Chapter 2
Historical and Contemporary Views on Non-wood Forest Products in Sweden—Contrasting Reflections

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Abstract Far away from the Southeast Asian forests in Northern Europe lies Sweden, a contrasting industrial country. Approximately 75% of the country is covered with boreal forest. Due to intense industrial forestry for almost two centuries, only about 25% have qualities as primary forest. The rest is managed forests. Biodiversity is low compared to Southeast Asia, the dominant species are 40.3% Norway spruce (*Picea abies*), 39.3% Scots pine (*Pinus silvestris*), and 12.4% birches (*Betula* spp.). About 8.7% of the forests is protected, mostly areas with low capacity to produce timber. Sweden is a developed country with 10 million inhabitants (average 25.4 inhabitants /km^2). Historically, the forests supplied game, fir and pelts, to a lesser extent berries and mushrooms, and it was also used for grazing. Timber was extracted mainly for household purposes or to produce coal, tar, and potash, but during late nineteenth century, the sawmill industry became increasingly important. Today most forests are subjected to industrial forestry and harvest of non-wood forest products (NWFPs) is considered a conflicting interest. So, how can forestry and harvest of NWFPs coexist? In industrial countries ecotourism and recreational uses of forests may be more urgent NWFPs than many provisioning ecosystem services—and most likely also more profitable. However, in order to safe-guard the future of valuable biodiversity-rich forests suitable for recreation as well as harvest of more concrete NWFPs it is necessary that some of the profits from such ventures finds the way to the forest owners in order to motivate them not to clear-cut.

Keywords Forestry · Hunting · Trapping · Berries · Mushrooms · Recreation

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A. Z. M. M. Rashid et al. (eds.), *Non-Wood Forest Products of Asia*, World Forests 25,
https://doi.org/10.1007/978-3-030-99313-9_2

2.1 Historical and Contemporary Non-wood Forest Products in Sweden—Contrasting Reflections for Common Benefits

2.1.1 Introduction

Far, far away from lush rainforests of Southeast Asia lies Sweden, a contrasting boreal country (Fig. 2.1). This might seem like an odd bird in this nest of chapters, and it is. However, the aim of this contribution is to inspire, for good or for worse, and to ventilate some different perspectives from a different reality.

The Swedish forestry industry has previously attracted the interest from Southeast Asia, when the king Chulalongkorn of Siam (Thailand) visited Swedish forests and sawmills in 1897 in order to reflect upon possible improvements that could be made within Siam's national forestry. Maybe it is now time to reflect further upon the clash between industrial forestry and the harvesting of non-wood forest products and consider how to achieve a sustainable future for forests, their ecosystems and adjacent human societies. Could lessons learnt in Sweden contribute to long-term solutions in Asia?

Fig. 2.1 A boreal spruce forest. Fiby pristine forest reserve, Uppsala. Photo: Håkan Tunón (2020)

This essay is based on experiences from previous research projects, personal observations, and a large proportion of surveys of the literature (scientific, grey and more popular literature as well as information in mass media) over a wide area of diverse interests in order to give a broad reflection on the subject.

2.2 Background

Sweden is situated in Northern Europe (55°20′–69°03′N 11°57′–24°10′E) (Fig. 2.2). In total there are 28.0 million hectares of forests. The total land area is 447,435 km^2, and approximately 75% of the land area is covered with forest. Due to an intensive forestry during the past two centuries and an active reforestation for the past, only about 25% of the forests have qualities as primary forest or ancient woodland.

The remaining forested area is the result of intense forestry and the term *plantation* is often used by nature conservatists to describe these managed forests, since natural forest-ecosystems seldom remain. Compared with more tropical countries the biodiversity is fairly low. There are only around 45 different species of trees in Sweden (including some few introduced species), and the dominant species are 40.3% Norway spruce (*Picea abies*), 39.3% Scots pine (*Pinus silvestris*), 12, 4% birch (*Betula pendula* and *B. pubescens*), 1.7% aspen (*Populus tremula*), and 1.7% alder (*Alnus glutinosa* and *A. incana*). In the southern part of the country there are mostly broad-leaved trees (seasonally shedding all foliage, no foliage during winter), while in central and northern Sweden there are mostly conifers, a part of the western taiga forest. Parts of the western mountainous area (the Scandes or the Scandinavian mountains) are above treeline. About 8.7% of the forests is formally protected, mostly areas with low capacity to produce timber, and only 6% of the productive forest area (SCB n.d.; SEPA 2021). However, if other forms of voluntary protection and considerations are included additional 6–7% could be included (Hannerz and Simonsson 2021, p. 59; SCB 2020).

Sweden is a developed country with around 10 million inhabitants. Today over 80% of the inhabitants are living in urban areas, but due to the low population density only 41% is considered to live in urban areas according to the OECD-definition. The country has undergone a quick transition from a relatively poor rural country in early twentieth century to today's urban society. In the early 19th about 90% of the population was living in rural areas, but. At the same time a change has occurred from primarily rural production from agriculture, animal husbandry and peasant forestry, to industrial society and further on to a post-industrial present with a stronger focus on the service sector and information technology. In average there are 25.4 inhabitants per km^2 (the average within the European Union is 117.7 inhabitants per km^2), but it is higher in the southern parts of the country, especially the Stockholm county with 364.9 inhabitants per km^2. Still relatively scarcely populated compared to other parts of the world. The northern county of Norrbotten is the least populated one with 2.6 inhabitants per km^2, followed by Jämtland county with 2.7 inhabitants per km^2 (SCB 2021).

Fig. 2.2 Map over Sweden and Europe. (*Source* Nuclear Vacuum, Wikimedia Commons)

The rapid change from a rural to an urban country and the industrialization and rationalization of agricultural and forestry have led to a rapid decrease of biodiversity-rich, small-scale, mosaic landscapes which used to be manage through traditional land uses (Emanuelsson 2009, pp. 25–43). The year 1900, 78.5% of the population lived in rural areas. Traditionally farmers mixed farming and small-scale selection forestry. The changes in land use during the past century have led to the disappearance of a cultural landscape based on traditional agroforestry, and consequently also the biodiversity that had become adapted to specific biotopes in that landscape. According to the national red list, forests and agricultural lands are the biotopes with the most red-listed species; about half of all red listed species appears in these areas. Forestry and clear cutting have a strong negative impact on about 1400 species, and bush and tree encroachment on former agricultural and pasture lands due to structure rationalisation is threatening about the same number of species (SLU Artdatabanken 2020). When comparing the present situation with historical data for approximately 123,000 ha it was shown that prior to the more intensive forestry the dominating natural stands were more than 200 years old. The number of old trees has been reduced with around 90% and old stands constitute less than 1% (Linder and Östlund 1998). On the other hand, the reforestation efforts during the twentieth century have resulted in that the standing volume per hectare has almost double between 1925 and 1995 (National Board of Forestry 1998), but this doubling is from an all-time low. Consequently, the ongoing forestry is questioned based on both environmental and social arguments, and the public debate is strongly polarised. The World Economic Forum highlights the problem with the Swedish forestry and even if the growth is bigger than the amount harvested the levels of biodiversity keeps decreasing. They also highlight the potential problems when climate change is putting pressure on a forested landscape with basically two species of trees and predicts increased risks for pest outbreaks, drought and storms (World Economic Forum 2018). However, a recent report points at the fact that the situation for forest biodiversity has improved slightly, since 1990s when ecological considerations were introduced in forestry meaning that the development might be going in the right direction (Hannerz and Simonsson 2020). The "forestry lobby" is currently highlighting the potential commercial value and climatic importance of an even more intensified forestry. The forests are considered to contribute to mitigate climate change through substitution of greenhouse gas-intensive materials and through carbon-sequestration. The reasoning goes as follows "In regions where forest growth rates exceed harvest levels (e.g. in Europe), it is expected that sustainably managed forests can make a substantially larger contribution to energy and material supply than is currently the case, thereby reducing carbon emissions." In order to increase the forest growth rates through various measures such as species selection, planting, fertilization, and other management options (Royal Swedish Academy of Agriculture and Forestry 2018). It is also stressed that products from forestry will result in materials that will trap carbon for a long time. However, according to statistics from 2011 concerning the Swedish forestry around 25% is used as timber, 16% is used for bioenergy and 59% was used for pulp and paper (Träguiden 2017). More recent calculations from the Swedish Environment Protection Agency 22% timber, 50% bioenergy and 25%

Fig. 2.3 Different versions of boreal forests. A pristine forest reserve (Fiby pristine forest reserve, Uppsala), a protected area for recreational activities (Andersöns natural reserve, Jämtland), a spruce plantation for production on former fields (Uppsala), and a clear-cut with'general consideration' in Dalarna. Photo: Håkan Tunón, 2020, 2017, 2019, 2012, respectively

pulp and paper (Röstlund 2021). Hence, the long-term trapping of carbon might be questioned (Fig. 2.3).

The most common forestry since the beginning of the twentieth century is industrial clear-cutting followed by replanting with spruce and pine trees. The rotation time is less than 80 years for spruce and 120 years for pine. Furthermore, during the 1960s and 1970s the clear-cut areas where initially sprayed with an herbicide and defoliant mixture of phenoxy acetic acids (2,3-D and 2,4,5-T, i.e. "Agent Orange") in order to kill off the competition from broad leaf shrubs and weeds. However, due to environmental consideration it was banned in 1977. During the last decades of the twentieth century an increasing environmental awareness has resulted in a rephrasing of the first paragraph of the Swedish forestry act: "The forest is a national asset and a renewable resource that should be managed sustainably in order to provide a good return while still preserve the biological diversity." It is also stressed that forestry should take other general interests into consideration (SFS 1998; Hannerz and Simonsson 2020). This resulted also in the evolvement of what is generally called 'the Swedish forestry model' that gives the forest owners a large amount of freedom regarding how to conduct forestry if it is within the legislation. This expects that the forest owners and companies will take a 'general consideration', i.e. when

managing the forest safeguard old valuable trees and elements in the forest and leave patches of less productive forests and tree curtains towards waterways and arable fields (Hannerz and Simonsson 2020). "The Swedish forestry model" is generally presented as a way to achieve a sustainable forestry, but on the other hand it is pointed out that the system has "led to even-aged forest stands with a single dominating tree species replacing previously diverse forests, to accommodate the forestry industry" (Royal Swedish Academy of Agriculture and Forestry 2009; Beland Lindahl et al. 2017). However, the issue of sustainability has been contested by various actors (e.g. Protect the Forest and Greenpeace Nordic 2021). In the recent taxonomy for sustainable financing within the EU's new green deal it is stated that: "the term 'sustainable forest management' should be construed by taking into account practices and uses of forests and forest land that contribute to enhancing biodiversity or to halting or preventing the degradation of ecosystems, deforestation and habitat loss, by taking into account the stewardship and use of forests and forest land in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems" (EU 2020/852).

This have been interpreted that the forestry in Sweden and Finland is considered to be unsustainable and is consequently risking losing future investments, and this in now heavily debated by the Swedish Forest Industries (2020). However, I will not dwell further into this in this essay. An interesting and relevant aspect to consider when it comes to Non-Wood Forest Products (NWFP) is that Sweden for the past century has a customary law called the right of public access (SE: *Allemansrätten*, 'everyone's right'). It is not a law per se, but it is mentioned in the Swedish constitution and is considered to be an historical custom, maybe even from Medieval time. However, the present regulations are from 1940 and give the public rights to a considerate access to most outlying lands, even if they aren't the landowners. The motto is "Don't disturb—don't destroy". You are free to pick flowers, berries, mushrooms, twigs and branches from the ground, but not damage living trees or bushes or leave garbage. You are allowed to walk in forests and pasture lands, but not on peoples' fields or in direct vicinity of gardens. For hunting you will need special permits and it is only the landowner that is allowed to pick nuts (hazel, *Corylus avellana*). This last remark goes back to days when nuts in southern Sweden had a commercial value. However, during the past decades arguments have been made that the right of public access and private harvesting limits the landowners' possibilities to develop business from their resources and that it consequently ought to be restricted. Thus the issue has divided the society in landowner organizations and right-wing parties on the "restriction" side and left-wing parties, NGOs and tourism organizations on the other (Naturvårdsverket n.d.; Sandell and Svenning 2011; Sténs and Sandström 2013, 2014).

When reflecting upon the delicate balance between urbanisation, forestry and a continued harvest of NWFPs Sweden could serve as an inspirational example vis-à-vis the situation of Southeast Asia and the future development. Sweden has a long tradition of forestry, but during the past 100–150 years it has been perceived as the sole

value of the forested landscape (Hannerz and Simonsson 2020, pp. 16–18). Most of the NWFPs have been seen as competing interests and limiting factors. However, the management and use of forests might need a change in order to improve or maintain biodiversity and the sustainable use of some of the NWFPs. The aim of this chapter is to visualise the complexity of historical and contemporary dependency of NWFPs and its change over time. Today most of this harvest is done for household purposes and on common resources, while the forestry is commercial and on owned land, this conflict of interest creates a tension between several different groups in society. The issue is complex and there are many different interests and perspectives to be considered. In these days forestry is not always profitable for the smaller landowners and it often compete with the use of other NFWPs. Perhaps there is time reconsider what the values of the forest really are?

2.3 NWFPs in History and Current Situation

In this essay I have chosen a broad definition of NWFPs (or non-timber forest products, NTFPs). Jenne H. De Beer and Melanie J. McDermott define NTFPs as "all biological materials other than timber which are extracted from forests for human use" (De Beer and McDermott 1989), while others have been more or less inclusive (Shackleton et al. 2011). I have mostly excluded wooden materials, for instance as material for handicraft and craft, which might have a strong potential for sustainable use. Furthermore, I have not fully differentiated between 'products' and 'services', as the recreational value of the forest is becoming increasingly important, especially in industrial countries, and nature experiences, eco- and cultural tourism constitute an increasing market. The policy discussions in industrial countries are beginning to highlight a decoupling of economic growth from material consumption meaning that experiences could be at least equally important as physical products.

Still over a century ago most forests belonged to farms with agriculture and animal husbandry, and forestry was based on selected logging for the household or sold in small-scale. The forest constituted a mixed source of all sorts of wood and NWFPs. In some parts of Sweden, close to the ironworks, most of the forest was repeatedly clear-cut and burnt into coal already in the seventeenth and eighteenth centuries. Some areas exported tar and pitch from pine and spruce and potash from wood of birch and aspen (SCB 1972, pp. 124–129). It could be questioned whether tar, pitch and potash really should be considered to be NWFPs, as they are produced from wood. However, they played an important economic role over a long period, especially during the seventeenth and eighteenth century. During the seventeenth century there was a huge demand for potash in Europe and potash became a valuable export product for Sweden as well as tar and pitch that was one of Sweden's most important export products due to the maritime expansion around Europe (Larsson 1996; Villstrand 1996). The statistics shows that in 1770 tar, pitch and potash constituted 4.2, 1.0, and 1.5% of the total Swedish export value, respectively. But around the year 1800 they had almost reached zero (SCB 1972).

Table 2.1 Statistics over the contribution from forest products to the total Swedish export (SCB 1972, pp. 155, 286–288; SPIN2015)

Year	Timber and pulp (%)	Paper (%)	Total (%)
1770	5.5	–	5.5
1871	45.3	1.2	46.5
1901	48.7	4.8	53.5
1911	41.3	5.1	46.4
1920	27.1	32.5	59.6
1930	17.8	25.9	43.7
1940	40.5	14.1	54.6
1950	23.3	11.7	35.0
1960	0.7	10.2	10.9
1970	0.7	8.8	9.5
2019	3.8	5.7	9.5

When Carl Linnaeus made his Lapland journey in 1732, he concluded from Lycksele (in northern Sweden) that:

> 2 June. The forest was filled with large pine trees, totally in vain, because no one uses him to build houses and he is eaten by no one. According to me he would be of better service if pitch and tar was burnt from him. (Carl Linnæus 1973).

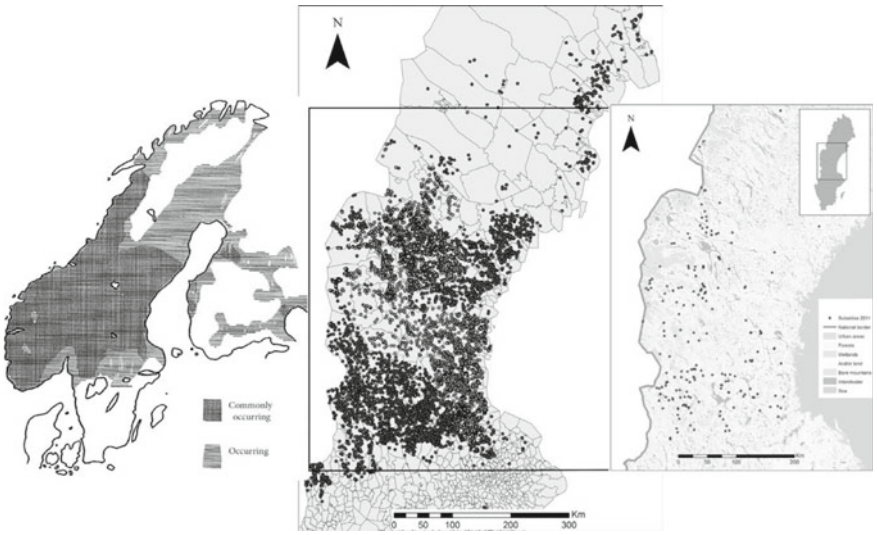
During the nineteenth century selected logging was intensified to an industrial scale and rivers were cleared and used for log-driving. Down the coasts, sawmills produced beams and boards for export, particularly to Great Britain. Around 1900, the standard procedure selected logging of big trees had led to vast areas of deforestation and consequently the clear-cutting and replanting became the way forward. This has since 1903 basically been the only kind of forestry in Sweden (Hannerz and Simonsson 2020, pp. 16–18). When it comes to NWFPs this kind of forestry has their pro and cons, but more about that later. Replanting changes the diversity of trees in the forests and creates more of a monoculture, which also often results in changed different vegetation on the forest floor and consequently can affect the possibility to harvest some NWFPs. During eighteenth and nineteenth century timber was among the most important export products nationally, but during the twentieth century pulp and paper gradually became of more and more important (see Table 2.1), but all in all the importance of forestry to the national export has dropped during the last 50–60 years (Fig. 2.4).

2.3.1 Grazing and Fodder Production

The outlying lands and the forest were for many centuries used for grazing by cattle, goats, sheep and horses, often guarded by a shepherd, and the traditional Swedish meadows are also often fairly rich in trees and bushes. In the southern and central

Fig. 2.4 Cows on forest grazing in Jämtland. Scandinavian mountain cows in an alpine birch forest, a crossbreed of Charolais and Hereford on a few years old clear-cut with saplings of pine, Different versions of boreal forests, red polled cows ploughing through bilberry and willow bushes. Scandinavian mountain cows and Jersey cows searching grazing in a spruce forest. For forest grazing the cow breeds need to be fairly light and with small udders. Photo: Håkan Tunón, 2012, 2016, 2018, 2012, respectively

parts of the country where the population was fairly dense the farms were close and the areas in the direct vicinity were used for agriculture, while in the northern half of Sweden the climate and geography was less favourable for cultivation meaning that the small proportions of available arable land were used for more robust crops like barley and potatoes. Consequently, fodder was to a large extent produced on the outlying, often forested, land. However, during the nineteenth century the competition with forestry led to conflicts and in early twentieth century there were political campaigns against forest grazing due to its potential negative effect on trees and saplings. Today forest grazing is of a limited importance to agriculture, but it still exists, and it plays an important role in nature conservation since this kind of biotopes and the plants, mushrooms and insects adapted to them have practically disappeared. It is also highly appreciated in the production of artisanal food. In the central part of Sweden there is still approximately 200 summer farms with seasonal grazing of forests (see Maps 2.1, 2.2 and 2.3). These are scattered remains of a customary transhumance system with probably 50,000–100,000 summer farms in the central region of Sweden 100–150 years ago. The daily practice was that the animals together with



Map 2.1 A presumed distribution of summer farms in Fennoscandia (Bergils et al. 1998). **Map 2.2** A GIS-map over documented summer farms present and historical (by Sebastian Liahaugen from Tunón and Bele 2019). **Map 2.3** A GIS-map with active summer farms in 2012 (by Parbakhar Poudel)

a cowherd left the summer farm in the morning after milking and went grazing in the outlying lands, e.g. forests, mires and alpine meadows, all day before returning to the summer farm in the evening. These daily excursions went to different directions each day, creating a grazing pattern with a radius of about 5–10 km from the summer farm. In some areas the grazing of the forests were quite intense. The cowherd accompanied the herd and made sure that they were safe from predators, and that they didn't graze the meadows for hay harvests for winter fodder or entered the grazing lands of a neighbouring village. When the number of large carnivores, mainly wolves, bears and lynx, as well as the number of active summer farms went down the need to herd the animals disappeared (Tunón et al. 2013; Tunón and Bele 2019). Also in other parts of Sweden the forests were used for grazing and are still to a very small amount used (Fig. 2.4).

However, it wasn't only the animals themselves that harvested the vegetation growth during the summer. Farmers harvested leaves, twigs and bark from trees and bushes, dried the harvest and gave to the cattle, goats, sheep and horses as winter fodder. There are several different ways to harvest leaves, either to cut down the trees and pick the leaves or make tight sheaves of the twigs with leaves, or you could pollard the tree, i.e. cut the branches and twigs from the standing tree, or coppice it and collect the ground shoots. All broad leaf trees could be used. However, in southern parts willow (*Salix* spp.), ash (*Fraxinus excelsior*) and elm (*Ulmus glabra*) and in the northern mainly sallow (*Salix caprea*), birch, and rowan (*Sorbus aucuparia*). All harvested parts were used in some way, first and foremost as fodder and then for

handicraft or firewood (Aronsson 1996; Borgegård 1996; Carlsson 1996; Kardell 1996a; Ljung 2015a).

Furthermore, in the most northern parts of the country the Saami reindeer husbandry is dependent on ground lichens (*Cladonia* spp.) and beard lichens (*Usnea* spp.) in the old forests with pine and spruce. In younger forest the abundance of lichens is almost absent (Berg et al. 2011). For the past century the annual number of herded reindeer after autumn slaughter have been around 250,000. Ground lichens have also been harvested as winter fodder for cattle, goats and sheep (Tunón and Bele 2019). A more modern conflict is due to commercial harvest of *Cladonia stellaris*, not for fodder but for Christmas and flower ornamentals, where some mean it is a part of the right of public access. However, some recent rulings in court have gone against that interpretation, so that resource is for landowners or private use (Fig. 2.5).

Fig. 2.5 Reindeer grazing leaves and ground lichens, mostly *Cladonia* spp. Both male and female reindeer have antlers. In the summer most reindeer graze leaves and herbs in the mountains, but in the autumn the migrate to the forested to graze lichens. There are no wild reindeer in Sweden anymore, they got extinct from hunting in the nineteenth century. However, they roam around freely in groups or larger herds and are gathered up several times a year. Photo: Håkan Tunón, 2017

2.3.2 Game

Forests have also always been used for hunting and trapping, especially in the northern parts where these activities still play a very important role for the individual households as well as the local economy. From rural areas game, fir and pelts were for centuries sold to the larger cities in Sweden or exported to other parts of Europe, and even taxes were paid in fir and pelts. Still hunting is a rural practice and today the number of active hunters is approximately 300,000 (i.e. 3% of the inhabitants), but the local importance in the rural communities is much more prominent. Hunting is regulated and you need special licences. The traditional game for food has been elk (*Alces alces*), roedeer (*Capreolus capreolus*), hare (*Lepus timidus*, *Lepus europaeus*), brown bear (*Ursus arctos*) and in recent decades wild boar (*Sus scrofa*) and red deer (*Cervus elaphus*). For fir and pelts the most important species are red fox (*Vulpes vulpes*), badger (*Meles meles*), wolf (*Canis lupus*), lynx (*Lynx lynx*), stoat (*Mustela erminea*), Eurasian red squirrel (*Sciurus vulgaris*) and brown bear. Among birds western capercaillie (*Tetrao urogallus*), black grouse (*Lyrurus tetrix*), hazel grouse (*Tetrastes bonasia*), and willow ptarmigan (*Lagopus lagopus*) are of importance (Arvidsson 1983; Kjellström 1995, 2013; Brännström 2006; Danell et al. 2016). Today hunting is regulated, and special permits need to be obtained, but still these species are of great significance, at least locally, and for instance over the past decade somewhere 80–100,000 elks have been shot annually (Viltdata n.d.), which equals about 10,000 tonnes of meat, but it also plays an extremely important cultural role in the rural communities. In many rural areas the first week of the elk hunting season is the most appreciated vacation of the year, and people that have moved away from the area will return for the hunt. In general it could be said that the populations of important game have increased during the past fifty years so the governance for most of the species seems to be sustainable (Danell et al. 2016; Hannerz and Simonsson 2020, pp. 25–26). The urban people's opinion on hunting is today partly related to their opportunities to access game meat. Not very surprisingly a study has shown that people with connections to rural hunters and access are more positive to hunting (Ljung et al. 2015). The interaction between forestry and the harvest of game varies depending on what kind of species we're referring to. Elks thrive on clear-cuts and feed on birch bushes and young pines and thus are a potential threat against future timber values. On the other hand forestry is less favourable for capercaillie, that relies on a varied forest with old-growth pines, and hazel grouse that is dependent on dense old-growth spruce forests (Fig. 2.6).

2.3.3 Wild Berries

In the northern forests there are about 35 species of berries, but there are only a few that have had any economic significance. The most important species are bilberry or blue berry (*Vaccinium myrtillus*), cowberry or lingonberry (*V. vitis-idaea*), and

Fig. 2.6 An elk (or moose) cow grazing on a clear-cut in Jämtland. The hunting of elks is one of the major events in the rural parts of Sweden, especially in the north. Elks benefits from the growths on clear-cuts and appreciate grazing saplings of pine, thus creating damage to the forestry. Photo: Håkan Tunón, 2016

raspberry (*Rubus idaeus*). According to the right of public access berries are considered as every one's property. The interest in harvesting berries has varied through history; increased during wars and depression but diminishes when times get better. The availability of berries is influenced by the local forestry. The annual production of berries in the forests in the 1970s were estimated to 219–307 million kg bilberries, 142–168 million kg cowberries and 15–20 million kg raspberries fresh weight, which equals about 20 kg berries produced per hectare of the total forested area and year. For the year 1977 it was estimated that only about 30 million kg of these three berry species were harvested, i.e. about 5% of the total production. After a clear-cut about 80% of the bilberries and 10% of the cowberries disappear for a decade or so. The herbicide treatment that was still ongoing at the time of this study killed many bushes and made the berries unsuitable for human consumption (Kardell 1980). During the past decade the average annual berry production in the forests has been estimated to 323 million kg of bilberries and 265 million kg of cowberries.

Historically harvesting of berries was considered too time consuming and it coincided with more important labour intense activities in agriculture. Conservation of the berries has also been a limiting factor, but drying or jam/preserves have been the methods of choice. In early twentieth century, people from urban areas went to

forested areas as seasonal labour to assist with the harvest of berries. From 1911 a more formal infrastructure was organised with the building of regional berry dryers around the country. The purpose was to use them both as food and medicines. The decades to follow the concept of "bilberry girls" was coined for young females from Stockholm and other cities that went to the rural areas for the berry seasons. For instance, one municipality in northern Sweden was "invaded" by around 300 "bilberry girls" for approximately two months in 1917. There was a small dip in the interest after World War I, but it rose again around World War II. In some cases there were conflicts between the guest harvesters and the locals, but the "bilberry girls" were generally seen as a positive experience (Tunón 2021; Sténs and Sandström 2013) (Fig. 2.7).

After the Perestroika and Glasnost in the Soviet Union and eastern Europe in the mid 1980s and then the aftermaths of the fall of the Soviet Union in 1991, eastern Europeans from Poland, Bulgaria, Estonia, Latvia, Lithuania, Ukraine, and Romania started coming to Sweden as seasonal berry pickers. About the same time Thai women that had migrated to Sweden for marriages started picking bilberries, cowberries and cloudberries (*Rubus chamaemorus*). In the early 2000s, the wild berry industry was restructured and staffing agencies in Thailand started to arrange transports and work permits for Thai people to come to Sweden. The berry pickers were promised good

Fig. 2.7 Bilberry (*Vaccinium myrtillus*) and cowberry (*Vaccinium vitis-idaea*) are the most important species of forest berries. Photo: Håkan Tunón

profit for harvesting berries and many pickers took loans to come. They were often forced to pay all sorts of fees for the opportunity to pick berries, so the profit margins weren't as good as promised. Consequently, they had to pick large quantities of berries as they were paid per kilo and they often had to work 12–19 h, six days a week. The kilo price depends on the world-market price that is determined by for instance the availability of wild berries. Some seasons the pickers could just not earn enough to cover the costs, so they ended up in debt. Some local companies withheld their earnings for various reasons. This has been described as human trafficking. The is bad press resulted in 2011 that the rules were changed, and the Swedish wild berry actors had to prove that they in the beginning of the season had sufficient financial assets to pay the workers in order to get work permits from the Swedish Migration Board. For the following seasons they companies had to show that the workers from previous years had been paid. Annually about 5000 people received work permits to pick berries, and they mainly came from Bangladesh, China, Thailand and Vietnam. The berry pickers do not pay tax in Sweden, but on the other hand they haven't any kind of social security either. The general situation has improved during the last decade but is still not considered to be satisfactory (Wingborg 2011, 2013, 2018; Thörnqvist and Woolfson 2012; Eriksson and Tollefsen 2013; Axelsson and Hedberg 2018; Hedberg et al. 2019) (Fig. 2.8).

Fig. 2.8 Porcini (*Boletus edulis*), chantarelles (*Craterellus lutescens*, *Cantharellus cibarius*). Photo: Håkan Tunón

2.3.4 Mushrooms

Among the peasants in the eighteenth and nineteenth century mushrooms were rarely seen as edible. They were perceived as related to the devil and was a sign of rotting. However, among the higher classes it began to be increasingly popular due to influences from the French court. In the mid-nineteenth century campaigns to increase the interest in mushrooms as a resource and a delicacy and from the mid-twentieth century a wide interest among the public has continued to grow. Today picking mushrooms is widely appreciate, mostly as a recreational activity that still makes a culinary contribution. However, there is a limited number of species that are being picked by the public. The most popular are chantarelles (*Cantharellus cibarius*, *Craterellus tubaeformis*, *C. lutescens*, *C. cornucopioides*) and porcini (*Boletus edulis*).

Interestingly enough, oyster mushroom (*Pleurotus ostreatus*) and shiitake (*Lentinula edodes*) are abundantly growing on decaying wood, but hardly ever picked by the public, even though they are among the most popular mushrooms in the supermarkets. Sweden has approximately 4000 mushroom species of which about a dozen are very poisonous, while around 120–130 species are considered culinary (Dahlberg and Tunón 2007). An interesting finding was made in 1998 when the species Matsutake (*Tricholoma matsutake*) was found in Sweden. Studies showed that it was abundantly occurring in some old pine forests. It is a mushroom of great economic interest and there is some export to Japan. Due to this export the value of the mushrooms in an old pine forest might be much higher than the value of the timber.

A recent study has shown that the industrial forestry with clear cutting is detrimental to the mushroom diversity in an area since the trees and the mushrooms are dependent on mycorrhiza. When the trees are harvested this dependence is broken and the mycelium dies. As an element of environmental consideration 5–10% of the trees are left at a clear-cutting. The study showed that this still resulted in a loss of 75% of the mycorrhiza mushrooms in the area. However, if 60% of the trees are left there are still losses of 30% of the species. It is estimated that the mushroom diversity is restored around 90 years after a clear-cut. However, some species will not recover within that interval. A cutting cycle of pine in Sweden is generally between 90 and 120 years and for spruce 70–100 years. If no trees were left the abundance of mycorrhiza mushrooms decreases with 95% and the number of species with 75% (Sterkenburg et al. 2019). Furthermore, when it comes to carbon sequestration of boreal forests the contribution from fungal mycelium is significant and the long-term below-ground input has been shown to contribute to around 50–70% of the total carbon stored in humus. When a forest is clear-cut much of the mycelia dies and the soil start leaking from the stored carbon. Initially the growing trees capture carbon, but when the forest gets older the importance of the humus and fungal system increases (Clemmensen et al. 2015) (Figs. 2.8 and 2.9).

Fig. 2.9 Mezereum (*Daphne mezereum*) and witch's brooms (*Taphrina betulina*) are two of many traditional medicinal plants that can be harvest in the Swedish forests. Mezereum is strongly poisonous and had a diverse use. Witch's broom has been used against skin diseases, but also as a protected measure against evil spirits. Photo: Håkan Tunón

2.3.5 Harvest of Medicinal Plants and Other Remedies

From time immemorial local people have depended on the forest for harvesting medical cures for various ailments. Some of these are pharmacologically active while others probably benefit mostly as placebo. In the folk medicine some of the most renowned domestic plants were mezereum (*Daphne mezereum*), heather (*Calluna vulgaris*), bilberry, cowberry, bearberry (*Arctostaphylos uva-ursi*), European goldenrod (*Solidago virgaurea*), common club moss (*Lycopodium clavatum*). Furthermore, resin from both pine and spruces were collected as wound healing agents or for dental health. Witch's brooms, a deformity on birches caused by a fungi (*Taphrina betulina*), was considered both as having medical properties and magical powers to protect from evil spirits. Animal parts were also used in the traditional medicine (Tunón 2021) (Fig. 2.9).

Around year 1900 there was an increased awareness among apothecaries and physicians in Sweden that the national supplies of medicinal plants relied too heavily on import and that in an international crisis the healthcare would be compromised. Hence, a national network for cultivation and wild harvesting of medicinal plants where initiated. This relied on the general public as harvesters of plant material and to deliver it to the local pharmacies or special facilities. During the first decades of the twentieth century several manuals were published instructing people in what to harvest and how to do it. Most of them described only 20 or 30 different medicinal plants that were easily identified by people to ensure a safe identification. Some of the most common plants for harvest was alder buckthorn (*Frangula alnus*), bearberry, bilberry, cowberry, common club moss, Iceland moss (*Cetraria islandica*), male fern (*Dryopteris filix-mas*) and yarrow (*Achillea millefolium*) (cp. the "bilberry girls").

After World War II the public interest in harvesting medicinal plants went down to close to zero and was supplied through import (Samuelsson 2001; Tunón 2021).

Even if there have been some minor endeavours in trying to develop businesses based on medicinal plant harvest it is today almost exclusively small scale and for personal use. You can still find ointments with resin from spruce on the market. However, the big part of the bilberries that are being picked in the Swedish forests are exported to European and Asian companies to produce herbal medicines or food supplies (Wingborg 2011). For medical and chemical purposes resin from pine and spruce was harvested, both for personal use and commercially. The bark was scarred in order to stimulate the resin production in the tree. This has been ongoing for centuries, but during World War I resins were harvested in substantial amounts. In 1917 alone it is estimated that more than 1450 tones of resin were distributed from the railway station in the village of Ljusdal. Most of which was harvested in the Ljusdal parish and neighbouring parishes. The national collection during World War I is estimated to have been worth over 20 million USD in today's value. A couple of years later the harvest of resins became banned due to its potential negative impact on the industrial forestry (Anonymous 1917, 1919; Magnusson 1996; Ljung 2015b). The resin was mainly used to manufacture turpentine and other products. Today turpentine is a biproduct in pulp production (Fig. 2.10).

Fig. 2.10 NWFPs have become high fashion on the market, for instance. The spring shoots on spruce are sold pickled or as marmalade, syrup or flavoured oil. Small bottles or jars with artisan products at fairly high prices. This development is driven by innovative entrepreneurs in the rural areas, and many products are short-lived, while other turns into success stories. Photo: Håkan Tunón

2.4 NWFPs as Food from the Forests

Vegetable food stuff not emerging from agriculture has often been referred to as emergency food. However, during the past decades there has been an increasing interest in more exclusive gastronomic products based on "forest food". Historically, apart from berries, mushrooms and game other NWFPs have been harvested in a relatively small-scale. The most renowned example is different kinds of bark to eke out flour in bread or porridge. In the southern parts of Sweden barks from elm (*Ulmus glabra*), birch and linden (*Tilia cordata*) were mostly used, but in the more northern parts pine bark was preferred (Niklasson et al. 1994; Niklasson 1996). However, there is a significant difference between them, as the southern bark flour was made from the entire bark, while in the north only the inner bark (cambium) was used. The Sami people traditionally harvested inner bark from pine that was eaten fresh, dried or roasted. The bark was often mixed with reindeer milk, fat, blood or other kinds of food, like fish or meat soup. When the bark was roasted it was done in pits in the ground. The bark was harvested from standing trees and in a way that ensures that the tree would survive the process in order to be able to harvest again. The oldest remains of Sami bark harvest are from 1450 A.D., but there are findings in Finland of tools for harvesting dated as far back as 1200 A.D. This tradition ended in the late 1800s (Niklasson et al. 1994; Zachrisson et al. 2000; Östlund et al. 2009).

In the spring when the birch sap rises after the freezing winter it was time to harvest in order sap to make a sugary and refreshing beverage—or after fermentation a kind of wine or cider. This has been further developed and from 2006 a Swedish sparkling wine is made commercially from birch sap in a méthode champenoise. Another traditional beverage *enbärsdricka* or *jenlag* is made from berries, twigs, branches and roots of juniper (*Juniperus communis*) together with yeast, water and sugar. The fresh shoots of pine and spruce have also been used to make herbal tea rich in vitamin C, which was valuable in a boreal country with long winters with a very limited supply of vegetables and fruits.

Attempts have also been made during the centuries with Swedish syrup production from broad leaf trees, like maple (*Acer plantanoides*). However, the sugar content is much lower than in its North American relative sugar maple (*Acer saccharum*), which explains why it never really succeeded, and in the early nineteenth century the sugar beets (*Beta vulgaris*) made other sources irrelevant. In rural development, a diversity of other products is being developed based on fresh spring shoots of spruce like for instance pickled shoots, jam, preserve, syrup and vodka. Often in small jars and at high prices. Consequently, you can today also buy exclusive, artisan bread with ground pine bark as an additive to the flour (Fig. 2.10).

2.5 Cultural and Recreational Values as NWFPs

Forests are also important for cultural and recreational reasons. It is sometimes said that poor people don't—or at least seldom—have the opportunity, possibility or ability to enjoy nature and its aesthetic values. However, in industrial and urban societies the concepts of spare time and outdoor recreational activities have become increasingly important. Thus the forest is a space for recreation while at the same time productive activities, like berry and mushroom picking or hunting, have gone from subsistence activities to leisure. This has turned outdoor and ecotourism into financially important business opportunities, which has changed the way we look at rural areas and the values they have to offer. In the late nineteenth century an increasing number of urban people started going on recreational vacations in scenic landscape.

Around 1930 the issue concerning equal opportunities also for poorer people to enjoy nature related recreation was on the political agenda. This resulted in the legal right to a 12 days' vacation in order to give all people a possibility for a meaningful spare time. Consequently, more areas close to the cities were set aside as protected areas for recreational values. In the 1990s and early 2000s the right of public access was questioned, especially in relation to the commercialisation of values, either in the form of commercial berry picking or ecotourism businesses. There is a political pressure from certain groups to restrict the right to public access which might affect the future possibilities for the public's outdoor activities (Sandell and Svenning 2011). Outdoor recreation in the forests is considered to have a strong tradition in Sweden. It has been shown that when it comes to housing, a large group (45%) wish to have a forest within 1 km from the household and that they plan their living accordingly. The closer a forest is the more often people will visit it. They take walks; pick berries and mushrooms, search peace and calm, etc. An increased distance to forests is considered to be negative to the quality of life. The forest ought ideally to be within walking distance and therefore forests within 1–3 km from the household are appreciated for recreation (Hörnsten and Fredman 2000).

The view on forests as recreational areas has been evaluated in 1977 and 1997 to establish possible changes in peoples' behaviour and perspectives. In this study it is shown that the average respondent visited a forest once a fortnight in the winter and once a week in the summer and this was comparable between the two questionnaires. However, the group of respondents of 45+ years had increased their number of visits, while the numbers had decreased slightly for younger people. The general interest in picking berries and mushrooms decreased significantly in all age groups. The conclusion was that the public use is changing from harvesting towards recreational and that there was an increased appreciation of pristine forests vis-à-vis production forests (Lindhagen and Hörnsten 2000; Hörnsten 2000). According to another survey, visits in forests make Swedes "feel relaxed and harmonious" (Hörnsten 2000).

In another study, social science students were compared with forestry students, and the result showed that both groups preferred recreational forests on photographs compared to natural forests and forests with signs of forestry management, including

clear-cuts, that was rated the lowest. Accessible forests with paths and trails were most appreciated. However, the preference was part affected based on the intended purpose of the visit (walking, outings (e.g. picnic), picking berries or mushrooms, exercising, or studying plants and animals). The students preferred "to walk, go on outings, and exercise in recreational settings whilst natural-looking settings were favoured for picking berries or mushrooms". Forestry students preferred "to study plants and animals in natural-looking settings than in settings with traces of forest management" (Eriksson et al. 2012).

Even if tourism is getting increasingly important and rural ecotourism businesses are growing all over the country one problem remains: The landowners are seldom the ones running ecotourism. Consequently, due to the right of public access other people can make a profit from being on someone else's land. But on the other hand, an ecotourism business might invest, plan and advertise activities, but in the end the landowner might clear-cut the site that is planned to be visited. Clear-cut areas are seldomly considered to appeal to tourists. In the same one there might be a clash between forestry and the customary use of an area by the local community. During the past decades all sorts of initiatives regarding ecotourism have appeared, like horseback riding, dogsledding or safaris to see elks or bears, or listen to wolves or owls. All of which to a certain amount relies on at least a convincing air of wilderness. When it comes to the perception of the urban population most forested areas are to be considered as wilderness even if it is a managed forest, but among biologists there is also an increasing interest for rewilding, i.e. "letting nature take care of itself, enabling natural processes to shape land and sea, repair damaged ecosystems and restore degraded landscapes" (Rewilding Europe 2021). This constitutes a major challenge vis-à-vis forestry, but only a minor threat to the harvest of NWFPs, except possibly for hunting. Among the urban population there is also a beginning anti-hunting lobby.

2.6 Reflections

Over the past centuries there has been continuous changes concerning what NWFPs that have been considered to be most important—or in some cases even legal. As forestry became more and more important in Sweden, everything that interfered has been actively hindered due to financial reasons, but still there are many different interests clashing in the forest. Today the forestry sector is an extremely powerful societal actor and fiercely defends its positions, but the sawmill and paper industry and the forest owners are not necessarily on the same side. The interest of the industry is not necessarily the interest of the landowners or the common good. The industry is interested in low prices of timber, while the landowners are interested in high return on their lands. When the importance of forestry in society is gradually going down other interests may come to play a more important role. Furthermore, since all stakeholders feel very strongly about their particular domain of interest the debate is fairly harsh. From a societal point of view it is important to consider all perspectives from a variety of users in order to include all potential values from forests, including various

NWFPs, but it is equally important to take the landowners' interests into consideration. It has been suggested that there is a need for a landscape forestry planning in order to make forestry and nature conservation work in practice (Michanek et al. 2018). I would say there from a NWFP point of view is a need for a much wider landscape plan in order to identify areas valuable for forestry, conservation, and harvest of NWFPs, recreation or as culturally significant places. The forest is providing many different ecosystem services, but only a few, like timber, is easy to put a price on. Hence, the "softer" uses of the forests often is neglected when estimating the values the forests provide—even if they might be more valuable to society, and potentially to the landowners. However, the right of public access is of course both a blessing and a curse since it makes the forests open to anyone, while it narrows down the possibility for the landowner to make a financial profit from other activities than forestry. This custom also makes it difficult to charge a small fee for access to the landowners' land. People are so accustomed to get access for free that they do not readily want to pay. Urbanisation has also resulted in that an increased proportion of the population lacks prior experiences from harvesting NWFPs, while at the same time various immigrant groups contribute with new possibilities for forest products based on their harvest traditions.

It could perhaps appear strange to include an essay on NWFPs in Sweden in a book focusing on the forests of Asia? However, I hope there might be some lessons to be learnt from experiences made during the Swedish transition from a rural country with high dependency of local biological resources in the nineteenth century to an industrial and urbanised country where NWFPs are of limited urgency for the national or the household economy, except perhaps the recreational part, in the twentieth century. Sweden has also at the same time gone from forests with multiple uses, where forestry was one of many activities, to a situation where industrial forestry became the dominant land use, and now it appears as we might be on the brink of returning to multiple use again. Today logging companies are active all over the world and the values of the forests are easily visualised in monetary terms by timber values. However, when trying to calculate the value of products from a forest one has to take both tangible and intangible products into consideration. I have for this essay interpreted the term NWFPs fairly wide, and even included 'products' that in fact are services, like ecotourism and recreation. NWFPs are basically only one part of what is often referred to as ecosystem services. The use of NWFPs can be for household purposes only or for commercial ones, either on a smaller or a larger scale. The international (and national) discussion concerning the value of a multitude of ecosystem services has been difficult to adapt to the Swedish forest situation, since the forestry industry is such a dominant player. For the past hundred years forestry has more or less been the sole answer to rural development, together with extraction industries, e.g. mining and hydroelectricity, now this hegemony is being challenged. When rating the value of ecosystem services the forestry is easy to put figures on, while softer values like recreational, emotional or cultural activities are almost impossible to put a true price on. However, increased consideration for environmental and biodiversity issues, as well as the evolvement of alternative livelihoods in the countryside, e.g. ecotourism businesses, but also the option of working remotely through

telecommuting, has put the rotation forestry with clear-cuts in a new light. There is in Sweden a dawning discussion regarding the possibilities to substitute the conventional rotation forestry with clear-cuts to a selection forestry, which probably would increase the potentials for a multiple land use at least for some NWFPs. We have to ask ourselves, what are the most valuable ecosystem services in the forests, to whom and in what 'currency'? I would like to see an increased discussion on that matter also in Asia and all over the world.

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