

PAST LANDSCAPES

*The Dynamics of Interaction between
Society, Landscape, and Culture*

edited by
ANNETTE HAUG, LUTZ KÄPPEL, AND JOHANNES MÜLLER

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From Hunting to Herding?

Aspects of the Social and Animal Landscape during the Southern Scandinavian Neolithic

Martin Hinz

Abstract

In accordance with current perceptions, the Neolithic landscape of Southern Scandinavia appears to be dominated by two innovations that are connected to the transition to the Neolithic in this region: agriculture and monuments such as megalithic tombs or Single Grave burial mounds. So it seems natural to assume that these aspects also dominated the contemporaneous perception and the organisation of space. Most prominently, the monuments have a very important role in the landscape archaeology of the Funnel Beaker period particularly because they form a landscape of monuments.

But from a pragmatic perspective, it is more likely for the perception of the landscape as a taskscape (*sensu* Ingold 1993) that the everyday practises and routines of the inhabitants as well as the movements that evoke such practises were much more salient than the monuments. Given the agricultural nature of the economy,

it would be consequent to assume that the most important constraints on spatial planning and settlement locations would arise from this economy, resulting in an agrarian landscape.

On the basis of a case study from the region of Stormarn-Lauenburg and the evidence of the number of identified specimens (NISP) of animals from a range of Funnel Beaker sites, this paper intends to demonstrate that it might not have been the monuments nor the agrarian subsistence economy but rather practises founded in the Mesolithic tradition that dominated the settlement system of Funnel Beaker societies. As an alternative, a scenario should be presented in which the access to larger animals, hunted or domesticated, as a currency in a social exchange, had a more significant influence on the choice of the settlement site than the purely economic optimisation of agricultural production processes.

Introduction

In terms of the Graduate School Human Development in Landscapes, landscape is the “dynamic space of social, cultural, and ecological significance, which develops interactively with the human societies occupying it” (<http://www.gshdl.uni-kiel.de/the-graduate-school/>). This can be divided into two aspects: the significance of specific spaces and interactions within these spaces. What in a dialectical way creates the significance of an individual place and that of a landscape are the relationships between different places. This includes, on the one hand, the semantic links between places, but also their spatial connections. This results from the fact that the term landscape entails both the web of meanings and the pure spatial layer. Moreover, with regard to this spatial layer a landscape unfolds through the spatial distances that exist between these places (Ingold 1993).

Due to its spatial character, a landscape becomes a reality and can only be conceived by moving in it. This may involve physical movements, or it just may be the eyes or the thoughts of the viewer that wander. Nevertheless, references within the landscape, the relations between its elements and with that the concept of a landscape as an interwoven unity of its parts can only be conceived when a bodily or mental movement takes place (*sensu* Ingold 2000, 54).

It is this movement that makes the spatial layer tangible, transcends it to a conceptual level and connects the different locations to a fabric of associations, which generates a landscape from geographical points. That is why the movement of people within a landscape is fundamental for their concept of this landscape.

Landscape as economic space

Why do people move? Probably to a large extent due to their daily, mundane activities that are connected to their subsistence and economy. Thereby, it certainly makes a difference how the temporal and cyclic pattern of this movement is composed. Early hunter/gatherer societies may have moved through space on the hunt for migrating large game, Mesolithic groups utilised different stations in their territory from a base camp in a seasonal rhythm, farming communities were bound to their fields, whereas movement in a pastoral setting was controlled by the needs of the animals and the seasonal cycle of transhumance (*cf.*, for example, Sjögren/Price 2013). All this undoubtedly must have resulted in a different attitude toward space and the landscape.

This directly leads to the second part of the statement above – interactions within spaces. This interaction is primarily based on the practises of these human societies when they utilize the ecological space, the way in which they shape this space with their actions and the way in which their actions are shaped by the ‘already existing circumstances’. These actions and the character of the constraints imposed by the environment are a source of the perception of the environment. Thus, it is this perception that represents the reflexive nature of the dualistic term ‘landscape’.

Considering this, the most important utilisation of the ecological environment in prehistory, including the Neolithic, was the exploitation of natural resources by humans, the possibilities that the products of this exploitation offered for practises and *vice versa* the constraints that the environment imposed on economic and subsistence possibilities. It is to a large extent the economy that defines the human attitude toward nature – being determines consciousness (*sensu* Marx).

From this, it follows that the nature of the places within a landscape defines the movements and it, in turn, is defined by this movement at the same time. Again, there is a dialectic relationship between the mobility of a life style and the permanence of the places (*i.e.* built or natural space charged with meaning) that are important for this life style. But this is not a simple relationship, since it cannot be claimed that, for example, highly mobile societies do not consider some specific permanent places to be significant. In contrast, some few permanent locations may have possibly gained even higher importance for such societies as a focal point of social, mental and ritual practices, as centres of their mental maps, when life in general was shaped by constant movement. However, a lifestyle based on an extensive rather than an intensive economy and land utilisation certainly distributes significance in space at other scales than that within an intensive lifestyle and economy.

Economy as a social playground

If we accept (subsistence) economy as one, if not the major factor in shaping a mental concept like landscape, it has to be kept in mind that this economy is not an activity that is conducted for its own sake, although “today’s perceived reality” seems to suggest this. It is embedded in a social dimension; it is driven by social forces.

A subsistence economy seems to be a rather simple endeavour: it must produce enough food for survival. But beyond mere survival, there is always the possibility to choose – if there are alternatives – how this way of survival is to be archived. This choice is always socially determined. Especially, but not exclusively, in prehistoric or other pre-industrial societies, in which economic decisions are not directed by controlling departments, spreadsheets and cost-benefit analysis, profit maximization in an economic sense was presumably not the main driver for strategic choices (Polanyi 1944; Sahlins 1972). Especially when we consider that the social value of this economy was as important as the pure output.

“Food is an unusually powerful symbol of identity because foodways involve the performance of culturally expressive behaviours and the literal incorporation of a material symbol” (Twiss 2007, 2). Both the way in which food can be used to express and negotiate identity as well as how food can be used as a tool in a social network of actors should be regarded as not the least important aspect in the decision-making process that is involved with subsistence economy. Food sharing and feasting are fundamental

mechanisms of the negotiation of status and power – probably extending from the Palaeolithic onward until today – and of “the creation or maintenance of important social relationships” (Hayden 2001) and are a potential risk reducing strategy. In this way, food and subsistence strategies directly connect the environmental and the social landscape, if they can be separated at all.

In what follows, I will argue that the choices for the locations of settlements and the economic network during the Funnel Beaker period in southern Schleswig-Holstein in the districts of Stormarn and Lauenburg were not least dominated by the decisions connected to the possibility of obtaining food that could have been used as a socio-political tool. This takes place within the setting of the Mesolithic settlement landscape. Therefore, a short characterisation of this will be included in order to demonstrate continuities. It appears that not the ‘rational choice’ of living near the fields was decisive, but the availability of game, and that later in the progress of the

Neolithic game was replaced by cattle, now fulfilling a role as a political animal. To demonstrate this, I will survey the record of animal remains from sites across the entire distribution area of Funnel Beaker ceramics.

The Mesolithic landscape

The elements of the Mesolithic landscape

The general picture of the Mesolithic landscape of the Ertebølle period may be described as follows (*cf.* Terberger 2006): The settlement sites near the rivers served as centres for the activities during most of the year, but were embedded in an overall settlement system with seasonal cycles. Sites with a certain distance to the rivers, for example, the site of Duvensee near the Stecknitz River, would have served as a location of temporary activities, especially for harvesting hazelnuts during the fall. The same can be assumed for the other core areas of settlement, since they provided similar ecological conditions: Due to their vicinity to open water and light floodplain forests, they offer favourable conditions for hunting and the utilisation of aquatic resources. This made it possible to fulfil the central necessities of everyday life within the range of the extended settlement area. There are indications that while aquatic resources together with gathering represented the ‘staple food’ sources of the Mesolithic, hunting large terrestrial game played a specific role within the prestige network and socio-political structure (Mithen 1990, 153-193).

The main elements within the Mesolithic landscape are therefore the base camp and the different non-permanent seasonal stations. Together they formed an extended territory with shifting borders, including the ‘nature’ that was enclosed within this territory, which may have provided specific ‘natural’ places (meaning those not altered extensively or durably, e.g., by building activities) that were additionally charged with (social and ritual) meaning, which hardly can be revealed and reconstructed by archaeological means. At least the evidence of permanent and shared burial sites is rare, so we can assume that such sites were not common as collective foci of significance within these societies, although burials might have represented important elements of the individual landscape of Mesolithic people. Regarding their fairly mobile life, and that the notion of the base camps as permanent places has been challenged (Johansen 2006),

it is reasonable to assume that significance was distributed within a loosely defined territory with shifting borders, associated with the distribution of activities within this territory and the shifting of the centre of daily activities during the year.

The Mesolithic landscape of Stormarn-Lauenburg

During the Final Mesolithic within the study area, three distinct clusters of sites are visible (Fig. 1). They group along the course of the Bille, Stecknitz and Trave Rivers. It seems that all activities were concentrated in the vicinity of the flowing water. Certainly, the remains of Mesolithic activities may be easier to overlook than the remains of later periods, but there has been extensive activity of archaeologists and collectors within the whole working area. If we compare the total density of sites with those that are dated within the Neolithic, it is discernible that especially these areas show an over-representation of sites of Neolithic age (Hinz 2014a, 191-194, resp. map 12, 239). Moreover, the

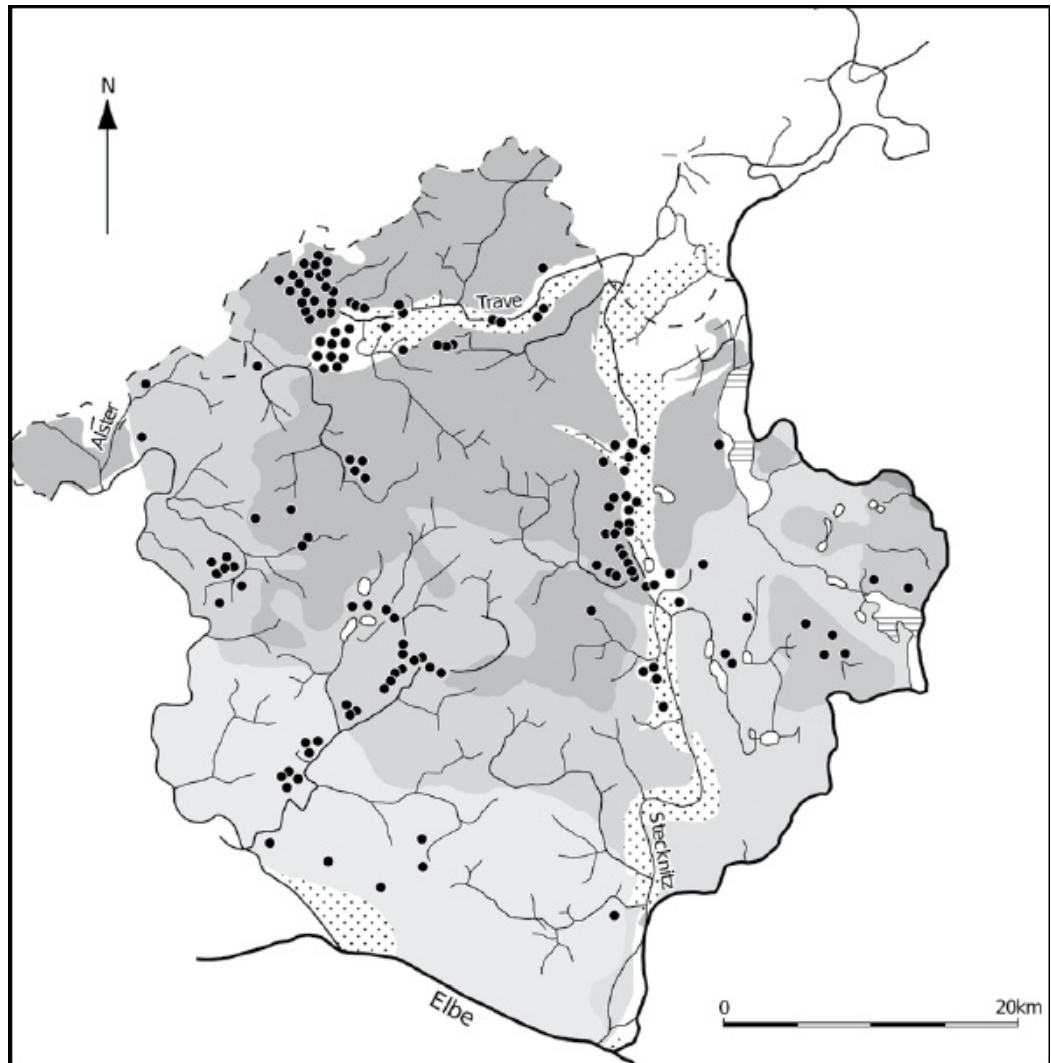


Figure 1: Mesolithic sites in the study area (after Schirren 1997, 247).

same is true for Mesolithic sites, so there is no reason to believe that the visible pattern is an artefact of a specific collector's activity or preference.

These rivers may have been utilised directly for subsistence by the exploitation of fluvial resources, but their substantial importance is additionally due to the floral and faunal composition of the surrounding floodplain forest. At the same time, they will also have served as a means of transport and as communication routes, most likely towards the marine environment. It is astonishing how void the hinterland of these riverside clusters appears, which do not provide any evidence of settlement or other activities during the Mesolithic. In the case of the Stecknitz Valley, a survey beyond the settlement cluster (Schirren 1997, 231) could confirm this negative evidence. It is the same pattern that we observe across the entire Baltic region (Zvebil 2008, 32-35).

The Neolithic landscape

The general elements of the Neolithic landscape within Southern Scandinavia and the site types that dominate the archaeological record include permanent settlements with

their fields, monumental burial sites, such as earthen long barrows, megalithic graves, and causewayed enclosures, accompanied by sites of specific (economic) character, for example, flint acquisition/processing sites. What differentiates the Neolithic landscape of Southern Scandinavia from the Mesolithic? At first glance, it seems that the monumental sites, the megalithic burials and the causewayed enclosures represent the main contrast to the preceding period. But this is probably only half the story. Extraordinary ritual sites (if the common interpretation of the causewayed enclosures as such is correct), which were visited only occasionally, but were nevertheless important as places

of identity focus for the society, could in principle have also been embedded in an extensive landscape concept. In the North European Mesolithic, a ritual landscape with places of significance and permanence certainly existed, although such sites are hard to trace archaeologically. But it is not coincidental that ritual sites, which were marked visibly above ground, e.g., by megalithic monuments, first occur in the archaeological record after the transition to the Neolithic. The difference is not the existence of such sites as durable ritual foci, but the practises that took place there, and first and foremost the fact that they were created by intense building activity, not inherited from nature or occasion. The fact that here an intentional materialisation of focal points of significance took place is absolutely essential for the understanding of change in the attitude towards the landscape from Mesolithic to Neolithic times in Southern Scandinavia. In this sense, even if we accept, for example, the derivation of monumental Neolithic burials in this region from the shell middens of Ertebølle (Müller 2013, 149), they still represent sites with a very different expression.

The reason for this new expression, the creation rather than the transformation of places, can be sought in the new economy. Firstly, the idea of investment in the land in the form of building activities for ritual sites significantly resembles the idea of clearing land for agricultural purposes. Secondly, within a Neolithic system of agricultural subsistence, increasingly more activities to secure the survival of a group could have been conducted within a smaller, more defined territory, likely resulting in decreased (daily) mobility. As a result, it is plausible to assume that significance was distributed to fewer sites within a closer distance to permanent, year-round settlements. Thirdly, an increased population may have simply enabled the mobilisation of a larger work force for such activities. These points probably also best describe the new landscape of the Neolithic, and the new attitude towards the environment, for which the monumental

sites are only symptoms.

If these economic changes were so influential for the reorganisation of ritual expression, how strong was their impact on the settlement systems and the locations of the sites? It would be expected that such a tremendous change with completely new requirements regarding the basis for the economy would result in a total rearrangement of the settlement structures. While during the Mesolithic, the exploitation of aquatic resources and hunting strategies required a landscape with a high diversity of plant and animal species, such as the landscape of the freshwater systems (Johansen 2006, 205), a Neolithic economy relied on dry ground with fertile soil, probably within the forested areas of the river banks, which offer a supply of leaf fodder and slash-and-burn agricultural space. It would have been a rational choice to settle in such surroundings, presuming that agriculture was the main driver for settlement location. We will investigate this on the basis of the Stormarn-Lauenburg region.

The Neolithic landscape of Stormarn-Lauenburg

The first phase

Within the working area, the earliest Neolithic is not visible archaeologically. The reason might be that the artefacts for this phase are not diagnostic enough (lacking good ceramic evidence for this period), or this phase is not present in the working area, and the sequence develops directly from the Mesolithic to the Early Neolithic (EN). Nonetheless, the evidence points towards continuity from the Mesolithic to the situation visible for the first phase of the Neolithic.

The EN Ia might be seen as a transition horizon, since the pollen evidence for this phase indicates no major forest opening, and accordingly no significant rise in human impact. It might also be denoted as Epimesolithic, since there is possible evidence for cereals, at least in the Danish area, in the form of cereal impressions on ceramics (Store Valby: Helbæk 1955; Stengarde: Hjelmquist 1975). But this form of agriculture neither left significant traces in the pollen profiles, nor are cereal depots known for this phase (Hinz 2014a, 202). It seems that the Neolithic element played a subordinate role within the economy of the Earliest Neolithic (Andersen 2008, 72).

A different land management regime becomes visible from the EN Ib onwards by a significant increase of *Plantago* values, accompanied by a rise in general open land indicators and a decrease of oak wood forest taxa. This might coincide with the introduction of the ard (Sørensen/Karg 2012, 7). The settlement clusters of this phase (in the valleys of the Trave, Stecknitz and Bille, Fig. 2) correspond to those of the Mesolithic period, making continuity very likely.

Sites that do not show the character of permanent settlements are located in confined areas in the vicinity of the settlement clusters. There is no indication of an extensive use of the whole area.

The pollen data for this period indicate an extensification of areas used for agrarian production and hint towards an increased importance of agriculture as a main source for the subsistence economy. Contemporaneous with this development is the beginning of monument and burial constructions that are visible above ground. These include earthen long barrows, megaliths and enclosures. At the same time, we see an intensification of copper imports (Müller 2011, 18). All this might hint towards the necessity to organise the social landscape, induced by an increased population (*e.g.* Hinz *et al.* 2012) and the

intensification of labour investment into the area by clearing activities, resulting in a more 'crowded' landscape that has to be regulated. The monuments themselves suggest the development of larger social organisational units which extend beyond the boundaries of individual settlements. The concentration of burial sites in the Sachsenwald area is one example of such regional ritual spaces in the working area.

The model for this phase can be summarised as follows: The settlement areas remain the same as during the preceding periods due to the favourable conditions resulting from similar social and economic necessities, although we have to acknowledge the changed basis of the subsistence economy. The settlement size as well as the number of sites may have increased. The river banks were now used more intensively for (permanent) fields as well as for burial sites. Nevertheless, the settlements were still located where they were established during the Mesolithic: on the floodplains that offer a high diversity of plant and animal species, and on the grounds favourable for hunting, fishing and gathering.

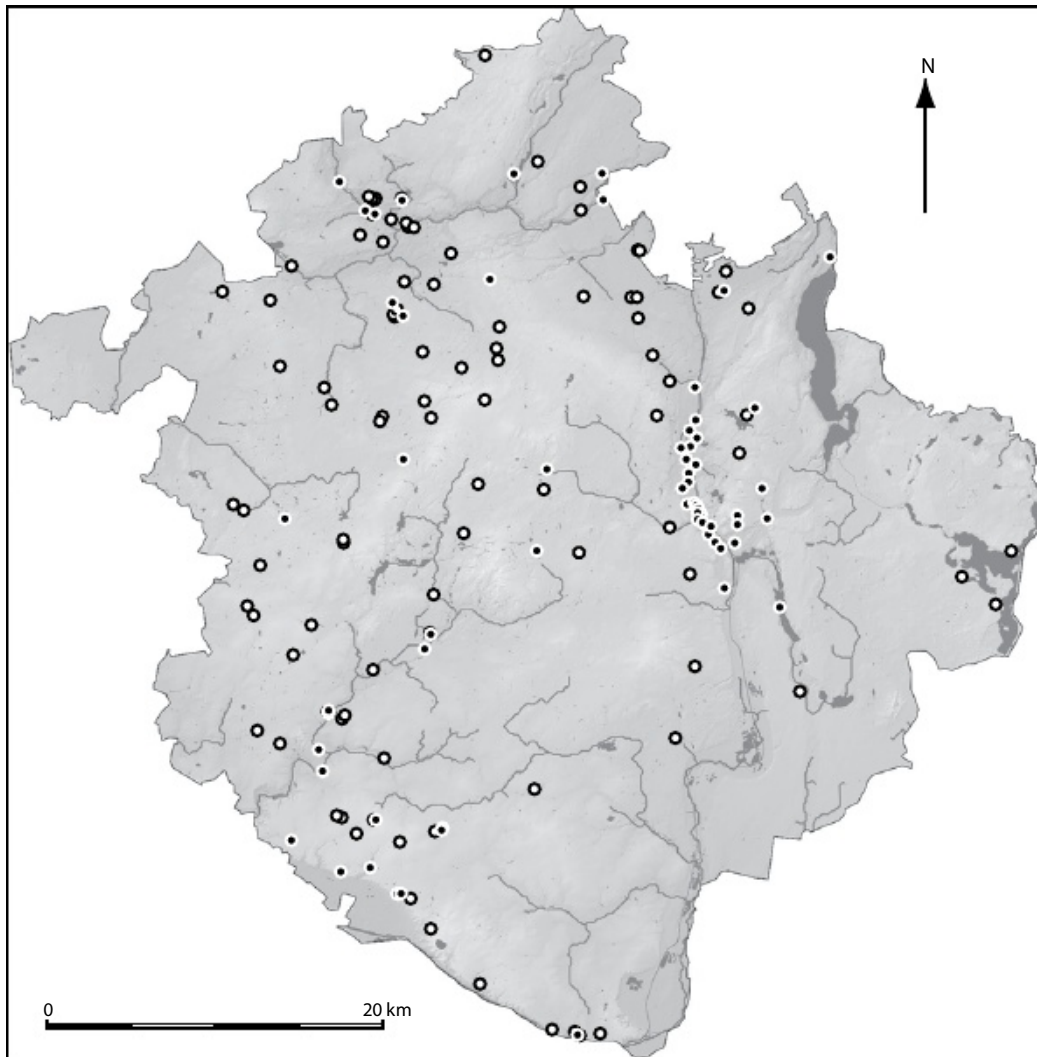


Figure 2: Early Neolithic sites in the study area; black: settlements; white: other sites (Hinz 2014b, 213 fig. 3).

The crisis

There are several indications that between 3400 and 3200 cal BC Neolithic societies all over Europe, including those that inhabited the distribution area of Funnel Beaker ceramics, underwent a restructuring process that could probably be called a “crisis”. In the overarching picture, there is a reduction in site abundance and the general amount of (radiocarbon) dated archaeological material (Shennan *et al.* 2013), whereby this phase has also been verified more regionally for the Funnel Beaker area (Hinz *et al.* 2012). Additionally, on the regional scale other indicators may be correlated (Hinz 2015) so that the following trend could be described and interpreted: Just as the number of ^{14}C dated sites decrease, human impact on the landscape, deduced from the pollen spectra, also declines. This takes place at a time when a sedimentological analysis of Lake Belau shows a constant series of cooler summer temperatures (Dreibrodt *et al.* 2012). At the same time, decoration diversity on burial ceramics increases, it becomes more regionally distributed, and copper imports to the north cease. Whatever the reason for these changes might be – demographic developments, environmental change or reorganisation of the settlement landscape – it is clear that

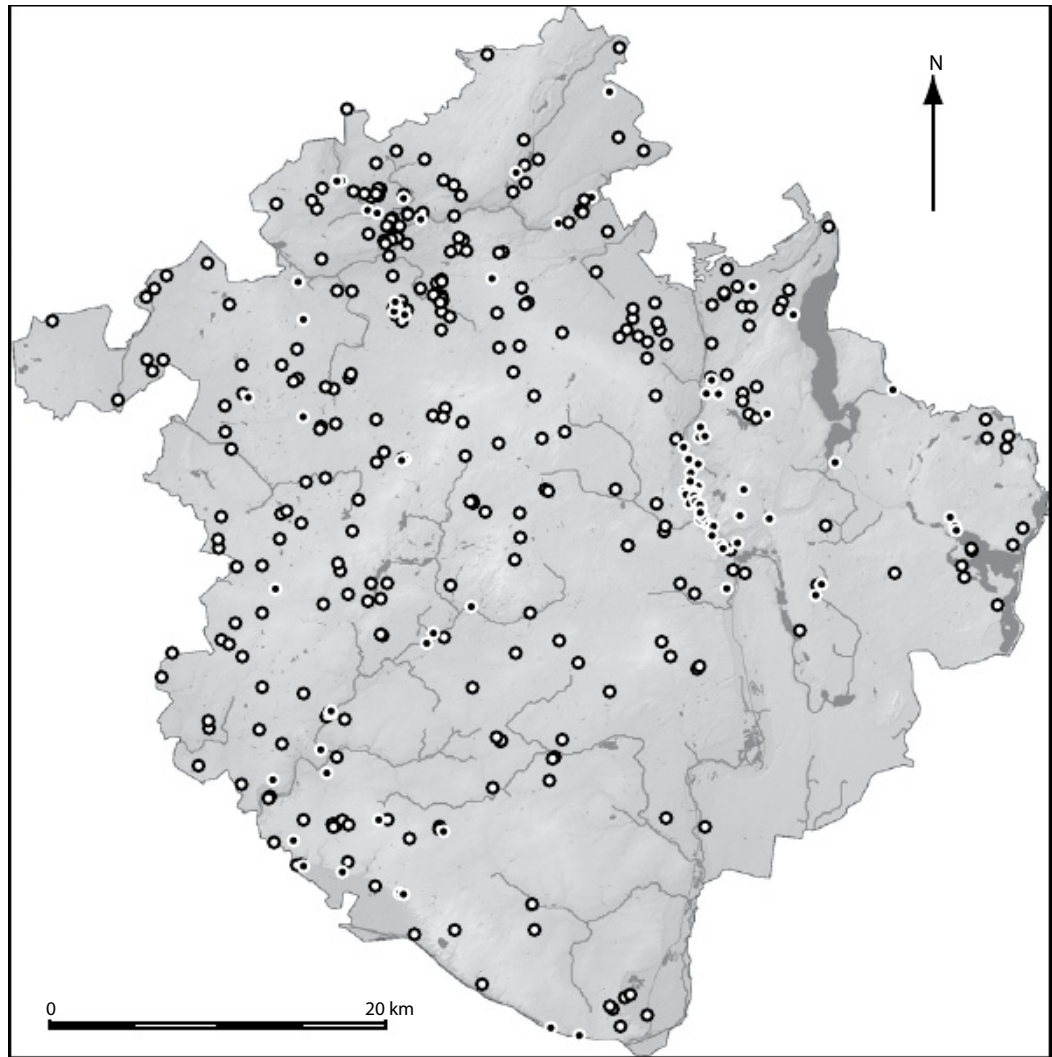


Figure 3: Middle Neolithic sites in the study area; black: settlements; white: other sites (Hinz 2014b, 215 fig. 4).

this transition indicates a significant shift in the practises of these societies in multiple spheres.

Within the working area of Stormarn and Lauenburg, few sites could be dated to this horizon. On the one hand, this substantiates that these developments could also be observed on a sub-regional level, but complicates, on the other hand, the detailed analysis of this process. Nonetheless, after this period the Neolithic landscape as a place for economic and social practises had changed, as will be shown below.

The second phase

The Middle Neolithic (MN) shows a different signature in the pollen data: *Plantago* values have declined significantly to recover on a lower level, taxa of mixed oak forest do show renewed clearing activities after a strong regeneration signal, while general openness indicators reach a higher level than ever after a strong decrease. The reasons for this picture might be found in changing environmental factors or shifts of human behaviour; most plausibly they are the result of changed human practises under changed conditions.

Considering the distribution of archaeological sites, a different land use regime, even a different landscape, becomes apparent (Fig. 3). The settlement clusters are stable, human occupation of the area in the form of permanent settlements do cover the same ground as before. But those sites that do not exhibit a permanent character are now spread evenly over the entire area and indicate land use at localities far away from the permanent settlements. The cause for such a pattern is most likely the onset of an activity that does not require or permit a daily return to an actual settlement site. Moreover, it must have been labour that was so location-independent and mobile that it would not have been reasonable to establish a new permanent settlement on the spot of this activity. Nonetheless, it must have been an activity for which these areas, formerly not under use, provided specific possibilities – the drier, less fertile morainic ridges. Animal husbandry, especially with cattle and transhumance, appears to be the most obvious explanation. This interpretation is backed by studies and syntheses from other regions of the Funnel Beaker area (Kristiansen 1988; Welinder *et al.* 1998; Andersson 2014).

Interim conclusion: Continuities and changes

If the preferences for settlement location were so similar from the Mesolithic to the Neolithic, it may be assumed that at least a part of the economic reasons for these preferences were similar, or that the new components of agriculture and husbandry could successfully be integrated into the existing system. From the pollen data, it is obvious that it took quite a while before the new way of life was predominant, and before human impact substantially changed larger parts of the landscape. It appears that the choice of settlement locations was not so much dominated by the conditions of the new agricultural way of life: Although the Neolithic inhabitants of Stormarn-Lauenburg settled on the floodplains of the rivers, these locations did not offer good conditions for cereal cultivation. The space that could have been utilised for fields was located on the drier river banks often some kilometres away, where the megalithic burials were also constructed.

If the new economic system was not the reason for the location of the settlements, it must either have been due to the old system or conditions that were favourable in both regimes – conditions suited to both hunting and gathering and farming. One advantage of these locations that is difficult to assess archaeologically – due to the perishable nature of its remains – is fishing. In general and from the ethnological record, the percentage of terrestrial animals, terrestrial plants and aquatic resources contributing to the diet of hunter/gatherer societies is equal, while in more northern latitudes fishing might contribute with ~50 % (Binford 2001). It is evident that the use of marine, but especially also of freshwater resources, postdate the Mesolithic – Neolithic transition, based on animal remains (*e.g.* Becker/Benecke 2002; Ewersen 2007), lipid analysis (Heron/Craig 2008; Craig *et al.* 2011) or on isotope data (*e.g.* Fischer *et al.* 2007). It seems plausible that the Neolithic inhabitants also valued the food source readily available at their doorsteps. The second benefit of the settlement locations near the rivers is the fact that they do represent by far the easiest and most comfortable transportation and communication routes. But the highest impact on settlement choice must have been the economic favour of the riverine sites that is clearly linked to the Mesolithic tradition – their richness in wild resources. Leaving aside the evidence of

fish, which clearly is underrepresented in the archaeological record, we will turn to the investigation of the animal spectra that were found at Funnel Beaker settlements. For this endeavour, we will use sites from all over the distribution area of Funnel Beaker ceramics to gain a broad and robust data basis for interpretations.

The animal remains of Funnel Beaker sites

How can the hypothesized importance of hunting within the agrarian Funnel Beaker society be analysed, interpreted and explained? Moreover, is it possible to observe changes from the Early to the Middle Neolithic situation? A survey of the isotope data of Southern Scandinavian individuals regarding the ratio of their consumption of animal and plant product is not yet available, so it is not possible at the moment to judge to what degree animal products were actually the basis of subsistence. But we have, of course, the animal remains from different settlements within the distribution area of Funnel Beaker ceramics. These can be used to estimate the ratio and relationship between wild and domestic animals and the individual share of the different domesticates for subsistence. The basic source in this study for this issue is the collection of NISP from Jan Steffens (2005), supplemented by the data from Ola Magnell, accessed via Peter Imperiale (2011). In total, the data of 61 sites could be analysed (Fig. 4, Tab. 1). From these sites, the site of Brachnowko was excluded because it has a very specific animal spectrum that skewed the results (~20 % foxes in the assemblage).

The spheres of domestic and wild animals

To investigate how practises that are related to different animal species are connected, a network analysis was undertaken. The basis for this is the correlation of the frequency of different species at the individual sites, according to the following procedure:

1. Testing the correlation of the values for each pair of species. This means that, e.g., the values of cattle and red deer were tested for correlation.
2. If the correlation was positive and significant, it is marked as an edge for the network in a matrix.
3. Displaying the resulting network.

The logic behind the procedure is explained as follows: If the presence of one species is positively (and significantly) correlated with that of another species, practises related to each species were conducted at the same site and therefore do represent a common realm of action.

The overall result is not very surprising: Within the network, two subnets are formed, one representing all wild species, the other consisting of domestic species. Both nets are connected by dog that may have served a role in the world of hunting as well as in the world of animal husbandry (Fig. 5).

What might be interesting is that fox also represents a connection and is therefore present in both worlds. Fox was either already a hemerophile species in the Neolithic and was hunted because of its presence at or near human settlements (either to secure stored food or due to occasion), or fox played another, special role, as is indicated, e.g., by the evidence of fox mandible in the burials of several Neolithic cultures. Not



Figure 4: Location of the analysed sites: 1 Alsleben; 2 Basedow; 3 Bebensee; 4 Bistoft; 5 Döläuer Heide; 6 Fuchsberg-Südensee; 7 Glasow; 8 Großobringen; 9 Haldensleben; 10 Heidmoor; 11 Hüde I; 12 Neukirchen-Bostholm; 13 Niedergörne; 14 Runstedt; 15 Schalkenburg; 16 Siggeneben-Süd; 17 Stinthorst; 18 Süssau; 19 Wangels FN; 20 Wangels MN; 21 Wolkenwehe; 22 Blandebjerg; 23 Bundsø; 24 Fannerup; 25 Lidsø; 26 Lindø; 27 Lyø; 28 Sølanger; 29 Spodsbjerg; 30 Svaleklint; 31 Troldebjerg; 32 Löddeborg; 33 Nymölla III; 34 Brachnowko; 35 Cmielow; 36 Gródek Nadbużny; 37 Kamiń Łukawski; 38 Kruska Podlotowa; 39 Książnice Wielkie; 40 Mrowino; 41 Pikutkowo; 42 Podgaj; 43 Śrem; 44 Strachów; 45 Stryczowice; 46 Szlachcin; 47 Ustowo; 48 Zawichost-Podgorze; 49 Makotřasy; 50 Muldbjerg I; 51 Björnsjöholm; 52 Saxtorj; 53 Almhov – GT1; 54 Hunneberget; 55 S. Sallerup 15H; 56 Elmelund 2B; 57 Hyllie station; 58 Hyllie vattentorn; 59 Hyllie Hotelltomten; 60 Skumpärberget; 61 Arneberg (map: Martin Finz).

id	site	cattle	pig	sheep/ goat	dog	horse	red deer	roe deer	elk	aur-ochs	wild boar	brown bear	bad-ger	mar-ten	pole-cat	otter	wolf	fox	lynx	wild-cat	bea-ver	hare	seal	others	sum
1	Alsleben	46	1	8	0	0	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	60
2	Basedow	87	26	15	9	29	265	71	10	25	81	2	4	0	0	0	0	0	0	0	10	0	0	0	634
3	Bebensee	43	17	2	11	6	99	20	1	47	27	0	0	0	0	3	0	0	0	2	8	0	0	0	286
4	Bistoft	213	112	209	24	0	363	17	5	22	72	0	0	2	0	48	1	0	0	0	53	1	0	0	1137
5	Döläuer Heide	105	35	44	2	22	2	1	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	1	216
6	Fuchsberg-Südensee	624	94	44	18	5	45	15	0	20	46	0	0	0	0	0	0	0	0	1	3	0	0	7	922
7	Glasow	37	11	68	0	0	5	10	0	21	3	2	2	0	0	0	1	0	0	1	0	0	0	0	161
8	Großobringen	3064	0	570	161	129	248	28	1	0	0	14	1	0	0	0	0	2	1	0	5	0	0	0	4224
9	Haldensleben	45	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	57
10	Heidmoor	891	440	139	145	35	1707	336	162	93	515	6	35	17	6	46	35	1	1	46	579	1	29	17	5282

id	site	cattle	pig	sheep/ goat	dog	horse	red deer	roe deer	elk	aur-ochs	wild boar	brown bear	bad-ger	mar-ten	pole-cat	otter	wolf	fox	lynx	wild-cat	beaver	hare	seal	others	sum
11	Hüde I	75	46	17	35	393	301	237	307	989	793	110	6	29	6	64	12	6	2	23	781	0	0	0	4232
12	Neukirchen-Bostholm	190	148	36	4	0	12	2	0	2	4	1	2	0	0	0	0	0	0	0	1	0	0	0	402
13	Niedergörne	60	29	39	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	135
14	Runstedt	67	7	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	83
15	Schalkenburg	1508	404	792	104	24	37	67	0	12	28	3	3	6	0	0	3	9	0	3	1	1	0	49	3054
16	Siggeneben-Süd	38	41	9	3	0	16	1	0	3	6	1	0	0	0	1	2	0	0	4	0	0	8	2	135
17	Stinthorst	15	18	6	2	8	151	31	13	5	30	5	1	1	0	0	0	1	0	0	3	0	0	0	290
18	Süssau	568	113	97	12	0	18	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	813
19	Wangels FN	164	8	57	11	1	65	23	0	13	11	1	0	1	0	1	0	0	0	0	0	0	5	9	370
20	Wangels MN	151	128	32	15	0	113	48	0	9	34	0	0	0	0	0	0	0	0	0	0	0	24	72	626
21	Wolkenwehe	2586	448	168	16	32	2875	416	16	104	288	0	8	1	0	8	2	8	0	8	456	0	8	0	7448
22	Blandebjerg	423	124	37	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	586
23	Bundso	1405	1222	359	196	0	142	3	7	7	7	3	0	14	1	3	1	0	0	0	0	0	10	0	3380
24	Fannerup	183	106	149	10	7	46	10	0	13	16	0	1	0	0	3	0	1	0	0	0	0	17	0	562
25	Lidso	672	66	137	49	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1	938
26	Lindø	1293	659	421	30	1	90	0	0	0	5	3	0	0	0	3	1	0	0	0	0	1	0	1	2508
27	Lyø	297	85	59	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	474
28	Sølanger	15	1	29	34	0	60	128	0	0	96	0	0	0	0	8	0	9	0	3	0	1	16	1	401
29	Spodsbjerg	1978	891	588	101	4	179	8	0	0	8	1	0	0	0	4	1	4	0	0	1	0	23	101	3892
30	Svaleklint	35	0	0	0	0	126	65	0	0	0	0	0	0	0	0	0	0	0	1	5	0	10	0	242
31	Troldebjerg	10459	11632	2721	25	75	25	25	0	1	5	0	0	0	0	5	0	5	0	1	1	0	5	0	24985
32	Löddeborg	7	0	0	3	0	65	30	0	0	0	0	0	0	0	1	1	0	0	0	2	0	33	22	164
33	Nymölla III	7	0	0	0	0	74	23	0	0	0	1	0	0	0	8	0	3	0	2	0	0	21	6	145
34	Brachnowko	24	76	107	0	0	0	0	0	0	0	0	8	0	1	0	0	80	0	0	0	0	0	0	296
35	Cmielow	1579	566	276	112	57	36	44	3	0	44	3	5	0	0	0	3	3	0	0	5	0	0	0	2736
36	Gródek Nadbużny	1265	453	252	41	15	19	11	6	0	60	2	1	0	0	1	0	2	0	0	0	6	0	0	2134
37	Kamień Łukawski	1675	581	402	66	9	26	28	3	11	11	3	3	0	0	0	0	0	1	0	23	3	0	0	2845
38	Kruska Podlotowa	237	0	1	7	25	8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	279
39	Książnice Wielkie	150	137	25	31	0	9	26	0	0	5	0	0	0	0	0	1	0	0	50	0	2	0	0	436
40	Mrowino	359	78	93	8	3	29	3	0	0	12	7	0	0	0	0	0	0	2	0	1	0	0	0	595
41	Pikutkowo	103	26	14	69	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	217
42	Podgaj	197	19	94	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	312
43	Śrem	1040	216	50	17	11	1	1	0	0	4	0	0	0	0	0	0	0	0	0	0	3	0	0	1343
44	Strachów	215	76	119	4	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	22	0	0	451
45	Stryczowice	327	36	48	71	0	0	0	0	8	4	0	0	0	0	0	0	0	0	0	0	3	0	5	502
46	Szlachcin	56	14	11	4	43	30	45	0	0	0	1	0	0	0	0	0	1	0	0	7	0	0	0	212
47	Ustowo	483	267	76	37	46	191	59	0	60	16	4	0	0	0	0	1	1	0	1	114	0	1	0	1357
48	Zawichost-Podgorze	1017	323	214	93	40	10	10	0	0	9	2	3	0	0	0	0	0	2	0	3	2	0	0	1728
49	Makotfasy	1636	373	173	50	14	31	1	0	5	10	2	0	0	0	0	2	0	0	0	2	7	0	2	2308
50	Muldbjerg I	33	0	3	0	0	665	116	0	0	5	0	0	2	0	115	0	0	0	0	179	0	0	4	1122
51	Bjørnsholm	1	0	2	0	0	6	9	0	0	3	0	0	1	0	0	0	2	0	0	0	0	0	0	24
52	Saxtorp	246	78	90	1	3	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	429
53	Almhov – CT1	157	170	51	0	0	71	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	452
54	Hunneberget	85	50	36	16	0	19	27	0	0	0	0	0	1	0	0	0	1	0	1	3	0	7	2	248
55	S.Sallerup 15H	371	52	43	2	4	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	495
56	Elinelund 2B	314	59	14	2	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	393
57	Hyllie station	39	41	7	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89
58	Hyllie vattentom	40	27	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68
59	Hotelltomten	79	68	7	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	156
60	Skumparberget	397	68	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	4	492
61	Anneberg	54	46	4	11	0	0	0	2	0	0	0	1	17	0	17	0	3	0	2	6	0	674	24	861

Table 1: NISP of animals at the analysed sites.

Figure 5: Network of the correlation of species from all sites (diagram: Martin Hinz).

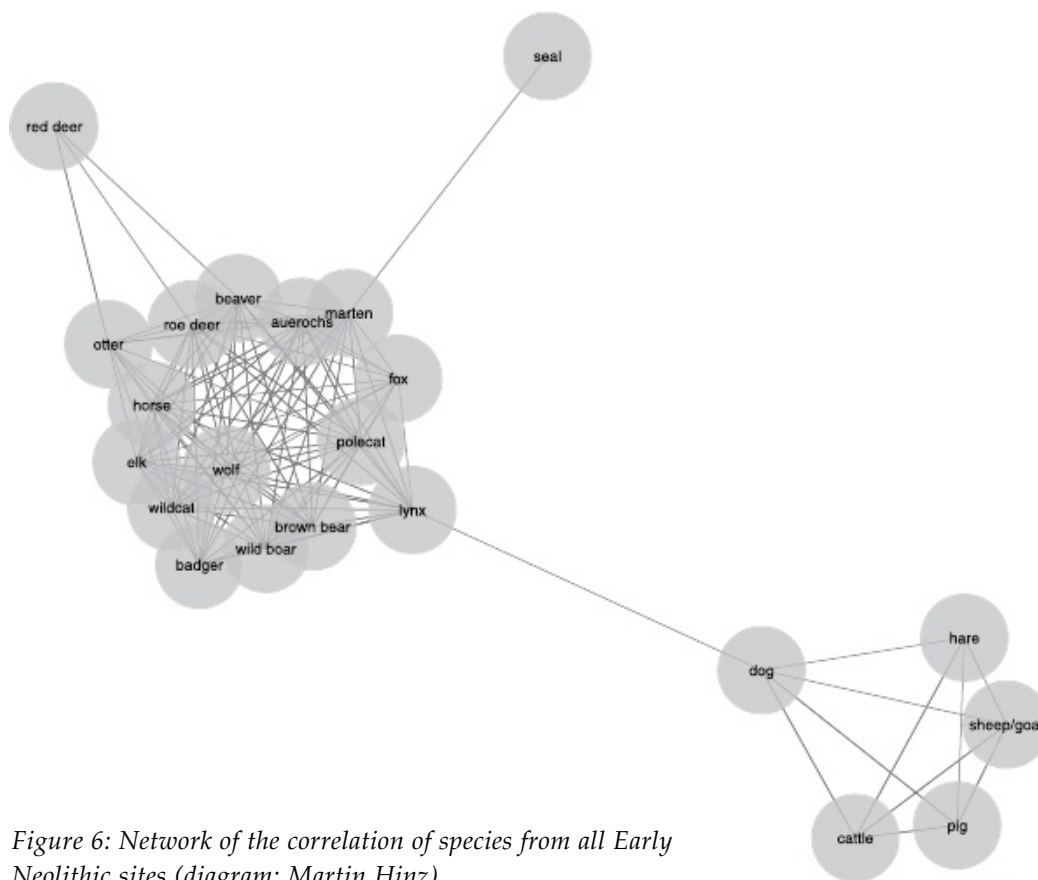
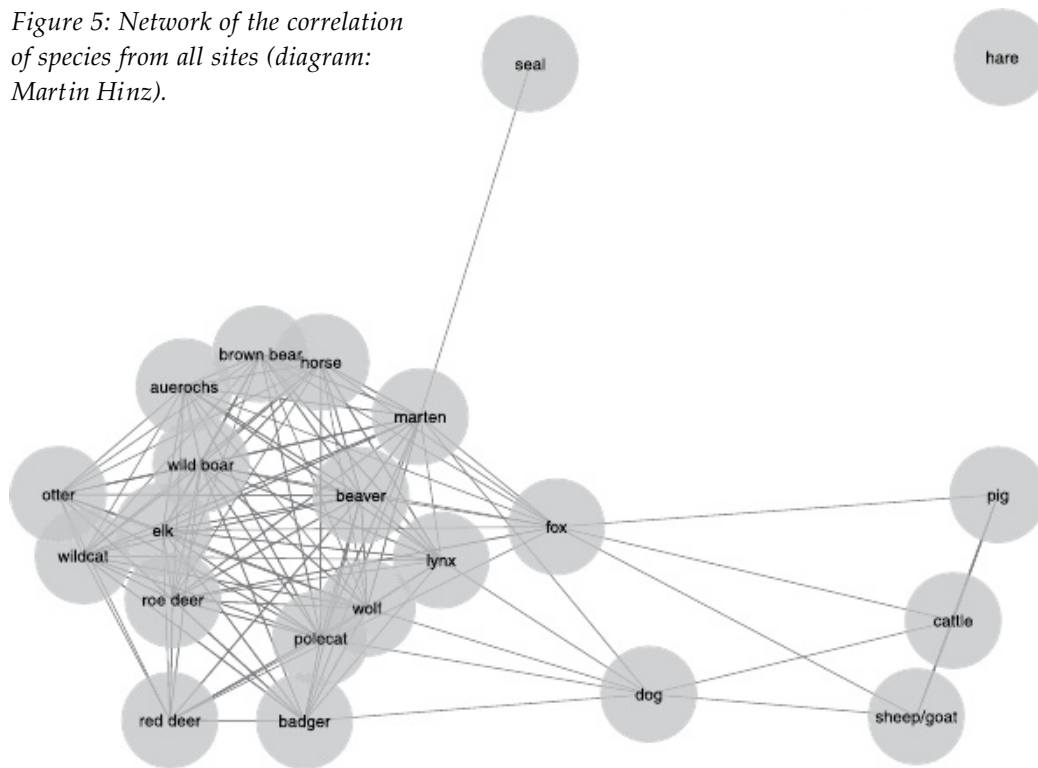
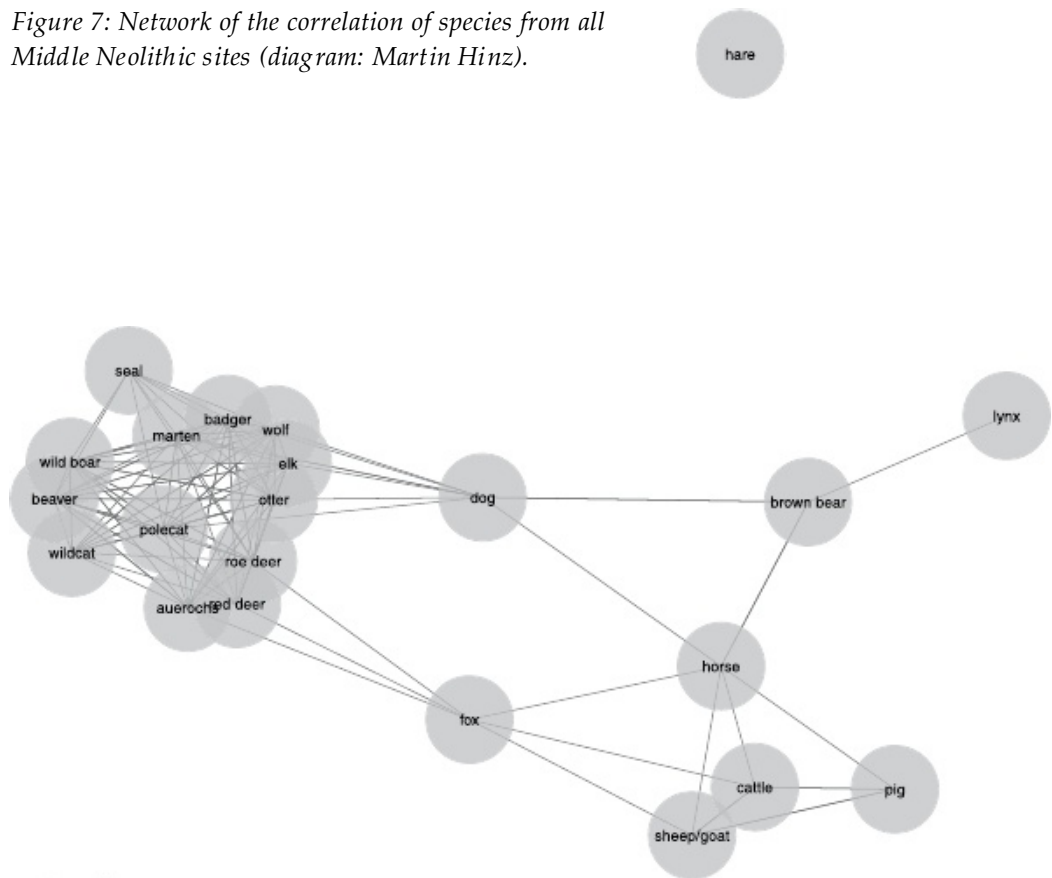


Figure 6: Network of the correlation of species from all Early Neolithic sites (diagram: Martin Hinz).

Figure 7: Network of the correlation of species from all Middle Neolithic sites (diagram: Martin Hinz).



connected to the network is the hare, so the appearance of this animal is not correlated to any other species. The seal is separate from the network, but still connected via the marten. The reason for this separation might be that it was mainly hunted at specific, specialised sites. In the bone assemblage of the sample, seal played either a negligible role, or its ratio is significant.

If we analyse the EN and MN sites separately, a somewhat different picture is gained. In the network of the species from the EN sites (Fig. 6), domesticates still are clustered together and form a separate subnet, but now only dog connects the two networks.

Hare is included in the network of domestic species. The reason might be that hare was not hunted primarily as prey, but probably to protect the fields in some form of ‘garden hunting’. Except for a dense network of wild animals, other species are also separate, for example seal and red deer. Seal might be separate for the same reason as in the overall analysis. In the case of red deer, it is common that no specific correlation to other species occurs, beside roe deer, beaver and otter. The latter correlations might be an indication that red deer was particularly hunted in wet areas, such as the floodplains that evidently represent the preferred settlement locations at least in the working area of Stormarn-Lauenburg.

In the network of the MN sites (Fig. 7), horse is now connected to the domestic species. If this indicates a changed role of horse or not must be the subject of a more in depth analysis with other methods. The identification of domestic horses within the Bernburg complex (3200-2700 cal BC, Benecke 2006) would fit culturally and temporally to such an interpretation. Fox and dog connect the network of domestic and wild species, whereas seal is now part of the subnet of wild animals. Interestingly,

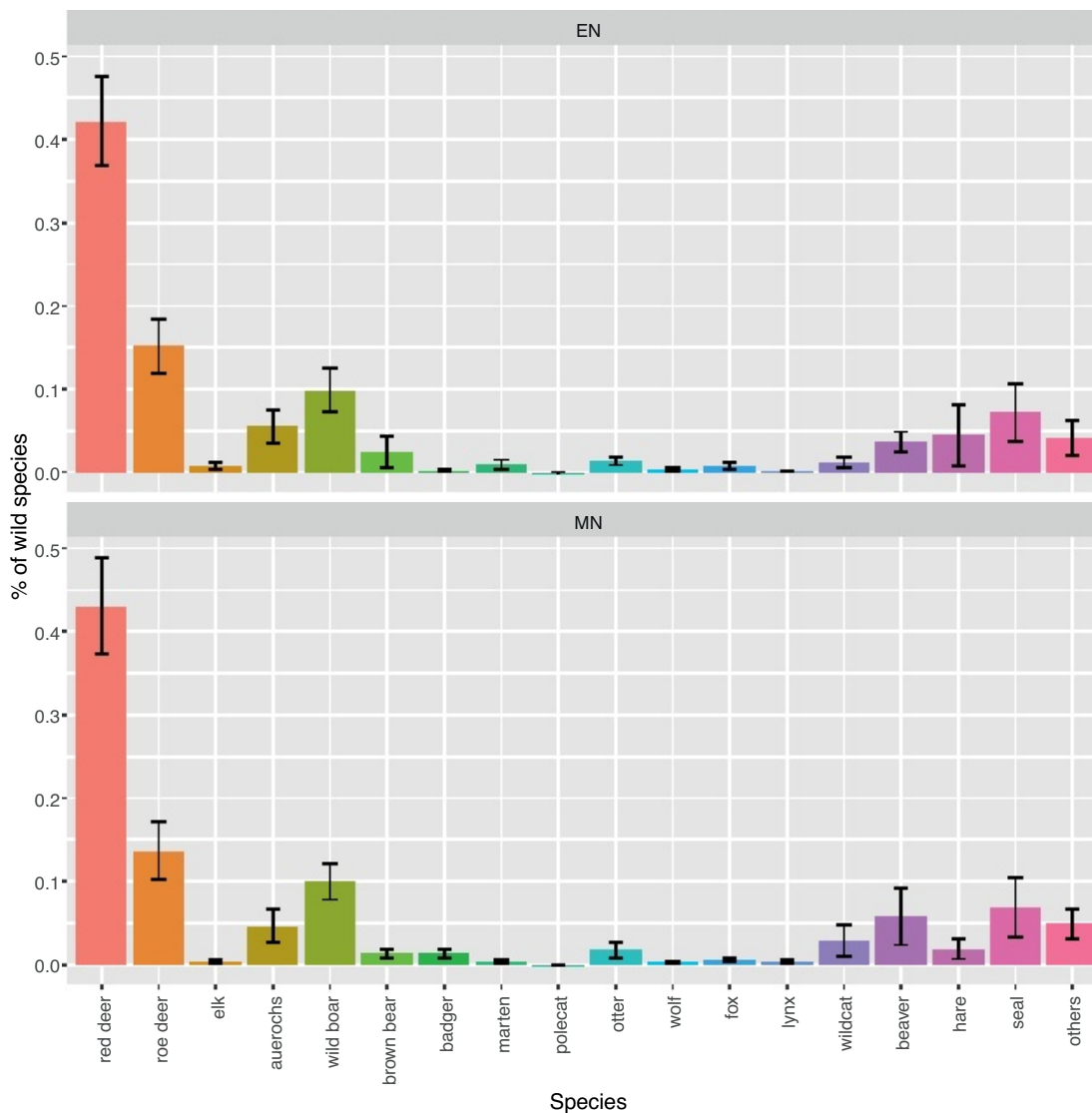


Figure 8: Ratio of wild species, divided between the Early and the Middle Neolithic (diagram: Martin Hinz).

brown bear and lynx occur in close connection to horse and dog. But both species are so rare in the sample that this correlation should not be overemphasised.

As a result of these analyses, the following seems to be a plausible synopsis: In general, we see two distinct areas of practise, one connected to domestic, the other to wild animals. Fox and dog seem to connect these spheres, or better remains of these species accumulate in both contexts. In the case of dog, the interpretation is straight forward. Dogs were present in the domestic sphere, but might also have been used for hunting. In case of fox, its special role seems to begin in the Middle Neolithic, and there are good reasons to believe that this is due to their ritual meaning. Seal hunting played a special role, but more in the Early than in the Middle Neolithic. It might be that the maritime connection is more pronounced in earlier Neolithic times due to Mesolithic traditions. While the hare is not connected in the MN, during the EN it is part of the 'domestic' sphere. If the interpretation of

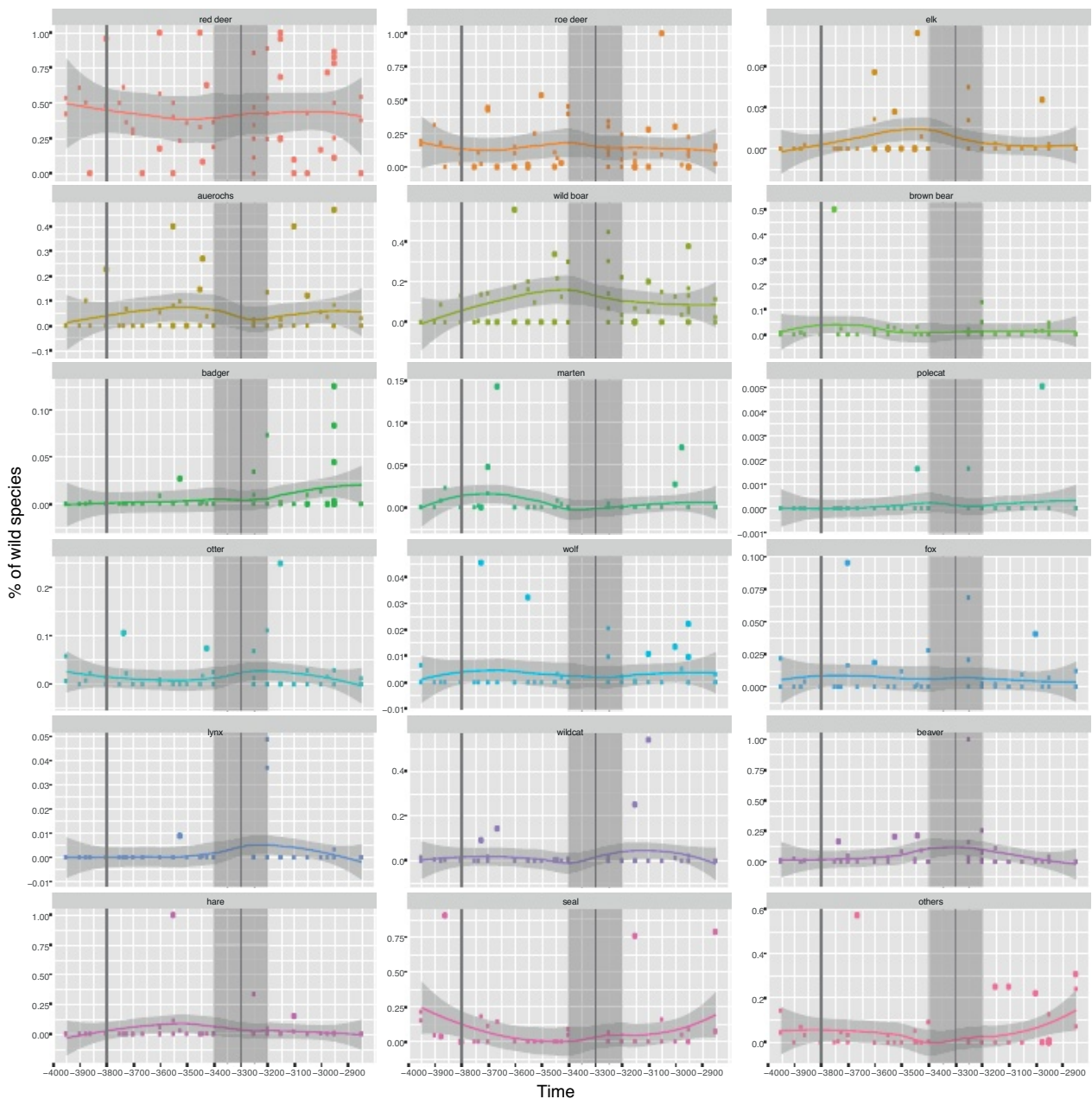


Figure 9: Visualisation of the change of the ratio of wild species within the bone assemblages of sites. Lines represent the temporal phases: before 3800 cal BC EN Ia, 3800-3300 cal BC EN Ib – EN II, after 3300 cal BC MN. The shaded area marks the time of the potential crisis from 3400-3200 cal BC (diagram: Martin Hinz).

the hare hunt for protective reasons is true, then the fact that this species is not connected in the later period indicates a change in the agricultural practises from the EN to the MN. During the Early Neolithic, red deer also played a special role in the spectrum of wild animals, while during the Middle Neolithic this species seems to be integrated into the general realm of hunting. Can we infer from this that the role of the hunt for large game changed from Early to Middle Neolithic? We will come back to this later.

Wild animals

Another perspective on the development of the relationship of humans toward animals during the Funnel Beaker period can be gained by analysing the dynamics of the animal spectra. To this end, each site was connected to a specific date. The temporal dimension was introduced by ^{14}C dates, if available, or by taking the mean of the duration of each site extracted from the archaeological material present at the sites. When this is done, each site can be placed on a temporal axis, and the development of the species spectra can be observed.

To start with wild animals, there is no significant change visible within the spectrum of hunted animals during time on a coarse scale. Regardless if we look at the mean values of the sites differentiated between the Early and the Middle Neolithic (Fig. 8), or if we investigate the dynamic of the ratio of individual species among the hunted animals over time (Fig. 9), no substantial difference can be determined.

In the mean of all sites, red deer represents 43.6 % of the bones of hunted animals, roe deer 14.6 %, wild boar 10.2 %, seal 7.5 %, aurochs 5.9 %, and all other species were below 5 % (18.2 % together).

Acknowledging the fact that this survey covers a large area with different ecological conditions and sites of different character, it can still be maintained that hunting was a rather traditional affair in the Funnel Beaker societies. Over the course of the duration, no fundamental changes in the hunting strategy seem to take place.

Domestic animals

If we turn to the domestic species (including horse among domesticates), the situation between the EN and the MN also seems to be static (Fig. 10).

In general, cattle comprises 59.4 % of the bone assemblages, pig amounts to 19.1 %, sheep/goat is recorded with 13.8 %, whereas dog and horse represent only 4.4 %, resp. 3.2 %, and are therefore rather insignificant.

An inspection of the dynamics over time (Fig. 11) offers a more interesting picture: While cattle has an overall high ratio within the domestic species, we observe a decrease over time until the advent of the possible crisis at 3400 cal BC. Within and after that time, the cattle ratio rises significantly and the ratio of pig also increases, both at the expense of other domestic species. In this display, this development is only visible within the range of domesticates. It becomes more pronounced and

meaningful if we look at the total composition of animal species, comparing the development of hunting and husbandry.

The wild/domestic ratio

The total share of domestic animals within the bone assemblages of the sites, in a diachronic view, shows an interesting pattern regarding the development of animal husbandry over time (Fig. 12). For the first phase, EN Ia (until 3800 cal BC), the animal spectrum of nearly all sites is dominated by wild animals. Only the Early Neolithic sites of Wangels and Almhov show a dominance of domestic animals. In Wangels, cattle is primarily observed, but this site has to be critically (re-)interpreted (Sørensen/Karg 2012, 101) on the level of zooarchaeology, which cannot be done here. The pattern of the ^{14}C dates for Almhov seems to indicate that the site belongs

to a late phase or probably even to a later period than 3800 cal BC, whereby 33 % of the pig bones from this site may actually represent wild boar (Magnell 2015, 86).

Within the second phase (EN Ib – EN II), the ratio of domesticates rises to a level of ~70 %, but this mean number might be misleading: Actually, we observe two

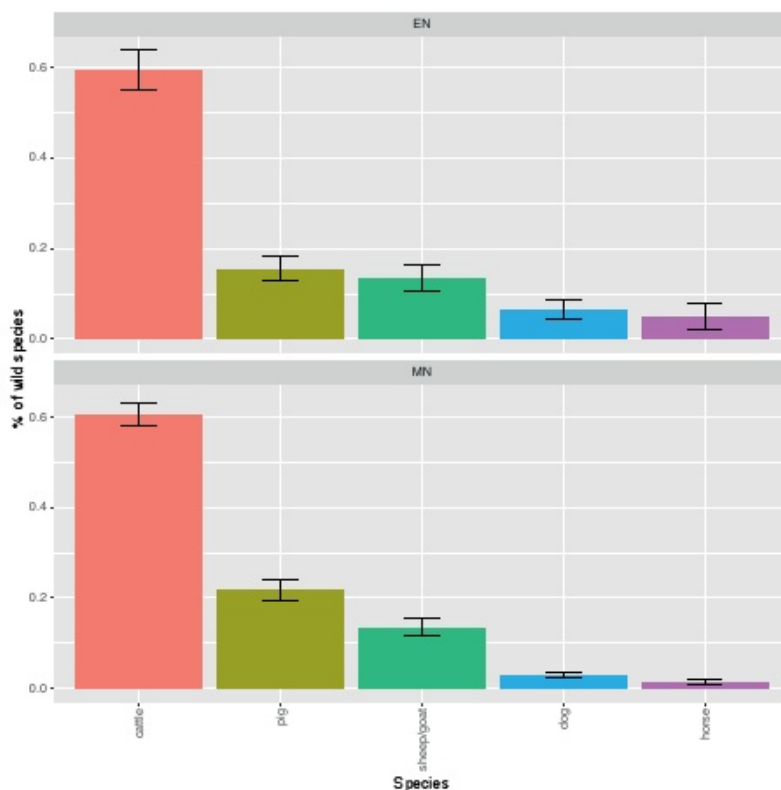
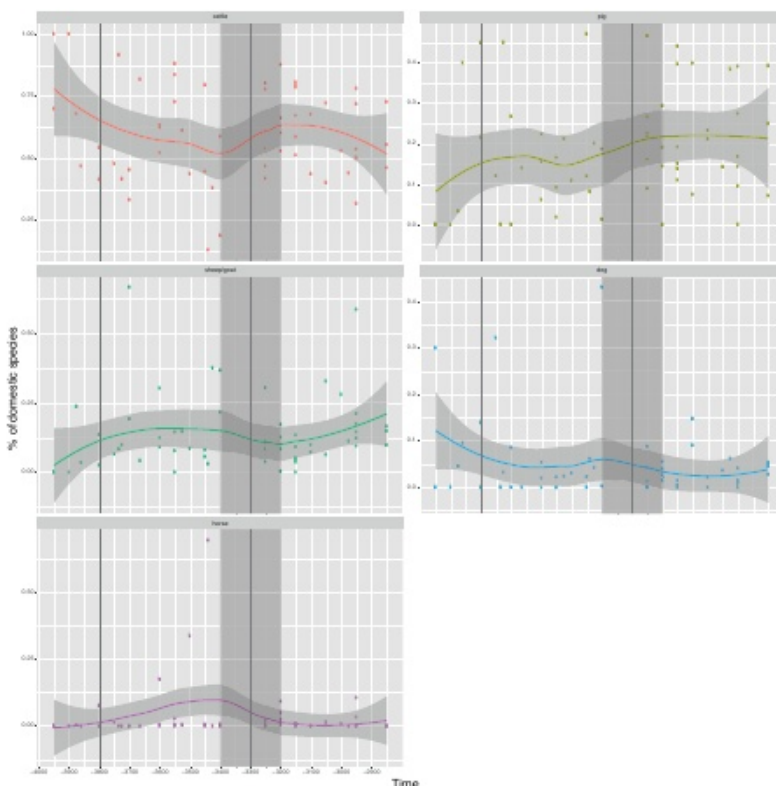


Figure 10: Ratio of domestic species, divided between the Early and the Middle Neolithic (diagram: Martin Hinz).

Figure 11: Visualisation of the change of the ratio of domestic species within the bone assemblages of all sites. Dots represent individual sites, whereas the solid line represents a running mean as a trend showing the development. Lines represent the temporal phases: before 3800 cal BC EN Ia, 3800-3300 cal BC EN Ib – EN II, after 3300 cal BC MN. The shaded area marks the time of the potential crisis from 3400-200 cal BC (diagram: Martin Hinz).



groups of sites, one with a domesticated ratio of more than 80 % and a second group with less than 40 % of domesticates. Moreover, there are some sites with ratios in between these levels.

For the time of the possible crisis (3400-3200 cal BC), little evidence is available, but after that the general ratio of domesticates rises up to 90 %. The cause of this is

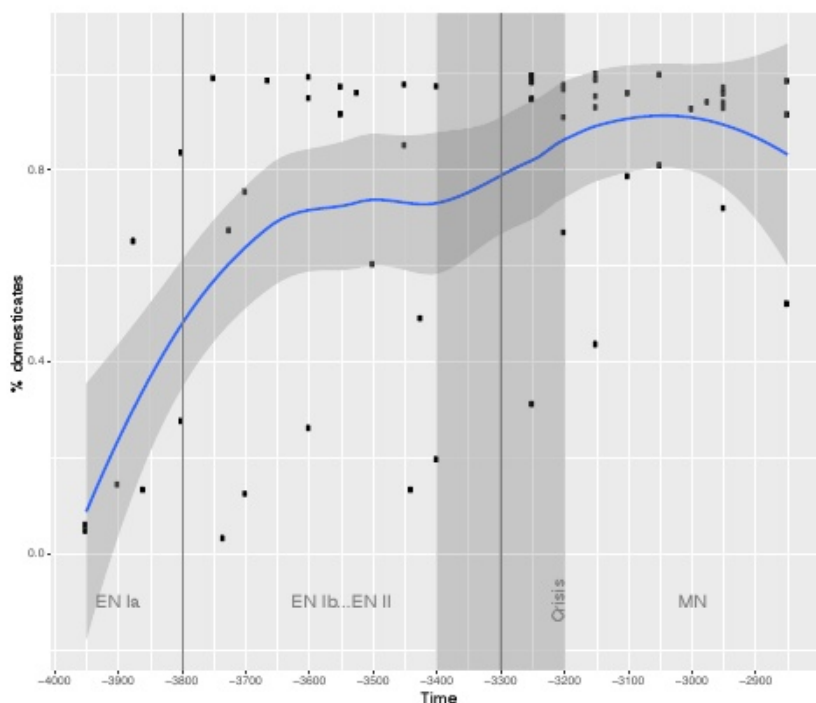


Figure 12: Visualisation of the change of the ratio of domestic animals in total within the bone assemblages of all sites. Dots represent individual sites, whereas the solid line represents a running mean as a trend showing the development (diagram: Martin Hinz).

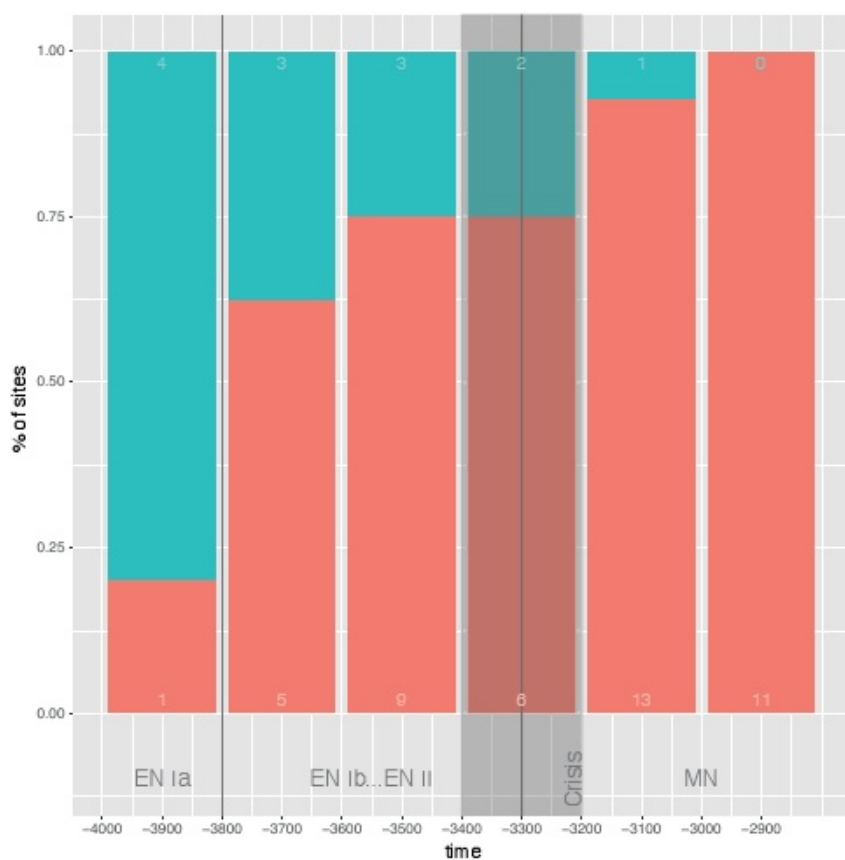


Figure 13: Percentage of sites with a dominance of wild or domestic animals (>50%). The numbers on the top and the bottom of each bar represent the absolute number of sites (diagram: Martin Hinz).

not a general increase in domesticates, but that the sites with a mean ratio of domestic animal bones of less than 50 % are nearly missing. This becomes even more obvious, if we compare the development of the number of sites with more and less than 50 % of bones from domestic species (Fig. 13).

While before 3800 cal BC, most of the sites were dominated by wild species, from 3800-3400 cal BC ca. 70 % of the sites show a spectrum with a majority of domesticates. During 3400-3200, there seems to be a shift in the subsistence strategy toward an exclusive reliance on domesticates, with only a negligible ratio of hunting.

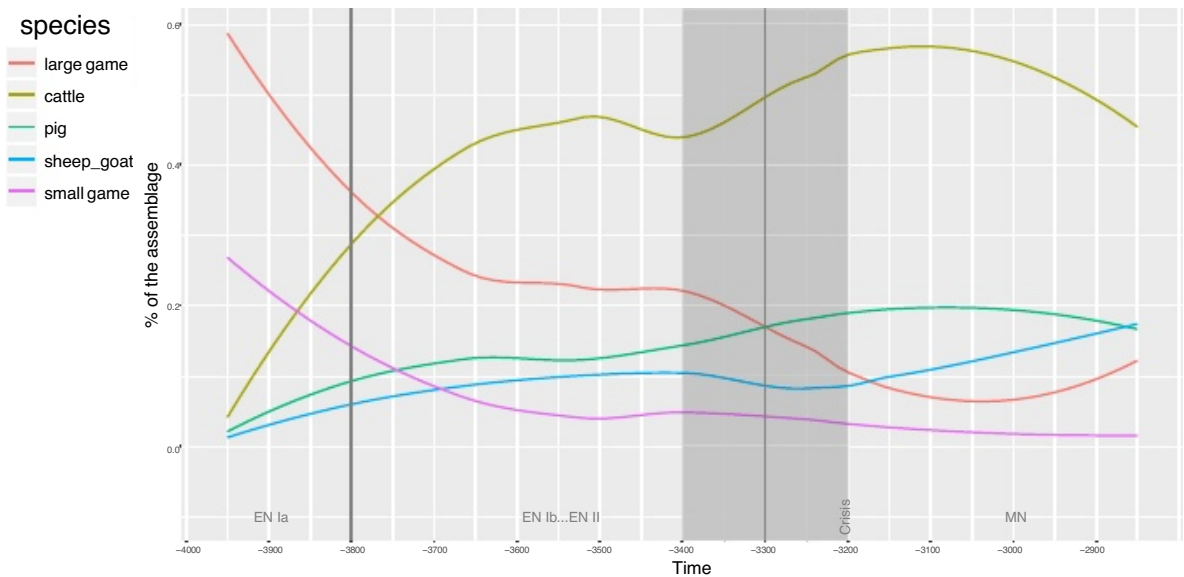


Figure 14: Visualisation of the trend of cattle, pig and sheep/goat as well as large (red and roe deer, elk, aurochs and wild boar) and small game or such that is not primarily used for subsistence (all other species) (diagram: Martin Hinz).

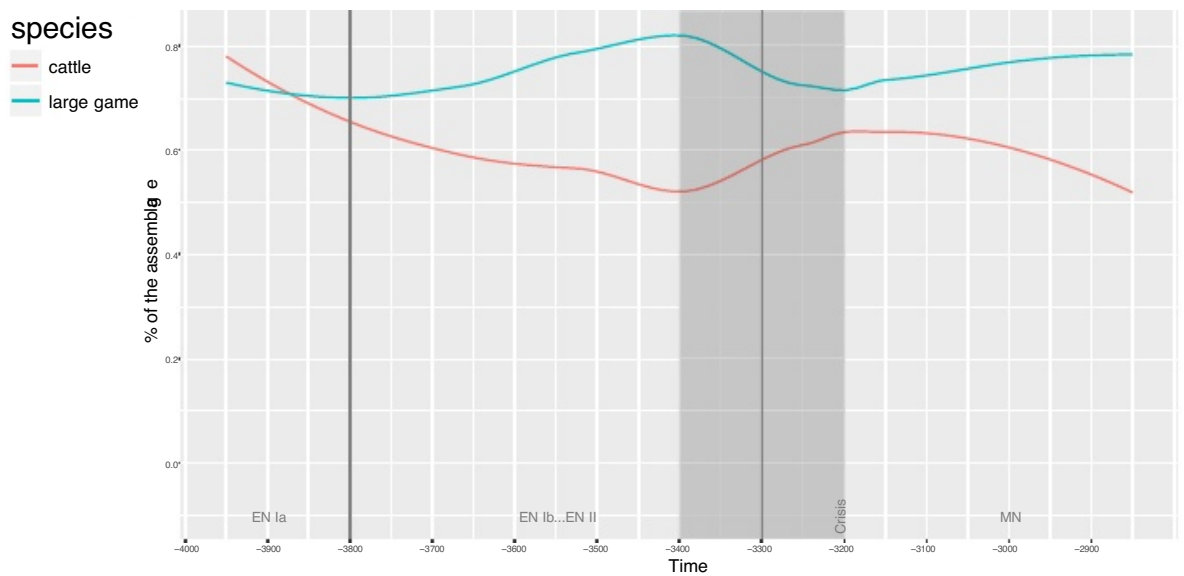


Figure 15: Visualisation of the trend of the ratio of cattle within domestic species and large game within wild species (diagram: Martin Hinz).

Cattle and wild species

We have seen that the ratio of wild animals within the assemblages declines over time. But which animal species take their place? Figure 14 shows the ratios of the domestic species that are primarily used for meat (cattle, pig and sheep/goat) in comparison to the ratios of large game (red and roe deer, elk, aurochs and wild boar) and small game or such species that are not primarily hunted for their meat (remaining).

From this chart, it becomes clear that the curve for cattle mirrors the curve of large game. Such a mirroring can also be observed if we compare the ratio of large game among the wild animals with that of cattle among the domestic species (Fig. 15). It is evident that cattle primarily assumes the role that large hunted animals formerly occupied.

Interim conclusion: Stages of human/animal relations

The analysis showed that the development of animal use, hunting and husbandry during the Funnel Beaker period is not simply a decline of hunting with the substitution of hunted meat by domestic animals. Rather, it appears that we are confronted with different stages of a complex transition.

From the beginning of the Funnel Beaker complex until 3800 cal BC, the spectrum of the sites is dominated by wild animals, with an addition of some domestic species, mainly cattle. Sites of this character are also visible in the next phase (3800-3400 cal BC). But at the same time, we can observe the establishment of another type of sites that is dominated by domestic species with only a small proportion of hunted animals. While we have little evidence for the time span from 3400-3200 cal BC, it is clear that this type of site does survive, while the sites with primarily wild animal remains vanish.

It is clear that the sites with a dominance of wild animals fulfilled a distinct function in the economic and social network of the Neolithic people, considering the distinctly different animal spectrum. It also does not seem plausible that these sites only represent situations in which hunting was of higher importance due to crisis, crop failures or other kinds of hazards. In such cases, we should observe a more continuous range. The explanation can also not be put forth that hunting was practised at these sites only during times when the inhabitants were free of agricultural duties: This might be a valuable explanation for animals hunted at sites with a dominance of domestic species, but it does not explain sites where wild animals represent the majority of bones.

Hunting may have possibly played a role in the ideology and/or in the social and political economy. This role must still have been important even where domestic species were available, but the relevance of hunted animals was replaced by cattle in later times. Both hunting as a 'traditional' subsistence strategy and hunted meat might have had a specific value. In many past and contemporary societies, hunting had a high social status. Moreover, there is a second aspect: The butchering of large game as well as cattle provides or even presupposes the opportunity to share the acquired provisions. These shared resources are likely to be a currency in the social bargain.

We have evidence that cattle gained a specific role in the ideology during the Middle Neolithic, be it the cattle burials of Northern Jutland (Johannsen/Laursen 2010) or the cattle depositions/burials of Central Europe (Pollex 1999; Szmyt 2006). Was this revaluation necessary so that cattle could become a social tool replacing hunted meat? Cattle-raising has another advantage over hunted meat: it is possible to share the stocks while it is still 'on the hoof'. If it is true that a social reorganisation has to be assumed

after 3400 cal BC, in connection not least with the establishment of larger settlements and resulting increases in social tensions leading to the establishment of a new social structure in the Single Grave period, the time had probably come to abandon the traditional economy that incorporated a substantial hunting aspect. Conceivably, it was this slight shift in the value of cattle that resulted in a changed configuration of the socio-political arena, replacing large communal building projects, such as megaliths, by feasting activities that gave individuals the possibility to set the agenda on the basis of an unequal access to the resources for such feasting – *i.e.* the number of cattle. These individuals appear to dominate the following Single Grave period at least from a ritual perspective, documented by the burial mounds of that time.

Conclusions

From what has been put forth, it is evident that although people in the study area of Stormarn-Lauenburg occupied the same places within the landscape from the Mesolithic onward and during the Neolithic period, this landscape and its perception must have changed very much in character. During the final Mesolithic, the riverine settlement clusters represented only one spot within the economic network, and the Mesolithic inhabitants of this region are likely to have been highly mobile during the seasons. Hunting was certainly an important part of the subsistence, yet the hunt for large mammals may have served more than just subsistence purposes.

In the Early Neolithic, we observe an even stronger concentration of these settlement clusters, and due to the nature of the economic system everyday mobility must have decreased. At this time, the centre of the landscape was surely the permanent settlement, representing one anchor point, while other foci and places of significance were marked by an intentional construction of places such as long barrows and megaliths. This mobility pattern, and the fact that landscape was also actively shaped by the clearing of fields and the building of places, would certainly have influenced conceptions of the environment. Hunting still continued to be an important activity, probably so important that it, together with access to aquatic resources, influenced the location of the settlement, respectively led to the stability of the settlement locations from the tradition of the Mesolithic. At the same time, it is not likely that the importance of hunting, especially for large game, resulted from the number of calories or protein that

it contributed to the diet. In the first phase, it seems, that 'husbandry and agriculture substituted fishing' (Johansen 2006, 218), not hunting. The reason for this must have been that its value must have been seen in its social significance as a tool for risk minimisation, and its function in the social arena.

During a time of change, approx. 3400-3200 cal BC, coinciding with the transition from the Early to the Middle Neolithic, it seems that this function switched to cattle, as can be observed in the changes in the ratio of different animal species at Funnel Beaker sites. The situation described here might be very similar to those described by David Orton (2008, 307, see also 121-123) for the Vinča communities: "Regional scale social trends, with domestic animals [meaning primarily cattle, M.H.] [became] increasingly important in the political economy as tensions between household and community increased". Archaeologically, the disperse distribution of non-permanent sites with a simultaneous stability of permanent settlement locations also underlines a changed

economic practise most likely reflecting mobile or transhumant cattle herding, while ritual practises connected to cattle show its growing significance in society. Again, a changed mobility pattern must have resulted in a changed perception of the landscape that now also became increasingly open, as pollen data indicate (Feaser *et al.* 2012).

Perceptions of landscape cannot be investigated without considering changes in the economic basis of a society that governs, to a large extent, the daily practises, which in turn determine world views. But this economy cannot be interpreted meaningfully, if its social embeddedness is disregarded. In this sense, this article represents an attempt to link the different layers of the complex term 'landscape'.

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