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Protoindustrial iron production in Østerdalen and challenges in managing this heritage

The empirical data

This paper deals with iron production in the Viking period and Middle Ages in Østerdalen in Eastern Norway. Questions concerning this production and especially the management of this heritage will be discussed. The empirical data come from the survey of a 230 square kilometres outfield area called Gråfjell, situated in Åmot, a municipality in the southern part of Østerdalen, which is the easternmost geographic area of Hedmark county. The Gråfjell area has been surveyed systematically by The Norwegian Institute for Cultural Heritage Research (NIKU), in the period 1999–2002, in connection with the establishment of a military training and firing range. A great number of cultural monuments, which demonstrate a versatile and intensive usage of the outfield, were uncovered. Beyond all doubt, iron production is the most dominant activity, and a combined total of almost 2000 monuments associated with iron extraction activities were recorded. The big issue was to define a way to manage this heritage. A central part of the project was concerned with the means by which one could combine land-use planning and the protection of the most valuable monuments and sites in potential future cultural environments, as an input to land use planning strategies.

A total of 99 iron extraction sites and 1657 charcoal pits, which date to the late Viking period and Early Middle Ages, were found (figure 1). In addition, a few smithies and some roasting sites were recorded. Excavations of smithies a few years ago at Rødsmoen, a neighbouring outfield area, showed that the bloomery process was not restricted to the production of iron in this region, but to some extent also included forging of the iron produced here (Narmo 1997:161-163). Consequently, all stages in the iron production process were present in the surveyed area.

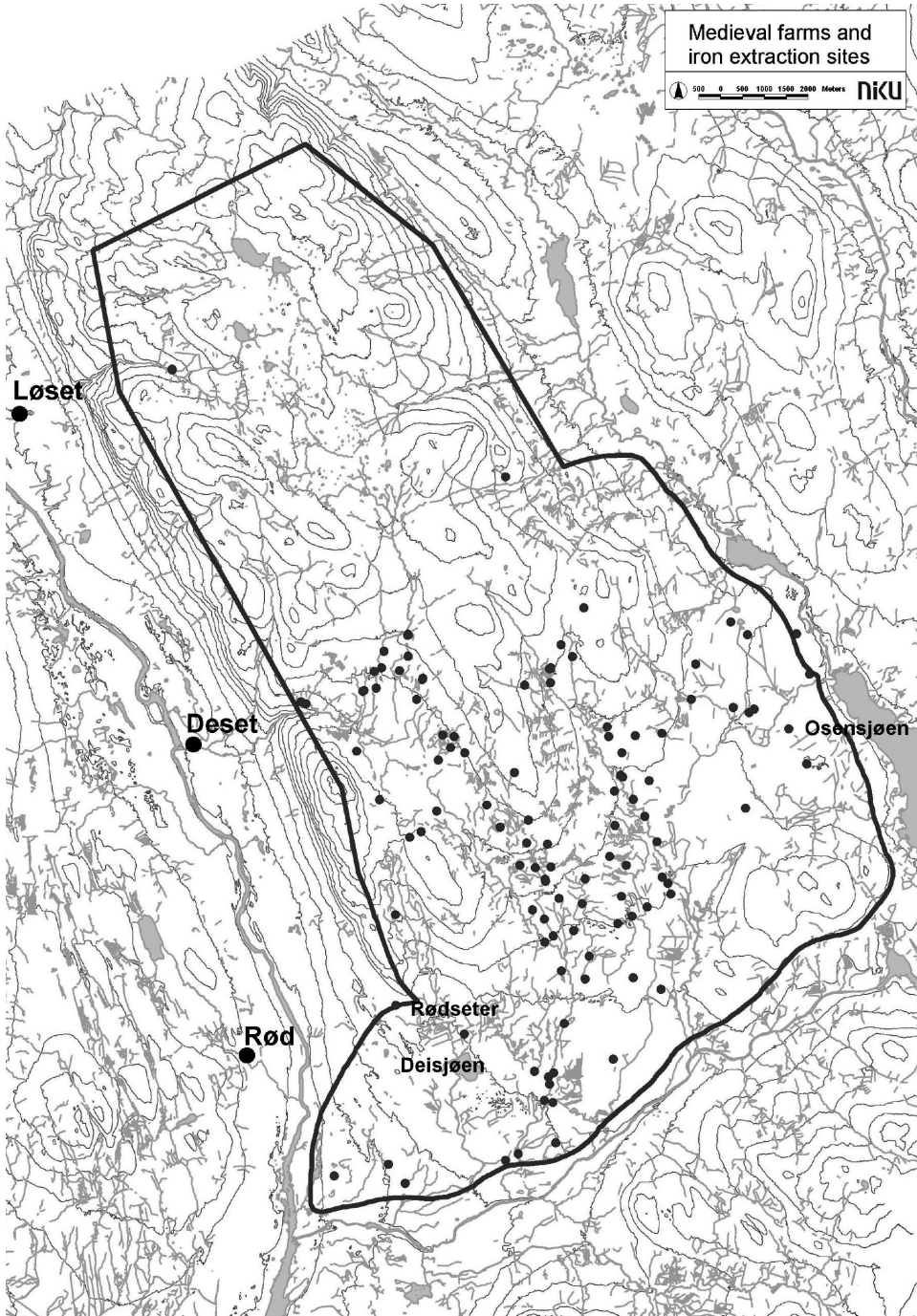


Figure 1. Medieval farms that we know of (the three larger dots), and iron production sites (smaller dots).

Results from excavations of iron extraction sites at Rødsmoen and recent datings from the Gråfjell area seem to state that there is no difference between the two iron production areas with regard to dating: both were in use in the late Viking period and Early Middle Ages (figure 2) (op.cit.:116, Risbøl *et al.* 2002b:53).

	Number	Period
Iron extraction sites	Total 99	
Pit furnace with slag blocks	1	200 – 6/700 AD
300-type with 1 or 2 circular slag heaps	9	950 – 1250 AD
695-type with 1–4 oval-shaped slag-heaps	78	950 – 1250 AD
Unspecified	11	
Charcoal pits	Total 1657	950 – 1250 AD

Figure 2. The number and dating of each iron extraction site type and of charcoal pits found in the area.

The period of intensive iron production seems to be limited to a period of approximately 300 years, from the middle of the tenth century into the mid- or late thirteenth century. A small-scale iron production started centuries before this, but during these 300 years, the production was carried out on such a scale that one can allude to a condition of a surplus production. This view was already established through calculations made by the Rødsmoen project (Narmo 1997:127-133), and has now been fully confirmed by the results from the Gråfjell project.

The monuments found in the area are representative of a wide time span, covering prehistoric and historic times. Mesolithic sites are among the oldest, and early twentieth century constructions for floating timber among the youngest. Pitfalls for trapping elk, constructions for tar production and other constructions showing different exploitation of marginal land resources have been found (Risbøl *et al.* 2000, 2001, 2002a, 2002b). About ten dairy farms, of which some at least date back to medieval times, are elements which very much characterise the landscape. Within the area there is no clear archaeological evidence of permanent prehistoric settlements, and only one inhabited farm situated on the fringe of the area has been in use until recently. A few smallholdings, which were cleared in the mid nineteenth century, but abandoned in the 1960s, are now in use as cottages.

The resources in the area have been exploited more or less continually since Mesolithic times, but how and to what extent, vary from one period to another. It seems obvious that the time of iron production stands out as a period when the activity can be described as particularly intensive. This period, 950–1250 AD, was a period of transformation in Norway, with the Christianisation, the formation of towns and the establishment of a state being among the most important changes. These are all matters of great significance when the background for the intensive iron production is to be understood. There is reason to state that, among other things, a large-scale surplus production in the outfield areas was a presupposition for this

development. To follow this line of evidence is unfortunately out of the scope of this paper, but it is, in my opinion, of vital importance to bear in mind the significance of the outfield and to analyse this topic in the context of a regional, as well as a national, framework.

The daily life of people living in forest regions differed from that of other farmers' lives. This was due to the versatility of the subsistence economy, which included a wide range of activities related to the exploitation of the outfield in addition to agriculture. Resources from the outfield were in some areas of greater importance than ordinary farming (Martens 1989:75, Holm 2002:70). Historically, the outfield was important to farms in general in Norway, but in some regions it was more crucial than in others. In Åmot, the number of farms doubled from the Viking period to the high Middle Ages (Sørensen 1999:96), and the challenge of a growing population in the early Middle Ages was probably met by intensifying the outfield production in the interior valleys. In the Gråfjell area, this means, first and foremost, an increased iron production.

Managing the heritage

The survey project offered quite a few challenges. One of the greatest was how to manage all the monuments lying scattered in the outfield areas. The data recorded shed light on crucial questions concerning the historic methods of production on the one hand, and the challenges pertaining to the management of this heritage on the other. Thus, a central issue in the project dealt with the management of this heritage in the land-use planning for the area.

Obviously, it is not possible to protect 3000 monuments located in an area which is going to be a military training and firing range. The aim has been to establish a few, well-protected areas as cultural environments. A cultural environment can, in accordance with the Norwegian Cultural Heritage Act, be defined as 'any area where a monument or site forms part of a larger entity or context' (The Norwegian Cultural Heritage Act §2). A Swedish definition is (my translation): 'Cultural environments are particularly valued segments of the surroundings. These are determined and defined with basis in an arrangement of criteria. In this meaning of the word, it can be used in the plural, one cultural environment – more cultural environments' (Welinder 1993:49). In Denmark, the official definition expressed by central authorities is (my translation): 'A geographically delimited area, which by its appearance reflects important features of the social development' (Grau Møller 2001:4). These definitions are very broad, and give no serious obstacles when it comes to the use of the concept cultural environment in land-use planning. On the other hand, it is a great professional challenge to apply the concept to a specific set of empirical data, as this process presupposes choices and decisions in a sphere of a very complex nature involving culture, time and space.

The use of the cultural environment as a concept and a construction is quite new in Norwegian cultural heritage. The significance of a larger totality and context,

which includes not only the monuments as objects, but the interaction between the objects as well, and also the complexity of culture – nature in coherence, is not a new phenomenon in archaeology. It was a central concept in the theoretical direction of New Archaeology of the 1960s (Carlie and Kretz 1998:16-17). In spite of this, the term cultural environment was not a part of Norwegian cultural heritage management until the beginning of the 1990s, when the Cultural Heritage Act was extended to include this concept. The Swedish archaeologist Stig Welinder has pointed out a tendency that new theoretical directions in archaeology are usually subject to delays due to the authorities dealing with cultural heritage management (Welinder 1993:18). The same process seems to have occurred in Norway (Schanche 1990:83-84).

Since 1992, Norwegian heritage management has been empowered by the Heritage Act to manage and protect cultural environments. Still, the use of these powers and their integration into cultural heritage management have, so far, been limited. One important explanation for this is, in my opinion, a lack of fundamental research concerning this issue. It is obvious that theoretical and methodical research into the use of the cultural environment concept is required within the frame of inter- and multidisciplinary research. However, the situation seems to have changed, with an increasing interest for this topic in Norwegian heritage research (Skar 2001).

In recent years, the work done on this theme has concentrated on open landscapes, focusing on the development of methodologies in order to define such landscapes and the cultural history values within them. In these cases, the visibility of burial mounds and other imposing cultural monuments has been a central element in the archaeological landscape analysis, combined with a visual approach in order to achieve a better understanding of how prehistoric people arranged their landscape (Gansum *et al.* 1997). Social, religious and political meanings are attributed to the location of these monuments in the landscape, based on the assumption that they reflect a demonstration of prosperity, social influence and power.

Iron production and the sites and monuments connected to this or other kinds of production in the outfield are, in my view, of a different nature. To our knowledge, the location of these rather functional monuments does not reflect a location of social, religious or political meaning, as is the case with for instance burial mounds, where visibility obviously is of great importance. Or to paraphrase: existing knowledge about social and ritual aspects, as they are shown in ethnoarchaeological studies (Barndon 2001), is very limited, concerning prehistoric and medieval bloomery, and therefore difficult to include in the assessment.

Archaeological monuments connected to production in the outfield often appear as insignificant and therefore constitute special challenges, including deliberate arguments to legitimate their formal protection (Lillehammer and Prøsch-Danielsen 2001:57). Dealing with production sites in the outfield areas requires a different approach. In the Gråfjell survey project, the application of the cultural environment concept to prehistoric and historical production units in outfield areas has resulted in inventiveness and in methodological development of this issue.

The definition and evaluation of cultural environments

Problems and challenges concerning firstly definition of, and secondly evaluation of cultural environments with a basis in the historic cultural exploitation of outfield resources, and in this case especially the iron production, have been central in our work.

In order to define cultural environments concerning outfield production, it is a primary task to understand how this production was organised and how it was carried out. In addition to labour power, the two most important resources needed in the production of iron are ore and wood; ore to be extracted and wood for roasting the ore and for producing the charcoal needed in the bloomery process. The trees were cut and brought to dug-out pits where the charcoal was produced, before it was transported to the iron extraction sites. The ore was dug out of bogs. Investigation of the bogs in order to examine from which bog the ore was taken, was not included in the project, but it is taken for granted that the nearest lying bog was the supplier. As a matter of fact, it seems quite clear that the access to bog ore was a prerequisite for the



Figure 3. An example of an iron extraction site with adjacent charcoal pits surrounding it.

location of the production sites. Quite a large number of sites, if not all, are situated on the edge of, or very close to bogs.

Typical of the way the iron production was organised in this particular area is the scattered location of the adjacent charcoal pits around each site, with distances of up to 5-600 metres (figure 3). The density of the extraction sites made it difficult to distinguish which pits belong to which site. In some areas, only one extraction site with charcoal pits was found, which gave a clearer picture of the situation, indicating that the number of pits belonging to each site probably varies between 10 and 15. This general picture enabled us to define areas of relevance to the production of iron. The site where the furnace is situated seems to have been the centre of the production area, with charcoal pits lying around like satellites on the periphery.

Based on the iron production sites themselves, cultural environments were defined, which included the nearest-lying bogs where the ore was extracted, and the surrounding dry land where the charcoal pits are situated. In this case, the demarcation of cultural environments was not based on a visual approach, but solely on the objects or the monuments present in the landscape as an integrated part of a production, combined with areas with the specific resources that made this production possible. Consequently, the culture–nature dimension has been emphasised, where, in this case, the term *nature* relates to *resources*. In this way, the methods of production, including the resources used in the production, have formed an essential basis for the delimitation of cultural environments. The defined cultural environments consist of complete production units, including all stages in the production of iron, but these units are, of course, not to be seen as independent from the rest of the medieval society. They constitute small parts of a larger complex, also involving settlements, transportation, trade, exchange and so on. In this complexity, the living areas of people, the farms, are of vital significance.

How the production was organised and who initiated it, is an important issue to discuss. There are few written sources mentioning iron bloomery (Magnusson 1986: 281ff). Furthermore, no traces of dwellings have been found at these iron production sites. This is as opposed to other parts of the country, such as at Møsvatn in Telemark (Martens 1988) and Dokkfloy in Oppland (Narmo 1996). In my opinion, the production was most likely organised and carried out by the local farmers (Risbøl *in press*). The involvement of specialists presupposes dwellings on the extraction sites or somewhere else outside the known farm sites. So far, no convincing examples of this have been found in the Gråfjell area. I propose that in all probability these resources were exploited first and foremost by the people living on the farms situated nearest the Rena river valley; the local farmers.

The relation between the production units and the medieval farms represents one of the greatest challenges when it comes to defining cultural environments, because the distances between the farms and the production areas are considerable. Ideally, cultural environments ought to embrace the whole cultural life of medieval society, including settlement, cultic places, areas of production and communication

connecting these places. This is, however, seldom possible, because protected cultural environments on that scale will restrict the present use of the areas in a way that will rarely be acceptable. The result is, as is the case with the defined cultural environments in Gråfjell, a mixture of the wishful thinking of professionals and the realities which face cultural heritage management. The establishment of cultural environments as part of larger coherent areas therefore requires a dissemination that explains their historic interrelation.

When it comes to *evaluating* cultural environments, the challenges are perhaps even greater. The whole purpose of an evaluation is to give a preference to some cultural environments at the cost of others (Welinder 1993:124). How does one measure values in cases like this? The lack of a constructive methodology is evident, and more research on this issue is needed. In the Gråfjell project, an assessment form was drawn-up, as an attempt to describe the values in the landscape with focus on values within the defined cultural environments. The form is based on the general system of concepts presented by the Norwegian Directorate for Cultural Heritage (Riksantikvaren 1993), but it has been adapted to fit the challenges in this specific project. The values were grouped under two principal headings: *knowledge values* and *experience values* (figure 4). In the form, each value was assessed and graded as to whether they were high, medium or low. In addition, there was the possibility to assess some additional criteria where these were considered present and relevant. This was *not* intended as a quantitative exercise with a summarily calculation of points. The purpose of the assessment form is not to give an impression of a formalistic or objective evaluation. It is therefore important to emphasise that the final evaluation was based on a professional assessment, and that the purpose of the form was merely to describe and explain the argumentation behind the evaluation. Regardless of the apparent documented value of the cultural environments, the professional assessment will always be the foundation. This is due to the complexity of these matters, which simultaneously involve horizontal and vertical dimensions; space and time. Assessments based on discretion are a common way of working with these matters and well integrated in the cultural heritage profession (Nesheim 1999:80-96). Evaluating landscapes or cultural environments is a complex matter, which also includes subjective assessments concerning for instance aesthetic and emotional experiences. The expert knowledge and experience of the person carrying out this evaluation is consequently of significant importance (Carlie and Kretz 1998:32-34).

The impact of legislation is another matter, which to a large degree influences the professional decisions made when managing cultural heritage. It is obvious that contradictions and controversy arise over the way cultural environments are described and evaluated by professionals, as compared with the formal demands of the central authorities. (Nesheim 2001:25-29).

Name of cultural environment:		ID-number:			
Landscape description:					
Cultural monuments and cultural history:					
Description of cultural historical values:					
Confinement of cultural environment:					
Evaluating	Low value	Medium value	High value	Additional criterias	
Knowledge value				Representativity	
• Technical history				Rarity	
• Societal history				Age	
• Industrial history				Authensity	
• Experience value				Homogenity	
• Symbolic value				Variation	
• Identity value				Condition	
• Aesthetic value				Tidsdybde	
• Educational value					
Total assasment of value:					

Figure 4. The assessment form used in evaluating cultural environments in the project.

When evaluating the iron production in the Gråfjell area, two contradictory values were assessed; one giving the production units high value and one giving medium or low value. The high value is connected to the significance of iron production in this region and also nationally. The Østerdalen region can be described as marginal when it comes to agriculture. As mentioned above, agriculture was by all measures the foundation of subsistence in the period in question. However, due to , in agricultural terms, the marginal geographic situation, the resources in the outfield and, in this case, and in similar areas, the iron production, played a crucial role in people's lives (Risbøl *in press.*). As mentioned earlier, iron production was also an important part of the development of the Norwegian state, which makes it relevant to assess the cultural environments as high value. As opposed to this, the knowledge of the scale of the iron production, the fact that these sites with adjacent charcoal pits are found in great numbers elsewhere in the district, lead the evaluation towards the opposite side of the scale. These monuments are quite common in the outfield of Østerdalen, and the use of the additional criteria, rarity, cannot, in my opinion, be justified. These considerations resulted in the fact that the cultural environments consisting of iron production were finally given medium value. It was, nevertheless, considered important to protect some of these production units. In areas where iron production was situated close to other kinds of cultural monuments or production areas, great

variation in the types of monuments, as well as the long duration of the cultural impact on the landscape, was decisive in assessing these cultural environments as being of high value.

As mentioned earlier, some dairy farms are situated within the area, thus giving character to the landscape. For centuries, mountain dairy farming has been a corner stone in the agriculture in many parts of Norway. Some of the dairy farms in the Gråfjell-area have been evaluated at high value, due to the presence of what appears to be more well preserved, authentic buildings, and also due to the importance of these dairy farms as a part of the agricultural cycle in the forested areas of Østerdalen. They also form production units in the outfield, as is the case with iron production, which the dairy farming seems to have succeeded (figure 5).

According to dated clearance cairns and house sites situated on dairy farms, it seems that these were cleared, or at least that the use was intensified, in the period succeeding the decline of iron production. This development is also emphasised by pollen analysis (Solem 2003:28). The end of iron production seems to coincide with a change in the methods of agriculture. The local answer to changes in the subsistence economy might have been to increase the livestock. This development makes it meaningful to include these two different methods of production in common cultural environments, reflecting the importance of the outfield production in this region.

The development outlined here, is based on an interpretation of the material within the framework of present knowledge. Knowledge is ever increasing, and, in general, it is important to stress the fact that the foundation on which cultural environments are defined and evaluated will change due to new knowledge, new interpretations and

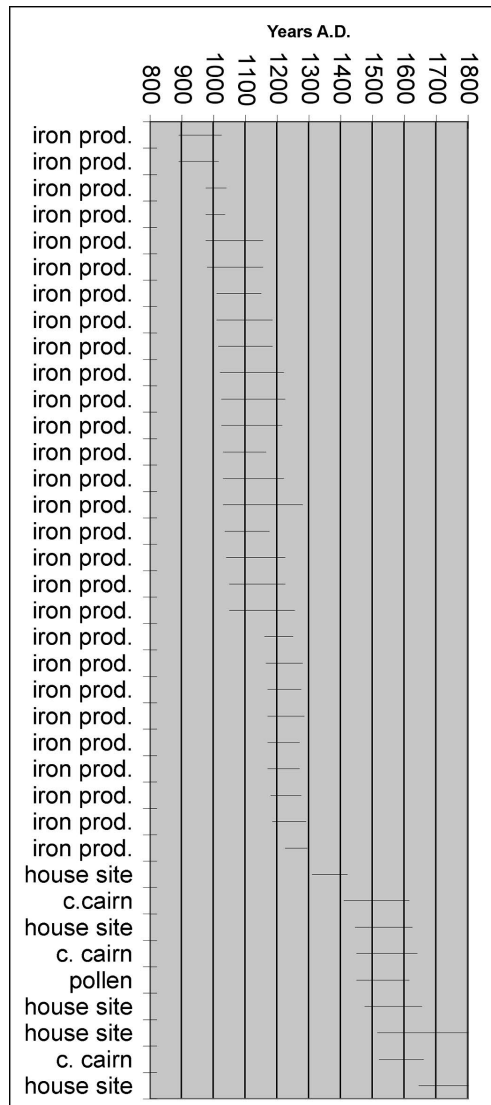


Figure 5. Datings of iron production at Rødsmoen and Gråfjell, and the succeeding datings from dairy farms of house sites and clearance cairns at Gråfjell. Sources: Narmo 1997, Risbøl et al. 2002.

different ranking of priorities (Carlie and Kretz 1998:28). The values we as scholars ascribe to cultural monuments or environments are the distinctive marks we find valuable, but this view will probably change, and the choices made today may be reconsidered in the future. In a way, the cultural environments are to be considered as temporary. This is an irresolvable dilemma, but when managing cultural heritage, one has to act in accordance with existing views, knowledge and legislation, and at the same time be aware of the fact that this opinion is not static.

Conclusion

A methodology for defining and evaluating cultural environments in the outfields, involving a formal description of values, combined with subjective assessments based on professional knowledge, has been outlined. In this way, 15 cultural environments have been defined and assessed as being of high value in the Gråfjell-area (figure 6). Of these, 14 seem to be maintained partly or completely within the process of land-use

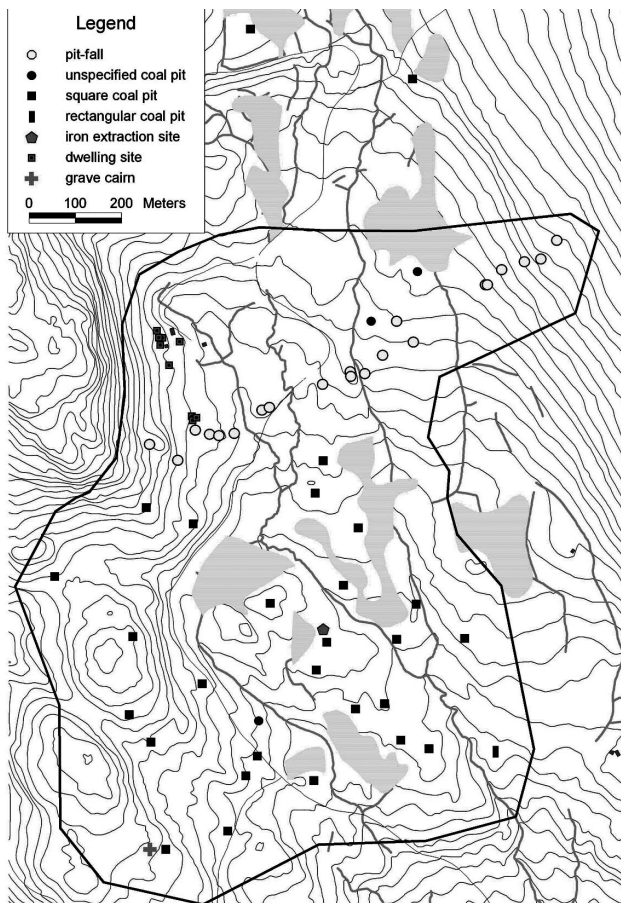


Figure 6. An example of a cultural environment in Styggdalen with iron production, a dairy farm and a system of pit-falls.

planning of the military training and firing range. It is important to stress the fact that our suggestions, when it comes to defining the protected areas, to a certain degree were altered by the assessment of the internal parts during the process of land-use planning. A cultural environment initially considered to be the most valuable in the area will not be maintained as a protected area, while the size of several others were changed during the process of land-use planning.

Not all of the protected cultural environments contain iron production and dairy farms, and the example referred to here is to help illustrate the reasoning behind the evaluation of the cultural environments with the

highest significance in this area. Some of the cultural environments are smaller and are given a high value due to the presence of single grave cairns lying in the outfield. In this context, these are considered as rare cultural monuments, and, in these cases, the criteria have seldom been decisive for the assessment of those particular cultural environments. The length of duration of cultural impact was given priority with regard to other cultural environments, which among other things include Stone Age sites.

A qualified concern was expressed during the project: it involved worries over the future of the protected monuments and cultural environments in an area where comprehensive military activity soon will be a reality. Some kind of comfort, though, is to be found in the fact that the monuments will not be left to fend for themselves within the protected areas inside the shooting range; their fate will be followed with hawk eyes as a part of the monitoring programme which is under preparation.

Summary

A new regional military training and firing range is to be established in Østerdalen in south-east Norway. Recently a comprehensive archaeological survey project of this area is completed. A total of 230 square kilometres have been mapped, resulting in the identification of about 3000 cultural monuments of which approximately 2200 date from the Middle Ages or earlier. The vast majority of these are associated with iron-extraction activities during the period from about 950 to 1250 AD. The data shed light on crucial questions concerning the historic methods of production on the one hand, and the challenges pertaining to the management of this heritage on the other. Thus, a central issue in the project dealt with the management of this heritage in the land-use planning for the area. The aim was to establish a few, well protected cultural environments. Problems and challenges in defining and evaluating cultural environments with a basis in the historic cultural exploitation of outfield resources are discussed.

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