

# Recapturing the Spatial Dynamics of the Venetian Occupation Period of Merabello in Eastern Crete through a GIS Approach

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## ABSTRACT

*Merabello County, an administrative unit during the period of the Venetian Occupation (1211-1669 d.C.), located in the Eastern part of Crete, Greece, is divided into two distinct geomorphological terrains, a wide arid region to the north and a fertile plain which extends to the south-west mainland. The road network which crosses the valley and connects central to east Crete, along which the most populated settlements were established, used to be – and still remains – a significant element of the region. In the end of 16<sup>th</sup> century d.C., after the construction of Spilaloga fort and the increase of the defense locations along the coastline, the rest of the county evolved into a region of high interest. An increased concentration of monastery units has been also noticed in both areas of the county during the same period. Thus, Merabello County can be considered as indicative for studying the evolution of the natural and rural landscape, road and communication network, military and defense geography and the settlement patterns during the period of Venetian Occupation.*

*The research aimed towards the visual presentation and analysis of the cultural and environmental elements of the region through the fusion of diverse data collected by studying published sources, documents and inventories, precision mapping of the visible architectural relics through GPS surveying and digitization of the available geographic and topographic data. The above information was entered to a relational database which was ultimately used to link the cultural information with the rest of the mapping information layers. The digital elevation model was constructed based on the 20m elevation contours. Subsequent analyses including slope and aspect statistics, cost distance, least cost path and site catchment analysis and also viewshed analysis were performed in a GIS platform in order to study the spatial dynamics of the landscape during the Venetian Occupation period. The results were thoroughly examined to investigate the role of the monasteries and the exploitation of the surrounding environment, by exploring their location in terms of the natural environment and their distance or visibility from settlements, fortresses, watchtowers, road network and natural resources.*

## 1. METHODOLOGY

After an extensive retrieval of the published material, 320 sites of the Venetian period, including villages, “metochia”, churches, monasteries, watchtowers and forts, were entered into a relational database and became the objects for further study and the GIS corpus. In order to approach the geographical context of the sites, a systematic GPS fieldwork campaign was carried out aiming towards the topographic mapping of the sites and the architectural monuments.

The locations of springs, wells and remains of old roads were digitized from 1:5000 scale topographical maps of Hellenic Army Geographical Service.

All layer forms, such as points (churches and wells), lines (roads and elevation contours) or polygons (monasteries and villages), were georeferenced in the Hellenic Geographical Reference System, known as EGSA' 87.

Topographical mapping of all known entities and the DEM covered an area of about 350 km<sup>2</sup>, representing 5% of the total surface area of Crete. Analysis of the data was carried out using ESRI's Arc GIS 8.1., together with the employment of Spatial Analysis and X-Tools extension modules.

The digital elevation model was constructed from the 20m elevation contours. Further analysis of the DEM results derived thematic maps to the degree of slope, the aspect and the visibility of the area from any given point (viewshed). For cost distance, least cost path and site catchment analysis, a cost surface grid was computed based on a classification scheme of the slope.

Other thematic layers were also created, based on particular criteria, such as date, type or size of the archaeological entities and they were used for the statistical analysis of the data.

## 2. ANALYSIS AND RESULTS

### 2.1 SETTLEMENT PATTERNS

Some basic geographical indices, such as altitude, slope gradient, aspect and proximity to coastline, plains, roads and forts, were employed in exploring the general trends concerning the settlements in Merabello.

Most of the 45 known Venetian villages (Map 1) were located at altitudes between 200 and 400 metres, on gentle slopes (0° and 20°), close to fertile plains. This means that habitation was mainly determined by the proximity of settlements

to agricultural land. Settlements exhibited a preference to north and northeast orientations that protected them from the northwesterly and southerly winds that affect the study area.

In the beginning of the Venetian period, Crete was divided into hundreds of feuds. Some of them were residues of Byzantine villages which continued their existence into the Ottoman and Modern periods, although a few of them were abandoned after the first two centuries of Venetian Rule. Most of the desolated sites were located in arid areas, away from the main roads or near to larger villages. Some of them were also close to lower slope coastline facing an increasing risk of mooring of pirates and invasion of Turks. Such kinds of examples were found in south Merabello, where the settlements near the sea were abandoned after the 15<sup>th</sup> century d.C., despite their proximity to fertile soils.

Therefore, it becomes that settlements were preferably sited close to the main roads and away from the sea. At the same time, it seems that settlements had no direct association to the forts, as they were away from Merabello castle (dated from 1206) or Spinaloga fort (dated from 1580). Nevertheless, after the construction of Spinaloga and the road leading to it, the eastern section of Merabello acquired a better access and importance, leading towards the re-appearance of a few desolated villages in the area appeared again, as "metochia" (small settlements of peasants or shepherds).

## 2.2 DEFENCE SITES AND NETWORK

Visibility analysis was used to verify the defence locations of almost 40 sites and to examine the communication network among watchtowers, Merabello castle and Spinaloga fort. An observation altitude of 3 metres above the current terrain was used, taking in account that watchtowers were just 4 metres high. These individual viewshed maps, which represent the fraction of the research area that lies within the visual inspection of each watchtower, were combined together to produce a visibility map for the whole area (Map 2, 3) and to outline the network of defence locations in the region. The corresponding results indicated that the Venetian network plans of both 1590 (Map 2) and 1633 (Map 3) provided a tied cluster and organized network of watchtowers, which controlled the access of the coastline. They ensured a visibility contact with each other in a particular order and they could send warning signals to the settlements in the case of an emergency.

## 2.3 ROADS AND ROUTES

Communication paths were calculated based on cost surface maps by considering the least possible cost route among the sites known as a station spots of the main network, according to the sources and the travellers' descriptions and based on parts of medieval roads that were found during the fieldwork or were portrayed on Venetian maps.

The main road axis, which crosses the main valley of Merabello, is still connecting central to east Crete. The western part of the road was a long different course from today's national road and according to the existing relics and least cost path analysis; it was passing through Kalaritis village leading to Latsida, to meet Neapoli, in agreement to Sieber's description at 1817 (1994, p. 71). Most likely, the next station would be the Merabello castle, where the town of Agios Nikolaos is located today, and to that point no other station is mentioned from the sources or has been suggested by the GIS analyses. From there, the road could turn south leading to Istro area. An alternative path has been suggested by Kalomenopoulos (1894, p. 323), leading to the same area, after passing through Lakkonia and the plain of Kritsa.

GIS analysis indicated that this route was not the shortest one and it was probably used only for passengers that travelled to Lakkonia and Kritsa, or at times that the coastal part of the road was in danger of an invasion. (Map 4).

After the construction of Spinaloga fort, the road that connected the main axis with Plaka, point of access across to the fortress, became of great importance. Least cost path analyses which were cross-correlated to archaeological evidence and itineraries of travellers, contributed to the reconstruction of the road from Neapoli to Fourni and Skouras and then to Plaka. It was also suggested that a cross-road from Skouras was leading to the very important "metochi" Elounta. (Map 5).

## 2.4 MONASTERY PATTERNS IN THE LANDSCAPE

About 60 monasteries of Merabello which were populated in Venetian times (Map 6) reaching their peak during the 16<sup>th</sup> and 17<sup>th</sup> centuries, were considered as a special type of settlement and were studied as individual sites. Though many of them could host a limited number of people, there were some cases of wealthy communions with a large number of buildings, who owned a considerable area of land and also controlled other monasteries.

Through the statistical of elevation, slope, aspect and cost distance, several observations can be made. Monasteries were usually built at altitudes between 200 and 500 metres, at a slope ranges between 0° and 22° and terrains with an orientation facing SE-NE direction. Most of them were very close or inside a settlement (village or "metochi"), in the vicinity of the main road network, but at larger distances from the sea and castles. Only monasteries located in the arid and isolated environment of north Merabello (even near coastline) were really secluded. It was also observed that monasteries were built close to each other having keen relationships between them, particularly at 17<sup>th</sup> century d.C. (Map 7).

The most important and wealthy monasteries were located away from the sea, castles, main road and major villages. They

were usually not visible from a distant point, but were prominent in the area around them and also had a direct contact with at least one watchtower. Sometimes, they were also located on a steeper slope and a higher altitude compared to the closer village. Site exploitation of those powerful monasteries was studied, using cost distance techniques.

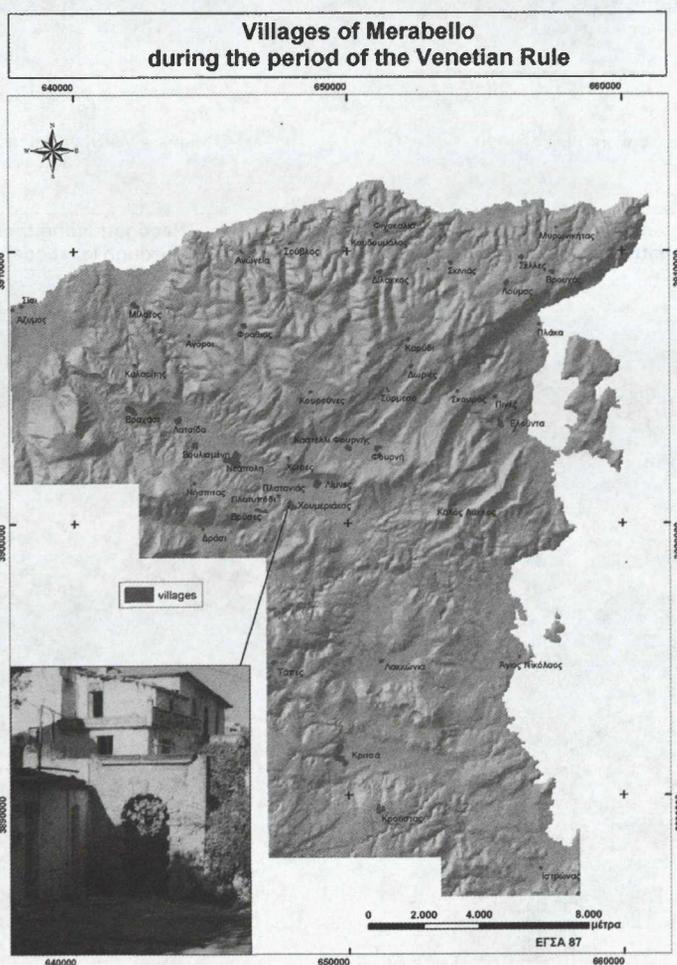
### 3. CONCLUSIONS

Merabello has provided an opportunity for studying the spatial dynamics of the landscape during the Venetian Occupation period in Crete. GIS analyses has been used specifically for exploring settlement patterns, studying the defensive network, reconstructing the Venetian road network in the district and understanding the role of the monasteries. A further spatial study of the island could help to investigate human interaction with the landscape during the period of the Venetian Rule.

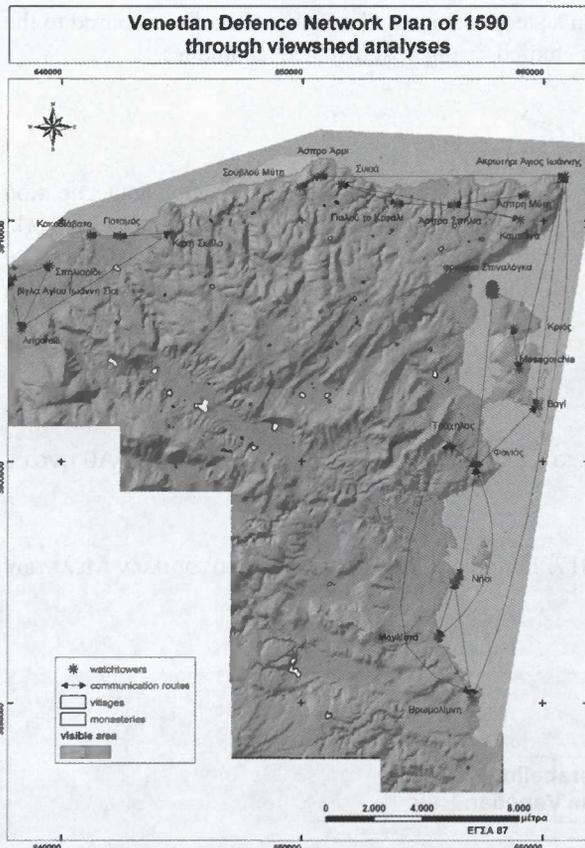
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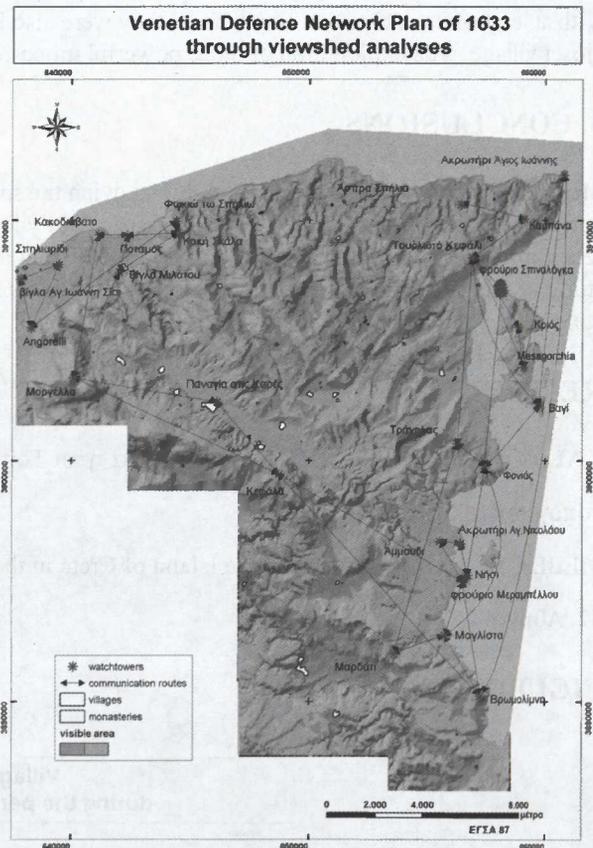
### FIGURES



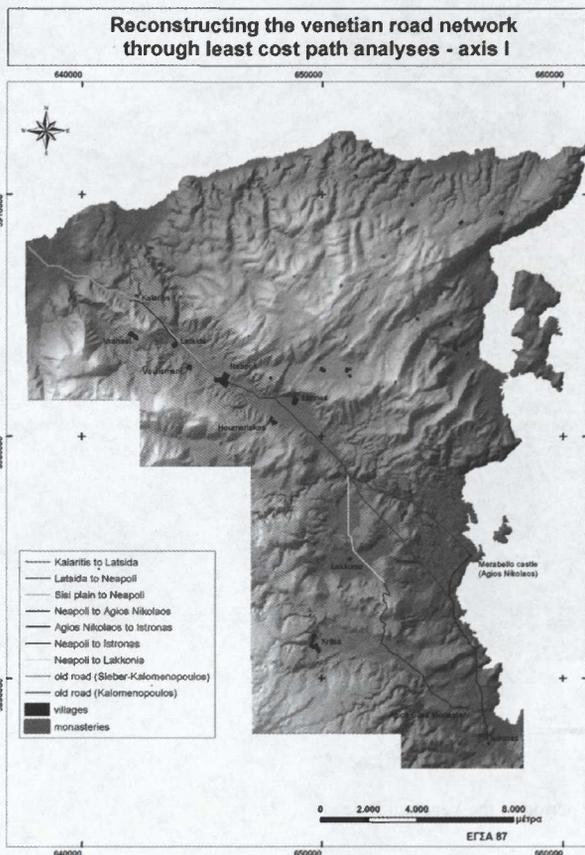
Map 1 – Villages of Merabello during the period of the Venetian Rule.



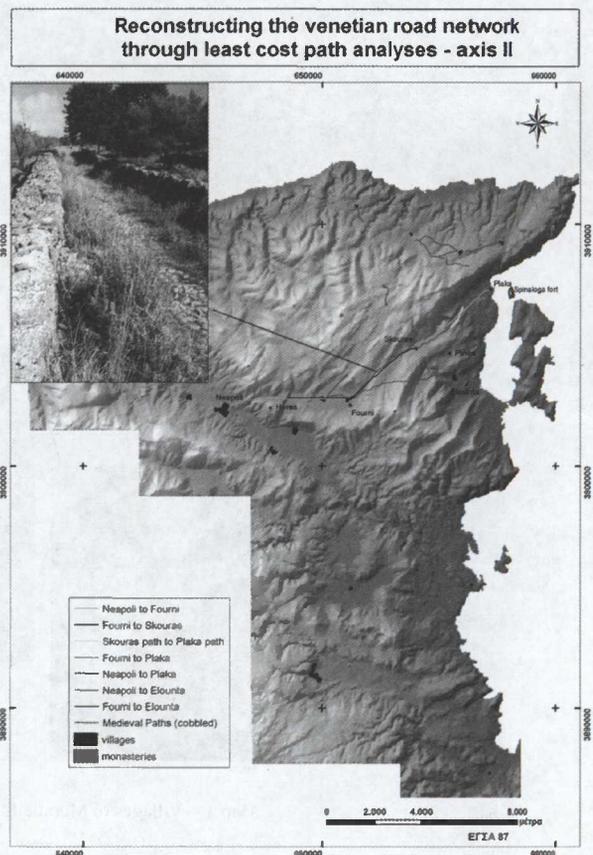
Map 2 – Venetian Defense Network Plan of 1590.



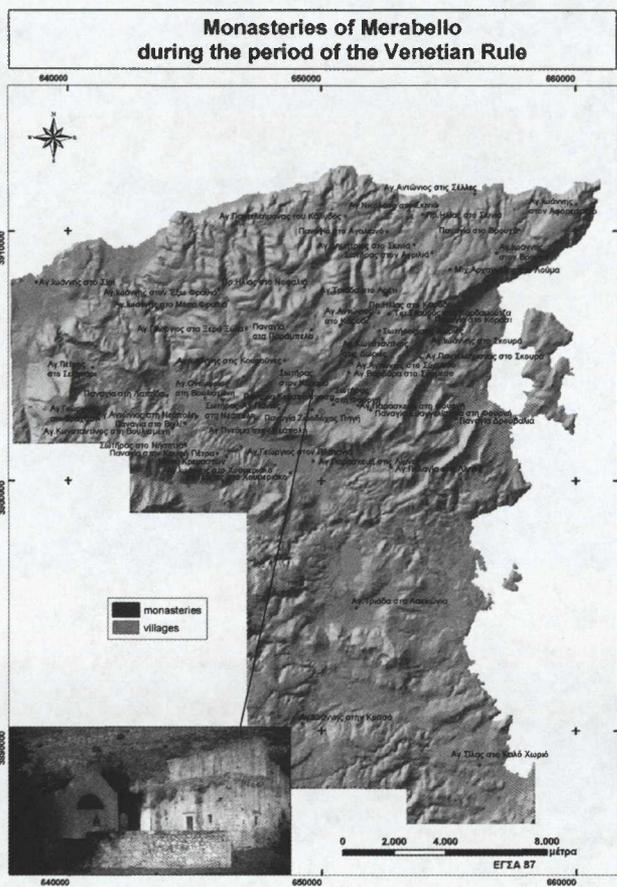
Map 3 – Venetian Defense Network Plan of 1633.



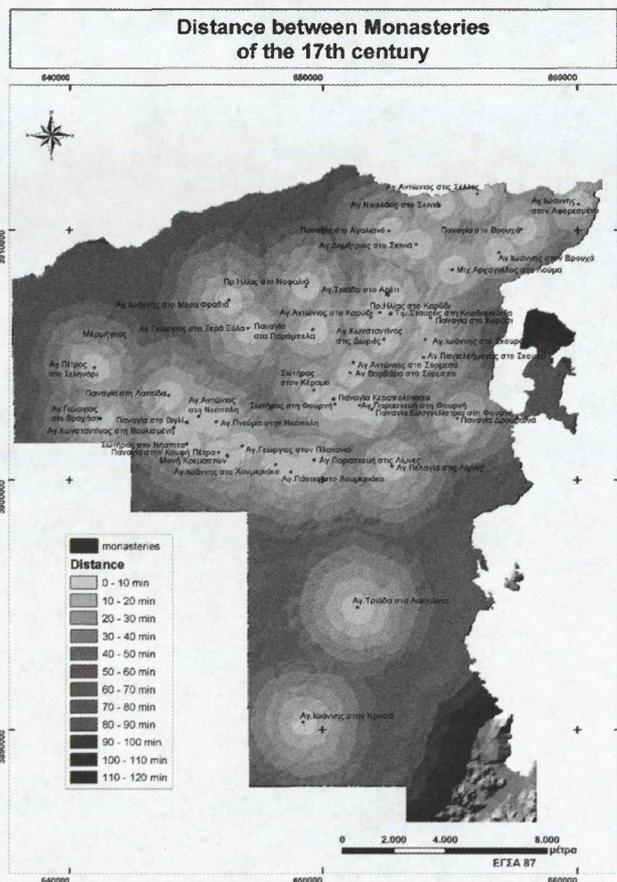
Map 4 – Reconstructing the Venetian road network – axis I.



Map 5 – Reconstructing the Venetian road network – axis I.



Map 6 – Monasteries of Merabello during the period of the Venetian Rule.



Map 7 – Distance between Monasteries of the 17<sup>th</sup> century.