Virtual Archaeology Review

3D Reconstruction of the Poggio Sommavilla Territory (Sabina Tiberina, Rieti- Italy) A new approach to the knowledge of the archeological evidences

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Resumen

El área objeto de este articulo está localizada en el Valle Medio del Tevere y comprende una amplia extensión de tierra dentro del meandro del rio Tevere entre las municipalidades de Magliano Sabina y Ponzano. Un estudio sobre esta región fue publicado en el volumen 44 de la Serie Forma Italiae, y ha jugado un importante papel en la reconstrucción de los aspectos culturales e históricos del Valle Sabina Tiberina en la antigüedad. Su estructura geológica ha producido un paisaje ondulado característico el cual ha determinado la vida del país de vez en vez. Por lo tanto, la reconstrucción 3D de esta área parece una importante ayuda para el conocimiento de la forma del territorio y su evolución. De hecho el modelo 3D de esta área ha sido desarrollado con el fin de entender mejor su conformación hidrográfica y antropológica.

***Palabras Clave**: SABINA TIBERINA, POGGIO SOMMAVILLA, PAISAJE, MODELO DE ELEVACIÓN DIGITAL,*

Abstract

The area object of this paper is located in the Middle Tiber Valley and comprises a wide stretch of land within the loop of the river Tiber between the municipalities of Magliano Sabina and Ponzano. A study about this region was published in the volume 44 of the Series Forma Italiae, as it has played an important role in the reconstruction of the cultural and historical aspects of the Sabine Tiber Valley in ancient time. Its geological structure has produced a characteristic wavy landscape wich has determined the country life from time to time. Therefore, the 3D reconstruction of this area appears an important aid to the knowledge of the territory shape and its evolution. In fact the 3D model of this area has been developed in order to better understand its geological, hydrographical and anthropological conformation.

***Key words**: SABINA TIBERINA, POGGIO SOMMAVILLA, LANDSCAPE, DIGITAL ELEVATION MODEL.*

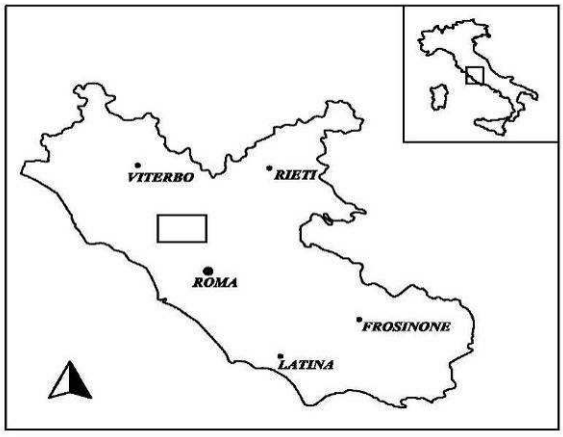

Fig 1: Schematic map of Lazium (Italy). Localisation of the analyzed area.

1. The area, which is the object of this 3D reconstruction, is located in the Middle Tiber Valley. During the Archaic Period it was the territory belonging to the Sabine settlement of Poggio Sommavilla in the Sabine Tiber Valley. From the End of the Republican Period up to the Late Antique Period it was part of the territory belonging to the Roman Municipality of Forum Novum .

A study concerning this territory was published in the volume 44 of the Series "Forma Italiae", as this region, though its archaeological-topographical evidence has been fragmentary, has nonetheless played an important role in the reconstruction of the cultural and historical aspects of the Sabine Tiber Valley in ancient time. (VERGA, 2002, 2006).

During the Ancient Period it was a frontier territory subjected to different cultures. At the beginning of the Middle Iron Age it shared the Latial Culture with all the Latial region. (BARTOLONI, 1986, 1991; BARTOLONI et al. 1987). During the Archaic Period it was influenced by the Etruscan-Faliscan-

Capenate Culture and by the Sabine Culture. (CRISTOFANI MARETELLI, 1973, 1977; SANTORO, 1991). During the Roman Period it shared with all the Sabine Tiber Valley a same evolution, which caused the end of autochthonal culture, but at the same time it gave rise to a change of the land-use and to an improvement of agriculture and ceramic manifactures by the Production System of the "Roman Villa". (GABBA-PASQUINUCCI, 1979; MIGLIARIO, 1995; VERGA, 2004).

Fig 2: Arcaic structures of Poggio Sommavilla.

Geographically, this area is inserted in the Tavv. IGM III SO- F. 138, IV NO – F. 144.

This territory comprises a wide stretch of land within the loop of the river Tiber, between the Municipalities of Magliano Sabina and Ponzano. Its boundaries are the River Tiber to the west and to the south, the Campana rivulet to the north and the ends of the Monti Sabini to the east, which are engraved by many rivulets oriented north-east/south-west.

The Tiber Valley shapes as a tectonic grave (Tiber's Graben).

The geological structure of this area is made by plio-pleistocenic gravels consisting of calcareous siliceous sandy materials and silt-sands succeeding each other. (AMBROSETTI et al., 1987; MANCINI et al., 2003-2004). After the last Würmian Glacial Era the raise of the sea-level filled the Tiber Valley by alluvial deposits up to the actual geomorphological condition and up to the present configuration of the River Tiber, characterized by windings.

From the point of the morphological view, this geological structure has produced a characteristic landscape with low altitude hills characterized by sinuous contour line and wide plains located near the River Tiber and the larger water-courses alternated each other. Moreover, a wide part of this territory is covered by the mediterranean wood.

This typical shape has determined the country life from time to time.

Particularly, this landscape has been exploited for the agriculture and pasture from the Bronze Age, (PUGLISI, 1959; PERONI, 1988) and its morphological and environmental features have been the cause of the typical scattered habitat, which characterizes this territory till date.

Therefore, the 3D reconstruction of this area appears an important aid to the knowledge of the territory shape and its evolution.

Therefore, in this paper it has been possible to make clear for the first time, through advanced technologies, the connection between the characteristic scattered habitat of the italic areas in the central Apennines and the territorial geomorphology.

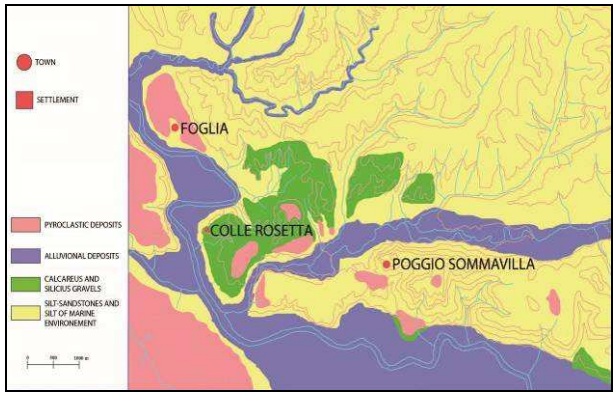

Fig 3: Elaboration of the geological map of the middle Tiber Valley (Mancini et al. 2003-2004; modified) geological composition of Poggio Sommavilla' s territory in ancien time.

2. In fact the 3D model of this area has been developed in order to better understand its geological, hydrographical and anthropological conformation. (HAGEMAN, BENNETT: 2000; WEIBEL, HELLER: 1991).

In an initial phase, the 1:25.000 scale IGM-tables were georeferenced over a grid shape, at a resolution of 400 dpi, and the respective numerical and vectored orographic data, with contour lines on an elevation of 25 meters, adding a number of themes such as the hydrographic network and the antique road network.

These primary elements allowed us to realize more complex maps, such as the DTM, which was made by generating a regular, 30m per square, grid over the orographic data. This scale was determined by the geotiff that was downloaded from the GDEMASTER-mission, since it adapted well to both the requested graphic rendering and the very numerous digital data of the examined area.

The three-dimensional model of the terrain was created with GIS-software (ESRI 3DAnalyst), after which an exaggeration by a factor 'Z' was applied on the data that was collected within the DEM, to highlight the morphology of the area. Certain elaborations allow us to note the elevation through a reclassification of the functional readings, this was done to highlight the areas with different elevations. (LEE:1991) Through the built-in instruments of the GIS managing software it has been possible, starting from the three-dimensional georeferenced data, to render a map of the slopes with rated values for the percentage of inclination.

Into the DEM changing the original coordinate system (WGS84) to the metric coordinate system UTM 32 N in order to include all the systems commonly used in Italy. The model initially appears in green shades, with default shading. In order to have a rendering more suited to the needs of the study, the visualization style was modified. The DEM raster design was changed interpolating the condition styles choosing a better characteristic. Subsequently, in order to visualize in detail the municipalities where the investigations were carried out, the Shapefiles of the

municipalities involved were loaded after downloading them from the ISTAT site, already in UTM 32N coordinates, that were automatically projected into the DEM.

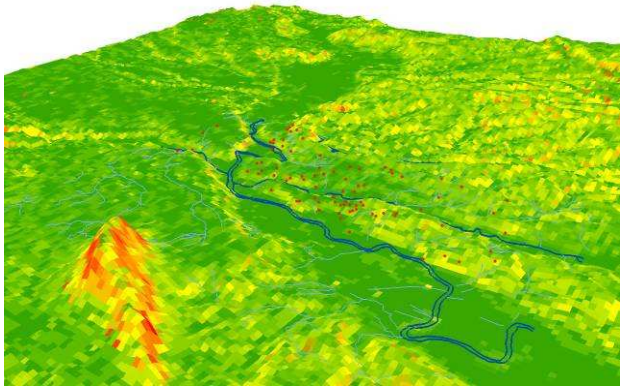

Fig. 4: Grid of the archaeological settlement of Poggio Sommavilla territory overlayed on a slope map.

Fig. 5: Digital elevation model of of the analyzed area.

In this way, it is possible to obtain a virtual model of the territory, in which one can navigate and perhaps even set all kinds of projects.

The DTM-representation in a vectored format, highlights the morphological characteristics of the terrain, which allows us to carry out consequent elaborations useful to the realization of thematic maps: a map of the slopes, a map for the inclination of the terrain, DEM in faux colours, exposition to sunlight, etc. (COLOSI,COSTANTINI, GABRIELLI, PIRO, SANTORO: 2000) by superimposing vectored themes (archaeological sites, hydrographic and orographic data, ancient roads) over the interpolated DEM, thus combining different analytical factors to find – even if approximate – models of territorial settling, as opposed to the landscape and the terrains morphology. (FORTE: 2002)

The recreated maps are fundamental for the historical, archaeological, micro-geographic and micro-morphological studies of the interested area (FORTE: 2000) since they have facilitated and rendered visible to the eye, the distribution of the various settlements, which show to have clear settling constants. Indeed, the 3D model clearly shows us a general tendency through time, of occupying areas that are, from a morphological point of view, the more favorable. The height of the terrain where settlements may be found is usually not over 90 meters above sea level.

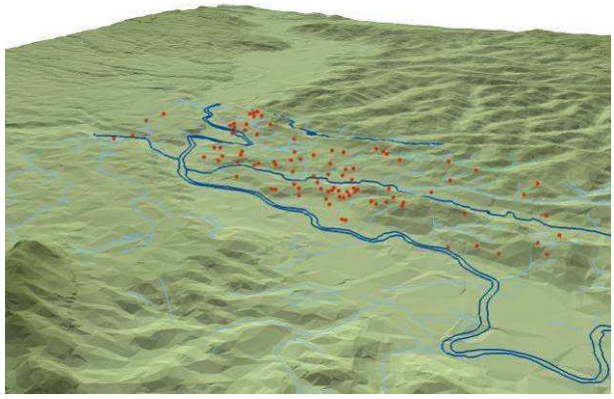

Fig. 6: DEM of the analyzed area with archaeological settlements.

Considering this, we need to reinterpret the slightness in number of the settlements in the northernmost fraction of the terrain, cut by the Campana ditch which limits it in the north, and the Casaglia ditch, an area characteristic for its limestone relief, mainly found between 110 and 180 meters of altitude, in which we find steep rock faces and thick forestation. The main part of the inhabited areas on the other hand, are to be found in the more southern part of the studied area, that runs from the town of Poggio Sommavilla to the north to the banks of the Tiber river to the west and south, a mostly level zone.

The DEM underlines that the studied settlements (Colle Rosetta, Poggio Sommavilla and Foglia) are all located on river terraces.

After these preliminary operations have been carried out, the model has been 3D-represented (it has been vertically grown up) to better underline its geo-morphological aspects and relate it to surveyed presences in the archaeological inspection on the target area.

Finally, digital images of the settlements of Poggio Sommavilla, Foglia and Colle Rosetta have been added to the model to highlight the strong relation between the settlements built in the course of the history and the area topology included the available water resources.

The archaeological data gathered both from the field and the study of the written texts, associated with the creation of the DEM, have further confirmed and emphasized the close relation that has existed since ancient times between the choice of areas for settlements and the plano-altimetric conditions of the terrain and the water resources present.

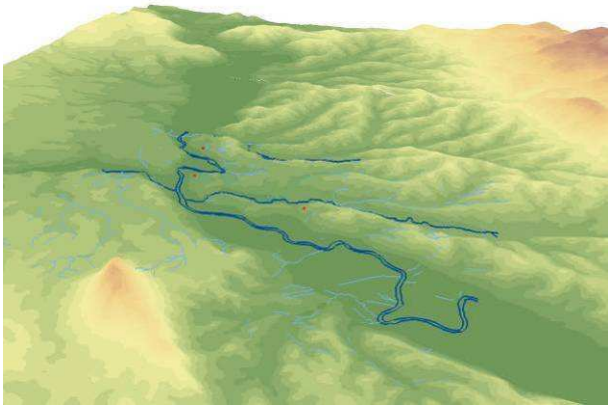

Fig. 7: The settlements of Poggio Sommavilla, Foglia and Colle Rosetta and the plano-altimetric conditions of the terrain and the water resources of the analyzed area.

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