



The history of clear-cutting in northern Sweden – Driving forces and myths in boreal silviculture



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ABSTRACT

In a broad sense, one that includes foresters, nature conservation organizations and the informed public in Sweden, it is common knowledge that the era of clear-cutting in northern Sweden began around 1950. This paper presents results of a study showing that this is a much too simplistic view. The main objective was to analyze how clear-cutting was discussed professionally and implemented in northern Sweden during the late 19th century and early 20th. We also wanted to discuss the development of forest management in this region from a comparative perspective. The study is based on a detailed analysis of extensive historical records from 1882 to 1960 and includes papers and reports from discussions and field excursions. The results of the study show that clear-cutting was widely applied in northern Sweden in the early 1900s as the interest in sustainable forest management and regeneration increased. The foresters wanted to improve the situation in the residual stands that were left after high-grading of Scots pine and, at the same time, the expanding pulp industry improved the market for smaller diameter trees and Norway spruce, making it possible to apply clear-cutting on a larger scale. A rapidly expanding wood market pushed a timber frontier northwards in Sweden and along with this came new knowledge and technology. During the 1930s, the financial crisis led to a temporary decline in clear-cutting in favor of selective cutting, but after that clear-cutting took over more and more. Rather than being a dramatic shift between cutting methods, the transition was a gradual process during which both clear-cutting and selective cutting were seen as rational cutting methods and therefore constantly applied and refined. With time, however, selective cutting was abandoned in favor of clear-cutting. The reason for keeping a persistent myth around the introduction of clear-cutting has its roots in the transformation process but also through the need for a positive historical narrative among foresters in Sweden.

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1. Introduction

Over the last 150 years, forestry worldwide has undergone dramatic changes: forest management has been rationalized, intensified and productivity-enhancing methods have been developed (Langston, 1995; Noble and Dirzo, 1997; Bürgi, 1999; Josefsson and Östlund, 2011). Currently, forestry throughout the northern hemisphere is mainly implemented through a silvicultural system based on clear-cutting, which, in its simplest form, is the removal of all trees, regardless of size and species, from a limited area (Kuuluvainen et al., 2012). The clear-cut area is left deforested for a limited period and then reforested through planting or sowing. This system contrasts to a wide variety of both traditional and modern cutting methods where only a proportion of the trees are cut at each logging event (Gauthier et al., 2009; Puettmann et al., 2009).

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The introduction and implementation of clear-cutting has happened at different times in different regions. Early on, Germany became one of the leading countries in terms of forest management (Knuchel, 1953; Noble and Dirzo, 1997). In most of the forested parts of Europe, selective cutting was the prevailing cutting method until the mid-18th century and the start of the industrial revolution (Lowenthal, 1956). The emerging industries required large amounts of timber (Williams, 2006), which necessitated the development of new and more efficient methods of managing the forests; clear-cutting was believed to meet those requirements (Hawkins, 1962; Bürgi and Schuler, 2003). Soon, these new management methods spread across Europe and to North America, where clear-cutting was introduced during the late 19th century (Langston, 1995).

In northern Scandinavia, this process started rather late compared to other parts of the world. Commercial forestry in northern Sweden goes back to the beginning of the 19th century, when the increasing demand for timber in the industrially-developed countries in Europe drove a “timber-frontier” further inland and further

north (Östlund, 1995; Josefsson and Östlund, 2011). Up to the 19th century, forestry was based on selective cutting of valuable trees without any corresponding regeneration. The legacy of these loggings was a forest landscape that has been described by foresters as dominated by residual unproductive forests. This situation was commonly referred to as the “green lie” and was advocated among foresters in Scandinavia as a reason to introduce new and more modern forestry practices, including clear-cutting and artificial regeneration (see Lisberg Jensen, 2011; Lie et al., 2012).

Clear-cutting was first described in Swedish literature in the mid-1800s, when foresters expressed the idea that clear-cutting was a more advantageous logging method compared to the various forms of selective cutting that prevailed at this time (Ström, 1839; Obbarius, 1857; Anon, 1859; Segerdahl, 1861), but it was not until the late 1800s that clear-cutting was discussed more intensely. The change from selective cutting to clear-cutting may have had its origin from several sources. For example, the demand for timber in the industrially-developed countries in Europe increased the exploitation of Swedish old-growth forest – especially in the northern parts (Björklund, 1984; Östlund et al., 1997). This timber was mostly Scots pine (*Pinus sylvestris* L.) from late-successional and volume-rich forests (Östlund et al., 1997). Also, at the turn of the century, the pulp industry expanded which further increased forest exploitation and increased the need for more rational forest management and cutting methods (Nordquist, 1959; Linder and Östlund, 1992; Kuuluvainen et al., 2012).

Despite extensive research into forest history over the last few decades, the timing and reasons behind the introduction and implementation of clear-cutting in Sweden remains unclear. Kuuluvainen et al. (2012) argued that the main motivation for the change to clear-cutting was to ensure a sustained yield of wood but we explore the possibilities that the driving forces behind this development are more complex. There is a general consensus that clear-cutting began around 1950 in northern Sweden (Ebeling, 1959; Öckerman, 1994; Kardell, 2004; Wallenius et al., 2007; Kuuluvainen et al., 2012), simultaneously with the mechanization of forestry operations (see Lisberg Jensen, 2011) and this view is reflected among foresters, nature conservation organizations and the informed public in Sweden. There are, however, some indications suggesting that clear-cutting was used as a method long before the 1950s (cf. Carlgren, 1917; Schotte et al., 1917; André, 1992; Lundin, 2011; André oral comm., 2012) and this raises the question how the 1950s have become so deeply rooted as the start of the clear-cutting era.

The main objectives of this study are to analyze how clear-cutting was discussed professionally and implemented in northern Sweden during the late 19th and early 20th century and to discuss the development of the Swedish silvicultural systems in relation to other countries in Europe. In our analysis of the expansion and development of clear-cutting, the following questions are asked: When was it introduced in northern Sweden and what were the driving forces behind this development? What characterized the early clear-cuts and the forests where this method was utilized? How has the introduction of clear-cutting been discussed among foresters in Sweden? Our hypothesis is that clear-cutting was introduced in northern Sweden around the same time as in other countries in central Europe during the latter part of the 1800s, but that its implementation and the replacement of other cutting methods was an extended process that progressed across many decades and was not finalized until the 1950s.

2. Materials and methods

This study is based on a systematic analysis of all volumes of the Journal of the Forestry Association of northern Sweden, from 1883

until 1960 and was conducted by critically reading the large volume of material from this journal. This journal was the singularly most important forestry journal for this region and the leading forum on forest management in northern Sweden, where foresters and forest scientists discussed forestry-related topics. Our method of carrying out an in-depth analysis corresponds to similar studies focusing on a specific topic and covering an extended time period (cf. Brandt et al., 2004; Hess, 2012). Our analysis also included source critical aspects (cf. Kjelstadli, 1999). It was typical of this time that most of the professional and scientific discussions on forestry were held in one journal. Altogether, 1326 articles from 1883 to 1960 were screened and all articles that dealt with logging methods were selected for further analysis. Articles on topics that might have influenced the choice of cutting method, such as forest legislation, timber market, industrial developments and field trials, were also superficially studied. In total, 198 articles were selected and scrutinized (Table 1). The starting year was set to 1883 i.e. the year when the first annual publication from the Association for Forest Regeneration in northern Sweden (Swedish: *Föreningen för skogskultur i Norrland*) was published and the end year to 1960 – ten years after the presumed introduction of clear-cutting in 1950. Other literature has then been used for comparison and interpretation of the development of forestry/forest management in northern Sweden in relation to other parts of Europe. Terms related to the topics covered in this study have been defined and described (Table 2).

During its first three decades, the Association for Forest Regeneration in northern Sweden was reorganized and renamed several times. From 1913 onwards, it was called the Forestry Association of northern Sweden (Swedish: *Norrlands skogsvårdsförbund*). From 1883 until 1905, an annual publication was printed; between 1906 and 1912, two publications were released each year and from 1913 onwards, the association published the Journal of the Forestry Association of northern Sweden on a quarterly basis. The association also made annual field excursions to different parts of northern Sweden which attracted both Swedish and foreign foresters (Fig. 1; Table 3).

3. Results

We have identified four different periods in the development of forest management in northern Sweden: 1883–1900; 1901–1920; 1921–1940; 1941–1960. In general, the interest in forest management increased with time, particularly during 1921–1940 (Table 1). Between 1901 and 1940, cutting methods and forest biology became more important. The annual field excursions visited all counties in northern Sweden and had many participants every year (Table 3) coming from all over Sweden but also from other countries, such as Denmark, Norway, Finland and Germany. The excursions took place in different forests owned either by the State, forest companies or private forest owners.

Table 1

Number of articles in the Journal of the Forestry Association of northern Sweden, relevant to clear-cutting, divided into different categories for four periods.

	Number of articles per period			
	1883–1900	1901–1920	1921–1940	1941–1960
Forest management	5	8	20	38
Cutting methods	2	6	6	10
Forest biology	1	5	7	5
Forest ownership	1		1	2
Forest economics		2	2	5
Forest technology			1	2
Other	21	15	15	18
Total	30	36	52	80

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