Chapter 4

THE CHANGING STATUS OF BIRCH TREES IN FINNISH FORESTS FROM THE SEVENTEENTH CENTURY TO THE TWENTIETH CENTURY

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Introduction

Forests are 'Green Gold', the highly valued treasures of Finland. For centuries, the livelihood of the Finns has been based largely on forest products, both in domestic households and in foreign trade. In the ancient times, among the main export articles were furs and pelts, then tar and timber and, in the past two centuries, paper, pulp and timber.

In Finland, forestry is a well-examined topic, as are the ecology, biology and geography of Finnish forests.[1] However, the history of forests has only recently received wider attention. Among the first environmental history studies on Finnish forests was my 2005 licentiate thesis, *Suomalaisen metsäluonnon lukemisen historiaa – Ihmisen ja koivun muuttuva suhde Suomessa 1730-luvulta 1930-luvulle* (The History of Environmental Literacy in the Finnish Forests – the Changing Relationship between Humans and the Birch Tree from the 1730s to the 1930s in Finland). In my study, I analysed some factors of environmental literacy, such as the power of dictating how people read their environment, and to what extent this power modifies or shapes environment. I used birch trees as my example of various ways of reading the language of forests. I also wrote a book, *Koivu – Suomen kansallispuu* (Birch – National Tree of Finland, 2016) based on my thesis.[2]

1. Vallinkoski 1963, pp. 146, 254; Hollsten 1996, p. 2; Emanuelsson 1997, p. 42; Michelsen 1999, p. 195; Ruuttula-Vasari 2004, p. 20.

2. A great deal of the information in this article is based on my thesis, Niemi 2005, and my book, Niemi 2015.

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After the Ice Age, the birch came as the first tree species to the area now called Finland.[3] If the forests had grown in their natural succession after the Ice Age, the longer living pine and spruce would have gradually exterminated birches. However, human interference, for example, when the ancient hunters burned trees to make clearings for hunting moose and other game, and later slash-and-burn cultivation, helped birch trees to survive. In recent centuries, the value of pine and spruce grew significantly as paper mills began to use these wood fibres in their production, while birch became an undervalued species since it had no such use. Gradually birch conquered a part of paper processing industry and became an appreciated tree there too.[4] Thus, birch has had its ups and downs, which makes it an interesting tree to study.

This article will illuminate the changing status of the birch tree, the ways in which Finns have perceived, used and valued it. It will also give some examples of the standards of Finnish environmental literacy from the seventeenth century to the twentieth century. This period covers both the pre-industrial and the industrial socio-economic changes in the environmental history of the birch tree.

Birch trees in the Finnish forests

The Northern Hemisphere is the realm of birches. Over 120 birch species, generally small to medium-sized trees or shrubs, grow in northern temperate and boreal climate zones. Birch trees are the biggest trees in Finnish forests. Their roots hold strong in ground even during storms. For successful growth, they need lots of light. It is difficult to breed birches from seeds: only 25–35 per cent of seeds will sprout.[5]

In Europe, Finland's forests are relatively the largest: of Finland's thirty million hectares, 26 million hectares, 86 per cent of the country's surface, are covered with the woods. The three most common tree species are pine, spruce and birch. The three main Finnish birch species are the downy birch (*Betula pubescens)*, the silver birch (*Betula pendula)* and the dwarf birch *(Betula nana)*. The most valuable are cultivars of silver birch. Another valuable form is the blaze birch.[6]

3. Myllyntaus 1999, p. 88.
4. Holopainen 1957, p. 32.
5. Tomppo 1998, 9.
6. Niemi 2006, p. 17.

Birch in Finnish is '*koivu*'. The original formative Uralic word is *kojwa*. In other Finno-Uralic languages birch is called for example '*koiv*' in Veps, '*kõiv*' or '*kask*' in Estonian, '*kue*' in Mari, and '*kŏ*' in Nenents.[7] In Sámi, birch is '*soahki*', in Swedish '*björk*', in Danish '*birk*', in German '*Birke*', in Russian '*berjoza*', in France '*boaleau*' and in Latin '*betula*'.[8]

In the old days, peasants called different kinds of birches by various names, mostly according to their growing place or their use. For example, in forests grew '*laulukoivu*' (song birch), '*rauvus-koivu*' (iron birch), '*lasi-koivu*' (glass birch), '*kääpiökoivu*' (dwarf birch), '*tunturikovu*' (fjell birch) and '*perjantaikoivu*' (Friday birch).[9] Birch also such names as '*the Tree of Wisdom*', since flexible birch branches were suitable for physical punishment. As late as the 1950s, a cane had the name '*the Master from the Birch Peninsula*' (Koivuniemen herra). Physical punishment was not yet forbidden in Finland at that time.

Environmental literacy

Charles E. Roth, an American scholar, defined *environmental literacy* in the 1960s: '[T]he capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems.'[10] In other words, a person is capable of perceiving harmful developments in his/her environment – that is, to 'read' the environment. A person is also able to react to destructive changes, either by preventing or remedying them - that is, to 'write' his/her own environment.[11]

In different periods people have perceived their environment in different ways based on their ways of thinking, conceptualising and valuing their surroundings. For example, in the seventeenth century, when Finland was a part of the Swedish kingdom, the greatest fear among Swedish mine owners was that common people would ravage the forests to extinction. They were not at all worried that they themselves ruined the forests around the mines by overcutting the trees.[12]

7. Häkkinen 2004, p. 456.
8. Kalm 1759, p. 3.
9. Ibid., pp. 4–5.
10. Roth 1992, p. 3.
11. Disinger and Roth 1992, pp. 4–5; Hares et al. 2006, pp. 5–6; Hsu and Roth 1998, pp. 229–49.
12. Niemi 2006, p. 17.

The common people lived in a close connection with their environment. Their awareness of the environment was based on their language, attitudes and values inherited from their ancestors. Their observations and experiences relied on inherited attitudes and values. Upon these inherited attitudes and values, they built their interpretation, definition and holistic understanding of nature.[13]

Different groups have different kinds of environmental literacy. Still today, cultural and socio-economic transitions affect our ability to interpret and understand the environment, as fast as the ecological changes take place. The values, ideologies and interests of decision makers influence the environment, as they use their power to make environmental decisions.[14]

Finns' traditional way of interpreting the environment

The first inhabitants on the area nowadays called Finland arrived when the ice cover gradually melted after the Ice Age. These newcomers were hunters following fur animals such as deer, moose, beaver, hare, fox and seal. Their environmental literacy emphasised knowledge of the surrounding world and understanding the regularities of different seasons. Hunters observed the life and routes of different animals, as hunters and gamekeepers still do nowadays. In the course of a year, hunters moved from place to place depending on where the best game, fish, plants and other natural resources were to be found. Presumably they wanted to achieve the same hunting results every year, but eventually, when the number of the people grew but the catch remained the same, unavoidable extinction of some animals occurred.

The impact of the ancient Finns on physical surroundings was almost invisible. However, some changes happened when they burned forests to make so called 'game meadows': open areas with tasty young forest growing after fire. Moose and deer eat young birches and other deciduous trees year-round. When these animals came to eat on the meadows, they were an easy target for hunters. Figures of moose and deer are common elements in ancient rock paintings, especially in south-eastern Finland. These figures can also be totem animals of various clans or groups.[15]

13. Orr 1992, p. 88; Golley 1998, pp. 1, 67–8.

14. Niemi 2018, p. 27.

15. Ruotsala 2002, p. 326; Niemi 2005, p. 12.

Figure 1. A game meadow. Photograph by the author.

The ancient hunters used birch for several purposes. First, it was good firewood; and it was also good material for parts of their weapons. Bows were essential equipment in a hunt. The ancient Finns made their bows from one

or two tree species. Carl von Linné, who researched the Sámi people in the eighteenth century, found out that the Sámi people made the bows of pine and birch and fastened the different wooden pieces together with perch glue. Another wood combination was willow and birch, so that outer part of the bow was birch and the inside willow. The two components were stuck together with pitch and the bow was covered by a narrow birch bark band wound around it.[16]

In wintertime, snow covers Finland for months. In the ancient times, skis were the most suitable means of moving from place to place, since there were no roads or other suitable forms of transport. When the old Finns went hunting, they used their bow as a pole in one hand. In the other hand they might have had a lance. Finns used two different types of skis. Both skis could either be equally long or the right ski was shorter than the left. The equally-sized skis were usually made of pine as was the longer ski in the odd pairs. The shorter ski was made of deciduous wood, usually birch. Such skis often had fur underneath, especially the shorter one, so that the hair helped in moving forward and prevented slipping backwards.[17]

Excellent material for household equipment[18]

Eventually the hunting way of life of the old Finns changed to farming. Forests grew and still grow all over Finland; thus they are familiar places for the Finns. In the ancient times, forests surrounded homes and villages. Wherever people wanted to go, they had to go there through a forest. In the forests, people kept their eyes open and perceived suitable material for all kinds of needs. Forests were old time supermarkets where one could pick up the right material for every purpose imaginable.[19]

Peasants knew that birches grow on all kinds of soils. On poor, nutrient-poor and low-lying ground, birches may grow crooked, and the wood turns hard, tight and difficult to work with. On dry and nutritious soils birches grow straight and the wood will be easy to mould for different purposes. On the other hand, birches grow even on poor soils where no other trees manage to grow. Birches feel themselves at home with other tree species, but among spruces, pines and junipers they will gradually disappear.[20]

16. Vuorela 1998, pp. 26–31.
17. Ibid., pp. 678–80.
18. The information here about ancient ways of using birch is mostly based on Kalm 1759.
19. Niemi 2005, p. 72.
20. Kalm 1759, p. 6.

Figure 2. Solid birch wood. Photograph by the author.

Birch wood is white, smooth and beautiful. It is strong, hard and durable. In the old days, people made axles of wheels, parts for carriages, sleighs, skids, knife and spade handles, handles, sticks, and all kinds of agricultural equipment from birch. They turned from birch spindles, bobbins, various kinds of dishes, boxes, rattles, dolls and other toys. Even the bandits in Germany used robust birch sticks, with pieces of root left on the head, as travel cudgels, and common travellers used same kind of cudgels.[21]

In such regions where few or no spruce or pine trees grew, people used birch as building material as well. Birch keeps its beauty and durability in a dry place under a roof. But if it is left out for longer periods, it will rot quickly. In Russia, in some areas around Moscow, people even built bridges out of birch, but had to repair them constantly.[22]

21. Ibid., pp. 11–12.

22. Ibid., p. 6.

Every inch of birch is useful, even the ash

Every part of a birch is useful, from roots to top, big and small branches with or without leaves, inner and outer bark, buds, pollen, sap, and even the ash. One of the most suitable uses is warming up buildings with birch firewood.

Green birch leaves were tasty feed for cattle. Leaves can be collected in all kinds of places: in forests and on mosses, on islands and islets, in glades and meadows. Peasants cut off leafy branches or ripped the leaves off a tree if they did not want to chop it down. Branches with leaves were stored either one singly or in bunches called '*kerppo*' or '*kerppu*'. Cattle ate the dried branches and leaves as they were, or softened in hot water before use. The taste of birch leaves is best when they are collected shortly after midsummer. They taste bitter in the spring, and, in the autumn, turn to chewy like skin. Usually, men felled trees and women and children cut branches with billhooks. In archaeological excavations, billhooks are found from earlier periods than sickles and scythes. This indicates that the collecting of leaves is a very old habit and that people used to build their dwellings near deciduous forests.[23]

Birch leaves are still suitable for many purposes today. You can dye thread or textiles yellow if you put birch flowers and buds with lots of pollen in the liquid. Dried birch leaves are suitable for tasty herb drink or tea. The leaves contain plenty of diuretic ingredients as well as lots of proteins and vitamins C, B_2 and B_3.

Birch twigs and branches are suitable for many other purposes as well. In summertime, Finnish houses are sometimes decorated by fresh birch branches, especially when it is time to celebrate something, for example summer weddings, birthdays and anniversaries. At midsummer, it is a custom to decorate both sides of doors with birch branches. A sauna without a fresh birch '*vihta*' or '*vasta*' is not a proper sauna, according to many Finns. Silver birches provide the best material for winter vihtas. Downy birch is suitable for summer vihtas. A new vihta-year begins after midsummer. Then you burn the last '*talvi-vihta*' (winter-vihta) in your midsummer fire and make a first new vihta when you walk to your sauna which, of course, is beside one of the hundreds of thousands of lakes or rivers or ponds in Finland.

In the old days, people used the outer white birch bark for various purposes. They created beautiful and practical artefacts such as caskets, boxes, cases, containers, shoes, horns, rings and knapsacks. They made ropes, and covered stones to act as sinkers on fishing nets. Large waterproof and bendy

23. Ibid., pp. 21–22; Laurén 1987, p. 75; Slotte 1996, pp. 201, 203; Vuorela 1998, pp. 216–17; Niemi 2005, pp. 55–58.

bark plates were used to insulate roofs. These plates were covered either by logs or turf. If coated in tar, they lasted even longer. You can see these birch bark roofs on some old houses even today. Before paper was invented, people used to write messages on birch bark, especially in Russia. In England people used birch bark as lamps. Still today, the outer white birch bark is the best tool to ignite any kind of fire.[24]

Figure 3. An old Russian birch bark roof. Photograph by the author.

The brown bark between the outer white bark and the wood inside a birch was used to tan leather. With this bark people also tanned fish nets since fish swim more readily into dark nets. Brown bark is good fertiliser for flower beds. In hard times when the crops failed people dried this bark, ground it and added it to flour. The Sámi people as well as Native American tribes used dark birch bark as a universal medicine for healing wounds and aching teeth.[25]

Birch ashes are perfect for potash, carbon black, birch tar and soap. In the old days in Finland, one important product was charcoal. The wintertime

24. Huurre 1995, p. 35; Niemi 2005, pp. 59–61.

25. Kalm 1759, p. 29.

was suitable for burning charcoal, when the ground was covered by snow and rural people had not much other work to do.[26]

In spring, when birch trees begin to green after a long winter, the sap begins to stream into the trunks. Then it is easy to tap the sap. Sap is a healthy drink, or you can make a syrup out of it. People used to make sap beer as well. In the old days, sap was used as a universal medicine. In Germany, distinguished gentlemen drank a glass of sap every day in May against bloating and kidney complications. The ancient name for March in Finnish language was '*mahlakuu*' = 'sap month' since March is a suitable month for tapping sap, when the ground is still a little bit frozen. Cold sunny days around midday are the best moments for tapping sap, when the warmth of the sun has given energy for liquid to rise.[27]

Slash-and-burn cultivation[28]

Slash-and-burn cultivation had a significant impact on Finnish nature for centuries. During a rotation of slash-and-burn cultivation, large areas of forests are in different stages of succession. The duration of a succession depends on the quality of the soil and of the forest. A fertile deciduous forest, after slash-and-burn cultivation, takes from 25 to 40–100 years to mature. Birch and grey alder appeared first to the burned spots. After that, cows, sheep and goats as well as horses grazed in the young forests, until the trees were again mature for felling and burning for cultivation.

26. *Ulrik Rudenschölds*... 1899, p. 62.
27. Niemi 2005, pp.63–64.
28. See Niemi 2005, 46–52.

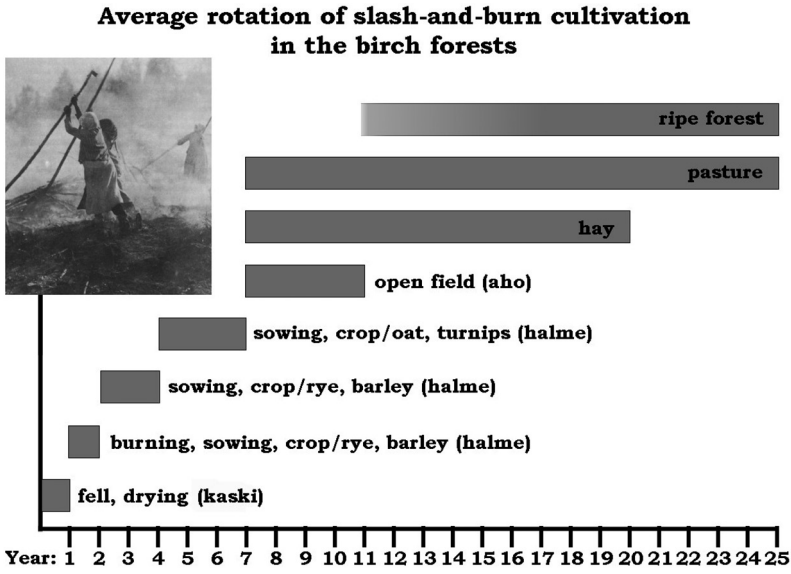

Figure 4. Slash-and-burn rotation. Photograph by the author.

One household needed approximately 1.5 hectares (3.7 acres) for a slash-and-burn cultivation area. For the whole 25 years' rotation, one household needed 25 times 1.5 hectares, so 37.5 hectares (92.66 acres) woodland.

No references are to be found to tell us how old Finns perceived their forests, or whether they had skills that could be called environmental literacy. But we can find indirect references in the huge ancient vocabulary of the Finnish language. For instance, the old Finns used various words for different stages of slash-and-burn cultivation, such as:

'*kaski*' this is the most common slash-and-burn term which can mean:

logging area, area where trees are felled for slash-and-burn cultivation (s.)

as yet unburnt area for s.

logging area, area where deciduous trees are felled for s

burnt area for s.

s.

the land for s., sown area for s.

the crop growing area of s.

'*halme*' the area of growing crops in s.

other sown area, land or area for turnips

'*aho*' the set-aside area of s.

the set-aside area for s. where grass and young forest normally grew

young forest, park, grove, fallow, field, pastureland

Today the Finns still use these words but few know the original meanings anymore.

Edward Sapir has noted:

> … the 'real world' is to a large extent unconsciously built upon the language habits of the group. … We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation.[29]

Language is in eternal change. The changes in a language happen in interaction with the surrounding society. For instance, when some mode of production, such as slash-and-burn cultivation, stops, people stop using the words related to this mode of production. Klemetti Näkkäläjärvi, who has studied the language of the Sámi people, considers these changes most frightening when they simplify and impoverish the language. They are also definite signs of changed environmental perception.[30] The example of slash-and-burn cultivation vocabulary shows us how the words have survived but their original meanings have faded away. We know still to-day that '*kaski*' means slash-and-burn cultivation, and we know that '*halme*' is a piece of land and '*aho*' is an open field, but the precise meanings of the precise stages of slash-and-burn cultivation are no longer familiar to us. We have also long forgotten the special names for birch species. Today even the difference between a downy birch and a silver birch is unfamiliar to most Finns.

29. Sapir 1958, p. 69.

30. Näkkäläjärvi 2000, 1p. 55.

Figure 5. A silver birch leaf. Photograph by the author.

Figure 6. A downy birch leaf. Photograph by the author.

The environmental literacy of the old slash-and-burn cultivators also included the skill of finding the most suitable forests for the best harvests. Such forests were broad deciduous woodlands rather than dry conifer forests with a soil of moraine or sand. People also knew was the best time to fell the trees, when to burn them, when to sow and when to harvest. Slash-and-burn cultivation benefitted many plant species, such as wild strawberries, daisies, clovers and thistles. Forests were renewed in a natural way. Without slash-and-burn-cultivation, forests would have turned gradually to dark conifer forests.

The contemporary owners of mines and ironworks, state officials and scientists considered slash-and-burn cultivation as severely detrimental to forests. These upper-class people thought that the peasants did not care for their forests at all. They did not understand the rotation of slash-and-cultivation, the benefit of the harvests which the peasants got from burned ground and other useful ways of using the growing forests while waiting for the next burning season to begin the rotation again. These opinions remained predominant since they were those of the ruling class whose word was the truth. So, to this day, public opinion is that the peasants did not respect their forests, while, in fact, forests and fields, their homesteads, were important for their livelihood and it was important for them to hand their homesteads in good shape to future generations. The peasants did not consider their slash-and-burn cultivation as destroying the forests. With the knowledge they inherited from former generations, the peasants knew that the forests would grow again after a certain interval, and they hoped that the next generations would benefit from the forests of their ancestors.

Of course, slash-and-burn cultivation had negative impacts on nature. For example, the spring, when birds nest, was a suitable time for burning the forest. Thus, bird populations declined.

Best firewood in the world[31]

Birch is the best firewood, as everyone in Finland knows. It gives the most heat, it burns nicely and it is easy to torch. In the old days, you could go in your own forest and get as much firewood as you needed. Today you can buy perfect birch firewood almost everywhere in Finland, both in the countryside and in the cities, either on bigger markets or from special sellers. In Central Europe, by the Middle Ages, the firewood business was in the hands of professionals since natural forests had disappeared due to cuttings, pasturing and clearance for fields.

31. See Niemi 2005, pp. 52–54.

In the days when people paid their taxes with different materials, firewood was one of the tax paying instruments to manors, manses, and state buildings such as castles. At times, firewood was among the ten most important Finnish export articles. When Finland was a part of Sweden, about from the year 1100 to the year 1809, lots of firewood was shipped to Stockholm. From 1809 onwards, when Russia conquered Finland, and ruled the country until 1917, when Finland became an independent state, St Petersburg was an important firewood market. After the Saimaa Canal was opened in 1856, and the railroad was built from Helsinki to St Petersburg in 1870, this city became the most important export destination for Finnish firewood.

Before the Second World War, in Finland, more than half of logging in a year was for firewood. Tar burning, and slash-and-burn cultivation accounted for only a tiny part of total forest use. However, within Finnish history research, these other topics have been more prominent than firewood and other household loggings.

In the old times, the worst enemies of birch were people and cattle. Firewood logging, pasturing, suckering, bark taking and chopping had a significant impact on the environment. Short deciduous trees and bushes appeared, and sturdy trees disappeared around villages. In the worst affected areas, severe shortage of wood emerged.

Cultural, scientific and industrial ways to interpret birches in the woods

Cultural birch

The forests have been places where the Finns have sought and found peace of mind. They have also been sources of aesthetic and moral experiences for both the Slavs and other Finno-Ugric people. Birch in particular was a sacred tree. Birch represented purity, goodness, summer and warmth. For the Mordovians, birch was the world tree: sap symbolised the continuity of life and transmigration, branches were symbols of the ancestors and the sphere of heaven.[32]

Fairytales have transported old customs and ideologies through centuries. When patriotism and nationalism started to suffuse societies, nature of the native country became a patriotic symbol. One example from Russia is Sergei Yesenin's poem *Beryoza* (The Birch Tree) which was published in the children's magazine *Mirok* (Small World) in 1914. This poem strengthened warm national

32. https://www.taivaannaula.org/2008/09/26/koivu/ (accessed 6 July 2021).

feelings already present towards the birch tree in Russia.[33] In Finland, a fairytale *Koivu ja tähti* (The Birch and The Star, 1893) by a beloved author, Zacharias Topelius, affected Finns in the same way. The story tells of a boy and his sister, whom the enemy kidnapped during one of the ancient wars between Sweden and Russia. They were brought to Russia where they lived amongst good people. They got enough to eat and were well-dressed; however, when they heard that peace had finally come to their native country after several years, they wanted to return to their father and mother. After a long and difficult journey, they found their home. They identified it from the birch growing in the garden and a star that shone through its branches. Their old mother and father lived still in the cottage. They all were filled with joy when they met each other after so many years. These two words, the birch and the star, became symbols of two important things: the birch for the native country and the star for eternal life after death.[34]

Birch is an essential part of the Finnish national landscape. In the early landscape paintings of the nineteenth century, birch is well represented. One well-known example is Werner Holmberg's *Ihanteellinen maisema* (Ideal Landscape, 1860) which is known also under the name *Suomalainen maisema, vanhoja korkeita koivuja kasvava* (Finnish landscape with high growing old birches). Though Holmberg painted the picture in Norway during his honeymoon, the atmosphere is strongly Finnish with white birch trunks in the foreground and people and cattle somewhere in the distance.[35]

Nature is the base of any culture. Culture and nature are thoroughly intertwined. The artists and poets of the Romantic era turned their gaze to nature. At the turn of the eighteenth and nineteenth centuries, beautiful lake scenes became popular in Finland. A view from a high hill over a region with lakes and forests is the national scenery of Finland. This was a new way to look at the environment. When a farmer of this period looked at this kind of scenery, he saw lakes to be drained and rapids to be cleared to reclaim land for fields.[36]

33. https://fi.ilovevaquero.com/zakon/111525-a-davno-li-bereza-simvol-rossii.html (accessed 6 July 2021).
34. Niemi 2005, p. 128.
35. Ibid., pp. 115–28.
36. Ibid.

Figure 7. An example of the national scenery of Finland. Photograph by the author.

The nineteenth century was a turning point in traditional environmental literacy. New people came into forests such as the above-mentioned artists, but also scientists, surveyors, sawmill owners, industrial bosses and gradually tourists and other recreation seekers.

Scientific birch

One of the first scientific studies on birch trees is *Björckens Egenskaper och Nytta I Den Allmänna Hushålningen* (Properties and Benefits of Birches in Common Households, 1759) by Pehr Kalm, Professor of Economy at the Academy of Turku, with his student Johan Grundberg. Kalm was himself a student of Carl von Linné. A large part of the information in this and other studies was collected by Kalm from common peasants, the Sámi people and from folklore. Most of his information is valid still today.

After Kalm's time, almost a century passed before the scientists found their way to the forests. The first textbook on Finnish forestry was published in 1841. In 1874, a committee found the state of the Finnish forests in devastating decline. The cure would be better knowledge of systematic forestry.

Side by side with the expanding wood processing industry grew forestry as a science. Higher education for foresters began at the Evo Forestry Institute at the end of nineteenth century. The university of Helsinki began educating foresters in 1908.[37]

Birch processing industry[38]

During the nineteenth century, slash-and-burn cultivation was abandoned in the favour of field cultivation. Simultaneously, the need for timber increased considerably within various fields of industry. The traditional way of forestry appreciated forests where all kinds of wood species grew in different stages of their succession. The needs of industry changed these old values. The most suitable forest for certain kinds of industry comprised certain wood species at the same certain age. This new type of forestry changed the appearance of forests totally.

In the first half of the nineteenth century in Germany, some innovative engineers discovered that wood fibres could be used in paper and cardboard production. Before this innovation, the main raw material for pulp and paper was rags. After this crucial turn in the wood processing industry, the value of pine and spruce in Finland grew. The first modern wood processing mills started production during the 1870s. While the value of pine and spruce grew, birch trees were viewed as 'weed trees'. Since birch was not suitable for pulp and paper production, it was despised until the 1960s.

However, the spool and plywood industries appreciated birch. The largest birch forests were in the south-eastern parts of Finland where slash-and-burn cultivation had persevered the longest. The same region was thus suitable for the spool and plywood industry. Fortunately, these industries used different parts of birch, so they did not compete for the same birch resources. Spools were made of thinner trunks while the plywood industry used sturdier birch stocks.

Spool factories[39]

The very first spool factory in Finland was established in Southern Finland, in Mäntsälä. It was built on the banks of Kaukas rapids from which the plant took its name, Kaukas Factory. The founder, Lars Magnus Robert Björkenheim (1835–1878), was a Finnish nobleman who owned nearby Kellokoski manor

37. Niemi 2005, pp. 101–09,

38. Ibid., pp. 143–61.

39. Niemi 2005, pp. 161–63.

and ironworks. Robert Björkenheim died unexpectedly in 1878. Since the birch forests around Kaukas Factory were gradually decreasing, the new owners decided to move production to Lappeenranta, in southeast Finland, closer to better birch wood deposits. The new owners also decided to start pulp and paper production. After some decades, this factory was one of the biggest paper processing units in Finland. Nevertheless, in 1986, Kaukas merged with the future global UPM-Kymmene company.

The spool industry is tightly connected with international economic markets. It depends on consumption of thread and spools, the cloth industry and innovations, economy and trade cycles. Before the Second World War, Finnish spool export headed global statistics. Finnish birch spools were exported, for example, to Great Britain, Russia, France, Germany, Austria, Belgium and Spain. However, in terms of the whole wood processing industry in Finland, the spool industry was only a small part. Kaukas Factory was the first spool factory, and it was also the last one in Finland. When plastic spools replaced wooden ones, Kaukas was closed in 1972. Altogether 23 factories produced spools in Finland in the 100 years during which these were made of birch.

Plywood industry[40]

Plywood is constructed of thin plyboards which are glued together in layers, each with its grain at ninety degrees to the layer beneath. Sufficient supply of raw material is a prerequisite of the plywood industry as are ease of transportation of logs to the factory and of the finished plywood to customers.

The plywood industry was a significant sector of the larger wood processing industry in Europe from the nineteenth century. Most of the plywood was needed for transport cases. For example, tea came to Great Britain from China in plywood boxes. Nordic birch is excellent material for plywood, since it does not give smell or flavour to articles packed in it. The smell of tropical wood species is rather strong and would be easily absorbed by articles transported in cases made from these.

In Europe, the plywood industry used various deciduous tree species, such as beech, oak and birch. In the Baltic countries, birch was used in plywood production in multiple factories. At the beginning of the twentieth century, Russia was the leading manufacturer of birch plywood.

Since Finnish forests had large reservoirs of birch trees it was natural that Finnish entrepreneurs began to produce plywood too. The first plywood factory

40. Niemi 2005, pp. 163–66.

was established in 1893 in southwest Finland, by the Pori-Tampere railroad and near suitable waterways. However, the story of this factory was short: it stopped production after six years because of economic difficulties. Plywood production in Finland started in earnest in 1912, when Wilhelm Schauman, the so-called founder of the Finnish plywood industry, established his factory in Jyväskylä. He had become acquainted with the plywood industry in the United States before starting his own production. He bought machinery from the United States and hired qualified managers from Russia and the Baltic countries. Compared to plywood production in the United States, the Finnish industry used thinner stocks.

After the First World War, the former rulers of the plywood market, Russia and the Baltic countries, were separated from western markets. This period was both advantageous and profitable for the Finnish plywood industry. Finnish plywood was mostly exported to Great Britain in qualities suitable for tea and rubber caskets: these accounted for almost 90 per cent of total production in many years.

In the early days of the Finnish plywood industry, birches were felled both during winter and summer. In winter, logs were piled on sledges driven by horses; in summer, logs were transported on boats. Horse transport was economic over short distances. Rather expensive boat transportation was suitable only in certain kinds of water systems. Gradually, floating became the main way of transporting logs. Since birch is a rather dense and heavy wood species, it gets wet quickly and sinks. Nowadays rail transport is the most common. The logs were stored in piles near the factory. In the summer, logs were easily spoiled and, in the winter, frozen logs cracked easily when soaking in warm water.

When the plywood industry started in the 1910s, people still used birch bark for many household purposes. These old customs threatened to destroy the best birch trunks, since the best bark grow on the straightest and smoothest trunks which also provided the best material for plywood. Gradually, the use of birch bark stopped. The plywood industry also learned to joint, patch and lengthen the plyboards, so they could use all sorts of birches; and the story of the plywood industry has continued until today.

When the plywood industry grew, birch even began to be in short supply. In the first decades of plywood manufacturing, environmental problems did not bother manufacturers. Floating caused problems with many logs lost by sinking. In the soaking pools, harmful extracts were dissolved from the logs into the water. Waste problems were solved by burning, for example bark and

the edges of the plywood plates in the steam boilers or selling the waste as fuel to other manufacturers.

Innovative birch

The future of birch as raw material for innovative products looks bright. One innovation is xylitol ($C_5H_7(OH)_5$, D-xylitol). It is made by reducing xylose from xylene which you can get from the leaves of deciduous trees like birch. Xylitol was found by German scientists in 1890s, but it was at the University of Turku in the 1970s that benefits for teeth were discovered. One of the first commercial xylitol products was a chewing gum called Xylitol-Jenkki, launched by a Finnish candy manufacturer in 1975.[41]

A couple of Finnish companies are developing birch bark as an environmentally friendly material for the cosmetic, chemical, textile and pharmaceutical industries. They refine coal powder, bark powder, betulin, suberin and azelaic acid from birch bark. Their aim is to create renewable materials and reduce the use of plastic raw materials.[42]

In 2018, at the presidential reception on Finland's Independence Day of 6 December – a very popular media event that many Finns watch on television – Jenni Haukio, the wife of Finland's president Sauli Niinistö, wore an evening gown made of birch fibres. Since then, the manufacturer has developed the idea of different recycled materials further and transforms used textiles, pulp and even old newspapers into new textile fibres sustainably and without harmful chemicals.[43]

One innovation from the 1930s is the curved armchairs designed by the Finnish architect Alvar Aalto. Today the chairs are globally-known Finnish plywood products. Their triumph began in London in the 1930s when Aalto's designs were exhibited at Fortnum and Mason.

41. https://fi.wikipedia.org/wiki/Ksylitoli

42. Sari Möller, Koivun kuoresta jalostetaan muovin korvaajaa kosmetiikkaan. Published 10 Aug. 2021: https://yle.fi/uutiset/3-12053008

43. Ioncell® https://ioncell.fi/ (accessed 13 Sept. 2021).

Figure 8. Alvar Aalto's Paimio-chair, designed by Alvar Aalto for the Paimio Sanatorium in 1932. The seat and back are created from one piece of form-pressed plywood. The fluidity of the design creates a soft, comfortable place to sit. Since wood changes over time, the armrests are formed from a single piece that is then split in half, ensuring that as the chair ages, it remains perfectly balanced. Source: The Finnish Heritage Agency.

Environmental literacy in the Finnish birch forests

Birches in the Finnish forests have encountered various actors. A long time ago, hunters needed birch wood for their bows, skis and other equipment. Later, slash-and-burn cultivators, charcoal burners, wood-hewers and loggers used birch trees for their various needs. These actors had only axes or other simple tools in their hands when they went to the forests. Their impact on nature was minor and there was almost no competition between different users. When lots of wood began to be needed in mines and iron works, and after that in the wood processing industries, problems began to occur.

Before the 1860s not many people other than peasants could read the language of birches in Finnish forests. For peasants, birch was a suitable material for multiple household uses. In the birch forests they also saw suitable areas for slash-and-burn cultivation. When the industrial revolution reached Finland,

the socio-economic situation changed. When new paper and pulp mills were established, the value of the forests altered. The ways of environmental literacy changed from those of peasants to those of industrial entrepreneurs. Eventually, the old ways of collecting different raw-materials, slash-and-burn cultivation, grazing, coppicing, suckering, bark taking and so on vanished and the Finnish forests transformed into 'tree fields' for wood processing industry.

When the environment changed, so did economic and political structures and functions: the forests which had been used for rural human purposes became more valuable for the wood processing industry. At the same time, and from another point of view, there arose the need to preserve the forests, and new laws and institutions were established for forestry and conservation. Environmental literacy changed because the ways of thinking about, conceptualising and valuing the surroundings changed. When people abandoned slash-and-burn cultivation they began to read their environment in a new way, and this process also altered their language.

These examples of the changing status of birch trees, how Finns have perceived, used and valued birch over the centuries, are only few fragments of the huge realm of Finnish environmental history. The birch is and has been an important tree for the Finns. They appreciate the silver birch so much that, in 1988, it was voted the National Tree of Finland.

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