

## Chapter 20

# Archaeological GIS for Land Use in South Etruria Urban Revolution in IX– VIII Centuries B.C.

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### ABSTRACT

*A GIS is developed for analysis of formation, growth, and collapse of past societies. The Urban Revolution in the Mediterranean area between 9<sup>th</sup> and 13<sup>th</sup> centuries B.C. pushed by development of Mediterranean market area is a good case study. The process leads to the growth of urban centers and of population. In Ancient Etruria the changes produced the abandonment of older sites and the origin of proto-urban centers on hill plateaus. The GIS is developed for explaining the factors affecting the urbanization process in Tarquinia. Settlement strategy was linked to available resources in the territory. The research focused on land use for ancient agriculture by reconstructing features of land use. The results show that the selection of plateau allowed a better resources management, required by population growth as well by the Mediterranean market demand. The changes explain the transition from a subsistence economy to a production of agrarian surplus in cereals. A new organization based on the private household property of agrarian plots could satisfy a better resource allocation.*

### INTRODUCTION

#### **Urban Revolution in Ancient Etruria Between IX-VIII Centuries B.C. Origin of the Etruria Protocities**

Archaeological discussion about protourban centers growth in middle Tyrrhenian and in Ancient Etruria regions outlined the original and revolutionary features of such process, called Villanovan Revolution for resuming the deep transformations occurring in a few decades.

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New largest protourban settlements grew through the concentration, fusion and absorption of the earlier scattered sites on the plateaux of South Etruria, extended for many hectares and well defended (Bartoloni, 2002; Bietti Sestieri, 1996; Carandini, 2003; Mandolesi, 1999; Pacciarelli, 2000; Peroni, 1994, 1996).

Geographic position of plateaux and agrarian quality of adjacent soils were the key factors for settlement position selection. Tens of scattered older villages were abandoned with simultaneous people transfer, called synoecism, to the plateaux from the late final Bronze age to the first Iron age. The process features, the plateaux selected and their area extension would prove existence of some urban planning. New settlements extension, until to about 200 hectares, would testify the great dimension of the new communities born from synoecism (Peroni, 1969, 1994) and a gradual reduction of settlements number with significant increase of their population size and surface extension (Carandini, 2003; Pacciarelli, 2000).

## **Analysis Objectives**

Although many aspects of protourban centers growth, like the foundation of Rome and its organization in *curiae* are investigated, relevant criticism remains about the same processes in South Etruria. In fact, some issues about the strong changes in settlement patterns observed in this period have to be yet clarified and deepened (see Background section - Bartoloni, 2002; Pacciarelli, 2000; Peroni, 1994).

The present research has the goal to explain the main factors that favored such historical process as well the features of the settlement strategies.

Use of GIS is the most powerful technology introduced to archaeology since the introduction of carbon 14 dating and seems the most suitable for specific information.

Most widespread use of this technology is for Cultural Resource Management, data visualization, excavations but also for prediction of archaeological site locations.

This paper focuses on the use of GIS for archaeological predictive modeling of ancient land use, by critically applying this new technology and exploring its theoretical and analytical implications. Archaeological data are point like geographical and temporal data with more or less large uncertainty. Work of the archaeologists is to connect all the point like data related to a geographic region and to an historical period using a qualitative and quantitative based narration that fit in the best way with available data and with the theory and model.

An archaeological GIS is designed with the aim to record the existing and reconstructed data on a database, to visualize data by thematic maps and to use such data for advanced statistical and spatial analysis. Archaeological GIS is realized installing GRASS GIS on OS Linux with interface to PostgreSQL database, with its extension PostGIS for geographic information and to R package for statistical and geostatistical analysis.

## **BACKGROUND**

### **Archaeological Theories on Protourban Centers Genesis**

Archaeologists suggested two approaches to protourban centers origin: the first approach underlined a continuity between protourban centers and earlier settlements through gradual development of settled areas, between the late final Bronze age and the beginning phases of first Iron age (Pacciarelli, 2000); the second approach suggested an ungradual transition from the scattered villages on the territory to

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