Coastal Livelihoods

A study of population and land-use in Noarootsi, Estonia 1690 to 1940

Hele Kiimann
Abstract

This thesis investigates how the inhabitants formed the coastal landscape of northwest Estonia through both internal change and external impact by estate owners, provincial government and imperial decrees. Two villages on the largely Swedish populated Noarootsi peninsula, Einbi (Enby) and Kudani (Gutanäs), are examined in detail. The aim was to answer questions about how the local livelihoods and farming systems of coastal inhabitants changed from the late 1600s to 1940. The background of a gradual weakening of the manorial estate system from 1800 onwards and a rapid development of freehold family farming from the 1860s is important to the analysis.

To examine the complex variety of factors and interactions that shape the landscape, an interdisciplinary approach to change has been used. This approach included a conceptual model for the local production unit, such as the individual farm. Information from historical maps, diverse population registers and agricultural censuses were used. The soil cover was examined with samples taken during fieldwork in the studied villages.

The study shows how the development of two villages in fairly similar geographic settings differed largely due to socio-political restrictions. During feudal times, the primary changes were related to the fact that local nobility could maintain their land ownership rights and regulations for manorial deliveries and corvée duties. Changes to natural conditions, such as soil quality and land uplift, had no substantial effect on land productivity. From the 19th century, the most important factor was the legalized opportunity to purchase farms as freeholds from estates, as well as through land reforms in an independent Estonia. The traditional niche of coastal Swedish peasants, who depended on a variety of productive activities, remained in practice. As all manor land was nationalized, many new smallholdings and crofts were created based on external activities by inhabitants, such as farm day labor. Farm productivity was now increased primarily by improvement to land quality (use of artificial fertilizers and meadow drainage), and by the introduction of new implements and crops on farms consolidated from open fields.

Keywords: Noarootsi, Estonia, cartographical analysis, interdisciplinary study, soil cover change, landscape history, coastal peasants, Estonian-Swedish, feudal manor system, land reform.

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Map on cover: Gutanäs village 1690 (EAA 1.2.IV-254). Photo by Gabriel Gumucio.
For my brother.
Acknowledgements

The landscapes, in both past and present, are fascinating objects of study. They are open to several interpretations. Landscapes in the north-west of Estonia comprise not only the physical features of an area – they also tell the story of people who lived there…

My PhD studies started out as collaboration between Estonian and Swedish Universities. Coastal landscapes of Estonian-Swedish areas were the meeting point. This thesis is the result of research encompassing multiple different knowledge areas and academic environments. There are number of people I would like to thank for their contribution and support during this long journey.

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Last, but most importantly, my heartfelt gratitude to my family in Estonia for your constant support and your belief in me. Hannes, your humor was most needed when times were hard. Aitäh!

Uppsala, 2015 December
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AI</td>
<td>Institute of History, Estonian Academy of Sciences</td>
</tr>
<tr>
<td>EAA</td>
<td>Estonian History Archive</td>
</tr>
<tr>
<td>EKK</td>
<td>Estonian Map Centre</td>
</tr>
<tr>
<td>ERA</td>
<td>Estonian State Archive</td>
</tr>
<tr>
<td>ERM</td>
<td>Estonian National Museum</td>
</tr>
<tr>
<td>GI</td>
<td>Institute of Geology, Estonian Academy of Sciences</td>
</tr>
<tr>
<td>IAES</td>
<td>Laboratory of the Department of Soil Science and Agrochemistry</td>
</tr>
<tr>
<td>INSPIRE</td>
<td>Estonian Land Board: Geoportal</td>
</tr>
<tr>
<td>KVA</td>
<td>The Royal Swedish Academy of Sciences</td>
</tr>
<tr>
<td>LC</td>
<td>Library of Congress (US)</td>
</tr>
<tr>
<td>RA</td>
<td>Swedish National Archive</td>
</tr>
<tr>
<td>SOFI</td>
<td>Institute of Language and Folklore Research, Uppsala</td>
</tr>
<tr>
<td>SOV</td>
<td>Cultural Society of Estonian Swedes</td>
</tr>
<tr>
<td>SSGS</td>
<td>Southern Swedish Geographical Society</td>
</tr>
<tr>
<td>ÖI</td>
<td>Institute of Ecology, Estonian Academy of Sciences</td>
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1. Introduction

... how great is the difference between what the man on the road sees and
the man in the field experiences. The man on the road does not see the im-
mediate reality: [yet] he does see something which those in the field do not
see; he knows something that those in the field do not know. He sees the
whole.1

(John Stewart Collis 1973)

Historical-geographical studies of the landscape are important for the
present-day context. They demonstrate how spatial patterns have
evolved through time and how people have interacted with their envi-
ronment. In the Estonian context, current socio-economic processes
such as land privatization and the introduction of market economy
principles have drastically transformed the coastal landscape, which
we know as valuable and traditional. Thus, the main challenge of the
current thesis is to develop a more holistic methodology for land-
scape change or persistence by combining sources from several aca-
demic disciplines.

In a wider European context, the main concerns during the last
few decades have been environmental issues (such as a gradual loss of
biological diversity) together with a discussion of the landscape heri-
tage and how it should be managed. Interdisciplinary studies of land-
scape change can be useful tools for identifying sustainable land-use
systems and solutions for ecologically sustainable management.2 Such
studies allow us to understand the structural characteristics of an area,
in combination with its hypothetical carrying capacity.3

In the Baltic Sea region, the dynamics of agricultural landscape de-
velopment have been a main topic of study, as I have pointed out in
previous articles.4 But in an Estonian context (during the Soviet oc-

duption), studies of land-use history and population dynamics, espe-

4 Kiimann et al. 2007, p. 79–90.
cially in coastal areas, have received limited attention. Thus, the main relevance and aim of the current study (on the northwest coast of Estonia) is to examine the land cover change and population development in two villages on the Noarootsi peninsula (Nackö in Swedish) from the late 17th century up to 1940, when the Soviet occupation brought a radical end to the traditional (agricultural) land-use development.

**Discovering the complexity of coastal areas**

The starting point for the current study of the coastal landscapes of northwest Estonia, which was inhabited by a Swedish-speaking minority for many centuries, began with my research project about forest landscape development on Naissaar (Nargö in Swedish) Island in the Gulf of Finland. The Naissaar landscape pattern appeared to be rather simple, according to the land cover maps compiled during the study (from the 17th century to the 21st century). A closer investigation of internal forces (mainly long-term processes of natural conditions) in Naissaar’s forest landscape revealed much more complexity. Coastal landscape localities, the alteration of forest generations, the varying relief of Naissaar and its soil cover conditions all had a significant impact. Living conditions were strongly interrupted by the forced evacuations of the island’s residents by military authorities carried out in the 1710s, 1914, 1940 and 1944. The last evacuations resulted in the disappearance of traditional life on Naissaar. At that time, most Estonian coastal areas became military border zones and were closed for economic use. Until Estonia regained independence in 1991, opportunities to conduct research on coastal landscapes and the settlements of northwest Estonia were limited due to lack of source materials and access.

The Naissaar study showed how human activity (the island’s strategic position for long-term military use) can determine the dominance of natural processes on the local landscape in the contexts of different political regimes. Those results gave me further interest in

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5 Due to the lack of accessibility to research areas (border zone) and to archival materials.
7 Gustavson 1994, p. 5-63.
8 Peil 2010, p. 102-117.
9 External forces in this thesis are primarily considered changing factors caused by human activity. Internal forces are used in the context of changes caused by natural processes in the local landscape.
developing a more complete understanding of how Estonian-Swedish areas have been transformed over time.\textsuperscript{10} There are now more opportunities than before to conduct comprehensive research on coastal landscape development in terms of source material availability and open access to the fieldwork on the research area.

After 1992, the collaboration between Estonian and Swedish universities resulted in several research projects about Estonian-Swedish settlement history, mainly initiated by Professor Göran Hoppe and his work group at Uppsala University. Archeological excavations were carried out in coastal villages of the Noarootsi peninsula, demonstrating how the earliest Scandinavian settlements, as well as all other early documentation of Estonia’s settlement history, date back to prehistoric times.\textsuperscript{11}

According to several authors, the name \textit{Estland} or \textit{Eistland} (Estonia in Scandinavian languages) means \textit{the eastern land}, showing how the very naming of Estonia resulted from close connections with Scandinavia.\textsuperscript{12}

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The first visit to the Noarootsi peninsula

Landscapes and their development are often influenced not only by topography, geology, climate and political decisions, but also by local residents and how their everyday lives are organized.\textsuperscript{13} My first fieldwork on the Noarootsi peninsula in northwest Estonia began with a gathering of specialists from several disciplines suggested for a cross-scientific project. As we drove around, I could not identify anything particularly exotic. The flatness of the area resulted in a rather uniform landscape. It exhibited a combination of open fields, stands of young pine, grey alder, and forests of spruce and pine. Villages were home mainly to elderly people. Many dilapidated remains of old farmhouses remained as relics of an agricultural past. These decrepit structures were mixed with the remnants of Soviet kolkhoz buildings and military border guard stations. Occasionally, one could see newly built summer houses valued for their closeness to the sea. Discussions within our group, talks with local residents, and literature on the area’s history revealed that the culturally fractured landscape had a most complex background.

\textsuperscript{10} Kiimann 2013, p. 36-54.
\textsuperscript{11} Hoppe & Markus 2001, p. 10-11.
\textsuperscript{12} Described by the Roman historian Tacitus in his \textit{Germania} (ca. 98 AD) Johansen 1951, p. 88-114. Lang 2007, p. 1-298.
\textsuperscript{13} Peil 1999, p. 68-74.
The landscape of Noarootsi is a result of multiple processes, both in the past and today. These included, for example, the early settlements of Swedish fishermen-cum-peasants who arrived thousands of years ago, and the subsequent feudal system that linked the area to political and economic developments in Western Europe and Russia. The Swedish presence on the Noarootsi peninsula nearly ended with the Soviet occupation in the 1940s. At that time, most Swedish-speaking residents had escaped or been evacuated to Sweden, and the area was militarized as an essentially depopulated Soviet border zone. As previously described, the coastal areas were ‘reopened’ after the withdrawal of Soviet troops in the early 1990s. In Noarootsi, this led to revitalized contact with Sweden, as well as the return, as it were, of Estonian-Swedes (primarily as restitutees of land and as owners of newly built summer cottages). There is reason to believe that the landscape will continue to change as the land is exposed to the principles of the market economy and as the newcomers articulate their landscape “tastes”. However, the complexities of these historical processes were well masked in a landscape that had slowly been transformed over centuries. How did this Estonian-Swedish area look and function before the Soviet transformation? How can we unveil the landscape’s past as a combination of the natural and societal circumstances that shaped it? These were the general interests that drove my investigative ambitions for this work.

The research area

The villages of Einbi (along the western coast of the Noarootsi peninsula) and Kudani (on the northeastern coast) were selected as the case studies (Figure 1). Ecological research studies are often conducted on a local scale, but studies on a broader scale of the landscape and its management have only been discussed recently.

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15 Einbi (Enby in Swedish) and Kudani (Gutanäs in Swedish).
16 Wallis et al. 2011, p. 203-216.
As mentioned previously, the Noarootsi area was historically settled by a Swedish-speaking population.\textsuperscript{17} At least from medieval times, Swedish peasants had a legally distinct status from the enserfed Estonians; they worked for the local manors as tenant farmers.\textsuperscript{18} As mentioned above, the focus on particular villages allowed me to combine diverse sources in order to analyze the effects of multiple factors of change that unfolded over my study period. The selection of these two nearby villages was based on several limitations and to further

\textsuperscript{17} Hoppe 1993, p. 55 f. \\
\textsuperscript{18} Jansson 2000, p. 400 ff.
justify my research focus, previous scientific works on Noarootsi will be discussed.

A multidisciplinary approach to the study of landscape and society

Numerous academic works have discussed specific aspects of the Estonian-Swedish settlement history. From that perspective, Markus studied the western coastal area of Estonia, particularly the Noarootsi area, which is the focus of the present thesis.¹⁹

Using archaeological methods, Markus concentrated on early settlement history spanning from pre-historical times up to the 13th century, paying attention to land-use characteristics in relation to ethnicity and continuity. Her findings suggest that the Noarootsi area was settled prior to Christianization and was utilized to a much larger extent dating back to the early Iron Age. In the current thesis, I try to further develop the method to estimate land-use history in terms of examining the conditions for cultivation. For that end, a soil profile analysis will be conducted (on the location of arable land from the Einbi and Kudani village maps from 1690), as determining the age of village soils and fields is not a simple task. The archaeological investigation that Markus used in her thesis of the past land-use incorporates phosphate mapping, but this method does not reliably establish the age of arable fields. In my work, the rate of organic carbon accumulation that describes the Holocene soil-forming processes is used in the context of cultivation practice and availability.

Grubbström’s thesis addressed the same area, investigating ethnicity and identity development from the 18th century among Estonian-Swedes. More precisely, she examined whether the creation of peasant farms from the estates of Noarootsi and Vihterpalu municipalities led to a change in the ethnic composition of the area from the late 1700s.²⁰ Her research demonstrated how important it is to consider the land ownership aspect, especially the process of purchasing the land in order to explain differences in the ethnic composition of different villages. In the current work, the land ownership aspect is studied in terms of how land-use patterns were affected by land purchase processes and what the consequences were for a single household and its management.

Berencreutz provided a structural foundation for Grubbström and others in a thesis that explored how estate owners controlled land and tenants in the 17th century. His work showed how estates originated and developed. In particular, he studied changes in the organization of the labor force and its social structure, as well as changes in the manorial demands on Swedish and Estonian peasants in West Estonia.21 His work concerned the years 1561-1710, a period when Estonia was part of the Swedish empire. In my work the method for calculating the average number of animals in Einbi and Kudani farms (during the Swedish Regime and Estonian Independence period) is adopted after Berencreutz. In addition, the formation of Paslepa estate is discussed in terms of its effects on the living conditions of local peasants and their household management.

A much later development was studied by Hedin, who studied the post-Soviet land restitution process in the former Swedish realm, focusing on attitudes among surviving Estonian Swedes and their descendants toward possible restitution and what to do with restituted property.22 The results showed that the local landscape will not return to the way it looked before the nationalization of land in 1940, or when Estonian Swedes emigrated at the end of World War II. The property structure from agricultural use will most likely be replaced by a second home settlement structure (an attractive location by the sea) as conditions for agriculture are not favorable. Also, economic conditions for agricultural production in Estonia have been bad in the last few decades. In the context of my study, this has led to a loss of biodiversity and raises questions of cultural heritage issues and how they should be handled.

Ecological aspects of a particular area were addressed in a work by Hoppe, Punning and Nõulik.23 They studied how land uplift at several coastal sites (Spithami, Dirhami, Rooslepa) of northwest Estonia attracted primary human colonization. Their views were based on an estimated rate of land uplift. Subsequent calculations allowed the topography of a section of the coast to be reconstructed and settlement chronology to be discussed. In addition, Koff and Punning investigated and described the vegetative development of the area using paleobotanical methods based on pollen and macrofossil data (also utilized in Markus’ work).24

While the current study draws on earlier research concerning specific aspects of the area, it attempts to conduct a more holistic analysis of the landscape of the Noarootsi peninsula. This is different from earlier studies, especially for the period in question, 1690–1940. During this period, the area experienced violent political fluctuations as the center of rule shifted between Sweden, Russia and Poland. The period witnessed the development of a strict manorial system, the gradual dissolution of Estonian-Swedish rights and the estate system, and the rise of freehold family farming. The holistic approach integrates analyses of diverse factors from both natural and socio-political domains.

In conclusion, as far as Estonian coastal areas are concerned, not much interdisciplinary research has been conducted. My aim is therefore to develop a comprehensive understanding of landscape development using an interdisciplinary approach. My main focus is on how the combination of internal and external forces influences the local landscape and its residents (see Figure 2).

The aim of the study

The general outline of my thesis is to investigate through an interdisciplinary approach the relationship between humans and their environment, and more precisely, how land-use characteristics and population dynamics formed the local landscape. Two villages on the Noarootsi Peninsula, Einbi (Enby in Swedish) and Kudani (Gutanäs in Swedish) are examined in detail. The analysis incorporates political and socio-economic transformations that affected the region over the period from 1690–1940. For analytical purposes, this period has been divided into sub-periods.

The concept of landscape is defined here as the field in which cultural and natural forces interact, providing opportunities or obstacles for local residents to make a living in a changing environment. The purpose of combining physical and human geography is to compile a method for capturing the main driving forces for change or persistence on the local landscape. To examine these interrelations, the empirical analysis of each temporal sub-period consists of four main themes: the general village structure, changes or persistence in land-use, population development in Einbi and Kudani villages and the populations’ relationship to the local resource base. These main themes will be scrutinized via the following four research questions:

1. What were the dominant forces of change in the development of the local landscape of Noarootsi peninsula from the late 17th century to 1940? This question concentrates on developing an integrated method for how external human influences in combination with natural processes came to affect the local community structure and the living environment in general.

2. How did the natural preconditions enable or constrain the living conditions of the coastal communities? This question explores how landscape patterns have evolved over time, including the analysis of a constructed land-uplift model, together with a series of land cover maps from 1690 to 1940. In addition, to explain the availability of arable land, soil cover maps for both villages have been compiled and analyzed. To comprehend the conditions for cultivation and its practice, the humus content in soil profiles from several historical fields have been compiled.

3. How did local residents adapt to such forces of change, with an explicit focus on the changes in population composition and resource management? The question involves calculations of the number of residents and farms in Kudani and Einbi villages, the amounts and types of taxes demanded by the local manor, as well as calculations of the farm area that existed during each study period. In conclusion, the question concerns how resources from both land and sea affected individual households (farms), or the entire village as a production unit in relation to socio-political restrictions.

4. Were there differences between settlements, due to their locations and general environment? This question is addressed via comparisons of Einbi and Kudani, the two studied villages on the Noarootsi peninsula.

The concept of change

The current work seeks to explain how and why changes tend to occur where and when they do. It requires attention to the causes of change and how the area evolved with regard to the local community and landscape. According to Sauer, landscapes are in constant change due to multiple factors, with the main cause of change being human activity. But change rarely comes about in a straightforward way, as an easily detectable chain of cause and effect. Nor is change, whatev-

26 Sauer 1963a, p. 1 ff.
er its reason for coming about, something that proceeds spontaneously. However strongly the need for change may be felt by an individual or a community, to some extent, it is always constrained.

In his text on the geographical nature of societal change, Dodgshon argued that “any understanding of change must begin, or at least incorporate, a clearer understanding of the circumstances under which society does not change, either because it finds change difficult or positively resists it”. Dodgshon was concerned about the way in which human geographers had come to regard the structures that underpin society and social life as being within the reach of everyday social practice. Supporters of this view were inspired, for example, by Giddens and Lefebvre. According to Dodgshon, many geographers adopt an understanding of structure as something that is always reproduced or altered through social practice, i.e. by ‘human agency’.

In this work, I shall adopt an understanding of structure as having more autonomy in regard to social practice than has sometimes been assumed. The societal conditions in Noarootsi were, after all, constrained by biological needs related to sustaining life, the natural preconditions of the area, or the spatial and temporal organization of land-use. While this is not to deny the existence of structures that can be changed through social practice (whether related to political, economic or social relationships), I want to examine the interplay between the forces or structures that are within, as well as outside, the direct reach of social practice. Therefore, Jones’ model for examining relationships between humans and their environment, and particularly how different factors interact on various scales, causing change or persistence in a local landscape, is also examined (see chapter 2).

Delimiting the scope of my study

The empirical basis of the study is primarily a careful study of two villages in Noarootsi parish: Einbi and Kudani. My original intention was to study a few more villages in the area, but the need to integrate different types of data and to employ (and learn) a variety of research methods restricted my ambitions. Nevertheless, something must be said about the selection of the two villages.

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28 Giddens 1996, p. 65-77. See also Lefebvre 2007, p. 15 ff.
29 Jones 1988, p. 197-204.
30 The initial outcome of my thesis was based on articles (see reference list), but in order to present and discuss the source material and socio-political aspects in more detail, the manuscript was changed to a monograph.
Geographical delimitation – two case study areas

First of all, the villages were chosen because they are coastal, which indicates a limited ecological regime within the traditional Estonian-Swedish realm. This provided an opportunity to study community and landscape as components of a specific ecological niche. Secondly, a range of historical documents relating to these villages has survived, including maps from the 17th century. Thus, the villages were suitable for investigation due to both their geographic location and the availability of sources useful for quantitative and qualitative analyses. The focus on particular villages enabled me to combine diverse sources, in order to illuminate the effects of multiple factors of change or persistence during the study period. Finally, during the entire study period in question, the two villages belonged not only to separate estates, but also to estates of different types. Kudani village belonged to the Narootsi vicarage (i.e. a village belonging to a relatively small Church estate). Einbi belonged to a larger private noble estate (Rittergut in German) called Paslepa (Pasblep in German or Pasklep in Swedish). Formally, the two estates belonged to different legal jurisdictions, and the two villages (though located close to each other and within similar natural settings) may demonstrate some differences in their development.

Temporal delimitation – three time periods

If the selection of villages constitutes the first delimitation, a second delimitation is the time period. There are different ways to define the study period, and all exhibit certain problems. The selected time frame may enhance a certain aspect or process. The temporal delimitation may be achieved either by binding a study to specific dates considered significant, or by indicating general temporal breakpoints such as decades, centuries or other periods believed to possess distinguishing characteristics. These methods are accepted as pragmatic compromises (which are necessary starting points). Here, the periodization of political shifts that redefined important aspects of societal change is based on a selection of available cartographical material. The purpose is to combine socio-political conditions with changes in land-use to enable a description of how new political regimes were reflected in the local landscape, which in turn affected the living conditions of local residents. The study focuses on the period from the 1690s to 1940, where some events and processes prior to the late 17th century are also considered for contextualization.
1. The late feudal period: 1690-1840;

2. The liberation period: 1840-1905;

3. The period of the end of the late Czarist era and Estonian independence: 1905-1940.

The first maps of the villages are from the 1690s, which conveniently provide us with a picture (no matter how selective) of the local landscape. Importantly, other contemporary information can be related to the maps as well. The 17th century starting point coincides with the end of Swedish rule, which was succeeded by two centuries of Russian rule. The agrarian system gradually transformed under both Swedish and Russian rule. The Russian period ended during World War I, and Estonian independence was declared in 1918. Thus, the final two decades included in this study coincide with the first period of Estonian independence, when virtually all remaining estates were expropriated and subdivided into family farms.

In order to provide a more coherent analysis, the study period is divided into sub-periods. This more thorough context of change at the societal level is necessary to better understand the complexity of forces influencing the local landscape.

The first sub-period is introduced in chapter 5 on how social and administrative structures developed in the Noarootsi area from the Middle Ages. It is followed by an analysis of the first 1690s sub-period on how changes in administrative structure affected the conditions of the Swedish peasantry. The reforms in the taxation system receive special attention. The empirical analysis involves the late feudal period from 1690–1840. It is subdivided into two parts, the first lasting from the Swedish Era up to the establishment of the Russian empire in the 18th century. The second period is the gradual liberation period from 1840–1905, which can be characterized by a gradually dissolving manorial system, accompanied by agrarian reforms from 1849–1860. The last period begins in the 20th century and documents changes during the late tsarist era. This is followed by a discussion of change in the rural economy prior to Estonia’s declaration of independence in 1918 and the approval of the radical Land Law of 1919.
2. A theoretical framework for landscape development in Noarootsi

On a broader scale, the study explores how external forces of change, such as socio-economic factors and the local physical environment, affected the landscape of the Noarootsi area over time. A special focus is placed on how the interplay between those forces influenced the living conditions of local residents in Einbi and Kudani villages. Therefore, this chapter will provide a theoretical background for describing such a relationship between humans and their environment, and especially how different forces interacted. The theoretical outline addresses the basics of the historical-ecological perspective in landscape studies, and this perspective is modified for the current study. It introduces a discussion on how to approach landscape change in the context of historical geography and how different authors have explored similar issues. This is followed by a discussion of a multi-scale approach (after Jones) to problematizing the forces of change on the micro, meso and macro-levels. The second part of the chapter discusses theoretical approaches for population change and resource usage after Malthus, Ricardo and Boserup. Chapter 2 ends with a concluding model by the current author to demonstrate how local farms or villages functioned as production units at different times. The theoretical approach forms the basis for chapter 3, which discusses the selection of methods and types of data used for the current study.

A general framework for landscape development in the Noarootsi peninsula

Several discussions have been ongoing in recent decades about whether to describe historical geography as a systematic or a regional discipline. The systematic approach concentrates on an explanation

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of how the landscape functions, providing a general overview of differences or similarities in spatial structures. It focuses on a change of space rather than a specific place.\textsuperscript{33} But the landscapes of Europe, for example, are quite varied.\textsuperscript{34} Variations in climate, soil, or land-use practice often produce a local environment specific to certain places. Therefore, the problem with using the systematic approach to examine change in local landscapes is that it tends to omit specific local aspects of physical and social change (i.e. the time factor). It overemphasizes change in terms of general spatial patterns, but in my work the complex relationships between humans and their environment are also in focus in order to describe the local landscape of Noarootsi.\textsuperscript{35} To demonstrate how these different factors can form a research tool for studying a change, a schematic overview of internal and external forces of change is presented in Figure 2.

It was also necessary to consider how to approach the temporal aspect of landscape. Methodologically, the present analysis is based on time slices. Landscape models are compiled for every time period, resulting in a series of changing patterns over time, where \textit{internal forces of change} are represented as long-lasting or constant change. These internal forces are mainly seen in the physical environment which forms the local resource base, causing gradual internal change resulting in constantly shifting environmental circumstances. \textit{External forces of change} are considered to result in more rapid changes and often include human-induced activities, such as socio-economic or cultural shifts in society.\textsuperscript{36}

\textsuperscript{33} Butlin 1993, p. 51-56.
\textsuperscript{34} Hardy 1988, p. 327-337.
\textsuperscript{35} It is also considered an ecological approach with the main focus on how people make a living in a given environment. See also Langton 1988, p. 17-25.
\textsuperscript{36} Naveh 2000, p. 7-26. See also Widgren 2004, p. 455-465.
Figure 2. Factors influencing change or continuity in the local landscape of Noarootsi. D1 – Noarootsi landscape 1690-1840; D2 – landscape 1840-1905; D3 – landscape 1905-1940. Source: modified after Berglund.\(^\text{37}\)

Landscape and time

The description or explanation of a specific area or the general distribution of natural or cultural phenomena comprise primary topics of study in the geographical field. According to Baker, geography is not only the discipline of location and distribution. When we describe a particular place, we are also seeking answers to the questions “where” and “why there”? To understand the causes of patterns at certain times, the question “why then” should also be considered. In a holistic study of a local landscape, geographic and historical perspectives are often combined. Here, I draw on the changing patterns of land-use in two villages in Noarootsi over three centuries. I question how change affected the living conditions of local residents. But how should one approach the question of time in geographical studies, when a special focus on different time scales is at work? Answering this question informs the model used to examine change in the Noarootsi landscape.

Landscape models were compiled for entire study periods and they reflect a series of changing structures over time (Figure 2). The selection of time slices is mainly defined by the availability of cartographic material, which is essential for compiling land cover maps. Each time period is described in terms of the ongoing natural and human-induced processes that were significant at that particular time. But using the cross-section method is problematic, because it reflects changes in the distribution pattern of a certain year or time. It leaves out ongoing processes that may have contributed to changes that appear in the maps. Such analyses assume that the geography of a place was stable, but as was stated in chapter 1, every place continuously changes. The same view appears in British historical geography, regarding the reconstruction of landscapes at specific times in history. This was critically discussed by Langton, who propagated for more work on history as a process, not as a historical stasis. But even when a landscape is seen in the light of a historical process, how can we capture this? A framework for analysis of change or continuity, as a process, is needed. The problem with examining change as a process, even when using a series of cross-sections, is a lack of continuity of historical data. In order to describe complexities from the past, especially in relation to how the coastal landscape of Noarootsi reached

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its current state, a comparison with a given site at a later date will be used.

Studies of landscape development

Physical environments are not inert, but tend to change more rapidly when exposed to human action.\(^1\) According to Antrop, any actions we perform influence dynamic systems, which possess spatial and temporal complexity in landscapes.\(^2\) Therefore, the reconstruction of a historical landscape is challenging. The most common techniques in historical geography have focused on reconstructions of past physical environments.\(^3\) Such reconstructions concentrated primarily on the extent to which the environment influenced human activity. In my work, such influences are defined as components of the natural resource base for local villagers. This approach was a starting point for a further understanding of the importance of the relationships between changing environmental conditions and the evolution of prehistoric settlement.\(^4\)

Geographical texts on the interaction between humans and their physical environment began to appear in the western world in the 18\(^{th}\) century. Works by Malthus, Ritter and Ratzel developed a concept of “environmental determinism”, arguing that the physical environment determined human action, causing specific variations in societies from place to place.\(^5\) In American geography (and British, to some extent), the importance of human factors was demonstrated by the geographer Sauer, inspired by earlier German scholars, who showed that landscape change occurred due to multiple factors.\(^6\) Sauer undertook a broad survey in the field of geography through his work on the morphology of landscapes.\(^7\) The distinction between natural and cultural landscapes was emphasized. Natural landscapes were essentially untouched by humans, while cultural landscapes exhibited modifications resulting from human activity. According to Sauer, the *cultural landscape* changed as a result of new developments

\(^1\) Pred 1986, p. 6-9.
\(^3\) Lovell & Johnston 2009, p. 212–220.
\(^4\) Butlin 1993, p. 306.
\(^6\) Sauer 1963a, p. 333 ff.
\(^7\) Sauer 1963a, p. 315-350.
within a culture or by a replacement of cultures. In my thesis, Sauer’s concept of transition, particularly in new cultural landscapes, is related to various socio-political changes that I will focus upon. His distinction between natural and cultural landscapes was commonly used in studies that aimed at identifying a “natural landscape” and the impact that human activities (“directed activity”) exerted upon it at different times.

Sauer originally developed an approach to obtaining a chronological view of change in the landscape. He concentrated primarily on human activity as the dominating factor in landscape change. He strongly opposed the dominating environmental determinism in geography. For me, Sauer’s framework offers a general terminology that helps to perceive and discuss different factors of landscape change, but it does not clarify the critical internal components of change. Compare, for example, the discussion about societal change by Dodgshon, who illustrates how human agency and structures in human society interact with each other on various levels. According to him, interactions between agency and structure at different levels of human conditions can be 1) socio-biological, where human agency interacts with cognitive structures; 2) socio-cultural, how interaction functions at cultural levels; 3) social, where norms, rules and practices are organized according to the goals that operate in society; 4) socio-organizational, where society is seen as a functioning system, and finally 5) the socio-technical, represented by the physical environment through which society organizes and sustains itself. All these dimensions are not so precise in reality, which means that they can overlap and interact at different levels. Therefore, these dimensions can be defined as a structure, i.e.: “the arrangement of, and relations between, the parts or elements of something complex” bringing order into society. The landscape and the practices utilized in it are in many ways the geographical inscriptions or materializations of these arrangements and relations.

In conclusion, Dodgshon points out how some structures, or structural levels, are more determinant or autonomous in relation to the transforming power of everyday social practice. They are not easily changed, but rather constrain human activities. Dodgshon asserts that all of these structures contain a spatial dimension and that

48 Sauer 1963a, p. 342-344.
49 Sauer 1963a, p. 326 ff.
this spatial aspect is important, because once a structure is in place, it is difficult to change. Sauer’s process of change, however, is seen as occurring in stages, and as it is analyzed in broad categories, it does not grasp the finer interactions between different factors, and uses a quite coarse definition of culture. Sauer did not regard human beings as objects of geographical enquiry, thus emphasizing the physical expressions of human activity in the landscape. Therefore, here, Sauer’s approach is accompanied by Jones’ methodology for examining landscape change at three different levels in order to provide a better understanding of the causes of change. One example is the structuring of power relations in the local society that included manor to peasant, state to manor, manor to Church, or peasant to Church.

The impact of Sauer’s work

Sauer’s approach to the effects of physical environment transformations on human activities was for a long time commonly acknowledged in historical geography as a leading conceptualization of cultural aspects of landscape change. However, Sauer’s work built on a European, more specifically a German tradition. Earlier French scholars, especially Paul Vidal de la Blache, regarded humans as agents who make choices and decisions from a range of possibilities provided by physical and cultural environments. In Britain, works in historical geography by Roxby, Fleure, and Gilbert considered human geography in its evolutionary aspects, studying the evolution of relations of human groups to their physical environment. To some extent, I have attempted to depict similar relationships and aspects of an Estonian-Swedish area, in an Estonian context.

At the same time, Granö, inspired by Ratzel and Schlüter, provided another point of view for landscape study. Granö was the leading figure in the conception of scientific landscape studies in Finland and Estonia, and his work suggested a reformed methodology of geography. Granö introduced the first definition of homogeneous landscape regions in 1922, based on maps. He later developed a system of landscape science that he described in his book “Pure Geography”. Granö agreed with German geographers that geography should con-

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55 The cultural environment was defined as milieu, and locality or pays was a concept of the result of the interaction between a society and its milieu. See also Baker 2003, p. 109-113. Mitchell 2000, p. 325 f.
56 Langton 1988, p. 17 f.
57 Granö 2003, p. 15.
centrate on examining areal differentiations, but in contrast to the German “Landschaft” school of study, which treated landscapes as material objects and limited areas (regions), Granö defined landscapes as perceptual environments (regions are related to the human agent observing them).\textsuperscript{59}

Sauer’s approach to landscape studies underwent severe criticism when a new school of humanistic geography emerged in the 1980s.\textsuperscript{60} Humanistic traditions explored in more detail the complexity of perception and analysis in geography. Each place possessed many nuances that gave it an identity, and humans were seen as actors who inhabited and influenced their environments with their behavior.\textsuperscript{61} With this rising criticism towards Sauer’s approach in the 1980s, several geographers began to view landscape as reflexive of heritage.\textsuperscript{62} Partly for the sake of landscape planning, it was necessary to consider human interaction with the landscape at an individual level, while the comprehension of cultural landscapes needed to be approached in light of the activities and interactions that formed the processes that caused change or supported continuity. Thinking shifted towards a view of the landscape as an historical text requiring study with symbolic and interpretative methods.\textsuperscript{63} This gave rise to fresh approaches in the study of cultural landscapes, especially in the Nordic countries.\textsuperscript{64} These were nations where environmental planning gave rise to active debates. Their questions and discussions tried to reconcile landscape as heritage and its relationship to change in landscape planning for the future.

The situation was quite different in Estonia where, in the early 20\textsuperscript{th} century, landscape studies emphasized ecological and physical aspects of change.\textsuperscript{65} This resulted from the internal development of Estonian geography, along with strong influences from the German and Russian schools of landscape science.\textsuperscript{66} The focus rested on analyses of large-scale topographic maps and the identification of landscape complexes based on two, three or four elements (major landforms, hydrology, vegetation, and settlement). Increasingly, however, human factors such as demography and economy were considered. World

\textsuperscript{59} Granö O. 2003, p. 13-34.
\textsuperscript{61} Gregory 1981, p. 6, p. 1-8 f.
\textsuperscript{62} Butlin 1993, p. 144-46.
\textsuperscript{63} Black & Butlin 2001, p. 17-22.
\textsuperscript{65} Teaduse Ajaloo lehekülg Eestist XI. p. 18-30.
War II and the Soviet occupations interrupted these developments. Since the mid-20th century, landscape studies in Estonia have been strongly influenced by Soviet traditions (landscapes were studied with a strong emphasis on physical parameters). In Sweden, on the other hand, landscape research has had a continued emphasis on human-induced change. Since regaining independence, Estonian landscape studies have started to diversify. As elsewhere, distinguishing between different phases of nature-induced landscape change is often more difficult than distinguishing different phases of human-induced change.

In conclusion, in the study of landscape development over time, different scales describing internal and external forces of change can be considered. Internal forces of change are examined as reconstructions of physical environments. These explain how natural preconditions improved or constrained the living conditions of coastal residents. I have drawn inspiration from Sauer and Dodgshon’s approaches to analyzing landscape change. Societal change discussed by Dodgshon can demonstrate how human agency and structures in human society interact with each other on various scales. Meanwhile, Sauer’s approach of seeing landscape change in terms of multiple factors provides a more general conceptualization. Sauer’s method misses critical internal components of change (assuming from his perspective that the dominant factor of change is human activity). In order to examine change or continuity as a process and to explain the causes of change, a complementary approach to examining change is needed.

Three modes of explanation in landscape change analysis

To place my case study in a more holistic picture of the northwest coastal landscape of Estonia, there was a need to establish a methodological framework that could estimate change in both the cultural and natural spheres of the landscape. To explain the complex of factors that influence the local landscape over time, a combination of methods derived from Sauer and Dodgshon’s approaches to change have been used. For capturing relationships between humans and their environment, especially regarding how different factors interact on various scales, a complementary methodology of examining land-

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scape change in the fishing communities of central Norway has been
drawn from Jones. Jones’ work also involved the role of land uplift,
weighed questions of land ownership and studied the uses of emergent land in the Vaasa area of Finland. These aspects are crucial in
the Noarootsi area as well (in the context of land purchase rights for peasants in 1860). Jones attempted to grasp a complicated, multi-scale
approach to problematic forces of change. He showed how processes of change could be more fully explained with a combination of
methods. While in many studies of cultural landscapes, processes of change are approached from an empirical rather than theoretical
point of view, Jones distinguished three modes of explanation at three different levels: the micro, meso and macro levels.

First, the micro level, representing the intentional or humanistic approach, describes the actions and decisions of individuals (their values,
atitudes, feelings). This is the intentional aspect that can be seen in how the Einbi and Kudani village structures were shaped by the relationship between the manor and the peasants, as well as between the vicarage and the peasants. This aspect is only superficially studied here as it requires a more specific analysis through interviews or notes from personal diaries.

The main emphasis rests on the second level, the meso level, which represents the functional or regional approach. It asks questions about which functions the landscape served, and how they were reflected locally. Causes for change are explained by how different elements of the cultural landscape functioned in relation to one another. Functional elements included types of land subdivisions, the organization of tax deliveries to the manor, and the practice of cultivation in a particular village. Since the main aim of my work is to study how humans and the environment functioned together at different times, it makes sense to acknowledge that until modern times, natural resources formed a fundamental framework for human activity. There was always a complicated interplay between natural resources, the population and the form of local society. Therefore, the functional approach helps to explain relationships between local residents and the natural resource base and how they changed over time. I have examined land cover changes and socio-economic development in the chosen villages in order to explain how and why the landscape

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72 This relationship reflects the dominant worldview held by people of that time, how that worldview shaped their understanding of their place in the environment and social order, and how this influenced their decisions.
pattern changed over time. In the case of Noarootsi, the additional income from the sea also influenced the role of arable land and its maintenance. According to Widgren, regardless of the small area of peasant land, the practice of arable farming could have provided for more than half of a family’s total caloric needs and accounted for a very large part of their labor.73

The third level, the macro level, represents the structural explanation, providing the context for processes of change. It is applied to show adjustments to prevailing socio-economic forces over time. It shows how the context of social, technological and economic factors influenced individual responses and activities at the local level. The macro level approach can be applied to explain a world preoccupied with the scarcity of resources, one where resources are largely agricultural. It can demonstrate regularity over large regions, showing how spatial units are organized in the socio-economic context.74 Therefore, a starting point for a macro level analysis is to register how land was organized and conceptualized in the past. According to Persson, the degree of subdivision of farms is largely a regional phenomenon, but it cannot be unequivocally linked to a single factor, such as an increase in the population or a change in productivity.75 In the Noarootsi area, farm subdivision was limited over the centuries, in spite of a slowly increasing population. Persson stressed that one important factor in the modernization of European agriculture was the transition from traditional peasant farming to the form of agriculture where the sole aim was production for the market.76 He showed that even though the number of farms did increase in some regions, it was not simple to estimate the significance of such subdivision of farms. Overall, the macro level of analysis mainly reflects changes in the power relations within society, which included fluctuations in political circumstances, ideology, or religion. An example is the establishment of the Estonian Republic in 1918. Here, the structural level explanation applies to the transformation from a feudal society towards a nascent capitalist system.77

In conclusion, Jones’ methodology was developed after debates about how to estimate change in cultural landscapes. Sauer’s concept of transitions in cultural landscapes differs from that of Jones, who demonstrated how change cannot be reliably examined through chronological stages. In addition, Sauer’s approach deals with the

73 Widgren 1979, p. 21-32.
75 Persson 1997, p. 119-134.
human factor in broad terms (suggesting that the main factor for change is human activity). Jones’ three modes of explanation clarify how different aspects of certain stages can overlap with one another or be represented at the same time. Also, Jones shows how some landscape elements change while others persist.78 For example, there might be a significant structural change, while at the functional (meso) level, change may remain very limited. Therefore, to conduct a study of landscape development over time, changing factors on various scales should be considered. In the current study the following scales are discussed: region; estate; village and farm/household; individual.

Surviving in a changing environment – population change and resource use

The following section on the theoretical background discusses how local residents adapted to change in terms of their population composition and resource use. The discussion relates to functional explanations of change, following Jones’ model. In his model, Jones demonstrated how households (as production units in the current work) operate as social and economic units, using resources of the landscape in order to sustain a living.79 What were the consequences for local residents who tried to make a living in a changing environment? It is asserted that society is organized, in part, to fulfill certain biological needs. Particular emphasis falls on the need for food (energy) and reproduction. Such factors can be regarded as structures that constrain potential transformations in society.80 If biological needs are combined with the capacity of a given area to provide the resources needed to sustain a population, we approach the concept of carrying capacity.81 Carrying capacity is sometimes defined as ‘the number of people a specific area can support at a given time’, or, ‘the ability of an area to support a human population or economy without undue deterioration of the natural environment; the number of people, living in a given condition, which a specific environment can support indefinitely’.82 Thus, the concept of carrying capacity represents a measure of the relationship between people and their environment.

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82 The Dictionary of Human Geography. Entry: carrying capacity.
Although he did not specifically discuss the concept of carrying capacity, Thomas Malthus is often regarded as the early theorist concerned with the capability of a human population to feed and sustain itself. Writing around the turn of the 19th century, Malthus suggested that populations tend to increase more rapidly than the volume of their subsistence base. The resulting overpopulation relative to the availability of food resources would regularly lead to crises. Crises could be avoided, however, by ‘positive checks’ (e.g. wars, pests, poverty) and ‘preventive checks’ (e.g. moral constraints in relation to sexual behavior).

Ricardo elaborated on Malthus’ theory, applying it more directly to agricultural technology. If biological needs are regarded as a constraining factor, what strategies or adaptations could be employed by the population in question? In Ricardo’s view, production of food could be increased either by expanding cultivation into marginal lands or by developing more intensive farming methods (e.g. drainage and the use of artificial fertilizers or less fallow). In the first case, however, the returns would diminish, because of the poorer quality of the marginal lands and the increase in labor needed to work them. In the second case, the returns would also diminish over time, partly because of the cost involved in maintaining an intensive farming system. Thus, the population increase would eventually slow down and shift towards population decrease.

These relations are essentially pessimistic about the possibility of a growing population to sustain itself in the long run. However, it is well known that Boserup, who introduced causal explanations of social systems in the 1960s, developed a more optimistic understanding of this relationship. In Boserup’s view, the driving force was the increasing demand for food that comes from population growth. Her central focus concerned the length of the fallow period (and subsequently the extent of the fallow area). By reducing the fallow period, agricultural output could be maintained or increased without necessarily increasing cultivation intensity or expanding the cultivated acreage, but with an increase in manuring. Even if a reduction in the fallow period led to diminishing returns, at least in output per man hour, the increased cropping frequency would ultimately result in more food produced.

83 Malthus 1798, p. 39-45.
84 Macfarlane 2013, p. 33. See also LeMahieu 1979, p. 467-474.
86 Boserup 1965, p. 124.
Boserup further argued that all agrarian societies in tropical conditions develop through a series of stages. They proceed from long fallow to shorter fallow, and finally into annual cropping and multiple cropping (in which fallow is no longer required). In the context of the current work, however, with a temperate climate, it is not possible to grow two or more cereal crops. Consequently, the potential for intensification as a response to population growth is limited. Furthermore, the annual cropping season is fairly short in Noarootsi. Boserup concluded that changing agrarian practices resulted from innovations generated by a mounting population pressure. In the Noarootsi context, one also has to consider obstacles such as limited access to marginal lands and the necessity of manuring.

The effects of population growth are perhaps most apparent in the economic structure of agriculture, but they also have consequences for land-use. One of the fundamental features of any agricultural system is that it takes more land to produce a given quantity of calories from livestock than from crops. Thus, in a pre-industrial society with a dense population, a high proportion of the land would be under food crops (mainly cereals in western Europe), and relatively little land would be devoted to crops to feed animals. The livestock would mainly have to rely on the natural vegetation for fodder. Livestock would be kept primarily as draught animals, which results in a scarcity of manure and poor harvests.

Whether we adopt a more pessimistic or optimistic theoretical stance, several situations are conceivable in circumstances that test an area’s carrying capacity. According to Haggett, three theoretical scenarios are possible. First, the population may increase until the carrying capacity is reached, when the increase rapidly drops to zero. Secondly, the rate of population increase may gradually decline until it approaches the carrying capacity level. Thirdly, when a balance is reached, the population may grow past the carrying capacity level, which will cause a resource shortage that will in turn result in a population reduction. This situation could occur periodically, thus causing the population to oscillate above and below the carrying capacity level.

Even if population change is not linear, as some of the traditional theories suggested, local overpopulation relative to available resources has always been an issue in agrarian societies. Strategies can be developed to cope with the threat of surpassing the ceiling implied by an

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87 Boserup 1965.
88 Warde 2006, p. 9-98.
area’s carrying capacity level. Nevertheless, the biological need to feed and reproduce could be one motive to keep a structure that constrains society.\textsuperscript{90} In the current thesis, therefore, the population size and its variation are of central importance. It is consistently related to the capacity of the landscape to sustain its residents. Indeed, the geological and ecological characters of the landscape in question are also of great significance. These factors, as noted by Grigg, severely limit the possibilities of intensifying agriculture.\textsuperscript{91}

The previous section focused mainly on the biological constraints involved in the transformation of agrarian society. These are also related to the ecological character of a given area, in this case to the village landscape. However, an agrarian population does not exist in isolation from the surrounding world. Any account of the relationship between the local residents and the landscape (the resource base) must also consider other structures that enable or constrain survival. Recent empirical studies of historical and contemporary agrarian communities and their evolution tend to emphasize the dynamic relationship between numerous factors. These include class and ethnic relations, the marketability of land, and gender relations within households.\textsuperscript{92} While these concepts offer insightful opportunities for study, they are still quite difficult to analyze in a manner that will result in a straightforward causal relationship between population increase (pressure) and agricultural innovation. For example, it has been demonstrated that cultivation systems with very brief fallow periods existed in parts of England long before substantial population increases; likewise, in some areas, population increases have not been accompanied by an intensification of cultivation.\textsuperscript{93} Furthermore, as argued by Warde in his historical study of agrarian change in Germany, there are examples of agrarian societies that increased productivity without introducing new technology; instead, increased output could be achieved through social and political reorganization.\textsuperscript{94}

Even if Boserup based much of her theoretical arguments on fieldwork, the latter often concerned societies with relatively simple ownership and political structures.\textsuperscript{95} In my study context, the feudal society that existed in much of medieval Europe, and also later in eastern Europe, was far more complex. Society involved a range of power relations emanating from different levels. This complexity also

\textsuperscript{90} Dodgshon 1998.
\textsuperscript{91} Grigg 1980, p. 20-28, 40-63.
\textsuperscript{92} Börjeson 2007, p. 249-267.
\textsuperscript{93} Overton 1996.
\textsuperscript{94} Warde 2006, p. 44-56.
\textsuperscript{95} Börjeson 2007, p. 249-267.
suggests that the gradual transformation towards capitalism involved forces that hid connections between population change, technological development and agricultural production.

Living on a coastal farm in the Noarootsi peninsula: a model of driving forces of change on the local landscape

The general aim of the model discussed here is to describe the relationship between the local residents and their environment, especially how different factors interact on various scales, mainly on the functional and structural levels (after Jones, see page 33). The study discusses how individual farms or entire villages functioned as production units in order to make a living in a changing environment. Calculations of the total number of residents and farms in the villages of Kudani and Einbi enable the depiction of changes in the carrying capacity at different times. As described in previous chapters, changes in land-use and population dynamics often occur as a complex of processes. In order to capture how the landscape functioned in terms of resource availability and social structure, a schematic model of change has been compiled (see Figure 3). It is partly inspired by the works of Löfgren, demonstrating how the combined resources from land and sea were related to the local unit, such as a farm or village production system (functional level). 96 In the first study periods in my work, one could see how the system was strongly affected by duties to the manor and church at different times. Trade and other economic activities also played important roles, and were often overseen by the local landlord or his employees.

Figure 3. The mechanism of a local production unit in the Noarootsi area.

The model in Figure 3 outlines, in principle, the main elements of the system under consideration in the thesis, specifically the use of the internal resource base and the natural preconditions that set certain limits for the exploitation of the local landscape.

However, as already mentioned, the model must not be understood as static. Changes in the social, political, economic and technological context of the system obviously meant that the relative importance of different factors and their mutual relationships also changed over time. In future chapters, the model is therefore adapted to the situation in each of the time periods studied. Thus, the model provides an instrument for describing the main driving forces of change (corresponding to the structural and functional levels in Jones’ model) and makes possible a comparison of the two neighboring villages, Einbi and Kudani, in order to explore whether there were differences between them that could be related to their different locations and general environments.
3. Sources and Methods

This chapter describes the different methods used in my work in order to conduct an interdisciplinary analysis of landscape development over time, with a special focus on the relationships between people and their environment in different socio-political contexts.

First, I will discuss the need for integration of different methods in order to achieve the aim of the study, to present a holistic analysis of the system that is studied.

Next, the focus is on methods and the sources available for the analysis of specific topics, including considerations of the limits on the choice of methods set by the availability of data, and the strengths and weaknesses of different methods in terms of data validity and reliability.

More specifically, sources and methods used to analyse population development and the farm economy are discussed, as well as cartographic analysis in order to estimate land cover changes and land ownership patterns. A land uplift model for the Noarootsi area has been established using Soviet topographical maps. Finally, the fieldwork done to establish the characteristics of the soil cover during different periods of cultivation is described.

A method for landscape analysis

Conducting a study of a coastal landscape at a particular location and in a particular time required an integrated research method in order to provide both a general overview and detailed local studies. The holistic approach in my work combines different factors of change on various geographical scales in order to explore the general influences on landscape change, but also more in detail how the inhabitants of Noarootsi had adapted to the local environment and it changes.
Four main themes are examined:

1) in order to describe how different factors on various scales interacted with each other and to answer in general which were the main driving forces of change and how did change affect local inhabitants and their environment, Jones’ three modes for explanation of change are applied and modified.

2) to answer how the natural preconditions enable or constrain the living conditions of local inhabitants, an examination of physical parameters was done by analyzing land cover maps from 1690 to 1940, describing changes in the landscape structure, a land-uplift model was compiled, soil cover maps constructed and fieldworks conducted for humus content estimation in several historical fields, in order to describe the cultivation practice and possibilities.

3) The analysis of how the local inhabitants made a living in a changing environment and how the carrying capacity changed over time, was analysed through changes in population and land-use. Focus lies on how a single household (a farm) or an entire village/estate functioned. A model of coastal farm economy has been applied. This required a combined investigation of change in the population and the natural environment of the area. Therefore, inhabitants per farm, the changing livelihoods and the evolving farming systems of the coastal peasants were examined in order to combine fluctuations in population. Such change was related to socio-political processes over each time period and finally, integrated with cartographical results of land-use.

4) The two nearby villages, Einbi and Kudani, were compared in order to illustrate differences between settlements due to their location and environment.

Overall, the need to combine research methods illustrates that the current work does not impose sharp divisions between cultural and natural landscapes. Jones’ concept of cultural landscape is essentially cross-analysed and integrated with source data that describe the natural environment. The result is a multi-disciplinary approach that draws from a number of academic traditions. It draws methodologies from historical, archeological, anthropological, ecological and geographical literature, integrating archival information, the cartographical analysis and soil cover data of the Noarootsi area.
A note on historical sources

Historical approaches are based here on the use of primary documents. Archival sources are essential for historical geographers. At the outset of the current case studies, it was useful to chronologically explore the sorts of sources that could be utilized. Attention first went to the crucial difference between library and archive. Interpretation here is consequently not the only factor that introduces questions of subjectivity into a study and its conclusions. For example, different priorities may guide the organization of governmental, or academic archives.

Archives where collections of material on Estonia are preserved bear testimony to an extremely diverse political background. During its history, Estonia has been under the rule of several powers (i.e. Sweden, Poland, Denmark, and Russia). Documents concerning the history of Estonia may be found in the archives of all of these states. Especially rich archives outside Estonia are located to Sweden (soul and ploughland revisions and tax-lists from the 16-17th century) Germany, Denmark, Latvia and Russia (land revisions from southern Estonia in the 18th century and the census of 1897).

This study uses sources from the 16th century onward. This timeframe affected the selection of sources. In Denmark, sources relate mainly to earlier medieval times. Material in Polish, Latvian and Russian archives mostly cover southern Estonia and old Livonia—regions and time periods outside my research area of northwestern Estonia.

Here are also utilized archival records from outside Estonia, as not all material was kept in Estonian archives. Research on the Swedish period logically involved the Swedish National Archive of Stockholm. Archival materials there provide information through which can be studied new aspects of the coastal settlement history of northwest Estonia. Additional sources for this period are also preserved in the provincial archive Lund. With regard to lost sources, the wide source

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98 Kümann 2015 (manuscript).
100 The Estonian State Archive (ERA) in Tallinn and the Estonian History Archives (EAA) in Tartu (all the Estonian National Archives digitalised records can be viewed free of charge in the virtual environment Saaga www.ra.ee).
Selection of sources

Collecting and interpreting historical data often requires combinations of different sources in order to fill gaps in particular data sets. For example, documents like population records and taxation data often have not survived in completion. The integration of complementary data from other sources helps fill such gaps, and to construct a more complete image of the processes that influenced past landscapes.

Source integration can also aid the development of computer-generated models, that benefit from more complete data sets. The use of multiple source types in current work also introduces a methodological complexity. Methods used to estimate landscape change, have necessarily to be varied for different time periods. Sources used for the study of one time period do not exactly match with those used for others. Further, not all data types are immediately compatible with the analysis techniques. For example, in the current work historical maps were digitized and rectified before they can be used in computer base analyses.

In conclusion, an integration of source data is necessary for an overview of interaction between physical environment and human populations, political influences and technological practices. Therefore, I shall attempt a more specific description and analyses of each source type, used later in the chapter. Then, the discussion turns to the broad range of archival materials that were available. And after that the methodological approach will be applied to each source type. Then the chapter turns to issues related to cartographical analysis. Lastly, discussion will address estimation of land quality for cultivation practice through soil analysis and topographical data modeling of land-uplift.

\[102\] e.g. population censuses during the Napoleonic Wars, also about Noarootsi parish in 1881, 1897.
The data analysis subdivided into the following parts:

In order to conduct an integrated method for examining the land-use change and population development in the coastal landscape of Noarootsi, various analyses has been carried out.

1) A population analysis of Einbi and Kudani villages based on archival sources and secondary historical literature.

2) An analysis of the farm economy derived from maps, manorial accounting books, and secondary historical literature.

3) A historical-cartographical analysis based on available cartographical material over time.

4) A historical context analysis related to general political, social and economic characters – this is based on secondary literature related to the Estonian history.

5) An estimation of the land uplift and its effects on the landscape structure conducted from Soviet topographical maps from 1961 and the latest results of research in this field.

6) An analysis of the soil cover development based, on fieldwork in Noarootsi and a laboratory analysis of the samples. Fieldwork also involved field reconnaissance, in order to observe landscape elements from the historical maps (locations of fields, farm buildings).

A methodology for examining change in the local landscape

For the purpose of describing dominant forces of change on local landscape of Noarootsi (1690-1940), Jones’ three modes for explanation of change are applied in order to enable the combination of general overviews and detailed local studies. His conceptual model attempts to explain change on several geographical scales. Explanations of change can be gained by looking for: 1) the intentions and aspirations of individuals or groups of people, 2) the function of various landscape elements within society, and 3) the general social, political and economic context that covers many aspects of life. 103 To some extent, each mode of explanation relates to a specific, societal level. Hence, intentions are best sought at the level of the individual person (the micro level). The functions of the landscape appear most clearly at a more general level (the meso level). The meso level can be spatially delimited by physical-geographical characteristics. General structural aspects come into view with a greater emphasis in overall socie-

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103 Jones 1988, p. 197-204.
tal contexts (the macro level). The macro level can be defined as the in which certain political, economic and social institutions dominate.

Besides to desire to describe how different forces converge in changing the local landscape, my intention was also to describe how single households functioned in a changing environment. Therefore, a model of farm economy of coastal villagers has been conducted for current study. Inspired after Löfgren, who has studied how social development was mainly caused by an interplay between population growth and economic change, where the development of new coastal settlements (of landless people), fishing crofters, was based on the extended use of maritime resources. Hence, the model is combined with Jones’ three modes of explanation, in order to explore how the different factors such as resources from land and sea as well as socio-political restrictions came to affect the individual household or the entire village as a production unit at a certain time. This combination of finding explanations by applying three levels of scale (region, village/estate, individual/household) enables me to describe how different forces influenced local communities and the landscapes they inhabited. However, due to the nature of the source materials, any precise influences of intentions pursued by individuals or groups are only marginally explored here. The main focus is on the functional and structural modes of explanation.

Explanations of change at the intentional level

The intentional explanation (at the micro level) concentrates on personal attitudes or preferences towards how to organise the surrounding living environment, and how they influence relationships between individuals. Current studies that pursue intentional explanations are not considered in detail. A more complete understanding requires interviews or diaries, which evidently were not available. The main sources on this level were factual data related to issues concerning land ownership and household organization. 104

This study seeks to emphasize the context of the individuals information. The sources contain that now and then hints at people's intentions. Examples include how the character of a specific estate owner could play a role in how peasants were treated, how individual manor policies affected labour efficiency (some manors continued to use corporal punishment even when it became forbidden by law) and how some manor owners decided to relocate entire villages for better

104 The household is the basic residential unit in which economic production, consumption, inheritance, child rearing, and shelter are organized and carried out.
manorial economic prospects. Most often, the individual peasant is silent in the archives, especially during earlier periods. Nonetheless, there are some documents where peasants complain about manorial exploitation. Thus, legal documents from 18th century Paslepa manor describe how the estate size was affected by the Great Reduction period and the subsequent czarist land restitution aimed at creating support for the new regime from the local nobility. For example, in the 1680's, many of the peasants of Paslepa had been either evicted or forced to move their farms, due to the relocation of the manor and all its land.

Functional explanations of change

Functional explanations of change (at the meso level) represent an interplay between natural resources, the inhabitants and the form of local organization and dominance. The analysis here mainly concentrates on two aspects: the environmental conditions as a natural resource base, the population dynamics and the societal regulations forming the society. In order to examine these three aspects as an interplay of change factors, I will initially examine the land cover changes in Einbi and Kudani villages during the period 1690-1940, where the proportions of arable land, meadow, pasture (grazing) land and forest are calculated and the spatial distribution over time is discussed. For example, if the meadow areas increased, it means that they produced more winter fodder for the animals, and that the animals produced the manure that could fertilise the fields. The fields, in turn, produced food for more people. On the other hand, if the meadows were enlarged, this probably reduced the areas of grazing, which provided summer fodder for the animals. An increase in the meadow could indicate a growing number of cattle, for example, while increase in the arable, at the expense of the meadow, could indicate a growing population and a subsequent intensification of agriculture. In the current case, an additional factor was the possibility to use resources from the sea. An interaction with the sea was necessary and influenced the role of agriculture and its intensity. Intensified fishing and sea fowl hunting could compensate for a reduced access to meat from farm animals, and the use of seaweed from the beaches could replace animal manure.

Secondly, to explore under what kind of circumstances land-use change occurred and how it did affect the living conditions of local

105 Hoppe & Langton 1994, p. 4-50.
inhabitants, population figures were compiled in combination with an overview of the main socio-political restrictions during the study period. In conclusion, to understand how a household or an entire village or estate functioned at different times as a production unit, the model has been compiled to show how the different landscape elements interacted (the type of land subdivision, the organization of deliveries to the manor and the practices of cultivation). The model can also describe the effects of societal regulations that formed relationships between manors and peasants and how decisions on land-use and work organisation on the common lands in a village were organized. In the course of the study, it was possible to identify how individual households were organized, in terms of seasonality or labour division between farm and estate during my first study periods. From the population registers, we can see that the number of people per farm varied substantially over time. This means that, we can only infer functional explanations according to sources. For example, if a farm had 10 children, a reasonable assumption might be that family size reflected the demand for labour and work days from the manor.

Structural explanation and local landscape change
To demonstrate how the social context, technological developments and economic factors affected individual responses and activities at the local level, the historical context analysis has been used. It consists of a description of the main political and administrative changes occurring during each time period. The analysis is based mainly on information from historical and economic literature. The context, specific to each time period, is presented in the introduction to each time period, including chapter 5 (sub-period prior to first empirical study) of how administrative units developed from the Middle Ages (13th-16th centuries) in Estonia and particularly Noarootsi area.

Population dynamics
In order to describe the village and landscape structure, three cross-sections were constructed according to the number of farms and inhabitants in Einbi and Kudani villages from 1680 to 1940. These figures were based on soul revision lists, Church registers and modern census lists. These, in combination, can give the number of farms, the number of ploughlands (adramaa in Estonian, bake in Swedish, baken in German) and the name and age of inhabitants. A problematic as-
pect of the ploughland is that its size did not remain consistent over time. It stayed an irrational basis for the assessment of peasant taxes.

Counting the number of inhabitants in Kudani and Einbi villages rendered it possible to trace population changes, and in order to describe a changing carrying capacity, the number of people was related to the availability of resources. This involved an analysis of the interconnections between production and farm population, as well as peering through the window of historical records into land-use characteristics and, hence, factors that influenced change in the local landscape and its management. This was based on the manorial accounting books (vakuraamatud in Estonian, vackeböcker in Swedish) at the National Archive in Stockholm, and other sources from the Estonian Historical Archive in Tartu, including those available on the internet through the Saaga project.

Tracing the farm economy

Information on the household structure was to some extent based on secondary sources. Certain information on everyday activities both at the manor and at the peasant level. Therefore it is possible to discuss how such household activities were organised, and how seasonality structured the organisation of work. Sources like fragments of manorial account books (for example 1732 Paschlep Haken Revisionen, 1739 Paschlep Vackeböcker) rendered it possible to see how work was organized in peasant households and how labour was divided between the peasant’s household and the manor farm.

Each of these documents also each aided the assessment of living conditions for coastal peasants during each time period. Manorial account books from around 1600 and up to 1744 gave the number of workdays required from the manor for each farm. Individual farm information included the number of people, the amounts and types

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107 Tarvel 1972.
108 Digital source http://www.eha.ee/saaga/
109 Ploughland revision 1732; Paschlep manorial account books 1739 (see footnote 110)
of taxes owed to the manor as well as details on animal husbandry. These documents gave information of farms in Einbi and Kudani villages. The number of inhabitants per farm was compared to the information from historical maps in order to calculate the approximate areas of arable land per farm and its carrying capacity. Farm area calculations were also based on information concerning the subdivision of land (arable land formed the basis for the taxation of the farms, and it was therefore most carefully divided among the peasants) and the result was an estimated average of farm sizes during the late feudal period, and which differed due to the degree of subdivision.\textsuperscript{111} In view of population calculations and approximate productivity, total deliveries to the manor were calculated and also the number of animals kept (1739-1744). Archival sources can also reveal estimations of essential produce from the sea.\textsuperscript{112}

The period that followed the formation of the Estonian Republic in 1918 was carefully recorded in Agricultural Censuses, kept in the Estonian State Archive in Tallinn.\textsuperscript{113} These documents record how every farm was registered as a single farm unit (talund in Estonian). The resulting calculations include farm area, inhabitants per farm, individual occupations, and also details of vegetables, grain, and animals that were produced in household. The documents even mention if farms used artificial fertilizers, what level of technologies they possessed for agriculture, and often state that mechanical equipment (later 19\textsuperscript{th} and 20\textsuperscript{th} century) was shared between farms.\textsuperscript{114}

In conclusion, it is possible, therefore, to describe the subsistence activities in each village and the evolving carrying capacity for over three centuries as the population changed. The conclusions are somewhat hypothetical and therefore combined with additional material such as changes in the land cover.

Calculating the population numbers from 1690 to 1940

To account for the number of people living in Einbi and Kudani villages during the 1680-1940 had several challenging tasks when it comes to describe a continuous population dynamics over time. The

\textsuperscript{111} Roeck-Hansen 1996.
\textsuperscript{112} For example fragments of fishing documents from 1591.
\textsuperscript{113} Agricultural Censuses (maaalehed and talundilehed in Estonian).
\textsuperscript{114} Sourc: Lääne maakonna Noarootsi valla maaüksuste nimekiri 1938; Talundilehed Einbi ja Kudani küla kohta 1938; 1939. Noarootsi valla boniteerimise toimikud ERA f.62 n.22 1918-1940
main limits were the differences in source materials. Based on available sources the population calculations have been sub-divided into three main sections:

1. The first section uses the maps of Einbi (1698) and Kudani (1690) villages and their legends, which stated the number of farms and the names of farmers. In order to account for the ploughlands, accounting books (bakerevisioner in Swedish, adramaa revisionid in Estonian) were used. These surveys gave information about household sizes and to some extent also on the family structure, number of sons, brothers, wives, daughters, and maids. In 1687, accounting books also state the approximate ages. In 1726, 1739 and 1744 the numbers of herds are given.

2. The second set of population data is represented by the soul revision lists from 1780 up to 1811. Three soul revisions are analyzed in order to compile population figures for 1780 up to 1830. Soul revision lists are mainly giving on data on family, where each family, more precisely each family name has its own number.

1794-95 EAA.1864.2.IV-10
1794-95 (EAA.1864.2.V-65)
1811 (EAA.1864.1.279; EAA.1864.1.290)

The third section of population sources mainly consist of records from the Lutheran Church and municipality registers. These documents contain birth, marriage and death entries in chronological order. Using the parish members list from Noarootsi Church books in Lääne–Saarte Deanery (Praostkond in Estonian) it was possible to calculate the number of inhabitants in Einbi and Kudani villages from 1839 and up to 1932. From parish member lists the information

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115 The Estonian Historical Archives, Tartu, 1.2.IV-253 (Enby); 1.2.IV-254 (Gutanäs)
116 These documents I accompanied by manorial accounting books from 1680, 1684, 1687, 1726, 1732, 1739 which simultaneously served also as a population registers.
117 Eight soul revisions were carried out in current day Estonia: 1781/82, 1795, 1811 (only men were counted under Napoleonic Wars), 1816, 1833/34, 1850, 1857/58. http://www.eha.ee/saaga/. The Russian censuses for 1881 and 1897 are not preserved for the Noarootsi area. According to the Estonian Historical Archive in Tartu, only the census data for southern Estonia is preserved for those years. The census data on the Noarootsi area from 1914-1939 have been discussed by multiple authors (Hyrenius, Tammekann, 1969) beside the parish registers information. Hyrenius placed more emphasis on family name development while Tammekann used original population records.
118 The oldest parish registers date from the 17th century, the majority begins in the 18th century http://www.eha.ee/saaga/
about the migration and emigration can be found, which in my study context was an important aspect in order to account the family members and not only those who permanently settled in the area.\textsuperscript{119} The following cross-sections of parish registers are used for calculation of population:

1839-1863 (EAA.3169.1.45)
1864-1880 (EAA.3169.1.48)
1875-1923 (EAA.3169.1.50)
1878-1888 (EAA.3169.1.52)
1889-1905 (EAA.3169.1.53) Estonian Congregation (Pibtkond in Estonian)
1885-1904 (EAA.3169.1.54)
1903-1914 (EAA.3169.1.65) Estonians
1903-1914 (EAA.3169.1.66)
1915-1932 (EAA.3169.1.67) Swedes
1915-1932 (EAA.3169.1.68) Estonians

In order to create “deeper” cross-sections from census data, the available family registers were treated with plus/minus ten years snapshots in order to compile the population figures for 1830, 1850, 1880-1900, 1905, 1914-1917, 1930 and 1934. Inhabitants, who moved out from the area or married to another village were not counted even though they might be living there the first 20 or more years. The population data in various type of sources enable the description of the social regulation in these villages, by discussing how the household and family structure developed. The problem with these taxation lists is that population registers are often fragmented, while covering the entire period from 1680-1940. But the strength is that it is possible to describe in detail the manorial deliveries in accounting books from 1680, 1739, 1744 including, for example, the number of animals per farm. This enables us to trace how the local production unit such as farm, or village or an estate functions at that time. And in conclusion, it is possible, therefore, to reconstruct the subsistence production in each village and to calculate the evolving carrying capacity.

These conclusions are somewhat hypothetical due to the source material fragmentation, in order to explain how and to what extent it influenced the local landscape structure, the additional factor such as a change in land cover could be integrated through the cartographical analyse.

\textsuperscript{119} Winberg 1978, p. 128 ff.
A methodology for map analysis

This section discusses the use of cartographical analysis in historical studies such as the present case. It addresses how source materials can be evaluated, methodological approaches to their interpretation, and the verification and subjectivity of sources. A critical factor in the present study deals with the use of maps as sources. Maps can be used as quantitative measurements or a practice open to different interpretations. To comprehend the qualitative elements of map analysis, one needs to understand and contemplate the map-making process.\textsuperscript{120} This includes understanding historical perspectives and methods of adapting historical materials. Historical research cannot produce a hypothesis that is verifiable under historical conditions. Sources and their interpretation always contain some degree of subjectivity.\textsuperscript{121}

Interpretations and subjectivity of maps

Maps have been drawn in different eras for various purposes and they have varied with each cartographer. A typical challenge in analysing historical maps is the difficulty of spatial matching between maps. One example is to consider the various purposes of different maps and how these purposes varied widely.

During the late 17\textsuperscript{th} century, large-scale cadastral maps were drawn for many villages in the Baltic region.\textsuperscript{122} Mapping efforts began when Sweden was a dominant power in the Baltic region\textsuperscript{123}. To be sure, many maps show evidence of how they were influenced by the political authority in the area. As a result, these maps represent an important resource for explaining aspects of social history. They illustrate the development of land ownership and land-use aspects of the local economy. They offer exceptional possibilities for a detailed analysis of land distribution. Interpretation is the key to unlocking the information here as of any type of data. Some types of data here derive from the needs of local and national administrations to record and inventor various aspects of society. For example, issues of demography, taxation, land ownership, land-use organization, and legal changes all related to interests of the administrations.

The language of maps, including the practice of recording place names, is an important and interesting object for investigation, as is

\textsuperscript{121} Kiimann 2015 (manuscript)
\textsuperscript{122} Kain & Baigent 1984, p. 49-67.
\textsuperscript{123} Roeck-Hansen 1996.
the symbolic representation of topography. For example, here I analyse arable land distribution and the agricultural production during different political eras. Conquests and internal reforms caused changes in the regulations related to land-use. These changes were later reflected in the mapped documentation, such as the situation under the feudal system, when maps were drawn by State authorities in order to clarify ownership and wealth. According to Persson, the development of land ownership, trajectories in land-use and exploration of diverse aspects of the local economy offer an opportunity for detailed analysis of landholding and productivity.¹²⁴

Historical priorities, like those described above, enabled me in the current work to describe the land-use development in terms of existing regulations and obligations in Noarootsi area. Still, the maps cannot provide a complete picture of how the local landscape and its inhabitants functioned at any given time. To reconstruct the 17th century landscape and the local conditions that influenced life and culture, it was necessary to accumulate accessible empirical data and to maintain an awareness that a map interpretation involves an analysis of documents that were produced for a specific purpose. Accordingly, Harley states that an essential skill is required by the historical geographer. This is the ability to “deconstruct” maps and the different sorts of evidence revealed in them. This deconstruction occurs in two senses: one is scientific, and the other is cultural, where one set may be defined as governing the technical production of maps, the other relates to the cultural production of maps.¹²⁵

The historical−cartographic method

The current method rests on an analysis of different historical phases and their reflections in the present day landscape. The study draws on modern technologies (e.g. GIS, cartographical methods) combined with ecological sources that include field surveys. A series of maps has been analysed for information on land cover, cultivation practise and population structure. Historical maps from the 17th, 19th and 20th centuries were utilized. These maps provide a picture that reveals conditions developed from the late Feudal period onward.

¹²⁴ Persson 1997, p. 119-134.
Historical maps from the 17th, 19th and 20th century

The series of maps provide extensive data analyzed in my work. The first are the 1690’s maps of Einbi and Kudani villages, constructed by Swedish surveyor Johan Holmberg. From these maps it was possible to distinguish different land-use types for the late feudal period.

Additional challenges relate to analyzing the maps using GIS (Geographical Information System). First, the result of any analysis is closely related to the accuracy of the source material, meaning that errors by the cartographer are transferred into the (GIS) analysis. Secondly, the archival map needed to be fit into a coordinate system compatible with today’s cartographical methodology. Such was the case for both Einbi village maps (1698, 1860-61, 1886) and those for Kudani village (1690, 1885, 1926). All maps, including smaller scale printed maps from 1903, 1935-38 and 1961 were digitally rectified, using modern orthophotos. Cartographical programs MapInfo 8.5; Vertical Mapper 6.0, and Adobe Photoshop 6.0 were used in order to conduct an overlay analysis for areal calculations of different landscape features (e.g. arable land, meadow, pasture, forest, farm size) and their spatial distribution.

The second time period is portrayed in the Einbi maps of 1860-61 and 1886. Kudani has one map for the period, drawn in 1885. These 19th century maps give more detail about farmhouses, gardens, fields and the surrounding area than the early ones. They also demarcate boundaries of manor fields, and village borders are recorded in more detail. These maps were drawn by German surveyors. Their composition was ordered by the manor and intended to estimate the land area, land quality and to inventory available resources.

The final time period utilised seven maps, beginning with the small-scale verst map from 1903. It was produced by the Russian authorities and later modified by the German army during the First World War. Its content is difficult to decipher, as land-use types and village borders are not clearly marked. In the 1926 Kudani map, land properties are depicted in impressive detail. A printed sche-

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126 The coordinate system used for these maps was Pulkov of 1945 to Lest 1992. Topographical maps from 1990 and the 1:10 000 orthophoto of the area were used. An orthophoto (1:5000-1:10 000) is a processed aerial photo from which distortions caused by terrain relief, camera tilt relative to the ground at the moment of exposure and camera central projection are removed. http://geoportaal.maaamet.ee
127 Einbi village map 1860-61 (EAA.2072.9.111) and 1885-86 (EAA.2072.9.112)
128 Kudani village map 1885. (EAA. F2072) Kaardikogu 1600-1900.
129 1903 verst map – Russian (Czarist) military topographical maps. 1:42 000. Estonian Land Board. http://geoportaal.maaamet.ee
130 Military maps from 1918. Karte der 8. Armee (1:25 000) (ERA.T-6.3.342)
131 Kudani village map 1926. Maido Limbak private collection.
matic map of the Einbi land ownership followed a few years later in 1936.132 The final land-use map used was the topographical map printed in 1935-39 by the Estonian topographic authorities at a scale of (1: 50 000).133 It has been combined with data from 1942 topographical map (1: 50 000) made by the Russian army during the first occupation of Estonia. In order to include the natural conditions of the area, the Estonian soil map (1: 10 000) was used.134 Other maps used for describing the physical environment of Noarootsi peninsula include geological maps (1: 400 000) and Soviet military topographical map from 1963 to compile land uplift figures.135

The land uplift model

The compilation of a model for land uplift in the Noarootsi peninsula, utilized the cartographical program MapInfo Professional 8.5. Firstly the grids, settlements, water lagoons and other topographical data on landforms were digitized. The Russian military topographical map from 1963 formed a basis for the cartographic analysis and for the collection of field work data. The corrected 0.5-1.0 m isobase was transferred to the digitized topographical map. The 1 m isobase in this map marks the sea level about 300 years ago as calculated assuming an average uplift of 2.8 mm/annum.136 This was the approximate time when the first village maps of Kudani and Einibi were drawn, around the end of the 17th century.

An analysis of the soils – a field survey of the natural resource base

The analysis of local resource opportunities available to settlements on the northwestern coast of Estonia required an estimation of how the farmland was chosen. This involved a combination of historical-cartographical method as well as field survey.

In order to investigate the differences in soil cover between areas in use in Einbi and in Kudani villages, as compared to those not cultivated, soil cover characteristics were analysed. This involved the use of cartographical data and the compilation of soil transects from the villages. The several fieldworks were carried out. Soil samples from Einbi and Kudani villages were taken from different land-use types

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132 Einbi schematic map (Skeemiline kaart) cadastral map mid-1930s. Map sheets for central Noarootsi municipality: XIV-18; Kudani schematic map: XIII-19. (1:10 000)
134 Estonian soil map 1:10 000. http://geoportaal.maaamet.ee
135 Eesti kvartneraatriสเตted 1:400 000. Eesti Geoloogiakeskus.
and analyzed in the Soil Laboratory of the Estonian University of Life Sciences, Tartu. The results of the soil profiles were computed and analyzed in order to describe the rate of organic carbon accumulation. To estimate the main characteristics of soil cover, the average C% (K, N, pH and P) content was calculated. In order to examine how the conditions for cultivation and expansion of agricultural land developed and to identify which areas were utilized as arable fields, a hypothetical genesis of soils was conducted, as well as detailed soil maps of both villages were drawn. The combination of historical data and cartographical analysis allows us to describe probable conditions of Noarootsi’s physical environment during the period spanning from the 17th century to 20th. Further, field studies were used to verify data presented on the historical maps in order to describe the present day land-use.

137 Several methods were used. The carbon content was calculated with I. V. Tjurini method, which in western countries is called the Anne method. The N level was calculated using the Kirsanovi method, see Reintam 2003.
4. Changing resource base – natural preconditions of the Noarootsi area

The degree of human impact on the landscape has depended on the resources available at various times. Therefore, chapter 4 focuses on the natural preconditions of the Noarootsi area in order to describe how it affected the livelihoods of the local residents. Two main factors that have influenced the land-use pattern in the Noarootsi peninsula are examined: first, the land uplift process calculated through (GIS) modeling, and secondly, the soil cover analysis based on map information and the results of the fieldwork.

Shore displacement gives the peninsular landscape its character, and its evolution is caused by ongoing land uplift.\textsuperscript{138} Uplift exerted significant effects on the physical geography, especially with regards to hydrology, shore development, and vegetation.\textsuperscript{139} These factors also govern the development of soil cover. In turn, the character of the soil is one of the main factors that determined the distribution of agricultural land in the area.

Geomorphology

Estonia is located on the southern slope of the Fennoscandian Shield. As part of the vast East European Plain, northwest Estonia is characterized by a flat surface with small relative and absolute elevations. The main processes that influenced the general trends in the development of Estonian territory were the retreat of ice cover and the development of Baltic Sea. Northwest Estonia retreated from the latest glaciation about 11,000 years ago.\textsuperscript{140} Fluctuations in the sea were caused by differential glacio-isostatic movement and climatically controlled eustatic change.\textsuperscript{141} In the postglacial time coastal processes

\begin{itemize}
  \item \textsuperscript{141} Harff et al. 2005, p. 441-446.
\end{itemize}
are largely transformed by the glacial land-form. The Noarootsi peninsula started emerging from the sea in the beginning of the Limnea sea stage approximately 4200-4500 years ago. The Limnea sea stage had a regressive character and the development of coastal form is characterized by a deficiency of sediments.

The crystalline basement of Läänemaa mainly consists of strongly distorted gneisses. The bedrock is composed of sedimentary rocks from the Paleozoic period. The lower layers largely formed from sandstone and sandy clay originating from the Vendian and early Cambrian periods. The upper layers are primarily limestone, mainly composed of Ordovician and Silurian carbonaceous sedimentary rocks. The bedrock is covered with Quaternary deposits.

Figure 4. The most productive arable fields are connected to the distribution of till. Sandy areas can be found over nearly the entire peninsula. Source: Estonian Quaternary map 1: 400 000.

These are thicker in the eastern part of peninsula and thinner in the central and western parts. From Figure 4 we can see how the glacial deposits, the yellow-grey till rich in pebbles is widely distributed on the peninsula. Sand dominates the southwest coast where most of the Einbi village fields are located. The eastern part of the area, particularly the former lake and bay areas, are abundant in clay. In conclusion, the Noarootsi area is characterized by the frequent appearance of two-member parent materials, consisting of underlying till or other

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types of sediments covered with coastal deposits. The Quaternary deposits have played important role in the soil cover formation.\textsuperscript{144}

**Shoreline development of the Noarootsi area**

The dynamics of shoreline development have attracted special attention in recent decades, particularly in the context of climate change. To visualize the past environmental conditions, it was necessary to model the development of shorelines of the Noarootsi peninsula. The construction of an original land-uplift model is based on data from a Soviet topographical map from 1963 (1: 10 000), which was scanned and redrawn at 0.5 m resolution using the cartographical program MapInfo Professional 6.0. It was then interpolated and transformed into a 3D model with the Vertical Mapper software tool. For the description of the current topographical conditions, the present coastal line was adopted (0 m a s l) from the Estonian base map (Eesti Põhikaart 1: 20 000).\textsuperscript{145}

**The land-uplift model of the Noarootsi peninsula**

Land uplift in Estonia ranges from about 45 m in the southern areas to approximately 75 m on the northern coast.\textsuperscript{146} The variation results from postglacial isostatic movements.\textsuperscript{147} According to Vallner, the estimated rate of land uplift on the northwestern coast of Estonia is 2.8 mm/year.\textsuperscript{148} Based on this estimated rate of land uplift, the area’s ancient shoreline dynamics and coastal topography were cartographically reconstructed in Nõva, Rooslepa and Riguldi and compiled by Hoppe et al.\textsuperscript{149} The study demonstrates how the 2 m isobase equals the shoreline at approximately 1300 AD, and the 5 meter level approximately 250 AD.\textsuperscript{150} This gave rise to a discussion about whether the maximum isobase on the northwest coast of Estonia could be more than 2 mm/year, according to estimates of eustatic change caused by transgression and regression in the Baltic Sea during its

\textsuperscript{144}According to Reintam, the character and development of pedogenesis is essentially dependent on the calcareousness and texture of the Quaternary deposits. See also Ratas & Nilsson 1997.
\textsuperscript{145} Source: Estonian Land Board (Eesti Maa-amet)
\textsuperscript{146} Kessel & Punning 1972.
\textsuperscript{147} Tõnisson et al. 2008, p. 602-614.
\textsuperscript{148} Vallner et al. 1988, p. 215-223.
\textsuperscript{149} Hoppe et al. 2002, p. 185-190.
\textsuperscript{150} Markus 2004, p. 195-197.
Holocene development and annual sea level deviation. In the southern Baltic, the coastline retreated continuously from the beginning of the Littorina transgression, 8000 BP. At the same time, uplift of the Fennoscandian Shield has caused permanent regression along the Scandinavian coast. In the current work, the estimate of land uplift at the present time of 2.8 mm/year has been utilized despite the lack of crystal movement measurement on the Noarootsi area (Figure 5,6). The beaches of northwest Estonia, classified by low wave activity and the relative infrequency of storms, are considered as silty shores (so called “dead beaches” möllirand in Estonian). The classification of the Estonian coastline is based on the concept of wave processes straightening the initially irregular outlines by the erosion of capes, deposition in bays, or a combination of the two.

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151 Mörner 1979, p. 287–318. See also Åse 1982, p. 95-112.
According to the distribution of coastal types on the Estonian coast, the Noarootsi peninsula belongs to the straightening abrasion-accumulation coast. Because the possibilities for the drainage of areas were better closer to the shore at that time, it was easier to find suitable landing places for small boats. Hoppe et al. have assumed that the villages along the coast with sheltered harbors were probably primarily Swedish settlements of the area. Figure 6, which depicts landscape development, shows that the peninsula comprised several small islands, which came together to form a peninsula in the 19th century. What used to be coastal lakes and bays are now overgrown and have transformed into mires.

Climate

The previously discussed Limnea sea stadium was characterized by the subatlantic and subboreal climate conditions. The subboreal climate period was dryer and cooler than the preceding Atlantic, but was still warmer than today.

The climate change at seasonal to annual resolutions during my study period (1690-1940) are based on the reconstructions either from natural archives (such as ice cores, tree rings, varved sediment etc.) or from early instrumental and documentary evidence.\textsuperscript{158} This time period, from 16th to the middle of 19th centuries, is also characterized as Little Ice Age, during which the European climate was most strongly affected. The colder conditions combined with altered patterns of atmospheric circulation were most probably connected to several crop failures in Northern Europe. There are several reports of famine, disease, and increased child mortality during the 17\textsuperscript{th} -19\textsuperscript{th} centuries that possibly are related, at least in part, to colder temperatures and altered weather conditions.\textsuperscript{159} According to Tarand et al. the average winter temperatures in Estonia during this period were -5.0°C for 1667-1699, -4.4°C for 1700-1733, -5.1°C for 1800-1883, -4.2°C for 1867-1899 and -3.7°C for 1900-1933. Except for the two short periods of 1700-1733 and 1867-1899, the winters were generally colder than those of the 20\textsuperscript{th} century. The average temperature during the months of April-July was +10.2 °C for 1671-1699, +9.6 °C for 1800-1833, +9.8°C for 1900-1933, and +10.7 °C for 1934-1966.\textsuperscript{160}

In the present day, the cyclonic activity in the northern Atlantic greatly affects the climate in Estonia. Estonian summers are comparably short and cool, autumns long and winters relatively mild. Average rainfall has been ca 600-700 mm/year over a long period of time.\textsuperscript{161} The climate is maritime in west Estonia; the Baltic Sea plays an important part in shaping the climate. The specific maritime influence manifests in sea breezes, resulting in rare cloudiness, regular sunny spells, and higher wind speed. The contrast in temperature originating from the warm Baltic Sea reaches its maximum in January. The average temperature in January between 1966 and 1988 was -4°C. The air mass warms considerably faster in inland areas than in maritime areas. The inland and maritime air temperatures even up only by July. The average temperature in April is +3.5°C, and in July, the average tem-

\textsuperscript{158} Luterbacher et al. 2004, p. 1499.
\textsuperscript{159} Mann 2002, p. 504-509
\textsuperscript{160} Tarand et al. 2013, p. 363-386.
temperature has been +16.5ºC for a long period of time.\textsuperscript{162} Autumnns are warmer in coastal belts than in the other parts of Estonia. The average temperature in October is +6.5ºC.\textsuperscript{163} Long-lasting measurements in the peninsula show an annual average temperature of +5.4ºC.\textsuperscript{164}

For a long period of time, average rainfall in the Noarootsi peninsula has been 600 mm.\textsuperscript{165} The influence of wind is important to coastal areas. Winds affect ice cover movement, deflation (the erosion of sand, soil, etc. by the action of the wind). South-westerly winds dominate the area together with the southerly and westerly winds. Average wind speed in the open coast area is 6.5-8.0 m/s, and 5m/s in the Väinameri coastal area.\textsuperscript{166}

**Vegetation**

The vegetation in Noarootsi area has change due to the ceassion of traditional farming activities, for example there was little forest in the the beginning of 20th. The present day vegetation is influenced by maritime conditions, as the surrounding sea warms slowly and cools similarly in autumn, influencing the temperature regime and the length of the vegetation period on islands and coastal areas.\textsuperscript{167}

The Noarootsi peninsula is one of the most forest-rich areas in Läänemaa County. Forests covered 66% of the area in 1992.\textsuperscript{168} The largest forests are situated in the northwestern and southwestern parts (see Figure 7). Pine (\textit{Pinus sylvestris}) and birch (\textit{Betula sp.}) are the most widely spread tree species in the area. Natural grasslands are common in the northwest and southwest parts of the peninsula (Figure 7). Coastal meadows with halophilic species are common in the entire area.

\textsuperscript{162} Jaagus 2002, p. 28-37.
\textsuperscript{163} Trand 1988, p. 15-36.
\textsuperscript{164} Jaagus 2001, p. 9-25.
\textsuperscript{165} Jaagus & Tarand 1988, p. 5-18.
\textsuperscript{166} Jõgi & Tarand 1995, p. 183-216.
\textsuperscript{167} Ratas 1992, p. 165-167.
Figure 7. The present day land-use in the Noarootsi peninsula. Source: after Corine Land Cover map 2006. http://geoportaal.amaamet.ee. The map illustrates how the pasture and forested areas are dominating in the Einbi village area.
Soils in Einbi and Kudani villages

The diverse final composition of the contemporary soil cover formed during the Atlantic climate period 7800-4800 years ago. In different stages of evolution, sea water fluctuations and various local bodies of water play an important part in soil cover development.\(^{169}\)

Dominating types of soils on the Noarootsi peninsula are Gleysols that cover 33% of the area.\(^{170}\) These types of soil are too moist and unsuitable for cultivation. Skeletic Regosols (Kg) and Calcaric Cambisols (Ko) can be found in the northwest area of the peninsula and Calaric Luvisols (KI) in the eastern area of the peninsula.\(^{171}\) The lowshores temporarily inundated by seawater and Salic Fluvisols occur.\(^{172}\) These are often used for hay lands and pasture (grazing). Skeletic Regosol (K) are present in the Pürksi and Lückholm till areas, where the most productive fields of the peninsula are situated.\(^{173}\) Most of the cultivated land during the Soviet Era collective farm period was located there.

In conclusion, the plant and soil cover in the peninsula are strongly influenced by the geomorphology of the area. The development of plant communities and soil types depends on moisture conditions and the characteristics of deposits and parental material. The Noarootsi area is young (ongoing uplift), which means the features of the soil types and the plant communities have not yet been fully established.

The soil map of Einbi village

The Einbi village region is low area inundated by some higher parts (2-3 m, from land uplift model) which means there are differences in moisture regime and parental material. The soils are quite variable. The compiled soil cover map for Einbi demonstrates the extent to which the establishment of arable fields in Einbi village has been possible according to land quality and various soil types.

\(^{169}\) Nõulik 2001.

\(^{170}\) Gleysols (G) are characterized by thin skeletal profile, presence of carbonates in the topsoil. Their agronomical value tends to be low due to the overmoistening texture.

\(^{171}\) These soil types (KI) and (Ko) are the main objects of agricultural amelioration in Estonia, they are especially suitable for grassland husbandry.

\(^{172}\) Saline littoral soils (Salic Fluvisols) are formed on low coastal territories of the Baltic Sea. They are young soils with slightly differentiated gelyic profile. Appendix 1.

\(^{173}\) (K) soil type represents Regosols. Rendzic Leptosols where the presence of carbonates is (more than 10%) already in humus horizon. The productive capacity is high. Appendix 1.
Figure 8. Einbi village soil map. Source: after soil map of Estonia 1: 10 000. Cartography: Hele Kiimann.

Figure 8. shows how along the coastline, saline soils such as Salic Fluvisols on sea sands are dominant along with Cambic Podzols. Gleysols are only present to a smaller extent. In terms of arable land distribution, the highly productive Cambisols, Luvisols and Regosols are represented on map.

To describe the possibilities to take into the use more arable land, it is necessary to study the conditions for availability to expand the fields. Therefore, a genetic row of soil type development could lead to the answer. The genetic row represents a hypothetical development of soil types over time on carbonic bedrock. Also taking into consideration land-uplift and changes in water regime, the hypothetical development of soil types can be represented as follows:

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174 Salic Fluvisols are formed on low coastal areas, they contain comparatively high amounts of soluble salts as chlorides, sulphates etc. Cambic Podzols are formed on sands of different genetic categories.
First, the soil development process in the area begins with the central influence of the water regime. The land-uplift process dictated which parts of the land were above water, and this often involved seasonal flooding of low-lying areas such as Einbi. Subsequent development of the Arg (frequently flooded by sea water) and Gr (rarely flooded) types (see also Appendix 1) can develop in several variations. As arable fields in Einbi are located mainly on calcareous parent material Regosols (Kg) or Luvisols (K), then the first genesis row could develop as a result of Calcaric Cambisol (Ko) evolving into Rendzic Leptisol (Gk) and Skeletic Regosols (Kg). The soil type genesis could also develop in other ways. Some types might not develop further, and other types are not represented in a row at all. For example, the Fluvisols (saline littoral soils) on the coastline are not suitable for agriculture.

The soils in Kudani village

The dominant soil types in Kudani village are Gleysols and Salic Fluvisols. Importantly, Rendzinas (Rendzic Leptosols) occur where the cultivated areas are located.
Figure 9. Kudani village soil map. Source: after soil map of Estonia 1: 10 000.
Cartography: Hele Kiimann.

Figure 9. shows that Gleysols dominate. These areas could be used as pasture (grazing land). The maps shows how suitable land for cultivation was limited (Regosols, Cambisols). These can be temporally too moist in the wetter season, but during drier summers, soil loses moisture fast enough to cause a lack of water for vegetation. The land is more stony (5-20 m³/ha) than in Einbi village, where sand is more prevalent. The parental material in Kudani is sandy loam. Fluvisols occur in former lake lagoon areas. They also occur in overgrown bays that regularly flood with seawater. Taking into consideration the water regime and land-uplift characteristics, the following hypothetical development of soil types emerges.

175 From fieldwork material.
Here we can assume that changes in the moisture regime could possibly affect development toward more fertile soil types, such as Calcaric Cambisols (Ko) as well as the Luvisols (K) and Regosols (Kg). The dominant types will remain Gleysols (low agronomical value due to the overmoistening conditions). At present, gley soils still predominate, extra drainage is needed for more efficient cultivation.

In conclusion, the compiled maps and hypothetical soil type development rows demonstrate how the soils of Einbi and Kudani developed in several distinct stages. These stages were formed by variations in relief characteristics, moisture conditions and parent material. The Einbi case showed higher variation in soil type development, while in Kudani the soils are not diverse (most probably due to the lower elevations).

The fieldwork in Einbi and Kudani villages

The main aim of conducting fieldwork on the soil conditions in Einbi and Kudani villages was to explore the hypothetical cultivation possibilities for local residents at different times. In order to answer the question about how the potential carrying capacity evolved, as local people sought to make a living. For example, could they expand the fields due to the natural conditions—or were their options significantly limited by the soil conditions in the area? This task has challenged historical geographers and archeologists. Efforts to gain a stronger understanding of previous land-use and its delimitations cross-disciplinary methodologies, such as soil science and history (cartography), are often in use.

The first fieldwork: suitability of soils for agriculture in Einbi village

Holocene soil forming processes by human-induced constructions are characterized by an increase in intensity. The progress of interactions between humus substances and parent mineral material is rather fast, resulting in the formation of pedogenetic diagnostics after decades or only a few hundred years.

The Einbi village area covers coastland and some higher elevation till areas. To investigate how villagers selected fields for cultivation, analyses of soil profiles were carried out (see Figure 10). The profile locations were chosen according to geomorphology (on the same bedrock) and by land-use characteristics. Noarootsi soils are
consistent in genetic composition, which means that the main soil types remain consistent over time.

![Image of map showing areas used today, temporarily used, and not used]

Figure 10. The samples were taken from areas that are: a) not used today, b) temporarily used and c) in regular use as arable land.

When we use land-uplift model to estimate the age of the investigated area (where soil samples were taken), approximate humus conditions were calculated. The results showed that humus content demonstrated the largest variance between natural and arable land in the northern part of Einbi village.\textsuperscript{176}

![Humus content table]

Figure 11. The approximate humus conditions on the Einbi village fields.\textsuperscript{177}

\textsuperscript{176} Kiimann & Jõeäär 2015 (manuscript).

\textsuperscript{177} Jõeäär 2005.
Figure 12. Results from the soil profile analyses (variances between natural and arable land in the Noarootsi area).

Figure 12. shows how on arable land, the A-horizon is a few centimeters thicker than in natural areas.\(^{178}\) This allows us to conclude that there was low plough (ard) in use in Einbi fields. Differences in the weight per unit of volume show suitable conditions for plants. The differences are so small that it shows low variance in vegetation. There is no difference in pH, which is an important consideration for farmers. Many plants need soil forms that are either alkaline or acidic, and the pH level can also affect the availability of nutrients in the soil. The annual rate of organic carbon accumulation in the 1 cm layer has been 10-36 times higher in areas with human activity constructions than in the soil epipedon\(^ {179}\) through the entirety of the Holocene.\(^ {180}\)

To verify the results from the present soil analysis, the contemporary soil map (1:10 000) was compared with the map of Einbi village from 1698. Taking into consideration land uplift and the hypothetical development of soils, the results show that arable land in Einbi was established on Regosols, Cambisols and Luvisols. These observations allow us to conclude that the expansion of arable land in Einbi was directly influenced by soil quality conditions.

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\(^{178}\) The A horizon is the top layer of the soil horizon. It is a surface horizon, and as such is also the zone where most biological activity occurs.

\(^{179}\) The epipedon is a horizon (or horizons) forming at or near the surface. It is darkened by organic matter or shows evidence of eluviation. An epipedon is not the same as an A horizon. The epipedons may include part or all of an alluvial B horizon if the darkening by organic matter extends from the soil surface into the B horizon.

The second fieldwork: soil cover analysis of historical fields in Kudani and Einbi villages

The second fieldwork was carried out with the additional goal of estimating soil quality and the conditions of the fields in the 1690s. The first fieldwork showed how the distribution of arable land in Einbi village was directly related to natural conditions. Everything cultivated was located in higher-elevation till areas. They were the most fertile.

During the previous fieldwork the soil profile was conducted on the same initial bedrock, as the purpose was to compare soil varieties between different land-use areas, then in current fieldwork the soil transects were compiled according to the historical field locations in Einbi and Kudani villages. A series of village maps from 1690 (1698), 1860 (1886) and 1903 were used to identify sample-taking locations, and they were combined with present-day aerial photographs. Then the whole soil transect was compiled. Einbi village sample locations (marked with a black star) were as follows:
Figure 13. Einbi village map (1698) field locations (marked with black contour) with soil profile locations (marked as symbol with star).

Figure 14. Einbi village map (1861) field locations (marked with black contour) with soil profile locations (marked as symbol with star).
Figure 15. Einbi village map (1886) field locations (marked with black contour) with soil profile locations (marked as symbol with star).

Figure 16. Soil transect in Einbi and Kudani villages (marked with red).
Figure 17. Soil pit from Einbi fields (a) and soil pit (b) from Kudani fields.
The results: an estimation of the soil conditions of historical fields from the late 17th century to the early 19th century

As the compiled soil maps for the villages showed, the Einbi village soil cover has much more variability than Kudani. This is also reflected in the soils of arable fields. The cultivated areas tended to consist mainly of Regosols, Luvisols and Cambisols. Soil samples taken from Einbi fields were divided by intensity of land-use. The first group of soil pit were taken from formerly arable fields now used as meadows that remain in active use (soil pit I, IV and V). The second group consisted of areas that have recently been cultivated (II, III) Table 1.

Estimation of agricultural soil characteristics

Humus content and thickness are most important in agricultural soils. With the increase of humus horizon, plant productivity often increases, though this also depends on the other constituents of the soil. It is thus not just the humus horizon’s thickness that determines the productivity of cultures, which depends on more complex characteristics of the soil. These change in conjunction with changes in humus horizons.

The main factors that determine soil characteristics are: soil fraction, stoniness and pH. Humus content in soil increases the productivity of Regosols, for example, but also boosts the productivity of a high stony level and a low capacity of hold active water.

Einbi and Kudani village soils are characterized by four factors: pH, content of carbon, humus and soil fraction (see Table 1).

---

Table 1. Einbi soil profile 1. Soil pit I, II, III, IV, V

<table>
<thead>
<tr>
<th></th>
<th>A 0-10 cm</th>
<th>A 10-30 cm</th>
<th>C 30-55 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH_{KCl}</td>
<td>7</td>
<td>7.1</td>
<td>7</td>
</tr>
<tr>
<td>C gkg^{-1}</td>
<td>13</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg^{-1}</td>
<td>22</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>sand</td>
<td>sand</td>
<td>loamy sand</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH_{KCl}</td>
<td>5.5</td>
<td>7</td>
<td>7.8</td>
</tr>
<tr>
<td>C gkg^{-1}</td>
<td>24</td>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg^{-1}</td>
<td>50</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>sand</td>
<td>sand</td>
<td>sand</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH_{KCl}</td>
<td>5.9</td>
<td>6</td>
<td>7.8</td>
</tr>
<tr>
<td>C gkg^{-1}</td>
<td>18</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg^{-1}</td>
<td>31</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>loamy sand</td>
<td>loamy sand</td>
<td>loamy sand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A 0-10 cm</th>
<th>A 10-28 cm</th>
<th>C 28-40 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH_{KCl}</td>
<td>7.2</td>
<td>7.2</td>
<td>7.7</td>
</tr>
<tr>
<td>C gkg^{-1}</td>
<td>24</td>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg^{-1}</td>
<td>41</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>sand</td>
<td>sand</td>
<td>sand</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH_{KCl}</td>
<td>7.2</td>
<td>7.2</td>
<td>7.7</td>
</tr>
<tr>
<td>C gkg^{-1}</td>
<td>18</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg^{-1}</td>
<td>31</td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>sand</td>
<td>sand</td>
<td>loamy sand</td>
</tr>
</tbody>
</table>
Figure 18. Einbi village’s agricultural soil profile 1 and 2.

From Figure 18 Einbi village soil profiles 1 and 2 show that actively used grasslands have a relatively consistent thickness, 28 cm of the A-horizon. It can be assumed that its genesis is related to intense human activity, using deep ploughing methods. The soil pH in the humus layer is approximately 7, but in the initial bedrock it is higher. In long unused areas, where young pine forests grow, the A-horizon tends to be thicker than average, varying up to 35 cm. On the higher horizon of the soil profiles, the pH is neutral or slightly acidic, which means it is suitable for the cultivation of most plants. The content of organic carbon is not high in the humus horizon but varies sporadically.
Analyzing Kudani’s arable, carbonate-rich fields shows numerous similarities. The A- horizon is productive, and thickness is constant at 28 cm (Figure 19). The homogeneity of the horizon can be related to ploughing activity. In contrast to samples from fields that have been fallow for several years, the humus accumulation process has occurred. But generally, the content of humus is stable, staying near 4.8%. The pH chemical reaction of soils stays fairly constant, as there is not as much variety in the initial bedrock as in Einbi village. Kudani soils measure 7.4 in the upper layers and 7.9 in the bedrock. (Table 2).

Table 2. Kudani soil profile 1. Soil pit I, II, III.

<table>
<thead>
<tr>
<th>Soil Profile</th>
<th>A 0-10 cm</th>
<th>A 10-32 cm</th>
<th>C 32-47 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>I pH_{KCl}</td>
<td>7.4</td>
<td>7.4</td>
<td>7.9</td>
</tr>
<tr>
<td>C gkg⁻¹</td>
<td>29</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg⁻¹</td>
<td>50</td>
<td>52</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>Loam</td>
<td>Sandy loam</td>
<td>Sandy loam</td>
</tr>
<tr>
<td>II pH_{KCl}</td>
<td>7.4</td>
<td>7.4</td>
<td>7.9</td>
</tr>
<tr>
<td>C gkg⁻¹</td>
<td>29</td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg⁻¹</td>
<td>50</td>
<td>45</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>Sandy loam</td>
<td>Sandy loam</td>
<td>Sandy loam</td>
</tr>
<tr>
<td>III pH_{KCl}</td>
<td>7.4</td>
<td>7.4</td>
<td>7.8</td>
</tr>
<tr>
<td>C gkg⁻¹</td>
<td>28</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>Humus gkg⁻¹</td>
<td>48</td>
<td>43</td>
<td>-</td>
</tr>
<tr>
<td>Soil fraction</td>
<td>Sandy loam</td>
<td>Loam</td>
<td>Loam</td>
</tr>
</tbody>
</table>

Figure 19. Kudani village’s agricultural soil profile.
Conclusion

The location of arable fields in Einbi village has basically remained constant for centuries, despite some field expansion. The fields have been in use with several different agricultural practices. Plant cultures have varied substantially. Taking into consideration the hypothetical genesis of Einbi soils and land-uplift estimations, we could assume that arable fields in Einbi were located at elevations of 0.9 m lower than their present positions. And as the old fields are located at relatively high elevations (3-6 m), then 320 years ago, those cultivated fields were probably not affected by drastic changes in moisture conditions. Regosols may have experienced gleyzation processes, but not to such an extent that it obstructed cultivation of the land. Today, Einbi fields are mainly used as hayland.

Land-use in Kudani village expanded more extensively than in Einbi, especially during the Soviet Era. Fields were primarily expanded after 1800, using drainage and incorporation of the village meadow areas. The soil quality is much more consistent throughout the village than in Einbi, where variation is more considerable. Looking at the land-uplift model, we can see how Kudani village’s field locations were 0.6-0.7 m, which gave them lower elevations and affected how the water regime supported the development of gley soils. Today, Kudani village fields are actively used for multiple kinds of cereal cultivation.
5. Socio-political developments in North-West Estonia during the 13\textsuperscript{th} – 16\textsuperscript{th} centuries

This chapter discusses the main socio-political changes that occurred from the 13\textsuperscript{th} century and up to the 16\textsuperscript{th} in terms of administrative development and social structure in Estonia generally and in Noarootsi particularly. Thus, chapter 5 provides a context for the empirical chapters that cover the late medieval period up to 1690. The aim is to provide an overview of land organization in the context of European feudalism, with special focus on land tenure development and how it came to affect the livelihoods of people on Noarootsi peninsula. The chapter ends with a discussion of how Estonian-Swedish peasants’ conditions differed from those of ethnic Estonians, in terms of legal status and manorial impost. Attention is also given to the religious influences, another important foundation of power in society.

Development of administrative units during the Middle Ages in Estonia

The Baltic Sea provided the spatial basis for a well-developed economic intercourse between continental Europe and the Baltic rim.\textsuperscript{182} Practices characteristic of feudalism started to develop in Estonia with the appearance of merchants from northern Germany during the second half of the 12\textsuperscript{th} century, who hoped to profit from continental demand for goods such as amber, furs and wax. These were products that the eastern Baltic regions were able to supply.\textsuperscript{183} Beside economic priorities, the Church also played an important role in the development of political circumstances at that time.\textsuperscript{184} The Baltic peoples were to a large extent pagans, and they were therefore seen as inferi-

\textsuperscript{182} Rebas 1976.  
\textsuperscript{183} Dunsdorf\textsuperscript{i}s 1974, p. 26-79.  
\textsuperscript{184} Läänmää 1938, p. 264-268.
or. Redemption of their pagan souls required conversion to Christianity. This created an opportunity, where economic progress could be combined with Christianization in the form of eastern Crusades. The missionary aspect of involvement with Baltic settlements attracted the attention of both the Catholic Church and Western European knights (who were mainly recruited from the German lands).

The conquest of Estonia resulted in the partition of lands between the conquerors (Danes and the Teutonic Order) in 1227. The Estonian area became vassal territories to the conquerors, and the local inhabitants were subjugated. Feudalism as an economic model reinforced the Danish-German conquest, giving rise to new administrative units.

In all of Estonia, the conquering Rule instituted similar feudal patterns. Land was enfeoffed to vassals. The vassals, who were mainly of German origin, were offered land in return for military services. In terms of territory, modern Estonia comprised the northern half of medieval Livonia. The Administration of this territory involved at least three organizational levels: the village, the parish (kibelkond in Estonian) and the province (maakond in Estonian). Northern Livonia was subdivided among several feudal authorities in the Middle Ages. Denmark held Tallinn and northeastern (Virumaa, Järvamaa, Harju-maa) Estonia while the Teutonic Knights controlled southwestern Estonia. The Bishropic of Saare-Lääne administered western Estonia and the western islands while the Bishropic of Tartu was in charge of southern Estonia.

With regard to social structure, Raun argues that the structure of Estonian society before the Danish-German conquest was fairly simple. The Estonian population did not exhibit great differences in either wealth or social power. He points out that there was no concept of princes or kings in the usual sense of those terms. Indeed, the regal nobility that existed in much of medieval Europe seems to have been absent in pre-conquest Estonia. The “elite” of society were the elders of the village, parish and district levels. Accumulation of wealth did, however, bring some social distinction. Such wealth usually de-

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187 The Teutonic Order was a German medieval military order formed in 1202.
189 Loit 1975, p. 15-82.
191 Raun 1987, p. 21 ff.
rived from landholdings and placed wealthier individuals above the average inhabitants.\textsuperscript{192}

The bulk of the population lived as smallholding farmers who were not legally or socially dependent on the will of the elite of the area. This relative autonomy would fade as the area went under the administrative authority of Danes and Germans. Still, there were probably also small groups of slaves mostly drawn from a population of foreign captives.\textsuperscript{193} Such social distinctions were less marked in some places than others. Western Estonia and the nearby islands were regarded as less economically advanced than other parts of Estonia.

Social and administrative structure of the Noarootsi area

The Estonian-Swedish peasants’ situation in the western coastal areas of Estonia might have differed substantially from the treatment of other peasant communities. As ethnic Swedes (Estonian-Swedes) had already settled the western shores of Estonia before the joint 13th century Danish-Germanic conquest, their heritage might add an additional twist to the land-use structure in the Noarootsi area.\textsuperscript{194} It is also important to consider how the new political situation of the 13th century affected their lives on the Estonian coast. According to Hedman, the Noarootsi area fell under the administration of landowners with connections to the Teutonic Order and different church institutions, based on Lihula and, later, Haapsalu.\textsuperscript{195}

By 1230, the parishes of Wiek (Läänemaa in Estonian) and Ösel (Saaremaa in Estonian) were united to create the Ösel-Wiek (Saare-Lääne in Estonian) diocese.\textsuperscript{196} The landowner here was the Episcopal See in Haapsalu castle itself and the Teutonic Order in parts of islands Saaremaa and Hiiumaa. There were two major taxes on peasant output, above all on grain. First came the tithe to the Church (kümnis in Estonian, as usual 10 percent of the crop). The second was vakus (paid in money or kind) a collective tax to the landowners, usually borne by peasants villages. Despite these taxes, the Estonian-Swedes benefited from the establishment of “Swedish rights” – ins Suecicum –

\textsuperscript{192} Kahk & Tarvel 1997, p. 12 ff.
\textsuperscript{193} Raun 1987, p. 11. Kahk & Tarvel, 1997 p. 27.
\textsuperscript{194} Ethnic Swedes had settled the western coast of Estonia since at least the late Iron Age. Hoppe & Markus 2001 with additional references.
\textsuperscript{195} Hedman 1992, 3-4.
\textsuperscript{196} Blumfeldt 1961, p. 73-75.
around 1200-1300. It stated that Estonian-Swedish peasants were free to move between established Swedish villages. If they moved out of this realm, however, their special rights were lost. The situation was quite different in other parts of Estonia, where Estonian peasants were enserfed, causing several peasant rebellions early on. At the same time struggles between different administrative areas led to crises inside power institutions, especially in the Church.

Gradually, the hold of religious institutions was weakened in Estonia through Reformation, and the nobility began to assume a more dominant position. The bishops found themselves in an opposite role, trying to restore the authority of the Church and the force of religion as a basis for higher authority. A short time after landholding in Saare-Lääne appear in 1530, Reinhold v. Buxhövden became bishop. He was strongly opposed by the nobility. Buxhövden lacked the personality and clout to satisfy the lords’ needs opposition in the area, and he had to resign in 1541. Johannes Münchhausen became the new Catholic bishop. He, in turn, sold his property rights to Saare-Lääne and the Kuramaa bishopric (Curonia) to Danish King Frederik II in 1559. Frederik II then handed over the recently-purchased areas to his brother, Duke Magnus. Magnus, becoming the new bishop in 1560, was Lutheran, however. This brief example shows the complexity of political and religious upheavals in the area in the middle of 16th century.

Sweden gained control of Läänemaa through warfare in 1563, after that the former Danish northern provinces had many German noblemen died in the war or moved out from the area. Once Sweden had succeeded in its expansion, the monarchy rewarded military service with land grants instead of monetary awards. The earlier conquerors had behaved similarly. Recipients of land grants or enfeoffments (förläning in Swedish) were frequently mercenaries, including Baltic-German noblemen. Regardless, the Estonian-Swedish peasants who had maintained their privileges for centuries in the Norootsi area were suddenly confronted with a new situation. They went under the formal power of the Swedish crown. Where “Swedish rights” had once offered privileges to ethnic Swedes under the power of other sovereigns, the new order did not bring any drastic change in the lives of Estonian-Swedes on the western coast.

199 Läänemaa 1938. See also Loit 2002.
But how did changes in the administrative structure affect the living conditions of local inhabitants in western Estonia towards the end of the 16th century? The Russian-Livonian (1558-1583) war exacerbated difficulties that included pests, famine, occupation and large scale deportation to slavery in Russia. War and rising manorial obligations significantly reduced the quality of life and the level of noble prosperity that had existed at the end of medieval times. These realities touched all levels of society during the war, but the heaviest burden was carried by peasants. They suffered sickness, famine and death in wartime, and many of their homes were destroyed. Just as the Livonian war had influenced the political regime imposed in Estonia, war and shifting political contexts also influenced the local subsistence.

Balthasar Russow’s numerical data on population and agricultural settlement date from 1580.\(^202\) In Läänemaa, deserted farmland was approximately 70% of the area.\(^203\) Considering the simultaneous material losses and the decrease of population due to death, flight and deportation, these extreme circumstances strongly influenced the future of peasants in terms of social and economic development. After the devastations of war, policies were implemented to repopulate the land. Reestablishing people on the land was important for both the individual manors and the monarchy. As a result, new settlers were coming in from surrounding countries but also from neighbor islands like Saaremaa (promised land and the right to establish farms).\(^204\)

In conclusion, deliveries to the manor and the overall tax system that developed during the early Swedish regime were strongly influenced by wartime depopulation. The number of people in the countryside had fallen dramatically, and many farms were abandoned. Despite the adversity, the manors demanded the same levels of manorial deliveries.

The hardest consequences related to day labour. A smaller population of labourers had to satisfy the demands of the manor, which increased the responsibilities of the remaining individuals. Indeed, peasants not only had to cultivate the abandoned lands, but even expanded them as the improving market for grain in Western Europe offered new benefits to manors.\(^205\) In essence, the manors wanted to increase production due to market demand, even as a reduced population had to provide the necessary labour. The number of days that peasants had to work for the manor increased rapidly. These obliga-

\(^{202}\) Viidang 1937.
\(^{203}\) Läänemaa 1938.
\(^{204}\) Läänemaa 1938, p. 278-294.
\(^{205}\) Läänemaa 1938, p. 290-94.
tions extended across all seasons, meaning the entire year involved certain manorial duties for the peasants. The level of taxes remained the same as during the Middle Ages, the main alteration to the tax system related to units of taxation.

The purpose of the tax reform (Landrevision in Swedish) in 1601 was to homogenize deliveries in all areas of Estonia, but it did not succeed. Local differences persevered (Table 3).

Table 3. Differences between Estonian and Estonian-Swedish farm manorial impost in Läänemaa (from Landrevision in 1601).

<table>
<thead>
<tr>
<th>Estonian peasant farm (1601)</th>
<th>Estonian-Swedish peasant farm (1601)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 ööri per ploughland 208</td>
<td>8 ööri per ploughland</td>
</tr>
<tr>
<td>4 barrels rye</td>
<td>2 barrels rye</td>
</tr>
<tr>
<td>4 barrels winter barley</td>
<td>1 barrel winter barley</td>
</tr>
<tr>
<td>1 barrel oats</td>
<td>1 grain bin oats</td>
</tr>
<tr>
<td>10 pounds butter</td>
<td>10 pounds butter</td>
</tr>
<tr>
<td>4 chickens</td>
<td>2 chickens</td>
</tr>
<tr>
<td>10 eggs</td>
<td>10 eggs</td>
</tr>
<tr>
<td>1 wether (male sheep)</td>
<td>10 pounds fish</td>
</tr>
<tr>
<td>1 sheep</td>
<td></td>
</tr>
<tr>
<td>1 pound of linen yarn</td>
<td>2 barrels of charcoal</td>
</tr>
<tr>
<td>8 cart loads of straw</td>
<td>3 fathom fire wood</td>
</tr>
<tr>
<td>2 full loads of hay</td>
<td>2 full loads of hay</td>
</tr>
<tr>
<td>per every 6th ploughland 1 oxen</td>
<td>per every ploughland 1 oxen and 1 wether</td>
</tr>
</tbody>
</table>

As we see from Table 3 these new tax regulations left the manorial impost pretty similar to the standards of the Middle Ages. The continuation of a standardized grain tax represented a challenging practice. The annual tax remained fixed even as production varied from year to year. Even if a peasant had a poor year in the fields, they had to pay the same as if they had a better crop in another year. According to Berencreutz, the 1600 tax reform went into place as more of the land went into noble hands.

The nobility simultaneously acquired the ability to exercise more influence in the use of law and the maintenance of order. So, if we look

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206 The tax unit grain tax (viljakümnis in Estonian) was replaced during the 1600 tax reform with tax unit grain tithe (viljamaks in Estonian) see also Läänemaa 1938, p. 202.
208 Monetary unit (öre in Swedish 1 riksdaler = 48 öre silvermynt)
at the situation when northern Estonia went under Swedish regime, it did not improve the living conditions in the Noarootsi area. The politics of feudalism placed peasants under noble authority even more than had been the case during most of the medieval period.

In conclusion, the socio-political transformations from the 13th century up to 16th century brought about change and struggle on various levels. After the Danish-German conquest, the feudal system was strengthened and taxes for land-use increased. The peasants lost some of their political independence and soon their moving rights were also restricted by law (Läänemaal talurahva õigus from 1358-1419). The struggles between nobility and Church and the outbreak of war 1558 worsened the situation. The new regime of the Swedish Crown similarly brought about change in the land ownership; that all lands became state-owned. This fluctuating situation changed again at the end of the Swedish era, which I will address in the following empirical chapters.
6. The late feudal period in Noarootsi

The first empirical study period from 1600 to 1840 is subdivided into two parts, following the primary political transformations that unfolded in society. To provide a contextual background, the first sections of this chapter will focus on the explanation of change at the structural level (how did the area develop administratively due to political shifts and what were the main consequences for local residents). The main aim of chapter 6 is to explore how relationships between local nobility and peasants (also between state/church and nobility) came to affect local land-use and population development in Einbi and Kudani villages at that time. The following sections will focus on the explanations on a functional level of how the local landscape of the Noarootsi area was organized (land-use analysis) during the Swedish and Russian regimes. An analysis of population development relative to available resources will follow in terms of estimated farm productivity. The conclusion discusses the main driving forces for change or persistence in the local landscape through a comparison of the studied villages.

The establishment of Swedish Government

The first section introduces how the political shift into the Swedish Era affected relations between the central state and the local nobility in Estonia, in order to demonstrate how changes on the macro level came to affect the living conditions of local peasants (at the micro level) with a special focus on land-use organization and the manorial tax system.

Sweden established control over Livonia in 1629 (although large parts had been Swedish since 1561) with the Peace Treaty of Altmark, holding sway in the area for almost a century. How did this new political power affect the lives of people in the Baltic provinces? In economic matters, Loit points to western European trade with Russian markets and how the agrarian Baltic allowed Sweden to gain

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International trade developed rapidly in the 16th and 17th centuries. The Baltic region provided Western Europe with products such as grain, timber and other goods. The Baltic Sea and Gulf of Finland comprised the most northerly west-to-east trade route, and Sweden controlled it. Still, overland routes were also important. Such routes ran parallel to rivers like the Daugava in Livonia. The geographic locations of Estonia and Latvia were important factors in supporting the growth of foreign trade at that time. The transit of goods between east and west intensified local production in Estonia. But how did this general growth in production affect the local peasants on the west coast of Estonia?

First of all, during the early phase of the Swedish era, new manors were formed due to the Crown awarding land in return for military service or financial assistance to fund the war. This allowed the regime to support its nobles and keep their loyalty. The sources reveal that landowners frequently dictated where peasants were permitted to live. This was often the case on the Noarootsi, where entire villages were evicted to poorer areas in conjunction with the formation of new estates. For example, in 1627, Hans von Fersen received Klottorp village as a heritable land grant of Haapsalu Castle demesne from Jakob De la Gardie. As the peasants farmed the best land, Fersen decided to evict them to poorer soils and establish his manor farm on the old peasant fields. In fact, the relocation of an entire village to new, poorer land in order to utilize the area for a new manor was a common practice (in Noarootsi parish, 10 new manors were established and at least 5 involved substantial evictions). At the end of Swedish rule in western Estonia, nine manors were located on the Noarootsi peninsula and fifteen in the parish. The earlier administrative structure from the 13th century, in which the southern part of the peninsula belonged to the estate of Hapsal castle and the northern part formed the vassal manor of Nuckhoff, was dissolved by the new manorial organization.

In general, the Roman Catholic Church gradually exerted less power in society from the 16th century. Germany, Scandinavia and England boasted a freer population of peasants than was typically the case in the east. Such circumstances led western Europe away from feudalism and toward a more capitalistic economy. According to Powelson, while feudalism was retreating in the west, it was en-

212 Hedman 1992, p. 5.
213 Hedman 1992, p. 3-8.
214 Powelson 1988, p. 79-82; 93-95.
trenched in the east. 215 Hoppe and Langton point out how free peasants pursued the fundamental aim of ensuring continuity of the family and its lands from one generation to the next.

“Their overriding goal was not profit or the accumulation of capital but survival on a satisfactory level. And because peasants had to pay taxes, and other dues, they were required to produce something for sale on a regular basis.” 216

This description does not apply to the Estonian-Swedish peasants of Noarootsi. Even though they were considered free peasants according to Swedish Law, they had high levels of manorial obligations. In Sweden, requirements for money were fulfilled by producing a particular cash crop, through livestock production or by practicing a marketable craft for the purpose of paying taxes. 217 The concept of investment, however, was absent. 218

Nonetheless, it is important to remember that simplistic economic relationships omit the cultural-political context that framed the actual situation. Loit points out that both Sweden and Finland became important providers of products in the Baltic economy, but first the Swedish Crown had to establish control over its new territories. 219 Therefore, there is a significant relationship between the roles of the state power structure and its capacity to support the development of provincial resources. It was necessary to exercise adequate control and organization to govern the Baltic provinces. During the reigns of King Gustav II Adolf (1611-1632) and Karl XI (1660-1697), the Swedish Crown attempted to create a so-called General Swedish Law in Estonia and Livonia (landslag in Swedish for the countryside and stadsflag in Swedish for the towns), but this attempt failed. 220 Other reforms had to do with the Swedish government in Estonia as a provider of agricultural products. The developments assisted the domain to produce sufficient quantities of grain. The government, however, was not just concerned with conquering new territories in the Baltic, or simply with feeding the population. Sweden held power in Estonia at the same time that it was heavily involved in religious and power control warfare on several European frontiers.

218 Magnusson 1980, p. 20. See also Hoppe & Langton 1994, p. 4-6.
Summarizing how political shifts affected relations between the state and local nobility as well as the local peasants, one can observe that attempts to integrate the Baltic provinces into Sweden mostly failed. The Teutonic Order that preceded Swedish rule had as much power as, or perhaps even more, than later Swedish governance.\textsuperscript{221} The local nobility tried to keep their autonomy and established rights. To the local peasants, this meant the feudal structure was further enhanced. Deliveries to the manor rose as the international market for grain and other goods expanded and many new manors appeared.

The Noarootsi area under the Swedish crown

At the beginning of the “period of the three kings” (Swedish, Polish and Danish during 1561-1710) in Estonia, the large land owners (the Hapsal Episcopal See, the Teutonic Order, the Padis Monastery and German barons) controlled estates of various sizes.\textsuperscript{222} These included the Swedish villages in the Noarootsi area. In 1560, the Swedish administration set up the system of land books (jordeböcker in Swedish) and tax registers (skattelängder in Swedish).\textsuperscript{223} During the reigns of Karl IX and Gustav II Adolf (1601-1632) in the 17th century, the subdivision of the Vormsi (Ormsö in Swedish) and Noarootsi (Nuckö in Swedish) parishes was completed. In 1600, Karl IX issued a confirmation document of the medieval privileges of the Estonian-Swedish peasants, where taxes were (kronoskatte in Swedish) determined per ploughland (approximately 2.5 hectares) of land cultivated.\textsuperscript{224} The document also established rules for peasants’ obligations to the manor. It is important to note, however, that the document contained no stipulation of how many workdays the peasants had to contribute. The resolutions later issued by King Gustav II Adolf in 1626 and Queen Christina in 1650 clarified this situation. In the queen’s letter, it was established that for every plough-land, the peasants on the estate had to send a day-laborer with a pair of oxen six days per week.\textsuperscript{225} This was required all year round. Besides labor requirements, peasants had to pay an extra tax in times of war. When the war tax was charged, it could comprise as much as 10 silverdaler (monetary unit) or 3 barrels of grain per hake.\textsuperscript{226} If the peasants fulfilled their tax obligations, Queen Christina granted inheritance rights that allowed

\textsuperscript{221} Loit 2002, p. 13-16.
\textsuperscript{225} Blumfeldt 1961, p. 125-132.
\textsuperscript{226} Hedman 1992, p. 5.
the descendants of landless peasants to use the land that their prede-
cessors had tilled. On noble estates in Sweden, peasants worked ac-
cording to similar principles.

In conclusion, looking at the peasants’ situation in Noarootsi from
the manorial level, we can see how the estate owners had the freedom
to determine how to use their land, manage their cattle, and control
the peasants living on their estates. An important change occurred in
the 1680s, however, when the government of King Karl XI launched
the “Reduction” process, in which the land granted to various no-
blemen and officers during the reigns of the previous rulers was re-
claimed into state ownership. This reduction came to mean that
many manor owners lost their allodia (förläning in Swedish), not least
in the Baltic provinces. In Estonia, the reduced property was tended
by state-appointed stewards. This caused severe conflicts between
Baltic-German nobility and the government. Conflicts between
Swedish peasants and the estate owners became frequent because of
the various royal resolutions, which came to mean vastly increased
corvée duties for the Swedish peasantry. These conflicts continued
for over 150 years, causing losses of Swedish rights, evictions and
physical punishment for the manor workforces.

In general, the various regulations related to the Reduction defined
the peasants’ rights and specified the requisite number of workdays
and duties to the manor. For a brief period, then, the burden of the
peasants was eased, only to become even worse after the Russian
conquest, through which the results of the Reduction were declared
void.

On the formation of Paslepa manor and the
Noarootsi vicarage

When Jakob De la Gardie purchased the entire Haapsalu Castle de-
mesne in 1628, he bought the town, the surrounding county and its
estates, including the Vormsi (Ormsö in Swedish), Hiiumaa (Dagö in
Swedish) and Noarootsi (Nuckö in Swedish) parishes. The land con-
tract did not contain a single word about limitations of the peasant
land rights due to their Swedish heritage. Swedish peasants, howev-
er, continued to keep a privileged status on the manors of their set-

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228 Grubbström 2003, p. 73-77.
230 Hedman 1992, p. 3-6.
tlement area, and what became Paslepa (Paschlep in German) manor moved to its new location in 1677. Previously (1625), Jakob De la Gardie had founded a manor in Kulani (Kollanäs in Swedish). According to historical documents, the manor was located on swampy, undesirable land. Most of the peasants of Kulani eventually moved to Paslepa village in 1677. The manor was relocated by baron Königsmarck and many peasants were evicted from Paslepa village. Some of them could relocate within the manor domain, while others had to move to Kulani. As mentioned before, when the first maps of Einbi were drawn, the village belonged to Paslepa manor. The second case study, Kudani came under the Noarootsi vicarage around 1540. Thus, the following empirical sections will discuss how and to what extent the socio-political roles of the church in Kudani village and the manor in Einbi came to affect the local landscape and its inhabitants in the late 17th and early 18th centuries.

The case study: Einbi and Kudani villages under Swedish rule

The maps drawn in connection with the Reduction in northwest Estonia (mainly by Swedish surveyor Johan Holmberg and his disciples) enabled me to describe the village structure of Einbi and Kudani at that time.

The discussion begins by combining map analysis and population data with the previously discussed socio-economic processes in order to describe how coastal production units functioned at the time. The required deliveries to the manor determined labor needs, farm formation and the spatial organization of land. One important aspect is the extent of different forms of land-use. Population characteristics are discussed in terms of socio-political change and the availability of natural resources.

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232 Blumfeldt 1961, p. 75.
233 No records exist of village structures between the 13th and 16th centuries. The most detailed knowledge comes from maps drawn by the end of the 17th century, but various registers for taxation and other purposes became common from the 16th century onward.
234 Roeck-Hansen 1996.
The structure of Einbi village

Due to the arrangement of farmsteads and different land-use categories, Einbi can be described as a cluster village.\footnote{According to Troska, in the 17th through the 19th centuries, two main village types were common in the traditional Estonian countryside: the \textit{row village}, where rows of dwellings were situated on one side of a road (\textit{rädaküla} in Estonian), and the \textit{cluster or circular village} (\textit{sumbküla} in Estonian), where farms were located without a plan around a central location. Most Swedish villages in Estonia were cluster villages. As most villages in Sweden were regulated in medieval times or earlier, forming single or double row patterns, this irregular pattern is somewhat surprising and reflects either a pre-regulated pattern or regulation in another form. See Troska 1987, p. 86.} Already from the descriptions in the Livonian Rhymed Chronicle by Henry of Livonia (1143-1290), we can conclude that cluster villages, with their irregular pattern of farmsteads and surrounding fields and pasture areas, were more common in western Estonia.\footnote{Eesti Talurahva Ajalugu 1992, p. 140-41.\hspace{1cm}Ränk 1976, p. 54-58.}

From the 1698 map (Figure 20), we can see that the arable fields was located near the village center. A strict parcel structure existed in the fields, according to the common field principle. Arable land was divided into irregular patches held by individual households. Forest, pasture and meadowlands were kept jointly.\footnote{Ränk 1976, p. 54-58.} Three additional complexes of arable fields were located some distance from the main settlement. According to Markus, the phosphate values are higher in the fields closest to the farms, indicating that they are quite a bit older than outlying ones.\footnote{Eesti Talurahva Ajalugu 1992, p. 142.\hspace{1cm}Ränk 1961, p. 279.} The map also indicates the locations of windmills.\footnote{These outside fields (from the late 1800s) comprised the land where Little Einbi (\textit{Lilla Enby} in Swedish) is located today. Markus 2004, p. 195-197.}
Mills were generally located outside the farms of the village and owned by farms, groups of farms or the manor. Windmills were first introduced to Estonia in the Estonian-Swedish areas in the 15\textsuperscript{th}-16\textsuperscript{th} centuries. They were similar to those common among farms in Eastern Sweden and on the Baltic islands of Gotland and Öland.\textsuperscript{241}

\textsuperscript{240} Arable land is marked with brown, meadows in green, and farms as red dots.

\textsuperscript{241} Blumfeld 1961, p. 277-280.
The digitalized map, based on the original 1698 map (see Figure 21), illustrates the spatial organization of land in order to describe the role of natural resources in forming land-use in Einbi village. For example, the location of cultivated fields (yellow) in the higher till areas can be explained by the higher quality of soils and the water regime at the time. The arable land comprised 61 ha (5%). The lower elevation levels in the northeast are mainly described as meadows on the map. The total area of meadow was 263 ha + wetland 60 ha (27% of the total village area). Meadows also existed in the direction of Ramsholm to the northwest, an area where the strait between Ramsholm and Noarootsi (Ose in Swedish; Voosi in Estonian) gradually became shallower as a result of ongoing land uplift. Woodland was scarce. In the digitalized map, it comprised only 46 ha (4% of the village area). Timber was found only in small copses of deciduous forest or lightly
wooded meadows. Most of the fairly rich, large pine forest nearby was reserved for use by the manor. The tofts, with surrounding gardens, are not depicted on the map, on which the farms were only marked as red dots (Figure 20). The area of pasture (grazing) were mapped as seasonally flooded areas, estimated at 780 ha (64%). The whole village area consisted of 1210 ha.

The description of the 1698 map gives further insight into Einbi’s landscape structure. The surroundings were characterized by low-quality pastures with occasional junipers. The fields are described as stony, and the soil as sandy and dry. This corresponds with today’s soil map (see chapter 4). The location of the fields was mostly based on the occurrence of sand and yellow-grey till rich in pebbles.

Another detailed description of the land quality can be found in the land registers from 1591 (Nuckö jordrevision in Swedish) where a scale is used to estimate the quality of the arable land (see Appendix 2). 12 villages were described, including Einbi and Kudani. Einbi village had 11 ploughlands (bakar in Swedish), four of which were occupied. There were thus four peasant farms total. The arable land was described as sandy (sandig in Swedish) and the meadow and grazing areas as rather good (tämlig in Swedish), while timber was missing (saknas in Swedish); the fishing was said to be good (gott in Swedish).\(^{242}\) The description from 1698 indicates that the total arable land in 1698 was 68.5 ha.\(^{243}\) The digitalized map indicated 61 ha of arable land, i.e. a difference of 7.5 ha. Most likely, the difference is due to

\(^{242}\) Blumfeld 1961, p. 92. See also Baltiska fogderakenskaper 1591 (SE/RA/5142).

\(^{243}\) An additional note tells us that Einbi was only taxed in rye.
the map processing: the 1698 map was rectified to a modern coordinate system and more precise measurement techniques were used.244

In conclusion, the land-use pattern was dominated by pastures (grazing), meadows and a minor area of forest. The hypothetical soil genesis structure (see chapter 4) and the amount of arable land and its location suggest that all available land for cultivation was utilized at that time.

The agricultural land unit

To intensify the production of grain, winter rye had begun to be grown in Estonian-Swedish villages by the 17th century and according to Blumfeldt, this meant that the ancient Scandinavian two-field system based on growing barley and some oats became a three-field system. In Noarootsi, the three-field system first appears on maps from the late 17th century.

But what was the reason for the change to a three-field system that had spread throughout the region by the 17th century? Several possibilities are plausible. It could have been demanded by state officials or lords of the manors, or the peasants may have introduced it themselves in response to internal or external demands. Unfortunately, neither literature nor archival documents reveal the origins of the three-field system in Estonia.245 In the Swedish villages, the third field is generally called “the new field”, indicating that the change was a recent one, while in the Estonian realm, the three-field system seems to be older.246

According to Roeck-Hansen, the same trend seems to have appeared in Finland, where the agricultural landscape has also been studied through the earliest large-scale maps from the 17th century and pollen analyses have been taken in order to describe the cultivation system, settlement structure and land subdivision system.247 Her study shows that a two-year crop rotation dominated the area, but in some cases a three-year crop rotation occurred.

The Swedish government attempted to standardize the agricultural land unit in order to levy taxes efficiently. However, they failed to achieve standardized ploughland in the 17th century.248

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245 Tarvel 1972, p. 313.
246 For example, the third field on the Kudani map from 1860 was called the “New field”, indicating this relatively late change.
248 Tarvel 1972, p. 28-43.
Farms and cadastral units in Einbi

Further agricultural development resulted in larger families. In 1680, Einbi village had 20 farms. Table 4 shows that there were three farms assessed at 12/24 ploughlands, six at 8/24, eight at 6/24 and, finally, three assessed at 4/24. The ploughlands were thus subdivided into two to four smaller units. The variations in farm size appeared to be due to different degrees of subdivision (Table 4). A review of other documents from the period reveals strong variation in the overall number of farms. 20 farms were populated in 1680, 18 in 1690 and 16 in 1691. More farms existed in 1698, when the map description contained 24 farms of various sizes. According to the sources, 7 of these farms were then deserted. Vacant farms at that time could probably be explained by the severe famine of 1695-97.

Table 4. Einbi farms in 1680 with the subdivision of ploughlands.

<table>
<thead>
<tr>
<th>ploughland</th>
<th>subdivision</th>
<th>name of farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12/24</td>
<td>Greis Andersson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Jacob Clementson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Marten Blässon</td>
</tr>
<tr>
<td>2</td>
<td>8/24</td>
<td>Matz Thomasson</td>
</tr>
<tr>
<td></td>
<td>4/24</td>
<td>Jacob Thomasson</td>
</tr>
<tr>
<td></td>
<td>12/24</td>
<td>Simon Thomasson</td>
</tr>
<tr>
<td>3</td>
<td>8/24</td>
<td>Jacob Knuuthson</td>
</tr>
<tr>
<td></td>
<td>8/24</td>
<td>Greis Blässon</td>
</tr>
<tr>
<td></td>
<td>4/24</td>
<td>Hindrich Matzon</td>
</tr>
<tr>
<td></td>
<td>4/24</td>
<td>Thomas Simonson</td>
</tr>
<tr>
<td>4</td>
<td>6/24</td>
<td>Greis Simonson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Ambros Simonson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Simon Ambroson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Simon Ambroson</td>
</tr>
<tr>
<td>5</td>
<td>8/24</td>
<td>Bertel Jürgenson</td>
</tr>
<tr>
<td></td>
<td>8/24</td>
<td>Marten Jürgenson</td>
</tr>
<tr>
<td></td>
<td>8/24</td>
<td>Michel Thomasson</td>
</tr>
<tr>
<td>6</td>
<td>12/24</td>
<td>Jürgen Blässson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Hindrich Jacobson</td>
</tr>
<tr>
<td></td>
<td>6/24</td>
<td>Ambros Jacobson</td>
</tr>
</tbody>
</table>

249 The land taxation unit in the 16th century was the ploughland (adramaa in Estonian, baxe in Swedish and haken in German). This unit of measurement for land area was initially used to measure the field in terms of the barrels of seed corn required for sowing. In some cases, this area of land required 6 days per week of labor days to the manor. The real size of a ploughland varied greatly from village to village. See also Tarvel 1972, p. 13-19.

250 Blumfeld 1961, p. 119.
There is no general evidence of how strongly the Estonian-Swedish settlements were affected by the famine in 1695-97, but the 1696 Noarootsi parish registers tell us that 100 people died in 1696 and 557 people died in 1697.\footnote{Blumfeldt 1961, p. 119.}

Comparing the area of arable land (from the 1698 map subdivided into a three-field system) and the number of farms from 1680 (20 farms), an approximate farm size estimate can be described as follows: if we divide 68.5 ha equally among the 6 ploughlands that were further subdivided into farms, this gives a total of 11.4 ha per ploughland. After accounting for the 24 farms that existed in 1698, it appears that the largest farms had 5.7 ha and the smallest only one-third of that – 1.9 ha. If the farms were divided into equal-sized units, this would give farms of 2.9 ha. The distribution, however, varied.

In conclusion, two thirds of the arable land was thus cultivated annually. One third was sown with rye, one third with barley, and one third lay fallow. Average farm sizes in central Sweden in the same period were 12 ha.\footnote{Hannerberg 1971, p. 60-65.} The much smaller farms in Einbi suggest that households living on the coastal farms probably depended on activities that supplemented arable farming.\footnote{Data about fishing is not available, only some fragmented documents from 1591. But it is generally known that fishing and seal hunting had a major importance, beside animal husbandry and arable farming in the Eibi and Kudani villages.} According to Berencreutz, the estimated cereal crop produced in Einbi only amounted to 20-50\% of the subsistence needs of the population.\footnote{Berencreutz 1997, p. 156-159.}

### The structure of Kudani village

Kudani was not one of the oldest settlements on the peninsula. The first written mention of the village name (\emph{Gutanäs} in Swedish) is from 1550, even though the village could be much older.\footnote{The church was established around the 13\textsuperscript{th} century and suffered damage during the Livonian wars in the 16\textsuperscript{th} century. It was rebuilt again in the 17\textsuperscript{th} century. See Nymann 1977.} The Haapsalu Castle accounting books from 1560 state that 11 farms were in use in Kudani, with 16 residents listed (not a complete list).\footnote{Blumfeldt 1961, p. 75.} The 1690 map has a record of peasant surnames, allowing their Swedish heritage to be identified (see Table 5).
Table 5. The list of farms in Kudani village in 1690. The farms were subdivided equally (13/13).

<table>
<thead>
<tr>
<th>name of farmer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ambros Bertellson</td>
<td>8.</td>
</tr>
<tr>
<td>7. Matts Simonson</td>
<td></td>
</tr>
</tbody>
</table>

Archival documents state that the entire village was deserted after an invasion by Tatars during the Livonian wars in 1583 (the village was largely exempt from day labor and deliveries for decades after this disruption). In 1591, only one farm was cultivated in the aftermath of that episode. By the 1690s, the village was fully repopulated and obligations to the vicarage had been reestablished.

At the end of the 17th century, the Noarootsi vicarage (Pastoraat in Estonian) was owned by the Lutheran church. The vicar lived in the vicarage and different church offices were close to the vicarage (Figure 23). The neighboring village of Hosbi held the site of the church of Saint Catherine (Püha Katariina in Estonian) and its cemetery. The area outside Kudani village belonged to local manors, which mainly focused on agriculture.

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257 The entire area was divided into parishes (kihelkond in Estonian), and each parish had a parish church and a vicarage. The vicarage (Pastoraat in Estonian) was a substantial area generally owned by the Lutheran Church. The priest lived in the vicarage, and there were different church offices located near the vicarage. They were usually situated close to the church.
Land-use in Kudani village

As in the case of Einbi, the first map was drawn by Johan Holmberg in the 1690s (see Figure 23) and had descriptive text. Kudani village had 13 farms and comprised 4 ploughlands in 1690 (Table 5). The village was clustered in two scattered groups – one western and one eastern group. At least in later times, the eastern (lower end) cluster of farms was called Neaenda and the western cluster (upper end) was called Oaenda.

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258 1 tunnland (barrel-land) is slightly more than one acre.
259 Kudani map legend from 1690s
260 Hakar (number of ploughlands)
261 17th century maps of Swedish villages in Estonia almost always show the use of the three-field system. This meant that the arable land in the village was divided
In Kudani, the enclosed fields comprised 60 tunnland (Swedish land unit, approximately 30 ha). Five of the farms stand out from the others. Three farms in one group were connected with the third C-field in the map (on the original maps, farms were marked as red dots, Figure 23). In total, on the digitalized map (see Figure 24) the arable land consisted of 34 ha, comprising 7% of the total. The meadow, which was quite extensive compared to other land-use, comprised 225 tunnland (on the digitalized map of 196 ha, this is 43% of the village area). The meadow was mainly located on the west side of village, divided between the vicarage and the village farms. We can also see small areas of meadow located near the farmhouses. The boundary of the vicarage by the meadow in the northwest area is marked in red on the original map (see Figure 23).
Although not explicitly stated on the map, farms had paddocks for animals near the houses, or even between the houses. A pasture (grazing) covered the area southeast of the village and was not fenced, as this area was held in common for the whole village. The digitalized map (Figure 24) reveals that the pasture covered 227 ha (50% of the total village area). It is hard to tell on the map where the village border was located, even though the roads were carefully marked. The total area of the village was 457 ha. The village had a windmill on the eastern side, and the map shows that another one was located by the Noarootsi vicarage.

In conclusion, if we compare the Kudani village map from the 1690s to the digitalized reconstruction of land uplift along the shoreline, they match very well. The only difference or scaling error might have occurred via the water level measurement that existed at the time. As the compiled reconstruction of the topographical development of the Noarootsi peninsula shows, Kudani was initially located on an island that later merged with others, just as Einbi village was originally part of a smaller island. The present-day Kudani Lake (Nåtan in Swedish) was a small bay until the 19th century. The east side of the village was close to swampy areas and the sea. The village was thus somewhat isolated from the mainland by the sounds between Noarootsi and the coast. The topographical model shows that Kudani village was situated on quite low ground. This means that it could not have been established at the same time as those in the higher areas of the peninsula (for example, Einbi).

Secondly, Kudani’s land-use was affected by the same political processes that were associated with the repeated conquests of Estonia. Therefore, it is necessary to consider whether the development of
Kudani may have differed from a manorial village controlled by the nobility, how this influenced the organization of land, and what effect it could have had on productivity. Being part of a vicarage community, one must consider the different setting and how it affected the peasants’ situation and their required deliveries. Furthermore, one must also consider how was the overall social structure was influenced compared to the situation in Einbi.

The organization of coastal household activities

Since the Middle Ages, the village pasture (grazing) had been shared among the farms. As mentioned before, the forest and pasture, as well as fishing and hunting continued to be open to common use for the entire village. Certain practices guided the use of commonly shared resources. For example, animals often had to be kept in a communal herd under the supervision of a collectively employed herdsman, or the animals had to be kept in specially allotted spaces. These practices saved labor and prevented individuals from sneaking extra animals onto the pastures. Herdsmen were often hired from among the poor, and they received food and shelter moving from farm to farm, staying from one day to one week at each place. They commonly had an assistant, usually a child from each host farm. During spring fieldwork, it was common to herd horses and oxen together through the night.

With the emergence of autumn-sown winter rye in the 12th century came the three-course rotation. The endurance of the two-course system in some locations might have been related to additional fishing resources, poorer coastal soil quality and more reliance on cattle breeding in addition to crop production. This style of agricultural organization required field work to be carried out essentially simultaneously by all farms in the village, regardless of a two or three-field rotation.

As we saw in previous sections, Einbi and Kudani farms in the 1690s used a three-field rotation system; they were not among the coastal villages that had retained the two-field arrangement. Often, there were not enough cattle on farms, resulting in a shortage of ma-

264 Ränk 1996.
266 Viires 2004, p. 25-58
267 Farm boys and girls rotated the duty of tending the herd, and they protected the herd with a bonfire that burned through the night to frighten wolves and other wild animals. See Viires 2004, p. 51 ff. Ränk 1976.
268 Tarvel 1972, p. 313.
This meant that some fields might have had to be left fallow for several years and used as pasture while cattle, sheep and other livestock grazed there to help fertilize them. It was also common to use seaweed from the beaches as a complementary fertilizer in coastal areas, which added extra nourishment for grain production and increased the carrying capacity of the area.

The role of seasonality on coastal areas

The organization of daily life in coastal areas followed specific characteristics of seasonality. This controlled the availability of natural resources and determined the seasonal distribution of work between men and women. The patterns differed greatly between coastal and inland areas. Proximity to the sea resulted in a milder climate with higher winter temperatures. This affected seasonal work compared to inland regions. Livestock, for example, were kept in sheds during winter. In coastal areas, they could be let out earlier in spring and stay out later in autumn. This meant that less winter fodder had to be produced.

Different soil types can tolerate different rates of exploitation. Manuring was an essential component of farming in coastal areas. In view of the balance between agricultural production and soil nutrition, the biomass transfer could provide a sustainable basis for agriculture. Adequate transfer of biomass depended on keeping the cultivation of arable land in balance with nutrient inputs. Therefore, pastures needed to be kept in order to maintain a sufficient number of animals and, consequently, the manure production that sustained acceptable nutrient levels on arable land. An overexpansion of arable land for food production sacrificed the soil’s nutrient content. Reduced pasture areas would limit the number of animals that could be kept, as well as manure production. Overgrazing on the remaining pasture would lead to degradation of the land and an overall lack of nutrients. This was, however, not the case on the Noarootsi Peninsula, where by the late 17th century, meadows and pastures were the dominant land-use types.

269 In terms of domestic animals, the 1691 tax books give an indication of the stock of animals on each farm in Einbi. Farms generally maintained one or two horses, between one and four cows, half a dozen sheep and a pig. This does not seem to be a substantial flock for extensive animal husbandry.
271 Jaagus & Tarand 1988, p. 5-17.
Seasonal change created further complications. Hay grown on meadows was an important source of winter fodder. These meadows were protected from grazing over several months of the year (usually from mid-spring until at least mid-summer) to allow for appropriate growth. Hay was not used until late autumn to feed the animals throughout the months of hibernation, when they were kept indoors. Straw and tree leaves provided winter feed as well, and in serious shortages, roof thatch could provide emergency fodder. In storage, hay loses a considerable amount of its protein content, and the quality declines due to mold and pests. Consequently, peasants could not use all of the calories and nutrients that their land produced.

The role of animal husbandry in Einbi and Kudani villages

Animal husbandry in Noarootsi had the important role of providing draught animals for farming, transportation and manure. Animals provided meat and milk for food, and they also yielded hides and wool for clothing. From the sources, it can be seen that in the Noarootsi area, the main livestock were horses, oxen, sheep and cattle (see Table 6).274

Table 6. shows the average and the total number of animals in Paslepa manor.275

<table>
<thead>
<tr>
<th>Year</th>
<th>Cows</th>
<th>Oxen</th>
<th>Horses</th>
<th>Total</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1591</td>
<td>2.6</td>
<td>2.3</td>
<td>0.9</td>
<td>5.8</td>
<td>17</td>
</tr>
<tr>
<td>1606</td>
<td>2.3</td>
<td>1.6</td>
<td>0.7</td>
<td>4.6</td>
<td>18</td>
</tr>
<tr>
<td>1682</td>
<td>2.7</td>
<td>2.7</td>
<td>1.2</td>
<td>6.7</td>
<td>47</td>
</tr>
<tr>
<td>1692</td>
<td>1.8</td>
<td>1.8</td>
<td>1.3</td>
<td>5.6</td>
<td>42</td>
</tr>
</tbody>
</table>

n- number of farms

Here, I adapt a method from Berencreutz to estimate the number of animals per farm in the two villages. Tables 7 and 8 are based on manorial tax books (vakuraamat in Estonian) from Einbi in 1739 and Kudani in 1744.

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274 Berencreutz 1997, p. 170-177.
275 Berencreutz 1997, p. 177.
Table 7. The average number of animals on Einbi farms in 1739.

<table>
<thead>
<tr>
<th>Horses</th>
<th>Sheep</th>
<th>Oxen</th>
<th>Cows</th>
<th>Calves</th>
<th>Total</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>0.1</td>
<td>2.4</td>
<td>2.3</td>
<td>2.1</td>
<td>8.1</td>
<td>15</td>
</tr>
</tbody>
</table>

n - number of farms

Table 8. The average number of animals on Kudani farms in 1744.

<table>
<thead>
<tr>
<th>Horses</th>
<th>Sheep</th>
<th>Oxen</th>
<th>Cows</th>
<th>Calf</th>
<th>Total</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>0</td>
<td>3.8</td>
<td>2.5</td>
<td>2.7</td>
<td>10.5</td>
<td>13</td>
</tr>
</tbody>
</table>

n - number of farms

From Tables 7 and 8, it is clear that cattle comprised the primary livestock. This is reasonable, as oxen were the main draught animals and dairy products were important for manorial deliveries. The unexpected figure is the very small number of sheep. Contemporary literature shows that sheep were important for managing a household. This animal provided meat and wool for clothing, was easy to keep outdoors until late autumn and could survive on poor pasturelands like those in Noarootsi.\(^{276}\) The horse was regarded as very hardy and strong (one horse was considered equal to two oxen by draught power). At the same time, draught power may not reflect how horses were actually used. The evidence suggests that the horse was mostly used for transportation and for draught work on manor work days.\(^{277}\) Horses required an inordinate amount of hay per individual compared to other animals. This was an especially important consideration in winter. Peasants had to consider how many and what type of animal they needed to help survive winter. Perhaps for this reason, oxen were more widely used as draught animals.

The lactation period of cows was short, and milk was generally available only in summer, and sometimes in autumn. But dairy cattle were important for extensive Estonian-Swedish areal production. Swedes in Estonia were famous for their cheese-making, and they often produced salted butter as a winter dairy product, or for delivery to the manor. Beef, on the other hand, was mostly sold to obtain cash. It was consumed by affluent townspeople and landlords. The main kind of meat consumed in peasant households came from pigs and sheep. Sheep were also sheared twice a year to obtain wool, and their hides were used for fur coats and bedclothes. Poultry – hens, geese and ducks – were kept for eggs and for meat.\(^{278}\)

\(^{276}\) The number of sheep probably went unreported, as later accounting books show larger numbers of sheep per household.

\(^{277}\) Ränk 1996.

\(^{278}\) Viires 2004.
An analysis of the coastal farm economy

The peasants in Estonia at this time were tied to the manor by their labor obligations and tax commitments – this was true for inland Estonian peasants as well as coastal Swedes in Noarootsi, even though, as demonstrated in chapter 5, Swedes were free to move and had smaller obligations.

 Deliveries to the manor were identical across all farms and villages on the Paslepa estate (see also Tabel 9). Each of the 6 ploughlands of Einbi – which were subdivided into farms of unequal sizes – were required to satisfy the following annual deliveries:

Table 9. Annual deliveries from each of the six ploughlands in Einbi village

<table>
<thead>
<tr>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 barrels of barley</td>
</tr>
<tr>
<td>3 barrels of rye</td>
</tr>
<tr>
<td>half a barrel of oats</td>
</tr>
<tr>
<td>10 pounds of butter</td>
</tr>
<tr>
<td>10 pounds of dried and salted pike</td>
</tr>
<tr>
<td>1 sheep</td>
</tr>
<tr>
<td>1 lamb</td>
</tr>
<tr>
<td>2 geese</td>
</tr>
<tr>
<td>2 chickens</td>
</tr>
<tr>
<td>10 eggs</td>
</tr>
<tr>
<td>1 cartload of hay</td>
</tr>
<tr>
<td>4 cartloads of straw</td>
</tr>
<tr>
<td>1 cartload of firewood</td>
</tr>
</tbody>
</table>

According to Queen Christina’s confirmation letter of the Swedish peasant privileges of 1650, farms were supposed to deliver substantially less than they did in reality. For example, the baron of the Sutlepa (Sutlep in Swedish) estate had already broken the rule that privileged Estonian-Swedes were to deliver certain amounts. Queen Christina’s letter stated the number of days that peasants should work with a pair of oxen on manor lands. Per ploughland, the prescribed requirement was one workday per day of the week. Hence, the largest farms had to deliver three days of labor with a pair of oxen each week. The smallest farms owed one day with oxen or two days of

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279 Berencreutz 1997.
280 Blumfeldt 1961, p. 73-75.
281 Oats were evidently grown, but they were not reported in the map description. This indicates that the information from the map might be somewhat schematic.
labor from two able-bodied men. Likewise, weekly labor days at the manor farm were shared among the farms of each ploughland. The largest farm owed 6 days, while the smallest provided only two days of labor. A workman and a woman with tools, along with the draught animals from every average-sized farm, also had regular work on the manor. Berencreutz studied documents from 1682 and 1692 for Paslepa manor, to which Einbi village belonged. Table 10 gives further details on the amount of workdays owed to the manor and how they were calculated according to the number of working males and existing oxen. In Table 10, we can identify a large difference in the male labor requirement between 1682 and 1692. Within ten years, obligations dropped by 75 men.

Table 10. A- the proportion of oxen workdays to be fulfilled for the manor from the total amount of existing oxen; B- the proportion of man-labor workdays to be fulfilled for the manor from the total existing man-labor; C- like B with 1710 existing lease norms; n- total amount of existing oxen; N- total amount of existing men in the labor force.

<table>
<thead>
<tr>
<th>Year</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>n</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1682</td>
<td>23</td>
<td>110</td>
<td>258</td>
<td>159</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1692</td>
<td>21</td>
<td>35</td>
<td>42</td>
<td>106</td>
<td>109</td>
<td>65</td>
</tr>
</tbody>
</table>

A comparison of the labor demands with the total population numbers (80 residents) could perhaps offer an explanation. From 1680 to 1690, the number of residents and the number of farms were basically the same. However, this could be a reflection of the fact that the manor had been reclaimed by the Crown and was operated under royal administration instead of by a baron.

Can we state in conclusion that manorial obligations for produce and labor were a heavy burden on the peasants of Einbi around 1690? This is not an easy question to answer without some kind of modeling exercise. An attempt, however, can be made using the figures from the 1698 Einbi village map. They permit an “assessment” of the average harvest. I have used a reasonable but very coarse “normal” fertility measure of 3. This is multiplied by 45.8, the area in hectares that represents the two thirds of arable land cultivated annually (the other third was fallow). This calculation indicates an annual “normal” production of 137.4 barrels of rye and barley from Einbi. Each of the six ploughlands needed to deliver 8.5 barrels of grain to the manor.

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286 Widgren 1979, p. 21-32.
total of 52 barrels went to the manor, a quantity that represented more than one third of the grain harvest. With added corvée duties and other deliveries, it is doubtless that the peasants of Einbi were quite heavily burdened by the upkeep of the manor. To add to their burden, the text of the map says that there was little forest in the area. All building timber, from which their dwellings were constructed, had to be acquired from elsewhere. Firewood must have been an expensive good, especially as one cartload per ploughland had to be delivered to the manor. However, barns and other outbuildings could be built mainly from readily available local limestone and straw.\footnote{Ränk 2004, p. 303-311.}

I applied the same modeling technique to Kudani, where arable land constituted a total of 30 ha. Considering that one third was fallow from year to year, this leaves 20 ha for arable production. Multiplying 20 ha by the previously used normal fertility measure of 3, the exercise results in 60 barrels of rye and barley for the village of Kudani. Observing that each of the 4 ploughlands needed to deliver 8.5 barrels, this means that 34 barrels went to the vicarage. Hence, more than half of the grain harvest had to be delivered! Could we state that the land was better for cultivation here and that the Kudani peasants were thus less heavily burdened than those in Einbi? But in Einbi, the income from fishing and seal hunting was certainly higher.\footnote{According to numbers from 1591 Einbi accounting book.} A reasonable mean fertility measure of four in Kudani still meant a heavier burden than in Einbi.

**Conclusive discussion**

The following schematic model of change will give an overview of the main driving forces for change or persistence of the local landscape of Einbi and Kudani. Figure 26 demonstrates how exchange with the outside world was limited. The manorial deliveries reflect the fact that peasants did not limit their activities to the cultivation of land or keeping of livestock. They had to divide their work between the land and the sea, not only during the different seasons that influenced their agricultural endeavors. Importantly, quantities were proportionally divided between each ploughland’s variously-sized farms. Although peasants were engaged in many types of production, self-subsistence was not absolute. A limited amount of money circulated through the hands of peasants. It was necessary to sell some products to acquire money to buy various items not produced on the farms.
An additional minor sum was demanded by the manor annually. The monetary component expected from the manor indicates that peasants had the ability to acquire currency. This suggests that Einbi’s peasants were already part of a limited market economy, probably involving the nearby market town of Haapsalu where their produce could be sold. Production and fulfilment of manorial obligations all revolved around the peasant family. Landholdings had to be self-sufficient to provide what their subsistence and the manor required. Families invested considerable labor per area unit to produce the varied output that satisfied their personal needs as well as those of the manor.

In conclusion, during the late feudal period, the main changes in the local landscape of the Noarootsi area occurred through societal change rather than through changes to the physical landscape or farming practices (no technological development or improvement of the land quality occurred). This was related to the fact that the local nobility managed to maintain feudal rights in terms of land ownership and regulations of manorial deliveries, as well as to the fact that natural conditions and processes such as soil quality and land uplift did not have much effect on improving land productivity.

Figure 26. The main mechanism of the local production unit in the Noarootsi area.
The local production unit was organized on three levels: the manor household, the village, and the single farm, where all surplus production went to the manor or the Church as landowners through taxes and land rent. The farming system remained a combination of cultivation, cattle breeding, fishing, and seal and sea fowl hunting. Each farm had arable land subdivided into strips for cereals. The three-field system remained common practice throughout the period. Forest and pasturelands were held in common for grazing. The rights from the local manor for fishing and hunting were commonly shared as well.

The early Russian period

This second part of chapter 6 analyzes the consequences in the study area of the political shift from Swedish rule to the authority of the new Russian empire. Attention centers on the situation of peasants and how the landscape was affected. This period does not possess the type of maps that provide vital information on the study villages, but parish registers, Church books and ploughland revisions contain information on the individual farms. They also provide population data. Plenty of this evidence makes it possible to trace the total number of people and major demographic development.

The geopolitical background in the 18th century

In the early 18th century, the political situation in the Baltic Sea region erupted in violent conflict. During the ensuing Great Northern War, Estonia was gradually conquered by Russia up to 1710 (formally in 1721, in the Treaty of Nystad). The result of Russian conquest in the context of the current work was that the pre-Reduction rights of the nobility were restored in order to ensure the loyalty of the Baltic Germans. As the 18th century progressed, rule in Livonia and Estonia continued to be based on the local noble language of German. The German tax and legal systems were preserved as well. Indeed, the Baltic portion of the Russian empire retained its traditional and most hierarchical agrarian society. The situation in the settled Swedish areas of northwestern Estonia witnessed particular problems related to their history under Swedish rule. During that time, Swedish peasants had succeeded in keeping their medieval legal status as free peasants. When Czar Peter returned the lands as “renationalized” during the Swedish Reduction, he gave barons a freer hand in dealing with

290 Whelan 1999, p. 29
their often obstinate peasants. For example, in 1710, Baron von Taube from Rickholtz manor in the northern mainland of Noarootsi parish raised the question of selling some of “his” Swedish peasants when he regained control of the land. Similar actions resulted in numerous legal processes in which manorial barons questioned the legality of any special rights claimed by Swedish peasants. Several villages had now lost their Swedish privileges. According to Hedman, peasants also often lost their right to move freely and manors demanded that anyone wanting to move outside their area should carry a “Frihetsbrev” (a letter of free movement) with them.

Einbi and Kudani villages in the early 18\textsuperscript{th} century

Einbi and Kudani were not settlements that lost their Swedish rights. It is therefore likely that manorial demands in Einbi and Kudani in the early 18\textsuperscript{th} century corresponded reasonably to the principles established under Swedish law. Still, a demographic challenge accompanied the Russian conquest. The population of the area fell as a result of the violent plague outbreak in 1710-11, on top of the famine of 1695-96 and the war.

The plague was particularly devastating in Noarootsi parish. About 65\% of Noarootsi’s already reduced population of 1,942 residents fell victim to the disease. The magnitude of the plague caused some villages to practically cease to exist. These circumstances encouraged the migration of native Estonians moving from the south. According to Blumfeldt, the Noarootsi Church books from 1710 show that between January 4 and September 17, 62 deaths were recorded. But after the plague epidemic exploded, the church books registered 909 deaths from September through the end of 1710. The 1711 church books recorded an additional 302 deaths, meaning that in two years, at least 1,271 people died in the Swedish parish of Noarootsi. The death rate varied from place to place. The approximate death rate for Läänemaa was 71.31\%, while in Noarootsi it was 64.83\%. The overall death rate is only an approximate value, as some people died while away from their home area and the vicar of Noarootsi lost count of his flock. Some, for example, were registered for military service.

The plague devastated the Estonian-Swedish population to a large extent, but the concentration of deaths to the most susceptible age

\textsuperscript{291} Hedman 1992.
\textsuperscript{292} Hedman 1992.
\textsuperscript{293} Rebas 1976.
\textsuperscript{294} Blumfeldt 1961, p. 73-75.
groups left behind a core population able to recover with time. The ploughland revision of 1726 gives insight into the condition of the population in Noarootsi parish by 1726. In that year, the population had already grown to 1,448 people (500 less than the pre-plague population).

Table 11. Blumfeldt identified three principal age groups in Noarootsi parish in 1726.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 15th years old</td>
<td>688 people (47.5%)</td>
</tr>
<tr>
<td>15-60 years old</td>
<td>605 people (41.8%)</td>
</tr>
<tr>
<td>over 60 years old</td>
<td>155 people (10.7%)</td>
</tr>
</tbody>
</table>

Blumfeldt’s numbers in Table 11 show that the age group under age 15 was dominant, which we can consider an effect of plague. There were more resources for raising young people since so many older people had died. The large number of young residents had consequences for daily life and the organization of labor. Different sources reflect the problematic shortage of labor after the war and in the aftermath of the 1710-11 plague. Nonetheless, population recovery took place quite rapidly. Around 1780, the population had risen to the level before the plague struck. As noted by Markus, a number of plague cemeteries still remain. She points out that some graves and unburied bones in Noarootsi parish date from the early 18th century.

We now turn to the case study of Einbi village, where it is possible to trace the peasants and their farms in documents from 1726 onwards. The soul revisions made me available to trace change in the village population as well as the parallel villages. The family size in neighboring villages was generally 5-7 members and in the current work, this has been considered an average for Einbi and Kudani farms.

In 1726, 14 functioning farms in Einbi supported a total population of 78 residents (Table 12).

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297 Paslepa tax books and ploughland revisions from 1680-1726
298 Saaga project http://www.eba.ee/saaga/
Table 12. Einbi farms in 1726 (source: Paslepa tax books and ploughland revisions from 1680-1726.)

<table>
<thead>
<tr>
<th>name of farmer</th>
<th>farmers</th>
<th>sons and husbands</th>
<th>farmers’ wives</th>
<th>daughters and maids</th>
<th>elderly males (60+)</th>
<th>elderly females (60+)</th>
<th>under 15</th>
<th>male children</th>
<th>under 15</th>
<th>female children</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mart Hansson</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Matz Bertelson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Matz Ambrosson</td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Adam Ambrosson</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>5. Jacob Greisson</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Hindrich Hindrichson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>7. Jacob Simonsson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>8. Matz Hansson</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>9. Hindrich Bertelson</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>10. Hans Stephanson</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>11. Marten Matzson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>12. Hans Greisson</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>13. Ambros Blesson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Jürgen Ambrosson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of residents</td>
<td>78</td>
<td>8</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>21</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The relationship between age and gender in Table 12 reveals one aspect clearly: the proportion of males and females among younger villagers was almost equal. Adults and the elderly display a slight imbalance with more women than men. Frequent explanations for an unequal gender ratio include the male responsibility of waging war, the brutal physical labor of daily life and accidents that occurred at sea while fishing and hunting.

The plague and the devastation of war might explain the imbalance. But these data reflect the same trend that appeared in the 1726 ploughland revisions for Noarootsi parish, as analyzed by Blumfeldt, who demonstrated the percentage ratios of ages. As individuals under 15 years of age dominated the population, Einbi village faced the same labor shortage problem. The dominant age group was not capable of covering all of the farm’s labor needs.
According to data from the tax books, land-use remained quite consistent. Differences surfaced in the cultivation of arable land during periods that included extraordinary factors, such as plague and war. More precisely, ploughland revisions show that 2.5 of the 6 ploughlands in the village were still unoccupied, meaning that 6-8 farms were still deserted in 1726.

Table 13. Einbi farms in 1744 (source: Paslepa ploughland revisions from 1739-1744)

<table>
<thead>
<tr>
<th>name of farmer</th>
<th>farmers</th>
<th>sons and hands</th>
<th>farmers’ wives</th>
<th>daughters and maids</th>
<th>males 0+</th>
<th>females 0+</th>
<th>male children under 15</th>
<th>female children under 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacob Hansson</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marten Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matz Bertelson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simon Adamson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian Matzson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas Jacobson</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Jacobson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jacob Simonson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marten Matzson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindrich Hindrichson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindrich Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindrich Bertelson</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Stephanson</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Greisson</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of residents 103</td>
<td>9</td>
<td>16</td>
<td>7</td>
<td>13</td>
<td>7</td>
<td>7</td>
<td>23</td>
<td>21</td>
</tr>
</tbody>
</table>

In 1739, there were still only 15 functioning farms in Einbi, an increase of two compared to the 1726 records. The farms now supported a total population of 103 and the number of deserted ploughlands had fallen to one.\footnote{Paslepa ploughland revisions from 1739-1744.} The 1739 data also include information about differences in age and sex.
Table 13 shows that 15 farmers, 7 farmers’ wives, 16 adult sons and 13 daughters lived in the village. Children below age 15 numbered 23, and the elderly comprised 14 people: 7 males and 7 females. The distribution of people could also say something about the divisions of labor and how farm life was organized. The 1739 data show an increase in the number of working-age people compared to 1726. Another change concerns the more equal distribution of males and females. These trends are reflected in Figure 27, where the number of farms and residents moves upwards toward the maximum level reached in 1782.

![Figure 27](image.png)

Figure 27. The number of farms and residents in Einbi village in 1680-1850.\(^{300}\)

It is necessary to look back to 1726 to assess the burdens of the peasants. Surviving documents from that year give the best details. The larger farms in 1726 comprised half a ploughland. These larger farms had to perform 3 labor days on the manor each week, the same figure required in 1691. There is no written explanation of the differences between summer and winter work, which also raises the question of how labor commitments were shared between the sexes. The summertime rhythm bound male labor to activities such as ploughing, hay-making and fishing. In winter, labor was oriented toward the females serving in domestic service at the manor house.

\(^{300}\) Sources: soul revision lists, parish registers, and tax books of agricultural production from the Stockholm National Archive, Estonian Historical Archive, including the Saaga project http://www.aha.ee/saaga/.)
But were there any changes in animal husbandry? This clearly played an important role in the deliveries to the manor. Information from 1739 shows that Einbi’s manorial deliveries of grain remained the same as in 1687, but more butter was demanded (12 pounds instead of 10), and 12 pounds of dried fish per ploughland, 1 cheese per peasant, 12 eggs (instead of 10), 2 geese and 2 chickens still had to be delivered. These are admittedly minor increases in deliveries, but they came at a time when the laboring population had been reduced severely. Any increase must have been difficult to cover.

The Paslepa manor tax books made it possible to trace the subdivision of the Einbi farms and provided a list of the people in Einbi in 1739 (Table 14).

Table 14. Farms in Einbi village in 1739. Source: Paslepa tax books from 1739-1744.

<table>
<thead>
<tr>
<th>ploughland</th>
<th>subdivision</th>
<th>name of farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/2</td>
<td>Jacob Hansson</td>
</tr>
<tr>
<td>1</td>
<td>1/2</td>
<td>Marten Hansson</td>
</tr>
<tr>
<td>2</td>
<td>1/3</td>
<td>Matz Bertelson</td>
</tr>
<tr>
<td>2</td>
<td>1/3</td>
<td>Simon Adamson</td>
</tr>
<tr>
<td>2</td>
<td>1/3</td>
<td>Christian Matzson</td>
</tr>
<tr>
<td>3</td>
<td>1/2</td>
<td>Thomas Jacobson</td>
</tr>
<tr>
<td>3</td>
<td>1/4</td>
<td>Hans Jacobson</td>
</tr>
<tr>
<td>3</td>
<td>1/4</td>
<td>Jacob Simonson</td>
</tr>
<tr>
<td>4</td>
<td>1/3</td>
<td>Marten Matzson</td>
</tr>
<tr>
<td>4</td>
<td>1/3</td>
<td>Hindrich Hindrichson</td>
</tr>
<tr>
<td>4</td>
<td>1/3</td>
<td>Hindrich Hansson</td>
</tr>
<tr>
<td>5</td>
<td>1/3</td>
<td>Hindrich Bertelson</td>
</tr>
<tr>
<td>6</td>
<td>1/4</td>
<td>Hans Hansson</td>
</tr>
<tr>
<td>6</td>
<td>1/4</td>
<td>Hans Stephanson</td>
</tr>
<tr>
<td>6</td>
<td>1/4</td>
<td>Hans Greisson</td>
</tr>
</tbody>
</table>

Table 14 shows the proportions of a ploughland that every farm contained. There were 15 farms in 1739, a number that grew to 19 by 1744. For the first time since 1691, no land lay idle. As the population and farm numbers show, the combined effects of famine and plague (1710-11) took approximately 35 years to repair. The number of residents had grown to 119 by 1744, nearly a 20% increase in only five years. The maturation of the population of individuals under 15 years of age played a significant role, but people from outside probably
moved into farms that were idle. An outflow of Swedish peasants from Hiiumaa (Dagö in Swedish) to Vormsi (Ormsö in Swedish) occurred during the first half of the 18th century due to conflicts with manors. Figure 12 also reveals that the population peaked in 1782. An analysis of the age and sex distribution shows a continuation of the trend toward a more equal gender balance that began to appear in the 1726 records.

Table 15. Einbi farms in 1744. Source: Paslepa ploughland revisions from 1739-1744.

<table>
<thead>
<tr>
<th>name of farmer</th>
<th>farmers</th>
<th>sons and hands</th>
<th>farmers’ wives</th>
<th>daughters and maids</th>
<th>males 60+</th>
<th>females 60+</th>
<th>under 15</th>
<th>male children</th>
<th>female children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marten Hansson</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jacob Hansson</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas Jacobson</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jacob Simonson</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Jacobson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindrich Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marten Matzson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindrich Hindrichson</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simon Adamson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matz Bertelson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambros Hansson</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matz Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hans Hindrichson</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian Jürgenson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambros Matzson</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian Matzson</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matz Hansson</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian Matzson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of residents 19</td>
<td>13</td>
<td>22</td>
<td>10</td>
<td>13</td>
<td>6</td>
<td>7</td>
<td>30</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

Table 15 shows that the number of farmers increased to 19 in 1744. The manor deliveries required in the peak population year were the same as in 1739. While corvée duties and deliveries were kept at the same level as 1739, the population increase over the course of the preceding decades put new demands on labor and production for the sustenance of the farms. The larger farms of 1744 comprised half a ploughland and they had to perform 3 labor days per week for the
manor farm. Smaller farms only owed the manor 2 days per week. The changes in agricultural practices that followed the population increase were primarily evident in animal husbandry.

Table 16. The average number of animals per farm in Einbi in 1744.

<table>
<thead>
<tr>
<th></th>
<th>Horses</th>
<th>Sheep</th>
<th>Oxen</th>
<th>Cows</th>
<th>Calves</th>
<th>Total</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1744</td>
<td>1.05</td>
<td>0</td>
<td>2.6</td>
<td>1.7</td>
<td>1.8</td>
<td>7.2</td>
<td>19</td>
</tr>
<tr>
<td>1739</td>
<td>20</td>
<td>0</td>
<td>49</td>
<td>32</td>
<td>35</td>
<td>136</td>
<td></td>
</tr>
</tbody>
</table>

n- total number of farms

Table 16 shows the increase in the number of animals (compared with 5 years before, in 1739) with the rising population. As mentioned above, one must question why so few sheep were recorded. A total absence of sheep does not seem realistic. Manor deliveries in 1744 demanded roughly 1 sheep per farm. There is no reason to doubt this and it illustrates the problem with an overreliance on a single type of archival source, as information in historical literature clearly shows the important role of sheep in the farm economy for this period.

In conclusion, no major increases in demand from the manor seem to have taken place in the first half of the 18th century. The population underwent a severe reduction due to famine and plague. These adverse conditions probably made it more or less impossible to raise manorial demands. By mid-century and forward, however, the population increased toward levels seen in the late 17th century. The manor owners had chosen another strategy to nullify the privileges of the Swedish peasants: they demanded original documents from the 17th century – documents that had often been lost, or as in case of Hiiumaa, incorrectly formed due to a misunderstanding between the Swedish government and the Hiiumaa peasants. Thus, in many areas, the Swedish peasants lost their privileges, and the workload and deliveries became identical to those of the inland Estonians. Considering the poor soils and other difficulties of coastal settings, these were serious drawbacks. The population decreased and sapped labor availability, and a lot of land lay idle. Therefore, with an eye toward how the effects within might influence human pressures on the land, especially in terms of productivity per farm, one could assume that no major changes took place.
Kudani village in the early 18th century

As mentioned, Kudani village underwent even less change to the village structure than Einbi in the first study period. This is clear from the 1739 ploughland revisions, where lists of residents show that the total number of farms was 12 (see Table 17). The farms were subdivided over 4 ploughlands and the proportion per farm was consistently one third of a ploughland. ³⁰¹

Table 17. Kudani farms in 1739. Source: ploughland revisions from 1739-1744. The number of farmers is 12 (farmers + old males).

<table>
<thead>
<tr>
<th>Name of farmer</th>
<th>Farmers</th>
<th>Sons and hands</th>
<th>Wives</th>
<th>Farmers' and maids</th>
<th>Daughters</th>
<th>Males 60+</th>
<th>Males under 15</th>
<th>Females 60+</th>
<th>Females under 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simon Bertelson</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Thomas Ambrosson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Christian Hinrichson</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Anders Hinrichson</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Matz Ambrosson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Johan Matzson</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Simon Hansson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Simon Peterson</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Marten Greisson</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mattis Simonson</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Johan Hinrichson (II)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total number of residents</td>
<td>12</td>
<td>6</td>
<td>15</td>
<td>5</td>
<td>15</td>
<td>6</td>
<td>8</td>
<td>18</td>
<td>14</td>
</tr>
</tbody>
</table>

In conclusion, the investigation of Kudani village in the first study period reveals the fact that the village structure was more stable than in Einbi. The farm subdivision was the same over the period. Also, the population over the period did not vary as much as it did in Einbi. In summary, consistent land-use prevented radical changes. As mentioned earlier, it was also important that the vicarage deliveries remained at a consistent level, and that those deliveries were equally divided per farm.

³⁰¹ The Kudani agricultural land subdivision per farm in 1739. The first table shows the ploughland number and the second table indicates the division shared of a ploughland per farm.
Table 18. The average number of animals per farm in Kudani in 1739.

<table>
<thead>
<tr>
<th>Horses</th>
<th>Young horses</th>
<th>Oxen</th>
<th>Cows</th>
<th>Calves</th>
<th>Total</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8</td>
<td>0.1</td>
<td>2.8</td>
<td>3.0</td>
<td>3.4</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>21.0</td>
<td></td>
<td>33.0</td>
<td>36.0</td>
<td>41.0</td>
<td>131.0</td>
<td></td>
</tr>
</tbody>
</table>

n- total number of farms

Table 18 shows that there were approximately 0.1 young horses per farm, which was much less than in Einbi. Horses were commonly shared between different families. There were larger numbers of oxen in Kudani. They numbered an average of 2.8 in Kudani and 2.4 in Einbi. The difference in horses and oxen per farm indicates that oxen served as the main draught animals in both villages. Cows (3 per farm) and calves (3.4 per farm) played important roles in dairy and manure production; larger numbers per farm were kept in Kudani.

Conclusive discussion of Einbi and Kudani villages in the mid-18th century

By the mid-18th century, Russian governance of Estonia was largely transferred to the barons of the numerous manors. Each manor comprised a municipality until the 1860s, and the barons presided over the municipal courts. Consequently, it was difficult for a peasant to argue over legal injustices committed by the baron accused of wrong-doing. In many cases, not least in the Swedish settlement areas, peasants who alleged unjust treatment ended up in the supreme courts of St. Petersburg. In other cases, Swedish and even Estonian peasants from Noarootsi sailed to Stockholm to try to get support from the Swedish king, whom they still saw as their proper ruler.

Most of these court cases concerned the rights of Swedish peasants. It was expensive for barons to keep their peasants under privileged conditions, since they could collect fewer deliveries and less labor from Swedish peasants. Consequently, they either wanted to replace them with enserfed Estonians or to remove the Swedish privileges.

The Paslepa manor in Noarootsi, which was owned at that time by Baron von Knorring, was no exception. From the 1770s, peasants

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302 Soom 1956, p. 3-42.
from the Paslepa villages cooperated with villagers from the neighboring estate of Saare (*Lyckholm* in Swedish) to defend their privileged status. Their cases appear in documentation from various courts, as well as in the minutes of the Estonian General Governor’s office. In 1780, peasants from Saare complained to the Governor of the Gubernya of Estonia that they had been evicted from their manor by Baron von Rosen. At the same time, the Paslepa baron tried to deny the peasants their privileges completely.

Again in 1773, Baron von Knorring tried to increase day labor obligations and deliveries owed by peasants on the Paslepa estate that contained Einbi. This time, the Board of the Estonian General Governor denied the increases after peasant complaints. In 1774, Baron von Rosen of the Saare estate reported to the governor that peasants on Paslepa and Saare refused to perform additional labor obligations. Continuous unrest prevailed over the next six years, with peasants escaping to Tallinn. The barons demanded that the governor’s office bring them back by force and militarily suppress the protesters. Numerous peasants were eventually evicted from their farms. The local Noarootsi vicar from Sweden was not used to such harsh measures and described the period of peasant unrest in the early 1790s. Once again, the dispute involved the barons of the Paslepa and Saare estates and their refusal to follow the principles of the privileges and the governors’ dictates.

From the late 18th century, a new system of conscription was introduced in the Russian empire, and its requirements were extended to Estonia. Conscription committed males to 25 years of service. Ongoing military ventures meant heavier burdens on the shoulders of all peasants, both Swedish and Estonian. In the population registers of Swedish areas and elsewhere, many young men disappeared abroad instead of risking such a fate. They fled either to Finland or Sweden, where coastal “Livonian refugees” became common in parish registers at that time. From the privileged status in the 17th century, the situation of Swedish peasants gradually deteriorated by the beginning of the 19th century.

Estonian peasants, on the other hand, might have acquired more security than their Swedish counterparts. With liberal ideas spreading across Europe in the early 19th century, the Czar and the Russian government were inspired to carry out reforms in their Baltic provinces. The main change in agriculture was related to the introduction of paid labor. The Czar and provincial landowners faced a transitional

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period from the old social order. Other changes included gradually increasing liberties for various social groups, including the peasantry.

For the Estonian peasants, serfdom was abolished in 1816.\textsuperscript{306} This brought wider personal freedom and strengthened their legal rights. By the early 1830s, all the peasants of Estonia, Curonia and Livonia benefited from laws abolishing serfdom and support for the gradual establishment of peasant self-government. But enforcement of new laws was controlled by the manor owners. The institutions of peasant government – the district councils and local courts – made decisions on practically all important local matters concerning economic, social and educational issues. Conversely, the Swedish peasants did not gain any new legal rights as they were not part of self-government.

Despite the efforts by the central government to relax demands on peasants, in the new laws, the landowners maintained a significant portion of their own privileges. According to Whelan, a new law granted ownership of all land to manorial barons.\textsuperscript{307} Manor-owners and peasants then signed a free-holding land rental agreement, which meant that landowners dictated the terms of the lease, and the peasants were often forced to surrender their newly legalized rights to relocate, which were already restricted by laws and the existing patterns of socio-political relations with the Russian government.

In conclusion, judging from their complaints to various higher courts, the Swedish peasants were sometimes agitated to no minor degree. They were often supported in their pleas for justice by courts and the governing bodies in Tallinn and St. Petersburg. Still, the barons continued to demand more workdays and deliveries than the privileges prescribed, placing the Swedish peasants on a lower level or the same level as their Estonian counterparts.

Considering the developments in Einbi and Kudani villages from the beginning of the Russian period, there was a brief phase of recovery following the disasters in the last two decades of Swedish rule. Signs of stability can be observed thereafter. The number of farms stayed the same, the number of residents was stable and the land-use structure remained essentially the same. At the same time, a steady outflow of people from Einbi took place, mainly by young men. Many hoped to escape military service and build a new life under more favorable conditions. Swedish residents who stayed in Einbi maintained an important difference between themselves and the Estonians. The coastal ecological niche remained the same, cultivated by the Swedes, and included fishing, seal hunting and animal husbandry.

\textsuperscript{306} Lagman 1961, p. 73-75.
\textsuperscript{307} Whelan 1999.
Estonians concentrated on arable agriculture. The Swedes had to coordinate a wide range of activities on land and sea. Hence, the rise in manorial demands, which were enforced with constant threats of flogging and other kinds of punishment, brought a serious consequence: less time for the continued traditional lifestyle of Swedes. They had to devote more time to the manor farms and fields. Their situation deteriorated until they were even poorer than the Estonians. There was no extra time to redefine the Swedish niche through arable reclamation, there were no resources to expand animal husbandry, and the only escape from misery was to flee from manor life. Departure was permitted as a privilege for free Swedish peasants, even though the barons attempted in vain to force the expulsion of refugees from Paslepa manor in Sweden and have them returned.
The previous chapter demonstrated how a political shift from the Swedish era to the Russian empire occurred in the Baltic provinces. The main influencing factor of the Russian empire was the preservation of much of the traditional social order. However, the rights of the Lutheran Church to continue its practices were preserved. The next influential changes came along with several reforms around 1856, resulting in peasant rights to purchase land and corvée duties being forbidden. Thus, chapter 7 will focus on how these processes affected the manorial system and how they are reflected in the local landscape of Noarootsi. Village maps from 1860 and 1886 describing the land-use organization will assist our understanding of how societal processes and natural conditions affected the local livelihoods in Einbi and Kudani. The chapter ends with an analysis of the family registers of Einbi and Kudani from 1780 to 1900, in order to describe changes in population, family size and migration in and out of the villages.

Main societal changes and the agrarian reforms
An influential process that eventually led to changes in the social structure and caused a weakening of the manorial system occurred between 1860 and 1918. This period has been characterized as a national awakening for the Estonian population. At the same time, an Estonian-Swedish cultural awakening occurred in response to the Estonian awakening. In the context of my thesis, this may explain how and to what extent radical changes in land-use took place. The main change occurred in land ownership, which shifted from manorial tenant farms to freeholders. Peasant land purchases within the large estates were allowed, but at the same time, they differed among the

309 Family registers from digitalized data in “Saaga” project.
various provinces of Estonia. A parallel process unfolded as the imperial government launched its policy of Russification, which primarily affected the educational system. The early years of the reign of Alexander II (1855-1881) reshaped several aspects of Russian society. Alexander’s influences included the agrarian reforms of 1849-1860, which included a prohibition of farm labor rents and granted peasants the right to purchase land, increased contact with the world outside the Baltic, and pushed for industrialization and technological advancement. These policies caused broad changes in urban environments and in the countryside. But how were these reforms reflected in the Swedish villages, which were relatively conservative, and ethnically and spatially isolated?

As a result of traditional privileges, Swedish heritage granted the peasantry a special status. The 1856 peasant law changed the situation by making the peasants permanent residents of one particular farm and enabling the sale of farms to peasants. Peasants’ land allotments were organized through the 1856 law for the redistribution of manorial land, very much along the lines of enclosures. Therefore, I will now focus on the organization of farm life and the structure of the community as a whole in order to provide insight into the impact of reform at a local level.

Einbi village maps from 1860 and 1886

In the late 19th century, Paslepa manor commissioned two maps of the estate to be made 26 years apart. These commissions were related to peasants’ rights to purchase their farms. The process included estimations of land quality and an overview of the land belonging to the manor and subsequent subdivision. For example, the 1886 map legend defines the different kinds of meadows, giving an approximate quality estimate divided into 6 different classes. Such knowledge was used to establish a basis for assessing the values of tenant farms. Unlike earlier study period maps from 1698, the main purpose was

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311 Hedin 2003, p. 268.
312 A series of administrative and cultural reforms by the central government designed to propel a more complete integration of the Baltic provinces. The first important steps in the introduction of Russification were that Baltic schools were put under the control of the Ministry of Education, and Russian was introduced as the teaching language. The self-government of towns and the court system were reorganized so that by 1867, all official documents had to be written in Russian.
313 Läänemaa 1938. See also Raun 1987.
314 Kahk 1972.
315 Land quality estimation (“Bodenbonitur”) of Paslepa village in 1869.
set by the State to account for the landholdings of the noble estates and their value in the Reduction process. The 19th century maps were ordered by local manors to obtain an overview of land quality and tenancy patterns and drawn by German land surveyors. The possibility for peasants to purchase farms and the coming reorganization of parcels introduced a new category of information on the maps around 1860. Thus, compared with earlier maps from 1698, the primary difference is that land subdivision has been recorded and field parcels are marked with the numbers of respective farms.

The rectified map of Einbi village from 1860

The first map drawn (scale 4:200) in the purchase process to estimate the manor lands of Einbi in 1860 was compiled by the German surveyor J. Reichhardt. It concentrated on the subdivision of arable land, grazing and meadows that belonged to each farm. The map does not show the village border or land quality (Figure 28). Still, it is unique, because it presents in extreme detail the division of land parcels belonging to each farm. The parcels are numbered, but their sizes were not equal for each farm. It might be assumed that the quality of land had been taken into account when this subdivision was made, as well as the size of the farms.

Figure 28. Einbi village map from 1860.
The map depicts 13 peasant tenancies in Einbi, presenting in detail the amount of land belonging to the farms. Ramsholm Island in the western part of village was subdivided into numerous strips (Figure 29) of meadow and barns, which were marked on the map with red dots.

Figure 29. Ramsholm meadows.

<table>
<thead>
<tr>
<th>farm number</th>
<th>meadow (number of parcels)</th>
<th>arable land (number of parcels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. Larsch (Lars)</td>
<td>36+6</td>
<td>41+6</td>
</tr>
<tr>
<td>23. Jakosch Mats</td>
<td>35+8</td>
<td>45+6</td>
</tr>
<tr>
<td>24. Simas</td>
<td>41+6</td>
<td>46+6</td>
</tr>
<tr>
<td>25. Klos Matsas</td>
<td>35+6</td>
<td>50+9</td>
</tr>
</tbody>
</table>

From the rectified map (Table 19), it was possible to take farm subdivision into account, which reveals the extent to which the peasant land was fragmented. Table 18 shows that farm number 22, named Lars, had 42 parcels of meadows in different locations, as well as 47 parcels of arable land in the three-field system. The farm thus had a total of 89 separate parcels. Another example was farm number 25

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316 Farm no. 22 Lars; 23 Mats; 24 Simas; 25 Klos Matsas; 26 Henders; 27 Smens; 28 Klos Jakas; 29 Hinter; 30 Knuters; 31 Matas; 32 Jakas Anders; 33 Urbas; 34 Urbas.
belonging to Klos Matsas, in which the meadow was divided into 41 parcels and the arable land into 59, for a total of 100.

According to the rectified map, the total area of the village in 1860 was 670 ha, of which arable land comprised 64 ha (10%). By comparing this with the data from the 1698 village map arable land (61 ha), we can see that the arable land on the 1860 map is 4 ha less! This is explained by the fact that several arable fields in the southeastern part of the village had been taken over by the local Paslepa manor due to the good quality of the land (higher till areas). The area of farm buildings covered 5 ha (1%) on the 1860 map (Figure 30). In the meantime, the meadow covered 32% of the area (217 ha), which, compared with the previous map from 1698 (263 ha), is a decrease explained by the ongoing land uplift. Over 200 years, the coastline moved approximately 0.6 m (considering an average land uplift of 2.8 mm per year; see chapter 4). The former sounds remain in the local landscape, especially the one separating the area northwest of Einbi village, Ramsholm Island, where the village farms primarily comprised meadows and pastures. Pastures covered 388 ha (57%) of the village area. The amount pastures varied. Even though the figures depend on the rectification, and older maps are less reliable, the average size is not substantially different. The amounts are similar, differing by only 8 ha! The sounds between islands in Noarootsi were mostly shallow, and the peasants made hay or gathered seaweed and leaves there to fertilize their fields and garden. It was often possible to walk the animals through the water. Only in early spring and late autumn, when the water level was higher and the area was flooded, was access by foot impossible.

Figure 30. Einbi land-use according to the village map from 1861.
In conclusion, a comparison of the village maps from 1698 and 1860 reveals that the land-use did not change substantially. Figure 30 shows how pasture and meadows were dominant, leaving 10% of the area for arable land.

The rectified map of Einbi village from 1886

The map from 1886 was compiled by German cartographer Wesen just 26 years after the previous mapping. This map depicts a subdivision into 15 farms in Einbi before the sale process. Obviously, the 1860 map had not been used for this purpose. The map legend describes different land-uses marked by various colors (see Figure 31), giving precise explanations of land quality.  

Figure 31. Einbi village map from 1886.

The map legend identifies the following land-use types: The toft included the buildings (marked by red dots); the gardens where fruit and vegetables were grown (marked by blue), and the courtyards of the farms (marked by yellow). Because these areas were small, the digitalized land-use map represents them as farmland. The other land-uses are described below: meadowland – meadows involved several kinds of land-use: meadows covered with trees (marked by green with either dark green or brown dots inside). Other meadows were essentially wetland (marked by green with blue dots inside). Pastureland – or “waste” land (light blue with dark blue dots) and pastureland marked by blue with red dots inside were sandy areas. Arable land – marked by light orange-red. Sand is marked by pink with red dots, mainly along the coast. Water – areas of water are marked by dark blue, showing the seashore, which also indicates the sound areas described above. Limestone quarry – represented in the eastern part of Einbi village. This is where the peasants obtained material for construction. Forest – marked with brown dots.

There is a blank area marked with light grey label on the map (north of the village) where the harbor is marked. The harbor workers labored on the land below the harbor and this area has been marked with white or left blank. This means there is no way to trace land-use in that area, and that the land did not belong to Einbi village.

317 The map legend identifies the following land-use types: The toft included the buildings (marked by red dots); the gardens where fruit and vegetables were grown (marked by blue), and the courtyards of the farms (marked by yellow). Because these areas were small, the digitalized land-use map represents them as farmland. The other land-uses are described below: meadowland – meadows involved several kinds of land-use: meadows covered with trees (marked by green with either dark green or brown dots inside). Other meadows were essentially wetland (marked by green with blue dots inside). Pastureland – or “waste” land (light blue with dark blue dots) and pastureland marked by blue with red dots inside were sandy areas. Arable land – marked by light orange-red. Sand is marked by pink with red dots, mainly along the coast. Water – areas of water are marked by dark blue, showing the seashore, which also indicates the sound areas described above. Limestone quarry – represented in the eastern part of Einbi village. This is where the peasants obtained material for construction. Forest – marked with brown dots.

There is a blank area marked with light grey label on the map (north of the village) where the harbor is marked. The harbor workers labored on the land below the harbor and this area has been marked with white or left blank. This means there is no way to trace land-use in that area, and that the land did not belong to Einbi village.
The areal data used here are from compiled rectified map in order to describe the spatial distribution of land-use types, as well as land ownership.

The village border was altered compared with previous maps, and the current map also included more detailed areas of water and sand. Often, for pragmatic reasons, land surveyors did not map areas of water, but carefully marked the land belonging to farms and the sandy areas that were occasionally used as agricultural land or as pasture.

**Land cover analysis of the Einbi map from 1886**

The total area of the village in the rectified map from 1886 (see Figure 32) was 841 ha. The dominant land-use type was still pasture, which was divided into watery areas covering 469 ha (53%) of the area. Arable land covered 64 ha (8%) of the area, and had not been expanded compared with the map from 1860. The meadow was smaller compared with the map from 26 years earlier, 227 ha (27%), but still remained larger than from the 1698 map (22% of area). This can be explained in part by the rectification process, as the 37 ha increase from 1698 could probably be explained by ongoing changes on the shoreline.

The map also states that sandy areas covered 36 ha (4%). These areas were not represented on earlier maps, but they could have been included as meadows. The forest was primarily located inland and covered 51 ha (6%), which meant that wood often had to be transported here for use as firewood and to build boats and houses. Despite that, the manor added some forest areas to the village.
Compared with the map from 1698, the forested areas increased from 46 ha in 1698 to 51 ha in 1886. It is most likely that areas covered by bushes were classified as forest by the later cartographer. As wood was scarce, most buildings, apart from human living quarters, had to be built with limestone.
Figure 33 shows that pasture and meadows were the dominant land-use types. Arable land and forests were smaller, but not unreasonable in an extensive agricultural system. Compared with the land-use map of Einbi from 1698, the landscape did not undergo substantial structural changes, while the land-use analysis shows that arable land increased to a minor degree (3 ha). Despite of the fact that several fields became manor land. The soil analysis revealed that residents chose the best-suited soils and locations for arable land, but there were no opportunities to expand the cultivated areas to other suitable conditions. In conclusion, forest remained scarce, and meadows and pasture dominated the areas along the shoreline.

Land ownership in Einbi in 1886

To explain how changes in land-use occurred in the local landscape, the previously mentioned land ownership aspects were clearly represented in Einbi village maps from the late 19th century. To describe the changes in land organization, land ownership parcels were drawn over the 1886 map of Einbi (Figure 34).

318 The farm number was marked on the parcels related to the possibility to purchase the land.
An aerial calculation of the land belonging to each farm was made according to the description of the land ownership parcels. This was later compared with the data from land purchase sheets about Einbi. Table 20 presents the name of the farm or farmer, the farm size calculated from the rectified map and the comparison with data on farm size from archival documents (given in cursive). Each farm had several parcels in different locations in the village area. These pieces are added together to analyze the size and land-use aspects of each farm.

319 Kadastridokumentide kollektsoon 1660-1940 (EAA. F3724).
Table 20. Data from digitalized map and archival documents of Einbi in 1886

<table>
<thead>
<tr>
<th>farm number and name of farmer</th>
<th>farm sizes in hectares (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Jakas Anders</td>
<td>66.8 ha 70 ha</td>
</tr>
<tr>
<td>24. Knuters</td>
<td>46.8 ha 53.4 ha</td>
</tr>
<tr>
<td>25. Klos Jakas</td>
<td>51.2 ha 57 ha</td>
</tr>
<tr>
<td>26. Lars</td>
<td>59.3 ha 66 ha</td>
</tr>
<tr>
<td>27. Maddes</td>
<td>58.3 ha 65.5 ha</td>
</tr>
<tr>
<td>28. Inter</td>
<td>55.3 ha 62 ha</td>
</tr>
<tr>
<td>29. Smens</td>
<td>54.2 ha 60 ha</td>
</tr>
<tr>
<td>30. Klos Matsas</td>
<td>50.1 ha 63 ha</td>
</tr>
<tr>
<td>31. Simas</td>
<td>60.9 ha 69.3 ha</td>
</tr>
<tr>
<td>32. Henders</td>
<td>55.5 ha 62.4 ha</td>
</tr>
<tr>
<td>33. Jakas Mats</td>
<td>67.9 ha 73.5 ha</td>
</tr>
<tr>
<td>34. Sedman Juhan</td>
<td>13.6 ha 15 ha</td>
</tr>
<tr>
<td>35. Mitman Anders</td>
<td>9.4 ha 9.9 ha</td>
</tr>
<tr>
<td>36. Sedman Mats</td>
<td>9.8 ha 10.1 ha</td>
</tr>
<tr>
<td>37. Östra Angen</td>
<td>13.2 ha</td>
</tr>
<tr>
<td>38. St in Telneskog (Tällnäs)</td>
<td>0.9 ha</td>
</tr>
<tr>
<td>A- Ramsholm Island</td>
<td>22.1 ha 26 ha</td>
</tr>
<tr>
<td>Total</td>
<td>695.3 ha 763 ha</td>
</tr>
</tbody>
</table>

Table 20 shows that the village consisted of 15 peasant farms, including one belonging to the forest warden, and several small holdings and craftsmen who did not have much land (farms 34, 35, 36). The other 11 peasant farms averaged in size from 46 to 68 ha. Despite efforts by the local manor to prepare the sale process carefully, it was still slow, according to the purchase contracts. This could be explained by the fact that coastal farms had difficult conditions and substantial manorial deliveries, and the peasants were pressed to the limits of survival and extremely poor.

Some could buy a farm immediately, while others had to wait at least a year to be able to buy “their” farm. The farms were now frequently subdivided and reorganized to suit the purchasing capabilities of peasants, which meant that several bigger farms were subdivided into smaller units, such as farm no. 23 Jakas Anders, farm no. 31 Simas, farm no. 33 Jakas Mats (see Figure 34, farm no. 23, farm no. 33 and farm no. 31).
Shares were then sold to peasants from outside Einbi village. This resulted in land subdivisions of varying sizes. 20 farms were sold between 1886 and 1912. The average farm size amounted to 23.7 ha. The sales also introduced a new ethnic dimension: seven Estonian families moved to Einbi between 1885 and 1905, mainly from Hiiumaa.\(^{320}\) The main consequences of the purchase and subdivision process were changes to the organization of farm activities, likely in the form of more fishing and hunting and fewer animals per farm.

The rectified map of Kudani village from 1885

The Kudani map was ordered from the Noarootsi vicarage to estimate the extent of lands belonging to the Church. It was also drawn by a German surveyor. The Kudani map includes land-use information, given in the map legend in Russian presents the following:

\(^{320}\) Grubbström 2003, p. 226.
Table 21. The original Kudani map legend from 1885.

<table>
<thead>
<tr>
<th></th>
<th>in desjatine</th>
<th>in hectar</th>
<th>Peasant farms</th>
<th>Sexton 321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plots and gardens</td>
<td>1.20</td>
<td>1.3 ha</td>
<td>5.12</td>
<td>5.6 ha</td>
</tr>
<tr>
<td>Arable land</td>
<td>17.23</td>
<td>18.8 ha</td>
<td>49.11</td>
<td>53.7 ha</td>
</tr>
<tr>
<td>Meadow</td>
<td>103.16</td>
<td>112.8 ha</td>
<td>216.02</td>
<td>236.1 ha</td>
</tr>
<tr>
<td>Pasture</td>
<td>185.02</td>
<td>202.2 ha</td>
<td>126.20</td>
<td>137.9 ha</td>
</tr>
<tr>
<td>Impediment</td>
<td>22.04</td>
<td>24.1 ha</td>
<td>93.21</td>
<td>101.9 ha</td>
</tr>
<tr>
<td>Total ha</td>
<td>359.2 ha</td>
<td>355.2 ha</td>
<td>18.35 ha</td>
<td></td>
</tr>
</tbody>
</table>

1 desjatine= 1,093 hectares

Table 21 demonstrates that the arable land of the Kudani peasant farms consisted of 53.7 ha on average, while the sacrist areas comprised only 1.3 ha. Plots and gardens were mainly on peasant land. The sources reveal that grain deliveries to the vicarage were still high for the village peasants.

The digitalized map (see Figure 36) shows that the whole village area within the village border comprised 600 ha, which differs to a large extent from the data in the map legend (912 ha). This is probably because the meadow belonging to the vicarage is not included in the rectified map. The meadow primarily occupied the northwest side of the village, a total of 220 ha (36%). That was the portion of the village border determined to be old lake lagoons. These were thus wet areas that were a valuable source of thatch. Scattered among the meadows, there were some pieces of arable land that covered 67 ha of the area, for a total of 11% (Figure 35).

321 Sexton was a servant to the Church, who was responsible for ensuring ceremonial items were brought, that the church was kept in good condition and the bells were rung on time.
The differences between the figures from the map legend and the rectified map are substantial. The map states that peasants had to carry out some melioration work in the northwest part of the village territory. Yards and gardens are shown on the map and comprise a total of 23 ha (4%). The pasture extended widely across the entire village area, comprising 286 ha (48%) of the total. Meadows were normally used as pastures after the hay was harvested, especially in late autumn. The map includes neither forests nor sandy areas.
Farm buildings, on the other hand, were possible to distinguish on this map (marked by squares). They covered approximately 4 ha, which is less than 1% of the total area. The village border is shown clearly, as well as the part of the meadow that belonged to the vicarage. From the perspective of the land-use analysis, land-use remained essentially the same. In Kudani subdivision process of farms did not take place, could it be assumed that peasants could organize their work on the fields more simultaneously, as the farms tended to be fairly similar in size. But how and to what extent were farm subdivision and the purchase process in Einbi reflected in the population figures while in Kudani these processes were absent?

Population change in Einbi and Kudani villages

The upward trend in population growth that began after the Great Northern War (1700-1721) continued after 1860. However, the rate of growth slowed by the late 19th century. In 1881, the total population of Estonia and northern Livonia was 881,455. About 90% of the
population declared themselves to be Estonian in nationality.\footnote{322} Emigration remained at a steady level. The vast majority of Estonians who left in those years belonged to the class of landless peasants.\footnote{323}

The social structure of the Estonian countryside underwent important changes in the decades that followed the peasant reforms of the 1850s and 1860s. The top layer of rural society continued to comprise Baltic-German nobility and clergymen. The farming population could be subdivided into: 1) land-owners, 2) tenants, and 3) landless laborers. Urbanization, a major social component of modernization, accompanied the process of industrialization. The Swedish areas did not undergo any sudden demographic transformations due to urbanization, although there was a strong migration from the countryside to cities like Tallinn, Haapsalu and Pärnu.

![Einbi and Kudani village populations 1780-1900](image)

Figure 37. Einbi and Kudani village populations 1780-1900. Both villages were influenced by urbanization and by emigration to Sweden and Finland.

**Population characteristics of Einbi**

Figure 37 demonstrates that the 19th century can be characterized as reasonably stable in terms of population. The main change occurred during the Napoleonic Wars (only the male population was counted in 1811, and tens of residents left for the army). At the end of the 18th century, the population comprised 128 residents. By 1830, the village population had dropped to 103. From 1830-1850, major changes

\footnote{322} Läänemaa 1938.
\footnote{323} Raun 1987.
took place as a result of outmigration to work in towns and industries: 25 residents left the village at this time, and three emigrated to Sweden. By the beginning of the 20th century, the opportunity to purchase peasant land brought new people to the village, mainly from Hiiumaa, resulting in an increase of more than half the population. The family registers for 1880-1900 state the number of residents as 256. Family size in Einbi varied from 7-9 members around 1900.

Population characteristics of Kudani

At the end of the 19th century, Kudani had 112 residents, and as farms were not sold until the arrival of land reform in the 1920s, the number of people remained essentially the same: 13 people moved to Tallinn and three emigrated to Sweden from 1830-1850, reducing the number of residents to 91. Like Einbi, the population underwent major growth by the end of the 19th century, rising up to 185 residents. The average family size varied from 5-7 members.

In conclusion, the population trend in Estonia generally showed growth (13%) at the end of the 19th century. The political repression that followed the Revolution of 1905 stimulated the single largest wave of emigration since 1860. The process of urbanization continued in the late 19th century and lasted into the beginning of the 20th century.

In Einbi, the population change was more drastic than in Kudani. This can be explained by the fact that the farm purchase process in Einbi arrived earlier, resulting in people moving out to work in towns and new people moving in, while family size did not grow. The population in Kudani village remained more stable, as the village parish was not permitted to sell farms until the arrival of land reform in the 1920s; few people moved in. Kudani village was primarily affected by outmigration around 1850, when several residents moved to work in towns or emigrated to Sweden.

324 Hyrenius 1934, p. 51-55. See also Raun 1987.
Main factors influencing change in the local landscape of Einbi and Kudani during the liberation period

In the late 19th century, the local landscape of Einbi villages primarily changed in terms of land organization. The reorganization was the result of several socio-political changes, when land ownership shifted from manorial to freeholds. The most influential factor that altered arable land distribution was the opportunity to purchase farms. However, despite the differences between the villages, the compiled land-use maps reveal no major changes in land-use. To explain how the local production units functioned (did peasant farm productivity increase?), it is necessary to combine the effects of the land reorganization with the population changes.

In Einbi there were 15 farms before the process of land sales began. The average farm size was approximately 50 ha, but there were great variations; some farms could have no more than 10 ha and belonged to crofters. In Kudani there were 12 farms, with the average size roughly similar to that of Einbi.
The subdivision of land in Einbi and the subsequent purchases of land by both people moving into the village and by local people increased the fragmentation of the arable. The low carrying capacity of the smaller farms meant that the family size was stable. To some extent labour was hired from outside the village.

There is reason to believe that land productivity was somewhat higher in Kudani than in Einbi, and that the equal size of farms in Kudani made it easier to organize the collective use of the farmland and to utilize resources from the sea.

The restructuration of the manor demesne was necessary in order to enable the sales of tenant farms (not in Kudani village). The land ownership reform represents a significant change in farming, but it is important to emphasize that the traditional niche of the coastal Swedish-Estonians, the dependence on a variety of productive activities, continued to be an important component of the local lifestyle.
8. 1905-1940: The end of the Czarist era and the Estonian independence period

The first of the three empirical chapters dealt with how feudal society influenced the local landscape of Noarootsi and discussed how manors were established and how peasant farms and entire villages functioned as production units at that time. This was followed by a chapter focusing on the changes of the Liberation period (1840-1905), in particular the re-organization from manorial landownership to freehold farms. The current chapter continues with the land consolidation process, represented by the agrarian reforms of the early 20th century. Structural changes in society brought about by events and processes such as the Russian revolutions, World War I and the establishment of Estonian independence (1918) will be discussed in as far as they influenced agrarian life in Noarootsi.

The end of the Czarist era

As discussed in the previous chapter, the end of the Czarist era unleashed unfamiliar dynamics that transformed important aspects of society at the beginning of the 20th century. The failure of the governmental leadership in the Russo-Japanese War (1904-1905) was accompanied by an economic downswing. In the midst of these events, large groups of the population became formally involved in a discussion of political and social issues for the first time. Together with the First World War and the Russian revolutions of 1917, this paved the way for Estonia’s declaration of independence in 1918, although it immediately followed by a war of liberation against Soviet Russia and the Landeswehr (armed forces of the Baltic nobility). The Treaty of Tartu (1920) finally brought peace to the region.

Although the revolution of 1905 inspired several demands for agrarian change, including the expropriation of the landed estates, no

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substantial reforms actually occurred in the final years of the Czarist era. According to Kõll, around half of the agricultural land at this time still belonged to the aristocracy, the church or the state. While peasant land purchases and land consolidation continued. However, these processes unfolded differently across the different parts of the area inhabited by Estonians. This was, among many other factors, a result of the different types of estates in the country, and of the differences between tenure reforms pertaining to the different estate categories. A major task of the newly proclaimed Estonian Republic was, therefore, to standardize the property regime across the national territory.

What were the consequences for Einbi and Kudani villages? As explained earlier, being located on a private estate, the farms in Einbi had already entered purchase agreements with the estate owner in accordance with the peasant law of 1856. Moreover, land consolidations had already removed the village-based open-filed system and communal pastures. Kudani village, however, belonged to the Noarootsi Vicarage; these farms could not be sold to the peasants until a few years after Estonia’s declaration of independence.

Land-use change in Einbi and Kudani villages towards the end of the Czarist Era

The Czarist topographical map of 1903 (1:42 000, the 1-verst map) has been used here to examine land-use development in the two villages. The village boundary had already been altered but this was not marked on this, essentially military map; yet, land quality and land-use types were represented in detail, including forest types. To resolve the problem of the omitted village borders and to trace the land use development during the beginning of 20th century I have been used the village boundaries from the previous village maps from 1886. The problem with using these military maps for land cover analysis is that the most accurate agricultural land unit is arable land as meadows for example could also mapped as forest (multifunctional use). And in order to get a true picture about agricultural land use, information from maps are compared with agricultural censuses. This will form

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328 Maandi 2010, p. 441-452.
329 In current work the agricultural census sheets from 1939 are used for Einbi and Kudani villages.
the starting point for the land-use description for my last study period, that of the Estonian independence period, 1918-1940.

The 1903 “1-verst” map of Einbi

Figure 39 visualizes the land-use situation in Einbi in 1903. Arable land had expanded by 35 ha compared to the map of 1886, covering 99 ha in total. The expansion occurs on the former filed locations and in the Ramsholm area. Forest covered 12 of the village area, 102 ha, doubled the area of the previous map. The meadow comprised 190 ha (22%) which was 37 ha less than in the earlier map. Pasture remained almost the same 463 ha (53%). In conclusion, arable land expanded, with meadow and pasture continuously dominating. The most substantial change appeared in the expansion of forested areas, clearly through a transfer or area from the Paslepa estate domain.

![Figure 39. Einbi land-use according to the 1903 “1-verst map”.

The 1903 “1-verst map” of Kudani

Figure 40 visualizes the land-use situation in Kudani, where changes in land-use were minor in comparison with the map from 1885. The extent of arable land remained the same, covering 11% of the total village area, 68 ha. Pasture expanded 7 ha covering 293 ha (48% of the total village area). The area of yards and gardens were 18 ha and

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330 The total village area, according to rectified map from 1886 was 813 ha.
331 Calculating forest areas in the map is not always easy, because forested areas were mapped according to different standards in different maps, largely due to their mixed functions (timber, pasture, hay etc.)
this indicates an increase of number of crofts. Meadow areas had increased by 17 ha covering 237 ha (most probably the increase due to the cartographical technique).

How did socio-political change affect the living conditions of local inhabitants in the Noarootsi area?

In the decade after 1905, the cooperative movement had taken hold in the Estonian countryside. The desire to improve agricultural production went hand-in-hand with the desire for more profitable marketing possibilities. In Noarootsi, a new Estonian-Swedish cultural organization SOV (Svenska Odlingens Vänner in Swedish) was established in 1909, mainly to promote Swedishness and language education, but also sought to organize the improvement of agriculture.\textsuperscript{332} They considered problems and questions related to agricultural activity in the Noarootsi area. In the quest for solutions, they hired an agronomists to teach them new methods.\textsuperscript{333} Artificial fertilizers and seeds were ordered and delivered to the island Ormsö and to the Noarootsi area. Several experiments were conducted to cultivate different root vegetables. New farm implements were bought and a new dairy was established, not far from Kudani. Cattle breeding was important as half of the village land consisted of pastures supporting animal husbandry. The domestic (dairy) breed (röd lantras in Swedish) was developed from various breeds.\textsuperscript{334}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{kudani_land_use.png}
\caption{Kudani land-use according to the 1903 “1-verst map”.

\textbf{Table 1. Land use in Kudani, 1903 (in hectares)}

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable land</td>
<td>11%</td>
</tr>
<tr>
<td>Meadow</td>
<td>38%</td>
</tr>
<tr>
<td>Pasture (grazing)</td>
<td>48%</td>
</tr>
<tr>
<td>Yards and gardens</td>
<td>3%</td>
</tr>
</tbody>
</table>

\textsuperscript{333} Lagman 1961, p. 141-144.
\textsuperscript{334} Lagman 1961, p. 162-169.}

\end{figure}
According to Lagman, agricultural output began slowly to improve, tending towards the average levels of production observed in Sweden.\textsuperscript{335} The living conditions and favorable markets stimulated Estonian-Swedish peasants to sell their domestic products by shipping.\textsuperscript{336} The coastal environment and the seafaring skills and traditions of the Estonian-Swedes gave them an advantage. This led to a favorable economic situation for the coastal villagers in Einbi. Additionally the recent railway system allowed farmers in northern Estonia to ship their goods to the markets of St. Petersburg.\textsuperscript{337}

The consequences of the 1919 agrarian reforms

During the War of Liberation the radically-oriented Estonian Constituent Assembly passed the Land Law in October 1919.\textsuperscript{338} To some extent, it marked a continuation of the development that began in 1856, and which gave rise to a class of freehold farmers (tenant farmers were allowed to purchase their farms from the estates).\textsuperscript{339} Before the 1919 Land Law, rural land in Estonia was subdivided among 1,149 large estates (58\%) and 51,640 family farms (42\%).\textsuperscript{340} The Land Law called for a land reform, by which 1,065 large estates were expropriated, including the estates of the Baltic German nobility, Czarist state lands and the agricultural land of the Church.

In the Estonian-Swedish areas, the land reform was basically completed by 1923. Expropriated landowners were to some small extent compensated by the state. It reimbursed former estate owners for confiscated land, livestock and implements.\textsuperscript{341} Almost half of the total agricultural land was reformed into new farms; forest and wasteland often remained as a state property. Tenant farmers who had not, for one or the other reason, been able to buy their farms, now became state tenants. The newly created farms were distributed to specific categories of people, such as veterans of the War of Liberation, widows of killed soldiers, and landless peasants; initially as leaseholds, but from the mid-1920s with the right to purchase the farms.\textsuperscript{342} Essential-

\begin{itemize}
\item \textsuperscript{335} Lagman 1961, p. 142.
\item \textsuperscript{336} Allikmaa 1982.
\item \textsuperscript{337} Kõll 1994, p. 22-27. See also map of Estonia (Russian Government) 1907 P. F. Pete (in Russian) – Library of Congress.
\item \textsuperscript{338} Raun 1987, p. 125-129.
\item \textsuperscript{339} The 1856 peasant law set a regulation between peasant and estate owners regarding the price and rent of land. The peasant law also recommended to abolish the use
\item \textsuperscript{340} Lagman 1961, p. 144.
\item \textsuperscript{341} Raun 1987, p.128.
\item \textsuperscript{342} Kõll 1994.
\end{itemize}
ly, the main aim of the land reform was to create a class of self-sufficient independent farmers. The number of agricultural households during the period of Estonian independence rose from 86 000 to 140 000, so around 54 000 new farms were created. According to Lagman, in 1918 (i.e., prior to the reform) Noarootsi parish had around 460 peasant farms. In the area of Paslepa estate there were 172, in Sutlepa 167 and in Riguldi 123 farms. The next ten years saw the creation of 240 new land reform farms. It marked a 50% increase in ten years! The new farms, however, were generally much smaller than the old ones; yet, the new farms were, however, frequently located to old manor farm land, which meant that their arable land was in many cases of a better quality as, when the manor was established it had appropriated the best arable land, previously held by peasant farms.

The Kudani village map of 1926

The requirements to the several regulations of ownership rights to land reform holdings after 1925 were strong. According to Kõll the redistribution of land took time, as the former owners often had the right to rent the land and continued farming.

Kudani had 11 tenant farms before the land reforms. Of the two villages, Kudani was the most affected by the Independence period as nor land purchases or consolidation had occurred prior 1920s. It is possible to follow the land consolidation process in a large scale map from the 1926. This map of Kudani was drawn by a land surveyor Aleksander Loorits. It was ordered by the Estonian Ministry of Agriculture in 1926, and was called “Lääne County Noarootsi vicarage planning and Kudani village tenant farms land consolidation plan”. The map contains a detailed description of each farm and its subdivision into different land-uses. According to the rectified map, the entire area of Kudani village and Noarootsi vicarage was 974 ha. Figure 41 shows how the arable land consisted of 89 ha (9% of the total village area), while yards and gardens added 11 ha. Pasture comprised 423 ha (46%) and meadow 451 ha (44%) of the total village area. Compared to the previous land-use map from 1903 the changes of

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343 Lagman 1961, p. 141-146.
345 1926 Kudani village map from the private collection.
land cover use were minor. However, the areas had increased by meadow, 113 ha.\textsuperscript{346}

![Pie chart showing land use in Kudani village](image)

Figure 41. Kudani land-use according to the village map from 1926.

Changes in the Kudani farm structure

Noarootsi’s “normal-sized” farms of 20-30 ha farmed around half of the land. Larger farms covered 20% part of the whole, while smallholdings comprised 30%. The average size of farms remained 27,4 ha but size varied substantially.\textsuperscript{347} In fact, it was not necessarily the rule that larger farms had more arable land than smaller ones. Some farms were dominated by forest, pasture or meadow. Forested areas used to make up a very small part of the farms, and this remained so after the land reform of 1919. Before the reform, the manor demesnes held most of the forest, and after, the Estonian state became a major forest owner.

As a result of the land consolidation and tenancy reforms of 1926 there were 17 tenant farms, and 9 smallholdings in Kudani village. Table 22 shows that the average farm size was approximately 30 hectares, while the bigger farms held approximately 50-60 ha of land. Compared to the map from 1885, the arable land had increased, as well as the areas of yards and gardens. The proportion of pasture land had increased by 126 ha. The meadow (used as hayfield) had increased.\textsuperscript{348}

\textsuperscript{346} On the 1885 Kudani map, part of the village meadow areas still belonged to vicarage.

\textsuperscript{347} Lagman 1961, p. 153-162.

\textsuperscript{348} As mentioned earlier, most probably due to the meadow from previous manor properties has been added to the village area.
In Kudani, the old farms became tenant farms not of the church, but of the state. No new farms were constructed (in contrast to the situation on many former manor demesnes); the existing farms simply changed status. In the middle of 1920s the users of these rented farms were allowed to purchase their farms from the state. At the same time, in 1926, two new land reforms were passed in parliament. One was the Land Consolidation Act which facilitated the consolidation of farm land in villages where land was still organized in open fields, and where pastures were still communally held by farms in the village (i.e. land ownership was thus individualized). Secondly, the Crofter Law (Popsiseadus in Estonian) enabled crofters to obtain land as their own property. Kudani village included several crofts located on land belonging to rental farms. Because this necessitated a re-drawing of boundaries, the Crofter Law was implemented simultaneously with the Land Consolidation Act. Thus, in Kudani, after 1926, the open field system was replaced with individual properties (see Figure 42) and the crofters also obtained land, at the expense of larger farms.

If we compare compiled rectified map of Kudani in 1926 with the later Estonian topographical map (1: 50 000) from 1935-1939, the land cover pattern occurs to be almost identical. This allows us to confirm the reliability of mapping.
In the process of consolidation, several of the old farms were divided between spouses. Hence, together with the distribution of the land to crofters, the total number of farms increased from 11 to 26 (see Table 22). For example, the original Johans farm (No.1) was split to produce also the Nybon farm (No.16) while also ceding land to the former croft Kopli (No. 18). In total, of 11 pre-land reform farms, 7 were divided (Johans; Matsas; Horris; Knutors; Miikas; Kristians; Simas; Ambros) and 3 were not (Theves; Luks; Berals).

Table 22. The average farm size (with list of farmer's name) in Kudani in 1926.

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (ha)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johans</td>
<td>27.3</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Matsas</td>
<td>49.8</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Uris</td>
<td>25.7</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Theves</td>
<td>47.3</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Knuters</td>
<td>61</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Miikas</td>
<td>55</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Kristjans</td>
<td>63.6</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Luks</td>
<td>43</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Simas</td>
<td>39.4</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Berals</td>
<td>47.9</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Ambros</td>
<td>29.1</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Hansas</td>
<td>54.2</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Söderholm</td>
<td>20.4</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Lill-Gård</td>
<td>29.1</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>(no data)</td>
<td>29.1</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Nybon</td>
<td>27.8</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Ribacks</td>
<td>27.3</td>
<td>Tenant farm</td>
</tr>
<tr>
<td>Kopli</td>
<td>0.5</td>
<td>Crofter</td>
</tr>
<tr>
<td>Spikars</td>
<td>4.54</td>
<td>Crofter</td>
</tr>
<tr>
<td>Nurka</td>
<td>4.5</td>
<td>Crofter</td>
</tr>
<tr>
<td>Kroske</td>
<td>7.5</td>
<td>Crofter</td>
</tr>
<tr>
<td>Järve</td>
<td>4.26</td>
<td>Crofter</td>
</tr>
<tr>
<td>Qjardbacks</td>
<td>6.7</td>
<td>Crofter</td>
</tr>
<tr>
<td>Irjjas</td>
<td>6.2</td>
<td>Crofter</td>
</tr>
<tr>
<td>Niggjas</td>
<td>1.6</td>
<td>Crofter</td>
</tr>
<tr>
<td>Musis</td>
<td>6.8</td>
<td>Crofter</td>
</tr>
<tr>
<td>Noarootsi vicarage</td>
<td>69.9</td>
<td>Crofter</td>
</tr>
</tbody>
</table>

As a result of land reforms the class of small farmers, who previously had lived in uncertain circumstances, now had the opportunity, at least, to pursue more secure lives on their own land and as owners they could possibly manage the land more efficiently.

![Photo of Ambros farm in 1925. Source: SOV bildarkiv.]

Land-use changes in Einbi and Kudani villages during the Independence period

Tenant farms and freehold purchased homes had, at the beginning of Estonian independence, basically the same importance.\(^{351}\) The units which were created during the land reform were at first rented out, but after 1929 tenant farms quickly disappeared, as the government as landowners sold it fairly subsidized prices to farmers. Given the new political, social and economic context, and the enactment of several land reforms, the question is whether and how land use changed during the independence period. For this purpose, I have analyzed the topographical map from 1935-1938.

\(^{351}\) Kõll, 1994.
Einbi village

The Estonian topographical map from 1935-1938 (1: 50 000) was used in order to compile the fourth land use map for Einbi. This rectified map of Einbi (see Figure 43) comprised 923ha of total village area. Arable consisted 115 ha (12%) which has increased 6ha compared to previous map from 1903. Pasture covered 412 ha (44%). Yards and gardens comprised 18 ha (2%). Forest (meadow areas) consisted 270 ha (20%). Reed -beds are also marked as it was on Einbi map from 1886, covering 59 (6%) ha as well as sandy areas 67 ha (7%).

Figure 43. Einbi land-use according to the Estonian topographical map from 1935-1939.
Figure 44. Land-use on the rectified Einbi map from 1935-1939.\textsuperscript{352} Cartography: Hele Kiimann.

Figure 44 visualize the situation in 1930 how the main change in land use has occurred on meadow areas, which are mapped as forest (meadow covered with trees). A new farm had appeared in Ramsholm (in the north-western corner of the map), arable land has expanded to eastern part of village.

\textsuperscript{352} The number of windmills have been increased comparing to previous village maps.
Kudani village

Also for Kudani village the Estonian topographical map from 1935-1938 (1: 50 000) was used, in order to describe the land-use pattern. The subsequently compiled map of Kudani (see Figure 46) reveals that meadow and pasture land were still dominant and had almost doubled when compared to the village map from 1885. This can be explained by the addition of meadows which were formerly managed directly by the vicarage. Meadows comprised 389 ha (37%) and pasture land 493 ha (47%). Arable land had increased by almost 50 ha compared to previous maps, consisting 115 ha (11%). Yard and gardens together with farm areas (which were marked as tofts on the previous map from 1885) comprised 10 ha (1%). The main difference that appears on current map is that also previous lake (lagoon) areas are marked down as water (40 ha), also two windmills are presented.
The main change in land-use was that the previous meadow area belonging to the vicarage had now been marked as pasture (see Figure 46). Despite changes in tenure and the property structure during the 1920s, the landscape structure remained basically the same.
Farm production and animal husbandry in Einbi and Kudani villages

After the land reforms of the first years of national independence the main changes in the management of the farm as production unit, was the improvements in land quality (use of artificial fertilizers, meadow drainage) and in farm technology (use of tractors, milk cream separators, mowing machines, more efficient ploughs and harrows). In order to describe these changes I have used the Agricultural Census individual farm primary sheets from 1939, where the inhabitants per farm, also details of vegetables, and fruit, both produced quantities and areas used, as well as animals on each farm were registered. The problem with using this information is that the Census sheets for Einbi and Kudani villages are only preserved for some farms (not a complete data set as in the 1680 accounting books). However, where we have information about a farm, it is very detailed. According to the Census data from 1938 the farm sizes in Einbi and Kudani could be divided in the following manner: large farms consisted of 45 ha or more, intermediate farms were between 20-45 ha and small farms were 20 ha or less. The average number of animals per farm in Einbi and Kudani villages are presented in Tables 23 and 24.

Table 23. The average number of animals per farm in Einbi village in 1939.

<table>
<thead>
<tr>
<th>1939 large farms ≥ 45 ha</th>
<th>cows</th>
<th>cattle</th>
<th>horses</th>
<th>sheep</th>
<th>pig</th>
<th>poultry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>5.</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>average</td>
<td>0.4</td>
<td>2.8</td>
<td>1.2</td>
<td>5.6</td>
<td>1</td>
<td>8.8</td>
</tr>
</tbody>
</table>
Table 23 discloses that the proportion of cattle was approximately the same in large and small farms. There were usually 1 or 2 cows per household (which most probably shows milk production was only for household use, not production for outside sale). The number of horses tended to be not more than one in small farms and several in large farms. The data shows also that number of tractors increased in large farms, and often number of horses fell to one. Usually there were 1 or 2 pigs per household, again kept for consumption on the farm. The number of sheep varied from 5 to 8, and poultry numbers were 7.5 on average. Some farms also had a number of bee hives. From the description of Agricultural sheets, one could see how farm technology in Einbi often consisted of gouter plowshares, mowing machines and milk separators. Other machinery, like tractors, were often shared commonly between several farms. The use of artificial fertilizers is often described in larger farms, as well as use of manure for potato. There are notes on Agricultural census sheets about potato shipping to nearby markets. One could also trace the products that were often sold like cattle, pigs and butter. Even though this shows that both milk and pigs were produced for sale and not only for household consumption. It could depend on family size or seasonal productivity from fields. In several farm descriptions, fishing has been registered as the main source of income, and in some other cases as an additional activity.

<table>
<thead>
<tr>
<th>1939 intermediate farms 20-45 ha</th>
<th>cattle</th>
<th>horses</th>
<th>sheep</th>
<th>pig</th>
<th>poultry</th>
<th>Bee hives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>2</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>5.</td>
<td>8</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>average</td>
<td>5,6</td>
<td>1,8</td>
<td>5,2</td>
<td>1,6</td>
<td>16,8</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1939 small farms ≥ 20 ha</th>
<th>cows</th>
<th>cattle</th>
<th>horses</th>
<th>sheep</th>
<th>pig</th>
<th>poultry</th>
</tr>
</thead>
<tbody>
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</tr>
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<td>6</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
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<td>0,25</td>
<td>3,5</td>
<td>0,75</td>
<td>2</td>
<td>0,75</td>
<td>7,5</td>
</tr>
</tbody>
</table>
Table 24. The average number of animals per farm in Kudani village in 1939.

<table>
<thead>
<tr>
<th></th>
<th>1939 large farms ≥ 45 ha</th>
<th>1939 intermediate farms 20-45 ha</th>
<th>1939 small farms ≥ 20 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cows</td>
<td>cattle</td>
<td>horses</td>
</tr>
<tr>
<td>1.</td>
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<td>10</td>
<td>2</td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
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<td>2</td>
</tr>
<tr>
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<td>0</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>0</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>average</td>
<td>2,8</td>
<td>8,2</td>
<td>2,6</td>
</tr>
</tbody>
</table>

Table 24 is shows how the numbers of horses and cows in Kudani were similar to those in Einbi, horses varying from 1 to 2. Also, the number of cattle varied from 1 to 3. Usually there were 2-3 pigs per farm, also sheep and poultry were common. Some farms also had up to four bee hives. From the Agricultural Census sheets, one can find that phosphate fertilizers (one sack was 100 kg) were often in used, and was naturally also common to use manure (200 kg=one horse cartload). Apart from phosphate fertilizers, farms bought in firewood, sometimes also rye from outside the village.

In conclusion, comparing to the previous time periods the farms started to manage their land more efficiently, often focusing on one particular occupation in some cases fishing, forestry) and producing more for outside markets. The census sheets reveal how large quantities of potatoes were shipped on locally owned ships to Tallinn, Helsingi and Stockholm after WWI, together with apples, fish and pork. Also some home built minor rowing boats (especially in Stockholm and Helsingi). The development of education and formation of cooperatives among farmers also supported this process. As the land-use maps demonstrate, the main land-use type continued to be pasture which is in line with the continued importance of animal husbandry.
Arable land use continued to expand through a combination of drainage of meadow areas and the use of artificial fertilizers. Fishing was continuously an important income in Einbi. An important aspect is also the labor differentiation used in farms, as family members often started to work in nearby towns. Therefore, extra labor was employed all over the year but particularly in the summertime when the hay and grain harvest demanded a lot of labor.\textsuperscript{353}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Photo_of_Matsas_farm_Hay_is_being_stored.png}
\caption{Photo of Matsas farm. Hay is being stored. \textit{Source}: ERM FK 909:8}
\end{figure}

Population change in Einbi and Kudani between 1900 and 1940.

In the previous chapter we found a growing population in both Einbi and Kudani villages. It was accompanied by the process of urbanization at the end of the 19\textsuperscript{th} century, some people, mainly young ones, moved out of the countryside to work in towns, some even emigrated to Sweden during the 1850s. The time period after 1900 is characterized by the outbreak of World War I, in 1914. Nearly 10 percent of the ethnic Estonian population was mobilized into the Czarist armed forces.\textsuperscript{354} Very little is known of the extent of losses in the war. There is no written documentation of how it affected Estonian-Swedish areas such as Noarootsi. The only thing that can be said is that Estonian Swedish peasants were also forced to serve in the military, and

\textsuperscript{353} Information from Einbi Agricultural census sheets from 1939.
\textsuperscript{354} Lääinenmaa 1938.
every family had to fulfill the military commitment according to their size.

From the Noarootsi Parish population registers it was possible to trace the inhabitants of Einbi and Kudani villages between 1905 and 1934 (Figure 47).

![Einbi and Kudani village populations 1905-1934](image)

Figure 47. Number of inhabitants in Einbi and Kudani village in 1905-1934.

In Einbi village, the family size according to the Church registers varied between 4 and 6 persons, while in Kudani, where more crofters existed, the family size varied between 3 and 5 persons. In Einbi the “personaal raamatud” from 1915 to 1917 give a total population of 269 inhabitants, the Swedes numbering 171 and the Estonians 98. The lists show a certain out-movement from former Paslepa manor demesne to Tallinn, Haapsalu and Finland, but not particularly from Einbi village. The population growth could be explained by a continued farm subdivision process. The population in Kudani also grew, the total number of inhabitants in 1914-1917 was 194 of which only two were Estonian, but no Estonian farm existed. Data from the next series of “personaalraamatud” reveal that during the 1930s Einbi had a stagnating 270 inhabitants, 141 males and 129 females. Out-migration tended to occur among the females, probably to work in towns as house servants. In Kudani the population decreased from 194 to 138 persons, and remained entirely Swedish. The census from 1934 reports that total population in Einbi was 201 inhabitants, 100 Estonian and 101 Swedish. In Kudani the population decreased from 194 to 138 persons, and remained entirely Swedish. In conclusion, the num-
ber of inhabitants in both villages continued the growth trend at the beginning of the 20th century, with minor changes occurring to the family size. After 1917, the population of Kudani decreased substantially, while in Einbi this decrease occurred in the 1930s. Most probably the decreases were due to out-migration to towns and abroad.

Main changes in the structure of production units during the independence period.

With the declaration of Estonian independence in 1918, a final transition from manor tenancies to privately owned farms took place, concurrent with the development of a more open market economy and a continued process of industrialization. Agrarian household production was mainly influenced by the following factors: scientific knowledge of agriculture was spread; artificial fertilizers were taken into use and the potato became more popular produce. This had a strong influence on this area. It provided both food and a seed potato (sätpotatis in Swedish) surplus, which went for sale in the market (Figure 48).
Figure 48. The main influencing factors for change in Einbi and Kudani villages during the 1905-1940.

Figure 48. Indicates how the local production unit was influenced by several factors such as the farm technology development as well as the sale of produce for outside markets. For the small farms, profits usually were used inside their own household.

The total area of a farm is usually the basis for an estimation of the productive capacity, but land quality is obviously also essential. Therefore the improvements in land quality and meadow drainage were very important changes to consider when we talk about farm management. Especially the role of potato growing (it changed the soil structure which in turn improved the land quality). Another important aspect of farm management had changed in land utilization. During the first two or three years of cultivation of previously unploughed land crop yields were better, but then the land had to stay fallow. But by now the Estonian-Swedes peasants had learned to cultivate meadow plants instead of just leaving it to develop on its own. That meant that they could use meadow to grow cultured hay (kulturbö in Swedish) which considerably raised crop production and provided high-quality animal feed. Rye and barley continued to be important crops in Estonian-Swedish villages. The range of crops also included root vegetables – beets, turnip and the Swedish turnip.
9. Concluding discussion

This thesis focused on an area on the north-west coast of Estonia, a place primarily settled by Swedes. The aim of my research has been to describe and understand the main influencing factors that formed the coastal landscape of Noarootsi over time. There has not been much interdisciplinary research done in Estonia about the Estonian–Swedish settlement history, especially by scholars after 1940. The reason may be that cultural studies were generally not supported during the Soviet period, and also that access to the border zone was limited until 1991. Thus, the current work has been focused on coastal livelihood from 1690 up to 1940 through a study of the local landscape change. A study of socio-economical change reflected in the landscape gave me the possibility to pose questions about continuity. My present work demonstrates how the proportions of the kinds of land use remained to a large extent the same even though there were drastic changes in land organization and political regimes. This corresponds to the point of view given by Dodgshon, stating that human agency and structures in society interact on various levels, once a structure is in place, it is very difficult to change. The study has described how administrative structures and manorial deliveries developed in the Noarootsi area since the middle ages, and once this organizational structure was in place it remained quite stable. In order to describe landscape change on several scales, Michael Jones model has been applied. And which shows that changes on a structural level are not always reflected in the landscape. At the beginning of the 20th century, important changes at the socio-economical level were brought about in Kudani village. In a land reform, the tenant farmers were able to buy their farms as freehold. Still, there were only minor changes in the land use in the, admittedly short, period of time studied after the freehold purchases.
An interdisciplinary approach

To understand how different factors caused change or up kept continuity in my studied area, it was first necessary to see that social and natural change actually brought about transformations of the landscape over time. In order to achieve this, different analysis methods from several disciplines were vital to apply. The availability of sources has played an important part in the delimitation of the study area. In particular, surviving older maps were of importance if spatial change were to be related to population development. Focusing on the villages of Einbi and Kudani, the general village structure, change or persistence in land-use, population development, and the population response to local resource base were subjected to the forms of analysis:

1) An assessment of the population sizes over time for the two villages studied;
2) An analysis of the farm (village or estate) economy;
3) An historical-cartographical analysis;
4) An historical context analysis (based on literature);
5) A compilation of the land-uplift model;
6) A soil analysis with a focus on the suitability for cultivation.

The next step was to develop a method to integrate all the different aspects in order to understand and explain the consequences on the local landscape and its inhabitants. Of special importance was how the local livelihoods changed over time and what were the consequences from a natural resource base perspective, such as land cover characteristics. The model of farm economy (inspired by Löfgren) for the coastal villagers was developed with this in mind. The model integrates factors of the social development and geographical setting. This model has been a helpful tool to explain how the different factors affected an individual household or the entire village as a production unit at different times. This approach of looking at a combination of different influencing factors on various scales allowed me to describe the main driving forces of changes in the local communities and the landscapes they inhabited over time. The weakness of this holistic approach is that due to the number of required skills and the requisite knowledge in different disciplines might result in a lack of deeper level knowledge. It is also extremely time consuming, requiring more co-operation between different specialists from various disciplines. The positive aspect to this approach is that for historical data, that is either very fragmented or unavailable, the information
from other sources might help to fill in the gaps in the knowledge base. There is very little about fishing for example, but from manorial accounting books we can see that fish was an important part of the required deliveries.

Land uplift and soils on the Noarootsi peninsula

Discussions on how natural preconditions direct land-use and in turn how human activity forms the landscape were studied already in early 20th century for example by Sauer and other scholars. This has given rise to studies of ecological niches in many parts of the world, where population composition and development is combined with the availability of different kinds of resources such as arable land. The ecological aspect in the historical landscape study can illuminate the delimitations or opportunities of the surrounding environment, as well as how people have adapted to these conditions. The Noarootsi study showed how the geographical location as well agricultural land quality in the coastal area determined the need for various productive activities, especially during the first two periods of study. In order to visualize past environmental conditions, the compilation of the land uplift process was used in order to describe how on the large scale the area consisted of several small islands which merged into a peninsula during the 19th century. In terms of land-use, over the last 300 years the coastline coastal has moved several meters, for local people in Einbi it rendered an expansion of the area where animals were kept. Later in the 19th century, new farms were created there as well as arable fields. The analysis of soils and their availability for cultivation showed that the dominating types in the peninsula are Gleysols, which are generally unsuitable for cultivation. In Einbi, Gleysols were present to a smaller extent. The highly productive Cambisols, Luvisols and Regosols were found in the cultivated field areas. Salic Fluvisols on sea sands were dominant along the coast. The analysis of humus content showed that the largest variance between natural and arable land was in the northern part of Einbi, where the oldest fields are located. This also shows how establishment of arable fields were directly influenced by soil quality. The cultivated areas were connected to the distribution of till in higher elevations. In Kudani, Gleysols and Salic Fluvisols were dominating, these areas can be used for pasture. Regosols and Cambisols were found on the arable field areas. Fluvisols appeared in the former lake lagoon areas. The soil analysis showed how suitable land for cultivation in Kudani was limited due
to the parent material, and moisture regime (lower elevations than in Einbi). Due to the ongoing land uplift, the Norootsi area is relatively young in geological terms and the characteristics of the soils have not been fully established yet. This implies that it is complicated to distinguish the soil situation at around AD 1700 as it would require more in detail research.

The productivity of soils improved over the last one hundred years of the study period due to the drainage, use of artificial fertilisers and potato growing (as it changes the soil structure). Also agricultural knowledge increased together with farm technology. The expansion of fields after 1940 has been increasing trend in Kudani while in Einbi former pasture areas are overgrown with forest today.

Land-use change in the Einbi and Kudani villages

Einbi village

If we look at the changes in land-use in Einbi village from the Swedish era up to the establishment of the Estonian Republic, we can see how the main changes occurred in the size of arable land, increasing from 5% up to 12% (see Figure 49). The beginning of study period, there were 20 farms in Einbi of three different sizes. The environmental conditions did not support cereal production, and manorial demands were substantial (heavy burden on the farms). Besides the work they had to do for the manors, the tenant farmers had work on their own field, there was the added difficulty of the climate conditions of the Little Ice age, associated with several famines in Northern Europe. The three-field system required that the work was done over one field at the same time by all farms, thus there was no time or resources to expand the arable provided that it was permitted by the landowner, the manor. Change was brought about from 1856, when farm purchase rights were introduced, meaning that many new freehold farms were created and also farms were subdivided and the population increased by natural causes and as people moved in to the area. The three field system was replaced, meaning that peasants could organize their work independently. There were 15 farms in the village before the land sales of an average size of 50 ha, with some crofter farms of less than 10 ha. The land subdivision process continued and reached its peak after 1919 land reforms when arable land was expanded on former field locations and also occurred on the Ramsholm island on northwest of Einbi. It is also explained by land
quality improvement with artificial fertilizers, increased prevalence of farm technology and improvement to cultivation methods.

The proportion of arable land of total village area in Einbi from 1698-1938

| Year    | Arable Land (%)
<table>
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<th></th>
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<tbody>
<tr>
<td>1698</td>
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<tr>
<td>1886</td>
<td>8</td>
</tr>
<tr>
<td>1903</td>
<td>11</td>
</tr>
<tr>
<td>1935-38</td>
<td>12</td>
</tr>
</tbody>
</table>

Figure 49. Einbi arable land proportion from 1698-1938.

Secondly, Figure 50 (see the next page) shows how the size of pasture decreased (most probably due to the mapping) through the entire study period. The landscape structure in general was open. Only some parts of village areas were described as covered by bushes and young forest (used for timber). The meadows, used for hay making, are represented in different maps sometimes together with watery areas, and later in 1930s as a forest. Meadows were decreasing in a minor extent, which can be explained by the use of drainage in the 1930s. The increase in 1886 can be explained by the mapping techniques (as watery areas had no precise boundaries).
In conclusion, we can see that the pasture (grazing) and meadow areas remained basically the same during the whole study period. This can, on one hand, be explained by the limitations of the physical environment and the dependency on several income sources (sea, animal husbandry). At the same time, the size of arable land expanded more than half, most probably due to the changes in the socio-economic structures (change in land organization such as land ownership and farming system, also population increase).

Kudani village

In Kudani, the land-use shows more stable trend; no drastic changes during the entire study period (see Figure 51). The proportion of arable land remained the same at 11%, which can be explained by the nature of the land ownership of the area, it was not permitted to sell Church tenant farms until after the land reforms in the 1920s. The farms were of a roughly equal size from the beginning of the study period.\textsuperscript{355} No new arable was claimed. Though the third field was called the new, even if it was formed in the 17\textsuperscript{th} century.

\textsuperscript{355} As the farms were the same in number, there were no further subdivisions.
Also, to some extent, as in Einbi village, the improvement in land quality as well as in agricultural technology was generally at a poor level when compared to other areas in Estonia. The pasture decreased a little, but remained virtually the same over the entire period. Only concerning the meadow did a more notable reduction occur still just 5-6 hectares. From Figure 51, we can see how the changes in land-use were represented to a minor degree on different maps from 1690 up to 1940. This, as in the Einbi case, is most likely related mainly to restrictions in the natural resource base, but also at the same time changes in land organization, after 1919. The land reform in Kudani did not result in any new arable up to the end of the study period. The traditional farms were in some cases subdivided, in other left room for the establishment of crofts.

![Proportional change of main land-use types in Einbi village from 1698 to 1938](image)

Figure 51. Changes in Land-Use in Kudani from 1690 up to 1938.

In conclusion, we can see how two villages that were geographically quite close but had different physical conditions when it comes to soils and productivity of arable land, can differ significantly due to the different legal status.
Discussion of population dynamics in Einbi and Kudani from 1680 to 1930

To account the population in Einbi and Kudani villages during the 1680-1934 had several challenging aspects when it comes to describe a continuous dynamics of population, the main limits were the differences in source materials (for example in 1680 the population data was available from the map descriptions or accounting books, which stated only the number of farms and the name of farmer). The advantage for conducting the population figures over time was source material availability, only the Russian censuses for 1881 and 1897 were not preserved for Noarootsi area.

During the first study period, late Feudal period, the population of Einbi and Kudani villages was affected by famine during the 1695-1697, war and plague, often leaving several farms deserted. By 1739, there were 15 functioning farms (20 farms in 1680) in Einbi, an increase of 2 compared to previous years in 1726. The average family size was 5-7 members. The difficulties occurred in farm labor, affected by plague, the age group under the 15 years old remained, which took couple of years to recover. The 1739 manorial deliveries reflect how the demand for grain stayed on the same level, compared to 1687, while the laboring population was reduced.

In Kudani, the population was first affected by Livonian wars, when the entire village was deserted after an invasion by Tatars in 1583, archival documents show that only one farm was cultivated after. By the 1690s, the village was entirely repopulated and manorial demands to vicarage had been reestablished. Further, the consistent land-use and the fact that the vicarages did not raise the manorial demands prevented radical changes. There were 12 farms (13 in 1690) in 1739. The population trend in both villages showed an upward trend.

During the next study period, the Liberation period 1840-1905, the population growth continued. The social structures in Estonia underwent important changes (such as urbanization). In Einbi 25 residents left the village to work in nearby towns, and three emigrated to Sweden. The main change in Einbi occurs by the beginning of the 20th century, when the opportunity to purchase peasant land brought new people to the village (mainly from Hiiumaa) resulting in an increase of more than 50% of the population. Family size in Einbi varied from 7-9 members. At the same time, Kudani had 112 residents, and as farms were not sold until the arrival of land reforms in the 1920s, the number of people remained essentially the same: 13 people.
moved to Tallinn and three emigrated to Sweden. The average family size in Kudani varied from 5-7 members.

During the Estonian independence period, the number of inhabitants in both villages continued the growth trend with minor changes occurring in the family size. After 1930, the population slightly decreased, most probably due to the out-migration as well as the population moving to the towns.

In conclusion, the study showed how the development of two, nearby villages, can differ largely due to their different socio-political restrictions. The local inhabitants of Einbi and Kudani were maintaining their traditional ecological niche over the last 250 years during the study. The surrounding environment nor the socio-political conditions, especially during the first study periods, did not support the improvement of their living conditions. The change in living conditions in the Einbi village occurred during the end of the 19th century with opportunity to purchase the farms, and in Kudani village through land reforms in an independent Estonia. The farming improved by the meadow drainage, introduction of new crops (especially potato) and the use of artificial fertilizers. The role of labor differentiation, agricultural education and societies were important as well.
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Appendix 1

Soil types after FAO (1994) terminology:

1. Rendzinas (Rendiz Leptosols)
2. Brown Forest Soils (Cambisols)
3. Brown Lessive Soils (Luvisols)
4. Pseudopodzolic Soils (Fahlerde, Planosols, Stagnic Luvisols)
5. Sod-Podzolic Soils (Haplic Podzols with A-horizon)
6. Podzols without A-horizon (Carbic, Ferric, Cambic Podzols)
7. Gley-Podzols (Gleyic, Histic Podzols)
8. Grey-Rendzinas (Rendzic Gleysols)
9. Gley-Brown Soils (Calcaric Gleysols)
10. Sod-Gley Soils (Eutric, Dystric, Histric Gleysols)
11. Mires (Histosols)
12. Alluvial Soils (Eutric, Dystric Fluvisols)
13. Saline Littoral Soils (Salic Fluvisols)

---

Appendix 2

Nuckö. Jordrevision 1591.

<table>
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<tr>
<th>By</th>
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<th>Besatta</th>
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<th>Äng Mulbete</th>
<th>Vedskog</th>
<th>Fiske</th>
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<td>Gott</td>
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<td>Täml</td>
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<td>Täml</td>
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**Övriga byar på Holmarna**

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<th>Antal bönder</th>
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</tbody>
</table>

Förkortningar: Vatt = vattaktig, Täml = Tämlig, T.god = Tämligen god.
Appendix 3

The 1903 “1-verst map” (Kudani village).
Appendix 4

Soviet military topographical map from the beginning of the 20th century (Kudani village).
Appendix 5

Kudani village map 1926.\textsuperscript{357}

\textsuperscript{357} Source: Private collection.
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