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'You Should Hate Young Oaks and Young Noblemen' The Environmental History of Oaks in Eighteenth- and Nineteenth- Century Sweden

Per Eliasson and Sven G. Nilsson

The oak was especially important in the economies of preindustrial Europe. In many European nations, however, oak stands declined sharply during the eighteenth and nineteenth centuries. A scholarly debate over the scarcity of wood in preindustrial European countries has dealt with wood as a fuel and its substitution with a fossil energy-source as coal.¹ But the history of oak stands in Sweden suggests that the burning of wood was only one factor in deforestation.

In Sweden, oaks became the focus of a bitter struggle between the state and the peasantry. To understand that struggle, scholars need to consider ecological factors, not just the traditional economic, social, and political forces. Hard and tall stands of oak were a vital resource, because oak timber was essential in the construction of naval ships.² To ensure an adequate supply of suitable timber, the state sought to protect oak trees. For the increasingly powerful peasants, however, oaks were obstacles to agricultural improvement. The trees inhibited the growth of fodder for livestock, and many peasants destroyed or crippled the oaks in their fields. By the end of the eighteenth century, indeed, "oak hatred" was widespread. The use of wood as a raw material and the attacks on trees by landowners each had dramatic effects on both the quantity and quality of Sweden's oak stands. The changes in the forest were significant not only for the people of Sweden. There is growing evidence that the long-term continuity of certain species of trees with particular qualities is crucial for a high level of biodiversity with many specialized species.³ Fully sun-exposed old oaks with partly rotten and hollow stems are among the most important trees for biodiversity in northern Europe.⁴ The story of the decline of the oak in Sweden thus sheds light on the ecological history of the continent.

Early-Modern Sweden—At the Periphery of Europe

The kingdom of Sweden was formed during the sixteenth and seventeenth centuries as an early modern state that succeeded in harnessing the country's resources in

Figure 1. Sweden conquered the shaded area in the middle of the seventeenth century.



the service of rapid military expansion. During the Thirty-Year's War (1618-1648), Sweden became a great power. In a series of wars against Denmark in the middle of the seventeenth century, the militarized Swedish State conquered the provinces in the southern part of the Scandinavian peninsula. From the beginning, the Swedish government treated the conquered provinces as an integrated part of the country. The nation remained dominant until 1721, when the loss of a war with Russia led to the cession of Estonia and Latvia on the Eastern side of the Baltic Sea. For most of the eighteenth century, Sweden was on the defensive, and concentrated on clinging to Finland, the eastern part of the kingdom. Following the loss of Finland to Russia in 1809, during the Napoleonic Wars, and the loss of the last remnant of her old seventeenth century conquests on the continent in 1815—the part of the German Baltic coast called Pomerania—Sweden acquired its current form.

The Swedish state emerged in a peripheral area of Europe with a small population and cold climate. The two main parts of the kingdom, Sweden and Finland, were mostly within the boreal coniferous woodland zone, with poor moraine soils.⁵ This woodland was to become an important natural resource, combined as it was with rich deposits of iron and copper, and with good access to waterpower. From the first, the Swedish government imposed severe restrictions on agrarian woodland use such as slash-and-burn cultivation, favoring instead the production of charcoal and timber for the mining industry. Swedish iron production increased dramatically during the first part of the seventeenth century, driven chiefly by British demand for Swedish iron.

The use of resources was shaped by the structure of the Swedish government. The four estates—nobles, clerics, burghesses, and peasants—since the seventeenth century

had representation in the Swedish parliament. Swedish laws were introduced by royal decrees but only after discussions in parliament where the nobles were most powerful. In the last decade, a new view of eighteenth-century Swedish political and social history has emerged. Scholars now emphasize the increasing political power of the peasants. Studies of their actions in the parliament and their local exercise of power in parish meetings have shown how a new, self-conscious, politically mature class of freehold peasant farmers evolved who set out to differentiate themselves both from the nobles and state officials above them and the landless below.⁶ The royal decree of 1789 was a milestone in this development, giving the Swedish peasant farmer the same rights to his land as the nobility.

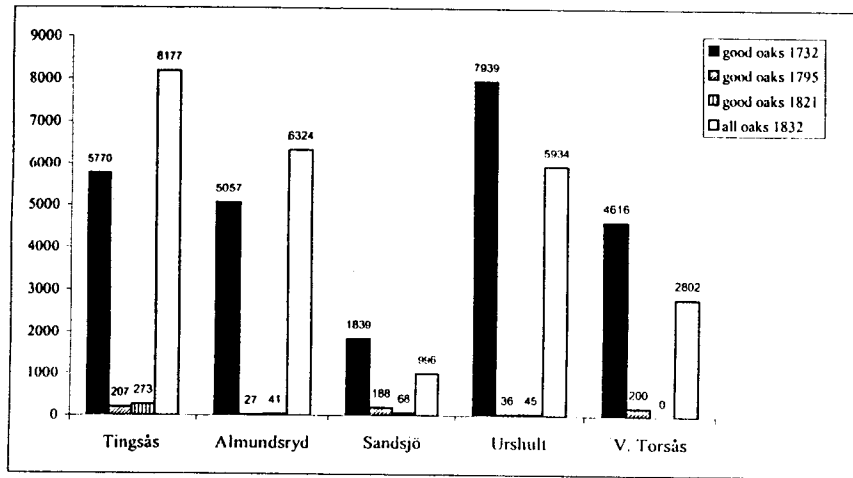
In the end of the eighteenth century the rural Swedish economy saw signs of an ecological crisis caused by overuse of scarce land resources. The extension of arable fields, primarily from meadows, worsened the situation because it hampered the production of livestock winter fodder which, in turn, led to declines in livestock, shortage of manure, and diminished crops.⁷ A doubling of the population and rising political aspirations of the peasants put pressure on the Swedish state to abolish the last remnants of feudal land rights, which limited food production. Among those feudal remnants was the regal right to the navy's precious oak trees, mainly growing in meadows.

Royal Oaks for the Royal Navy, 1558-1789

As early as 1558, oak, beech, and other so-called "fruit-bearing trees" were declared by King Gustav Vasa to be the property of the Swedish state. They were not to be felled or damaged because acorns and beechnuts were important pig fodder, and therefore constituted a source of income for the state. But of far greater concern was the oak's importance as timber for warships.

In the sixteenth century, European states began to equip permanent naval forces. The need for ship-borne artillery became the determining factor in ship design, which began to emphasize durability and resistance to enemy fire.⁸ From the middle of the seventeenth century, these states built large battle fleets, commanded by a professional officer corps and supported by an extensive bureaucracy responsible for construction and maintenance. For the bureaucracy, provision of timber was a central issue. Since only oak met the high requirements of strength and durability, oak timber became a strategic raw material. Yet the production of oak suitable for naval use required specific ecological conditions. Good oak could not be produced regardless. Most deciduous trees, unlike coniferous trees, become harder the faster they grow, so that an oak growing in good soil with a favorable climate will be harder than one growing in poor soil and a colder climate. For Sweden, this meant that the capture of the southern provinces gave the navy a great advantage, as it had access to significantly larger numbers of good oaks than before. This and the provinces' proximity to Sweden's arch-enemy Denmark were telling reasons for the move south of Swedish naval headquarters in 1680 to the newly founded town of Karlskrona in one of the conquered provinces.⁹ The loss to Russia in 1721 of the

Figure 2. The number of good timber-oaks (1732-1821) and the number of all oaks (1832) in five parishes in the province of Kronoberg.



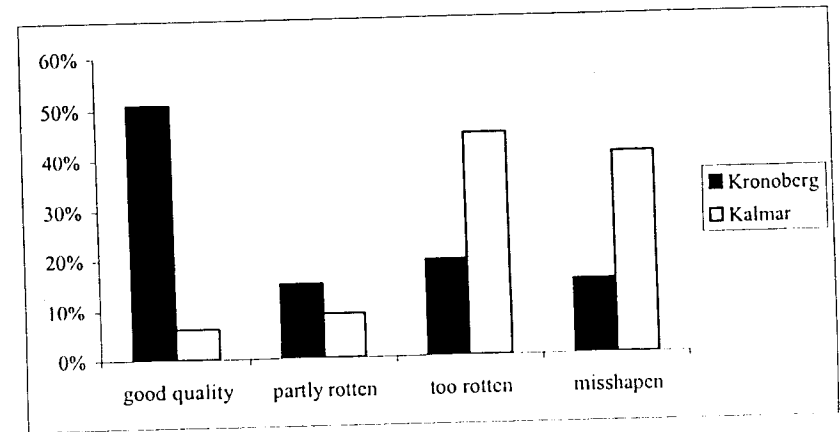
former Swedish provinces of Estonia and Latvia on the other side of the Baltic Sea left the Swedish navy facing a situation that demanded a greater degree of long-term planning for the provision of timber. How had the navy's selective felling of trees affected oak stocks? An inventory of the hitherto unaffected regions in the southern province of Kronoberg was made from 1729 to 1732, and its findings furnish us with a departure point from which to judge the changes of the eighteenth century. In the five parishes where most of the good oak was found, a comparison with later inventories gives the following results.

The number of good timber-oaks in these parishes decreased dramatically between 1732 and 1795. The figures from a final survey in 1821 confirm the trend. A comparison between good oaks and all oaks present in these parishes, as reckoned at the local redemption of 1832 when the state surrendered its ownership and the oak became the peasant's tree, underlines the changes even further.¹⁰

A comparison between larger areas included in the 1732 survey supports this picture. The survey included the province of Kalmar, where oaks had been felled for centuries for shipbuilding. A comparison between oak stands in the old areas of production in Kalmar and the hitherto spared woodland in southern Kronoberg demonstrates the effects of the long-term exploitation of oak forest.

Oaks designated *mature and of good quality* and *mature, but partly rotten* were considered by the navy's officers to be fit for use. In the untouched areas, 65 percent of the trees were fit for use, compared with only 15 percent in the areas of old production.¹¹ Hundreds of years of selective felling of the highest quality oaks

Figure 3. Oak quality in the provinces of Kronoberg and Kalmar as judged in the 1729-1732 survey. Classes were mature and of good quality (*mogna*), mature, but partly rotten (*anstuckna*), mature, but too rotten (*odugliga*), and misshapen oaks with too many branches (*risekar*).



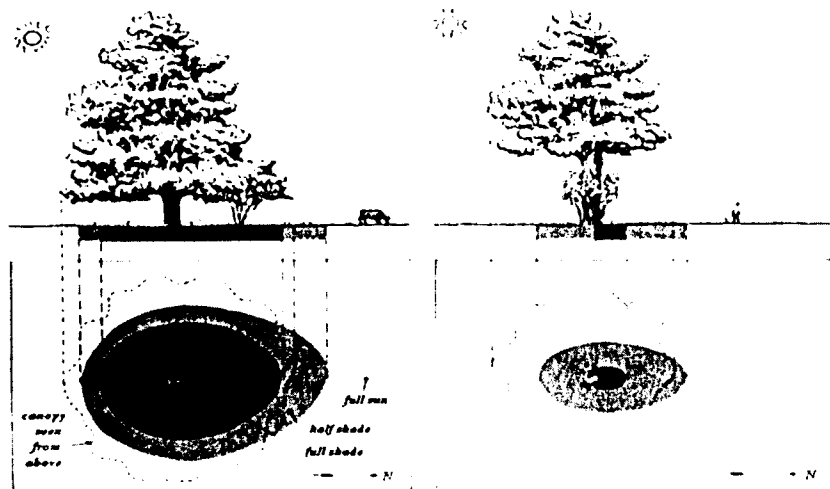
caused this difference. But if the navy's cutting during the seventeenth and eighteenth centuries changed the proportions of good timber-oaks, the impact of the peasants on the whole oak stand during the same period was far greater. And the peasants had good reasons for cutting so many trees.

Royal Oaks in the Peasants Meadows, 1558-1789

After the royal decree of 1558, Swedish oak thus became still more important to the state during the sixteenth and seventeenth centuries. But oak was equally important to the peasantry. The value of acorns as fodder and the tree as timber was significant in the agrarian economy. On the other hand, oaks that grew in tillage and meadows, where they reduced the production of grain and hay, were viewed with dislike. This created a deep antagonism between the state and the peasantry, and led to a dramatic decline in the numbers of useful oaks in the eighteenth and early nineteenth centuries. What were the ecological conditions that created this conflict over land-use?

From the early Middle Ages, Swedish village lands were divided into two parts. Nearest to the village's farmsteads lay the inner fields, or *inmarken*, with a small area of tillage for grain and turnip production and a larger area of hay meadows for winter fodder production for the domestic animals. *Inmarken* was enclosed to protect the growing crops and grasses from the grazing animals that were pastured on the surrounding area, or *utmarken*, outside the village enclosure. *Utmarken* was often, but not always, wooded, and was used collectively by the villagers as pasture. In general, *utmarken* was several times the area of *inmarken*.

Figure 4. The difference between the shadow cast by an untouched oak and a branch-cut oak. Full sun means that at least 50 percent of the possible sunlight reaches the plants on the ground. Full shade means that less than 10 percent of the light reaches the ground.



At the start of the nineteenth century, various sources note that oaks seldom grew in *utmärken*. Animal grazing had held back their growth, while the felling of older trees reduced their overall numbers. The greatest number of surviving oaks grew in the meadows. An inventory of oaks in Östergötland in the eastern part of southern Sweden, one of the provinces richest in oaks, shows that over 80 percent of the oaks grew in enclosed meadows on *inmärken*.¹² The meadows were a sensitive ecological system where the variation between sunlight and shade was crucial. The production of hay for winter fodder was encouraged by a certain amount of shade that could prevent the ground from drying out during warm summers, but it also required enough light for the crop to grow and become nutritious. The amount of light could be regulated by cutting back the trees' branches to give the right balance between light and shade, and the twigs and leaves themselves could then be used as winter fodder for the livestock. Furthermore, the tree's deep roots collected nutrients from soil layers below those the grasses could reach, and those nutrients could then be released to the grasses in two ways: A number of the tree's fine roots died and rotted when the tree's crown was pruned, thereby releasing nutrients into the upper layers of the soil; and the leaves that remained on the tree and fell in autumn were raked up and burnt every spring, and the ash spread on the soil surface.¹³

In such an ecological system the royal oaks were unwelcome guests. Large, full-crowned oaks retarded the grass growth and dried out the earth round about. In order to get rid of the tree's shade, the oaks were treated to heavy-handed branch-cutting along the trunk, *shredding*.¹⁴ The great agrarian changes of the period merely sharpened the competition between fodder production and oaks in meadows in two ways. First, it was the better meadow soils, where the oak fared best, that came

under the plow, diminishing both oak stands and fodder production. Second, this change from fodder-producing meadows to tillage created a greater need for winter fodder from the remaining meadows, making their oaks still more disliked by the peasants.

In the eighteenth century the Swedish government took an equivocal position on branch-cutting oak trees. The pollarding of oaks was in principle forbidden. At the same time, branch-cutting was encouraged to get the tree to grow a single, main trunk. It was even decreed that young trees should be branch-cut because the practice was seen as a way to improve growth. This ambiguity opened the way for extensive cutting of branches from both young and old trees. Linnaeus noted on his travels in western Sweden in 1747 that branch-cutting of oaks was common: "The meadows were splendidly ornamented with much hazel and oak, which oaks, as their sides had been shredded, had put out small twigs in profusion the whole length of the trunk and all around, over which the proper limbs branched out into the crown."¹⁵

The drastic branch-cutting of oaks, with or without the state's encouragement, had serious consequences for the oak stands, a fact that Linnaeus also noted on his travels in Östergötland in 1741: "The oaks hereabouts are many but are ill managed and in poor condition. The thick boughs were hacked off a handbreadth from the trunk, but far too late. Small twigs spring out round the stumps of the cut branches. Altogether too small crown, insufficient for such a tall tree, was left right at the top. For this reason, many oaks are quite decayed and dried up."¹⁶

By the end of the eighteenth century the damage was obvious to many observers. The forestry commission that was working on a new forest ordinance requested opinions on the problem from people with knowledge. In his answer the navy's timber surveyor drew attention to the decree that young oaks should be branch-cut, but from the navy's own felling it was apparent that branch-cutting, and especially the cutting off of larger branches from growing oaks, had introduced rot that spread into the trunk and destroyed the timber. The branch-cutting of oaks that was common everywhere meant that good timber was ruined. Those oaks that had been left alone gave good ship timber.¹⁷

The peasants' branch-cutting of larger oaks, to fulfill the state's request to promote the growth of the trees or their own needs to reduce shade, meant that the trunks rotted and oak stocks worsened. This was the peasants' impact on the whole oak stand in their meadows. Here was the most important reason why the number of oaks the navy could find for its use shrank during the eighteenth century.

Struggles Over the Right to Dispose of Oak, 1789-1819

The royal decree of 1789 gave the Swedish peasant farmer the same rights to his land as the nobility had before. But there was one important exception. As oak and beech were important for the navy, the decree exempted the right to dispose of these species from the peasants' new rights. In answer, the peasantry immediately called for a nationwide survey of oak and beech to determine which trees were fit

for the navy's purposes, the remainder to be released from state control. Their demands were met, and during the 1790s province after province was surveyed by the navy's officers, and the good trees were marked twice with a crown stamped into the tree trunk near the root. Beech trees were released from state control in the new forest ordinance of 1793, but the right to the free disposal of oak was postponed, and the peasantry's impatience grew. The idea that those trees that had not been stamped by the navy's officers were the peasants' property spread, creating a degree of uncertainty even among the authorities. The result in many provinces was that requests to fell trees were extensively sanctioned by the provincial governors. But, in a new forest ordinance of 1805, the state went back on its promise to release oak from its control. Instead, a complicated procedure for seeking permission to fell oak trees legally were introduced. This new ordinance was the start of the last battle over the right to the Swedish oak.

The proposal to relinquish the royal oaks was first presented in the Estate of Nobles at the parliament of 1809, but it received its greatest support in the Estate of Peasants. The proposal failed, but it was reintroduced in ensuing parliaments; the main argument given was the damage the trees inflicted on agriculture. In addition to the claim that oaks were destructive, the principle was brought forward that there should be private rights of possession. Free title, if applied to oak forest, would mean that many "old and damaging trees" would be felled. Corruption was widespread. By paying large bribes, a peasant could get permission to fell the best, most valuable trees instead of the old, worthless trees that the forest ordinance had envisaged. The Estate of Peasants argued in parliament that this corruption was a significant reason for the decrease in numbers of good oak trees.¹⁶

To this picture of mismanagement and corruption we must add the impact of marking the royal oaks. The officers of the 1790s survey had stamped the best oaks with the crown stamp on the basal trunk and also higher on the trunk, indicating that they were reserved for the navy. In the 1810s, the provincial governors and forest officers began to report that the royal oaks were rotting because of damage caused by the stamp.¹⁷ The matter was taken up in parliament, and several members attested to the fact that royal oaks had indeed rotted. The damage had not only ruined many oaks by leaving them vulnerable to rot, but it also had diminished what little respect the peasants had for the trees that now stood rotting in their tillage and meadows, of no use to anyone.²⁰

The peasantry's argument in parliament had consequences for attitudes toward oak trees in general. At the parliament of 1815, for example, the peasant Anders Danielsson stated that useless oaks existed only to the detriment of the landowner, and that from this stemmed such hatred against them that the trees were rooted up "from the very first."²¹ The use of word "hate" was virtually universal in describing the peasants' views not only on the trees that caused damage to their tillage and meadows, but of all oak trees.

The central authorities' answer to local resistance to their policy on oak took its time in coming. The 1790s, which saw doubt caused by the delay and then the retraction of the promise to waive the state's rights to royal oaks, were a turning point for the wealthier peasantry. In provincial governors' reports, navy statements,

Table 1: The number of oaks fit for naval use on state land and taxable land in the surveys of the 1790s and 1825, arranged by province.

Province	1790s	1825	Percentage reduction
Blekinge	10,269	4,480	56
Kristianstad	15,909	4,312	73
Malmöhus	3,267	1,621	50
Kalmar and Öland	65,298	5,674	91
Kronoberg	8,408	891	89
Östergötland	38,922	7,038	82
Jönköping	13,617	1,952	86
Södermanland	11,228	630	94
Västmanland	5,653	496	91
Örebro	6,641	142	98
Skaraborg	2,353	305	87
Älvsborg	7,037	385	95
Gotland	11,479	11,290	2
Halland	9,751	793	92
Göteborg and Bohuslän	2,516	71	97
Stockholm	9,753	615	94
Uppsala	7,407	146	98
Total	229,508	40,841	82

Sources: RA ÄK 741 vol.1; RA Skogsstyrelsen F II a:1.

and parliamentary debates, the situation was described as being completely altered: among the peasantry, respect for oak trees was now non-existent. The old policies had lost their legitimacy for peasants, and the penalties meted out for crimes against the state's rights were not seen as shameful. Instead the penalties were looked upon as a necessary evil, a price to be paid in order to get rid of the hated oaks. The damage that royal oaks caused to the meadows, the political measures that the central authorities used to maintain the trees at the expense of local communities, the severe punishments inflicted on those who damaged oak trees, and the methods that the peasants developed to dispose of the trees and elude the central authorities' decisions culminated in a cultural view of the species at a local level that can be summed up in the term oak-hatred. The expression "you should hate young oaks and young noblemen" was first coined in the eighteenth century, and captured the new attitude toward oaks that was revealed in parliamentary debates.²²

The Last Survey and Struggle, 1819-1830

The Napoleonic Wars brought great territorial changes to Sweden. Six years after the loss of Finland to Russia in 1809, the German province Pomerania seceded. The loss of Pomerania was insignificant in all but one respect: the provision of oak timber for the navy. Much of the timber that was used at the naval base in Karlskrona came from the Pomeranian oak woods. The perennial problem of finding

sufficient oak now became acute, and a naval committee was directed by the government to study the matter. After making inquiries among the provincial governors and the navy's construction officers, the committee suggested in 1819 that the whole area of Sweden where oak grew should be surveyed, both to learn the extent of the nation's timber supply and to find places where royal oak plantations could be established.²³

The results, which were ready in 1825, were disappointing. The numbers of sound oaks had shrunk by over 80 percent in thirty years, and the navy's officers could find only about 40,000 useful timber oaks in all. The reasons for the oak's decline were explained by the officer in charge, the chief ship-builder at Borneman, who recorded that the tillage and meadows were overgrown with oaks whose shade and thirst destroyed the grain and grass growing round about. It was for this reason that the peasants cut back the branches to reduce the shade, and made bonfires of the leaves around the trunks in a deliberate attempt to damage the trees: the oak's competition with fodder production in the meadow was the greatest problem. Therefore af Borneman suggested that peasants should be allowed to buy the royal oaks, surrendering them to private ownership, and that new state oak plantations should be established.²⁴

The results of the survey had been reported to the government as work progressed, and in 1823 officials considered what should be done about a situation that clearly verged on catastrophe. af Borneman's suggestion met with great approval by all the parliamentary estates, and at the parliaments of 1823 and 1830 proposals were worked out on how the redemption should be arranged. The committees that dealt with the question were sympathetic to the tax-paying peasants' problems with the oaks, and spoke with understanding of "the Oak tree hater." Even if the law could stop the felling of full-grown oaks, it could never prevent "rooting up, hewing down, or trampling the young plant."²⁵ Oak-hatred lay behind the root pruning, boring, leaf burning around the trunk, and plain illegal felling to reduce the number of oaks in the tillage and meadows, and behind the general attempt to prevent renewal by rooting up, trampling, or cutting down oak saplings. Indeed, oak-hatred appears to have been universal in the Estate of Peasants in parliament. A picture of a resistance culture emerges where local social norms diverged strongly from those of the central authorities. Alexis de Tocqueville's grand formulation of the shattering of feudal oppression in contemporary France can be said to be valid, if on a much more modest scale, for the Swedish peasants' relationship to oaks that grew in their meadows: "The evil that you bear with patiently when it appears unavoidable becomes unbearable as soon as you believe that it is possible to escape it."²⁶

The peasants made oak a political issue in parliament, but even more they made it a political issue out in the meadows, where, armed with axes, billhooks, hatchets, and adzes, they defied the mode of management imposed by the central authorities. The methods used by peasants in these fights were not only instrumental but also had an expressive and ideological dimension. In this sense they expressed their understanding of trees in meadows, saying in a different way: "What are these trees for?"²⁷

As long as timber production was part of agrarian production, the oak was hostage to the Swedish peasant. When the peasants no longer accepted an exploitation of nature imposed from above and used their power, the central authorities were forced to give in. This was a severe limitation for the pre-industrial Swedish state's access to a strategic organic material—high-quality oak-timber.

As a result, parliament decided in 1830 to recommend that the government surrender the royal oaks against a small redemption fee for each farm, that should be collected and paid collectively by each parish to the state. Thus, in the 1830s, the majority of oaks in Sweden were bought from the state by individual landowners. The navy's future need for oak timber was to be met by state oak plantations established on an island in one of Sweden's largest lakes. Just before Christmas 1831, the first 25,000 young oaks were planted, and almost 150 years later, the head of the Swedish state forests finally reported to the navy that the first oaks were ready for delivery. The navy refused the offer politely but firmly.²⁸

Ecological Consequences—Changes in Landscape

What changes to the landscape caused the long struggle between the peasantry and the state over the rights over oak trees? Information from the eighteenth and beginning of the nineteenth centuries for a number of parishes in the province of Kronoberg shows a steep decline in the number of trees fit for naval use. This was linked directly to the improvements in transport in the region. Once the admiralty had opened up the rivers for navigation, the felling of the best trees for the navy could begin. Much as in the nineteenth century in North America and Scandinavia, where one can see a "timber frontier" where felling followed the watercourses, so one can talk of an "oak frontier" in eighteenth-century Sweden.

Selective felling affected the composition of the oak woodland, as is shown if one uses the 1729-1732 survey to compare the older areas of production near the coast with the new inland areas. Older trees that were too decayed to be used as ship timber and gnarled trees dominated in the older areas, and rot resulting from widespread branch-cutting and the stamping of the best trees was common. The number of older, rotten oaks was probably significantly greater in eighteenth and nineteenth centuries in southern Sweden than in today's Swedish forests. Furthermore, they were concentrated in the meadows nearest to the villages which, like the better soil of *utmarken*, came under cultivation in the population explosion of the century. This meant that it was the older, rotten trees that disappeared when the state gave up its rights, and the peasantry could finally free their land from the hated tree.

The great decline in good oak fit for the navy's purposes between 1790 and 1825 also was connected to the extensive, legal felling to meet the peasants' needs that began after 1805. During the 1810s an average of 70,000 oaks per annum were felled legally, and between 1806 and 1835 more than one and half million oak trees were cut altogether.²⁹ The navy's officers judged that at the same time at least as many were felled illegally. Widespread corruption, which was itself the subject of much comment, seems to have ensured that it was the best, and not the worst, trees that

were felled. In the province of Kalmar, where legal felling was greatest, surviving evidence from the local redemption of oaks in 1831 shows that around half of the remaining trees were small and gnarled. Only 5 percent were deemed "good and massive" yet unfit for navy use, and the rest were either wholly or partly rotten.³⁷

This change in the landscape, first with the selective felling of the largest, best trees and then with the successive decline in the trees' dimensions and quality, was mirrored in the boreal woodlands in northern Sweden a hundred years later. The extensive felling from the 1830s onwards took the large, old trees first, turning later to those of increasingly small dimensions.³⁸

Consequences for Biodiversity

The dramatic changes in landscape had an impact on biodiversity. In southern Sweden, the highest level of biodiversity is associated with *inmarken*—the old inner fields, the extensive hay meadows, and the enclosed pastures near the villages—all forms of land use that today have nearly vanished. The transformation of the oak stands, with a rapid decline in density during the eighteenth century and a subsequent increase in old, hollow, and rotten oaks, had its effect on biodiversity. The opening up of the forests in the central region of southern Sweden during the Middle Ages increased the richness of the vascular plant flora.³⁹ With the enclosure of the woodlands in the last hundred years, the diversity of the vascular plant flora has returned to a lower level.

But it would be wrong to equate vascular plant diversity with total diversity. First, vascular plants constitute only a small percentage of the total number of macro organisms.⁴⁰ Second, in the case of Sweden, several thousand species are dependent on dead wood, and their presence cannot be inferred from pollen analysis. Very old living and large dead trees are crucial for the diversity of species-rich groups such as insects and fungi.⁴¹ The most important component for a high level of biodiversity in northern Europe is hollow, ancient oaks. Some of the most demanding species need large concentrations of such trees.⁴² Furthermore, most species dependent on old oaks fare best in open woodland where the oaks grow in full sun.⁴³ Twice as many beetle species dependent on dead, deciduous trees are favored by well-lit substrates than by shaded substrates.⁴⁴

Thus, it can be argued that the opening up of the landscape and the presence of large numbers of oaks with rotten trunks between 1700 and 1850 probably resulted in high biodiversity in southern Sweden. Two detailed beetle inventories that were rediscovered as manuscripts in Museum of Natural History in Gothenburg and the Museum of Natural History in Stockholm give support to this hypothesis.⁴⁵ Many rare species that are usually taken to have been relicts from virgin forests, including some now extinct in Sweden, were found in the cultural landscapes of southwest Sweden between 1770 and 1840.⁴⁶ When the felling of ancient oaks accelerated between 1810 and 1850, the total biodiversity of the cultural landscape may have declined markedly. Indeed, it is possible that we now are witnessing the same

process of extinction, since there is evidence that some species are experiencing delayed local extinctions.⁴⁷

A Comparative Perspective on Oaks in Europe

Was this battle over rights to trees a particularly Swedish phenomenon, or does it help explain the changes in landscape experienced in other European countries during the eighteenth and early nineteenth centuries?

In France, the strict control of oak trees embodied in Colbert's forest ordinance of 1669 could not prevent a decline in the amount of timber available for the navy's use during the eighteenth century. The timber cycle in the royal forests in the seventeenth century was from one to two hundred years in the eighteenth century, mirroring the French state's ever deepening financial crisis, the time between cuts dropped to twenty-five to sixty years, giving a significantly better economic return. The extensive sale of royal forests and land clearance for agriculture also had their effect on the oaks. The result was noticeable as early as the start of the eighteenth century, when the Mediterranean fleet's dockyards in Marseilles and Toulon began to import Italian and Balkan oak to meet the demand for new construction and repairs. Those areas in the south and east of France that hitherto had been the main source no longer could produce timber of the right quality, and toward the end of the eighteenth century imports were significantly greater than domestic production. Likewise, the lack of curved oak, so-called compass timber, for the dockyards along the Atlantic coast had become a problem by the end of the eighteenth century, when the import of oak from the Baltic area began.⁴⁸

England had no equivalent to the royal ordinances that in France gave the state the right to oak timber. The navy's provision of timber came from the open market where it was above all the gentry who traded oak timber. Robert Albion's classic study of the British navy's timber supply asserts that, from the end of the eighteenth century, the lack of larger oaks and compass timber was a serious problem. Charcoal burning, the growth of the merchant fleet, the effect of enclosures—where large hedges with their bowed oaks were ripped out—and industry's need for timber for construction contributed to the reduction in the navy's timber assets. Surveys of oak in the royal forests showed that their numbers shrank from the beginning of the seventeenth century to the end of the eighteenth by more than three-quarters. This forced Britain in the second half of the eighteenth century to begin to import oak timber. During the Napoleonic Wars, the British navy became dependent on oak timber imports from the Baltic region, which led to a crisis when the Continental Blockade began in 1807. Salvation came in the form of Canadian oak timber which met 40 percent of the navy's needs by 1812. For the remainder of the wooden ship era, until the middle of the nineteenth century, imports were essential, and at last British oak was sufficient to meet only a quarter of the navy's needs.⁴⁹

Albion's picture of the accelerating decline of British oak in the eighteenth and nineteenth centuries is both confirmed and elaborated on by later research. A. J. Holland has pointed to the attempt to spare timber by using new construction

methods and replacing oak with other kinds of timber and with iron.⁴³ Cyril Hart documents the reduced supply of oak caused by the conflict of interests between different users of the forest of Dean during the seventeenth century. Coppice owners were keen that no large timber trees should shade their deliberately stunted trees or compete for space. In this way traditional rights to the underwood enjoyed by certain inhabitants of the forest prevented the growth of larger oaks.⁴⁴ Charles Watkins describes developments in eighteenth century Sherwood Forest in a way that not only reflects quantitative but also qualitative changes. The traditional rights to pasture in the royal forests prevented the growth of young oaks, while the older trees were often of poor quality. Pollarding and damage meant that most trees were too rotten to pass muster as timber. To this problem was added both the forestry officials' habit of boring healthy trees to establish the timber quality and the procedure of stamping the trunk of good trees with a crown, number, and forest's name. This stamping method was later replaced with a marking on the outer bark that was less damaging. In a parliamentary report of 1790, the remaining oaks were described as hollowed, withered, decayed, misshapen, or seared.⁴⁵

In Denmark, oak constituted a large part of the so-called *overskov*, the large timber trees that grew on the main farms and were owned by the estates themselves. Bo Fritzböger has shown that the number of larger timber trees shrank during the sixteenth and seventeenth centuries, and that oak was replaced by beech as a result of the overuse of timber. Here the navy's demand for timber played an important role when taken in conjunction with other significant users such as the building trade. This did not mean that the woodland shrank; rather it changed character. The total forested area in Denmark was almost constant between 1660 and 1760, but the forest's composition altered dramatically. The *overskov*, with its mature, large oaks, dwindled as the forested area went over to *underskov*, low-growing young woodland of oak and beech.⁴⁶ The cause was the felling of timber trees and the competition posed by the peasants' need for wood from the *underskov*. To obtain wood, the peasants branch-cut the timber trees: the larger ones because they otherwise shaded and held back the *underskov*; the smaller ones so that they would never grow into full, standard trees.⁴⁷ The result of this change in forest composition meant that the Danish state began to have problems in obtaining oak timber for the construction and maintenance of its navy.⁴⁸

A decline in the number of oak trees was noticeable in France, England, and Denmark during the eighteenth and beginning of the nineteenth centuries. An important cause of this decline in France and Denmark was the transition from woodland with mixed underwood and timber trees to woodland where underwood predominated. The competition between underwood and timber trees also was important in the British royal forests. In Sweden, there were no coppices with fixed cycles as in England or France.⁴⁹ What distinguished Sweden above all else from the other countries was that the need for winter fodder for animals was significantly greater because winter pasture was only to be found in the southernmost and westernmost areas of the country. Winter fodder was produced in the meadows on *inmarken* where most oaks grew. Wood for tools and fuel often could be got from trees on *utmarken*, outside the enclosure. This meant that the antagonism in Swe-

den was not one of timber trees versus underwood, but rather timber trees versus winter fodder. From this perspective, Swedish developments fall into a larger European pattern, with the same ultimate cause. The competition was over sunlight reaching the ground.

Conclusions

The battle in Sweden between the navy and peasantry over oak trees was not only a matter of ownership rights and timber values, but also the oak's ecological role in damaging crops in the village tillage and meadows. The struggle led to extensive branch-cutting to reduce leaf mass, and to an oak-hatred embodied in the deliberate destruction of royal oaks. The result was first a rapid reduction in the number of trees fit for the navy's use, and in the end a professional, state-run, oak forestry system, separate from agrarian production.

Branch-cutting, oak-hatred, and the navy's own stamps ruined the timber trees. The navy's selective felling of better trees and the extensive, legal felling for clearance at the start of the nineteenth century contributed further to a landscape that was dotted with large numbers of dead, decaying, and hollow trees. These landscape changes initially were positive for biodiversity, because they maintained habitats for species-rich groups such as insects and fungi. However, later cutting of more than a million old oaks destroyed much habitat.

By rephrasing the problem of deforestation more exactly as a lack of timber of a particular quality, it becomes possible to reflect on pre-industrial society's multiple uses for wood. Energy resources were a severe limitation in some regions.⁵⁰ But the dependency on wood as a material was a severe limitation as well. Because of the long growing time and the difficulty in obtaining big dimensions and certain shapes, high quality wood for building materials in reality was a renewable resource to a lesser degree than wood for fuel. This became obvious in Sweden in the beginning of the nineteenth century when the competition for land between an increasing population's demand for food, fodder for animals and the state's demand for high quality timber intensified. The solution was to separate agrarian and silvicultural production. The debate over this separation spurred the introduction of forestry in Sweden. The supervisor of the first oak plantation and chief forester Israel af Ström executed, between 1825 and 1832, the separation of the Swedish state forests from traditional use-rights, in the same way as were done in other European countries at the same time. The result was that a third, or 25 000 hectare, of the royal forests were reserved only for timber-production for the state's own needs of oaks and other trees.⁵¹ In Sweden, state forestry has its roots, not in the industrial deforestation of the late nineteenth century, but in a pre-industrial society's effort to escape the limitations of nature. In the same way as agriculture replaces gathering of food where it can be found, silviculture replaces the gathering of wood where it can be found. Thus, we can speak of a silvicultural revolution.⁵² And in Sweden it started with the oak.

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Notes

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- For some of the most important works in the British forestry debate, including a general introduction and a discussion of wood as fuel for the coal industry, see R. A. Church, ed., *The Coal and Iron Industries*, vol. 10 of *The Industrial Revolution*, 11 vols. (Padstow: Blackwell, 1994). With its clear link to their particular field, environmental historians have naturally joined the debate. See for example: J. Radkau, "Zur angeblichen energiekrisis des 18. Jahrhunderts: Revisionistische Betrachtungen über die 'Holznot,'" *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte*, 73 (1986); R. P. Sieferle, *Der unterirdische Wald. Energiekrise und Industrielle Revolution* (Munich: Verlag C. H. Beck, 1982); T. Kjaergaard, *The Danish Revolution 1500-1800. An Ecological Interpretation*. (Cambridge: Cambridge University Press, 1991).
- In the early nineteenth century the tallest pine trees also were the most sought after in both North America and Sweden, leading to a later dearth of trees of such dimensions. See L. Östlund, "Exploitation and Structural Changes in the North Swedish Boreal Forest 1800-1992," (Ph.D. diss., "Swedish University of Agricultural Science," Umeå, 1993); L. Östlund, "Logging the Virgin Forest: Northern Sweden in the Early 19th Century," *Forest & Conservation History* 39 (1995), 160-171.
- For example, F. Rose, "Lichenological Indicators of Age and Environmental Continuity in Woodlands," in D. H. Brown, D. L. Hawksworth, and R. H. Bailey, eds., *Lichenology: Progress and Problems* (London: Academic Press, 1976), 279-307; G. F. Peterken, *Natural Woodland: Ecology and Conservation in Northern Temperate Regions* (Cambridge: Cambridge University Press, 1996); Ö. Fritz and K. Larsson, "Betydelsen av skoglig kontinuitet för rödlistade lavar: en studie av halländsk bokskog," *Svensk Botanisk Tidskrift* 91 (1996), 241-262; S. G. Nilsson and R. Baranowski, "Habitat Predictability and the Occurrence of Beetles in Old-growth Beech Forests," *Ecography* 20 (1997), 491-98; K. N. A. Alexander, "The Links between Forest History and Biodiversity: The Invertebrate Fauna of Ancient Pasture-Woodlands in Britain and Its Conservation," in K. J. Kirby and C. Watkins, eds., *The Ecological History of European Forests* (Cambridge: Cambridge University Press, 1998), 73-80; S. G. Nilsson, J. Hedim and M. Niklasson, "Biodiversity and Its Assessment in Boreal and Nemoral Forests. *Scandinavian Journal of Forest Research* 16 Suppl. 3 (2001) 10-26.
- T. Palm, "Die Holz- und Rinden-käfer der Süd- und Mittelschwedischen Laubbäume," *Opuscula Entomologica Supplementum XVI* (1959), 1-57; T. Ranius and N. Jansson, "The Influence of Forest Regrowth, Original Canopy Cover and Tree Size on Saproxylic Beetles Associated with Old Oaks," *Biological Conservation* 95 (2000), 85-94; P. T. Harding and F. Rose, *Pasture-Woodlands in Lowland Britain: A Review of Their Importance for Wildlife Conservation* (Huntingdon: Institute for Terrestrial Ecology, 1986).
- Dominating tree species are spruce *Picea abies*, pine *Pinus sylvestris* and birches *Betula pubescens* and *B. pendula*.
- P. Aronsson, "Swedish Rural Society and Political Culture: The Eighteenth- and Nineteenth-Century Experience," *Rural History* 3, (1992), 41-57.
- C.-J. Gadd, *Den agrara revolutionen 1700-1870* (Boras: Natur och kultur/ETs förlag, 2000), 235-239.
- J. Clete, *Navies and Nations*, 2 vols. (Edsbruk: Akademytryck AB, 1993) 1:35-38.
- Similarly, it also was nearer the other important source of oak, the German province of Pomerania on the Baltic coast. Pomerania had been occupied by Sweden in 1630, and from 1641 onward a permanent workforce was based there to supply oak to the Swedish navy. Pomerania was a part of the Swedish Kingdom from 1648 to 1815.
- Krigsarkivet (State war archive, Stockholm) Amiralitetskollegiums arkiv old series no. 10; Riksarkivet (State archive, Stockholm, hereafter RA) Skogsstyrelsens arkiv F Heba vol.6; RA Krigsexpeditionen arkiv F I vol.4; Vadstena Landsarkiv (State regional archive, Vadstena, hereafter Vala) Kronobergs länsstyrelse Landskontoret H II vol.3.
The scarcity is not a result of higher demands on quality or dimensions from the navy. On the contrary the surviving primary material reveals an increasing scarcity of timber, with lowered requirements for dimensions, the introduction of substitutes for oak timber such as iron and spruce, and new forms of warship construction designed to spare timber. See F. af Chapman, *Dimensioner på virke och järn til fem sorter linie-skepp samt längd och storlek på master och rundhult, salningar och eselhufvum til samma skepp* (Carlskrona: Kongl. Amiralitetets Boktryckerier, 1796), B.
- There were in total 126,236 oaks in Kalmar and 50,494 in Kronoberg. See "Summariskt extract af de inkomne och nedannämnde åhr förrättade Generalskougsbesiktninginstrumenter uti underbenämte lämn." *Frihetstida utskottshandlingar R 2627*, 731-735. RA.
- "Sammandrag af den uti Östergötland år 1813 förnyade berättelse efter föregången undersökning om Ekskogarne å Krono- och Krono Skattegrund." *Krigsexpeditionen F I:1*. RA.
- C. Bergendorff and U. Emanuelsson, "History and Traces of Coppicing and Pollarding in Scania, South Sweden," in H. Slotte and H. Göransson, eds., *Lövtäkt och stubbskottsbruk: människans förändring av landskapet-boskapskötsel och åkerbruk med hjälp av skog* 2 vols. (Stockholm: Kungliga Skogs- och Lantbruksakademien, 1996), 2:235-304.
- Terminology about different forms and purposes of branch-cutting is complicated. We will here follow the terminology used by Oliver Rackham: *Ancient Woodland: Its History, Vegetation and Uses in England* (Norwich: Edward Arnold, 1980), 1-5.
- C. Linneus, *Västgöta resa år 1746* (1747; new edition, Stockholm: Wahlström & Widstrand, 1978) 78; compare S.-O. Borgegård, "Exposé över lövtäkt i tryckta dokument från 1700-talets mitt till modern tid," in Slotte and Göransson, *Lövtäkt*, 1, 132.
- C. Linneus, *Öländska och Gotländska resa år 1741* (1745; new edition, Stockholm: Wahlström & Widstrand, 1975), 26.
- "Nils Fåhrens to Skogscommissionen 9.2.1802." *ÅK 741 vol 1*. RA.

18. 1815 Swedish Parliament Appendix 4:174.
19. "Landshövdingarnas rapporter till K.M:t till följd av cirkulärskrivelse 17/12 1816 överlämnade till kommitterade för reglering af flottornas ärenden och deras skrivelse till K.M:t 6/2 1819." Krigsexpeditionen F I:1. RA.
20. 1812 Swedish Parliament Appendix 2:1079.
21. 1815 Swedish Parliament, Bondesändets protokoll 3: 454.
22. L. Nordström, "Skogsskötselteorier och skogslagstiftning", in G. Arpi ed., *Sveriges skogar 100 år*, (Stockholm: Kungl. Domänstyrelsen, 1959), 249.
23. "Committerade till reglering af Flottornes ärenden 27 mars 1819." Krigsexpeditionen F I:1. RA.
24. "af Borneman to the King," 1822. Krigsexpeditionen F I:1. RA.
25. 1823 Swedish Parliament Appendix 4:4780.
26. A. de Tocqueville, *L'Ancien Régime et la Révolution* (Paris: 1856), 292.
27. As Guha and Martinez-Alier have put it: "In field or factory, ghetto or grazing ground, struggles over resources, even when they have tangible material origins, have always also been struggles over meaning." R. Guha and J. Martinez-Alier, *Varieties of Environmentalism*. (Guildford and Kings Lynn: Earthscan Publications, 1997), 11-13.
28. A similar project was at the same time in progress in Florida with the establishment of live-oak plantations on the Santa Rosa Peninsula with the support of the Adams administration. But the project did not survive the political conflicts when Jackson administration took over. V. S. Wood, *Live Oaking: Southern Timber for Tall Ships*. (Boston: Northeastern University Press, 1981), 50-54.
29. Skogsstyrelsen F II:bb vols. 1-18. RA.
30. Kalmar länsstyrelse landskontoret C XII:476. Val a.
31. Östlund, "Exploitation and Structural Changes."
32. M. Lindbladh, "Long Term Dynamics and Human Influence in the Forest Landscape of Southern Sweden" (Ph.D. diss., Swedish University of Agricultural Science, Alnarp, 1998).
33. S. G. Nilsson, "Biologisk mångfald under tusen år i det sydsvenska kulturlandskapet. (Biodiversity over the Last One Thousand Years in the Cultural Landscape in Southernmost Sweden)," *Svensk Botanisk Tidskrift* 91 (1997), 85-101.
34. S.G. Nilsson, J. Hedin and M. Niklasson, "Biodiversity and its assessment in boreal and nemoral forests," *Scandinavian Journal of Forest Research* 16 Suppl. 3 (2001), 10-26.
35. T. Ranius and P. Wilander, "Occurrence of *Larca lata* H. J. Hansen (Pseudoscorpionida: Garypidae) and *Allochernes wideri* C. L. Koch (Pseudoscorpionida: Chernetidae) in Tree Hollows in Relation to Habitat Quality and Density," *Journal of Insect Conservation* 4 (2000), 23-31; T. Ranius, "Minimum Viable Metapopulation Size of a Beetle, *Osmoderma eremita*, Living in Tree Hollows," *Animal Conservation* 3 (2000), 37-43.
36. Ranius and Jansson, "The Influence of Forest Regrowth."
37. S. G. Nilsson and L. Ericson, "Conservation of Plant and Animal Populations in Theory and Practice," *Ecological Bulletin* 46 (1997), 87-101; M. Jonsell, J. Weslien, and B. Ehnström, "Substrate Requirements of Red-listed Saproxylic Invertebrates in Sweden," *Biodiversity and Conservation* 7 (1998), 749-764.
38. O. Lundblad, "Några faunistiska koleopterarter av C. J. Schönherr," *Entomologisk Tidskrift* 70 (1949), 147-154; P. Osbeck, *Djur och natur i södra Halland under 1700-talet* (Halmstad: Spektra, 1996).
39. S. G. Nilsson, "Gammelträäd och grova döda träd i ålderdomliga kulturlandskap," *Kulturmiljövård häfte* 5/6 (1995), 77-85.
40. S.G. Nilsson, "Mörkbaggen *Grynocharis oblonga* (L.) (Coleoptera: Trogositidae) - en specialiserad vedskalbagge med reliktdistribution. (*Grynocharis oblonga* L. (Coleoptera: Trogositidae) - a specialized wood beetle with a relict distribution)," *Entomologisk Tidskrift* 118 (1997), 1-9; Ranius, "Minimum viable metapopulation size."
41. P. W. Bamford, *Forest and French Sea Power 1600-1789* (Toronto: University of Toronto Press, 1956), 89-92, 95-112.
42. R. C. Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862* (Cambridge, Mass.: Harvard University Press, 1926), 134-138, 115-120, 136, 392, 138.
43. A. J. Holland, *Ships of British Oaks: The Rise and Decline of Wooden Shipbuilding in Hampshire* (Newton Abbot: David & Charles, 1971), 29-45.
44. C. Hart, *The Forest of Dean: New History 1550-1818* (Stroud: Sutton, 1995), 149.
45. C. Watkins, "A Solemn and Gloomy Umbrage: Changing Interpretations of the Ancient Oaks of Sherwood Forest," in C. Watkins, ed., *European Woods and Forests: Studies in Cultural History* (Cambridge: CAB International, 1998), 93-111.
46. B. Fritzböger, "Danske skove 1500-1800" (Ph.D. diss., Odense University, 1992), 220-222, 284-292.
47. B. Fritzböger, "A Silvicultural Revolution: The Dissolution of Traditional Agro-forestry in Denmark, AD 1730-1820," in C. Björn, ed., *The Agricultural Revolution Reconsidered* (Odense: Landbohøistors Selskab, 1998), 8. Kurt Mantel has argued that many contemporary descriptions of woodland reveal a similar development in Germany during the eighteenth century. Timber trees, particularly oak, were felled in the *mittelwald* for sale to Holland. See K. Mantel, "Wald und Forst in der Geschichte" (Alfeld-Hannover: Verlag M.&H. Schapper, 1985) 192.
48. P. C. Nielsen, "Skibets krav til skoven," *Handels- och Sjöfartsmuseets årbog 1960* (Helsingör: 1960), 174.
49. More irregular coppicing however was common in Skåne in the southern-most part of Sweden. See Bergendorff and Emanuelsson, "History and Traces of Coppicing," 235-304.
50. See, for example, V. Smil, *Energy in World History* (Boulder, Colo.: Westview Press, 1994).
51. P. Eliasson, *Skog, makt och människor. En miljöhistoria om svensk skog 1800-1875*. (Ph. D. diss. Stockholm: Kungliga Skogs- och Lantbruksakademien, 2002). In the end not more than 400 hectares were cultivated with oak. The costs were high and the labor used until 1857 has been estimated to 400 000 days of work. See L. Kardell, *Skogshistorien på Visingsö* (Jönköping: Sveriges Lantbruksuniversitet, 1997), 67-75.
52. We borrow this phrase from B. Fritzböger.