THE RIVER FLOWS FOREVER ON:
LANDSCAPE AGENCY IN SOUTH-WESTERN SWEDEN, 550-1750 A.D.

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ABSTRACT

This thesis studies the interaction between rivers and human culture through a wide theoretical perspective combining the theories of Fernand Braudel, Jean-Paul Sartre, Homi Bhabha and recent "symmetrical archaeology". While landscape archaeology previously to a large degree has been focused on phenomenology and studies of symbolic landscapes, this thesis tries to emphasise the importance of the land itself. Rivers have strangely been rather overlooked in landscape archaeology considering their central role in the natural landscape. Two river systems – Göta Älv and Ätran – are selected for closer analysis of the period between 550-1750 A.D. The main questions raised are:

- *Have the rivers in question contributed to the construction of society?*
- *Has the interaction between nature and culture created riverine hybrid landscapes?*

These questions are explored and analysed through the development of a geodatabase with digital information from several official databases such as: FMIS, SGU, SMHI, KARL, GEORG, Lantmäteriet and SDHK. The methodology is centered on the investigation of a large diversity of river uses, including the natural preconditions, economic factors and ideological aspects. Three case studies for each river are selected for a more detailed study and the synthesis is then analysed through a comparative perspective.

The analysis shows that although there might be certain differences between Göta Älv and Ätran, some common patterns of character exist. Both rivers have clearly contributed to society in a large variety of ways and on a diverse number of levels. Both economically and ideologically Göta Älv and Ätran have affected their surrounding settlements. The hybrid character of the riverine landscapes is difficult to capture physically, although a few clear examples exist. Both milling and water meadows are suggested as examples of important factors in the creation of hybrid landscapes.

Further suggestions for future research are also given, along with a discussion concerning the problematic nature of the present landscape archaeological discourse.

Key words: landscape archaeology, long-term perspectives, GIS, geodatabase, river interaction, river use, riverine history, symmetrical archaeology, archaeological theory, Middle Ages, Early Modern, Iron Age, environment, culture and nature, historical maps, FMIS.

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"There is a town that once was green,
And the river flowed to the sea.
The river flows forever on,
But the dear green place is gone."
//
The Dear Green Place by Battlefield Band

1. Introduction

This master's thesis is the result of several years of interaction with nature, in its many forms. Much like the famous British landscape historian W.G. Hoskins (Johnson 2007: 36), I spent my childhood exploring the forests of my home, contemplating over the serene qualities of snow-clad fields, the beauty of summer leaves and the overwhelming power of the autumn storms that often ravage the west coast of Sweden. It is not strange – rather, it is quite obvious – that this has hugely influenced the ways in which I analyse the world. Being aware of this fact, as an author, makes it easier to contrast your work to that of other authors and academics. Biographical analysis, like the *progressive-regressive method* promoted by Jean-Paul Sartre (1968), is an important tool in the understanding of personal bias. This thesis is – while of course also the result of serious and entangled work – *also* the result of a bias; that of a romanticized view on nature and its power to influence the individual.

The aim of the thesis is not however, to propagate the poetic thoughts of 19th century romanticism, nor in any way to reinstate the power of nature over that of society. Rather, the goal is to show some of the ways in which nature *contributes* to the making of society, and how the interaction between human and nature creates a certain *hybrid* coexistence.

1.1 Problem Formulation and Aims

For many years of archaeological thought, there has been a discussion concerning the role of nature in the production of human culture and society. The debate has focused on different themes through the years; for example processual archaeology argued that nature was the force controlling human life. Subsequently, the study of human history and culture should follow the same rules as the natural sciences. In this kind of inquiry, it is nature alone that is the *shaper* of our human world. Post-processual archaeology, which later dominated the archaeological discourse, instead sought to bring the study of past societies closer to the social sciences – through which the power of humanity in shaping the world around us is emphasized (Webmoor 2007: 565-68). This *socially* anchored research took power away from nature, much similar to the way in which processual archaeology diminished the importance of the individual, as well as that of *culture*.

This thesis combines the thoughts and ideas of recent *symmetrical* archaeology (for example Gosden 2005, Webmoor 2007, Witmore 2007, Olsen 2010), which is mostly based on the works of Latour (2005), with Fernand Braudel's famous concept *la longue durée* (Braudel 1958) and the post-colonial conception of *third space*, fashioned by Homi Bhabha (1994). I have also used

the work of Jean-Paul Sartre (1968) to identify the contrasts of human/nature interaction. The idea is to question the instituted hierarchy controlling the philosophical relationship between nature and culture and, like the symmetrical agenda proposes, to not *a priori* treat either one as the major agent of change. More on the issues of combining these theories can be found below.

In order to tackle this issue effectively, I have chosen to use fluvial systems – i.e. rivers – as the main objects of study. Two issues dominate this thesis concerning the relationship between a river and its anthropogenic surroundings. The first issue concerns the active agency of the river, i.e.:

- Have the rivers in question *contributed* to the construction of society? Here, note the use of the word *contributed*, as it indicates that it is not nature alone that has shaped society, but the unison force of nature and culture.

This theme is central to this essay, and leads to the second issue:

- Has the interaction between nature and culture created riverine hybrid landscapes?

In Chapter 3, some additional questions have been asked, which can be seen as sublevels of the questions above. These subquestions have directed the methodological focus of the analysis and made it possible to *characterise* the rivers.

In methodology this study much resembles traditional landscape archaeology, as it was promoted by Michael Aston (1985: 11-20). The landscape archaeological method is highly interdisciplinary in its nature, combining several types of source material. Modern technology has contributed to the effectiveness of this method, and I have chosen to use a Geographical Information System as the methodological centre of this thesis.

The period of study has been limited to 550-1750 A.D. – from the beginning of the Scandinavian Vendel period till the Agrarian Revolution of the 18th century – spanning 1200 years of riverine history. This means that I have engaged in the study of many forms of source material – both historical, archaeological, geographical and geological – in order to capture the entire scope of the period. Two rivers of varying natural characteristics have been chosen for this thesis: Göta Älv and Ätran.

1.1.3 A Note on the Written Structure

The written structure of this thesis could benefit from a short description. In this chapter I first outline the main research questions posed to the material, then I go on to describe the research which has previously been conducted on riverine history and the relationship between those studies and this thesis. After that, the chapter describes in small detail what sort of source material I have used and which limitations that I have found necessary. The next chapter outlines in detail the theoretical background of the study, setting a foundation for the applied methodology. Chapter 3 gives an account of the methods used in this study and then discusses some initial point of self-critique. In Chapter 4 I have given a simple background to hydrology

and fluvial geomorphology, which is necessary in order to fully understand what comes after. Chapter 5 and 6 is dedicated to the main analysis of the two river systems in question, wherin I describe in total 6 case studies with a comparative conclusion. In Chapter 7 I have tried to characterize the rivers in question and the patterns which have emerged in the study of their riverine history. The argument is tied to the theoretical background. Chapter 8 concludes this thesis, in proposing answers to the research questions posed in Chapter 1, and subsequently gives ideas to future research.

1.2 Previous Research

This subchapter gives an outline on the previous research done on the history of water/society interaction. Of course, it is impossible to produce a complete picture of all the published work related to this issue. Therefore this chapter should be seen merely as a small assemblage of the research that I have found most relevant. For research history on the theoretical perspectives used in this thesis, see Chapter 2.

1.2.1 On the international history of rivers

The research on the history of flowing water has a long and quite rich history. Many of the earliest advanced societies were formed around the control of rivers, a fact recognized by Karl A. Wittfogel in his research on hydraulic societies. Wittfogel argued that the control of extensive water systems for agricultural irrigation depended on advanced administrational institutions, and was therefore more long-lasting and influential than other stratified agrarian societies (Wittfogel 1955). Wittfogel was environmentally deterministic in his arguments, where he tried to demonstrate that these societies only emerge in areas with specific environmental conditions – i.e. in areas with an arid, or semi-arid, environment (Wittfogel 1957: 344). The deterministic theories of Wittfogel are rarely used today, though his main theme of long-term hydraulic societies is still considered important in the study of ancient civilizations (Harrower 2009). Grounded in his work is also a recent article by Duncan Sayer, concerning the medieval management of waterways on the East Anglian fen (Sayer 2009). Sayer argues however, that Wittfogel's model is too general, and that closer investigations reveal much more complex relations (ibid: 145-46). In general though, Sayer's article is an admirable attempt to apply some of the research done on ancient civilization to a medieval period, which otherwise have been a sadly ignored time period.

In English historical geography, there has been a certain focus on discussing the use of medieval waterways for transportation. In the 1990s, a heated debate occurred in the *Journal of Historical Geography* between different authors arguing about the navigability of England's rivers. The argument was more or less concluded by Jones (2000) who emphasized the fact that the use of rivers for transport declined during the later Middle Ages, due to an increased amount of obstructions in the upper areas of waterways, as well as lowered maintenance levels caused by a decreasing population (Jones 2000: 72-73). This research has been followed by other interdisciplinary works to which both historians, geographers and archaeologists have contributed. One of the most obvious examples is the volume *Waterways and Canal-building in Medieval England* edited by John Blair (2007). The volume is one of the few major recent works

actively discussing the use of medieval waterways, from several different perspectives. The works presented focus on describing the economical possibilities of river transport and communication. Though this is a highly interesting aspect of riverine history, I have chosen to focus on the diversity of the subject rather than a single issue. Moreover, the historical study of river transport in Sweden is full of problems, mostly due to a lack of usable source material.

A fine example of a treatise which objects of study resembles this thesis', is the volume by Paolo Squatriti on early medieval Italy (Squatriti 1998). Squatriti emphasizes the pluralistic use of water during the period 400-1000 A.D, examining diverse themes such as drinking water, mills, irrigation, fishing etc. By attempting to create a *histoire totale* of water usage in early medieval Italy, he captures the puzzling dualism that is an important characteristic of a hybrid landscape:

> An analysis of human adjustments to water in the evolving postclassical Italy is thus both an analysis of a sometimes neutral, almost inert thing, an element with stable characteristics such as chemical composition, boiling and freezing temperature, or susceptibility to gravity, and an analysis of people's imaginative reactions to it. This study demonstrates one thing above all others: water was indissolubly both matter and custom, both nature and culture in the diverse landscapes of Italy during the early Middle Ages. This duality shaped the modes of water procurement, distribution, and usage. … The interaction of natural and cultural components is a leitmotiv of Italy's early medieval "aqueous history" (Squatriti 1998: 4).

Sqautriti also emphasizes the importance of studying periods of transformation in the history of water. It is highly valuable to examine how the use of water is affected by social, economic, cultural and environmental changes (Squatriti 1998: 3). This can be related to the period studied in this thesis, as it captures many diverse examples of change. However, Squatriti's study is based mostly on historical legal documents, and needless to say this in turn leads to issues of representation. Is a legal document a description of reality? Certainly, documental sources rarely fully represent all the aspects and complicities of past societies. Thus, in order to explore the relationship between humanity and water on a deeper level, a multidisciplinary approach should be used.

One of the most relevant works on the archaeology of rivers is a volume by Matt Edgeworth (2011) called *Fluid Pasts. Archaeology of Flow*. This volume more than any other study resembles the research conducted in this thesis. Edgeworth shows how rivers have been affected by human society throughout a large period of history, but also emphasises the importance of the rivers themselves in shaping human life. The volume treats the subject on a highly theoretical level, although with many practical examples of human/river interaction. I have instead through this thesis tried to show how these questions can be explored on a more detailed level, within a highly specific period of time. Edgeworth also raises the issue of a certain ignorance towards rivers found within the subdiscipline of landscape archaeology. This ignorance – in which the rivers according to Edgeworth constitute the *dark matter of landscapes* – is the result of the post-processual perspective, acknowledging the landscape as a cultural construct. The rivers have until recently only been seen as natural systems, which is why they have been largely ignored in landscape archaeolgy (Edgeworth 2011: 25-26).

Richard Bradley has contributed to the archaeological research on natural landscapes in general, first through his book *An Archaeology of Natural Places* (2000), where he mainly considered the meaning and symbolism ascribed to *unaltered* places by prehistoric societies. In a recent article together with David Yates (Bradley & Yates 2009), he considers Bronze Age wetland deposits in the English Fenlands and how they can be tied to different types of "waterscapes". Bradley (2000, Bradley & Yates 2009) still, however, seems locked in an anthropocentric world-view. It is merely the object of investigation that has changed, and both studies are still in many ways anchored in post-processual theory.

One of the more glorious examples of recent environmental history on water-human interaction is David Blackbourn's *The Conquest of Nature* (2006). In this volume Blackbourn engages in a study of 300 years of German history, through a bright perspective on water control and landscape transformation. The author describes how the wetlands of Germany were domesticated and how country, nation and society was shaped in the process. Blackbourn also raises some interesting thoughts on the issues of modern landscape history, and the idea of the *symbolical landscape* (Blackbourn 2006: 16).

1.2.2 Riverine research in Scandinavia

Scandinavian historical research concerning the relationship between rivers and human society has – so far – been rather limited. The questions posed have often been directed towards an understanding of the human *use* of a river, rather than inquiries concerning the interaction between rivers and society. A volume called *Kring Göta Älv* (Lorentzon et al. (ed.) 1993) is a typical example of Swedish research on river history. This book is highly interdisciplinary, including chapters by both geologists, historians, archaeologists and botanists. While this – at least on the surface – seems like an unbeatable combination of disciplines, the combined study still results in nothing more than a broad historical account of human activity, filled with some small anecdotes on nature. Arvidsson's chapter illustrates this well, were he merely starts the section called *Kulturen och Växtligheten* ("The culture and the vegetation") by stating that "no other organism has affected the vegetation to the same degree as humans (Arvidsson 1993: 28, author's translation)." He does not recognize that vegetation plays an important part in shaping human society as well; it is not merely a passive backdrop, threatened by anthropogenic exploitation.

Perhaps the most illustrative example of Swedish riverine historical research is the volume *Medeltid i Ätrandalen – en resa i fyra etapper* (Nicklasson (ed.) 2005), which is the result of a project at Lund University centered on the medieval[1] archaeology of the Ätran valley. Although the Ätran valley obviously figures as the main character of the volume, the valley merely constitutes the arena of research, rather than being a factor of agency *in itself*. The river – which is the natural centre of this valley – does not appear in anything more than passing remarks in the landscape archaeological chapter by Lihammer (2005). Moreover, the project seems to have been limited to present day Halland, as the volume contains no active analysis of the relationship

[1] It should be noted here, initially, that the medieval period in Scandinavia differs from the continent. When used concerning the Scandinavian material in this thesis, I refer to the period between ca 1050-1550.

between the lower regions of the valley and the area north of the present day border between Halland and Västra Götaland.

The importance of certain rivers to human society has been recognized by several Scandinavian authors, although from a highly limited point of view. Recent years of research on medieval society and Göta Älv illustrates this, where the focus is set upon an admirable description of the political and cultural characteristics of the area – i.e. the function of the area from a socioeconomic perspective where the river is a passive backdrop only to be used for human purposes (Carlsson 2007, Harlitz 2010).

An important exception in this case is Jakobsson's article *Ditching from a water system perspective: Draining the Swedish water landscape 1200-1900* (2013), in which she explores the practice of agrarian ditching through a combination of historical and hydrological sources. Ditching, according to Jakobsson, creates hybrid landscapes where nature and culture is forced to interact (Jakobsson 2013: 350).

1.3 Choice of Source Material

The source material comes from a wide range of disciplines, and mostly consists of different anthological information, such as digital databases. While the amount of information I intend to use in this thesis may seem huge, the integration of the data into ArcGIS will make it possible to digest and visualise. I have mainly chosen data that *can* be integrated easily into a GIS. Most of the digital information used has been collected from databases connected to the administrative authorities of Sweden, such as the Swedish National Heritage Board (RAÄ), Geological Survey of Sweden (SGU), the National Archives (Riksarkivet), the Swedish Metrological and Hydrological Institute (SMHI), Lantmäteriet etc. This type of data is usually well collected and organised, which is why the data also can be easily integrated into a geodatabase. What follows is a limited account of the source data used in this thesis. All the information has been taken directly from the different websites connected to the projects, and links can be found in the reference list on page 98.

1.3.1 FMIS and BeBR

FMIS is the Swedish register of ancient monuments and remains, administered by the National Heritage Board, containing information concerning different sites of archaeological interest. The information has been collected mainly from archaeological surveys and excavations, but the database also contains information on finds made by locals. FMIS online application visualises the data in points and polygons, with the possibility to use several maps as a backdrop. Each point contains information regarding the archaeological nature of the site/find, relative dating, administrative data, excavation status etc. Tied to this are also notes taken by the surveyor which often provide invaluable information. It is also possible to query the database, by searching for different attributes. While FMIS is a public database, with a rather public profile, its purpose is mainly to provide information to companies and the data is commonly used in administrative planning and exploitation. The data is available as downloadable georeferenced shapefiles – though this function is restricted to community planners, students and researchers. While the

downloaded shapefiles contain much valuable information, the notes taken by the surveyor are missing – perhaps a result of the fact that the text in these files is not often digitised. Thus, it is necessary to manually add parts of this information to the data in order to enhance its analytic capability. For more on the data manipulation of FMIS, see Appendix 1.1 & 1.2.

A major problem in the use of FMIS for geographical studies is its representational limits, caused by the methods and theories used during the acquisition of the data. Many parts of Sweden have been unevenly surveyed, and the period of extensive surveys stretches over many diverse methodological paradigms. This means that features considered important in surveys today were not necessarily included 20 years ago. Earlier archaeological surveys were mostly concerned with prehistorical remains, as can be seen by the instructions given to the surveyors in 1969 (Selinge 1969). The necessity to expand the different classes of features that were included was discussed just a few years later (Selinge 1974), but it was not until relatively recently that the classification system assumed its present appearance. For example, many pre-industrial mills were not previously included in the database if they could not be supported by written historical documents before 1750. It is also important to recognize that the classification involved in archaeological surveying also influences the results gained from the use of this database. According to Rubensson (2000) the picture produced by FMIS must never be seen as a complete illustration of archaeological remains in an area. The result should rather be seen as an overview of the frequency of certain remains (Rubensson 2000: 261).

Figure 1 illustrates this by showing the geographical spread of ancient farmlands in Halland and Southern Västra Götaland. On a first glance, the ancient cultivated areas of the region seem constricted to the uplands. However, this is a result of the methodology involved in surveying, where this type of land is usually – in this region – recognized by clearance cairns. While this is certainly valid, it raises several problems for the geographical analyst. Clearance cairns are mainly the results of the farmers need to clear the soil of smaller rocks which prevents effective cultivation. This in turn is a result of the soil type, as such rocks are often found in coarse moraine soils. Coarse moraine usually clings to the higher topography of the land, where it has been deposited by glacial rivers and the ice sheet that covered the landscape during the last Ice Age. Thus, these traces are rarely found on sedimentary or fine soils, which generally provide a better foundation for cultivation. Ancient farmlands in river valleys, by the coastline and on the extensive plains of Västra Götaland are not well illustrated on the map. This is mainly connected to the fact that these areas have been heavily farmed during a long period of time, something which has affected the preservation of older systems of farming. The picture produced thus merely illustrates the historical farming of rather liminal areas. This emphasizes the importance of understanding the fundamental conditions under which all types of data is produced.

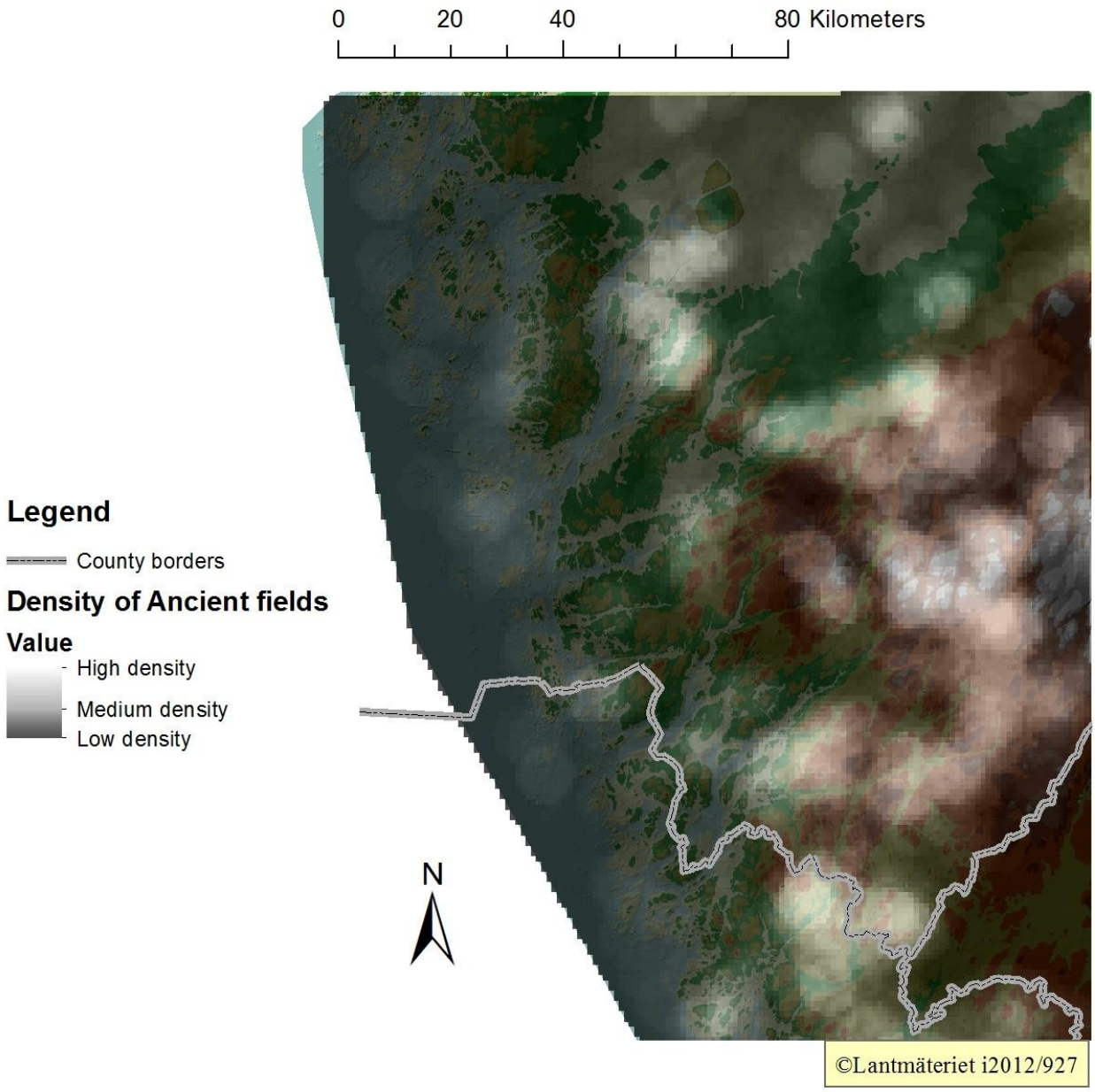


Figure 1. The density of ancient fields and farmlands in FMIS – in Northern Halland and Southern Västra Götaland. Note how the clusters relate to the topography of the region. The county of Jönköping is not included in the analysis.

BeBR (Bebyggelseregistret) is the Swedish register of protected buildings, and is like FMIS also administered by the National Heritage Board. This database contains – apart from administrative data – basic information regarding the original function of the building and subsequent changes made, as well as a dating ranging from earliest possible till the latest possible date. The information has been acquired in collaboration with several other institutions, such as the Swedish Church and different Universities, and the data is downloadable to the

general public in point shapefiles. In the web application of the database, it is also possible to view photos of some buildings and see further information regarding the institutional sources. BeBR of course suffers from many of the same problems as FMIS, though the use of this database should be seen as a secondary supportive source material. I have not intended to base my inferences on this register alone.

1.3.2 Lantmäteriet

Lantmäteriet is the administrative authority that leads the digital mapping of Sweden. Mostly, these maps cover the visible parts of the country along with administrative boundaries and private property. The data is available in different levels of detail, from overview maps to large-scale[2] information concerning different forms of terrain, paths, individual houses etc. This information is usually provided in vector data, although it is also possible to download raster versions. Georeferenced orthophotos are also available for download. Quite recently, Lantmäteriet also added LIDAR data to their databases, which stands for LIght Detection And Ranging. This data is collected by airplanes equipped with a certain type of laser scanner, which produces a relatively high resolution terrain model of an area. The laser can also penetrate the vegetation, which makes it possible to visualize a heavily forested area on a ground level. This GIS data is available to students and university staffs via an online service called "GET", administered by the Swedish University of Agricultural Sciences.

Lantmäteriet also administers a database containing most of the historical maps in Sweden. This database contains invaluable information to historians, geographers and archaeologists, but is not downloadable to the general public. The maps can be visualized and surveyed in the online service, although the resolution is often too low. I have been given access to the downloadable section of this database, in connection to my work on this thesis. This gives the possibility to download high resolution versions of the maps, which can then be integrated as raster data in the GIS. After georeferencing, these maps provide much information on historical land use. For more information on the georeferencing procedures conducted in this thesis, see Appendix 1.3.

1.3.3 KARL and GEORG

KARL and GEORG are two databases administered by the National Archives, containing historical large scale maps from the 17th century. KARL is the only database that is currently available to the general public, as it was the result of a project called "Äldre Geometriska Kartor" (Older geometrical maps) between 2001-2010. The project called "Yngre Geometriska Kartor" (Younger Geometrical Maps), which eventually will result in the publication of GEORG, is still ongoing and is expected to be finished by autumn 2014. Both these projects have put an effort into creating high quality digital copies of the maps, and the resolution is therefore much higher than the maps from Lantmäteriet. KARL also allows the user to download the maps for free.

[2] When I use the word "large-scale" in this thesis, I refer to the geographical use of the word. In this context, a large scale is the more detailed scale, showing a smaller area. I have used the word "macro" (as compared to "micro") to refer to an analysis focused on a larger amount of material, or covering a larger area.

KARL is a user-friendly online database with many functions, such as the ability to visualize the features found in the historical maps with Google Maps imagery as backdrop. Among the included features some are more interesting for the questions posed in this thesis, e.g: mills, fishing stations, weirs and bridges. The maps themselves often provide invaluable information regarding the land use of the time, as well as physical information concerning the terrain. Small pieces of text describes different features of interest directly on the map, sometimes regarding peasant feuds, place names, soil quality etc. Apart from this, the maps also include a separate accompanying text which details economic information on a household level, such as the amount of arable lands and meadows, as well as the yields. Hopyards, gardens and secondary economical resources are also often described in this text, which has been transcripted, digitised and is searchable in the database. This information has been statistically structured with the use of GIS, and is downloadable in XML-format, with the possibility to include coordinates. GEORG will also be published in much the same manner.

I have chosen to use the maps in KARL and GEORG mostly as a resource on terrain and river use. The statistical data is valuable in more macroanalytical studies, and could have been used to illuminate the rivers contribution to agriculture on a national level. This is however a quite complicated task and is not covered by this study.

1.3.4 SDHK

SDHK (Svenskt Diplomatariums Huvudkartotek) is an online database into which all medieval letters in Sweden are registered. The information is based on the printed publications of Diplomatarium Suecanum, a project which started in the early 19th century and whose goal is to make medieval writings more accessible. Since 1976, the project is administered by the National Archives and has covered the years up till 1378, and 1401-1420. All the letters are available to the general public in SDHK, where it is possible to query the database for specific information. The detail of the information on each written source often varies – e.g. some letters only contain a summary of the text whereas others contain a digital photocopy, a detailed summary and a transcription of the original text. In this thesis, I have mainly used SDHK to query the contents of the letters, for information on different places of interest. The database has also been used to establish and confirm the historical chronology of the landscape. More on this in Chapter 3.

The letters in SDHK is referred to by using the format “SDHK nr X” (where X symbolises the number of the letter), and is a reference to the online database. This differs from a more traditional reference using the printed version of the medieval letters, which goes by the format “DS-nr X” (for Diplomatarium Suecanum) or “SD-nr X” (for Svenskt Diplomatarium).

1.3.5 SMHI

SMHI (Swedish Metrological and Hydrological Institute) have several online databases, mostly concerning climate and hydrological information. In this thesis, I have used the hydrological information to understand how the investigated rivers function within their natural system. All the databases are more or less available to the general public.

The databases most useful in this study have been SVAR (Svenskt Vattenarkiv), which provides georeferenced information on drainage areas, lakes and rivers, and Vattenwebb.

Vattenwebb provides downloadable information on water discharge measurements from several stations in Sweden. The measurement data also contains historical information, as the water discharge information has sometimes been recorded on a daily basis since the 1930s. This is invaluable information, as it shows how the flow of water through a river system can fluctuate according to environment and weather. It also illustrates the variation of water bearing on a yearly basis, where the flow is most concentrated during spring and late winter.

1.3.6 SGU

SGU (Geological Survey of Sweden) is the organisation responsible for documenting, examining and providing geological data of Sweden. They are also actively trying to promote the use of geology in societal planning, the mineral industry and environmental planning. The databases of SGU are free to the general public via their online application, but cannot be downloaded. Instead, the organisation provides georeferenced data in shape file format to researchers and students, bound by a rather strict license as the data is highly valuable. The data from SGU which is used in this thesis is mainly limited to soil geology.

1.4 Limitations

The area of study has been limited to Southern Sweden, though this is more due to a large amount of easily accessible material than to any pressing need to conduct studies in this specific region. Really, the study could have been made in any country/region or across conventional borders, given a similar amount of useful data. Although the main area of study is limited, the thesis also draws on a comparative material, where international studies are used to illustrate areas of research which have been rather ignored by local inquiry. Also, this comparative material helps articulating the defining traits of human/river interaction, and put the results of localised studies into the context of a more global world.

The period covered in this thesis spans 1200 years of history, but is nonetheless indeed a major limitation. It could be argued that the study of an even longer period of time would bring more clarity into the complex nature of human/river interaction. For example, an investigation comparing the rivers in question during the Early and the Late Iron Ages would almost certainly prove fruitful in illuminating the possible social and natural structures formed by riverine landscapes, not the least because the Scandinavian Migration period traditionally has been seen as a major period of change and social unrest. However, it must be recognized that the representational limits of the prehistoric material in the studied areas constitutes a large problem to any study focusing on the diverse aspects of river interaction. I have thus chosen the specific period of investigation for reasons tied to the variety of the material, as it covers a highly useful range of written, archaeological and geographical sources.

I have chosen two rivers as the main objects of investigation: Göta Älv and Ätran. Both of these rivers have different natural and historical characteristics, which is why a comparison of the two provides a solid foundation for contrasting analysis. I have mainly dealt with features that actively *connect* to the rivers – like mills, harbours, fishing stations etc. However, as many of these features are also tied to human settlement – and thus raising several questions which a

mere economical perspective would overlook – I have also chosen to include farms, buildings and symbolic elements into the study of the rivers in question. In this case, the area of interest has been limited to elements of the landscape which can be geologically or visually connected to the river. Farms, towns and different forms of land use have been included mainly according to their geological relevance, i.e. their location on soils which are the results of the river's water flow. In some cases, settlements have a diverse geological foundation of which just a part can be included in this thesis. For example, the village of Faurås by the river Ätran used the riverbank for meadows, but the fields lay further uphill and cannot be geologically tied to the river. This is a clear example of a case where the meadows are included in the main analysis, but the fields are not. Symbolic elements have been included according to their visual connection with the river. Iron Age graves which have a clear view of the water itself therefore figures in the main analysis.

As the thesis covers a huge amount of source material, I have found it necessary to make some further limitations concerning the features included in the analysis. Thus the thesis is mainly concerned with features which can be relatively easily fitted into studied timeframe. Features such as clearance cairns – which could have been used to analyse farming in river areas – are highly difficult to date effectively and are therefore not included in the analysis.

Some other aspects which have not been covered in this thesis are the powerful individual human actors known as *kings*, *high noblemen* and *religious leaders*. Traditionally, Swedish literature covering the historical aspects of certain river valleys is full of references to these *men* (e.g. Löfberg 1992, Ekre 1993, Carlsson 2007: 165 ff.). This has according to myself attributed a rather unearthly power to these nonetheless important figures, giving them a status in society as the dictators of history. The early written source material in Sweden is centered around politically important characters and does not in any way reflect an objective reality. Nonetheless, these individuals may indeed have influenced certain aspects of river use, but that is not the main focus of this study. Instead, I have chosen to focus on the more general relationship between the rivers and their surrounding human population. To a certain extent, the rivers in question have been raised to the status of individuals, and by doing so I have tried to analyse how these natural agents have contributed to the course of history.

2. Theories of Active Landscapes

The scope of this thesis incorporates a quite large variety of theories. I have used thoughts from a diverse range of theoretical "disciplines" and tried to merge them into a coherent research perspective. This is not an easy task, as these theories rarely have been used in unity before. However, the ideas in question – regardless of their diversity and contradictions – can be *manipulated* to form new perspectives. Some of the theories are originally focused on discussing dimensions of this world that is not of main interest to this study. In those cases – like in the case of Sartre (1968) – I have chosen to use the writings of the authors as an allegory for my own investigation. While it may not have been the intention of Sartre to promote the individuality of Nature, this is indeed an interesting aspect which his theories can illuminate.

This chapter is dedicated to the description of how the different theoretical perspectives used in this study can form a coherent unity. First of all, the keywords of the thesis are defined in order to bring clarity to rest of the chapter. Then, I elaborate on the theoretical issues of GIS and lastly turn to the broad, theoretical discussion of natural agency and Third Space.

2.1 Definitions

2.1.1 Nature and Culture

As should be obvious by now, this thesis encompasses a certain criticism of the traditional definitions of nature and culture. Although the use of these terms is highly problematic, and carries with them a certain inherent assumption, the terminology is difficult to avoid. This is a problem common to post-colonial archaeological research, where the deconstruction of a present terminology seldom leads to any useful conclusions on how to develop a *new* terminology, moving away from the old one. It is also common that the present definitions are heavily criticised in the opening passages of an article, yet still used in some manner within the actual analysis of the material. An article by Jimenez (2011), studying Late Iron Age Iberian sculptures, is a good example of the problems involved in deconstructing terminology. Though she admirably tries to apply the theories of Homi Bhabha (1994) to archaeology, she still ends up using an old definition of culture in describing the "colonizing" culture of the Romans – which is described more or less as a homogenetic unity (Jimenez 2011: 117-18).

However, I still firmly believe that – in order to properly tackle the issues of a certain terminology – it is necessary to create a connection between old and new definitions. The way forward is *not* cleared by a disconnection, which would create a discourse without origin and with nothing to *build upon*. It would mean shaping the archaeological discourse anew; building a temple of "enlightened" research on a secluded shore, without even the driftwood of past archaeological thinking as foundation. Instead, a terminological shift is a slowly changing process, where the discourse is at first balanced on both legs, in both past and future definitions.

My intention is not to create a new terminology for archaeological and historical research. Moreover, it is not to completely deconstruct the definitions of nature and culture. Rather, I intend to *use* the present terminology *against itself*, and by doing so also setting the foundations

for something new. In a way, I intend to transform the definitions through a terminological Third Space (see Chapter 2.4). This will be discussed in the final chapter of the thesis (Chapter 8.3).

Nature is thus *traditionally* defined: "The phenomena of the physical world collectively; esp. plants, animals, and other features and products of the earth itself, as opposed to humans and human creations (Oxford English Dictionary 2003: nature 11b)."

Culture is thus *traditionally* defined: "sammanfattning ... av de förhållanden gm vilka människan l. ett visst folk l. en viss folkgrupp … i sitt allmänna levnadssätt l. på ngt visst … område höjer sig över djurstadiet (l. primitiva förhållanden); (andlig l. materiell) odling; gm dylika strävanden uppnått (högre) utvecklingsstadium (SAOB 1938: Kultur 8)."

["a summary of those conditions by which humanity 1. a certain people 1. a certain ethnic group … in their common ways of life 1. in some certain area has advanced beyond animal level (1. primitive conditions); (spiritual 1. physical) cultivation; through such endeavours reached a (higher) stage of development", author's translation.]

2.1.2 The Character of a River

In this thesis, I have sought to explore the *character* of each river. Some effort should be put into the description of my use of this term, and how it relates to other perhaps similar choice of words. The observant reader may already have noticed my choice of words in the title of this chapter, where I chose to write *character*, rather than *nature*. The term *nature* is usually used to define something stable, with a clear purpose, and carries with it a certain belief in an absolute *truth*. In more plain language, the term speaks of the *essence* of the object, in ontological terms. It is rarely that the essence of an object (or in this case, a natural phenomenon) changes. In the natural sciences, it is therefore possible speak of the *nature of rivers*, as this is defined through hydrological and geological terms. The word *character*, on the other hand, implies that the object is not entirely passive, that it is somehow extroverted. It is only in relation to other objects that *character* arises, while *nature* somehow resides *within* the object, regardless of how it acts upon the world.

It is the relations which shape the *character* of a river that is of central importance to this thesis. Therefore, when I speak of *character* in this thesis, I mean the *relational essence* of an object during a specific time in the past. The character is the generalised core of the river's temporal relations, regardless of whether this was obvious to common people during the period in question. When these relations change, so does the character.

2.2 Theoretical issues of GIS

In this thesis, I use GIS mainly as a tool for handling large amounts of geospatial information. The data – as well as the methodology – *could* have been utilized without the use of GIS, and it is not GIS that have chosen the source material. Still, there are some important theoretical issues that need to be discussed when using GIS analysis in archaeology.

The use of GIS in research has been discussed extensively within the discipline of Geography. The discussion has focused on debating the issue of describing GIS as a "tool", or a "science" (Connolly & Lake 2006: 6). A discussion concerning this definition appeared on an online forum in 1993 (Wright et al. 1997: 347), where proponents of the "tool view" argued that GIS cannot be seen as a science, as it "gains meaning only by its goals (ibid: 349)." A scientist may *use* GIS, but it is not science in itself. Those who argued for GIS as a science instead saw it as a method in which spatial theories can be put to the test (ibid.). This issue is, as can be seen, an old one within Geography. However, the discussion is obviously still flourishing, which have contributed to the creation of the geographical sub-discipline Critical GIS. In CGIS researchers are actively engaging in the use of GIS, but with a critical agenda aiming to unravel the different problems of the software and its methodology. The main question asked is: What are the representational limits of GIS? (Hacigüzeller 2012: 246-49).

Within archaeology, GIS analysis has been hugely popular in studies of landscape. However, the traditional cartographic school in this subdiscipline has been criticised for using a level of analysis that alienates "ordinary people". To use maps – and consequently GIS – in archaeological research is to view the world from "God's eye", i.e. a type of vision which could not possibly have been available to the peoples of the past (Wickstead 2009: 250). Wickstead argues that the critique of this technology should move away from these representational issues, where it has previously followed a uniform pattern that is heavily generalising. The discussion must rather follow the unique circumstances and methodological collaborations in which GIS is used. Each cartographic endeavor has its own characteristics, and also helps to produce a certain "reality" based on the investigation in which GIS is involved. This also means that the technology can be used to reshape a discourse (ibid: 254-59). While I cannot take into account all the circumstances under which the data used in this thesis has been produced, it is important to bear this in mind. Had I conducted this study for a longer period of time, a more detailed background analysis of the data would have been useful.

Another issue relates to how different aspects of GIS have been used in archaeology, and their theoretical implications. Landscape archaeologists commonly use *viewshed analysis* to investigate different phenomenological aspects of past societies (e.g. von Hackwitz 2009, Rennell 2012). This analysis basically illuminates the area that is visible from a chosen point in the landscape. It is inferred that *visibility* and *experience* were important aspects governing the location of settlements, monuments and sites (von Hackwitz 2009: 152). This analysis is subject-centered (Rennell 2012: 511) and therefore anthropocentric in character, in that it rarely goes beyond the human senses. Needless to say, I find this rather provocative. According to Olsen (2010), phenomenological landscape archaeology rarely acknowledges the importance of the

landscape *itself*. The contemplative human present in phenomenological studies is somehow far removed from the complexities of everyday life. In a way, this style of research has more in common with the practice of landscape painting, than any investigation into the relationship between humans and landscapes (Olsen 2010: 31). Another important issue is that meanings in a landscape are not necessarily formed through the senses. Symbolic meaning can also be ascribed to things with certain *physical* or *practical* attributes, which are not captured in a viewshed analysis, or in phenomenological observations. Thus, I have chosen to focus on diverse aspects of human-nature interaction, something which is reflected in the applied GIS methodology. While the use of experiential tools is not entirely absent from the study, they do not constitute the *only* form of analysis on which inferences are based. More on this in Chapter 3. The multitude of aspects central to this thesis is also reflected in the theoretical discussion below.

2.3 Natural agency

2.3.1 La longue durée

In 1958 the French historian Fernand Braudel published an article by the name of *La longue durée* (1958) which had a huge impact on the discipline of history. In this article, Braudel discussed the movement and rhythms of *time*, which he divided into three different timeframes. The first and most central to this thesis is *La longue durée*, in which changes only can be observed over long periods of time. Braudel labeled the forces driving this timeframe *structures* – i.e. a phenomenon or constellation that has almost completely withstood the test of time. Geography and environment, according to Braudel, were important structures in the shaping of human society:

> The most accessible example still seems that of geographical constraint. Man is a prisoner – for centuries – to climate, vegetation, animal populations, cultures and slowly builds a balance; he may not depart without risking to challenge everything. Look at the place of transhumance in mountain life, the permanence of certain sectors of maritime life, rooted in such privileged points that are coastally articulated; look at the location of lasting towns, the persistence of roads and traffic, the surprisingly fixed nature of the geographical setting of civilizations (Braudel 1958: 731-32, author's translation).[3]

Braudel's use of the word *contrainte* [constraint] is telling, as it reveals the philosophy behind his thinking. In this view, humanity has its own agenda – e.g. the domestication of animals and plants, or the control of water – in which nature constitutes the boundary of possibilities. It is impossible to entirely breach this natural wall without *challenging everything*. Although Braudel recognizes the discrepancy between human agenda and nature, he also recognizes that humanity is a *part* of – and highly dependent upon – nature.

[3] "L'exemple le plus accessible semble encore celui de la contrainte géographique. L'homme est prisonnier, des siècles durant, de climats, de végétations, de populations animales, de cultures, d'un équilibre lentement construit, dont il ne peut s'écarter sans risquer de remettre tout en cause. Voyez la place de la transhumance dans la vie montagnarde, la permanence de certains secteurs de vie maritime, enracinés en tels points privilégiés des articulations littorales, voyez la durable implantation des villes, la persistance des routes et des trafics, la fixité surprenante du cadre géographique des civilisations (Braudel 1958: 731-32)."

In Swedish historical research, the perspectives of Braudel are rarely used. According to Elgán (2010), this is related to a certain cowardice, where historians do not dare to create generalisations out of their research. She argues that without generalisations it is impossible to connect the results of an investigation to broader questions, which consequently renders history pointless (Elgán 2010: 746). Historians need to study the cause of long-term change and continuity in order to make history meaningful (ibid.: 748).

Braudel's theories have been more extensively used in Swedish archaeology, though the research often focus on the more easily accessible timescapes, called *conjunctures* (social and economic history) and *l'historie événementielle* (history of events, politics, kings etc.) (Braudel 1958: 727). Kristina Carlsson uses the history of events and the long-term mainly to illuminate the history of *conjunctures*, in her analysis of the medieval politics and religion of Western Sweden (Carlsson 2007: 26).

2.3.2 Jean-Paul Sartre and the power of the individual

I have chosen to study *la longue durée* in this thesis mainly as a result of my interest in natural agency. This agency is best captured by first searching for long-term historical and geographical structures which have affected society. However, it can also be discussed how those very structures are illuminated.

Jean-Paul Sartre tried, in his volume *Search for a Method* (1968), to emphasize the ways in which the individual has a certain power over structures. He argued – among other things – that an individual is affected by structures, but not *governed* by them; i.e. that a person is not entirely the direct result of an external social or natural force. However, he *also* recognizes that there are certain material preconditions that controls the ways in which a person may act (Sartre 1968: 92-93). These material conditions are opposed by the *field of possibles*:

> The structures of a society which is created by human work define for each man an objective situation as a starting point … The material conditions of his existence circumscribe the field of his possibilities (his work is too hard, he is too tired to show any interest in union or political activity). Thus the field of possibility is the goal toward which the agent surpasses his objective situation. And this field in turn depends strictly on the social, historical reality. … Yet the field of possibles, however reduced it may be, always exists, and we must not think of it as a zone of indetermination, but rather as a strongly structured region which depends upon all of History and which includes its own contradictions. It is by transcending the given towards the field of possibles and by realizing one possibility from among all others that the individual objectifies himself and contributes to making History. … [The action] then takes on a reality which the agent himself may not know, one which, through the conflicts it manifests and engenders, influences the course of events (Sartre 1968: 93-94).

This quote captures well the scope of Sartre's *progressive-regressive method* (ibid.: 85-166), where he tries to define a method to understand an individual; her motifs and actions. The structures that affect an individual can be seen through her actions, and situations where the individual *confronts* and *bypasses* a structure are the moments when it is the most visible. A biographical study of a revolutionary – to take an example close to Sartre – tells us more about the preconditions of the revolution, rather than its consequences.

The work of Sartre has been used in archaeological research, but with a certain focus on other parts of his theory, such as the concept of *seriality* which discusses the classification of social groups (Young 2008: 231-36, for archaeological examples see Cornell 2004, Johanesson 2004, Fahlander 2011). In this study, I have instead chosen to use certain aspects of the *progressive-regressive method* to emphasize the diversity of riverine characteristics.

Sartre's perspective has mostly been used in the direct study of humanity. I use his arguments to illuminate the notion that even natural forces, governed by very complex systems (like the hydrological cycle), cannot be wholly described in functionalistic terms. A river is not only a result of the natural structure of which it is a part, but also of the local variations formed by bedrock, soils, precipitation etc. It is these material conditions that limit a river's *field of possibles*. Yet through interaction with human society, or through some other agent which changes the course of a river, the river has surpassed the given. It is in those circumstances, in the conflict between a system and the "individual" action, that the "true character" of an agent arises.

2.3.3. Symmetrical Archaeology and Non-human Agency

In recent years of archaeological research, there has been a certain focus on discussing the concept of agency. As a reaction to post-processual relativism, authors have tried to increase the number of active agents involved in the shaping of society (e.g. Gosden 2005, Webmoor 2007, Whitmore 2007, Olsen 2010). This theoretical approach has been labeled "symmetrical archaeology", and is mostly based on the work of Latour (2005).

According to Latour, there are no such things as a socially built structure. Everything is based on some form of material reality. Even laws, ethics or discriminations are not *socially constructed*, but rather centered on *things*:

> It is always things—and I now mean this last word literally—which, in practice, lend their 'steely' quality to the hapless 'society'. So, in effect, what sociologists mean by the 'power of society' is not society itself—that would be magical indeed—but some sort of summary for all the entities already mobilized to render asymmetries longer lasting (Latour 2005: 68).

Latour argues that the range of agents in the shaping of "structures" should be increased, as an agent is *anything* that affects the action of another agent. This means that things can shape the course of an action. E.g. it is the combination of axe and human that chops firewood. If the axe had not been present, then the action would not be the same (Latour 2005: 70-71).

Gosden's study of the Romanisation of Britain is a good example of how these ideas have been used in archaeology. By discussing material inertia and how the form, style and function of an object shapes social relations, Gosden shows how a much more complex picture of the "romanisation" arises (Gosden 2005: 195-97). For example, the introduction of orthogonal roman villas has previously been seen as a revolution in British prehistory. However, Gosden emphasizes that the change from roundhouse to an orthogonal building is not a major change of form. Rather, the central hearth still remained in the Roman villa, a feature that helped to solidify the social relations and prevented any remarkable change (ibid: 199-200). Thus, the material

qualities of social structures can make them long-lasting.

Processual archaeology saw *nature* as the force controlling human life, and the methods of the natural sciences could therefore be used to interpret past societies. The post-processual reaction during the 80s instead was to use theories from the social sciences to criticise the processual way of conducting research, and to emphasize the *human factor* involved in the construction of society. This meant that non-functionalistic themes of investigation became more important, such as meaning, symbolism, social structures and rituals (Webmoor 2007: 565-68). Nature was thus forgotten, and humanity ruled the worlds of the past once more.

Symmetrical archaeology then, should be seen as a reaction to the past 50 years of archaeological thinking. Within this style of inquiry, the focus lies on the dialogue between nature and culture, and how *this* has shaped human society. There should be no *a priori* designation of natural or cultural explanation, and the world should be seen as a labyrinthine web of different thoughts, materials and times (Whitmore 2007: 546-47). The perspective on time is one which in many ways connects to the ideas of Fernand Braudel (1958). According to Christopher Whitmore (2007), the *past is not exclusively past* in symmetrical archaeology. A common theme in post-processual archaeology is to regard the past as separated from the present by a deep rupture, which is possible to bridge but not to cross entirely. This, according to Whitmore, is to oversimplify the complexities of time, and is the result of modernist linear thinking. Archaeological objects are useful examples of the present past – although artifacts may be difficult to interpret, they are still physical remains of a distant time – yet some material entities created in the past still in many ways control people's lives in a much more concrete way. Here, Whitmore exemplifies this by describing how Roman roads still affect traffic in Europe today (Whitmore 2007: 556).

Considering this, it is somewhat strange that none of the authors above have connected their perspectives on time and long-term changes to those of Fernand Braudel, who already in 1958 published an article which promoted a basically similar idea.

More importantly, symmetrical archaeology also recognises the problems and assumptions involved in using the terms "nature" and "culture". Webmoor (2007) argues that modernist thought has divided our world into separate entities based on qualities such as "intentionality" and "consciousness". These qualities are assigned to a subject based on human prejudice, where an object labeled unintentional or unconscious – from a distinctly human point-of-view – is considered separate from humanity. Nature, in this view, is *not* intentional but rather follows the strict rules of "natural "systems. According to Webmoor, this presumption has resulted in a series of central concepts within archaeological research (Webmoor 2007: 570). Tvedt and Oestigaard have directed certain critique towards this kind of thinking, arguing that nature and culture "exist as two distinct systems, and this differentiation is indispenseble and real (Tvedt & Oestigaard 2011: 8)." However, they still recognise the shifting borders between the two definitions, arguing that water specifically is both a social and a natural bond (ibid.).

A similar conclusion is drawn by Matt Edgeworth (2011), who shows that rivers are so called *entanglements* of nature and culture. Even some of the most natural systems, such as meandering

rivers, have cultural – or *archaeological* – dimensions. This means that in order to fully understand a landscape, especially a fluvial one, it is important to recognize both the cultural and natural aspects of the land (Edgeworth 2011: 31).

This aspect of archaeological thinking is important, in that it recognises certain colonial concepts of humanity's relation to nature. What right have we to believe that it is only humanity who holds the power of intentionality? This is an important question, and although it is impossible to answer it is useful to consider such aspects in the interpretation of past societies. In this sense, I have chosen to use the perspectives of symmetrical archaeology as a sort of bridge between the different worlds of nature and culture. Only by considering the cultural aspects of nature *as well as* the natural aspects of culture can the questions posed in this thesis be answered.

2.4 Hybridity and Third Space

Post-colonial archaeology is in its very nature anti-generalising and focused on local studies. This can be a problem, for it is necessary – as discussed above – to generalise in order to create historical meaning. However, some of the ideas involved in the post-colonial agenda are extremely useful in this discussion.

One of the most influential modern thinkers within the post-colonial movement is Homi Bhabha, who fashioned the concept of "Third Space". According to Bhabha, Third Space is the result of an interaction between opposing social units, where they are forced to negotiate and adopt. This social encounter produces something new, both resembling the units involved, but also with previously unknown characteristics (Bhabha 1994: 40-41, 53). According to Fahlander, this renders any concept of "pure" cultures meaningless, and useless. If everything is a hybrid creation, then no such thing as a uniform culture exists (Fahlander 2007: 22). However, this concept is also rather ambiguous, which has led to many different variations of the use of Third Space in archaeological research (ibid: 24) – e.g. Varberg (2007) interprets the concept as an actual *physical* space, rather than a social one.

Bhabha's idea has been extensively used by archaeologists to criticise traditional concepts of cultures in past societies. Fahlander (2006) uses Third Space to illustrate the diversity of Scandinavian Neolithic culture, promoting local studies which emphasize material variations. Peterson (2011) criticises the use of a specific archaeological material as an indicator of homogenous culture. The example she takes is the spread of Bronze Age house urns, which has previously been interpreted in this manner. Third Space is indeed a useful concept in the critique of cultural categorisation, but it can also be used in a way closer to the symmetrical agenda. The concept has rarely been used in discussing the colonial aspects of nature/culture.

The term "*hybrid landscapes*" is used within certain forms of environmental history. White (2004) uses the concept to discuss the Salton Sea, which was the result of an accident in which the Colorado River was diverted into the Colorado Desert. This created a sea, which superficially resembled a prehistoric one. However, "none of the earlier seas lay below rich agricultural areas and growing towns, which pumped them full of sewage and agricultural runoff. This waste mixed with naturally occurring salts and minerals of the area and created a toxic stew (White

2004: 564)". The product was thus a *hybrid creation* created in ways similar to a Third Space encounter. The mistake that caused the accident had a *cultural origin* (human miscalculation), the driving force was *nature* (Colorado River) and the result was mixed with both natural and cultural contents (e.g. water and agricultural waste).

Jakobsson (2013) also shows how this concept can be used in more historically relevant studies. Her study of ditching practices in Sweden from 1200-1900 illuminates a clear example of how a hybrid landscape is created, and how it interacts with both nature and culture. According to Jakobsson, human uses of water – like ditching, land reclamation and transportation – constitutes complex systems in themselves, which in turn have to coexist within the natural system of water. A certain duality is involved in this, where these systems are dependent upon both the hydrological cycle and human control. In order to keep the water flowing through a ditch, it has to be cleared and receive regular maintenance. This illustrates a dialogue between the natural and the human system, and thus the result is the creation of a hybrid landscape (Jakobsson 2013: 350).

Ditching in Sweden during this period obviously sheds light on the intricate interaction between natural and cultural identities. This interaction creates a new form of hydrological entity, the *ditch*, which is dependent upon both hydrology and human action. At the same time, it also forces people to collaborate and thus actively shapes society. The draining of water from a farmer's land in turn affected his neighbor, as the flow of water was redirected into someone else's land (Jakobsson 2013: 351-52). Therefore, the dialogue sometimes creates *multiple* Third Space entities. The ditch itself is a Third Space, but also the shapes of society that consequently have been articulated through the negotiation between nature and culture – in this case the several laws that regulated ditching from the 13th century and onwards (ibid.).

Although none of the authors mentioned above connects the idea of hybrid nature to Bhabha's work, the connections are quite clear. Jakobsson's study shows how the concept of *hybrid landscapes*, here related to *Third Space*, may change our view of how society is shaped. This is a theme that is central to this study, and it is important that these aspects of the landscape are illuminated.

2.5 Concluding Remarks

As explained in the beginning of this chapter, the thesis combines several different theories into a uniform perspective. A certain friction is involved in the practical application of these different perspectives, e.g. the theories of Braudel and Sartre have rarely been combined as they form a sort of opposing units. While Braudel argued that long-term structures more or less governed history, Sartre promoted the individual's power over those structures. This is a contradiction, of course, and not without its inherent problems. However, I have not taken these authors on their absolute word; i.e. I have chosen – like C. Wright Mills (Mills 2000 [1959]) – to *use* the parts of their work which brings light on the objects studied as well as new perspectives. Thus, I use Sartre's theory of biographical importance to bring forth the contrasts in the interaction between human and nature. He would probably turn in his grave had he known that I use his theory to discuss the power of Braudel's long lasting structures.

It is basically Braudel and Sartre that shapes the foundation of the theory used in this thesis, as their thoughts contribute to the analysis of the data itself. *La longue durée* is used to illuminate the long-term structures that have shaped the relationship in question, and the *progressive-regressive method* to see how individual actions – or events – have shaped or reshaped those structures. Symmetrical archaeology – which is all too often only emerged in theory – can be combined with Third Space without any real friction, and helps to *motivate* the study itself. By emphasising the colonial and asymmetrical aspects of former research, it is clear that the perspective raised here is not only interesting, but also sorely needed.

It should also be said, that the generalisations created through this thesis are based on *inductive* reasoning (Godfrey-Smith 2003: 42-42), where the two rivers in question have served as case studies. From observations made during the study of their history, I make generalisations concerning a larger picture. The generalisations should not, however, be seen as a search for a uniform reality which can be applied everywhere. They rather form the synthesis of the study, which directs future research and asks further questions to the nonetheless limited cases.

The inferences made in this thesis are analytically based on several themes, which are both theoretically and methodologically anchored. A river can contribute to society in many ways – not just economically and socially, but also symbolically. Therefore, it is important to not *a priori* assume that a river's agency is physically manifested. This is covered by the methodology applied in the construction of this thesis, which is centered on several questions of interest. More on this below.

3. Method and critique

3.1 Method

As described in the concluding remarks of the chapter above, the methodology used is centered around additional questions of interest. First of all it is of absolute necessity to briefly investigate how the rivers have *physically* affected the surrounding natural/cultural landscape. This can be traced geologically and geographically, where erosion, deposition, hydrology etc. have all contributed to the qualities of a river landscape. This in turn serves as the natural foundation on which human society is based, and which constitutes Sartre's (1968) material limitations. For example, the most arable soils of Sweden lie beneath the Highest Coastline ("Högsta Kustlinjen"), where glacial sediments were deposited in water. This natural precondition still limits agriculture in Sweden to this day. Second, it is interesting to investigate how the rivers in questions have been used throughout the period of study. Can a change be discerned, and for what reasons? It is vital to explore several sublevels of this question, e.g. how the introduction of mills and the development of riverine agricultural systems correlate with social, religious or environmental changes. Third, symbolical aspects such as the link between different types of rivers and structures of power or religion need to be explored. Göta Älv was a famous scene of Scandinavian politics during the medieval and the early modern period, and Ätran also periodically served as a sort of national border. Is this anchored in prehistory as well? These sub-questions are of course interrelated, but should be methodologically divided. It is only in the synthesis of this information that the questions originally posed can be answered.

In relation to this, the thesis uses a large amount of source material. Such "source pluralism" is something which is common within historical research focused on the more obscure aspects of history, an approach which has previously been promoted by Janken Myrdal (2007). The only way to be able (within a limited time frame) to analyse this amount of material is through the use of GIS. The analysis will be made by putting different forms of information together to identify specific historical characteristics of the investigated rivers. This sort of interdisciplinary inquiry is not new; it was advocated already by the founders of the English Landscape tradition in the 50s (Johnson 2007: 81-95), followed by Michael Aston in the 80s (1984). The basic methodology of landscape archaeology has remained rather strangely intact, and is still promoted today – though with enhanced technology and larger sets of information (e.g. Chapman 2009).

To answer the questions posed in this thesis, I have first of all created a database of georeferenced information (For the visualized structure of the database, see Appendix 1.4). Most – if not all – of the original information could have been analysed in isolation, but the scope of this study goes much further than that. By integrating the data into the different layers of the geodatabase it is possible to compare, combine and contrast the information. This does not only simplify the research procedure, but also generates new information. As explained in chapter 1.3, some of the data has been modified in the integration process, in order to make the information useful for answering the research questions. I have tried to describe the manipulation procedure in some detail in Appendix 1: Data manipulation.

The database can most of all be used to find traces of different *structures* – i.e. long lasting patterns in the landscape. In this small scale (geographically speaking), it is possible to analyse the larger context of the rivers, how they relate to human settlement, topography, ancient monuments, land use etc. To go beyond the *structural scope* is difficult, and it is thus necessary to use historical literature, archaeological and geological reports as reference in order to find the traces of events. Such information gives insight into themes such as chronology, biography and rapid changes, and can to a certain extent also be integrated into the geodatabase. However, the procedure in which this information is georeferenced to produce a base for full structural analysis is a project in itself. Instead, I have mainly used this as a basis for settlement history and to illuminate certain aspects of the landscape. Literature – used in its base format – brings a historical depth to the flat image produced in the GIS.

The rivers that constitute the foundation of this thesis have been divided into two case studies. Within these case studies several themes are explored: natural, economical and ideological aspects. Beneath I have tried to explain how I have sought patterns in the landscape within these three themes.

3.1.1 The Natural Preconditions

As already noted above, the geology, hydrology and geography of a place constitutes the "base" of human society and culture. Without the possibility to cultivate the soil, there would be no farmlands. The importance of natural preconditions to the formation of human culture and society has been recognized elsewhere, e.g. in Britain (Knight & Harrison 2013). In order to investigate this, I have incorporated data from SGU, SMHI and Lantmäteriet in the geodatabase. This has given me the possibility to see how different forms of human settlement and land-use relate to the natural geography of a region. If a certain form of industry/settlement can be tied to a specific soil type shaped by the river, then it can be assumed that the river in question may have interacted with human society.

More importantly, the combined natural geography of a river makes it possible to investigate the vulnerability of the system. For example, Göta Älv flows through a valley that is frequented by landslides, which is caused by a combination of soil geology and hydrology. The danger of landslides is not something new in this region, and is also indicated in the historical source material. This in turn could have shaped the relationships between the river and the human world, which was presumably aware of this fact. While it is impossible to entirely reconstruct the hydrology of the distant timescapes in question, it *is* possible to evaluate the relative risks of settling down on a riverbed, and how this could have affected the uses of the river. To a certain extent, the geomorphological development of a river can be analysed through the use of historical maps. By comparing the historical map to the contemporary morphology of the river, it is possible to analyse the ways in which the river has meandered through the centuries, as well as changes in the hydrological context of the river. Many rivers seems much more fixed in geomorphology than can be imagined (Figure 2.).

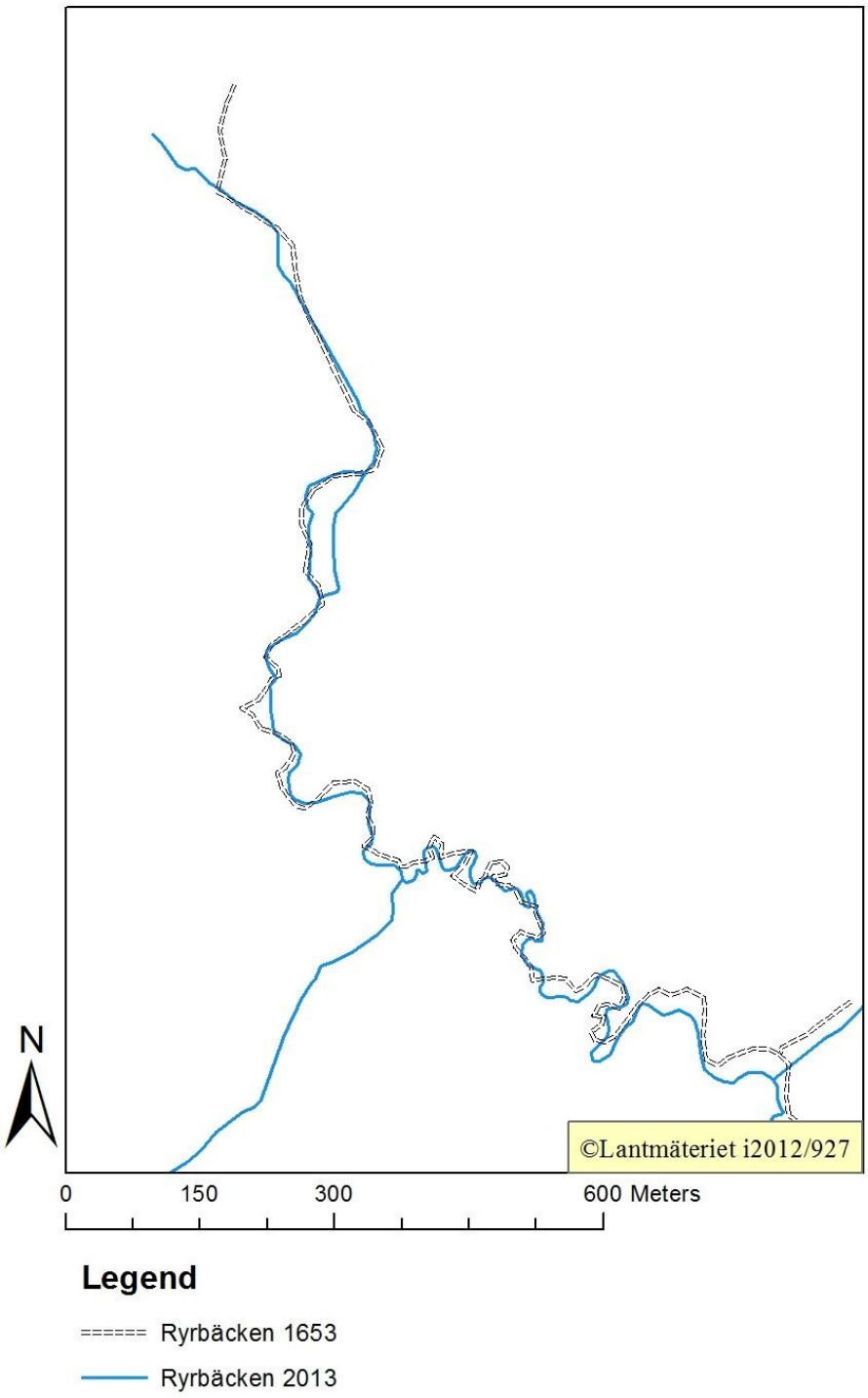


Figure 2. Map comparing the geomorphological change of the stream of Ryrbäcken near Åkerström in the vicinity of Göta Älv, between 1653 and 2013. Although some obvious changes can be observed in the meandering pattern the stream has stayed rather fixed, regardless of many human impacts on the surrounding area. Of course, the mistakes of the surveyor must also be taken into account.

3.1.2 Economic factors

The economical use of a river is important in the shaping of its *character*. Economy can be illuminated through the geographical analysis of different industries and resources. Here, I have intended to explore the river as a centre of activity, where people have fished, travelled and used the water for different purposes. During the period in question many changes can be seen in river use, e.g. watermills – both small and large – were introduced during the Middle Ages. Presumably, many of the other activities changed as well. Two questions are therefore central to the exploration of the economical aspects of river use.

The first question: Can different forms of economical activity be tied to specific periods of time? As described above, the use of watermills has been demonstrated from the Middle Ages and onwards – but can river transport, fishing and travel be similarly connected? River transport and travel, both on boats and on foot along the riverbed, can be illuminated for example through the spread of trade goods and patterns of communication. Here, FMIS plays a vital role where it is possible to illustrate different forms of archaeological and historical remains geographically. I have also found the work of Rollof (Rollof 1960, 1977, 1979, 1981) invaluable in the historical investigation of river transport, though his studies are mostly based on written source material and more focused on the Industrial Era. Fishing in rivers is hard to illuminate archaeologically, and I have therefore mostly used the cartographic material to analyse this form of river use, as well as the osteological anlaysises made by others where available. The various forms of secondary resources found in the historical cartographic material constitute a highly important source material.

The second question: Can different forms of economical activity be tied to specific types of rivers? Here I have intended to compare the two rivers, which both have different characteristics. The comparison illuminates the variance of economical uses that can be seen in the source material, but also the common features that unites river economy in general.

3.1.3 Ideological and Symbolical aspects

As described in chapter 2, a landscape of meaning is not necessarily physically manifested. Instead, many natural places have *mental* functions, as explored by Bradley (2000). A river may serve as a border between neighboring countries, or it could be seen as a dangerous force of evil – e.g. in 19th century Värmland (Sweden) it was considered dangerous to cross a flowing body of water without spitting in it (Tillhagen 1997: 105).

To explore the *mental aspects* of human-river interaction I have mainly chosen to focus on politics and religious life, both of which are sternly connected to ideology and symbolism. Göta Älv was a famous arena of politics during the middle ages, and this has been well covered by other authors (e.g. Ekre 1993, Linge 1993, Carlsson 2007, Harlitz 2010). Ätran's medieval political history is less explored (c.f. Andersson 1992). I have based my analysis to a certain extent on the literature written on Göta Älv and Ätran, but the main focus is once again the geodatabase.

By analyzing the patterns of military activity and features it is possible to analyse the political

function of a river. If castles or fortifications are connected to a river, it is logical to assume that the political control of the watercourse was important. Administrative borders between countries, counties, hundreds and parishes are often quite easy to examine through the use of historical maps. For prehistory, it is interesting to explore the relation of the rivers in question to prehistoric hill forts, which illuminates the historical depth of later political importance.

Religious life in river valleys is best illustrated through a geographical analysis of religious buildings and archaeological remains. Investigating the relationship between Iron Age grave fields, churches and popular beliefs in river regions it is possible to discuss the potential symbolic importance of flowing water. This could of course also relate to other things – e.g. a geographical concentration of grave fields to river valleys can be merely the result of economic factors.

In order to take this seriously – and to further analyse the symbolic aspects of rivers – I have used different experiential methods. Tools such as *viewshed* analysis have been utilised in this thesis to investigate the relation between features in the landscape and *river visibility*. It is assumed that features which are not visible from the river – or from which the river is not visible – cannot be consciously affected by the water. I have further tried to physically visit many of the places in question, and by doing so also exposed myself to phenomenological experience, which can be used to a certain extent. Phenomenology in its traditional landscape archaeological context may be problematic, but working in unison with other theoretical perspectives it is a highly useful tool.

3.1.4 Issues of Chronology

The most difficult methodological problem in this study is connected to historical chronology. This thesis is centered around structures and change – the image provided in the GIS is only superficial and can only be said to represent a locked period in time. To illuminate change it is necessary to decide which features are older than others within the palimpsest[4] of the landscape. Most of the historical information used in the geodatabase is not easily positioned within a specific period of time. For example, FMIS only contains rough estimations of a relative dating, based on its classification system. This system is general, and thus all grave fields are labeled "stone age/bronze age/iron age", disregarding the fact that a majority of those features are commonly connected exclusively to the Iron Age. However, the enormity of effectively dating all the visible features of the geodatabase cannot be covered within the limited pages of this thesis.

This methodological issue is common within historical geography, which often encounters the problems of working with palimpsests. In order to study medieval land use, historical geographers in Sweden often use maps from the 17th century. These maps contain information that can be traced backwards, using a so called *retrogressive method*. Studies using this method have shown that many features found in Early Modern maps also reflect medieval land use and

[4] the palimpsest metaphor is common within landscape archaeology, and refers to the similarities between landscape and written texts. A landscape in this manner could be seen as a parchment upon which generations after generations have scribed their own layers of meaning. For more on this metaphor, see Johnson (2009: 52 onwards).

administration (Karsvall 2013: 411-13). This method has also been used to analyse pre-medieval settlement patterns and their relation to medieval outland colonisation. Tollin (1999) uses the boundaries of villages in Småland found on historical maps, along with written source material and archaeological features in the landscape to study the chronological development of settlements during the early middle ages. He shows that the relative size of a village's boundaries is connected to the age of the settlement. Villages with larger tracts of land – and a relatively high number of farms – most likely existed during and before the turn of the 12th century. Tollin has also used a similar method to analyse village chronology in Södra Säm parish in south-eastern Västra Götaland (Tollin 2010), and shows that it can be used in other contexts as well.

This classification – where "large" prehistoric villages are distinguished from smaller medieval agricultural units – is a rather generalised method of chronological analysis. I have thus only chosen to use village "size" as an indicator of prehistoric origins where no other evidence exists. Göta Älv, for example, has long been the focus of historical research and the chronology of places such as Kungahälla and Lödöse has been developed through a rich material of archaeological and historical sources. In places such as Ätran however, it is sometimes necessary to adopt a different perspective, where this kind of source material is lacking.

Another source material that assists the chronological investigation is SDHK, which often can provide the first written evidence of a village. For example, Dalum by Ätran first appears in SDHK nr 814, which is dated to 1262 A.D. Apparently, the village existed at this time, and the vicar received 300 "mark penningar" for his land sold to Håkan of Änglatorp.

3.1.5 Area of Study and Scale of Inference

As described above I have chosen to compare two rivers of different size and natural characteristics. The idea has been to see if a difference in river interaction arises in the comparison between these rivers, which would indicate that each river has affected society in an individual way. Similarities seen in the material instead point towards an enduring larger structure of human/nature interaction, which is active more or less regardless of river size and characteristics. I have also assumed that some forms of river use have not historically been suitable to all types of rivers. A relatively small body of water like the upper reaches of Ätran should have been much more suitable for milling, whereas the large river Göta Älv was more suited for large scale water transport. Thus, by including not only the large and politically important rivers of Sweden, but also smaller variants, it is possible to investigate a more diverse complex of river interaction.

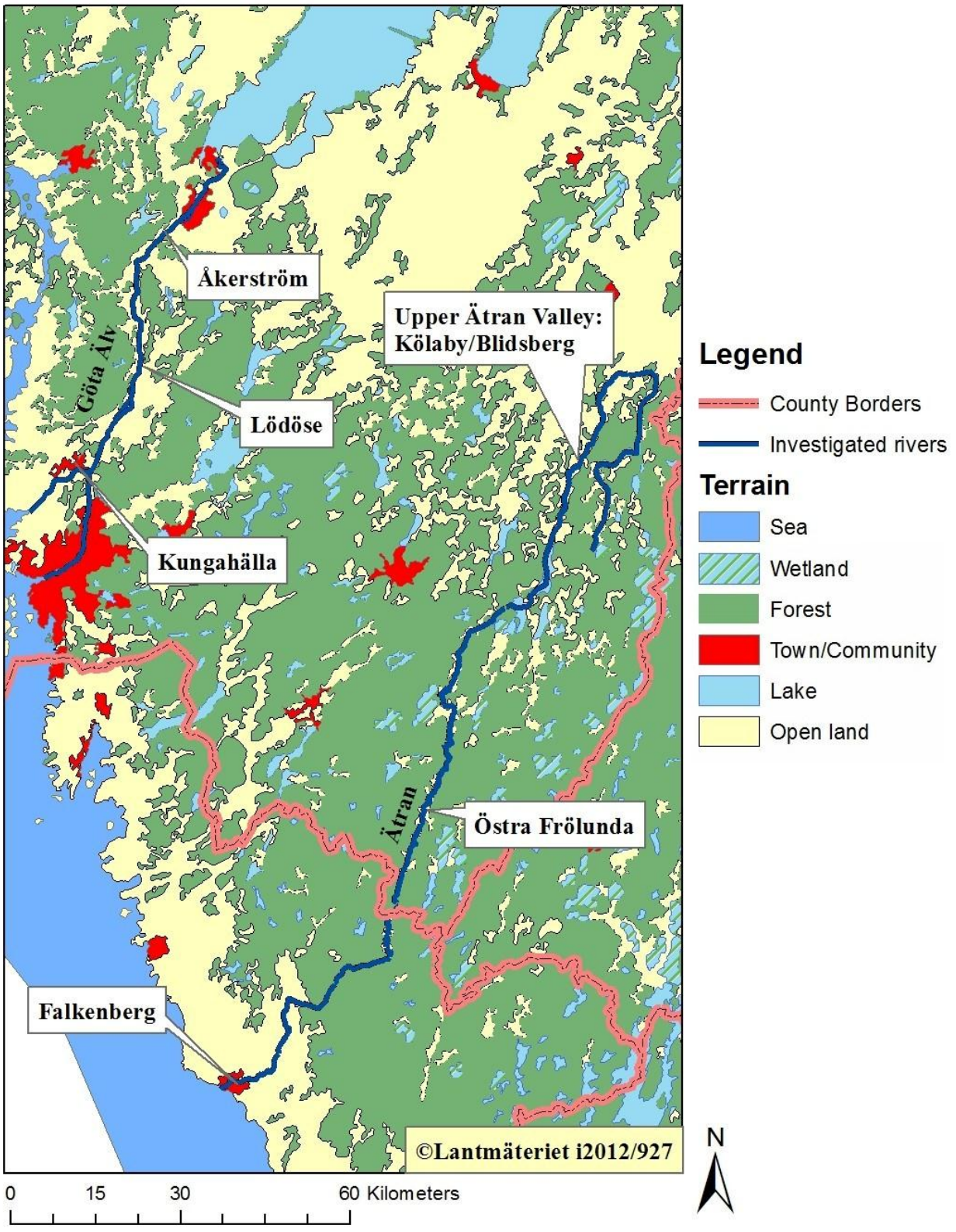


Figure 3. Map of the studied rivers, with the locations of the case studies marked.

As described above, it is impossible to produce a *histoire totale* of the rivers in question; regardless of the time spent conducting this form of study, the amount of detailed material needed to construct such a work does not simply exist. Like many other landscape archaeologists, I have therefore chosen to focus on certain local areas within each case study – thereby setting the ground for generalisation using inductive reasoning. However, a problem common to the landscape archaeological method has been the particularisation from which those generalisations have been produced. A local study does not, after all, tell us anything about the surrounding area if it is not effectively and contextually compared.

In order to properly address this issue – and to counter the problems of limited time – I have chosen to *start* on the local scale, where three illustrative areas on each river have been selected for closer analysis (Figure 3.). Within this local scale, structures of *la longue durée* can be observed alongside more temporal patterns of change. The results gained from this can then be used to analyse the possibility of large scale structures by comparing them to a regional – and subsequently, an interregional – scale. A local pattern which can be observed in a larger area is an ideal example of a larger – geographically tied – structure.

The area of study has thus on each river been limited to three case studies in the manner described above. In cases where I have chosen to explore *beyond* these areas, features which connect with the river physically or visually are included. On a macro level, I have also included features within the drainage area of each river, to provide a context to local observations.

3.2 Critique

The first major critique which can be directed towards this kind of inquiry is the representational limits of the source material. As described above, the study stretches over traditional borders of investigation, with highly different sets of information. An analysis of the Prehistoric period is mostly based on the *silent* source material of archaeological features and finds. Traditionally, the feature most important to archaeology in Sweden has been the *burial feature*, which has resulted in an overrepresentation of ideas and thoughts connected to such features in archaeological research. Unlike the farms of the Early Modern period, not many definite traces of Prehistoric land use can still be seen today. The only exception is the "ancient farmlands" registered in FMIS, which for reasons described in Chapter 1.3.1 and 1.4 have not been included in this study. Of course, Prehistoric agriculture can also be illuminated through the close analysis of archaeological material such as tools, but such an inquiry goes beyond the scope of this thesis. This thesis has mostly been concerned with traces left in the landscape, as the connection of such elements to the rivers in question can be easily determined. In turn, this leads to the overrepresentation of burial remains in the analysis of the Late Iron Age, as these features relatively easy can be dated and included in the study. Looking at the landscape through the eyes of burial features in FMIS illuminates the religious aspects of past societies but does not include much else, although the geography of these features may to a certain extent be used to analyse settlement location. It is important to recognise that an analysis of Late Iron Age use of water power is almost impossible simply due to a lack of source material. Beneath I have tried to

summarise the nature of the source material for each period studied in this thesis. The result gives an important overview of the representational limits of the material and also illuminates the differing amounts of the sources used in this thesis. A shallow analysis would give the impression that each period can be defined in different terms than another, and the last column define the periods according to this material prejudice. Note that the material included in the table below is entirely based on the sources used in this thesis. For example the written source material on Early Modern politics is rather huge, but has not been included to any great extent in this thesis.

	High Level	**Medium Level**	**Low Level**	**Summary: Definition**
Late Iron Age	**Religion**: burial features, deposited finds, written sources.	**Settlements**: burial features, place names, excavations, written sources (h. limited).	**General Economy**: dated ancient fields, iron industry.	Age of Religion
Middle Ages	**Ideology (politics/religion)**: written sources, churches, grave yards, castles, borders, towns.	**Agriculture**: written sources, historical maps, agricultural tools, osteological material.	**Secondary economy:** written sources, historical maps, excavated towns.	Age of Ideology and Agriculture
Early Modern	**Economy**: historical maps, written sources, FMIS (mills, iron industries, quarries etc.).	**Politics**: written sources, fortresses, towns, borders.	**Religion**: written sources, churches, grave yards, local traditions.	Age of Economy

Table 1. Levels of source material representation and summarising definitions based on material prejudice. Note that the levels of representation are relative to the period in question. Thus, a "High" level of representation in the Late Iron Age is not the same as a "High" level of representation in the Early Modern period.

The over simplistic nature of the summarising definitions described above is indeed highly problematic if not taken seriously. However, I have throughout this study tried to emphasise the diversity of the material, not weighing the concepts against each other. Although the Early Modern period is raised as a period of economic river use in this thesis, it does not necessarily mean that the ideological or religious aspects were unimportant. The *character* of the rivers in question has thus *not* been defined entirely by the status of their periodical source material. Instead, the diverse nature of the material has been used to *supplement* the different aspects, rather than to *contradict*.

Another problem that might be pointed out is that I have consciously chosen to ignore the use

of the written cadastral source material in the study of the historical landscape. These sources have traditionally been used to analyse medieval villages, popularly in combination with historical maps. However, the limited time dedicated to the construction of this thesis has forced me to use the material which has been easily available, and thus I have chosen to mainly rely on the historical maps for the analysis of the historical landscape. Furthermore, it has been argued that the large-scale historical maps (often referred to as geometrical cadastral sources) produce a much more valid picture than the use of the written counterparts (Höglund 2008: 11).

4. The River System

In order to analyse the interaction between a river and its human environment, it is necessary to understand the natural systems that controls it. While it is impossible to produce a full background of hydrology, limnology and geomorphology within this limited space, I have intended to describe some of the basic information needed to understand the results below.

4.1. The Water Cycle

First of all, freshwater constitutes only 3% of the hydrosphere – of which 2% is locked in glaciers and icecaps, and almost 1% consists of groundwater. The movement of water which can be directly observed in the landscape – i.e. rivers and lakes – account for only 0.02% of the earth's freshwater. Needless to say, this resource – which is so valuable to human life – only affects a highly limited part of the planet. Freshwater is transported inland in what is commonly called "the water cycle" (Figure 4.), where heat from the sun causes the evaporation of other bodies of water, like the ocean (Bertoni 2011: 2). The evaporated water is then condensed in the atmosphere, transported by winds inland and forced upwards by the rising topography. This, due to lower temperature and atmospheric pressure, causes the water to fall like rain (Rundgren 2006: 46-48).

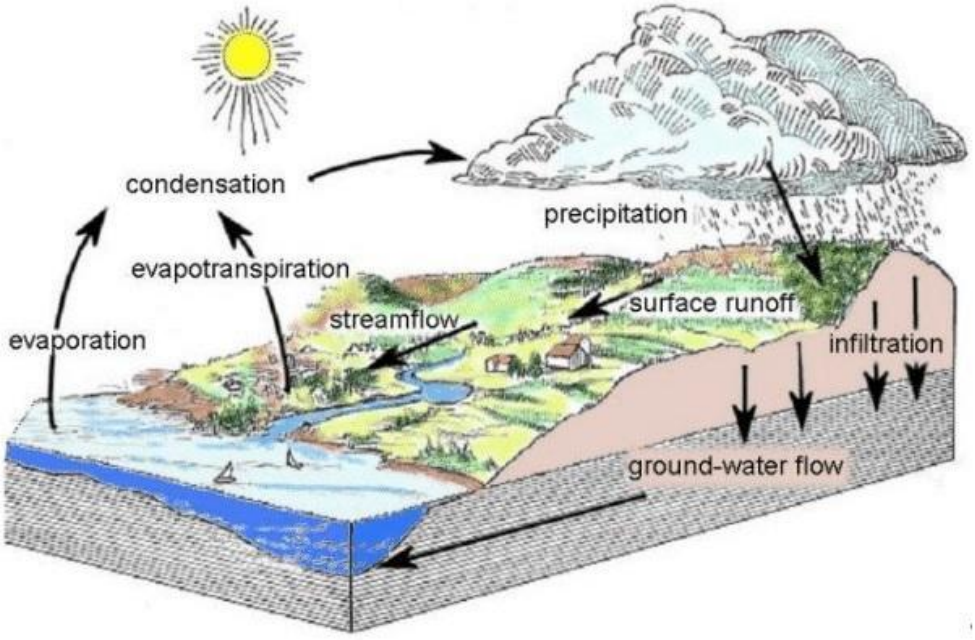


Figure 4. The water cycle. (Bertoni 2011: 2).

This water is then infiltrated through the ground (causing a flow of groundwater), or transported on the surface of the land. The surface runoff is collected into bodies of water - i.e. rivers, streams, lakes. Usually, these bodies of water converge into a single unit, which constitutes the main water transport system of a drainage basin. This is the result of an often ancient developmental process, where the water's surge to establish stability and energy-efficiency has reshaped the topography – this is called *water erosion*. The erosion process is

rather complicated and difficult to describe, but in short, water erosion mainly works through either the transportation of material (like stones, rocks, sediments etc.) which mechanically reshapes the landscape through its motion, or through congelifraction (e.g. frost wedging) in mountains, highlands and during winter (Adrielsson 2006: 300-1). Water erosion is connected to the discharge of a river - i.e. the volume of water which flows through a given point in the fluvial system during a specific period of time. Usually, discharge is measured in cubic meters per second, and determines the relative size of a river according to depth, width and speed. A high discharge leads to heavy erosion (Charlton 2008: 3-6).

4.2 The River as a Transporter

Within the hydrological system, the river is a carrier of different forms of material. The transported material varies depending on different natural factors. Original sediments derive mainly from the bedrock, and are the results of weathering which have broken the material into transportable pieces. Sediments also derives from the river banks where water erosion, landslides etc. deposits particles of soil in the water (Charlton 2008: 37). The size of the transported particles varies according to the topography of the landscape. In areas with steep slopes, running water naturally has a higher velocity and thus a higher transportive capacity (Bertoni 2011: 5). The capability to transport a specific particle is determined by resisting and driving forces, where the resisting force is mainly constituted by the weight of the particle. Driving forces are divided into two concepts: *drag force* and *lift force*. The drag force follows the direction of flow of the river and *drags* the particle along, exercising a greater pressure upstream than downstream of the object. A particle can be *lifted* only when the *lift force* exceeds the gravitational force. This is also a result of water flow, as the water flowing *above* an object moves faster than below, thus creating lower pressure (Charlton 2008: 98-100). The transportive nature of a river section can be roughly calculated with the mean flow velocity of the specific area, using the Hjulström diagram (Figure 5.).

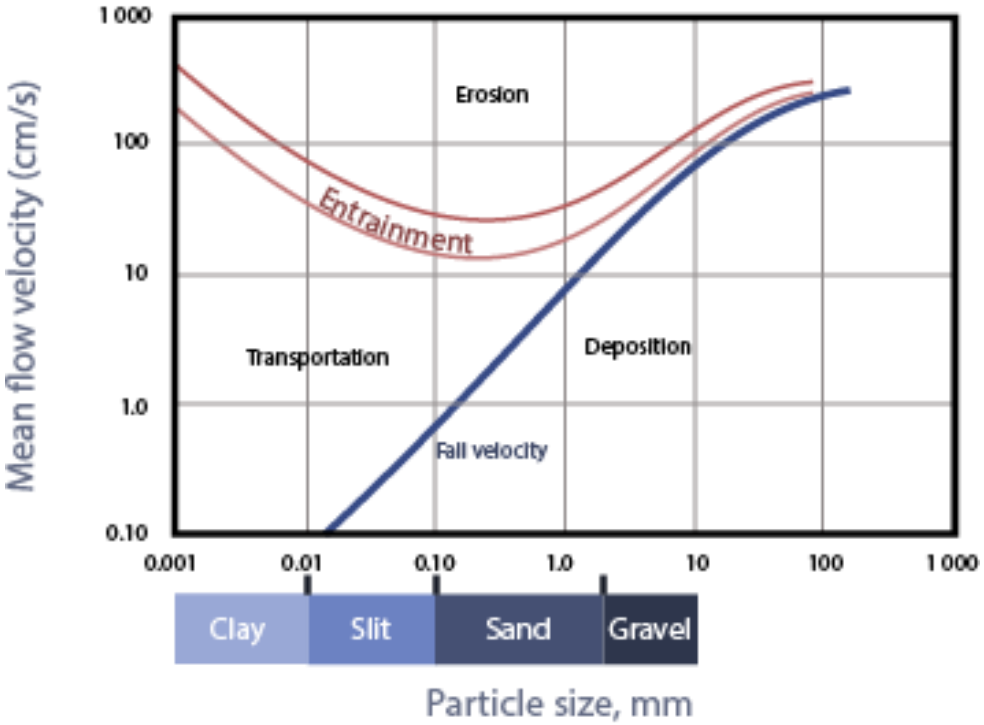


Figure 5. The Hjulström diagram which describes the relationship between particle size, flow velocity, transportation, erosion and deposition (from Charlton 2008: 102).

The aspects of transportation, erosion and deposition in fluvial systems create certain distinct channel forms. Streams and rapids, which are able to transport blocks of greater size, generally erodes their way into the bedrock – often creating V-shaped valleys. The heavier particles are then deposited in the border between such regions and flatlands, where the flow velocity drops. In large lowland areas, or places with a flat topography, the river starts to meander its way through the landscape, by a complex system of deposition, transportation and erosion (Adrielsson 2006: 305-6).

4.3. River flooding

Although the discharge of a river system can vary a lot during a one-year cycle, most of the water – and the transported sediment – is kept locked within the actual channel. However, sometimes the discharge reaches such a level that the channel itself cannot withhold the amount of water flowing through the system. This results in the flooding of the areas surrounding the river and is often caused by sudden flashes of heavy precipitation, storms and snowmelts. Flooding is a highly natural part of the river's system and vital for the biological formation of the riverbed (Kling 2007: 15). This is especially true of the many river valleys filled with clay and silt, as such small particles can only be deposited when the water level exceeds the channel and flows onto the floodplain (Adrielsson 2006: 305). Floods are also geomorphological forces with the power to significantly reshape their river channels (Charlton 2008: 30-33). This can be easily imagined by looking at Hjulström's diagram (Figure 5). An increased discharge leads to a higher flow velocity – as more water is forced through the same channel – and particles which would

normally be more or less stationary is transported by the water.

A normal river usually floods, to some extent, with a frequency between every 3-5 years (Kling 2007: 15), but the recurrence of specifically extreme floods can be roughly calculated using records of water discharge, preferably from more than thirty years of measurements. The records from every year are used to produce an *annual maximum discharge series*, which is then ranked according to flood size ("1" being flood with the highest discharge). Using a simple formula, the recurrence interval of the specific flood can be calculated (Charlton 2008:31):

$$T = \frac{(n + 1)}{m}$$

Figure 6. Formula to calculate flood recurrence. T = return period in years, n = years in record, m = rank. (From Charlton 2008: 31).

The result is of course merely a rough estimation, and should be used with caution. It is only relevant in combination with proper consideration of the environmental, historical and contemporary contexts during which these floods occur.

4.4 Environmental Considerations

Apart from being distinguished by many social and economic changes, the period studied in this thesis is also one of large environmental variations. These variations of course affected the landscape in different ways, and society along with it. Of course, the ways in which climatic changes affects societal development and change can be discussed (Lagerås 2007: 29); but this is not the time or the place for that discussion. In this study, I have not been concerned with the direct effects of climate on human life. Rather, the interest lies in the effects of environmental variations on the life of the rivers in question.

Paleoclimate is a topic of high interest in modern society, mostly because of its relation to phenomenon such as global warming. Climate changes, both today and in the past, affect the weather in many different ways, which also consequently leads to changes in hydrology. It is not entirely easy to reconstruct paleohydrology, but the variations in temperature can be used as an indication with which to discuss the hydrological effects on river flow.

One interesting examples is the climate anomaly of the Early Middle Ages (Figure 7.) – here referring to the continental use of the term – during the decline of the Roman Empire. Studies have shown that the agricultural system, especially in central and northern Europe was entirely redefined between ca. 500-700 A.D. (Cheyette 2008: 163). This, according to Cheyette, was caused by increased precipitation and a generally colder climate. Fields in river valleys which had earlier been relatively dry now became waterlogged, resulting in crop failure, starvation and subsequently a general economic and demographic disaster. The peoples of Europe turned from a field based to a pasture based economy – which was not as sensitive to the uncertain environment – and in general moved their settlements to more secure sites uphill (Cheyette 2008).

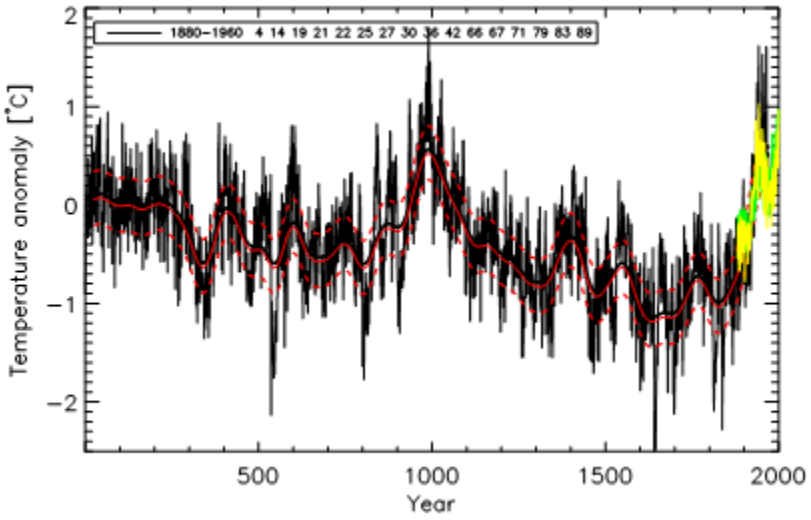


Figure 7. Mean temperature variations in the Northern Hemisphere, based on proxy data (From: Christiansen et al. 2012: 775). This figure is used in this thesis for the Iron Age. A more commonly referred graph for the Medieval and Early Modern period can be seen in Figure 8.

The general climatic decline also coincided with other disastrous events, such as the volcanic eruption – perhaps causing the introduction of harsh winters to legends in later mythologies – and the Justinian plague, both occurring during the middle of the 6th century (Gräslund 2007). These events, according to Gräslund, caused large portions of the cultural landscape in Sweden and Northern Europe to disappear (ibid.: 110-11). The archaeological material also illustrates a decline, showing an extensive decline and reorganization during the Vendel period (ibid.: 110-13).

Considering this and analysing the mean temperature variations in Figure 7, it is possible to theorise on the ways in which temperature variations affected the weather, and consequently human society. The beginning of the period studied in this thesis was – as have been shown above – a period defined by a wet and cold climate. During the Medieval Climate Optimum (Solomon et. al. 2007: 6.10, Figure 8), the climate became more dry and warm, with increased agricultural possibilities (Mann 2002). The later temperature decline would have caused the return of a wet climate with increased precipitation and generally worse agricultural conditions.

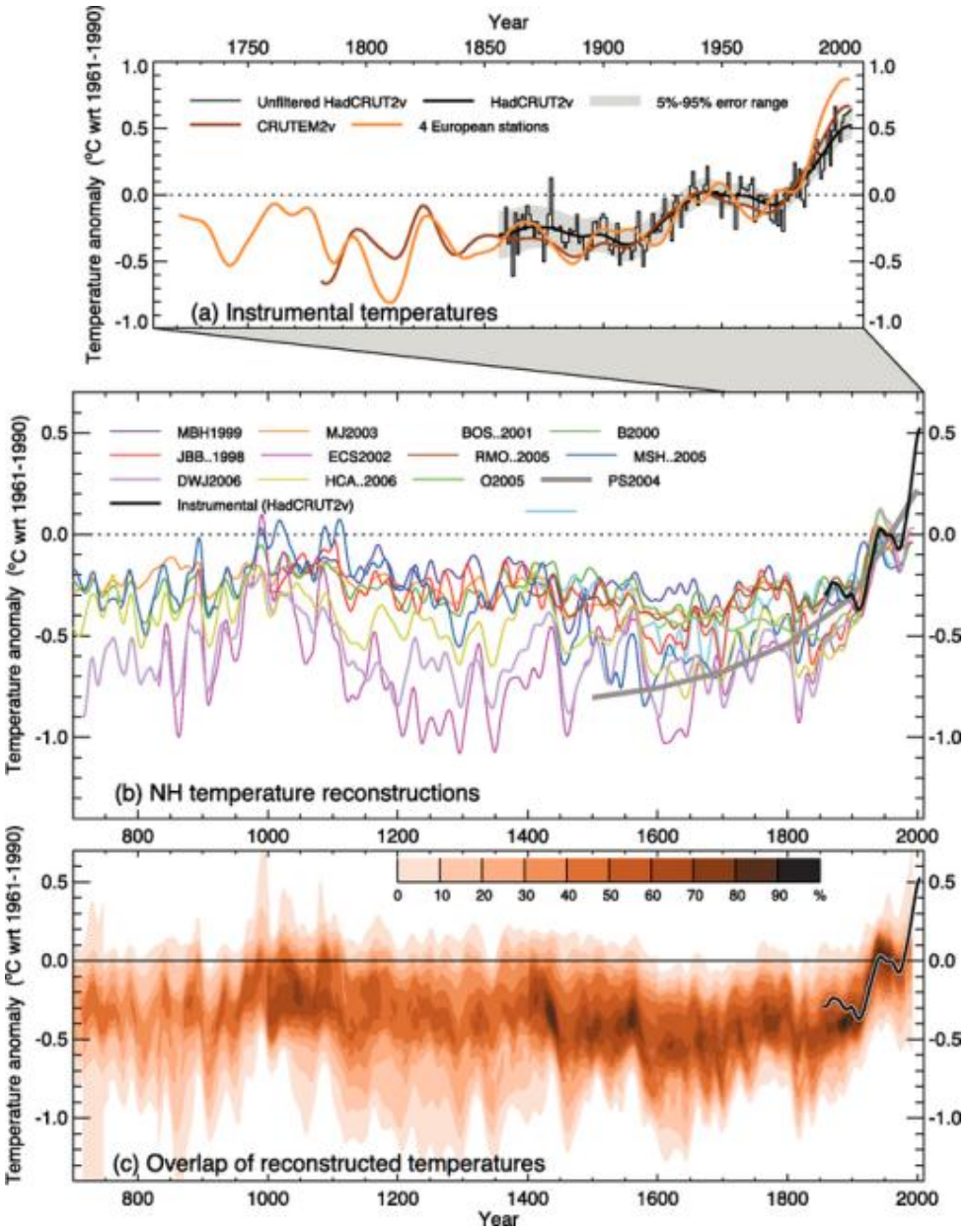


Figure 8. Temperature variations in the Northern Hemisphere during the last 1300 years (From Climate Change 2007: The Physical Science Basis. Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Figure 6.10. Cambridge University Press.).

5. Analysis: Göta Älv

Göta Älv is the largest river of Sweden, which drainage area covers most of the county of Västra Götaland. This is mostly due to the river's connection with the lake Vänern, into which a large amount of waterways flows from the northernmost border of Värmland and beyond. In length, Göta Älv itself is not as impressive as its water bearing capacity (Appendix 2, Figure 1.) – only covering half the length of the much smaller river Ätran. Nonetheless, the region surrounding Göta Älv is one which is rich in history and archaeological remains. The river has during long periods of time been the focal point of political activity between rivaling countries and agents of power. This political history has been the interest of many researchers (e.g. Carlsson 2007, Harlitz 2010), but the importance of the river *itself* remains strangely unexplored. In more recent times, Göta Älv has become a highly active agent in determining the relationship between humanity and nature (SGIa 2012), but is this an entirely new agenda?

One of the most defining features of the history of Göta Älv is its function as a national border between Denmark, Sweden and Norway. During the Late Iron Age, the entire Göta Älv valley has been seen more or less as a cultural unity, with many similarities in material culture, place names etc (Harlitz 2010: 57-59). The national borders of the river were not established until the 13th century, when Sweden first can be seen as a united country (Carlsson 2007: 143). This border function lasted until 1658, when Bohuslän and Halland was incorporated into the Swedish realm (Rådmark 1993: 102). It has previously been suggested that Göta Älv served as a national border already during the 11th and 12th centuries, with reference to Icelandic tales and meetings between the kings of Norway, Sweden and Denmark (e.g. Bengtsson 2001). However, this has been criticised by more recent research, raising the problematic nature of this written source material and its relation to the formation of the Swedish state (Harlitz 2010: 61).

This chapter – like the Analysis chapter that follows – has been structured according to the direction of flow of the river in question (Figure 9.). It starts by defining the natural preconditions which have governed the river valley and human settlement. Then, I have started my analysis at the origin of the river, in a place which is highly connected to downstream activity, and the chapter subsequently moves along the flow of Göta Älv towards the estuary. In the end, I have dedicated a subchapter to drawing conclusions from the three case studies, also comparing these to other sites of interest along the river.

5.1 Natural preconditions

Göta Älv flows through an older shear zone, which has been eroded by water for many hundreds of millions of years. This erosion, along with bedrock movement and glacial processes, has given the valley a rather unstable character (Hillefors 1993: 12). Moraine deposited during the last Ice Age can mostly be found on the westerns hills of the valley, and during the same period the river floor was covered by the ocean (ibid.: 24). Oceanic sediment deposition from the Ice Age has filled the valley with a layer of salted clay, which in places is 100-200 meters thick (SGI 2012a: 17). The salt that stabilises this clay has been leached by precipitation and groundwater in more recent times, which in turn has led to an increasing rate of dangerous

landslides (Hillefors 1993: 24). This leaching process creates quick clay – a form of clay which is transformed into an almost liquid form when set in motion. The liquid character of quick clay can cause extensive landslides, especially in slopes where the groundwater pressure is high (SGI 2012a: 17-18). This has shaped the landscape that can be observed in the region today, and the process was indisputably active during historical times as well (Appendix 2, Figure 1.). At least 6 extensive landslides are known from the period studied in this thesis, and the oldest one in record occurred in 1150 (Hågeryd et.al 2007: 10). This disastrous event sealed the eastern channel of Göta Älv entirely, perhaps forcing the water to flow through the narrower western channel called "Nordre Älv" (Bengtsson 1993: 78) (Figure 9.). However, after considerable dredging in the 20th century Norde Älv still bears more than 70% of the water flowing out of the river system (Bengtsson 1998a: 1). Another landslide has left its mark on the historical records by the name of "Stora Jordafallet", which occurred in 1648. The large water masses which were released when the earth masses eventually eroded (Hultén et. al 2006: 13-14) away completely destroyed the settlement of Lilla Edet (Särlvik 1993: 187).

From the 1930s the waters flowing into Göta Älv from the lake Vänern were regulated by dams, which have evened the spring and autumn floods downstream of Trollhättan. According to Bengtsson (1998a), regular flooding of the river valley was much more common in the past. This is supported by measurements done before 1930 which indicates that the relative water level of Göta Älv could increase with up to two meters during heavy storms (Bengtsson 1998a: 2). Among other things, two large floods occurred in 1661 and 1697 which caused considerable damage to the settlement of Lilla Edet. Between these floods, the water level was unusually low which made an effective use of the many water based industries in Lilla Edet impossible (Särlvik 1993: 187).

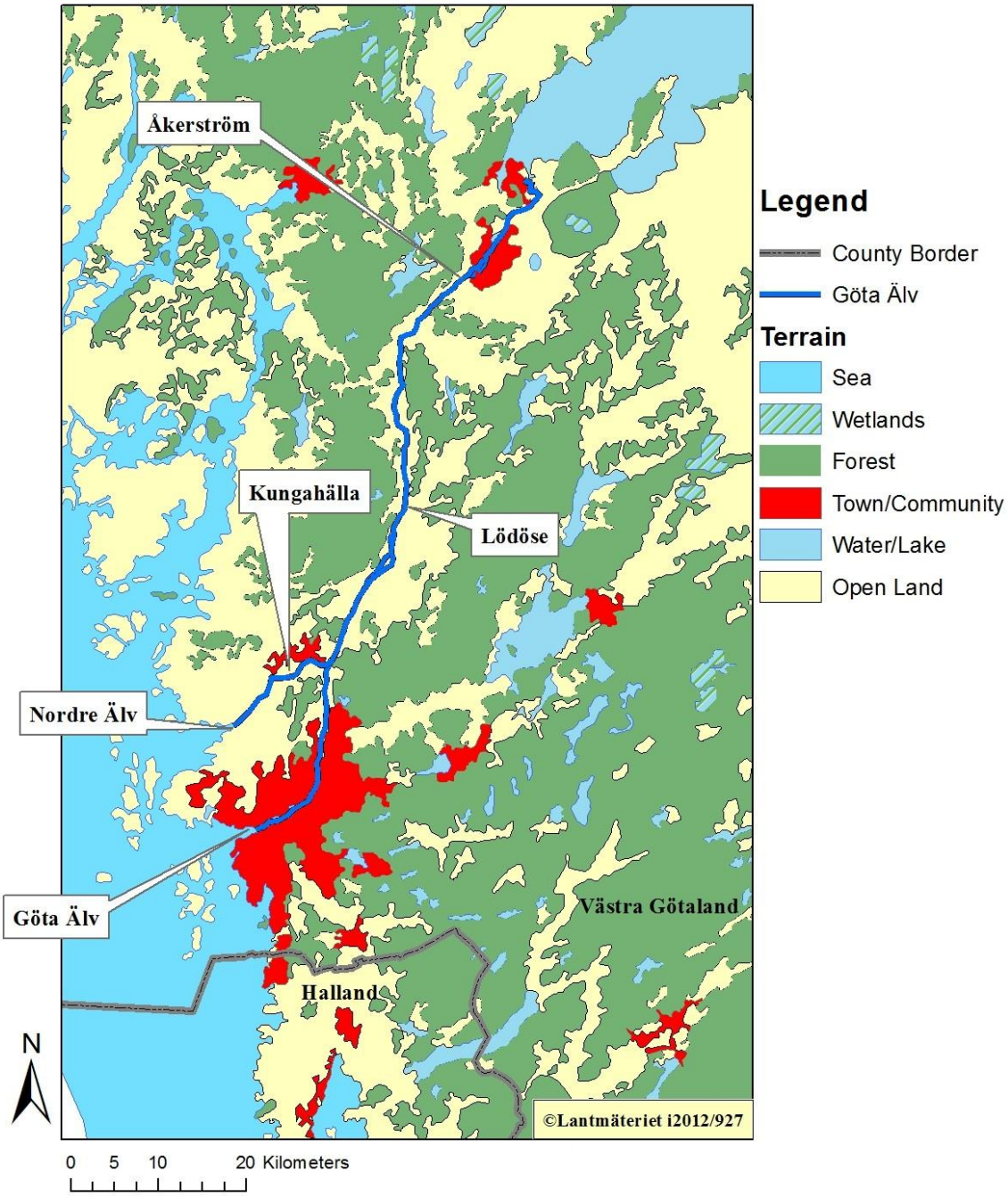


Figure 9. Map of Göta Älv, marking the location of the three case studies (Kungahälla, Lödöse and Åkerström) and the twin estuary of the river (Nordre Älv, Göta Älv).

5.2 Åkerström

The area surrounding the village of Åkerström south of Trollhättan was a region of some importance during the 16th and 17th centuries. Where the border of Norway followed the course of Göta Älv from the Estuary at Kungahälla, Åkerström marks the location from where the opposite riverbanks were under Swedish control. The prehistory and medieval setting of this area remains rather unexplored, though I have tried to give an outline of the general Iron Age settlement pattern below. From the 16th century and onwards, a rich quantity of written source material is available from which to analyse the use of the river in this region. Göta Älv was an important waterway for the transport of different goods during this period, and largely shaped the patterns of international trade in western Sweden. The area of Åkerström summarises both the macro-scale economic aspects of Göta Älv, as it was here that goods were transferred from land to water transport.

5.2.1 The Late Iron Age

As already noted above, the Iron Age of Åkerström remains rather shrouded in mystery. In general, the picture generated from archaeological remains in the area seems to indicate that the Late Iron Age was a period of decrease in population. This is contradicted by pollen analyses, which has shown a clear agrarian expansion in the region surrounding Åkerström and Trollhättan (Munkenberg 2011: 34). While this of course complicates the action of drawing conclusions on the Late Iron Age of the region, it also emphasises the complexity of archaeological remains. Typical late Iron Age features such as grave fields and burial mounds are almost unrepresented in the vicinity of Åkerström. Considering the pollen results, it is necessary to recognise the fact that the grave structures of this region does not entirely represent the pattern of settlements, which of course makes the Late Iron Age society of Åkerström very difficult to trace.

A map of the Iron Age features within the vicinity of Åkerström shows that the potential settlements cannot be clearly tied to the river. The later villages of Slätthult and Stubbered seem to have no connection to Iron Age grave types. Three hill forts are located on mountains overlooking the watercourse and RAÄ Trollhättan 161:1 is located close to the villages described above. Hillforts are traditionally seen as fortifications constructed for the benefit of the local population, to which they could withdraw during enemy raids, invasions and times of trouble (Stenberger 1979: 550, Andersson et al. 1993: 48). Thus they are also connected to pathways of communication, with a visual control of the directions from where a potential enemy could attack. With a comparatively large number of hill forts, Göta Älv (Appendix 2, Figure 4.) has been interpreted as an important communicative waterway during the Iron Age (Andersson et al. 1993: 48). A viewshed analysis from Trollhättan 161:1 reveals that the hill fort had a considerable visual control over Göta Älv to the northeast (Appendix 2, Figure 5.).

5.2.2 The Middle Ages and onwards

Little is known of the area surrounding Åkerström during the medieval period – few written records remain and no archaeological features can be clearly tied to the Middle Ages. The early modern period, from the 16th century and onwards, is much more easily defined through a cartographic and historical source material.

According to Carlsson (2011), the absence of a typical early medieval christian culture in the northern region of Göta Älv indicates that the local chieftains continued to practice older traditions and rituals into the medieval period (Carlsson 2011: 38). However, the christianisation of the Göta Älv region in general is difficult to define and, compared to the rest of Västra Götaland, the valley seems to have been an area of political – rather than religious – focus (Carlsson 2007: 165-66).

The main area of settlement during the Middle Ages lay to the northeast of Åkerström, by the contemporary city of Trollhättan. With a soil made of clay and silt this region was highly suitable for farming, and the proximity to the lake of Vänern as well as extensive forests created a foundation for a diverse range of secondary resources. Cattle farming was the most important agrarian resource in the area, something which to a certain extent has been observed already during the Late Iron Age. In the Middle Ages, cattle – and its byproducts – became an important resource in long distance trade (Carlsson 2011: 48-49). 18th century maps indicate that the land used for cattle farming and meadows can be tied to the riverbanks (Gäddebäck O208-19:1, Näset O208-49:1). The extent of early river transport on the northern parts of Göta Älv is difficult to trace, but the river should at least sporadically have been used in this manner during the entire medieval period (Carlsson 2011: 39, 49).

Åkerström and the surrounding villages may have played an important role in the transhipment of goods already during the Middle Ages. The waterfalls at Trollhättan were impossible to traverse with boats, which had to be carried on land to reach the navigable parts of the waterway. According to Icelandic tales, this was done during the summer of 1064 by the Norwegian king Harald Hårdråde (Rollof 1979: 219). During later centuries, a road named "Edsvägen" ("Ed" being a place name connected to an area between two navigable waters) was used to transport goods up and down the northern reach of Göta Älv. Goods were either transhipped in Lilla Edet, where another waterfall was situated, or carried by boats from Åkerström (ibid.: 221).

The area of Åkerström must then be seen as a liminal area in the landscapes surrounding Göta Älv during the Middle Ages. Not much is known from this period, but the river itself seems not to have attracted settlement in this mountainous forest region. Instead, it is likely that any potential household in this area was highly specialised and did not leave any significant traces of agrarian settlement.

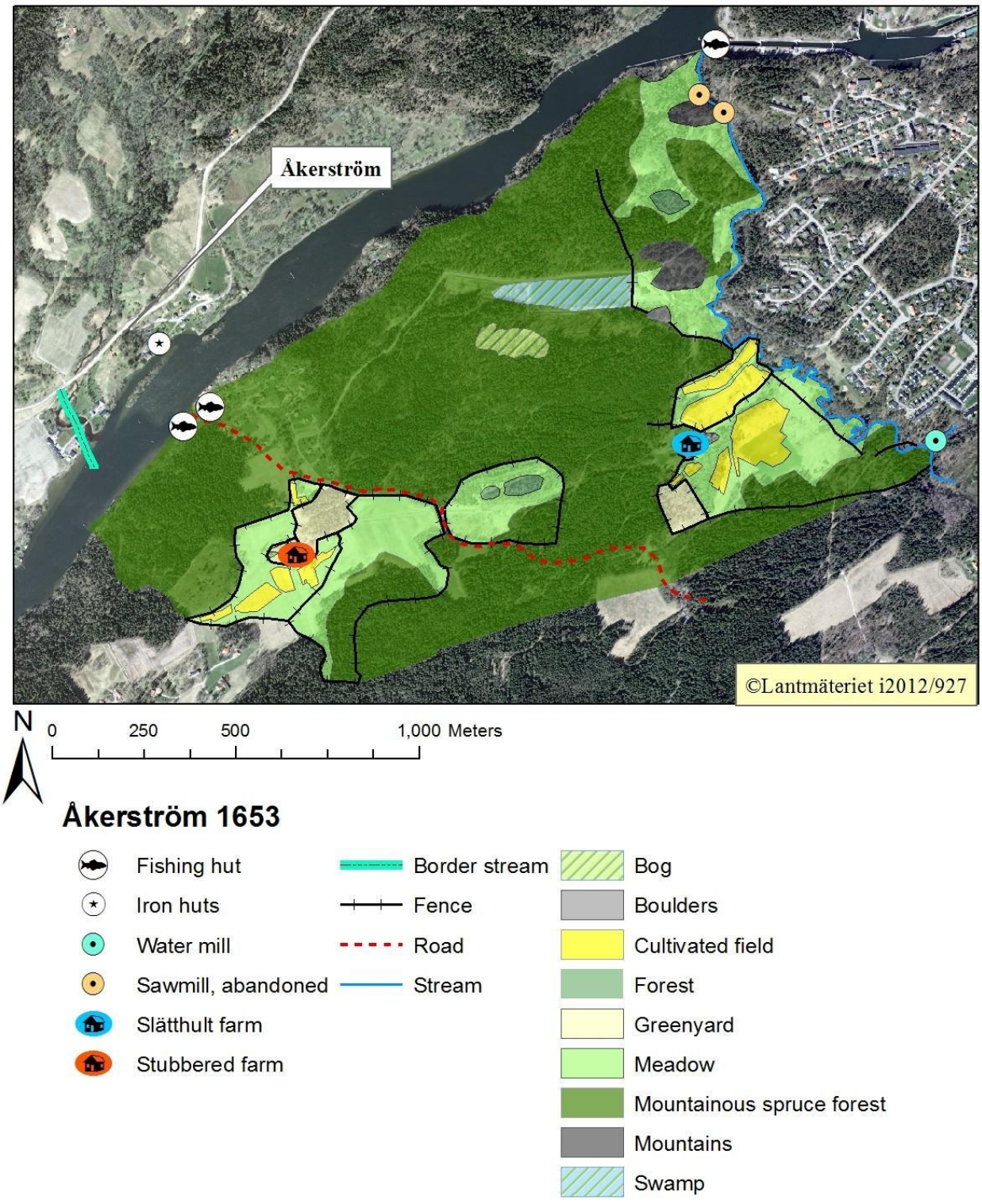


Figure 10. Digitised map of Åkerström in 1653 (Främmestad: 61), on top of a modern orthoimage.

A map from 1653 (Främmestad: 61) is perhaps one of the most valuable sources on Early Modern Åkerström, and it contains many features of high interest to this study (Figure 10.). Although Åkerström itself is not described in great detail, the neighboring farms of Slätthult and Stubbered are both recorded in Notarum Explicatio[5]. These farms – which both have separate fields and meadows – can be seen as single households, traditionally tied to outland colonisation during the Middle Ages and the Early Modern period. Thus there is no retrogressive evidence of prehistoric settlement found on the map. The map also contains two fishing huts named "Knuorraboo", a name which has not survived to contemporary times. Of the farms introduced above, Slätthult is the most interesting, as the surveyor have described that this farm makes good revenues from rafts going down the river towards Gothenburg. As the farm – according to the surveyor – also produces timber these rafts are most likely connected to timber rafting. This is further supported by two sawmills which lay on the land owned by Slätthult. These sawmills were however abandoned at the time of surveying. On the opposite side of the river lay a place named "Järnbodarna" ("the iron huts"), which might indicate that the rafts were also used to transport iron. Apart from this, the surveyor makes it clear that Slätthult also had access to fine fishing waters in Göta Älv. Although the historical depth of this relationship between long distance trade and local entrepreneurs cannot be seen in the studied material, the connection of Slätthult to what seems to be the transshipment station of Åkerström is clear.

Åkerström first appears in written records from 1552, in letters connected to the iron industry. During the 16th century, iron from the county of Värmland was transported on the river from Åkerström, brought by carts on the road "Edsvägen" (Rollof 1979: 222). This continued into later centuries, which is also supported by the "iron huts" illustrated on the map described above. Timber rafting from Åkerström began during the middle of 16th century and in the 17th century almost half of Sweden's timber export was transported on Göta Älv. The timber came from such distant places like the counties of Dalsland and Värmland (Larsson 2011: 77-78), but the local area was also – as have been shown above – included in this activity. That timber rafting in Göta Älv can be traced back to the Middle Ages has previously been suggested by Carlsson (2007: 154), but no clear evidence exists.

The map also marks the location where the borders between Denmark and Sweden met Göta Älv. This border seems to have followed the course of a small stream which exits into the river.
A note on the map also connects this stream to a landslide called "Stora Jordfallet". This landslide occurred in 1648 and was a disastrous event, costing the lives of at least 85 people. Several houses and ships were destroyed and the entire river blocked by earth mass. When the water eventually broke through this natural dam, the discharge created a tidal wave which swept down the valley, causing severe damages to the surrounding settlements along the way (Hultén et. al 2006: 13-14).

The meadows and fields of the Early Modern farms that surrounded Åkerström were geologically mostly connected to fine glacial clay. A limited part of the land used by Stubbered

[5] Notarum explicatio is the written description which is almost always found on geometrical maps in Sweden. This description contains information concerning ownership, fields, meadows, secondary resources etc.

lay on postglacial sand and silt which cannot be connected in its entirety to Göta Älv (SGU).

5.3 Lödöse

Lödöse was one of the earliest towns in western Sweden, founded somewhere during the end of the 11th or the beginning of the 12th century (Carlsson 2007: 96). The town has traditionally been tied to Swedish interests and long distance trade, and has been called "the western gateway of Sweden". This traditional view is rather complicated, as this mostly reflects a reality which was first established during the 13th century (ibid.: 143). The origin and establishment of Lödöse is still a topic of discussion, and Harlitz (2010) has shown that the settlement can be tied to the Norwegian urbanisation of the 11th century, in contrast to traditional ideas (Harlitz 2010: 148). While the town itself has been the focus of substantial research (e.g. Ekre 1993, Carlsson 2007, Harlitz 2010), its relationship to the estuary region of Göta Älv and the town of Kungahälla has been a rather neglected topic (limited examples in Carlsson 2007, 2011).

5.3.1 The Late Iron Age

No real traces of Iron Age activity exists within the vicinity of Lödöse. Instead, the area to the east of present day Alvhem seems to have been the central settlement of the area, at least from the bronze age and onwards (Carlsson 2007: 76). This stands in stark contrast to the estuary region of Göta Älv, where many settlement traces can be found in more direct connection to the river. To the north lies Lilla Edet, which was settled during the Iron Age to a limited extent, and downstream from Lödöse lies a hillfort overlooking the watercourse. The area surrounding Lödöse itself contains few traces of Iron Age river use. This might be the result of modern exploitation, or of natural changes such as landslides. It is also interesting that the area surrounding these riverbanks might have been considered a dangerous place to settle, because of the unpredictable nature of Göta Älv. The area close to Lödöse is not however a danger zone in this manner, according to modern research (SGIb 2012: 13-19).

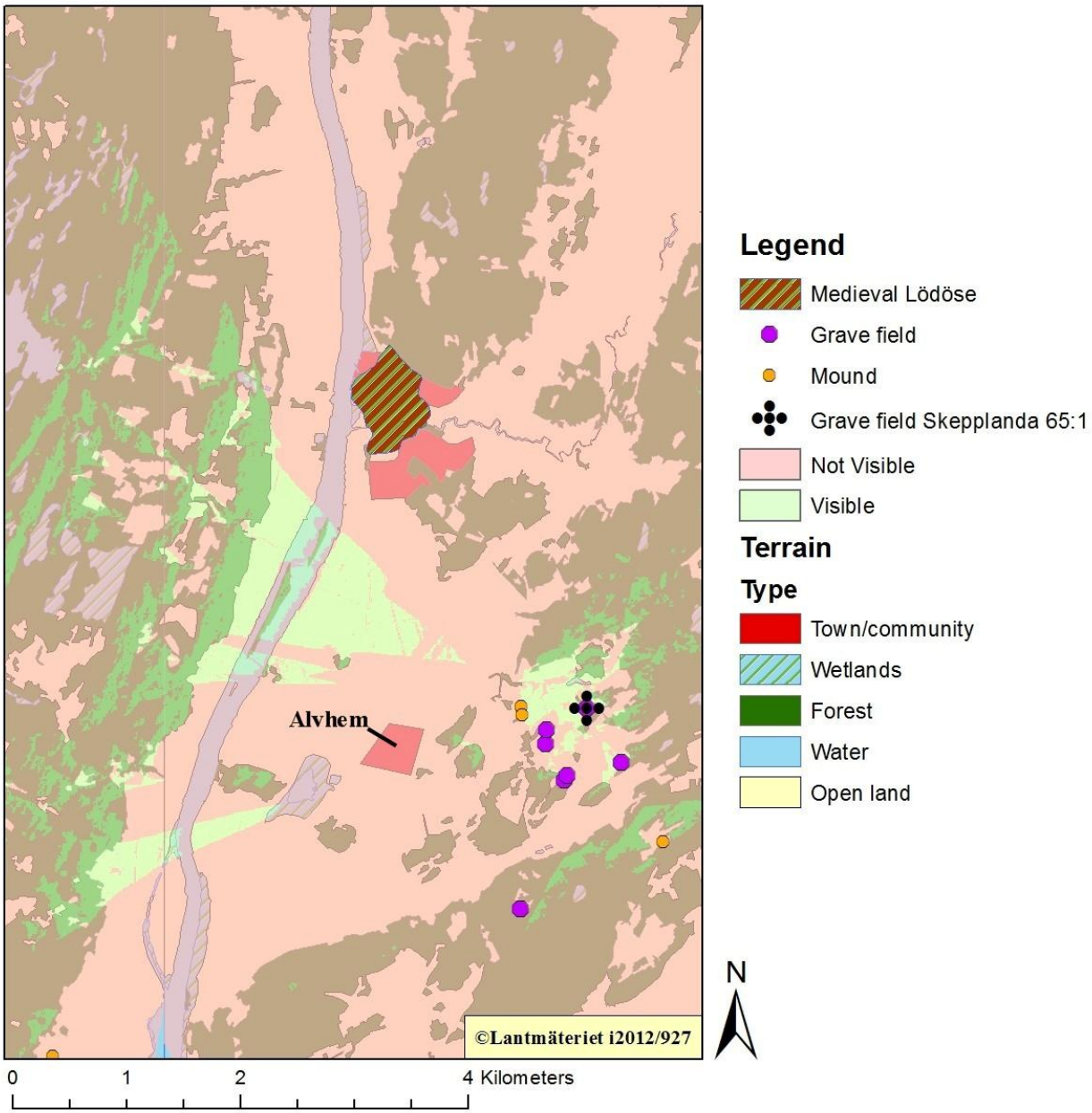


Figure 11. Viewshed analysis from the gravefield RAÄ Skepplanda 65:1, based on LIDAR models.

It is clear that the proposed settlement to the east of Alvhem was visually connected to the river, as shown in the viewshed analysis (Figure 11.). The spread of visible space surrounding the grave field Skepplanda 65:1 could correlate with the possible locations of the local Iron Age farms. It is highly likely that the riverbanks of Göta Älv, although devoid of human settlement, were areas with a high symbolic or strategic value. A visual control of the river would have granted the inhabitants of the area a better protection against potential enemies. The need for protection could explain the relatively uninhabited river banks distinguishing the Late Iron Age

in this area.

That Göta Älv was used by boats during the Late Iron Age is evidenced by a famous ship named "Äskekärrsskeppet", which was found in 1933 close to the river, about 8 kilometers to the south of Lödöse. The ship was used during the whole 10th century for trade and transport over long distances (Andersson et.al. 1993: 48).

5.3.2 The Middle Ages and onwards

As described above, the town of Lödöse was founded sometimes between the end of the 11th and the beginning of the 12th century, and has been the object of several archaeological investigations during the 20th century (Carlsson 2007: 75-78). The town was already during its early stages connected to long distance trade with Germany and Eastern England and during the 13th century trade also commenced with France. Traces of minting activities in the central areas of Lödöse have been seen as evidence of royal interests, at least between the end of the 12th century till the 13th century (ibid.: 79-90). The topography of the town was radically changed during the middle of the 12th century, with a new layout and architectural style. This continued into the 13th century, when a castle was built in the western part of the town, along with an extensive system of moats (ibid.: 95-97). A new district tied to metalwork was founded during the 13th century, and Carlsson (2011) argues that the material needed for the construction work could have been shipped from the northern parts of Göta Älv (Carlsson 2011:44).

According to Harlitz (2010), Lödöse was under Norwegian control during the most part of the 12th century, which included the early minting industry. The regulation of streets, changes in town layout and the evidence of Swedish coin production in the town should be seen as a change in political control, when the royal power of Sweden assumed control over Lödöse. Harlitz ties the important early role of Lödöse to the changing national borders of the region, which from the foundation of the archbishopric of Uppsala in 1164 went through Göta Älv. The town also served as a portal town of long distance trade, which contributed to its importance (Harlitz 2010: 87-88). During the 13th century, the central political role of Lödöse was further established by the construction of the castle, which supported the solidification of Göta Älv as a national border between Norway and Sweden. The Hanseatic league also began to operate in Lödöse during this period (ibid.: 126). In the 14th century, Lödöse and the Göta Älv valley became the object of political conflict and the town lost much of its ideological importance due to the construction of the fortress of Bohus, which after its foundation became the administrative centre of the King of Sweden and Norway, Magnus Eriksson (Andersson 1997: 105). A rather dramatic event in the medieval history of the Göta Älv valley is the Hanseatic attack on the Scandinavian towns of the area in 1368. During this attack – caused by a tension between the King of Denmark (Valdemar Atterdag) and the Northern German trading towns – the Hanseatic fleet burned the town of Lödöse, along with a church and the castle described above, although the exact extent of the destruction is not known (Ekre 1993: 62). This attack however, did not affect long distance trade – which continued into the 15th century (Harlitz 2010: 117-18) – although a limited material decline can be seen during the years that followed the attack (Carlsson 2011: 45). During the 15th century, the town eventually lost its contacts to long distance trading routes. The newly founded

town of Nya Lödöse – close to present day Gothenburg – became the focal point of Swedish international trade in the region (Harlitz 2010: 126). According to Linge (1993), the foundation of Nya Lödöse can be partly tied to the toll that was collected at the fortress of Bohus, and which prevented Swedish trade (Linge 1993: 90). The old town of Lödöse still retained a regional position after this, with seasonal markets and a connection to local trade (Harlitz 2010: 125). A riverine activity which continued in Old Lödöse till modern days is the construction of ships in the local wharf. The wharf became of central importance especially during the 16th and 17th centuries, as one of the wharfs in the Göta Älv region which constructed ships to the crown (Persson 2003: 11).

A map from 1653 (Främmestad: 62) provides a highly limited account of the early modern functions of Lödöse. Only one farm has been mapped, located at the "bridge by Old Lödöse" (author's translation)[6]. No part of the map shows Göta Älv itself, although the river is mentioned in Notarum Explicatio. The surveyor writes: "Limited fishing, for it is forbidden to them in the large river … he has only access to small trade and to row people to and fro in the river between Gothenburg and Old Lödöse (author's translation)".[7]

5.4 Kungahälla-Bohus

Where Göta Älv and Nordre Älv separates from each other stands today a landmark of Scandinavian history: the fortress of Bohus. This fortress – which was originally founded in the 14th century – is a symbol not only of its time, but also of the historical research which has been conducted on the dual estuaries of Göta Älv (see above). The estuary region of Göta Älv has rarely been comparatively studied (c.f. Carlsson 2011), and this investigation has sought – among other things – to put this region into a larger context.

5.4.1 The Late Iron Age

Long before the construction of the fortress of Bohus, an older settlement called "Kungahälla" acted as the focal place of the region. The prehistoric origins of Kungahälla remains rather shrouded in mystery, although researchers have tried to connect the medieval town to a large Iron Age grave field in Ytterby (RAÄ Ytterby 22:1, Figure 12.) to the west (e.g. Bengtsson 1998b). Although interesting, the exact location of prehistoric Kungahälla will not be discussed here. Recent excavations have uncovered a complex set of buildings at the location of the grave field in Ytterby. These buildings have in general produced an Early Iron Age C^{14} dating, although the place seems to have been active also during the initial stages of the Vendel period (Karlsson et.al 2012). The largest building – a long house which was 48m long and 10m wide – has been dated to the migration period, and must have played a central role in the estuary of Nordre Älv. This house was most likely abandoned during the early Vendel period, and no continuity into the period discussed in this thesis has been secured (ibid.: 35-36). However, the

[6] "Bron vedh Gamble löösa (Främmestad: 61)".

[7] "Fijskerij ringha, dy dhet ähr dem förbudit ij storre elffwen ... , allenaste han haffwer läygenheet med små handell och roo folck af och an ij elffwen emelom Giötheborg och Gamblößa (Främmestad: 61)".

nearby grave field contains features of both an Early and Late Iron Age type, among them 15 burial mounds. This indicates that the area was still settled during the Vendel period and onwards, but to what extent remains unknown.

A map of the grave fields in Halland and Västra Götaland (Appendix 2, Figure 3.) shows that the estuary of Göta Älv, with the island of Hisingen, was a central region in Iron Age society. Compared to the rest of the river, the estuary seems to have been a focal point of Iron Age religion. Although the majority of the grave fields lie on the inlands of Hisingen, the mountains and hills surrounding the medieval site of Kungahälla – as well as the outlet of Nordre Älv – were places of concentrated burials. The importance of the outlet itself is marked by a series of poles, which were found stuck into the river (RAÄ Säve:404). This feature was most likely constructed for defensive purposes, and has been C^{14} dated to somewhere between 965-1200 A.D. Considering this, the poles might be a medieval feature rather than an Iron Age one. The feature can be found at almost the exact location where Nordre Älv becomes thinner and surrounded by steepening cliffs. A grave field containing 65 graves (RAÄ Säve 70:1) is located about 200 meters south of this feature, on the bank of the river. The Iron Age hill forts of the estuary region display a similar pattern to the grave fields, where a large concentration can be found on the island of Hisingen. RAÄ Säve:404 is also connected to a hill fort (RAÄ Harestad 19:1), which along with another hill fort (RAÄ Rödbo 5:1) close to the location of the medieval castle Ragnhildsholmen indicate that a more physical control of the estuary of Nordre Älv was considered important already during the Iron Age.

5.4.2 The Middle Ages and Onwards

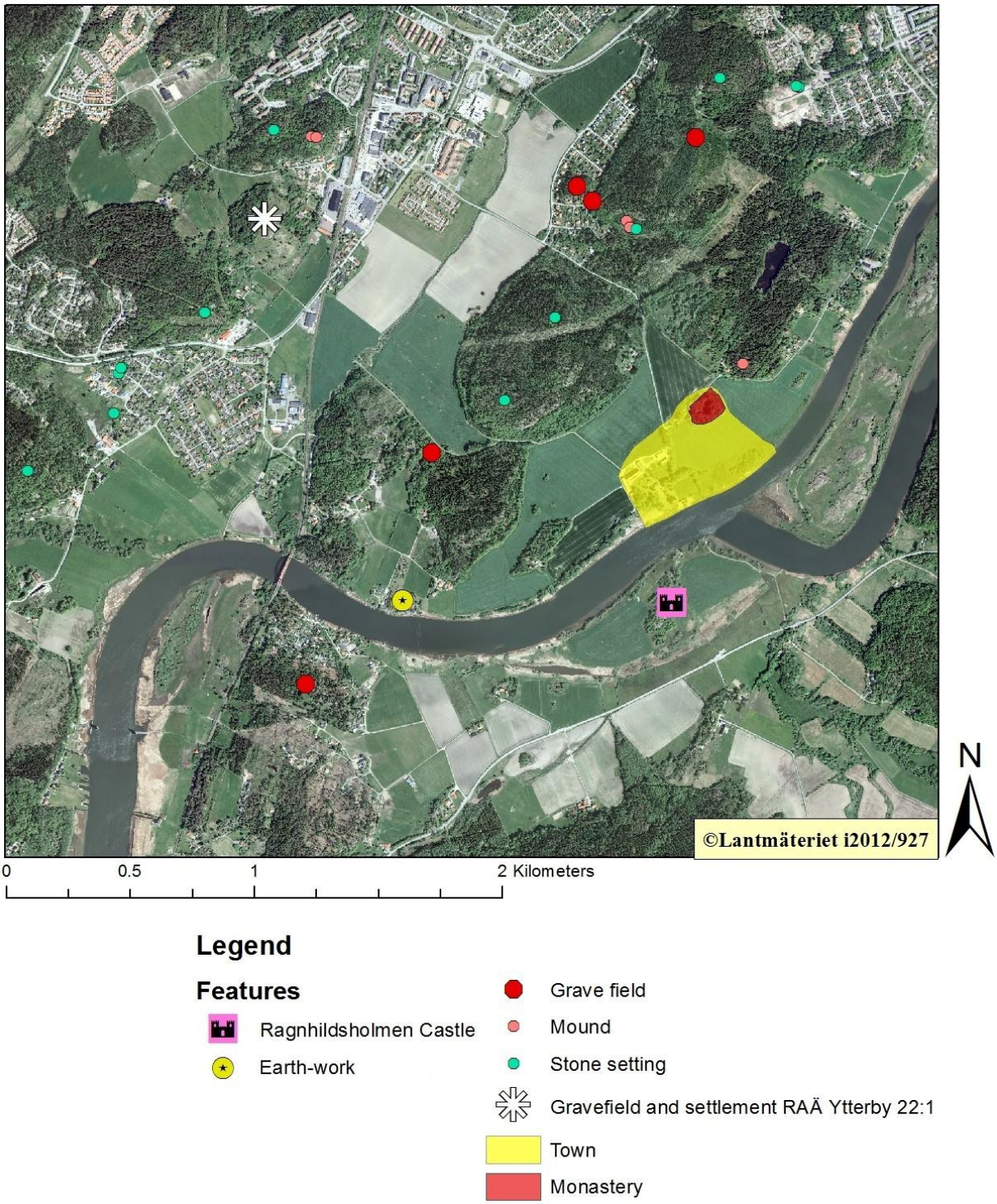


Figure 12. Map showing the location of the medieval town Kungahälla and related archaeological features.

The medieval settlement of Kungahälla (Figure 12.), which lies about 2.5 kilometers southwest of present Kungälv, was established sometime between the end of the 11th century and the beginning of the 12th century. This town has been excavated mainly during the period 1985-2001, although to a rather limited extent (Carlsson 2007: 37). According to conventional ideas, the early medieval town was an intricate part of a royal manifestation and system of power, and served as an administrative centre. The later economical functions that the town served in this region have been seen mainly as a byproduct of its political importance (Andersson & Carlsson 2001: 9-12). During the later stages of the 12th century the older buildings of the settlement were replaced, and a more complex pattern of urban life becomes clear. This phase is also marked by finds of long distance trade – mainly with Northern Germany and northwestern France (Carlsson 2007: 104) – and during the 13th century this development continued with increased contacts with eastern England. Pottery from this youngest phase also indicates that the patterns of communication became more regionalised than before (Carlsson 2001: 72). Sheep was the most important livestock in medieval Kungahälla, which indicates that the landscape was open and deforested. Fish seems to have been the main source of food, and according to Wretemark (2001) Kungahälla became a place of exchange between a maritime and an agricultural population. Cod, which is the major fish species seen in the osteological material of the town, was also an important trade good during this period (Wretemark 2001: 125-32). The original town of Kungahälla was finally burnt by Swedish soldiers in 1612, and a new town called "Ny Kongelf" was founded by King Christian IV on the island where the fortress of Bohus was located. Ny Kongelf was also destroyed by Swedish soldiers in 1645, but the settlement endured for some years after. When the region became Swedish in 1658, the settlement lost its town charter. In 1676 Ny Kongelf was finally burnt to the ground by Danish troops. A new settlement had by then already started to appear on the northern shores of Nordre Älv, where present day Kungälv is situated. When Ny Kongelf was incorporated into the Swedish realm long distance trade with the town became forbidden, and the settlement afterwards relied mostly on an agrarian economy (Hökerberg 2003: 14-15).

Two castles can be directly tied to river use in this region: Ragnhildsholmen and the fortress of Bohus. Ragnhildsholmen was founded by king Håkon Håkonsson of Norway on an island in Nordre älv during the middle of the 13th century, its function tied to the protection of the town of Kungahälla (Schönborg 1992: 148). As a result of the major earth slide described above, Ragnhildsholmen and Kungahälla also served a central function in controlling the river trade of Göta Älv during the first centuries of the Middle Ages (Bengtsson 1993: 79). In 1308 the fortress of Bohus was constructed by the Norwegian king Håkon V Magnusson, and came to play an important role in the political and economic development of the Göta Älv region. The fortress constituted an obstacle to trade and communication on the river already during the 14th century, and tolls were collected from the castle at least from the beginning of the 15th century and onwards (Linge 1993: 89). During the centuries that followed, the economic and political status of the fortress became a central topic of discussion and negotiation (ibid).

The medieval land use of Kungahälla is somewhat difficult to analyse, as there is no 17th

century map of the area. A map from 1750 (N135-15:1) – on the exact border of the period covered in this thesis – indicates that the riverbanks were used for meadows in this region, with mostly dry soils which gave good revenues. Many fields are also connected to the riverbanks – such as the fields of the manor "Castellegården" on the former land of medieval Kungahälla. No traces of an active urban settlement can be found on the map, although the surveyor writes that the manor "lies on the location of the former town of Konghell, where a few ruins still can be seen (author's translation)."[8] This manor was moved here in 1594, after the remnants of the medieval monastery had been usurped by the crown during the Reformation (Bengtsson 1993: 74-75).

The land use of the early modern period in this area is geologically tied to different forms of clay (SGU). About 47% of the meadows connected to the manor "Castellegården" in 1750 lay on postglacial clay and flooding sediments. The cultivated fields of the same manor all lay on postglacial clay.

Nordre Älv seems to have been the main waterway used by ships travelling up and down the river, at least up till the 16th century (Bengtsson 1998a: 2-3). During the 17th century, the southern estuary channel leading to the newly founded town of Gothenburg became more important, perhaps due to political decisions rather than natural factors. In the middle of the 18th century however, voices were raised concerning the shallow nature of Nordre Älv (Rollof 1979: 21), which presumably hindered effective transport on the river.

The southern estuary of Göta Älv – by modern day Gothenburg – should perhaps also be mentioned in this context, as it seemingly became politically important during the middle of the 14th century – after the construction of Bohus. This is manifested in the construction of the Swedish castle Älvsborg – on the south bank of the estuary – which first appears in written records 1366 when the fortress was placed under Danish control. The castle was involved in several political struggles during the Late Middle Ages and the Early Modern period, and was finally razed in 1673. A new fortress named Nya Älvsborg was then constructed on the northern shores of the estuary. This fortress stayed in active use until 1869 (Asker 1997: 10-11). Together with the foundation of Nya Lödöse and eventually Gothenburg the southern estuary is in many ways as interesting as the northern. Both estuaries obviously formed a central arena of the political struggles during the period studied in this thesis.

5.5 Chapter Conclusions

This chapter has shown that Göta Älv was a river which has figured historically in a diverse number of ways according to traditional research. Although many interesting observations have been made in the text above, the material presented does not immediately answer the research questions posed in the introduction chapter of this thesis. As much of the previous research has been focused on answering questions based on human interaction, I have beneath tried to draw some of my own conclusions on which the later argumentation will partly be based. This subchapter should then be seen both as a summary of what has been written above – which is

[8] "på den Plan dereff Staden Konghell fordom varit belägen, hvaraf några få Rudera ännu skönjas kunna (N135-13:1)"

mainly based on the geodatabase and the interpretative texts written by other authors – but also as a space of text where I develop some of my own interpretations. Here, the three themes raised in Chapter 3 (Natural Factors, Economy, Ideology) are summarized for the whole river and the three case studies are compared to produce a fuller picture.

5.5.1 Natural Factors of Human Activity

The most clear natural factor in developing the human society surrounding Göta Älv is the unstable geology of the valley. This has been most defining for the upper reaches of the river, where the risk of landslides is high even today (SGI 2012b), perhaps best illustrated by the area close to Åkerström where the Late Iron Age settlements are located inland from Göta Älv. The estuary region of Nordre Älv and Kungahälla was not affected in this manner, as grave fields and prehistoric settlements seem to have clustered around the outlet of the river. As no prehistoric record of landslides exists, it is not possible to calculate the relative frequency of landslides in the Göta Älv region during the Late Iron Age. Considering the mean temperature variations of the period (Figure 7 and 8.), it is likely that the years from 500-900 A.D were marked by similar weather conditions as the years that followed the 12th century – a period in which the landslide of 1150 occurs. Although based on rather shallow evidence – as weather is not entirely a result of the mean temperature – this would indicate that at least the risk of landslides was equally high during the Vendel Period.

During the historical period covered in this thesis two landslides emerge as significant *moments* in which Göta Älv acts upon the surrounding human environment – "Jordafallet" in 1150 and "Stora Jordafallet" in 1648 (see above). The first landslide blocked the southern estuary of Göta Älv and most likely redefined the hydrology and geomorphology of the western estuary. In theory such an event – due to a high increase in discharge – would have caused a greater erosion of the riverbed and the surrounding banks than before. Although difficult to say, this may be reason why Nordre Älv still carries the majority of water in Göta Älv. This natural event also corresponds with the expansion of Kungahälla during the latter half of the 12th century, which indicates that the communications of the area were redirected in the process. The southern passage of Göta Älv was – according to Bengtsson (1993) – blocked for an unknown amount of time. It is highly likely that the earth masses eventually were eroded away sometime during the 13th century.

As described above, cattle farming was important to the farmers of the Göta Älv valley at least from the Middle Ages and onwards. The meadows which were vital in providing food for the livestock during winters can to a certain extent be connected to the riverbanks, at least during the Early Modern period. This is most clear in the estuary region close to medieval Kungahälla, but also in the upper reaches of the river, to the north of modern Trollhättan. The soil geology of the estuary mostly consists of postglacial clay, which has been deposited by the river and upon which most of the valuable meadows are situated. In the upper reaches, the soil geology consists of glacial clay and postglacial silt (SGU), where at least the latter is connected to the meadows found on the map of Näset O208-49:1.

Grain production in the Göta Älv valley was not the main resource on which society was based,

but can to a certain extent be connected to the riverbanks, at least during the 18th century. The historical map of Castellegården (N135-15:1) shows that some cultivated fields were located rather close to the river.

Another natural factor which limited the possibilities of effective waterway transportation was the waterfalls at Lilla Edet and Trollhättan. This constituted an obstacle to river-based communication during the whole period studied in this thesis. During the reign of king Karl XI of Sweden (1655-1697) a river lock was constructed in Lilla Edet to overcome the first waterfall (Hallberg 1993: 171), something which shows that the falls were indeed considered a problematic obstacle. Thus, it is not possible to discuss any macro scale upstream river transportation above Lödöse before this period. Downstream transportation was perhaps also limited by this natural factor, but could be more easily overcome. Barges of timber, for example, would be more easily transportable downstream than upstream, and were not as vulnerable to the waterfalls as boats would have been. The waterfalls at Trollhättan and Lilla Edet nonetheless limited the possibilities of waterbased transport, and the transhipping functions of both locations separated the long distance transports into several smaller steps. This is further emphasised by the function of "Edsvägen" which connected Åkerström with Trollhättan.

5.5.2 Economic factors of river use

The economical use of Göta Älv has been diverse in character, mostly depending on the local topography and natural geography which surrounds the river. Kungahälla and the surrounding landscape became a human metaphor for the relationship between the river and the ocean. Goods of both maritime and agrarian origin were exchanged within the precincts of the medieval town of Kungahälla, and the fortress of Bohus served a similar function during the Late Middle Ages and the Early Modern period. Lödöse is a clear example of how the river connected the inlands to international economic communication, which must have contributed to the local economy of the town. The river at both Kungahälla and Bohus was inseparably entwined with the exchange and trade of the region, setting the foundation for overseas contacts as well as being the locus of local communication. However, while Göta Älv in its estuary region and middle reaches – at least from the Early Middle Ages till the end of the studied period – fed an economy based on both primary and secondary resources, the area surrounding Åkerström seems to have been connected to a largely river-based secondary economy. The importance of Göta Älv in providing a foundation for secondary economies in the upper reaches has been emphasized by Larsson (2011). In Trollhättan – a few kilometers to the north of Åkerström – small mills were located in the waterfalls already during the 15th century. These mills were later developed and became a centre of activity in the area (Larsson 2011: 83-84). Mills were also located by the waterfalls at Lilla Edet, which also became of central economic importance during the Early Modern Period (Särlvik 1993: 187). The river also provided plenty of fish for sustenance, something which in accord with the milling industry made the Göta Älv region more resilient to agricultural crises (Larsson 2011: 61).

The farmstead of Slätthult serves as an excellent example in illustrating the possibilities given by Göta Älv to local households in Åkerström during the Early Modern period. Slätthult was a

modest farm in terms of agricultural yields, but seems to have been engaged to a great extent in the important resource export of the area. The forest industry in which the farm was engaged seems to have suffered from the natural disaster of 1648, which is indicated by the abandoned saw mills in the stream "Rydbäcken". A farm near Lödöse was also personally engaged in a rather commercial enterprise connected to the river, which is illuminated in the Notarum Explicatio of Främmestad: 62. The farmer used some form of rowing boat to transport people between Old Lödöse and Gothenburg, which indicates that the river was also used for travel during the Early Modern period.

In itself, the southern estuary of Göta Älv is highly interesting, but has been covered only limitedly in this thesis. The towns of Nya Lödöse and Gothenburg can perhaps be more tied to maritime communications than riverine. It is however clear that they also served a certain riverine purpose, which is why a larger study would need to compare these towns with the older ones upstream the river. It can be noted that the town of Gothenburg, which was founded in the beginning of the 17th century, affected the trade of Göta Älv positively (Linge 1993: 94). The river, with both estuaries, seems generally to have constituted a good foundation for an urban economy, although the foundation of several towns can – and have been – also tied to ideological factors.

5.5.3 Ideological aspects of river use

As noted by Kristina Carlsson (2007, 2011), the Göta Älv region became an arena of political struggles during the middle ages, rather devoid of traces of early Christian religion. The estuary was a central area in the Iron Age society of the river valley, for unknown reasons. According to Bengtsson (1998c) the area appears several times in the writings of Snorri Sturlasson, which generally seems to indicate that this was a border region already during the Viking period. This is perhaps not too far-fetched – as the river obviously must have been an obstacle to everyday communication – although it must be said that a source material from 13th century must be used with caution in the analysis of this period. Still, the communications of the valley may be reflected in contemporary parish borders, which to a large extent follow the course of Göta Älv – the only exceptions being the parishes of Trollhättan and Gothenburg (Appendix 2, Figure 6.). This is further discussed in the chapters below.

As noted by Carlsson (2007: 75), the Göta Älv valley from the estuary to Lödöse has a high concentration of ancient hill forts (Appendix 2, Figure 4.), which suggests that the river was an important waterway during the Iron Age. Control of the river was central to settlements in the vicinity, which is marked for example by the viewshed analysis from the grave field RAÄ Skepplanda 65:1 (Figure 11.). This control was of course more visually than physically connected, and it is likely that a visual control gave some sense of security. A potential enemy or threat could be observed from a safe distance and precautions taken. This agenda of control is something which to a certain extent continued into the Middle Ages – marked by the castles of Ragnhildsholmen, Bohus, Älvsborg and Lödöse – and eventually the river developed into a national border. The political struggles of the Early Modern period were also represented in this region, where a certain emphasis on the control of the river based economy can be observed.

Control in this manner adopted a physical shape, and the regulation of waterborne communication apparently became a more central agenda than in earlier periods.

Religious and symbolical values are more difficult to illuminate in the valley of Göta Älv. Many Iron Age grave fields of the estuary lie in close proximity to the river, but further upstream the surrounding slopes seems to have been the preferred location of settlement. It can be discussed whether this merely reflects a natural logic – where the river banks of the upper region were unsuitable for any sort of settlement or burial feature – or whether it is a result of different forms of symbolical values. The viewshed analysis of RAÄ Skepplanda 65:1 shows that even though the graves in the proximity of Lödöse lay rather far away from the river, they clearly had a visual connection with the watercourse.

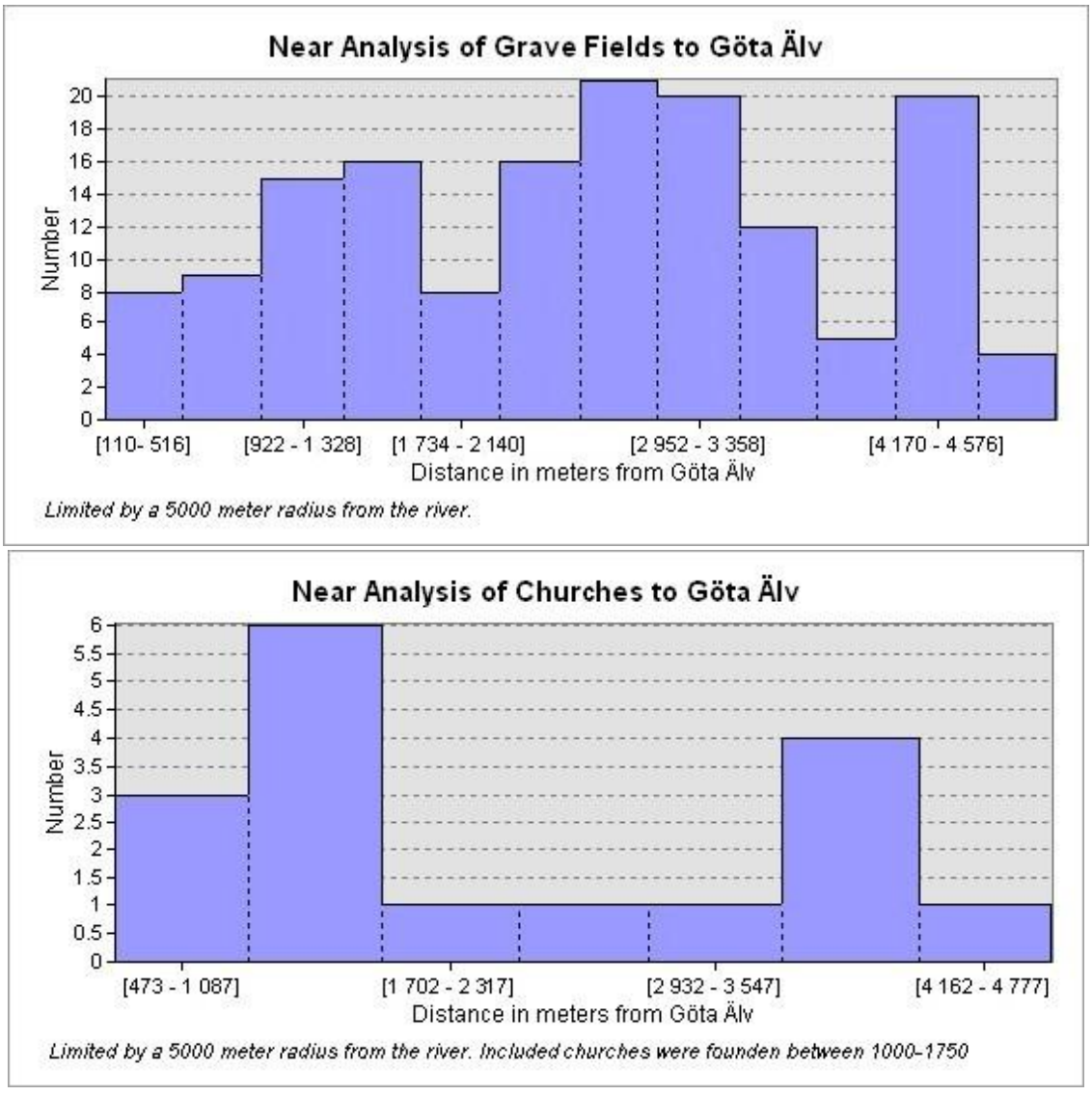


Table 2. Histograms showing the average distance between two categories of religious features and Göta Älv (Grave fields from FMIS, Churches from BeBR).

Table 2 shows that both grave fields and churches generally lie some distance away from the actual river of Göta Älv. A majority of both features lie more than 1 kilometer from the watercourse. There seems also to be no correlation between river proximity and church foundation, as most of the medieval churches lie more than 1.2 kilometers away. The only exception in this case is the 12th century church in the parish of Hjärtum, which lies 870 meters from Göta Älv. If compared to geographical spread of the features, the table above largely displays the great variety of locations within the whole river valley. A certain concentration of grave fields within less than 500 meters from Göta Älv (in total 8 features) is found around the estuary and the area of Kungahälla. Apart from this, the geographical spread is quite even.

6. Analysis: Ätran

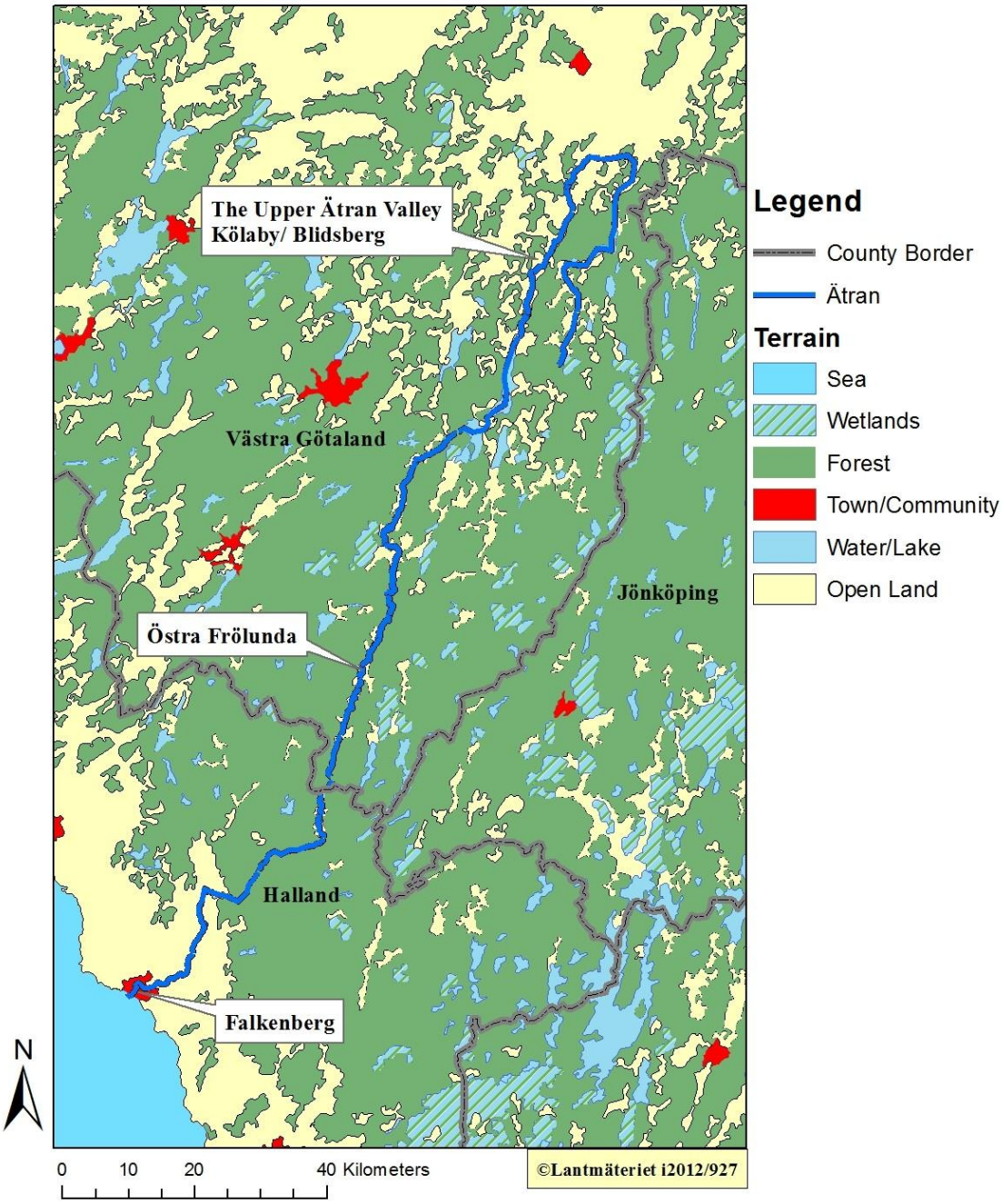


Figure 13. Map of Ätran showing the locations of the three case studies.

Ätran is one of the major rivers of Halland, and its drainage area covers 3338.561 square kilometers (SMHI). With its source in the inlands of southern Västra Götaland, it flows through a diverse region of natural and cultural heritage before reaching the ocean in Falkenberg on the west coast of Halland. In past times, this area was a border region between different settlement

centres – the Ätran valley was one of the few natural links between the coast and the central inlands of Sweden. During the Iron Age and onwards, the highland through which Ätran flows seems to have constituted a natural border, only scarcely populated (Appendix 2, Figure 3.)

For many years, the border region between the counties of Västra Götaland and Halland figured as the border between Denmark and Sweden. The relationship between the Nordic countries was tense during the whole Middle Ages, and the aggressions continued more or less till the end of the 17th century. Subsequent Danish and Swedish invasions and raids pestered the border regions with only limited periods of peace (Wahlöö et. al 2003: 9-11). Halland was incorporated into Sweden from 1645 and onwards, after which the border region of Ätran became a much more stable area. This chapter starts with the definition of the natural preconditions from which human society in this river region was formed, and then continues to explore the three case studies connected to Ätran: The Upper Ätran Valley, Östra Frölunda and Falkenberg (Figure 13.).

6.1 Natural Preconditions

At its northern source, Ätran is a rather small river meandering through a flat landscape. After reaching the lake Åsunden however, Ätran has cut a road through the highlands, surrounded by more steep topography. As a result, the further south the river flows, the more water is added to its flow. The average water bearing recorded at the station "Yngeredsforsen", close to the community Ätrafors, is almost 8 times higher than the water bearing at Hillared, just southwest of Åsunden (for details see Appendix 2, Figure 2.). Ätran follows the course of an older glacial river, which can be seen on the soil map from SGU. As a consequence, the river valley is in most parts filled with glacial alluvial sediments – i.e. a range of rounded particle types which can be diverse in size. Depending on local topography the size of the transported particles varies, and can in places reach a quite significant depth (Nilsson 2003: 7-8). The amount of rapids on Ätran also varies depending on the landscape. In the uplands, the variation in speed of flow is higher than in the lowlands, and it is on the border between these differing topographies that rapids are the most common. This affected the past communication in the area, where the slowly flowing Ätran on the lowland plains of Halland was unsuitable – if not impossible – to ford. Still in the 18th century, there were only two effective crossing places on the southern watercourse (Carlie 2004: 18-22), which illustrates the difficulty to construct effective methods of river crossing on Ätran. This is also emphasised by an old verse, saying that Ätran claims twice as many lives as the neighboring rivers Nissan and Lagan in unison (Rollof 1977: 198).

In recent times several dams and hydroelectric plants have changed the flow of water in the southern Ätran valley and the exact historical course of the river is hard to estimate. The picture seen in historical maps seems to indicate that the upper course of the river has remained largely intact since the mid-17th century (see for example the map of Blidsberg O3: 71-72). Modern alterations – among them ditching, drainage of marshland and obstacle clearing – along with a changing climate have caused the river to flood rather severely during the last decades. An untouched natural river system normally floods every 3-5 years (Kling 2007), but a higher frequency of large floods has recently caused problems in the communities surrounding Ätran

(Borås tidning 2012). This problem was not common in the past, when more water could be stored in the wetlands of the valley and dead wood often obstructed the watercourse (Kling 2007: 7-16). However, the 17th century maps shows a heavily deforested landscape surrounding Ätran, especially to the south of the lake Åsunden, where heather moors covered a large part of the land (e.g. Torpa: 88-89, O1: 13-14). This process began already during the Late Iron Age (Wallin 2004: 52-54) and dead wood in the channel of Ätran cannot have been common during the most of the period covered in this thesis.

6.2 The Upper Ätran Valley – Kölaby and Blidsberg

The upper reaches of Ätran is highly different from the area surrounding the estuary and Östra Frölunda. Here, rather uncharacteristically, the river meanders through a flat landscape with several marshlands and cultivated fields. As seen on the map (Appendix 2, Figure 7) this area was central in the Iron Age society of the region, with a clear correlation between grave fields and the river. During the Middle Ages, the ancient road "Redvägen" or "Ätranstigen" followed the course of Ätran. This road was used several times to transport Danish and Swedish troops during times of war (Andersson 1992). During the Early Modern period, traditionally a period of Swedish expansion, the area north of Ulricehamn is characterised by a diverse range of secondary agrarian resources – such as hop yards among other things. As shown by the analysis beneath these villages are places with a rather long continuity, and in certain aspects deviates from the common pattern of the Ätran valley.

6.2.1 The Late Iron Age

The upper Ätran valley is a region rich in archaeological remains, and continuous settlement can be traced from the Bronze Age and onwards. Iron Age graves from the whole period seems to indicate a similar pattern of settlement localisation, and graves from the younger period are often found built on top of older burial features, such as flat graves. Two concentrations of grave fields are found in Kölaby and Borred (Artelius 1993: 10-13), but there is also a constellation near Blidsberg. The general settlement pattern of the area is further emphasised by the rune stones, which at large correlates with the grave field geography. There are a comparatively large number of rune stones in the upper Ätran Valley, a feature which is otherwise not common in Västra Götaland (Selinge 1997: 58). Only one of the rune stones can be clearly tied to the Christian period (RAÄ Bjärka 7:1), whereas many others refer to travels in the east. Only two rune stones (RAÄ Dalum 10:2, Ulricehamn 21:1) mention travels to the west and three (RAÄ Böne 2:2, Norra Åsarp 2:1 and SRI Vg 183) refer to the construction of bridges (Svärdström 1958: 308-335).

The settlement pattern in the upper Ätran valley thus has a long continuity, where people for various reasons have found the area suitable for cultivation. Grave fields in Kölaby indicate that the area was inhabited by a large variety of social classes, and excavations have uncovered both humble and rather luxurious grave goods – although nothing remarkable. Continental contacts are illuminated by silver coins from both eastern and western travels (Artelius 1993: 95-97), which indicate along with the rune stones that this region – at least during the Viking Age – was

not an isolated cultural centre. This is further supported by the discussion concerning the Christianisation of Sweden, which is first assumed to have begun in the central parts of eastern Västra Götaland. According to Carlsson (2007), the Christianisation of this region originates from contacts with Denmark, most likely via the large river valleys between Västra Götaland and Halland (Carlsson 2007: 165-66).

6.2.2 The Middle Ages and onwards

Both Blidsberg and Kölaby are illustrated on 17th century maps (Blidsberg O3:71-72, Kölaby O3:46-47), showing a system of strip fields which might indicate a Late Iron Age origin. The meadows of Kölaby covers mostly dry land close to the river. In Blidsberg, the meadows are more widespread, but also concentrated to the river and connecting streams. The meadows were highly valuable to the farms of the Ätran valley, and usually covered more land than the cultivated fields. This was a direct result of the dominant one-field system – also illustrated on the map – which required a large amount of manure and consequently extensive meadows (Hansen 1997: 29). Bridges crosses Ätran at both Kölaby and Blidsberg, and the river has also been used extensively for water milling. Both locations contain farms named "Stommen", whose area of ownership is distinctly tied to the river. Kölaby contains 8 household, and Blidsberg 15 which is enough to indicate a Late Iron Age or Early Medieval origin of both villages.

A detailed comparison between the 17th century land use of these two villages and the soil geology data from SGU is not possible, as the region for some reason is not included in the detailed data set. The only information available is that these villages, along with their fields and meadows, lay on top of glacial alluvial sediments, which includes many different types of transported material. This general information does not give any details on the postglacial deposition of the river Ätran.

Figure 14. Blidsberg church (left) and Kölaby church (right). Illustrated on maps from the early 1640s (Blidsberg O3:71-72, Kölaby O3:46-47).

The present churches at Blidsberg and Kölaby were built in the 19th century (BeBR), but the 17th century maps illustrate the older church buildings (Figure 14.), which seems to be of medieval origin. Kölaby church is a clear example of a romanesque building, with a rounded

choir and a square tower. Blidsberg church seems to be a gothic construction, with no traces of a secluded choir. The tower is pointed and might be an indication of an earlier romanesque building (as shown in Halland by Nilsson 2009: 255-58), especially as few towers were reconstructed during the period of Gothic architecture (Bonnier 2008: 142-44). In general, Västra Götaland's churches were built between the 11th and 13th centuries, and it is therefore highly likely that the church at Blidsberg has romanesque origins. Very few gothic buildings were built in this region during the High Middle Ages (ibid.: 164), in which the parish structure of Västra Götaland was founded.

Ätran has been used for milling during the early 17th century, at several locations; something which is common in this region during the period and also illustrates the differences between this area and the border region of Östra Frölunda. At Blidsberg, 8 water mills of unknown type are located in Ätran, and most of these ran all year round. The map of Kölaby does not show any mill in Ätran itself, although a minor stream has been used for milling during autumn and spring. Further upstream a mill stands in Ätran on the riverbank opposite of Kölaby's meadows (Kölaby O3:50-51). Water mills were mainly – like the mills seen in the maps of Blidsberg and Kölaby – used for household purposes, and were introduced to Sweden during the Middle Ages (Nilsson 2010: 29). According to Sven B. Ek (1962) both small and large water mills[9] existed in Sweden and Denmark to a limited extent before the 13th century, but first appear in more common contexts during the 15th century (Ek 1962: 99). However, this is perhaps only the result of the limited nature of the written source material.

6.3 Östra Frölunda

The village of Östra Frölunda lies in the middle of the border region between Halland and Västra Götaland. During medieval times, this village was the centre of Östra Frölunda parish, which first clearly appears in a letter from 1375 (SDHK nr 10634). Östra Frölunda has been selected for closer analysis mainly for its location and political importance during the late 14th century. This subchapter starts by searching for a prehistorical origin of the village.

6.3.1 The Late Iron Age

The neighboring area of Östra Frölunda is defined by continuous traces of prehistorical communication and settlement. Several bronze age cairns follow the course of the river valley, and are located close to graves of a traditional Iron Age type (graves of various forms covered with stone and stone circles). Both Bronze Age and Iron Age burial customs in the area seem to follow contemporary pathways of communication, and graves of different types are commonly found connected to modern roads (see Appendix 2, Figure 8.). Whether this reflects a continuous system of roads, or just the spread of prehistoric settlements cannot be known at this point.

An exact picture of Late Iron Age settlement in the area surrounding Östra Frölunda is difficult to produce, for a number of reasons. The Iron Age graves found in this region are of types that

[9] "Large" and "small" water mills in this thesis have been defined according to the Swedish terminology. A large water mill is called "hjulkvarn" in Swedish, which basically is a water mill with a vertical wheel. A small water mill is called "skvaltkvarn" in Swedish, which is a water mill with a horizontal wheel.

have traditionally been connected to the Early Iron Age. A Late Iron Age burial practice dominated by mounds is simply not represented in this area. According to Selinge (1997) this illustrates that the relatively mobile settlement system of the Bronze Age continued into the early Iron Age, shown by the correlation in grave locations between these two periods (Selinge 1997: 54). However, considering the natural soil foundations of the region – where moraine dominates the landscape – the ability to construct traditional grave mounds is highly limited (see Appendix 2, Figure 9.). Building material would have to be collected from limited parts of the river bed, transported over huge distances or extracted through an exhaustive clearing of moraine soils in order to raise a mound similar to the graves found in central Västra Götaland.

However, the exact distinction between mound and round stone filled graves is not entirely clear, and a great variation can be observed in the landscape. In southern Småland – where the natural conditions are very similar to the central Ätran valley – round stone filled graves are common within late Iron Age contexts. To distinguish the late from the early period it has been suggested that grave fields containing a larger number of graves can be tied to Late Iron Age settlement (Hansson 1999: 52-53).

There are no grave fields in connection to Östra Frölunda, and the only remains of Iron Age burials in the area are two stone circles in the northern part of the village (RAÄ Östra Frölunda 15:1-2), and six loosely connected graves almost 3 kilometers to the southwest (RAÄ Östra Frölunda 58:2, 58:4-5, 59:1-2 and 60:1) – the latter lie in clear correlation with two Bronze Age cairns. Instead, the only relatively solid evidence of late Iron Age activity within the vicinity of the village, seems to indicate that the nearby farm of Torsvi, by the tributary river Lillån, was settled (Figure 15.). However, considering the problematic nature of the traditional ideas of Late Iron Age settlement culture, the pattern produced is most likely highly simplistic.

The retrogressive material provided by the historical map of Östra Frölunda from 1732 (0226-8:6) shows a village with in total 4 households, which is not enough to indicate a pre-medieval origin. However, the map also shows fields and meadows belonging to what must be a recently abandoned farm, raising the number of households to 5, which is within the limits of a pre-medieval settlement. The village boundaries, taken from a 19th century geographical map called "Häradsekonomiska kartan" (J112-25-25), have a relative "boundary radius"[10] of 2.5 kilometers. Tollin (1999: 190) has shown that this is a measured radius often tied to settlements with a medieval origin. The origin of Östra Frölunda is thus somewhat ambiguous in character, and considering the unreliable nature of the archaeological remains in the area it is impossible to say with any certainty that the village existed before the Middle Ages. If viewed traditionally, Östra Frölunda could be seen as a resettlement of lands which were abandoned during the middle of the Iron Age.

[10] "Boundary radius" is a translation of Tollin's term "ägoradie", which refers to a measurement from the central area of a settlement to the most distant boundary mark (Tollin 1999: 35).

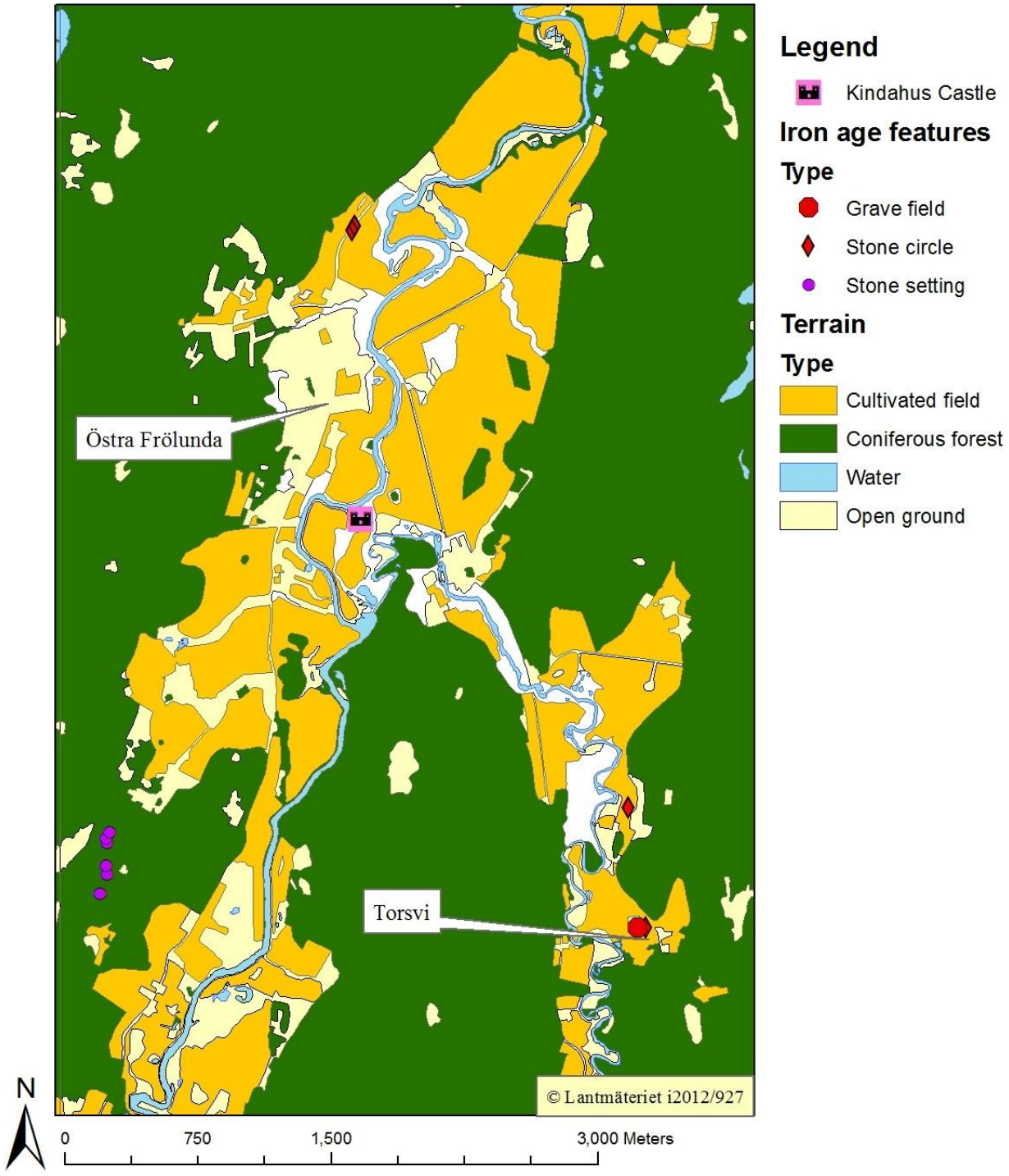


Figure 15. Map showing the Iron Age features in the area close to Östra Frölunda. The grave field at Torsvi RAÄ Östra Frölunda 11:1, with 7 features of different types – including an oval stone circle, a trident formation etc. – can be classified as a Late Iron Age settlement, according to traditional ideas.

6.3.2 The Middle Ages and Beyond

During the Middle Ages, Östra Frölunda became a place of significant strategic importance, which was marked by the construction of Kindahus Castle sometime during the High Middle Ages. Kindahus has been as Swedish royal castle (Ekre 1992: 109) and first appears in the Chronicle of Erik (Erikskrönikan, written during the 1320s) where a Danish army stayed at or laid siege to the castle sometime between 1306-1307 (Jansson 1991: 116-117, Andersson 1997: 110). The strategic importance was, according to Andersson (1992), the result of the communicative values of the Ätran Valley, through which the old road "Ätranstigen" (being the same as "Redvägen" described in the chapter above) penetrated the landscape towards the inlands of Västra Götaland. This road was used several times to transport Danish troops into Sweden, and the construction of Kindahus Castle should be considered a mainly military action (Andersson 1992: 169-72). Figure 16 shows how Ätran has been used for tactical purposes, where the river itself constitutes the northern moat of the castle. Clearly, there is a certain defensive tactical emphasis directed towards the southeast, which is indicated by the directions of the moats as well as the remains of the southeastern tower, guarding the entrance. The innermost space of the castle, which was most probably the location of the main keep, is directed towards the river. Ätran was thus not considered a weak point in the defensive system. This meandering part of the river – where the flow of water is generally slow – was difficult to ford (Carlie 2004), which in turn meant that a crossing would have required the use of boats, a rather hazardous enterprise under military circumstances.

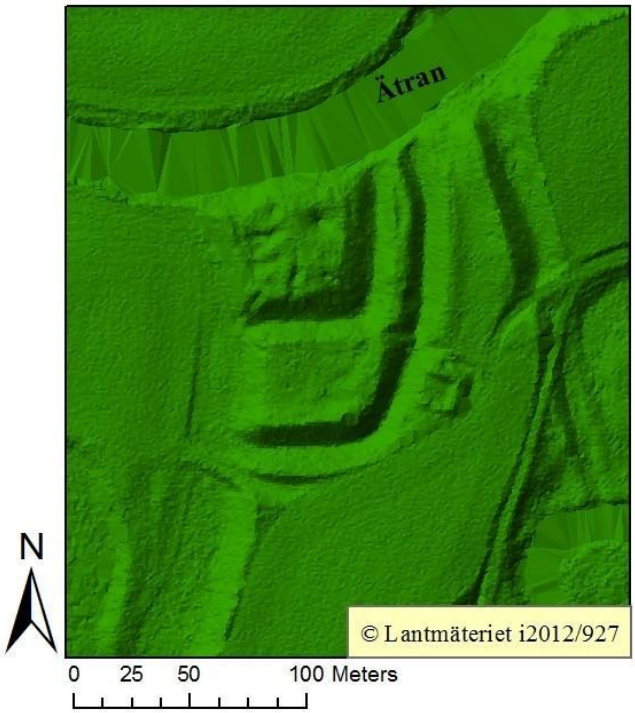


Figure 16. LIDAR model of Kindahus Castle. Note how the river has been a feature included in the defensive system of moats.

Another interesting factor connected to the establishment of Kindahus Castle is the iron production in Västra Götaland, especially in neighboring Tranemo where a high concentration of bloomeries can be seen. This production began during the early Viking Age and continued till the middle of the 14th century. According to Englund (2002), this iron production was the result the Danish market, and a large part of the resources were shipped to central Denmark. From the Late Middle Ages the Danish iron making industry was instead concentrated to Halland and Scania (Englund 2002: 356). In this context, the construction of Kindahus Castle – which is assumed to be of Swedish origin – becomes interesting. The castle was built in the period when the iron production of the area began to recede, raising the possibility that this was the result of a Swedish strategic counteraction. Preventing a source of Danish iron – which was presumably transported by land or water down the Ätran Valley – the construction of the castle led to a decreasing production.

While there is no direct evidence with which to discuss the medieval settlement in Östra Frölunda, a map dating from 1732 (see Appendix 2, Figure 10 and 11.) shows some elements that can be retrogressively studied. First of all, the farm named "Storegården" on the map seems to indicate a previous household of some stature. The land directly owned by this farm was not mapped by the surveyor in the 18th century, which is evidence of its unique status in the village. Although uncertain, this might indicate a manorial farm, perhaps formed during the foundation of Kindahus Castle, or earlier. The farm named "Stommen", which in 1732 was owned by the local priest, can perhaps be traced back to the formation of Östra Frölunda Parish sometime before 1375 (SDHK nr 10634). This has been indicated under similar circumstances elsewhere (Tollin 2010: 58) and is also supported by the architectonic features of the church illustrated on the map. The map shows a gothic church with a single hall, giving the building a relative dating between 1250-1350 (Bonnier 2008: 145-55). In addition, the long central field strips seen in the map (in Swedish called "bandparceller") has within the same hundred (Kinds härad) been dated to the late Iron Age (Hansen 1997: 31). It is therefore relatively safe to assume that these fields also existed during the medieval period.

The medieval and later land use can to a certain extent be analysed through this retrogressive material. Assuming that farming at both "Storegården" and "Stommen" was active during the Middle Ages, it is highly likely that the land use seen in the map from 1732 has a long history. What becomes clear when analysing the digitised map (Appendix 2, Figure 11.) is that the infields were aligned in a south-north direction along the western riverbank. The meadows were especially tied to the river, and were highly important resources in the household economy of the region. A large majority of the meadows in Östra Frölunda lay on glacial alluvial sand, but there were also some parts of the used land which was covered in postglacial flooding sediments (SGU).

6.4 Falkenberg and the estuary region of Ätran

The southern Ätran valley is rich in archaeological remains, and seems – along with neighboring areas – to be a central region of Late Iron Age culture. The area has been cultivated since the Neolithic period, with an almost equal amount of cultivation in both coastal and inland areas until the forests regrew sometime during the Middle Ages. The Iron Age can be characterised by extensive agricultural expansion, where the landscape was transformed, e.g. by the forest colonisation. During the period studied in this thesis, heather moors also expanded in Halland, as a result of deforestation and increased grazing (Wallin 2004: 52-54).

The town of Falkenberg was originally the site of a castle, from where several high noblemen exercised their power. Ätran also served as a border between the two Counties of Halland, of which the northern one reached a form of temporal sovereignty during the 14th century (Rosén 2004: 338-41). As described above, the province of Halland was under Danish rule until 1645, and is usually described as a poor region in the historical source material (ibid.: 351). The region is thus the object of many changes during the studied period, and structures are difficult to trace. This is further complicated by the aspect of Halland's mobile medieval villages, where the settlement had been relocated to improve cultivation standards as the necessity arose (Håkansson 2004: 286). Falkenberg and the estuary of Ätran is an area which summarises a diverse history of change, and has therefore been selected for closer analysis.

6.4.1 The Late Iron Age

The prehistory of this region is tied to the river in many ways. During the Neolithic Period, most settlements can be found in direct contact with the riverbank. From the Bronze Age and onwards, a change can be observed where the settlements have moved further uphill from the river. The wet riverbanks were, according to Carlie (2004), most suitable for meadows and greenyards, while the land above the riverbank was used for farming (Carlie 2004: 16-18). A rough sketch of the Late Iron Age settlement pattern can be produced through a map of grave fields and mounds in this region (Appendix 2, Figure 12.). The map shows that the settlements close to present day Falkenberg cannot be tied in any particular way to Ätran itself, which at large corresponds with the ideas of Carlie. Northeast of the estuary, where the lowlands give way to a highland topography, the settlements can be more easily tied to the river.

A central settlement in the area surrounding the estuary was Stafsinge, where silver hoards and two large long houses have been found. The houses have been C14 dated to somewhere between 1000-1200, and the archaeological material indicates a settlement with a complex set of internal relationships (Rosén 2004: 329-30). Other places, such as Faurås and Vinberg became so called "Kungalev" (royal manors) during the Middle Ages (ibid.: 330) and these can be tied to a relatively high concentration of burial mounds – something which in turn indicates a Late Iron Age origin. Although most of these sites cannot be clearly tied to Ätran, they often lie on slopes overlooking the main watercourse.

However, some of the settlements had graves in close proximity to the riverbed. One of these is RAÄ Vinberg 5:1-2, with two Late Iron Age burial mounds which lies on a slope about 250 meters from the banks of Ätran. A viewshed analysis shows that the mounds have a clear visual

connection with the surrounding river valley (Appendix 2, Figure 13.), and also that surprisingly distant burial mounds and grave fields are visible from this location – some more than 8 kilometers away. A total of 25% of all burial features seen in the map are visible from Vinberg 5:2. While this visual result is not remarkable, it emphasises that intervisual contact was not entirely unimportant. The viewshed analysis also serves as an example in illustrating the visual relationship between the Late Iron Age settlements of the area and the river.

According to Carlie (2004), the communications in this region have been determined by the waterways, which have constituted natural obstacles. Contacts in the south-north direction were dependent upon reliable fords, which were relatively uncommon in the estuary region of Ätran. At least during the Early Iron Age, only the rapids of Vessige and Falkenberg were places where an effective fording could be secured (Carlie 2004: 22).

6.4.2 The Middle Ages and Onwards

During the Middle Ages, Halland in general became a theatre of political importance. The province was divided into two counties – a northern and a southern – and Ätran constituted the border between these regions. In the early years of the 14th century, the northern county assumed a sort of sovereignty – after years of political unrest - until 1326 when it was placed under the rule of Magnus Eriksson. In 1360 the county came under Danish rule once more (Rosén 2004: 338-40).

During these years of political change, the castle of Falkenberg was founded by the estuary of Ätran (Rosén 2004: 338) – on the south side of the river. The original settlement was rather small, and concentrated around the castle of Falkenberg, most probably based on an earlier royal manor of some sort which existed at least during the end of the 13th century. A castle was founded later, during the initial stages of the 14th century, and the location has been seen as a point of administrative and political importance due to its border function. This castle was used in military action during the 14th century, and was destroyed in 1346. The castle was rebuilt after this, but was finally razed during the rebellion of Engelbrekt in 1434, after which it was not reconstructed (Redin 1983). It has been argued that the settlement which existed before the castle can be tied to village supposedly named "Ätraby", which is mentioned in written sources 1313 (Dahlblom & Skoglund 2011: 42). Ätran has been discussed as a main factor affecting the localisation of this settlement, in establishing the foundation for oversea contacts and the fishing of salmon – a species which is still today common in Ätran – or herring (ibid.: 166, 184). However, no extensive evidence of a strong economic foundation seems to exist in the archaeological material. During the middle of 15th century, the *town* of Falkenberg emerges in the written source material, and later during the same century two locations of urban character existed in the area – called "The Old" and "The New" Falkenberg, of which the elder one lay closer to the estuary. Both towns lost their town charters during the latter half of the 16th century. However, the town of Falkenberg was given a common charter in 1582 (Redin 1983).

Little is known of the christianisation of this region. In BeBR, only one church (The Church of Falkenberg) has been dated to the 12th century, though most of the building is renovated. The parish structure of the region supports the idea of Ätran as a natural border, where the parish

borders follows the course of the river until it reaches the parish of Gällared, to the northeast of Falkenberg (Appendix 2, Figure 14.).

While the early cartographic material from this region is highly limited, the villages of Faurås and Höstena were mapped in 1692 and 1694 (Faurås M2:37-38, Höstena M2:54-55). The map of Faurås is poorly detailed, but indicates that the riverbanks were used as meadows. According to the surveyor, the meadows were dry but gave quite poor revenues. The surveyor writes, regarding the only farm to have been mapped, that no specific mill or fishing activity can be tied to it. Of the other farms that existed in Faurås, none were mapped and we presently know nothing about them. Höstena – which lies much further north – was obviously mapped with greater detail, although most of the land here also remains unsurveyed. The riverbanks were used for meadows of much the same quality as in Faurås, and salmon have previously been caught in the river, although not at the time of surveying. In total three natural springs are recorded on the map, which at the present are places of local tradition called "Höstena Källor"[11]. According to local tourist information, the largest – and the only remaining – of these springs have been called "bottomless" (halland.se). In the map, the stream leading down from the this spring (called "Ådrebrunnan" by the surveyor) exits into Ätran. These springs have also been noted in FMIS (RAÄ Ljungby 180:1) where a legend which refers to "boiling" water has been recorded.

The historical maps described above cannot be effectively georeferenced, due to the lack of detail. However, as their connection to the riverbanks still has been shown in the limited material – a land use also observed during the Iron Age (Carlie 2004) – the banks themselves can be geologically discussed. The riverbanks of the lower region of Ätran mostly consist of different forms of flooding sediments – which includes clay, silt, sand and gravel (SGU). As proposed by Carlie (2004), the wet nature of these soils provided a good foundation for cattle farming with its connected resources.

6.5 Chapter Conclusions

Although the written sources concerning Ätran are limited, the analysis above has shown that a closer analysis of the archaeological and historical geographical source material emphasises different aspects which cannot be clearly seen in the region of Göta Älv. To illustrate this I have beneath – apart from summarising the case studies above – also included some comparisons with other sites of the Ätran valley.

6.5.1 Natural Factors of Human Activity

The three case studies above have shown that the meadows of each village can be clearly tied to the riverbanks. Although the soil geology which served as foundation for these meadows varied in nature, they were all in some way connected to *alluvial* sediments. Of all the case studies, the region of the lower Ätran valley shows most traces of river soils in connection to meadows, with a high degree of flooding sediments. Although the historical development of such sediments has not been covered in this thesis, it is highly likely that flooding is an element which has affected the riverbanks during a long period of time. The meadows seem to have been

[11] "Källor" in Swedish means "natural springs"

dependent upon the regular flooding which occurs in any form of river system, and therefore this natural factor dictated the agriculture of the whole region. A sudden change in water discharge would have affected a large proportion of the settlements close to Ätran in a negative way. More on this later, as it connects to a broader discussion.

The watermills of the Ätran Valley have mostly been connected to the upper regions, where the natural factors have provided a good foundation for using the river as a power source. In Östra Frölunda, the only mill of the village makes use of a smaller stream which enters Ätran, but the large river itself was not suitable for milling. In addition to this, the milling industry of the upper Ätran valley must have affected the watercourse. The construction of a mill required certain changes to be made to a previously "natural" body of flowing water – such as the construction of dams and channels. This enterprise altered the flowing properties of the river, changing the speed of flow as well as the relative discharge. As seen in the Hjulström diagram (Figure 4.), this also changes the erosion and deposition of the river. Moreover, in such a place as the upper Ätran Valley – where mills presumably have been abandonded, constructed and rebuilt since the Early Middle Ages – the changes brought by mills to the river system have been active for many centuries. It has recently been shown by Walter & Merritts (2008) specifically that the *abandonment* of mills contributes to the reshaping of river morphology where sediments are built up behind the mill dams, which eventually breaks due to a lack of maintenance. This process of buildup and breaking of dams results in a much larger erosion and deposition pattern which eventually leads to a meandering morphology. Rivers which are affected in this manner have much higher riverbanks than what could be provided by the bankfull discharge[12] (Walter & Merritts 2008: 303). This can be related to the upper course of Ätran, especially to the north of Blidsberg where the river is characterised by many 17th century mills and a clear meandering pattern. Such a pattern would be natural in the estuary region of a large river but as described this is only in the beginning of Ätran where the river still has a comparatively small discharge. Ätran had obviously formed a heavy meandering pattern already during the middle of the 17th century (see for example the historical maps O3:10-11 & O3:96-97), which would then indicate that the river had already been the object of extensive milling for quite some time. However, the meandering pattern could also be a natural development and it is not possible to say to what extent full mill dams existed during earlier centuries on the locations studied in this thesis. Different sorts of dams were common in connection to both small and large water mills, but side channels were *also* common (Ek 1962: 8-10, 92) which would perhaps not leave as clear a mark upon the natural character of the river. Nevertheless, dam accidents where not uncommon during the Middle Ages and appears in several provincial laws from the period (ibid.: 92). The issue of the contribution of milling to the geomorphological development of Ätran is highly interesting and should thus be discussed. It would be rather strange if major milling activity of at least the Early Modern period did not leave any clear mark upon the riverine landscape.

[12] The bankfull discharge is a term referring to the level of discharge when the river channel is completely filled. An even higher level of discharge leads to flooding, which consequently results in the deposition of sediments above the riverbanks.

6.5.2 Economic factors of river use

During the whole period studied in this thesis, Ätran seems to have flowed through a valley which in many ways was based on a primarily agrarian economy. The only clear exception is Östra Frölunda and the area immediately to the north of the village, which was connected to the iron industry in present day Tranemo – an industry with Iron Age origins. The topography has once again dictated the rules of economic life in the valley of Ätran, where the villages in the border region between Västra Götaland and Halland – where Tranemo and Östra Frölunda are located – due to its highland nature and largely moraine soils became more engaged in secondary resource production. The 17th century farms of the region obviously used their cattle-based economy in this manner and paid their taxes partly in butter (see for example Torpa: 86, O1: 11 and O1: 16). In Buttorp (Torpa: 88-89) the butter was produced in a large watermill located in Ätran, a quite uncommon feature in this part of the river. This shows that the river in many ways was central to this secondary resource production, and not just in its relation to the meadows. The watermills of the upper Ätran valley also illustrates that the river was a considerable agent in defining the economy of the surrounding settlements. How these mills affected the society on the long term is not however easily analysed. Apart from this, Ätran does not distinguish itself as a central economic entity. The river seems instead to have played a more important ideological role, based on its communicative values. This is manifested in the town of Falkenberg, which was not founded on economic purposes – as compared to Kungahälla and Lödöse. Of course, the town in itself channeled the local economy, but cannot be tied to any extensive economic river use.

6.5.3 Ideological aspects of river use

The ideological aspects of Ätran are distinctly tied to the communications of the river valley, in which the river has formed the base of contacts and travel for many centuries. It is easy to imagine that the river could have been used for water based transport – as it is one of the major rivers of southern Sweden – but no clear evidence of such river use has been shown in this study. This is most likely related to the fact that Ätran – in contrast to Göta Älv – stretches across a wide variety of topographies, with many waterfalls and rapids. Nonetheless, the river has carved out a valley which for many centuries served as a connection between the inlands of Västra Götaland and Halland. The road of "Ätranstigen" played an important role in the shaping of the societies of both Counties. Although the history of this road remains rather unexplored, the rune stones in the upper Ätran Valley indicate that it might have been used for travels to the west during the Viking Period. The striking correlation between prehistoric burial features and the modern road system shown in Appendix 2 Figure 8 also gives the impression of a long lasting communication structure. Ätranstigen was a strategically important road during the Middle Ages, illustrated by the castle of Kindahus in Östra Frölunda. The notion raised by Carlsson (2007) – concerning the christianisation of Västra Götaland – also shows that the road might have been used for more non-military communication.

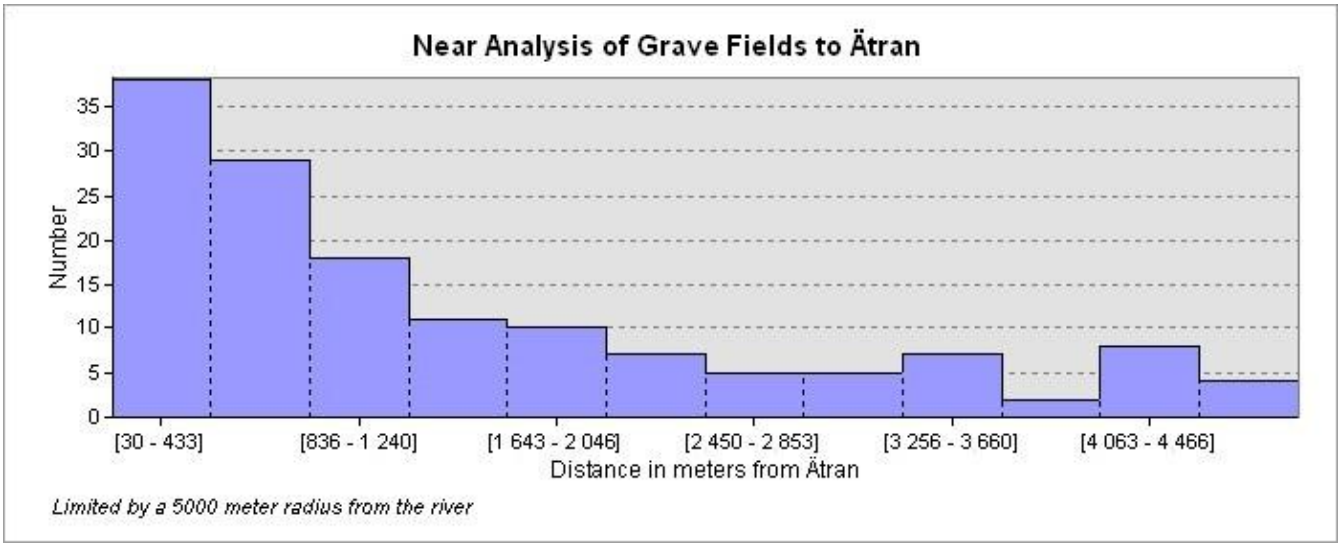
As shown by Carlie (2004), Ätran affected cross-river communication already during the Iron Age. The borders of our contemporary parishes may in some ways reflect the prehistoric

communicative limits of the river (Appendix 2, Figure 14). Although the exact borders of a parish may not be a structure engraved upon the landscape, the medieval parish formation was most likely built upon pre-existing patterns of daily communication. Ätran dictated the rules of casual contact for the people living in its vicinity – where crossing the river was dangerous or complicated the physical interaction between the inhabitants of the opposite riverbanks was highly limited. The region immediately upstream of Falkenberg was such an area, and the ford at present day Garvareforsen became a tunnel of north-south communication. In some of those places, were the meandering pattern of Ätran is particularly clear or where the river is wide, the parish border follows the course of the river. However, in the upper Ätran Valley – in which the river's meandering geomorphology is similar – the parish borders are not connected to the river. This indicates that cross-river communication in the area was not limited during the period of parish formation. As shown above, the river geomorphology of this region may have been radically altered by the introduction of mills during the Middle Ages. The previous watercourse may have been more suitable to cross on foot, with a more limited sediment deposition. Thus it is possible that the medieval parish structure, in connection to the river, in some ways reflects the possibilities of pre-Christian – or at least pre-parish – regular communication. This relationship – founded on the preconditions of nature in the area – later shaped the ideological and administrative functions of the river valleys. As argued by Claes Theliander (2005), the inlands of Västra Götaland converted to some sort of Christendom during the middle of the 10th century, before the church gained an administrative power over the region. Religious parishes were formed in a "spontaneous" manner, without connection to missionaries or church officials (Theliander 2005: 350), which also supports the idea of organically formed parish structures based on communicative patterns. The rune stones of the upper Ätran valley should also be mentioned in this context, as they refer to the construction of "bridges". However, such bridges often referred to rather simple constructions and "road-like" features across wetlands and marshes, which is why they cannot be seen as the equivalents of more "modern" bridges (Haverling 1996: 25, Andersson & Nordberg 2009).

Table 3 shows the general correlations between grave fields and churches in their distances to Ätran. Both features have a quite clear connection to the river, and a majority lies within a distance of less than 700 meters. All the churches included in the table have been founded during the Middle Ages, according to BeBR most likely during the 12th century. Thus no clear correlation between church age and river proximity can be seen.

Considering the more regional spread and geographical aspects of the table above, the prehistoric graves by Ätran show a rather greater diversity in location. In the upper reaches, in the present day county of Västra Götaland, there is a rather clear correlation between Late Iron Age burials and the river. The middle region of Ätran, where Östra Frölunda lies, is difficult to analyse due to the problematic nature of the Iron Age graves of the area, and very few typical graves of the Late Iron Age can be found here. By the estuary region close to present day Falkenberg, many grave fields are found with a visual connection to the river course, but are otherwise generally located some distance away from the actual water. A similar situation

emerges when looking at the medieval churches of the studied area. The upper Ätran valley shows a striking connection between Ätran and the parish churches. This also applies to the cultivated fields owned by the priests of these churches, at least during the Early Modern period, which often laid in more or less direct connection to the watercourse. Östra Frölunda displays a similar pattern, but the area surrounding Falkenberg does not.



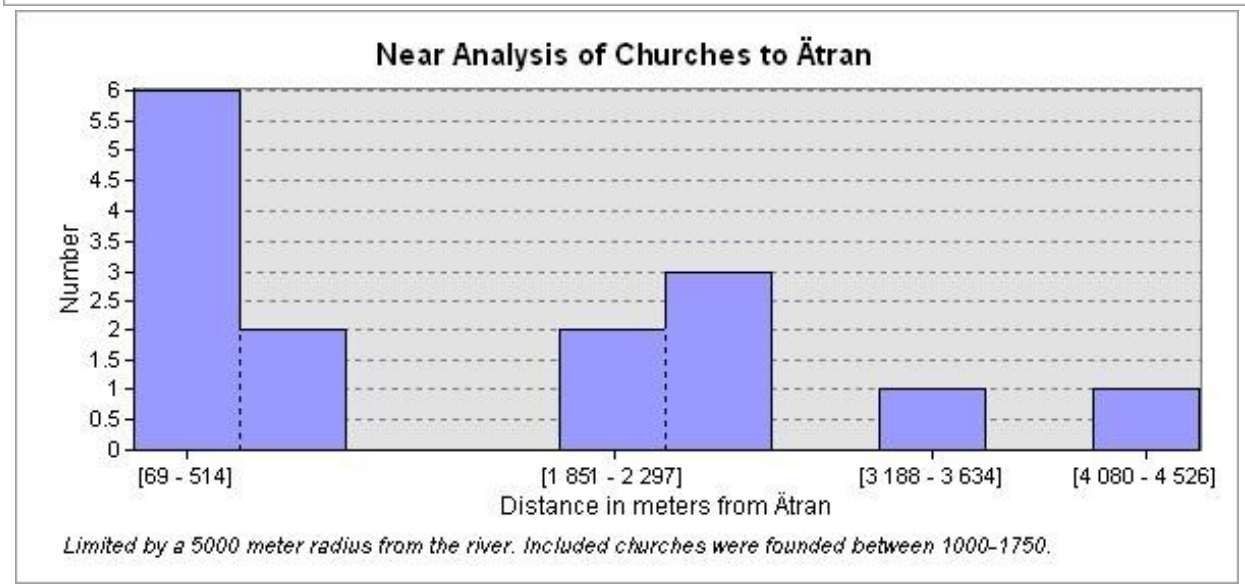


Table 3. Histograms showing the average distances between two categories of religious features and Ätran (Grave fields from FMIS, Churches from BeBR). The three churches of Kölaby, Blidsberg and Östra Frölunda are not included in the table, as these are not present in BeBR. A larger study including the churches seen in the cartographic material would provide a fuller picture.

7. Characterisation of the River

In Chapter 3 I outlined the methodological structure of this thesis, concerned with three categories of river interaction: nature, economy and ideology. This structure has been carefully followed in the investigation of the case studies described above. However, in order to delve deeper into the problems and possibilities of riverine historical research a more holistic approach should be used. A river – according to the theoretical approach adopted in this thesis – should not be seen a simple natural entity, used and exercising its agency according to strict categorical definitions. Rather, the uses of a river – like that of most landscapes – are *connected* to each other in a complex scheme of interaction. E.g. the symbolic value imbued upon a river may not only be connected to religion or popular beliefs, but also to the natural characteristics of the river or its economic values. This is a somewhat complicated discussion, which can only incorporate certain aspects of the above study which has proven more useful than others. Thus this chapter and the chapter that follows compare the two river systems in a more general way, trying to put the discussion into a more widely usable context. However, before engaging in such a specific yet wide argumentation, a short interpretational summary of the methodological categories and the periods investigated in this thesis should be presented.

7.1 Categories

The categorisation involved in the methodological construction of this thesis has proven highly valuable. Such divisions of the material make the study more easily accessible, not the least because the sources used are quite numerable. It also shows – in ways which have been discussed in the following subchapter – that this categorization in itself raises the complexity of riverine material and its associated agencies. This subchapter tries to summarise the methodological results in an interpretative way, to further connect the following discussion with the analysis of the two river systems (Chapter 5 & 6).

7.1.1 Natural Factors of Human Activity

Göta Älv flows through a valley which to a large degree is filled with more or less thick layers of clay. This has provided certain preconditions to human life, by defining the dangers involved in living within the valley – landslides, floods etc. – as well as being the foundation of agricultural life. Variations in water levels have most likely affected the agriculture of this valley, which is why many meadows – as opposed to cultivated fields – are found in close connection to the water. A similar picture has been produced in the Ätran valley, where the same connection can be seen between the meadows and the river. Cultivated fields were almost never found in direct contact with the riverside. However, Ätran has not been a danger zone in a manner similar to Göta Älv. Flooding levels could have brought a certain degree of caution to the settlements surrounding the river, but there seems to have been no imminent risk of landslides.

Both rivers have also been used for water power during the Medieval and Early Modern periods, but the role of nature in defining the preconditions for such industries varies in the two valleys.

Milling on Göta Älv seems to have mostly concentrated to the falls at Trollhättan, where the waterfalls have been the precondition of the industry, requiring small alterations to be utilised effectively. The upper Ätran valley – where most water mills were found – did not have any waterfalls of a size comparable to Trollhättan, and an effective milling industry thus required larger river alterations. Later, this may have completely reshaped the geomorphological pattern of the river.

7.1.2 Economic factors of river use

What both the rivers have in common in economy is that the flowing water has generated the foundations of secondary resource production. In the Ätran valley this is manifested in the production of butter, perhaps using the water mills as shown in one example, and perhaps the Iron production of the Early Medieval Period in Tranemo which was presumably transported on the road "Ätranstigen". In the Göta Älv region, the use of the river as an important waterway connected the towns of the valley to international as well as local trading patterns. At least from the Late Middle Ages and onwards, the forest industry became a central secondary industry to the settlements surrounding the river, as illustrated on the 17th century map of Åkerström. This map, along with the map of Lödöse, shows that Göta Älv also functioned as an economic entity on several levels, both locally, regionally and internationally. This can be opposed to Ätran, which economic functions were more tied to local settlements than to long-distance communications – with a few exceptions. In the valleys of both Ätran and Göta Älv, cattle farming seem to have been the most central agrarian resource, at least from the Middle Ages into the Early Modern period. The historical depth of this agrarian land use is further argued in the chapters below.

7.1.3 Ideological aspects of river use

Both Ätran and Göta Älv have functioned as borders in some way, although not in an entirely similar way. Göta Älv has – similar to its economic functions – served as a border on both the local, regional and national level at least since the middle of the Medieval period. How this border affected the settlements of the valley is a complicated issue, although the region has been seen as a cultural unity at least during the prehistoric periods. It is my opinion that this oversimplifies many things, and the river should have served a separating function – at least locally – even during these periods. The river was obviously impossible to ford and while boats may have been in common use by the locals, cross-river daily communication must still have been rather limited. Ätran's lower reaches served a separating function in this manner during the Iron Age, where the meandering parts of the river limited the communications of the area – something which is to certain extent still reflected in contemporary parish patterns.

The ideological importance of the river systems in question seems to be mostly connected to these communicative functions. During the Iron Age, several hill forts on the hills and mountains overlooking the Göta Älv valley emphasise that such ideologies were also present in the prehistoric periods, and the both rivers are connected to *visual control* during the Iron Age – also

considering the visual capabilities of several grave fields. It is impossible to know if *physical control* was also considered important during this period. This is instead manifested during the historical periods, when several castles – e.g. Ragnhildsholmen, Bohus, Falkenberg and Kindahus – are established with a direct physical connection to the rivers. These castles gave their inhabitants a certain power over the communicative values of Ätran and Göta Älv, something which was obviously considered important.

The symbolical values imbued upon the river in question have been difficult to capture, not the least for the Late Iron Age. In general terms, Ätran was seemingly more connected to religious features (Iron Age graves and Medieval churches) than Göta Älv. In both river valleys certain regions are found which have been central in Iron Age society. The estuary of Göta Älv is such a place, and a larger quantity of Iron Age burials can be seen in closer proximity to the river – if compared to Trollhättan on the upper reaches. However, no other area of study has sported the same Iron Age riverine burial connection as the upper reaches of Ätran, where a close connection between medieval churches and the river also can be observed. Whether this in fact reflects some sort of religious symbolism is difficult to ascertain.

7.2 Patterns of Character

The observant reader will have already noticed that certain aspects of river use have proven more valuable than others in this study. It is clear that this subject raises questions of interest, and in the written text above I have raised some thoughts which cannot be covered in their entirety within the limited pages of this thesis. As these thoughts are not clearly connected to the research questions posed in the Introduction chapter, I have chosen to leave them to future studies. Some of those thoughts have been listed in Chapter 8.3. However, several patterns have emerged through the analysis of Göta Älv and Ätran which in this chapter have been selected for some detailed reasoning. These patterns are as follows:

- The location of secondary resource production and "industry" – such as water milling, timber rafting and private fishing – largely correlates with the flow of the river, i.e. these activities were concentrated to and originated from the upper reaches of the rivers. In the lower reaches of the rivers, where sediment deposition is high, the river was mostly used as a backdrop for primary resource production, such as agriculture. The relative size of the river also affected the river use, where mills are almost never found in the lower areas of the main watercourse.
- The rivers are both *connecting* and *separating* in their character. Göta Älv itself has been used for transportation during many centuries, both by private individuals and on a larger scale, whereas the old road "Ätranstigen" or "Redvägen" used the river valley of Ätran to connect Halland with the inlands of Västra Götaland. At the same time, both rivers have figured as border regions, both on a national, regional and a local scale. The river as an obstacle to cross-river communication is a theme applicable to both Göta Älv and Ätran.
- Both rivers show signs of *individual action*. Göta Älv acted – and still acts – upon the human society in the river valley by a series of landslides, some of them with catastrophic

results. It is not unthinkable that this shaped the mindsets of the people of the Göta Älv region, as well as influencing settlement location. Ätran instead may have reshaped itself through human action. This is most clear in the northern part of the river, where intensive water milling most likely has contributed to river morphology. In turn, this also must have affected the surrounding human society, whose communication possibilities became limited by the meandering pattern of Ätran.

- Meadows and cattle farming are closely tied to the rivers, although with a somewhat varying geological connection. Fluvial soils in general – both glacial and postglacial – seem vital to farms dependent on cattle farming in river regions. The fluvial dependence might also be a result of a limited amount of usable land, where the cultivated fields – which were more vulnerable to flooding – lay further away from the river.

Beneath I have chosen to briefly investigate each of these themes further, in order to develop a discussion from which I have drawn my conclusions and answered the research questions posed in the beginning of this thesis. As will be shown in the following subchapters, all of the patterns described above are more or less related to each other, and it is not possible to entirely separate the one from the other.

7.2.1 The Flow of Water and Its Relation to Economy

The first of the patterns mentioned above regards the relationship between the local natural characteristics of a river and economic possibilities. In the case studies described in this thesis, it is clear that the natural characteristics of a river in many ways define the economic possibilities of the surrounding settlements. This is most clear during the historical periods studied, when both Göta Älv and Ätran were the objects of intensive milling. The mills at Trollhättan, active at least during the 15th century and onwards, were located where the waterfalls brought the natural power needed to maintain a concentrated industrially active settlement. In the upper Ätran valley, the flow of the river was much gentler than Göta Älv at Trollhättan and the concentration of mills should rather be tied to the relatively easily maintained character of the river in this region. In contrast to the falls of Trollhättan, the effectiveness of the mills at Kölaby and Blidsberg were most likely based on human alterations to the river, such as dams. Göta Älv to the south of Trollhättan – as well as the estuary region of Ätran – was not in itself used in this manner, most probably due to the difficulty of controlling the water. In such regions – where the size of the river and its natural character prevented effective use and control – mills where uncommon or connected to smaller watercourses which entered the main river. Such was the case in Östra Frölunda, for example.

The estuary regions of both rivers can be seen as places of passage between terrestrial and maritime economies, something which is quite symbolically reflected in the natural mixture of the river and the ocean. Perhaps this is best illustrated by the medieval town of Kungahälla, where agrarian and maritime resources where exchanged. International trade also illuminates the fact that the access to water gave the opportunity to engage in long-distant economic

communication. This in turn must have served as a foundation for the central administrative role of many estuary settlements during historical times. Thus, Göta Älv became a central urban arena during the Early Middle Ages and the river should perhaps be seen as the main agent in defining the urban characteristics and the economy of the region. Although the urban entities in the Göta Älv valley were constantly changing in location, ownership and characteristics, the river still remained the force of connection between the different towns. Had the river itself been inactive in agency, the towns would not have been so intricately entwined with riverine locations and activities. If the river was considered economically unimportant, the towns would have been engaged in rather different enterprises, following other patterns of development. Thus, I would argue that the economic possibilities granted by Göta Älv contributed to the formation of central places in the region. The *urban character* of Göta Älv, which was also formed through its ideological aspects (see below), is an enduring structure formed through the periods covered in this study, constituting perhaps one of the most clear examples of natural agency in the manner argued by Fernand Braudel (1958). This structure is still active today, governing the lives of hundreds of thousands of people.

7.2.2 The Separating and Connecting character of the river

One of the most defining characteristics of a river has been seen in the material studied in this thesis. Both rivers in question have to a certain degree figured as borders during the studied period, yet have still served a connecting function between the estuary and the inlands. The most clear example is that of Göta Älv, which served as both a national, regional and local (parish) border during historical times – a structure which origin has been the object of some debate. It is clear that the river must have constituted a large obstacle to daily cross-river communication during the whole period studied in this thesis. At the same time, communications – both land-based and riverine – up and down the river valley connected the north and south regions of Göta Älv. This communication was not entirely restricted to grand scale economic schemes – governed by persons of considerable power – but was also exploited within a more private sphere, as have been shown in Lödöse and Åkerström during the 17th century. The historical depth of the communicative relationship is difficult to analyse, but it is clear – from ancient hill forts and Norse sagas among other things – that the river could have been used in a similar manner during the prehistoric and medieval periods.

Ätran served a somewhat similar function, though the communicative values of the river itself can indeed be questioned. It is not impossible that the river was used for water-borne transport in the past – especially on a local scale – but no evidence of such interactions has survived. Instead, the river has carved out a valley which has served as a land based communication line at least since the Iron Age. The river formed a central – but to a certain extent inactive – part of this road, not the least visually. At the same time, as have been shown above, Ätran posed a considerable obstacle to cross-river communication during the Iron Age, something which later shaped the border relationships of the river valley.

Both rivers have also formed the ideological and political patterns of the surrounding agents of

power, mainly I would argue as a result of the long-term structures of riverine communication. Göta Älv has most likely been an important connecting factor since the Iron Age, reflected in the Hill Fort pattern of the valley. The struggle for controlling this valley is manifested mostly during the historical periods and the history of urbanisation connected to the river. Many of the towns became temporary administrative centres, something which reflects both the separating and connecting functions of the river. The foundation of Falkenberg and Kindahus indicates that Ätran served a similar purpose, and the estuary regions of both rivers seem to have been central political arenas during the medieval period. Thus the rivers both separated different countries from each other and connected them politically through the formation of the administrative centres.

The dualistic character of riverine communication is something which is reflected on all levels of river interaction. Even in its natural foundation, a river both unites and separates the land through which it flows. By constantly seeking an ideal equilibrium on its way to the ocean, the river carves out a valley which can be seen as a natural unity, due to sediment deposition and morphology. But this valley simultaneously splits a preexisting natural unity – such as a region with similar soil geology – into two parts, divided by the sediment deposited by the fluvial system. The river also carries in its waters the geological remnants of its source, constantly causing a mixture of minerals and soils, forming a hybrid natural entity until it finally enters the ocean. Thus every single part of the fluvial system is a mixture of both local and upstream geological variations.

Considering this, the character of riverine communication must be seen as a long-term structure which has defined the contacts of the river valleys through many periods of history. An interesting notion is that human attempts to manipulate this structure – such as the building of bridges – create Third Space entities. The actions surrounding the construction and maintenance of bridges can initially be seen as a rather physical negotiation between nature and culture, but it is the *need* to cross the river at a specific location that is the most interesting. The relationship between the *desire* and the natural world forces the human mind to devise ways in which the preexisting structure can be overcome, something which in turn requires profound knowledge concerning the character of the natural object – i.e. the river. Out of this *mental dialogue* comes a physical creation, which is dependent upon both the "cultural" and the "natural" world. Perhaps it is the complexities of crossing a river and the difficulties in overcoming the structure which subsequently have turned into symbolical manifestations in later Scandinavian folklore (for more on this folklore see Tillhagen 1997: 93-111).

7.2.3 Individual actions of river characterisation

The theoretical approach promoted by Jean-Paul Sartre (1968) has been used in this thesis to analyse how the character of the rivers in question have changed in individualistic manners. Both rivers have proven valuable case studies in this manner.

Göta Älv is a river whose character for many years of human history must have been defined by danger and natural hazards. It is clear that landslides, sometimes with disastrous effects, have shaped the river valley to a large degree, something which cannot be easily tied to the river itself.

Of course, Göta Älv also affects the relative risk of landslides by undermining the deposited clays of the valley, but it seems like precipitation and ground water flow plays a more important role in determining landslide frequency and shape. A major event which may have shaped the character of Göta Älv during historical times is the landslide called Jordafallet, which as have been described above occurred most likely in 1150. This landslide perhaps reshaped the entire geomorphological appearance of the estuary, which redirected the previous lines of communication and contributed to the rise of the town of Kungahälla. In turn this may have started a certain struggle for economic power in the valley of Göta Älv, especially as the landslide occurred in a region of high economic activity. In this aspect the large landslide of the 17th century becomes interesting, although no major material associated with this event has been uncovered in this thesis. A specific investigation of the more macro scale economic effects of this natural disaster would prove highly valuable to future research. However, it is clear that Göta Älv has not only acted on its own behalf, but also been affected by other natural agents which have defined its character. The interaction with human agents of alteration has not been covered in this thesis, as it is a complicated subject. Clearly, the locks which were installed in Lilla Edet during the 17th century would have affected the geomorphology of the river, but to what extent remains rather uncertain and needs further investigation.

Ätran, as opposed to Göta Älv, instead shows some signs that might be connected to human agency and river change. Especially the upper region of the Ätran valley has been used extensively for milling, a type of river use which most probably has a long history in the area – although the age of the mills seen on the 17th century maps still remains unknown. I have described above how the meandering pattern of some rivers may be the result of mill construction and abandonment, an aspect of fluvial geomorphology which is intimately bound to questions regarding the relationship between nature and culture. If such man-made geomorphology can indeed be traced in the upper reaches of Ätran, then it is a clear example of how a river surpasses its *field of possibles*. However, other aspects must be taken into account – such as the fact that Ätran was a glacial river during the Ice Age, with an entirely different level of discharge and transport capacity. Here once again further studies are required to investigate this, using a similar methodology as Walter and Merritts (2008). Nonetheless, the extensive milling on the upper reaches of Ätran must have left geomorphological traces, to a certain extent. At least locally, the increased sediment build up behind mill dams may have contributed to other aspects of river use, such as constituting land which was highly suitable for meadows.

What have become clear in this study is that a river is by no means an isolated natural phenomenon, which can be explained using simple formulas and deductive reasoning. Above all else, the "natural" character of a river is defined by a large range of external agents, dependent upon local variations of "natural" and "cultural" entities. Thus – although rivers may follow some common patterns of geomorphology – each river should be seen as an individual character which is not only able to *act*, but also free to be *acted upon*.

7.2.4 The Character of the River in Agriculture

Another *structure* which has been observed in the material studied in this thesis is the connection between meadows and rivers. This structure can be observed during the whole period studied, at least on some locations like the estuary region of Ätran. I would suggest that most – but not all – meadows with a riverine connection in the past lay on so called *temporary wetlands*, either natural or artificial ones. Such wetlands are maintained by yearly floods, when the bankfull discharge is surpassed and the river spills out unto the surrounding soils. Such events are common on most types of river, but it can also be managed by the construction of artificial irrigation channels or dykes. These types of water meadows are called "madängar" or "översilningsängar" in Swedish and have been described by other authors. John Granlund writes of the meadows in Högsby parish by the river of Emån in Småland:

> What the Nile was to the fields of Egypt, was Emån to the nearby meadows of Högsby. Letting the spring flood rise over the meadow – soaking it properly and leaving behind nutritious silt – was considered the foundation of a good harvest of fodder. It was considered necessary to keep the meadow temporarily under water [author's translation] (Granlund 1969: 291).[13]

It is difficult to say with any certainty to what extent such habits were exercised during the period studied in this thesis, and a more detailed analysis would require a close investigation of the written source material concerning the local farming culture. In England, the introduction of artificially managed water meadows has been dated to the early 16th century, although an earlier introduction has been discussed – especially as such systems were used in medieval France, e.g. by Cistercian monasteries (Cook et al. 2003). However, no clear evidence of irrigation channels has been observed in the material studied in this thesis, and many meadows in the area of study may have been naturally managed. Another problem is the fact that later years of water drainage and river regulation has in many ways reshaped the hydrological landscape. Historical water levels of the rivers in Sweden – as well as in most parts of the world – are therefore difficult to find. The use of historical maps only gives information in 2D, but could perhaps be combined with LIDAR data to explore this further.

In any case, the rivers must have played an important role in defining the preconditions for effective livestock farming, as many extensive meadows are found in connection to flowing water. This might also be the result of a human risk adaption, as very few cultivated fields are found in connection to the rivers. The risk of flooding is always present in a river valley, and could be disastrous to the fields. This is evidenced by the ditching and water draining of fields during the historical period studied in this thesis (Jakobsson 2013). Valleys such as the Ätran valley also restrict the amount of land which can be effectively used for agricultural purposes. Thus, farmers – following a common tradition and given a limited amount of usable land – chose to place the meadows close to water, as they – compared to the fields – would not be rendered

[13] "Vad Nilen var för Egyptens åkrar, var Emån för de närliggande ängarna i Högsby. Att låta vårfloden stiga över ängen, ge den en grundlig rötblöta och lämna kvar näringsrikt slam ingick i förutsättningarna för en rik foderfångst. Att ha ängen tidvis under vatten ansågs nödvändigt (Granlund 1969: 291)."

useless by a flooding event. The fields instead were more commonly placed inland, within a more secure distance from the river.

What can be observed in the above arguments is also a negotiation between humanity and nature. The river – along with local geology and biological foundations – forces the cultivation of the valley to take a form which is not a mere result of human agency. Society and river use is shaped by the natural preconditions of the valley, and reshaped when these conditions changes – as have been argued by Cheyette in a more general way (2008). Considering the climatic changes which also occurred after the Vendel period, such as the Medieval Climate Optimum and the Little Ice Age, it would not be surprising to find that the land use seen in the historical maps is one with old roots, but with a changeable character. During the dry and warmer periods between the 9th and the 12th centuries in the Northern Hemisphere (Figure 7 and 8), the amount of land dedicated to meadows were perhaps more limited than in earlier and later centuries. The change to a colder climate with increased summer precipitation after the 12th century then led to a change in agricultural structure, with the result visible in the historical maps of the 17th and early 18th centuries.

This shows that agriculture in river valleys is not detached from the river; it is in many ways *entwined* with it. To take this even further would be to argue that the meadows – and in some ways the whole agricultural system – is a hybrid landscape on a grand scale. The agricultural structure is not only related to the rather fixed characteristics of the land – such as soils, topography, bedrock etc. – but also to moving entities of change like rivers and streams. Rivers – as argued by Edgeworth (2011) – *cannot* be seen as natural features which are separated from the cultural landscape.

8. Conclusions

Throughout this thesis, I have tried to emphasise many important aspects of how rivers interact with human society. The argument which has been followed is that a fluvial system is not a passive agent and that it is the hybrid quality of both natural and cultural actions which has constructed riverine societies. In the beginning of this study I posed two research questions – the first one referring to the active contribution of rivers to the construction of society and the second one to the hybrid nature of human/river interaction. These questions have been the goal towards which this thesis has steered, and in this chapter I have tried – in the best way possible – to answer them properly. It should be noted initially that there can be no thing such as a definite answer – in my opinion – and what follows have therefore taken the form of a conclusive discussion in which future investigations may be founded. The topic of riverine landscapes is far too huge to be covered in its entirety within the limited pages of this study.

8.1 Riverine societal contribution

It is clear that the rivers studied in this thesis to a certain degree have affected society on several levels. Economically, ideologically, locally and regionally Göta Älv and Ätran have contributed to the construction of society.

A river seems to interact with human society in many ways. First of all, it constitutes a central part of the natural landscape in which human settlements are founded. Within its own watershed, a river is indeed the centre of activity and change, contained within the slow processes tied to geological time perspectives. It would indeed be quite foolish to assume that this fundamental natural characteristic was unperceivable to the peoples of the past. In certain ways, this is reflected in the human society of river valleys such as Göta Älv, where the river was indeed a focal point of human activity. The urbanisation of the region illustrates how people, ideologies and culture were drawn to the river, much similar to the way in which the tributary rivers of a watershed join with the main watercourse.

Secondly, a river is not only a *part* of the landscape, it is also an *object* which can be utilised and used for human purposes. The milling of the upper Ätran valley and Trollhättan by Göta Älv illustrates that the natural conditions in an area often give rise to human innovations which later must have shaped the society of the region. Every type of river is not suitable for milling, and thus such industries must be located according to the natural characteristics of a place. Thus it is clear that the construction of a mill – which at first might seem like an idea entirely of human origin – is dictated by the rules of a natural agent. A similar argument may be applied to other actions, such as water transport, fishing, water/land based travel, the construction of bridges etc.

Thirdly, a river also actively *reacts* against human action. Any human manipulation to a fluvial system is a temporary one, as a river eventually will reshape almost anything which comes in its path. Therefore, every human use of a river is either dependent upon a complete understanding of the system – which does not exist today – or doomed to be locked in a continuous struggle against a natural agent. The discussion concerning the meandering pattern of the Ätran valley shows that the outcome of such a struggle may result in something completely new, in its own

way affecting the surrounding settlements. Jakobsson (2013) also shows that the struggle between humans and water itself shapes society and local relationships, something which might also be applicable to the scenarios described in this thesis.

Fourthly, rivers are also forces of societal change in their own right. Above I have discussed the possibility of temporal patterns of agriculture in river valleys, being the results of climatic changes and variations of riverine water levels. It is clear that the environment affects human society in certain ways, but one of the main environmental *driving forces* is the river. The effects of increased precipitation on inland areas will be most visible in the watershed, which in turn is summarised in the main river. Therefore, societies which are based in river valleys will most likely be affected in some manner by environmental changes, which will force the adaption to new natural conditions of life. For example, the dominating one field system of the Ätran valley can be seen as the result of an environmental adaption, to a cattle based farming which was less vulnerable to variations in precipitation. A large stock of cattle would in turn produce a large amount of manure, which could be utilised to cultivate the same field on a yearly basis.

Considering the four aspects of river agency mentioned above it is clear that rivers at least have the *possibility* to contribute to the construction of society in a diverse number of ways. When discussing the relationship between culture and nature in river valleys it is thus important to take a large number of aspects into account. Had this study been focused on the investigation of water-borne transport, for example, many important elements of river interaction would have been completely ignored. Water transport in its own right leaves few tangible traces in the fluvial system, which is why the rivers would have emerged as more purely "natural" characters, as compared to the complex picture generated in the text above.

An aspect which has been difficult to cover in this thesis has been the purely symbolical contributions of rivers to human cosmology and religion, mostly due to a lack of source material. I would argue that an investigation of such matters is a huge study in itself and needs to incorporate a large amount of qualitative archaeological – religiously connected – material. As stated in Chapter 2.5 the agency of a river is not always physically manifested, something which also applies to investigations of symbolism. Meanings of water are not purely formulated through its visual qualities, which is why its related symbolism is not easily seen in a geodatabase. However, regardless of the difficulties involved, the rivers – which as have been discussed above are central features of any river valley – must have contributed symbolically to human society, not the least because the agricultural life was often distinctly tied to the flow of water. This is especially relevant for the Upper Ätran valley, where long settlement continuity can be observed from the Prehistoric periods till the Modern day. Future investigations should thus focus on such areas, with a high potential.

8.2 The question of agency and the hybridity of the riverine landscape

Seemingly – considering the theme followed in this thesis and illustrated by the discussion above – this thesis might be seen as an attempt to put humanity in its rightful place, as a substratum to the overwhelming force of nature. This study has taken the perspective of the rivers, which is why a certain emphasis has been put upon describing the effects of fluvial systems on society. An important question to be raised is therefore: Is human society in river valleys entirely shaped by these watery landscapes? My answer is: No, of course not. A river valley is not an isolated hub of cultural activity. Thus, it is also important to consider the influences of cultural contacts, Third Spaces and other aspects tied to a more "human" world. The question itself interestingly raises another question: What is an *interaction* and how is it related to the agent?

To answer this question it is first of all necessary to look at the difference between an *action* and an *interaction*. A simple *action* – I would argue – is formulated internally within the agent, without a clear external purpose. The result may for example take the form of waving one's hand at no one in particular. An *interaction* – on the other hand – is negotiated both internally and externally, caused by a relationship between the agent and an *object*. E.g. the eating of an apple requires the existence of the apple, a desire to eat and the knowledge to refer to the apple as edible. Following the words of Latour (2005: 70), an agent is *anything* which affects the course of an action, and thus the apple *must* take the form an agent as its mere existence formulates the action. Therefore, following this argument, any *action* related to external factors should be seen as an *interaction*, requiring two or more agents.

River interaction cannot then be seen as a simplistic one-way communication where the river alone is the active agent. Instead it should be seen as a complex system of actions, reactions and counteractions – which all in my definition could be seen as parts of an interaction – where the agents involved are both "natural" and "human". As this is an archaeological study each of the elements involved in the text somehow requires the existence of a human agent – as I have not intended to investigate the relationship between e.g. rivers and frogs. Thus, as every form of river interaction covered in this thesis is based on a dualistic agency, any human use of the river may be seen as a result of the hybrid negotiation of a Third Space. This argumentation however, might be criticised for drawing conclusions on a far too abstract level of inference. It is therefore necessary to consider more tangible aspects of landscape hybridity.

Such hybrid factors are most easily seen in human alterations to a river, such as the construction of a canal, a dam, a mill or irrigation channels. As described in the previous subchapter, such alterations results in a very real interaction; the struggle between the hydrological system and human intentions. A possible example of this would perhaps be the milling of the upper Ätran valley, which may have left a mark on the riverine landscape. Resulting in the meandering pattern of the river, the mills – of which most are invisible to the untrained eye today – symbolizes the struggle between culture and nature. Even after the abandonment and destruction of the dams, mills still interact with the fluvial system. This hybrid negotiation has then shaped the landscape on a long-term basis.

The discussion concerning the "unnatural" character of the upper Ätran valley is still however moving on a highly hypothetical level. Another argument, perhaps based on more solid evidence, concerns the meadows relationship to rivers. Human adaptions to riverine environments have resulted in the extensive use of both natural and artificial water meadows, as seen both in the Ätran and Göta Älv valleys. Such meadows may be seen as a type of Third Space, shaped by the interaction between the human and the riverine agent. One interesting aspect is that river meadows are *both* geographical and mental Third Spaces. The meadow is located on the border between a river and the human settlement, and thus both agents *meet* within that space. Interaction also occurs on a mental level – as a result of the geographical meeting – where the meadows are utilised in a specific way, resulting in more intangible changes to human society.

8.3 A possible discoursive transformation?

As shown by the arguments above, the traditional post-processual *and* processual discourses are highly problematic in the historical study of landscape interaction. By using a simplistic terminology many interesting questions and relations are ignored. The use of a cultural explanation excludes fundamental "natural" factors of cultural development and vice versa. Both Göta Älv and Ätran have not only played an active part in defining the preconditions of human settlements, but also acts in their own continuous way upon the surrounding society. Rivers can not be seen as stabile entities whose lives are stable structures in the "natural order", but are instead changing in character according to a multitude of external factors. Riverine settlements are not separated from this process but are *entwined with it* and to a large degree *contribute* to the flow of change.

The discourse then– if described in deconstructive terms – must be seen as governed by superficial separative theoretical constructions whose generalisations oversimplifies the complexities of the world. It is not the landscape which is socially constructed (e.g. as described by Greider & Garkovich 1994) – and thus becoming a human creation – but our perception of it. As written so elegantly by David Blackbourn (2007):

> Rivers flow and do their work whether or not people are present. That is to say, they do what we call "flow" and "work": the river has no name for these things, which are human constructs every bit as much as saying that the river has been "conquered" (Blackbourn 2007: 17).

This means that the separation of "nature" and "culture" is *also* a social construction with which the world becomes understandable, in a contemporary context. It is impossible to argue that such terminology is a description of "reality", or that it has been universally used since the dawn of human time. Therefore – as humanity must indeed still be seen as a product of this world – the border between culture and nature is nothing but an imagined construction. As shown by the argumentation above, rivers carry within them certain characteristics which have previously only been given to individuals (e.g. by Jean-Paul Sartre 1968). Human society depends on and relates to riverine changes. The world is thus constituted by an increadibly complex system of relations which is impossibly difficult to describe in its entirety.

Still, generalisations such as those on which the traditional discourse is built is an important tool in order to understand the world and produce progress. The discourse *should* then be seen as a limited functional description rather than an ultimate truth. Sadly, although this is rather obvious, theoretical ideas tend to be used in rather deterministic ways. The social construction of landscapes is one such example, where the original idea – which was probably only to capture the social *elements* of the land – has developed into an entire research agenda almost ignoring all else. A generalisation should thus – however valid – be recognised and discussed but must never steer the discourse.

What alternatives are there then? Is it possible to move away from the traditional terminology? A Third Space regeneration of the discourse would propel the researcher into an unknown territory where disciplines, definitions and concepts are blurred into each other. For example, if "nature" and "culture" were seen as one, then "cultural" and "natural" heritage would merely be labeled "heritage", following the same laws and sets of rules. In a similar way, archaeology, history, ancient history, paleoclimatology, osteology and aspects of geology, ethnology, geography, hydrology, biology etc. could all be formed into a single discipline merely labeled "historical studies" which is concerned with the past in general. The structures of the academic world and of society in general do not at the moment allow such a discipline to be formed. Interdisciplinarity does not solve this issue (as seen in Nilsson et al. 1993, described in chapter 1.2.2) and the use of source-pluralism is highly constrained by human limits (as noted by Bloch 1953: 68). It is not therefore possible – at this moment – to forsake the traditional discourse for a new one.

The only thing that remains is then to increase the collaborations between the disciplines. In my opinion, articles written by representatives from different disciplines may provide the best examples of the above mentioned research agenda. Interdisciplinary research published in a single volume with a chapter – or an "article" – for each discipline is in some ways a waste of time. The authors in this case have not collaborated, only taken their own separate points-of-view on a given topic or area. If published in a single text with a common conclusion (where each author takes an active part), the researchers are instead *forced* to collaborate. Only then has the "interdisciplinarity" transcended the superficial.

Another aspect which is important is to further raise the problems of the discourse, while still relating to it. As shown by this thesis, the material is often already there to be used. It is in most cases the *questions* that need to expanded, and the historical study of Göta Älv and Ätran clearly shows – although in a limited way – the possibilies of such research.

8.4 Suggestions for future research

In this subchapter, I have given my opinion of future directions of potentially valuable riverine research. Many more aspects may be found in the chapters above which can be further explored through more traditional perspectives. However, below I have listed some areas of investigation which are highly valuable for the researcher interested in landscape interaction and "symmetrical" archaeological research.

- The study of Göta Älv should include a larger number of case studies, such as Nya Lödöse and Gothenburg.
- A comparative historical analysis of the rivers of Halland could prove highly valuable. Such a study should also include the entire Iron Age period.
- A more thorough investigation of the meandering pattern of the upper Ätran valley, with a hydrological focus on the effects of milling.
- A deeper contrasting analysis comparing several types of rivers and streams. The relationship between tributary and main system rivers is highly interesting in this manner. The use of smaller streams is also of central importance, and needs to be contrasted to the use of larger rivers.
- Further investigations concerning the relationship between rivers, waterways and urbanisation.
- A study concerning the role of the environment in societal change, with a focus on the riverine landscapes. Here, the flooding capacities of the rivers must be taken into account, perhaps combined with the use of 3D terrain models and historical maps.
- A spatial investigation of the relationship between historical meadows and fluvial landforms. Once again the use of historical maps, and the databases of GEORG and KARL, might be found highly valuable. Such an investigation would need to take agricultural yields and amount of used land into account. Incorporating a large amount of written source material and local farming traditions would provide more qualitative aspects to such a research agenda.
- A problematising analysis of the relationship between cultural and natural heritage in riverine areas. The analysis could perhaps relate to issues of funding and protection of heritage and the differences between laws governing natural and cultural heritage. Public awareness, opinion and discussion is highly interesting from this point of view.
- A comparative analysis of riverine cosmology, beliefs and religion through a long-term perspective using written sources, anthropological and ethnographic source materials in combination with material culture. This analysis would need to incorporate the problematic nature of the retrogressive study of folk beliefs as well as focusing on a large range of both natural and human agents.

9. Summary

This thesis has encompassed a large amount of source material, ideas and thoughts. In this chapter I have therefore tried to summarise to entire text above in a manner which can be useful to the impatient reader. Needless to say, this summary is a rough simplification of the text above, and it is not recommended to read this chapter alone. I have merely tried to write a simple overview of the topics discussed.

Chapter 1. Introduction

The purpose of this text has been to investigate the relationship between human culture and nature, through a problematising theoretical perspective. I have chosen to study two rivers in southwestern Sweden – Göta Älv and Ätran – between 550-1750 A.D, mainly by taking the perspective of the rivers themselves. The main research questions which have directed the study are:

- Have the rivers in question *contributed* to the construction of society?
- Has the interaction between nature and culture created riverine hybrid landscapes?

These questions have been studied using a mainly landscape archaeological method and through the development of a GIS database with relevant interdisciplinary data.

The study of riverine history in general has a long international history. Previous research has however been rather limited in several ways. Where the theoretical ideas have been comparable to those of this thesis the material studied has served as a limiting factor. What is clear though is that the interaction between culture and nature has recently become an active research agenda, where the relations of water to society and the problems of the previous traditional discourses have been raised. In Sweden, very few comparable studies have been conducted and the theoretical ideas adopted in this thesis are rarely found in previous Swedish riverine research, although a few exceptions exist.

The choice of source material has mainly been limited to information which can be easily integrated into the geodatabase. Included data is taken from the databases of: FMIS, BeBR, Lantmäteriet, KARL, GEORG, SDHK, SMHI and SGU. The information from each database suffers from its own specific limits and also provides certain possibilities.

The thesis has been mainly limited to Southwestern Sweden due to a large amount of usable source material in this area. However, comparative material from other regions, both national and international, is included to provide a context for the analysis. I have chosen to study mainly features which actively connect to the river, but nearby settlements and symbolic elements have been included to a certain degree.

Chapter 2. Theory

Nature and culture are terms which are central to the questions asked in this thesis. I have chosen to *use* the traditional definitions of these terms to illustrate the flaws of the previous discourse. By doing so, I have also actively connected this thesis to previous research, building the foundation for something new. The term *character* is also central to the questions asked, as I have to a certain extent intended to define the characteristic traits of each river.

The theoretical issues of GIS are many, especially in a study focused on quantitative analysis. In this thesis, however, I have chosen to use GIS as a *tool* rather than a *science*. My point is that the material could have been studied in the exact same way without the use of GIS, which merely makes it possible to conduct a comparative analysis faster. In landscape archaeology, recent research has focused a lot of energy on the use of experiential tools in GIS. The use of such tools is highly problematic from a theoretical point of view, and has only been used to a highly limited degree in this study.

The active role of Nature in defining the material constraints of human society has previously been recognized by Fernand Braudel. In his concept *la longue durée*, Braudel captured the slow geographical structures which govern the lives of humans. The progressive-regressive method developed by Jean-Paul Sartre illuminates how the structures of society can be illuminated through the study of significant moments. This theory also illuminates the possibilities of individuals to transcend those structures, creating something new. I have used this theoretical concept to discuss how the rivers in question have transcended their "natural preconditions", and to illuminate the individualistic traits of each fluvial system. Symmetrical archaeology is a branch of theory largely based on the works of Latour and argues that the range of agents should be increased in archaeological research. The world is not easily divided into separate entities and should rather be seen as a complex system of relations between objects, landscapes, humans etc. This is an important philosophical concept, which raises certain colonial aspects of humanity's relationship with nature. Post-colonial theory, especially the concept of Third Space developed by Homi Bhabha, has been used in archaeology to discuss the problems of cultural concepts. Such archaeology emphasises the diversity that can be found within a "homogenuous culture" and the importance of local studies. Third space is a term defining the interaction between opposing social units, i.e. a product produced when those units are forced to negotiate and adopt to each other's rules. This in turn creates something entirely new, which is not enitirely a mere "hybrid creation". In recent environmental history, the hybridity of the landscape has been raised as an important concept which can be connected to the theories of Homi Bhabha. The theoretical focus of this study can thus be divided into two separate theoretical categories: the theories of Braudel and Sartre direct the means of investigation and the concepts of symmetrical archaeology and Homi Bhabha motivates the research questions.

Chapter 3. Method

The methodology adopted in this thesis is centered on additional questions of interest. These questions are divided into three separate categories: natural preconditions, economic factors and ideological/symbolic aspects. This has been explored through the use of the geodatabase – which illuminates the structures of the landscape – in combination with literature and other sources which to a further extent emphasise the temporality of the material.

The natural preconditions have been explored through the incorporation of data from SGU, SMHI and Lantmäteriet in the geodatabase, which makes it possible to see how human settlements and land use relates to natural factors such as hydrology, topography and geology. Economic factors to a large degree shape the relations between the river and human society, and

thus also contribute to the *character* of the river. I have explored the rivers as centres of activity, where the water has been used for different purposes such as milling, fishing or transportation. The ideological aspects are centrered around concepts concerning politics and religious life – the latter which incorporates both official religion and popular beliefs. I have explored this mainly through analysing patterns of military and religious activity which can be tied to the rivers in question.

One main issue in this kind of inquiry is the historical chronology of the landscape, which is a major problem in any form of landscape analysis. I have used a retrogressive method – primarly developed by historical geographers – in combination with SDHK to explore the chronology of places where the history of development – otherwhise usually taken from previous historical or archaeological investigations – remains unclear.

The area of detailed study has been limited to three locations on each river, but a comparative material is also used which relates to the rivers or to river use in general.

A problem with any analysis which studies long-term perspectives is the representative limits of the source material which, also varies in amount and quality for each period. I have tackled this issue by recognising these limits and by comparing the periods according to their qualities rather than the quantity of the material.

Chapter 4. The River System

Any river is a part of the hydrological cycle and is mainly the result of precipitation. Rivers are also transporters of different forms of natural material, which varies according to several natural factors. Bedrock, soils and other forms of sediment is transported and deposited in a way described in Hjulström's diagram. This in turn develops the channel form of the river, which takes different shapes according to the levels of transportation and deposition. River flooding – which is a natural part of the fluvial system – is another factor which contributes to a river's morphological development.

The period studied in this thesis captures some major environmental changes. For example, during the 6th century, the climate turned cold which in turn affected the agricultural system and settlement patterns of almost the entire European continent. Other climatic changes of interest to this thesis are the Medieval Climate Optimum and the Little Ice Age. These changes were mostly articulated by variations of precipitation, which in turn affected the river systems and their surrounding settlements.

Chapter 5. Göta Älv

The three case studies of Göta Älv are Åkerström, Lödöse and Kungahälla/Bohus. Åkerström mainly emerge as a settlement connected to economic river activity during the Early Modern period, with few relevant indications of earlier river use. The town of Lödöse became important during the Middle Ages, and can be tied both to ideological and economic significance. A grave field in the area shows how prehistoric features which lay quite far away from the actual watercourse were still connectec visually with the river. At Kungahälla/Bohus a longer continuity can be observed with traces of activity during the whole studied period. The dual

estuary of Göta Älv became a location of central political and economic importance during the Middle Ages and onwards, where the human activities are intimately tied to the river.

The natural factors of Göta Älv to a certain degree affected the societal development of the area, where landslides and floods have possibly contributed to the course of events. Economic activity was highly connected to the river, with a large variation in character depending on local topography and the natural traits of the river. The river served as a border on several scales during the whole period, something which to a large degree shaped the politics and ideologies of the river valley. Visual control of Göta Älv was important during the Iron Age and during the Historic periods this developed into an actual physical control.

Chapter 6. Ätran

The three case studies of Ätran are The Upper Ätran Valley, Östra Frölunda and Falkenberg. The Upper Ätran Valley is a region were settlements from the whole period can be clearly tied to the river. During the Early Modern period – but most likely also earlier – the river was used extensively for milling. The riverbanks can also be clearly tied to meadows which were a central part of the agricultural system of the region. Östra Frölunda emerges as an important strategic location during the Middle Ages with the construction of Kindahus Castle. The meadows of the Early Modern settlement at this location were also connected to the river. Falkenberg became ideologically important during the Middle Ages, but the region also shows that Iron Age settlements cannot be clearly tied to the river – compared to the Upper Ätran Valley. The riverbanks seems to have been used for meadows here as well.

The meandering pattern of the Upper Ätran Valley is highly interesting in connection to the milling activities of the region, which might have contributed to the geomorphological development of the river. This in turn may have affected the communications in the area, which previously had not been limited by a meandering river. Economically, Ätran provided a valuable foundation for an agrarian economy in an area which was otherwhise not really suitable for effective farming. The dominating cattle-based farming of the valley may be a result of Ätran's natural characteristics. Ideologically, Ätran became an important political river during the historical period, with many castles being constructed and troop movements along the connected road "Ätranstigen" or "Redvägen". The river also to a large degree may have shaped the parish borders of the region, which reflects the pre-parish patterns of daily communication. Religious features from the whole period can also be closely tied to the river.

Chapter 7. Charactersation of the River

This chapter starts with a summary of the methodological results, which has already been described in the summary of chapters 5 and 6.

Several patterns emerged from the analysis of Göta Älv and Ätran. The location of secondary resource production and industry were largely concentrated to the upper reaches of the rivers. A certain natural foundation produces specific types of economic possibilities, which is why many mills can be found in the upper regions where most waterfalls are located. The lower regions of a

river connect the inlands with the ocean, which in turn raises the possibility of long distance trade, communication and cross-water exchange.

Both Göta Älv and Ätran have served separating and connecting functions. Göta Älv was used as a waterway during most of the studied period and an old road followed the course of Ätran connecting the lowlands of Halland with the inlands of Västra Götaland. At the same time, both rivers have limited the local cross-river communications, something which is to a certain degree still reflected in contemporary parish patterns. Humanity has tried to overcome this natural structure in several different ways, which can be connected to Third Space theories.

Göta Älv and Ätran both show signs of individualistic properties connected to the theory of Jean-Paul Sartre. Göta Älv transcended its material conditions through natural events – e.g. Jordafallet 1150 A.D. – which in turn affected and changed the human society of the valley. Ätran may have acted upon human alterations by a change of morphology which altered the communicative properties of the river valley.

The meadows that can be clearly connected to the rivers were most likely water meadows, which were either naturally or artificially maintained. Especially in the Ätran valley, the meadows served an important agricultural function and their location might also be a result of the limited amount of arable land in the river valley. The cultivated fields were generally not located close to the water, which might be the result of an environmental adaption and extensive floods would have ruined any fields connected to the river.

Chapter 8. Conclusions

It is clear that the rivers have to a varying extent contributed to the construction of society on several different levels. A river is a central part of the landscape, and most human settlements in a river valley would need to relate to the fluid system in some way. The rivers were also objects which could be used for human purposes, but this in turn also depended upon certain natural factors. A river may also react against such human uses. Therefore human riverine societies, with their mills, boats, bridges and canals, must always adapt to the flow of water. The fluvial system may also be an agent of change in itself as it is the main channel of environmental change, which often takes the form of variations in precipitation.

However, human societies in river valleys are not just shaped by natural agents such as rivers, as inter-human communication also affects the development of culture. This thesis has focused on investigating the *interaction* between rivers and their surrounding human society. An interaction is not a one-way communication but relies on two agents which both to some degree influence the course of an action. Therefore, every form of river interaction can be seen as a hybrid negotiation, creating a Third Space entity. The most clear example of this are the riverine meadows, which are both geographical and mental Third Spaces.

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APPENDIX 1: Data Manipulation

1.1 FMIS: Geographical overviews

The data in FMIS comes in two different shape file formats: point and polygons. In order to analyse the geographical patterns of ancient monuments I have converted the polygon data into point data, and merged the two shapefiles. This gives me one shapefile with all the information in points, which in turn can be used to produce point density maps, like Figure 1.

1.2 FMIS: Data Categories

I have divided the data from FMIS into five different categories, which in turn correspond to the two different "cultural" aspects investigated in this thesis – i.e. economy and ideology/symbology. Beneath is a complete list of the different archaeological monuments, remains and features that is included in each category. The name of each post is given in the original Swedish FMIS format, but I have also where possible tried to translate the name into English. Consequently, the translations may not be perfectly idiomatic, as I have attempted a literal translation. The five different categories are as follows: Communication, Economy, Farming, Military and Religion.

It should be noted that the division of these features may seem unbalanced and unmotivated. For example, ancient farmlands and fields have been given a specific category, but could have been logically fitted within the Economy category. However, the categorisation of the FMIS data has not been used to form the arguments upon which I have based my interpretations. I have instead used these categories to sort the point data shape files in order to get a better visual overview of a larger area. For example, the ancient farmlands constitutes a huge number of points in the general FMIS shape file, which makes it impossible to easily find features which are of more interest to this thesis, such as mills, dams, smithies etc. By breaking the data into smaller parts, it is possible to produce a more clear overview of the research interests in an area which I had not previously explored.

1.2.1 Communication

FMIS Post **Lamningtyp**	**English**
Bro	Bridge
Båtlänning	Boat launch
Fartygs/båtlämning	Shipwreck
Färdväg	Road
Färdvägssystem	System of roads
Förlisningsuppgift	Information on wreckage
Förtöjningsanordning	Anchoring device

Gränsmärke	Boundary mark
Kanal	Canal
Kanalmärke	Canal mark
Sjömärke	Sea mark
Vad	Ford
Vägmärke	Way mark

1.2.2 Economy

FMIS Post

Lamningtyp	**English**
Bergshistorisk lämning övrig	Other mountain historical remain
Blästbrukslämning	Bloomery remain
Blästplats	Blooming area
Brott/täkt	Quarry/catchment
Brunn/kallkälla	Well/spring
Brytningsyta	Quarried area
Dammvall	Damming weir
Dike/ränna	Ditch
Fiskeläge	Fishing station
Fångstanläggning övrig	Other fishing/hunting feature
Fångstgård	Trapping yard
Fångstgrop	Trapping pit
Fångstgropssystem	System of trapping pits
Förvaringsanläggning	Storage
Glasindustri	Glassworks
Gruvhål	Mining shaft
Gruvområde	Mining area
Hammare/smedja	Hammer/smithy
Hammarområde	Hammer area
Hamnanläggning	Harbour
Hamnområde	Harbour area
Hägnad	Fence
Hägnadsområde	Fenced area
Hyttlämning	Metalwork remain
Hyttområde	Metalwork area
Industri övrig	Other industry
Kalkugn	Lime kiln
Kemisk industri	Chemical industry

Kokgrop	Cooking pit
Kolningsanläggning	Coaling feature
Kvarn	Mill
Livsmedelsindustri	Food industry
Metallindustri/järnbruk	Metal industry/ironwork
Område med skogsbrukslämningar	Area with forestry remains
Pappersindustri	Paper industry
Småindustriområde	Small-scale industrial area
Smideslämning	Smithy remain
Stenindustri	Stone industry
Tegelindustri	Brick industry
Textilindustri	Textile industry
Tomtning	Tomtning
Träindustri	Wood working industry
Varv/slip	Ship yard

1.2.3 Farming

FMIS Post

Lamningtyp	**English**
Fossil åker	Ancient (fossil) field
Fäbod	Hill farm
Område med fossil åkermark	Area with ancient fields
Röjningsröse	Clearance cairn
Terrassering	Terracing

1.2.4 Military

FMIS Post

Lamningtyp	**English**
Borg	Castle
Fornborg	Ancient hill fort
Fästning/skans	Fort/sconce
Gränsmärke	Boundary mark
Militär anläggning övrig	Other military feature
Slagfält	Battlefield
Spärranordning	Catch device (for ships)

Stadsvall/stadsmur	City wall
Stridsvärn	Military emplacement

1.2.5 Religion/symbology

FMIS Post

Lamningtyp	**English**
Begravningsplats	Burial place
Begravisningsplats enstaka	Single burial place
Bildristning	Picture carving
Depåfynd	Deposited find
Flatmarksgrav	Flat grave
Grav- och boplatsområde	Grave and settlement area
Grav markerad av sten/block	Grave marked with stone/boulder
Gravfält	Grave field
Gravklot	Grave sphere ?
Gravvård	Moved grave stone
Grav övrig	Grave other
Hällbild	Picture on flat rock
Hällmålning	Painting on flat rock
Hällristning	Rock carving
Hög	Grave mound
Källa med tradition	Spring with local tradition
Kompassros/väderstreckspil	Wind rose
Kyrka/Kapell	Church/chapel
Minnesmärke	Memorial monument
Naturföremål/-bildning med tradition	Natural feature with local tradition
Offerkast	Sacrifice pile
Offerplats	Place of sacrifice
Park/trädgårdsanläggning	Park/garden
Plats med tradition	Place with local tradition
Röse	Cairn
Runristning	Rune carving
Slott/herresäte	Palace/manor
Stenkammargrav	Stone chamber tomb
Stenkistgrav	Cist
Stenkrets	Stone circle
Stensättning	Stone setting

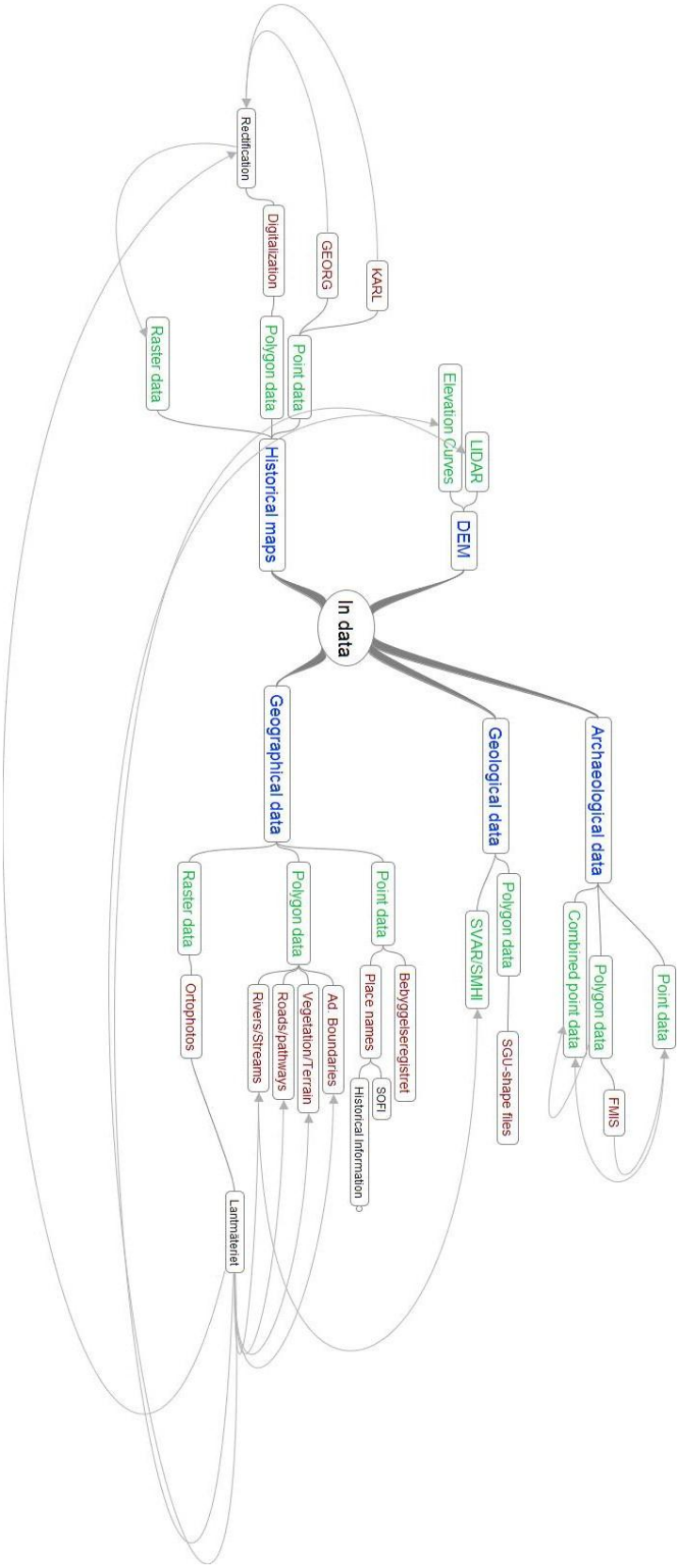
1.3 Rectification of Historical Maps

The rectification of historical maps has been invaluable to the study; in that they form the basis of producing historically tied – georeferenced – digital information with which to compare other forms of geographical data. Some cultural geographers are rather critical towards the way in which archaeologist use rectification of historical maps. This is mostly based on the fact that archaeologists seldom have the fundamental experience and knowledge needed to understand and successfully work with historical maps. Features and similarities in historical and contemporary maps are often taken for granted – such as the stability of roads, boundaries and farms. In my experience in working with historical maps, I am often quite critical towards the use of humanly made structures in the rectification process. Buildings should only be used in rare circumstances when the stability of the structure can be easily established. This is the case with many pre-modern churches and manors, which are often stabile features of the landscape. Often, it is much more valuable to use the natural topography as a base for rectification. Rocky hills and other forms of impediments were not cultivated in historical times, and often still remain uncultivated today. These land forms are thus often highly valuable in giving control points for the rectification of historical maps.

Another error often conducted by archaeologists is the use of too many control points. The surveyors which drew the historical maps were often much more accurate than can be imagined. Archaeologists sometimes use more than 10 control points, which stretches the digital image of the map to a point where the measurements of the surveyor are no longer valid. In my work, I have often found – even in early 17^{th} century maps – that 2 points are enough for producing a usable rectification. Such few points only scale and turn the map, keeping the original measurement values intact.

Here, the limitations of the surveyor should be also emphasised. When two control points are not enough to produce a usable picture, this is not the result of a poorly drawn map. The surveyors were often concentrated on the cultivated land, which is where their measurements are the most accurate. Outlands, forests and large rivers were not the primary focus. The picture thus varies in accuracy, which has been taken into account during the rectification process.

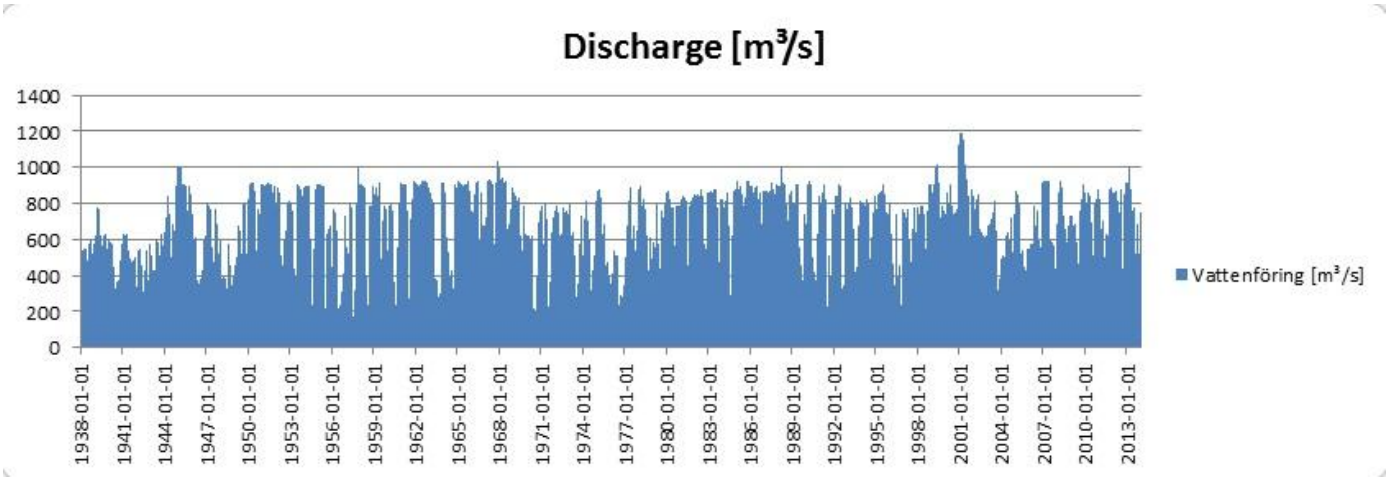
1.4 Geodatabase Structure



APPENDIX 2: Figures

Figure 1. Water Discharge of Göta Älv (Vargön) compared to earthslides

Station Vargön (SMHI)



Average 1938-2013: 521 m^3/s

<u>Highest discharge levels of Göta Älv and Major Earth Slides</u>

Highest discharge (SMHI)

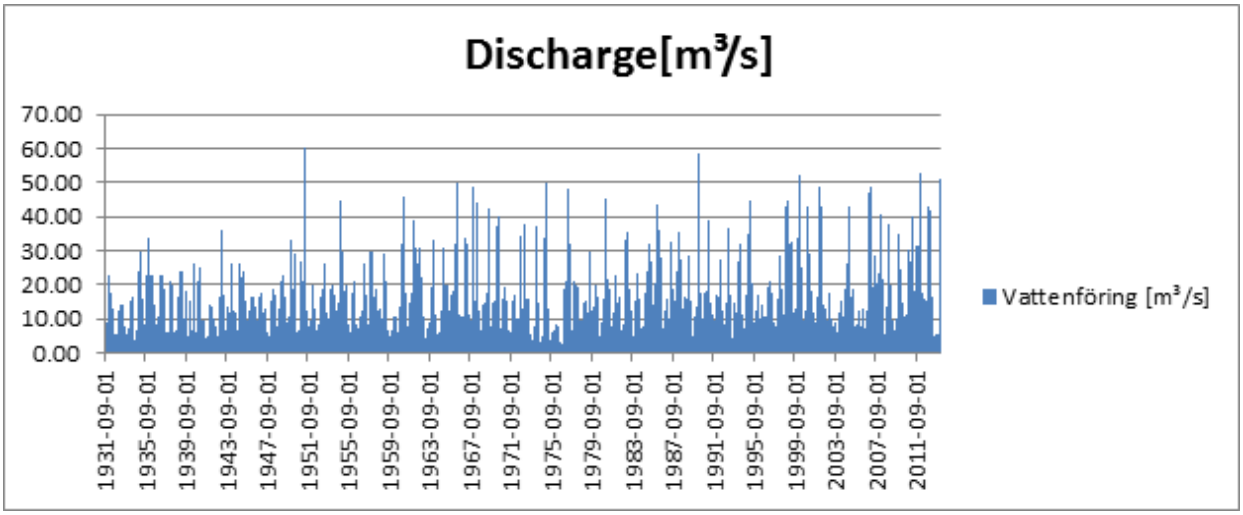
Month and year	Discharge [m³/s]
January 2001	1130
February 2001	1130
March 2001	1130
December 2000	1090
April 2001	1030
May 2001	1000
November 1967	984
January 1945	982
December 1944	968
May 1999	951
November 1957	949

Major documented earth slides of the 20th century (Hågeryd et al. 2007).

1950: Southern Surte, 0.26 km^2
1953: Guntorp, mainly affecting 60 meters of railway
1957: Göta industrial area, 0.32 km^2
1993: Agnesberg, 2400 m^2
1996: Ballabo, 7000 m^2

Figure 2. Water discharge of Ätran – Hillared and Yngeredsforsen

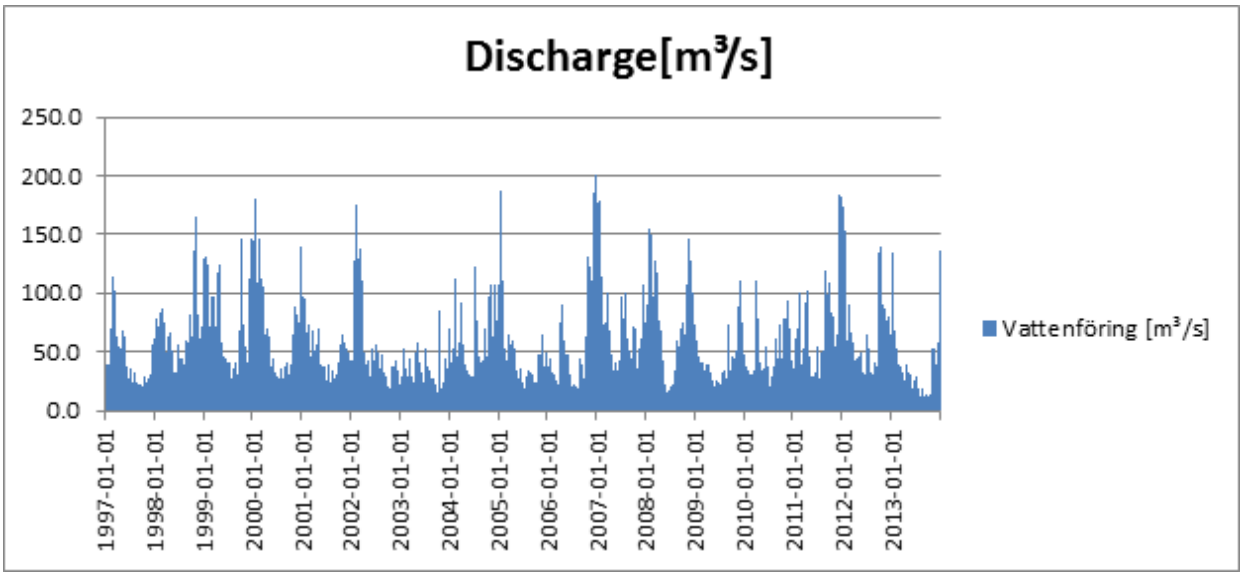
Station Hillared (SMHI)



Average 1997-2013: 11.9 m^3/s

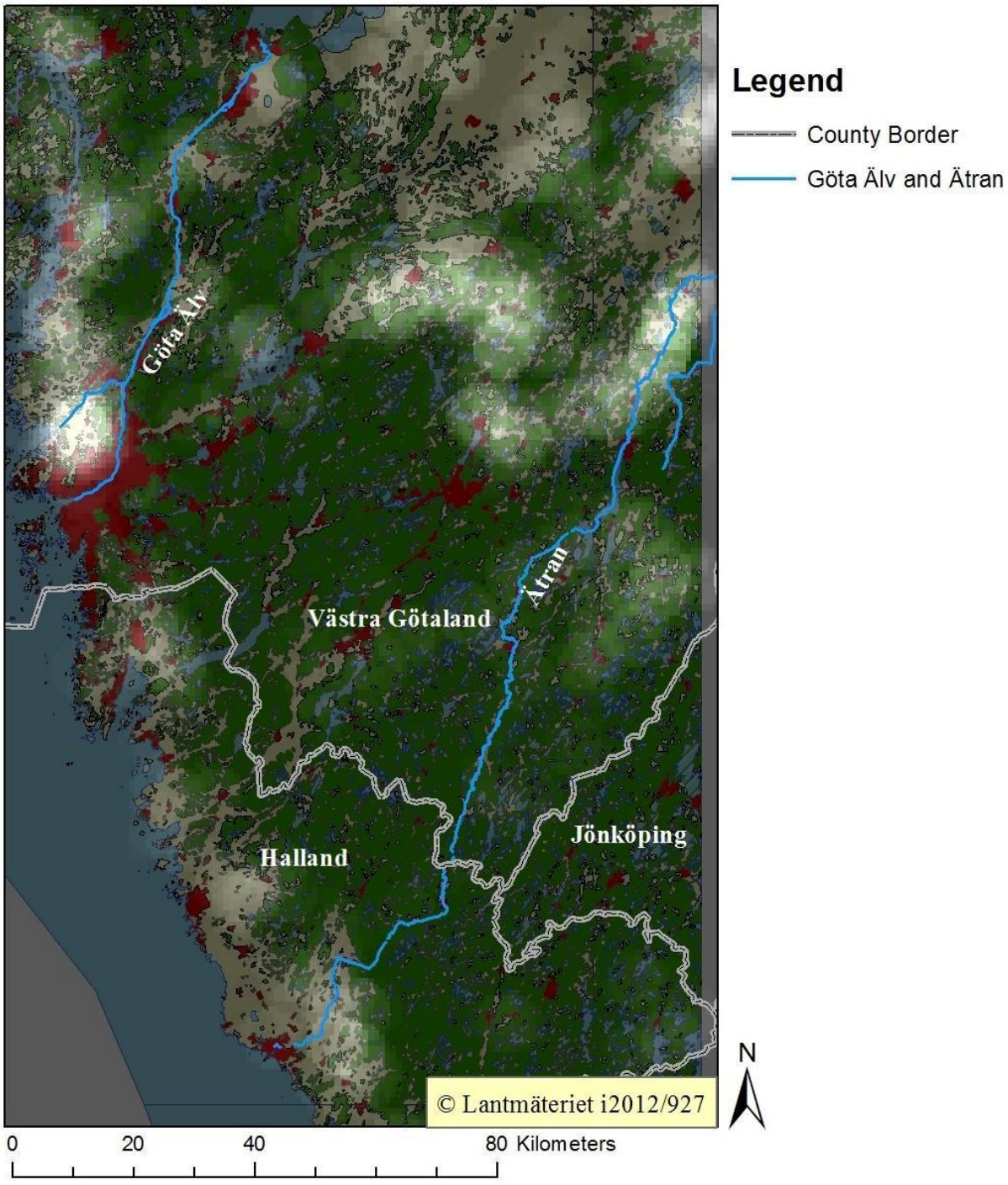
Highest flood return frequency ($60m^3/s$): 81 years

Station Yngeredsforsen (SMHI)



Average 1997-2013: 89 m^3/s

Figure 3. Grave Field Density in Southern Västra Götaland and Halland



The white colour marks areas with a high density of grave fields.

Figure 4. Hill Forts in the Göta Älv valley and on the coast of Bohuslän

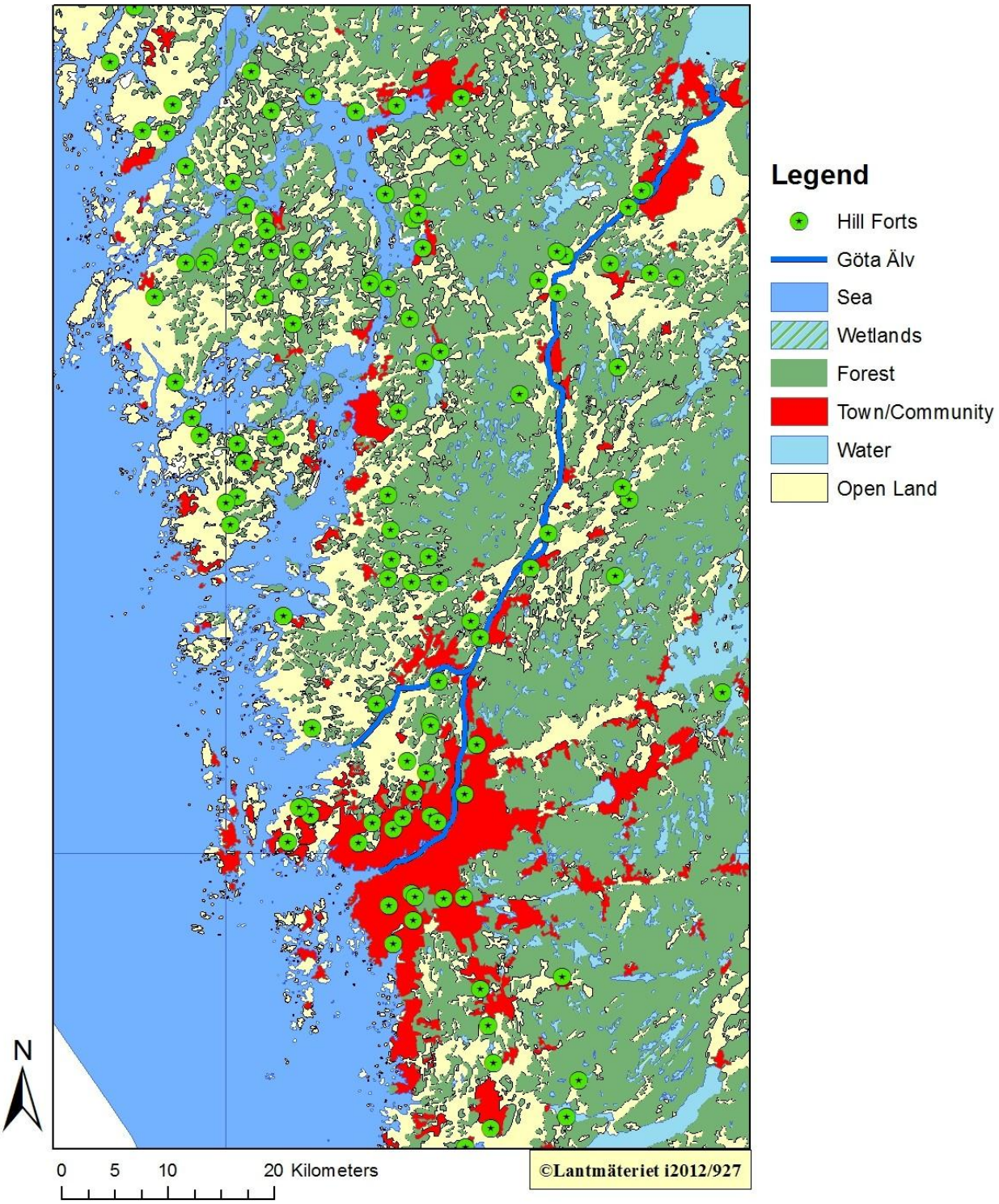


Figure 5. Viewshed Analysis from the Hill fort RAÄ Trollhättan 161:1, Åkerström

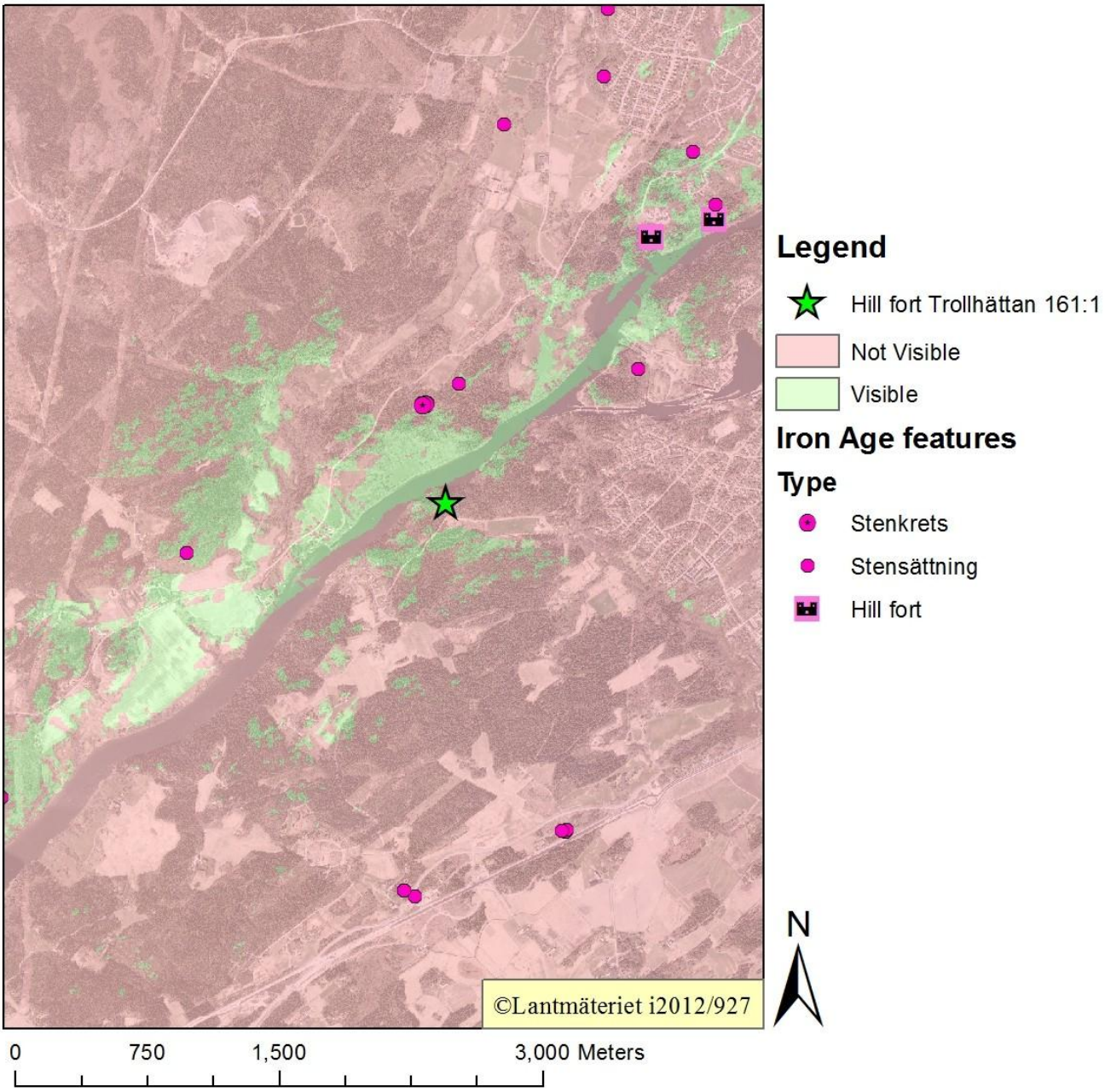
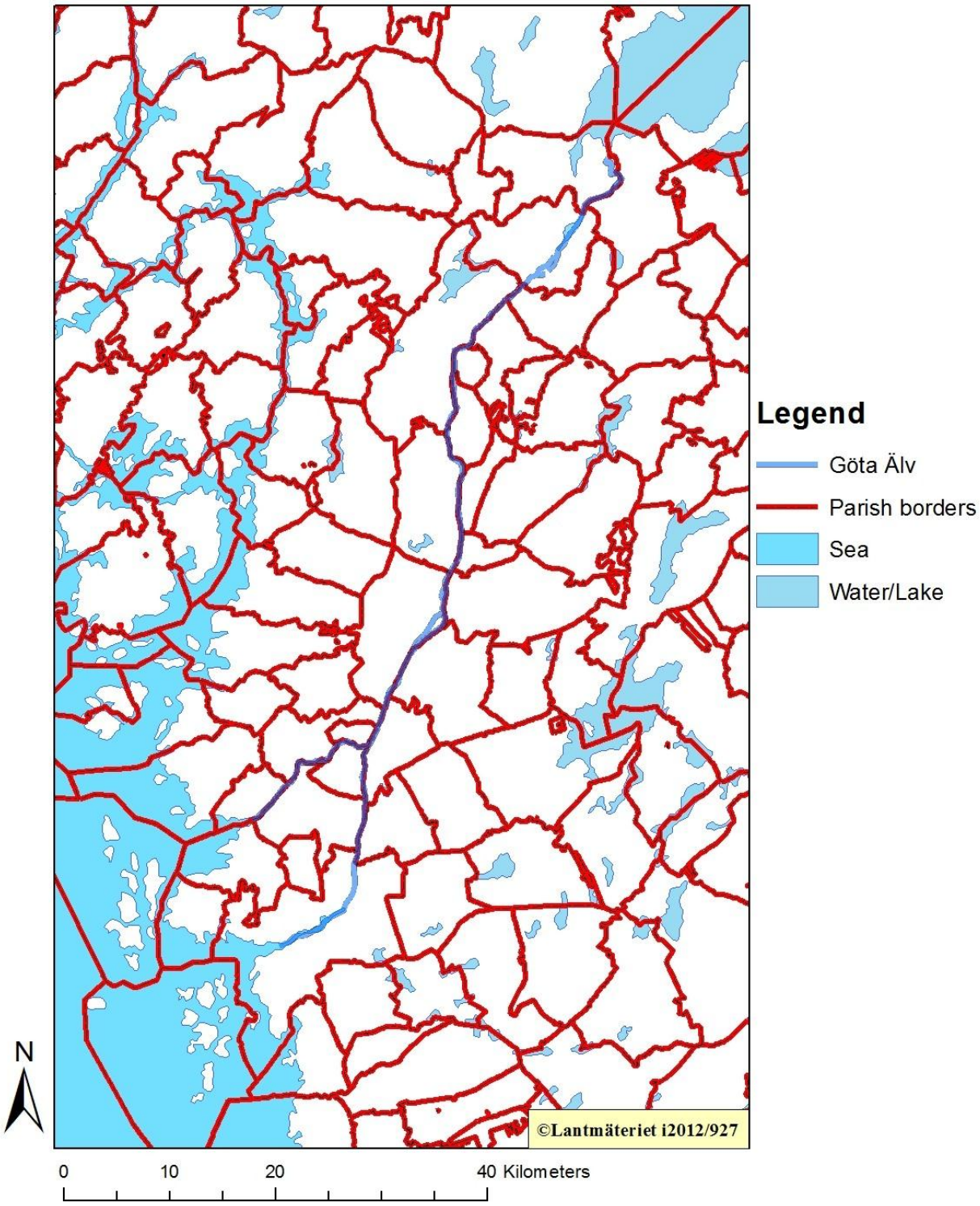


Figure 6. Alignment of Parish Borders to Göta Älv



Aligning parish borders are marked by a deep blue colour

Figure 7. Grave fields of the upper Ätran river valley

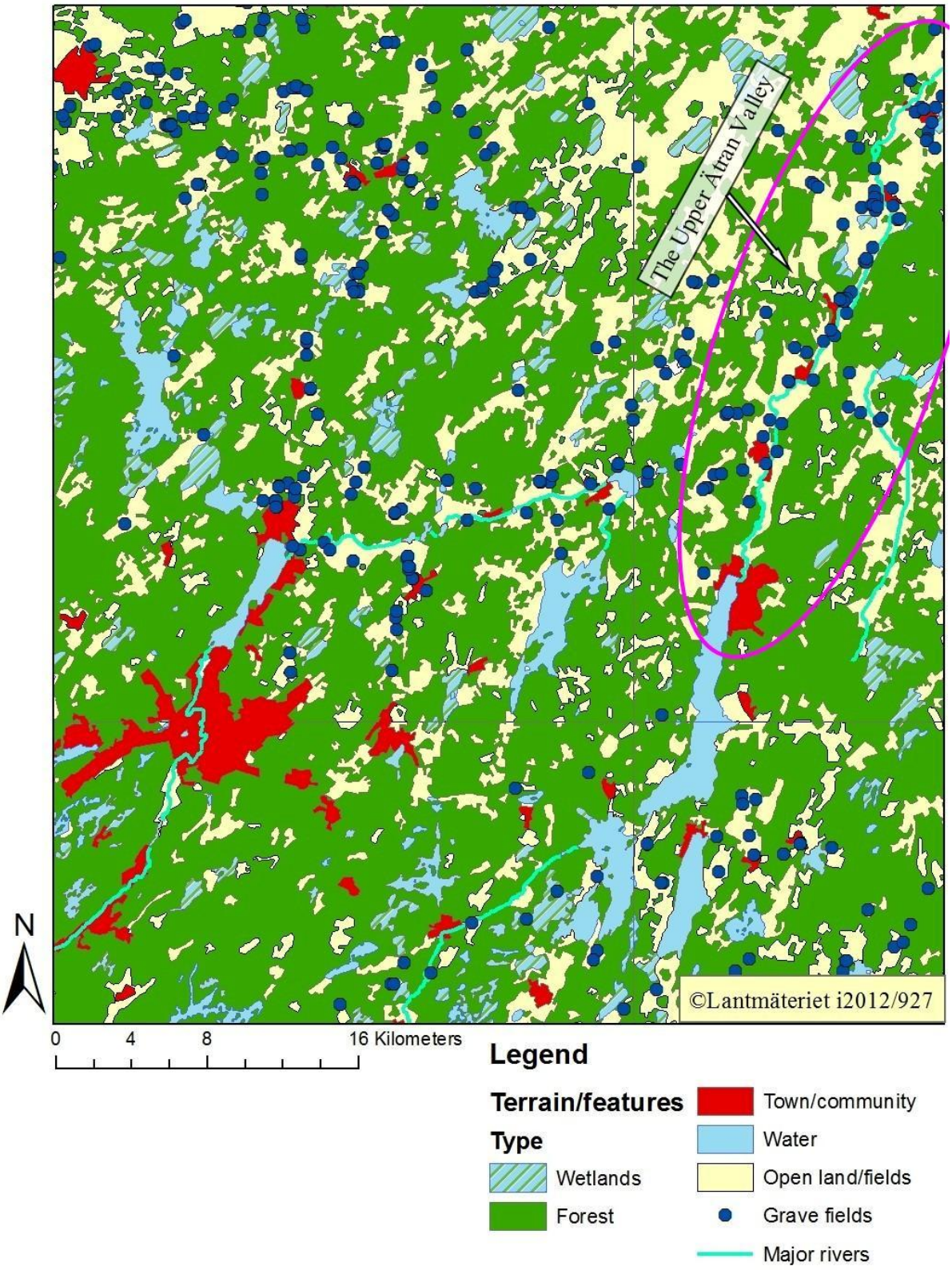


Figure 8. Prehistoric Graves and Roads: North of Östra Frölunda

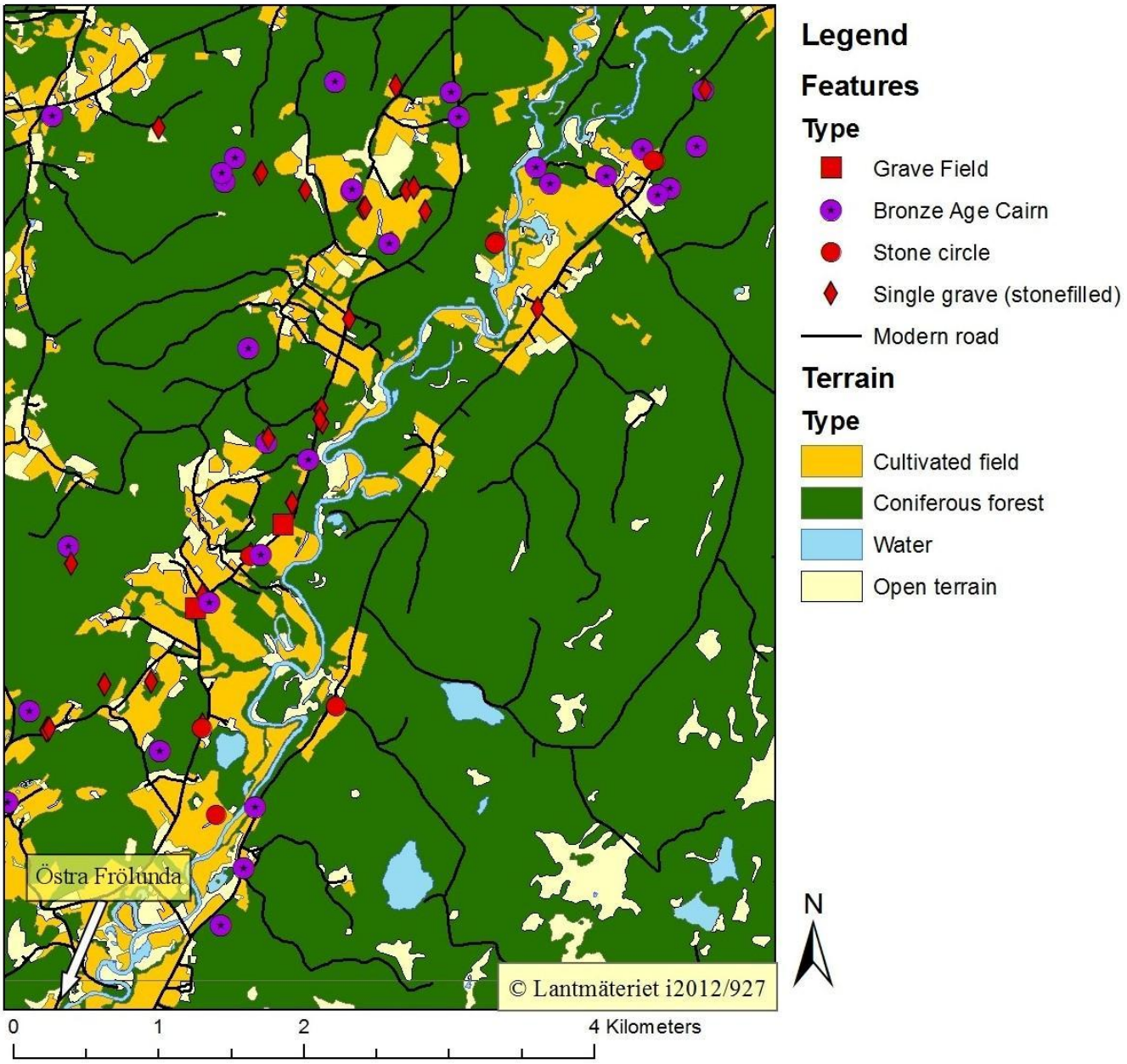


Figure 9. Grave Mounds and Soil Types in Västra Götaland and Halland.

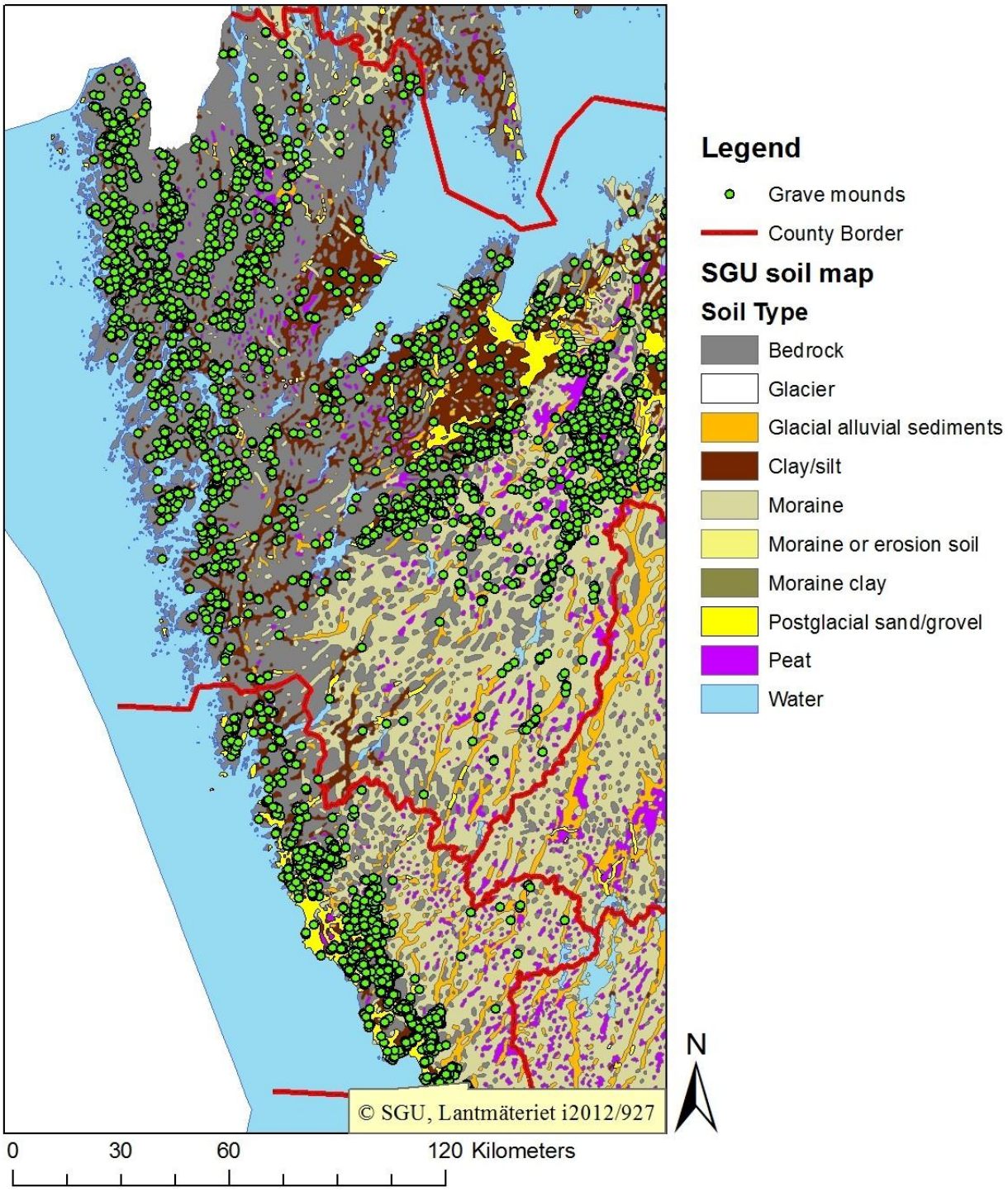


Figure 10. Map of Östra Frölunda 1732 (Lantmäteriet 0226-8:6): Ownership of fields and meadows

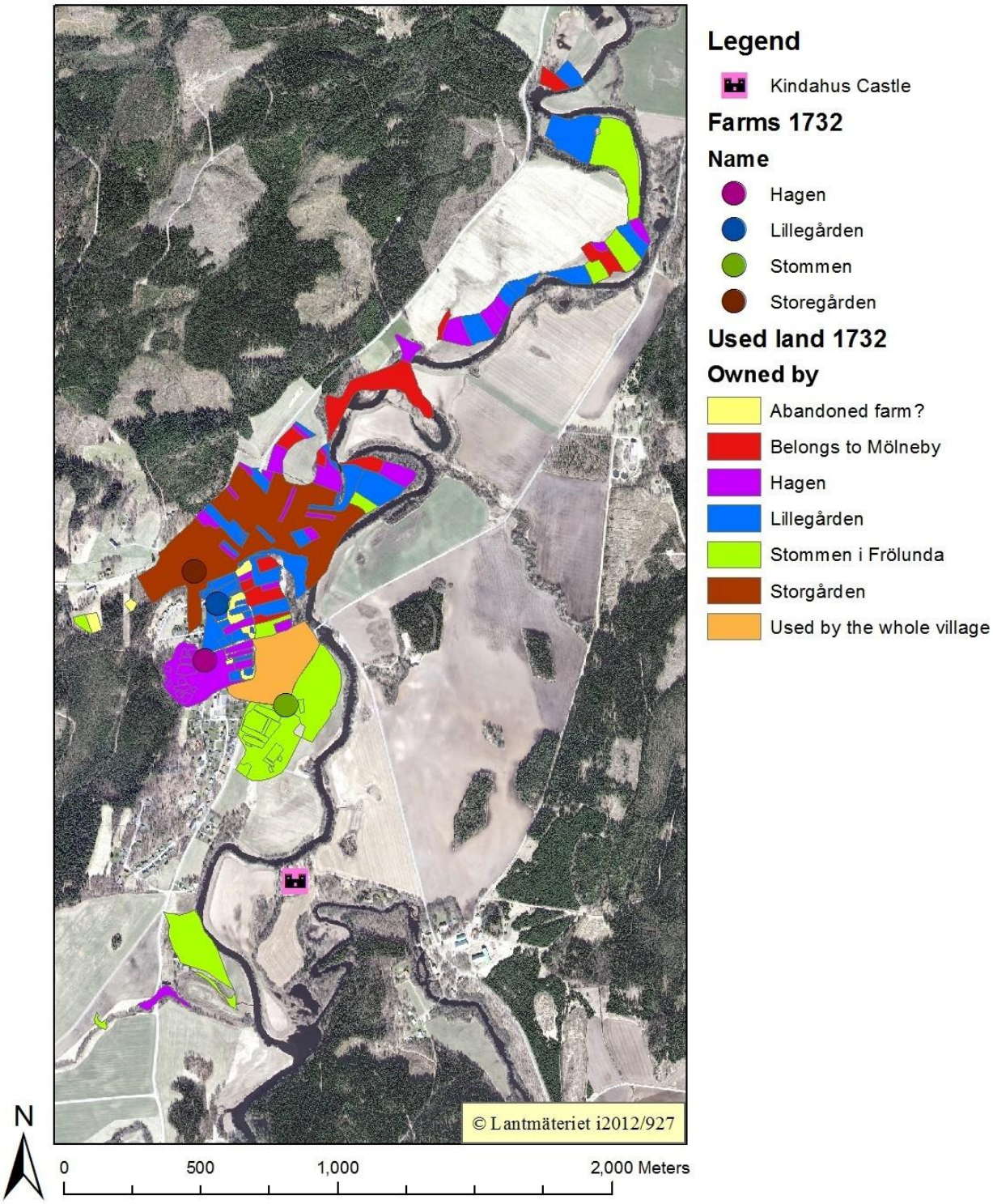


Figure 11. Map of Östra Frölunda 1732 (Lantmäteriet 0226-8:6): Land use

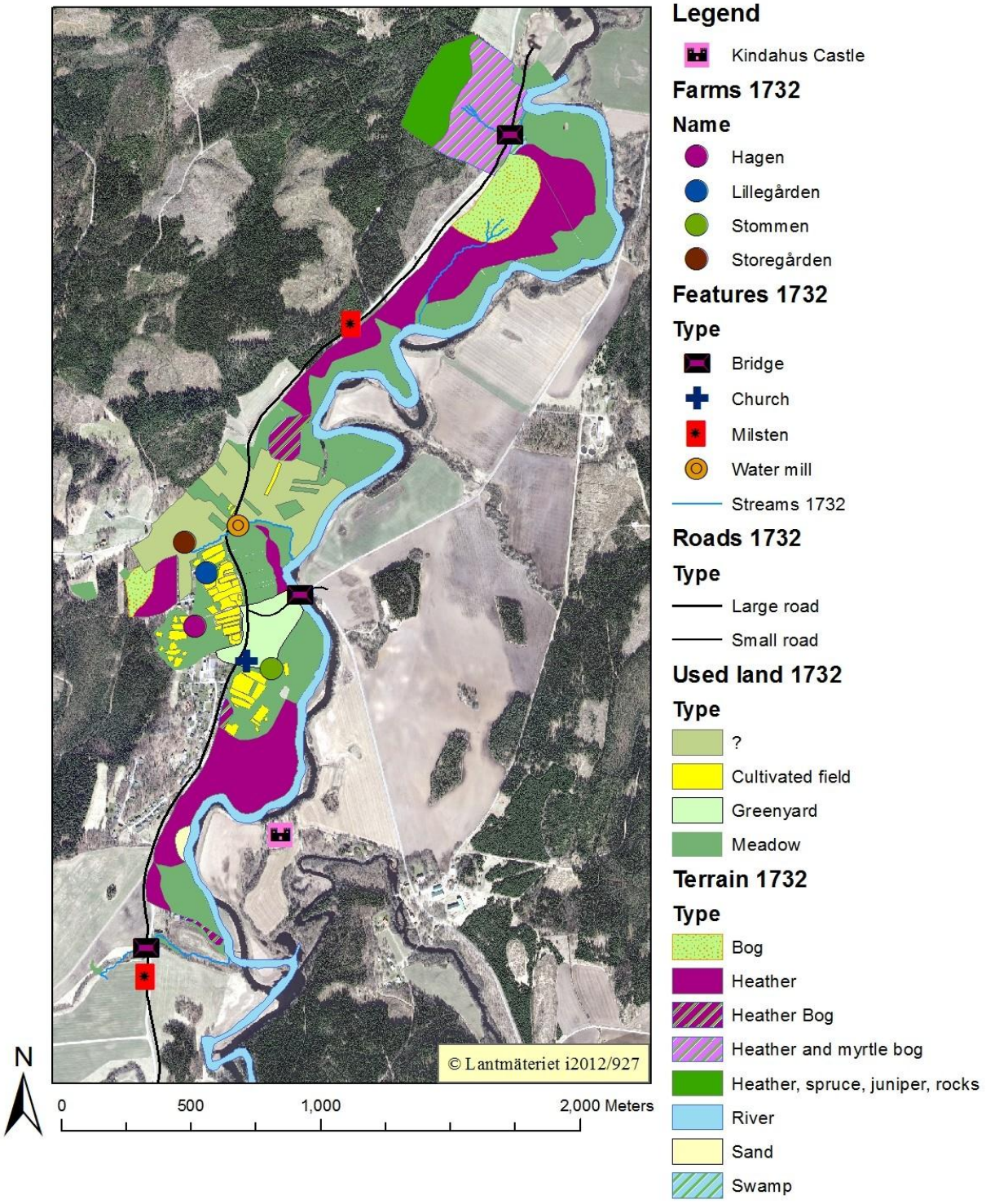


Figure 12. Grave fields and mounds of the Ätran estuary.

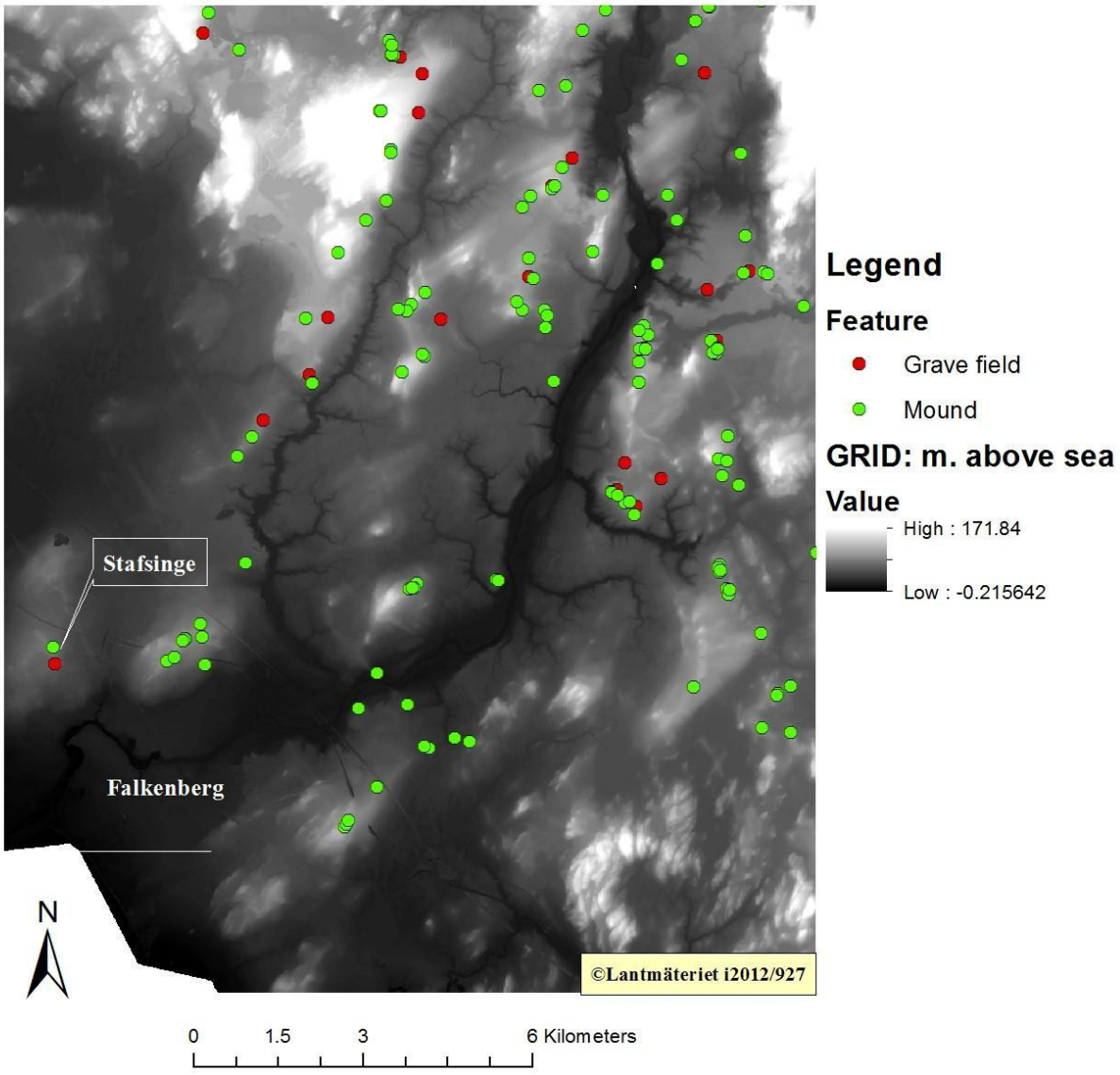


Figure 13. Viewshed Analysis from Vinberg RAÄ 5:2

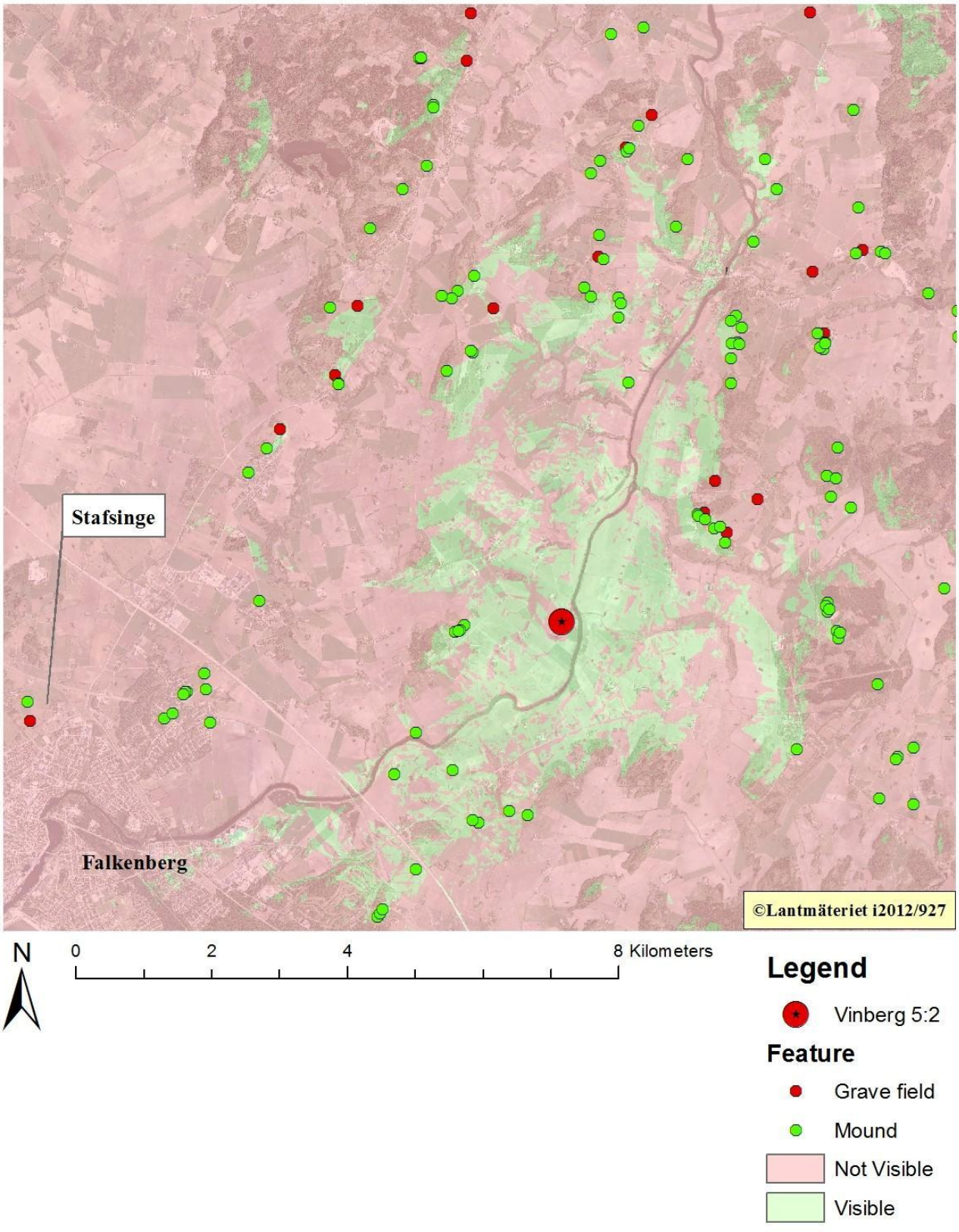
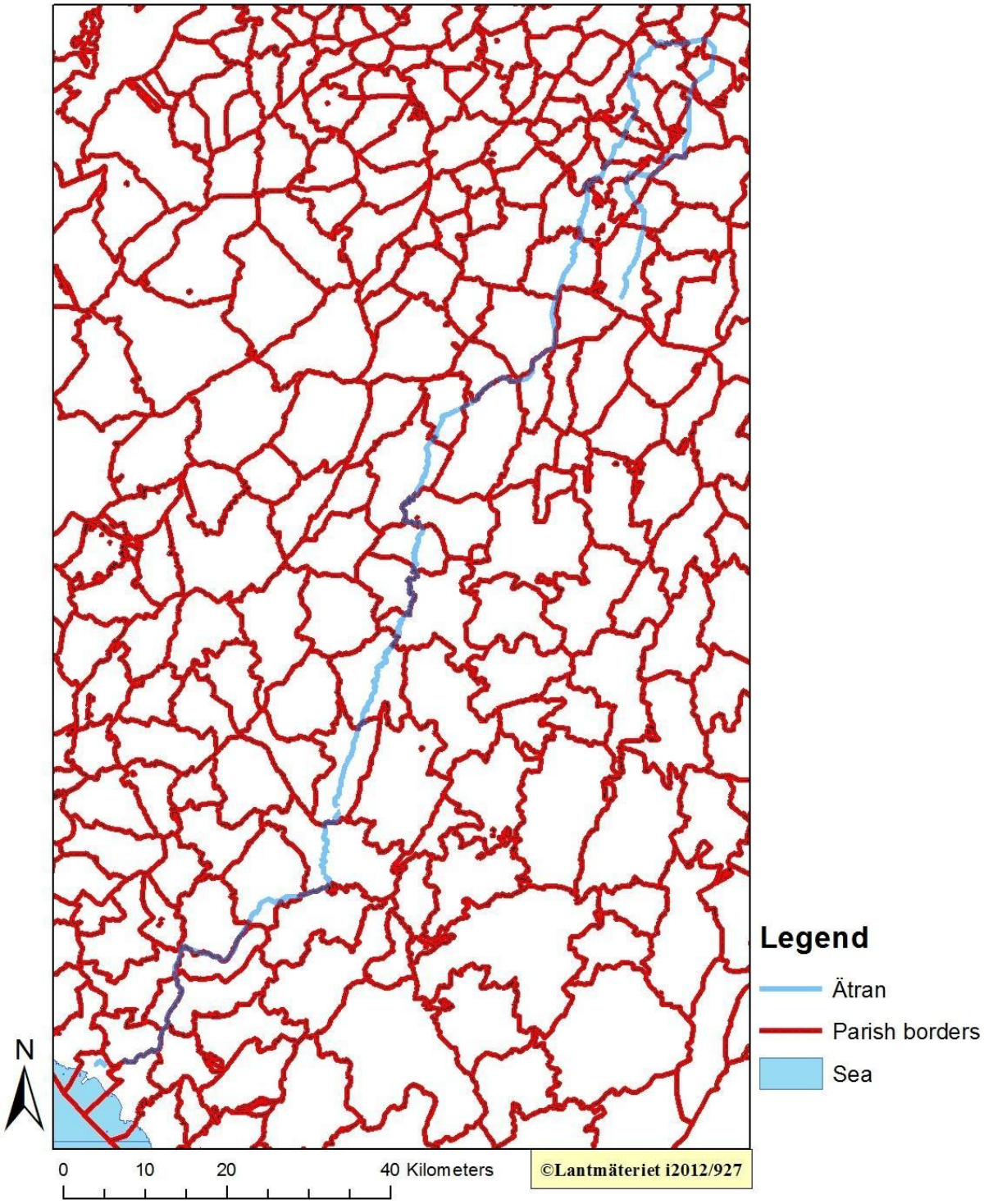


Figure 14. The Alignment of Parish Borders to Ätran



The aligning parish borders are marked by a deep blue colour.

Figure 15. 17th century mills in Blidsberg (O3:71-72)