

Sweden



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FACTS AND FIGURES

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Definitions

Coppice forests - forest composed of trees originated from stump or root resprouts.

Lågskogsbruk / skottskogsbruk

Legal Framework

There is no specific legal frame for coppice forests in Sweden. Except for *Salix*, which is considered as a agricultural crop, coppice has mainly been practised historically and is very limited nowadays. Pollarding and coppice with some trees, such as alder, is sometimes practised.

Rotation Period

Rotation period is 3-5 years for *Salix*.

Typology

Simple coppice	Have been used historically, but not anymore
Coppice with standards	Have been used historically, but not anymore
Pollarding	Widespread historically, nowadays only for restoration purposes and along roads etc. in the southern most part of the country
Short rotation coppice	<i>Salix</i> plantations

DESCRIPTION

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In Sweden there are limited areas where traditional coppice forest management has been applied, while coppice with standards does not exist at all. The national statistical authority of Sweden (Forest Statistics - Riksskogstaxeringen) does not record these types of forests, which is indicative of the status and condition of coppice forest management in the country.

The same concern regarding recording applies to pollards, although there are several sites in Sweden where there has been a recent restoration of pasture with pollarded trees of *Tilia*

cordata, *Sorbus aucuparia* (mountain ash), *Fraxinus excelsior*, alder (*Alnus* spp.), aspen (*Populus tremula*), willow (*Salix* spp.) and poplar (*Populus* spp.).

There are a number of sites of simple (low) coppice managed forest in the South (Scania) and in the mountainous areas of Sweden, however these are not very extensive compared to 'conventional' forestry. The species used for simple coppice are alder (*Alnus* spp.), birch (*Betula* spp.), aspen (*Populus tremula*), willow (*Salix* spp.) and poplar (*Populus* spp.).

The most common coppice system in Sweden is willow (*Salix* spp.) short rotation coppice (SRC), which is used to produce biomass for energy. Today, approximately 11,500 ha are being grown. Willow cultivation is fully mechanized, from planting to harvest. In the initial phase, approximately 12,000 cuttings per hectare are planted in double rows to facilitate future weeding, fertilization and harvesting. Conventional inorganic fertilizers have commonly been applied in the years following planting. The willows are harvested every three to five years, during winter when the soil is frozen, using specially designed machines. The above-ground biomass is chipped on-site, and then stored or directly burned in combined heat and power plants. After harvest, the plants re-sprout vigorously, and replanting is therefore unnecessary. The estimated economic lifespan of a short-rotation willow coppice stand is between 20 and 25 years. Average yields from commercial SRC willow plantations in Sweden are between 6-10 tons dry matter per hectare each year.

There is an increased interest in using willow SRC in phyto-remediation systems to clean soils, for example from heavy metals, especially

Cadmium, and waste water that is nutrient-rich. Several plantations have been established specifically for these purposes. At the same time, there is an interest in coppice plantations designed to promote biodiversity (such as birds and wild game) and this can also be a reason for implementing willow coppice systems.

The ambition for future coppice sites in Sweden is to design new forms of production that produce biomass for energy and also enhance bio-diversity, landscape diversity and cultural values. It is important to incorporate new ideas on modifying coppiced stands to meet current needs and designing systems that will satisfy society's requirements in an economic, environmental and energy efficient way. For example, trees in urban forests, urban environments, under power line corridors, as well as strips within 5 to 7 meters of forest roads and agricultural fields, should all be seen as a resource. Production systems could be designed so that they fulfill the requirements mentioned above. Some specific thinning regimes of dense young stands, around 5 to 7 m in height, might be considered as a relevant 'coppice approach' to forestry.

FORESTRY REGULATIONS

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In Sweden nearly 70% of the land area is covered by 28.1 million hectares of forest, 23 million hectares of which are productive. The forests are mainly of spruce and pine (82%). The remaining percentage includes broadleaf species such as birch, aspen, alder, willow and poplar, and, in the south, oak and beech. Even-aged forestry is the norm. Traditional simple coppice management and pollarding, which were very common in the past, are now rarely practiced and then only on very small areas of conservation interest. Pollarding is also still

practiced near farms and in villages to keep the traditional scenery.

The **Forest Act** was first enacted in 1903 and covered only privately-owned forests, in 1979 it was revised to include all forests. The main forest policy of maintaining high levels of industrial wood production was amended in 1993 to include ecological provisions concerning environmental improvement and biodiversity and later to give regard to social values. The aim of Swedish forest policy is also to ensure sustainable forest management in line with

international agreements. A **National Forest Programme** was established in 2014.

The **Swedish Forest Agency** (SFA, Skogsstyrelsen) is responsible for enforcing the Forestry Act and the 1999 Environmental Code where it affects forestry. On their website (<http://www.skogsstyrelsen.se/en/forestry/The-Forestry-Act/The-Forestry-Act/>) some of the provisions of the Act are summarised:

Reforestation

New forest must be planted or naturally generated after felling when the land's capacity to produce timber is not fully exploited. Planting or measures for natural regeneration must have been completed by the end of the third year after felling, or by the fifth year in northern areas where regeneration is slower.

Disused agricultural land must be reforested within three years of the land falling into disuse. This does not, however, apply to land to be protected for its natural characteristics or its cultural heritage.

Reliable methods and suitable species of trees must be used in the reforestation work. Natural regeneration can be a good method if the site is suitable. Otherwise, the land must be sown or planted. Mechanical soil scarification is often a prerequisite for good results.

If there are insufficient numbers of seedlings, supplementary planting must take place before it is too late. Subsequent weeding and thinning may be necessary.

Felling

Thinning encourages forest development. Timber stocks after thinning must be large enough to utilise the production capacity of the land.

After thinning the trees must be evenly distributed on the area. Damage to trees and the ground must be avoided as far as possible.

Regeneration felling must not be carried out

until the forest has reached a certain age. For predominantly coniferous forests, the age varies between 45 and 100 years, although this is much debated as it does not really apply to continuous cover forestry practices.

Regeneration felling is restricted on forest holdings larger than 50 hectares. Up to half of the land may be made up of finally felled areas and of stands less than 20 years old. Additional rules apply to holdings larger than 1,000 hectares.

Notification of regeneration felling

Regeneration felling of stem wood on 'productive forest land'* sites larger than a half hectare must be notified to the Swedish Forest Agency at least six weeks in advance of harvesting.

*Defined as land outside protected areas and other than mountainous forest, and forest with noble broad leaved trees and that can produce no less than 1 m³ year⁻¹ stem wood including bark and that is not used for any other purpose such as agriculture, buildings or infrastructure.

'Regeneration felling' replaces the term 'final felling', and includes all felling with the exception of thinning and cleaning. Notification is made on a special form (Timber Harvesting Notification, TFN*) available from the Swedish Forest Agency. The area to be felled and the regeneration methods to be used must be specified. A copy of a forestry map must be attached. A description of the intended natural consideration measures to be used, and measures to protect existing cultural heritage within the area, must also be stated.

*The SFA inspects TFNs within a 6-week period using the Forest Agency's processing system, comparing the notifications to maps and register data. Local knowledge and staff expertise are also used. A proportion of the notified areas are inspected in the field before harvesting begins.

Notification must also be given if the land is to be used for purposes other than timber production, i.e. if forest fuel is to be removed, foreign tree species are planned to be used, or in the event of protective ditching.

A permit is required for regeneration felling in mountainous areas in the interior of northern Sweden. Details of measures planned to secure regeneration and to safeguard the balance of nature, the cultural heritage and reindeer husbandry, must be given.

A permit is required for regeneration felling in forests that contain so-called 'noble broad leaved trees', i.e. stands of temperate broadleaved tree species of which at least 70 % of the basal area consists of broad leaved trees and at least 50 % consist of oak, beech, ash, lime, elm, cherry, maple and hornbeam. Regeneration and conservation measures to be taken must be stated. Normally, felled hardwood stands must be regenerated with a new hardwood species stand.

Insect damage

Insect pests breed in the bark of newly felled coniferous wood. Insect damage is controlled by removing damaged trees if they exceed 5 cubic metres per hectare. Unbarked conifers must not be stored in the forest or at the roadside during the summer.

Nature consideration & cultural heritage

Biological diversity in the forests must be preserved. At the same time, the cultural heritage must be safeguarded and social aspects must also be taken into consideration. Therefore, it is important that due care and attention is paid to all forestry measures. The conservation requirements must not be so far-reaching that they make on-going forestry activities significantly more difficult. Where there is a choice of methods to be used, the promotion of biological diversity must always be given priority.

Reindeer husbandry

The size and locations of felling areas in northern Sweden must be decided with due regard to reindeer husbandry. Further consideration can be shown by leaving groups of trees standing on felling sites and on non-productive land, such as migration routes.

Forest Management Plans (FMP)

These are voluntary in Sweden. In a response to a questionnaire from the EU's Directorate-General for the Environment in 2013 (European Commission 2014), Sweden reported that: "The obligation of having a FMP was taken away from the Swedish Forest Act in 1994. Instead a nationwide GIS database was established. The information in the database covers all forest properties and is available for forest owners and authorities, free of charge through the internet. The database includes information on Natura 2000 and other protected areas as well as other ecosystems with biodiversity and social values. All forest land is covered by regularly updated satellite imagery and aerial photography."

All past and planned (for the following 2 years) harvest activities are shown for each individual property, including the regeneration method used / planned, outtake of bioenergy, scarification method, environmental and cultural protection activities, etc. Forest owners must send harvest notifications to the Swedish Forest Agency, which is possible through the database. As the GIS database integrates data on Natura 2000 areas, other nature reserves, and areas with special considerations (hydrological, historical, biological, etc.), the SFA system for monitoring the implementation of the forest legislation is highly interactive and automated.

Most of the forest owners in Sweden have their own FMP, often offered by timber-buying companies as a service to the forest owners. FSC- and PEFC-certified forest owners are obliged to have a FMP due to certification

requirements. An estimation is that for family forestry, approximately 8.5 M ha are covered by FMPs and for productive forest land 22.5 M ha, half under FSC, half under PEFC, with some overlap because of double-certified forest owners. An overall expert estimation is that >95% of forest land is covered by some sort of management plan in Sweden. In Sweden FMPs are considered a tool for forest owners and managers to plan their business activities in the medium-term (normally 10 years) and to plan environmental care in detail for each stand.

Adoption of Natura 2000 forest management plans in forests designated as Natura 2000 sites

In Sweden the County Administrative Boards have the overarching responsibility, at regional level, for Natura 2000 areas. Forest management plans are not normally used for Natura 2000 forest areas. The management of these areas are regulated through conservation plans as most Natura 2000 forest areas in Sweden are nature reserves. Currently, the Swedish Environmental Protection Agency is preparing guidelines for updating the existing Natura 2000 conservation plans.

The SFA is the responsible authority when it comes to forestry measures that could affect the environment in Natura 2000 areas. Consideration is given to forestry measures within designated areas and measures adjacent to, or in the vicinity of, designated areas. The County Administrative Boards are the competent authority for measures other than forestry operations taken in forested and other types

of Natura 2000 areas. Permission needs to be obtained from the County Administrative Boards for measures that are likely to have a significant effect on the environment in Natura 2000 areas. In cases where the SFA is the competent authority – i.e. concerning forestry operations – the SFA evaluates whether or not a planned activity or operation needs permission. Thus, the SFA ensures that forestry operations that might affect a Natura 2000 area are not taken without prior consent from the County Administrative Board. The operator must evaluate if the planned activities need prior consent and seek permission from the County Administrative Board.

All forest owners have to notify the SFA when planning a final felling. The SFA then has six weeks to respond – i.e. giving detailed instructions on how and where certain activities should be conducted or if they are prohibited. In cases when a notification is received that concerns a Natura 2000 area or its vicinity, the SFA evaluates the planned activity regarding prior permission. The management restrictions included in the conservation management plans form the basis for that decision. If the planned activity does not need prior permission, it is treated like any other notification to the SFA. If it needs prior permission, the operator is informed in writing. An activity might be partially allowed or allowed under specific preconditions. If the County Administrative Board gives permission under certain preconditions, the SFA is responsible for checking that they are followed.

References

- Swedish Forest Agency <http://www.skogsstyrelsen.se/en/forestry/The-Forestry-Act/The-Forestry-Act/>
- The Royal Swedish Academy of Agriculture and Forestry (KSLA). *Forests and Forestry in Sweden*. http://www.ksla.se/wp-content/uploads/2015/08/Forests-and-Forestry-in-Sweden_2015.pdf
- European Commission (2014) *Forest Management Plans or equivalent instruments. Summary of Member States' replies to the DG ENV questionnaire*. http://ec.europa.eu/environment/forests/pdf/fmp_table.pdf
- K. B. Lindahl et al. (2016) *The Swedish forestry model: More of everything?* *Forest Policy and Economy* <http://www.sciencedirect.com/science/article/pii/S1389934115300605>

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