The Settlement Pattern of Ancient Icaria through a GIS Approach. Part II: Data Visualization

SOPHIA TOPOUZI

PhD Candidate, Department of History & Archaeology, National & Kapodistrian University of Athens, Greece, stopouzi@arch.uoa.gr

ABSTRACT

As it was presented at last year's CAA conferance at Prato (CAA 2004), Icaria, an island located in the Eastern Aegean Sea, on the path from Cyclades to Asia Minor, must have played a significant role among important Aegean civilizations. Thus, the presence of human activity on the island during the entire Antiquity should be considered as a fact. However, until today, archeological finds on the island remain scant, for various reasons, in a way that the ancient environment can't be reconstructed. In addition to that, there are only a few literature sources mentioning information about the area.
Given the aforementioned facts, this PhD project deals with the reconstruction of ancient Icaria's settlement pattern through the use of GIS analyses and predictive modeling. The aim of this poster is to present the visualization of all the data, used in the specific GIS. Thematic maps of the digitized background (contours, geological map, land use map, road network, water resources), combined with archaeological data from the GPS-recorded sites, results of the viewshed, cost distance and thiessen polygon analyses and the related statistics will be demonstrated.

1. INTRODUCTION

Although there is significant evidence of habitation on Icaria since the prehistoric period, no systematic research on the settlement pattern of the island has ever been contacted. Since the archaeological evidence does not clarify the reconstruction of ancient Icaria's settlement pattern during Antiquity, it has been decided to use Geographic Information Systems as a tool for this rather challenging case study.
Final aim of the project is to combine data from the GIS and Remote Sensing analyses with archaeological and social facts, in order to create a predictive model for unknown settlement sites. This model is going to be tested in the southwestern part of the island, which up to this date seems completely uninhabited.

2. DATA VISUALIZATION

The specific Geographical Information System contains data in both vector and raster format. All data have been transformed in the same geodetic reference system, the Hellenic Geodetic Reference System 1987 (EGSA '87), which is used by the National Cadastre of Greece.

2.1 DIGITAL ELEVATION MODEL

The Digital Elevation Model has derived from the digitization of 36 Greek Army Service topographical maps (scale 1:5000). Besides that, the sea-bed has been produced by digitizing isobaths and depth points from the natural resources map. Both of them have been used to visualize the image of the island. Additionally, by overlaying digitized plans of the excavated sites in 3D format, information about the landscape is gathered.

2.2 LAND USE / NATURAL RESOURCES / GEOLOGICAL MAP AND STATISTICAL ANALYSES OF ARCHAEOLOGICAL SITES

The digital land use, natural resources and geological maps have been produced by digitizing the 1:50000 analog maps, provided by the municipalities of Agios Kirikos and Evdilos, Icaria and the Hellenic Institute of Geology and Mineral Exploration respectively. The statistics, regarding the land use, vegetation and geology that apply to each settlement site, came up by the superimposition of the sub-cm GPS coordinates of the known archaeological sites.

2.3 SATELLITE IMAGES

One multispectral and one panchromatic image from Landsat 7 (acquired from http://image2000.jrc.it) have been georeferenced into the Hellenic Georeference System 1987 – EGSA' 87. So far true-, false- and pseudo-color composites have been created, while supervised classification might indicate evidence of unknown archaeological sites.

2.4 VIEWSHED ANALYSIS

Viewshed analysis has been conducted using the DEM and GPS coordinates of the sites. The fact that a large area in the western part of the island is not visible from any known site seems rather interesting, indicating that more unknown sites are yet to be found there.

3. FUTURE PLANS

During this summer period, a surface survey will be carried out in the southwestern part of the island, which up-to-date shows no archaeological evidence. The aim of this survey is to verify the results of a predictive model, which will combine data from all the abovementioned maps and analyses.

ACKNOWLEDGEMENTS

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REFERENCES

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FIGURES

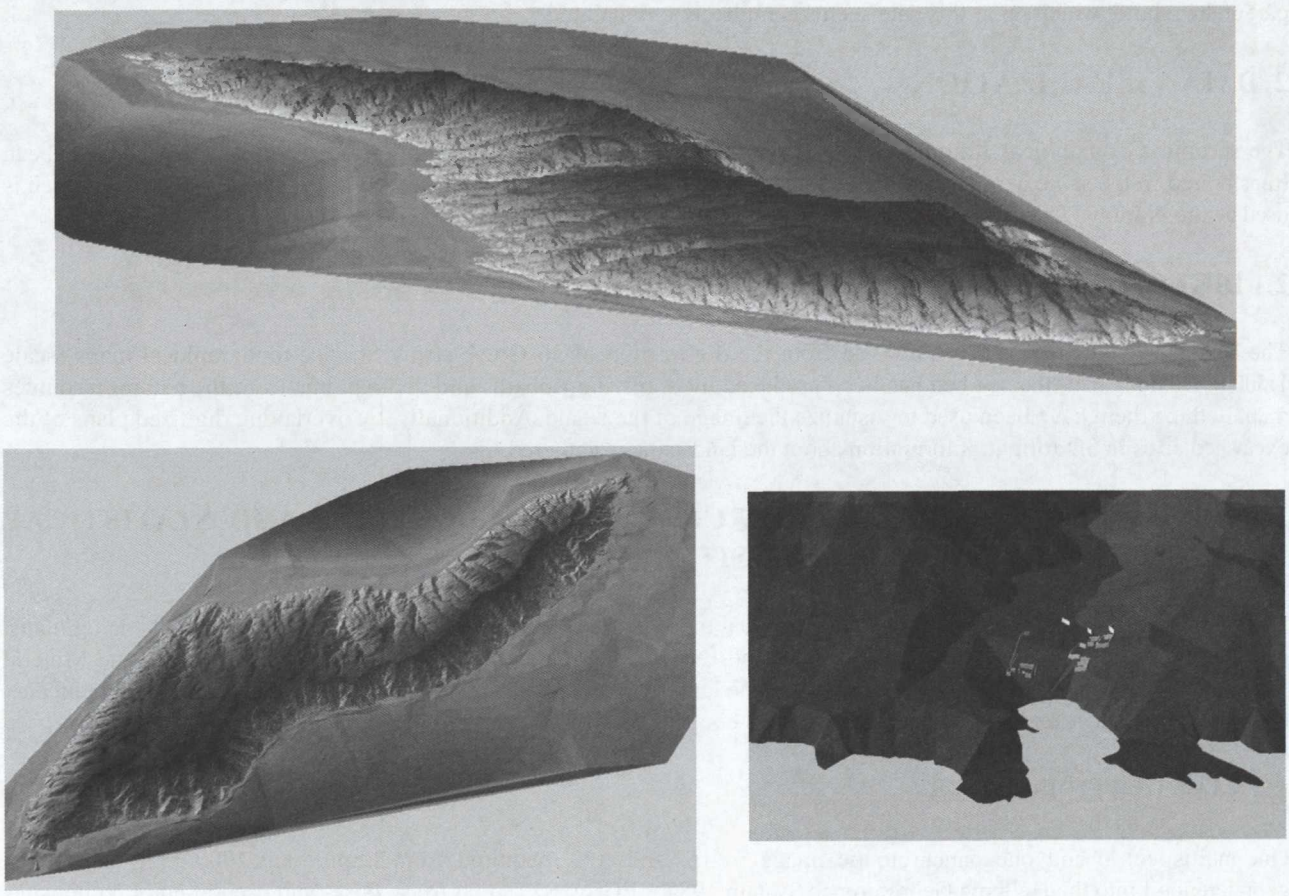
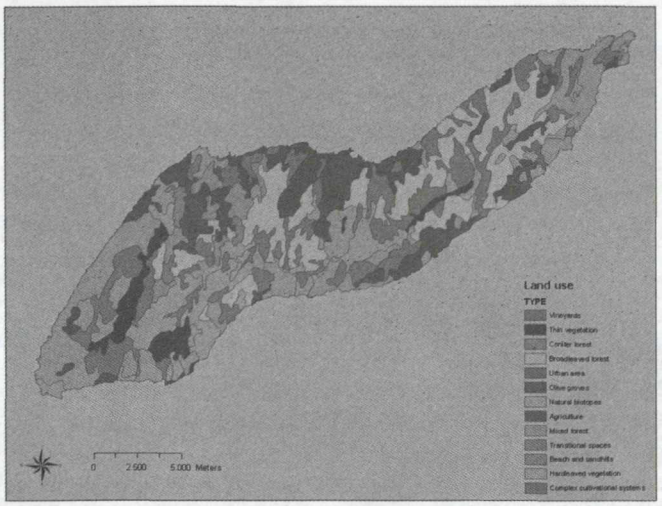
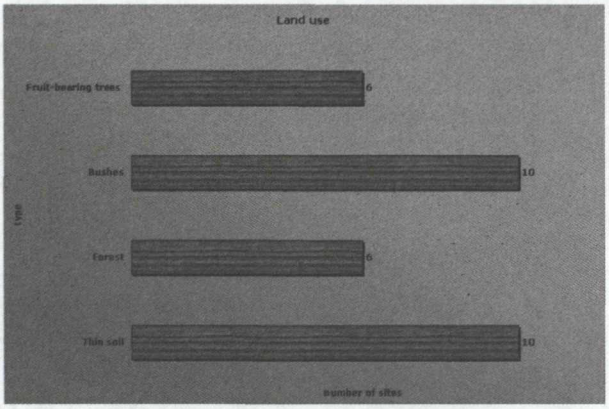
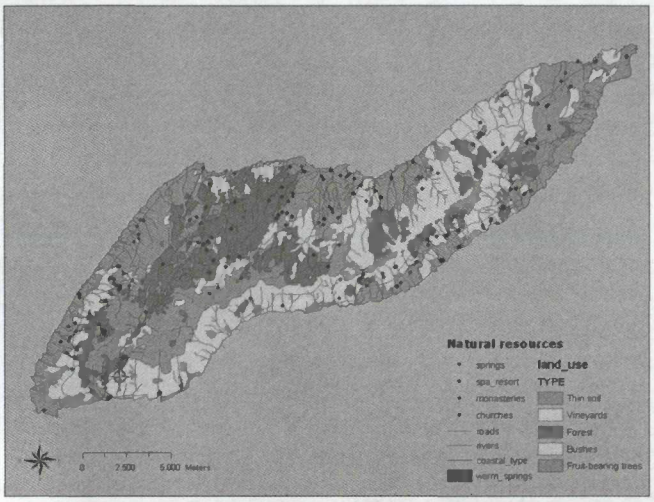
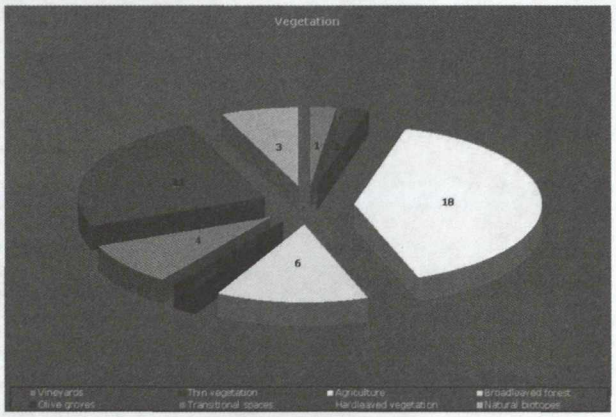


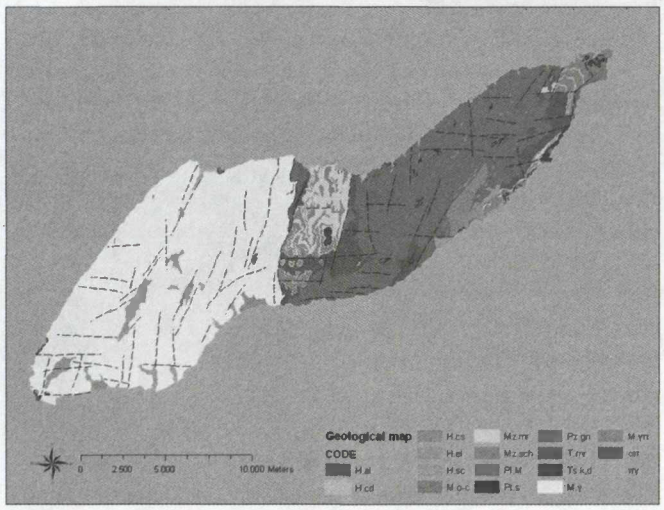
Fig. 1 – 3D visualization of the island (up and left-down) and of Nas archaeological site (right-down).











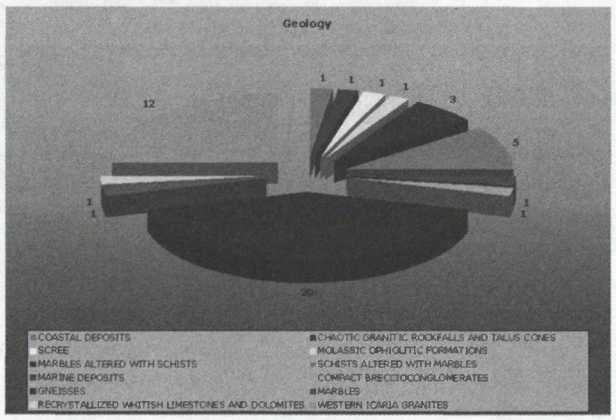


Fig. 2 – Land use – natural resources – and geological map with the relevant statistics.

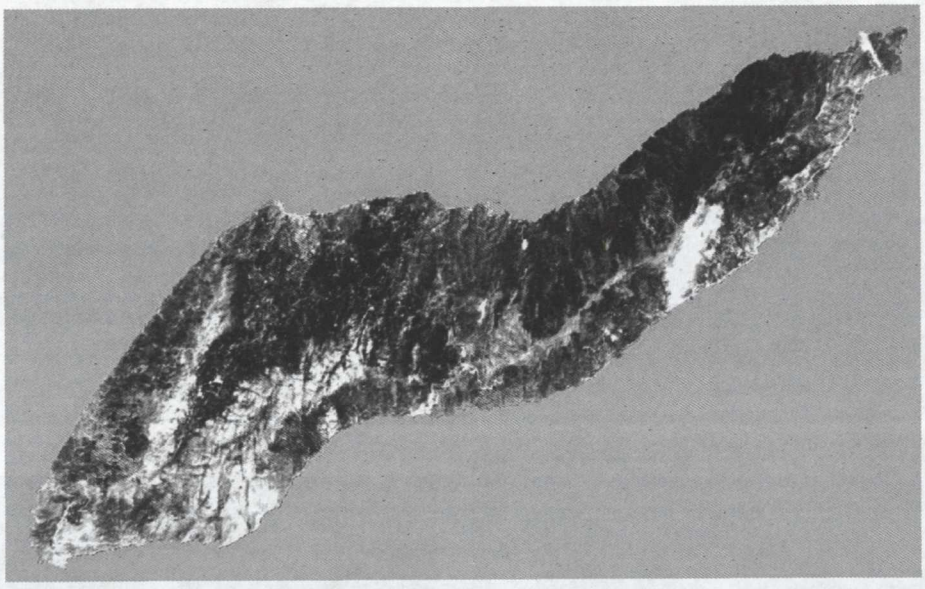


Fig. 3 – Landsat 7 true-color composite of Icaria

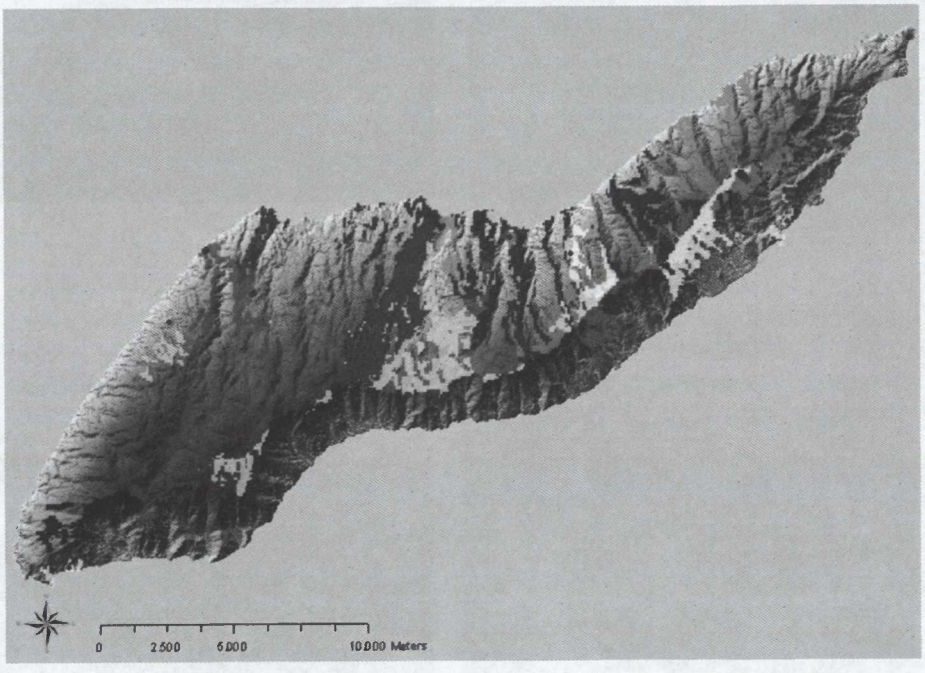


Fig. 4 – Superimposition of viewshed analysis on the Digital Elevation Model.