Relation between the Classical Sciences and Gis

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Abstract

As is already known, in recent years, the use of satellite remote sensing and GIS is a deployable occupation. With their help, we offer the opportunity to acquire knowledge through spatial, temporal, spectral and radiometric resolutions of remote sensing systems and through analysis and incorporation of data Gis. The representation of facts and results of research on the topography and geomorphology sites of archaeological interest, visualization of them with the help of modern software, is growing. The application of innovative technological methods in classical science was and is certainly a challenge for scientists, especially when using them to produce results that lead to understanding the history of a place.

So far the formulation of conclusions from the archaeologists was with traditional practices, through sources from the extant ancient texts and by archaeological excavations. In some cases lack of data, to find the exact position of the archaeological monument needs to take place science and technology of Geoinformatics methods and techniques that enable the management of various information from anthropogenic and natural geographic area below of a single digital environment.

Since that archeology examines the evolution of historical events through the geography, geomorphology, time and culture, the results of archaeological research is rich in spatial information. The Gis is an experienced program to process these large volumes of data, particularly those referred to the geomorphology.

Consequently the aim of the paper is to show us that through the help of software can visualize the archaeological monuments of the region through the geomorphologic background mainly. Having as a study area the prefecture of Arcadia owned in the Peloponnese/ Greece shows the direct relation of geomorphology with archeology.

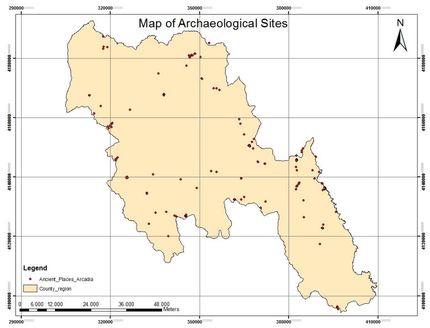
introduction

This work attempts to create a database through which it becomes possible initial input of data points display of archaeological monuments as well as physical-geographical characteristics of the study area, and then the subsequent comparison between these data to determine how they interact and how the latter assist in finding the first survey.

The work consists of chapters such as:

- finding data to be used,
- creation of database
- data analysis,
- mapping with the help of software,
- comparison data and
- conclusions.

In this paper we use as an example of our research Arcadia, which is a prefecture of Greece in the center of the Peloponnese. Taking as a reference this region will attempt to show the interaction of Classics science with the modern technology. So we have as base of already existing archaeological sites in the county and try to compare them with the physical-geographical characteristics of the surrounding area to discover new potential locations.



Software- Data

The softwares which took place in the present study were ArcGis and Google Earth. They had as main objective to gather, to group and to classify some of the already existing data from the archaeological work of LE Prehistoric and Classical Antiquities (EKPA) of Arcadia and creating a database in accordance with the Inspire Directive which contained all of them in order to achieve an easier processed. Through this data collection, the work of scientists becoming easier to proceed with their comparison.

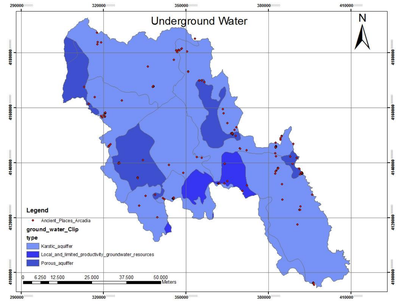
The types of data which used were the following thrice forms in ArcGis:

- Point
- Linear and
- Polygon.

Specifically, the data used are the following: the archaeological sites, the epicenters of earthquakes of the wider region, the woodland, the river network, groundwater, the geological zones, the tectonic discontinuities, the topography, geology and land uses.

Data collection

The inventory and mapping of archaeological sites (or sites of archaeological interest) was performed with field work and by using a device GPS (Global Positioning Systems) that was integrated into a handheld computer (Palm Top). This effort was realized with the help of LE Prehistoric and Classical Antiquities (EKPA) based in Tripoli in Arcadia. Each archaeological site depicted as a point which depend on the species of the monuments. Data on the topography were generated by digitizing contour of 20 meters from the analog maps of general use, from the Geographical Military Service in scale 1:50000. The same maps were the source for the digitization of the key rivers networks of the county. The geological and tectonic discontinuities (faults, crustal) were derived from geological maps which were published by the Institute of Geology and Mineral Exploration, scale 1:50000, which are the result of the development of mapping the geology of Greece. Both topographic and geological analog maps were scanned and converted to digital files tiff. The images were then georeferenced to a single georeferenced system EGSA87. This system is the same which used for the creation of the database for the study area. The data of the contour and of the river network were edited with the software ArcGIS. The epicenters of earthquakes that have occurred in the region originate from the database of the Geodynamic Institute of the Athens Observatory. These data were organized according to the focal depth of earthquakes and their size. The land use data derived from the program corine land cover, and although the original scale was not satisfactory, the limits of the uses certified by individual local data of the prefecture of the province. From the data of the Forest Service were reflected and mapped the forest areas of the county. Finally, data such as the limits of the county, was based on the digitization of the data from the prefecture.



Design Standard Geographic Database

The design of the geographic database was made in accordance with Directive Inspire abbreviation of " Infrastructure for Spatial Information in Europe". The design of the Geographical Bata Base includes three distinct stages, which are easily to be distinguishable (Historic Architecture, Archaeology & Historic Preservation Office Projects).

Additional procedures- Methods

Sources and Data Collection

The first and most important process for developing and perfecting the VGD which contains spatial data is the acquisition of digital mapping and geographical material from private and public sector which in their own way, they support the work of the Archaeological Service.

Methods for process automation

To establish the Geographical Bata Base preceded some basic procedures such as identification of the geographic reference system, build data, topological data integration (the topology regards to the mathematics of relations used to validate the geometry of vector entities and to detect the relationships proximity of these entities and their networking), indexing (the directory a database is a special representation of information about objects that improves the search) and the compliance of multiple versions which are applied automatically by using appropriate algorithms.

Importing Data

The steps for importing the data were:

- The acquisition of data from various sources which were in different formats (analog files, digital files, printed maps, geographic data from geoportals)
- The process of selection through the filtering, selection, which is based on specific standards based on the site, the structure of data, their accuracy and their themes
- From these data some will be classified as unsuitable and the "useful" will proceed to the next stage which is the appropriate preparation for entry into the software.
- Proper preparation is becoming through their homogenization, their classification and their geo-referenced.
- The conversion of non-digital files to digital files which, when handled in an appropriate treatment for their improvement by removing the digital noise and after being evaluated for their correctness and suitability, imported into Geographical Data Base.
- If the previous stage of the evaluation realize that further adjustments in order to be closer to the standards set, then we can return to the stage of digitization - change.

Creation of Soil Topography

The steps to create the soil topography were:

- The recovery of the contour from the Geographical Data Base
- The conversion to Digital Elevation Model (DEM)
- The DEM accepts those processes in which to be presented with the appropriate color shades that give the variations of elevation
- Then from the DEM we have the production of the depiction of terrain shading
- Then the processed DEM deposited on, since we develop adequate to its transparency, over the shadow of the relief
- With this accretion , we have the production of the final result of the simulated soil.

Important layer

As we have already mentioned throughout the process of collecting of data and the creation of Geographical Bata Base, we had as further aim of this gathering of the data the easier use and comparison of them through a software such as ArcGis.

One of the basic data of this study is the location of ancient monuments in the study area (Arcadia).

It was observed through the study of the location of archaeological sites that were easy to prove:

- The diachronic habitation of the study area (Arcadia)
- The causes of settlements and destruction of historical monuments in general and
- The correlation with the physical-geographical characteristics of the area.

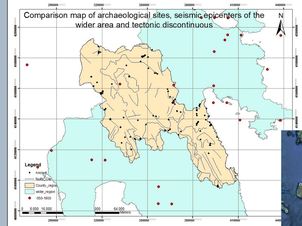
Results

All this effort of data collection and creation of Geographical Data Base has as main purpose to intend of a comparison of the physical-geographical characteristics of the region of Arcadia with the already existing archaeological sites in order to find new potential sites and to fill gaps from archaeological excavations and from ancient texts with the help of Geographic Information Systems (Gis).

To take place this argument we compare the layer which consists of the archaeological sites with other layers such as the epicenters of earthquakes in the wider region, the forests, the river network, groundwater, geological zones, tectonic discontinuities, the topography area, geology and land use.

The results of these comparisons was to demonstrate the increased occurrence of potential archaeological sites in areas where groundwater was more surface than in others. Furthermore it has been observed that there was an increase of appearance of positions in areas where the topography of the region were milder. Also reports from disasters of settlements by earthquakes in ancient texts combined with their cartographic representation using the ArcGis, help us to locate more easily the listed positions.

Other important indicators which show possible locations is the river network, the geology and the land use. It is reasonable to assume that there have not been major changes in these indicators over the course of years because we refer to a few thousand years, so references to monuments that are close to these indicators is discoverable. Finally, to understand better the reality, we transferred the data in Google Earth.



Conclusion

In this research there are several particularities, which focus on various scientific fields, one of the most important is the science of cartography as a method of visualization of representing the archaeological landscape. In conclusion we can say that nowadays with the help of Geographic Information Systems it is easier to compare data, especially when they are recorded in Geographic Data Base. A comparison took place between data that is important for the researchers because it helps them to come closer to the real conditions in the current moment of the monuments.

The comparisons between the location of the already known ancient monuments and natural-geographic features of the site is easy to understand the assistance provided by the Geographic Information Systems to further discovery likely positions of sites. This happens if we consider that the characteristics that we have already mentioned, that encloses the river network, the forest area and the geology of the region have not accepted major changes in the last thousands years. Therefore, the combination of the topography of the study area with ancient texts that have been discovered until today are a great help towards the researchers who want to deal with the excavations.

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