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Federica Massagrande

The Romans in southwestern Spain: total conquest or partial assimilation? Can GIS answer?

1 Introduction

The Guadalquivir Valley, in Andalucía, southwestern Spain, was fully 'Romanised' by the 1st century AD[1], or was it? The classical view of the Roman archaeology of the area, based mainly on Latin sources, is that in the 3rd century BC the Romans entered the area to fight the Carthaginians, whom they defeated in 206 BC, over the control of the Mediterranean. Afterwards they settled in the Guadalquivir Valley where they established a fully Roman society and way of life, completely overriding the local Iberian culture, whose structure and organisation disappeared forever (Amores Carredano 1982: 245). In 197 BC the Roman province of Hispania Ulterior, of which the Guadalquivir Valley formed the core part, was created.

This view is typical of the archaeology of the Roman expansion, seen as the uninterrupted conquest and colonisation of new territories to be added to the Empire, with conquered populations being replaced by Roman or Romanised people bearing a completely Roman culture. This imperialistic view of the Roman expansion in the Mediterranean and later in continental Europe has led to a separation between the Roman archaeologists and the prehistoric archaeologists, with the consequence that pre-Roman cultures cease to be studied at the time of Romanisation, while similarly, no attention is paid to the influence of pre-existing cultures and trade networks on the organisation of Romanised areas (see Dyson 1991).

This paper explores this issue in the modern province of Seville through the use of GIS and tries to assess how true this view of the colonisation of the Guadalquivir Valley is. Since the only way to obtain enough data to cover a large part of the province of Seville was to use the non-systematic survey data from the local archaeological units, there are important issues of data quality and data validation, which have already been discussed elsewhere (Massagrande 1995a, 1995b) and will not be repeated here. The scope of this paper is limited to trying to assess the development of the Roman settlement pattern in time and the distribution of different types of diagnostic pottery in the province of Seville.

2 The archaeological data set

The data used in the study were collected over a number of seasons in non-systematic surveys and were kept on paper cards at the *Dirección General de Bienes Culturales* in Seville. These data were integrated with data from the non-systematic surveys of M. Ponsich (1974, 1979, 1987 and 1991) and the systematic surveys published by several authors (Amores Carredano 1982; Escacena Carrasco/Padilla Monge 1992; Ruiz Delgado 1985; Durán Recio/Padilla Monge 1990).

3 The Guadalquivir Valley

The study area covers a large part of the province of Seville. The size of the region covered by the study is 143 (east) × 108 (north) km. The coordinates of the southwest corner of this area are 29SQA545893, and those of the northeast corner are 30SUG450880 (U.T.M.). Most of the study area consists of the fertile valley of the river Guadalquivir, with the first foothills of the Sierra Morena to the northeast and hills to the southwest. Apart from these two areas of higher ground, the study area is almost completely flat and well-drained.

By the late 1st century BC, the Guadalquivir Valley (Roman Baetica) was one of the main producers of oil, corn and wine in the Mediterranean. These products, despite competition from Africa, were exported to various parts of the Roman empire. To the north the rich mines of the Sierra Morena were easily accessible.

4 The Software used

The information about the site contents and coordinates was stored in a dBASE III+ file. The GIS package used was Idrisi 4.1. The χ^2 and Kolmogorov-Smirnov tests were carried out using custom produced programs in dBASE III+ language, while the Correspondence Analysis was carried out using MV-ARCH. The Correspondence Analysis plots were produced using Gnuplot.

5 The analysis – the Roman site distribution pattern

A number of tests were carried out to investigate the relationship between the Roman settlement pattern in the

Guadalquivir Valley and various background variables. The variables considered were:

– soil type
– agricultural potential
– distance from the nearest Roman town
– distance from the navigable rivers, and
– distance from Roman roads

All this information was available as Idrisi image maps. The distances from the towns, rivers and roads were calculated as cost surfaces, while the way the agricultural potential map was obtained is described below.

5.1 The soils

The first test to be carried out was a χ^2 test between the soil map and the number of sites occurring on each soil type. The area covered by each soil type was used to calculate the expected values in the χ^2 test. A binary mask of the province of Seville was used to exclude from the analysis those areas for which information was not available. The result of the test shows a significant relationship between the position of Roman rural sites and the soil type on which they occur. This test was also carried out for the settlement distribution for the three chronological bands Republic, Early Empire and Late Empire, and separately for high-status sites and low-status sites (a discussion on what defines high and low status sites can be found in Massagrande 1995b). The result was that, generally, there is a relationship between soil type and site location. This is true both for low status and high status sites for the Early and Late Empire, but not for the Republic. However, when the observed number of sites is compared to the expected number of sites, it emerges that sites are located preferentially on bad soils. The bad soils have more sites than expected, while the good soils have fewer sites than expected. This pattern is consistent for all types of rural sites in all chronological bands.

5.2 The agricultural potential

It was decided to take this study a step further and to use a more reliable test than the χ^2. Since the χ^2 test is virtually the only one that can be carried out on variables expressed on the nominal scale, it was first necessary to express the cultivation potential of the land in a different way. Though the soil fertility index was available and can be considered a variable expressed on the ordinal scale, it was decided to create an agricultural potential map, which would be a more complete description of the suitability of an area for agricultural exploitation. The agricultural potential map was created using variables such as the soil fertility index, the distance from water and the slope. This information was kept in separate Idrisi layers and was combined using map algebra after weighting the variables according to the requirements for the cultivation of olive trees and corn, which formed the main agricultural production of the valley. The result was an agricultural prediction map in which each cell has a value ranging from 1 to 10, representing the agricultural suitability index. Since the agricultural capability prediction classes can be thought of as an ordinal scale (i.e. class 6 can be thought of as including all the other classes from 1 to 5), it is possible to use the Kolmogorov-Smirnov one-sample test. This approach to testing the relationship of archaeological features to continuous landscape variables such as altitude or distance has been discussed by Hodder and Orton (1976: 226-229). The Kolmogorov-Smirnov test is more sensitive than the χ^2 test and its efficiency is greater as it treats individual observations separately (Cohen/Holliday 1982: 139). The test was carried out on the high and low status sites separately and for the three chronological periods. All the results were negative, except where the total distribution for all periods was tested together. This indicates that although there is a significant overall relationship between site location and the agricultural potential index, this is lost when the data are split into specific subsets.

5.3 The tests on the other variables

Kolmogorov-Smirnov one-sample tests were also carried out to see whether there is a significant relationship between the Roman site distribution and the distance from Roman towns, Roman roads and navigable rivers.

One of the main characteristics of the Guadalquivir Valley in Roman times was the presence of two major waterways, the Guadalquivir and the Genil. It was possible for smaller boats to move between Cordoba and Hispalis (Seville) on the Guadalquivir (Strabo III, 2,3), while west of Seville the river was suitable for larger vessels, so that Hispalis was actually considered a sea port (Silius Italicus, book III, 390). The river Genil, connected to the Guadalquivir, was navigable up to Astigi, modern Écija (Pliny, Naturalis Historia, book III, 2, 10). The two navigable rivers were used as starting points to create a cost distance surface to test the relationship of sites to the waterways of the Guadalquivir Valley. Again, the relationship was tested by means of the one-sample Kolmogorov Smirnov test. The test showed a significant relationship between the high status sites in all periods and the distance from navigable rivers, while the test was significant for the low status sites only for the Early and Late Empire but not for the Republic.

Exactly the same results was obtained for the distance from Roman towns, while the test for distance from Roman roads was significant for the Early and Late Empire only for both the low and high status sites.

5.4 What does it all mean?

These results indicate that the variables which influenced the Roman site location in the Guadalquivir Valley are those with a social and political implication, rather than the environmental ones. Considering the high status sites, which are more visible archaeologically than the low status ones, it appears that soil type and agricultural potential played a very small part in the location of settlements, while the important elements seem to have been the distance from Roman towns and the distance from navigable rivers. Almost all Roman towns in the Guadalquivir Valley were built on top of earlier Iberian settlements and indeed the Romanisation of the area seems to have been more of an integration of the Roman settlers than a take-over, as has already been argued by Keay (1992). The distribution of sites in the Republic still follows the landmarks which were important in the Iberian period: the Iberian-Roman towns and the rivers Guadalquivir and Genil. Only in the Early Empire do the Roman roads become important for the location of high-status sites, but this is due to the fact that few of them had been built before the end of the Republic.

For the low status sites, the situation is slightly different. The tests are all negative for the Republic, but there is a significant relationship between the low status sites and the Roman towns, the navigable rivers and the Roman roads in the Early and Late Empire. It seems that non-environmental variables were responsible for the location of low status sites, as is the case for high status sites, but this is only apparent from the 1st century AD onwards. Moreover, the fact that pre-existing structures such as the Iberian towns were influencing where the Romans were settling shows that they did not choose the best locations for agriculture, and they were under other types of (socio-political) constraints.

6 The analysis – the distribution of the different pottery types

The distribution of different pottery types was also studied to assess whether the way imported pottery was redistributed changed over time. This was done by counting the number of rural sites with a particular pottery type occurring in the catchment of each Roman town. Such an approach was imposed by the fact that the available data are only qualitative (i.e. we have information on whether a certain material was present at a site, but not in what quantity). The town catchments were calculated using cost distances, equivalent to moving 15 km over a flat (with uniform friction of 1) surface. This figure of 15 km was arrived at from written sources which designate this as the catchment for a market town (Frayn 1993: 77). Where two towns were too close together to have 15 km catchments, the midpoint between the two cost catchments was used to

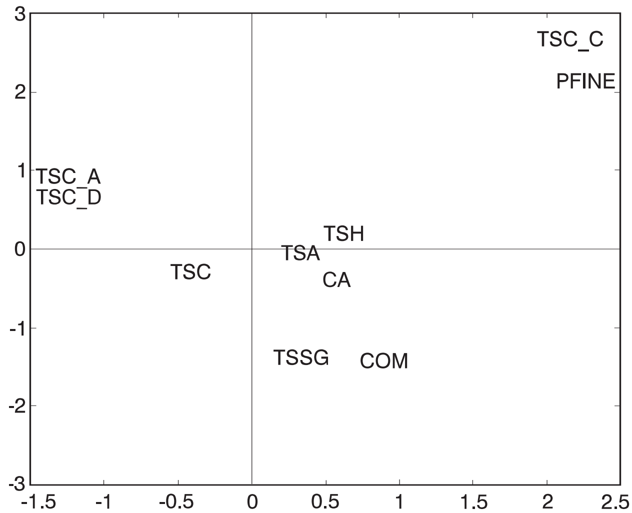

Figure 1. The Correspondence Analysis variable plot. CA = Black Glazed pottery, COM = common pottery, TSA = Terra Sigillata Aretina, THS = Terra Sigilata Hispanica, TSSG = South Gaulish Terra Sigilata, TSC = Terra Sigillata Chiara, TSC_A = Terra Sigillata Chiara A, TSC_C = Terra Sigillata Chiara C, TSC_D = Terra Sigillata Chiara D, PFINE = Thin-Walled ware.

define the border between the two areas of influence. This is in effect a variation on Thiessen polygons taking into account the land form and putting a maximum distance for the size of the catchment. Some of the catchments thus derived did not contain any sites, and these were therefore excluded from the analysis. The most noticeable exclusion is the territory of Hispalis (modern Seville), where no Roman rural sites are found due to a combination of a small catchment, its closeness to other Roman towns, and modern development.

The result was a table containing the number of sites in the catchment of each town with a specific pottery type. This data table was particularly suitable for analysis by Correspondence Analysis (Baxter 1994: 100-139).

The plots of the variables and objects are shown in figures 1 and 2. Figure 1 shows a clear patterning in the data, in particular the division between the Terra Sigillata Chiara A[2] (TSC_A) and Terra Sigillata Chiara D (TSC_D), and the Thin-Walled ware (PFINE) and the Terra Sigillata Chiara C (TSC_C). Another interesting feature is the fact that Black Glaze Pottery (CA) and Terra Sigillata Aretina[3] (TSA), which are similar in date, cluster together, as does Terra Sigillata Hispanica (TSH) which was in use until the 3rd century AD.

Generic Terra Sigillata Chiara (i.e. Terra Sigillata Chiara which has not been further identified as belonging to a specific subgroup) is on the edge of the central group and leans towards the group containing Terra Sigillata Chiara A

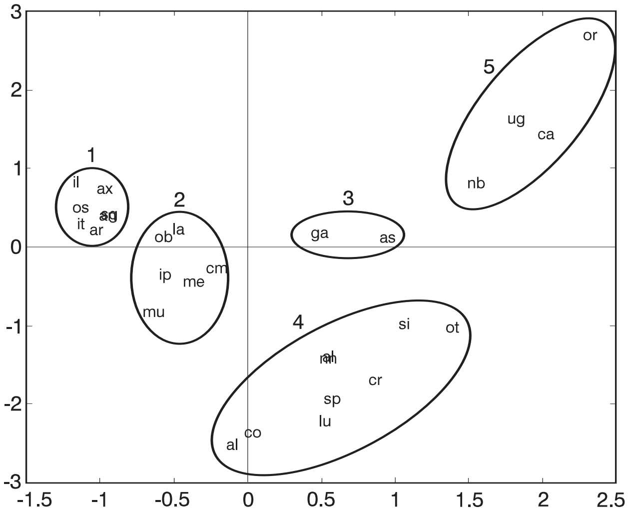

Figure 2. The Correspondence Analysis object plot (towns).

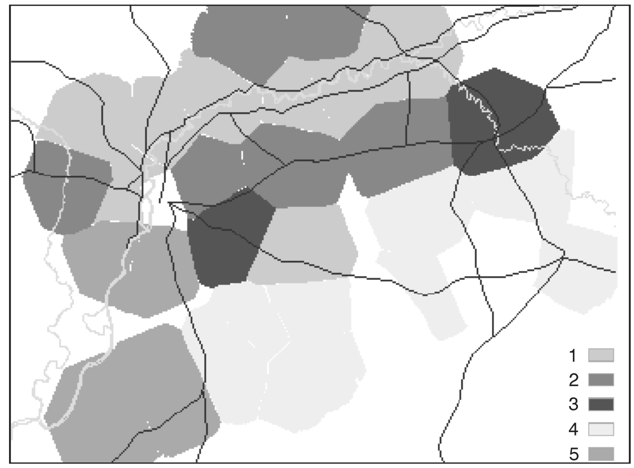

Figure 3. The town territories colour coded as the groups in figure 2, with the navigable rivers (lighter lines) and the Roman roads (darker lines).

and Terra Sigillata Chiara D, well away from Terra Sigillata Chiara C. This might indicate that the Terra Sigillata not identified behaves much more like the two subgroups A and D, rather than subtype C. The interesting fact is that, according to the results of the Correspondence Analysis, Terra Sigillata Chiara C is found at sites where there is no or very little Terra Sigillata Chiara A and D. This is strange, as the subtype C is chronologically located between the subtypes A and D. The three subtypes were produced in modern-day Tunisia, but while subtypes A and D were produced in the same places, subtype C was produced in different workshops. If subtype C was imported from its place of production into the Guadalquivir Valley following different routes from subtypes A and D, it would explain why it is found in different places.

The towns in the object plot (fig. 2) were grouped together in five clusters (numbered 1 to 5) to study the geographical position of towns with similar catchment assemblages according to the Correspondence Analysis. Using Idrisi, the territories of the towns in each of the 5 clusters were differentiated by giving them a different colour (fig. 3).

The object plot shows a concentration of cases in the position corresponding in the variable plot (group 1) to the Terra Sigillata Chiara A and Terra Sigillata Chiara D pottery types. When the towns in this concentration are checked against their geographical position, the relative closeness of their territories to the river Guadalquivir is striking. It was immediately evident that almost all of these towns are either crossed by the river Guadalquivir itself, or are on the Via Augusta which leads directly to Hispalis (Seville). The territories of the towns which correspond in the object plot to the position of Terra Sigillata Chiara (group 2) in the variable plot follow a similar distribution along the Guadalquivir, slightly further away than the territories explained by Terra Sigillata Chiara A and Terra Sigillata Chiara D, but still on major roads directly linking the territory to Seville. Terra Sigillata Chiara A and Terra Sigillata Chiara D appear to be dominant in the northern half of the study area.

On the contrary, the territories explained by Thin-Walled ware and Terra Sigillata Chiara C (group 5) tend to occur to the south of the region, or at least to the south of the distribution of Terra Sigillata Chiara A and Terra Sigillata Chiara D. Remarkably, the two distributions appear to be self-exclusive, as is also strongly suggested by the Correspondence Analysis plots.

The other pottery types, Black-Glazed pottery, Common pottery, Terra Sigillata Aretina, Terra Sigillata Hispanica and South Gaulish Terra Sigillata[4] occur throughout the study area and do not seem to be limited to specific locations as is the case for the Terra Sigillata Chiara subgroups and Thin-Walled ware. The fact that the distribution of Terra Sigillata Aretina is similar to that of Black-Glazed pottery, as can also be seen from the Correspondence Analysis variable plot, might suggest that Terra Sigillata Aretina was distributed along the same routes as Black-Glazed pottery. Black-Glazed pottery was imported into the region from the earlier 2nd century BC, well before the Romanisation, and was distributed along the Iberian exchange network. The similar distribution of Terra Sigillata Aretina and Black-Glazed pottery suggests that these networks were still being used after the Romans first settled the area. Terra Sigillata Hispanica, which was a locally produced ware imitating the foreign forms, also has a very similar distribution to Black-Glazed pottery and Terra Sigillata Aretina, showing that the original exchange network might still have been in use as late as the 2nd century AD while, at the same time, a different redistribution network was used for Terra Sigillata Chiara A and then Terra Sigillata Chiara D.

In the Late Empire the only evidence we have comes from the Terra Sigillata Chiara D, which follows the Guadalquivir network, so that the first two centuries AD can be seen as a period of transformation from one system to the other. There is no information on whether Black Glaze and Terra Sigillata Aretina were being traded along the Guadalquivir, but if they were, they were then distributed more extensively than the Terra Sigillata Chiara A and D. It is also important to note that the Terra Sigillata Hispanica was being produced in workshops at Andujar and Granada and was therefore imported into the Guadalquivir Valley by land, rather than along the navigable rivers. Terra Sigillata Aretina and South Gaulish Terra Sigillata had a strong influence on the form of Terra Sigillata Hispanica and it is likely that this latter ware was traded to the same areas of the pottery it ended up replacing.

Terra Sigillata Chiara was clearly almost only available in the town territories which were directly connected to Hispalis. The majority of the territories in which the Terra Sigillata Chiara subtypes are found depended on towns which were either directly located on the Guadalquivir (such as Axati), or on a major road leading directly to Seville (such as Segida). This also suggests that Terra Sigillata Chiara was brought to the towns and then redistributed to the sites in the town territories from the centre, rather than being brought to the sites directly. This is consistent with the creation of influential Roman centres (coloniae) under Caesar and Augustus linked by an integrated road network. Since the sites which received the Terra Sigillata Chiara A and D are on the Via Augusta or the Guadalquivir, these were the main routes for the redistribution of this type of pottery. Though there are other Roman roads leading south from these towns, it seems that these were not used to redistribute the Terra Sigillata Chiara A and D to the other centres.

7. Model of settlement pattern change in the Guadalquivir Valley

The Romans already had trade contacts with the Iberians in the Guadalquivir Valley during the 2nd century BC. There is archaeological and historical evidence that at this time the Iberian society consisted of a centralised network of towns with dependent rural settlements. In the 1st century BC the Romans first settled the area, but the old Iberian trade network and organisation was still strong and the Romans had little impact on the local society. The Roman rural settlement pattern at this time was already differentiated between high status and low status sites, with the high status sites clustering around the Romano-Iberian towns, while the low status sites were spread wide across the countryside.

The situation changed in the 1st to 3rd century AD. While right at the beginning of the Early Empire it looks likely that the old Iberian exchange network was still being used for the Terra Sigillata Aretina, a new distribution network appears for the Terra Sigillata Chiara A and D, favouring those sites which were on the Guadalquivir or on the Via Augusta. The density of rural sites increased dramatically with new high and low status sites appearing centred around towns. Several of the Iberian towns either had a Colonia of Roman citizens founded on their territory, or were granted Municipium status, making their Romanisation official. Under Augustus most of the towns which became Colonia or Municipium were on the Guadalquivir and seem to have monopolised the distribution of fine Terra Sigillata Chiara A and D which is hardly found outside their territories. These towns were also the key sites in the trade of oil and corn produced in the Guadalquivir Valley.

Between the 3rd and 6th centuries AD the situation changed again and several high and low status sites disappeared. The pattern of disappearance of the high status sites seems to have been different in different parts of the valley. Around the Guadalquivir the situation stayed rather similar to what it was in the Early Empire, with high density sites clustered around the towns, while elsewhere a distributed pattern appears. This is consistent with the appearance of larger estates in the southern part of the Guadalquivir Valley, while the sites along the Guadalquivir were still depending on the towns for their wealth. The low status sites which disappeared were mainly those away from the towns, showing that there might have been a collapse of the large-scale exchange networks with smaller sites having to rely on the services offered by towns to survive.

notes

1 Strabo, *Geography* III.2.15, '*...The Turdetanians* (the Iberian population of the Guadalquivir Valley), *however, and particularly those that live about the Baetis, have completely changed over to the Roman way of life, not even remembering their own language any more*'.

2 Terra Sigillata Chiara is better known to English archaeologists as African Red Slip.

3 Arretine pottery.

4 South-Gaulish Samian ware.

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