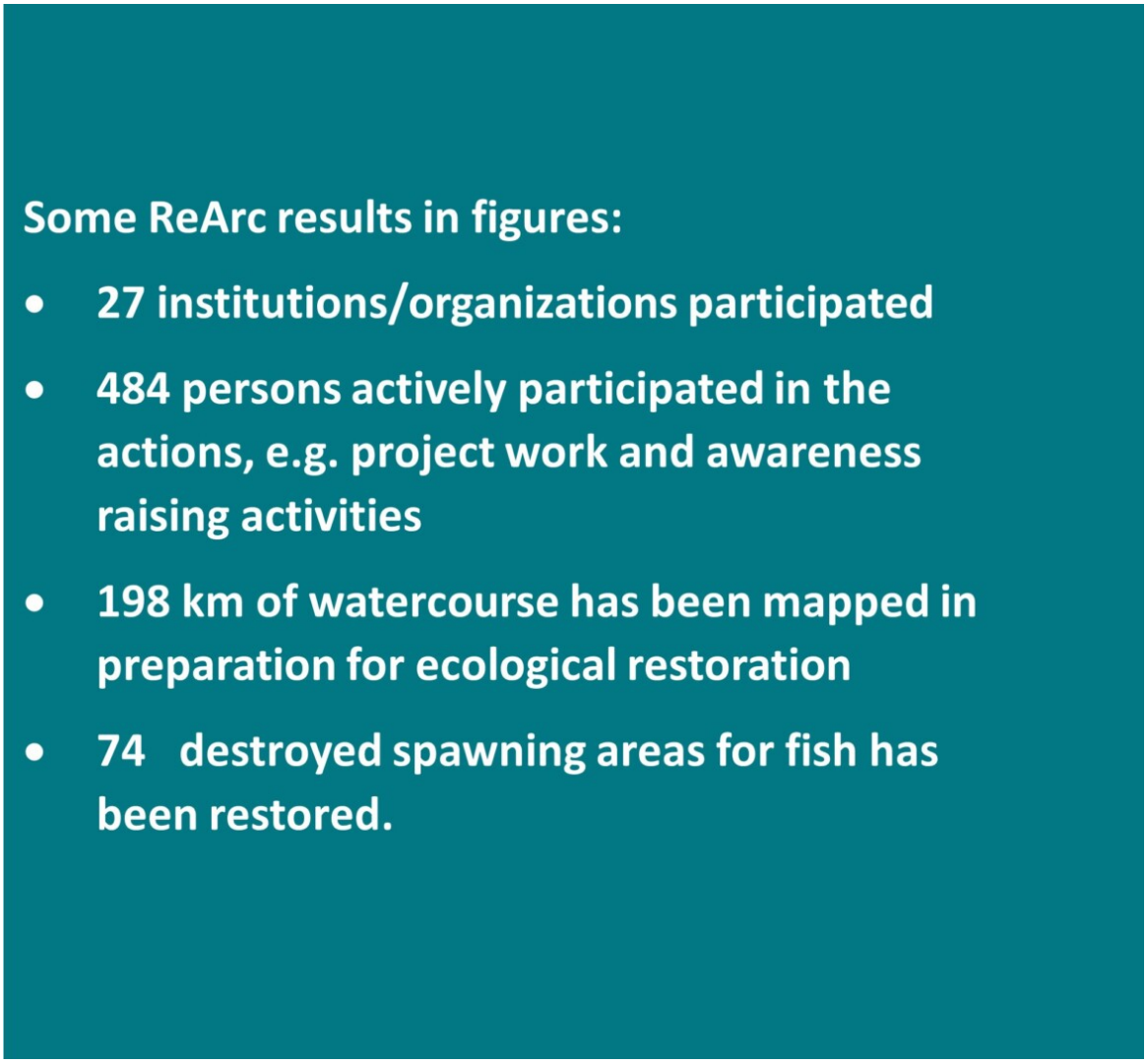
All this has a negative effect on river biodiversity.

During the beginning phase, ReArc partners exchanged experiences in the topic, and synchronised the meanings of concepts, e.g. professional “glossaries” of the four countries. Then, the project actions have been on three levels:

- mapping of watercourses and need for restoration
- planning of restoration methods
- restoration actions of some selected migration barriers.

Implementation of ReArc has meant many occasions when biologists, ichthyologists, geographists, IT-technologists climb onto boats or walk along riversides to do the mapping. The work requires a professional look into biotopes and waterways. Also, it requires arranging field work professionals and e.g. excavators and their operators to go to the watercourse and to their job in a professional way. ReArc revealed a shortage of excavator operators specialised in restoration, and this inspired a micro-project ”EXcavator Pro in Ecologicial ResToration” (EXPERT) linkki

The project objective was to carry out actions leading to restoration of previously modified arctic rivers, and thus to increase the fulfillment of the environmental objectives in EU Water Framework Directive. In a broader perspective this will result in a greater potential for river ecosystems to adapt to climate change and contribute to the viability of the arctic nature resources, environment and economy.



Project: Ecological Restoration of Arctic Rivers (ReArc)

Lead partner: County Administrative Board of Norrbotten, Luleå
Other partners:
* Pechenga local public organization on ecological enlightenment “EcoCentre”, Nikel
* Metsähallitus, Parks and Wildlife Finland, Vantaa
* Centre for Economic Development, Transport and the Environment in Lapland, Rovaniemi
* Norwegian Water Resources and Energy Directorate, Narvik

Project information in KEEP database

Restoration of rivers needs skilled excavator operators

In river restoration projects, such as ReArc, excavators are needed in field work. A problem that the projects, including ReArc, encountered, is the lack of knowledge among excavator operators regarding why and how the work should be done. There is huge gap in biology and hydromorphological knowledge among the machine operators. This can affect the quality of the restoration.

The project partners of ReArc made the initiative and planned the project "EXcavator Pro in Ecologicial ResToration" (EXPERT), which produced four compendiums and four films. The outputs of the project can be categorized in four groups:

1. Restoration of streams (historically damage by timber floating) film: https://play.mediaflowpro.com/ovp/16/44FEO9N9Y8 (in Swedish)
2. Removal of migration barriers (road water-crossings and dams) film: https://play.mediaflowpro.com/ovp/16/00FEF9V9IX (in Swedish)
3. Restoration of wetlands film. https://play.mediaflowpro.com/ovp/16/81FET9EVIV (in Swedish)
4. Erosion measures film: https://play.mediaflowpro.com/ovp/16/55FEF979NC (in Swedish)

Here is one example of the outputs of the project: it is in Finnish, about restoration of swamps

The compendiums and films are on the websites of the partners.

- In Swedish: on the County Administrative Board of Norrbotten's website: Restaurering av sjöar och vattendrag | Länsstyrelsen Norrbotten (lansstyrelsen.se)
- In Finnish: Expert-hanke – ely – ELY-keskus
- In Norwegian: EXPERT-prosjektet – NVE

The main objective was also to build a partnership between the countries and organisations in the Barents region regarding environmental restoration. This succeeded well. The project has created a restoration network between the northern parts of Norway, Finland and Sweden. The network makes it easier for the participating organsiations to continue with other restoration projects (i.e., the cross-border LIFE project TRIWA).

Project: EXcavator Pro in Ecologicial ResToration (EXPERT)

Lead Partner: County Administrative Board of Norrbotten

Other partners:

- Norwegian Water Resources and Energy Directorate
- Centre for Economic Development, Transport and the Environment for Lapland
- Pechenga local public organization on ecological enlightenment "EcoCentre"

Basic information about the project in KEEP database

Love your neighbour, it might pay off

Written by Riikka Holster, Programme Manager of Kolarctic CBC.

It is natural for people to communicate with their neighbours. We want to say hello to our neighbours and invite them for coffee. There is often an unspoken cooperation agreement between neighbours, and for example, yard care equipment can be owned together. Getting along and communicating with neighbours also across national borders has been vital throughout the ages: people have exchanged or bought across the border goods that could not be found in one's own country. Wife or husband has often been found on the other side of the border.

The cross-border cooperation programmes supported by the EU have been created to serve the desire and need for cooperation on a larger scale than the individual level, to enable cooperation between countries and regions, and to support joint development activities.

30 Years of programme-based cooperation

Cooperation and joint development projects between the North-Calotte and northern regions of Northwest Russia, have been supported within the framework of the Kolarctic CBC Programme and the preceding cooperation programmes for about thirty years. The central idea of the programmes has been to support and develop the ancient cross-border cooperation that has been practiced in this area throughout history, and in this way to take care of the vitality of the northern regions. Arctic regions are challenged and united by e.g. demanding climate and vulnerable nature, sparse population, long distances, and nowadays to the greatest extent also climate change. Therefore, it's vitally important for organisations in the area to join forces, to improve living conditions and increase earning opportunities. Thanks to the joint development work, the area has high level cold climate know-how related to e.g. technology, construction, and transport. This know-how is of interest to other countries as well, which offers new business opportunities.

An increase of cooperation was predicted

The first projects within the Kolarctic CBC 2014-2020 programme started in the autumn of 2018. At that time, the change that had occurred in the operating environment after the programme preparation was immediately visible. The period of programme preparation, around the years 2012-2013, was a time of growth, which could be seen i.a. as an increase in trade between Europe and Russia, an increase in the number of tourists and, of course, an increase in the number of border crossings. The Programme was naturally designed for these purposes, and the most central themes of the Programme's strategy were, in addition to environmental themes and commercial cooperation, development of transport links and the capacity of border crossing points. When the first projects started, the direction had turned the other way, and trade and the number of passengers had started to decline. The imbalance was corrected by transferring funds from priorities for the development of connections and border crossings to better implemented priorities, i.e. environmental development and adaptation to climate change, and development of business in various sectors, which remained relevant.

Achievements

Kolarctic CBC 2014-2020 Programme has supported, for example, development of energy efficiency and facility management of buildings in the Arctic area, re-using and recycling of concrete wastes, and biotechnological methods for rehabilitating coastal areas contaminated by oil spills. Further, the financed projects have restored arctic rivers, studied growing threats faced by fish populations due to climate change, cage culture industry and diseases, as well as created new practices for conservation of freshwater pearl mussel populations in the river ecosystems. The problem of meeting the demand and supply of professionally qualified labour, which can be seen in the employment of graduates, has been mitigated by joint projects with involvement of companies and university and vocational students. And finally, traffic connections have been improved, e.g. making roads and transport channels safer, more fluent, and more comfortable for passengers

and cargo – to mention just a few topics.

These all are great and important achievements and results, which with no doubt have benefited the sparsely populated northern regions and created new exportable Arctic innovations. All project partners from all four participating countries have played an important role in achieving the results.

The programme period 2014-2020 was challenging

The programme period 2014-2020 was challenging for all the northern EU external border programmes. In the Kolarctic CBC Programme, the first call for project proposals was implemented at the beginning of 2017, and the first decisions on financing the projects were made in June of the same year. However, the projects could start not earlier than in October 2018, after the Financing Agreement between the European Union and the Russian Federation had entered into force. This meant a gap of 16 months between the decisions on financing and the start of the projects.

After this, projects and the Programme could be carried out normally for 14 months until February 2020, when the COVID-19 restrictions hit. The restrictions significantly hampered the project implementation, when field work, trainings, events, etc. could not be carried out as planned. All meetings and events had to be edited into online versions, and field work could be carried out separately in each country only. Big part of trainings had to be cancelled. Numerous changes had to be made to project plans, budgets, schedules, and project administration.

And then finally, in early 2022, it felt like the COVID-19 restrictions were left behind, and everybody expected the normalization of the cooperation and project implementation. Joint meetings and events, and border crossings were highly expected. However, due to the Russian military aggression in Ukraine, the European Commission suspended in March 2022 the Financing Agreement between the European Union and the Russian Federation and at the same time the participation of the Russian Federation and Russian project partners in the Programme and project implementation. Since then, the projects were completed by the Finnish, Swedish and Norwegian partners, which again required a lot of changes to project plans, budgets, schedules, and project and Programme administration in general. Due to the absence of the Russian partners and their expertise, a lot of goals set to the projects were not achieved. The preparation of the new programme for the programme period 2021-2027 was also suspended.

As a result of decades of cooperation, the programmes had managed to create truly joint structures, which both the European Commission and the participating countries and regions had wanted. Representatives of all participating countries were involved in the Programme administration, and project selection and other decision-making took place jointly. Even the national funding of Finland and Russia was pooled in such a way that the measures in both countries could be cross-supported with the funding of both countries. The difficulty of suspending the participation of the Russian Federation and Russian partners showed how joint everything in fact was: cutting off one participating country required huge administrative and practical efforts. Returning to cooperation, everything must be started from the very beginning.

Finally

The project partner organisations have shown excellent commitment, resilience and flexibility in challenging conditions, and respectable creativity in adapting their project plans as required by the circumstances, to complete the projects. They deserve a lot of thanks for that. The Programme’s Managing Authority has also been able to stick to the schedule for finalising and closing the Programme. So, all in all, the Programme has been successful, it has achieved significant results and met the goals that were reasonably possible to meet. It has been a great pleasure and honour to take part in the work.

Materializing cross border co-operation in the North

Written by Markus Karlsen, former chair of the Barents Regional Committee and former head of the International Barents Secretariat

The Barents co-operation has been close to my heart for a very long time, established in 1993 in Kirkenes, the co-operation engulfed a range of areas for co-operation e.g. transport, tourism, environment, education, youth, culture, health, rescue to mention some.

The participants of this co-operation «*recognized the features characteristic of this arctic region, especially its harsh climate, sparse population and vast territory. They agreed therefore to examine how they can improve the conditions for local cooperation between local authorities, institutions, industry and commerce across the borders of the region*».

A unique aspect of this co-operation was the fact that the co-operation took place on an equal measure both on a national and on a regional level. Through the Barents co-operation I have been privileged to meet and get to know many colleagues with just as strong if not stronger commitment to the co-operation. All seing the sturdy usefulness of coming together discussing common opportunities and challenges and how to meet them. Opportunities such as an abundance of natural resources including minerals, forests, fish, energy and so on. We also share many challenges such as harsh climate, long distances within the region as well as to outside markets. We are also very sparsely populated, increasing the importance of getting together to exchange ideas and experiences.

An achillees heel in the Barents co-operation has been funding. For the co-operation to be effective, one would need a financial instrument that could fund and thus operationalize the co-operation. In this regard, Kolarctic CBC became very important. Encompassing more or less the same geographical area as the Barents Co-operation, Kolarctic CBC became crucial for funding concrete projects in the different sectors.

One example is the Joint Barents Transport Plan that came to light in 2013. With its biannual renewal, funding was needed in order to operationalize the plan. Here, Kolarctic CBC played a crucial role in providing this.

This is also a prime example of how different international co-operation mechanisms are well co-ordinated and complements each other, how political decisions are being implemented due to funding and thus providing tangible results thanks to Kolarctic CBC.

So, Kolarctic CBC, thank you for being such a strong supporter of the Barents co-operation.

Some milestones of Kolarctic CBC

The European Commission, Finland, Sweden, Norway and Russia together drew up the Kolarctic CBC programme document, which was approved by the European Commission on 18th December 2015. The EC started negotiations with the Russian Federation about the implementation and financing the programme.

A first call for proposals was open from 23.01.2017 till 15.03.2017.

The fist 11 projects to be financed were approved in the Joint Monitoring Committee meeting of Kolarctic CBC in June 2017.

In August 2018 the Russian Federation ratified the Financing Agreement between RF and the European Commission, about the financing of the programme. After this, the Managing Authority could sign Grant Contracts with the projects.

The 2nd, 3rd and 4 th CfP:s were arranged during the next circa three years.

In its meeting in June 2020 the Joint Monitoring Committee approved 14 micro-projects to be financed. These were the last approved projects.

Totally 48 projects were implemented in the framework of the programme. The last projects ended in June 2023.

in February 2022, the program faced a significant setback when Russia attacked Ukraine. As a result, the European Union suspended the Financing Agreement with the Russian Federation. Finland, Sweden, and Norway ceased their collaboration with Russia, while Finnish, Swedish, and Norwegian organizations continued to carry out their Kolarctic CBC funded projects independently of the Russian partners.

An earlier version of the Managing Authority and the Branch Offices: (Back row) Katri Niska-Honkonen, Svetlana Peltoperä, Jan Martin Solstad from the Norwegian Branch Office, Marjaana Lahdenranta, Katja Sukuvaara, Julia Korshunova from the Russian Branch Office, Kairi Pääsuke from the Swedish Branch Office, and in the front Hans Dahlin from the Swedish Branch Office and Linda Mosand from the Norwegian Branch Office.

Managing Authority of Kolarctic CBC in 2022 consisted of (top row from left) Katri Niska-Honkonen, Katja Sujala, Laura Mäki, (front row from left) Sari Peltoniemi, Svetlana Peltoperä, Riikka Holster, and Marjaana Lahdenranta

3D printing of metal has a place in industries

The more complex the structure of the metal object, the more advantages can be achieved by producing it using 3D printing. 3D printing is among the most important current and developing technologies in industrial production. It enables efficient production in terms of low costs and minimal environmental impact.

In short, this technology can be described as follows: the laser beam scans the programmed shape of a future product to melt the metal powder and gradually grow the new product, layer by layer. This technology, also called additive manufacturing, allows for the elimination of several manufacturing steps.

The complexity of the object also means that carrying out the process – starting from 3D design and ending with a ready object in the printer – requires specialized skills. Although additive manufacturing offers high potential, unlocking it can be challenging, particularly for small and medium-sized enterprises (SMEs), because AM demands knowledge and skills for more complex, sophisticated changes that are difficult to acquire.

The I2P project has faced this challenge by striving to meet the development needs of the Kolarctic CBC region. The central aim of the project was to increase Nordic collaboration in metal 3D printing, elevate the region’s level of expertise, and showcase the benefits and possibilities of metal 3D printing to companies. After printers were installed in Luleå and Narvik, the project conducted webinars and workshops to present 3D metal printing. A market analysis identified opportunities and development needs related to the topic.

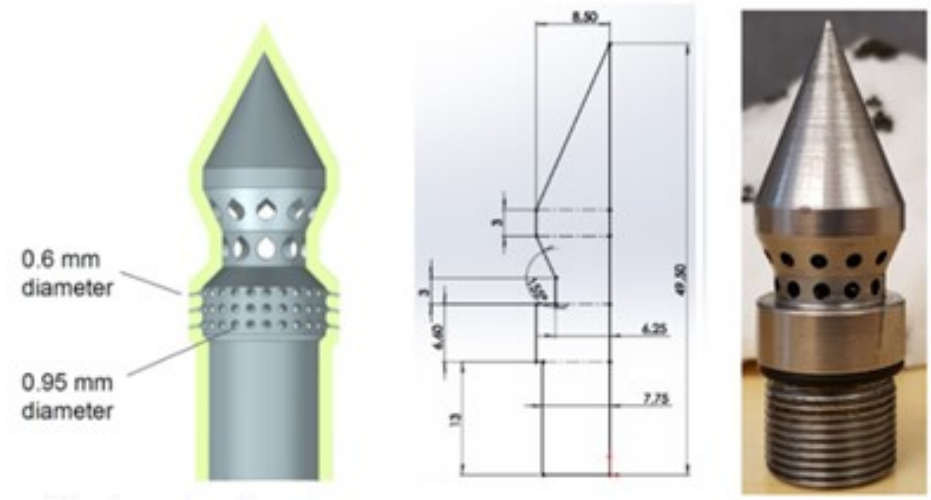
Furthermore, the project resulted in the creation of a close-knit community focused on 3D printing and additive manufacturing in the northern region. This community is open to anyone interested in the subject, and its website can be found at i2am.eu, providing access to materials produced during the project and other metal 3D printing resources

Example case: design of a firefighting nozzle

The firefighters’ nozzle is one example of objects which are relatively small, have a complicated shape, and do not need to be produced in large batches. This is an earlier model of a firefighting nozzle which firefighters can use e.g. hitting it through a door or wall, and it is effective at extinguishing fire and cooling of materials.

The challenge in this case was to develop a nozzle shooting water backwards, so that the water stream could be used to cool off doors from the inside, which would help firefighters to enter a building in flames. Due to complexity of its shape and manufacturing, it is an ideal case for metal 3d-printing. Also, in a 3D printer, several variants can be produced at the same time.

The process of solving the challenge is through design, printing and testing some variations.



This is how the new nozzle works, tested by Skellefteå firefighting.

Other 3D printed parts:

Combined nozzle for gas supply and crossjet for laser welding and parts for a rotary device for mounting on robot arm

Project: From Idea to Printing of Metal Products

Lead partner: Luleå University of Technology, Sweden

Other partners:

- Mekinor Metall AB, Kalix
- Ofottech AS, Narvik
- UiT The Arctic University of Norway
- Northern Arctic Federal University, Arkhangelsk
- Sozvezdye, Arkhangelsk
- Filtra Group Oy, Oulu
- University of Oulu, Finland

Basic information about the project in KEEP database

Phenomena of Arctic Nature

You could watch this for at least some minutes, couldn't you?
PAN project was carried out at a time when the attractiveness of nature and its phenomena grew particularly fast in tourism. The project partners maybe saw it coming, when they planned the project, but the COVID-10 related restrictions in e.g. gatherings enhanced the development.
Phenomena of Arctic Nature is a project who has improved the experience and the knowledge of the tourist visiting the Arctic.
Arctic nature and its species are vulnerable because of many reasons. Traffic, trails, paths, and other structures can easily wear out the vegatation. This is he reason why well planned observations sites are a good solution.

Attention to observation sites

The spring, the summer with its polar day, autumn and its colors, and the polar night, stars and aurora borealis are all fascinating sights. PAN-project has planned and constructed observation sites in nature. An ideal observation site is one which allows the visitors to see a wide landscape, where they can sit down and have a rest, preferably under a shelter, and where light pollution is minimized – this allows observing the starry sky and the northern lights. See some photos of the construction of Kaunisharju observation point:

https://kolarctic.info/wp-content/uploads/2024/01/1kuvakoostekaunisharju.mp4

Expertise in nature tourism has increased

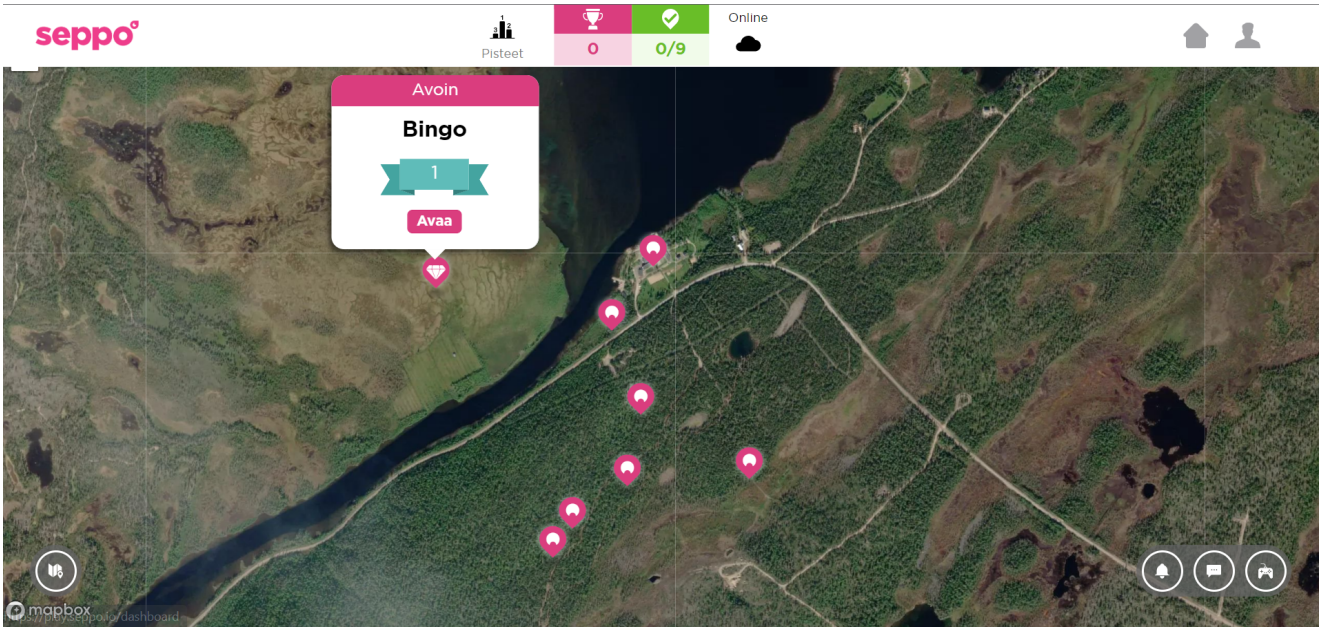
Tourism business is growing fast north from the Arctic circle. The reasons behind the increasing demand of nature-based tourism services are megatrends of societies: e.g. the longing of people to be out in clean, safe and calm natural surroundings, and an interest on their own well-being.
The organisations and other participants of PAN have been given knowledge in workshops about how to respond to the demands. The first in a series of events organised by the project was a timber architecture workshop held in Norway's Pasvik Valley in October 2019. The participants brainstormed ideas for using local timber in construction for tourism and outdoor recreation infrastructure. The next events have been more or less about what kind of services are the best to be offered to these tourists interested in nature, and how can we improve service provision – especially in summer. The attitude of the project seems to be that no matter how fascinating services we already have, and will have, there is no limit for how good they could be, and how great an experience the tourist could have.

Observation site by lake Keselmäjärvi

Visitor centres and exhibitions are developed

The project has produced and updated exhibitions and audio-visual presentations for visitors in the visitor centres of the national parks. The educational institutions involved have produced multilingual education materials, which will be at the disposal of youth and nature centres, visitor centres and schools. This serves the important purpose of providing the audiences knowledge about our nature, its vulnerability, and how it should be treated.

Mobile game of the Youth Visitor Centre awakes your curiosity



Youth Visitor Centre Vasatokka participated in the project in an innovative way. Who could resist this mobile game where you are given tasks to find spots and solve riddles in the nature surrounding the centre?

Webpage of the project in the Lead Partner's website

Project: Phenomena of Arctic Nature

Lead Partner: Metsähallitus, Finland

Other partners:

- Salla municipality
- Lapland University of Applied Sciences
- Youth Center Vasatokka
- Norwegian Institute of Bioeconomy Research (NIBIO)
- Øvre Pasvik National Park
- Biotope AS
- Institute of Industrial Ecology problems of the North (INEP)
- State Nature Reserve Pasvik

Basic information about the project in KEEP database

This is how professional workforce is made

Arctic Skills – project has worked for improving the status and pride for vocational education in the programme area. Project activities range from international vocational tournaments to cross-border exchange of students and apprentices, and their practice in enterprises.

A gathering of the emerging professionals

Seeing a vocational skills tournament is, for a newcomer, amazing. ”How do those young people know how to do that?” you ask yourself. And also, for an outsider spectator, it illuminates the fact that there is a new generation of experts coming, year after year, to these professions participating in the tournament. The respect for the professionals, and for vocational education, gets a boost.

National tournaments in vocational skills have been arranged in the participating countries for decades – in Finland starting from the 1980´s. International tournaments is a natural consequence of the national ones. Hundreds of students have participated in the Arctic Skills tournaments, where also schools and students from Russia participated during 2020-21. Arctic Skills tournaments have included at least the following vocations: Heavy machinery, Car painting, Welding, Cook, Waiter, Plumber, Painting, Electricians, ICT-service, Hairdresser, Motor vehicle mechanic, Building constructions, Duodji, Health & Social care and Reindeer operations.

COVID-19 restrictions were transcended

During the COVID-19 related traveling and gathering restrictions, the arrangement of the next tournament of course was at stake. The consortium made careful assessment of the alternatives. The solution was to arrange competitions on different premises of the participating countries, and digital, online, tools would serve to combine them and also give a chance for the audiences to follow the competition online.

In short, the restrictions gave the Arctic Skills project a chance to new solutions.

After national competitions were carried out, an Arctic Skills tournament was arranged as a distance competition with digital connections. The competition covered a total of 15 competences. The actions were located in Övertorneå, Tornio, Rovaniemi, Kirkenes, Murmansk, and Apatity. The Swedish partner, represented by Utbilding Nord in Övertorneå, was the host and responsible for conducting the competition. Utbildning Nord established a broadcast studio, and interested audiences could follow the work of the competitors also via occasional interviews.

Meeting the colleagues across the border

After COVID-19 related traveling restrictions were lifted, Arctic Skills had finally the chance to carry out the remaining cross-border exchange of students and apprentices. Five colleges participated in the exchange and 65 persons had the opportunity to observe the education, work and routines of the neighbouring country. The participants were either teaching or studying to be hairdressers, light vehicle mechanics, heavy machinery operators, welders, building constructors, car painters, cooks, waiters, plumbers, health and social care workers, reindeer herders, and duodji (Sámi handicraft) professionals. In total, 24 enterprises from these branches hosted the students.

Some of their thoughts in the feedback:

> “It went well, we had nor too much or too little to do. I think that the students would have spent more time with the Norwegian students if they had been there longer.”

> “Some feedback from the students even though it varied: some student wished a stricter program. And other students wished that the exchange could have carried on over more time, they could easily have stayed for two more weeks.”

> “The assessment is that perhaps a week was a bit too long, tiring for a teacher who has 24/7 responsibilities. The learning outcome was good, the Finnish teacher was well prepared and very friendly. Archery in the afternoon captivated everyone.”

Example: Car painters

The car painters are a small and most valuated group in the trade. In our region, only Kirkenes and Rovaniemi can offer an education in this field. REDU has a well-equipped department, which could provide an interesting experience for the Norwegian guests. Two Norwegian students came to REDU to study car painting. One of them is Charlotte Jørgensen-Bergheim, who is studying to become a car painter in Kirkenes. “The exchange week was fun and different. One difference is that more simulators are used in studies in Finland”. “During the exchange week, we have done a motorbike taping exercise, hydro-dipping paint and visited the Wetteri and Pörhö workshops”. Vocational education in Norway has a different structure compared to Finland: the students first study at the educational institution for two years, then the student does an apprenticeship in a company for two years.

Impact of Arctic Skills

Boosting visibility of vocational education is just one aspect of the competitions. They enhance cooperation between businesses and educational institutions, so that the businesses e.g. get a view to how people are trained – people who later perhaps work with them. Teachers, too, need the interaction between educational institutions, in order to utilise the experiences and best practices of each other.

Project: Arctic Skills

Website: arcticskills.com/

Lead partner: Kirkenes Upper Secondary School, Norway
Other partners:

- Organization for private training offices in Finnmark County, Hesseng
- Kemi-Tornionlaakso Municipal Education and Training Consortium Lappia, Tornio
- Murmansk Technological College of Service (MTCS), Murmansk
- Tornedalsskolan, Haparanda
- Sàmi Institute for Education, Inari
- Sàmi High School and Reindeer Husbandry School, Kautokeino
- Lapland Education Centre REDU, Rovaniemi
- Utbildning Nord, Övertorneå
- Gränsälvgymnasiet, Övertorneå

Information about the project in KEEP database

What is Barents?

The Kolarctic CBC 2014-2020 programme document, as well as many projects funded by the programme, refer in many ways to Barents Region or Barents Cooperation. What is meant by Barents?

Cooperation in the **Barents Euro-Arctic Region** was launched in 1993, when Denmark, Finland, Iceland, Norway, Russia, Sweden, and the European Commission signed the Kirkenes Declaration establishing the *Barents Euro-Arctic Council (BEAC)* at a Foreign Minister's Conference in Kirkenes, Norway. At the same time, the county governors of Barents Region counties, and representatives of indigenous peoples, signed a cooperation protocol establishing the *Barents Regional Council (BRC).*

The documents mentioned above stated that the overriding goal of the Barents Euro-Arctic Council (BEAC) is to promote stability and sustainable development in the Barents Region, i.e. in the Northern parts of Finland, Norway, Russia, and Sweden. Other members of the Barents Euro-Arctic Council are Denmark, Iceland, and the EU.

In making the Kolarctic CBC programme, the programming Committee wanted to make sure that the aims and achievements of Barents Cooperation, and the experience of organisations participating in it, is taken into account in the Kolarctic CBC programme. The programme document of Kolarctic CBC states e.g. "When the substance of the project activities concerns implementation of the activities defined for Barents cooperation or support of Euro-Arctic development, partners from outside of the Programme area can participate as equal partners."

Links to more information:

Barentsinfo

Barents Euro-Arctic Council

Foreign Ministry of Finland

The word Barents refers to the Dutch navigator Willem Barentz (1550 – 97) who made three voyages in search of a Northeast Passage to Asia. More information about him, and about the region, can be found on Barentsinfo.org

http://www.barentsinfo.org/barents-region/History/Willem-Barentz

The question of demolished concrete waste

Concrete is a second most consumed artificial material in the building industry. Construction faces certain challenges connected to the carbon footprint of concrete. In Europe, about 150 million tonnes of concrete waste is produced every year (source: CEMBUREAU) Re-using of concrete has been a topic of development globally, The Kolarctic CBC funded project De-Concrete focused on re-using large volumes of reinforced concrete wastes and search for optimal technological and economic methods for their recycling.
The video below presents the topic. First, Mr Arkadiy Ayzenshtadt, Doctor of Chemical Sciences, professor in Northern Arctic Federal University, describes the meaning of the project.

The project carried out comparison of existing demolition practices, case studies and laboratory testing of new demolition techniques, development of waste management strategy, and recommendations for the most eco-efficient approaches to reuse and recycling of concrete.

In total 30 publications, presentations, and study materials were realised. Achieved results were disseminated to the industries on regional, national and international levels in the form of matchmaking results of companies, workshops, meetings, seminars and conferences. It contributed to better knowledge in the topic and consequently impacted to safety and risk reductions in concrete industry and operations

The DECONCRETE project has built a good partnership in cross-border cooperation. The participating institutions, in cooperation with some other European partners, are today carrying out a project Arctic Low Carbon Concrete with outstanding Sustainability and Durable Properties (ArCorD).

Website: en.uit.no/project/deconcrete

Project: DeConcrete: Eco-efficient Arctic Technologies Cooperation

Lead partner: Northern (Arctic) Federal University, Arkhangelsk

Other partners:

- UiT The Arctic University of Norway, Narvik
- Northern Research Institute Narvik, Narvik
- University of Oulu, Oulu

Basic information about the project in KEEP database

The Freshwater Pearl Mussel is a senior ecosystem service provider

Freshwater pearl mussel, *Margaritifera margaritifera* (later FPM) is the longest living species in the fauna in Kolarctic region. It can attain an age of at least 150 years and in some cases over 250 years.

The Freshwater pearl mussel is an ecologically many-sides species. Abundant number of FPM contributes to its surroundings. It inhales water through exposed siphons, and filters out tiny organic particles on which it feeds. This way it clarifies the water. In addition, they act as an attachment surface for many other organisms and cause beneficial bioturbation when burrowing in the river bottom.

WWF and project SALMUS have published the time-lapse video above, of their Freshwater Pearl Mussel live cam in summer 2020.

The start of a life

A freshwater pearl mussel begins life as a tiny larva, measuring just 0.6 to 0.7 millimetres long, which is ejected into the water from an adult mussel in a mass of one to four million other larvae. The chances of a larva encountering a suitable fish are very low, and thus nearly all are swept away and die; only a few are inhaled by an Atlantic salmon or sea trout, where they snap shut onto the fish’s gills.

Attached to the gills of a fish, the glochidia live and grow in this oxygen-rich environment until the following May or June, when they drop off. If lucky, the juvenile lands on clean gravely or sandy surface and continues growing.

Ecosystem service provider

It is thought that in areas where this species was once abundant, the filtering type of feeding of the FPM acted to clarify the water, benefiting other species that inhabited the rivers and streams.

FPM is an indicator of the state of the river ecosystem. A vital FPM population with stable recruitment of young mussels always indicates clean water and a healthy ecosystem. On the other hand, a population of only old mussels indicates that negative changes have taken place in the environment.

Most FPM populations in Southern and Central Europe have already become extinct, but even in Northern Europe major part of the populations is nowadays estimated to be non-functional, i.e. individuals reproduce only occasionally or – more often – not at all.

Endangered species

In European Union, FPM is listed on the IUCN Red List of Threatened Species as an endangered taxon (EN). It is also listed in Annex II of the EU´s Habitats Directive. In addition, it is nationally protected in Finland, Russia, Norway and Sweden.

The protection of FPM and its salmonid hosts goes always hand-in-hand. Especially the land-locked forms of the Atlantic salmon are critically endangered.

Cooperation in mapping, detecting and assessment

Heikki Erkinaro is helping Aune Veersalu prepare for a dive in river Luttojoki

In project SALMUS (Salmonid Fish and Freshwater Pearl Mussel- Riverine Ecosystem Services and Biodiversity in the Greenbelt of Fennoscandia) the partner organisations from four countries enhance the protection of the FPM. They do this by mapping the FPM communities, developing the protection methods and pointing out the importance of the wellbeing of watercourses.

The project SALMUS focuses on salmon and freshwater pearl mussel because Atlantic salmon and brown trout are the host species for the larvae of FPM and thus an indispensable part of its life cycle.

At present, the only remaining large and regularly reproducing FPM populations can be found from Fennoscandia and North-West Russia. Therefore, cross-border cooperation in this area is of great importance for the conservation of the species.

Besides research of the living conditions and state of the FPM populations already known, the project is mapping FPM populations that are so far unknown. This is a demanding task, as the project works on hundreds of kilometres of watercourses on Kolarctic CBC area. For this purpose, the project will use two novel techniques: 1. Electrofishing of the FPM host fish and inspecting the FPM larvae in their gills and 2. Detecting eDNA (environmental DNA) from the water samples taken from the target rivers.

When those methods have given positive signals about the presence of FPM, the mussel communities can be finally found ”In Real Life” by diving or using an aquascope.

An ideal freshwater pearl mussel population consisting of different age groups

Project: Salmonid Fish and Freshwater Pearl Mussel– Riverine Ecosystem Services and Biodiversity in the Green Belt of Fennoscandia (SALMUS)

Lead partner: Metsähallitus, Parks and Wildlife Finland, Vantaa, Finland

Other partners:

- Alleco Oy, Helsinki
- University of Jyväskylä, Jyväskylä
- County Administrative Board of Norrbotten, Luleå
- Natural Resources Institute Finland, Oulu
- Norwegian Institute for Bioeconomy Research NIBIO, Svanvik
- Karelian Research Institute of the Russian Academy of Science
- Institute of Industrial Ecology Problems of the North of the Kola Science Center of Russian Academy of Science (INEP KSC RAS)

A freshwater pearl mussel individual with siphons filtering bypassing water. Photo: Aune Veersaly / project SALMUS

Green filming locations

The Barents region has become an attractive destination for film recordings. One major challenge produced by increased film production is the increased pressure on the unique natural environments of the region. In order to preserve natural ecosystems and the communities that depend on them, a higher standard for sustainability in film productions needs to be established and disseminated.

Green Ice Camera was a project between Norway, Finland, Sweden and Russia, in order to

- collectively create protocols for sustainable media production
- create a database of creative companies in the region
- promote creative collaboration online, and
- make it easier to hire local crew members.

The project established a network of film and sustainability experts in four countries of the Barents region and worldwide. A first edition of the Green Ice Camera framework was published for sustainable media production, and is available in 5 languages: (ENG, NO, RU, FI, SE). This framework makes use of best practice and insights from regional and international guidelines and has a wide set of references and contacts for further information.

Project: Green Ice Camera

Lead partner: Ice-9 AS, Norway

Other partners:

- Webbon, Norrbotten
- Lapland University of Applied Sciences, Rovaniemi
- LLC Art Media Service, Murmansk

Basic information about the project in KEEP database

Hackathons finding Disruptive Information Technologies

The purpose of the project DIT4BEARS was to develop innovative technologies in transport and communication systems and to distribute them through a Living Laboratory in Disruptive Information Technologies (Living Lab DIT4BEARs). The project partners have carried out use cases, which have utilized Disruptive Information Technologies for solving particular problems in the Barents Euro-Arctic region. The four particular problems can be considered as different work packages of the project:
• SmartID: development of identity management system on the basis of blockchain technologies;
• SmartWaste: development of citizen-centric platform for running municipal services (such as waste management);
• SmartRoad: use of disruptive technologies for winter road maintenance in the Kolarctic region;
• ConnectedDeer: development of digital platform inspired by Internet of Things to ensure the safety of reindeers on roads.

The results from the project include a developed ecosystem model for reindeer traffic warning, developed models for road friction to simulate and to enable safer hill ascending for heavy vehicles such as lorries, and a better understanding of choosing the right technology for decentralized identification systems, considering specific use cases.

Inclusion in hackathons

An impactful aspect of the project was its way to involve people, e.g. young students. The project utilized hackathons as a working method. The term hackathon originally combines the words ‘hacker’, which refers to a clever programmer, and ‘marathon’, an event characterized by endurance. Initially, a hackathon—also known as a codefest—is a social coding event that brings together computer programmers and other interested individuals to enhance or create new software programs. Over time, the concept of a hackathon has evolved to represent an event where people collaborate to solve problems or explore fresh opportunities. The primary objective of a hackathon often involves building a working prototype or proof-of-concept for a product or feature within a limited timeframe. Participants engage in this process not only to achieve technical goals but also to have fun, enhance their skill sets, and expand their professional networks.

More about the project: **Website**: dit4bears.org/

Intriguing curio in the project: The ConnectedDeer made a music (“humppa”) video presenting the topic in Finnish: Porotokkaa etsimässä: https://www.youtube.com/watch?v=tJvp-KARHBs

Project: Disruptive Information Technologies for Barents Euro-Arctic Region (DIT4BEARS)

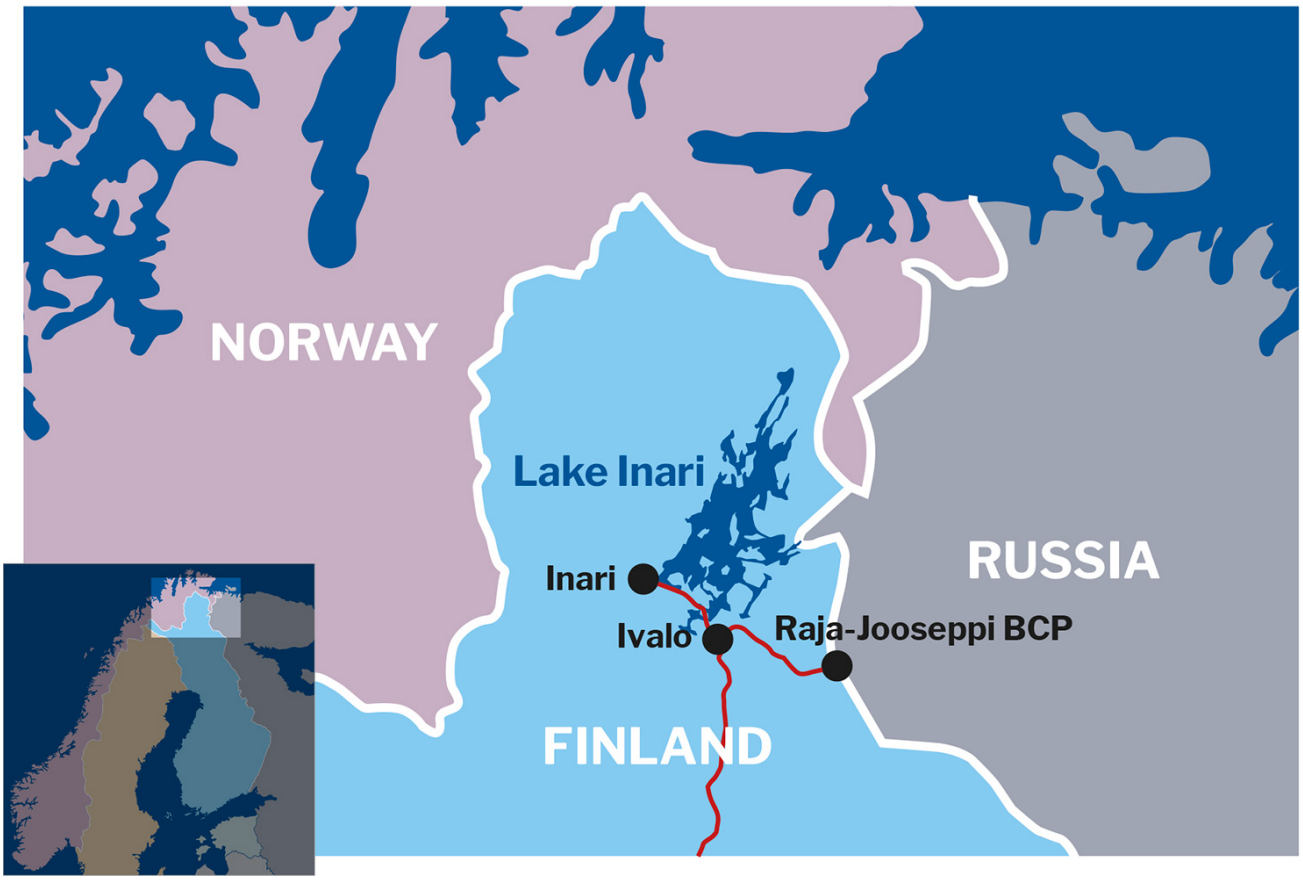
Lead partner: Luleå University of Technology, Luleå

Other partners:

- Saint Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO University), Saint-Petersburg
- Northern (Arctic) Federal University, Arkhangelsk
- RUSSOFT Association, Saint-Petersburg
- Lapland University of Applied Sciences, Rovaniemi
- UiT, The Arctic University of Norway, Narvik

Basic information about the project in KEEP database

Functional and safe premises of a border crossing station



Location of Raja-Jooseppi border crossing

The **Raja-Jooseppi border crossing point** is the oldest, and the northernmost, of the two border crossings between Finnish Lapland and Russia. Prior to the project, its infrastructure was outdated, posing a hindrance to border crossings. The number of crossings had increased since the year 2000, reaching 80,800 in 2019. Staff from the Finnish Border Guard, Finnish Customs, and the Finnish Radiation and Nuclear Safety Authority work at this border crossing point. The old building was unhealthy for personnel, who had relocated to temporary barracks.

The project went beyond mere renovation or constructing a new building; it began with a comprehensive plan. The new border crossing point is located a few hundred meters away from the old one. It features updated traffic management arrangements, including a roofed lane check area, lane check facilities (booths), and facilities for further measures (second line). Additionally, it incorporates state-of-the-art border control technology for checks, surveillance, and customs control. An outdoor spectrometric radiation portal monitor has been installed as a secondary inspection tool for heavy traffic.

Despite a significant decrease in border crossings since 2020, the new BCP now serves border security and surveillance purposes. The modern building meets user expectations, providing safe and practical premises. The newly implemented CCTV system, along with the renewed access control system, ensures overall area surveillance and staff security at the station.

Project: Raja-Jooseppi BCP development and reconstruction; traffic arrangements, buildings and technology

Lead partner: Finnish Transport Infrastructure Agency, Helsinki, Finland

Other partners:

- Centre for Economic Development, Transport and the Environment for Lapland
- Senate Properties of Finland
- Finnish Border Guard
- Finnish Customs
- Finnish Radiation and Nuclear Safety Authority
- Fintraffic Tie Oy (former Intelligent Traffic Management Finland Ltd)
- ANCO Directorate for Development of the St. Petersburg and Leningrad Region Transport System

Basic information about the project in KEEP database

Improvement of the road Kaamanen - Kirkenes

The Road between Kaamanen (Finland), and Kirkenes (Norway) stands as the northernmost east-west road connection in the Barents region. Thanks to a Kolarctic CBC-funded Large Infrastructure Project (LIP), the most hazardous and worn-out sections have been reconstructed, resulting in reduced risks of accidents, wildlife and reindeer collisions, and road closures.

The route from Northern Finland to the coast of the Barents Sea has played a crucial role in various ways. Initially, there were paths and waterways leading to Neiden in Norway. Over time, a road was gradually constructed and improved, starting in the 1900s, connecting Kaamanen to Neiden. The road today serves both business and transportation purposes, and it is also renowned as one of the most scenic tourism routes in the North.

Project: Reconstruction of the road Kaamanen-Kirkenes

Lead partner: Norwegian Public Roads Administration, Bodø

Other partners:

- Finnish Transport Agency, Helsinki
- Centre for Economic Development, Transport and the Enviroment for Lapland, Rovaniemi
- Murmanskavtodor, Murmansk
- Project Management Centre, Murmansk

Basic information about the project in KEEP database

Agro-forestry: between cultivation and picking wild food

The forests in the Arctic region produce not only timber. In the northern parts of Norway, Sweden and Finland, we have a very strong culture of utilizing the wild resources in the forest and mountains. Also today, use of various forest products such as wild berries and mushrooms is part of the life of practically everyone. It is not unusual that most of them we pick ourselves to our families, and luckily there are people who can earn some extra money by picking berries for their family neighbours and friends. When it comes to products like sap, resin, chaga, and herbs, we have specialised SME:s who have the ability to refine them.

Collecting filipendula ulmaria. Photo Detria / Eija Vuorela

Non-timber forest products (NTFP) is a widely known concept by which is generally meant berries, mushrooms growing on the ground and on trees, resins, various kinds of natural products that grow in forests. The legal concept of **"Everyman's Right"** in Finland… pick wild berries, mushrooms and flowers, as long as they are not protected species (this can be restricted **or forbidden in national parks and other nature reserves** during certain seasons or year-round) The written and informal rules are to a large extent similar in Norway.

Harvest every year!

While a tree grows for maybe decades before it can be eco-efficiently used for timber products, many of the non-timber forests species grow and are ready for utilization in the meantime. Some of them (e.g. berries) can be picked every year. Domestic use of them is everyday life, and selling berries gives an extra income to many.

Many of the NTFP that are on the focus of the project, are already utilized on the markets.

The availability of the products is insecure. You never know when and where they grow. How good is the harvest this year? This is one of the reasons why SMEs are interested in the NTFP business only to a certain extent.

The project Agroforestry in Barents Region has worked on potential methods how humans can enhance and control their growth – this is agroforestry.

The objective of the project is to combine agricultural and forestry technologies aiming to create profitable, healthy, ecologically sound and sustainable land-use systems for improved availability of NTFP raw materials in Barents region. Agroforestry is always governed, target – oriented concept in which investments are used or alternative costs are accepted in order to achieve the most profitable output.

One interesting part of the project is piloting of agroforestry practices. In the task division in the project, the Norwegian Institute of Bioeconomy Research is responsible for it. The participating organisations all are experienced in field testing, and in this project they have combined their strengths in testing. It is then also possible to compare results in different testing areas and in different habitats – in different countries.

Bilberry – a long-term favourite

Bilberry is one of the species in the project. It is a desired berry because of its taste and healthiness, but the availability varies a lot. It is not exceptional to see 3- 4 fold differences in the amount of bilberries in subsequent years. The growth of bilberry and methods to control it is tested in the project.

Chaga, the hit of recent years

Chaga mushroom (Innotus obliquus) growing on a birch tree.
Photo: Marja Keskitalo, Natural Resources Institute Finland

Not all forests and trees are suitable for sustainable timber production. Where the circumstances are appropriate, the production of chaga mushroom may be one alternative. Chaga is a success among health products. Natural Resources Institute Finland especially has promoted knowledge on Chaga, and it is one species that the project has involved in their field tests.

To whom does the NTFP belong?

The project also paid attention to the problematics of combining everyman's right and agroforestry. How to combine investments in agroforestry and, on the other hand, the freedom of citizens to utilize the output of it? This is a puzzle which is still to be solved.

Bjørn Egil Flø in NIBIO, Norway, has studied the socioeconomic aspects of agroforestry. It is, how economic activity, in this case use of non-timber forest products, affects, and is shaped by, social processes. The written and non-written laws and rules about utilizing forest NTFP have evolved in Norway, Sweden, and Finland over centuries, by people agreeing on the best practices.

One interesting thing, says Bjørn Egil Flø, is that in history, from the state perspective, it was important to settle the land here to claim the National ownership and agree upon the borders towards the neighbouring countries. The communities in the north were remote, and the climate was harsh. "Therefore the state provided support for people to settle and cultivate the land. It was a welfare issue to give local people access to the resources in the outfield" says Bjørn Egil Flø.

The applying of everyman's right has not always been self-evident and the interpretations have varied.

Agroforestry as a tool of rural development

Bjørn Egil Flø has compiled the conditions for agroforestry as a rural development tool.

First we have to ensure that it is

- embedded in local recourses as well as history, skills and knowledge.

Second we need to secure

- local ownership, both to the recourses as well as to the means of production and the values created by the production

Third we need

- local engagement, we need to stimulate and facilitate potential entrepreneurs both economically as well as trough counselling and training and other services.

And finally we need good old-fashion

- endogenous approaches

Project: Agroforestry in Barents Region

Lead partner: Lapland University of Applied Sciences, Rovaniemi
Other partners:
*Northern Arctic Federal University, Arkhangelsk
*Natural Resources Institute Finland, Helsinki
*Norwegian Institute of Bioeconomy Research, Tromsø

Information about the project in KEEP database

Treasures from the Northern Nature

Treasures of the Northern Nature was a micro project which completed the standard project Agroforestry in Barents Region. Northern natural sustainable resources include a wide range of goods of biological origin. To Non-Timber Forest Products (NTFP) belong e.g. edible berries and nuts, mushrooms, fruits, herbs, spices and condiments, aromatic plants, game, fibers (used in construction, furniture, clothing or utensils), resins, gums, plant and animal products used for medical, cosmetic or cultural purposes.

The main objective of Treasures from the Northern Nature (TreNat) project was to widen cooperation between SMEs, educational and research institutions as well as consulting organizations working in the field of natural sustainable resources. It contributed to increasing general awereness and interest towards NTFP. The project also drew attention to cultural and health aspects of NTFPs.

TreNat pruduced a video promoting the potential of agroforestry in Kolarctic region.

The project arranged workshops and round table discussions to interest groups having to do with agroforestry and with refining and promoting natural products.

Project: Treasures from the Northern Nature (TreNat)

Lead partner: Lapland University of Applied Sciences Ltd, Finland

Other partners:

- Norwegian Institute of Bioeconomy Research, Tromsø
- Northern (Arctic) Federal University named after M.V.Lomonosov, Arkhangelsk

Basic information about the project in KEEP database

Transport and logistics is a key factor of our livelihoods

It is important that transport and logistics decisions made in the Barents region are based on a common strategy between the countries, and not just on national plans. For pursuing this purpose, the Barents Regional Working Group of Transport and Logistics (BRWGTL), developed the idea for the project “Barents Region Transport and Logistics”. The BRTL project (1.11.2018 – 30.4.2022) focused on implementing the Barents Region’s common, strategy-level transport document at regional level. The global economy, innovations in production methods and the international political situation constantly bring new conditions for transport and logistics. Also, the world has experienced that the new conditions are not always predictable.

The project produced altogether seven reports which content-wise were built around three main themes: economic competitiveness of the Barents Region’s logistics, Green Transport – environmentally friendly mobility of peoples and goods, and Smart mobility.

BRTL Plan document gives proposals for future development and co-operation. Part of the work has been outlining the transport corridor development. Key questions in transport corridor development are :

- How will the transport system respond to the Green Industrial Shift?
- How can efficient cross-border corridors be formed that share data and create continuous fueling / charging infrastructure?
- How can the transport system respond to new mobility demands? How can it ease industry’s ability to get qualified workforce?

The Lead Partner, Regional Council of Kainuu, has made the reports available on the website https://kainuunliitto.fi/en/projects/studies-produced-by-brtl-and-nabl-projects/

Project: Barents Region Transport and Logistics (BRTL

Lead Partner: Regional Council of Kainuu, Kajaani

Other partners:

- Regional Council of Oulu region, Oulu
- Regional Council of North Karelia, Joensuu
- Regional Council of Lapland, Rovaniemi
- Finnmark fylkeskommune, Vadsø
- Troms fylkeskommune, Tromsø
- Nordland fylkeskommune, Bodø
- Norway Public Road Administration, Bodø
- County Administrative Board of Norrbotten, Luleå
- County Administrative Board of Västerbotten, Umeå
- State Committee of Transport of Karelian Republic, Petrozavodsk
- Arkhangelsk Regional Road Administration, Arkhangelsk
- Strategic Partnership on economic and social development of the North-West federal district, St Petersburg

Project information in KEEP database

The fascination of STEM

Many young people seem reluctant to studying STEM subjects – science, technology, engineering, mathematics. BeTech has contributed to change this.

The school development experts and education policy makers have in the 2010s expressed their concerns about STEM subjects. Industrial companies have been worried about how to get qualified and skilled personnel. The challenge is common for the countries involved in Kolarctic CBC.

Inspiration to the schoolchildren

9th graders participate a Science Camp in Alta, Norway. The theme was rockets, speed and excitement.

Project ” Development of common approaches to involvement youth into science and technical sphere”, also known as Be Tech, has been doing its best to present the STEM subjects as appealing to schoolchildren and students. Science camps and visits to companies and workplaces have proven to be one way to do something about the challenge, says Gunn Heidi Henriksen – at least those actions have received positive feedback. Gunn Heidi managed the project BeTech from January 2020 until its end.

The project has arranged for schoolchildren and students the possibility to get to know science – for example in the first BeTech!-seminar in 2019, which brought together more than a hundred young people and their teachers from Alta, Murmansk and Oulu. The participants visited for example Nokia, Science Centre Tietomaa, Oulu Mining School and FabLab. That was before the pandemic related traveling restrictions, and after that the project had opportunities to arrange actions mostly on local level. Some examples of that are e.g. cooperation with Northern Norwegian Science Centre. Also SmartDok which is an IT company in Norway, presented science and programming to the pupils. Some youth have also had the chance to go and see how reindeer herding has met new technology.

Survey results show that most students are motivated to study science and mathematics.

Knowledge about the preferences of young people

What factors impact the young people when they are choosing their studies, fields of interest, and a career? What makes them choose or not choose a STEM subject? Surveys and research work in the project have investigated common features of students’ attitudes towards studying science and mathematics in comprehensive and secondary schools in Norway, Russia, and Finland. The results suggest that most students are motivated to study science and mathematics. But the data analysis indicates that there are gender

differences in attitudes to students' future studies and career plans. Most girls recognized the importance of these subjects for their future, while more boys than girls showed interest in local career opportunities in industries. The studies showed that teachers have a significant role in directing students' attitudes towards science and mathematics. Student experienced that, teachers who use innovative teaching approaches, both motivate and reduce anxiety in the students' learning process. We could see an increase in positive attitudes towards science after students had participated in international seminars with inquiry-based activities and meetings with technology sector in business and industry. (Kvivesen & Tomperi, 2021)

And of course there is the "coolness factor", like Gunn Heidi Henriksen says. Young people regard things and subjects as cool or un-cool. Heidi reminds us that one of the critical factors for recruitment of needed competence in general is the outflow of people and youths.

That is a task for not only one project to tackle.

A link to an output publication: Guidelines: Research and recommendations for interventions in science and mathematics:

Project: Be Tech

Lead partner: Municipality of Alta, Alta, Norway

Other partners:

- Murmansk Arctic State University, Murmansk
- UiT The arctic university of Norway, Alta
- University of Oulu, Oulu
- Limited Liability Company "Education, innovation, science and research union "Socium+", Murmansk
- Association of Arctic projects contractors "Murmanshelf", Murmansk

Website of BeTech

Facebook:https://www.facebook.com/BetechKolarctic

Information about the project in KEEP database

Towards survival of the Atlantic Salmon

The Atlantic salmon in is an amazing creature in the Barents Sea area. It transforms from a freshwater fish to a seawater fish with all the physiological changes involved. It migrates across thousands of kilometres from the feeding grounds to coastal areas. It returns accurately to the river and even the riffle where it was born, to breed and re-start its life cycle. All this captures human imagination.

Project Conserving our Atlantic salmon as a sustainable resource for people in the North (CoASal) has examined the changes in the salmon stocks, analysed threats, and in doing this, the project has successfully involved different stakeholders and people of the coast. The video below summarizes the contant of the project.

Salmon stocks face multiple threats

More and more wild salmon populations become threatened, most likely because of multiple factors, including global climate change, intensive development of salmon aquaculture industry, introductions of foreign fish species and habitat destruction. Another major threat, where knowledge status is poor, is the transmission of various pathogens from farmed to wild salmon and outbreaks of “dormant” diseases due to an increase in river and sea temperatures. New fishery regulation measures are carried out to maintain conservation limits and to harvest salmon stocks sustainably.

The CoASal project has studied the growing threats Atlantic salmon populations face today with climate change, growing cage culture industry and emerging diseases. The project has also examined and documented the effects of the new sea salmon fishery regulations. As a result, the project has published 24 reports about the research done on the project. It has raised awareness on the Atlantic salmon also by arranging public events for audiences who are closely connected to the salmon fisheries, and by publishing awareness raising materials. The project has had good connections with appropriate bodies: fishermen associations, administrative bodies and research institutions. In doing all this, the project has contributed to saving the Atlantic salmon.

The project outcomes, e.g. the study reports, are in the website of the Lead Partner, County Governor of Finnmark.

Project: Conserving our Atlantic salmon as a sustainable resource for people in the North (CoASal)

Lead partner: Office of the Finnmark County Covernor, Vadsø

Other partners:

- Knipovich Polar Research Institute of Marine Fisheries and Oceanography, Murmansk
- University of Turku, Kevo Subarctic Research Institute, Utsjoki
- Swedish University of Agricultural Sciences, Department of Aquatic Resources, Uppsala
- Institute of Marine Research, Bergen

Basic information about the project in KEEP database

Why not take the bus?

Bus is a natural choice around the world…. but.

The Barents on Time project was planned during a period when the borders between Russia, Finland, and Norway witnessed daily crossings by hundreds of travelers. With an anticipated increase in tourist travel, buses emerged as a natural choice for cross-border transportation.

Barents on Time aimed to address the bottlenecks in cross-border bus transport by establishing a solid, safe, accessible, and user-friendly bus network across the region. The project's specific objective was to provide cross-border travelers with up-to-date tools and services for utilizing public transport.

Important theme, unlucky time

Unfortunately, BoT was unlucky as the COVID-19 broke out shortly after the project start. As a result of travel restrictions, the number of travelers on east-west routes sharply declined in 2020. This hindered the project's ability to gather extensive feedback from travelers and bus operators regarding their experiences and preferences for bus connections.

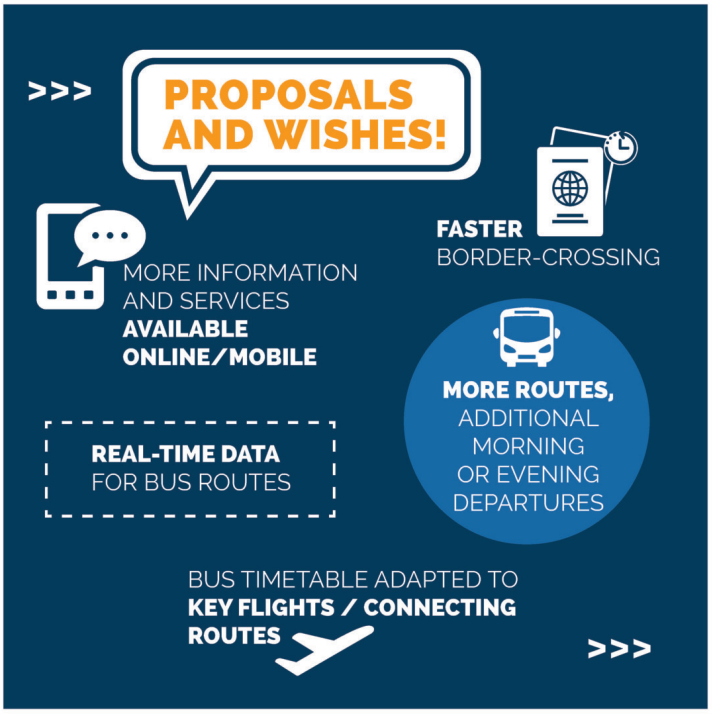
Nevertheless, the project conducted research among passengers and bus operators to identify areas for improvement, as well as the need for new routes and services. The results of the customer survey was shared with transport authorities and bus operators. The project developed a website providing information on cross-border public transport. Additionally, an Emergency Plan was created in the form of a brochure for bus companies. This resource outlines bus drivers' actions in case of road accidents, fires, or other emergencies, and also includes contact details for safety authorities and other useful information.

The project installed two information screens equipped with electronic timetables at bus stops in Kirkenes, Norway, and an additional two information screens were placed in the ticket office in Murmansk, Russia.

Overcoming bottlenecks is possible

Coordinating bus connections in the North Calotte area is challenging, due to legal and business reasons, as well as differences between the countries. However, there is an example of how these obstacles can be overcome: a daily bus connection between Finnish Lapland and Northern Norway has started as a result of the project.

To further enhance bus connections, ongoing dialogue among stakeholders in the respective countries is essential. Many of us hope that Sweden will also actively participate. The project has successfully laid the groundwork for cooperation between partners in Finland and Norway, which will play a crucial role in the development of efficient border-crossing transport.



Project: Barents on Time

Lead partner: Finnmark County Authority, Norway

Other partners:

- OOO Murmansky Avtovokzal
- Centre for Economic Development, Transport and the Environment for Lapland (Lapland ELY-centre)

Information about the project in KEEP database

Reindeer is sustainable food

Reindeer is an animal living today on most parts of Kolarctic region in its natural environment. Here reindeer meat is both local food and a luxury product. The demand for it exceeds the supply in Finland, and there is almost nothing left to export – whereas in Russia the populations of reindeer are big. The reindeer in Russia live in endless forests, rich of lichen, mushrooms and other food.
Reindeer is a good choice for those who choose not to eat animals grown in cages. The markets in Europe, outside the Kolarctic CBC programme region, are promising. In Finland, there is expertise in exporting meat products.

Project Reindeer Meat – Quality High aimed to develop the export of Russian reindeer meat from Russia to Finland and other European countries. Initially, the focus was on the workers, including working clothing and occupational safety. Subsequently, attention shifted to hygiene practices. The project also addressed meat cutting techniques. The training sessions concluded with packing the products and monitoring subsequent phases of the production chain.

However, due to the Russian aggression against Ukraine, the project's course changed. For the remainder of the implementation period, the project shifted its focus to enhancing the image of, and exploring the markets for Finnish reindeer meat in Europe.

Project: Reindeer Meat – Quality High

Lead partner: Lapin Nahka Oy, Rovaniemi

Other partners:

Izhemski olenevod agriculture kolkhoz cooperative, Iskateley

Agricultural Production Cooperative HARP, Krasnoye

Basic information about the project in KEEP database

Initiative: Industrial Tourism

Micro-project ITinA targeted to enhance the brand: Industrial tourism in the Arctic, based on the industrial heritage of the Arctic regions. The focus was on small and medium enterprises in Northern parts of Finland, Sweden and Russia.
Profiling the new industrial tourism destinations requires understanding and international cooperation. The partner network selected a number of industrial themes which would bring the identity, history and industry of the region into the spotlight.

Specific emphasis was given to support structures, associations and businesses in the fields of circular economy, responsible industry, cultural heritage and food industry.

Through dialogues and discussions, the project helped participating companies to get broader understanding of the industrial tourism concept. Even though the market situation varies in different countries, companies have recognised the potential of industrial tourism, and international cooperation in developing it.

The project developed an analysis of the action together with a preliminary action plan for development. It was recognized that innovation and experiences from participants facing similar challenges can be shared for the common benefit.

More about the project can be read on the Lead Partner's website

Project: Industrial tourism: Developing New Destinations in the Arctic

Lead partner: Lapland University of Applied Sciences Ltd

Other partners:

- Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk
- Kazakov Consulting, Nordland

Basic information about the project in KEEP database

Kolarctic Food Refining

In the Arctic regions a meaningful part of local food production is based on what grows wild in nature. In Kolarctic region it is wild berries and reindeer. They both live and grow in a clean environment and are products of nature.
Food trends are going through big changes, partly because of changes in peoples understanding of the impact of food on health and the impact of food production on the environment. The appreciation of local food is rising.
Kolarctic Food Refining-project consortium decided to grab this topic vigorously. 11 organisations working in refining of berries, refining of reindeer or in business development work towards using and refining more and better than earlier the forest berries from Murmansk region, Nenets Autonomous Area and Finnish Lapland.

Training in making sausages, fudge, and drinks

The project carried out trainings in reindeer meat handling, product development of reindeer meat, handling of wild berries, and skills in developing and making e.g. marmalade and fudge. The raw materials are cloudberry, cranberry, bilberry, and raspberry. Also, another topic of the training was herbs, fermentation, tea, and the utilization of berry products in these.

In the background of the project there is some differences between countries and some development needs. In Finland, entrepreneurship in the branch of berry products and other nature products has been in a strong development phase for many years. The availability of berries is more or less a bottleneck in increasing of the production volume. The supply of fresh berries is better in Russia. The same differences applied in reindeer meat.

After the Russian aggression in Ukraine, the co-operation with Russian partners in Kolarctic CBC funded projects came to an end. The project continued training and product development in Finland.

Sixth training session of the project in Kemijärvi, Finland. Something delicious is being made.

Project: Kolarctic Food Refining

Lead Partner: NordGuide

Other partners:

- Lihankäsittely Hanhela avoin yhtiö, Ranua
- Arctic Berry Finland Oy, Rovaniemi
- Cooperative KorvatunturinMaan Osuuskunta, Savukoski
- Union “Chamber of Commerce and Industry of the Murmansk region/Northern, Murmansk
- SPK “Put Ilitsa”, Khorey-Ver
- OOO “Kolsky kray”, Murmansk
- Agricultural Production Cooperative Fishing Collective Farm “Vozrozhdenie”,Teriberka
- North-West Centre of Food Security Issues (NWCFSI), St. Petersburg
- Nenets Centre of Energy Efficiency and Cleaner Production (NCEECP), Naryan-Mar
- SHPK “Tundra”, Lovozero

Information about the project in KEEP database

Construction goes even more sustainable in the Arctic

A ‘gámme’, a type of peat and wood-constructed house, represents the most ecologically sustainable form of housing in the Arctic area. This assertion comes from Eigil Roaldset, an expert in housing and construction at the Arctic University of Norway. However, the era of the gámme has long passed. We now inhabit comfortable houses, but their sustainability remains a question.

The challenge posed by global climate change has inspired a group of researchers, including Mr. Roaldset, from Finland, Norway, Russia, and Sweden to launch a project Green Arctic Building (GrAB) in the field of construction. The project team’s goal was to create and promote environmental innovation in the realm of “green” building specifically adapted for the Arctic region.

Constructing a building with a low carbon footprint in the High North presents greater challenges than in the temperate climates further south. As of approximately 2015, maintaining comfortable indoor conditions accounted for nearly 40% of a building’s energy consumption.

The project involved extensive data collection, including both existing and new data, culminating in comprehensive reports. They can be found on the website of the Lead Partner.

Test buildings in Murmansk and Petrozavodsk

One central action was the construction of pilot test buildings in Russia. These are two identical houses (model objects) located in Murmansk and Petrozavodsk, built within the same timeframe. Researchers meticulously selected materials that align with “green” building criteria, emphasizing their potential for reuse and recycling. By employing double-log and frame-based construction technologies, utilizing various insulation materials, and installing 250 temperature and humidity sensors, the project researchers aimed to discover the optimal solutions for the challenging climatic conditions of the Arctic.

Like other Kolarctic CBC projects, also Green Arctic Building was affected by the collapse of Russia-cooperation. Before the suspension of the Russian participation in Kolarctic CBC programme, the project succeeded in getting data to some extent, but not as much and as long as they had desired.

Project: Green Arctic Building

Lead partner: UiT The Arctic University of Norway, Norway
Other partners:

- Murmansk State Technical University, Murmansk
- Petrozavodsk State University, Petrozavodsk
- Umeå University, Umeå
- University of Oulu

Project information in KEEP database

Reducing the Environmental Impact of Buildings

In the Arctic regions, facility management faces unique challenges, especially during the record-breaking snow seasons. The facility managers grapple daily with those challenges, and with the challenge of sustainable housing and buildings. The experts behind the **Facility Management of Regional Buildings** project are well-versed in these challenges and more.

The following facts form a challenge in the North:

- **Snow is Water:** When snow melts and refreezes into ice, it expands. Eventually, it will melt again. Water plays a central role in damaging buildings and affecting their durability.
- **Heat Moves with Temperature Differences:** Heat naturally flows from warmer material to cooler ones. Understanding this principle is crucial for managing Arctic facilities.
- **Water Vapour and Condensation:** Warm air can hold more water vapour than cold air. When warm air cools down, some of this vapour condenses into liquid water.
- **Extreme Climate Conditions:** The northern regions of the Nordics and Russia experience extreme climatic conditions. The temperature difference between winter and summer can exceed 70°C.

The project has created an animated video to explain the basic requirements of facility management.

Modern housing and Environmental sustainability can be combined

Buildings account for 40% of energy consumption and nearly the same amount of CO2 emissions. Residential buildings, being more numerous than commercial or public structures, significantly impact the environment.

The project partners combined their strengths around the topic. The knowledge and expertise is collected into the outputs of the project and impact the education related to construction and housing. A central output is Facility Management of Residential Buildings in Barents Region – booklet, a non-scientific publication for anyone who owns a building or is involved in its management.

Some recommendations as well as preliminary results from the case study (partly refurbished dormitory in Arkhangelsk, Russia) have been presented to a wider audience at venues such as symposiums and conferences.

Student dormitory in Arkhangelsk is a test building of FAMARB

Project: Facility Management of Residential Buildings (FAMARB)

Website: site.uit.no/famarb/

Lead partner: UiT The Arctic University of Norway
Other partners:

- Oulu University of Applied Sciences, Oulu
- Northern Arctic Federal University named after M.V. Lomonosov, Arkhangelsk
- RISE Research Institute of Sweden, Borås

Project information in KEEP database

Methods of more efficient exploration of mineral resources

Renewable energy and energy storage facilities, such as electric batteries, are imperative components in the ongoing transition towards a fossil fuel free society. The demand for battery and high performance magnet metals, has increased. Hydrogen powered vehicles are also important to for a CO2-neutral future, and platinum group elements (PGEs) are imperative components in the fuel cells and cannot be substituted by any other component.
Most of these metals have high supply risks. Europe needs to make better use of its internal resources, not only through enhanced recycling and substitution, but also through improved efficiency in mineral exploration, mining, and beneficiation. This is why we need projects like ARLIN.
The participants of project ARLIN (Arctic Layered Intrusions as a Source of Critical Metals for Green Economy) saw that the demand for certain metals will increase, and that their production chain has to be developed with sustainability in mind.

ARLIN participants on a field trip on Penikat, Northern Finland

Layered intrusions?

The Fennoscandian layered intrusions, located generally in the Arctic area or close to it, host a wide range of resources of critical metals (PGEs, Cu, Ni, Co, chrome (Cr), vanadium (V)). Discovering the next minable deposit requires a deeper understanding of the ore-forming processes and incorporation of this knowledge in

our exploration models. So, the project ARLIN focused on going deep into studies about how the ore deposits have been born and taken shape during the existence of Earth. This leads to increased knowledge about where the ore deposits can be found.
In Russia, Finland and Norway, there are a number of mafic layered intrusions which host mineral resources of critical green-economy metals. The mineralizations can form by a range of processes, which are not necessarily present in all intrusions, and a complete view of what is happening in these different intrusions to decipher the genesis is needed. Previously, there has not been much interaction among researchers in these three countries.

ARLIN collected the expertise and knowledge

ARLIN has refined the ore deposit and ore-genetic models. It has identified the key research questions and research methods to address them. The participants have, during the workshops, proposed future research directions regarding ore deposit model and exploration. The basis of a new research proposal has been formulated, towards application for a bigger project.

While doing what was shortly described above, the project has put effort in combining the resources, experience, knowledge and technological capabilities of leading research, academic and industrial institutions of the European Arctic. Also, young researchers and students have been attracted to studies of layered intrusions and related mineralizations. 25 students and 32 researchers have participated in the project and its discussions. A new research and educational platform for the green-economy metal mineralization involving both academy and industry have been established in the Arctic region.

Project: Arctic Layered Intrusions as a Source of Critical Metals for Green Economy (ARLIN)

Lead partner: University of Oulu, Finland

Other partners:

- Geological institute, Kola Science Center, Russian Academy of Sciences, Murmansk
- Norwegian University of Science and Technology
- Geological Survey of Finland
- University of Helsinki

Basic information about the project in KEEP database

A special case in oil spill remediation

The introduction of sulphur emission control areas (SECA) and the new regulations MARPOL2020, which set the limits for sulphur content in fuel oil to 0.1 % for SECA and 0.5% for other sea areas outside SECA, has led to the use of higher quality fuel oils with very low sulphur content. This new type of hybrid fuel oil, ultralow-sulphur fuel oil (ULSFO) has been used increasingly both within and outside SECA.

The ultra-low sulphur fuel oils tend to be rich in waxes and have high pour point which affect the dispersibility of the oils at low temperature and presents challenge for removing them from marine environment in cold winter. The parties and countries participating in RemULSFO share the need for more knowledge about the behaviour of ULSFO in cold marine environment, the potential risks in oil spill response as well as suitable remediation strategies.

The project created a well-functioning network to investigate the behaviour of the spilled ultra-low sulphur fuel oil (ULSFO) under marine sub-arctic and Arctic winter conditions and exchange of best practices.
The project produced

- An evaluation report on the use of dispersant in oil spill combat for the oil HDME 50,
- Recommendations for developing oil remediation strategies based on risk assessment of the spilled oil for appropriate environment protection authorities and agencies from BEAR cross border countries,
- A teaching material for educational program

Project: Remediation strategies for ultra-low sulfur fuel oil in winter conditions (RemULSFO)

Lead Partner: SINTEF Narvik A.S.

Other partners:

- Northern (Arctic) Federal University named after M.V. Lomonosov
- Finnish Environment Institute SYKE, Marine Research Centre

Basic information about the project in KEEP database

Seafarers come across various forms of ice

From the point of view of oil drilling and shipping, ice and the varying ice conditions are a challenge, and cause safety risks. In the Kolarctic CBC funded project Ice Operations, the partners have collected and analysed data in order to improve the accuracy of information about ice conditions on the Barents Sea. The video below presents shortly why expertise and knowledge about ice needs to be developed.

The project has carried out its tasks by exploring and studying the sea ice of the area. Radar technology – synthetic-aperture-radar, SAR, to be more precise – has made it possible to get very exact information about the quality of ice. Ice has also been examined in cold-climate laboratories. Through the qualities of ice, the research can get further into defining what kind of risks the ice causes to e.g. oil drilling infrastructures and to shipping.

During the ICEOPs project many scientific papers have been produced and published. These scientific papers represent the research thematic front in its area. Furthermore, the ICEOPs have provided experience transfer in between the partners.

The further use of the meta-dataset from the navigation in ice expeditions (IB Frej and Aranda) will be used in coming projects for research analysis and competence development in areas as ice management and operations. The project has a ripple effect on ice monitoring direction development in the Arctic zone on university level.

Ice conditions and Ice maps and risk (Polaris rio) information provides a valuable knowledge basis for potential development activities in the arctic (navigations, operations industry developments). Ice mechanical models (rubble ice, level ice, ridges, ice structural interaction) provide good models for potential industry development activities.

Project: Ice Operations (ICEOPs)

Lead partner: Northern Research Institute Narvik, Narvik, Norway

Other partners:

- Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk
- Association of oil and gas suppliers “Sozvezdye”, Arkhangelsk
- Luleå University of Technology, Luleå
- Storvik & Co Oy, Oulu
- Finnish Meteorological Institute, Helsinki

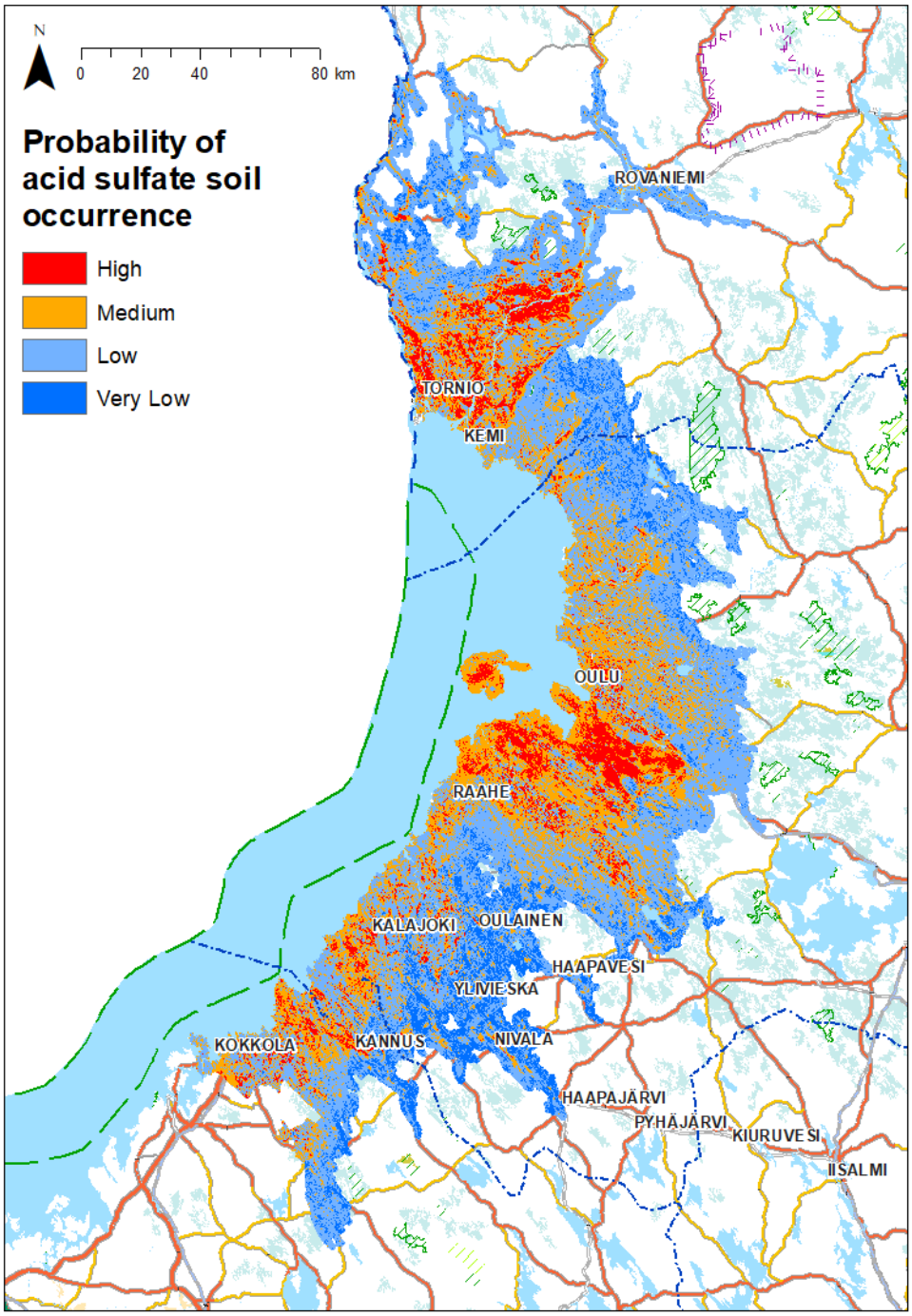
Information about the project in KEEP database

Hazards in the ground

HazArctic –project has approached environmental problems and risks of geo-bio hazards in the Arctic Region. It has focused on hazards which all have more or less to do with acidification of soil and water. Field work and analyses of samples has been the central working methods.
In the plan of the project, three categories of geo-biohazards were presented:

- Acid sulfate soils
- Mine environment issues
- Geomicrobiology

Acid sulfate soils



Map of the Finnish part of acid sulfate soil survey, Source: https://www.isric.org/news/isric-supports-geological-surveys-norway-sweden-and-finland-map-acid-sulfate-soils

Acid sulfate (AS) soils are considered to be the nastiest soils in the world. They are generally found in coastal settings globally. In Finland and Sweden, it is known that AS soils exist within the maximum extent of the preceding Littorina Sea (i.e. coastal areas), whereas knowledge of AS soils in similar settings in Norway is scarce.

One of the new findings of this project are that AS soils were found in the surroundings of Alta, Norway, and that potential AS soils were discovered in areas around Lake Inarijärvi and Utsjoki. The AS soils found at Alta are the northernmost AS soils in the world and show that these soils can develop in Arctic regions too.

In Sweden, it was shown that active AS soils are most common in areas with clay and silt situated at low altitudes and that the most active AS soil materials are underlain by potential AS soil materials. Potential AS soils are common in peat covered areas. The studies showed that several elements have mobilised from the active AS soils and several elements occur in high contents at the transition between the active and potential AS soil materials and some elements, for example manganese, are leached to the surroundings, for example lake sediments.

The project has improved the societal awareness of local people, decision-makers and other stakeholders regarding AS soil occurrence and environmental impact by communication of project results throughout the project time. Project results enable the authorities in all partner countries to do knowledge-based decisions in land use planning and to avoid a land use causing oxidation of potential AS soils, and thereby avoid negative environmental impacts of AS soils.

Mine environment issues

The aim of Work Package 2 was to increase the knowledge on how to study the present state of the art of the active or closed/abandoned mine sites, and to opt decommissioning/closure methods and process for follow up monitoring.

The COVID-19 related traveling and gathering restrictions set heavy obstacles to the implementation of the plan, as samples from Russia could not be taken and used, and the project participants had to cancel a lot of on-site gatherings. Nevertheless the consortium managed to carry out a ”plan B” and only some parts of the work packages had to be totally cancelled.

The project presented a promising exploration method for examining the ground on, for example, open pit areas, using unmanned aerial vehicles and photogrammetry. See in the video how it improves the speed and safety of exploration.

Mine slope stability

In this sub-task the material from European Space Agency’s Copernicus – programme was utilized to study the physical stability of the open pit slope and the waste facility. The Kovdor mine was chosen as a pilot location for these studies as there was a very large open pit with steep walls as well as a large area of mining waste dump and tailings dam. The results of satellite data processing showed compaction of the waste dumps that were like the company’s geotechnical reports. A slow movement of open pit wall towards inside of the pit was detected from the satellite data and this as well was notified in the geotechnical report.

Training on mine waste and water management and on mine closure and environmental inventory of closed mine waste facility

In a large workshop, the Participants were introduced how to assess, manage, and monitor the environmental impacts of closed and active mine sites and best practices in mine closure. In addition, the state-of-the-art methods for mine waste valorization were presented.

Geomicrobiology

This study has improved our understanding of the huge diversity and complexity of the microbial communities related to acid sulphate soils and the processes driven by them. Bacterial community structure was analyzed from the DNA of a total of 211 soil samples collected from Finland, Sweden and Norway in co-operation with the WP1's studies. The studies found patterns in, and connections between, bacterial community structures, soil pH and sampling depth. For example, some bacteria classes appeared only in the deeper reduced layers. There seems to be also linkage between the bacterial community structure and Fe and S minerals in soil.

The project carried out experimental studies around oxidation, bacteria, impact of temperature, (and other things which the MA of Kolarctic CBC is not competent to present here). The topic needs further research to which the results of this project can create solid foundation.

The nucleotide data from microbiology studies was submitted to the European nucleotide archive. It is a worldwide gene bank and researchers can use the data for their own studies now and in the future.

Project: Geo-Bio Hazards in the Arctic Region (HazArctic)

Lead partner: Geological Survey of Finland, Rovaniemi

Other partners:

- Natural Resources Institute Finland, Helsinki
- Geological Survey of Sweden, Uppsala
- Geological Survey of Norway, Trondheim
- Geological Institute of the Kola Science Centre of the Russian Academy of Sciences, Apatity
- Mining Institute of the Kola Science Centre of the Russian Academy of Sciences, Apatity

Project information in KEEP database

Sustainable innovations in aquaculture

To develop in a sustainable way, Arctic aquaculture needs to expand and implement environmentally friendly farming and feeding practices. SMEs alone cannot make all the needed innovation work and need support from research partners to implement new practices under commercial conditions.
ARCTAQUA project has contributed to an expansion of an economic, ethical and environmentally sustainable aquaculture industry in the Arctic region. In alternative to most of marine farming projects focused on Atlantic salmon, ARCTAQUA has dealt with other fish species (whitefish, nelma, wolfish, Arctic char). These species have a high economic value and have proved to be suitable for farming in the Arctic region.

The results of the project represent the most specialised research. The consortium has studied

- the effect of more sustainable feed on the health of wolffish
- effects of other diets on fish
- the optimal density of arctic char on fish farms

Spotted wolffish

- the fertility of arctic char
- the genetic diversity of arctic char

And develped protocols for

- broodstock follow-up
- egg incubation and monitoring
- egg transport
- hatching and start feeding

The strength of ARCTAQUA lies in gathered, complementary scientific expertise within the consortium and in close collaboration with SMEs from Russia, Sweden, Finland and Norway. The generated results are critical elements for the sustainable development of viable farming of spotted wolffish, Arctic char and European whitefishes.

Website: https://site.nord.no/arctaqua/

Lead partner: Nord University, Bodø

Other partners:

- Swedish University of Agricultural Sciences, Uppsala
- University of Gothenburg, Göteborg
- Murmansk State Technical University, Murmansk
- Berg State Research Institute on Lake and River Fisheries, Saint-Petersburg
- Akvatik AS, Bodø
- Sigerfjord Fisk AS, Sortland
- Natural Resources Institute of Finland (LUKE), Oulu

Basic Information about the project in KEEP database

The dilemma of nitrogen fertilizers

Nitrogen compounds (such as ammonia, nitrate and nitrite) form an important part of the nutrient cycle for plant growth. Significant advances in food production were made with technologies to 'fix' nitrogen from air, and make it available to plants in the form of fertilizers. However, the leakage of nitrogen compounds into waterways is harmful.

Objective of the micro-project Nitrogen compound removal processes (NITRGONE) has been to provide information on means of reducing emissions of nitrogen compounds to the environment. This information is directed to businesses and authorities with responsibility for reducing environmental impacts.

The main source of nitric oxide and nitrogen dioxide emissions is from fossil fuel combustion (70%), with transport being a major component of this. Biomass and biofuel also provide a significant emission; hence this requires focus as renewable fuels are promoted.

Tightening emission demands are faced by mining companies, too. Emissions from explosives in mining and road construction are low (0,12%) on a global basis, but they can be locally significant.

NITRGONE was planned to be a pre-project for further development. In the project, literature reviews were made of the technologies for reducing nitrogen compound emissions, both to water and to air. Kola Science Centre prepared a report with 30 references reviewing 13 technologies for reducing nitrogen compounds in water. University of Oulu have studied these, and a further three. SINTEF has focused on emissions to air, particularly from combustion processes and agriculture and added a further 9 technologies to the list. Lab testing was made of three technologies.

This pre-project has established the basis for a main project, in terms of the emission sources and the available technologies for treatment. Contact with prospective end-users has also been established. So the potential for a main project on the topic of nitrogen compound removal was confirmed. However, the situation with Russia and Ukraine from Feb 2022 meaning the likely discontinuation of the Kolarctic NEXT programme poses difficulties for the pre-project's proposed continuation.

Project: Nitrogen compound removal processes (NITRGONE)

Lead partner: SINTEF Narvik A.S., Norway

Other partners:

- University of Oulu
- Kola Science Centre

Basic information about the project in KEEP database

Maintenance of railroads has to be developed on the Kolarctic region

The railway infrastructure has a central role in the Kolarctic region and enables efficient transportation of ore, timber, goods and passengers both inside and out of the region. In Europe and in the Kolarctic region, there is an increasing demand for the railways to be better utilized through heavier, longer, faster and more frequent trains. This, together with the harsh arctic conditions, causes certain requirements for the railway infrastructure.

The project ARINKA has developed a cross-border railway research and development collaboration on the Kolarctic region. The project has exchanged railway technical know-how and best-practice solutions with the goal of making the Kolarctic railway more reliable.

The railways in the Kolarctic region, which includes the railway lines in the North Calotte and North-West Russia, were built in the early 1900s. Although the railways have been upgraded over the years, much of the railway substructure consists of elements from the time when the railway lines were built. Therefore, there is a mismatch between the existing infrastructure and the expected increase in railway traffic. Increased load at the tracks also involves greater wear, which means more frequent errors and more extensive maintenance requirement. Increased uptime and punctuality will also require increased use of monitoring systems, so that errors can be uncovered earlier, and that maintenance and repairs can be carried out at the right time and in a most cost-effective way.

The project has gathered solutions to make the railways more reliable, in numerous mappings and reports, which are about

- robust rail infrastructure solutions,
- more cost-effective maintenance and repair operations, and
- railway infrastructure monitoring through advanced sensor technology solutions.

Project: Arctic Railway Infrastructure in Kolarctic (ARINKA)

Lead partner: Northern Research Institute Narvik

Other partners:

- Luleå University of Technology
- Trafikverket, Luleå
- Bane NOR, Hamar
- Lapland University of Applied Scienses, Rovaniemi
- Finnish transportation Agency, Oulu
- Federal State Budget Educational Institution for Higher Educational “Empreror Alexander I St. Petersburg State Transport University”, St. Petersburg
- Kola Science Center of the Russian Academy of Sciences, Apatity
- October Railway – Branch of Joint Stock Company “Russian Railways”, Murmansk

Information about the project in KEEP database

Black carbon mitigation

In climate change science and mitigation policy making, the role of black carbon (soot; hereafter BC) has been growing. It is estimated that by the total climate forcing, BC is now the second most important human emission type after carbon dioxide.

Barents cooperation is very important in black carbon mitigation. The project main activities included four workshops during the year, office work, and fact-finding missions and dissemination.

A roadmap written during this project, will bring a regional perspective. The frame for the roadmap was built up after every workshop and in the final workshop, the results were introduced to the audience. New ideas for cooperation have been found during this CB4BC-project and the work for black carbon mitigation continues.

Project: Capacity Building for Black Carbon Mitigation (CB4BC)

Lead Partner: Lapland University of Applied Sciences Ltd,

Other partners:

- Kola Science Center of the Russian Academy of Sciences, Murmansk
- UiT The Arctic University of Norway

Basic information about the project in KEEP database

SEESIMA has studied how to more reduce the impacts of mining

The SEESIMA project has aimed to raise awareness of technological solutions to the environmental impacts of mining activities and enhance improving economic returns. The project has conducted research and tested different technological advances that can improve the current practice of mineral processing, both from the production and from the waste handling point of view.

The mining industry consumes 10% of the world's energy, of which a large part is used for reducing the size of the rocks to allow the separation of the valuable components from the waste rock. Reducing the rock to smaller sizes increases the energy consumption and can give problems in the later disposal of the waste rock. If the rock pieces are too large the separation of the valuable components can have a lower efficiency, reducing the economic result.

In project SEESIMA studies have been made of ways to improve the energy efficiency of grinding of rocks and separating the valuable components.

Allegory to eating?

The process of reducing the size of the rock can be likened to cutting chewing your food, and there are ways of making it more efficient. E.g. if the food is dry, you might add some drink to help the process. It is common to use water to help transport the rocks in the machinery, but it is desirable to use as little water as possible.

Some mines use a size reduction process without water, termed «Dry Grinding». This avoids the need to treat the waste water produced, but typically uses more energy than wet grinding. At Luleå Technical University the researchers have examined the effect of additives that made the size reduction and separation more efficient for Dry Grinding. They have shown that the energy used for Dry Grinding can be reduced by as much as 30%. Further works remains to determine what energy savings are possible if these results were implemented in industry.

Project: Supporting Environmental Economic and Social Impacts of Mining Activity (SEESIMA)

Lead partner: Northern Research Institute Narvik A.S., Narvik, Norway

Other partners:

- Luleå University of Technology, Luleå
- Narvik Science Park, Narvik
- University of Oulu
- Kola Science Center of the Russian Academy of Sciences, Apatity

Project information in KEEP database

Bacteria can be tamed to work as fighters against oil spills

The Arctic Coast Bioremediation project staff collecting samples by the Barents sea shore

The risk of oil spills has become a real threat due to development of the oil and gas industry and transportation activities in the Arctic. Oil spills in the vicinity of the coast are the most dangerous, as their effects can last for years and even decades. The project “Arctic Coast Bioremediation” has aimed at finding a technological solution to minimize the oil spill effects.

The project developed an integrated biotechnology for cleaning oil-contaminated coastal areas of the Arctic seas, including methods of bioremediation (biostimulation, bioaugmentation, biological-sorption treatment and phytoremediation) applied separately or together.
Bioaugmentation with two local arctic oil-degrading biopreparations: based on microfungi (Tolypocladium inflatum, Meyerozima guilliermondii) and based on microfungi and bacteria (Penicillium janthinellum, Penicillium simplicissimum, Pseudomonas fluorescens, Pseudomonas putida) were shown to enhance oil biodegradation at low temperature. However, the fungal inoculum caused changes to the native microbial community. The biotechnology can be applied at the final stage of coast cleanup, and as the only cleanup method in vulnerable areas.
Advantages of this technology are:
– natural cleanup mechanisms;
– low impact on environmental objects, making the cleanup possible without major damage to coastal ecosystems;
– relatively low costs and requirements for personnel qualifications.
Furthermore, the project gained new knowledge on the native microbial community in arctic seawater, seashore sand and soil and knowledge on new so far unknown oil degradation genes that can be exploited in the future.

Basic information about the project is available on KEEP database

Project: Arctic Coast Bioremediaton

Lead partner: FBI State Regional Centre for Standardization, Metrology and Testing in the Murmansk Region (MCSM), Murmansk

Other partners:

- Institute of Industrial Ecology Problems of the North of the Kola Science Center of Russian Academy of Science (INEP KSC RAS), Apatity
- OOO Storvik Consult, Murmansk
- Finnish Environment Institute (SYKE), Helsinki
- UiT – The Arctic University of Norway, Tromsö

Drones for safety in mining

Drone technology can give added value to solving some problems related to

- safety of the mining industry workers,
- load on natural environment and
- influence the health of local inhabitants

as accidents or other challenging situations occur in mining.

During the market analysis, micro-project DROSAMO identified common requirements shared by hazardous industries. These included:

- Safety of Workers: Ensuring the well-being of employees operating in hazardous environments.
- Optimized Environmental Impact Assessment (EIA) Procedures: Streamlining the assessment process to evaluate environmental effects.
- Protective and Preventive Measures: Implementing safeguards to minimize risks.
- Studying Pollutant Concentrations in the Atmosphere: Investigating the presence and impact of pollutants in hazardous settings.

To address safety challenges faced by workers, the project conducted autonomous navigation and mapping demonstrations in an underground mining environment. Using thermal cameras, sensors, SLAM technology, and 3D scanners, they successfully detected human beings and enabled 3D navigation within the mine. This robust and reliable autonomous navigation was crucial, especially in a GPS-denied and toxic mine environment.

Additionally, the project developed strategies for data collection during the EIA process in mines and formulated proactive maintenance approaches. To tackle the challenge of estimating air pollution levels in Apatity city, the DROSAMO team employed computational fluid dynamics (CFD) modeling. This analysis provided valuable insights into predicted dust concentration levels, with particle sizes of up to 20 µm.

More information about the project is e.g. in KEEP database.

Project: Drone safety monitoring systems for Arctic mining (DROSAMO)

Lead partner: Institute of North Industrial Ecology Problems – Subdivision of the Federal Research Center «Kola Science Center of the Russian Academy of Sciences» (INEP KSC RAS)

Other partners:

- Cherepovets State University
- Centria University of Applied Sciences, Oulu
- Luleå Technical University

Support for SMEs in natural products

This project has aimed to develop a better understanding of the real needs and priorities of SMEs in the Kolarctic region, with respect to development of New Natural Kolarctic Products (NNKPs) with assistance from research institutes and academic institutions. The target group were SMEs, and they were invited to present success stories, priorities, needs and problems that they have encountered in the development, approval and marketing of natural products based on local raw material resources.

The project concluded with a hybrid physical/online seminar where participants and SMEs gavce presentations about their organisations and products. The seminar took place in Arkhangelsk and was well-attended by Russian SMEs, underlining the high level of interest in Russia for the project.

Project: New Natural Kolarctic Product SME Assistance

Lead partner: SINTEF Narvik A.S., Norway

Other partners:

- Federal State Budgetary Educational Institution of Higher Education Northern State Medical University of the Ministry of Healthcare of the Russian Federation, Arkhangelsk
- University of Oulu

Basic information about the project in KEEP database

New northern transport route was a goal

The **Northern Axis – Barents Link project** aimed to develop an east-west transportation corridor and cross-border mobility in the Barents Euro-Arctic region. The project investigated the potential of key transportation infrastructures in the participating areas, as well as the Northern Axis and Barents Link transportation corridors. The goal was to identify bottlenecks within the transportation corridor and, thereby, further harmonize its development. The project sought to enhance understanding and define the impacts of various initiatives on transportation routes and networks, including their effects on economic sustainability.

After the Russian aggression towards Ukraine, the common east-west corridor planning with Russia was cancelled.

More information on the project is on the website of the Lead Partner

Project: Northern Axis – Barents Link

Lead Partner: Regional Council of Kainuu

Other partners:

- Futurum AS, Narvik
- Northern (Arctic) Federal University, Arkhangelsk
- The Local Federation of East Lapland, Kemijärvi
- Strategic Partnership «North-West», Saint-Petersburg
- Luleå University of Technology, Luleå
- Arkhangelsk regional road administration, Arkhangelsk
- Association of International Road Carriers, Saint-Petersburg
- Nenets Oil Company, Iskateley settlement
- Finnish Transport Agency, Oulu
- UiT, The Arctic University of Norway, Narvik

Basic information about the project in KEEP database

Safety of wind power

SafeWind project's objective was to find cross-border, common approaches for minimising wind farms' negative environmental impact in the future. In the background of the project was the need to establish new international transport corridors, and wind-power generation for them, at remote and hard-to-reach territories along the Northern Sea Route. The project worked in close cooperation with Kolarctic CBC project Northern Axis – Barents Link.

More information about the project is in KEEP database

Project: Environmental Safety and Sustainability of Wind Energy Projects at Remote Territories of Arctic Region (SafeWind)

Lead partner: Autonomous nonprofit organization «Center of management projects for social and economy, scientific and technological, innovative development and staff provision for regions» St. Petersburg

Other partners:

- UiT, The Arctic University of Norway
- Regional Council of Kainuu
- Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk