Sampling past landscapes

Methodological inquiries into the bias problems of recording archaeological surface assemblages

Waagen, J.

Publication date
2022

CHAPTER 6.
CONCLUSIONS

Here I would like to return to the main research questions that were asked in the introduction to this thesis:

I. Can we develop a more advanced analytical technique for finding traces of ephemeral sites in what is usually regarded as offsite data?
II, What is the potential for mitigating visibility and observer biases with a more intensive sampling method to identify and map archaeology, onsite and offsite, and what is the effect of quantification biases when counting or weighing batches of archaeological finds?
III. ow can we apply a proportionate stratified sampling scheme in order to deal with visibility issues and research area selection biases, as well as establish an adequate sample size?

These questions connect to a set of interrelated research biases common in archaeological field survey. The applied theoretical framework has been designed to approach these questions analytically from a hypothetical-deductive perspective. The questions have been investigated using empirical research into existing datasets from a series of research projects based in the Tappino area, east of Campobasso, capital of Molise in south-central Italy. I characterized the involved methodology as a critical introspective approach, looking systematically into the spatial and quantitative aspects of biases in the datasets and research design, and working on fieldwork methods to mitigate such biases. The toolset for the analysis has been a strong reliance on data exploration and a reflective approach to statistics, using them to investigate the particularities of the collected field survey samples.

As for question I, in chapter 2 I have argued that a careful approach to offsite data can be very valuable. It is insufficient to deal with offsite data in terms of general densities and global patterning. Detailed analysis at the local level of both the archaeological visibility of sites and the ground visibility of the archaeological surface record can lead to the identification of clear evidence of human activity. It is also demonstrated that densities alone are not enough; variability of find classes is an important parameter for identification of points of interest in the find distributions. The factor appears significant especially in combination with bad visibility conditions, where those conditions create the proverbial 'tip of the iceberg' situation. The search for anomalies that may point to such situations in the whole body of offsite material can be facilitated by applying GIS queries using multiple variables, that can classify spots that warrant further inspection. Such inspection should then take place in the form of field revisits, in order to try and collect complementary evidence on the identified anomalies. The outcomes of the case study attest the presence of Hellenistic/Samnite farms and likely burial areas that have been missed by the intensive transect survey. As such, this affects the estimations of site density, typology, and spatial settlement organisation in the research area, and also sharpens subsequent assessments of offsite data.

As for question II, an innovative fieldwork technique called point sampling has been examined as a means of extenuating various biases and problems that can occur with intensive offsite survey. These have been specifically; variable or zero ground visibility, spatial coarseness of the standard intensive transect method as well as the cumbersome full collection at large rural sites. The point sampling approach mitigates the ground visibility issue by removing vegetation during sampling and reduces observer biases by much closer inspection of the ground. In addition, it allows for a greater spatial precision in the projection of collected data. Collecting and projecting data using transects results in a smearing, i.e. a generalization, of the actual spatial find distribution, which can lead to ambiguous interpretation. Point sampling allows for a much finer grip on the actual spatial spread of artifacts. It also avoids the collection of huge amounts of data that may weigh heavily on the finds processing and will probably add relatively little information, which is inevitably the result of transect collection because the latter simply covers a much larger area. However, a more intensive sampling method leads to more complete sample collections and an increase of smaller finds. This poses questions on the means of quantification using numbers of finds as the main measure of densities, which has been the subject of chapter 3. After a detailed assessment of point sample collections, it is demonstrated that weight is a very important component for quantitative assessment, as is the concept of breakage. They affect metrics of relative abundance, but also give insight into the actual sample compositions, in terms of differential fragmentation. Weight and breakage should always accompany quantitative assessment of surface finds in archaeological field survey.

In chapter 4 the breakage analyses inform the quantitative examination of the collected batches of point samples. The analyses show that point samples can be meaningfully compared to transect sampling, evidencing general correlations in find densities and variabilities. Under varying conditions of visibility and coverage, point samples have specific capacities for information retrieval as well, making them highly complementary to the intensive offsite method. It is demonstrated that the visibility mitigating qualities of the point samples are especially strong in case of fallow fields, i.e. fields that have not been ploughed for consecutive years. It also follows from the analysis that the linear approaches to visibility correction are problematic, corroborating conclusions in earlier research. In addition, point samples offer higher resolution in the projection of collected data, which in turn allows a better grip on fluctuating densities, as well as a more precise definition of for example fall-off curves from site areas to offsite areas. Point samples placed at a 10 m interval are demonstrated to produce an adequate correlation with the surface material patterns detected through transect sampling, and even at a 20 m interval it appears that the coarse spatial and quantitative trends may be traceable. In this case study, one of the most prominent observations has been the increased retrieval of plain ware feature sherds, which have a clear diagnostic potential. As such, point sampling is demonstrated to be effective in tracing materials that have a large likelihood of being missed in the regular transect survey.

As for question III, chapter 5 finally considered archaeological visibility, ground visibility and research area biases on a regional scale. This chapter analyzed these potential biases in the context of a hypothesis concerning Samnite settlement densities on more elevated parts of the landscape in the Tappino area. Here, it is demonstrated that a proportionate stratified sampling approach allows for a careful analysis of potential geomorphological and visibility biases. In the analyses non-parametric statistical tools are applied to explore the survey dataset and evaluate a set of hypotheses concerning occupation intensity. The stratification allows for assessing effects of various variables such as land use and geomorphology in an efficient workflow. These lead up to the statistically underpinned conclusion that the evidence corroborates the hypothesis of relative dense Samnite settlement in more elevated parts of the area, ruling out the possibility of substantial research or visibility biases. As an important condition for warranting the approach, a method has been developed to establish the sample size of the survey area in order to collect a sample that is large enough to allow such conclusions, hereby tackling an important potential conceptual research bias in archaeological field survey design.

Also on a more general level, some conclusions based on the combined case studies can be drawn up here, yielding implications for further research. Based on the investigations presented in this thesis, it is clear that archaeological field survey can improve its robustness in collecting reliable samples of the surface record, as well as develop approaches to mitigate potential conceptual, visibility and observer biases. This can be achieved by careful research design and field sample methods, as well as subsequent analysis. It is clear that sampling intensity matters a great deal. More intensive sampling will on average result in more complete samples and an increase in smaller finds, which will affect our information on the archaeological surface record considerably. Based on the breakage analysis, the necessity emerges to always consider counts, weights and breakage in any analysis of the archaeological surface record.

The intensive offsite method has clear merits in its full collection, allowing for detailed analysis of offsite data. However, visibility and observer biases will always affect this method, and an effective alternative instrument to avoid these can be found in point sampling. This technique can be applied to both counter ground visibility conditions, mitigate observer biases, as well as allow sample areas that are inaccessible to transect sampling. Since point sampling has been demonstrated to correlate, as well as produce complementary data, in comparison with the intensive offsite survey method, both methods can be effectively incorporated in an intensive archaeological field survey design. This can one the one hand be useful for particular sites and find conditions that risk biased or unworkable large samples when examined using the intensive offsite method. On the other hand they could be deployed as a systematic check in order to understand what may be missed otherwise. As such, point sampling is a welcome addition to the existing range of sampling possibilities. Of course depending on actual research questions, extensive field survey designs may be well-served in some calibration efforts based on more intensive control sampling. For example, grids of point samples, and/or clusters of fields examined with the intensive offsite method may be spatially distributed using proportionate stratified sample designs over areas investigated with a more extensive method. As such, a well-designed field survey research should make use of these complementary methods, carefully designing sampling approaches to the continuous finds distributions, individual sites as well as large rural and urban sites.

The study into point samples has further clearly demonstrated their potential to detect archaeological find distributions in non-arable areas. In addition, the inquiry into point samples in combination with the study of variability as indicator for ephemeral sites hidden in offsite material, has shown that there can still be important artifact scatters in what appear to be low density fields. This has clear implications for extensive field survey approaches where information on such fields is unlikely to end up in a dataset at all. In the context of the studies into legacy datasets these results should be taken into account as well. On the one hand, the specification of potential biases may be used to get some quantitative grip on the probability of missing a site, and help in estimating the proportion of missed sites. On the other hand, they could inform a strategy to revisit areas that have been part of past projects and do replication and calibration experiments. The point sample method here would allow to apply for example a more extensive interval of hyperintensive samples to test larger areas with substantial adverse visibility and observer effects. Additionally, especially in landscapes with challenging visibility conditions, point sampling allows for prospecting archaeology. This opens up possibilities to research marginal areas such as heavily vegetated mountainous landscapes where human activity in past may be expected but currently nigh impossible to trace.

Finally, the proportionate stratified sampling approach has demonstrated the procedure to generate a well-balanced regional inventory. Again, this approach can inform future survey designs as well as a restudy of areas belonging to previous generations of projects, resulting in more effective sampling procedures. With the developed sample size estimation a contribution is made to the discussion on how large an area in a specific region must be covered by archaeological field survey to be able to make substantiated inferences about that region, which is an essential issue but is often disregarded.

All in all, it is hoped that the methodological case studies that form this thesis help in understanding, and where possible mitigating, research biases in collected survey samples. This eventually should allow for an improved perspective on the archaeological surface record, and will increase the representativity of the collected data which eventually permits the attestation of a more detailed, rich and varied typology of archaeological remains. It is believed that the here developed methodological tools can help to assess research questions such as the debates on hidden landscapes and missing sites, and can result in more reliable retrieval rates of archaeological traces of habitation, land use and other manifestations of past human traces in the landscape.