MEDIEVAL COLONISATION AND ABANDONMENT IN THE SOUTH SWEDISH UPLANDS: A REVIEW OF SETTLEMENT AND LAND USE DYNAMICS INFERRED FROM THE POLLEN RECORD

PER LAGERÅS

Abstract

In this review of pollen data from the South Swedish Uplands, evidence is presented of colonisation and strong agricultural expansion during the 11th to 13th centuries, followed by farm abandonment and land use change during the 14th to 15th centuries. The latter is associated with the Black Death and the late medieval crisis. Pollen data show that abandonment in the uplands resulted in the regrowth of woodland, but also in land use change from cereal growing to grazing. Similar cycles of agricultural expansion and decline are identified also from earlier periods during the Iron Age, which highlights the sensitive character of upland agriculture and settlement.

Key words: pollen analysis, agriculture, Middle Ages, Black Death, late medieval crisis.

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Introduction

During the period AD 1000 to 1350, corresponding to the High Middle Ages in a European perspective, Sweden witnessed strong population growth, which went hand in hand with social change, technological development, and agricultural expansion (e.g. Myrdal 2011). Part of the expansion may be defined as inner expansion on the already densely populated agricultural plains, with village formation, intensified cultivation, pastures turned into arable, and so on. However, equally important was the colonisation of wooded uplands and other marginal areas. This outer expansion was characterised by deforestation and settlement establishment, usually as single farms or small hamlets, in more or less remote areas. The driving force behind the colonisation of marginal areas may have been a combination of push factors, like population pressure and land shortage, and pull factors like the demand for iron, timber and other natural resources that these areas could offer. Written sources are scanty, and the agricultural expansion in marginal areas is evident in particular from archaeological data, place names, and the distribution of Romanesque churches, but also from pollen-analytical investigations.

As in most of Europe, the expansion was followed by decline during the 14th and 15th centuries. Even though other factors may have contributed to the decline, a major cause was certainly the plague pandemic, the Black Death, which ravaged Sweden in 1350. The first strike was followed by several recurring outbreaks of plague during the second half of the 14th century and the early 15th century, leading to significant population decline, as well as social and political unrest. Different opinions have been put forward regarding the force of the epidemics, the magnitude of the population decline, and the general extent of the crisis. According to earlier research based on historical records, Sweden came off relatively well, possibly due to its small and scattered population (Gissel *et al*. 1991; Nordberg 1995). However, later research, still based primarily on historical records, gives a different picture, and suggests a larger population decline (Palm 2001; Myrdal 2003). According to the latest estimation, the total Swedish population decreased by around 40% between 1350 and 1450 (Myrdal 2012, p.227). This estimated population decline is slightly smaller than in Norway, England and some other West European countries, but larger than in Finland and the Baltic countries (cf. Livi Bacci 2000; Benedictow 2004).

The population decline was accompanied by farm abandonment. Deserted farms (in Swedish *ödegårdar*) are frequently mentioned in the earliest land records from the 15th century, and in the more plentiful records from the 16th century onwards (e.g. Bååth 1883). However, by that time many farms were already re-established, and others were forgotten, which means that the original frequency of farm abandonment in the late 14th century is difficult to estimate based on these records (Myrdal 2012, p.226). Archaeological excavations contribute with important information on single

deserted farmsteads (e.g. Hansson *et al*. 2005; Åstrand 2006), but investigated sites are still few. Another source of information is pollen records. Farm abandonment was accompanied by agrarian and vegetation changes, and recently it was shown that vegetation changes related to the late medieval decline are readily visible in several pollen diagrams from the South Swedish Uplands (Lagerås 2007).

Little is known about the geographical variation in desertion frequency within Sweden, but it has been suggested that it was particularly high in marginal areas with poor conditions for agriculture (e.g. Larsson 1964, p.160; Myrdal 2012, p.225). In a recent publication, Myrdal (2012, p.226) has tentatively estimated the late medieval desertion frequency of the South Swedish Uplands to have been 60% to 70%. Such large-scale abandonment of farms in marginal areas may not necessarily indicate that those areas were particularly hard struck by the plague, but rather may reflect migration to central areas where vacant farmsteads on better soils became abundant in the wake of the Black Death. There is no evidence for such migration in Swedish sources, but a similar process is known to have taken place in other countries (Benedictow 2004, p.261).

The aims of this paper are: (1) to review pollen-analytical indications of medieval expansion and abandonment in the South Swedish Uplands; (2) to contribute to the discussion on marginal areas and their possible sensitivity to societal crises; and (3) to present an interdisciplinary project in progress on social and agricultural change during the Late Middle Ages.

Marginal areas: two opposing views

In Sweden, as in most parts of Europe, different areas offer different natural conditions for agriculture. Climatic gradients from south to north, and from east to west, are of major importance, and so are the distribution of different bedrock, Quaternary deposits and soils. In southern Sweden, an important division may be made between fertile lowlands and poor uplands.

The fertile lowlands are underlaid by sedimentary bedrock, resulting in a flat topography and clayey soils. The soils are usually calcareous, which, together with their high clay content, makes them nutrient-rich and fertile. Today, these plains are heavily cultivated and densely populated, and according to historical records and the distribution of prehistoric monuments, they were also the most populated areas in the past.

However, most of southern Sweden constitutes another type of terrain. It is characterised by a higher elevation and an undulating topography, sometimes with a strong relief. Due to hard crystalline bedrock, like gneiss or granite, the soils are relatively nutrient-poor and less suitable for agriculture. Today, they are covered to a large degree by coniferous forests. Their high elevation results in lower temperatures, which further contribute to the relatively poor conditions for agriculture.

Based on differences in environmental and climatic conditions for agriculture, but also on differences in settlement and population density, lowlands and uplands may be referred to as central and marginal areas respectively. The dichotomy of central *versus* marginal had a strong impact on Swedish archaeology during the 1980s. A typical example was the 'Ystad Project', a large-scale interdisciplinary project which focused on a rural region in southernmost Scania (Berglund 1991). In this project, researchers studied the long-term settlement and land-use history, and made comparisons between the coastal plains, regarded as central, and the hummocky landscape further inland, regarded as marginal. They concluded that the most marginal uplands were utilised in periods of population expansion, and then probably abandoned for more fertile plains in periods of population regression (Berglund *et al*. 1991, p.432).

One consequence of such a view was that marginal areas became particularly interesting for landscape history studies, because they could be expected to reflect changes in society better than central areas. This view of a sensitive marginal area we may call 'marginal agriculture'. According to this view, poor conditions for agriculture result in small margins and high risk, which makes marginal areas sensitive and vulnerable to crises. In such areas, we can expect late colonisation, and during periods of decline and recession we could expect widespread abandonment.

However, since the 'Ystad Project', during the last decade or two there has been a strong development in Sweden of what may be called woodland archaeology. This development is partly due to rescue archaeology in connection with infrastructural projects, and partly due to the establishment of new universities with archaeology departments in forest regions. Several different and also new types of archaeological remains have been discovered and investigated. Some of them reflect agriculture (e.g. clearance cairns), but many of them reflect other activities, like iron production (furnaces, slag heaps), tar, potash and charcoal production (kilns), peat cutting, forestry (sawmills) and hunting (pitfalls). Together, they seem to reflect a diverse woodland economy, of which agriculture was only one part.

The discovery and investigation of these different types of remains have not only resulted in new data and new

interpretations, but also the view on marginal areas has gradually changed (e.g. Svensson 1998). Instead of focusing on poor natural conditions for agriculture, the flexibility and sustainability of a diverse woodland economy has been emphasised. A typical example is the 'Ängersjö Project', an interdisciplinary project in the woodland region of central Sweden (Johansson 2002). In this project, it was suggested that the mixed 'forest economy', because of its flexible strategies of resource utilisation and land use, may have been resistant to economic crises such as the late medieval decline (Emanuelsson 2001, p.26). This view of a flexible and sustainable woodland economy we may call 'sustainable flexibility'. According to this view, a diverse economy provided stability and low risk, which is quite the opposite of the view expressed within the 'Ystad Project'.

The 'Ystad' and 'Ängersjö' projects were used here to exemplify a general shift within Swedish archaeological research and its approach to woodland societies. Before the shift, research focused on central settlement areas, and on the agricultural economy in general. Wooded uplands were more or less defined as peripheries to central areas (the marginal agriculture view), and the specific social and economic characteristics of woodlands attracted little attention. During the last two decades, several projects have focused specifically on woodland societies, and in particular on non-agricultural production. Instead of emphasising vulnerability and abandonment, the possible sustainability and continuity of woodland societies have been highlighted (the 'sustainable flexibility' view). This later view may, to some degree, be seen as a reaction against the earlier one.

However, questions still remain. How continuous was land use and settlement in marginal areas during history? In what ways were they affected by crises, and to what degree did their past development reflect general trends in society?

In this paper, I will use pollen data to discuss continuity and discontinuity in the South Swedish Uplands, with a special focus on the environmental responses to the late medieval decline.

Environmental conditions and pollen data

A large part of southern Sweden is occupied by an upland area called the South Swedish Uplands (Sydsvenska höglandet). It is characterised by crystalline bedrock and Quaternary deposits dominated by sandy till, rich in boulders and stones. Altitudes in most of the uplands range between 100 and 300 metres above sea level (with the highest peak reaching 377 metres), which results in slightly cooler conditions and a shorter vegetation period than in the surrounding lowlands (Raab, Vedin 1995). Due to the relatively poor conditions for agriculture, today the uplands are mainly used for forestry, and they are to a large degree covered by spruce and pine plantations. In relation to the fertile plains, the uplands are sparsely populated, and may be referred to as a marginal area.

The uplands offer very good conditions for palaeoecological studies. This is due to numerous well-preserved peatlands and lakes with stratigraphies suitable for pollen-analytical sampling. Pollen analysis has strong traditions in Sweden in general, and the South Swedish Uplands have been subject to several high-quality pollen-analytical investigations. While earlier studies focused on the regional vegetation development based on pollen diagrams from large lakes (e.g. Digerfeldt 1972; see also Berglund 1969), most recent studies have tried to reveal detailed pictures of the local vegetation based on pollen diagrams from small lakes and peatlands (e.g. Björkman 1997; Lindbladh, Bradshaw 1998; Lagerås 1996; 2007). Many of these local diagrams, in particular those with high temporal resolution (i.e. many analysed levels in relation to the time period studied) and detailed radiocarbon chronologies, have provided new insights into the settlement and land-use dynamics of the last two millennia.

The pollen diagrams presented in this paper are local records based on peat cores from small peat bogs. The sites are situated on the southwest rim of the South Swedish Uplands, at altitudes of 100 to 120 metres above sea level (Fig. 1). They are from typical upland environments, but still not very far from cultivated plains to the west and south, from which people may have originated when colonising these parts of the uplands. The complete pollen diagrams, together with radiocarbon dates and stratigraphical descriptions, have been published elsewhere (Lagerås 2007; Sköld *et al*. 2010). Only simplified versions plotted on a calibrated time scale are presented here to support the discussion.

Medieval settlement and land-use dynamics

Medieval colonisation

Agriculture was introduced to Sweden in approximately 4000 BC, and within only a few centuries both cereal growing and animal husbandry were established in all major lowlands in the southern parts of the country (Berglund 1985). The South Swedish Uplands were also affected from the very beginning, but mainly by

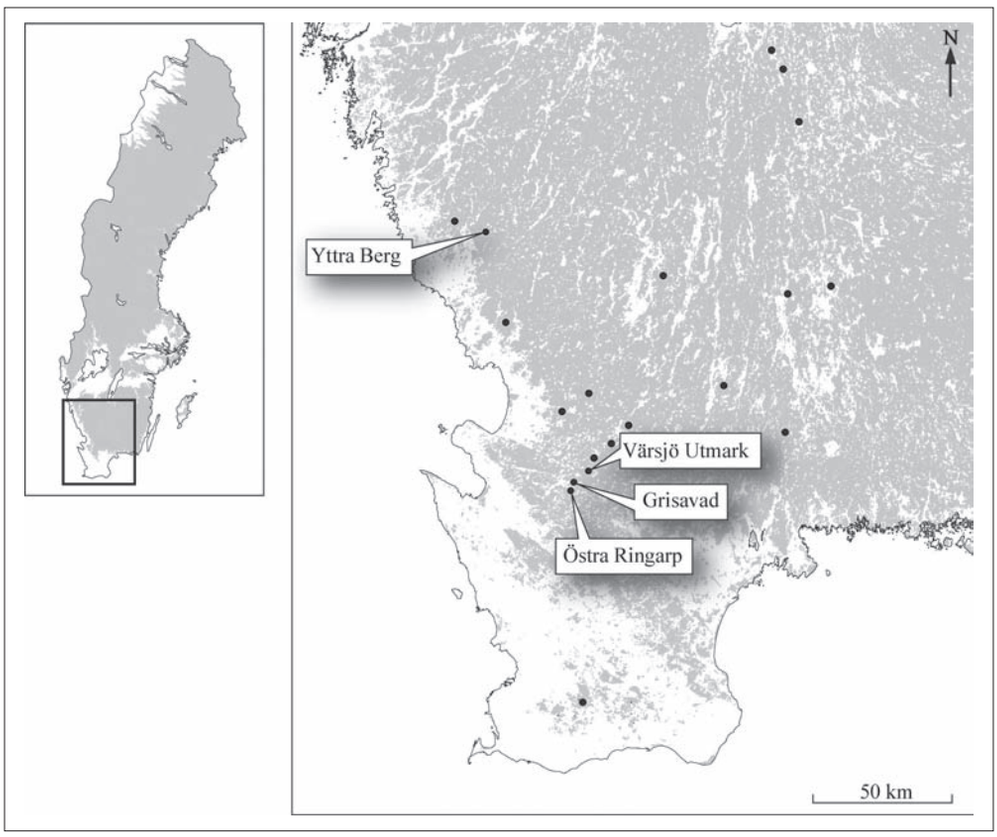

Fig. 1. A map of Sweden, with a close-up of the southwest part. Dots with name lables represent pollen records discussed in the text, while dots without lables represent other pollen records included in the compilation in Fig. 4. Grey shading indicates the distribution of woodland in today's landscape (prepared by author).

extensive wood pasturage, possibly in systems of herding or transhumance (Lagerås 1996). Cereal growing in the uplands was generally established later, in particular in connection with the agricultural expansion of the Bronze Age and the Early Iron Age. However, even after these periods, the uplands remained rather forested, and some parts were still relatively unaffected by agriculture by the time of the medieval expansion. For the parts that witnessed their first permanent agriculture and settlement during the Middle Ages, it is justifiable to talk not only of medieval expansion but of colonisation.

An example of what medieval colonisation of the uplands may look like in pollen data is presented in Fig. 2. The diagram is based on a sediment core from a small peatland close to the hamlet of Östra Ringarp, and it reflects the local land-use history of this settlement. Through written documents, the hamlet and its predecessor Ringarp was traced back to AD 1523 (Skansjö 2010, p.22), while an archaeological excavation of a furnace for bloomery iron production, situated by the hamlet, revealed dates to the 13th century (Strömberg 2008, p.87). However, in the pollen diagram, a continuous graph for cereal pollen starts already in the ninth century, and reaches higher values in the 11th century. In the 11th century, there is also a strong increase in grassland indicators, reflecting local deforestation and the establishment of pastures and possibly hay meadows at that time. Based on the pollen record, we may conclude that permanent agriculture and settlement were established on the site in the 11th century, possibly preceded by small-scale temporary cultivation from the ninth century onwards. Alternatively, permanent agriculture and settlement were established on a small scale already in the ninth century, and expanded during the 11th century.

According to the pollen record, cultivated crops on the site during the Middle Ages were barley, rye, wheat, hemp and flax (and during later periods also oat and buckwheat). The continuous graphs for cereals and grassland pollen in Fig. 2 indicate that the settlement survived the late medieval crisis, although a small decrease in the cereal graph during the 14th century may indicate the short-term abandonment of some fields. Arable agriculture expanded significantly during the 16th and 17th centuries, and even more around 1800. In the 20th century, arable fields were abandoned, and much of the area was transferred to modern tree plantations. Hence, the strong dominance of coniferous forest that we see today is a recent phenomenon.

Before the medieval colonisation of this site, the area was covered by deciduous woodlands. However, light-

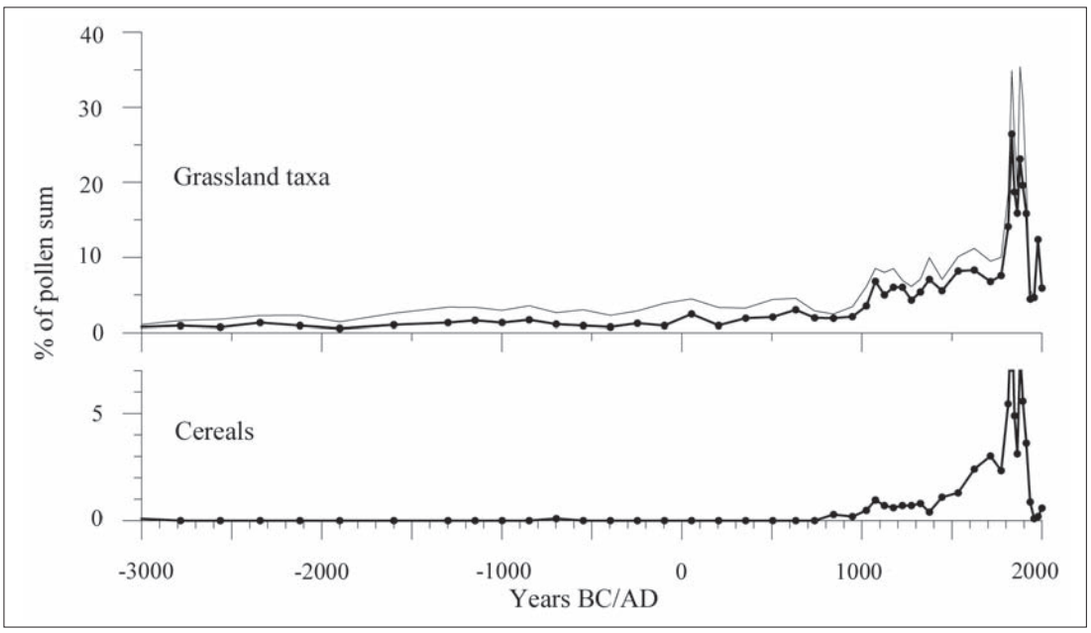

Fig. 2. Pollen graphs from the Östra Ringarp site. The lower graph shows cereal pollen, and includes barley (*Hordeum* type), rye (*Secale cerale*), wheat (*Triticum* type) and oat (*Avena* type) pollen. The upper graph reflects grasslands, and includes grass (*Poaceae* undiff.), ribwort plantain (*Plantago lanceolata*), sorrel (*Rumex acetosa/acetosella*) and yellow-rattle (*Rhinanthus* type) pollen. The thin line at the top of the graph shows heather (*Calluna vulgaris*). The graphs show percentages of the total numbers of pollen identified in each sample. Dots on the graphs indicate analysed samples. The time scale on the x-axis is based on calibrated radiocarbon dates (based on pollen data from Lagerås 2007).

demanding grazing indicators (grasses, ribwort plantain, sorrel, etc) show that there were openings in the woodlands, which were obviously used for grazing. The combination of high tree pollen percentages, low percentages of grassland indicators, and the absence of cereal pollen (with the exception of one cereal pollen grain from the Bronze Age), indicates that there was no permanent settlement in the area before the Middle Ages. Probably the woodlands were used only for extensive herding.

The herding interpretation, based on pollen data, is supported by archaeological evidence. A number of simple hearths have been identified and dated to the Bronze Age and the Iron Age, but no prehistoric monuments, burials or settlement structures are known, in spite of thorough investigations (Lagerås 2007, p.23). A plausible interpretation is that the hearths represent herdsmen's campsites.

The story of Östra Ringarp as presented here is in many respects typical of the region, which had few prehistoric settlements (except during the Mesolithic) and to a large degree was not colonised until the Middle Ages. However, the first settlers were probably well acquainted with the area due to the long tradition of herding and wood pasturage prior to colonisation.

Colonisation followed by abandonment

The previous example showed medieval colonisation followed by continuous agriculture and expansion until the modern abandonment and reforestation of the 20th century. Other sites may show a different land-use and settlement history, with earlier periods of agricultural expansion, and sometimes also with recurring periods of decline and abandonment. An example of such development, reflected in pollen data, is presented in Fig. 3. The diagram is from a small peatland close to the hamlet of Yttra Berg (cf. Fig. 1), and reflects the local vegetation and land-use history of this settlement and its predecessors. The site is a nature reserve with a species-rich herb flora regarded as typical of the traditional cultural landscape in the uplands, which today is preserved in only a few places. The site is also rich in clearance cairns, stone walls and other remains of ancient agriculture. These remains have not been excavated or dated, but by comparison with other areas, the clearance cairns may tentatively be dated to the Iron Age or the Middle Ages (e.g. Bartholin, Lagerås 2003). In spite of being rich in agricultural remains and having a species-rich flora, the site is poor for farming, due to the sandy and stony soils, high altitude and high precipitation.

According to the pollen record, the site has witnessed several periods of agricultural expansion, as well as

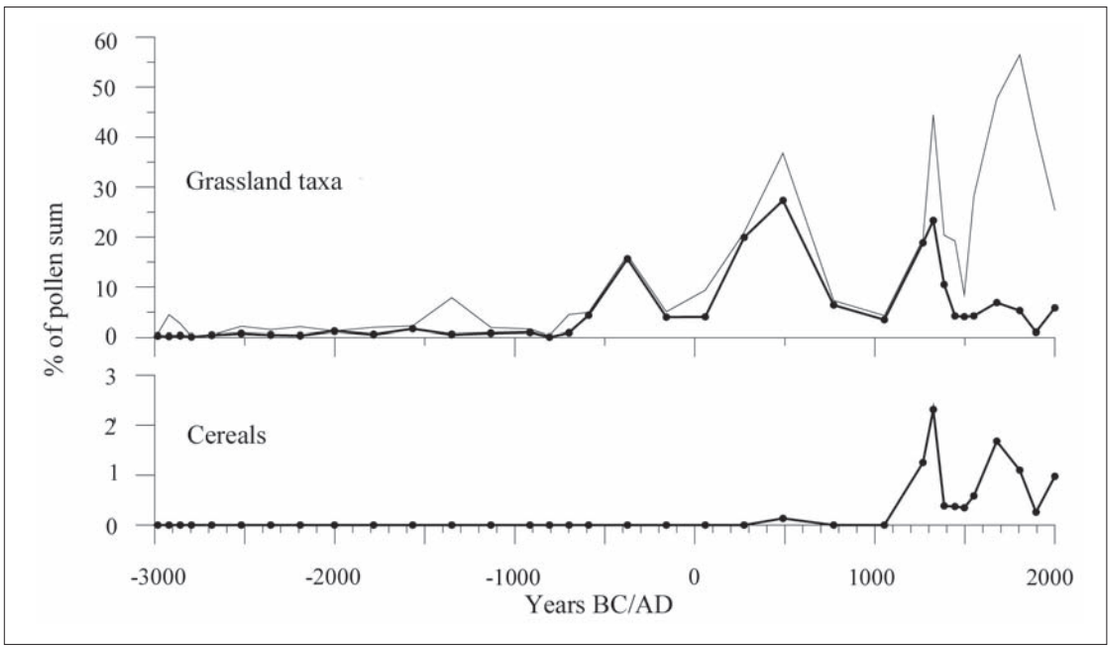

Fig. 3. Pollen graphs from the Yttra Berg site. For an explanation, see the caption to Fig. 2 (based on pollen data from Sköld *et al*. 2010).

periods of the decline and regrowth of woodland. After a period of extensive wood pasturage, starting in the Late Neolithic, the first significant expansion started at the end of the Bronze Age (circa 600 BC). Woodland was cleared and semi-open pastures were established, reflected in Fig. 3 as a peak in pollen percentages of grassland species. No cereal pollen was detected from this phase, and a few centuries later (circa 300 BC) the pastures were already abandoned and the woodlands closed in.

In the Roman Iron Age, starting in approximately AD 100, the area was once again cleared of woodland and open pastures were established. The occurrence of a few cereal pollen grains shows that some arable plots were established as well. But this land-use period also came to an end when abandonment of pastures and arable fields, followed by woodland regrowth, started around AD 500. Several pollen diagrams from the uplands show similar signs of abandonment from this time (Lagerås *et al*. 1995; Lagerås 1996; 2007), and the same is true of many pollen diagrams for much of northern continental Europe (Andersen, Berglund 1994). The agricultural decline may be connected with a general population decline associated with the much-debated Migration Period crisis during the sixth century (e.g. Näsman, Lund 1988; Gräslund 2007).

A third significant agricultural expansion at Yttra Berg started in the 12th century. It is characterised in the pollen record by a strong increase in cereal pollen and grassland pollen, indicating the clearing of woodlands and the establishment of arable fields and pastures, and possibly hay meadows. Obviously, one or a few farms were established on the site in the process of medieval colonisation. According to the pollen frequencies, the landscape became approximately as open as during the Iron Age land-use phase, but with more arable land. However, during the 14th century, both arable fields and pastures were abandoned, which is reflected in a sharp decrease in cereal pollen and grassland pollen frequencies. This decline may be connected with the late medieval crisis, which will be further discussed in a separate section below.

After the late medieval decline, arable fields and pastures were reestablished during the 16th century. As is evident from the pollen diagram, pastures now included more heather (*Calluna vulgaris*) than before, reflecting poor heathland. The same development is found in several pollen diagrams from the western part of southern Sweden. In this region, which is the rainiest part of southern Sweden (800 to 1000 mm/year), heathlands were still widespread during the 19th and early 20th century. Most of them were later forested, and today only small fragments remain (Malmer 1965). The beginning of the modern decline of heathland is reflected in the decrease of *Calluna* pollen frequencies in the far right part of the diagram from Yttra Berg (Fig. 3).

To sum up, in a long-term perspective, the upland area of Yttra Berg has been subject to repeated agricultural expansions, dated to the Late Bronze Age, the Roman Iron Age, the High Middle Ages, and Early Modern Times. Likewise, the area has witnessed recurring periods of abandonment, dated to the Pre-Roman Iron

Age, the Migration Period, the Late Middle Ages, and Late Modern Times. This very discontinuous land-use and settlement history seems to reflect an agriculturally marginal area that was colonised during periods of expansion and then abandoned during periods of decline. It supports the view of marginal areas as vulnerable and sensitive to societal change, i.e. the 'marginal agriculture' view as defined above.

The Yttra Berg example is also interesting from another point of view. It shows that the medieval colonisation in parts of the uplands may have been preceded by earlier land-use periods, i.e. earlier attempts at colonisation. In that respect, the medieval colonisation, although perhaps the strongest, was only one of several in a long-term series of recurring expansions.

Environmental responses to the late medieval population decline

Until recently, the late medieval crisis had not attracted palaeoecological research, and therefore very little was known about vegetational and environmental responses to the population decline and the societal unrest. In a few publications, vegetation changes were ascribed to the late medieval crisis (Königsson 1989; Lindbladh, Bradshaw 1998), but the representativeness of the results in a broader perspective was not known. According to a compilation of pollen records presented by Berglund *et al*. (2002), indications of regrowth of woodland during the Late Middle Ages were identified in only three out of 30 pollen records from southern Sweden. However, several of the diagrams used for that compilation had a relatively poor temporal resolution, and several had uncertain absolute chronologies based on radiocarbon dating of bulk gyttja samples (Berglund *et al*. 2002, p.163). The latter gives erroneous dates due to the reservoir effect of lake sediments (e.g. Olsson 1986, p.291). A different picture emerged from a more recent compilation based on 20 pollen records from upland areas in southern Sweden (Fig. 4; Lagerås 2007). The records used in this case were local pollen records from small lakes and peatlands, and with more reliable chronologies based on AMS radiocarbon dates of terrestrial plant material (macrofossils or bog peat). According to this compilation, agricultural decline during the Late Middle Ages was identified in eight out of 20 records.

Indications of agricultural decline during the Late Middle Ages may look different in different pollen records, depending on several factors, such as the type of land use before and after the decline, or the character and magnitude of land-use change (total abandonment, change from intensive to extensive land use, decrease in grazing pressure, etc). They may also be influenced by the characteristics of the sampling site, like basin size and local vegetation, and the distance between the sampling site and arable fields, pastures, and so on, of the medieval landscape. Most straightforward to interpret in terms of abandonment are cereal pollen graphs, which reflect cultivation. There are, however, some

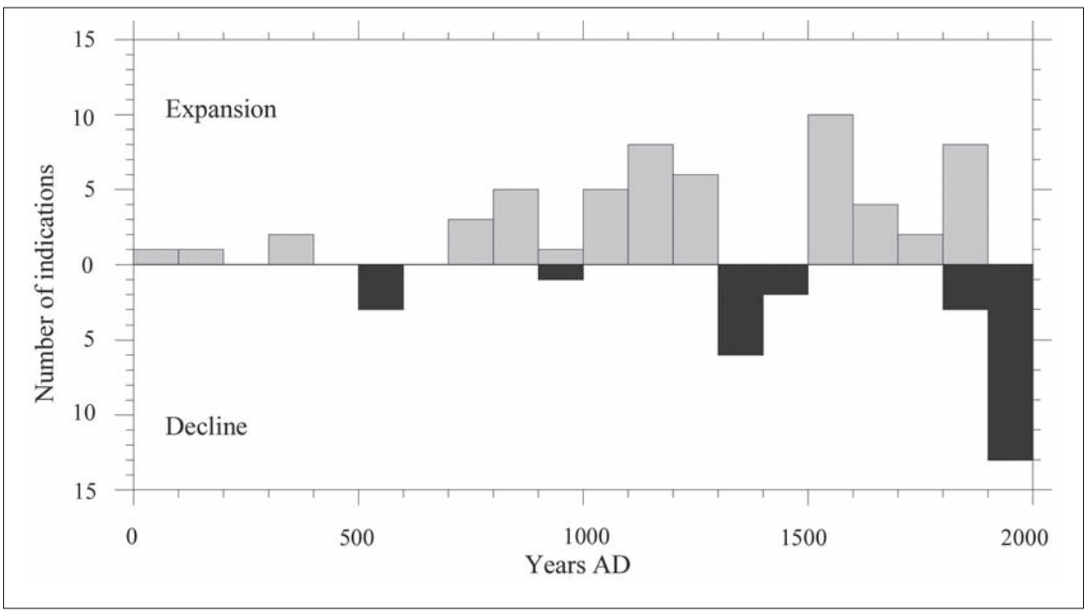

Fig. 4. Indications of agricultural expansion (grey bars) and decline (black bars) in 20 pollen records from upland areas in southern Sweden. The bars show the number of indications per century, i.e. the number of different pollen records indicating expansion or decline during each century. The sites are indicated on the map in Fig. 1 (from Lagerås 2007).

complicating factors. Barley, which was the main crop during the Middle Ages, is a poor pollen producer, and therefore it is under-represented in pollen records. Furthermore, the dispersal of barley pollen and other cereal pollen is to some degree influenced by agricultural management, like harvesting technique and threshing, which makes it difficult to estimate the extent of arable land (Vuorela 1973). In spite of these complicating factors, many cereal pollen graphs from the South Swedish Uplands paint a similar picture, with a significant decrease in cereal pollen percentages during the Late Middle Ages (examples from four different sites are presented in Fig. 5). Some sites show a gap in the cereal pollen graph (e.g. Grisavad and Värsjö Utmark in Fig. 5), while others show a sharp decline but no gap (e.g. Yttra Berg). Some sites show no or only a minor decline (e.g. Östra Ringarp), but it is important to note that none of the 20 examined pollen diagrams show increasing cereal pollen percentages during the same period (Lagerås 2007, p.91). The Late Middle Ages was obviously a period of abandonment and overgrowing of arable land. Some farms managed to remain as before, but there was no agricultural expansion.

Even though pollen records do not reveal the cause of the decline, the temporal association with the Black Death is striking. The first plague epidemic, the Black Death *sensu stricto*, ravaged the uplands and most other parts of Sweden in 1350 (Benedictow 2004, p.175). It was followed by two devastating outbreaks in 1359–1360 and 1368–1369, and then again at the beginning of the 15th century (Myrdal 2012, p.223). Pollen records cannot be dated with the same accuracy as historical documents, but according to their independent radiocarbon chronologies, the decline in cereal pollen in most diagrams is dated to the 14th century.

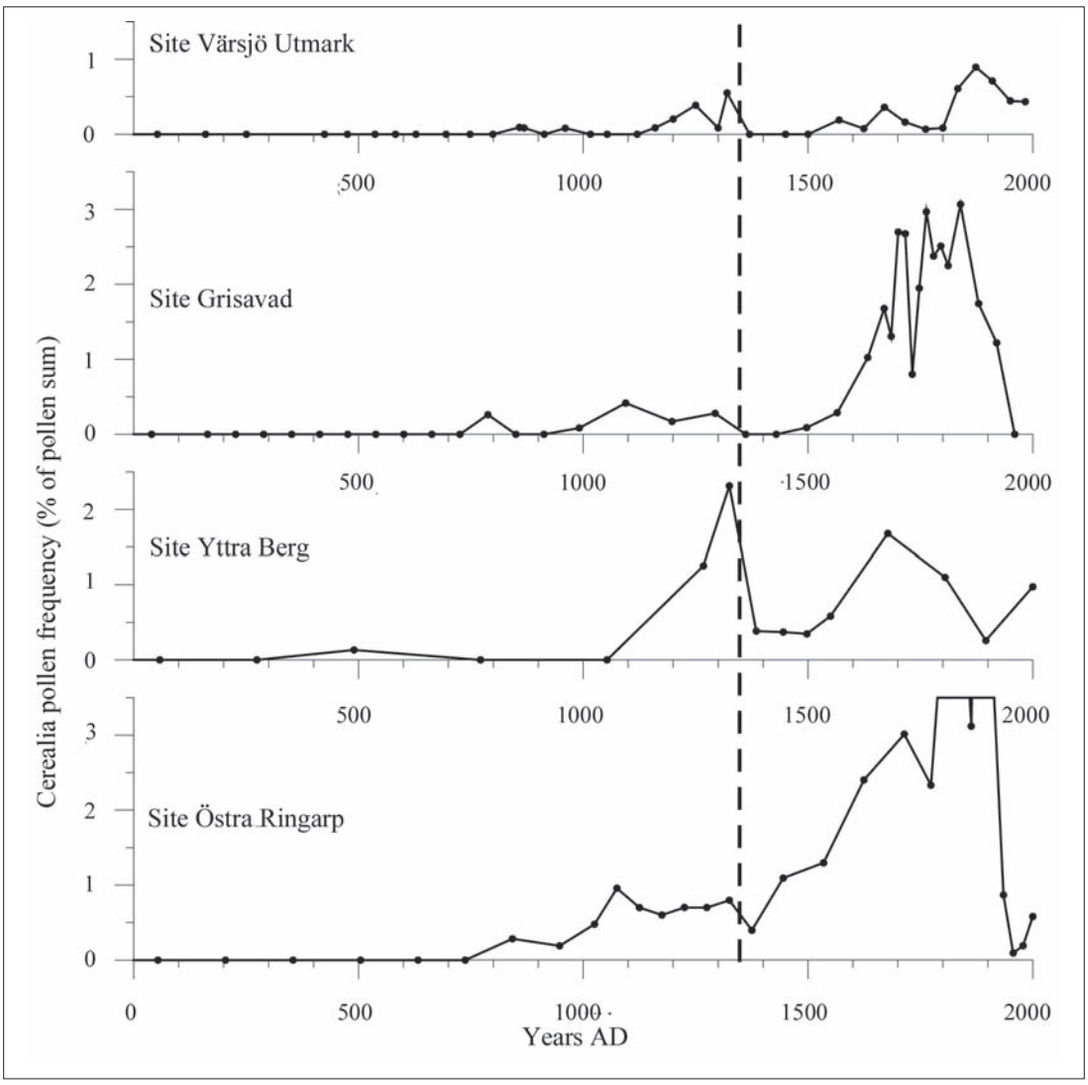

Fig. 5. A compilation of cereal pollen graphs from four different sites plotted on the same time scale. The dotted vertical line indicates the year 1350, i.e. the year of the Black Death (based on pollen data from Lagerås 2007 and Sköld *et al*. 2010).

After the decline, almost all sites witnessed agricultural expansion in the 16th century (Figs. 4, 5), meaning that the time elapsed between decline and expansion was approximately 150 to 200 years. Also, sites that do not show any signs of abandonment or a significant decline in the Late Middle Ages show expansion in the 16th century (e.g. Östra Ringarp in Fig. 5). Obviously, the post-crisis agricultural expansion, like the expansion of the High Middle Ages, was very strong in the uplands.

The late medieval decline is not only reflected in cereal pollen, but also in pollen types reflecting grassland. During the Middle Ages, grasslands were used as pastures and hay meadows, managed by grazing and mowing, both of which are related to animal husbandry. In most diagrams with a late medieval decrease in cereal pollen, grassland pollen percentages decrease at the same level, which indicates that grasslands were also abandoned, or at least witnessed a significant decrease in grazing pressure. This development may be exemplified by Yttra Berg, where both cereal pollen and grassland pollen frequencies decrease sharply at a level dated to the 14th century (Fig. 6). From the same time, there is an increase in tree pollen percentages, and we may distinguish a peak in early-successional trees (birch), followed by a peak in late-successional ones (oak, elm, lime, beech and spruce). Birch and other early-successional trees are light demanding and fast growing, and in a natural succession they are the first trees to colonise abandoned grassland. In a second phase, they are gradually outcompeted by slow-growing but more shade-tolerant late-successional trees. Hence, pollen data from Yttra Berg indicate not only the abandonment of arable fields and pastures/meadows; they also indicate the natural regrowth of woodlands on abandoned land. A similar development has also been identified at other sites.

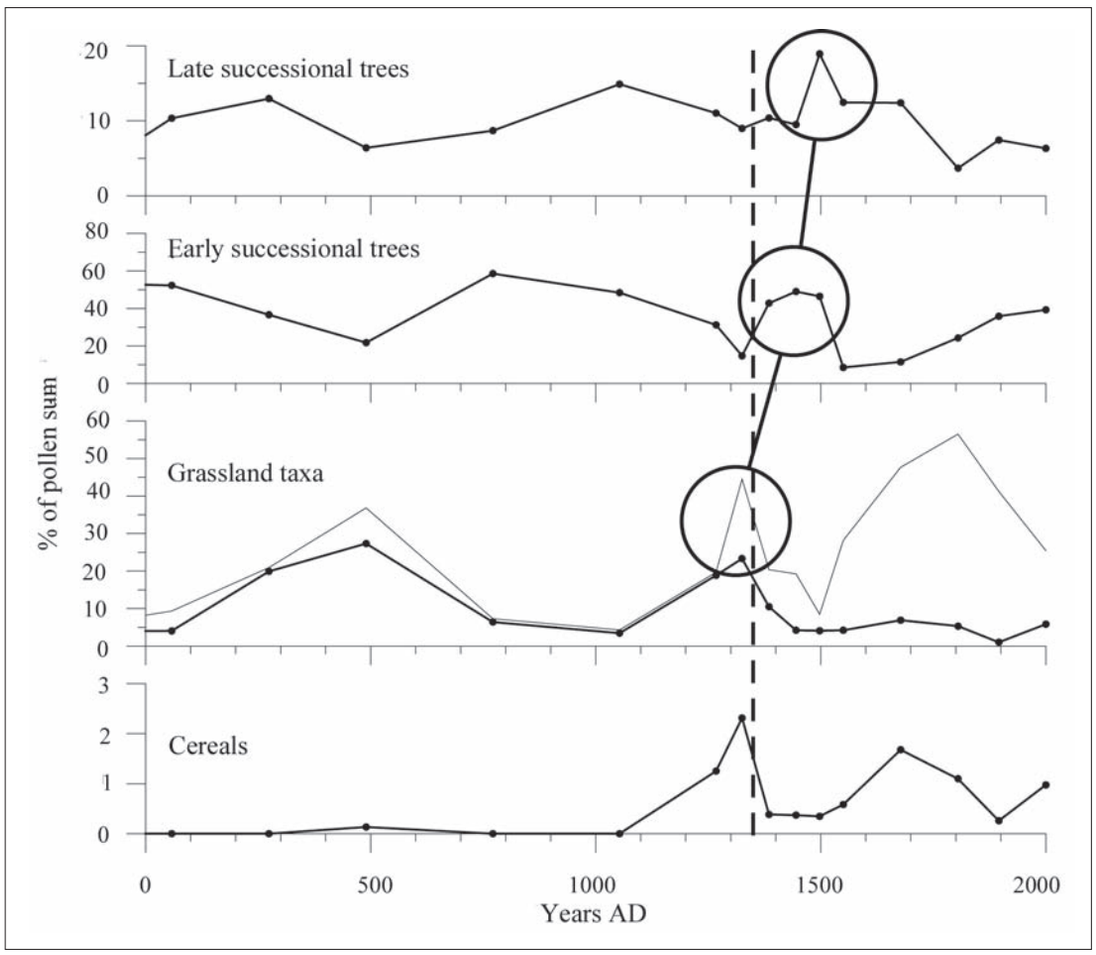

Fig. 6. Pollen graphs from the Yttra Berg site. The lower two graphs show cereal pollen and grassland pollen respectively (cf. Fig. 3). The graph for early-successional trees includes birch (*Betula*) pollen, while the graph for late-successional trees includes oak (*Quercus*), elm (*Ulmus*), lime (*Tilia*), beech (*Fagus*), and spruce (*Picea*) pollen (based on pollen data from Sköld *et al*. 2010).

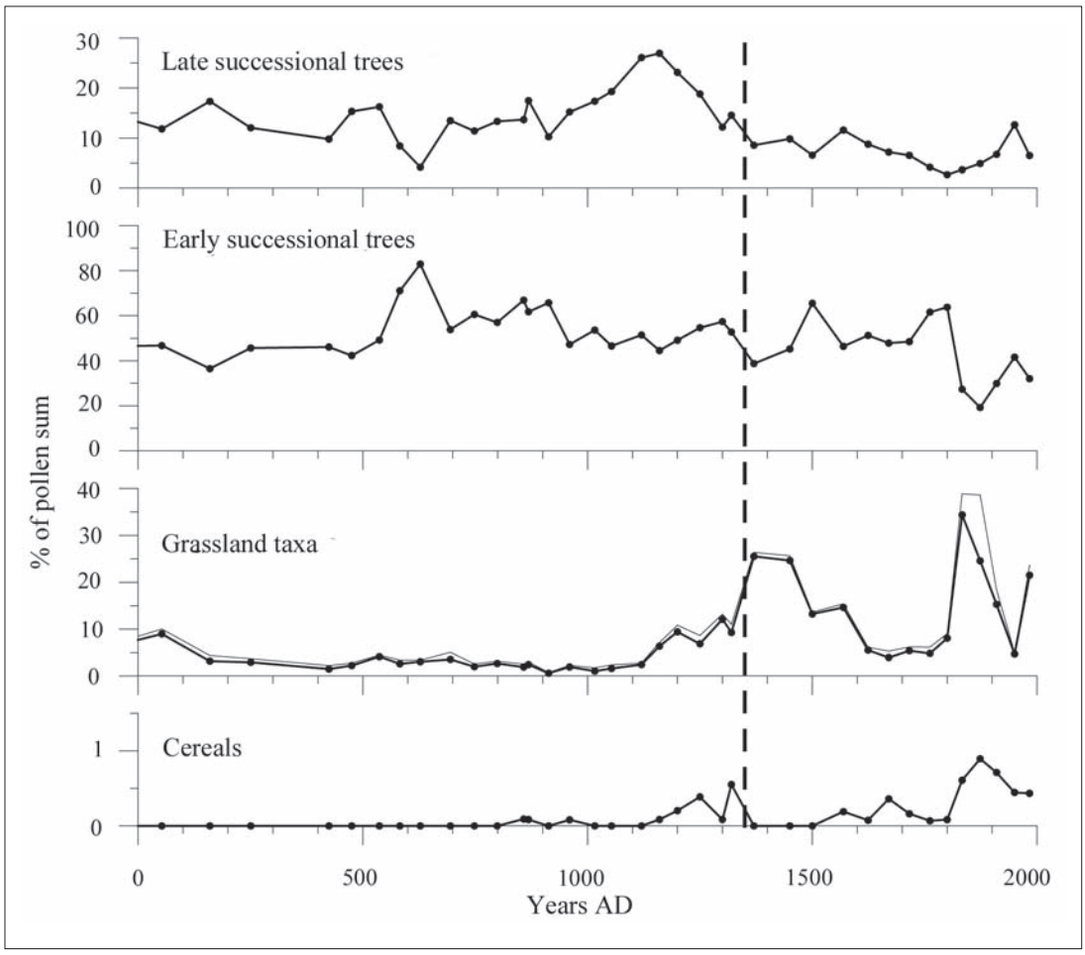

Fig. 7. Pollen graphs from the Värsjö Utmark site. For an explanation, see captions to Figs. 2 and 6 (based on pollen data from Lagerås 2007).

The regrowth of woodland is perhaps what we may expect from a period of population decline and farm abandonment. However, some pollen diagrams reflect other vegetation changes. In a diagram from the Värsjö Utmark site (Fig. 7), the decrease in cereal pollen percentages in the 14th century is not accompanied by a decrease in grassland pollen or an increase in tree pollen percentages. On the contrary, the decrease in cereal pollen is mirrored by a strong increase in grassland pollen. This relationship probably reflects how abandoned arable fields were turned into grassland. Since cereals are very poor pollen producers in comparison with wild grasses, it makes sense that the replacement of cultivated fields by grassland would result in a small decrease in cereal pollen and a much stronger increase in grassland pollen (e.g. Vuorela 1973). A tentative interpretation may be that the settlement at Värsjö Utmark was abandoned and the arable fields were overgrown, and that the area was used for extensive grazing by neighbouring farmers. If this interpretation is correct, it is an example of how intensive land use was replaced by extensive land use, and how animal husbandry may have gained in importance when there was a shortage of manpower but an excess of land in the wake of a population drop. A transition from arable farming to animal husbandry in Sweden during the Late Middle Ages has been suggested based on other sources (Myrdal 2012, p.221).

Conclusions

This review of pollen records has shown that the Middle Ages was a period of colonisation and agricultural expansion in the South Swedish Uplands. The expansion started already in the Viking Period, but it was most pronounced during the 12th and 13th centuries, with the widespread establishment of permanent agriculture and settlement. Together with other marginal areas in Europe, the uplands of southern Sweden were the agricultural frontier at the time.

While parts of the uplands were colonised for the first time during the Middle Ages, other parts were colonised much earlier, in some areas already during the Late Neolithic, and in several areas during the Bronze

Age and the Early Iron Age. The Roman Iron Age in particular was a period of strong expansion in the uplands. After the Middle Ages, the 16th century was a period of exceptional agricultural expansion. Altogether, it may be concluded that most periods that are traditionally regarded as periods of expansion in a Scandinavian and West European perspective are reflected in agricultural expansion in the South Swedish Uplands. This conclusion supports the view of marginal areas as sensitive to societal change. Furthermore, it highlights the strong connection between upland societies and the outside world, or rather that uplands and lowlands were just two sides of the same society, affected by the same trends and fluctuations in demography, economy, etc.

In addition to periods of expansion, the uplands have witnessed several periods of agricultural decline and abandonment, in particular during the Migration Period, the Late Middle Ages, and Late Modern Times. In many cases, attempts to colonise the uplands resulted in relatively short-lasting settlement, abandoned just a few centuries after establishment. Mechanisms and causal relationships behind abandonment may have been different from time to time, but the recurring periods of abandonment highlight the marginal character of the uplands.

A special emphasis in this review has been put on the late medieval decline. Thanks to high-resolution pollen records with good chronologies, it is now evident that farm abandonment, or, more precisely, the vegetation changes associated with farm abandonment, is reflected in pollen data from the uplands. The interpretation is most straightforward from cereal pollen graphs, which in several diagrams show a gap or a sharp decrease in the Late Middle Ages. However, by also examining graphs of grassland pollen and tree pollen, more complex and interesting information about vegetation responses to the decline may be obtained. Two types of vegetation change were identified in this review: 1) natural regrowth of woodland on abandoned land; and 2) transition from crop cultivation to extensive grazing. The latter may tentatively be interpreted as indicating a shift to from arable farming to more labour-saving animal husbandry.

The social complexity and the much-debated causation behind the late medieval crisis have not been dwelt on here (for a recent compilation of the debate in a European perspective, see Kitsikopoulos 2012). In Great Britain and other parts of Western Europe, there is evidence of stagnation and even farm abandonment before the Black Death, but due to the much more scanty historical records, such pre-Black Death stagnation is difficult to prove from a Swedish perspective. However, it must be noted that the South Swedish Uplands were relatively sparsely populated even during the settlement peak of the High Middle Ages. Therefore, it is unlikely that overpopulation, nitrogen deficiency or overuse of land resources, which have been suggested as important factors in more densely populated regions of Western Europe (e.g. Postan 1972; Myrdal 2012, p.233), caused farm abandonment in the uplands. Climatic deterioration associated with the onset of the Little Ice Age (Lamb 1995) may possibly have affected settlements in the uplands, due to the relatively high altitude of the area. But on the other hand, during the 16th century, when the Little Ice Age reached its lowest temperatures (Moberg *et al*. 2005), there was much agricultural expansion in the uplands.

Regardless of the causation in detail, the agricultural decline in the uplands during the Late Middle Ages may for good reason be interpreted as a reflection of the late medieval crisis. Similarly, the agricultural decline witnessed during the sixth century may be associated with the Migration Period crisis. Both these periods of decline were far-reaching European phenomena, and their reflection in farm abandonment in the uplands further supports the view of marginal areas as sensitive to societal crises.

In summary, this review gives support to the 'marginal agriculture' view rather than the 'sustainable flexibility' view, as defined above. However, it should be noted that pollen data reflect vegetation, which, in turn, reflects first of all agricultural land use. The possible importance of non-agricultural production still has to be studied by other methods, in particular archaeology. It is unlikely, though, that the significant agricultural declines witnessed in the pollen records do not reflect depopulation and settlement abandonment in the uplands.

Project in progress

This study is part of a project in progress 'The Archaeology and Ecology of Collapse: Social and Agricultural Change Following the Black Death in Sweden'. The background for the project is recent studies by historians, in particular Palm (2001) and Myrdal (2003; 2009; 2012), who have reevaluated written records, and come to the conclusion that Sweden was hit hard by the Black Death, with a population drop of 40% to 60%, and major consequences for society. In our project, we use non-written records, such as pollen, tree rings, archaeological data and human skeletons, to study the environmental and social consequences of the Black Death. From an international perspective, Sweden has a wealth of such data, but they have so far

not been used for any thorough studies of late medieval decline. Each type of data will be processed separately, and combined into interdisciplinary interpretations. A focus will be on the standard of living in towns and the countryside (based primarily on archaeology and anthropological analyses of human skeletons), and its connection with agricultural change, and the ecological and social consequences of farm abandonment and the regrowth of woodland (based primarily on pollen data). The aim is to identify agricultural and social strategies developed to meet the crisis, and to understand ecological feedback mechanisms to societal change. The general aim is to contribute to international research on the historical relationship between society and the environment. The project is being carried out by the Swedish National Heritage Board and the Department of Earth and Ecosystem Sciences at Lund University.

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Per Lagerås
Swedish National Heritage Board
Odlarevägen 5
SE-226 60 Lund
Sweden
e-mail: per.lageras@raa.se

VIDURAMŽIŲ KOLONIZACIJA IR DEPOPULIACIJA PIETŲ ŠVEDIJOS AUKŠTUMOSE: GYVENVIEČIŲ APŽVALGA IR NEDERLINGOS ŽEMĖS NAUDOJIMO DINAMIKA PAGAL ŽIEDADULKIŲ DUOMENIS

PER LAGERÅS

Santrauka

Švedijoje, kaip ir didžiojoje Europos dalyje, viduramžių pradžia sutapo su gyventojų populiacijos didėjimu ir žemdirbystės plėtra. XIV a. tai keitė socialinės krizės ir gyventojų skaičiaus mažėjimas. Pastarasis pokytis didžia dalimi galėjo būti nulemtas juodojo maro, nusiaubusio Švediją 1350 m., nors ir kitos priežastys galėjo prisidėti prie krizinės situacijos susidarymo. Istorinė informacija liudija gyventojų populiaciją Švedijoje sumažėjus vidutiniškai 40 % ar net daugiau. Tiesa, pažymėtina, kad viduramžius Švedijoje apžvelgianti istorinė informacija yra gana skurdi, todėl dar gana nedaug galime pasakyti tiek apie gyventojų populiacijos nykimo, tiek ir apie ankstesnio teritorijos apgyvendinimo pobūdį. Pristatomoje apžvalgoje su žiedadulkių informacijos pagalba atskleidžiama Pietų Švedijos aukštumų regiono kolonizacija viduramžiais ir ją lydėjusi depopuliacija bei ūkių sunykimas (1 pav.).

Apžvalga liudija viduramžius Pietų Švedijos aukštumų regione buvus aktyvios kolonizacijos ir žemdirbystės plėtros laikotarpiu. Nors fiksuojama ekspansija prasidėjo jau vikingų laikotarpiu, ženkliausiai ji pasireiškia XII ir XIII amžiais, kai plačiai plito nuolatinė žemdirbystė, kūrėsi gyvenvietės. Greta kitų teritorijų Europoje Pietų Švedijos aukštumų rajonas tuo metu buvo ribinis žemdirbystės paplitimo regionas.

Nors dalyje aukštumų viduramžių plėtra sutapo su ankstyviausiu nuolatinės žemdirbystės plitimo etapu (2 pav.), tačiau kitose teritorijos dalyse žemdirbystės plėtra išryškėjo ankstesniais laikotarpiais (3 pav.). Ženklios žemdirbystės plėtros etapai aukštumose datuojami I–V, XI–XIII ir XVI amžiais. Vis dėlto žiedadulkių duomenys liudija aukštumų apgyvendinimą sutapus su trumpalaikių gyvenviečių, kurios būdavo apleidžiamos po kelių amžių, plėtra. Gyvenviečių ny-

kimo etapai sutapo su VI, XIV ir XX amžiais. Pasikartojantys žemdirbystės plėtros ir jos nykimo etapai matyti tiek pavienėse žiedadulkių diagramose (3 pav.), tiek aukštumose ištirtų palinologinių duomenų dvidešimties diagramų kompiliacijoje (4 pav.).

Galime daryti išvadą, kad daugelis etapų, kurie tradiciškai pripažinti plėtros laikotarpiais Skandinavijos ir Vakarų Europos perspektyvoje, Pietų Švedijos aukštumų regione pasireiškia žemdirbystės išplitimu. Panašios tendencijos išlieka ir kalbant apie gyventojų populiacijos sunykimą, t. y. VI ir XIV a. Pateikiamos išvados įrodo egzistavus stiprų ryšį tarp aukštumų gyventojų ir išorinio pasaulio arba, greičiau, liudija aukštumų ir žemumų gyventojus buvus tos pačios bendruomenės, kurią veikė tos pačios demografinės ir ekonominės tendencijos bei svyravimai, dalimis.

Pristatomoje apžvalgoje ypatingas dėmesys skiriamas vėlyvųjų viduramžių nuosmukiui. Turint gerai chronologiškai pagrįstas detalias palinologinių duomenų diagramas, akivaizdu, kad ūkių sunykimas ar, tiksliau, su jų sunykimu susiję augalijos pokyčiai matyti aukštumų žiedadulkių spektruose. Tiesioginė duomenų interpretacija sietina su javų žiedadulkių kreivių pokyčiais. Trūkiai kreivėse ar ženklų žiedadulkių kiekio sumažėjimą rodančios vietos išryškėja vėlyvaisiais viduramžiais (5 pav.). Vis dėlto nagrinėjant taip pat ir pievų augalų ar medžių žiedadulkių kreives, gali būti gaunama dar kompleksiškesnė ir įdomesnė informacija apie augalijos reakciją į minėtą nuosmukį. Du augalijos pokyčių tipai nustatyti šioje apžvalgoje: pirma, natūralus miško atsikūrimas apleistose žemėse (6 pav.) ir, antra, perėjimas nuo pasėlių auginimo prie ganiavos (7 pav.). Pastarasis faktas gali būti preliminariai interpretuojamas kaip perėjimo nuo ariamosios žemdirbystės prie menkesnių darbo sąnaudų reikalaujančios gyvulininkystės liudijimas.

Remiantis chronologinėmis sąsajomis, žemdirbystės sunykimas aukštumose vėlyvaisiais viduramžiais, nustatytas pagal žiedadulkių tyrimų duomenis, gali būti interpretuojamas kaip gyventojų bendruomenės nykimo, sukelto maro bei vėlyvųjų viduramžių krizės, atspindys. Analogiškai, VI a. žemdirbystės nuosmukis, išryškėjęs žiedadulkių kreivėse, gali būti siejamas su migracijų laikotarpio krize. Minėti du recesijos epizodai apibrėžiami kaip Europos masto fenomenai, o jų pasireiškimas aukštumose anksčiau čia egzistavusių ūkių sunykimu pabrėžia jautrią marginalinių arealų reakciją į sociumo krizes.

Vertė Miglė Stančikaitė