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Kooijmans, L.P.L.; Jongste, P.; et al., ; Jongste, P.F.B.; Kooijmans, L.P.L.

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# SCHIPLUIDEN

## A NEOLITHIC SETTLEMENT ON THE DUTCH NORTH SEA COAST *c.* 3500 CAL BC

EDITED BY LEENDERT P. LOUWE KOOIJMANS
AND PETER F.B. JONGSTE

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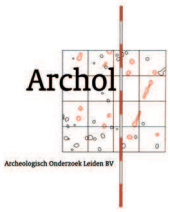


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# PART IV

# SYNTHESIS

# 27 Schipluiden: a synthetic view

Leendert Louwe Kooijmans

*The local group at the Schipluiden site consisted of four households, together comprising around 25 persons, who lived on the dune on a permanent basis. For the procurement of stone and flint they were dependent on contacts with a hinterland in the south and the east. They did not have all the required wood species at their disposal either. A broad range of tools and other utilitarian objects were produced and used at the site. Most of the activities can be assigned to the men or the women in the group.*

*The first pioneers who arrived at the dune settled in an unusual coastal landscape that was from time to time flooded during marine ingressions. Their subsistence strategy was based on the exploitation of a broad spectrum of natural resources in different ecozones, some in winter, others in summer, combined with stock keeping and cereal cultivation.*

*To be able to describe how the local community functioned we must regard it as part of the regional group that exploited this region and the surrounding area. Approached from this angle, the community's way of life proves to have been far less agricultural than is suggested by the large numbers of bones found at the site. It is instead a good example of an extended broad spectrum economy. The isotope signal of the human skeletal remains shows that aquatic/marine resources were of substantial importance. Schipluiden can be seen to represent a late stage in the very gradual, step-by-step neolithisation process, with many elements recalling the preceding Mesolithic and the Swifterbant culture.*

## Man and materials

### 27.1 The local group

#### *27.1.1 Complete households*

The site's first occupants settled not on the dune itself, but at its foot – behind the dune, viewed from the water courses. This particular spot may have been selected out of a need for shelter in the open landscape. A number of open clusters of postholes on that side of the dune testify to small houses that were used for a relatively short length of time. The first unlined wells were dug there, too, in this first occupation phase. On the other side of the dune waste produced in butchering was dumped in the tidal creek. Occupation soon moved to the top of the dune, most probably due to floods – in the flat landscape the 1.5 metres' height of the dune meant the difference between a dry yard and wet feet.

The dune was occupied by complete households, *i.e.* men, women and children. This is first of all evident from the analysis of the human skeletal remains, which, besides men, were found to represent children aged between 2 and 8 and probably also one woman. It should be borne in mind that the archaeological population does not constitute a representative sample of the original population. The underrepresentation of women and children will be due to differences in the treatment of the deceased. The attested minimum number of 17 individuals is less than 10% of the deceased one would expect for a population of 4-5 households in around two centuries.

A second argument for assuming the presence of complete households on the dune is the broad range of artefacts made of a wide diversity of materials that were manufactured and used at the site. Pottery was made from local clays, tools of flint, stone, bone and antler were made and repaired on the dune. The activities that can be inferred from the typology of those tools and from the analysis of the use-wear traces observable on them represent the full range of activities of normal households. All this is characteristic of a base camp.

This conclusion is further supported by evidence relating to subsistence. The exploitation of the great diversity of food sources available in the site's immediate and distant surroundings is likewise characteristic of a basic function within a wide territory (see section 27.8).

#### *27.1.2 Size of the group: four households*

The area of the entire dune was in all the occupation phases organised as a settlement site. This is primarily evident from the fact that waste was dumped around the entire circumference of the dune in every phase. Only the evidence relating to the disposal of waste in phase 1 is not entirely complete. In phases 2b and 3 the dump zone shrunk somewhat along the southeastern edge of the dune because the rising groundwater led to a reduction in the area suitable for occupation. In each phase the daily activities extended into the plain and (later) the swampy zone surrounding the dune, in phase 2a even over a distance of at least 20 metres.

Thousands of postholes show that the entire top part of the dune, from the southwestern to the northeastern end, was intensively used. Four clusters were distinguished on the basis of the clustering of the holes of the thickest posts; they are assumed to represent individual yards. Diffuse clusters in the southeastern dump zone corresponding to these yards lead to the conclusion that the local community living on the dune – from phase 2a onwards at least – consisted of four or five households, *i.e*. around 25 persons. In this respect this local group does not – or at least not demonstrably – differ from the Late Mesolithic group that is assumed to have lived at the almost 2000 years earlier site of Hardinxveld. The greater size of the Schipluiden site will be attributable to the fact that this settlement was occupied on a permanent basis, and a much larger range of activities were carried out there.

### *27.1.3 A permanent settlement*

One of the most important questions that must be asked when dealing with settlements dating from a period in which people began to exchange a mobile existence for a more settled way of life is whether the settlement was occupied on a permanent basis. Generalising the conclusions obtained for Hardinxveld we assume that people in the preceding Mesolithic exploited a large territory in different seasons from different camps, which were all strategically chosen with a view to the specific seasonal activities. An important characteristic of the Neolithic way of life, besides the adoption of crop cultivation and stock breeding, is also the investment of ever more effort in the construction of settlements – in the building of larger houses and storage facilities and in the creation of permanent fields. The maintenance required by those structures and the necessary tending of the crops will have made a fixed settlement perhaps not immediately necessary, but certainly desirable.

A first argument in favour of permanent occupation is the construction and maintenance of sturdy houses and a settlement layout based on their yards. Unfortunately we were unable to make out any house plans at Schipluiden, but we consider the dimensions of the postholes and their linear arrangements good arguments for interpreting the clusters as representing the sites of small, well-built rectangular houses like those at Wateringen 4 and Ypenburg (Raemaekers *et al*. 1997; Koot *et al*. in prep.). The postholes moreover imply a high degree of continuity: new houses were each time built at the site of a former house. The phasing and spatial patterns of the southeastern dump zone show that the sites of all the houses remained unchanged and the dune was divided into fixed yards. This fixed layout of the entire area was at some time accentuated by the construction of a fence that enclosed the entire site. This implied a substantial communal effort.

A formal cemetery of the kind found at Ypenburg (Koot/Van der Have 2001; Koot *et al*. in prep.) would have been a strong argument in favour of permanent site use, but the absence of such a cemetery is not an argument to the contrary. This difference with respect to Schipluiden does in our opinion not imply a functional difference between the settlements, but more a difference in the occupants' preferences and their urge to express their collectiveness. The selective burial of certain members of a community and differentiated treatment of the deceased are more in line with a permanent than a temporary settlement.

Besides these spatial arguments there are also material ones. The diatom research showed that all the pottery was made from estuarine clays, and was therefore most probably locally produced. There is no evidence of any import from a different ecological zone. The fact that people did not always use the best and most suitable wood species to make certain objects, for example axe hafts, but instead less appropriate, or even inferior, regionally available wood also implies close ties between the occupants and the surrounding region. This is something we wouldn't expect in the case of a community that regularly moved around within a larger annual territory.

Additional evidence of year-round presence at the site is provided by the results of the various biological analyses (section 27.8) in the form of indications of activities in specific seasons: fishing in the estuary and cereal cultivation in summer, the gathering of wild fruit in late summer and autumn, the hunting of swans, geese and ducks and the collection of shed red deer antler in the winter half of the year.

There is one comment that should be made in this context and that is that the occupants kept digging new wells on the northwestern side of the dune in the earliest occupation phases. Those wells are assumed to represent *ad-hoc* responses to unpredictable, incidental marine ingressions in those early days. An alternative interpretation would be that these wells reflect seasonal use of the site, with a new well being dug with each visit to replace the former that had filled up during the community's absence. This might be a realistic option for phase 1, about which comparatively little is known, but it is incompatible with the abundant evidence of year-round presence in phase 2a.

## 27.2 Tools and activities

At sites with normal, dry conditions the preserved material culture is usually limited to flint, stone and pottery, but thanks to the good preservation conditions in the wet peripheral zone of the dune and the fills of the features we have at Schipluiden also a sample of artefacts made of more perishable, organic materials: bone, antler, wood and even plant fibres. This makes us realise that the ratios of excavated artefacts manufactured from the various raw materials are

exclusively determined by the chances of those artefacts' survival, and tell us nothing about the artefacts' original importance to the occupants. The discovered artefacts made of organic materials, especially those of wood, are to be seen as the proverbial tip of the iceberg – they provide only a glimpse of a much more varied spectrum. A good indication of the important roles of fibres, skins and wood are the frequencies of use-wear traces on the flint, stone and bone tools. Use-wear traces, rejected waste and semi-finished artefacts enable us to reconstruct the production processes of certain categories of artefacts and identify the tools that were employed in them.

### *27.2.1 Raw materials*

Most of the required raw materials were provided by the local vegetation, fauna and soil, but certain essential materials were not to be found in the region. Some of them could be procured via expeditions. Only special types of flint and stone, axe blades and pyrite will have been obtained via social networks.

In the days of the Schipluiden settlement there were no large deciduous trees in the Delfland region: no oaks, ashes, limes, elms or yew. The need for wood of those species had to be met via import. Ashes probably grew fairly close by, in the forests aligning the major rivers or else on river dunes such as those of Hillegersberg (20 km) or Nieuw-Lekkerland (30 km). The same holds for oaks, which were in the Neolithic generally used for the manufacture of dugout canoes. The closest sources of yew were probably the sandy soils of the province of Noord-Brabant (>40 km). The distances concerned could be covered in expeditions of one or a few days. As far as the beautifully shaped ash paddles and the ash 'canoe partition' are concerned, there are two options: they were either made at the site using imported wood or they were obtained as finished artefacts through exchange. The scarce pieces of unworked ash and yew wood constitute an argument favouring the first option.

The sources of some of the other materials are still unclear. The main type of flint used as a raw material – rolled flint pebbles – could primarily derive from the Pas de Calais (200 km) coastal area, and the same holds for the jet, for which a primary source in that same region, near Boulogne-sur-Mer, is known. The two materials may however have been transported northwards by marine currents and have been picked up closer by, for example along the beaches of Flanders, the jet possibly even on the beach of Delfland itself. Small vein quartz river gravels, flat quartzite pebbles and even amber may have been washed out of the subsoil and picked up on the beaches, too. Two problems are that insufficient observations have been made in natural exposures of ancient beach deposits to verify the occurrence of such materials, and that present-day beach finds do not provide a reliable frame of reference for the past due to various contaminations and a higher sea level. Large pieces of selected types of stone, pyrite, axes and large flint tools were certainly imported from distant sources. Dependence on long-distance social exchange for such high-quality materials and artefacts is not specific to this site, but indeed inherent to the Neolithic in general, and not only that of this delta area. The combination of a simple flake industry based on readily available small pieces of flint and large artefacts made of 'exotic' flint has been observed at the other Hazendonk sites, too, and that is a good reason for assuming that the rolled flint pebbles of Schipluiden were also collected by the occupants themselves, not too far away from their settlement.

### *27.2.2 Tool manufacture*

#### *Axes*

Axes were perhaps the most valued possessions in view of their distant origins. Most are made of flint; fragments of axes of other types of stone (quartzite) are much less common. The axes may have been imported as semi-manufactured objects and polished at the settlement or they may have been obtained as complete, finished artefacts in the exchange network. What we do know for certain is that damaged and blunt axes were sharpened at the site using grindstones of quartzite or quartzitic sandstone. The axes will have had a long life and were used until they were completely exhausted. A few small, almost totally worn axes were found in the dump zone. It is not very likely that they are representative of the tools used by the dune's occupants. Strenuous chopping work, certainly the felling of trees for house construction, will have called for axes that were a good deal heavier than the recovered small specimens. Some surviving fragments show that the occupants indeed also had larger, heavier axes. We have moreover found some handles of axes of such a larger size.

#### *Flint flake and blade tools*

Crude flint, usually in the form of river gravels, but also broken axes, was knapped at the site using a simple, usually hard flaking technique. The flakes were used to make arrow points, scrapers, drills and strike-a-lights, but most were only retouched or were used without further flaking. The occupants also imported larger retouched blade and flake tools. The flint tools were mostly used directly for processing soft materials such as skins and plant fibres, and to a much lesser extent for carving bone and wood. A few flint artefacts that were used for cutting silicious plants show the typical 'sickle gloss' formed in harvesting cereals.

Many flint tools originally had a handle, as can be inferred from typical microscopic hafting traces and tiny remains of the tar that was used to hold them in place. Unique to the Netherlands is a crude piece of birch tar that was probably mixed with bee's wax.

*Stone*

Stones were often used in a crude form, as cooking or hearth stones. Other apparently unworked stones appear to have been selected mainly on the basis of stone type, shape and dimensions for use as querns, grindstones or hammer stones, the latter for example for knapping flint and stone, breaking open bones or roughening querns. Besides two small, complete specimens, several dozen fragments of querns of a coarse-grained quartzitic sandstone and granite were found, plus a few rubbing stones. The micro-wear and phytolite analysis showed that some of the stones were used for grinding cereals. Like worn, broken axes, exhausted grindstones were also used for producing flakes.

Most stone tools were recovered in the form of fragments that could not be refitted, so we may assume that many have disappeared without trace. They may have been crushed for use as temper in the pottery or they may have been secondarily used, for example as net sinkers or for securing fish traps and then have been lost off-site.

*Bone and antler tools*

As in earlier and later times, metapodia were usually selected for the manufacture of bone tools. This is not only a tradition, but also a rational preference, metapodia being the most compact, straight types of bones. This 'metapodial tradition' comprised an entire toolkit of chisels and awls, which were finished and sharpened with grindstones. Awls were used predominantly for processing fibres and skins, chisels for woodworking. Alongside this systematic production line we also observe evidence of a more opportunistic use of suitably shaped bone splinters.

Red deer antler beams were in the Neolithic used mainly for the manufacture of axes and axe handles; the tines were used predominantly as awls and punches. This was the case at Schipluiden, too. The occupants used both gathered shed antler beams and the antler of shot animals. The antler was divided into parts by roughly breaking it or carving transversely all the way round it. Strips were also cut longitudinally from the beams using the groove-and-splinter technique, but the end products of this technique were not found at the site and are not known from elsewhere either. This technique was very popular in the Upper Palaeolithic and Early Mesolithic, but was rarely used in the Neolithic. For Neolithic examples of its use we must turn to Switzerland (Cortaillod culture) and the Hebrides (Oban culture), where it was in both cases used for the manufacture of harpoon points.

Tool marks show that flint implements were used in these different forms of bone and antler processing, but oddly enough virtually none of the tools in question were identified in the use-wear analysis, in spite of the fact that the traces concerned are readily identifiable. This could mean that fairly inconspicuous flakes were used for this purpose, or that bone and antler processing was relatively rare.

*Wood*

Wood was an important raw material that was used for many different purposes. This is indirectly evident from the large numbers of axe fragments and pieces of grindstones found at the site. Large quantities of wood were required for building houses and fences and making fish weirs and so on. The sharpened ends of the fence posts show that the employed axes were most effective. Once a tree had been felled, its trunk was cleft tangentially or radially using wedges. Tangential cleaving may have been the first stage in the production of dugout canoes or it may have been used for producing posts and beams with square cross-sections.

In manufacturing artefacts from split wood and thick branches, the occupants used predominantly differently sized bone chisels, but also flint tools and heavy flakes of quartzite and quartzitic sandstone – the latter both for 'sawing' or carving and for sanding the carved wood. Some objects testify to great skill and workmanship in fine woodworking, such as two paddles, the axe handles and artefact no. 9411 of unknown function.

The diversity of wooden artefacts is greater than at any other Stone Age site in the delta area. All the artefacts except the axe handles seem to have been intended for hunting and transport. Besides objects that can be easily interpreted, such as paddles and a bow, there is also a series of mysterious objects for which we have no parallels and with which our imaginative powers are unable to associate a function. One of the objects could be part of a boat or a canoe, others could be parts of traps. Whatever those objects may be, the Schipluiden people did evidently not make exclusively simple implements, but also more complex, composite pieces of equipment consisting of several parts. The assemblage of wooden objects seems to represent a random selection of a multitude of artefacts.

### *27.2.3 Processing of soft materials*

Flint flakes and tools were used mainly for processing soft materials such as skins and plant fibres.

Two unique pieces of fabric of thin willow bark fibres – or rather parts of fine basketry made using the 'looping-around-the-core' and a twining technique – and a find consisting of individual strips of hawthorn bark represent a group of materials that was originally very important but of which remains are rarely found. The finds in question are probably remains of mats and clothing. The high percentage of use-wear traces formed by silicious plants among the flint tools is an indication of the importance of this group of materials. In making the basketry, bone awls were inserted between the loopings to make openings through which the bark fibres could be drawn. Besides for these fine applications, plant fibres and bark were of course also used on a large scale for the manufacture of rope, (fishing) nets and traps, but no

Figure 27.1 Bird's-eye view of a reconstruction of the Schipluiden settlement in its natural surroundings around the middle of the occupation period. On the dune lie four small farms surrounded by yards and (hypothetical) kitchen gardens and enclosed by a fence. Outside the settlement crops are cultivated on the high salt marsh deposits in the beach plain and cattle are pastured. The open landscape is intersected by tidal creeks and dotted with dunes with a shrub vegetation. The coastline bordered by a row of low dunes is visible in the distance.

remains of such objects were found at Schipluiden. They have however been found at younger and older sites such as Hardinxveld, Bergschenhoek and Vlaardingen (Louwe Kooijmans 2001a, 1987; Van Iterson Scholten 1977).

No skins or hides were found, but we do have indirect evidence of them. In the first place in the form of cutting marks on bones associated with skinning and secondly abundant traces on flint tools, especially scrapers, indicating that those tools were used to scrape both fresh and dry skins. Holes were made in the skins with bone awls. A third source of indirect evidence consists of the ratios of different types of bones that imply that only the skin or fleece of some animals was brought back to the settlement. This holds for brown bear, at least some of the aurochs and lynx. We assume that the skins of most of the animals were used to make clothing and covers for benches, beds and the like.

We finally also have indirect evidence of the use of feathers. Some birds that are nowadays not considered to be game birds, such as white-tailed eagles and ruffs, may have been shot especially for their feathers, which were very suitable for use in arrows or for decorative purposes.

### *27.2.4 Special activities*

*Ornaments*

Crude pieces of jet and small pieces of amber were at the site turned into beads using flint drills and knives, which show distinct traces of this activity. Things did not always

go as intended, which led to interesting evidence of the manufacturing process.

*Fire*

Pieces of flint – both intentionally shaped artefacts and pieces that happened to have a suitable shape – were used as strike-a-lights in combination with pyrite and – presumably – punk powder, as is beautifully attested by the exceptional grave goods found in burial 2.

*Pottery*

Pottery manufacture proves to have been an entirely independent activity. The pots are simple, bucket-shaped vessels of crude workmanship, formed from thick coils of clay. The outside of the pots was sometimes 'decorated' with fields of impressions made with the fingertips or objects. The fields are devoid of any patterns, serving merely as a form of roughening of the surface. Two variants of pottery were produced: a slightly thinner ware that was tempered with crushed shell and shows little decoration and a slightly thicker variety that was tempered with ground quartz and was more frequently decorated. The first variant gradually went out of use in the course of the occupation period.

The diatom research showed that the pottery was made from local clays. The tempering with crushed shell is a distinctive technical feature and the almost complete absence of linear decoration a distinctive stylistic feature. The use of ground quartz and – less often – quartzite or granite as tempering material is surprising in this environment in which stone was rare or even completely absent. Quartz gravel may however have been collected on the beach. So all in all, the pottery was certainly locally produced.

## 27.3 Division of tasks in the local group

In fairly non-complex communities such as that of Schipluiden each household was self-sufficient, although there were of course also activities demanding a collective effort, such as the construction of houses. There was at most some specialisation on an *ad hoc* basis, associated with special, individual skills. In principle, all activities within each household were divided on the basis of age and sex, according to the group's traditions. There were on the one hand a number of 'rules', *i.e.* common, stereotype divisions of tasks, but on the other there was also quite a bit of cultural variation, often emphasised by anthropologists. The archaeological record offers no indisputable clues as to the allocation of tasks, so no concrete statements can be made and no assumptions can be verified. It is nevertheless challenging to speculate about how the activities at Schipluiden may have been divided so that all the members of the community contributed the effort of which they were organisationally and physically capable. We will in the following restrict ourselves to the various craft activities. The tasks associated with subsistence will be discussed later in this chapter.

The four households functioned together as a single unit. As far as the earliest phases (1/2a) are concerned this is evident from the clustering of wells along the northwestern periphery of the dune, which were evidently a collective source of water for the entire group. For the later occupation phases (2b, 3) it can be inferred from the fence that enclosed a large part, if not all, of the dune and of which large stretches were in the course of the occupation period replaced on several occasions. The construction of houses will, in view of the required manpower alone, have implied work for the entire group.

There will also have been household-specific and individual activities. The skeletons of the adult males systematically show evidence of the heavy work they did during their lives. That heavy work will have included the felling of trees, strenuous woodworking, the construction of houses and fences and the manufacture and maintenance (polishing) of axes. Flint and stone knapping are likewise generally regarded as typically male tasks. This means that the flint tools that the women required for their tasks were also provided by the men. The wooden implements used for hunting and fishing, ranging from canoes to traps, will also have been made by the users themselves. In practice this means that all fine carpentry was men's work, including the production of the required tools, in particular the bone chisels and quartzite flakes. We assume that the manufacture of fish traps, including the production of the required rope by twisting fibres, also belonged to the male domain, as did the making and repairing of nets – they are all activities for which the required skills were needed at the place of action, far away from the settlement. Growing boys would help the men and in doing so learn the skills they would later need themselves.

The preparation of food – from grinding and crushing to cooking – and the time-consuming manufacture of clothing and other fabrics from fibres and skins are typical female tasks. To this may presumably be added pottery production as a domestic activity: it was an independent activity for the benefit of specific women's work – the preparation of food. The women will have had at their disposal flint flakes and scrapers, bone awls, querns and the hammer stones needed to roughen them, plus stone for grinding into pottery temper. The women may have made their bone awls themselves. They will of course have involved the young girls in their work, getting them to help them so that they would learn the skills in the process. It is not certain who made the jet and amber beads and whether the failed beads are to be regarded as the products of children's efforts; from the viewpoint of the learning process this is indeed an attractive interpretation, but it does not agree with the presumed value and scarcity of this material.

Figure 27.2 Artist's impression of the Schipluiden settlement. Visible in the foreground is a muddy trampling zone at the foot of the dune, along which the occupants are building a fence to keep the cattle outside their settlement. In the distance are other low dunes whose vegetation includes the juniper shrubs that yielded the wood for the fence posts.

The grave goods from burial 2 finally show that the making of fire was probably surrounded by an aura of magic and was probably a privilege of the leader of the household. Main-taining the cooking fires will however have been an everyday activity, for which the women and children gathered the required firewood.

## 27.4 The wider social group

The sources of the raw materials and stylistic features show us to which wider community the Schipluiden occupants belonged. That was primarily the Hazendonk group in the rivers area, within which the stone procurement took place. Like the occupants of all the other Hazendonk sites, the Schipluiden community had contacts in a southerly direction, extending to the south of Belgium, via which axes and large flint blade tools were obtained.

### *27.4.1 Raw material lines* (fig.27.3)

The occurrence of special mineral raw materials needed for the manufacture of essential artefacts is often restricted or even very localized, so they usually had to be imported from other areas. Such 'raw material lines' reflect the areas and the communities with which contacts were maintained. Those contacts may have comprised expeditions by small special task forces or direct or indirect exchange relations. Sometimes statements can be made about such contacts on the basis of the nature of the materials, the distances that had to be covered and the distribution pattern relative to the source. In the Lower Rhine Basin it is however often difficult to identify sources due to a shortage of references in the form of material studies based on sound evidence, the absence of specific distinctive features of some types of stone and the materials' scattered distribution in

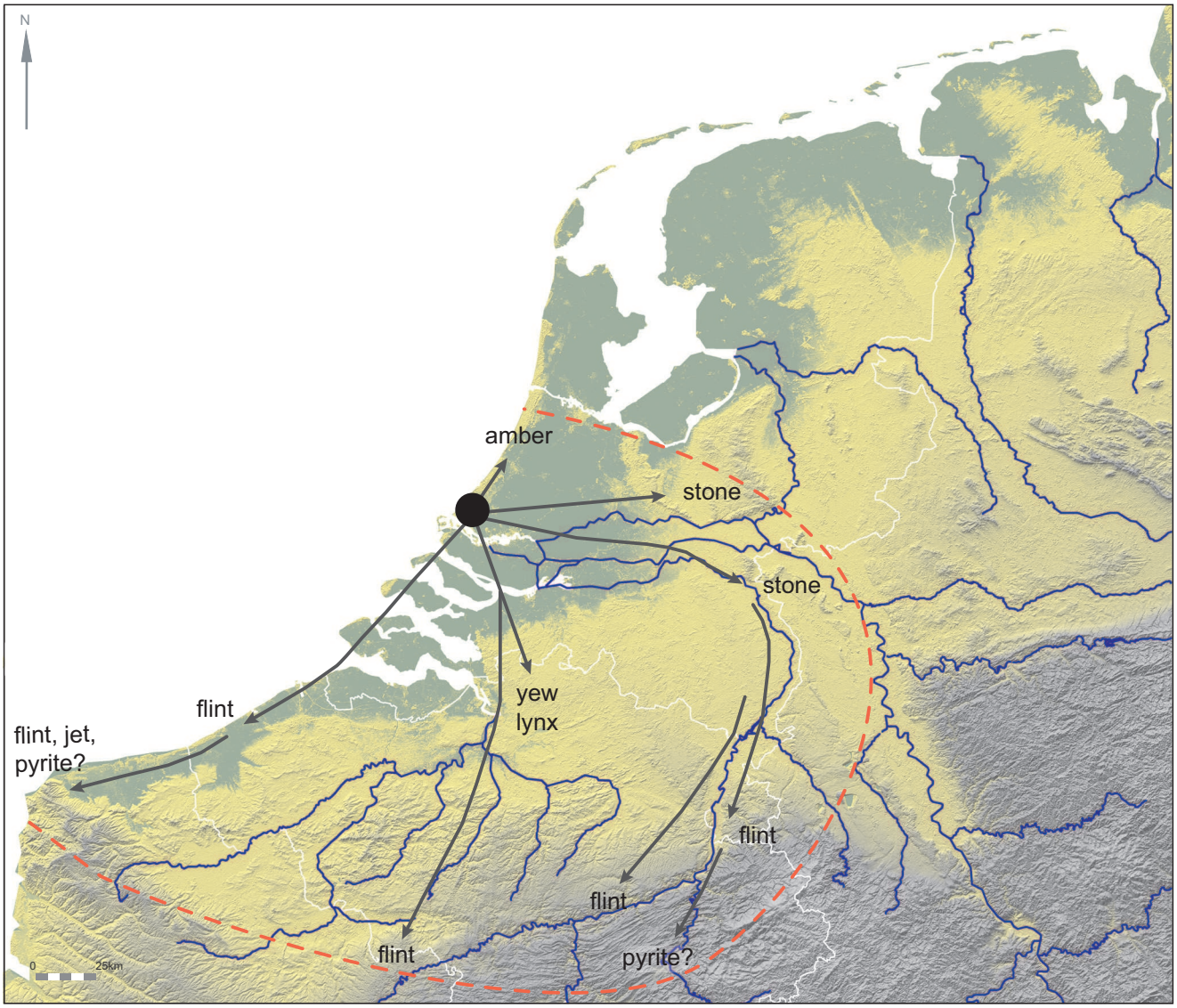


Figure 27.3 Contact lines of the Schipluiden occupants based on the origins of materials that were not locally available. The lines reflect the occupants' interaction sphere, which coincided largely with the distribution area of the Hazendonk pottery style group, but extended as far as the Michelsberg area in a southerly direction.

secondary contexts as a result of transport by rivers and marine currents.

All this is particularly true of the delta area, where stones do not occur naturally or are very scarce. In the Delfland region some commonly used wood species were moreover unavailable.

The largest distances, of roughly 200 km, were covered for the procurement of flint axes and blades and blade tools made on mined flint from central Belgium, what is known as Belgian flint and flint from the well-known mines of Obourg. The pyrite nodules used with the strike-a-lights probably came from the same general direction, either from the Ardennes or from Pas de Calais. As the material concerned was fairly prestigious and was obtained via contacts that extended far into the area of a substantially different cultural tradition, we in this case assume a combination of mobility of the Schipluiden occupants and exchange.

The most prestigious artefacts known from this period that are assumed to have been distributed via exchange in long-distance networks – jadeite axes from the western Alps and

blades of Romigny-Léhry flint from the Reims area – are absent at Schipluiden, but then we would of course not expect to find such objects in the dump zone of a simple domestic site.

While the flint was obtained from the south, the larger pieces of other types of stone most likely came from sources in the east, namely the Meuse gravels. The sources in question cannot be specified any more precisely than 'somewhere between the ice-pushed deposits near Rhenen and the terrace gravels in the surroundings of Venlo', which lay some 80-150 km away. This holds for the quartzite and sandstone that were used to make grindstones, hammer stones and querns, but also for the pieces of granite and other igneous and metamorphic rocks that have no counterparts in the northern erratic material.

### *27.4.2 Stylistic affinities* (fig. 27.4)

So the lines of contact of the occupants of the Schipluiden dune extended in an easterly and a southerly direction, covering distances of 100 and 200 km, respectively. They correspond to cultural relations, based on similarities in stylistic features of the pottery and flint implements, respectively.

The Schipluiden occupants formed part of a simple, but original ceramic style group which we have termed the Hazendonk group after the pottery recovered from level 3 of the Hazendonk site (Louwe Kooijmans 1974, in press a). This is a phenomenon in the southwestern interaction zone of the late Swifterbant communities of the Dutch/northern German plain and the Michelsberg culture in the loess zone to the south of it. The Hazendonk group covers only a small style area, most prominent in the Dutch rivers area from the coast up to Nijmegen and with a series of small assemblages in the Limburg Meuse valley. The boundaries to the south and to the north are both ill-defined.

On the basis of its simple coil construction and coarse temper, the pottery is assumed to have been derived from that of the Swifterbant culture. It is certainly in no way related to the high-quality thin-walled Michelsberg ware. At some sites in the east a Michelsberg-like component in the assemblages testifies to southern contacts, but this is not the case in the west (delta area). The material culture, and therefore also the people, are consequently unmistakably regional in character. The lines via which stone was supplied to Schipluiden coincide precisely with this pottery province.

The entirely individual pottery style was combined with a southern, Michelsberg-inspired component in the flint artefacts, in which a dominant local river-gravel flaking industry was always combined with the import of larger, more prestigious tools made on large blades and flakes of mined flint. This is something we see in all the Hazendonk find assemblages. They comprise thick, triangular arrow points that are asymmetrical when viewed from aside, leaf-shaped points, large 'horse-shoe scrapers' and pointed blades that were used as piercers and reamers. The typical Belgian Michelsberg flake axes are absent, but that could be due to the late phase in the Michelsberg chronology. This absence is countered by an unusual type of 'tanged' scraper that is unknown in the Belgian Michelsberg assemblages. So the Schipluiden people did not indiscriminately take over or import the entire tool spectrum, but indeed selected what suited them most, showing a certain degree of material expression. Viewed on the basis of their flint, the Schipluiden people did not form part of the Michelsberg culture, but they did have close connections with it.

A third 'stylistic' feature is the distinctive burial posture with the strongly flexed, probably bound, legs, for which no native precedents are known and which appears to have been derived from an as yet poorly known Michelsberg tradition.

### *27.4.3 Cultural geography*

Thanks to a new comprehensive study of the Michelsberg culture in Belgium (Vanmontfort 2004) and additional information on the Netherlands (Verhart 2000; Schreurs 2005), the German Rhineland (*Untersuchungen* 1971-1982; Amtmann/Schwellnus 1987) and Westphalia (Eckert 1986; Knoche 1997) we now have a better view on the cultural patterns in the Lower Rhine Basin (Lüning 1967; Vermeersch 1987; Vermeersch/Burnez 1998). From Pas de Calais to the Münster Basin and in the Lippe region the Michelsberg culture, represented by settlement sites and a large number of enclosures, was clearly restricted to the clay and loess areas, including the sandy clay parts of Belgium. In Belgium two large, separate distribution areas can be distinguished – one in the Dender and Scheldt area and the other covering the entire part of central Belgium and extending in an easterly direction up to Hesbaye, which seems to be devoid of sites of this culture. The sites in South Limburg seem to be the westernmost of the Michelsberg cluster of the adjacent Rhineland. In areas of flint and chalk, flint mines were dug (*e.g.* Spiennes, Jandrin-Jandrenouille, Rijckholt) or flint was exploited at the surface.

The question always was how far the culture area extended across the sandy soils in a northerly direction, and whether its northern limit may even have lain in the Netherlands. A number of findspots are known in those northern areas – Aalter, Antwerp, Zwijndrecht, Lommel, Dilsen – but they yielded only isolated pots of this culture. The most probable interpretation of these finds is that they are objects that were exported to the north and were there deliberately deposited in burials. It is less likely that they represent actual expansion of the Michelsberg communities. Michelsberg settlement sites, which are readily identifiable by their characteristic flint industry, are completely absent on the sandy soils of

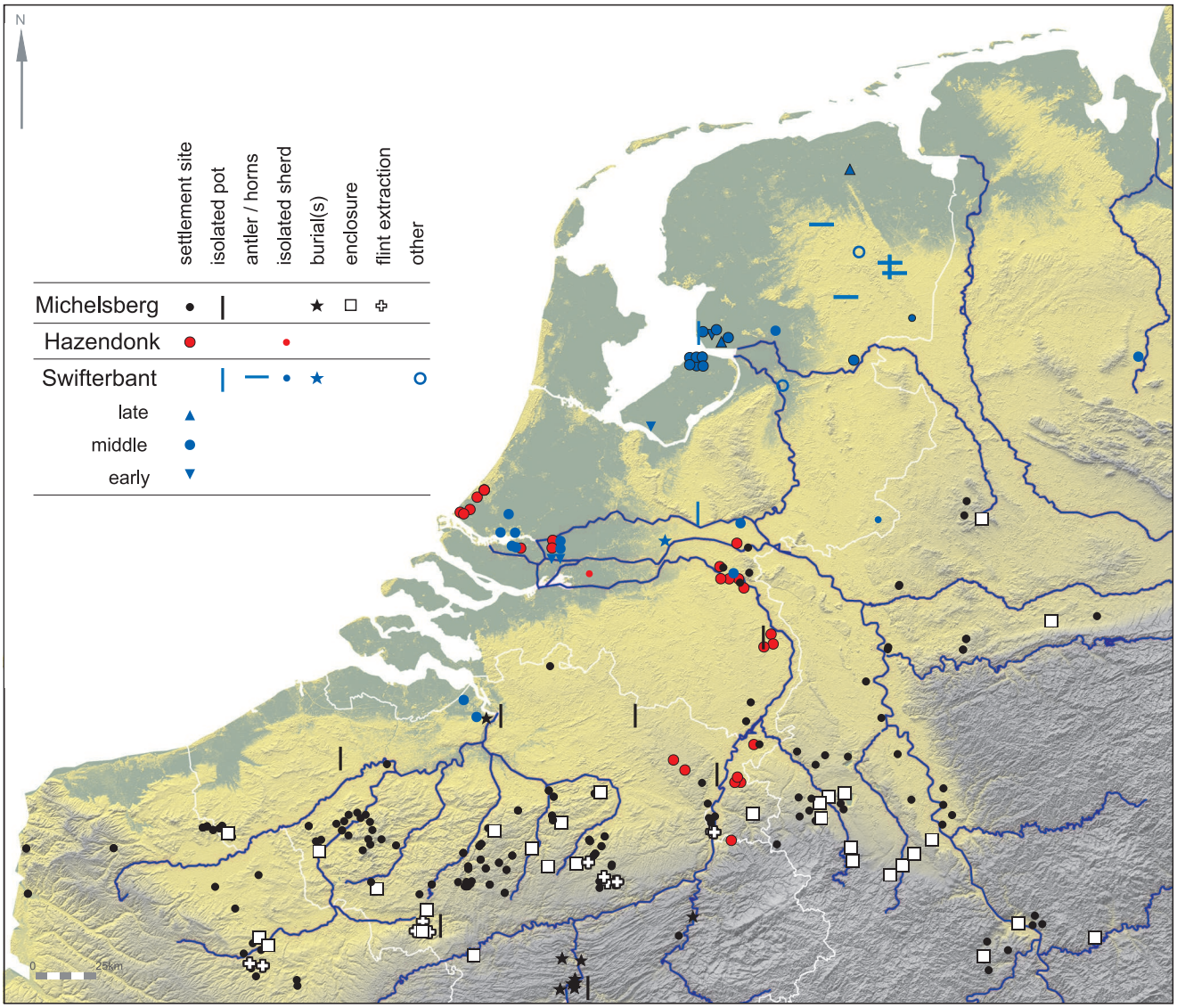


Figure 27.4 The Lower Rhine Basin showing sites of the Michelsberg culture, the Swifterbant culture and the Hazendonk group around 4300-3400 cal BC. The distribution of the sites shows that hilly areas were avoided. The density of the sites is not related to the original occupation density, but largely associated with preservation conditions and the intensity of research. The Hazendonk group evolved around 3700-3600 cal BC in the southwestern part of the late Swifterbant culture, under the influence of contacts with Michelsberg communities. Michelsberg seems to be confined to the loess zone, but dispersed small flint assemblages (not mapped) and a few isolated more or less complete Michelsberg pots have been found to the north of that zone. The status of this zone (and the southern limit of Hazendonk) is as yet unclear. The Meuse valley however seems to have been an important contact route.

Main data sources:

Michelsberg: Lüning 1967; Eckert 1986; Knoche 1997; Vanmontfort 2004; Verhart 2000; Toussaint 2002

Swifterbant: De Roever 2004; Raemaekers 1999, 2003/2004

Hazendonk: Louwe Kooijmans in press a; Amkreutz/Verhart in press

depositions: Ufkes1997; Prummel/Van der Sanden 1995; Van der Sanden 1997

northern Belgium and the southern part of the Netherlands. Conversely, settlements of the Swifterbant culture have meanwhile been found as far south as in the environs of Antwerp (Melsele, Doel). And both the import of southern pottery (Blicquy at Hardinxveld-De Bruin; Michelsberg at the Hazendonk site, Rössen and Bischheim at Hüde I) and the burial of complete pots (Bronneger, Hardinxveld-De Bruin, Urk-E4) are now known from a number of Swifterbant sites. All this implies that only the very ends of the southern contact lines of the Schipluiden occupants – and of the Hazendonk group in general – extended up to the edge of the Michelsberg world, where (by chance?) the most important flint mines lay.

An exception is the Meuse valley in Limburg, where a series of assemblages of flint tools made according to the typical Michelsberg tradition testifies to occupation. Some of those assemblages are associated with both Michelsberg and Hazendonk pottery (Verhart 2000). Even if we make allowance for the relatively high intensity of research in this area, the Meuse valley stands out as a zone of intensive north-south contacts – a corridor via which mined flint at least, if not other commodities, too, found its way northwards.

The Michelsberg world with its large enclosures and deep flint mines contrasted markedly with the world of the semi-agricultural occupants of the lowlands, and not only in the people's way of life, but also in population density.

## 27.5 Symbolism/symbolic acts

Although daily life must have been full of significant rituals, we have only a very limited impression of them via the settlement archaeology and only few or no relations are observable between the various phenomena. Most acts with a symbolic significance will have left behind no traces in the material remains of the human activities. Even so, we have at Schipluiden come across several artefacts and other evidence which we assume to have a symbolic connotation.

### *27.5.1 Treatment of the deceased*

There is evidence of differentiated treatment of the deceased. One of the households formally buried some of its deceased: a number of men whose advanced age may have granted them a special position in the community, and two children. The strike-a-light that accompanied one of the men is an exceptional grave good that may have several meanings: it may be an indication of the *persona* of the deceased or the material expression of the people's ideas about the afterlife. The highly flexed burial posture, with the legs presumably bound together, also appears to reflect views on the power of the ancestor's spirit, which had to be curbed. It is a new burial posture whose significance was derived from the southern Neolithic. Usually, however, the deceased were subjected to a treatment aboveground, which sometimes led to the dispersal of skeletal elements and their incorporation among the settlement refuse.

### *27.5.2 Artefacts*

Some puzzling wooden artefacts with which we are unable to associate a function on the basis of analogies need not necessarily be viewed in a cult context. There is in this field still a substantial shortage of material knowledge.

This does not hold for the curious antler beam sharpened on two sides (no. 4263.1), which was roughly shaped, but not finished and certainly not used. No comparable artefacts are known from the large Mesolithic and Neolithic assemblages from the Lower Rhine Basin, or indeed from elsewhere. It may simply be something that was produced by someone fiddling around with a tool, but it could also represent a serious effort to create an exceptional object, with the option of a symbolic use.

Jet and amber beads have incidentally been found as grave goods, in particular at Ypenburg and Swifterbant-S2. They may be – modest – indications of the personal identity of the deceased, but it is possible that some special value or power was (also) assigned to them. Amber had a special significance throughout the entire late part of prehistory. Sometimes jet replaced amber in this respect; this was for example the case in northeastern England in the Beaker period.

### *27.5.3 Dogs*

Most remarkable is the systematic deposition of remains of dogs. Dogs were apparently sometimes killed with a blow to the head, after which the head was discarded separately from the body; after some time the (incomplete and disturbed) remains of the carcass were buried. This suggests some form of ritual butchering and loss of the affection evident from the formal burials known from earlier times, for example at Hardinxveld-Polderweg (Louwe Kooijmans 2001a). This may be associated with the change in the position of dogs at the transition from hunting to farming. What precisely happened to those dogs at Schipluiden and why – with what intentions – completely eludes us, but the acts must have been meaningful to the people who performed them.

### *27.5.4 Cattle*

On one occasion, fairly early in the occupation period, but certainly not at the beginning, the remains of three heads of cattle were deliberately deposited in a small pit, which we have termed a 'deposition pit' (feature 12-48; section 22.3.7). The remains derived from two juvenile-adult animals (older than 24 months) and a juvenile. The latter was killed when it was between 5-6 and 7-10 months old, that is – assuming it was born around the end of April – between the end of September and the beginning of March, in late autumn or winter, which is the period in which we would expect animals

to have been slaughtered. Evidently three heads of cattle of different ages were killed and butchered on the same occasion and a (relatively small) proportion of their bones was deliberately deposited in a small pit along with – most remarkable in view of what has been said in the preceding section – one of the complete, smashed dog skulls. The bones are mainly parts of the skull, vertebrae and parts of the pelvis; parts of the legs are somewhat underrepresented. The deposition pattern closely resembles that of the dog remains, except that, unlike with the dogs, this type of deposition was a once-only occasion. It is in accordance with the wider custom of the deposition of (parts of) animals in the Neolithic, other examples of which are aurochs crania and red deer antlers that were found in the province of Drenthe, a deposition made in phase 3 at Hardinxveld-De Bruin (Louwe Kooijmans 2001b, 91, 274 and fig. 8.7) and peat depositions known from Denmark (Koch 1998). The Schipluiden deposition is difficult to interpret. Its composition is more indicative of slaughtering waste than of remains of some special meal.

#### *27.5.5 Birds*

It is fairly unlikely that certain birds were hunted primarily for their meat; in these cases the motive was probably some assigned meaning or prestige. This holds first of all for birds of prey, in particular the white-tailed eagle, which is virtually always represented in Neolithic assemblages of a certain size. A more functionalistic interpretation is that those birds were shot to obtain feathers for use in arrows. The fact that hardly any remains of waders were identified, except the ruff, may imply that these birds were selectively shot, specifically for the coloured feathers sported by the males in the brooding season. The same explanation has elsewhere been put forward for remains of the great spotted woodpecker (Van Wijngaarden-Bakker *et al*. 2001a, 222).

#### *27.5.6 Conclusion*

We have only an anecdotal understanding of the spiritual world of the dune occupants. The burial rite implies a distinct interpretation of the afterworld. The manipulation and deposition of dogs and incidentally cattle can be viewed in a more general deposition tradition that is regarded as a form of communicating with higher powers, the spirits of nature and ancestors.

## Ecology and subsistence

### 27.6 The genesis of Delfland

#### *27.6.1 The Rijswijk-Zoetermeer beach plain*

During the period of occupation the coastal landscape changed drastically. Crucial in its development was the equilibrium between the supply of sediments (sand) from the sea on the one hand, and on the other the area available for accommodating those sediments in the tidal basins behind the beach plain. That area constantly increased due to the rise in sea level (fig. 27.5).

Around 4900 BC the rise in sea level decreased to 30 cm per century, the basins filled up and the tidal inlets gradually closed. Until a few centuries before the first occupants' arrival the Delfland region consisted of an open coastal plain of sand banks and beaches on which sand was deposited in pace with the rise in sea level. Around 4350 BC an established coastline ultimately developed in the form of a low coastal barrier that more or less coincided with the course of the present-day A4 motorway. That coastal barrier was regularly flooded, during which overwash deposits were laid down behind it. In front of the barrier a broad, uninterrupted beach plain evolved and in the north (near Zoetermeer) a broad tidal gulley penetrated far inland. This gulley was later to fill up with sediments, too. Together, all that sand is referred to as the 'Rijswijk-Zoetermeer sands'. The molluscs found in our drill cores (chapter 16) point to a marine environment, a tidal flat area with a good connection to the open sea. There are no good present-day parallels for this landscape; it is most closely approximated by the eastern part of the coast of the Waddenzee, between Simonsplaat and Rottumeroog.

#### *27.6.2 From beach to salt marsh*

In spite of the continuous rise in sea level the beach plain was constantly raised, to above the average high tide. The clay content of the deposits gradually increased and the landscape evolved into a salt marsh plain. The formation of the 1.5-metre-thick layer of high tide and salt marsh deposits (Units 40-26-19) must have taken several centuries. It is hard to conceive how it may have taken place without a protective coastal barrier in the west.

To the south this new coastal area bordered a broad estuary, in which both the Meuse and one of the branches of the Rhine flowed into the sea. From this southern estuary, the sea, but also the water of the rivers, at high tide had access to the hinterland via widely branched tidal creeks, which led to the deposition of fine-layered clays.

In the vast, 3-km-wide plain the old beach sand was in some parts blown onto the salt marsh deposits, leading to the formation of flat, low dunes, one of which was that of Schipluiden, which was formed at the time of the deposition of the clay of Unit 26. Basing ourselves on the currently available evidence we assume that there were at least fifty of such dunes dispersed across the plain, which are now completely hidden from sight, buried beneath later deposits.

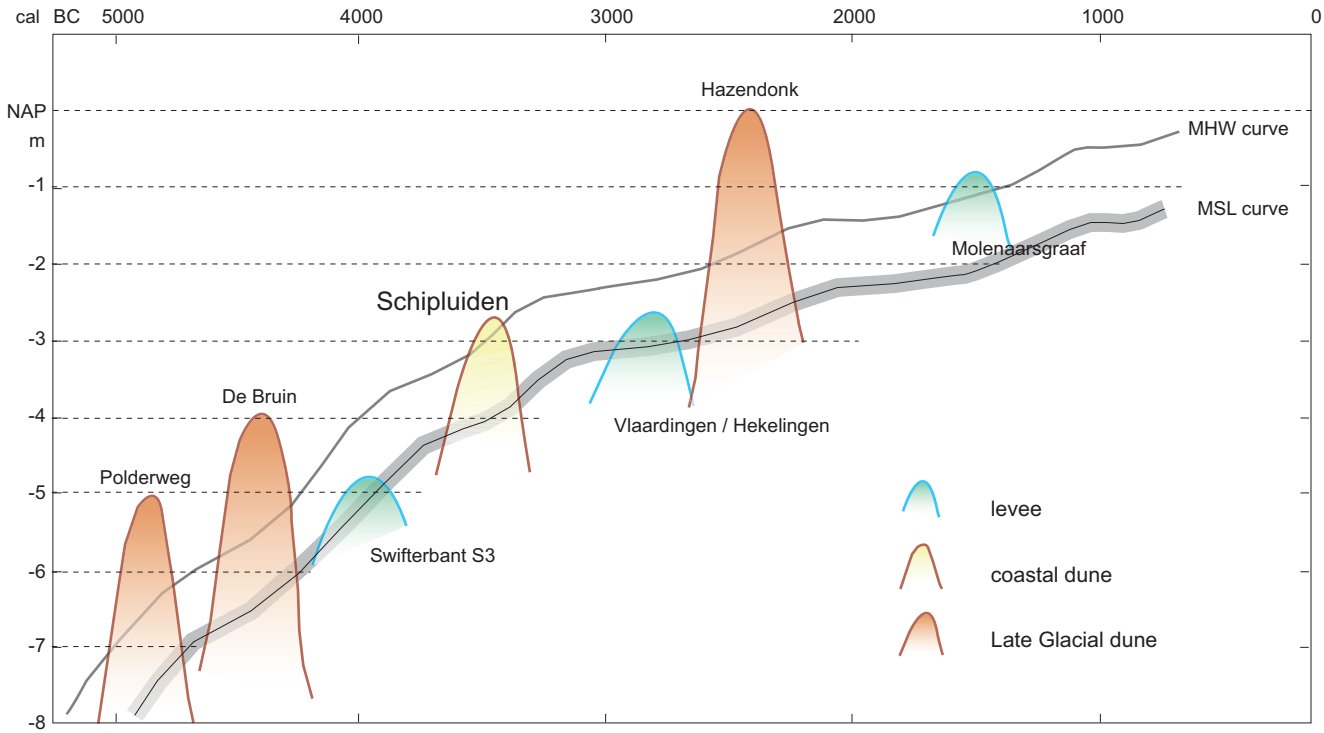


Figure 27.5 Curves representing the rise in Mean Sea Level (MSL) after Van de Plassche 1982 and the Mean High Water (MHW) at an assumed tidal amplitude of 2 m with some prehistoric settlements in the low-lying parts of the Netherlands projected on to them. The last occupation phase of the late glacial river dunes is indicated. The low coastal dune that bore the Schipluiden settlement lay within the former tidal range, but apparently somewhat protected and out of reach of daily marine ingressions.

### *27.6.3 Palaeogeography: four ecozones*

Four ecozones can be distinguished in this new coastal landscape. First of all there was the coast in the far west. Next came a broad sedimentation plain and further east was the periphery of the reed swamps and alder carrs that extended several dozen kilometres in an easterly direction. In the south this regular zoning was interrupted by the Rhine/Meuse estuary. This estuary is to be seen as a wide tidal inlet with sand flats into which flowed the tidal creeks of a system that extended far into the delta plain and absorbed saltwater at high tides. The Schipluiden dune lay at the eastern periphery of the sedimentation plain, 3 km from the coast and 10 km from the tidal inlet (fig. 27.6).

## 27.7 The changing conditions in the plain surrounding the dune

Whereas the geography of Delfland as a whole did not change demonstrably during the relatively short period for which the Schipluiden dune was occupied, the old beach plain did undergo a major ecological transformation which – oddly enough – seems to have had little influence on the occupants' way of life. From phase 1 until phase 3 very little changed in the ratios of hunting and stock farming and in the exploited natural resources.

### *27.7.1 Sources*

The major changes that took place in the landscape and the environment of the settlement and its surroundings during the period of occupation are known to us in great detail thanks to the palaeogeographical and palaeoecological studies carried out in our project (chapters 14-25). The water regime and the salinity are now accurately known thanks to the outcomes of the diatom and mollusc studies, supplemented with the information obtained in the studies of the fish and insects. The interpretations of the vegetation are based on three pillars. The first comprises the results of the study of the botanical macro-remains, which provide a detailed picture of the local vegetation within a radius of a few hundred metres. The wood and charcoal analyses meanwhile yielded information on the tree and shrub vegetation in the site's wider surroundings, to which the analysis of the insects added a few further specifications. The pollen research, finally, yielded

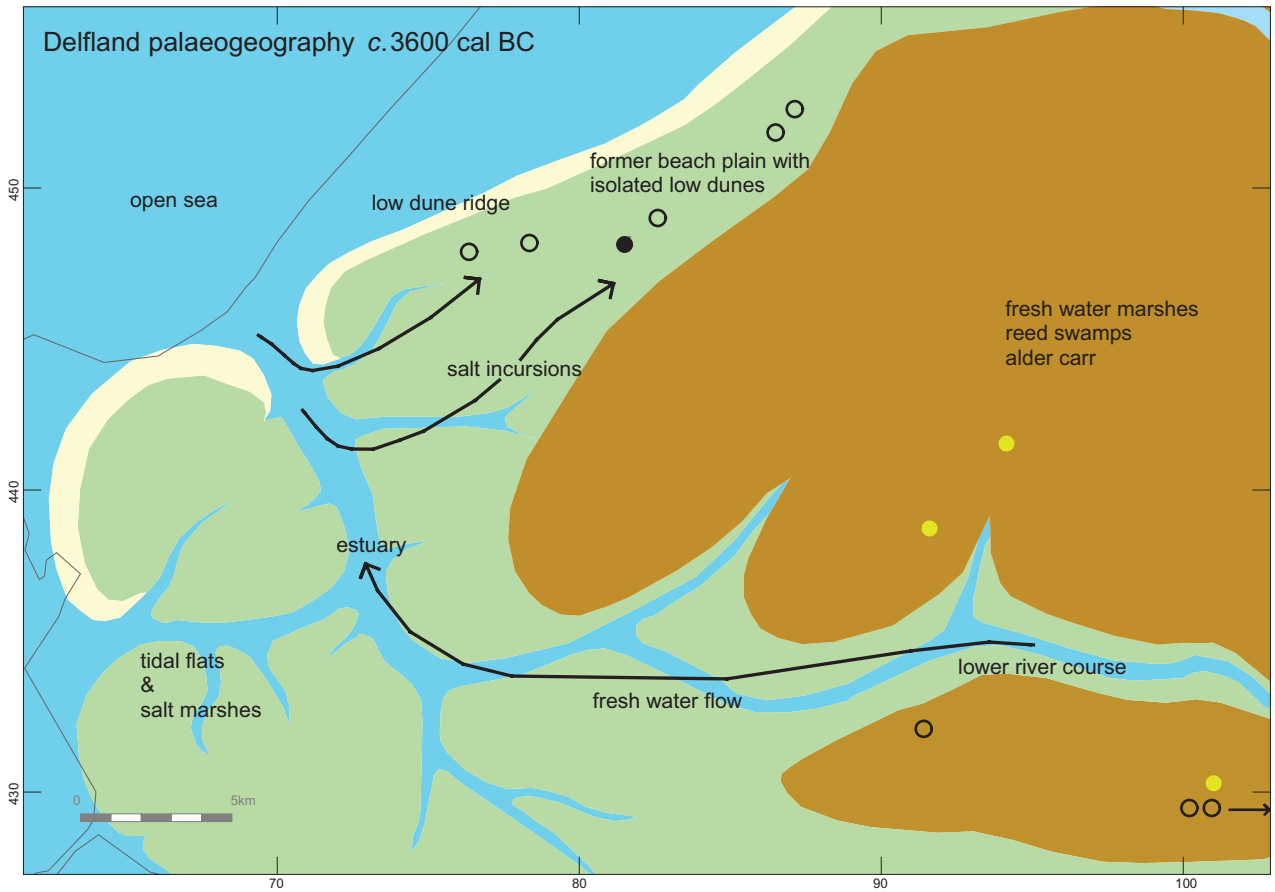


Figure 27.6 Palaeogeography of Delfland and the Meuse estuary around 3600 cal BC showing the settlements of the Hazendonk group. Schipluiden is indicated by a solid black symbol; some late glacial dune tops (so-called *donken*) are shown in yellow.

a somewhat less detailed regional survey. The diatoms, insects and background fauna tell us all about the local conditions at the site itself with respect to issues such as moisture, flooding and hygiene.

The detailed data on the conditions in the individual phases are particularly important for our understanding of the extent to which people were determined to remain at their settlement and adapt their way of life if necessary.

### *27.7.2 Changes in the landscape*

The various studies revealed a number of trends in the development of the landscape. The diatoms, the seeds and the pollen point to an indisputable change from a salt marsh landscape proper with brackish to saline conditions in the earliest occupation phase to freshwater conditions in the last phase. The main turning point of this change occurred in phase 2b. Evidence of marine ingressions in the earliest occupation phase is provided by remains of many young herrings and smelt that were found in the fills of two early wells along with remains of common gobies and (three-spine) sticklebacks – the fish were trapped in the wells when the seawater retreated. The same saline conditions are reflected by the salt-loving to salt-tolerant insect fauna of the remarkable low-lying 'deposition pit'.

Figure 27.7 Aerial photo of the De Kwade Hoek nature reserve on the coast of the island of Goeree. This is one of the few parts of the Dutch shoreline where the coast is being expanded seawards. In this case the expansion may be a consequence of the Delta Works. A beach plain has been cut off from the open sea by a newly formed row of dunes and has evolved into an area of natural grass- and reedlands. It is a rare small-scale present-day reference for the large-scale landscape development along the Delfland coast *c.* 3600 cal BC.

Figure 27.8 Low salt marsh in the De Kwade Hoek nature reserve. Glasswort *(Salicornia europaea)* can be seen in the foreground. Sea aster *(Aster tripolium)* grows on the higher salt marsh in the background, behind the gulley. This landscape illustrates the environmental conditions during the first stage of occupation at Schipluiden (phase 1).

An important question is whether there was a tree and shrub vegetation. For the information required to answer this question we must first of all turn to the samples of wood, in particular the wood that was used to build the fences around the middle of the occupation period. To enable the construction of a single fence with a length of around 300 metres that enclosed the entire settlement, the site's surroundings must around the middle of phase 2 within a short space of time have supplied stakes with a total length of 2000 m and an average cross-section of 6 cm: juniper, apple, hawthorn and sloe wood from shrubs on nearby dunes (a *Rhamno-Prunetea*) and alder wood from carrs (an *Alnetea glutinosae*). So the vegetation consisted of more than the odd spindly tree, and indeed comprised substantial groves including as remarkable elements juniper shrubs. Finds of numerous carbonised sloe stones and apple pips imply that sloes and crab apples grew here and there on the dune slopes. It is doubtful whether there were any deciduous trees 'proper' in this area – at most perhaps a few spindly oaks, ashes or elms, but certainly no sturdy trees. Only alders, and probably also willows could grow to a cross-section of more than 50 cm.

In the course of the occupation period the area was flooded less and less often, the area surrounding the dune emerged from the water more frequently and for longer stretches of time (as shown by the diatoms) and there was a hiatus in sedimentation. These developments are associated with the formation of the Voorburg-Rijswijk coastal barrier, 3 km west of the site, which prevented the seawater from penetrating far into the area at high tide, leading to a local fall in the average high-water level. This is a stereotype landscape development observable at all occupation sites on delta deposits, also in later times (Louwe Kooijmans 1974, 57). In the long term this effect was however countered by the continuously rising sea level, which caused the level of the groundwater behind the coastal barrier to rise, too, resulting in increasingly swampy land and ultimately the development of lush, wet grass- and reedlands of the kind that are today to be found on a much smaller scale in the Kwade Hoek beach plains

Figure 27.9 View of De Kwade Hoek from the row of dunes on the landward side.

closed off from the sea on the island of Goeree in the province of Zeeland (figs. 27.7-10). The formation of a steadily growing layer of reed peat followed by sedge peat ultimately made the site unattractive for occupation, and it was abandoned around 3400 BC.

These few centuries between 3700 and 3400 BC constitute an important episode in the development of the Delfland landscape, which saw the transition from a period of coastal conditions that had lasted for more than a thousand years to the evolution of the typical Holland peat landscape that was to remain undisturbed by large-scale ingressions for three millennia.

It would seem that after abandoning their settlement, the occupants continued to use the site for some time as a base camp for expeditions, in particular for hunting red deer (see section 22.7). Even after it had changed into a large peat bog, the area will have remained attractive for its abundance of waterfowl and fish. This can be inferred from a cluster of 25 wooden posts that were driven deep into the peat, down into the underlying dune, around 2300 BC. The aim of these posts eludes us due to the absence of associated finds. All we can venture to say is that it had something to do with an off-site activity.

### *27.7.3 Conditions at the site*

The uninterrupted use of the site for occupation over a long period of time led to the formation of a black occupation layer. The colour is caused by fine charcoal dust; the entire site was indeed found to be covered with a veil of charcoal particles. Nothing comparable is known from later sites with similar conditions, such as the Bell Beaker settlements in the Alblasserwaard area. It implies some special burning activity whose aim at present eludes us. The charcoal could represent the burning of vegetation or remains of open fires that were washed or blown across the site. Interestingly, a similar 'burnt layer', only without any significant archaeological remains, was found on another small dune in the vicinity of the Schipluiden settlement. That dune was used but not occupied.

The many pits that we have interpreted as 'unlined wells' testify to frequent problems with the supply of freshwater. This was also observed at the other settlements found in this region, with the only difference that the field of wells at Schipluiden implies a particularly high intensity of use. It is surprising that this site was selected for such intensive occupation.

Figure 27.10 Natural grassland, rich in reed, has developed in a more sheltered part of the former beach plain, where the formation of fen peat has started. The earlier row of dunes, covered with dune shrubs, is visible in the background. This landscape illustrates the environmental conditions during a later stage of occupation at Schipluiden (phases 2-3).

Dung beetle remains found in the fill of one of the wells show that conditions in parts of the settlement site must have been fairly unhygienic, and that cattle roamed freely among the houses in the phase before the erection of the fence. The same was observed at Wateringen 4 (Raemaekers *et al*. 1997, 150). It is interesting to see that a later well was dug in an area with much cleaner conditions. Domestic flies and human fleas show that there were unpleasant sides to life, too.

## 27.8 Subsistence

The dune occupants' subsistence system was based on two pillars: farming – both livestock and arable farming – and a broad exploitation of the various ecological zones in the surrounding landscape. This system is known as an 'extended broad spectrum economy' – the Mesolithic basic system combined with new Neolithic elements. The exploitation of a broad diversity of food resources, in the immediate vicinity of the settlement and at a greater distance from it, is the opposite of what we would expect to find at a special activity site, and confirms the site's function as a basic settlement within a wide territory.

It is difficult to assess the relative importance of the different activities, as the only remains available for such assessments have undergone various formation processes. The only two activities we can reliably compare are stock farming and the hunting of large mammals. The problem of distinguishing between remains of pig and wild boar could thankfully be satisfactorily solved thanks to the abundance of remains of the two species and the availability of sufficient discriminating bone dimensions. Both the numbers and the weights of the bones show that stock farming was in all the phases more important than hunting, though the cattle did become a little less important in the course of the occupation period. It will be argued below (section 27.12.5) that the many mammal bones found at the site represent only a limited proportion of the consumed food.

So, in spite of the changing environment, no clear trends are observable in the subsistence system in the 250 ± 50 years for which the site was occupied. A few comments should be made here. From phase 2b onwards the number of swans and geese killed decreased substantially whereas even more ducks were shot. A possible explanation for this is that the geese's stopping places had come to lie further away in the less accessible parts of the estuary. It would also seem that young cattle were no longer slaughtered in phase 3. The apparent increase in the importance of red deer hunting in phase 3 at the expense of stock farming cannot be explained on the basis of changes in diet. A more likely explanation is that the abandoned settlement was used as a hunting base where certain parts of shot red deer were left behind and became mixed with the refuse of phase 3.

*27.8.1 Stock farming*

The domestic animals kept by the dune occupants were first of all cattle and secondly pigs, but oddly enough no sheep or goats. The cattle will have been pastured in the plain, but they also regularly roamed close to and even in the settlement, as can be inferred from coprolites of the cowpat variety and dung beetles recovered from one of the wells. We therefore assume that the fence was intended to keep the cattle out of the settlement, and that the broad trampling zone was created by cows behind the fence (of which no postholes were however found in that zone).

With a withers height of 118-129 cm the cattle were of the same size as those in the subsequent centuries, and distinctly smaller than aurochs, from which their remains can be readily distinguished. The animals were taken to the settlement to be slaughtered. Animals of all ages were slaughtered: a quarter in their first year and 40% not until after 3 to 4 years. A find of apparently deliberately deposited remains of three heads of cattle – two adults and one juvenile – in a small pit suggests large-scale slaughter, and hence a slaughtering season and measures for preserving the meat. The waste produced in butchering (the bones at least) was usually however dumped at the swampy periphery of the settlement.

The weight percentages suggest that cattle supplied about half of the meat consumed – a little less towards the end of the occupation period. The spectrum of the animals' ages at the time of death does not in any way suggest that the animals were kept for their milk. The analysis of remains encrusted on the pottery sherds did not provide any evidence of the use of milk either.

Pigs were kept in much smaller numbers. Domestic pigs had a distinctly smaller withers height than wild boars (66-72 cm as opposed to 81-89 cm). There is only a small overlap between the ranges of bone measurements of the two species. Pigs were likewise slaughtered at varying ages: 35% in their first year and a quarter not until after 3 years. It is not clear where the pigs were kept – in the yards or outside the settlement. No pig droppings were found among the coprolites, and the biotope in the dune's immediate surroundings was not particularly suitable for pigs.

*27.8.2 Arable farming*

The consumption of cereal was demonstrated for all phases at Schipluiden by the presence of carbonised grains of emmer and six-rowed naked barley in almost all the samples. The samples also all contained threshing remains – both chaff and rachis internodes – implying that the cereal was at least threshed at the site, during which the grains were released from the ears, after which the rachis internodes, spikelets and chaff were removed. This will according to the Neolithic tradition have been done on a daily basis, according to the occupants' needs, before the grinding. The quern fragments, the phytolite analysis of those fragments and the carbonised remains of food all point to the consumption of cereals.

If all the arguments in favour of permanent occupation by complete households are correct, it is likely that the cereal was grown close to the site itself, in spite of the specific conditions and the regular flooding with saltwater, certainly at the beginning of the occupation period. There are two botanical arguments for this. The first is the presence of threshing remains of naked barley, the second the systematic association of carbonised cereal with carbonised seeds of plants characteristic of high-lying salt marshes. On the basis of the latter argument it is assumed that the crops were grown in the high parts of the surrounding salt marshes. The fact that the floods will have occurred mainly in autumn and winter makes it likely that the cereal was a summer crop that was sown in spring. The crops may however also have been grown on (parts of) small dunes in the surrounding area.

*27.8.3 Hunting and fishing*

From the recovered remains and the assignment of the identified animal species to the various ecological zones in the research area we may infer a multitude of activities in all the ecozones, both in summer and in winter. Only the coast seems to have been visited fairly rarely, even though it lay only 3 km from the settlement. The odd seal and birds such as gannets and great black-backed gulls may have been shot there. A whale vertebra found at the site will derive from an animal that was washed ashore. The only possible conclusion is that the foredune did not play an important part in the occupants' subsistence strategies.

*Hunting*

By far the most important hunted wild animals were red deer and wild boar. We assume that the red deer in particular were attracted by the vast grasslands of the old beach plain. The

wild boar's preferred habitats will have been the shrubs and the swamps. Antler beams with part of the skull attached and the absence of juvenile remains imply that the red deer were hunted at least from September until February, and that the hunting season probably closed for spring and summer. Nothing can be said about the wild boars as remains of domestic piglets and juvenile wild boars cannot be distinguished from one another. From time to time a roe deer or an aurochs was shot, too.

The hunters went on expeditions into the swamps to the east of the settlement to set traps for beavers and otters. In the case of these species, too, juveniles were released. This form of hunting is traditionally associated with winter, but no concrete seasonal evidence was found at Schipluiden.

Small and large predators other than otter were virtually not hunted. Only the fleece of a shot brown bear was taken back to the site. The recovered remains of lynx are assumed to imply the import of skins from outside the region. The odd seal and bottle-nose dolphin may have been caught in fish weirs in the estuary.

*Fowling*

The killed birds were almost exclusively waterfowl, in particular ducks, more specifically mallard. In the winter the estuary was ideal for this activity. There, geese will have every day flown to and fro between their foraging areas in the plain and their sleeping places on the open water. There, too, were large groups of ducks that spent the winter in this area, such as mallards, goosanders, teals and pintails. In the summertime ducks will most likely have been hunted in the swamps, where greylags and cranes will have bred, too. As several studies have shown that open water was scarce in the plain, it is unlikely that fowling took place there. Nevertheless, birds may have been shot there, too.

*Fishing*

Fishing focused on sturgeons and flounders in the estuary and on eels and Cyprinids in the freshwater of the swamp. Sturgeon fishing was a summer activity, which probably involved the use of large fish weirs as attested at Vlaardingen and Hekelingen for the subsequent Vlaardingen group. Eels were probably caught with traps.

Some 'saltwater fish' (roker and bass) were caught in the estuary and migratory fish proper (salmon, whitefishes, allis shad/twaite shad) may have been caught in courses of the major rivers a little further upstream. Some of those fish may have been caught along with sturgeon in the large fish weirs in the summer.

### *27.8.4 Gathering*

We have on the whole a fairly poor understanding of the gathering of plant food as only seeds of fruit and shells of hazelnuts were recovered. The most conspicuous plant food remains at Schipluiden are large quantities of sloe stones crab apple pips. They are followed at a great distance by seeds of rosehip, blackberry and dewberry. Remains of hawthorn, red dogwood, elder and juniper were also found in small quantities. Hazelnuts, which are very common (for easily identifiable) at most sites, were quite rare at Schipluiden, but the remains that have survived date from all the phases.

Electron-microscopic and gas-chromatographic analyses revealed remains of other species at Schipluiden, notably sea beet, wild onion and tubers of sea club-rush. They probably represent important sources of food of which remains are however rarely recovered and identified. The actual spectrum of exploited plants will certainly have been much larger and will have included wild vegetables like *Chenopdium* species, orache/seablite (*Atriplex*/*Sueda*) and wild celery *(Apium graveolens).*

## 27.9 Storage and preparation of food

Carbonised sloe stones were found all over the site, but also burnt complete sloes. Carbonised halved apples with curled edges are typical of a burnt supply of dried sloes and apples, and an important indication of the storage of supplies for the winter. The combination of a large quantity of sloes combined with fish remains at the bottom of the 'deposition pit' (12-48) implies a form of preservation under water, which at the same time improved the flavour of the sour sloes.

Chemical analysis and SEM photographs of carbonised remains tell us something about the form in which the food was consumed. Tubers and leaf vegetables were mixed into a pulp or mush. Cereals were crushed and boiled with water to obtain a gruel. The crushing may have been done with 'hammer stones' or wooden pestles and mortars. Cereal was also ground on small portable querns, but considering that only a small number of such implements were found this was obviously not common practice.

Carbonised remains encrusted on some of the pottery sherds show that the pots were used not only for boiling water, but also for cooking various foodstuffs. The chemical and microscopic research revealed various components: remains of seeds (sea aster, seablite), emmer, vegetable oil (possibly of rapeseed or red dogwood) and animal or vegetable proteins, in varying combinations.

No evidence of baked farinaceous food (bread) was found among the carbonised remains and no evidence of the use of milk among the remains encrusted on the sherds. The research did not help us any further in interpreting the strongly deviating $^{15}N$ and $^{13}C$ values, of both the encrusted food remains and the bones of the people who consumed the food. These values clearly point to a substantial freshwater fish component in the diet.

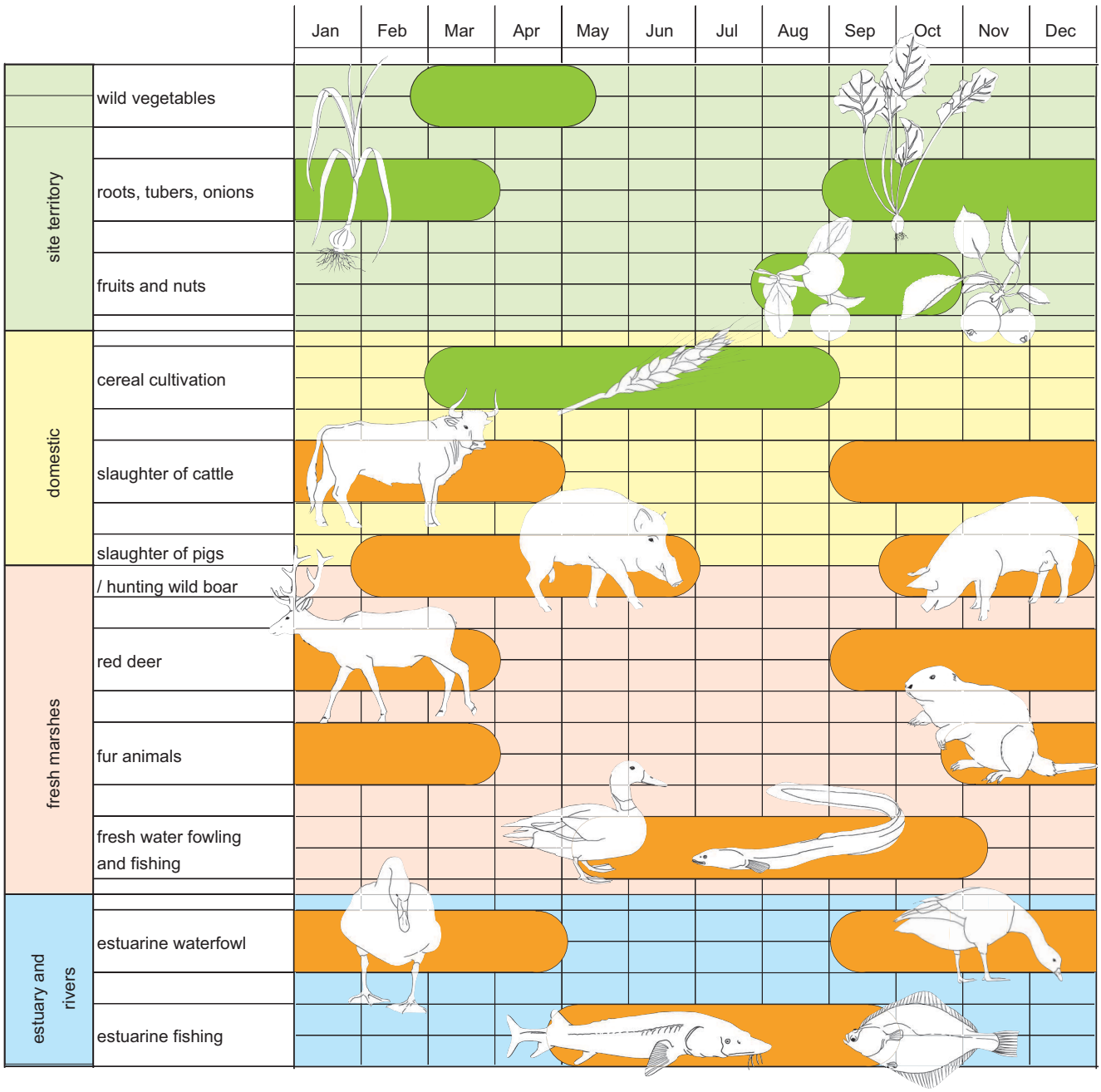


Figure 27.11 The various subsistence activities arranged according to season on the basis of the results of the different biological analyses; an integration of figures 19.14, 22.16, 23.13 and 25.13. A distinction has been made between plant food (green) and animal food sources, interpreted as representing predominantly the domains of women and men, respectively. In addition, four zones have been distinguished: a central domestic sphere, the site territory and two more distant zones, the freshwater marshes and the estuary with the lower river courses. Note that some seasonal indicators suffer from rather large margins of error, especially the slaughtering of pig and cattle; it is not certain to what extent this was confined to a specific season.

**A REGIONAL PERSPECTIVE**

## 27.10 DATES AND PHASES

### *27.10.1 Dates*

The settlement is culturally characterised by the exclusive presence of Hazendonk 3 pottery and the absence of elements of both the preceding 'Swifterbant' and the succeeding 'Vlaardingen' cultures. The Hazendonk group has been dated to around 3700-3300 BC, roughly the middle of the 4th millennium BC.

$^{14}$C dates tell us that Schipluiden was occupied from around 3630 to 3380 BC, *i.e.* within the aforementioned period. The two ranges however have margins of error, as a result of which the length of the occupation period cannot be determined with any greater precision than 130 to 370 years. The main cause of this uncertainty are two substantial wiggles in the calibration curve. Another confusing factor is that potentially informative samples (remains encrusted on pottery and human bones) systematically yielded too old values due to nutritional effects, and could therefore not be used to obtain accurate dates.

### *27.10.2 Duration of the occupation*

For our interpretation of the occupation we need a more accurate determination of the length of the occupation period than is provided by the $^{14}$C dates. There is a second source of information to which we can turn and that is the curve representing the relative rise in the average sea level (Van de Plassche 1982, 86).

The sedimentation levels in the sheltered conditions of the Schipluiden dune can be more or less equated with the average sea levels. The measurements of -4.50 m NAP/3630 cal BC and -3.70 m NAP/3400 cal BC at the beginning and end of the period of occupation (chapter 2) coincide precisely with the curve. Assuming an average rise in sea level of 27 cm/century, this 80 cm rise in water level moreover implies a duration of around three centuries. This shows that the probabilities of the extreme values of the $^{14}$C dates – both the low and the high ones – are indeed low. On the basis of these considerations we assume that the site was occupied for 250 ± 50 years. This duration is important for our interpretation of the (permanent) character of the settlement and (the absence of) economic and cultural changes. We are dealing not with a given moment in a transformation process, but with a system that remained stable for many generations.

### *27.10.3 Phases*

The only information that can be used to divide this occupation period into phases is provided by the stratigraphy of the aquatic deposits covering the flanks of the dune in which finds were incorporated. On the basis of in particular the stratification on the southeastern side of the dune three phases can be distinguished, the middle one of which can be divided into two. Phase 1 is separated from the beginning of phase 2 by a hiatus in the deposition of refuse on the southeastern side of the dune, but this does not necessarily imply a hiatus in occupation. The magnitudes of the error margins of the dates in relation to the duration of each of the phases however make it impossible to estimate the lengths of the individual phases.

## 27.11 THE OCCUPATION

### *27.11.1 The beginning*

By the time the first occupants settled on the dune the new landscape had existed for quite some time. The poorly developed podzol soil shows that the dune had had a vegetation cover for some time and had to some extent undergone eluviation by rainwater penetrating into it. In this period marine influence will still have been too strong to allow permanent occupation. A series of sites (Schiedam, Bergschenhoek, Rotterdam-CS, Rotterdam-Zuid) demonstrate that people of the preceding Swifterbant culture practised hunting and fishing in the coastal swamps in these days and they probably did become familiar with the region, for example via hunting expeditions and later, when conditions improved, by pasturing their cattle there. But to actually settle in this coastal region was an entirely different matter, and must have been quite an adventure. It is after all unlikely that people will have settled in an unknown area in an unreliable situation.

What made this area so attractive? That must have been the large areas of grassland that were ideal for pasturing cattle. This grassland will have been an unusual biotope, certainly in this area's wide surroundings. Such biotopes will in those days have been relatively rare in these densely forested parts. Something must have made the site itself extra attractive, too, considering the intensity and duration of the occupation. That may have been its situation in this particular ecotone – the transitional area between the plain and the swamps – and/or perhaps the presence of a second dune in its immediate vicinity that could be used for growing crops and/or as a refuge for the cattle in the event of floods. There were however no simple, dry access routes. People will have had to drive their cattle across either the peatland or the estuary to reach this new area, which was rather isolated in an environmental, and possibly also social respect. We therefore assume that several groups of a comparable size settled in this area more or less simultaneously.

### *27.11.2 Two centuries of permanent occupation, 3600-3400 BC*

The local group consisted of four households, together comprising around 25 persons, who lived on the dune on a permanent basis. For the procurement of stone and flint the

people were dependent on contacts with a hinterland in the south. Certain wood species required for various purposes were not available in the site's immediate surroundings either. But otherwise the dune's occupants could manage very well with the locally available resources and raw materials.

Subsistence was based on an extended broad spectrum economy. The exploitation of different ecozones around the site by means of gathering, fishing and hunting in different seasons was combined with cattle and pig farming and cereal cultivation.

In spite of the drastic environmental changes, the occupants managed to survive at this site for two to three centuries.

All this has already been summarised in greater detail in the previous 'Man and materials' and 'Ecology and subsistence' parts of the synthesis. This final part focuses on the organisation and functioning of the regional group of which the Schipluiden occupants formed part.

### *27.11.3 The end*

The rising water level, the transformation of the ancient beach plain into a vast fen marsh and the gradual 'submersion' of the dune ultimately made the site unfit for further occupation. The settlement was abandoned and the occupants moved elsewhere. They may have continued their way of life unchanged at a site somewhere at the periphery of the belt of coastal barriers that had by this time become much broader and covered with low dunes all along the coast between Loosduinen and Voorschoten. Settlements of the Vlaardingen group are known from the latter area. They are of a slightly later date, following a hiatus in finds of one to two centuries in which the Hazendonk-Vlaardingen cultural change took place. The economy of the Vlaardingen communities along the coast was distinctly agricultural in character – with 90% domestic animal bones far more so than that of Schipluiden – and the livestock had by this time been expanded with sheep and/or goat. These people however also had southern contacts and indeed many other characteristics in common with the Hazendonk group: the import of flint axes from what is now Belgium, the use of broken fragments of those axes for the manufacture of flake tools, the manufacture of amber and jet beads, a lack of interest in the coast for the exploitation of resources and the apparent importance of sturgeon in the diet.

A remarkable increase in the average weight of red deer bones in phase 3 put us on the track of the deposition of large red deer foreleg bones in that phase, which we interpreted as an indication that the abandoned site was used as a hunting base by people living at a new settlement (section 22.7). The hunters will have consumed the forelegs at this camp and have taken the other parts of the butchered animals back to their settlement. But where that settlement was we don't know.

It is appealing to associate the as yet unexplained exceptional subrectangular hut plan on top of the dune with this later use of the site. The hut differed from the usual houses in its small dimensions (4 × 6 m) and light structure. Intersections tell us that the plan dates from a late part of the occupation sequence. A parallel is known from Vlaardingen. There, the feature of a fairly flimsy Bell Beaker hut measuring 3 × 7 m (Van Beek 1990,) is also assumed to represent a temporary shelter.

## 27.12 A SOCIO-ECONOMIC MODEL

### *27.12.1 Size of the regional group*

The main area of focus is the former beach plain, which measured 5 × 20 = 100 km$^2$. The occupants of the Schipluiden dune did not live isolated in this plain, but formed part of a wider social community that included other, comparable groups with which they shared the exploitation of the plain. There will definitely be quite a number of settlement sites buried in the subsoil of this region beneath the 3 to 4 m of later deposits. A few have been discovered during public works. One of those settlements (Wateringen 4) was demonstrably occupied for a short length of time. Another (Ypenburg) seems to have been more intensively used, and $^{14}$C dates prove that both were indeed occupied at exactly the same time as Schipluiden. Nothing can be said about the duration of occupation of the other two – Wateringse Veld and Rijswijk-A4. But altogether perhaps not more than 10% of the subsoil is known in sufficient detail. A rough estimate is that a total of 20-40 dunes must lie buried beneath those sediments, half of which will have traces of occupation. So there will certainly have been several contemporary settlements.

For our model we will work with an educated guess of five to ten settlements at a time, some of which will have been smaller than Schipluiden (such as Wateringen 4), and the odd one possibly larger (Ypenburg). We see Schipluiden as a particularly favourable site that was intensively used in its entirety, to far beyond the limits of the dune, for a long time – indeed for the entire period for which this area was fit for occupation. Assuming Schipluiden was occupied by 25 persons, the entire area will have had a population of between 100 and 200, or roughly 150 inhabitants/100 km$^2$.

We can compare the size of this group with earlier population estimations for the Netherlands as a whole (Louwe Kooijmans 1983, 1995). We assumed populations of roughly 2000 for the Mesolithic and 10,000 for the evolved Neolithic, *i.e.* 5 and 25 inhabitants/100 km$^2$, respectively, based on a total area of 40,000 km$^2$. When we restrict ourselves to land that was fit for occupation – and hence exclude the raised bogs and wetlands – these densities become twice as high: 10 and 50/100 km$^2$. These figures are considerably lower than the estimated population of 150 people for

the Delfland microregion of 100 km$^2$. The Mesolithic figure implies that hunting large game in the coastal plain itself would have covered not more than the needs of 10 person-equivalents, while the Neolithic figure means that the coastal plain was relatively densely populated.

A third approach is based on ethnographic references to comparable communities living under comparable conditions (Binford 2001, 215). In the case of pure hunter-gatherers in the cool-temperate zone the maximum population density of hunters of exclusively large mammals is only 5 inhabitants/100 km$^2$. A dominant exploitation of aquatic (fish) or plant resources however allows much higher population densities, with maxima of up to 80 and 100 inhabitants per 100 km$^2$. So again the hunting of wild mammals will have accounted for only a very limited part of the overall subsistence basis in the case of Delfland. Other natural resources could have covered at most about half of the subsistence needs of the assumed population or approximately 75 person-equivalents.

### *27.12.2 Relative importance of different food resources*

Two clues help us to estimate the importance of the different food resources in the overall subsistence system in the case of Schipluiden and the Delfland region. The first is the fixed ratio of domestic animals and large game (chapter 22), the second is the isotope ratio of the human skeletal remains (chapter 5).

It is usually rather difficult to assess the relative importance of food resources on the basis of archaeological remains due to the highly diverse formation processes that those remains may have undergone and the great differences in sampling techniques usually employed in their recovery. There is no relation between the importance of individual resources and archaeological visibility. This principle is well known, but insufficient allowance is usually (always?) made for it. The only exception concerns the relative importance of hunting and stock farming, assuming that the refuse of those two activities both underwent the same deposition processes. This however usually involves some technical problems such as the difficulty of distinguishing between domestic and wild pigs. At Schipluiden this problem could however be solved. Secondly, Antler and remains of dogs and fur animals must not be included in the assessments, because antler would result in an overestimation of red deer, dogs were not eaten and fur animals (except beaver) were no main food resource. In the case of Schipluiden this means that the assessment boils down to a comparison of cattle plus pig with red deer plus wild boar. This wild:domestic ratio is 35:65 based on the numbers of bones and 28:72 based on the weights of the bones. This difference is caused by the relatively small proportion of remains of domestic pig and the relatively large proportion of those of wild boar. In actual fact the figures should be converted to the weight of the meat, and then to

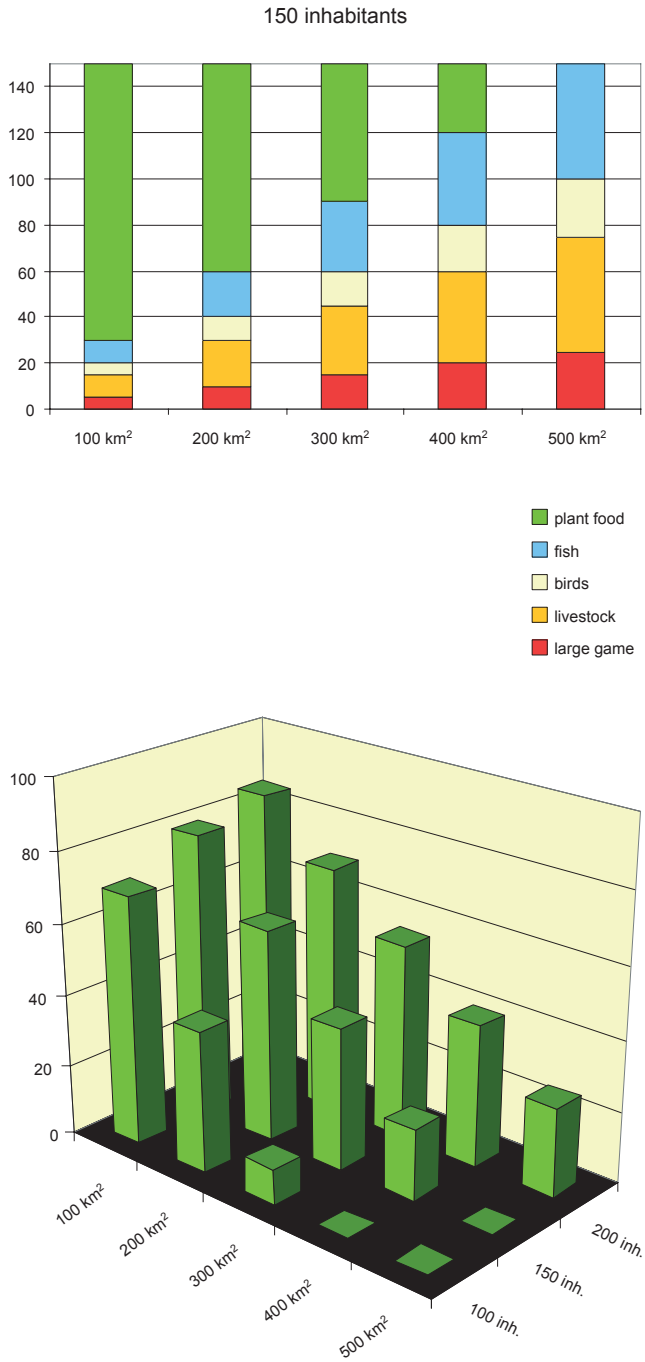


Figure 27.12 Calculation of the composition of the food package of the Neolithic community in the Delfland microregion. The calculations are based on the assumption that large game could support the equivalent of 5 inhabitants per 100 km$^2$.

a Calculation based on a population of 150 inhabitants and a group territory increasing from 100 to 500 km$^2$.

b Plant food as a percentage of the food package in relation to the number of inhabitants and size of the group territory.

the meat's caloric value. The caloric value of for example pigmeat is much higher than that of red deer or cattle meat, so such a conversion would be to the advantage of wild animals. Here we assume a ratio of 1:2.

The relative abundance of bones of waterfowl (chapter 23) and the more modest assemblages of fish remains (chapter 25) must together represent important sources of animal protein. This statement is based on the stable isotope analysis of the human skeletal remains. The results reveal a pronounced 'marine signal' and a freshwater reservoir effect in the $^{13}C$ values pointing to consumption of roughly 50% of the protein from these resources; these signals would be inexplicable if terrestrial mammals had played a greater part in the diet. This implies a domestic : terrestrial : aquatic ratio of 2 : 1 : 3 in our exploitation model.

The plant food diet (chapters 19 and 20) must have been varied, including cereals grown locally and fruits, berries, nuts, roots, tubers, onions and vegetables gathered as wild resources, though some may also have been cultivated in garden plots at the site. The relative importance of this part of the diet is however the great unknown and can only be estimated as the outcome of the model.

### *27.12.3 An exploitation model*

The three main variables in our model are the number of inhabitants of the microregion, the extent of the surrounding ecozones exploited and the ratio of plant and animal food. The relations between these variables are illustrated in figure 27.12a. In the case of a population of 150 people the exploitation of the coastal plain alone results in an extreme proportion of plant food of 120 person-equivalents or 80%. Extending the exploited area with parts of the estuary and the fresh water marshes causes the value to decrease to less than 50% at 300 km$^2$, which can be considered a realistic score. The alternative combinations of 200 inhabitants exploiting 400 km$^2$ and 100 people exploiting 200 km$^2$ result in similar values (fig. 27.12b). We should realise that grazing of livestock and the use of the coastal plain in general will have had a negative effect on the stock of game, resulting in the use of an even wider region. Some Hazendonk sites along the lower courses of the main rivers, such as the recently discovered Barendrecht-Vrijenburg site and the Hazendonk itself, which lay 15 and 30 km, respectively, from Schipluiden, may have functioned as subordinate special activity sites of the Delfland people. The specialised faunal spectrum of the Hazendonk site (fig. 27.17; Zeiler 1997) is indeed indicative of such a function.

Binford (2001, 213) however argues that when mobile hunter-gatherers adopt a sedentary way of life we observe not only a 'dramatic increase' in the size of the 'ethnic group', but also a 'dramatic decrease' in the size of the 'occupied area'. We assume that the latter also holds for the hunting component of our semi-agricultural group, with Binford's 'occupied area' corresponding to our group territory (see section 27.12.5). It should be added that our calculations have a much smaller scale than those of Binford.

### *27.12.4 Site territory* (fig. 27.13-14)

It is unlikely that the wider area was divided into separate territories, considering that both the Schipluiden and the Ypenburg occupants exploited all the different ecological zones. It is however plausible that each group enjoyed exclusive rights of use over the immediate surroundings of its settlement, within which it could meet its most common daily needs, by gathering wild fruits and firewood, obtaining wood for structural purposes, creating fields for its crops and possibly also pasturing its cattle – in other words its 'site territory'. How large this territory may have been depends on what activities we regard as territory-bound. It comprised part of the plain, including some of the dunes that lay in it. With a radius of 2 km the entire plain will have been divided between the settlements; with a radius of 1 km only a quarter of it.

Like artefacts and craft activities, subsistence-related activities will have been divided between the two sexes. In the traditional division of tasks, women's tasks are concentrated in and around the settlement, and the women's life takes place largely within the site territory. We assume that the Schipluiden women's tasks included the gathering of berries (in summer), fruits, nuts and tubers (autumn and winter) and the tending of the fields and kitchen gardens (spring, summer). Firewood will also have been collected in the site territory. These are the less prestigious – but very reliable, and therefore important – aspects of the subsistence system.

Many of the more strenuous activities involved in crop cultivation will have been carried out by the men (too). Their bones indeed show signs of frequent hard work. Those activities may have included opening up the land for cultivation and building fences round the fields, and activities such as tree felling, house construction and canoe manufacture.

Stock farming is generally assumed to belong to the men's domain. The cattle may have been pastured in the immediate vicinity of the settlement, and the pastureland may also have lain within the local group's territory. With a stock of ten heads of cattle per household and a stock density of one animal per 2 ha, the group will have needed 80 ha of grassland – an area that was readily available within the territory in the various alternatives, with due allowance for the territory's ecological differentiation.

### *27.12.5 Group territory*

Outside the site territories there was presumably an area over which the entire community enjoyed collective rights of use. The estuary was evidently open to anyone for hunting and

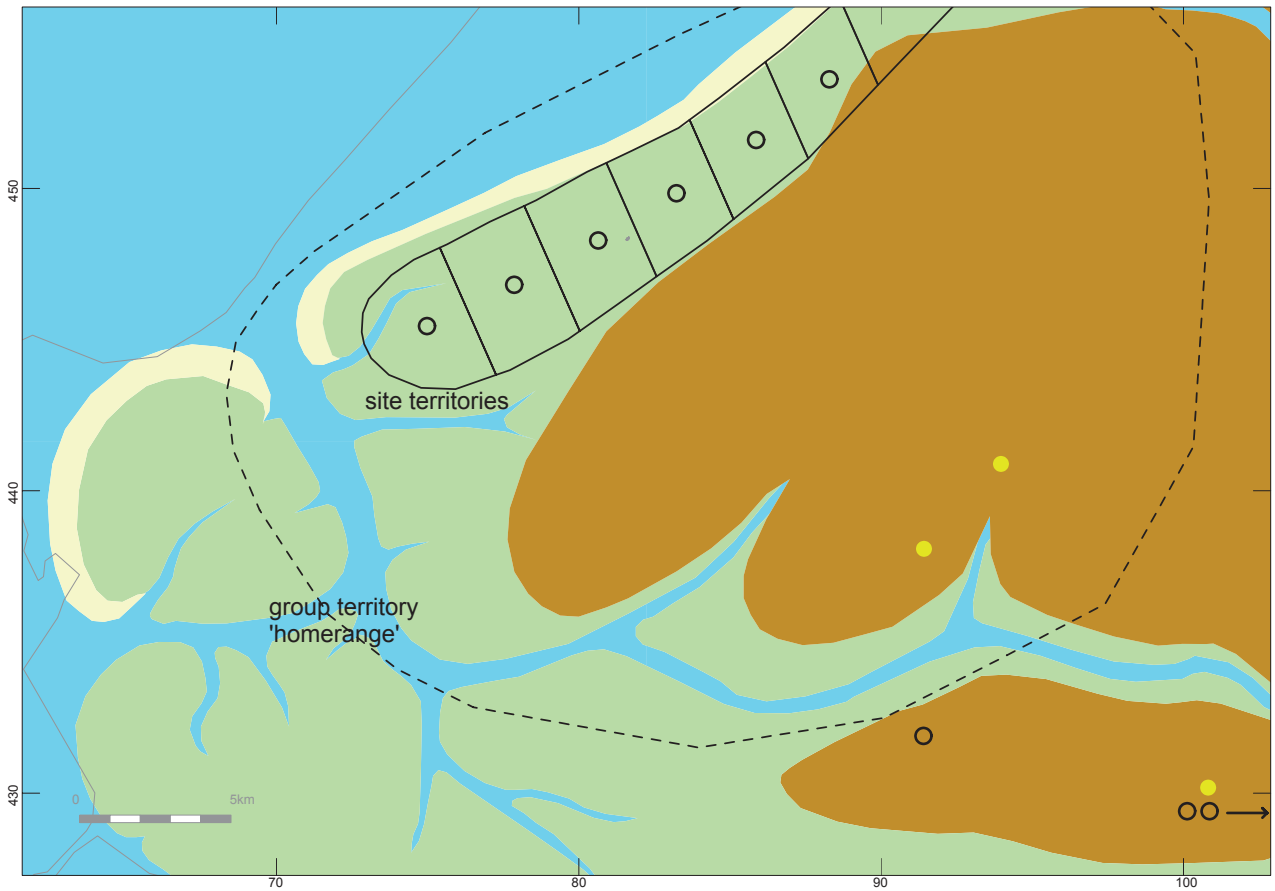


Figure 27.14 Spatial model of the Delfland microregion showing six contemporary settlements of four households each with site territories of at most 10 km$^2$ and a collective group territory that will have extended far into the freshwater marsh ecozone.

fishing, and the same holds for the vast swamps to the east of the sites. The hunting of large mammals may well have been a collective activity and the same may hold for the catching of large sturgeons and the construction and maintenance of the fish weirs used for that purpose. This wider area, which in actual fact comprised the whole of the 'Delfland' region including the peripheral areas, we could call the 'group territory' (fig. 27.13-14). The resulting model has much in common with that of the *Bandkeramik* in the south of the province of Limburg (Bakels 1978, 141), except that the Delfland community, being still strongly focused on natural food resources, will have exploited a much larger territory. We therefore prefer to use the term 'group territory' rather than 'home range'.

### *27.12.6 Interaction sphere*

The Schipluiden occupants lived in this region on a permanent basis and lived off the rich diversity of food resources available in the region. They made pottery from local clays, which they tempered with (sea) shells and other materials. They also used the locally available wood species, even if they were not optimally suitable for the intended purposes. They however also maintained contacts with areas fairly far removed from their settlement, within a wide 'interaction sphere', via which they obtained certain essential raw materials that were not locally available. Those lines of contact extended in a southerly direction for mined flint, axes and pyrite, and in an easterly direction for stone (27.4.1).

With an assumed size of 150 persons, the regional group will have been smaller than the minimum assumed for an independent reproduction group, and external social and marriage relations will have been essential for its survival. If the group comprised more than 200 persons, it will have been potentially independent, but external contacts will still have been highly desirable.

Those contacts demanded extra efforts, because the Delfland occupation area was fairly isolated. The Meuse estuary

complicated communication in a southerly direction while the peat bogs hampered communication with the east. Direct communication will have been possible only in a northerly direction, along the coast to the mouth of the Oude Rijn and from there along the river's banks towards the east. Communication will have taken place mainly across water. The sites on the river dunes in the Alblasserwaard area may (also) have had an intermediate function. There will however be other sites buried beneath sediments whose existence is unknown to us; fifteen years ago the sites in the Delfland region were indeed also still unknown.

What form this communication had is not clear. As far as the eastern relations, within the Hazendonk pottery style group, are concerned, human mobility is more likely than exchange, considering the modest nature of the materials concerned. If women were exchanged between the settlements, that must have taken place in the context of these contacts. The arguments for this are the assumption that the women made the pottery, and the originality and uniformity of the pottery throughout the entire Hazendonk style province.

The southern relations concerned more prestigious goods – axes, mined flint and pyrite – and the contacts extended into a zone with a different cultural tradition and organisation: the completely agricultural Michelsberg culture of the loess zone with its enclosures, flint mines and sophisticated pottery (fig. 27.4). In this case, too, the contacts may have involved a combination of mobility of the Hazendonk groups and exchange. Being fairly hard to find, pyrite nodules, for example, will have been appealing objects for exchange. The skins of the 'exotic' lynx will also have made perfect exchange articles for the products the delta occupants were able to supply, and the same holds for the beautifully designed paddles. Complete, or possibly semi-finished axes are likewise more in accordance with an exchange relationship than with free access to the flint procurement sites.

These southern networks are continuations of those of the preceding periods, as represented for the period 5500-4500 cal BC in the Hardinxveld sequence and earlier in the distribution pattern of artefacts made of Wommersom quartzite (Louwe Kooijmans 2001a and b; Gendel 1982).

### 27.13 Schipluiden's place in the neolithisation process (fig. 27.15)

Schipluiden provides a perfect impression of society 1500 years after the introduction of the farming way of life in South Limburg by the people of the *Bandkeramik* culture, 1000 years after the adoption of stock farming by the Swifterbant communities in the large northern plain, and 700 years after the first crops were sown in this area. It is a reference point for the advancing 'Neolithic' way of life, which had by this time become largely established in a material respect. Economically – in terms of subsistence – life was however still very much dependent on the old traditions of fishing and gathering.

Formally speaking it's quite straightforward: Schipluiden is a Neolithic settlement. The people used polished axes and made pottery; they lived in a permanent settlement, grew cereals and kept cattle. So all four criteria of the 'Neolithic package' are perfectly met. To this can be added the fact that, with a livestock farming:hunting ratio of 2:1, the subsistence system had evolved beyond Zvelebil's substitution phase (1986) and had reached his phase of consolidation of the neolithisation process (fig. 27.16). The deceased were moreover buried according to a new, Neolithic tradition, in one case (Ypenburg) even in a formal cemetery. So why not characterise the settlement as Neolithic and have done with it? Because we must also consider the following factors.

Besides showing all the aforementioned characteristics of the new way of life, the Schipluiden community was actually still strongly influenced by old traditions. We observe plenty of native elements that go back to the preceding Swifterbant period and even the Mesolithic; they make these people appear conservative. Those elements are first of all the pottery: the women stuck to the good old familiar techniques and didn't switch to making the elegant, varied Michelsberg types – quite the contrary: the robust bucket-shaped pots actually seem to be a reaction against those newfangled types!

Hearth pits have long been regarded as one of the most typical characteristics of the Mesolithic way of processing food. The sixty or so hearth pits found at Schipluiden show that this method was still very much alive here.

It is not altogether certain whether the groove-and-splinter technique of antler working should be traced back to the Mesolithic at Schipluiden. This is after all a typical *early* Mesolithic technique, used for the production of the barbed points of those days, which goes back to the processing of reindeer antler in the Magdalenian and the Hamburg culture. Its use in the Neolithic at sites far removed from one another in the Hebrides and Switzerland suggests reinvention of this technique, which was after all a fairly obvious processing method that moreover has a lot in common with that used for processing metapodia.

Far more fundamental is the subsistence system, which we have characterised as an 'extended broad spectrum economy' (Louwe Kooijmans 1993). The people settled at a site strategically positioned between different ecozones, which they exploited on a certain seasonal basis, with a readily identifiable division of tasks between men and women. This is all very 'Mesolithic'. The people lived in relatively small settlements, in groups of a few households, at sites surrounded by expansive areas of land over which they could claim rights of use without competition from other sites.

They also kept cattle and grew cereal, but the isotope signal of the human skeletal remains points to a considerable

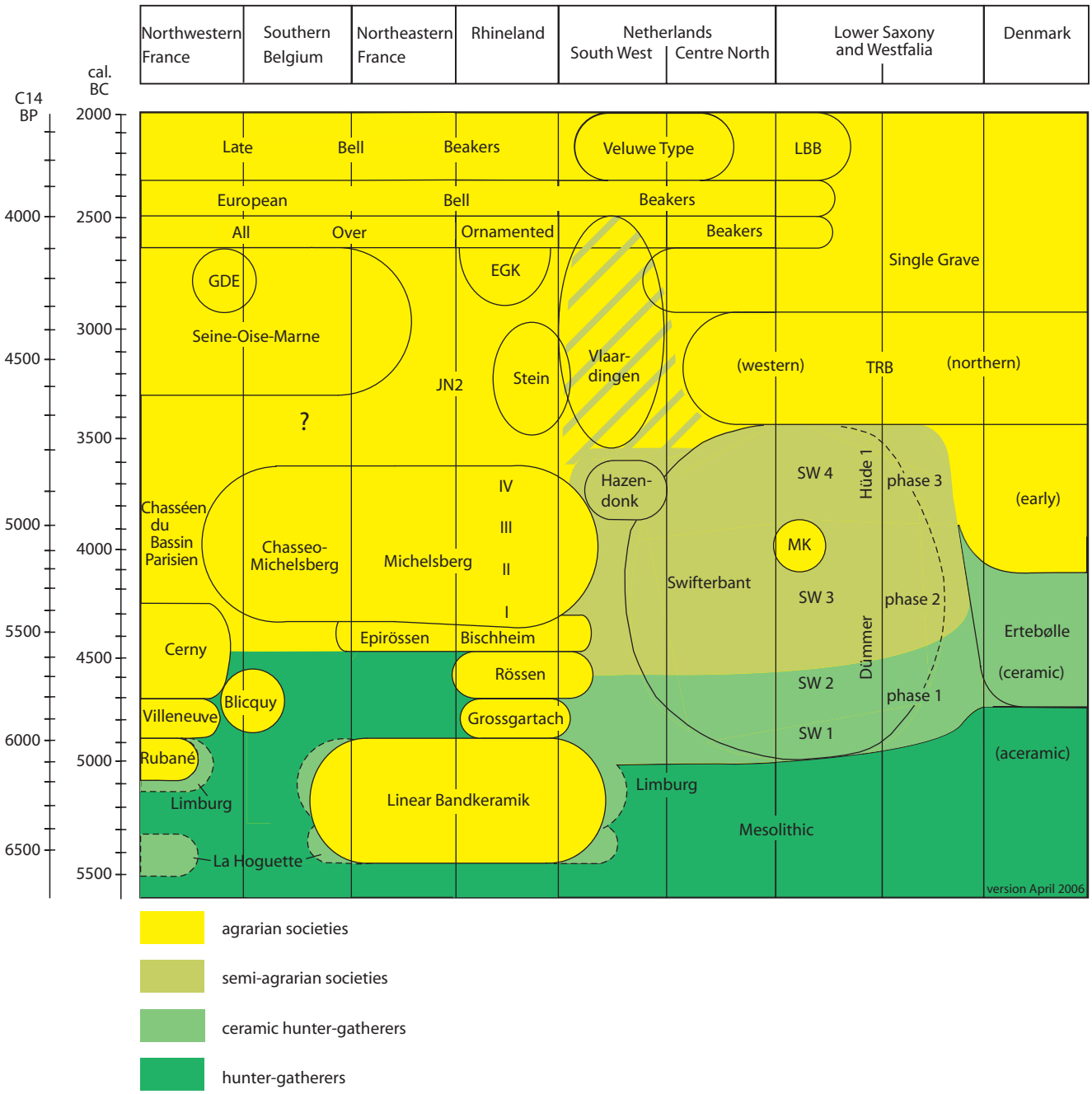


Figure 27.15 Chrono-geographical diagram of the Neolithic of the Lower Rhine Basin and adjacent areas, the colours indicating the stages of neolithisation. Update of a diagram originally drawn in 1974. Note how long the boundary between the agrarian societies and the foragers and semi-agrarian Swifterbant societies in the Dutch/North-German plain remained stationary. The Hazendonk group represents communities in this frontier zone at a stage when this distinction was about to dissolve.

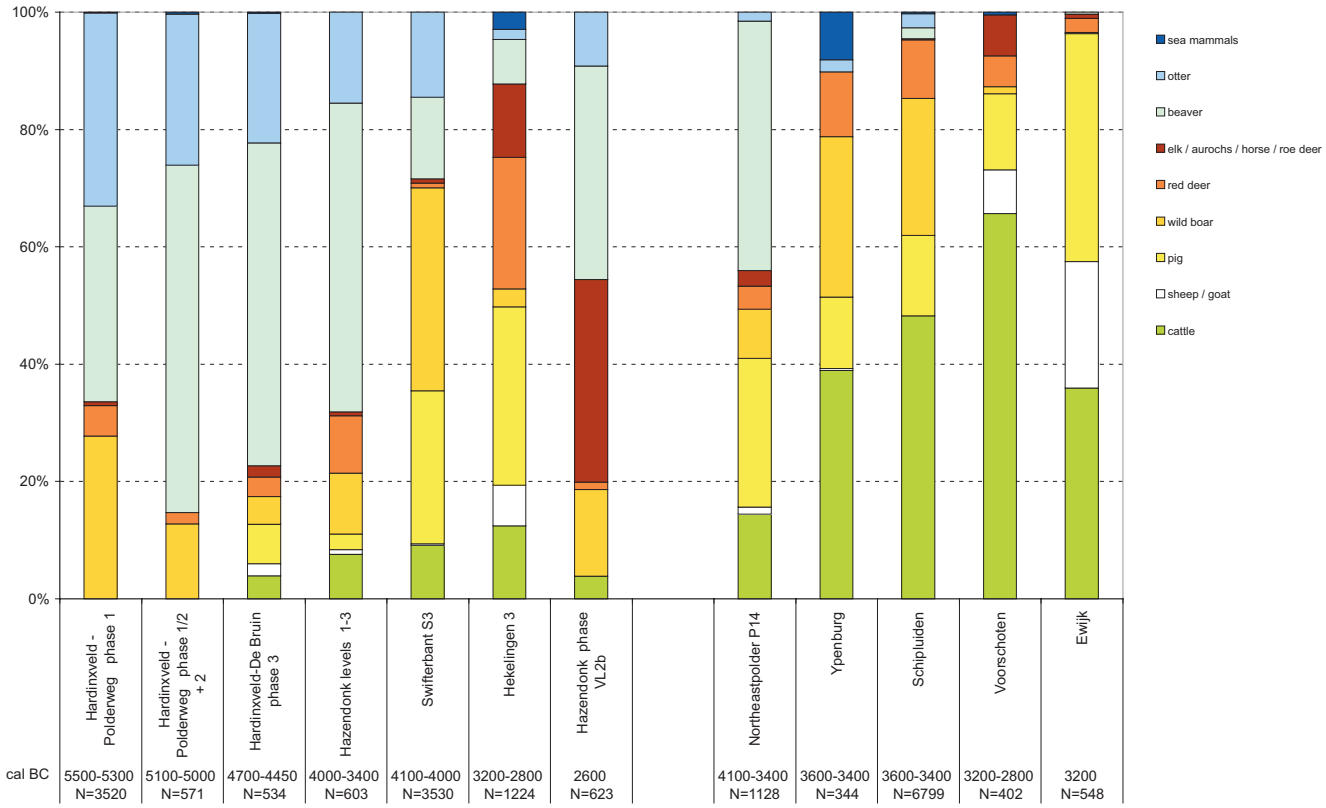


Figure 27.16 Faunal spectra of selected Late Mesolithic and Neolithic sites, 5500-3500 cal BC, in the Holocene sedimentation area divided into two groups: pure wetland sites on the left and agricultural settlements on the right. Both groups of spectra are presented in chronological order from the left to the right. Excluded are antler, dog and all fur animals except otter. Indeterminate pig/wild boar bones have been attributed to pig and wild boar on the basis of the ratio of the positive identifications. The same holds for cattle/aurochs bones.
Four factors are of importance in the interpretation of these data: the stage in the process of neolithisation, the ecozone in which the site was situated, possible differences in function of the sites in the former settlement system and seasonality. The left group is thought to more closely reflect the upland processes.

| | |
|---|---|
| coastal | Schipluiden, Ypenburg, Voorschoten |
| rivers area | Ewijk |
| upland margin | Noordoostpolder P14 |
| estuarine, fresh marshes | Hardinxveld, Hazendonk, Swifterbant, Hekelingen |

After Louwe Kooijmans in press b. Data from Clason 1990; Gehasse 1995; Groenman-van Waateringe *et al*. 1968; Oversteegen *et al.* 2001; De Vries 2004; Van Wijngaarden-Bakker *et al.* 2001; Zeiler 1997.

aquatic component in the protein consumption, which makes us characterise the community as 'semi-agrarian'. The Schipluiden occupants were much less agricultural than would appear from the bone assemblage alone.

Looking at things from this perspective we also understand why the people decided to settle in an area surrounded by coastal swamps. The site must nevertheless partly have been selected on the basis of a need for good pastureland for the cattle. That was always a critical factor in the then still densely forested land. It remained an important consideration in the Late Neolithic and even in the Bronze Age, especially in the West-Friesland region and the rivers area. We assume that the cattle was not only of economic value, but also constituted a basis from which men derived their prestige. All this made Delfland a particularly attractive area for these people.

Schipluiden therefore provides a good impression of the very gradual process of neolithisation that seems to be characteristic of the Lower Rhine Basin and is epitomized by the Swifterbant culture. In this process, small groups of people – we should be thinking of several hundred rather than thousands – adhered to the traditional way of life for a long time and adopted the achievements of the Neolithic

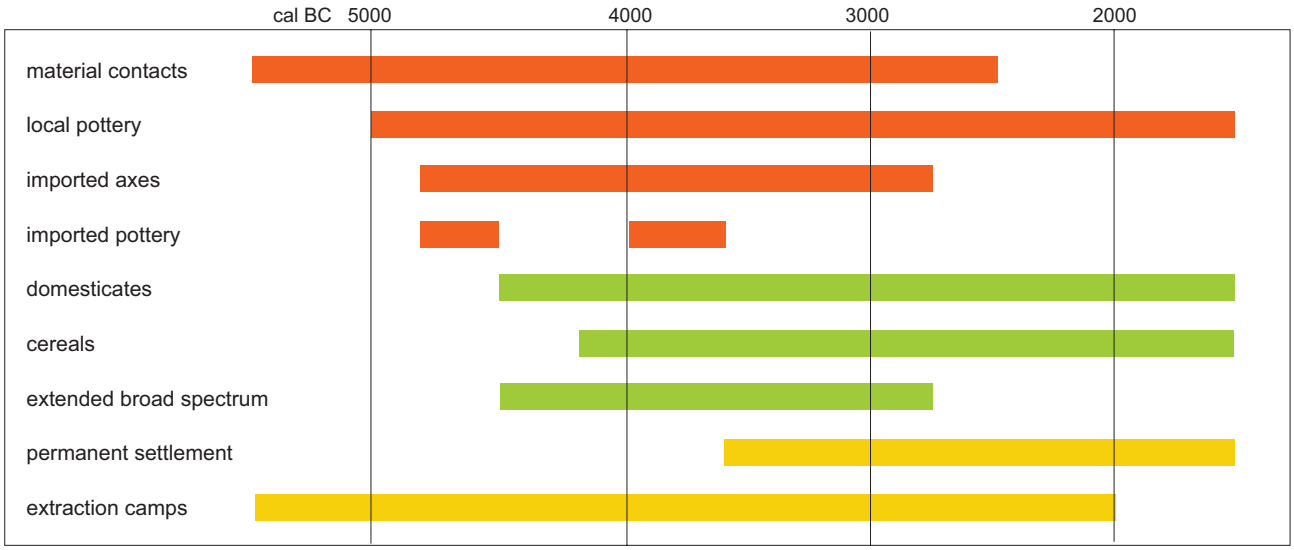


Figure 27.17 Graphic representation of the neolithisation of the Lower Rhine Basin. Technological aspects (red) preceded shifts in subsistence (green) and settlement system (yellow). The earliest archaeological evidence found so far may postdate the actual introduction of new elements. New research may yield earlier evidence. The exploitation of natural resources from special activity or extraction camps decreased through time, but did not end before the end of the Neolithic.

only step by step, almost imperceptibly. Settlements elsewhere – in the rivers area and on the southern sandy soils – may well have been more agricultural in character, as established for the later Vlaardingen culture on the Older Dunes and in the eastern part of the rivers area, but at present we have insufficient evidence to prove it.

Thus characterised, Schipluiden may hence definitely not be regarded as an average Neolithic settlement, typical of a much larger area. Further south, in the area of the Michelsberg culture, settlements will have been more agricultural and will have had much smaller territories. There, people will have needed a much smaller 'group territory' for the more restricted exploitation of natural resources. Social cohesion was instead expressed on a higher level by communal enclosures, which represent social and ideological alliances rather than communal rights of use of exploitation areas.

The subsistence system outlined for Schipluiden is not a unique development in the European Neolithic. It has also been encountered at sites with different conditions, where restricted landscape units with agricultural potential bordered a large irreclaimable wilderness. Examples of such sites are the Swiss lakeside dwellings, whose hinterland consisted of expansive mountain forests. At those sites the percentages of animals hunted in the different phases of the Neolithic vary substantially, from 10 to 90% (Wyss 1969, 122). At Arbon-Bleiche (3385-3370 cal BC) hunted and domestic animals were equally balanced, each represented by 50 percent by weight (Dreschler-Erb/Marti-Grädel 2004). At those permanently occupied lake dwellings equal proportions of wild and domestic animals remained quite common until well into the Late Neolithic Horgen culture.

The particular environmental situation and the associated research conditions make Schipluiden an anchor site for our understanding of the neolithisation process in the Lower Rhine Basin. Here, this process was evidently characterised by a gradual adoption of Neolithic elements over an exceptionally long time span, in which material innovations (pottery, flint, axes) largely preceded economic ones (arable and livestock farming), and the exploitation of natural resources remained important even in a highly advanced phase (fig. 27.17). It was a fairly exceptional and original trajectory in the mosaic of cultural change processes that together constituted the neolithisation of Western and Northern Europe.

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L.P. Louwe Kooijmans
Faculty of Archaeology
Leiden University
PO Box 9515
2300 RA Leiden
The Netherlands
l.p.louwe.kooijmans@arch.leidenuniv.nl

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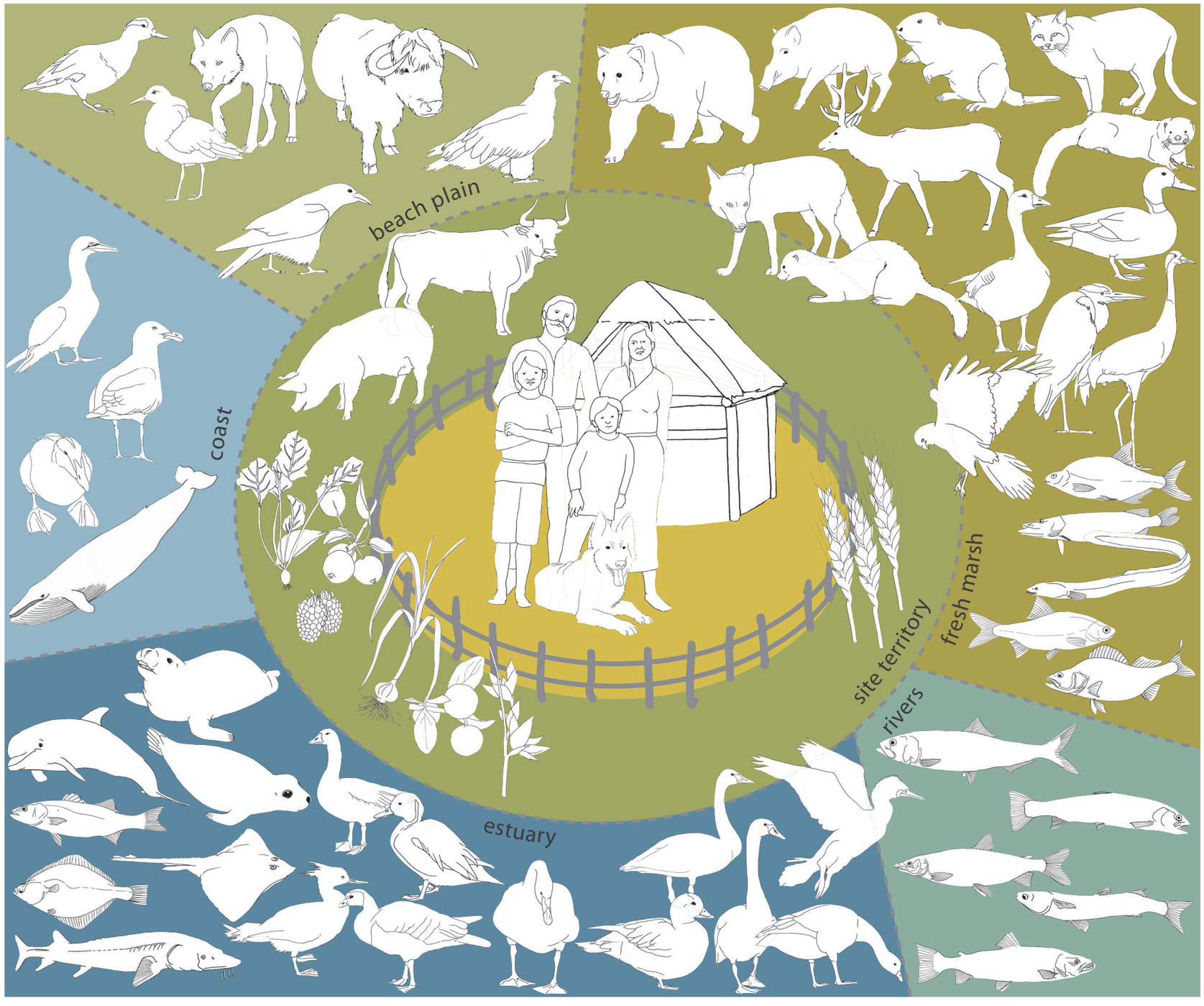


*See section 27.12.4 p. 509*

Figure 27.13 Socioeconomic model of the semi-agricultural community of Schipluiden. The most important element is the domestic space, with the farmstead at its centre, closed off from its surroundings by a fence. The dog is considered a member of the household, in a long tradition going back to Mesolithic times. Around this domestic space lies the part of the beach plain over which we assume the occupants enjoyed exclusive rights of use. In this zone crops were grown, cattle were pastured, pigs were herded and plant food, firewood and construction wood were collected. Beyond was the uncultivated wilderness comprising different ecozones, of which in particular the freshwater marshes and the (Meuse) estuary were collectively exploited with the occupants of nearby settlements. Not included in the model are the background fauna and some of the identified bird species. Each species is illustrated only once, in its most characteristic biotope, but it was of course not exclusively restricted to that biotope.
Illustrated are:

| | |
|---|---|
| site territory: | cattle, pig, sea beet, sloe plum, sand leek, sea club-rush, crab apple. |
| beach plain: | garganey, ruff, carrion crow, wolf, aurochs, white-tailed eagle. |
| fresh water marsh: | brown bear, wild boar, beaver, wildcat, red deer, marten, fox, otter, greylag goose, mallard, grey heron, crane, marsh harrier, bream, pike, eel, rudd/roach, perch. |
| rivers: | salmon, sea trout, whitefish, allis/twaite shad, thin-lipped grey mullet. |
| estuary: | grey seal, bottle-nosed dolphin, common seal, bass, roker, flounder, sturgeon, white-fronted goose, pintail, goosander, barnacle goose, mute swan, wigeon, Bewick's swan, whooper swan, brent goose, cormorant |
| coast: | gannet, great black-backed gull, eider, whale sp. |