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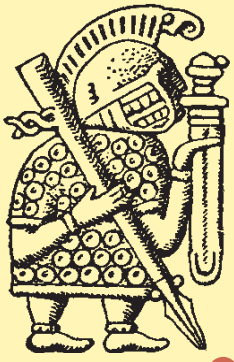

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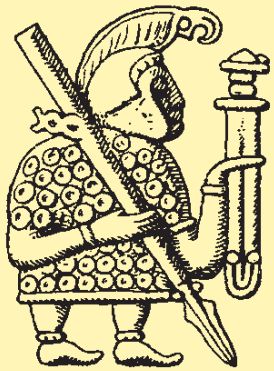

2025/4

Timber use, timber trade and dendrochronological data in Denmark and Sweden in the medieval and early modern era

By Anton Hansson and Martin Hansson

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Large amounts of dendrochronological data sets exported from the SEAD database have in this study been used to analyze timber trade and provenance from the three Scandinavian towns of Copenhagen, Stockholm and Nya Lödöse/Gothenburg during the medieval and early modern era. In total, 964 dendrochronological samples with a dating and provenance description were compiled in this study and compared with written historical sources regarding timber trade in order to investigate their coherence and discuss possible deviations. The results indicate that Copenhagen and Nya Lödöse/Gothenburg used oak timber up until the 1600s, with a later shift towards coniferous timber, whereas Stockholm relied on coniferous timber since its founding around 1250. More or less consistent for all three investigated towns is the early reliance on more local wood that later shifted into more distant wood sources as the local areas became depleted. However, the Swedish towns relied on imports from within the kingdom, whereas Copenhagen saw timber imports from other countries. This historical records and dendrochronological data are largely coherent, but we see that extrapolation of historical data back in time is often not in accordance with the dendrochronological records. This case study show the potential of dendrochronological big data analysis and importance of research-focused databases such as SEAD for maximizing research output.

Keywords: Dendrochronology, Scandinavia, Timber trade, Historical sources

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Introduction

Dendrochronology is a well-known and well-used method with obvious advantages for anyone within the archaeological sector. Dendrochronology is used for dating of standing buildings, shipwrecks and other archaeological constructions where timber is preserved (Tegel et al. 2022). Traditionally, the method has been used for dating individual objects such as a church, a

building, or a shipwreck, and the results have mainly been used in a single-object perspective. This perspective is often fruitful, but today when the number of available dendrochronological datasets amounts to several tens of thousands, this material must now be regarded as some form of "big data". This opens up the possibility to use these datasets to answer new types of research questions, apart from just the dating of a single object. In the last decade such studies have been made, where this type of dataset has been used to study major societal events in the medieval and early modern era (e.g. Ljungqvist et al. 2018, 2022; Thun & Svarva 2018; Kolář et al. 2021; 2022; Seim et al. 2022; Antoine et al. 2024).

In a study of the Black Death in Sweden, dendrochronological datasets were compared with pollen analytical datasets in the region of Småland. While the pollen data showed a significant decrease in cereal production in the 14th century, the comparison with dendrochronological data, gave a precisely dated decrease in building activity at c. 1350, which thus correlated in time with the diminished cereal production. The dendrochronological data also indicated that the building activity remained limited in the region also in the following centuries, thus implying the long-term effects of the Black Death and the late medieval crisis (Lagerås et al. 2016, pp. 45–46).

Large datasets with tree felling dates have also been used on a European level to see how building activity correlates not only with known outbreaks of plague and longtime warfare, but also with grain price and mining activity. These studies showed that crisis symptoms were visible already before the outbreak of the Black death in the mid-14th century. The regional variation within Europe regarding when and how the plague struck was also evident in this data, where up to 55 000 felling dates were used (Ljungqvist et al. 2018; 2022).

Interesting as these results may be, these studies did, however, not consider the fact that building activities might continue without the use of newly felled timber. In preindustrial society, timber houses were a form of "construction kits" that could be disassembled and moved. Building-archaeological studies have often also shown that a timber building may be largely consisting of reused timber. Furthermore, the abovementioned studies did not discuss questions regarding the provenance of the timber. Where did the timber in question come from? Was it always local resources that were used? Would it, for example be possible to use this type of data for studying timber trade in the Middle Ages and early modern era?

Previous studies of provenance have shown that already in the first century C.E, building timber was traded and transported, long-distance, for example from northeastern France to Rome (Bernabei et al. 2019). Several other research projects have highlighted the export of oak from the Baltic to Western Europe in the late Middle Ages (Daly 2007; Dominguez-Delmás et al. 2022; van Ham-Meert & Daly 2023). These studies have mostly used minor datasets from a few buildings and also concentrated on the distribution and trade of oak. In other cases, pieces of artworks, a very specified type of movable product, have been used (Seim et al. 2024).

In this paper we aim to showcase the possibilities of using larger dendrochronological datasets for analyzing timber trade and timber provenances from the Scandinavian urban centers of Copenhagen, Stockholm and Nya Lödöse/Gothenburg during the medieval and early modern era. Furthermore, we will compare the dendrochronological data with what is known from written historical sources concerning timber trade and woodland management in order to determine the coherence of the two records and discuss the reasons for possible deviations.

The Strategic Environmental Archaeology Database (SEAD) and dendrochronology

The Strategic Environmental Archaeology Database (SEAD) (https://sead.se/) is a research data infrastructure for the storage, management, analysis, and dissemination of environmental archaeology and Quaternary science data hosted at the Umeå University in Sweden (Buckland et al. 2018). The project Old Wood in a New Light, which started in 2020, aims at digitizing and making accessible dendrochronological results

and data from the four Swedish university-based tree-ring laboratories at Lund University, Stockholm University, University of Gothenburg, and the Swedish University of Agricultural Sciences in Alnarp into the SEAD database (Edvardsson et al. 2022). Today (2024) the dendrochronological module of SEAD holds data from c. 22 000 samples, mainly from northern Europe.

The imported dendrochronological samples are divided into one of the categories buildings, archaeology, ship wrecks, living trees and sub-fossil trees. Information on location, analysis (dating, number of measured years, tree species, timber provenance etc.) and references are applicable for all categories, whereas e.g. timber characteristics, stand information, sample location within a ship wreck, building or an archaeological excavation are only applicable for certain categories. The information is gathered from the archives of each laboratory and compiled in Excel sheets which are then imported into SEAD.

Dendrochronology is the method used for determining the age of trees by tree-ring analysis (Schweingruber 1988). In Scandinavia the method is mainly applied to oak, pine and spruce, species that produce clear annual rings and are most often used in construction (Linderholm 2025). The tree-ring growth is influenced, at least partly, by temperature and precipitation and therefore trees of a certain species growing in the same area will have a similar tree-ring pattern. In theory, the closer two trees grew to each other, the more their tree-ring patterns will match, and this relation is used to determine the timber provenance. By measuring the thickness of each annual tree-ring, a curve is constructed that is compared statistically and visually to a network of reference chronologies. In order to obtain a secure dating of a sample, factors such as the number of measured rings and irregularities in the tree-ring pattern is important. In order to determine the date of a building or other construction, the number of analysed samples is important for a successful dating (Edvardsson et al. 2025).

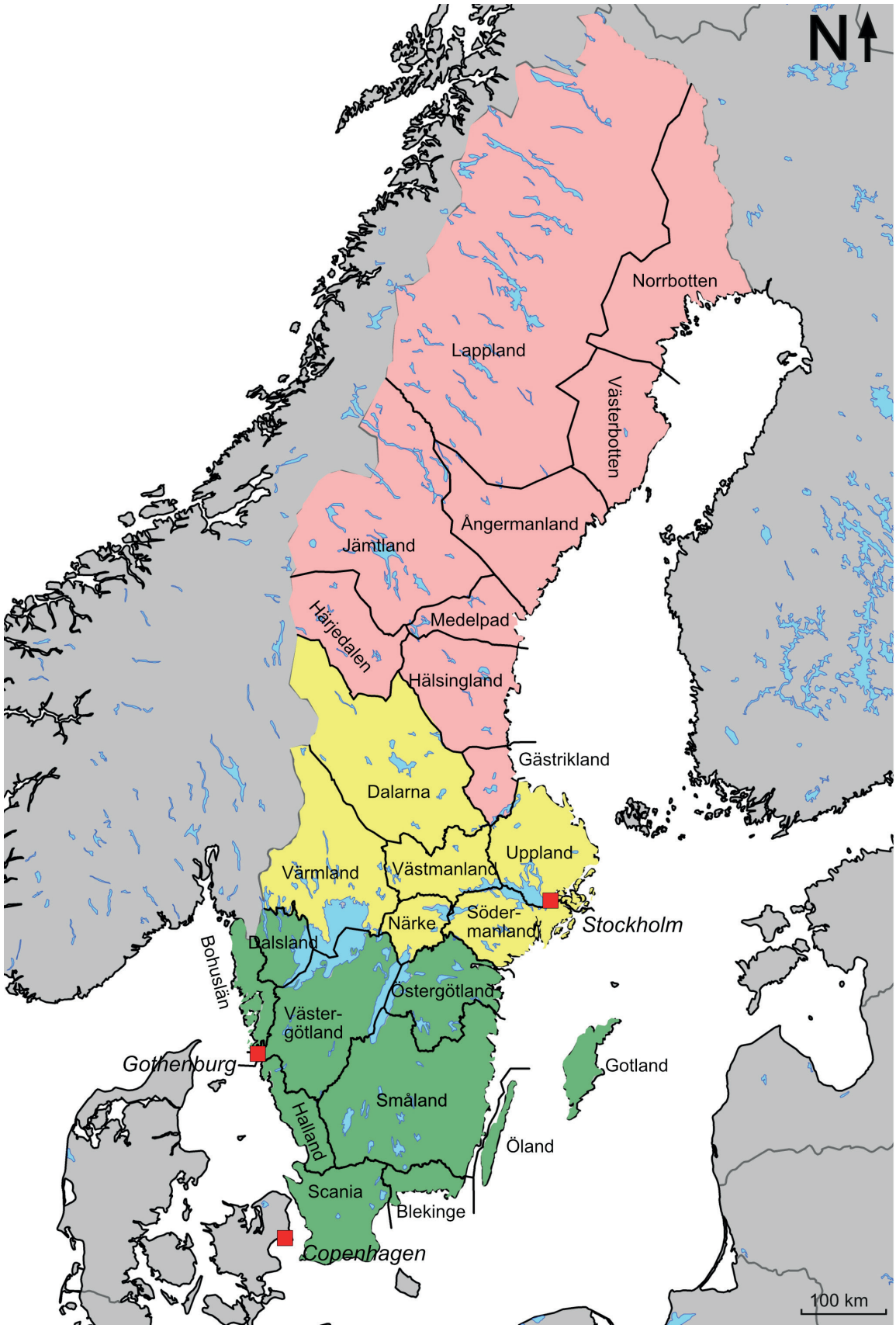
In this study, the building and archaeology data imported to SEAD from the towns of Copenhagen, Stockholm and Nya Lödöse/Gothenburg was obtained in order to perform the analysis (fig. 1). The species, number of years, distance to waney edge/bark, year of the outermost measured ring, estimated felling date and provenance parameters were used for the analysis (supplementary data, published in Zenodo: https://doi.org/10.5281/zenodo.17350414). For Copenhagen 284 samples were extracted whereof 152 have a dating and a timber provenance (fig. 2). From Stockholm, 1045 samples were extracted, whereof 349 have a dating and timber provenance (fig. 3). From Gothenburg, 947 samples were extracted whereof 463 have a dating and timber provenance (fig. 4). For each town, two timelines of tree species and provenance respectively have been obtained in order to analyze timber import. As the timber provenance determinations are in a free-text form they have to be grouped together to form more coherent units. For example, for the Nya Lödöse/Gothenburg samples with the provenance descriptions "50 km radius", "Gothenburg area" and "locally" have been categorized into the Local provenance group, whereas the samples tagged with "Halland" or "northern Halland" have been categorized into the Halland provenance group. However, a tree from northern Halland could also be categorized in the local group, meaning there exist a certain overlap within the provenance groups.

Timber trade in historical sources in Denmark and Sweden

Woodlands in medieval Denmark and Sweden were important resources that had to be managed. They could either be privately owned, by peasants or large landowners, or owned collectively by a village or a hundred (*härad*) as a common. Some of these commons were also seen as royal forests (*kronoskog*). The Danish kings laid claims on the woodlands in northern Blekinge and Halland already in the thirteenth century.

→

Fig. 1. Scandinavia with the investigated towns marked by red boxes. Sweden is divided into three lands: Götaland in green, Svealand in yellow and Norrland in light red. Further the black lines mark the borders of the Swedish provinces named in the figure. Map: Anton Hansson.


N
Norrbotten
Lappland
Västerbotten
Ångermanland
Jämtland
Härjedalen
Medelpad
Hälsingland
Gästrikland
Dalarna
Uppland
Värmland
Västmanland
Närke
Söder-
manland
Stockholm
Dalsland
Bohuslän
Östergötland
Väster-
götland
Gothenburg
Gotland
Småland
Halland
Öland
Scania
Blekinge
Copenhagen
100 km

The king's forests could also be used by the peasantry, but here regulations regarding whom had the right to use what type of resources were more specific. In the early thirteenth century the nobility in eastern Denmark tried to prevent their tenants from using larger high deciduous trees in woodlands owned by the nobility. These large trees, suitable for house- and shipbuilding, where to be left to the noble landowner. The tenants of the nobility were only allowed to use the smaller trees and shrubbery, from which they could get timber for making tools and wagons, but also firewood (Hoff 1997, pp. 248–287; Hybel & Poulsen 2007, pp. 3–8).

In Denmark a shortage of good building timber can be seen already in the Middle Ages, in medieval Lund already in the twelfth century (Bartholin 1976). In the late fifteenth century, a general lack of timber can be noticed in many parts of Denmark. A widespread need for ship- and housebuilding timber in combination with an increased need for firewood, both for warming houses and industrial purposes, (brickmaking, making charcoal, tar etc.) did put the forests under stress. This is shown by an increased number of legal disputes regarding the use of woodlands and attempts to limit the felling of timber and protect the forests from grazing cattle (Borggreen 1994; Fritzbøger 1994; Hybel & Poulsen 2007, pp. 15–17).

Parts of Zealand, Jutland and Scania lacked forests, while other parts of Denmark had plenty. However, in northern Zealand the timber belonged to the King and in northern Jutland the timber was of poor quality. Timber was shipped from Blekinge, Halland and Norway to other parts of the Danish kingdoms already in the late fifteenth century, in return for grain. A "timber for grain trade" developed between Bornholm and Blekinge. The Danish kings also tried to ban export of timber; timber was only to be traded within the country. The normal situation was to firstly use local or regional resources, but there are also examples of import of foreign timber into Denmark. It was in the 16th century that oak started to be traded in larger quantities (Daly 2007; Hybel & Poulsen 2007, pp. 18–23).

Preserved accounts from the Danish Royal Chancellery in Copenhagen, from the years 1551 to 1648, give an insight into how the need for timber and firewood were met. Orders were sent to different parts of the kingdom to meet the demand. Of the orders, 40% were sent to receivers in parts of present-day Denmark, while 13% were sent to Scania, 10% to Blekinge, 3% to Halland, 20% to Gotland and 10% to Norway. In relation to its size, Blekinge and Gotland seems to have been specifically important providers of timber for the Danish Crown. It is also possible to see that 50% of the orders sent out after timber for ship- and housebuilding were sent to regions in present-day Denmark. Shipbuilding timber also arrived from Norway, Blekinge and Scania, while housebuilding timber often came from Gotland and Norway. Concerning orders for middle-sized timber 75% came from Scania, Blekinge and Halland. About 50% of all the royal need for firewood in 1622 was covered by the same area (Borggreen 1994, pp. 59–61). The Danish loss of the regions east of Öresund in 1658 was devastating for the Danish supply of timber. This also started the process of legislation regarding protection, care, and development of woodlands in Denmark (Fritzbøger 1994).

In medieval and early modern Sweden, woodlands were plentiful in many parts of the country, and not a scarce resource in the same way as in Denmark. Just like in Denmark, woodlands could be privately owned by peasants or large landowners, or be a collectively owned resource, controlled by the village or hundred. In those cases, it was only the peasants in the village, or hundred, who had the right to use the resources of the common woodlands for collecting firewood, felling building timber or grazing their cattle (Myrdal 1999a, p. 300; Gadd 2000, pp. 138–141). In the Middle Ages, the Crown started to lay claims on parts of these common lands, a process that continued into the early modern era.

The peasants of a village were allowed to use the woodlands on the village commons for personal use only, but with moderation. The common woodlands of the hundred were also possible to use, but here permission granted from the hundred was needed, making its use more complex. In the 16th and 17th centuries, the

competition regarding woodland resources increased. The mines and iron works in Bergslagen in mid-Sweden needed more and more timber and firewood, while the newly established Swedish Navy needed shipbuilding timber (Johansson 2023). From the 1530s, the Swedish king Gustav Vasa tried to control the cutting of oak and beech in the woodlands of the Crown and commons mainly in Småland and Västergötland. However, he was more careful to go into conflict over tree cutting on the lands owned by the nobility. In 1558 a general ban on cutting of oak, beech, and other large deciduous trees was proclaimed, regardless on which land the trees were growing. It is, however, unclear if this general ban applied to the whole or parts of the country (Eliasson & Hamilton 1999; Johansson 2023). Oak and beech timber should be reserved for the Crown (Heckscher 1935, pp. 136–141).

The guiding principle for the use of the woodlands was thus "household needs". You should not cut more timber than necessary, regardless of whether the timber were to be used for housing, making enclosures or as firewood. To cut down timber on the village commons for general sale was not encouraged. Looking at the regulations regarding woodland it is obvious that timber trade was not seen as something positive. In 1647, felling timber on the common lands as a resource for sawmills, later to be sold on the market, was generally banned, expect for the regions Dalarna, Medelpad, Ångermanland and Värmland. To cut trees on privately owned land for sawmills was however permitted, only to be banned in 1681. This ban could not be upheld but instead control of the export of timber was introduced in 1683. In the 1720s the export of timber from Sweden increased considerably and in The Civil Code of 1734, peasants were allowed to cut and sell timber from privately owned land, however, as long as the long-term preservation of the woodland were not put in danger (Eliasson & Hamilton 1999, pp. 51–52, 62–65).

At the same time, timber from different types of trees were used for different purposes. This meant that some form of local trade probably always existed. If you needed a particular type of timber for a specific purpose, and this timber was not locally available, it had to be bartered or purchased from elsewhere. This specified use of timber for specific purposes is also probably the origin of why the written accounts often stated that there was a lack of timber. Mostly this was a lack of a specific type of resource/product, that had been overexploited in a specific area.

Despite this, a considerable amount of timber was still exported from Sweden in the middle of the 16th century, especially from southern Sweden via towns like Kalmar, Västervik, Lödöse, Älvsborg and Stockholm. About half of the total Swedish export of timber came from Småland. At this time, the timber that was exported from Småland was probably mainly deciduous trees, as opposed to the present day planted coniferous-dominated forests. It is however evident that timber for shipbuilding became more and more rare both within Denmark and Sweden in the early modern era. In Denmark shipbuilding timber was imported from Norway and the eastern Baltic, in Sweden from Pomerania and the eastern Baltic (Heckscher 1935, p. 139; Myrdal 1999b, pp. 128–129; Eliasson 2002, p. 73; Hybel & Poulsen 2007, pp. 18–23).

If we are to summarize the legislation regarding woodland use in Sweden and Denmark, it is obvious that this was a local affair. When peasants needed to build something, or make something using timber, local resources from their own farm's land or the commons of the village, were the source. In the same way, when churches were to be built, where the parishioners often contributed with workforce and materials, local timber resources from the parish were probably supposedly used. The nobility likewise used local resources, or timber from subordinated farms, for their building activities. The Crown was the entity that had the legal possibilities, and the resources, to use non-local timber. Intra-regional or long-distance trade with timber was thus not the normal situation judging by the written documents.

Data presentation – results

For Copenhagen, the tree species is made up of 95 oaks (64.2%), 42 pines (28.4%) and 11 beeches (7.4%) (fig. 2). The earliest cluster of Copenhagen timber extends from the 1180s to the 1230s,

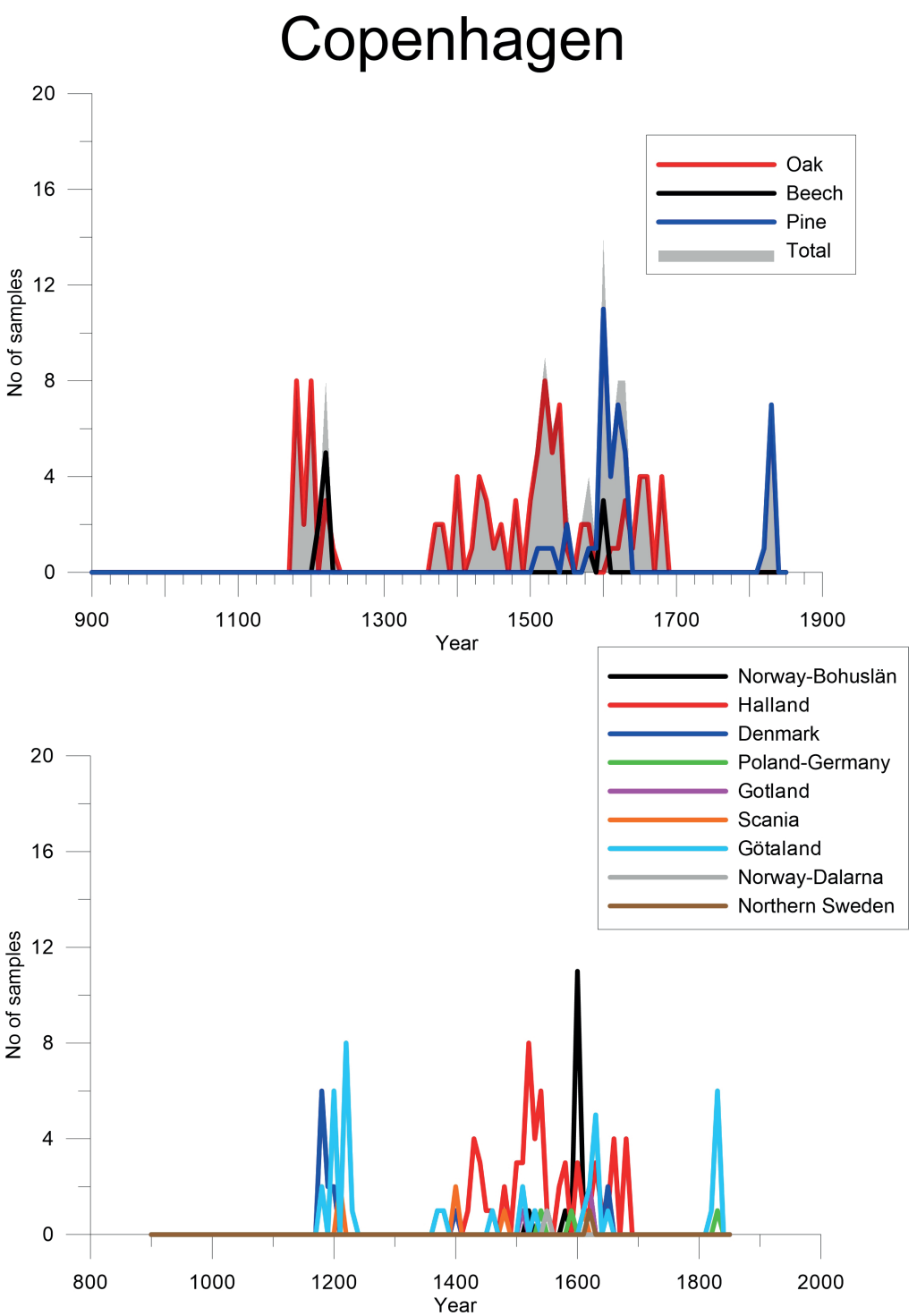


Fig. 2. Dating, species and provenance data for the Copenhagen timber, in total 148 samples.

followed by a gap without any timber until the 1370s. This early cluster contains mainly oak but also some beech, whereas pine is absent. The provenance for this timber is Denmark, Scania (then part of the Danish kingdom) and Götaland (the southern part of present-day Sweden). The main timber phase extends from the 1370s to the 1690s and is characterized by oak timber in the early part, with pine (and some beech) being introduced first in the 1500s. A later pine peak around the 1830s can also be seen. During the 1400–1500s the timber provenance is dominated by the provinces Halland and Scania (both part of the Danish kingdom at the time), but some timber from within the then Swedish kingdom can also be seen. The timber coming from inside the present-day Danish borders is minimal. Around 1600 imports from Norway/Bohuslän, the Baltic island of Gotland and Germany-Poland can also be seen. The timber from the 1830s is taken from Götaland and Germany-Poland.

The urbanization of Copenhagen starts in the 11th century, with an urban expansion in the 13th century and onwards. In the 15th century Copenhagen became, together with Malmö, the major town in medieval Denmark, which affected the expansion of the town (Krongaard Kristensen & Poulsen 2016, p. 278). This is also seen in the dendrochronological data, were the building activities increases in the late Middle Ages.

For Stockholm, the tree species are 328 pines (94.3%), 19 spruces (5.5%) and 1 oak (0.2%) (fig. 3). Building activities are seen continuously from the early 13th century with increased activities in the late Middle Ages and early modern era. Stockholm emerges as an urban center in the 13th century, expanded quickly and became the capital of medieval Sweden from the 15th century and onwards (Dahlbäck 1995). The earliest timber used in Stockholm is locally sourced, but already in the 1400s more distant timber is present, imported from Dalarna-Hälsingland. Local timber is dominating until the late 1600s, when distant timber from a variety of source areas start to take over. All imported timber comes from within the then borders of the Swedish Kingdom.

For Nya Lödöse/Gothenburg, the tree species are 207 oaks (44.7%), 144 pines (31.1%) and 112 spruces (24.2%) (fig. 4). The first cluster of timber is seen during the late 1400s and early 1500s, exclusively of oak. The timber provenance is the local area and Halland. From the 1620s and onwards the timber species are dominated by pine and spruce, with just some occasional oak. The provenance is dominated, at least initially, by Västergötland timber but trees from other parts of Götaland is common as well. From the 1650s and onwards the local timber diminishes whereas a trend of more northern timber (Dalarna-Värmland) is seen. During the late 1700s a single timber from Norrland is seen.

Nya Lödöse, which preceded Gothenburg as the Swedish port to the west, was established in 1473 as a replacement for Lödöse, situated even further north along the Göta River. Nya Lödöse got its town privileges in 1473, which fits well with the datasets, with a lot of tree felling in the 1470s. After several failed attempts to establish a new town at the estuary of the Göta Älv river by the Swedish Crown, the present town of Gothenburg got its town privileges in 1621. The town Nya Lödöse was dissolved and the townspeople transferred to the new site (Andersson, H., 1990, p. 44; Andersson, B., 1996). This transformation is well attested by the data, where we see an intense building activity in the 1610–1620s.

Analysis

Tree species

The three towns of Stockholm, Copenhagen and Nya Lödöse/Gothenburg show fairly distinct differences with regards to timber species use over time. The Stockholm timber is almost completely void of oak, whereas oak use in Nya Lödöse/Gothenburg and Copenhagen is common up until the 1600s, when oak diminishes in Copenhagen and ceases to be used completely in Gothenburg.

Oak exists in southern Sweden, with the northern limit along the Dalälven river, around 100 km north of Stockholm (Prentice 1983). Based on the so called *Riksgropen* archaeological excavations of the parliament in Stockholm in the 1978–1983, we know that oak was used as a

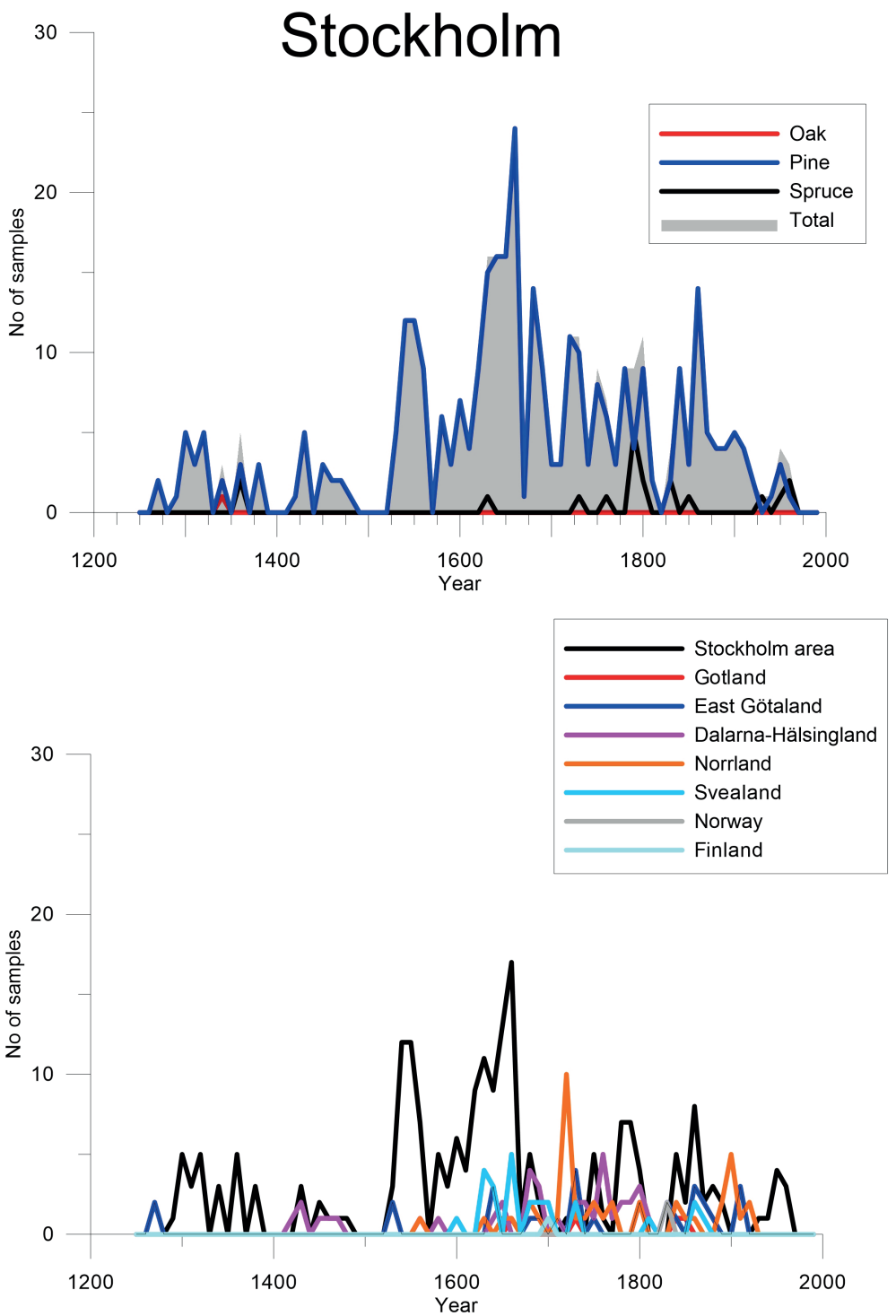


Fig. 3. Dating, species and provenance data for the Stockholm timber, in total 348 samples.

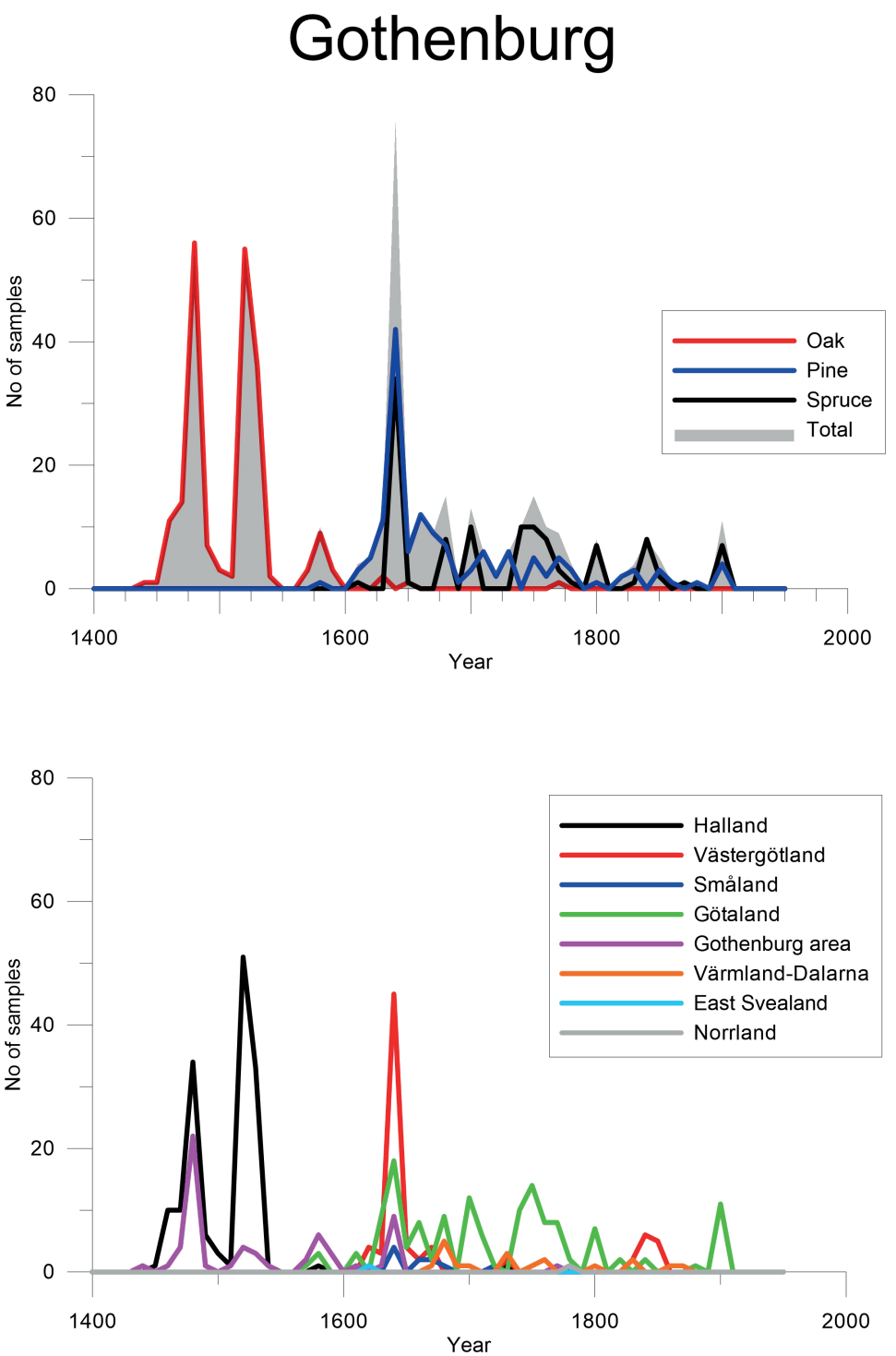


Fig. 4. Dating, species and provenance data for the Nya Lödöse/Gothenburg timber, in total 463 samples.

construction material in the 11th century (Bartholin & Ödman 1987). Furthermore, archaeological excavations from the town of Enköping, around 60 km northwest of Stockholm, show the use of good quality oaks during the middle of the 13th century (Hansson & Linderson 2019), at the same time as Stockholm proper was founded. Furthermore, in the archaeological record of the town of Söderköping, some 130 km south of Stockholm, oak is present both in the 13th and 14th centuries, but in a small minority compared to pine timber (Bartholin 1992). Pollen analysis from central Uppland indicate no decline in oak pollen during the medieval period (Skoglund et al. 2020).

Based on the pollen data and the use of oak timber in other towns in the region, it seems likely that oak would have been available for constructions in Stockholm as well, even though it is not found in the dendrochronological material. It is also unlikely to be a methodological choice to avoid sampling oak timber as it is one of the best, if not the most, suited species for dendrochronological dating. There would also be little reason for the medieval builders actively avoiding oak timber if available. To fully understand the absence of oak as a building material in Stockholm is difficult at present. Either the local resources were limited or exhausted already in the 13th century, which is hard to substantiate, or the landownership of the oak woodlands in the region made it difficult for the urban population to get hold of oak. This issue needs further attention in the future. Gullbrandsson and Hansson (2025) show that the large medieval oak forests of central Västergötland and Kinnekulle were heavily used for timber and that some forest areas were depleted already in the late Middle Ages, whereas other oak forests lasted until the 18th century.

In medieval Nya Lödöse oak was widely used as construction timber during the 1400s and up until at least the 1530s. However, for constructions in Gothenburg during the 1600s and thereafter, pine and spruce timber is almost exclusively used. Most likely, the shift from oak to conifers can be attributed to both diminished resources and a consequence of the oak cutting regulations starting in the late 1530s in Västergötland (Johansson 2023). As will be shown below, large quantities of oak timber were shipped from the Gothenburg area to Copenhagen, which also must have had a deteriorating effect on the local oak supply.

In Copenhagen the pine timber introduction during the 16th century, and later domination during the 17th century, marks a shift from the medieval exclusive use of deciduous timber. This shift can be seen as an adaptation to both a general diminishing oak supply and to Denmark's territorial losses during the 17th century where forested areas were lost to Sweden.

The diminishing oak forests discussed above are part of a larger Western European trend where the demand for oak timber was larger than the supply. In Sweden, the oak was substituted for pine and spruce from the large Swedish boreal forests, as seen in Gothenburg and Stockholm, whereas Denmark had to both change from oak to pine timber, and as will be seen below heavily rely on imports from other parts of Scandinavia and Europe. In other parts of western Europe, the oak demand was solved by large-scale imports of Baltic oak (e.g Wazny 2005). During the 14th and 15th centuries, Polish timber was exported in large quantities mainly through Gdansk, but during the late 15th and 16th centuries, these regions were also depleted of oak and the timber trade moved eastwards into the Duchy of Lithuania (Seim et al. 2024).

Provenance

The oldest timber in Copenhagen, from c. 1200, were either local timber or imported long-distance timber from Scania and Götaland in Sweden. Already when Copenhagen was emerging as an urban center there seems to have been a shortage of good local building timber. In the 15th and 16th century timber from Scania, Götaland and especially Halland dominated in Copenhagen. Timber from Norway and Bohuslän starts to be used first around 1600.

Nya Lödöse was built by more or less local oak timber, mainly from northern Halland and southwestern Västergötland. It is interesting to note that the king Gustav Vasa announced a renewed ban on cutting of oak in Västergötland in 1539 as previous bans had been proved

fruitless (Johansson 2023). Perhaps this renewed ban can be linked to the large amounts of oak timber used in Nya Lödöse in the early 1530s. With the foundation of Gothenburg in the 1620s, the timber provenance shifts from Halland to Västergötland, with some elements of more long-transported timber from the north of Västergötland. We can also see young timber being used in large quantities, often timber younger than 100 years of age, indicating that the construction of Gothenburg demanded so much timber that the quality component was not a priority. However, the long-transported timber is generally more mature meaning that maybe this timber was reserved for high-status projects and/or construction parts where good quality timber was of the essence.

Halland stands out as a main provider of timber for both Copenhagen and Nya Lödöse/Gothenburg especially in the 15th and 16th centuries. This timber export seems to have been intense and must have affected the landscape. One might wonder whether this timber export was one reason behind the emergence of the vast heather lands which is a well-known landscape feature in Halland and the western parts of Västergötland in the 18th and 19th centuries. Cutting down the woodlands, followed by intense grazing in combination with natural preconditions, are normally seen as having caused this landscape type to develop. In Halland, this is a development that often is dated to the period after 1600 (Larsson et al. 2021, p. 8; Larsson & Stenström 2022, pp. 21–22). Hypothetically, one might wonder, however, if the heather in Halland did not start to expand already in the late Middle Ages, partly because of the intense woodland use in the 15th century.

In Stockholm, the first sight of more distant timber appears in the early 1400s with timber from the provinces Dalarna and Hälsingland. This could mean that the timber demand from Stockholm started to become larger than the local forests could supply. However, it is not until the second half of the 17th century that we see a local timber collapse and imports from several parts of the Swedish kingdom. Here, it is evident the local supply is diminished. Furthermore, Sweden was in its most expansive phase, *stormaktstiden*, during c. 1610–1720 that led to a construction boom and consequently the need for large timber quantities in the capital of Sweden.

Conclusion

It is evident that the dendrochronological datasets usually support what is stated in various rules and regulations regarding woodland use. Local and regional resources were mainly and firstly used. When the local resources were depleted, timber from further and further away had to be used. In Copenhagen/Denmark the woodlands seem to have been rather exhausted already in the early Middle Ages, and it is interesting to note that timber from Scania and Götaland was exported to building projects in Copenhagen, already c. 1200. In the 1400s Copenhagen relied to a large degree on timber from Halland. At the same time timber from Dalarna/Hälsingland were used in Stockholm.

This implies that a form of long-distance trade emerged already during the Middle Ages. This trade was in many ways not according to general rules and norms regarding the use of timber, which instead promoted household use in a local context. How this early timber trade was organized needs to be investigated further. The importance of the woodlands in west Sweden, especially in Halland, although Danish territory up until 1645, from the 15th century onwards are also evident. This timber export probably affected the landscape.

Studies regarding timber trade based on written documents often use sources from the 16th and 17th centuries, like the royal accounts from Copenhagen mentioned above. These sources have often been extrapolated backwards in time and used as evidence for a medieval situation. However, this study shows that this does not really seem to reflect the actual medieval conditions. For example, the import of timber to Copenhagen from Norway and Bohuslän does not seem to start until the 17th century, at the same time as this information is first found in the written sources. In the dataset studied there is no evidence of any large medieval timber import from Norway to Copenhagen. A cautionary note is valid when it comes to use the written sources retrospectively.

This case study has been an example of how the SEAD database can be used to use large amounts of dendrochronological data in combination with historical sources. The possibilities for studies with the material available in SEAD are many. Further studies on this data set could for example be more in detail, which timber was used for what type of building, and in which part of a building? And the possibility is there to enlarge the study with material from other parts of northern Europe and other towns. In this case we have focused on a historical period, but the dendrochronological module of the SEAD database is also a great source of data for other types of studies as well. The data could be used for other types of studies regarding, for example, vegetation and climate history. The data is available, the possibilities are many.

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