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Sustainable development of local communities by multiple use of forests in the Barents region

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Innehållsförteckning

Summary

The vast boreal forests of the Barents region are of great economic, social and environmental importance. An increased multiple use of forests offers a further opportunity for the development of rural communities in line with the 2030 Agenda for Sustainable Development.

The role of small and medium-sized enterprises (SMEs) is imperative in developing multiple use of forests and a sustainable development of local communities. This study has mapped the current situation for SMEs related to forests in seven landscapes within the Barents Region: Vindelälven-Juhttátahkka Biosphere Reserve and Tornedalen 2020 (SWE), North Karelia Biosphere Reserve and Rokua Geopark (FIN), Sør-Varanger Kommune (NOR), Metsola Biosphere Reserve and Vodlozersky Biosphere Reserve (RUS).

There are numerous opportunities for development of multiple use SMEs in the Barents region, and there is an increasing interest for trades that use wood fibres in their products as well as for trades that utilize other values of the forest (i.e. wood and non-wood enterprises). It is also apparent that the studied landscapes have many challenges and opportunities in common.

The availability of raw material is an ever-present issue for the wood-enterprises. Increased forest damages make themselves known as the effects of climate change are ever more apparent. Damages on the forest landscape are also detrimental for the non-wood enterprises, as it is the basis for reindeer herding, the collection of foods and tourism. In general, the SMEs in the studied landscapes could do with more collaboration which would enable them to handle bigger quantities of products and customers, as well as offer a wider range of products and services. The trades also struggle with attracting the right competence for different positions in their organization.

The overall conclusion of this study is that multiple use of forests, and an increased collaboration between SMEs in forest related businesses, offers a promising potential for a sustainable development of local communities in the Barents region. This is especially valid in landscapes where the forest land is owned by a multitude of different owners. To realize this potential, there is a need for improved dialogue and increased cooperation between forest owners and multiple-use entrepreneurs, as well as between the wood and non-wood sector. Cross-border collaborations, that focus evidence-based knowledge and best practices, can support this development and ad additional value.

It is imperative for the survival and development of both wood and non-wood enterprises to find ways to adapt to climate change. For a prosperous future for all kinds of businesses in the Barents region it is also of utterly importance to foster land use practices and the use of forest resources that contribute to climate change mitigation and prevent loss of biodiversity.

This report builds on a study by Esselin & MacTaggart (2021) of Biosphere reserves in the Barents region. After publication of that study, a collaboration was initiated between the regional forest programs and the biosphere reserves in Västerbotten County (Sweden) and North Karelia County (Finland). As a future prospect, the collaboration envisions a large-scale, cross-border collaboration project. A basic structure of this future prospect consists of three work packages (Wood, Non-wood, and Environment) and three cross-cutting themes (SMEs, Youth, and Academia).

1. Introduction

The northern Taiga stretches around the globe throughout the high northern latitudes, between the tundra and the temperate forest. It is characterized by coniferous forests consisting mostly of pine, spruce, birch and larch. In the Barents region, large parts of Norway, Sweden, Finland and Russia are covered by this kind of boreal forests, which is of vital importance for the economy of the region and the well-being of its people. Besides the trees, the forests host a vast variety of wildlife, birds, plants insects etc. Together, they constitute the foundation of forest industries, tourism and outdoor recreation, reindeer herding, and they are important for food supply and food industry. In recent years, it has also become clear that the northern Taiga plays a crucial role for the global carbon cycle and as such for climate mitigation. And not to forget, the forests play a central role in the transition to a bio-based circular society.

1.1 Forests for bioeconomy and sustainability

Forests play a vital role in the debate about climate change. As the need for replacing the use of fossil raw material has become apparent, biomass from forests has been found to be a renewable and more sustainable alternative to ensure future prosperity. The term that is used for the transformation of the economy by increasing the use of biological resources is Bioeconomy. This concept is frequently used to describe a desirable future economy by national governments in Europe and the EU alike, and recent development has shown that the opportunities are numerous. For example, bio-based products have been developed to replace plastics, steel, concrete and textile fibres, just to name a few. In addition to biomass, the forests are important in supporting biodiversity and purifying air and waters (Widmark 2020, 2).

However, the discussion of a bioeconomy is inevitably accompanied by that of ecological boundaries. Since the removal of biomass from the forests affects the forest structure and therefore also the habitat that is common in unmanaged forests, there is a lively discussion in research about the effect on biodiversity (eg Bauhus et al 2017, Krumm et al 2020). But how to exactly measure biodiversity in the forests varies around Europe, and it proves that there is no commonly accepted system of mapping it (Pilstjärna & Hannerz 2020).

Another very physical consequence of land use is the effect on cultural heritage. The relationship between people and forests goes beyond industrialised forestry, and includes traditional ways of using forests, recreational activities, but some places also have historical and spiritual significance. The most essential tools in applying cultural and spiritual aspects in forest management are planning and practical recommendations (Parviainen 2005, 68).

The forests do undoubtedly contain many different values, because of which they also constantly are the topic of various debates. In this report, we will take a closer look on how these different values are utilized in a specific part of the bioeconomy, namely that of local communities in rural areas.

1.2 Multiple-use of forests

The term *Multiple use of forests* implies that the same forest can be used for many different purposes. The purposes can be both commercial, such as forestry, reindeer herding, and tourism, and non-commercial, such as non-profit organizational activities and recreation. The term overlaps the commonly used concept of ecosystem services, which includes all types of ecosystems in addition to forests, and therefore focuses on even more functions. Multiple use of forests does, however, regard forest management as a way of steering the functions of a forest ecosystem in a desirable direction

(Nordström et al 2020, 26). The term multiple use of forests is so flexible that it can be applied to different spatial circumstances, meaning that both segregative and integrative land use can be counted as multiple use of forests. Segregative land use means that subdivisions of the same forest can be designated for separate activities, such as timber production and nature reserves. In contrast, integrative land use implicates production of several different goods and services on the same forest land, simultaneously (Hoogstra-Klein et al 2017, 250).

Multiple use of forests is a term that originates from early German ideas of multifunctional forests. These commonly use three function categories: *Use*, *Protection* and *Recreation* (Kindler 2016, 53). The *use*-function, interpreted as the economic utilization of forests, can be divided into wood and non-wood use of forests, depending on whether raw material from wood is used or not (FAO 1999, Winkel 2017). The wood-products have constituted the base for the forest sector due to its significant economic importance and well-developed value chains. However, there is an increasing interest for non-wood products and services as an opportunity for rural economies (Wolfslehner 2019).

All forms of multiple use of forests are dependent on a functioning societal infrastructure, especially if the use includes visitors. It is imperative that there are sufficient possibilities for transportation, purchasing food and accomodation, as well as healthcare in case of emergency. Studies have shown that multiple use of forests that includes tourism does not motivate the financing of basic infrastructure. Tourism is instead dependent on infrastructure motivated by forestry, mining, wind power etc, as well as the service that has developed in relation to such activities (Bjärstig et al 2020, 3). It is also important to note that all multiple use is dependent of some kind of land use, and all kinds of multiple use are not always compatible, which is a potential cause of conflicts (Nordström et al 2020, 44).

There is potential for developing multiple use of forests, which often is connected to rural development, since many actors of multiple use either exist in the rural areas or want to base their activities in rural areas. The challenges for multiple use of forests are similar to the challenges of SMEs in general (Bjärstig et al 2020, 4). Therefore, in order to assess the possibilities for developing a multiple use of forests in the Barents region, it is essential to have a basic understanding of the conditions of SMEs that base their business on different values of forests.

1.3 Aim and method

In a study by Esselin & MacTaggart (2021), biosphere reserves in the Barents region were compared, and the possibilities for collaboration were examined between the biosphere reserves, as well as between the biosphere reserves and the Barents Cooperation and regional forest programmes. The study concluded that many topics and possible solutions coincides, e.g.:

- Sustainable management and utilization of forest resources and ecosystem services in line with the 2030 Agenda for Sustainable Development, the United Nations Strategic Plan for Forests as well as the Paris Agreement
- Multifunctionality of forests
- International cooperation and youth exchange
- Knowledge transfer, including sharing of scientific results and best practices

This report builds on Esselin's and MacTaggart's study. It focuses multiple use of forests in a selection of landscapes in the Barents region (figure 1), and opportunities and challenges for small and medium size enterprises (SMEs).

The aim of this study is to contribute to the development of multiple use of forests by describing and analysing the situation of forest SMEs in the chosen landscapes, and to propose cross-border collaboration activities.

The sample of landscapes was chosen to represent a variation of rural areas in the Barents region and includes two landscapes in Sweden, two in Finland, two in Russia and one in Norway. The information about the trades and SMEs is mainly derived from research papers, regional strategies and related documents. Some local contacts have been interviewed to fill in blanks.

Figure 1. Chosen landscapes.

The enterprises are categorized into two groups: wood and non-wood. The wood enterprises are dependent on wood fibre for their production and profit. This group includes forest owners, entrepreneurs and companies in the businesses of forestry, wood construction and wood manufacturing. The non-wood enterprises include tourism, reindeer herding, food production, and thus depend on other forest values such as grazing opportunities, collectible foods, biodiversity and scenic landscapes.

1.4 Acknowledgements

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2. Vindelälven-Juhttátahkka Biosphere Reserve (Sweden)

Vindelälven-Juhttátahkka Biosphere Reserve was designated by Unesco in 2019 and encompasses the Vindel river catchment area, which is one of few unregulated river systems in Europe. The area reaches across the Swedish land mass from the Norwegian border in the west to the Bothnian Sea in the east and covers approximately 1,3 million hectares (core areas 20,865 ha, buffer zones 402,707 ha, and transition areas 905,546 ha). It covers parts of eight municipalities: Sorsele, Arjeplog, Lycksele, Norsjö, Malå, Vindeln, Vännäs and Umeå. More than half of the area is covered by forests. Reindeer husbandry, tourism, hunting, fishing and outdoor recreation are activities practiced in all zones of the biosphere reserve. Forestry, farming, mining and wind power are important economic activities in the transition area (Esselin & MacTaggart 2021, 11).

2.1 Wood Vindelälven-Juhttátahkka Biosphere Reserve

Forestry

Almost half of the forest land within the biosphere reserve is owned by private citizens. Other substantial owners are the Swedish state, private forest companies, the Church of Sweden and municipalities (Esselin & MacTaggart 2021). Even though some small-scale forest owners do some forestry measures on their own land, most forest management is done by small-scale entrepreneurs and forest companies (Barsk 2020, 2).

Half of the private forest owners are represented by forest owner associations, the main one in the area being Norra Skog. The actors related to forestry are well organised and part of several collaborative organs in the region. Mera Skog I Västerbotten (lit. More Forest in Västerbotten County) gathers many of the forestry and forest related industries in Västerbotten county. The purpose of the collaboration is to spread knowledge of, and interest in, the forest. The target groups of the collaboration vary from decision makers to teachers and their pupils. Much of the work is done through information campaigns and educational projects for children and youth, all in line with the school's curriculums.[1] Skogstekniska klustret (The Cluster of Forest Technology) is an economic association for companies specialising in forestry machines and related components. The association works with connecting its member companies with financers, researchers and forest companies in order to facilitate collaboration.[2]

Contact and collaboration with agencies and non-wood actors takes place in many ways, among others through the Regional Forest Programme of Västerbotten County. It gathers a large variation of stakeholders of the forest in Västerbotten. The Swedish Forest Agency also hosts sector councils in all regions of the country. These are advisory boards for the agency, and contribute to exchange between companies, agencies, and organizations. These regional councils meet up to four times a year.[3]

Wood industry

The wood industry within the biosphere municipalities consists of just over 50 companies. These enterprises include sawmills, planing mills, house builders and carpentries. Most of the companies are family enterprises and generational changes are common. While the sawmill companies generally export most of their products, the rest of the companies only export smaller amounts. Most of the

1 http://meraskog.se/
2 https://www.skogstekniskaklustret.se/english
3 https://www.skogsstyrelsen.se/om-oss/organisation/radgivande-grupper/sektorsrad-for-skogliga-fragor/regionala-sektorsrad/

export of manufactory goes to other Nordic countries, and lesser volumes are shipped to Great Britain and Germany (Skogsprogram Västerbotten 2019, 5-6).

The wood industry in the area is involved in several networks and collaborations. Träbransch Norr is a development company owned by the wood industry in Västerbotten county. They work with collaboration, information and education.[4] They advocate for their member companies, which usually are small-scale, to collaborate in order to be able to handle bigger orders. A company that has managed well in doing just that is Skellefteå snickericentral, SSC, which advertises and sells the products of its six member companies that are located in various places in the Västerbotten region.

The largest cities in Västerbotten are also members in the Trästad Sverige association, which spreads information about the possibilities of using wood in buildings. Both constellations are also represented in a Wood Innovation Cluster situated in Skellefteå, which is situated outside the biosphere reserve, but which conducts research that is relevant for forest industries. The cluster is a collaboration between the Luleå University of Technology, RISE in Skellefteå and Skellefteå municipality.

Opportunities and challenges

Access to raw material
Both forestry and the wood industry are depending on active use of forest land. Trees grow slowly, and the question of how much material can be extracted from the forest is ever present. The wood industry indicates in their report for the regional forest programme of Västerbotten that finding trees with a larger width, around 8", is a challenge today (Skogsprogram Västerbotten 2019, 19). The forest industry sees opportunities in forests that have not been actively forested until now. But there is also a worry among the actors that national and international ambitions to increase the number of protected forests will lead to less areas available to forestry (Skogsprogram Västerbotten 2020, 26).

Restrictions in rights of ownership and use
Swedish forest policy of today is steered by two equal goals: a production goal stating that Swedish forests are to be utilized efficiently to make a good profit, and an environmental goal stating that the preconditions for biodiversity in forests must be preserved. The rights of a forest owner to use his or her forest are therefore not unrestricted, but regulated through law, and authorization is needed for some measures to be allowed. One important aspect of this is the occurrence of nature values that are difficult for a forest owner to foresee, and that affect the prospects of measures being allowed. Additionally, other groups in society have far-reaching rights to affect forestry and appeal against certain measures. These factors create an uncertainty for forest owners and their investments (Skogsprogram Västerbotten 2020, 26).

Climate change
According to scenario calculations made by the Swedish University for Agricultural Sciences, SLU, climate change could affect the preconditions for forestry. The warmer climate could lead to an increase in growth in the forests. However, the risks increase also. With shorter periods of ground frost and higher levels of ground water during the autumn and winter seasons, the root system can be weakened, leading to a higher risk of felling during storms. Moist winters might make it difficult to fell and transport the wood, and hot and dry summers increase the risk of forest fires and insect infestations (Skogsprogram Västerbotten 2020, 31).

4 https://www.trabranschnorr.se/

Forest damages
Grazing by moose and different kind of pests (e.g. resin top disease) cause extensive damage to young pine stands every year. This leads to reduced forest growth, extra work and big economic losses for forest owners as well as the forest industry.

Recruitment of competent personnel
Both forestry and wood industries find it challenging to find and recruit the right competence for all levels of their activities. This is especially the case for enterprices operating in the more rural areas, outside of the bigger cities. Education programmes at the upper secondary level get less applicants than they have the capacity for, which shows a restricted interest among youths for forest related work. In their report for the regional forest programme in Västerbotten, the forestry industries present that one of the reasons can be that the forest sector is "non-existent" for many urban youths (Skogsprogram Västerbotten 2020, 29). Further education on all levels can be done on a distance. It is important to make clear for prospective employees that there are possibilities for competence development within these local industries.

Finding the right markets
It is challenging for small enterprises to find orders on their own. To develop the trade in the region, the small enterprises need support through education and sales competence. For the smaller enterprises to be able to handle bigger orders, it is important for them to find a form of collaboration with each other (Skogsprogram Västerbotten 2019).

Demand for fossil-free alternatives
A clear standpoint in the climate debate is that products made from fossil materials should be traded with renewable materials. Products from wood can be used to replace fossil fuels and products, as well as cement (Skogsprogram Västerbotten 2020, 27). The Swedish government has launched a project called Fossilfritt Sverige (Fossil-free Sweden), with a mission to promote such a transition, and wood is an important component in this ambition.[5]

Promotion of Wood Construction
Several policies and strategies, both nationally and internationally, promote an increase of the usage of wood in new constructions. This is because wood in buildings and other constructions is a carbon sink and thus a measure to mitigate climate change. Internationally, the European forest strategy plans to promote wood construction. Nationally, Trästad Sverige gets financing from the government to promote using wood in house building. Regionally, the Regional Forest Programme of Västerbotten has included wood building as a point of development in their strategy.

Digitization
An increase in digitization could bring new opportunities to the wood sector. Digital information about forests is ever increasing, and by integrating the information flows, efficiency could be increased. Mistra Digital Forest is a research programme that focuses on digitization of the forestry sector. The researchers connected with the programme develop digital innovations that drive on the automatization of forestry, contributing to greater precision in planning and resource efficiency and sustainability in the forestry sector.[6]

5 https://fossilfrittsverige.se/fardplaner/
6 https://www.mistradigitalforest.se/om-mistra-digital-forest/

2.2 Non–wood Vindelälven-Juhttátahkka Biosphere Reserve

Reindeer husbandry

The Vindelälven area is a traditional migration route for the Sami reindeer herding. Reindeer herding is an exclusive right of the Sami people and is protected as a traditional activity of public interest (Esselin & MacTaggart 2021). Reindeer husbandry is organised through *Sami villages,* which represent the reindeer herding families within a specific geographical area. The Sami villages are a kind of economic associations, and the reindeer herding families in the villages constitute separate companies. The Sami Village is not allowed to operate any other trade apart from reindeer herding, but individual reindeer herders are (Skogsprogrammet 2020, 6).

Sami reindeer herding is based on the reindeer being a semi-domesticated animal with a seasonal migration behaviour. The task of the reindeer herder is to move the herds to appropriate grazing areas depending on the current conditions (Sametinget). Around 50,000 of all reindeer in Sweden can be found in Västerbotten county. The value from reindeer husbandry mainly comes from sale of reindeer meat (Jonasson & Persson 2017, 30).

Apart from the reindeer herding areas representing local reindeer herders and their families, the Sami people are represented by the *Sami parliament*, which is a state agency and parliament with popularly elected representatives. It also works as an advisory organ on Sami issues. The National Association of Swedish Sami (Svenska Samernas Riksförbund, SSR) is a politically independent interest organisation for economic and social issues relevant for the Sami people. It represents Sami people connected to reindeer herding areas or Sami associations.[7]

Food from the forest

The production of food from forests in the region includes everything from berries, mushrooms, plants, to reindeer, game and fish. The amount of SMEs in this category is difficult to map, since there is no functioning trade organization. Some of them have managed to distinguish themselves, such as *Fjällvilt AB*: a family enterprise based in Ammarnäs. The production is mainly focused on meat production from their own reindeer, but also moose and fish from the local nature.[8] Another one is *Fjällfrö*, which produces porridge and curd with plants they have picked in the nature.[9] Almost all the enterprises are very small and usually do not enable the practitioner to work full time. In most cases, there is a lack of collaboration between different strands of the production. The exceptions are berry picking companies that hire pickers from abroad and have long term contracts with the wholesale sector. There are also more continuous contracts found in meat production (Skogsprogram Västerbotten 2019a, 5).

The statistics concerning wild berries within and around the biosphere reserve are uncertain. According to approximations made by the Swedish University of Agriculture, around a fifth of all wild berries in Sweden, around 100,000 tonnes, can be found in Västerbotten county. Most of the berries in the county are picked for commercial use and only a few percent are kept for household use. Only around 10% of the wild berries in the county are picked in total. Hardly any of the profit from this raw material stays in the region. Because of the right of public access, it is free to pick berries in the forest and the landowner does not get any part of the profit. The berry picking for commercial use is almost entirely done by foreign work force, and none of their profits stay in the region. There is also no substantial refinement in the area, and most of the raw material is not even rinsed or packed

7 https://www.sapmi.se/
8 https://fjallvilt.se/
9 https://www.bertejaure.se/fjallfro/

before it gets shipped off. The only big refinery in the area is Danica Foods, that produces jam and marmalades in Lycksele (Jonasson & Persson 2017, 20-21).

Game, such as moose and roe deer mainly provide meat for private use of the hunters. It is difficult to find correct numbers on the charcuterie production of meat from game, it is assumed (in the report) that 10% of the meat goes to charcuterie production and that the value of this meat is doubled. Around 80% of the production value stays with the hunters. The hunt is steered by the availability of game and refineries have the capacity to process what has been harvested. The potential increase of value could be found in processing the meat further (Jonasson & Persson 2017, 28-30).

Tourism

The vast forests in and around the biosphere reserve offer great natural experiences and are of great importance for activities such as hiking, bicycling, driving snowmobiles, hunting, but also enjoying peace and quiet (Skogsprogram Västerbotten 2020a, 5). Many of the entrepreneurs in tourism have another occupation at the side of the tourism business. Either because the businesses are small, or because they only offer activities in certain seasons of the year (Interview).

One example of a company that has managed to unite various opportunities of activities in the forest is Svansele Wilderness Center. Its most popular activity is a moose safari, where guides drive around visitors on electric snowmobiles in the forest on a lookout for moose. This can be combined with other nature-based experiences, such as ice-fishing or dogsledding.[10]

There are numerous constellations working with the development of tourism in the Vindelälven area. The tourism section of Region Västerbotten is the convener for the "sustainability group" that gathers all destination representatives in the region. The group meets up to six times a year to exchange experiences and ideas with each other. The destinations in the northern parts of the biosphere are represented by the collaboration "Destination Lapland".

Opportunities and challenges

Intensive forestry
Intensive forest management poses a big challenge for reindeer husbandry. Forest management methods such as clear cuts, fertilization, soil scarification, the use of alien tree species (such as Pinus contorta) etc. interrupts migration routes and negatively affects ground lichens, which is a major food source for reindeer during winters. There are also major conflicts between the forest industry and environmental organisations about the forestry's effect on biodiversity, and also between between moose hunters (who wants many moose) and foresters (who wants less moose because they do damage to young stand of pine).

Varying access to berries, mushrooms and plants
The availability of resources is not continuous, but varies from year to year, especially when it comes to berries, mushrooms and plants. The availability of meat from game is more restricted and therefore fluctuates less.

Lack of personnel
As previously mentioned, only around 10% of available berries are picked in total. The lack of personnel is a problem. When it comes to berries, the collection for commercial use is almost exclusively done by foreign workforce. This is a well-established and well working system since many years. Berry picking by locals has, however, decreased.

10https://svansele.com/en/

Lack of organization and representation
The lack of organization among pickers poses a challenge in many ways. Many small-scale enterprises in this category have difficulties to find and reach out to customers. Selling raw or slightly processed products through shops demands a lot from formalities. Therefore, many producers prefer direct market solutions, such as “bondens egen marknad” (lit. the farmers market) where the product is sold directly to customers and no middle hands are involved (Skogsprogram Västerbotten 2019a, 12-13).

Climate change
Climate change poses challenges to all non-wood industries. The challenges to reindeer husbandry often have to do with the strain other nature-related industries put on the flexible nature of reindeer husbandry. The migration pattern of the reindeer is decided by the available food in the area, which varies year to year and, because of climate change, becomes even more scarce. Also, anthropogenic reasons, such as forestry and tourism, cause strain on the migration.[11]

Increased value by processing
An increased processing would need increased competence. Examples of this are techniques for picking and cleansing and detection of areas with material. Rinsing and packing the raw material alone would double the value of the berries. Also, only around 10% of the berries are picked today (Skogsprogram Västerbotten 2019a, 22).

Certifications
Since there is an increasing interest among the customer base to travel sustainably, it would be advantageous of the enterprises in the biosphere area to be able to display their sustainability to potential customers and partners. One way of doing this is by getting certified. Certification is also often a requirement for getting a label.

11 https://www.sametinget.se/83615

3. Leader Tornedalen 2020 (Sweden)

The LEADER local action group of Tornedalen 2020 operates in an area containing Pajala and Övertorneå municipalities, the northern parts of Haparanda municipality and the congregations of Karesuando and Vittangi in Kiruna municipality.[12] This results in an area of 24,016 km^2 and a total population of 22,306 people (Tornedalen2020 2017, 6). Both the culture and economy are strongly influenced by the proximity to Finland and the open borders between the countries. In addition to Swedish and Finnish, the minority language Meänkieli is spoken in the area. The landscape varies from tundra-like with mountains in the north to a more typical forest landscape in the southern parts, with a rich farming land. Around 477,000 hectares in the municipalities included in the leader area are made up of productive forest land (Skogsstyrelsen).[13] Forestry and reindeer herding are the biggest land users (Tornedalen 2020, 2017.)

3.1 Wood Leader Tornedalen 2020

Forestry

The forests within the leader area are in most cases either owned by the state or by private individuals. The state or big private companies own larger areas in the northern parts of the leader area, while private ownership is more common in the southernmost parts (Interview 7). The public sector, the mining industry and forest industry are the biggest employers in the area (Tornedalen2020 2017, 8). In 2018, forestry employed 390–500 people within the leader area (Eriksson & Lundmark 2020, 43). Even though there are some small-scale forestry entrepreneurs in the area, most of them are hired from Finland (Interview 7).

There are no established collaboration groups among forestry actors in the area, but forest owner associations, such as Norra Skog, arrange educations and forums for small-scale forest owners. The Regional Forest Programme of Norrbotten county also includes representatives for forestry in their work. The Swedish Forest Agency also hosts sector councils in the region. These are advisory boards for the agency, and contribute to exchange between companies, agencies and organizations.[14]

Wood industry

In 2019, there were 46 people within the Leader area employed in the wood industries (Eriksson & Lundmark 2020, 59). Small-scale wood industry can be found in, for example, Korpilombolo with the company Jutos Timber that employs approximately 20 people. Micro companies are distributed quite evenly across the area, consisting of one-man sawmills and carpentries. These mainly sell their products locally, often by individual orders (interview 7).

There are no established networks or collaborative organs for the actors in the wood industry in Tornedalen. The regional forest programme of Norrbotten county states that more collaboration among SMEs is needed in order to enable the development of the forest and wood industries in the county (Länsstyrelsen Norrbotten 2020,16).

12 https://www.tornedalen2020.se/
13 Note that two of the municipalities in the LEADER-area are not included in their entirety.
14 https://www.skogsstyrelsen.se/om-oss/organisation/radgivande-grupper/sektorsrad-for-skogliga-fragor/regionala-sektorsrad/

Opportunities and challenges

Lack of collaborative organs
Without any groups of collaboration representing small-scale forestry and wood industry, the discussion stalls off.

Evenly distributed, but small industries
Micro- and small-scale wood industries are fairly evenly distributed across the Tornedalen area. These are, however, very small and mostly used to fulfil orders from the local community, on demand. Taking on bigger orders is not relevant in the current situation.

Collaboration among SMEs
By expanding small-scale sawmills, for example to also include planing mills, there is an opportunity for value increase. However, expanding is expensive, and few small enterprises can afford such investments. Therefore, there should be more networking among these small enterprises.

Cross-border collaborations
With the proximity to Finland and the open border between the two countries, cross-border trade and collaboration comes naturally. As mention before, it is usual to hire forest entrepreneurs from Finland. This has potential for further collaboration also.

Forest damages
The forest in the county suffers from damages caused by game, mainly moose. Moose cause damage in around 11% of the young pine stand. Coming to terms with these damages would affect the availability of future raw material (Länsstyrelsen Norrbotten 2020, 25-26).

3.2 Non-wood Leader Tornedalen 2020

Reindeer herding

Tornedalen is situated within the reindeer herding area in Sweden, and reindeer husbandry is operated all around Tornedalen. The right to use land and water to sustain one's reindeer is an exclusive right of the Sami people. This right can be utilized by those who are members in "Sami villages" (Länsstyrelsen Norrbotten 2020, 31). The Sami village is, in turn, made up of small family enterprises that work with reindeer husbandry. The Tornedalen 2020 area contains different kinds of Sami villages that are characterised by different migration routes of reindeer. Most of the land is made up of concessional areas, which contains many non-Sami reindeer herders. Most reindeer herders in these concession-areas see their trade as a spare-time occupation. More full-time reindeer husbandry can be seen up north.

The biggest source of income from reindeer husbandry comes from the meat production, but also the fur, leather and horns are utilized (Eriksson & Lundmark 2020, 33). In 2019 there were 30–180 people employed within the leader area (Eriksson & Lundmark 2020, 78). The uncertainty depends on the fact that the leader area does not encompass Kiruna municipality in its entirety. Most of the reindeer herding is carried out in that part of the LEADER-area.

The Sami villages represent the reindeer herding families within its area. The National Association of Swedish Sami (SSR) represent its member Sami villages nationally. The concessional areas, with the exception of one, are not represented by SSR (Svenska Samernas Riksförbund).

Food from the forest

Collection of berries and mushrooms is done by the locals for household use, but the largest amounts are gathered by foreign work force, whose visit is arranged by entrepreneurs in the Tornedalen area. There is also no substantial activity when it comes to refining collected raw materials in the area. A couple of small-scale producers make jams and marmalades of, for example, cloudberries, which then are sold in local shops (Interview 7). "Made in Tornedalen" is an economic association that promotes small-scale food production in the area.

Hunting is an important free time activity in the area, but also has the function of controlling the number of game species, to prevent both forest damages and traffic accidents. The hunting does therefore offer both substantial nature experiences, cultural values, food, and also damage control. Most hunters use their gained meat for household purposes, but some of it is sold. Most hunting is done by locals, even though some hunting tourism is present (Länsstyrelsen Norrbotten 2020, 33).

Tourism

Strengths for the tourism in the area are the midnight sun, the polar night, the large areas of untouched forests, fishing, hunting, the Sami trades, the culture and the fact that the area is crossed by the polar circle (Tornedalen2020, 2017, 11).

The tourism companies in Tornedalen are small-scale and often family enterprises. The cluster "Explore the North" are exceptional in the sense that they offer 500 beds all in all. Most enterprises have full-service facilities that can be operated all year around. The winter is, however, high season for international tourists: that is when the destinations can offer nature experiences such as the northern lights or dog sleighing. Only a few enterprises are solely activity based. A strong exception of cases is, however, Kalix Adventure Group, which consist of different small enterprises that offer different experiences.

Tourism companies in the area have the opportunity to become members in Heart of Lapland, a destination company that works with market development in the area.[15]

Opportunities and challenges

Potential of the forests
An unexploited tourism idea is that of proper nature guidance: such as guides for picking foods from the forests, and bird watching.

Collaboration tourism companies and Sami villages
There are some tourism companies that offer the visitors to see reindeer, especially in the winter as that is when the reindeer are gathered in their winter enclosures. The collaboration is not extensive, however, and there is an opportunity to develop it further. It is important to have a good communication from the beginning, since both trades have a risk of competing over land use.

Local food is a trend
Local specialities are increasingly demanded by tourists who want an authentic cultural experience. Tornedalen has an advantage with its cultural minorities and their distinctive foods.

[15] https://heartoflapland.com/

Space for establishment
As a tourist destination, Tornedalen is quite young, meaning that there is a capacity for more entrepreneurs to establish themselves and offer more activities for visitors and together offer even more complete experiences.

Investing capital
Is always a challenge. In northern Sweden tourism is also a young trade to be investing in.

Transportation
Tornedalen lies in the distant north of Sweden, and distances within the area are also long. It is difficult to travel there sustainably. The collective traffic is also scarce.

Collaboration with Finland
A strength of the Tornedalen area is the institutionalised collaboration with Finland. There is a possibility to further collaboration on certain places, mainly to be able to offer even more alternatives for the visitors, for example getting to visit two countries at the same trip.

4. North Karelia Biosphere Reserve (Finland)

The North Karelia Biosphere Reserve was designated by Unesco in 1992 and consists of the city of Lieksa, Ilomantsi municipality and the Tuupovaara district of the city of Joensuu. Biosphere reserve activities do, however, occur in the whole region of North Karelia. The biosphere reserve covers approximately 800,000 hectares (core areas 24,953 ha, buffer zones 22,779 ha, transition areas 750,000 ha). The forest land of the biosphere reserve covers 89% of the terrestrial area. Tourism, outdoor recreation, hunting, fishing and the collection of non-timber forest products are common practices in all zones of the biosphere reserve. Forestry and peat industry are important practices in the transition zones (Esselin & MacTaggart 2021, 16-17).

4.1 Wood North Karelia Biosphere Reserve

Forestry

North Karelia is by 89% covered by forests (Metsäkeskus 2020a, 8). 52% of the forest land is owned by private persons, but forest companies and the state are also substantial forest owners. The significance of forestry has slowly increased since the beginning of the 21st century.[16] Due to increased efficiency in forestry measures, the level of employment decreased after 2012 and is now stabilised at around 1,600 employees in the county (Wallius et al 2020, 18-19). The process of getting the trees from the forests to the users of the raw material, there are a number of available enterprises to be hired, all depending on what the wood is supposed to be used for. The enterprises offer services such as logging, transportation, evaluation, storage and long-distance transport (Jahkonen 2018, 9-10).

Private forest owners are organised through forestry associations (Metsänhoitoyhdistys, MHY). There are 59 forestry associations in Finland, one of which organises forest owners in North Karelia. The forestry associations are associated to The Central Union of Agricultural Producers and Forest Owners (MTK), which is the trade association for forestry (MHY.fi).

Forest bioeconomy is an important focus in the regional development of North Karelia, and forestry representatives are included in an expert panel for bioeconomy that works with the development programme of the region, POKAT.[17] Forestry is also represented in the regional forest council that produces forest programmes for the county.[18]

Wood Industry

The wood industry in North Karelia includes sawmills, planing mills, production of different panels of wood such as plywood, carpentry and production of wooden houses. In some cases, but not always, the production of furniture is also calculated into this category.

Wood industry, and especially sawmills, have long traditions in the county of North Karelia. In the beginning of the century, there were 1,600 within the trade in North Karelia. This number has dropped by a fourth as of today. In 2017, the wood industry employed 1,200 people in the province (Wallius et al 2020, 20-21). Some employers closing down has, however, decreased the amount with about a hundred as of today. Without counting the production of furniture, there were 107 workplaces for wood industry in the county in 2017. The furniture production sites were 22 (Metsäkeskus 2020a).

16 Statistics Finland typically calculates these two industries together. In North Karelia, this constellation is mainly dominated by forestry.
17 https://www.pohjois-karjala.fi/pokat2021
18 https://www.metsakeskus.fi/en/node/979

In the Regional Development programme supervised by the Regional Council, the wood industry is described as one of the most important trades in the region, and developing the trade is a part of their ambition to enhance the bioeconomy of the region (Pohjois-Karjalan Maakuntaliitto 2017, 33-34). The wood industry is represented in a bioeconomic advisory council connected with the regional development programme of North Karelia.[19] The wood industry is also represented in the regional forest council of North Karelia, the task of which is to produce forest programmes for five-year periods.[20]

Opportunities and challenges

Profitability for, and passivity among, small forest owners
A particular challenge is to make first time thinning and harvesting wood for energy use profitable, especially on small and remote lands. The generally small size of private forest properties affects the profitability, and the generational shifts shatter the lands even more. A related problem is also the passivity of private forest owners (Jahkonen 2018). Within the frame of the regional forest programme of North Karelia, this issue is approached by interaction with, and information addressed to, forest owners. This has to do with sustainable decision making related to forest ownership and inheritance. One ambition of the regional forest programme is to add a deadline in the law for the division of estates (Metsäkeskus 2020a, 15-16).

Recruitment of competent personnel
The forest industrial sector experiences difficulties in recruiting young people to the trade. Forestry work is also in large parts seasonal, meaning that it does not offer work for a full year. Possible solutions for this problem have been discussed in the forest strategy, including the development of a shorter educational programme for those in need of retraining, for example a one-year education for clearing. Another suggestion is to investigate the possibility of combining different seasonal jobs.

Forest damages
Forest damages caused by moose is a challenge for forest owners. In 2019, the Finnish Forest Centre estimated that moose had caused around 274 ha of damage in the region. The compensations for moose damages in North Karelia reached a total sum of 212,000 euros. New methods of forest management for preventing moose damages should be developed.

High costs for wood construction
The county has expressed a will to increase the use of wood in all construction. The biggest current obstacle is the cost of wood construction compared to using concrete (Pohjois-Karjalan maakuntaliitto 2021, 21).

Promotion of wood construction
The Finnish government promotes wood construction through its Wood building programme. It was launched in 2016 and will run until 2022. The promotion of the use of wood is to be done by strengthening the skills in the industry, updating legislation, and providing evidence-based information on wood construction. Government subsidies for municipally founded wood construction projects have also fitted within the frame of the programme.[21]

19 https://www.pohjois-karjala.fi/pokat2021
20 https://www.metsakeskus.fi/en/node/979
21 Finnish Ministry of the Environment, Wood Building Programme. Ym.fi. https://ym.fi/en/wood-building [retrieved 4.10.2021]

Digitization
2020–2025, a new programme for laser scanning of forests and production of data will be implemented. This will increase the precision of the forest data, and therefore enable even better services for forest owners. Through various digital solutions, forest owners and forestry entrepreneurs could utilize this new, enhanced data in their planning, which could bring new opportunities to the wood sector (Metsäkeskus 2020a).

Investments for the bioeconomy
A new growth package for the bioeconomy of the county was established in 2019, in which 350 million Euros worth of investments is to create more jobs and growth in the sector until the year 2030.[22]

Communication and marketing
Wood Joensuu works to show off the wood industry in the region by gathering all projects and happenings in one place.[23]

4.2 Non-wood North Karelia Biosphere Reserve

Food from the forest

The most common non-wood products in Finland are berries and mushrooms. The collection of birch sap is an old Finnish tradition, and its commercial use has increased dramatically during the last years (Wallius et al 2020, 28). Berries that are most picked for commercial use are blueberries and lingonberries, and the cep is the most picked mushroom (LUKE 2016).

In Finland, the amount of berries is calculated per "large areas". The area that contains North Karelia also contains South Karelia, North and South Savo and Central Finland. More detailed information on the trade income of solely the berries and mushrooms from North Karelia is not available. The harvest varies from year to year, which affects the total income. 2018 was a year with a good berry harvest, and from this area in east Finland, 1,3 million kilograms of blueberries ended up in sales. This made up 22% of all berries sold in Finland. 90% of the berries are picked by foreign work force. Most mushrooms ending up in sales is picked in East Finland. In 2018 it was 89%. In 2019, there were 34 enterprises specialising in natural products in North Karelia (Wallius et al 2020, 29-30). Many of the Non wood producers are members of the nationwide association Arktiset Aromit, the aim of which is to promote gathering, processing and use of natural products, as well as to improve their quality.24

Tourism

Tourism related to nature and food are special strengths of the area. The versatile nature in North Karelia, three national parks and good structures enabling movement in the nature, make good preconditions for nature tourism. There are more than 7,000 kilometres of recreational routes in North Karelia, of which 1,500 kilometres are hiking trails (Pohjois-Karjalan maakuntaliitto 2017b, 31). The food culture in North Karelia is also a special one, and many famous dishes originate from the area, such as Karelian Pirogi. The tourism in North Karelia has for a long time relied heavily on a Russian customer base. In 2016, the sales of the tourism businesses in North Karelia reached 152 million Euros and employed 1,508 people (Metsäkeskus 2020a, 25).

22https://www.pohjois-karjala.fi/documents/33565/34097/Metsa%CC%88biotalouden+kasvupaketti_final%5B6%5D.pdf/3667cb88-1df4-cb0c-0a8d-487d3c2fc451
23 https://woodjoensuu.fi/
24 https://www.arktisetaromit.fi/en/association/

Many of the tourism companies in the area are micro-firms, with 1–3 employees. These usually offer places to sleep in combination with organised activities. There are also initiatives to take advantage of traditional Karelian culture in different forms, even though the traditions are not as preserved on the Finnish side as it is on the Russian side. Examples of companies are Puukarin Pysäkki which offers a place to stay and experience traditional knowledge, such as Karelian cooking or herbology.[25] A case of best practice in nature tourism is the company Äksyt Ämmät and its cluster of businesses. Äksyt Ämmät provides nature-oriented holidays in an environmentally friendly context, combining services from different businesses to make a complete experience for their customers. For example, the different companies arrange joint cross-country skiing, kayaking, and bicycling from inn to inn (Regional Council of North Karelia 2019, 14).

The main collaborative network for the development of tourism in North Karelia is Visit Karelia, which is a regional part of Visit Finland. There are, however, also other projects such as *Lakeland Finland* where North Karelia is advertised as a tourist destination together with its neighbouring counties (Pohjois-Karjalan Maakuntaliitto 2017a, 40). The biosphere reserve gathers enterprises interested in sustainable development in the area, of which a substantial number are tourism and dining enterprises, in its sustainable partnership network. So far, the activity in the network has been heavily dependent on the activity of the different members, but post-covid development has been undertaken. International cooperation is done, for example, through the Fennoscandian green belt. Through EU:s CBC Karelia funding programme, collaboration projects have been done with the Russians. As an example, SUPER (Sustainability Under Pressure: Environmental Resilience in Natural and Cultural Heritage Areas With Intensive Regreation) was a project in planning tourism in a way that it causes the least possible damage to nature.

Opportunities and challenges

Added value from forest products
Today, non-wood products such as berries and mushrooms have no weight in forestry, the purpose of which is to produce timber. Because of the right of public access, the forest owner does not get any part of the profit from picking natural products. However, the production of wood and non-wood products are not conflicting, which means that there is a potential in more efficient co-production (LUKE 2016). There has also been a project driven by the Finnish forest centre and financed by the EU, LULUME, that aimed to enhance the production of organic products by certifying areas as organic collecting areas. An organic collecting area is an area in which collection of plants and plant-parts is certified with organic production.[26]

Networking
In the strategic documents concerning non-wood products and services, the need for internationalization is apparent. The non-wood enterprises are usually small and have no interest in growing or internationalizing. These enterprises do, however, have special knowledge that, together with bigger and international agents, would make a growing non-wood industry possible. The LUTU-project, driven by LUKE and the university of east Finland, aims to enhance the growing of business networks and the preparedness of international activity. The ground thought is that the enterprises cannot grow internationally on their own or act alone on an international market. Therefore, networks are needed. The long-term goal of the project is growing and resilient value networks in the area. The project contains a first part, in which the existing value networks are mapped. The second part of the project aims to spread the results and knowledge through workshops in North Karelia and South–eastern Finland. The project runs from 2019–2021.[27]

25 https://www.puukarinpysakki.com/huvit/
26 https://www.metsakeskus.fi/en/node/1097
27 https://uefconnect.uef.fi/tutkimusryhma/luonnontuotealan-rajat-rikkova-liiketoimintaekosysteemi/

Recruitment
The collection of natural products is rarely an alternative for a full-time job. Therefore, the possibility of combining different seasonal jobs in the non-wood sector, such as berry picking and tourism, has been discussed. The regional forest council has suggested a course in international natural product-enterprises. Existing international actors could be used as sparring partners in education.

Travel certifications
Labels of different kind help promoting companies and destinations both nationally and abroad. One such label, Sustainable Travel Finland, is granted by the organization Visit Finland. One of the criteria for getting it, however, is that the company has some kind of certificate of its sustainability (Ekokompassi, Green Key, ISO 14001 etc.). Visit Karelia is working on this issue in the region.

Growing interest in natural products
In recent years, the interest of natural products has developed in a favourable direction for the non-wood industry. The interest in things such as makeup and medicine produced from natural products may enable the use of forests as a source of non-wood products (Wallius et al 2020, 12).

Possibilities for increased collection
The portion of the annual harvest that is picked is very low. Therefore, the prospect of increasing the harvest is there. The natural products found in North Karelia are most often exported as raw products. By refining them, the added value would be higher (LUKE 2016).

5. Rokua Geopark (Finland)

Rokua Global Geopark was designated by Unesco in 2015. It is located in Finland about 200 kilometres south of the arctic circle. Rokua Geopark covers around 1,300 square kilometres in three municipalities: Muhos, Utajärvi and Vaala, and crosses the border of two counties: Northern Ostrobothnia and Kainuu (Rokuageopark.fi). Two significant urban centres of north Finland are located on both sides of the Geopark: Oulu to the northwest and Kajaani to the southeast. The geopark includes several bedrock sites, showing examples of the main development stages of the Fennoscandian bedrock area and a diverse range of landscape forms formed during the time of the ancient continental ice sheet and its melting stage as well as during the following uplift process. Forests cover approximately 70% of the three geopark municipalities.

Rokua Geopark operates closely with local schools and other educational institutions. Education and workshops are organized for both teachers and pupils. The geopark also operates with local businesses and has created a group consisting of 40 companies to discuss the development of the trade in the area. These companies have agreed to follow the rules of Rokua Geopark, and have therefore achieved the status of Unesco global geopark companies (UNESCO, Rokua UNESCO global geopark).

5.1 Wood Rokua Geopark

Forestry

In the three geopark municipalities, there are 236,544 ha of forest land, covering 66–75% of the total area of the municipalities. The dominant tree type is pine, making up 80% of the total stock. (LUKE, 2019). Private forest owners are generally helped out in their forest management by professionals in the form of entrepreneurs (Metsäkeskus 2020).

Private forest owners in Finland are organised through 59 forestry associations. The forestry associations are associated to MTK, which is the trade association for forestry (MHY.fi*).* Forestry entrepreneurs are represented by Koneyrittäjät ry (lit. Machine entrepreneurs). These organisations represent the forestry sector in the Regional Forest Council of Northern Ostrobothnia (Metsäkeskus 2021). The council consists of different stakeholders in the Northern Ostrobothnian forests and is tasked with formulating a development strategy for the forest every four years.[28]

Wood industry

North Ostrobothnia has a substantial amount of wood industries. The sawmills and wooden house manufacturing are mainly family companies with an employment rate that varies from just a couple to 100 people. In addition, numerous small-scale enterprises produce wooden doors, windows, furniture and various carpentry (Pohjois-Pohjanmaan Liitto 2014, 14). The wood industry has, however, been left in the shadow of the chemical industries and biorefineries. On the other hand, the wood industries are more evenly distributed across the county, and the value of the production is distributed more evenly, since the wood construction is mainly a local business (Pohjois-Pohjanmaan Liitto, 2018,16). An example of a wood manufacturer that also is a GeoPark company is Laserwood in Muhos.[29]

[28] https://www.metsakeskus.fi/en/node/979
29http://www.laserpojat.fi/

Woodpolis is an organisation promoting the woodworking industry in Kuhmo. The organisation has a partner network consisting of companies and educational institutes.[30] In addition to Woodpolis, the wood industry in the county is represented by Metsäteollisuus ry (lit. Forest industries) in the regional forest councils in North Ostrobothnia and Kainuu regions (Metsäkeskus 2021). The regional Centres for Economic Development, Transport and Environment include forestry actors in groups concerning water management and traffic. A wider range of business sectors meet in advisory boards and county co-operational boards (Metsäkeskus 2020b, 25).

Opportunities and challenges

Need for workers
Wood-related trades experience difficulties in recruiting enough employees to the industry, even though some recruitment has been done of foreign work force. The education to forest industries is done by vocational schools, and these strive to increase the time of practice in the companies. However, the challenge is to resource the supervision and equipment (Metsäkeskus 2020b,25).

Inefficient property forms
Some properties are small and shattered, making it difficult to manage and utilize. There have been attempts to ease the situation by unifying plots and by creating forest commons (Metsäkeskus 2020b, 10).

Increased demand for forest raw material
Substantial users of raw wood material in the county are sawmills and the Stora Enso-factory in Oulu. That Stora Enso is going to develop its factory to also produce carton, which will increase the use of pulp wood. Investments made in the sawmills will increase the utilization capacity of timber. The local energy company Oulun Energia also has plans to move over to more wood-based energy production in the wake of the opening of its new bio-power station (Metsäkeskus 2020b, 6).

Digitization
The digital forest and nature data covers the lands of almost all forest owners in the area. The databases of forest information have enabled the planning of forest management and logging and the increase efficiency of these processes. The possibilities of AI are also considered. The increased digitalization offers forest owners and professionals an opportunity to increased finding of information, information sharing and interaction (Metsäkeskus 2020b, 7).

Need for diversified products
A challenge in the value chain of wood refinement is the diversifying of the use of wood raw material and increase of added value. Since North Ostrobothnia is, at some places, covered in peatlands, some forests consist of trees with smaller diameters. The use of smaller sized trees should therefore be increased, for example within the furniture industry (Pohjois-Pohjanmaan liitto, 6).

5.2 Non-wood Rokua Geopark

Reindeer herding

The northern part of Utajärvi is a part of the Pudasjärvi Reindeer herding area (paliskunta). These reindeer herding areas are associations formed by their shareholders: the reindeer herders and their families. The area includes Pudasjärvi municipality and the northern part of Utajärvi municipality. The area stretches around 2006,3 km^2 and includes 67 reindeer herders.

[30] https://www.woodpolis.fi/in-english/

The reindeer herding contributes to the rural economy and is an important part of the tourism industry in the area (Pohjois-pohjanmaan liitto 2014, 12).

Within the reindeer herding area, there are several Natura 2000-related protected mire areas. Because of the area being rich with swamps, the activities of the reindeer husbandry are strained by the resulting peat production (Paliskuntain yhdistys). Also, the use of land related to agricultural practices is a challenge (Pohjois-pohjanmaan liitto 2014, 12). To fit together the trades of reindeer husbandry and forestry, the reindeer herding areas and the forest agency do regular co-operations. Information material on how the needs of reindeer husbandry is taken into consideration in forestry have been made. Also, LUKE has investigated the restoration of abandoned peat production lands into reindeer grazing areas (Metsäkeskus 2020b, 21).

Food from the forest

In the county of North Ostrobothnia the production of natural products is small scale, and the available raw material is not fully utilized. The term natural products in this case includes wild berries, mushrooms, herbs and special products such as tar, sap, resin and peat. The enterprising in the area deals mainly with collecting and refining berries and wild herbs, and the enterprises are mainly self-employed (Pohjois-Pohjanmaan Liitto 2017, 21). The collection of natural products is a natural and important part of the lives of the local population. The commercial collection of natural berries is, however, mainly carried out by foreign work force. According to the development strategy for the bioeconomy of the county, the demand for wild herbs and chaga fungus has increased among restaurants (Pohjois Pohjanmaan Liitto 2014, 12). The degree of refinement of natural berries in the county is low. (Pohjois-Pohjanmaan liitto 2014, 22). Hunting is also an important activity around the geopark. The Oulu region of the Finnish Wildlife Agency contains around 42,000 hunters (Metsäkeskus 2020b, 21).

The trade representative and organization Arktiset Aromit is a nation-wide organisation for producers of natural products. In the Oulu region, which officially also includes the western parts of the Geopark, there has also been a project to facilitate more networking among natural product producers (Siira-Pietikäinen 2020). The project that ran from 2017 to 2020 was, according to the final report, a success in many ways. The project team fears though that the sudden corona pandemic might have stalled the evolvement.

Enterprises that produce food in the area of the Geopark according to the rules of the geopark, can be granted the label “Geofood”.[31]

Tourism

The area that today is Rokua Geopark has been a tourist destination since at least the 1950’s, when Rokua national park was established in 1956. The area around the lake Oulujärvi is a well-known cottage area, and Muhos has culturally significant sights. The basis of Geopark activity is telling the story of the birth of planet earth, all through the arrival of the humans and to the forming of cultures. The Muhos-formation, a rock formation found in the Oulujoki river basin, is essential in telling the history of Rokua. The Rokua esker formations continue all the way to Oulujärvi, where also the oldest rock ground in Europe can be found (Saastamoinen 2019, 42-44). In addition to nature tourism, the area has invested in educational traveling and its development (Pohjois-Pohjanmaan liitto 2020, 12).

31 https://www.rokuageopark.fi/en/experience/geofood

Rokua Geopark works as a collaboration network for the enterprises and municipalities in the area and aims to facilitate an open discussion about the needs for development of tourism. Rokua Geopark has been a part of numerous projects for developing local tourism. The Geofood-project, for example, strived to link together food and tourism in a way that offered tourists food made from local raw materials (Saastamoinen 2019, 45).

Opportunities and challenges

Access to more raw material is needed
The nature product trade lacks developed chains for acquiring raw materials and enough organic collection sites, which poses a challenge for a trade that is trying to expand and within which new companies are started up. Forest owners and related practitioners are increasingly interested in multiple use of forests, production of natural products and offering nature related services, for example in combining the production of resin and chaga mushrooms with regular forestry. However, only a part of the forest owners has knowledge about the option to register their forest as an organic collection site. To secure the supply of raw materials, there is a need for increased information to forest owners about their options to register their forests as organic collection areas (Metsäkeskus 2020b, 20).

Opportunities in digitization
Digitalization is a substantial advantage for tourism. Even if there are groups of tourists who choose nature destinations in order to get away from technology, there is an increasing demand for digital services. (Pohjois-Pohjanmaan Liitto 2020, 7). The collection of natural products has also found advantages through digital collector's registers. [32] It maps collecting areas and facilitates the certifying of organic collection sites.

Favourable trends among tourists
Trends among the tourists are favourable for the area of Rokua. Clean forests, waters and air are attractive on the travel market. These are also factors that are brought forth in advertising. (Metsäkeskus 2020b, 20). The factors of wellbeing and safety are pointed out as drivers for the choice of destination. The climate change also affects the future choices of tourists. The ecological perspective is, therefore, already apparent in the priorities of tourists, but also social responsibility. Tourists are increasingly aware of how the travel is made, how the locals and local nature are respected to avoid a negative imprint (Pohjois-Pohjanmaan Liitto 2020, 7). Climate-conscious tourists also want to travel more on home turf (Metsäkeskus 2020b,20).

Existing networks
Rokua Geopark functions as a networking platform for the businesses within the area. According to a study made on the subject, this networking has at times been very effective. However, the actors have identified a need to unite different services and experiences to create broader experiences for the tourists. The preconditions for this are good, as the Geopark offers the businesses a collective image (Saastamoinen 2019,75).

Possibility for development of natural products
The refinement of wild berries in the area is currently low, but as the interest for natural products increases, there is potential for development and growth. The entrepreneurs need help with developing channels for advertising.

32 https://www.keraaja.fi/

6. Sør–Varanger kommune (Norway)

Sør–Varanger kommune is a municipality in the county of Troms og Finnmark in Norway. It is a land area of 3,459 km² wedged between Finland in the southwest and Russia to the southeast. The landscape in the northern part of the municipality is cut by fjords, with many islands. The rest is relatively flat, with smaller hills. The southern part, Pasvik, is more forested, and has several protected areas with old-growth forest (Askheim 2021). The national park, Øvre Pasvik Nasjonalpark, Pasvik Nature Reserve and Øvre Pasvik Landscape Protection Area are a part of Pasvik-Inari Trilateral park, which is a collaboration on forest management and tourism between Norway, Finland and Russia. Approximately 24% of the Troms og Finnmark county is covered with forests. Tourism, outdoor recreation, fishing and reindeer herding are common land-use practices in the area.

6.1 Wood Sør–Varanger kommune

Forestry

The most dominant kind of tree is birch, which makes up 73% of the trees in the county (Statsforvalteren Troms og Finnmark). Forestry is a minor business in the area. Thinning is the main occurring forestry measure, and the wood mainly goes to the local heating plant, Garnisonen in Sør-Varanger. Micro companies, such as Pasvik Biovarme AS,[33] can be found to carry out forestry measures. According to an estimation based on Norwegian Official Statistics and information from the County Governor, the employment in the trade only includes 3–10 people in total (Statistisk Sentralbyrå).

Finnmarkseiendommen Finnmárkkuopmodat (FeFo) is a state company that owns 95% of the land in all Finnmark county, making them the second largest property owner in the country.[34] This relation also applies to the Sør-Varanger municipality, where most of the land is owned by FeFo, apart from a few privately owned forests in the north of the municipality (Interview 5).

There is no established network for the forestry sector in Sør-Varanger specifically, but the forestry and wood industries in the county of Troms og Finnmark have a tight cooperation through Finnmark Treforum, that gathers all actors in the trade. A wider cooperation is done through Kystskogbruket, that also gathers all forestry along the Norwegian coast. Projects within this cooperation include strengthening the value chains between the forestry and wood industries, which has been identified as a challenge in many of the coastal regions in Norway.[35]

Wood industry

In the Troms og Finnmark county, there is no major industry or sawmill that buys the local timber. However, there are several smaller sawmills that process and sell lumber and special products locally. Finnmark Treforum, which is the main forum for forestry and wood industries in the area, has registered 13 enterprises in the trade in Sør-Varanger municipality (Finnmarktrerforum.no). Wood products offered by these enterprises range from small-scale sawmills, building of cottages to carpentry. As an example of a well-established enterprise in the municipality, Heimo Johansen Byggsenter makes pre-cut building sets for cottages, making it easy for private persons to assemble their own cabin. According to Norwegian Official statistics, these enterprises together employ around 7 people in total (Statistisk Sentralbyrå b).

33 http://www.pasvikbiovarme.no/index.htm
34 https://www.fefo.no/om-fefo/
35 https://kystskogbruket.no/prosjekt/fou-innovasjon-og-trebruk/

There is no locally established collaboration between the wood industries in Sør-Varanger, but Finnmark Treforum organises forestry and wood–industries on the county level. This association is a member in Skogsnæringa Kyst, which represents all organisations by the coast, from Finnmark in the north to Agder in the South (Statsforvalteren i Troms og Finnmark). A nation-wide network pushing for an increased construction with wood, Tredrivere, also has a section working in Troms og Finnmark specifically.[36]

Opportunities and challenges

Forest damages
Climate change, resulting in a warmer climate, has increased the risk for forest damage caused by pests. In Finnmark, large areas of deciduous woods have been damaged by winter moths.

Organised interest
Even though the forestry and wood industries are small and few in Sør-Varanger, there are organizations representing them both regionally, in Finnmark treforum, and nationally, through Kystskogbruket.

Incomplete value chains
According to the cooperation Kystskogbruket, the value chains that supply raw material are incomplete in its member regions. Therefore, the organization emphasizes the need for further networking between the organizations for forestry and those of the wood industry.

Wood construction
Both the networks of Tredrivere and Kystskogsbruket work to facilitate an increase of the use of wood in large scale constructions.

Use of Norwegian wood in carpentry
According to Kystskogsbruket, only a few of the many furniture manufacturers use wood from Norway in their products. They have, therefore, started a project on local value chains to connect them to the furniture producers.[37]

6.2 Non–wood Sør–Varanger kommune

Reindeer husbandry

The reindeer husbandry in Finnmark makes up approximately 70% of the trade in the whole country. In total, there are 37 reindeer herding districts in Finnmark. All districts have a popularly elected leadership that also represents the interests of the group. A condition for managing reindeer herding is that it is done within the share of a Siida. A Siida share resembles a concession for reindeer husbandry, and is a personal right, but does commonly have several members. Usually, reindeer husbandry is carried out as a family business (Fylkesmannen I Finnmark).

Sør-Varanger is a part of Polmak/Varanger reindeer herding area. Four districts can be found within the municipality. These are Sør-Varanger vinterbeite, Pasvik, Østre Sør-Varanger and Vestre Sør-Varanger (Reinbase a). In all Polmak-Varanger there were 24,124 reindeer in the spring herd, 2016–17.

36 https://www.innovasjonnorge.no/no/tjenester/innovasjon-og-utvikling/finansiering-for-innovasjon-og-utvikling/tilskudd-til-innovativt-bruk-av-tre/tredrivere/
37 https://kystskogbruket.no/2548-2/

A more accurate number for Sør-Varanger specifically, even if it is based on older calculations, is around 5,000 reindeer (Reinbase b).

Food from the forest

The food production from forests in Sør-Varanger includes berries, mushrooms and herbs. There is also a significant production of meat from reindeer and some from moose. The tourism sector generally uses local food as a part of their offered experiences (Interview 6).

To increase the picking of berries in the northern parts of Norway, the ten northernmost Outdoor recreation boards in Norway launched the project *Ut og Plukk* (Go out and collect). It is a website where people can register how much berries they have collected and where. This also allows for the public to see how much has been collected around the different areas. To further motivate people to participate, the project rewarded the best pickers with mugs that were specially designed for the competition, with berry motifs painted by a local artist (Sør-Varanger Kommune).[38]

There is a food and tourism strategy for Troms og Finnmark, which is a collaboration between by the Fylkeskommune, Fylkesmannen, Innovasjon Norge Arktis, NIBIO and Norges Råfisklag (Troms og Finnmark Fylkeskommune 2020).

Tourism

Sør-Varanger is, according to data from 2015, the second most profitable tourist destination in Finnmark, after Alta (Finnmark Fylkeskommune 2019, 5). The primary goal of tourists coming to the northern parts of Norway is to experience the nature: the northern light, the fjords and the mountains. The tourists want an active vacation. The cruising route *Hurtigruten* has an inlet in Kirkenes, the largest city in Sør–Varanger, which enables a stable inflow of tourists to the destination (Finnmark Fylkeskommune 2019, 11).

The SMEs specialized in tourism in the area offer services such as hiking, dog-sleighing, snow mobiles and king crab fishing. Tourism companies also take advantage of the municipality's location between Finland and Russia, enabling experiences that include visits to multiple countries. One example is Pasvikturist, a small company that offers sightseeing tours both in Kirkenes, in the Pasvik National park and also in Russia.[39]

Nordnorsk Reiseliv is an association with a goal of establishing northern Norway (Troms og Finnmark and Nordland counties) as a whole-year travel destination by advertising and development of businesses.

Opportunities and Challenges

Few Actors
Large geographical area with small and fragmented actors. The manufacturers are far from each other, but also far from the market.

Foreign actors compete with locals
According to the county, foreign actors with no local connection or adequate competence are a challenge for the local tourism sector. Examples of this are unlicensed fishing or guided tours without safety evaluations (Finnmark Fylkeskommune 2019, 12).

38 https://www.sor-varanger.kommune.no/fram-med-baerplukkeren.5896182-17830.html
39 https://pasvikturist.no/

Work force and education
The tourism industry in Sør-Varanger, and Norway in general, is largely staffed with seasonal workers. The industry also has a low level of education in comparison to other industries. A precondition for further development of the tourist industry in the municipality is access to competent employees. To a degree, this competence can be found or educated in the area. The development of the demography in North Norway does, however, imply that work force also should be attracted from elsewhere.

Potential for collaboration between non-wood trades
As has been pointed out in the local food strategy of Finnmark, by regarding tourism as a market for their products, there is an opportunity for local food producers to reach out to new markets.

7. Metsola Biosphere Reserve (Russia)

The Metsola Biosphere Reserve is located in the Republic of Karelia in Russia, at the border to Finland. It was designated by UNESCO in 2017 and covers an area of approximately 400,000 hectares (core areas 123,613 ha, buffer zones 70,275 ha, and transition zones 210,725 ha). The Biosphere Reserve comprises Kostomuksha Nature Reserve, Kalevalsky National Park and Kostomuksha urban district. The Kostomuksha Nature reserve was established in 1983 and has since 1990 been the Russian part of the Russo-Finnish Friendship Park. Kalevalsky National Park was added to the Nature Reserve in 2015. The Biosphere Reserve contains a wide range of typical and unique north-taiga ecosystems. 86% of the area is constituted by pine forest and the Biosphere Reserve contains one of the oldest intact north-taiga forests in Northwest Russia (Esselin & MacTaggart 2021, 36*).* Important economic activities in the landscape are forestry, tourism, agriculture, fishing, hunting, gathering of non-timber forest products and mining. The processing plant Karelskiy okatysh is a major employer in the area.

7.1 Wood Metsola Biosphere Reserve

Forestry

Practically all forest land in Russia is owned by the Russian Federation and leased on long term contracts for 10–49 years. In some exceptional cases, forests have been leased for shorter periods on a "purchase contract". However, the conditions for these short contracts were tightened in 2009, which mainly affected small-scale logging companies (Karvinen et al 2011, 63). Large scale wood harvesting companies therefore have a dominant position in the forestry sector in the area. There are smaller, independent logging companies in Northwest Russia, but low profitability drives many of them to merge with larger corporations (Karvinen et al 2011, 71).

Cross-border collaboration with Finland is common in the area, not least through projects related to forestry. In order to take advantage of competences on both sides of the border, a project called Bofori was launched through EU's CBC Karelia funding programme. The aim of it is to support the cross-border trade of forestry SMEs. The project establishes a model for cross-border services and works with new services related to forest information.[40]

Wood industry

The production of value-added forest products in the Russian Federation is concentrated to the European part of the federation. In the Republic of Karelia, the forest industry is therefore one of the most important branches of industry (Karvinen et al 2011,89-90). Kostomuksha Construction Company and Fintec are examples of big forest industrial companies in the Kostomuksha area (Savaliev, Kolesnikov & Mikhel 2015, 20).

Unfortunately, we have not succeeded in finding wood industrial SMEs located around the Metsola area in this project. This could be a consequence of small actors focusing their activities on a local customer base, and our knowledge of the Russian language being too limited to find them on the internet.

The construction of wooden houses is increasingly popular in the Republic of Karelia and the whole of Russia. This is due to the high demand for new housing to replace poor quality housing stock, but also its low cost. A state programme for emergency resettlement of people from dilapidated housing

40 https://www.kareliacbc.fi/en/projects/boosting-forest-cluster-sme-business-two-karelias-bofori-ka4002#project

has been going from 2014. By 2018, 8,300 people in Karelia had received new apartments. A new programme from 2019 is predicted to resettle 9,000 people before 2025 (Berlina & Trubin 2019, 19-20).

Opportunities and challenges

Wood construction
The construction of wooden housing is increasingly popular in Karelia, which should pose an opportunity for development of the local forestry and wood industries.

Recruitment of new employees
Shortage of employees on all skill levels could be a challenge. The area has a constant outflow of young people and distribution of educational resources in the territory is uneven. The available labour is cheap, however, which has not facilitated the modernizing of machinery and intensifying of business activities. The logging companies also do not want to educate temporary workers (Karvinen et al 2011, 79).

Forest damages
The main natural disturbance in the area is wildfires, with other damage forms only being minor in comparison (Lerink et al 2020, 78). The number and intensity of wildfires are expected to increase in Russia due to climate change. Also storms and pests are expected to increase in general (Leskinen et al 2020, 132).

Underdeveloped infrastructure
An underdeveloped road network is a challenge for both the availability of forest resources, but also measures for protection. This challenge concerns both the construction of new forest roads, but also the reconstruction of old roads and bridges to be able to handle heavy vehicles (Savaliev, Kolesnikov & Mikhel 2015, 33).

7.2 Non-wood Metsola Biosphere Reserve

Food from the forest

The Karelian forests are rich with non-wood resources, such as mushrooms, berries and medical plants. Also, the collection of sap and resin are common (Karvinen et al 2004, 17). Forests can be leased for collection of non-wood forest products for commercial purposes. Private citizens are also allowed to collect forest products for personal use. Berries and mushrooms make up a significant supplement in the diets of many Russians (Karvinen et al 2011, 79-80).

Collection of berries and mushrooms for personal use and for sale is common, but there is no centralized purchasing system, which means that the collectors have to bring their products to the market by themselves. A way on which this is solved is that small and medium sized enterprises come up with trading points where they can sell their products during the peak season. There are enterprises that process and preserve the picked material and have developed an infrastructure for gaining these materials, a Karelian example of which is Zagotprom. The majority of the enterprises operate without an established network, however. The collected products are mostly sold unprocessed directly to food, alcohol, and medicine producers (Karvinen et al 2011, 80).

Karelia Berries LLC has their production units located in Kostomuksha. This company provide producers and restaurants with frozen, dried, and pulverized berries as well as mushrooms. They have a

well-established infrastructure for securing the forest products, as they both employ seasonal berry pickers and buy harvests from the local population.[41]

Tourism

The Republic of Karelia has a strong tourism image. Some of its selling points are its many lakes. Accommodations in the area are often built in the proximity of a lake, surrounded by forests. A variation of accommodations is offered in the area, from tourist cottages and hotels to houses shared with hosting families. Accommodations are usually located close to rural settlements, because the lack of roads in areas outside of them (Savaliev, Kolesnikov & Mikhel 2015, 33-34).

The capacity of tourist accommodation is relatively high in the Kostomuksha region. A structural explanation for this is that the district has a direct road connection to Finland. The feature of "borderness" is a competitional perk, just as the remoteness of the area seen to the big cities in Russia (Savaliev, Kolesnikov & Mikhel 2015, 35). Through the collaboration CBC Karelia, an online service has been developed for a smoother booking of accommodation in both North Karelia and the Republic of Karelia.[42]

Active and nature-based tourism are the most popular reason for visiting Karelia, as it has rich natural resources and three national parks in total. The most tourism activity is developed for the summer season, while alternatives in the winter are underdeveloped. Karelia is also largely situated in a rural area, with opportunities for rural tourism in culturally interesting areas. However, the rural areas cannot provide a whole package, which usually is demanded of tourists, such as internet (Yurinevna 2011, 62-63).

To develop cooperation between tourism SMEs in Finland and Russia, Karelia CBC hosts the project TouriSME. The aim is to improve the capability of these SMEs to create border-crossing services for international tourists by finding new partners, getting training on new types of services and finally by piloting new services or enterprises.[43]

Opportunities and challenges

Increasing interest among customers
There is an increasing demand for authentic and environmentally friendly products, which makes up a good potential for niche products with a typical Karelian touch. Linkages between local food, tourism, recreation could be developed to offer visitors a Karelian experience (Berlina & Trubin 2019, 38).

Undeveloped opportunities in the rural areas
The interest for rural tourism is ever growing, both among national and international tourists. However, many of the rural areas in Karelia lack comforts that are essential for many tourists, such as internet access.

Border region controls
Tourism development in the border regions having nature parks and reserves is regulated by a number of documents concerning visits, economic activity and border control procedures.

41 https://frombio.com/#
42 https://wildacha.ru/
43 https://www.kareliacbc.fi/en/projects/tourism-cooperation-between-smes#home

Opportunity in increasing collection

Even though there are no available Russian statistics on collected non-wood products, most of the annual crop of berries and mushrooms are estimated to be left in the forest (Karvinen et al 2011, 80).

8. Vodlozersky Biosphere Reserve (Russia)

The Vodlozersky Biosphere Reserve is located in north-west Russia, in both the Republic of Karelia and the Archangel district. It was designated by Unesco in 2001 and covers approximately 865,000 ha (core areas 99,453 ha, buffer zones 315,657 ha, and transition areas 450,000 ha). It contains the Vodlozero National Park. The area is by 47% covered by forests, and substantially by bogs, rivers and lakes. The national park area includes Lake Vodlozero, the river basin of the Ileksa river, and the upper course of the Vodla river. The forested landscape is intersected by areas of traditional substinence farming (Esselin & MacTaggart 2021,31). Other common land-use activities are forestry and the collection of non-timber forest products.

8.1 Wood Vodlozersky Biosphere Reserve

Forestry

The largest part of the territory is constituted by mid-latitude and northern taiga forests dominated by boreal conifers. There are, however, also elements of birch and aspen. All Russian forests are owned by the Russian Federation and leased on long-term contracts. Only in exceptional cases the forests are leased on shorter contracts, which affects the preconditions for small-scale logging companies (Karvinen et al 2011, 63). During the Soviet era many Russian regions, including Arkhangelsk, were intensively exploited. The state of the forests has generally improved since the 1990's, and the forestry businesses in the region claim to prioritize forest restauration (Berlina & Trubin 2018, 4).

Most of the logging areas around the biosphere reserve are used by Segezha group (Perekopskaya & Alekseev 2019, 5). Even though logging is carried out in the area, the main activity is concentrated to north-eastern Arkhangelsk (Berlina & Trubin 2018, 4). Arkhangelsk region has the biggest timber industry complex in the north-western Federal district. The timber Industry is the dominant sector in the regional economy and is mainly export-oriented. The majority of the logging is done by large companies, but the number of SMEs has increased in the timber industry. The SMEs are mainly involved with logging, lumber, planing, wooden buildings and manufacturing (Berlina & Trubin 2018, 7).

Wood industry

The cluster PomorInovaLes brings together 37 companies in the timber industry. The largest companies in the cluster are APPM, TITAN Group, Arkhbum pulp mill holding and Sawmill 25. The rest of the members are SMEs spread all across the region. These work within, for example, paper, timber, plywood, furniture, wooden houses and pellets. The cluster is an innovation-driven cooperative, one of the first of its kind in Russia, and has received strong support from relevant authorities in the region. The purpose of this cluster is to create an environment for new innovations and improvement of the performance of all enterprises in the cluster (Berlina & Trubin 2018, 15-16).

Opportunities and challenges

Wood construction
Wood based housing construction is a promising area in the bioeconomy that has been increasingly promoted in Russia and in Arkhangelsk oblast (Berlina & Trubin 2018, 7). However, multi storey wooden houses are not built in general. The main constraint is an outdated fire safety regulation that, until recently, prohibited the construction of houses with more than 3 storeys (Nordregio).

Low supply of wood in the domestic processing market
Even though the region has vast forest resources and an increasing interest in wood-based construction, the domestic market is not attractive for wood suppliers compared to the export market. This has resulted in the domestic market experiencing a shortage for wood as building material (Nordregio).

Scarcity of special competence
In addition to obsolete regulations concerning wood construction, the trade in the area lacks the appropriate competence. This deficiency is especially acute when it comes to specialists to use new technology for the construction of wooden buildings. There are also few professional architects and designers (Nordregio).

Lack of young work force
This area in Archangelsk is located in a rural area, which accordingly suffers from negative migration trends. There is an obviously low interest among the younger generations to work in the forest industries. This results in a tangible age gap in qualified staff and a lack of younger professionals (Berlina & Trubin 2018, 22)

Forest fires
The main natural disturbance in the area is wildfires, with other damage forms only being minor in comparison (Leskinen et al 2020, 78).

8.2 Non-wood Vodlozersky Biosphere Reserve

Food from the forest

The forests in the area are rich with non-wood resources, such as mushrooms, berries and medical plants (as food from forests in Vodlozersky share many common conditions with Metsola, se information in the Metsola chapter).

Tourism

As of today, tourism is the strength in the Arkhangelsk region. The region has a rich natural and cultural heritage and therefore nature and cultural tourism are seen as special interests in the tourism industry of the region. Most companies in the region are small, with an average of five employees, and the majority of them focus on domestic tourism (Kohllechner- Autto 2011, 5).

Opportunities and challenges

Insufficient infrastructure
The Arkhangelsk region lacks the sufficient infrastructure for nature tourism. This includes transportation, but also the availability of different activities in an area (Andrades & Dimanche 2015, 65).

Lack of educational programmes
There is an unavailability of educations that meet the requirements of the tourism industry. This also leads to difficulties finding qualified personnel to the trade (Kohllechner-Autto 2011, 6).

9. Analysis

The vast boreal forests of the Barents region constitute an important resource for the countries included in the Barents Euro-Arctic Cooperation. There is a possibility that small and medium size enterprises (SMEs) and local communities in rural areas, where the resources are situated, would benefit from multiple use of these forests. The notion of a multiple use of forests encourages non-wood products and services to be utilised in addition to forestry and forest industry that traditionally have constituted the core of the forest sector. This overview of forest related SMEs in seven landscapes in the Barents region has shown that there are a multitude of activities going on in the field of multiple use of forests and that there are many opportunities for development.

In this report, the enterprises have been divided into two separate categories, depending on whether they use wood fibres in their businesses or not: as either wood or non-wood enterprises. The two categories of business do have different challenges and preconditions. However, both are increasingly affected by the effects of climate change. As for the wood-trades, climate change affects forest management and put their stock in increased risk for damage by pests and fires. The changing conditions also entails a risk for the non-wood enterprises. It is imperative for the survival and development of these trades to adapt to these changes. It is also of utterly importance to foster land use practices and the use of forest resources that contribute to climate change mitigation and prevent of further loss of biodiversity.

9.1 Wood

The wood enterprises are dependent on wood fibre for their production and profit. This group includes forest owners, entrepreneurs, and companies in the businesses of forestry, wood construction and wood manufacturing. These trades are gaining increasing interest as the demand for fossil free materials and fuel is growing, which is evident in the regional strategies used in this report. There are opportunities for development, especially if the local resources and entrepreneurs are successfully connected to the processes.

But even if there are substantial opportunities for growth and development for SMEs within the wood trades, there is significant worry for future lack of competence and labour force. It is not always easy to find people to fill all functions of a business in rural areas and the demographic development of the rural areas does not work in favour of the trades, as young people often choose to move away to live and work in more urban areas. Some tradespeople experience that the forest industries do not seem to constitute an attractive career choice for young people who rather would move from rural to more urban areas. This reinforces that in order to facilitate the development of these industries in the rural areas, there must be rural development to make these sites attractive for people to stay in.

The supply of raw material is central for the development of the wood enterprises. The nature of the challenges related to raw material vary among the studied landscapes, from property forms challenging the efficiency of logging to a lack of roads preventing access to the raw material. A common challenge is the destruction of the raw material by effects of an increasing climate change: pests (e.g. resin top disease), forest fires and an increased intensity of moose grazing. Every year this causes enormous economic losses to the forest industries as well as to individual forest owners. Forest management methods are being developed to minimize these risks as much as possible, and this is an important field of knowledge that should be distributed between the landscapes.

The planning of forest management has gotten a boost through digitization, which enables the forest owners to get an increasingly accurate picture of the state of their forests, which in turn should provide opportunities for a more efficient forest management. Another opportunity for development found in many of the studied landscapes is networking and clustering. The SMEs are usually so small that they cannot process bigger orders on their own. By clustering, they would manage bigger orders, be able to offer a wider range of products and make bigger, common investments. But further collaboration has wider opportunities than only in the local area: through contact with SMEs nationwide and across borders, the enterprises could get inspiration on new products or forms of collaboration. Most landscapes also have a clear experience with cross-border collaboration with other countries in the Barents region, meaning that there are contacts to utilize.

Another area of development for forest owners is to start seeing more opportunities and values in the owned land than just the trees. By allotting the forest for multiple use, either by themselves or by collaboration with entrepreneurs. However, the use of the same land tends to lead to conflicts, which is why it is important that the forest owner and entrepreneur have a mutual understanding and agreement on the current land use.

9.2 Non-wood

The non-wood enterprises include tourism, reindeer herding, food production, and thus depend on forest values such as grazing opportunities, collectible foods, biodiversity, and scenic landscapes. The ecosystem services that can be used by the non-wood sector have been noticed all over the Barents region. Today companies in the non-wood sector make up a promising but young trade in the rural landscapes included in this report. The enterprises that are engaged in the field are small, and more often even micro-size. They are often located in areas where funding for investments is difficult to obtain and where the infrastructure, or lack thereof, poses a challenge for both the transportation of goods and visitors. However, nature, tranquillity and authenticity are trending among tourists and consumers worldwide, meaning that the products and services of SMEs on the rural sites in the Barents region are demanded by many. In addition, much indicates that there is a capacity to expand the offer of enterprises.

An untapped potential that has been identified in many of the studied landscapes is activity based on collection of berries, mushrooms and herbs. The knowledge is available, as the collection of these products in many cases are an important activity for the locals – both as a nutritional addition to the diet and as a recreational activity. Even though the calculations in many cases seem uncertain, the numbers tell us that the amount of produce in the forests is much larger than the amount that ever gets picked. However, to promote prosperous trade in forest-related food production, the value chains between the collectors and sales need to be developed. In many cases, the landscapes also lack local refineries to add value to the products. There are also opportunities for connecting local food from the forests more systematically to the tourism sector.

The interest and knowledge in sustainability and authenticity is increasing among customers, meaning that proof of sustainable production benefits the enterprises. In Finland, there is a current discussion about the possible advantages of organic labelling of forest lands. Labelling is also promoted among many of the collaborative organs in tourism, as they are seen as a way to promote both the single enterprise, but also whole destinations when enough enterprises are labelled.

Tourists experience the sum of the offers as a total, meaning that the more different experiences there are at offer, the more complete the tourists will perceive the experience. An example of how collaboration is facilitated among actors within an area comes from Rokua Geopark which, by gathering local companies in a network, gives the actors a common marketing brand.

Non-wood enterprises are, just like the wood enterprises, disadvantaged by the negative demographic development of the rural areas, and the diminishing base for recruiting personnel that follows. When it comes to rural development, non-wood trades rarely constitute a factor that motivates big infrastructural investments. Therefore, non-wood enterprises often develop beside wood industries. To facilitate non-wood entrepreneurship, it is therefore important to actively work with rural development as well.

A challenge for many of the non-wood enterprises in the chosen landscapes is forestry, more exactly the effect of intensive forestry in the forest landscapes. Concrete examples of this are the effect on cultural heritage and migration routes of reindeer. Intensive forestry can also be a risk for biodiversity and water quality.

There are many potential courses of development when it comes to non-wood enterprises, and many good examples of this have come across throughout this paper. Even if non-wood firms do not use wood as a raw material, these firms are still dependent on land-use of different kinds. This means that there are risks for potential conflicts if the different users of the same land disagree over the use of the area. The non-wood branches of multiple use of forest are, in addition, often a young trade in the landscapes and often micro-scale. To ensure the security and rights of both non-wood entrepreneurs and forest owners, it is important that both the entrepreneur and forest owner agree over the activities, and how long they will be carried out, on the land.

9.3 Conclusions

The overall conclusion of this study is that multiple use of forests, and an increased collaboration between SMEs in forest related businesses, offers a promising potential for a sustainable development of local communities in the Barents region. This is especially vailed in landscapes where the forest land is owned by a multitude of different owners. To realize this potential, there is a need for improved dialogue and increased cooperation between forest owners and multiple-use entrepreneurs, as well as between the wood and non-wood sector. Cross-border collaborations, that focus evidence-based knowledge and best practices, can support this development and ad additional value.

However, even though the appearance of an increased number of SMEs can be expected to stimulate local economy in the long run, it would be far too simple of a solution to expect entrepreneurship alone to solve the challenges of rural development. The development of multiple-use SMEs and rural development are co-dependent, as many SMEs are dependent on infrastructure that cannot be financed by the enterprises alone, such as transportation, health services and internet access.

It is imperative for the survival and development of both wood and non-wood enterprises to find ways to adapt to climate change. For a prosperous future for all kinds of businesses in the Barents region it is also of utterly importance to foster land use practices and the use of forest resources that contribute to climate change mitigation and prevent further loss of biodiversity.

10. Future prospect

As mentioned in the introduction, this report builds on a study by Esselin & MacTaggart (2021) of Biosphere reserves in the Barents region. After publication of that study, a collaboration was initiated between the regional forest programs and the biosphere reserves in Västerbotten County (Sweden) and North Karelia County (Finland). The collaboration has resulted in four parallel pilot studies focussing the Barents region (2021–2022)

- Sustainable development of local communities by multiple use of forests
- Sustainable nature tourism
- Youth exchange and collaboration
- Exchange and collaboration between universities and research institutions

10.1 Aim of large-scale, cross-border collaboration project

As a future prospect, the collaboration envisions a large-scale, cross-border collaboration project (2023 – 2026) with the proposed title: Sustainable development of local communities by multiple use of forests in the Barents region. The project aim will be

- To promote international cooperation, cross-border collaboration and learning in the Barents region
- To share best practices and evidence-based knowledge
- To increase the knowledge about forest ecosystems, multifunctionality of forests, and different values the forests bring to local communities in the Barents region
- To support sustainable management and utilization of forest resources and ecosystem services in line with the 2030 Agenda for Sustainable Development, the United Nations Strategic Plan for Forests as well as the Paris Agreement

10.2 Structure and content/issues

A basic structure of this future prospect consists of three work packages and three cross-cutting themes (figure 2).

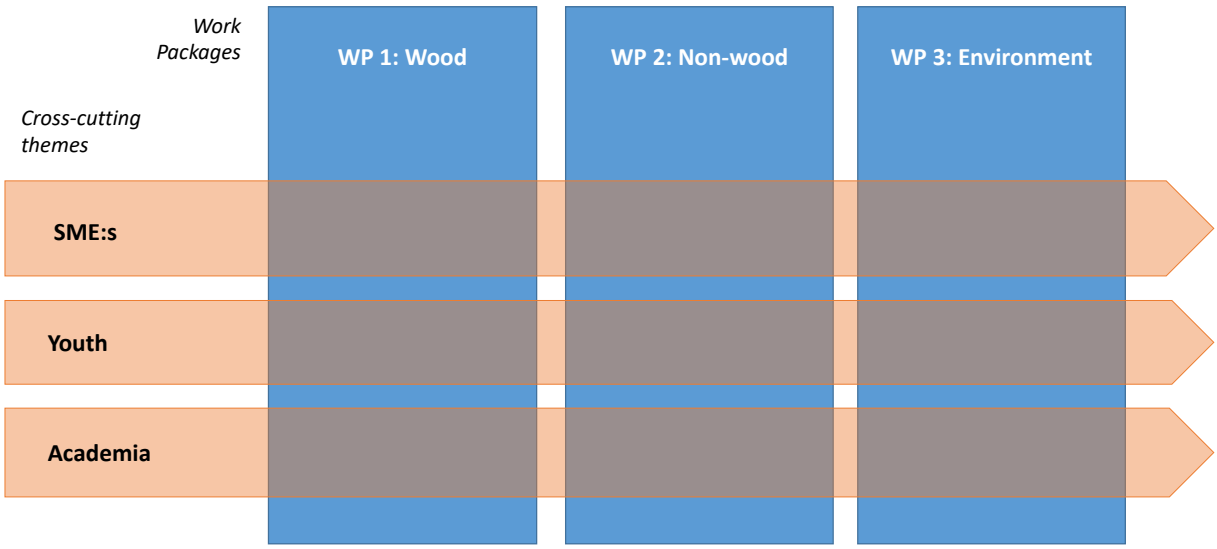

Figure 2. Structure of a potential large-scale, cross-border collaboration project, focusing forests of the Barents region.

Findings from this pilot study suggest that interesting and rewarding issues for cross-border collaboration activities within this framework can be:

Overall

- Multiple use of forests

WP1: Wood

- Climate change adaptation
- Recruitment of competent personnel
- Engagement and involvement of youths
- Rising demand for fossil-free alternatives
- Promotion of wood construction
- High costs for wood construction
- Forest damages by moose and pests
- Forest damages by wildfires
- Finding the right markets
- Digitization
- Low profitability for small forest owners
- Passivity among small forest owners
- Investments for the bioeconomy

WP2: Non-Wood

- Climate change adaptation
- Organization, networking, collaboration within non-wood businesses
- Collaboration between different non-wood businesses
- Recruitment of (competent) personnel
- Engagement and involvement of youths
- Increasing demand for authentic and environmentally friendly products and experiences
- Refinement of natural products and food
- Certification
- Effects of intensive forestry on non-wood businesses

WP3: Environment

- Forest management methods that consider both climate mitigation and climate adaptation
- Conservation of cultural and natural heritage
- Conservation of environmental values such as biodiversity and water quality

10.3 Organization and funding

The organization of the envisioned project can be in form of a partnership with representatives from different landscapes/countries.

Possible seed money to explore ideas and writing applications for large-scale projects

- BEAC project fund (Barents Financial Mechanism)
- Swedish Institute (project initiation)

Possible funding for a large-scale project

- EU's Interreg Programmes (e.g. Northern Periphery and Arctic Programme, Interreg Aurora, Interreg Baltic Sea Region)
- EU's ENI CBC Programmes (e.g. Kolarctic CBC)

- The Nordic Environment Finance Corporation, NEFCO
- Nordic Council of Ministers, NCM (e.g. The Arctic Cooperation Programme, NORDBUK Grant Programme, The Open Call Programme)
- Swedish Institute (collaboration with third country)
- Swedish Agency for Economic and Regional Growth
- Vinnova innovation platforms

References

Andrades, L. & Dimanche, F. (eds) (2015) *Nature-based tourism in Russia – A situational analysis*, NETOUR.

Askheim, S, *Sør-Varanger*, Store Norske Leksikon, updated 28 june 2021 https://snl.no/S%C3%B8r-Varanger

Barsk, E (2020) *Sysselsättning inom skogsnäringarna i Västerbotten* [Employment in the forest industries of Västerbotten], Västerbottens Regionala Skogsprogram

Bauhus, J; Kouki, J; Paillet, Y; Asbeck, T & Marchetti, M (2017) How does the forest-based bioeconomy impact forest biodiversity? In Winkel, G (ed.) *European forest-based bioeconomy – Assessment and the way forward.* What Science Can Tell Us 8, European Forest Institute

Berlina, A & Trubin, A (2018) *Bioeconomy in Northwest Russian region – Forest- and waste-based bioeconomy in the Arkhangelsk region, Russia.* Nordregio, Working paper

Berlina, A & Trubin, A (2019) *Transition to a bioeconomy in Northwest Russia – Regional cases of the Republic of Karelia and Murmansk oblast.* Nordregio report 2019:10

Bjärstig, T; Nordström, E; Zhang, J; Sandström, C. 2020. *Mångbruk – att samsas om samma skog* [Multiple-use forestry – sharing the same forest] Policy brief, Future Forests

Eriksson, V & Lundmark, R. (2020) *Skogsnäringen i Norrbotten Fram Till 2030 – Definition och Kartläggning [The forest industry in Norrbotten until 2030 – Definition and Mapping].* Luleå tekniska universitet.

Esselin, A & MacTaggart, J (2021) *Pilot study of UNESCO Biosphere Reserves within the Barents Region and the possibilities for collaboration*

FAO. 1999. *Towards a harmonized definition for non-wood forest products*. Unasylva 50:63-63.

Finnmark Fylkeskommune (2019) *Reiselivstrategier for Finnmark 2019-2023* [Tourism strategies for Finnmark 2019-2023]

Finnmark Treforum, *Skog- og Trebedrifter I Finnmark per 06/2021* [Forest and wood industries by 06/2021], finnmarktreforum.no https://www.finnmarktreforum.no/contentassets/eb0869ce5f1b4bceb2a263dae0be6679/kopi-av-trebedrifter-i-finnmark-06_2021.pdf

Fylkesmannen i Finnmark, *Reindrift i Finnmark* [Reindeer husbandry in Finnmark], statsforvalteren.no https://www.statsforvalteren.no/nb/Finnmark/Landbruk-og-mat/Reindrift/reindriften-i-finnmark/ [accessed 19 oct 2021]

Hoogstra-Klein, M.A., Brukas, V., Wallin, I. (2017). Multiple-use forestry as a boundary object: From a shared ideal to multiple realities. *Land Use Policy* 69, 247-258

Jahkonen, M (2018) *Metsäbiotalouden nykytila Pohjois-Karjalassa* [The current situation of the forest bioeconomy in North Karelia], Pohjois-Karjalan Maakuntaliitto

Jonasson, L & Persson, S (2017) *Skafferiet mellan kust och fjäll– livsmedelsproduktion i Västerbottens län [The pantry between the coast and mountains – food production in Västerbotten county.]*

Karvinen, S; Markovsky, A. V: Rodionov, A. V; Rogov, A. A; Sikanen, L & Tsypuk, A. M, (2004) *Notions on forest sector of the Republic of Karelia (on the official data and results of a questionnaire study).* Monograph. Institute of economy of KSC of RAS. Petrozavodsk.

Karvinen, S; Välkky, E; Gerasimov, Y; & Dobrovolsky, A. (2011) *Northwest Russian Forest Sector in a Nutshell*. METLA

Kindler, E (2016) A comparison of the concepts: Ecosystem services and forest functions to improve interdisciplinary exchange, in *Forest Policy and Economics* 67 (2016) 52-59

Kohllechner-Autto, M (2011) *Strategic tourism development in the Barents Region – An analysis*. Lapland University Consortium

Lerink, B; Hassegawa, M; Kryshen, A; Kovalev, A; Kurbanov, E; Nabuurs, G-J; Moshnikov, S & Verkerk, P (2020) Climate-Smart Forestry in Russia and potential climate change mitigation benefits, in Leskinen, P., Lindner, M., Verkerk, P.J., Nabuurs, G.J., Van Brusselen, J., Kulikova, E., Hassegawa, M. and Lerink, B. (eds.). *Russian forests and climate change*. What Science Can Tell Us 11. European Forest Institute.

Leskinen, P; Van Brusselen, J; Lindner, M; Nabuurs, G; Verkerk, P; Lukina, N; Bartalev, S & Kulikova, E. (2020) Conclusions, in Leskinen, P., Lindner, M., Verkerk, P.J., Nabuurs, G.J., Van Brusselen, J., Kulikova, E., Hassegawa, M. and Lerink, B. (eds.). *Russian forests and climate change*. What Science Can Tell Us 11. European Forest Institute.

Luonnonvarakeskus, *Pohjoiskarjalaiset haluavat 350 miljoonan investoinnit johtavaan metsämaakuntaan [The North Karelians want 350 millions of investments to the leading forest province],* luke.fi, 16.12.2019 https://www.luke.fi/uutinen/pohjoiskarjalaiset-haluavat-350-miljoonan-investoinnit-johtavaan-metsamaakuntaan/

LUKE (2016) Luonnontuotteista potkua Pohjois-Karjalan biotalouteen [Boosting the North Karelian bioeconomy with natural products].

LUKE, Kuntatilastot 2019 [Municipality statistics 2019]. https://www.luke.fi/tietoa-luonnonvaroista/metsa/metsavarat-ja-metsasuunnittelu/metsavarakartat-ja-kuntatilastot/

Länsstyrelsen Norrbotten (2020) Strategi för Norrbottens regionala skogsprogram [Strategy for the Regional Forest Programme of Norrbotten]

Metsäkeskus (2020a) *Pohjois-Karjalan metsäohjelma 2021-2025[North-Karelian forest programme 2021-2025]*

Metsäkeskus (2020b) *Pohjois-Pohjanmaan metsäohjelma 2021-2025* [The Forest Programme of North Ostrobothnia 2021-2025]

Metsäkeskus (2021) *Maakunnallisten metsäneuvostojen jäsenet ja varajäsenet toimikaudella 2019-2023* [Members and stand-ins of regional forest agencies during the period of 2019-2023]

Metsänomistajat, *Metsänomistajat – Valvomme etuasi,* [Forest owners – We monitor your interests] mhy.fi, https://www.mhy.fi/jasenedut/metsanomistajat-valvomme-etuasi [retreived 4.10.2021]

Nordström, E-M; Bjärstig, T & Zhang, J. (2020). Mångbruk – om att utveckla skogens mervärden [Multiple use of forests – developing the additional values of the forest]. Future Forests rapportserie 2020:5, Sveriges lantbruksuniversitet

Nordregio, *Wood in Construction Industry in Russia: Present State, Challenges and Prospects*, nordregioprojects.org
https://nordregioprojects.org/nordic-northwest-russia-cooperation-on-wood-and-construction/wood-in-construction-industry-in-russia-present-state-challenges-and-prospects/ [accessed 17 dec 2021]

Paliskuntain Yhdistys, *Pudasjärvi*, Paliskunnat.fi
https://paliskunnat.fi/py/paliskunnat/paliskuntien-tiedot/pudasjarvi/ (Accessed 11-11-2021)

Parviainen, J (2006) Forest Management and Cultural Heritage, in *Forestry and Our Cultural Heritage – Proceedings of the Seminar 13-15 June, 2005, Sunne, Sweden,* Ministerial Conference on the Protection of Forests in Europe

Perekopskaya, M & Alekseev, J. (2019) Timber industry and forest environmental resources of the North-West Federal District of Russia, *E35 Web of Conferences*, 110(2019)

Pilstjärna, M & Hannerz, M (2020) *Mäta biologisk mångfald – En jämförelse mellan olika länder* [Measuring biodiversity – a comparison of different countries]. Future Forests Rapportserie 2020:2, SLU

Pohjois-Karjalan Maakuntaliitto (2017a) *Pokat 2021– Pohjois-Karjalan maakuntaohjelma 2018-2021* [Pokat 2021 – The Regional Programme of North Karelia 2018-2021], Publication 187.

Pohjois-Karjalan maakuntaliitto (2017b) Ympäristöselostus – Pohjois-Karjalan maakuntaohjelma POKAT 2021 [Description of Environment – The Regional Programme of North Karelia POKAT 2021].

Pohjois-Karjalan maakuntaliitto (2021) *Pohjois-Karjalan Ilmasto- ja energiaohjelma 2030* [North Karelian Climate and Energy Programme 2030], publication 199

Pohjois-Pohjanmaan Liitto (2014) *Pohjois-Pohjanmaan Biotalouden Kehittämisstrategia 2015-2020 : Kohti kestävää taloutta* [Development Programme for the Bioeconomy in North Karelia 2015-2020: Towards a sustainable economy].

Pohjois–Pohjanmaan Liitto (2017) *Pohjois-Pohjanmaan Elintarviketalouden strategia 2017-2025* [Strategy for the food economy in Northern Ostrobothnia 2017-2025].

Pohjois–Pohjanmaan Liitto (2018) *Metsä- ja Puubiotalouden Uudet Arvoketjut – Mahdollisuudet Pohjois-Pohjanmaan Alueella* [New value-chains of forest and wood bioeconomy – Opportunities in North Ostrobothnia].

Pohjois-Pohjanmaan Liitto (2020) *Pohjois-Pohjanmaan matkailustrategia 2021-2023* [Tourism strategy of Northern Ostrobothnia 2021-2023].

Regional Council of North Karelia (2019) *POKAT2021 Regional Strategic Programme – success stories and good practices*

Reinbase a, *The reindeer husbandry in Norway*, reinbase.no https://www.reinbase.no/en-us/About-reindeer-husbandry/The-reindeer-husbandry-in-Norway [accessed 20 oct 2021]

Reinbase, *Population size,* reinbase.no https://www.reinbase.no/en-us/About-reindeer-husbandry/Population-size [accessed 20 oct 2021]

Rokuageopark.fi
Svenska samernas riksförbund, *Medlemmar SSR* [Members of the SSR], Sapmi.se https://www.sapmi.se/medlemmar-ssr/ [Accessed 9 feb 2022].

Saastamoinen, M (2019) Syrjäseutujen Matkailun Kehittäminen – Matkailupalvelujen Yrittäjien Näkemyksiä Rokua Geoparkin Matkailun Tilasta [Development of tourism in rural areas – Views of tourism entrepreneurs regarding tourism in Rokua Geopark]. Thesis, Oulu University

Sametinget, *Renskötselns förutsättningar* [Conditions of reindeer husbandry], Sametinget.se https://www.sametinget.se/83615

Saveliev, Y; Kolesnikov, N & Mikhel, E (2015) Prospects for cross-border cooperation in the Republic of Karelia: From borders to shared space – BOSS Report. Karelia University for applied sciences Publications, C:22

Skogsprogram Västerbotten (2019) *Temaområde mat från skogen* [Thematic area: food from the forest], 2nd ed

Skogsprogram Västerbotten (2019) Temaområde träindustri [Thematic area: Wood industry], 2nd ed

Skogsprogram Västerbotten (2020a) Temaområde Friluftsliv och besöksnäring, 2nd ed

Skogsprogram Västerbotten (2020) *Temaområde skogsbruk*, 3d ed

Skogsprogrammet (2020) *Temaområde Rennäring*, 3d ed

Statistisk Sentralbyrå b, 08536: Sysselsatte per 4. Kvartal, etter region, næring (SN2007) statistikkvariabel, år og kjønn. 16. Trelast- og trevareindustri

Statsforvalteren i Troms og Finnmark, *Skogsbruk,* Statsforvalteren.no https://www.statsforvalteren.no/troms-finnmark/landbruk/skogbruk/#Trebruk [accessed 14 oct 2021]

Sør-Varanger Kommune, *Fram med bærplukkeren – ny nettsida skal få folk til å plukke bær* [Get out the berry picker – New website to encourage people to collect berries], sor-varanger.kommune.no https://www.sor-varanger.kommune.no/fram-med-baerplukkeren.5896182-17830.html [accessed 6 dec 2021]

Tornedalen2020 (2017) *Strategi för lokalt ledd utveckling – Tornedalen 2014-2020*, 2:nd ed

Troms og Finnmark Fylkeskommune (2020) *Matstrategi for Troms og Finnmark 2020 – 2025* [Food strategy for Troms og Finnmark 2020-2025]

Unesco, *Rokua Unesco Global Geopark (Finland),* unesco.org https://en.unesco.org/global-geoparks/rokua (accessed 05-11-2021)

Wallius, V; Viitanen, J; Konu, H; Mutanen, A; Heräjärvi, H; Kurttila, M; Chen, X; Hälinen, M & den Herder, M (2020) *Pohjois-Karjalan ja Kiinan välisen metsäbiotalouden nykytilanne ja kehitysmahdollisuudet [The current state and potentials of the forest bioeconomy between North Karelia and China]*

Widmark, C; Heräjärvi, H; Katila, P; Kurttila, M; Lier, M; Mutanen, A; Øistad, K; Routa, J; Saranpää, P; Tolvanen, A. and Viitanen, J. (2020) *The Forest in Northern Europe's Emerging Bioeconomy – Reflections on the forest's role in the bioeconomy*. EFI, ForBioeconomy

Winkel, G (ed.) (2017) European forest-based bioeconomy – Assessment and the way forward. What Science Can Tell Us 8, European Forest Institute

Wolfslehner, B (2019) Non-wood forest products – an introduction. In Wolfslehner, B; Prokofieva, I &Mavsar, R (eds), *Non-wood forest products in Europe: Seeing the forest around the trees*. What Science Can Tell Us 10, European Forest Institute

Yurievna, F. M, (2011) Tourism Development in the Republic of Karelia: Problems and Perspectives, Book of Proceedings Vol. I – International Conference On Tourism & Management Studies – Algarve 2011

Appendix I: Interviews

Informant	Landscape	Name	Position at time of interview
1	Vindelälven	Ann-Kristin Vinka	Coordinator of the Vindelälven-Juhttátahkka biosphere reserve
2	Vindelälven	Annika Sandström	Head of Regional Tourism, Region Västerbotten
3	North Karelia	Leena Leskinen	Process manager for the Regional Forest Programme of North Karelia
4	North Karelia	Vilma Lehtovaara	Coordinator of the North Karelia Biosphere Reserve
5	Sør-Varanger	Helge Molvig	County Forester, Troms og Finnmark County
6	Sør-Varanger	Marta Valdez	Senior adviser for local food and tourism
7	Tornedalen 2020	Lars-Gunnnar Lundström	Coordinator of Tornedalen 2020
8	Tornedalen 2020	Jessica Wennnberg	Executive Manager, Heart of Lapland
9		Lars Andersson	International coordinator at the Swedish Forest Agency