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# The Structuring of the Landscape in the Low Padua Plain (Italy) during Roman Times: New Contributions from an Archaeomorphological Study of the Territory

Landscape archaeology; archaeomorphology; GIS; centuriation; Padua plain

## 1 Introduction

### 1.1 Geographical Context

The study presented in this paper is drawn from an ongoing PhD project that focuses upon a broad area south of the city of Padua, delimited by the Euganei Hills to the west and the Venetian Lagoon to the east, and defined by the fluvial systems of Brenta, Bacchiglione and Adige (Fig. 1). The primary aim of the research is to investigate the complex relationship between mankind and the environment that developed in this area during Roman times.

### 1.2 Historical and Archaeological Context

From the IInd century BC onwards, this territory, which up until that time had been controlled by the Venetic *oppida* of *Patavium* and *Ateste* and by the rich Greek-Etruscan centre of *Atria*, became profoundly affected by the Roman presence. This influence manifested itself especially through the construction of great consular roads; these included the road from *Patavium* to *Bononia* (175 B.C.), the *via Annia* (153 B.C.) from *Patavium* to Aquileia, and the *via Popillia* (132 B.C.), connecting the cities of *Ariminum* and *Altinum* along the Adriatic coast. During the Ist century B.C., the area became, *de facto,* a part of the Roman state when the *Venetia* came to form a constituent part of the province of Cisalpine Gaul and the Venetian townships assumed, firstly, the rank of *coloniae latinae* (89 B.C.) and, subsequently, that of *municipia* (49 B.C.).

From that time onwards and throughout the IInd century A.D., the archaeological data bear witness to a population which was distributed over the greater part of the territory, leading to think that a major program of territorial reorganization must have been implemented in order to exploit the land's agrarian potential to the full. The real existence of this intervention, already variously hypothesized since the mid-nineteenth century, was confirmed in the early 1970's by the finding of a squared stone bearing the cadastral indications of a land division carried out during early imperial times.[1]

1 Lazzaro 1971/1972.

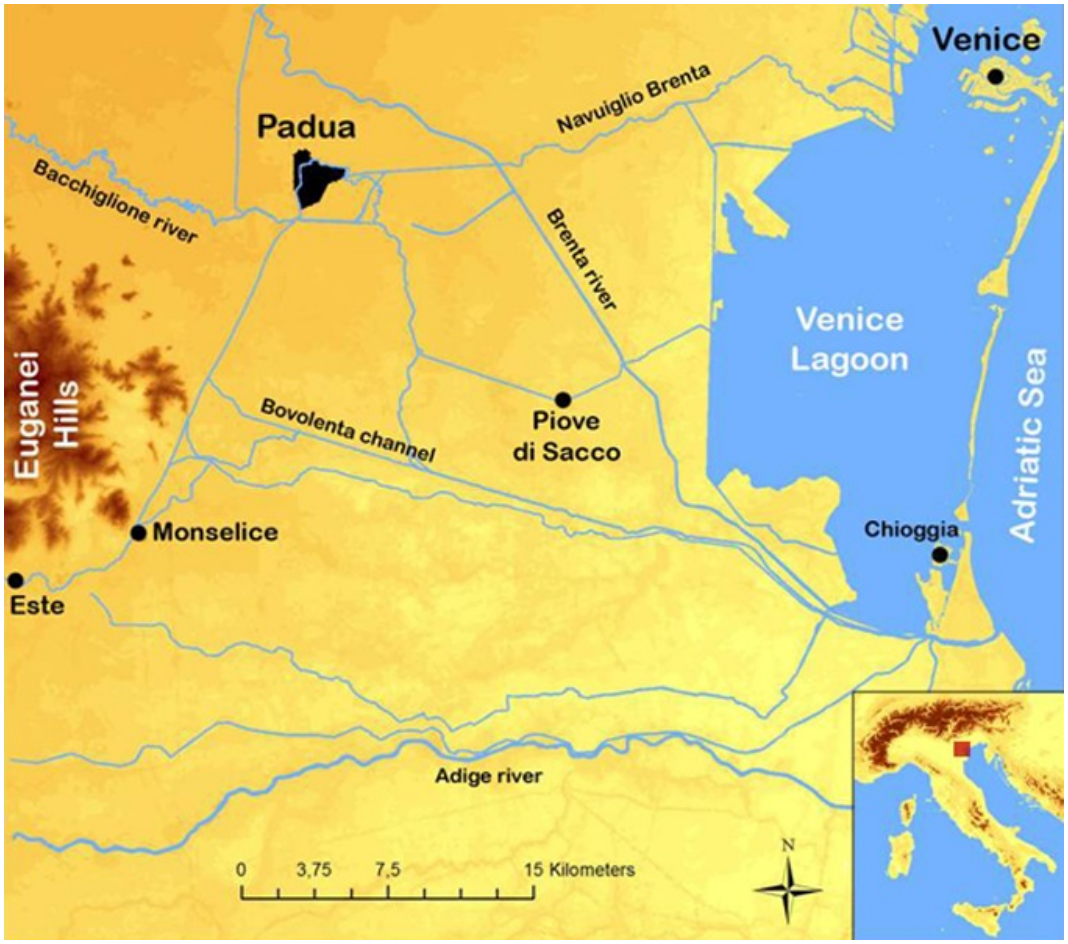


Fig. 1 | Location of the study area.

# 2 Methodology

## 2.1 Archaeomorphological Research

The investigation starts from the precepts of Landscape Archeology and proceeds by way of an archaeomorphological approach that considers the landscape as having been shaped by a series of structural elements (such as roads, paths, channels, field boundaries) which were created at different times and by different communities: each one of these elements has suffered from time overlaps, changes, erasures and captures by the subsequent elements and has been preserved in the form of traces within later interventions up to the present day.[2] The present landscape would then have been formed by a succession of layers of traces dating back to different time periods, as well as an archaeological record that is formed by the succession of stratigraphic units. In this sense, the landscape can be investigated by way of a "stratigraphic" reading, by establishing chronological sequences of the various traces identified.[3] The very existence of each of these traces is also indicative of a change that occurred in the structuring of the territory, change that we can try to link to the historical dynamics that have characterized the territory under study.

The incorporation of written sources (such as inheritance, donation, sale, foundation or cadastral documents) is very useful for archaeomorphological analysis: since they take great care to define the land boundaries clearly, they can provide *ante quem* dates for some

2 Palet 1997.
3 Ariño Gil et al. 1994.

of the documented traces, allowing a more certain relative chronological relation among them to be obtained.[4]

Environmental sources are essential in the identification of ancient morphologies, but they can also provide important data related to human-environment relationships. Disciplines such as sedimentology and palynology, for example, can help in reconstructing ancient landscapes, defining those areas subjected to human action and providing important insights into the effects that this action had on the landscape.[5] An ample knowledge of palaeoenvironmental settings of the study area is the basic requirement needed to carry out satisfactory archaeomorphological analyses; ignoring them, instead, could lead to erroneous restitutions.

## 2.2 The Use of GIS

The use of Geographical Information Systems in Landscape Archeology has greatly increased in recent years, especially in those studies that consider an archeomorphological approach.[6] These provide a framework in which all geographically referenced information required to conduct archaeomorphological research can be included and analyzed in a multilayered and multiscale environment. They also provide for easy and effective management of the data, excellent graphical output and, above all, high spatial accuracy.

The first step to conducting our archaeomorphological analysis based on GIS was the development of an adequate geo-database that gathered all the relevant geo-referenced information (both vector and raster data) about the morphology of the study area: orthophotos, aerial photographs (old and recent), different types of maps (topographical, historical, geological, geomorphological...), cadastral information (e.g. administrative boundaries), Roman site locations and other important palaeoenvironmental data.

The use of a DTM with 5m cells, made available by the Cartographic Office of the Veneto Region, has also been invaluable: definition of this sort, in which the microrelief (e.g. alluvial ridges and depressions) and other characteristics which influence the morphology of the territory are particularly highlighted, has been especially useful when carrying out certain types of topographic GIS-based analysis, such as Least Cost Route or Viewshed analysis.

Once the construction of the geo-database was completed, it was possible to begin the archeomorphological study through the creation of a polyline vector layer that included all the morphological traces identified. This layer was then linked to a table in which all relevant information related to each trace had been stored, such as orientation, type of trace, source, morphological features and the historical data associated, beside a proposed chronology.

## 2.3 Archaeomorphological Survey

A specifically designed archaeomorphological survey was needed to evaluate the different hypotheses generated by archaeomorphological analysis. This survey aimed to evaluate the documented traces, their morphology and the stratigraphic relationship between them and also to identify all structures and scatters of material associated with them. This has made it possible to ascribe absolute chronologies to some traces; it has also been useful in rejecting evident modern traces and establishing relative chronological relationships among traces.

4 Palet and Orengo 2011.
5 Orengo and Palet 2010.
6 Orengo and Palet 2010.

## 3 Results

Using this methodology, the study of landscape shapes allowed the indentification of the traces belonging to an ancient territorial structuring organized by an orthogonal axis that spreads over a large part of the study area (Fig. 2). This field system follows the same orientation of the Bovolenta channel, of which the results have acted as an important reference axis of the system itself.

The alignment of the majority of known Roman sites along or near its axis as well as the same orientation followed by the wall structures of the (few) excavated Roman settlements, are good clues that could suggest a Roman origin of this orthogonal system.

In this sense, the field system could be recognized as an example of the most famous Roman typology of land division, known as "centuriation;" metrological analysis shows that almost all of the identified traces come to recreate a centurial grid with a module of 15×20 *actus* (532.2×710 meters). In this reconstruction, the stone found in the 1970's plays an important role: according to the information provided by this stone, we can, in fact, identify the *decumanus maximus* of the land division with a road currently passing through the village of Cartura.

This proposed grid includes the Roman road to *Vicetia*,[7] acting as a *decumanus*, while two other roads, one leading to the medieval *castrum* of Bovolenta (and recognized as a part of the ancient route to *Atria*) and another to the early-medieval fortified village of Piove di Sacco, run diagonally through it: the first one cutting exactly each grid unit (called *centuria*), the other one crossing groups of three grid units (or *centuriae*). This fact is noteworthy because it has been argued that centuriated systems could have been constructed from straight stretches of road, which would act as hypotenuses, or diagonal lines of the grid units following the gromatic process known as *varatio*.[8]

In respect to the real extent of this centuriated system, we can situate its northern limit in an area to the north of Padua where the traces belonging to this design come to intersect with those belonging to the so called "centuriation of Padova North East," today still perfectly preserved. Here, the archaeomorphological analysis suggests that the limit between the two grids could have corresponded to what was likely the northernmost branch of the course followed by the river Brenta in Roman times (Fig. 2).

To the south, the traces disappear within an area where the reading of some aerial photographs had revealed, since the early 1980's, the evidence of a land division believed to be a Roman centuriation administratively dependent on the city of *Atria*.[9] In order to reach a better definition of the tracks, these photos were recovered and placed in a GIS environment where they were geo-referenced, orthorectified and re-analyzed. The new analysis has therefore led to confirmation of the existence of this centuriation, for which an unusual module with *centuriae* of 27×27 *actus* (958.5×958.5 meters) has been proven. It was also noted that the two grids find a natural limit in an ancient alluvial ridge of the Po River, active until the early first millennium BC, and whose orientation has been followed by the southern grid (Fig. 2). However, there is another, closer connection between the two centurial structures: if we extend the *kardines* to the north-west of the southernmost land division, we can see how they diagonally intersect the northernmost grid, crossing groups of exactly two *centuriae*. This fact would seem to suggest a major antiquity of the so called "centuriation of Adria": in fact, the impression is that this could have been used as an important reference point at the moment of the construction of the centuriation we detected to the south of Padua.

7 Matteazzi 2008.
8 Roth 1996; Palet and Orengo 2011.
9 Masiero 1999.

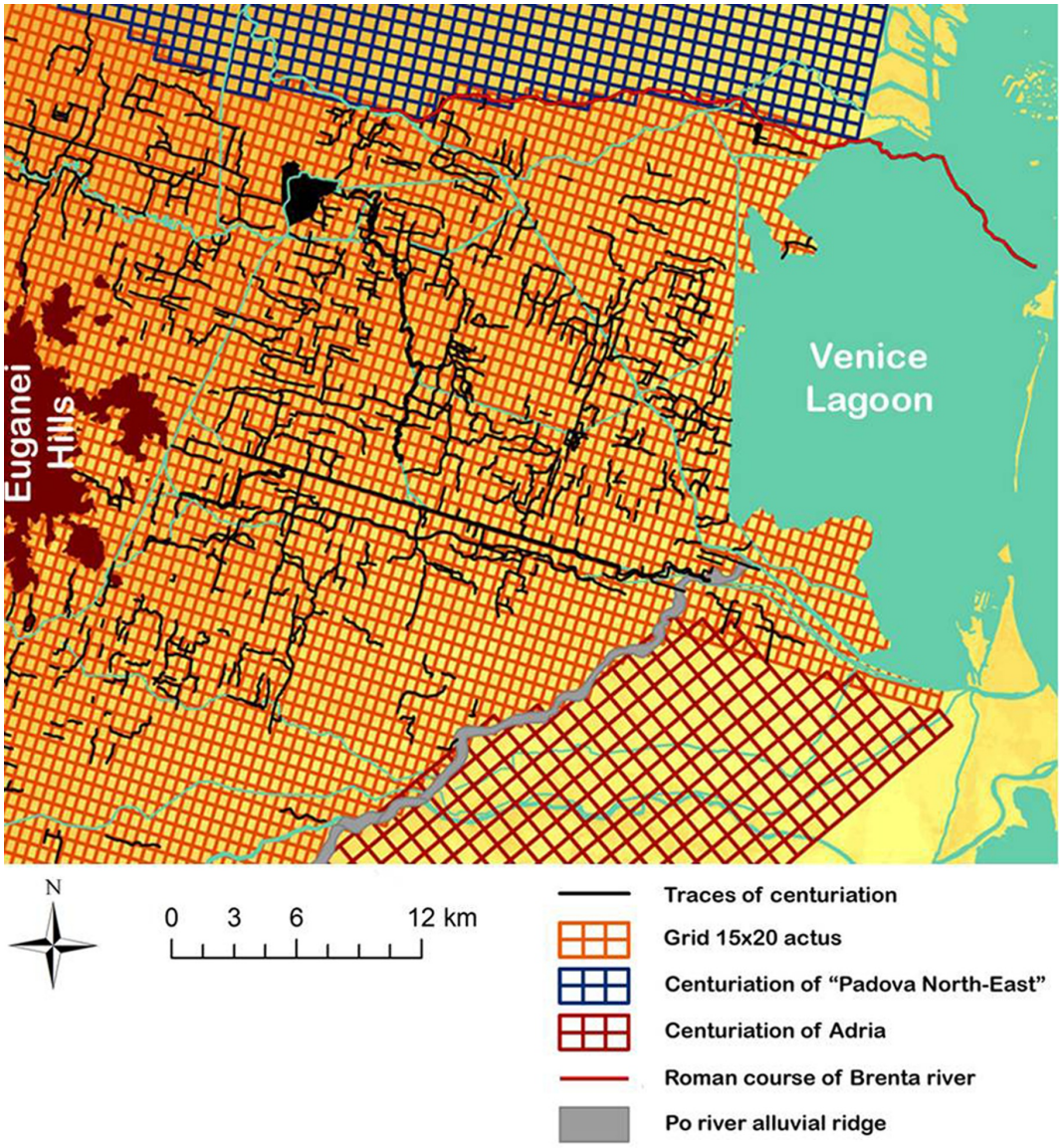


Fig. 2 | Archaeomorphological analysis of the study area, showing locations of the three centuriated grids detected in the Padua plain.

It's also interesting to note that in the areas where the traces of this orthogonal system are no longer detectable, traces of radial road networks were identified: regressive analysis and medieval written sources confirm that all the axes belonging to these radial systems converge on churches, castles and villages founded since the early Middle Ages and, in particular, at the time of maximum territorial expansion of the city of Padua that took place between the 11th and 12th century AD. The center of each radial network, i.e. the medieval core, generally coincides with an axis belonging to the centuriated system. This could indicate that the Roman network continued to somehow be used up until the Middle Ages, even though the setting of new foundations along the axes of the land division and, especially, the development of radial road networks associated with these centers subsequently caused its erasure.

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