

II. TOWNS AND HINTERLAND

MODELLING AGRICULTURE IN THE MIDDLE TIBER VALLEY

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1. Research objectives

This research is looking at agriculture and subsistence in the Middle Tiber Valley, with the aim of modelling subsistence regimes associated with the development of settlements, and uses historical and archaeological evidence in conjunction with a spatial predictive modelling system. By using evidence for property size and landholding patterns, alongside data regarding agricultural production, manpower and yields, it is hoped that a quantification for the provisioning of the urban structures within whose territories these properties lie may be attained. How were the towns supported, and how did the villas and farms within the hinterland operate? On a larger scale, what was their relationship on a regional scale, and how were they affected by their proximity to Rome?

2. Property size and organisation

So far, research has focussed on evidence relating to property size and organisation, as well as traditional agricultural practice. Aspects such as tenancy have been well studied (see De Neeve 1984; Kehoe 1997) but those concerning the actual size of holdings beyond the central villa itself have been few. These have used evidence such as the calculations of the Roman agronomists concerning yields and manpower in order to estimate the size of estates from excavated storage capacity, amongst other approaches (for example Berqvist 1992; Duncan-Jones 1982).

There is a variety of textual evidence relating to land use and production. The Roman agricultural writers, Cato, Columella and Varro discuss various subjects relating to ideal estates, and other writers, particularly Pliny the Younger, also shed light on aspects such as estate management. Agrarian legislation is frequent in the Roman world, and, in conjunction with works by the *Agrimensores*, may help shed light on property issues. The *Casae Litterarum* from the *Corpus Agrimensorum*, thought to be a teaching manual of some description for land surveyors, also contains details regarding the types of estates one is expected to come across in course of their work, and contains illustrations (despite probably being later additions) giving an interesting view of what the landscape could have looked like.

Further, epigraphy provides vital evidence for Roman property studies. In particular, the Trajanic alimentary inscriptions of Veleia and Ligures Baebiani (*CIL* XI 1147 and IX 1455) contain very interesting data regarding estate size and ownership, and have been used with varying degrees of success to reconstruct the landscapes of their respective areas (de Pachtère 1920; Veyne 1957-58). The tablets are, in essence, land registers naming landowners, properties and rents pledged to the alimentary scheme of Trajan.

Other sources of epigraphic evidence include the fourth century BC Heraklean bronze tablets from the southern region of Metapontum (Carter 2001). These detail the restoration of the property lines and revenues of sacred lands of the Greek colonists. In doing so, they list the names of renters, guarantors, and the rent paid; that is, in effect listing the size of the farms in this area. Also, in the course of this, they

describe the farmland, major agricultural crops, and the relative proportions of cropland and woodland.

Cartographic evidence is highly limited for the Roman period, but we do have, from an earlier period, the Iron Age topographic rock drawings from the caves of Valcamonica in northern Italy (Blumer 1964). These show in surprising detail the layout of a settlement. More importantly, it also illustrates the existence in this period of mixed economies - showing agriculture (apparently with cultivated regular field systems), pastoralism (or at least the keeping of animals for whatever reason), as well as hunting activities.

It is also hoped that later cadastral sources alongside studies of early Medieval ecclesiastical holdings in the area may reveal preserved patterns of land organisation and exploitation. For example, the Catasto Gregoriano from the early 1800s is a very detailed source, consisting of maps and associated explanatory notes for the majority of towns in the study area. These outline aspects such as ownership of property, for example in dispersed plots or agglomerated estates, size of estate and what was grown in each plot, whether it be arable, pasture, meadows, vineyards, olivegroves and so on.

These sources, although not directly related in either period or specific region, illustrate the diversity of economy and changes in land use and exploitation across Italy, and will assist in creating general models of landholding and land use.

3. Production

Regarding actual production, again the sources are many and varied. The Roman agronomists include details on soil-types and crop-positions, equipment (including manpower) needed for certain size estates, potential yields, and so on. These texts have been studied in great detail by various scholars in order to analyse various issues, including whether the techniques and subsequent yields claimed were realistic (White 1970; Frayn 1979; Spurr 1986).

There is also the question of the ratio of agriculture to pastoralism, and how this changed over time and space. Was it the landscape that dictated the type of activity followed, or was it a conscious cultural choice? For example, do the Heraklean tablets indicate Hellenized agro-pastoral pursuits, or were they merely the most sensible economic options for that particular area given the environmental conditions available to the colonists? With the models produced from this research, we should be able to say something about why the rural settlements and villas grew up where they did. By examining the location of these sites in proximity to available resources and markets, we can see which areas were exploited preferentially, and how this changed over time.

The sources mentioned above will be supplemented by excavation, geophysical and field survey data, as well as agricultural and climatic statistics from pre-mechanisation period Italy. The Naval Intelligence Division Geographical Handbooks contain much data from the 1930s and before, regarding aspects such as regional production statistics for all crops and animals, and climatic statistics detailing frequency of wind direction, temperature, rainfall, duration of sunshine and so on.

4. Conclusions

This research is still in the data collection stage, but it is hoped that, at the very least, potential productivity and subsistence patterns may be modelled with some success within a GIS.

A very basic analysis has already been done on the position of sites based on slope, aspect, geology, soil-type and modern land-use. Unsurprisingly, sites tended to appear on flatter areas, although this has a lot to do with survey collection strategies, as well as the survival and post-depositional movement of materials. It will therefore be necessary to try and distinguish patterns of settlement separate to that of collection. The data available for modelling has until recently been limited, but it is hoped that more detailed data will highlight more meaningful relationships between soil and site.

All of the datasets were given basic classifications on the same scale, from worst to best, to use within a multi-criteria evaluation. For example, the slope map was classified with the flatter the area representing the higher the value, since the steeper the slope, the more difficult it is to carry out many agricultural activities. Aspects within the modern land use map, such as woodland, agricultural areas, areas of sparse vegetation and so on, were classified along similar criteria.

These maps were combined to produce a suitability map that may then be reclassified in order to identify the most suitable areas for agriculture within the territory of each settlement or villa estate. This, of course, is only a basic model, and will incorporate such factors as cost distance from markets, rivers, and other communication routes.

It will be necessary to attempt a number of different models based on the variety of evidence available. For example, using a combination of a Digital Elevation Model, resource data and climatic statistics, it is highly likely that a model of average production given the environmental conditions of the study area may be achieved. A basic reconstruction of property size and distribution, as well as an analysis of possible correlations with economic resources should be attainable given the survey data available, but beyond this, we have yet to see whether these models may be improved upon, integrated, and applied to specific case study areas with any success.

5. Bibliography

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