

## THE SETTLEMENT SYSTEM OF THE DUTCH LINEARBANDKERAMIK

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*Dutch Linearbandkeramik settlements are analysed on three levels. The first level includes a description of the individual settlement. This is followed by the analysis of a cluster of settlements; the cluster is thought to have functioned as a kind of unit. The third level involves comparison of the Dutch cluster with neighbouring clusters of settlements.*

### *Introduction*

Up till 1982 thirty two Linearbandkeramik sites have been discovered in the Netherlands and these are entirely restricted to the southeastern part of the country. The "sites" are defined by the occurrence of pottery. Many have been demonstrated to be real settlement sites with houses, and further investigation may well prove that this was also the case with the remainder. Isolated finds of flint tools and adzes are not considered here.

Leaving aside their internal structure, these settlements can be studied on three levels. The first level involves analysis of the settlements as individual units. The second level examines the degree of association between settlements, and the third level involves comparison with neighbouring settlement systems.

### *The individual settlement*

Locational analysis forms the basis of the first level of investigation. The geographical setting can be described, and an attempt can be made to establish the relationship of the settlement to its environment. The three Dutch settlements of Sittard, Stein and Elsloo have already been studied in this way (Bakels 1978).

All three are located 1. on the edge of a loess-covered plateau, 2. within 750 metres of a perennial watercourse, and 3. on more or less flat terrain (fig. 1a, 1b). All the settlements were surrounded by dense woodland. Further inves-

tigation shows that these geographical factors apply to twenty six of the thirty two Linearbandkeramik sites.

Such factors do not, of course, cover all aspects of individual settlement location, but a more complex approach is not easy. Reconstruction of economic aspects, for example, is inevitably superficial and it is almost impossible to deal in terms of quantitative data. This problem will be returned to below.

There are six exceptions to the general locational rules, involving either the distance to the watercourse or the nature of the substrate. Two sites lie relatively far away from perennial water in the middle of a loess-covered plateau. It is unclear whether these were settlements with real houses. Despite careful investigation, the settlements have never produced more than a few rubbish pits. The sites are Urmond-Graetheide and Urmond-Hennekens (Bakels 1978, p. 50 and p. 130). The other exceptional sites are distinguished by a different substrate. Two are situated on a sandy subsoil and two on Meuse floodloam deposits. The sites on sand, both called Montfort, are possibly real settlements, but have yet to be excavated. The sites on loam, Horn and Heel, are at present just find spots with a few sherds. They might, however, fall into the category of "unknown and unexpected settlements in river valleys" described by Quitta for the German river valleys (Quitta 1969). Even then it remains to be seen whether they are real, permanent settlements with the usual houses.

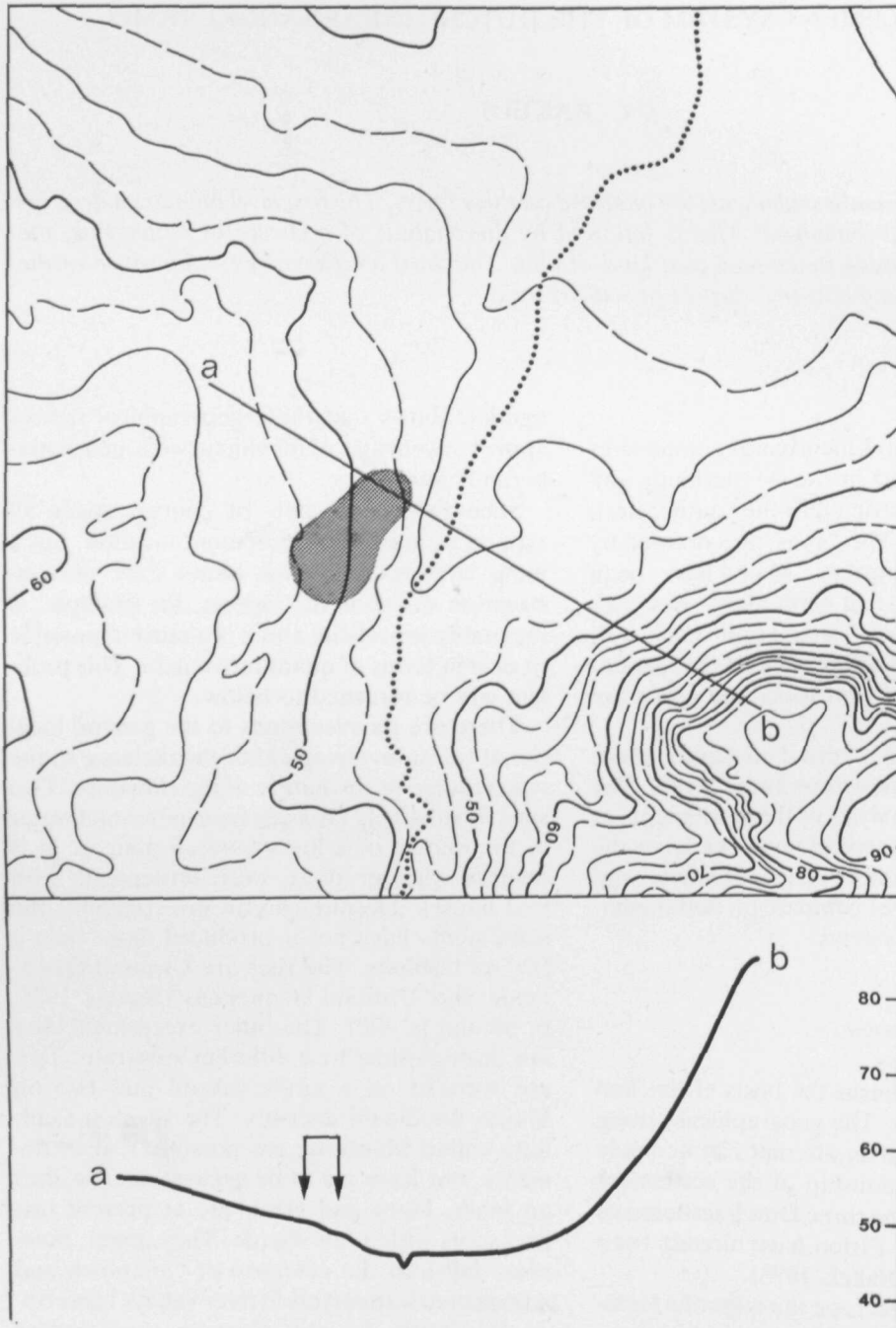


Fig. 1a. The location of Sittard. The settlement area is shaded on the contour map and indicated by arrows on the section. The watercourse is represented by a stippled line. Scale of map 1 : 25 000, height in metres.

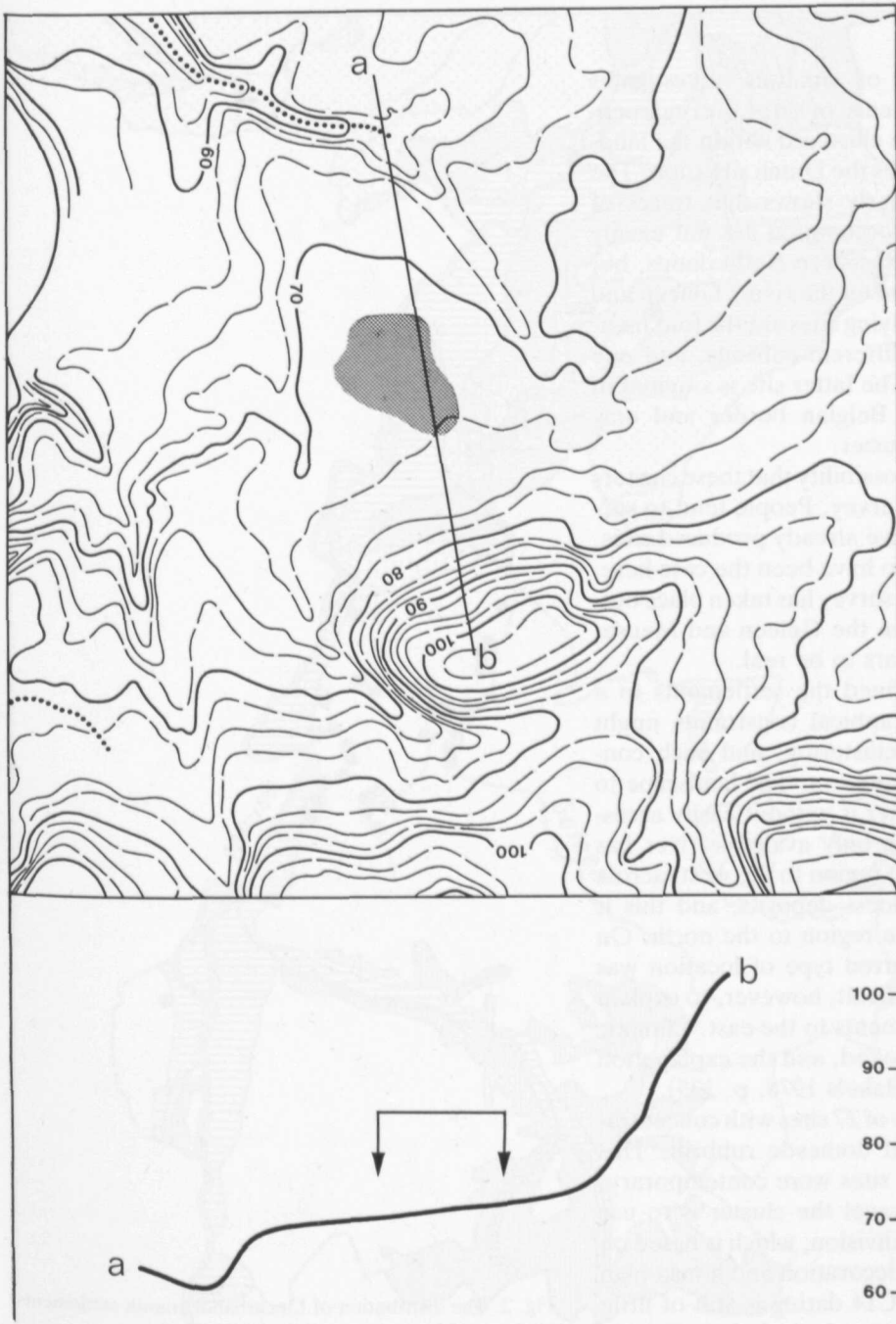


Fig. 1b. The location of Elsloo.

### *The cluster*

The second level of analysis investigates whether the settlements or sites are independently located or are clustered within the landscape. Fig. 2 illustrates the Dutch situation. The distribution map clearly shows that traces of Linearbandkeramik occupation are not evenly spread over the southeastern Netherlands, but that they cluster between the rivers Geleen and Meuse. The only outlying sites are the four mentioned above with different subsoils, and one other site: Caberg. The latter site is situated in the south near the Belgian border and may belong to another cluster.

There is always a possibility that these clusters result from uneven survey. People tend to survey regions which have already produced sites. This does not seem to have been the case here. Much archaeological survey has taken place outside the area between the Geleen and Meuse, and the cluster appears to be real.

What factors confined the settlements to a certain area? Geographical constraints might indeed explain the clustering, and such constraints are certainly present. The landscape to the south of the cluster is without easily accessible open water; the only available river has very steep banks. The region to the west, across the Meuse, has no loess deposits, and this is also the case with the region to the north. On three sides the preferred type of location was not available. It is difficult, however, to explain the absence of settlements to the east. Climatic factors cannot be invoked, and the explanation must lie elsewhere (Bakels 1978, p. 135).

The cluster consists of 27 sites with concentrations of features and domestic rubbish. This does not mean all 27 sites were contemporary. The only way to unravel the cluster is to use Modderman's phase-division, which is based on variations in pottery decoration and house-plan (Modderman 1970). C14 dating is still of little use for establishing chronological phases within the Linearbandkeramik.

Fig. 3 shows the chronological development of the cluster. Some settlements, or rather sett-

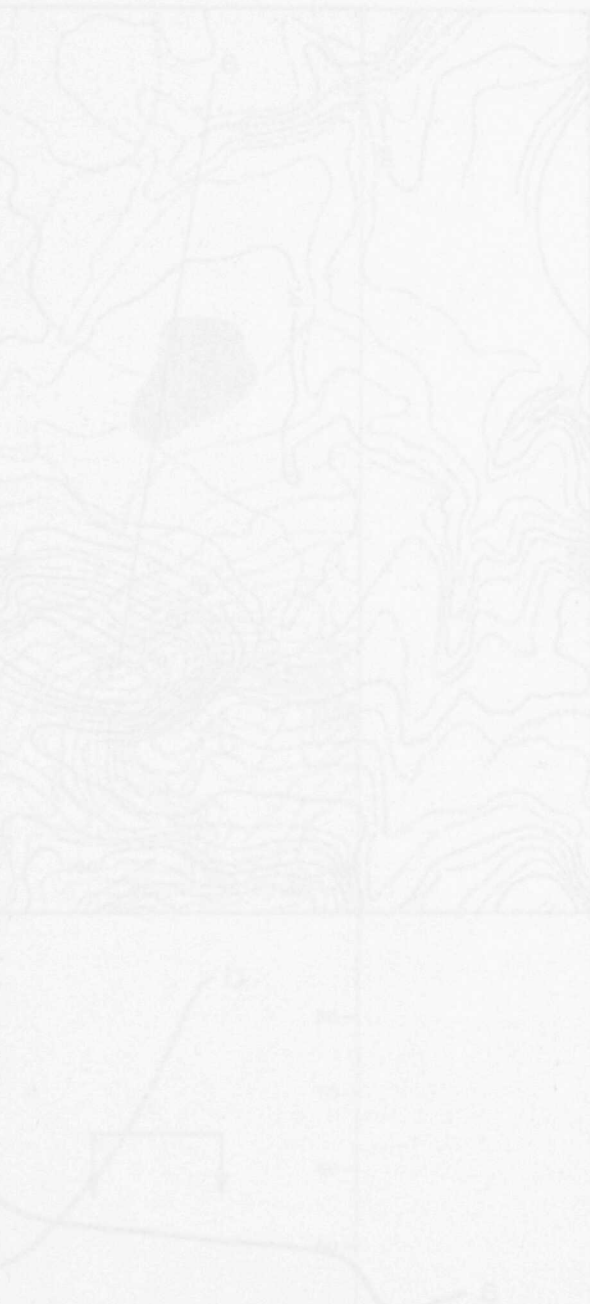
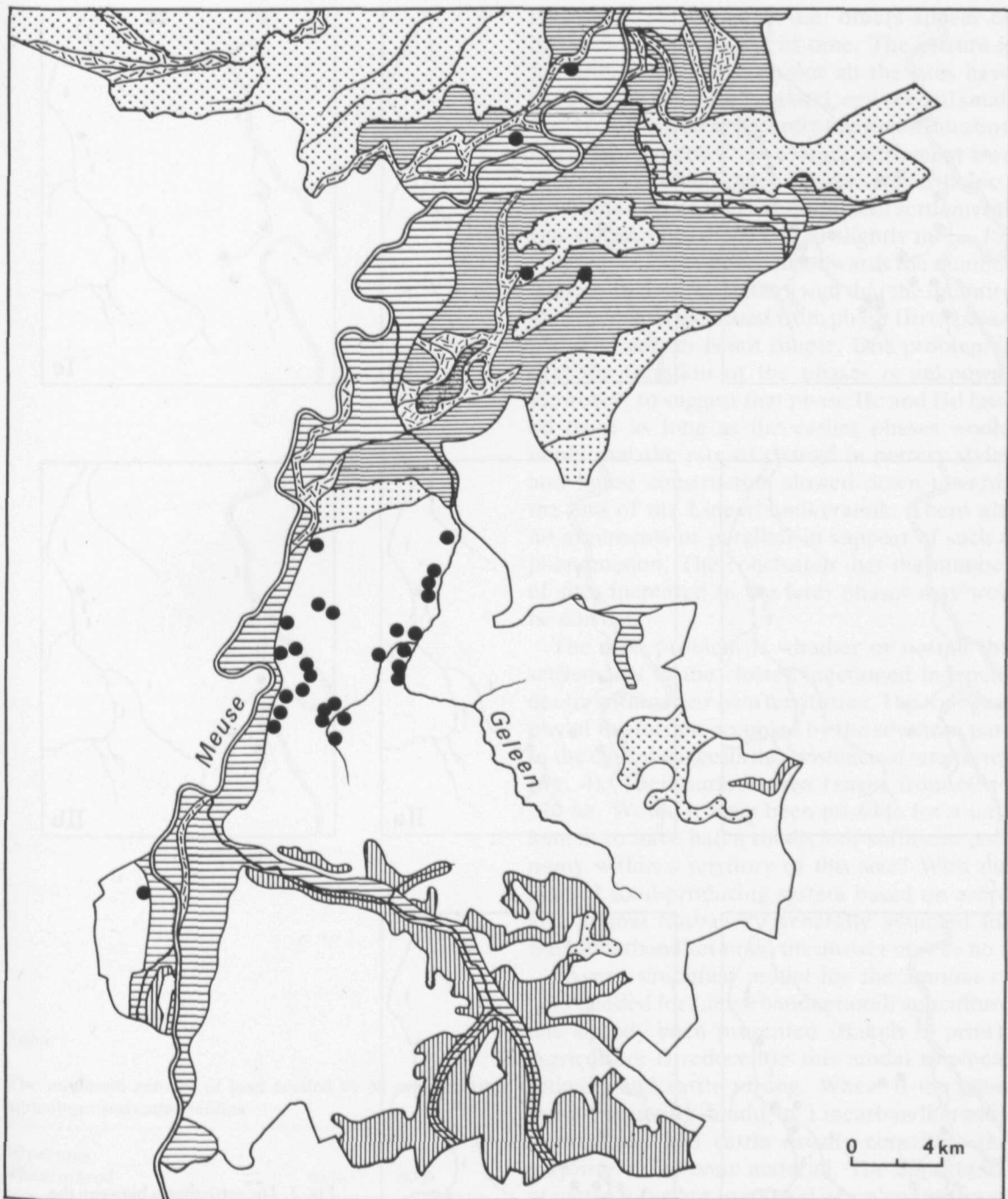


Fig. 2. The distribution of Linearbandkeramik settlements in the southeastern part of the Netherlands.

1. younger alluvial clays; 2. older alluvial clays; 3. sand; 4. sandy loess; 5. loess; 6. former river beds; 7. remaining deposits. Scale 1 : 300 000; map after the Bodemkaart van Nederland.



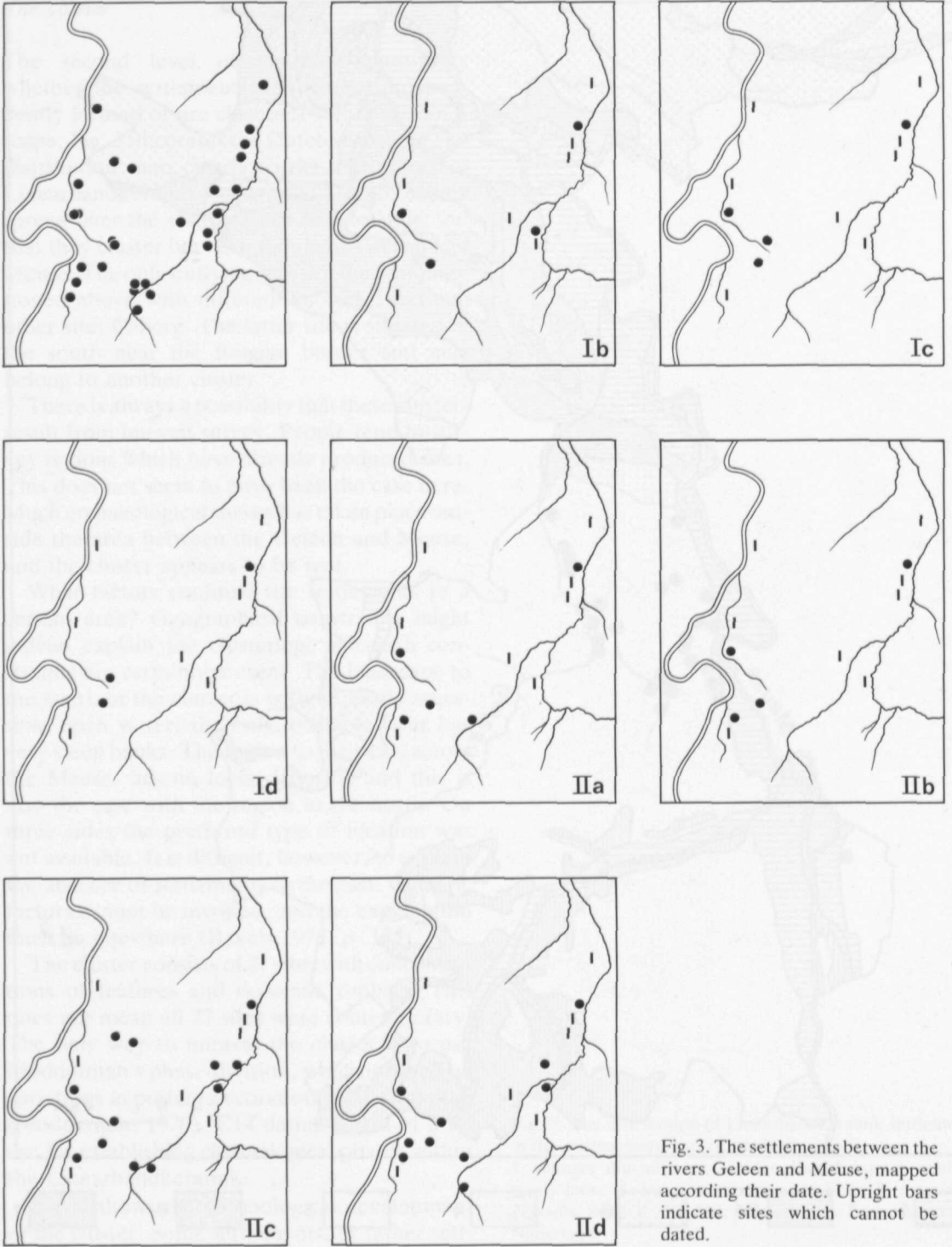


Fig. 3. The settlements between the rivers Geleen and Meuse, mapped according their date. Upright bars indicate sites which cannot be dated.

lement areas, remain in use; others appear or disappear in the course of time. The picture is far from complete since not all the sites have been equally well investigated, and several small find spots with an apparently restricted duration might be "windows" on a larger settlement area that was occupied much longer. Nevertheless, the map suggests that the number of settlements was stable, at perhaps five or slightly more, for some time. From phase IIc onwards the number appears to double. Is this a sign that the quantity of settlements increased from phase IIb to phase IIc? The answer is not simple. One problem is that the duration of the phases is unknown. However, to suggest that phase IIc and IId lasted twice as long as the earlier phases would imply that the rate of change in pottery styles and house construction slowed down towards the end of the Linearbandkeramik. There are no arguments or parallels in support of such a phenomenon. The conclusion that the number of sites increased in the later phases may well be correct.

The next problem is whether or not all the settlements in the cluster functioned independently within their own territories. The topography of the terrain occupied by the southern part of the cluster suggests the existence of territories (fig. 4). Their surface area ranges from 60 to 170 ha. Would it have been possible for a settlement to have had a totally self-sufficient economy within a territory of this size? With the kind of food-producing system based on crops and animal husbandry generally assumed for the Linearbandkeramik, the answer may be no.

A very simplified model for the amount of land needed for Linearbandkeramik agriculture has already been presented (Bakels in print). Agriculture is reduced in this model to wheat growing and cattle raising. Wheat is the plant most frequently found in Linearbandkeramik settlements, and cattle usually constitute the majority of the bone material. The importance of cattle is further increased when quantities of meat are taken into consideration.

A set of calculations are given in table 1. The figures are based on the requirements of the

Table 1

The minimum amount of land needed by 50 persons for agriculture and cattle herding.

50 persons	65%	80%
wheat in food		
fields, yield 800 kg/ha	11 ha	14 ha
fields, yield 1600 kg/ha	5.5 ha	7 ha
grassland	150 ha	90 ha

"average people" of the FAO (FAO 1957), and calculations are made for diets which consist of 65% or 80% wheat (see Bakels 1978, p. 145). Yields of consumption wheat (seed for sowing deducted) per hectare are taken from historical Canadian and Russian sources and from the results of experiments. The highest yield is derived from experiments with einkorn on Butser Farm (Bakels in print). The area needed for summer grazing and winter fodder for cattle is expressed in hectares of pasture and meadow; data are from historical sources (Slicher van Bath 1963 and Henning 1969, for example). The calculations are made for groups of 50 persons, which is perhaps an acceptable figure for the number of inhabitants of an average Linearbandkeramik settlement.

It is obvious that sufficient agricultural land can be found within the 60-170 ha available to each settlement. However, the necessary grassland is clearly missing. The countryside was densely wooded, and there is little natural pasture in this kind of landscape. A possible conclusion is that either the agricultural or the dietary model is incorrect. The role of cattle in the diet cannot be replaced by other domesticates, or by game and fish. The sheep and goats kept by the Linearbandkeramik would have required grazing as well. The fact that a sheep or goat eats less is counteracted by the fact that they provide less meat than cattle. The conditions for pigs were hardly better, as the local forest consisted mainly of lime. Oak was confined to the river valleys and beech was absent or very rare (Bakels 1978, p. 34; Kalis in print). The density of big game must also have been low, and the small watercourses in most of the territories would not have provided sufficient fish.

The population may of course have been smaller, but the fact remains that Elsloo, the only settlement where a population estimate is really feasible, probably contained more than fifty inhabitants. A further possibility is that the Linearbandkeramik people were vegetarians. A more plausible explanation is that cattle were tended partly within the territory (stubble fields included) and partly beyond the territorial limit.

Table 2

The minimum amount of land needed by the inhabitants of the cluster during phase IIc or II d.

500-2000 persons wheat in food	65%	80%
fields, yield 800 kg/ha	110- 440 ha	140- 560 ha
grassland	1500-6000 ha	900-3600 ha

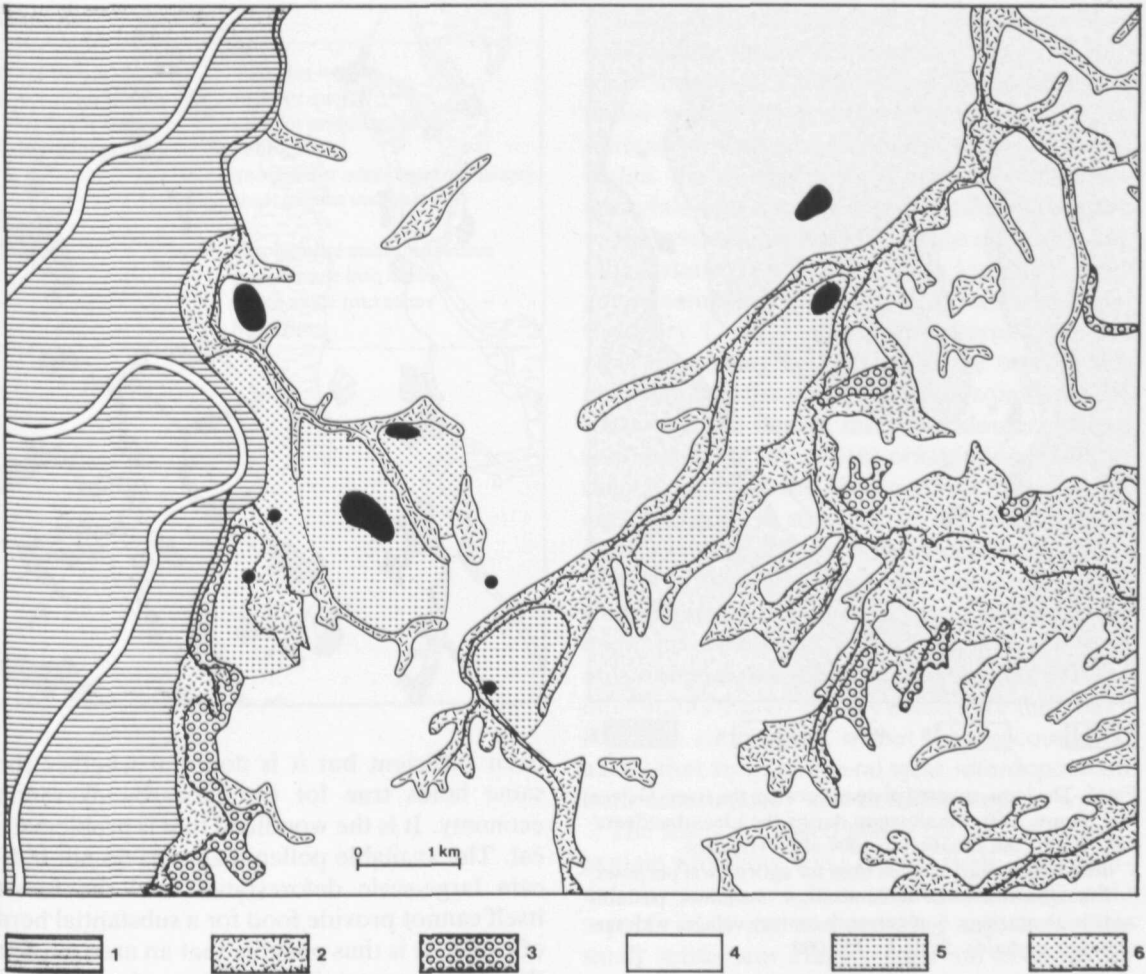


Fig. 4. The southern part of the cluster area, showing possible site territories in phase IIId. The settlements shown are those of Stein, Elsloo, Beek and Geleen.

1. alluvial clay; 2. valleys and dry valleys; 3. sands and gravels exposed in slopes; 4. loess; 5. and 6. territories. Scale 1 : 75 000; map after Bakels 1978.

If the same calculations are made for the whole cluster of settlements in the densely populated final phases, the figures listed in table 2 are reached. There were at least 10 contemporary settlements at this time and perhaps even 20 if the undated sites are taken into account. Further settlements may await discovery under deep colluvial deposits. An estimate of the cluster's total population might lie between 500 and

2000. The latter figure is based on the assumption that all the settlements were of similar size to Elsloo, which contained a possible 100-200 inhabitants during its final phases (Modderman 1970; Bakels 1978).

The plateau between the Geleen and Meuse covers 5700 ha. With the exception of the two sites mentioned above, the settlements are located on the edge of the plateau. Fig. 5 shows

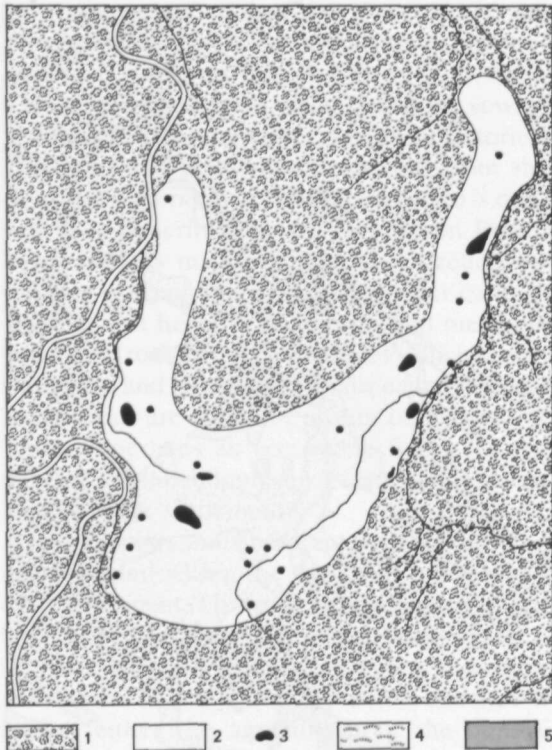
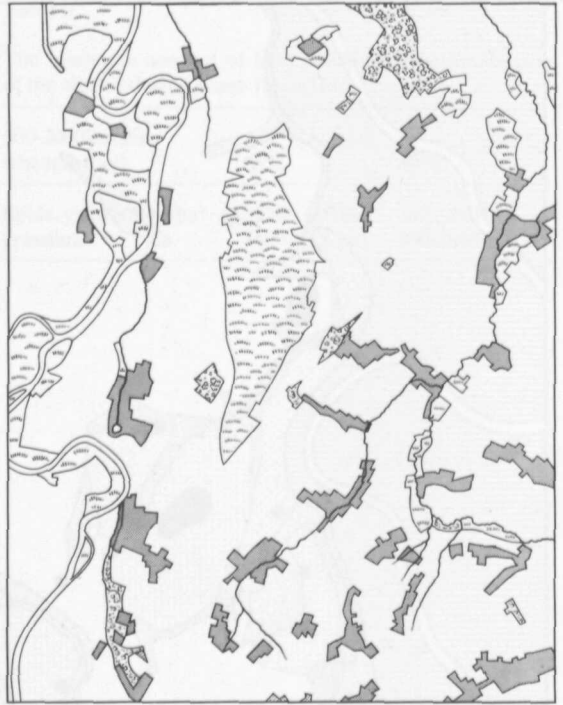


Fig. 5. The loess-covered plateau between the rivers Geleen and Meuse. Left: the situation during the Linearbandkeramik. Right: the situation in 1804 after Tranchot. 1. deciduous woods; 2. area used for agricultural purposes; 3. Linearbandkeramik settlements; 4. meadows, pastures and rough grazings; 5. nineteenth century villages with surrounding orchards. Scale 1 : 150 000.

how the land may have been exploited: a belt of land used for fields and grazing, with the interior used only for grazing. This type of land-use is well known from historical times. Fig. 5 illustrates also the situation on the plateau as mapped in 1804. The digging of wells had made occupation of the interior possible, but the centre of the plateau was still needed to graze the cattle belonging to the surrounding communities. The difference is that in Linearbandkeramik times the interior is thought to have been covered with dense woods, whereas in historical times the woods had completely vanished.

In historical times the inner area may have



been sufficient but it is doubtful whether the same holds true for the Linearbandkeramik economy. It is the woodland that is problematical. The available pollen diagrams do not indicate large-scale deforestation and the forest itself cannot provide food for a substantial herd of cattle. It is thus possible that an area outside the plateau containing the cluster of settlements was required for economic purposes. This may well explain why the land to the east of the cluster was never settled. It was a matter of economy rather than unsuitable geographical conditions. The settlements needed to be surrounded by an empty zone.

If the hypotheses about the area needed for cattle are correct one must conclude that the inhabitants of the settlements could not depend entirely on their own 60 to 170 hectare territories. They had to share their surroundings. In the following it will be shown that they shared these not only for food-producing activities but also for the procurement of various raw materials.

Table 3

1. firewood wood for houses loam for houses loam for pottery	2. wood for houses rock for querns rock for grinding-stones pebbles quarzite for adzes (minor source) chert (minor source)
3. chert	4. amphibolite made into adzes basalt made into adzes lydite made into adzes hematite

Table 3 lists the materials known to have been used in the Dutch settlements. They fall into four categories. Category 1 includes materials found within the postulated territory of each settlement. Category 2 contains materials found within the cluster area. Category 3 includes materials that are not found within easy reach of the settlements but still within six hours walking distance (i.e. a day's return journey). Category 4 comprises the real long-distance imports. Category 1 and 2, the local materials, are the most interesting here. Rock is the best known material, and the most important source for the rocks was the bed of the river Meuse. All the settlements in the cluster obtained the bulk of their rocks from the Meuse gravel bars. As not each territory is adjacent to the river, people in the cluster had to share this local commodity.

It is argued here that the whole cluster of settlements between the Geleen and the Meuse might be considered, in part at least, as a form of economic unit. This is not to suggest that the inhabitants shared all they needed for their daily life. The supposition is that they encountered each other frequently and were interdependent both economically and in other ways as well.

The ideas discussed above do not, of course, explain why there was a cluster at all. The explanation must be sought in social and demographic aspects of living and working together. One small settlement cannot have survived on its own, if only for demographic reasons. Here we are straying outside the scope of this paper, but one remark is worth making. Up till now only one cemetery has been found in the region. Apart from two or three possible graves in the settlement at Geleen-Rijksweg (known also as Geleen-Kermisplein and Geleen-Haesselderveld), and some hypothetical ones at Stein, Elsloo is the only cemetery within the cluster (for Geleen see Bakels & van den Broeke 1980-1981, for Stein Modderman 1970, p. 78). The cemetery may only have been used by the inhabitants of the Elsloo settlement, and the absence of cemeteries elsewhere may be due to the fact that graves contain less artefacts than rubbish pits and are therefore less easy to detect. It is

striking, however, that there are far more Linearbandkeramik settlements than cemeteries. An explanation might be that settlements in a cluster shared one burial ground. The relatively low number of graves in the Elsloo cemetery, which led to the conclusion that it belonged to one settlement, may also reflect the fact that not everyone had the status to be buried there.

#### *Comparison with neighbouring clusters*

The third level of investigation is the comparison of the Dutch cluster with settlements belonging to adjacent regions. The present evidence suggests that the neighbours tended to live in clusters as well. The nearest clusters are on the Aldenhovener Platte, 30 kms to the east in Germany, and around the Heeswater, 20 kms to the south-west in Belgium. The former is very well documented. In Belgium only Rosmeer and Vlijtingen have been investigated to any extent.

Although the Aldenhovener Platte cluster is much larger than the other two, the clusters are very much alike. The settlements occupy comparable locations and were founded at the same time (Modderman phase Ib). Do the clusters differ in any way? Regional variation within the Linearbandkeramik can involve 1. agriculture as reflected in carbonized plant remains, 2. house-plans, 3. pottery, 4. flint tools and 5. rock sources. As far as 1. and 2. are concerned there appear to be no important differences between the three clusters. A comparison of pottery and flint tools will be possible in the near future when data from Rosmeer and Vlijtingen have been published. The data from the Aldenhovener Platte indicate that differences were certainly present. In theory local rock sources can be differentiating. Materials from long distance sources are expected to be the same. A clear result of comparison of the German and Dutch clusters is that the rocks used for the manufacture of local artefacts such as querns and certain adzes differ from one cluster to the other. Differences between the Dutch and Belgian cluster

are less easy to distinguish. This probably because the inhabitants of the Belgian settlements used the gravel bars of the Meuse as their main source of material; these gravels are similar to the Dutch ones. If this is the case it will not be possible to differentiate between Dutch and Belgian material. In the absence of more detailed investigation into this problem it is perhaps unwise to say more. The imported rocks are better known and the same rocks are indeed found in all three clusters.

It is to be expected that it will always be much easier to detect similarities than differences between neighbouring clusters. The changes from cluster to cluster are perhaps so gradual as to be virtually invisible. Differences stand out better on a wider, regional scale, and this brings us to a fourth level of analysis: the inter-regional comparison of sets of clusters. Whilst the fourth level may appear more rewarding, little work has been carried out on the third level and its importance should not be underestimated.

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