Field trials and errors: field methods used in the Agro Pontino survey

Loving, S.H.; Kamermans, H.

THE AGRO PONTINO SURVEY PROJECT

Methods and preliminary results

Editors:
A. Voorrips, S.H. Loving, H. Kamermans.

Offprint

AMSTERDAM 1991

FIELD TRIALS AND ERRORS: FIELD METHODS USED IN THE AGRO PONTINO SURVEY

S.H. Loving and H. Kamermans

SUMMARY

Information collected on all fields surveyed regardless of whether or not artifacts were found concerned physiographic features, soil properties and displacement, conditions affecting visibility, and actual survey coverage of the field. Most artifacts collected were individually plotted on maps; others were plotted as units. Field information and artifacts were processed in a field laboratory, after which the data were entered into databases implemented on a microcomputer.

1 INTRODUCTION

This article briefly describes field methods used during the Agro Pontino survey. Anyone who has worked on an archaeological project knows that field methods evolve, usually because initial conceptions about how things should be done don't work out, but sometimes also because the aims of the project and/or the conditions under which it is working change. Rather than describing this evolution, we will first review the field procedures that we finally settled upon, and then discuss some of the differences between those and their predecessors.

2 OVERALL ORGANIZATION AND OVERVIEW OF FIELD PROCEDURES

2.1 General

Field seasons lasted approximately a month, and participants worked six days a week. Most participants were students from the Netherlands and Italy. The participants were divided into crews; the number of field crews varied, depending on how many people there were, how many vehicles were available, and how far behind we were in the lab work, and there was always a lab crew, even if it was only one person.

The field crews generally consisted of three to four people, one of them being the head of the crew, usually a project leader or someone who had participated the previous season. The head of the crew was responsible for finding/selecting the fields to be surveyed, making administrative assignments, dividing tasks among the other crew members, making tactical decisions, making sure the data had been collected correctly and as completely as possible, and writing a daily report for the Daily Log. The lab crew processed the data and materials collected by the field crews and undertook initial analyses of the artifacts.

The Daily Log was a more comprehensive daily written report about the survey project, in which was also recorded the weather, arrivals/departures of survey participants, visitors, crew composition, and progress of the survey as a whole. Compiling information from field crews and writing the Daily Log was generally the task of one of the project leaders, but during one season a student assumed this responsibility as part of his studies.

2.2 Locating fields to survey

The agricultural fields to be surveyed were preselected (see Loving *et al.*, this volume) and pictured on 1:5000 blow-ups of 1:35,000 aerial photographs (obtained from the *Aerofototeca, Ministero per i Beni Culturali e Ambientali*).

The field crew first located the field, or one of its alternatives to see if the amount of vegetation did not preclude survey. On the transect photographs, the transect line proper was considered to run down the centre of the photograph, and the priority fields to be surveyed were those that the transect line crossed. If the priority field could not be surveyed, a field on either side of the priority field to the edge of the photograph was to be chosen, but if no field there was available either, the crew just moved further along the transect. The theoretical transect width was about 500 m, but the actual width at any one point depended on the size of the field surveyed there. "Gaps" in the transect line were filled in later in the same field season or in a later season, if possible.

Other enlarged aerial photographs were of previously surveyed fields not on transects where artifacts had been found, but could not be dated. These fields and/or ones adjacent to them were to be surveyed to collect more artifacts.

2.3 *Obtaining permission for survey and information about the field*

After a preselected, surveyable field was located, the crew leader and usually one of the Italian students would try to get permission from the owner or responsible person to survey the field. If it was not possible to locate the owner, the crew usually started surveying under the assumption that the owner or someone who rented his/her land or worked it would show up. This was almost always the case, and an advantage was that he/she could see what we were doing (which otherwise was frequently difficult to explain).

Permission to survey was not infrequently contingent on field conditions. In general, farmers did not allow survey on fields that had been recently seeded, bore very young plants, or had water-logged soils.

Other than obtaining permission to survey the field, specific information about the field was obtained from the owner or other person knowledgeable about the history of the field. He/she was asked: if the topsoil been removed, and if so, where it went; if (some of) the soil been added from another place, and if so, from where (if a substantial amount had been added, but the owner didn't know from where, there was no point in surveying the field); if he/she did know where the soil came from, the field was surveyed without plotting the artifacts; if the field had been levelled for cultivation; how the soil dredged up from field canals was distributed.

Many owners also volunteered information about artifacts—where they could be found, what kinds of artifacts had been found in the area, etc. A few owners collected materials themselves and let us photograph them.

2.4 *Field survey tasks*

Every field that we surveyed or made observations about was given a unique *field* number. Each time a field was visited a *visit* number was also assigned. It was the responsibility of the crew leader to know the field number and last visit number of previously surveyed fields and the next unique field number that could be used for fields not previously surveyed. To collect data from and about the field, four tasks were performed: (1) survey of the field and profiles present to look for artifacts; (2) mapping and collection of artifacts; (3) assessment of the pedological situation and coding of soil variables; and (4) filling in field forms.

2.4.1 Survey for artifacts

The usual field survey technique was to walk straight across the field, usually along the furrows, looking for artifacts. Surveyors spaced themselves approximately 10 metres apart along one of the borders of the field and then walked across the field in as straight a line as possible. The crew leader set the pace. The field was recrossed until the field was covered. In most situations a surveyor could see the ground thoroughly up to a metre on either side, about 2 metres width total. By recording the number of times surveyors crossed the field and the orientation of their crossings vis-a-vis the field, the surface coverage of the field could be calculated. Denser vegetation that obstructed viewing the surface a full two metres was corrected for by changing the width visible to surveyors to 1 metre, 1.5 metres, or whatever.

When the surveyor found an artifact, he put a flag next to it and walked on without collecting the artifact. Most of the artifacts flagged for collection were lithic tools and debitage and ceramic sherds and tiles. Massive tiles and/or those in large quantities were not collected because of their bulk, but their presence was noted on field forms. Whole beach pebbles were considered artifacts when found out of their natural context.

A dense concentration of artifacts (i.e., 10-20+/m^2) fairly localized within the field was termed a "scatter". Surveyors were not expected to put a flag down for each artifact, but to put in enough flags to delimit the extent of the scatter along a row.

A field with a very large number of Roman sherds and tiles over most of its surface was collected by "dog leash" sampling. More or less evenly spaced points were designated in the field around which all artifacts within a 1-metre radius were collected as a unit.

Most of the few profiles found were surveyed completely. The position of the artifact in the profile was marked by a flag, and the artifact was placed on top of the profile and marked by a second flag.

These four methods of survey sufficed for the situations that were encountered on the Agro Pontino, given the goals of the survey project (see Loving *et al.*, this volume).

2.4.2 Field mapping and collection of artifacts

Field maps were made on the 1:5000 aerial photographs or on millimetre graph paper usually at a scale of 1:1000. If the aerial photograph was used, the field was outlined on it, with measurements taken where necessary (if field boundaries had changed, for example). Millimetre maps were made for all fields surveyed during the exploratory phase; they were also made in later phases when artifact density was too great to plot artifact locations legibly on the photographs and when a field was visited a second time. During the exploratory phase, the field had to be measured with a tape in order to make the map. In the probability sample and problem-oriented phases, the field outline could be transferred easily from the aerial photograph to the millimetre paper using a ruler and protractor. Millimetre graph paper maps were labelled with the full field number, the date, an arrow indicating North approximately, the scale of the map, and the name of the person who made the map.

After the field was outlined on the map, slope lines and boundaries for changes in soil colour across the field were drawn on the map as accurately as possible. Then, artifacts not in scatters or collected by dog leash sampling were plotted individually on the map, given numbers, and collected. Numbers were written directly on the artifacts or on tape put around the artifacts (ceramics and very small lithics were usually wrapped in tape). The artifact was put in the sack for the collection and the flag picked up.

In fields with scatters the scatter boundaries were determined and drawn on the map, and all artifacts (except tiles) within the scatter were collected as a unit. In the case of dog leash samples, the points of the collecting circles and the letter given for each were plotted on the map. The radius of the collecting circle was put on the label for the bag. This type of collection allowed an estimate of the number of uncollected finds to be made, which was important for calculating artifact density.

Soil profiles were drawn to scale on soil profile forms, and the location of the artifacts found were plotted on these. The horizontal location of the artifact was also put on the field map and its depth below the surface (in cm) and its soil horizon association was noted on one of the field forms.

2.4.3 Collection of data on soils

The survey crew was expected to check the soils of the field because there was a considerable difference in the scale of the mapping provided by the soil survey for agricultural purposes and that needed for archaeological interpretations. Soil units defined by the soil survey were plotted on photographically reduced copies of 1:25,000 topographic section maps. A sample of the soil of the field was taken with an auger and compared with that given on the soil unit map by using the key to the Soil Map of the World (FAO, 1974), which gives the distinguishing characteristics among soil types. If the soil type appeared to differ, it was noted down why, and an attempt was made to type the soil. In such a case, however, one of the authors (HK) returned to the field to check the soil and make a final decision.

Only one soil type was associated with a field even when others were present. Either the soil with the most artifacts or, if no artifacts were found, the areally dominant one was selected for coding. The other types were noted on the field form and drawn on the field map, and other observations, such as a change in drainage or texture, were written down on the form. Variables coded for the (dominant) soil were sediment (i.e., parent material), texture, and drainage using the drainage classes defined by the U.S. Department of Agriculture (1951).

As stated above, boundaries of different soil colours exposed on the surface of the field were drawn on the map, and exposed soil profiles were drawn on a standard soil profile form.

2.4.4 Reporting field and survey conditions on field forms and in daily notes

The survey also collected information about factors that might be expected to influence the presence, density, and distribution of artifacts. These factors were the degree of field slope, if any, and its aspect, the time of day, daylight conditions (clear, cloudy, etc.), the coarseness of ploughing, the amount of vegetation, the wetness of the surface of the field, visible signs of erosion, levelling, and addition or removal of soil. These variables were coded with nominal or ordinal values on the field form; they were, of course, coded each time a visit was made to a field.

Observations made in the field or lab that were not coded on the field or artifact forms, such as complexities in soil development, in the amount of vegetation, special interpretations of profile sections, etc., were written in the daily field notes, as were additional information provided by owners (whether or not obviously relevant) and ideas or impressions about patterning in the data.

2.5 Laboratory processing of field information and artifacts

In the laboratory, other administrative numbers were assigned (see below), new fields were plotted on 1:25,000 topographic maps, the field forms were completed, and artifact locations on the field maps were recorded using a digitizer. The artifacts themselves were washed, laid out to dry, numbered, and listed on artifact forms. Collections were photographed and then separated according to type of material, lithics and ceramics, for weighing and performing initial analyses (see Kamermans this volume; Loving and Koot, this volume).

All of the data from the field forms and the artifact forms were entered into the microcomputer using a separate database for each. The field and artifact databases were implemented on the microcomputer(s) using the MINARK data base package (Johnson 1988). In the artifact database, the files with digitized data from the maps were merged with those containing data from the artifact forms. Forms for coding variables selected for the lithics and ceramics analyses were printed from the artifact database. Labels for the sacks in which the artifacts were packed were printed from the field database.

During analysis of the collections, the prehistoric periods thought to be represented were noted. This information was relevant to "sites" (defined below) and was added, if not already there, to the field database.

2.5.1 Administrative numbers

As stated above, field numbers and artifacts not in scatters or collected by dog leash sampling were assigned numbers in the field. In the lab, artifacts in scatters and dog leash samples, which had been collected as units, were assigned consecutive numbers following the last number of individually plotted finds.

Each artifact collection was also assigned a site number, which pooled collections from adjacent fields together if their distribution appeared to be continuous on the field maps, and a find number, which was a unique number for that collection. One person was put in charge of giving collections site and find numbers. It should be noted that every artifact, even if an isolated find, was assigned site and find numbers. A site, therefore, was really a findspot. As "gaps" in the transect were filled, two sites were merged together if the fields surveyed in the "gap" showed that there was a continuous distribution of artifacts between them and all the fields involved could be associated with the same physiographic unit. Any other definition or use of the term *site* was dependent on the goals of individual research projects. One could even chose to ignore "sites" altogether since our survey methods were in accordance with a "nonsite" approach (Thomas 1975).

The field maps were assigned unique map numbers, and the datum point on each used for digitizing the artifact locations was given a unique datum point number. All of these administrative numbers were recorded on the field forms.

2.5.2 Laboratory map work

The fifteen 1:25,000 topographic section maps that covered the Agro Pontino and some of the area adjacent to it were tied together in a regional grid, with the 0,0 point of the *x-y* axes to the SW of the entire Agro Pontino. The *x-y* coordinates of the SW corner of each section map were measured in tenths of millimetres.

Each field surveyed was drawn to scale on the topographic section map, and the coordinates of a point in the centre of the field were measured in terms of the regional grid, in tenths of millimetres, and recorded on the field forms. At the same time, the area of the field in square metres and the percentage of the field surveyed were calculated and recorded on the field form. The datum point on each field map served as the 0,0 point for the *x-y* axes used for plotting individual artifacts and other features. These datum points were plotted on the 1:25,000 section maps and their coordinates in the regional grid recorded on the field form.

Individual artifact plots on the field maps were digitized using a digitizing program implemented on one of the microcomputers in the lab. Their coordinates were in terms of the datum point on the map and were recorded in actual, i.e., on the ground, metres.

2.5.3 Further coding of field conditions and environmental classifications of fields on the field forms

Certain variables to be filled in on the field forms were derived from other information or other variables; this was done in the laboratory. For example, the percentage of field coverage was calculated by multiplying the number of times the field was crossed by the length of the crossing by two metres and dividing the product by the area of the field. Some variables were summaries of other variables; for example, the soil transport variable was a summary of the field erosion, soil addition, and soil removal variables, which was implemented to facilitate data retrieval.

Other variables assigned fields to classes on various criteria, and the fields were coded accordingly in the laboratory. For example, the region had been divided into vegetational zones and each field was coded according to which vegetational zone it belonged on the field forms.

2.5.4 Processing of artifacts

Artifacts were washed, dried, and numbered in the laboratory. Screen-bottomed boxes were built for drying the artifacts. The screens allowed the air to circulate on all sides of the artifacts, and the boxes were fairly deep and could be stacked and so offered protection from the wind. This type of box greatly speeded up drying of ceramics, which had to be thoroughly dry before they could be numbered.

Before laying out a collection for washing, drying, and numbering, a grid of drafting tape was put on the screen to make individual cells for the artifacts; each cell received an individual artifact number, and the artifact with that number was put into the cell. Artifacts affected by errors in numbering in the field—such as double numbers—were identified when the collection was laid out in the screen-bottomed box and were coded as errors on the artifact form.

The year of collection, the site number, the find number, and the individual artifact number were written on each artifact. Theoretically, the find number and artifact number should have been sufficient. Over the years, however, this redundancy has allowed us to retain many items that otherwise would have had to be thrown out (in cases where part of a number flaked off or some numbers were illegible or reversed).

After the collection had been laid out, the artifact form for that collection was filled in. Each artifact listed was coded for type of material (ceramic sherd, obsidian, etc.), curatorial status (e.g., curated, modern and thrown out, thrown out but valid), and its status on the field map (e.g., individually plotted, in a scatter, not plotted at all, field error in numbering). Using the field maps, each artifact also received codes for field slope and soil horizon associations.

3 CHANGES IN FIELD METHODS

The methods described above were not achieved overnight. At the beginning, the aims of the survey were in flux; field methods were affected during the process of these becoming better defined. Over the years, too, we replaced the more cumbersome procedures and we succeeded in devising less ambiguous instructions for coding and processing of data.

3.1 Some changes in project aims that affected field methods

Initially, we were interested in recovering the pattern of Palaeolithic settlement visible on surface adjacent to Monte Circeo, and to relate our findings to the cave sites there. We expected to find "sites", more or less dense concentrations of lithic tools and associated debris, which were visible on the surface. But, the normal situation soon proved to be that after surveying a field and picking up a handful of artifacts, we emerged with no "sense" of their spatial distribution. To remedy this problem, we made flags and used them to mark the locations of the artifacts. But it proved rather hard to get a bird's eye view of the positions of the flags in a field with knee-high corn or half-grown tomato plants. Thus, we started plotting the locations of the flags on 1:1000 maps drawn on millimetre paper. From doing this we learned that our idealized "sites" did not exist or were very rare, at least as far as Palaeolithic materials were concerned. At the same time we realized we had no idea about the "grain size" of patterns in the artefact distribution (Cowgill 1975:266); not only would it be necessary to conduct the survey to discover this, but we would also have to collect information to investigate what was controlling the distribution. So, our aim shifted from finding "sites" to describing the archaeological record of the Agro Pontino in terms of landscape variables (soils, slopes, surface stability, age of surface, etc.) and modern cultural variables (modern land use, irrigation and drainage systems) as well as artifact associations.

The second aim that changed, affecting our field methods, was the range of archaeological periods that were to be included in the survey. First, the focus on the Palaeolithic was broadened to include all periods through the Bronze Age after we realized that many of the lithics collected were post-Palaeolithic. What we thought were pre-Roman ceramics were also collected, but Roman materials were not included on maps or collected, although they were mentioned in the Daily Log. Somewhat later, we began to collect Roman materials systematically. Then, we saw that the density of Roman materials was frequently too great for point-plotting; consequently, we developed other methods (i.e. scatter collection and dog leash sampling, see section 2.4.1) for sampling and mapping these concentrations.

3.2 Tools and procedures adopted that expedited field methods

There were two major changes that improved field work considerably. One was the use of 1:5000 blow-ups of aerial photographs for making field maps and the other was the "discovery" (made while working on a Palaeolithic excavation in the Netherlands) that numbers could be written in pencil directly on artifacts.

Before the 1:5000 blow-ups of aerial photographs were used for field mapping, each field that we surveyed had to be measured with a chain and drawn to scale on millimetre paper. More often than not, the artifacts also had to be measured in by chaining. The time involved in this task was greatly reduced by mapping on the enlarged aerial photographs, which not only depicted the size and shape of the field, but usually other features of the natural and cultural landscape as well, making it possible to plot artifact locations adequately for our purposes without chaining.

Before we began writing numbers directly on artifacts or on tape wrapped around them, each artifact was collected separately in a plastic bag to which was added a label with its number. Later, to save time in labelling in the field, sets of consecutively numbered bags were made. In many cases, sets did not have enough bags to match the size of the collection found in the field or sets got mixed up and duplicate numbers were used, making the solution to the labelling problem equally or more time-consuming than the problem.

3.3 Some developments in data administration

A computer database for the project began to be set up very soon after the project started. At the time, the only database package available was Scientific Information Retrieval (SIR), an hierarchical one, which was on the SARA (Stichting Academisch Rekencentrum Amsterdam) mainframe computer in Amsterdam. Although this package is cumbersome in data retrieval, in retrospect, it was very useful to build the structure of the database and the administrative organization of the field data at the same time. The levels of data and how they were related had to be built into the database structure, which forced us to consider field administration very carefully. An ambiguity that developed in the field administration, on the other hand, was commonly resolved by working with the database structure.

When we began taking microcomputers into the field for data entry, the information stored in the SIR database was downloaded to the MINARK database (which combined hierarchical and relational database features) that we used in the field. The MINARK data entry program is menu-oriented and easier for students to use than typing formatted records for batch entry, which SIR required. After the field season, the data from the MINARK database was uploaded into the SIR database on the mainframe.

Some of the nominal and ordinal variables that were coded in the field were added or changed after the project began. Fields surveyed prior to this were coded on the basis of the field notes, if possible; otherwise the variables were coded as missing. The process of setting up the database, designing the field administration system, selecting variables and their possible values, and designing field forms that could be filled in easily in the field and lab and were easy to read during computer data entry occurred mainly during the exploratory phase of the project.

By the end of the exploratory phase, we had reached a kind of "plateau". Many decisions had been made and from them we selected those we wanted to adhere to. We did this in the process of writing a field manual which, among other things, described the administrative and database organizations and their contents in full. This was valuable for us, but also served as a reference for the participants in the following field seasons.

4 CONCLUDING REMARKS

Although it took quite a number of field seasons, the field procedures worked so well by the last season that the project leaders had to do very little that was not routine. Murphy's Fourth Law of Random Perversity states, "If everything appears to be going well, you obviously have overlooked something." We guess that we are still overlooking it, since we still think that the procedures developed seem adequate for field survey in the Agro Pontino.

But in different circumstances they wouldn't necessarily work. If we were to survey more inland, for example, many techniques would need to be revised. Even on the Agro Pontino, persons conducting surveys with aims different than ours have adopted other methods that serve them well. Field methods are tools that must be specifically modified for the aims and conditions in which they are expected to be used.

REFERENCES

Cowgill, G.L., 1975.
Selection of samplers. In: J.W. Mueller (ed.), *Sampling in Archaeology*. Tucson. p. 258-274.

FAO/UNESCO, 1974.
Soil Map of the World 1:5,000,000 volume 1. Paris.

Johnson, I., 1988.
MINARK user manual, version 4.11. St. Lucia.

Thomas, D.H., 1975.
Nonsite sampling. In: J.W. Mueller (ed.), *Sampling in Archaeology*. Tucson. p. 61-81.

U.S. Department of Agriculture, 1951.
Soil Survey Manual of the Soil Survey Staff of the United States Department of Agriculture, No. 18.