

# From economic to environmental sustainability: the forest management debate in 20th century Finland and Sweden

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**Abstract** The issues of sustainability, efficiency, and profitability in private forestry dominated debate on Finnish and Swedish forest policy throughout the 20th century. The management and utilization of private forests have been significant for these countries since more than half of productive forest land has been owned by families. Forests have also played an important role in Finland's and Sweden's national economies. There was however no consensus among forest owners and forestry experts—forest scientists and forestry authorities—about the methods of achieving forestry sustainability and profitability, particularly in the early 1900s. This article focuses on the types of argument on which perceptions of good forest management were based, and the reasons for their use. The article also explores how disagreements and occasional open conflicts between private forest owners and forest authorities were solved, and what kind of regulative means were developed to avoid such differences. There are three main reasons for making a case study of Finland and Sweden: Firstly, the forest sector has played an important role in their national economies, secondly, the objectives and content of their forestry laws are quite similar, and thirdly, the tradition of family forest ownership has remained strong. The debate on good forest management in this period revolves around the two silvicultural paradigms: even-aged and uneven-aged systems. The former concerns formal, scientific knowledge of forest management, and the latter takes a traditional approach.

**Keywords** Forest management · Even-aged system · Uneven-aged system · Traditional knowledge · Formal knowledge · Finland · Sweden

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## 1 Introduction

Since the great land reform that commenced in Sweden in mid-eighteenth century—when Finland was part of Sweden<sup>1</sup>—state land policy was based on the privatization of farming and forest land by assigning it to peasants. It was assumed that this would decrease the peasants' wasteful use of forests. Slash and burn cultivation and tar burning still left large areas of forest in an underproductive state in the late nineteenth century, although forests had not been used in this way for decades in either Finland or Sweden. Instead, forests retained their crucial role as the source of building materials and energy, with other important uses including grazing land and hunting ground. The expansion of industrialization in nineteenth-century Western Europe and the simultaneous abolition of mercantilist regulation in the sawmill industry initiated a new phase in Finnish and Swedish forest history by increasing the demand for logs and raising the value of forests (Palo and Lehto 2012; Tasanen 2004; Eliasson and Hamilton 1999; Kardell 2004). The impact of this expansion on mechanical wood-processing industries could soon be observed in private forests located in the vicinity of water routes. Concerned about forest overcutting and deforestation, many forestry experts in Finland considered that privatization had been a thoroughly unsuccessful measure, but no serious plans were made to develop other forms of forest ownership (Helander 1949). In Sweden, the forest authorities also paid attention to the long periods—of up to 50 years—for which forest companies had bought timber concessions to family forests (Enander 2007; Sörlin 1988).

The management and utilization of private forests were not insignificant for governments since more than half of productive forest land in both countries was in family hands (see e.g. Suomen tilastollinen vuosikirja 1951, 1952; Kungl. Skogsstyrelsen 1953). Forests also played an important role in the national economies of Finland and Sweden. Between the two world wars, about 80 percent of export income came from forest products in Finland, and in Sweden, the figure was around 50 percent (see e.g. Suomen tilastollinen vuosikirja 1926, 1926; Statistisk årsbok för Sverige 1927). Forest authorities and researchers were concerned that the management of private forests was unplanned and unsustainable and that most logging operations conducted in family forests were devastating. In accusing private forest owners of devastating cutting, however, forestry experts failed to recognize that the only timber of any real market value in the early twentieth century was the large-sized lumber harvested by selective cutting (Heikinheimo 1931; Ekelund and Hamilton 2001; Kuisma 1993).

The issues of sustainability, efficiency, and profitability in private forestry dominated debate on Finnish and Swedish forest policy throughout the twentieth century. Ultimately, sustainable planned use of forests was the most important precondition for forestry efficiency and profitability. There was however no consensus among forest owners and forestry experts—forest scientists and forestry authorities—about the methods of achieving forestry sustainability and profitability, particularly in the early 1900s. This article focuses on the types of argument on which perceptions of good forest management were based, and the reasons for their use. The article also explores how disagreements and occasional open conflicts between private forest owners and forest authorities were solved, and what kind of regulative means were developed to avoid such differences.

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<sup>1</sup> Between 1809 and 1917 Finland was part of the Russian Empire as an autonomous Grand Duchy. Since the 6th of December 1917 Finland has been a sovereign state. For more about the history of Finland see Meinander (2011).

There are three main reasons for making a case study of Finland and Sweden: Firstly, the forest sector has played an important role in their national economies, secondly, the objectives and content of their forestry laws were quite similar, and thirdly, the tradition of family forest ownership has remained strong.

National scarcity of forests was not really the main cause of conflict between forest owners and forestry experts (Ilvessalo 1927; Riksskogstaxeringsnämnden 1932). The most burning issue was forest management practices. Private forest management had traditionally been based on the selective cutting method of picking out the biggest trees which meant thinning from above. This was the traditional or uneven-aged system of forest management, a further characteristic of which was their use for multiple purposes, not only wood production (Leikola 1986; Ekelund and Hamilton 2001; Stjernquist 1973).

The forestry experts' perception of good forest management relied on sustained yield forestry, a concept which originated in Germany and was formalized and incorporated into forestry textbooks in the nineteenth century. Sustained yield means the achievement and continuous maintenance of a high-level annual or regular periodic output of timber and other forest products without impairment to forest land productivity. This definition foresees a continual flow of goods and services from the forest and emphasizes the productive goal of forestry (Clawson and Sedjo 1984). Even-aged forest management is based on the rotation of stands by thinning from below leading to a final cut at the end of the cycle, after which a new cycle is initiated by regenerating the logged area either naturally or artificially (Leikola 1987).

Perceptions of forestry sustainability were linked to differing knowledge systems. Particularly in the early twentieth century, forest owners interpreted forestry sustainability in the context of traditional knowledge which contradicted formal knowledge in many ways. Traditional and formal knowledge are identified here through the two abovementioned competing silvicultural paradigms. Traditional knowledge is characteristically fluid and constantly changing, subject to ongoing negotiation between people, their environments and the outside world. Sillitoe (2000) reminds us that traditional knowledge is fragmentarily distributed and exists nowhere as a totality. In contrast, one characteristic of formal knowledge is that it relies on scientific information and can be found in books, manuals, and documents (Conklin 1997).

The archives of district and county forestry boards which supervised the enforcement of forest law in Finland and Sweden provide excellent empirical data for a systematic investigation of grass roots forest management since the beginning of the twentieth century. These administrative records, including annual reports, inspection reports, correspondence, etc., clearly reveal forest owners' perceptions of what constitutes good forest management. Another important set of sources are committee reports and other official preparatory data concerning the development of private forestry. A comparative analysis of forest ownership and management literature provides an excellent third source of information.

## 2 Sustained yield versus multifunctionality

What did forests mean for family forest owners—of whom the vast majority were farmers—in the early twentieth century? Forestry and farming were closely interlinked in Finnish and Swedish country life at that time. Forests were not only important to farmers for wood production; they were also a significant source of fuel and building timber, pasture land, and fodder for cattle and small livestock. Family forest owners saw forestry

as subsidiary to agriculture, particularly in the case of small farms (see Björn 2000; Kardell 2004; Palo 2006).

The first Finnish and Swedish national forest inventories, conducted in the 1920s, revealed that a large proportion of cut woodlots were underproductive. From the mid-nineteenth century onwards forest scientists had been concerned that family owners were devastating their forests through uncontrolled cutting (see Israel af Ström 1830; von Berg 1856, 1859). During the last decades of the century, several commissions were set up to prepare regulations on family forest cutting, and the first concrete measures to regulate the utilization of family forests in Sweden were the Forest Act of 1903 and the Forestry Act of 1923 (von Seth and Wisén 1925; Nylund 2009; Appelstrand 2007). In Finland, the first law governing private forests was laid down in 1886, followed by the Forest Decree of 1917. The first comprehensive legislation regulating family forest use was however the Private Forest Act of 1928 (Mäkelä 2005; Suomen asetuskokoelma 161/1928). The key objectives of these laws in both countries were to stop deforestation, to ensure the regeneration of felled areas, and to encourage forest owners to adopt the principles of sustained yield forestry. Finnish and Swedish forest laws were similar in terms of content and addressed the same need to change the management methods of family forest owners.

The most problematic issue affecting forest legislation enforcement was the interpretation of the concept of deforestation. The traditional selective cutting method based on thinning from above was criticized by forest scientists as unsustainable under Nordic conditions since it was seen to leave the forests in an underproductive state. Instead, the even-aged system was prioritized as the most sustainable forest management method (Enander 2007; Heikinheimo 1924, 1931).

Although the first laws concerning private forests mainly aimed to prevent deforestation, legislation in both countries allowed the use of forest land for other purposes. Forest land could be converted into arable land without permission from the district or county forestry board. The forest owner could also decide to adapt forest land for grazing purposes. The only prerequisite for using forest land for grazing was that the soil should be suitable for the new purpose and that the area cleared corresponded to the owner's real need for grazing land (Suomen asetuskokoelma 161/1928; von Seth and Wisén 1925).

The areas of forest cleared for cultivation were nevertheless not large, so the problem did not become severe, yet the extensive use of forest land for grazing remained a significant issue for forestry professionals until the late 1950s. Forest legislation could be quite freely interpreted since the concept of grazing land was not clearly defined. Forest owners thus had a fairly free hand to alter the use of their land and to defend their rights if accused of deforestation by the authorities (see Stjernquist 1973; Laitakari 1923).

Stjernquist's (1973) Swedish study reveals that the concept of forest land was difficult to interpret and that the authorities adopted a flexible approach to distinguishing between forest and pasture. Particularly in southern Sweden, farmers' logging practices were determined by their interest in producing good pasture land. For this reason, farm forests were thinly stocked and resembled something between forest and pasture. In the 1920s, almost all Swedish county forest officers reported that farmers were clinging to the old form of forest grazing and were not keen to establish permanent pastures.

The definition of pastureland was not a minor national issue for either country. It was estimated that in the mid-1920s, almost 18 % (2.3 million hectares) of family owned forest in Finland (12.9 million hectares) could be categorized as grazing land (KOM 1926:2). In Sweden, it was estimated that on forest land used for pasture, the growing stock was only 40–50 % of the corresponding figure for actual forest land (SOU 1958:45).

The unclear distinction between forest land and grazing land caused law enforcement problems at farm level. Until the late 1940s, the Swedish forestry authorities interpreted the legislation more as a matter of moral obligation than a law to be strictly upheld. In Finland in contrast, the Private Forest Act was interpreted to the letter, so that any selective cutting led almost automatically to the imposition of a logging prohibition (ANKFB 1932–1954 550:10–26, 552:5–8). In 1940, almost 6 % of the total area of privately owned productive forest was excluded from cutting for this reason (Suomen tilastollinen vuosikirja 1941, 1942). However, logging ban inspection reports revealed that in about 15–20 % of cases the banned cutting was actually forest clearing for grazing purposes, which had been recorded in all cases as deforestation by selective cutting (ANKFB 1932–1954; 550:10–26, 552:5–8; see also Siiskonen 2007).

The logging ban inspection reports clearly indicate how difficult it was to make the distinction between deforestation by selective cutting and thinning for grazing purposes, and in conflict situations, the district or county forestry board played the crucial role in defining the concept of productive forest land. From the forestry experts' perspective, "traditional" farming culture was on a collision course with modern forest management methods. During the first half of the twentieth century, the forestry experts' leading aim was to promote the adoption of even-aged system principles in forest management. This proved difficult particularly in forests located near to farm centers which were used multifunctionally. Forest owners saw it as humiliating that multifunctional forest use was interpreted as deforestation. Despite the acceleration of modernization in farming, dependence on forest pasture continued until the late 1950s.

### 3 Maximizing economic productivity

After the Second World War, liberal views on forest owners' rights to manage their property also became obsolete in Sweden. County forestry boards had been criticized for not making full use of the existing legislation and the second national forest inventory revealed that the condition of family forests had not improved in the desired way. The establishment of a National Board of Private Forestry in 1941 provided forest scientists with a better forum to express their ideas on silviculture, and in 1942, the Swedish government instructed the board to evaluate the relevance of existing forest legislation. This revision of forest law was initiated largely by the left-wing parties' demands for increased regulation of the activities of family forest owners (Enander 2007).

The 1948 Forestry Act brought economic assessment into forest management in Sweden. It emphasized that forestry should be economically profitable for the forest owner, and that the long-term aim of forest management was to secure a sustained yield. The need for a regular yield was approached from three angles. Firstly, the practice of agriculture was substantially dependent on forestry, and rationally planned forestry could provide farmers with a reliable income to ensure that their farming was viable. Secondly, a continuous flow of timber from private forests was essential for ensuring stable operational conditions for the forest industry. Thirdly, forestry held a very important social function in maintaining the viability of country life by providing work and incomes for the rural population (Enander 2007; Appelstrand 2007; SOU 1946:41).

The new Forestry Act of 1948 did not endanger the private ownership of forests, but a significant difference compared to previous legislation was its clear setting of productivity goals. The new forestry bill widened the concept of forestry land from productive and poorly productive forest land to waste lands such as old logging areas where regeneration

had failed, meadows, old abandoned pastures, and peatlands. According to the national forest inventory, approximately 900,000 hectares of old logging areas and abandoned pastures was in an unproductive state. It was also estimated that by ditching about one million hectares of peatland, scrub and waste land could be converted into productive forest land. The 1923 Forestry Act had already included the idea that the owner had a legal duty to tend all his forest land, but this had not been applied in practice, particularly as far as the reforestation of old logging areas and abandoned pasture land were concerned (SOU 1946:41; Enander 2007; Ekelund and Hamilton 2001).

The application directives of the Forestry Act included detailed forest profitability calculations based on different rotation cycles and interest rates (Kungl. Skogsstyrelsen 1949). In the early 1950s, productive forest land was considered to be a stand where the annual appreciation of growing stock was at least 3 %. The mechanical interpretation of this productivity demand meant that undevelopable stands should first be clear-cut, and then regenerated (Enander 2007). Nylund (2009) has noted that the new act rested firmly on an assumption that was never openly declared: to convert natural forests into approximately homogeneous management units, taken through a cycle of final felling, regeneration and successive thinning, all characteristic elements of intensive forestry for a maximum yield. By the 1960s, even-aged management had become the dominant silvicultural system in Sweden (Axelsson and Angelstam 2011).

The new act brought family forests under greater public control and provided forest authorities with an efficient means of regulating private forest owners. The content of the act reveals that forest management's main aim was to support national economic growth by producing raw material for the expanding forest industry. The significant difference compared to forest policy during the first half of the twentieth century was that national economic concerns took priority over the interests of the family forest owner (Nylund 2009; SOU 1946:41).

Commitment to intensive forestry was further strengthened in Swedish law through the new Forestry Act of 1979 and its revision in 1983. The committees preparing the new forestry bill considered the even-aged system to be the only acceptable method of forest management. Shortening the rotation of stands was seen as the most important means for increasing productivity. This was to be achieved by tilling and ditching the soil in logging areas and favouring artificial regeneration over natural regeneration. Thinning sapling stands and increasing fertilization were considered to be other important means of accelerating forest growth. It was necessary to define the optimum final cutting time to maximize the land's productivity (SOU 1973:14, 1978:6). The new legislation encroached on the owner's freedom to manage his or her property by making pre-commercial thinning, felling mature forests, and constructing forest management plans compulsory (Rixlex SFS 1979:429, 1983:427; Nylund 2009; Appelstrand 2007).

Just as in Sweden, one weakness of Finland's Private Forest Act of 1928 was that it sought to ensure the regeneration of recently felled areas but did not consider the reforestation of old logging areas and abandoned pasture land. Partly for this reason, a Forest Law Committee was appointed in 1943 to prepare a proposal for revising the private forest legislation. The bill prepared by this committee closely followed the Swedish Forestry Act of 1948 but was never passed by the Finnish Parliament (KOM 1953:8). It was strongly supported by professional foresters but was opposed by the Agrarian Party and the Farmers' Union (Palo and Lehto 2012). This tension clearly indicates the owners' unwillingness to increase public control of private forest management. The revision of private forest law was postponed until 1967. Yet this did not mean that the committee's ideas were ignored.

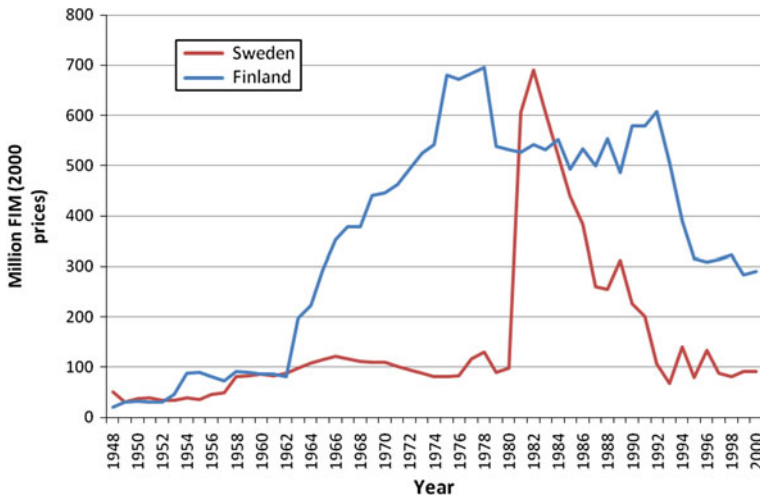
After the Second World War, Finland's economy was much more dependent on the forestry sector than Sweden's, due to the heavy reparations called for by the Soviet Union. In the years, directly after the war, almost 90 % of export income came from forestry products and in 1951–1955, the share was still 84 %. Investment in the expansion of forest industries increased demand for industrial wood by 60 % during the years 1955–1970. New capacity in the wood pulp industries opened up desirable markets for small wood, which had been a problem between the world wars. To secure a sustainable supply of round wood for the forest industries, a planning commission for the development of forestry was appointed in 1957. The proposals of this committee furthered the systematic transition to intensive forestry in Finland (Holopainen 1981; KOM 1961:1).

The most significance of the programs prepared in the 1960s to promote wood production in Finnish forests was the Forestry Financing Committee's series of MERA programs conducted between 1964 and 1975. The MERA programs reflected a strong national commitment to increase the profitability of forestry. Funding was received from the International Bank for Reconstruction and Development to implement the last MERA program. The main goal of the MERA programs was to intensify wood production by financing forestry improvement activities in both state and private forests. Family forest owners were given financial incentives to drain peatlands, increase forest fertilization, build permanent forest roads, and plow clear-felled areas (Uusitalo 1978; Palosuo 1979; Eriksson 1993). The introduction of new lumber technology increased the pressure for clear-felling and artificial regeneration. As a whole, the MERA programs meant a rapid transformation from natural to artificial regeneration in family forests (Tuokko 1992). An important undeclared objective of these programs was to commit family forest owners to supporting intensive forestry based on the even-aged system.

One important reason promoting the breakthrough and success of intensive forestry in both countries was the radical increase in financial incentives. Forestry subsidization was not unknown before the 1950s, but the modest level of subsidies meant they were not very significant as a regulatory instrument. Initially, financial incentives were mostly targeted at ditching peatlands and building forest roads. Finland took a decisive step forward in using financial incentives as a regulative instrument in 1953 when the fixed-period Forest Improvement Act was renewed for a further 5 years. The size of the grant was increased substantially, and it was now allocated exclusively to family forest improvement projects. The new legislation thus emphasized the long-term development of private forestry (Tuokko 1992; Ollonqvist 1998; Holopainen 1954). In Sweden, reorganisation of the silviculture subsidy system was connected with the 1948 Forestry Act. Forest improvement measures now began to be funded from the state's forest improvement grant. New focal areas of forest management were the reforestation of open wasteland and the improvement of underproductive forest land, as in Finland (Ekelund and Hamilton 2001) (Fig. 1).

Due to the launch of the MERA programs, financial incentives increased significantly from the early 1960s, reaching their peak in Finland in the mid-1970s and in Sweden in the early 1980s. The most noticeable difference between the systems was that Swedish subsidy levels began to decrease from the mid-1980s, while in Finland, they remained much higher. In 1986, the Swedish State Auditor's Office published a report about the impact of state subsidies on private forestry, aiming to evaluate how the subsidy system functioned as a regulatory instrument in forest policy. Since the 1970s, the subsidy system had aimed to increase commercial cutting in private forests, but the results did not correspond to expectations. The subsidy system had increased forestry activity, but there was a risk that private forestry would become dependent on subsidies, which would begin to steer development in that sector (Riksrevisionsverket 1986).





**Fig. 1** Financial incentives for forest improvement in Finland and Sweden in Finnish Marks (FIM), 1948–2000 (The figures on state subsidies to silviculture in Finland and Sweden cover only grants allocated to development of forestry based on forest improvement acts. Figures for each country are not fully comparable). Sources: Suomen asetuskokoelma 399/(1953), 423/(1957), 592/(1962). *Metsänparannuslaki*. Helsinki, Finland: Valtioneuvoston kirjapaino; Metsätilastollinen vuosikirja 2001 (2001). Helsinki: Forest Research Institute; Skogsstatistik årsbok 1948–2001 (1948–2001). Stockholm/Jönköping: Kungl. Skogsstyrelsen/Skogsstyrelsen

According to Nylund (2009), state subsidies became an effective policy instrument in Swedish forestry. Finnish research into private forestry in the 1960s and 1970s paid little attention to the impacts of government subsidies on forest promotion or cutting practices. The survey of forest owners' satisfaction with government subsidy levels carried out by Järveläinen (1974) revealed that only a quarter of forest owners regarded these as high enough, and forestry experts also supported an increase. In Finland, the use of economic incentives has not been critically assessed (see e.g. Aarnio 2004).

Since the late 1940s, forest policy in both countries mainly aimed to maximize timber production, ensuring a steady supply of raw material to the expanding forest industry, whereas in the early twentieth century, the focus was on preventing deforestation. Public interest in forests also broadened in this period. Besides national economic interest implemented through forest administration, the forest industry and forest workers became more vocal. After the Second World War, Swedish forest legislation enabled even stricter control of family forest owners that was possible under Finnish law. Public control of family forest owners was justified by national necessity. Nylund (2009) has wondered why a market economy like Sweden could go as far to regulate family forest owners as it did in the 1980s. Their commitment to a forest policy that firmly focussed on productivity was achieved by generous state financial incentives.

Decreased infringement of forest legislation did not mean that forest owners had voluntarily internalized every letter of the law, but rather than the forest authorities had adopted more sophisticated implementation methods. Interest in traditional management practices had not disappeared anywhere, but state financial incentives became significant in committing forest owners to the new management paradigm and the even-aged system. It was particularly among the younger generation and more economically oriented forest



owners that the even-aged paradigm—successive thinning of sapling stands and young forests, for example, targeted toward final cutting—replaced the traditional forest management paradigm, the uneven-aged system. The introduction of new lumber technology also increased the pressure for clear-felling and artificial regeneration.

#### 4 Toward sustainable forest management (SFM)

Since the 1980s, national and international pressure to give as much consideration to environmental and social aspects as to economic gain increased also in forest management. The Brundtland Commission's broadening of the definition of sustainability and particularly the convention on biological diversity accepted at the United Nations Conference on Environment and Development (UNCED) in Rio in 1992 obliged governments to reformulate their forest policy goals (WCED 1987; UNCED 1992). Sustainable forest management (SFM) became the guiding principle of forestry. It builds on the three pillars of sustainable development: social, economic, and ecological. The problem with the concept of SFM has been the range of interpretations. For example, even in 2009, Global Witness observed that many operations claiming to practice SFM failed even to achieve sustained timber yields, let alone sustainability with regard to other values such as biodiversity (Davenport et al. 2010).

International environmental awareness had also impacted on the Nordic countries from as early as the 1960s. Environmental criticism of the forest sector was first directed toward water pollution by the pulp industry, but attention soon turned to prevailing silvicultural practices, particularly the use of herbicides in the management of coniferous sapling stands and large-scale clear-felling in Swedish Norrland and Finnish Lapland. Tilling and ditching the clear-felled areas were criticized on environmental, esthetic, and recreational grounds. Since the 1980s, environmentalists directed their criticism toward the felling of old growth, particularly in state forests. There were also complaints that the afforestation of marginal agricultural and former grazing land created an unfamiliar landscape—referred to as “spruce darkness”—around settlements (Enander 2007; Ekelund and Hamilton 2001; Nylund 2009; Haila 2001; Reunala and Heikinheimo 1987).

In both countries studied, the even-aged system became the institutionalized forest management strategy in the 1960s. In the new millennium, more than 90 % of timber in Sweden was harvested by clear-cutting (Axelsson and Angelstam 2011). Clear-cutting had aroused dissatisfaction among forest owners too, however. Their criticism was especially targeted at the meticulous forest management directives of the 1979 Forestry Act. The high cost of the artificial regeneration—tilling and ditching of the soil and planting seedlings—which was a fixed part of the even-aged system and uncertainty as to the results became a continual cause for complaint (Ekelund and Hamilton 2001; Enander 2007; Nylund 2009). Swedish forestry professionals countered that family forest owners' short-term savings on regeneration costs noticeably decreased forest profitability in the long run (SOU 1978:6).

Despite the efficient promotion of intensive forestry, there were still forest owners who trusted in ‘traditional’ methods. The survey by Hellström (1989) of infringements of the Private Forest Act in Finland in the 1970s and 1980s offers a good summary of forest owner attitudes to intensive forestry. Old forest owners particularly demonstrated distrust of forestry professionals. Many of them still had more confidence in their own experience in matters of forest management. Hahtola (1967, 1973) and Järveläinen (1974, 1977) noted that clear-felling met with social resistance in farming communities in Finland. Since the 1970s, however, an increasing number of forest owners have been living outside their

estate, quite independently of forest income. Another significant trend has been fragmentation of forest ownership due to the distribution of estates. Furthermore, an increasing number of forest owners have begun to question whether intensive forestry—the even-aged system—is the only viable forest management model (Ingemarson 2004; Karppinen 2000).

Environmentalists had openly criticized clear-cutting since the late 1960s, and some forest owners had never accepted it as a forest management method. In the early 1980s, “rebellious forest owners” became organized in Finland and began to attack intensive forest management practices openly. The tension between forest authorities and forest owners led to several court cases. The cause of the conflict was almost always the selective cutting related to the uneven-aged system which main-line foresters severely condemned (see e.g. Lähde 1991; Reunala and Heikinheimo 1987).

In the early 1990s, the growth of international and domestic criticism of intensive forestry created a new situation and increased the pressure to revise forest legislation. The 1991 environmental policy statement accepted by the Swedish Parliament revealed that forest legislation was outdated. The new Forestry Act of 1993 maintained the basic structure of the previous legislation but included two radical changes. Environmental goals written into the legislation were explicitly given equal weight to production goals. The new target for wood production was defined as securing sustainability, whereas the previous act had aimed for continuously high and valuable timber production. The second significant change was the abolition of the detailed family forest ownership regulation system, including compulsory thinning and clearing of sapling stands, the obligation to cut mature forests, financial incentives, etc. The remaining financial incentives were allocated mainly to preserving the biodiversity of the Swedish forest environment (Appelstrand 2007; SOU 1992:76).

The 1993 Forestry Act meant a total reversal in Swedish forest policy since World War II. Appelstrand has stated that this caused a crucial change in the relationship between state authorities and forest owners, from one of master and subject to one resembling partnership. The Swedish slogan “freedom with responsibility” (*frihet under ansvar*) clearly summarizes the forest policy objective (Appelstrand 2007). Besides economic and ecological sustainability, the new forest legislation and its enforcement on the estate level also considered social sustainability.

Axelsson and Angelstam (2011) point out that in Sweden, two drivers promoted the transition toward sustainable forest management. These were the extension of national forest policy to include forest owners and internationally driven forest certification. The shift in emphasis toward forest multifunctionality widened family forest owners’ management alternatives. One of Axelsson and Angelstam (2011) informants succinctly summarized how the new forest policy was experienced among forest owners: “The forest policy is rigid. In forestry, it has always been like that ... but the new forest policy is better, you are not as much steered today. Earlier you could be forced to do felling. Today you are free to test different methods, so it is better.” A majority of their respondents stated that a more diverse set of forest management methods were needed than had been used in Sweden. Axelsson and Angelstam predict that the direction of forest policy will change yet again. Enforcement of the new legislation caused forestry to turn firstly from sustained yield to a more environmentally and socially orientation, but in recent years, a return to more production-oriented forestry has occurred.

With largely the same justification as the Swedish legislation, Finnish forest law was revised also in the mid-1990s. The new Forestry Act of 1996 emphasized the preservation of biodiversity and the multifunctional use of forests alongside pure productivity as forest policy goals. Unlike its counterpart in Sweden, however, the new Act did not abolish

financial incentives, which have remained important regulatory instruments. Although the subsidization policy continued to support the even-aged system, coexistence between these two forest management paradigms became possible (KOM 1995:11). Once more the previously dismissed uneven-aged system has become an object of research and an option for owners considering the management of their forests (Pukkala et al. 2010; Tahvonen 2009).

In Finland, the fragmentation of forest ownership has been a great challenge for the forestry sector. The average size of a Finnish forest holding is noticeably smaller than in Sweden. For many owners of a few hectares of forest land, maximizing the increment of growing stock is not the primary aim. For example, the preservation of important biotopes and landscape has become a more important goal for a growing number of owners than productivity, even though this would decrease the economic yield of their forest holding. The diversification of forest owners' values has become a great challenge in forest management (Karppinen 2000; Kasanen 2011). According to Palo and Lehto (2012), the weakest link in the transition toward SFM has been maintaining social sustainability.

The most noticeable change in the forest policies of these two countries during the last two decades of the twentieth century was the increasing number of parties which actively tried to influence the management of both family and state or commercial forests. The strengthened role of global environmental governance, particularly the role of non-state actors, has impacted on forest research and administration at the national level. SFM requires a suite of forest management systems that match the diversity of natural forest disturbance regimes in different ecological regions and site types (Axelsson and Angelstam 2011).

## 5 Conclusions

The normative concept of sustainability has morally legitimised state control of forest owners in Finland and Sweden since the early twentieth century. During the first half of the century, the vast majority of forest owners were farmers dependent on forests as a source of income and pasture land. In Sweden, forest authorities realized more clearly than their Finnish colleagues that it was difficult to reduce the multifunctionality of forests rapidly with the methods available. In Sweden, forest legislation was interpreted more as a matter of moral obligation than as a law to be followed to the letter, whereas in Finland, strict interpretation of the legislation led to numerous conflicts between forest owners and their authorities. During the first half of the century, there was no significant national timber shortage, and sustained yield forestry was not the main priority for forest policy. Instead, the focus was more on preventing deforestation and securing the growth of young forests which meant that the primary aim was to introduce the principles of the even-aged system to forest owners and challenge the traditional selection cutting method.

The Social Democrat rise to power in Sweden after the Second World War was soon reflected in forest policy. Productive goals for forestry, closely connected to forest industry interests, directly impacted on the perception of forestry sustainability. Sustained and increasing yield became the key objective resulting in increased regulation of family forest owners. In addition to direct regulation, financial incentives became a more sophisticated means of influence. In the 1980s Sweden, which had been far more liberal, regulated family forest owners much more extensively than Finland did. The detailed provisions of the Forest Act approached sustainability from a very narrow economic perspective, neglecting issues of ecological diversity and social sustainability.

In the 1990s, Sweden took a forest policy U-turn by radically abandoning direct regulation and abolishing economic incentives. Thus, international environmental metadiscourses impacted on national decision making. Finland followed Sweden by prioritising environmental forest policy goals alongside productivity, but economic incentives remained an efficient regulatory instrument in the Finnish forest authorities' policy toolkit. The increased role of new actors in the forest policy debate has however given family forest owners more management options. Alongside economic sustainability based on the idea of continuous yield, ecological and social sustainability have become serious issues in the forest management debate.

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