

The Enhancement of the South Etruria Survey: GIS in the Study of the Research History of the Southern Faliscan Area

U. M. Rajala, A. R. Harrison, S. K. F. Stoddart

Abstract

The enhancement of the south Etruria survey is one of the projects connected to the Tiber Valley project launched by the British School at Rome. The purpose of the enhancement project is to use new methods to analyse material collected by the British School at Rome during the south Etruria project between the 1950s and 1970s. The idea is to bring together researchers in Britain and Italy to process the material using modern research procedures. As an example of the potential of GIS in the enhancement, a study using Arc/Info to analyse the relationship of the Roman road network to the results of surveys carried out in the area of the southern Ager Faliscus is presented. It is a preliminary investigation into the effect of different research strategies. As a result of this work, the influence of ancient transport networks on the results of pre-1960s surveys is proven.

1 Introduction

This paper presents a preliminary investigation into the effect of different research strategies on the recovery of archaeological information. GIS and simple statistical tests are employed to demonstrate aspects of our changing knowledge of the pre-Roman archaeology in an important cultural and political area north of Rome. For the purposes of the present paper, the impact of the later Classical road network on research strategies will be investigated. It is hoped that the simple measures presented here will be expanded in the course of the current research into a more sophisticated analysis of how the cultural resource developed over time.

The study owes its inspiration and a major part of its material to the so called south Etruria survey (more properly a series of surveys in south-eastern Etruria), one of the most influential British research programmes in the field of Italian archaeology. The programme was the idea of John Ward-Perkins, director of the British School at Rome, and carried out in the decades following the Second World War and influenced by the previous topographical surveys of Thomas Ashby in the beginning of century (e.g. Ashby 1927). The first field-work was carried out in the mid-1950s. The last of the field-work was completed in the early 1970s. The publication of an overall, general synthesis by Dr Timothy Potter marked the end of the project (Potter 1979).

During a period of nearly 30 years some 1000 km² were surveyed in the area north of Rome. Survey covered the *Ager Veientanus*, the territory of Sutri, the *Ager Capenas* and the *Ager Faliscus* (see Fig. 1). The survey programme resulted in the documentation of more than 2000

Etruscan, Roman and Medieval sites and new knowledge on the ancient road network (for the history of the survey and full bibliography see Potter 1979, 3-14. The beginning of the survey coincided with a period of intensified land use following land reform launched in the 1950s (Potter 1979, xii). Many of the sites recorded have since been lost.

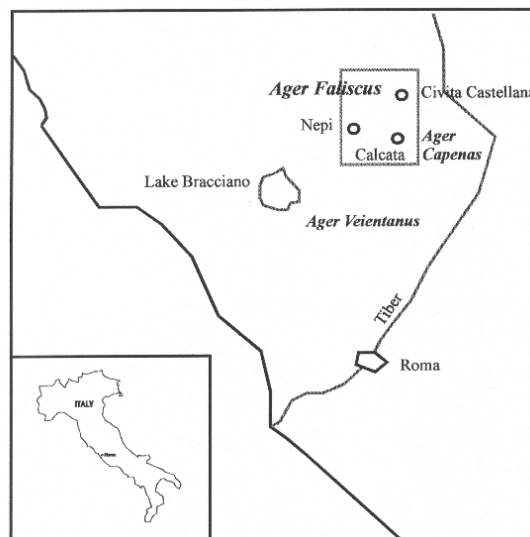


Figure 1. Study area in the central Italy.

The methodological problems encountered by the surveyors were common to all archaeologists working in Italy. The absolute chronology of the sites was difficult to assess on the basis of scanty surface finds. As might be expected these problems were most profound for sites of early date (Malone and Stoddart in press). There were gaps in distribution maps resulting from modern land use, colluviation and river valley alluviation. The sites of older phases of occupation seem to have been

more vulnerable to destruction (Potter 1979: 10-14). These processes, as well as a predominant research interest in Classical antiquities, biased the research towards the later periods. Later research has reinforced these biases (e.g. di Gennaro & Stoddart 1982).

The South Etruria survey has had a formative impact on surveys carried out in Italy. Since the 1970s, the South Etruria surveys have set an example to both Italian (see e.g. volumes of *Forma Italiae*; Camilli *et al.* 1995) and British archaeologists (see Barker 1995).

2 Enhancement of south Etruria survey

The enhancement of the south Etruria survey is a part of a larger research project organised by the British School at Rome in 1997, although the origin of the project dates to the beginning of the decade (Carver & Stoddart 1990). The larger Tiber project brings together a number of archaeological projects working in Italy or with Italian material. The idea of the enhancement project is to work towards a new synthesis of old material. The purpose is to use new methods to analyse archaeological material held by the British School (see Fig. 2). As the project develops, we hope that researchers in Britain are joined by Italian and other European colleagues to incorporate the archaeological material gathered to a common database and analyse the material collaboratively. There are plans to do limited re-surveys in certain areas and to compile environmental information. The aim is to produce a publication covering the main themes of the original project using new methodologies (Stoddart *et al.* 1996; Belcher *et al.* in press).

The most visible achievement of the project is a database that holds the raw data that will be used in the forthcoming synthesis. This database includes the result of decades of field work, comprising a computerised catalogue of find spots of south-east Etruria. The data have been drawn from the paper records of the British School at Rome which were input in 1991-2 by Vedia Izzet at the University of Bristol in conjunction with a re-organisation of the collected artefacts held in the British School at Rome. The first version of the relational database had entries for 3473 individual records. The database was originally produced as a dBase database, but has now been imported into Microsoft Access 2.0. In the original database each entry had a potential of 57 fields of data, which included information on grid reference (easting, northing, map sheet), the possible name of the site, topography and location, visits, finds and some cataloguing information. The database is now undergoing checking and correction to remove

errors which have been introduced through mis-coding and interpretation of the original material. The purpose is to make the data usable for different kinds of queries and analyses, and particularly for geographical analysis. The database development is being carried out by Ulla Rajala and Andrew Harrison at the University of Bristol, in close contact with Helen Patterson (British School at Rome) and Simon Stoddart (University of Cambridge).

The enhancement of south Etruria survey represents a huge challenge to turn material collected during a period of non-systematic surveys into data suited for modern research techniques (Stoddart *et al.* 1996). Although topographical information and grid references were collected, the kind of minute documentation, which is routine today, was then patchy or non-existent. The debates over the complexity of survey field work in the Mediterranean area and the meaning and representativeness of survey data were just about to begin (e.g. Cherry 1983). The material was not meant to be used in computerised studies. Indeed, the idea of using computers and statistical methods was just evolving during the span of the original research programme. The use of non-systematic data affects both the planning of improvements to the database and the use of material in connection with GIS. The material has its limitations, and future verification in the field will be necessary.

Apart from database development and GIS analysis, information derived from remotely sensed data will play an important part of the project (Belcher *et al.* in press). The aim is to produce a high resolution DEM of the area based on satellite stereoscopic images and to use high resolution satellite imagery and aerial photographs to extract topographical and cartographic information. Remote sensing and environmental studies will be valuable for further studies applying GIS (see Fig. 2). Ezra Zubrow from SUNY at Buffalo, USA, is also collaborating with the GIS component of the project, and has special interests in demographic reconstruction.

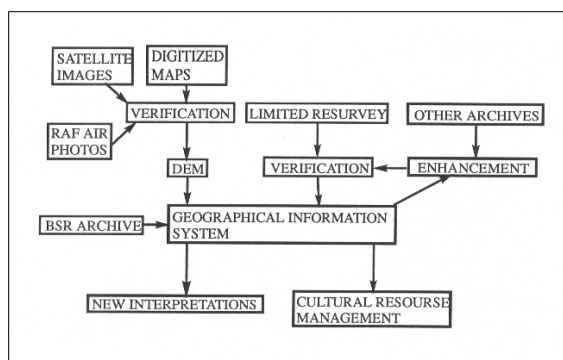


Figure 2. Basic uses of Geographical Information Systems in the enhancement of the south Etruria project.

3 The study area in the southern *Ager Faliscus*

An area lying in the southern part of the historical *Ager Faliscus* has been chosen as a starting point for more detailed study. The area, from Monti Sabatini in the south to Civita Castellana in the north, was surveyed by T. W. Potter between 1966 and 1971. The western and eastern boundaries were defined by the Roman roads of the *Via Amerina* in the west and the *Via Flaminia* in the east. The survey was never published, but it was used in Potter's doctoral thesis (Potter 1974 and published as part of the synthesis of the South Etruria Survey (Potter 1979). A manuscript on the survey was written during 1980 and 1981, but the publication was postponed (Potter pers. comm.) as it was clear that new dates for the ceramics were becoming available. The original manuscript has been generously made available for the current project at a time when new information can be integrated with the old.

A smaller area of approximately 15 x 10 kilometres was defined for the present study, namely the area covered by the following Italian IGM (*Istituto Geografico Militare*) sheets: 143 I S.E. Nepi and 143 I N.E. Civita Castellana (see Fig. 1). This area was chosen because the Faliscan sites of Nepi, Falerii Veteres and Narce lie within its boundaries and it comprises more than half of the survey area. The region has always been the centre of archaeological activity because of presence of the Roman towns of Nepi (Nepet) and Falerii Novi, as well as large Faliscan sites.

The landscape is dominated by the Treia drainage system, incised into a volcanic landscape. Tributaries, often cut deep into the soft tuff, collect water from the ridges and hills of the area, and the river Treia itself empties into the Tiber further to the north. The dominant feature is the sequence of ridges and river channels running from the south to the north. In the south, the landscape is more subtle

and the relief is hilly. The landscape has changed greatly from earlier times because of alluviation and erosion, as shown by studies in the Narce area which have revealed a sequence of erosion and deposition dating from pre-Roman period to modern times (Cherkauer 1976, 106-107). Structures and sites near streams have been covered by several metres of later alluvium (Judson 1963).

4 The history of discovery of pre-Roman sites in the area

The pre-Roman period has been an object of study in Italian archaeology since the latter half of the 19th century. The official organisations were trying to create a common past for a new unified Italian nation and this led to intensified archaeological activity (Guidi 1988). The beginning of systematic research resulted in the excavation of many famous Villanovan and Etruscan cemeteries. The fifth *Congresso di Antropologia e Archeologia preistoriche* in 1876 was the first major occasion where Italian prehistorians met and formulated their research strategies. In the early 20th century archaeological studies concentrated on typology. Later in the century, the new ideas of socio-anthropological theory, economic models and spatial distribution had a profound impact on the study of the pre-Roman period (Bietti Sestieri 1981; di Gennaro 1982). The concepts of landscape and site catchment analysis also contributed to the intensification of survey work in Italy (e.g. Bartoloni 1989, 13-18).

The purpose of this study is to investigate how patterns of recognition of pre-Roman sites have changed through time. We will observe how different survey methods and objectives have changed our knowledge of site distributions. The study will concentrate on the importance of one type of man-made landscape feature which has imposed major mental and logistical constraints on the pattern of discovery: Classical roads. This type of feature has been chosen because the original idea of the south Etruria survey of the British School was the elucidation of the pre-Roman, Roman and Medieval road network (Ward-Perkins 1962; Potter 1992: 637). The remains of the Roman and earlier roads also guided Italian archaeologists in the late 19th century (Barnabei 1894, 9). The Roman roads were the object of study when Thomas Ashby carried out his major study on Italian topography (Ashby 1927). His material was presented road by road and the same structuring principle was also used by Giuseppe Tomassetti (1913). The identification of the ancient road cuttings was much assisted by aerial survey and air photograph interpretation. The intention here is to evaluate the meaning and importance of the Roman roads for different types of survey and the relative

representation of different types of sites during different periods, employing GIS and simple statistics.

Pre-Roman sites vary considerably in number (for the original survey chronology see Potter 1979, 16; for a relatively up-to-date Italian revision, see Guidi & Piperno 1992). Pre-agricultural and early agricultural sites (dating to before the second millennium BC) seem to have been rarely found in the Faliscan area. From the Apennine Bronze Age (c. 1400 BC) there is an appreciable increase in the knowledge of sites, mainly as a product of recent research. Differences of chronology greatly affect interpretations of numbers of Late Bronze Age and Iron Age sites and this is an area where revision of the South Etruria results will be enhanced by more recent research (di Gennaro 1986). Evidence for Archaic sites (dated to the period c. 750 - 500 BC and variously ascribed to Etruscan or Faliscan cultural groups) is much greater, and this demonstrates greater research intensity and real demographic growth. The Romans incorporated the area into their empire after the collapse of Falerii Veteres. The period saw the forced re-settlement of population to Falerii Novi (see Shotter 1976, 32) and further demonstrable demographic.

We argue that archaeological surveys in this area fall into three major categories (cf. (Stoddart 1987)). Firstly, there are the topographical surveys of the 19th century. These were concentrated on ancient centres, which were often catalogued in alphabetical order. Secondly, there are the surveys where the past road networks were followed. The work organised by A. Cozza and A. Pasqui and the early work of the British School at Rome will be discussed in this connection. Thirdly, there are systematic regional surveys. The survey made by Potter belongs to this last category. The similarities and differences of the surveys will be discussed. It is recognised that the way surveys are made and the results which are reached create the apparent archaeological reality. This study explains how our collective knowledge of pre-Roman sites has changed over time.

5 Using simple GIS in order to study the accumulation of archaeological data

A simple database was designed to store the information needed in this study. It included the sites mentioned or listed by scholars in published surveys or manuscripts. The columns include the information of grid reference, name, type and dating of a site and different studies in which sites could be included. This database only included information on point features. The sites of road cuttings were omitted from the point file, because they form a part of the Roman road network. The

polygon coverage of major centres was produced in Arc/Info polygon format.

Eastings and northings for the point features were taken from the source material of the British School at Rome or, when dealing with finds from other surveys, measured from Italian IGM maps at the scale 1:25,000. The locations of the other sites were positively identified on the basis of description, published map or modern place-name. The grid reference is usually given to an accuracy of 100 metres. The grid reference of large cemeteries referred to the approximate centre of the area. The dating of the sites is based either on the information given by Potter (1974; 1976; ; n.d.), on the interpretation of the scholar, or on the presence of certain type of finds or monument.

GIS was used as a tool to extract distance information and create distribution maps and analytical images. The significance of the results has been further confirmed with the help of a chi-squared test. GIS software (Arc/Info and ArcView) was used to extract distance information and to create distribution maps. Chi-squared analysis of the distribution maps was carried out using the Minitab statistical package. Final presentation of maps was performed using CorelDraw.

Preparation of Arc/Info map coverages for the Ager Faliscus involved a series of stages. First, the Roman roads for the whole of the Potter survey area were digitised. A distance-from-roads surface was then calculated using this road network. This surface was represented as a series of distance zones, at 500 m intervals, on a 10 m grid. Second, a series of point coverages, for each phase of survey, were constructed derived from the eastings and northings held in the Access database of sites and find spots. Third, for each survey phase, a point-in-polygon procedure was used to allocate each site to a distance zone.

The distribution of sites from the main surveys was studied. The main surveys were those of Cozza & Pasqui (1881-1902), Frederiksen & Ward-Perkins (1957) and Potter (1966-1971). The numbers of sites in other minor studies were so low that the test was unreliable. Analysis of the effect of the Roman road network on the discovery and identification of archaeological sites within each survey was performed using a one sample chi-squared test for categorical data (Shennan 1988, 65-70):

$$X^2 = \sum_{i=1}^K \frac{(O_i - E_i)^2}{E_i}$$

where k is the number of categories, O_i is the observed number of cases and E_i is the expected number of cases based on the probability of occurrence given the number of cases. The probability was calculated according to the proportion of sites falling within each of the distance zones within the study area defined by the extent of the Roman road network. Theoretically, it is assumed that sites are uniformly distributed and each distance zone has an equal probability distribution of sites. Of course, in reality this theoretical distribution is distorted by local landscape. The deep ravines filled with alluvium and areas covered by *macchia* or brambles are not explorable (Potter 1974: 15). Nevertheless, the essential variable in this study remains the distance from a classical road. The dependence or independence of site location on the distance from classical roads can be assessed with this kind of research strategy. The strategy is similar to the study of the dependence of sites on different soil types or climate zones (e.g. Gaffney and Stancic 1991, 58-76).

6 Surveys

6.1 Topographical surveys of the early nineteenth century

The period preceding real archaeological surveys was characterised by topographical survey. The scholars and enthusiasts associated with these surveys moved from one centre to another mentioned by the ancient authors. *The Cities and Cemeteries of Etruria* by George Dennis (1848) has been stated to be the first topographical survey of the Etruria and Faliscan area (Potter 1979, 1). One of earlier studies was *Analisi storico-topografico-antiquaria della carta de dintorni di Roma* by A. Nibby (1837). In this book he discussed both *Latium Vetus* and the areas of other ancient peoples including the Etruscans and the Faliscans. He described briefly the topography of the towns of Nepi and Civita Castellana. He described Nepi as a Latin colony, although it is known to have been founded in 383 BC (Liv. 6.21.4), and not as a Faliscan site. Nibby and Sir William Gell planned to produce a topographical map of the territory of archaic Rome. The project was dropped, but the idea resulted the mapping of ancient settlements in the area. Work resulted in the book *The topography of Rome and its vicinity* by Sir William Gell (1846). In this book he discussed the topography of Calcata, Civita Castellana and Nepi.

The previously mentioned study of Dennis is a good example of the type of research done during this period. The emphasis was on cities and cemeteries, on well defined points in the landscape, the kind of structures the antiquarian cannot miss.

All sites, except one, are located near a Roman road. The cliffs near towns and road cuttings were the places where the Faliscans excavated their tombs, and like the Romans, their cemeteries were placed on the roadsides around the towns. Furthermore, the sites are all, with one exception, Faliscan.

The guideline of the roads was taken up by the followers of these early scholars. Thomas Ashby (1927) described the Roman roads radiating from Rome, but none of the roads in the study area. Giuseppe Tomassetti also described the roads and towns along them in his *La Campagna Romana, antica, medioevale e moderna* (1913), but his interest was mainly in the historical analysis of Medieval sites. Rodolfo Lanciani in his *Wanderings in the Roman Campagna* (1909) defined *Campagna Romana* in such a way, that the Faliscan area was left outside his research.

6.2 Archaeological field work of A. Cozza and A. Pasqui

In the late 19th century, the Italian Ministry of Public Education (*Ministero dell'Istruzione Pubblica*) begun a project to create an archaeological map of southern Etruria. The emphasis was on systematic survey for administrative purposes. The idea was to map the remains of the ancient roads, their topography, history and to collect new material, mainly for the pre-Roman period. The main emphasis was again on centres and cemeteries. The persons to whom the work was allocated were G. F. Gamurrini, A. Cozza, A. Pasqui and later R. Mengarelli and E. Stefani (Barnabei 1894, 6-10). However, the material of the *Carta Archeologica d'Italia* was not to be published until 1972. Priority was given to the supervision of the excavations in the environs of Narce and Civita Castellana. The idea of archaeological mapping contributed to the birth of the series of *Forma Italiae* (Cozza 1972, 429-431, 459). The tombs excavated near Narce were published in *Monumenti antichi* in 1894 and more tombs from the area were published in *Notizie degli Scavi* in 1902 by A. Pasqui. The material from the cemeteries of Civita Castellana was not published until 1981, but was usable to some extent by later Italian and British surveyors.

The main importance of their survey lies in the degree of overall systematic mapping of sites and cemeteries. The discovery of the Faliscan sites in Narce south of Calcata was the important new achievement. The site was immediately supposed to be the unknown town of Fescennium (Barnabei 1894: 22). Surveyors took into account the topographical locations of the sites: they interpreted geographical and geological features in order to identify the promontories and solitary rock formations which could have been Faliscan

defended settlements (*pagi*). Their field work was essential to chronological analysis. The dating of pit (*pozzo*) graves as Villanovan, trench (*fossa*) graves as early Faliscan and chamber (*camera*) tombs as late Faliscan resulted from the studies in Narce and Civita Castellana (see Cozza 1894; Potter 1976: 14-16). The tomb material has been basis of overall studies on the Faliscans (e.g. Holland 1925).

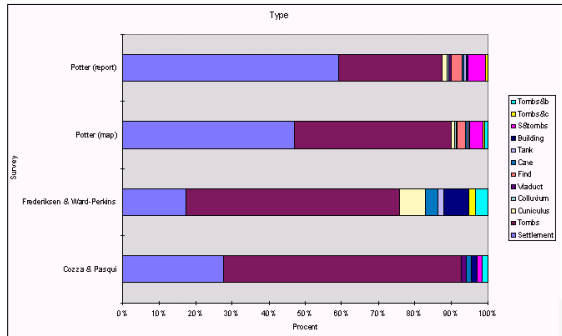


Figure 3. Surveyed sites according to monument type.

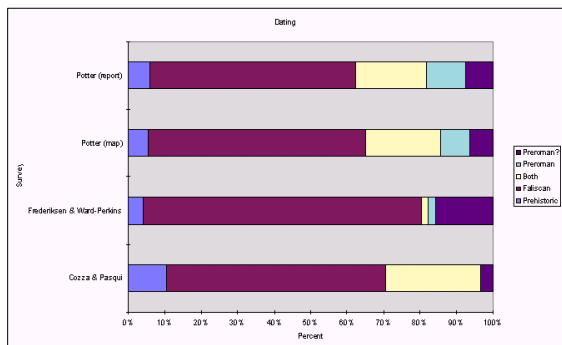


Figure 4. Surveyed sites according to archaeological date.

Most of the sites surveyed were cemeteries or tombs (see Fig. 3). They also listed 18 known and possible pre-Roman major and minor centres (*pagi*). Sites were usually Faliscan or both prehistoric and Faliscan (see Fig. 4). Prehistoric means mainly Villanovan, although some Neolithic or later caves were known and excavated (Cozza 1972, 369-372). Because the roads were a major point of interest, the question of Faliscan roads was also investigated (Cozza 1894, 114-118). The *Carta Archeologica* described all ancient roads and monuments and sites along them (Gamurrini *et al.* 1972). It is no wonder, that the sites are located near the roads (see Figs. 5 & 6). Of all the sites, 55 (76.4 %) lie nearer than 500 metres to a Roman road (see Fig. 13). Only one *pagus* lies almost two kilometres from a Roman road. The distance from a road is slightly more than 330 metres on average (see Fig. 12). The distribution and the chi-squared test testify that the importance of the Roman roads was significant (see Fig. 14.1.). The calculated $C^2=22.873$ is remarkably higher than the ∞ -value,

16.266, for three degrees of freedom when the level of significance is 99.9 %. The H_0 hypothesis, that the known Roman roads have not affected the finding can be rejected.

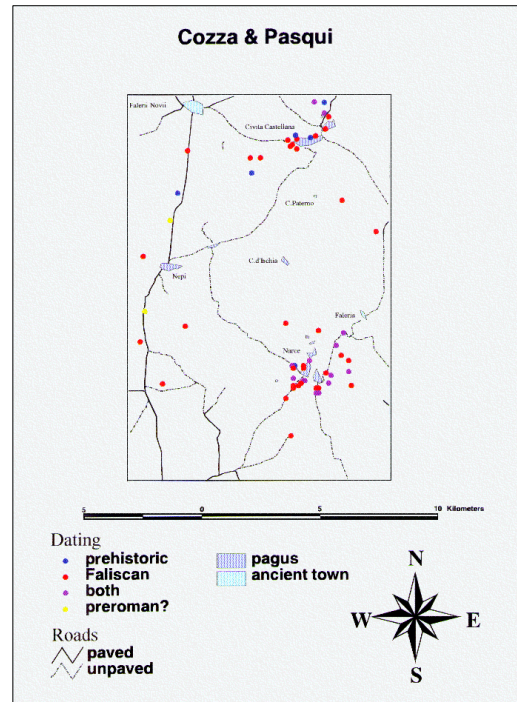


Figure 5. Pre-Roman sites from the field-work of Cozza & Pasqui

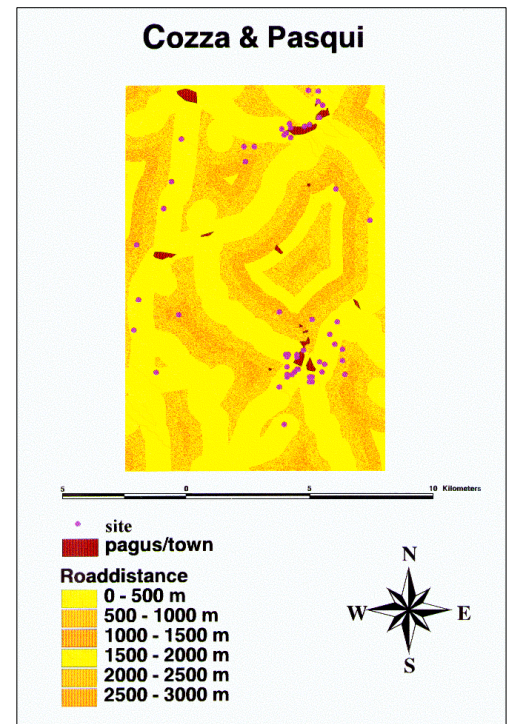


Figure 6. Relative distance of the sites of Cozza & Pasqui from a known Roman road.

6.3 First field work of the British School: Frederiksen and Ward-Perkins

The road network was also followed by the surveyors of the British School at Rome. The aim of Frederiksen and Ward-Perkins (1957) was to map the network in the core of the Faliscan area. They concentrated on the *Via Amerina* and roads connecting the centres near it. Their survey covered the areas next to the roads or big centres like Falerii Veteres. They did not take into account sites in the upper Treia valley.

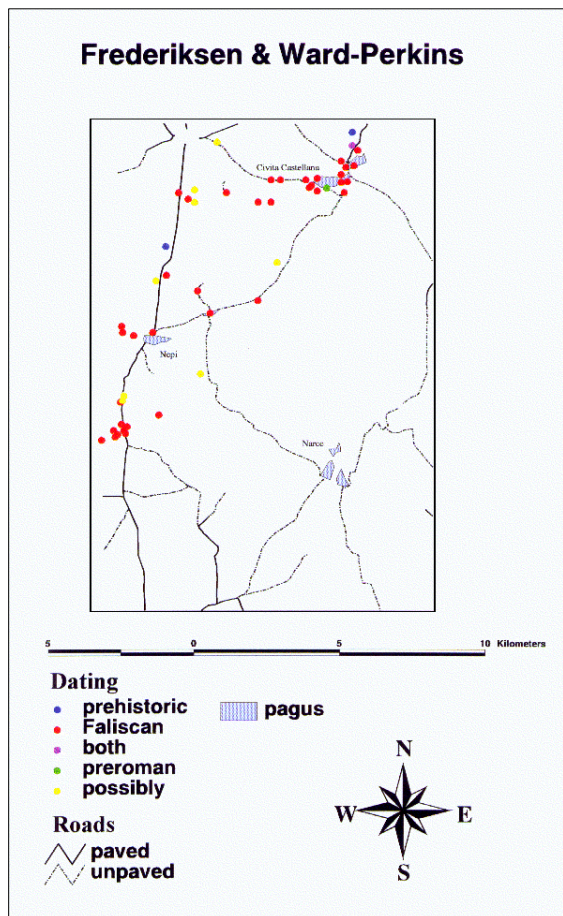


Figure 7. Pre-Roman sites from the survey of Frederiksen & Ward-Perkins

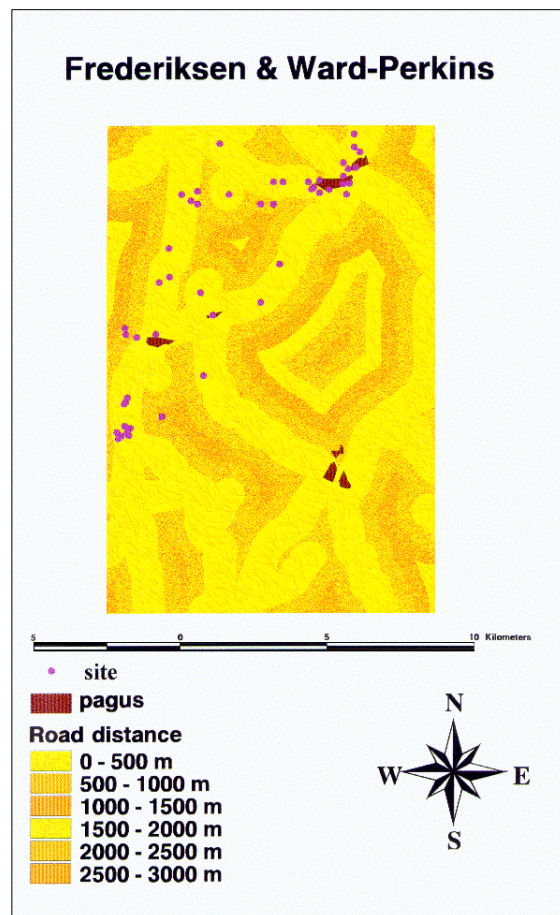


Figure 8. Relative distance of the sites of Frederiksen & Ward-Perkins from a known Roman road.

Most of the sites they catalogued were cemeteries and tombs (see Fig. 3). The number of settlement sites is not very high. The share of tombs is over 60 % of the total even when Faliscan centres are counted as settlement sites. The number of prehistoric sites is low. The Faliscans were the subject of study for pre-Roman period (see Fig. 4). A typical site was a chambered tomb from the late Faliscan period. Needless to say, the pattern of the location of the sites follows Roman roads (see Figs. 7 & 8). The distance from the known Roman roads was an average of only 244 metres (see Fig. 12). Nearly all sites lie less than 500 metres from a road (see Fig. 13). The statistical test confirms the obvious result (see Fig. 14.2.): the calculated $C^2=40.912$ and is three times as high as the ∞ -value, 13.816, for two degrees of freedom when the level of significance is 99.9 %. The H_0 hypothesis, that Roman roads have not affected the discovery pattern can be rejected with complete confidence. It is obvious, that this kind of research resulted in a distorted picture of the *real* settlement pattern.

6.4 Field work of the British School: Potter and the southern Faliscan area

Timothy Potter had worked in the Cambridgeshire Fenland before going to Italy. He was inspired by the work of Sylvia Hallam and her methods of field work. Dr Hallam laid stress upon the measurement of the site, quantification of the finds and identification of site function and adoption of a period scheme based on local pottery types. Working in the Fens convinced Potter that a survey is only a preliminary stage in the process in which the character and dating of a site will be confirmed. He has evaluated his own work: he saw that prehistoric sites were under-represented in the data, because deep ploughing had not been practised long enough to reach the prehistoric levels. Thus the surface material tended to be Roman. His classificatory system of the material was also more suitable for Roman sites. One must remember that the contemporary knowledge of the local pottery types was poor (Potter 1992).

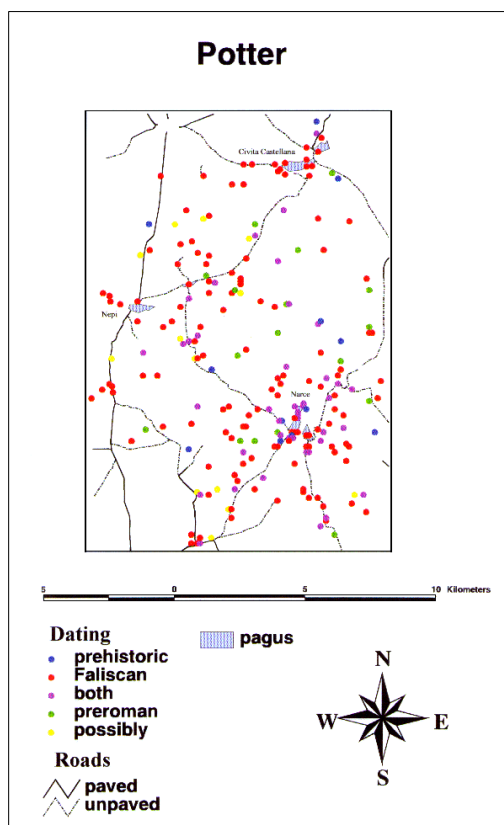


Figure 9. Pre-Roman sites from the survey map of Potter.

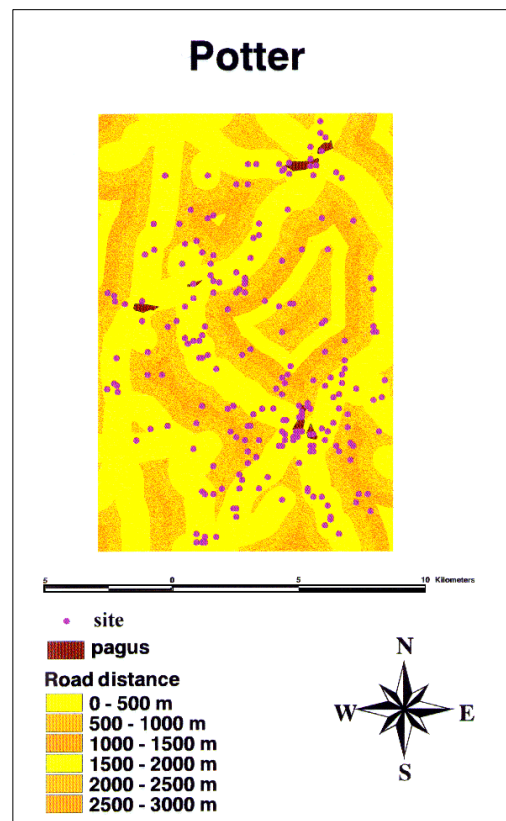


Figure 10. Relative distance of the mapped sites of Potter from a known Roman road.

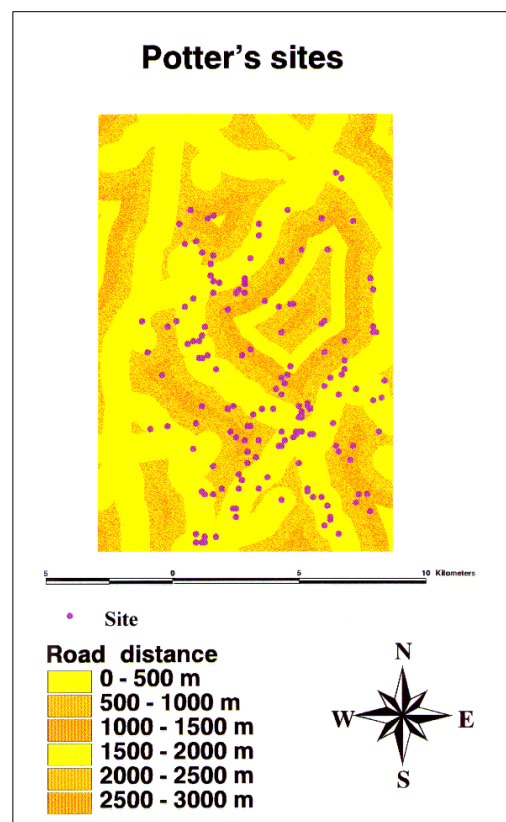


Figure 11. Relative distance of the reported sites of Potter from a known Roman road.

Potter tried to cover all parts of the survey area which were possible to survey. This makes his survey unique amongst those covered in detail here, although Cozza, Pasqui and others had tried to get as much knowledge of the area as possible. However, the tracking of ancient roads was still part of the agenda (Potter n.d.). Effort had been made to find sites from all periods in order to construct a synthesis of the settlement history (Potter 1974). The number of sites was enormous compared to the other surveys in the area. There were 161 pre-Roman sites mentioned in the survey manuscript (see Fig. 12). One must also include those previously found cemetery sites which were only marked on the survey map, but noticed in the later studies (Potter 1976: 15-16). The number reaches 231 when one counts all information (see Fig. 9).

Potter found slightly more settlements than cemeteries (see Fig. 3). He also found smaller settlements with associated tombs and cemeteries. Some of the sites can be ranked as sporadic or uncertain finds. When one counts only the sites listed in his PhD thesis or unpublished manuscript as his survey sites, the settlements outnumber the cemeteries (see Fig. 3). Most of the sites were Faliscan. Nearly 60 % were Faliscan alone and 20 % had signs of both prehistoric and Faliscan periods (see Fig. 4). 10 % of the sites had an unspecified pre-Roman period of use. A typical site is a settlement site from the Faliscan period. The occurrence of flint artefacts points to the existence of eight further Bronze Age or earlier open settlements. There are definite signs of Bronze Age occupation in the case of nine sites. Villanovan or proto-Villanovan diagnostic material was found on 34 sites (although one should recall in this case the differences in opinion over dating and attribution for this phase). Nearly half of the sites have only one pre-Roman phase while one third have evidence for two or more phases. For 21.1 % of the sites the dating is unspecified or unclear. Continuity from the Villanovan Iron Age to the Roman seems to occur in 10 % of cases. Newly discovered sites tend to be occupied for just one phase.

Survey	f	Min	Max	Avg	Stddev
Cozza & Pasqui	58	1.06	1459.15	339.07	368.37
Frederiksen & Ward-Perkins	51	1.34	1135.81	244.16	262.16
Potter, map	224	1.34	2453.51	492.18	496.80
Potter, report	161	2.03	2453.51	576.36	531.23

Figure 12. Points of sites and distance from a known Roman road.

Band	A	B	C	D
	f	f	f	f
1	46 (79.3 %)	45 (90.0 %)	139 (62.1 %)	87 (54.3 %)
2	7 (12.1 %)	4 (8.0 %)	50 (22.3 %)	43 (28.5 %)
3	5 (8.6 %)	1 (2.0 %)	26 (11.6 %)	23 (14.3 %)
4			2 (0.9 %)	2 (1.2 %)
5			6 (2.7 %)	6 (3.7 %)

Figure 13. Points of sites and distance bands. A = Cozza & Pasqui B = Frederiksen & Ward-Perkins C = Potter, map D = Potter, report.

Band	Probability	Observed	Expected	Chi-square
1	0.4897	56	35.7881	11.4730
2	0.2927	9	21.3671	7.1580
3	0.1343	7	9.8039	0.8019
456	0.0833	1	6.0809	4.2453
Sum	1.0000	73	73.0000	23.6783

14.1. Cozza & Pasqui

Band	Probability	Observed	Expected	Chi-square
1	0.4897	52	27.9129	20.7857
2	0.2927	4	16.6839	9.6429
3456	0.2176	1	12.4032	10.4838
Sum	1.0000	57	57.0000	40.9124

14.2. Frederiksen & Ward-Perkins

Band	Probability	Observed	Expected	Chi-square
1	0.4897	146	112.631	9.88618
2	0.2927	50	67.321	4.45651
3	0.1343	26	30.889	0.77381
4	0.0545	2	12.535	8.85411
56	0.0288	6	6.624	0.05878
Sum	1.0000	230	230.000	24.02939

14.3. Potter (map)

Band	Probability	Observed	Expected	Chi-square
1	0.4897	87	78.8417	0.84420
2	0.2827	43	47.1247	0.36102
3	0.1343	23	21.6223	0.08778
456	0.0833	8	13.4113	2.18340
Sum	1.0000	161	161.000	3.4764

14.4. Potter (report)

Figure 14. Chi-squared tests of the relationship between location of surveyed sites and distance from a known Roman road.

Although half of the sites lie within a 500 metre buffer from a Roman road, there are sites in the central parts of the study area which are over two kilometres away from a road (see Fig. 10). The average distance from the road is 492 metres for

sites mapped on the survey map (see Fig. 12). When one looks at the chi-squared test (see Fig. 14.3.), one sees that the calculated $C^2=24.029$ is higher than the α -value, 18.467, for four degrees of freedom when the level of significance is 99.99%. The H_0 hypothesis, that Roman roads have not affected discovery pattern can be rejected, when both the previously known and surveyed sites mapped by Potter are taken into account. However, when one only uses the sites Potter listed as his survey sites (see Fig 14.4), the calculated $C^2=3.4764$ is lower than the α -value, 7.815, for three degrees of freedom when the level of significance is 95%. The H_0 hypothesis, that Roman roads have not affected the finding cannot be rejected. The location of the pre-Roman sites is not determined by the mere checking of areas along known Roman roads. The distribution is more even (see fig. 11 and Fig. 13) and the mean distance from roads is higher at over 550 meters (see Fig. 12).

7 The surveys in the areas of Nepi, Narce and Falerii Veteres

The surveys described in this article are not the only studies in the area. In 1920 the dominance of Roman and Faliscan archaeology was challenged by the research of U. Rellini. His selection of sites from prehistory did not follow the guidance of the Roman roads, but he had biases of his own kind. He was listing all possible caves in the area and some stray finds without proper provenance. Later this century other Italian archaeologists (including amateurs) have looked for new sites in the area of the Nepi map sheet. Unfortunately, there is very little information on the results of the work. The knowledge comes mainly from the publication of Selmi (1976) and the study of di Gennaro and Stoddart (1982). The sites known to be found by *Gruppo Archeologico Romano*(GAR) suggests that the impact of the road network on the detection of pre-Roman sites is waning. The emphasis has shifted towards looking for prehistoric sites in their geographical environment and evaluating their geomorphological and hydrological characteristics.

The modern archaeological survey differs considerably from earlier types of archaeological enquiries. This can be recognised by using GIS as a tool to manipulate geographical space. These different routines have resulted in a great variety of distributions both by space and by category. During the era of the topographical surveys, only major centres and cemeteries near them were considered

important. They were the only types of monuments the scholars knew how to recognise. By the time of Cozza and Pasqui the perspective had changed. There was a knowledge of the existence of the sites outside certain alphabetically listed towns. The significance of the road network was realised, and the information on ancient road networks was added to that of pre-Roman centres and cemeteries. Defended settlement sites and cemeteries were dominant features. And these are the types of sites which are located near the pre-Roman road network. At the beginning of the south Etruria surveys the view of the past use of space remained the same. Roads were the most important single factor affecting where new sites were searched for. The mean distance from a Roman road was at its lowest. The view that the sites were connected to certain roads was very strong. However, by the 1960s, there were new survey methodologies. The importance of blanket survey was recognised and the total coverage of an area became the goal. The mean distance of sites from classical roads reached its highest level. The sites found during recent times were all distributed more evenly within the landscape. The importance of trying to find other types of prehistoric sites from earlier periods has at last been understood.

8 Conclusions

All the evidence points to the conclusion that the types of sites found during survey are connected to phases of methodological preoccupation in archaeological thought. The understanding of what a site is seems to be correlated to the period during which the study was carried out. Until recently, a typical Faliscan site was a cemetery and a cave was a typical prehistoric site. The trend of looking for pre-Roman cemeteries was intensified during the mapping of the ancient roads by Frederiksen and Ward-Perkins. The possibility of the existence of further settlements was partly discussed, but there seems to have been very little effort expended on their discovery. The importance of searching for settlement sites was recognised when systematic surveys of larger areas became standard. Investigation of the South Etruria landscape in terms of the differential density of artefacts has still to be adopted (e.g. Bintliff & Snodgrass 1988) and will produce in turn a pattern much less affected by classical roads. In the interim we hope that the present analysis shows how GIS can be adapted to examine, and make more precise some of the research biases inherent in surface survey.

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Contact details

Ulla M. Rajala
 Institutum Romanum Finlandiae
 Passeggiata del Gianicolo 10, I-00165 Roma
 ITALY
 e-mail: ulla.rajala@utu.fi

Andrew R. Harrison
 Department of Geography
 University of Bristol
 University Road, Clifton
 Bristol BS8 1SS
 UK
 e-mail: A.R.Harrison@Bristol.ac.uk