A different perspective on the Carolingian economy: Material culture and the role of rural communities in exchange systems of the eighth and ninth centuries

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The effects of formation processes and research methods

Introduction

Before objects used in the past become the archaeological artefacts that are at the heart of a study such as this, they go through various filtering processes. The filtering starts with the effect of past use practises of objects and value systems, in particular in relation to deposition, whether intentional or unintentional. The archaeological record always represents a selection of the material present at any particular location for the period during which that location was exploited. The distribution of material over a location may be random or related to meaningful intra-site use and meaningful depositions may have been made to look random by processes which occurred after deposition. Therefore, overly simplistic interpretations of object distributions, for example attributing a particular activity to a particular area within a site based on the presence of certain objects, can provide erroneous interpretations of the available data. Because this study focuses mostly on intra- and inter-regional variation, site-specific depositional practises are of lesser importance. However, post-depositional processes, the various factors which can distort initial depositional patterns, can be of considerable influence on distribution patterns of artefacts at a regional level.

Much research has been done, and continues, both theoretically and practically, on the implications of factors such as soil conditions, ploughing and other agricultural practises, water tables, animal activity and later human activity on the physical preservation of finds and features as well as cultural practises such as inheritance, veneration of ancient monuments in the past or collecting of older artefacts, on the representative value of what is discovered archaeologically.[1] In addition, the methods used during excavation, for instance the choice whether or not to sieve the soil from features or use a metal detector, can have a profound effect on the amount and variability of material culture unearthed. As the collated data was derived almost exclusively from published excavations, publication practices are another important factor to take into account. In some cases excavations carried out to a high standard have limited use for the present research because the results have been published in such a way that it was impossible to extract the relevant information. The aim here is not to provide a long list of possible factors that may have influenced the data compiled in our database, any one of which probably is applicable to one or more sites in our survey, but to identify which of them had an impact that has caused a significant bias regarding aspects relevant to the research goals. We need to determine what those biases entail at site, inter-site and inter-regional level.

3.1 Site, inter-site, inter-regional biases

First we will examine the biases at the site level, of which it should be noted that most also have a bearing on the inter-site and inter-regional levels. A prime example of this is excavation methods, which often differ between sites depending on the methodologies in vogue in a particular period or used by the excavating institution or company; then there are financial or time constraints, to name but a few factors. These can also be relevant at site level when this has been excavated in several stages by different institutions or private companies, sometimes decades apart. Because differences in excavation methods affect the comparability of any one site to any other site to a greater or lesser degree, it is impossible to give general estimates of the effect for the analyses carried out in chapters 4 to 6.

1 Some examples are Schiffer 1987; Roymans 1995; Fokkens 1998, 56-80; Bazelmans *et al.* 2002; Huisman 2009.

For pottery the implications will presumably be mitigated by its omnipresence and the relative ease with which it can be recognised during excavation. Many of the sites for which the methods of collection are obscure are also those which have been poorly published, and excavated in the period before the rise of commercial archaeology. This period saw a greater variability in the accuracy and detail of collecting of finds between institutions. Commercial archaeology often shows less exacting levels of recovery than the better executed excavations of the previous era, but the differences between excavating parties are smaller due to the introduction of minimum standards.[2] For pottery therefore, it seems reasonable to assume the representative value of sites in the analyses will be influenced primarily by the standard of publication and less by excavation methods.

Other, less common find categories, may be affected more by differing excavation methods. Metal objects are a case in point, as the use of metal detectors on excavations has only become common practise relatively recently in the Netherlands. Metal objects are much less likely to be deposited on sites than pottery because they were less common in daily life and broken objects could be recycled. For that reason alone they are less likely to be found. The same applies to glass artefacts and probably certain objects made of organic material such as combs. Most of these types of material are also more susceptible to decay than pottery. The use of metal detectors can therefore have a significant effect on the recovery rate of metal objects and the same applies to sieving, especially for glass. Unfortunately, sieving has rarely occurred in a consistent manner on any of the Carolingian sites in our dataset and consequently very little glass has been found at all. This means glass artefacts by default will be underrepresented, and play a minor role in our analyses.

Another issue particularly relevant at site level is that features from later phases of habitation will tend to contain more finds than the initial phase. If a Carolingian settlement consisted of for instance three consecutive phases without older habitation being present at the same location, the features of the first phase are less likely to contain find material due to the fact that refuse will not have had a chance to build up at the time the first features were dug.[3] This can lead to a false impression of the amount and variability of material present during the consecutive phases of habitation. The material culture of the first phase may be underrepresented. A related issue arises when older and or younger habitation is present at the same site as the Carolingian settlement. Older material may end up in Carolingian features which is particularly problematic for artefacts which cannot readily be dated to a specific period such as stone artefacts, some metal artefacts and a proportion of the hand-made pottery. Younger material may find its way into Carolingian features through human or animal activity perhaps making the features seem younger than they are. It may also lead to difficulties recognising Carolingian structures among the many, often larger, younger features.

Second, factors relevant to the inter-site and inter-regional levels of comparison are differing soil conditions and water tables, the nature of the features present on sites, the degree of disturbance of the original habitation level, whether or not there is a natural build-up of sediments at the site, later agricultural practises and significant changes in the landscape.

The effects of soil conditions on artefacts are well known and can be substantial. There are many differences in the composition of soils across the Netherlands, but the main soil types are essentially clay, sand and peat (*fig. 3.1*). Pottery, stone and glass artefacts are relatively well preserved in all these soils, though clay can have an adverse effect on softer fired ceramic wares, in our period

2 Whether these have actually been adhered to in all cases is another matter and minimum standards are often applied as maximum standards.
3 Verhoeven 2010, 269-276.

hand-made pottery in particular. However, metal and organic materials are much more reliant on favourable soil conditions and water table levels to remain preserved. Iron and copper-alloy artefacts are particularly susceptible to corrosion, especially in aerobic conditions, in comparatively dry, loose soils.[4] Both metal and organic material are preserved better in anaerobic conditions and relatively compact, wet soils. Therefore metal artefacts and objects made of organic materials are more likely to be found in clay soils of which the compact nature limits the availability of oxygen and retains moisture better. They survive much less well in sandy soils. Because soils play an important part in our definition of regions, and most regions therefore have relatively homogenous soil conditions, the main differences will be between sites from different regions. Region 5 perhaps shows the greatest internal differentiation in soil conditions with habitation on sand dunes, along rivers and in (former) peat areas. This makes it an interesting region to examine for the possible effects of soil conditions on the comparability of sites, although it might be the case that sites on different soils also had different habitation histories exactly because of their differing location.

A factor which may have had a significant effect on the comparability of sites and regions is the degree to which the original habitation level(s) were preserved. Some sites in our survey consist of nothing other than the remains of habitation levels and original surfaces deposited one on top of the other, whereas for many other sites these levels have been completely removed, either by ploughing, erosion or commercial exploitation. In the past most unintentional refuse depositions will have been incorporated into the soil just below the contemporary surface. This material found its way into the pits that were dug through habitation layers. Therefore, what is found in the vast majority of archaeological features is a limited selection of what was present in habitation layers. Sites that do contain habitation layers can be expected to yield considerably more finds than those that do not. The preservation of habitation layers is partly dependent on local, natural conditions. They are often discovered in areas that were flooded repeatedly in later centuries, to an extent protecting the layers from later human activity. Layers of deposited wind-blown sand have in some cases helped preserve habitation layers in the dune areas of region 5, but in contrast with sites which were later flooded, the settlements on sand-dunes often remained continually inhabited at least until the end of the Central Middle Ages. Unsurprisingly, many sites with intact habitation layers have been discovered along rivers and in zones which were flooded and covered in peat following Carolingian habitation. Settlements on terps in region 1 are by their very nature also characterised by the presence of habitation layers, though here they are a consequence of human action. Due to the fact that these sites were often continually inhabited before and after the Carolingian period, there is generally a degree of disturbance and intermingling of habitation layers.

On sandy soils where no sedimentation took place the post Carolingian use of the landscape led to a gradual destruction of the upper part of the topsoil mostly through ploughing. In the Late Middle Ages most Carolingian sites on sandy soils were progressively covered by layers of sand mixed with manure, intended to improve the fertility of the otherwise relatively poor soils. This eventually led to thick deposits of arable layers (plaggen soils) protecting the older dug in archaeological features. However, because each subsequent fertilisation required mixing with the soil already present, the early medieval habitation layers will have been completely incorporated into cultivation layers within the first few generations of the application of sod-fertilisation.[5] In addition, manure fertilisation, which does not necessarily lead to significant raising of the surface level, is likely to have taken place for several centuries after habitation ended. In the period before sod-fertilisation started existing habitation layers would already have been turned over considerably.

4 Carmiggelt/Schulten 2002, 71-72.
5 Theuws/Van der Heijden/Verspay 2011, 86-90.

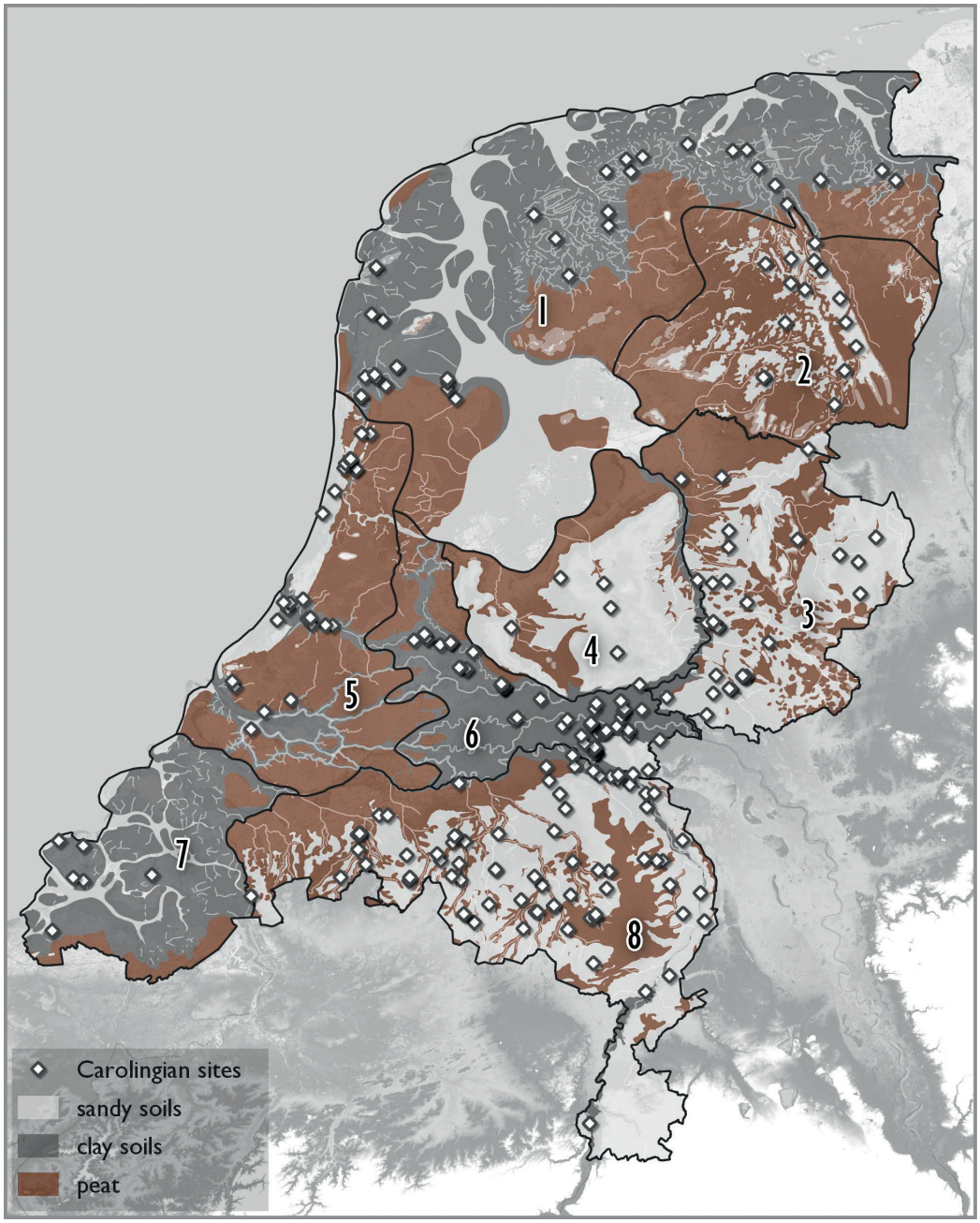

Fig. 3.1 Parts of the research area where either, sandy soils, clay soils or peat dominate (based on De Vries/Vos 2013). For the site numbers see figure 2.1.

Therefore, habitation layers are rarely found on sites in regions dominated by sandy soils.

Finally, the kind of features present on a site may have had an impact on the amount and variability of finds. Some types of features are more likely to yield a large amount of artefacts compared to others simply due to their relative size, but the use of features in the past can also be a cause. Wells are often among the largest single archaeological features on sites and because they lay open for their entire use-life there was always a possibility of material falling in, although in general they seem to have been kept clean as best as possible as long as they were in active use. As the purpose of wells was to obtain water they were dug to groundwater level, meaning that on many sites they are the only features to yield finds from waterlogged conditions, especially those on dry soils. Wells could be used as refuse pits after abandonment of their primary purpose, although it seems to be more common for them to be filled up swiftly after disuse. Even so, due to the sheer volume of the contents of the well shaft there is a greater chance of find material having been deposited in a well than in most other features. Therefore, sites containing many wells may yield more and more varied finds than those containing few or none.

Region	No ditch-systems	Ditch-systems
1	97.0%	3.0%
2	73.3%	26.7%
3	100.0%	0.0%
4	50.0%	50.0%
5	77.8%	22.2%
6	87.8%	12.2%
7	100.0%	0.0%
8	97.3%	2.7%
All regions	**91.0%**	**9.0%**

Table 3.1 Percentage of sites per region where either ditch systems were present or not.

Ditches, though often not preserved to a great depth on Carolingian sites, can also contain relatively large amounts of finds because they cover a considerable cumulative surface. The use of ditches was not common to each of our regions in the Carolingian period (table 3.1). This will have partly been due to the fact that water management was a necessary component of settlement organisation in wetter areas, but this does not account for all observed variability. Sites in regions 2 and 8 were characterised by comparatively similar soil conditions and water table levels, but where several settlements in the former region do show the use of ditches, almost none have been found on sites in region 8. Whereas wells are a common feature of settlements in almost all regions, ditches are not and may be responsible for significant differences in the amount of finds between regions.

Silted up watercourses which were still active in the Carolingian period are an even more regionally specific feature type. These only occur at sites in regions 1, 5 and 6, often where there were very dynamic river systems. In many cases these channels seem to have been used as dump sites for refuse from the neighbouring settlement. Another common practise was to build revetments along the stretch of channel which passed the settlement. These were then reinforced with settlement refuse. Silted up channels are understandably rich sources of find material and can cause significant biases in the amount and variability of find material, especially as they generally have excellent conditions for the preservation of metal and organic material.

Sunken huts are another type of feature unevenly distributed over regions and which, due to their relatively large size, can contain high amounts of artefacts. This could make it difficult to compare

sites with sunken huts to those where craft activities took place in above ground structures or in the open air.

Though dug-in post constructions are fairly common in most regions there are areas where buildings were constructed by other methods such as sod-walls or hammered in posts. As postholes contain a significant proportion of the finds from features on sites where they are present, their absence in particular regions will presumably have had an effect on the amount of finds potentially present. At the same time, areas where structures constructed of dug-in posts are common are generally also those where sod-fertilisation took place, causing the most find rich upper section of postholes to be disturbed.

In the next sections I will be examine how several of the discussed factors may have influenced the data on which the analyses in the following chapters is based. Firstly, the various factors that can be grouped under preservation conditions will be discussed. Secondly, effects of the presence of particular kinds of features on the amount and variability of finds is examined. Finally the impact of excavation methods and publication practises on the collected data will be discussed.

3.2 The effects of preservation conditions

A recent overview of brooches found in the low countries dating from the Iron Age to the Early Middle Ages examined what post-depositional factors likely had the greatest influence on observed distribution patterns.[6] Based on similarities in the distribution of brooches in the Netherlands with those of glass La Tène bracelets and Late Roman *terra sigillata* sherds it was concluded that soil conditions played a limited role as far as the spread (though not the volume) of items is concerned while the depth of deposits relative to the surface were deemed to be of primary importance. In areas with sandy soils the process of improving the soil, discussed in the previous section, has buried finds under thick deposits, while for example the clay soils in the central river area require little additional fertilisation. This means that ploughed land in areas where clay soils dominate will more readily bring archaeological objects close to the surface, where they can be found through surveying and metal detecting. The conclusions are mainly relevant for the area of the Netherlands along the major rivers and to the south of them because the reference material circulated mostly in those areas. However, the principles can be expected to be the same for the northern half of the Netherlands. In fact an analysis of the specific find conditions in the northern provinces, particularly in the province of Friesland led to similar conclusions. The interplay of past and present-day land-use, metal detecting practises, and archaeologists role in recording finds, could be shown to have had important consequences for the distribution of stray metal finds.[7]

The analyses in the following chapters are usually based on finds from excavated contexts, so the depth of deposits should not be a factor.[8] Despite soil conditions not appearing to be of great consequence for the overall distribution of stray finds, in this study the volume and variability of find assemblages is an important factor in interpreting the level of connectedness of sites and regions. Therefore the potential effects of soil conditions for the recovery of the different find categories needs to be examined. The number of finds of metal and organic material per region and per soil type reveals that objects made of bone or antler have been found mostly on sites situated on clay. The

6 Heeren/Van der Feijst 2017, 365-371.

7 Bazelmans/Gerrets/Pol 2002, 232-235.

8 However, in the chapter on metal artefacts use is made of the stray find evidence for Carolingian coinage. The difficulties in interpreting their distributions is discussed there.

same is true for artefacts made of wood. Where objects in bone, antler, leather or wood have been discovered on sites on sandy soils and recorded per feature they were recovered from wells. The consequence is that hardly any artefacts made of these materials has been found on sites in regions 2, 3, 4 and 8. For this reason and the fact that their recovery is so dependent on favourable preservation conditions, they have not been studied in great detail. With regard to metal artefacts the image is somewhat more diffuse. As expected, in general metals seem to be found more frequently at sites on clay than on sandy soils, though the difference is limited in absolute terms. Of each major group of metal in the database except iron, that is gold, silver, copper-alloys and lead, the majority was recovered from sites on clay (table 3.2). It is remarkable that in a number of instances the amount of copper-alloy artefacts is much higher than iron objects on the same soils in the same regions. This is probably partly a consequence of publication practises, copper-alloy artefacts being more likely to be mentioned in less comprehensive reports, and partly to the fact that copper-alloy objects can often be dated accurately on morphological grounds rather than just context.

Region	Soil	Silver	Gold	Copper-alloys	Iron	Lead	Tin	Total
1	**Clay**	39	-	42	9	2	3	95
2	**Sand**	2	-	4	6	-	-	12
3	**Clay**	-	-	-	2	-	-	2
	Sand	4	-	10	11	-	-	25
4	**Sand**	-	-	-	4	-	-	4
5	**Clay**	20	-	21	93	4	8	146
	Sand	80	-	43	70	3	-	196
6	**Clay**	48	-	56	4	4	1	113
	Sand	-	-	7	-	-	-	7
7	**Clay**	-	-	10	6	-	-	16
	Sand	2	-	20	2	2	4	30
8	**Sand**	12	2	17	36	2	-	69
Total		**207**	**2**	**232**	**243**	**17**	**16**	**717**

Table 3.2 Number of finds per metal, per region and per soil type.

If we compare the coastal and riverine regions 1, 5, 6 and 7 with the more inland regions 2, 3, 4 and 8 the former group contains 28 sites on clay and 14 on sand, where metal artefacts may be expected to have been recovered and recorded if they had been present, based on the excavation and publication scores (see section 3.4). In the inland regions two sites were situated on clay and 43 on sandy soils. These figures indicate that inland areas are at a slight disadvantage with regard to the likelihood of metal artefacts being discovered due to the lack of sites on clay soils. However, if we compare the average number of metal finds on sites on sandy soils between coastal and inland areas it is clear the average for the former is much greater (table 3.3). This suggests a difference in recovery of metal objects which cannot readily be explained by the factor soil conditions. One site in region 7 classed under sites on sandy soils, Domburg (191), contained a relatively large assemblage of metal finds. Here the numbers can at least partly be explained by the fact that the site was waterlogged and that the soil consisted of anthropogenic layers. However, it is not so easy to clarify the relatively high average quantity of metal artefacts at sites on sandy soils in region 5 (table 3.4). On closer inspection two sites on sandy soils in region 5 stand out due to their find conditions. Both at Bloemendaal-Groot Olmen (212) and Wijk aan Zee-Hoogovens (172) habitation layers were relatively well preserved which may explain the particularly large assemblages of iron artefacts which together account for roughly 70% of iron artefacts found on sandy soils in region

5. By contrast the amount of copper-alloy objects at both sites is fairly limited. But even when these two sites are omitted the amount of metal artefacts on sites with sandy soils in region 5 is still high compared to other regions.

Area	Soil	Artefacts	Sites	Avg N artefacts per site
coast	clay	370	28	13.2
	sand	233	14	16.6
inland	clay	2	2	1
	sand	110	43	2.6

Table 3.3 Average number of metal artefacts by area and soil type.

Region	Soil	N sites	Silver	Gold	Copper-alloy	Iron	Lead	Tin
1	clay	10	3.9	-	4.2	0.9	0.2	0.3
2	sand	3	0.7	-	1.3	2.0	-	-
3	clay	2	-	-	-	1.0	-	-
	sand	13	0.3	-	0.8	0.8	-	-
4	sand	2	-	-	-	2.0	-	-
5	clay	3	6.7	-	7.0	31.0	1.3	2.7
	sand	7	11.4	-	6.1	10.0	0.4	-
6	clay	13	3.7	-	4.3	0.3	0.3	0.1
	sand	6	-	-	1.2	-	-	-
7	clay	2	-	-	5.0	3.0	-	-
	sand	1	2.0	-	20.0	2.0	2.0	4.0
8	clay	1	-	-	-	-	-	-
	sand	25	0.5	0.1	0.7	1.4	0.1	-

Table 3.4 Average number of artefacts per metal and site, separated by region and soil type. The number of sites per soil type does not represent the total amount but rather the sites with an excavation score of 1 or 2 and a publication score of 1 to 4.

3.3 Aspects related to features

The manner in which data was collected and the nature of features themselves both create problems when attempting to compare the find density and variability between feature types. Ideally something like a figure for the average number of finds per cubic meter of fill should be calculated but that is not possible. For some feature types even an average number of finds per feature could not be derived. Due to time constraints, in this research the decision was taken to mostly group finds from postholes and pits together, either as part of a structure or as a class of features. It was simply far too time consuming to enter the finds per individual unit for these feature types. Therefore, in the case of most feature types a direct comparison of the amount and variability of finds between sites and regions is not possible. However, it is possible to examine how influential the presence of particular feature types has been on the nature of assemblages between select regions.

Table 3.5 shows the absolute number of ceramics from rural sites per structure type and per region. Ceramics were chosen because they are least affected by post-depositional processes. Table 3.6 is similar but shows the sum of sherds per feature type. In both tables stray finds (broadly defined as finds dated to our period and not attributable to a feature or structure) have been excluded. It is important to note that the remaining sherds represent roughly 30% of the total number of recorded fragments (table 3.7). The number of stray finds compared to those that could

be assigned to structures and features is first and foremost an indicator of the effects of publication practises. These are discussed in section 3.4. However, some of the differences between regions can probably be related to the presence of specific feature types.

Structure type	1	2	3	4	5	6	7	8	Total
barn	-	-	68	-	-	-	-	5	73
defensive works	-	-	-	-	7	-	-	-	7
ditch	137	50	259	16	1231	1340	-	137	3170
fence	-	-	-	-	2	-	-	-	2
grain store/ haystack	-	-	16	9	1	61	-	38	125
hearth/fireplace	22	7	-	10	-	-	-	-	39
layer	649	3	15	47	367	1287	121	43	2532
main building	5	7	471	152	967	90	34	1420	3146
natural waterway	4	-	-	-	8108	53	-	2	8167
outbuilding	-	-	26	-	876	8	-	158	1068
palisade	-	-	-	4	-	-	-	-	4
pit	178	1116	464	431	870	3096	4	421	6580
posthole	12	15	434	211	302	433	-	622	2029
sunken hut	26	40	15	761	-	38	-	17	897
well	283	207	877	181	658	227	-	879	3312
Total	**1316**	**1445**	**2645**	**1822**	**13389**	**6633**	**159**	**3742**	**31151**

Table 3.5 Total number of ceramic sherds per structure type and per region.

Feature type	1	2	3	4	5	6	7	8	Total
building ditch	-	-	7	-	-	-	-	-	7
ditch/moat	137	50	252	16	1238	1340	-	137	3170
layer	649	3	15	47	367	1287	121	43	2532
layer building	-	-	-	-	1809	-	-	-	1809
natural waterway	4	-	-	-	8108	53	-	2	8167
pit	178	1116	464	431	870	3096	4	421	6580
posthole	12	22	1015	376	339	592	-	2243	4599
sunken hut	26	40	15	761	-	38	-	17	897
well	283	207	877	181	658	227	-	879	3312
Total	**1289**	**1438**	**2645**	**1812**	**13389**	**6633**	**125**	**3742**	**31073**

Table 3.6 Total number of ceramic sherds per feature type and per region.

Region	Stray find
1	14388
2	7890
3	4011
4	8786
5	24035
6	8979
7	301
8	4914
Total	**73304**

Table 3.7 Total number of ceramic sherds recorded as stray finds.

It is worth briefly noting that the figures for metal artefacts are roughly similar to those for ceramics with 61% of the total amount of metal finds from sites in the research area, where finds could be attributed to individual structures, having been recorded as stray finds. However, there appears to be a considerable difference between artefacts made in silver and copper-alloys and those made of iron. Of the objects made in the first two metals 94% and 85% respectively have been recorded as stray finds while for iron artefacts the figure is 44%. An examination of the sites with the largest assemblages of silver and copper-alloy artefacts indicates that the high percentage of stray finds is not the result of less than ideal publication practises, but that the majority of artefacts indeed were discovered in topsoil. Part of the explanation for the difference between copper-alloys and iron objects probably lies in the already mentioned difficulty of dating many iron artefacts on morphological grounds. In contrast copper-alloy artefacts mainly consist of brooches, and silver items are usually coins. These can be dated far more accurately. The evidence suggests iron objects were more common on rural sites than they now appear.

The figures in tables 3.5 to 3.7 indicate that in general sites in regions 5 and 6 have the largest assemblages. The structures that yielded relatively large amounts of finds in these two regions compared to other regions are ditches, layers, natural waterways and pits. The amount of sherds discovered in features belonging to buildings is comparable for regions 5 and 8 but the evidence behind table 3.6 suggests that is for different reasons. One main building and one outbuilding from two sites in region 5 account for almost the complete assemblage of sherds from buildings in the region. In both cases remnants of habitation layers had survived. On the one hand this underlines the influence the presence of such layers can exert, on the other hand it suggests that buildings in region 5 yielded relatively few finds overall. Equally, in region 6 only one main building contained ceramics, at least as far as finds could be attributed to structures (table 3.8). The numbers for regions 1 and 2 are also limited. In contrast, buildings, and postholes more generally, are consistently among the more find-rich elements in regions 3, 4 and 8.

Structure type	1	2	3	4	5	6	7	8	Total
barn	-	-	5	-	-	-	-	2	7
defensive works	-	-	-	-	1	-	-	-	1
ditch	3	3	2	-	7	9	-	3	27
fence	-	-	-	-	1	-	-	-	1
grain store/ haystack	-	-	4	8	2	4	-	21	39
hearth/fireplace	-	1	-	-	-	-	2	-	3
layer	5	1	1	-	-	1	1	1	10
main building	3	5	14	37	15	1	6	102	183
natural waterway	2	-	-	-	3	4	-	1	10
outbuilding	1	-	5	-	1	1	-	40	48
palisade	-	-	-	1	-	-	-	-	1
pit	2	25	19	-	3	8	3	15	75
sunken hut	2	10	2	103	-	6	-	2	125
well	19	13	29	7	56	16	-	77	217
Total	**37**	**58**	**81**	**156**	**89**	**50**	**12**	**264**	**747**

Table 3.8 Count of the number of individual structures in the find database that contained ceramics. Only instances of finds from individually recorded structures were included and not those from aggregated groups of features such as postholes, layers and ditches. Therefore, the figures are somewhat deceptive for ditches, layers and pits.

An important question is whether the presence of certain features contributed meaningfully to the large differences in absolute number of finds between some regions? Once more, for most features this is impossible to say with confidence due to the manner in which the finds were recorded. The presence of silted up natural waterways running along a settlement clearly does lead to relatively high numbers of finds. The finds from two sites in region 5 where a silted up watercourse was present could be assigned to specific feature types, Leiderdorp-Hoogmadeseweg (158) and Valkenburg-De Woerd (155). Finds from the fill of the watercourses made up roughly 95% and 78% of the total assemblage respectively (excluding stray finds). For Leiderdorp this is not so unusual because the sections of the site included in the dataset mainly consisted of trial trenches over the watercourse. However, at Valkenburg the adjacent settlement was also excavated. The sherd count from the remaining features at Valkenburg is still sizeable compared to other sites in the research area, so the presence of a silted up natural watercourse may not account entirely for the higher absolute number of finds for sites around the mouth of the Rhine. Nonetheless, this feature type probably does account to a large degree for the relatively high absolute number of stray finds in region 5. For example, the finds from Koudekerk aan den Rijn-Lagewaard (198) could not be attributed to specific features, but the publication on the site indicates that two-thirds of the material dated to our period was recovered from a silted up natural watercourse.[9] This site alone accounts for almost 4000 ceramic stray finds.

With regard to ditches the picture is less clear without a more detailed analyses of the kind of ditch-systems present on sites in the various regions. Both inland and coastal regions have reasonably similar amounts of records in the find database representing ditches, meaning that a comparable number of sites at least contain some ditches. However, it says nothing about the number of ditches per site or the total volume of infill they represent. A closer examination of the sites where finds could be assigned to feature types reveals that it is mainly a small number of sites in regions 5 and 6 which contribute to the relatively high numbers of sherds from ditches in those areas. The site Uitgeest-de Dog (161) has one of the largest assemblages in the research area. Unfortunately, it was not possible to assign the finds to feature types in the context of this study due to the manner in which they were published. However, the find report does provide total numbers of sherds per feature type. Of the 2846 fragments assigned to features, almost 25% was recovered from ditches, followed at some distance by wells, pits and postholes.

Although the interpretation of the number of finds from layers suffers from the same problems as ditches, it seems clear that at least in region 1 the presence of layers on sites has had an influence on the amount of sherds recovered. Unfortunately, the nature of layers was not systematically recorded during data collection, partly because it was not always possible to determine from the published data. For sites in region 1 where finds could be attributed to feature types most contained at least some finds from layers and in most cases those finds accounted for at least 20% of the total assemblage. In particular several sites in the north of the province of Noord-Holland contained remnants of habitation layers. Even though the finds from Medemblik-Schuitenvoerderslaan (172) and Schagen-Waldervaart (169) could not be attributed to specific feature types the site descriptions make it clear much of the find material was recovered from layers that were covered by younger sediments. Therefore the presence of find rich layers on sites in region 1 appears to be one of the main reasons for the large amount of stray finds in that area. In region 5, the finds from the site Wijk aan Zee-Hoogovens (172) accounts for almost a third of the stray finds in the region. This site was meticulously excavated which almost certainly led to a relatively high artefact recovery rate.

9 Dijkstra/Van Grinsven 2007, 29.

However, the large amount of pottery fragments is undoubtedly also due to the preservation of habitation layers under a meters thick, undisturbed stratigraphical sequence.[10]

Sunken huts only occur regularly on sites in regions 1, 2 and 4, but have also been found on sites in parts of regions 3, 6 and 8. Figure 3.2 shows they are unevenly distributed across the research area and as they are a relatively large feature may cause overrepresentation of finds compared to areas where they do not occur. Unfortunately few sites where sunken huts have been discovered were published to the extent that finds could be attributed to individual structures or features.

Region	Site	Place	% of assemblage	N sherds
1	**21**	**Leeuwarden**	8.6%	26
3	**45**	**Zelhem**	15.3%	11
4	**507**	**Oud Reemsterzand**	7.5%	7
4	**530**	**Uddel**	49.1%	708
4	**538**	**Putten**	16.1%	46
6	**501**	**Wijchen**	49.4%	38
8	**67**	**Beegden**	36.6%	15

Table 3.9 The proportion of the total assemblage contained in sunken huts at sites where finds could be associated with structures and features.

Table 3.9 gives an overview of the percentage of the total ceramic assemblage that was recovered from sunken huts on rural sites where this could be determined. The table indicates that where they were present sunken huts may well have contributed considerably to the volume of finds. Given the small number of sites with sufficient evidence for the kind of finds recovered from sunken huts it is not possible to make any assertion regarding them containing above average quantities of material associated with artisanal activities.

The examples given above indicate that at least to some extent the differences in the absolute number of finds between regions is due to the presence of particular feature types. However, this does not necessarily imply the amount of ceramics present in settlements would on average be roughly equal for each region if we could correct for the influence of feature types. The Valkenburg site still shows relatively high absolute figures when the silted up watercourse is ignored and the absolute number of sherds from postholes and pits at Uitgeest-De Dog is relatively high compared to an average site in regions 3 or 8. Perhaps the best way to compare the volume of material on sites is by examining the finds from wells. Their characteristics are comparable throughout the research area and they usually represent a single feature. Therefore it is possible to calculate average numbers of sherds per well (table 3.10). The figures for the overall average number of sherds per well, per region indicate that the regions considered to be inland areas have higher values than riverine and coastal areas. When the sherds are split up into wheel-turned and hand-made groups it becomes clear that the high values for regions 2 to 4 are largely due to considerable amounts of hand-made ceramics. The differences in the average amounts of wheel-turned and hand-made pottery per well roughly reflect the relationship between both groups within and between regions, something that will be discussed further in chapter 4. The figures are probably also a reflection of a tendency for handmade ceramics of the period to be more prone to breakage, or to fragment more than wheel-turned pottery.

10 Bosman/Calkoen 1967, 224-231.

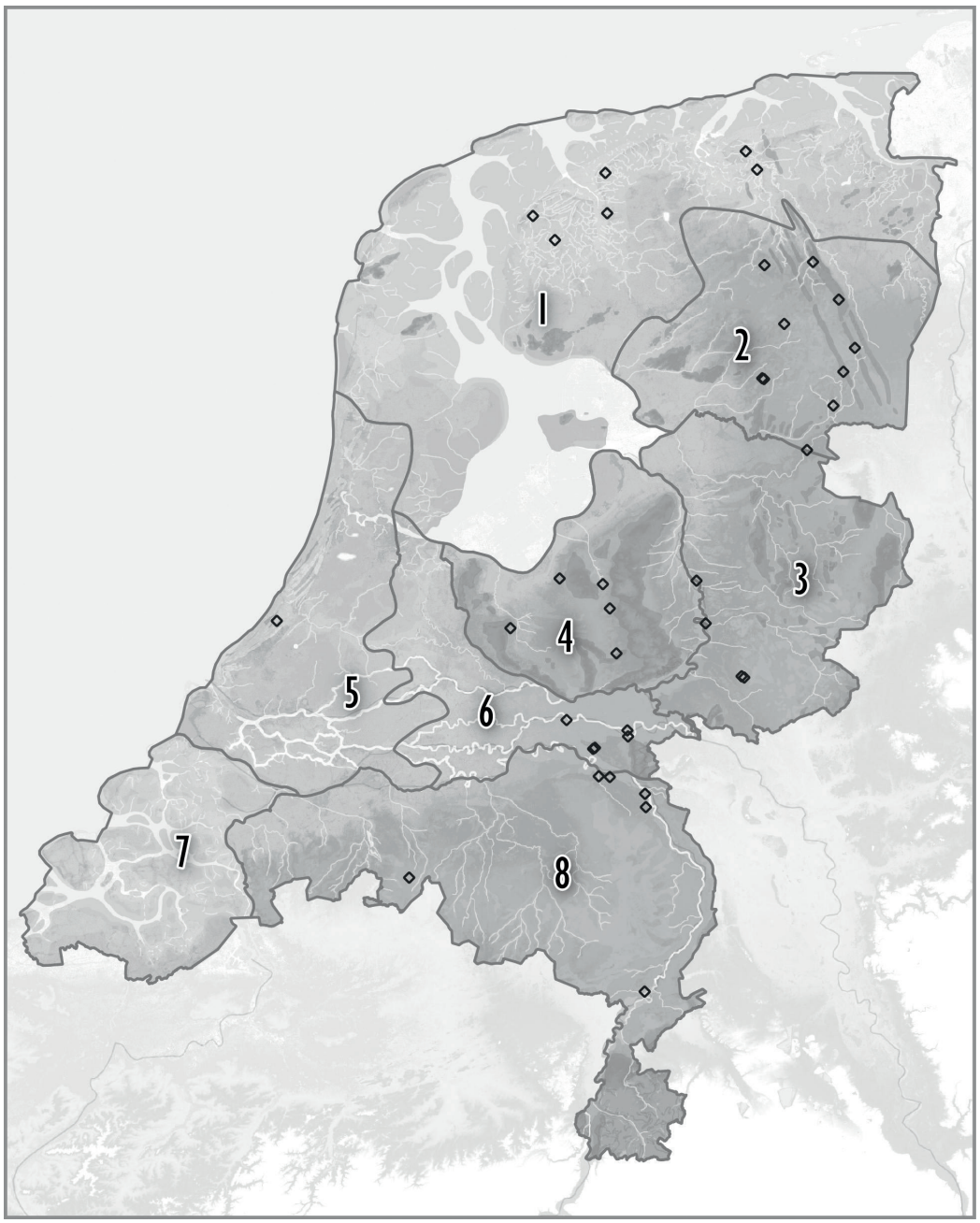

Fig. 3.2 Distribution of sites containing sunken huts.

When only the wheel-turned sherds are considered the differences between regions are generally limited, but region 5 has a lower average than the three inland regions for which we have figures. This seems to contradict the evidence from some individual sites in region 5 mentioned above. Table 3.10 also contains the average number of wells per 1000m² for each region. The numbers suggest the amount of wells on sites in regions 5 and 6 was on average considerably higher than in some

inland areas. This might explain why, even if the average amount of sherds is relatively low in for example region 5, the total amount of sherds from wells is still high.

Region	Wells[11]	Avg N of wells per 1000m2[12]	N Sherds	Avg N sherds per well	Avg N WT	Avg N HM
1	14	0.7	87	6.2	1.3	6.3
2	6	0.4	206	34.3	-	34.3
3	27	0.7	767	28.4	4.4	28.6
4	6	0.2	171	28.5	6.0	23.5
5	67	1.1	380	5.7	3.9	4.1
6	13	1	93	7.2	7.4	2.4
8	54	0.4	565	10.5	7.4	9.3

Table 3.10 Figures relating to the number of ceramic sherds recovered from wells in the research area.

In summary the evidence for differences in the size of artefact assemblages on sites between regions is ambiguous but indicates they are not as big as the total absolute numbers suggest. However, the question remains whether the variability of finds between regions might differ because of the size of the samples. The ceramic evidence presented in chapter 4 certainly suggests this played a role but perhaps not to such an extent that developments cannot be followed or comparisons between regions are made redundant. For artefacts produced in materials particularly susceptible to decay such as metals, bone and wood the question is difficult to answer because the regions with large assemblages are also the areas where preservation conditions are often more favourable to their survival. Table 3.11 shows on which proportion of sites in a region artefacts belonging to a particular find category occur. Region 5 has among the highest scores in each category but otherwise there is no clear distinction between inland and coastal areas. Presumably it is a combination of factors that makes region 5 stand out, making it complicated to determine whether the region ultimately had a richer material culture or not.

This can be illustrated further by once again examining the relationship between different metals and the contexts in which they were discovered. When this relationship is viewed by region it becomes apparent that in most coastal and riverine regions artefacts in silver, copper-alloys and iron have all mainly been discovered in topsoil. In inland areas silver and copper-alloys have also predominantly been found in topsoil but iron was discovered more often in features. This suggests that besides the morphological traits of artefacts, differences in land-use between the various regions, such as discussed in section 3.1 also played a role in the recovery rate of metal objects. Particularly the extensive occurrence of relatively acidic plaggen soils in the inland areas characterised by pleistocene sand may have caused a higher degree of decay of iron artefacts in topsoil compared to coastal and riverine areas.

The large assemblages in coastal and riverine regions are also, at least in part due to a lesser degree of disturbance of archaeological levels in later centuries. Aside from agricultural practises, subsequent disturbances could have been caused by continued habitation on sites after our period. Table 3.12 shows the percentage of sites per region that either provide evidence for continuity or not. It makes clear that continued occupation at the same site was considerably less common in region 5 than in other areas.

11 The numbers of wells that contained ceramics.
12 Based on the total number of wells dated to our period per site divided by the excavated surface area. Sites with a surface area below 1000m2 were excluded.

Region	Brick	Glass	Ceramics	Metal	Zoological	Wood	Stone
1	20.7	13.8	100.0	31.0	27.6	6.9	41.4
2	33.3	13.3	93.3	26.7	0.0	13.3	46.7
3	17.4	8.7	100.0	52.2	13.0	13.0	43.5
4	25.0	25.0	100.0	50.0	0.0	0.0	75.0
5	36.8	31.6	100.0	63.2	36.8	26.3	52.6
6	18.8	6.3	93.8	53.1	6.3	3.1	28.1
7	25.0	25.0	100.0	100.0	50.0	0.0	75.0
8	31.0	5.2	96.6	34.5	0.0	1.7	51.7

Table 3.11 Percentage of sites that contain the various find categories per region.

Region	No continuity	Continuity
1	66.7%	33.3%
2	53.3%	46.7%
3	53.8%	46.2%
4	0.0%	100.0%
5	81.5%	18.5%
6	42.9%	57.1%
7	50.0%	50.0%
8	59.5%	40.5%
All regions	**57.3%**	**42.7%**

Table 3.12 Percentage of sites in each region that either show continuity of occupation or not.

3.4 The effects of excavation methods and publication practises

In order to assess and to factor in the effect of excavation methods and publication practises each site was assigned an excavation and a publication score (table 3.13).[13] The scores do not necessarily equate to an assessment of the quality of excavation or publication in a general sense. They are first and foremost intended as an indication of the usefulness of the sites in the context of the current research. However, the evaluation of the excavation quality in particular is normative to an extent, based more on the overall impression of an excavation than on the use of specific methodologies. Any excavation with a score of 1 to 4 can be expected to have been carried out to a degree that finds were recorded per feature and each find category was recovered and recorded if they were encountered. Also they are expected to have been carried out fairly systematically. Sites with a score of 5 or 6 may have been excavated less thoroughly. Furthermore some find categories may not have been recorded systematically, either because they were not deemed of interest or because of time-constraints. The reason for making separate categories for small-scale excavations and trial trenches (scores 3 and 4) is that they may represent just a small proportion of a site and therefore provide only a limited overview of the variability of find material. In addition, few features are sectioned during trial trench campaigns meaning that for the most part only finds discovered during removal of topsoil will have been recovered.

13 Initially a post-excavation score was also applied because in some cases the post-excavation analysis of a find category had obviously been carried out to a high standard but the publication of the data was not sufficiently detailed for our purposes. However, it often proved difficult to assess the quality of post-excavation analysis exactly because it had to be derived from the publication. Furthermore, the quality of publication ultimately determined how useful the data from a site was for carrying out analyses.

The publication scores have been applied mainly based on how comprehensively the different find categories were published per structure or per feature. The first two scores stand for publications that provide the total amount of finds for each find category, either per structure and feature, or not. In addition the information about the various find categories is usually fairly comprehensive in these publications. The finds from sites with a publication score of 3 or 4 have only partially been published. For example, the total amount of ceramics per type and fabric may have been published, but stone and metal artefacts might only be mentioned as being present without giving exact numbers or descriptions. The finds from sites with a publication score of 5 are merely useful to give an impression of the distribution of find categories or, for example ceramics vessel types, but give no information on the volume of finds. For finds from sites with this score it is also often difficult to determine whether all recovered find categories have been stated or only a selection of finds deemed to be worthy of mention. To a lesser extent this can be the case for sites with a publication score of 3 or 4 as well.

The find category of which the recovery is probably most dependant on excavation methodology is glass. The collected data clearly shows that the discovery of glass artefacts is highly dependent on excavation methods, particularly the sieving of features. Of the six rural sites in the database where sieving took place only one did not yield glass objects dated to our period, although at the site in question (Geldrop-Genoenhuis (132)) fragments of sixth or seventh century glass artefacts were discovered. Of the 84 fragments of glass vessels found on rural sites, 56% were recovered at the sites where sieving took place. The underrepresentation of glass artefacts in the dataset due to a lack of sieving is counterbalanced somewhat by the likelihood that when glass artefacts have been discovered by other means they were published even when the overall publication of finds is poor.

The recovery of artefacts made of stone seems to suffer with low excavation scores. Only five stone artefacts have been recorded on sites with a score of 5 or 6. The same is true for production waste associated with metal working which is even rare on sites with a score of 4. The explanation is probably that seemingly indeterminate objects are more readily overlooked during less intensively and systematically conducted excavations.

Excavation score	meaning	Publication score	meaning
1	High quality, including sieving or at least sectioning by hand	**1**	Total counts for all find categories, per structure/feature
2	Normal quality, use of metal detector	**2**	Like 1 but not per structure/ feature
3	Like 2 but small excavation	**3**	Partial counts or total counts only for certain find categories, per structure/feature
4	Trial trenches	**4**	Like 3 but not per structure/ feature
5	Poor overall quality	**5**	Only presence/absence information for find categories
6	(Virtually) Non-archaeological fieldwork	**6**	(Virtually) no data on finds
0	Indeterminate	**0**	No finds

Table 3.13 Summary of the meaning denoted by excavation and publication scores.

Even more problematic for the current study are the consequences of publication practises on the availability and detail of data. Poorly excavated sites understandably often lead to reports of limited value, but well executed excavations can be rendered of similar worth by choices made in the publishing of the results. Thankfully the general trend is for good quality excavations to be published well more often than not (table 3.14). Nonetheless, only 18% of the available publications can be said to be optimal for our purposes (with an excavation score of 1 to 3 and publication score of 1) and for just over 50% of excavations with a score of 1 to 4 the finds could not be systematically assigned to structures and features. Table 3.15 indicates that this has likely had an effect on the frequency with which non-ceramic artefacts have been recorded. Obviously the recovery of the various find categories depends on several other factors, but for most the relative number of instances that they have been recorded drops steadily with successively lower publication scores.

Q pub Q exc	0	1	2	3	4	5	6	Total
0	22	2	-	-	3	1	21	49
1	-	5	4	1	-	-	-	10
2	-	23	16	6	18	4	-	67
3	-	14	14	6	15	9	2	60
4	-	9	8	4	4	5	4	34
5	-	1	1	-	3	5	3	13
6	-	-	1	1	3	5	3	13
Total	**22**	**54**	**44**	**18**	**46**	**29**	**33**	**246**

Table 3.14 The relationship between excavation scores and publication scores.

Q pub	Ceramics	Metal	Stone	Zoological	Wood	Brick	Glass
1	100.0	61.1	63.0	18.5	9.3	35.2	16.7
2	100.0	65.9	59.1	22.7	9.1	31.8	22.7
3	100.0	50.0	61.1	11.1	0.0	38.9	5.6
4	97.8	45.7	30.4	8.7	10.9	19.6	10.9
5	93.1	34.5	20.7	10.3	6.9	10.3	6.9
6	15.2	3.0	0.0	0.0	0.0	0.0	0.0

Table 3.15 The frequency with which find categories occur on sites relative to publication score.

Field	Description
Quality Excavation	Excavation score (see above)
Quality Publication	Publication score (see above)
Per structure	Whether finds could be recorded per structure. Either yes, no or partial
Per feature	Whether finds could be recorded per feature. Either yes, no or partial
Metal/Glass/Ceramics/Brick/Stone/Zoological/ Wood/ present	Whether the find category was found at the site. Either yes, no, indeterminate or likely
Metal/Glass/Ceramics/Brick/Stone/Zoological/ Wood/ totals usable	Whether the figures for each find category provided by the publication can be used for comparison with other sites

Field	Description
Sieving	Whether sieving took place
Metal detector	Whether metal detecting (likely) took place
Only Ceramics per structure	Whether only ceramics have been recorded per structure.
Only Ceramics per feature	Whether only ceramics have been recorded per feature.
Total ceramic types available	Whether the number of sherds per type represent the figure for the entire assemblage and is not just based on rims.
Total ceramic rims per types available	The number of sherds per type only represents rims, not body sherds
Total ceramic fabrics available	Whether the number of sherds per fabric represent the figure for the entire assemblage and is not just based on rims.
Total ceramic rims per fabric available	The number of sherds per fabric only represents rims, not body sherds
Percentages ceramics	Whether percentages can be calculated on the figures for ceramics even when the total assemblage has not been published in detail
Ceramic types available	Whether the types present among the assemblage are mentioned
Ceramic fabrics available	Whether the fabrics present among the assemblage are mentioned
Number per type usable	Allows making a distinction between sites where the total number of sherds assigned to types can be used for comparison, sites where that is not possible and sites where it is possible only for either wheel-turned or handmade ceramics
Number per fabric usable	Allows making a distinction between sites where the total number of sherds assigned to fabrics can be used for comparison, sites where that is not possible and sites where it is possible only for either wheel-turned or handmade ceramics

Table 3.16 Characteristics of the published datasets that have been recorded in order to make comparison between site assemblages easier.

3.5 Discussion

The examples provided above indicate that it is virtually impossible to correct systematically for the kind of biases present in the data that arise from preservation conditions, the nature of find contexts and excavation methods and publication practises. In several cases a combination of factors might be at play. The danger lies therein that every pattern observed in the data can be explained away as a result of one or more of the discussed factors instead of being an indication for activity in the past. This is not desirable and equally not necessary. It does mean that for each analysis carried out on the distribution of find and artefact categories it must be considered what the effects of the specific combination of post-depositional processes and archaeological methodologies may have been on the observed patterns. Whether that has been done adequately in the following chapters is ultimately at the reader's discretion.

In order to ensure that the data used in any given analysis is as comparable as possible each site has been scored on a range of characteristics (table 3.16). The excavation and publication scores have already been discussed, but others pertain to the find categories themselves. For each find category a judgement was made whether the number of artefacts present in the available publications represented the entire assemblage from that site or whether it was likely that finds had been omitted. This was necessary for publications with a score of 2, 4, 5 or 6. Quite a number of characteristics relate to ceramics because there were many variations on how they were published. For example, in some cases only the total amount of rims were available and not the total of the sherd assemblage. When only the rims were published this was sometimes done just for wheel-turned pottery or only per type and not per fabric. Another common variation was that the total assemblage was divided up by type and by fabric separately meaning the two could not be connected. These variations mean that assemblages can be suitable for some analyses but not for others. The recorded characteristics allowed assemblages not suitable to particular analyses to be filtered out and at least mitigate the influence of excavation and publication practises on the comparability of assemblages.

3.6 Conclusion

The aim of this chapter was to identify the various factors that may have caused the distribution patterns of artefacts (based on their initial deposition) to be distorted, and also to gain an idea of the extent to which each factor played a part. The evidence regarding post-depositional processes, in particular the effect of differing soil conditions was a first indication that sites in coastal and riverine areas were more likely to reveal find rich assemblages. Clay soils, which are better suited to the preservation of metals and organic materials are more common in regions 1, 5, 6 and 7 than in other regions. However, this did not explain the relatively large amount of metal finds from sites on sandy soils in region 5.

Examination of the possible influence of the presence of particular feature types on differences between sites and regions provided more indications that the relative abundance of finds in coastal and riverine regions may not be entirely representative of variation in the past in the research area as a whole. In region 5, near the mouth of the Rhine, several sites were located adjacent the remains of a silted up watercourse that had presumably been used as refuse dump in our period. These features are especially large, find rich and do not occur often in other regions. Furthermore, they generally have good preservation conditions for metals and organic materials. It also seems that

stratigraphical layers associated with sites were less prone to disturbance through later land-use than on more inland sites. This is indicated by the large number of finds from topsoil and habitation layers in regions 1, 5 and 6. The average number of sherds found in wells suggests the differences between regions were not as great as the total amount of finds indicates.

The number of stray finds compared to the quantity of artefacts recovered from features cannot be entirely explained by post-depositional processes. Unfortunately, the published data for the majority of sites in the dataset did not allow the finds to be attributed to individual structures or feature types. In terms of the ability to use site assemblage in a comparative manner, insufficiently detailed publications probably form the greatest obstacle. Limitations arising from excavation methods also play a role, particularly with regard to metal and glass artefacts.

The combined effects of the various distorting factors led to the decision not to analyse artefacts made of glass and organic materials in detail. Their distributions were too dependent on excavation methods and preservation conditions respectively. Another general conclusion is that inland and coastal areas will be difficult to compare. Archaeology often has to deal with data that is not entirely comparable and it is no different for this research, especially given the broad geographic scale that was chosen (at least in archaeological terms). A certain degree of simplification is unavoidable and this has several consequences. It will be necessary to work mainly with averages, ratios and percentages rather than with absolute amounts, and even then always with caution. Another consequence is that there are limits to the kind of questions that can be answered. In addition it means my research is not focussed on defining a single model of the Carolingian economy based on archaeological sources. There are too many unknown or partially known variables to convincingly combine all the available data in one unified model. What is possible is to investigate alternative options regarding key issues and determine which options are more likely in the wider context.