# Ongoing Development of the National Sites and Monuments Recording System in Albania

**Miti, A., Serjani, E.**
Future of Albania's Past project, Albanian Heritage Foundation, Albania
*ardit_miti@hotmail.com; egla.serjani@gmail.com*

*At the CAA meeting in 2007 we presented the Future of Albania's Past project which runs the national database for recording and managing the archaeological sites and monuments of Albania. In this paper we will discuss the latest development of the system, which has evolved from MS Access to a MS SQL server based database linked to a GIS platform. These developments, which were due to the increasing amount of data stored and the desire to align with emerging European and international data standards, brought important changes to the database structure. The integration of the database with the GIS platform has since provided a spatially interactive database management system. The project has achieved not only the adoption of new theoretical and practical standards for recording and managing the archaeological and historical data, but also provides a useful instrument for researching the country's heritage.*

*Keywords:* Albania, Database, GIS, Spatial Analyses, Cultural Heritage Management.

## 1. Introduction

The first Albanian national digital archive for archaeological sites and historical monuments was established in 2005 by the Future of Albania's Past (FoAP) project, part of the Albanian Heritage Foundation (NDRENIKA *et al.*, 2007). Its main objective was to document and virtualize heritage data to continuously evaluate and monitor archaeological sites and historical monuments and their surrounding territory. Part of this management process identified the urgent need to create a digital archive for the vast quantity of data accumulated during over 100 years of surveys and archaeological research (KAMBERI, 1993; MITI *et al.*, 2009). At the same time the archive accommodates future data management requirements. The system initially became functional through the creation of a database management system based on MS Access. Within three years the database was migrated to MS SQL server coupled to a Geographical Information System (GIS) platform, which also represents the development of the first interactive digital archaeological map of the country.

Today the system stores over a terabyte of information and has become a powerful analytic tool used both for academic research and to fulfil legislative requirements. The utilization of the system is of significant importance to the planning process, especially now that Albania is facing an accelerating scale of construction within areas of great archaeological and historical potential (MARTIN, 2006). The involvement of students and young specialists in the process of data recording along with the publication of the database and web-GIS map on the project's website (www.archaeofoap.org.al), fulfils another important project mandate - education and engagement with the wider public.

## 2. Development of the database system

The Albanian national digital recording system was developed from scratch, in an environment which had suffered form a lack of practical experience in managing digital data as well as theoretical expertise in the way archaeological data should be conceived, treated and managed. Hence, initially the database was based on MS Access, allowing easy configuration and implementation. At the same time the project began a detailed programme of data collection, beginning with the desk-based research of published material from books, journals and reports and also unpublished archival material in the form of manuscripts, sketch plans, photographs, aerial photographs and thematic maps, all related to specific sites and monuments. The collected information was digitized as text, raster or vectoral graphic formats for its inclusion within the database. In addition, the database was continuously expanded with new data from field surveys, undertaken annually by the project team. These surveys aimed to evaluate and update archaeological sites data, correct any descriptive or geographic anomalies, and also identifying new sites.

During the first years of the project, it was apparent that the level of research needed was continually increasing. A solution was found through the involvement in the project of a number of students, an initiative which also resulted in a training program for a new generation of archaeologists and heritage specialists in the use of new computer technology and methodologies.

In order to facilitate the working process, an intranet connection to the database was established, allowing access by more than 3-4 individual computers at once. However, the limitation of MS Access for multiple connections was soon observed. In addition, the increasing quantity of information recorded in the database soon exceeded the 2 GB limit imposed by MS Access (ROBINSON, 2004). To overcome these limitations, the database was migrated to MS SQL Server.

By comparison, SQL server is stable, more robust and can support multiple network connections, and store a potentially unlimited amount of information – features which create a more useful and sustainable system (PETKOVIC, 2006). The migration of database tables also afforded the opportunity to alter some elements of the database structure. These improvements allowed for better future proofing, the incorporation of a wider variety of data types, and better control and analysis functions. In particular, the relationship between individual data points and their surrounding territory was made more interactive and intuitive. The restructuring also allowed much of the database lexicon to be aligned with emerging European standards for recording and managing heritage data (COUNCIL OF EUROPE, 2009). Other structural changes to the database included the addition of fields containing data related to site location within territorial and administrative divisions (comprising of regions, districts, communes and municipalities), and as well as the inclusion of toponym tables (Figure 1).

The increase in the amount of the archaeological data stored in the database, and its complexity, resulted in a greater number and variety of site types, which could be more appropriately managed if grouped into categories and so a Site Category table was added. Another important element added to the database was information concerning interventions made at a particular site, such as surveys, excavations, restorations etc., including the people, organization or institutions associated with them and the time.

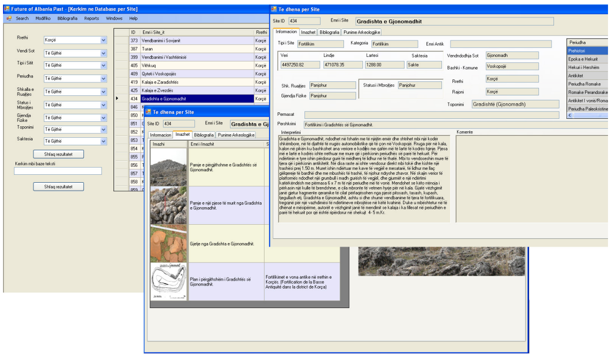

**Figure 1:** *Results obtained by querying in the database.*

The chronology of a site in the original database was enabled through the user choosing a predetermined date category, and limited to a start and end date. However, this method of chronological assignment was not very accurate, producing a fragmentary historical time line for the site. Within the new database structure, selection from a list of periods and sub-periods is possible, i.e. those during which the site had been occupied; an option which has proved to be very useful when querying the database.

The structural changes to the database were also associated with the creation of a new interface for browsing and data entry, written in Visual.net (basic), designed primarily to be user friendly. A very helpful tool within the interface is the incorporation of Crystal Report, a program which generates reports and allows the user to graphically design data connections and report layouts.

### 2.1. GIS platform

The large amount of data stored in the database, represented by coordinates, text and images would be largely mute or “dead points” if it were not possible to show them graphically, and analyze them spatially by using an interactive map. Conversely, if site locations were merely plotted on a map, they would remain only beautiful symbols if they were not connected to the tables of the database.

In order to obtain a combined statistical and spatial analysis of the archaeological and historical information, a GIS platform was created and then integrated with the database system. The resulting interaction between the two allows the generation and display of complex thematic maps, based on site type, period, land division, and preservation status etc. The spatial representation of the data also allows an assessment of how the data is distributed and how they relate to the territory and their geographical surroundings (Figure 2).

The development of the GIS platform was also seen as a potentially indispensable tool for aiding national planning and policy making decisions at a time when Albania is undergoing a huge number of infrastructure development projects in the areas holding great potential for undiscovered archaeological assets. The administrative bodies and construction companies engaged in these projects design and construct their developments employing computer technologies and especially GIS, and for us as archaeologists, it is important to interact with this reality by utilizing the same technological language (CAMPANA *et al*., 2003).

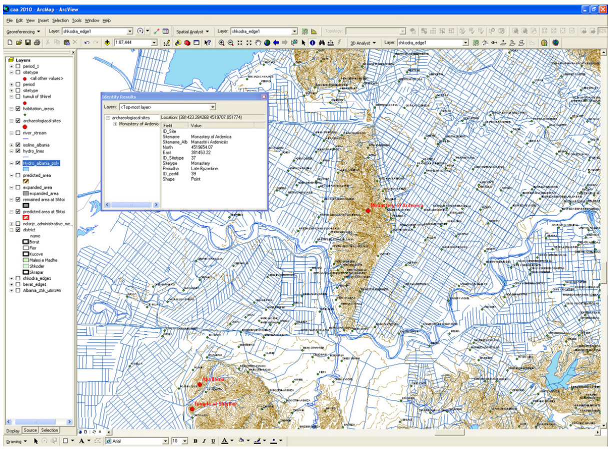

**Figure 2:** *The representation of a site and the surrounding geographical elements in the GIS map platform.*

Our GIS platform was created in 2008, and is based on ESRI's ArchMap 9.2. It contains a number of georeferenced raster elements, digitized CAD plans for the recorded sites and monuments and vector layers for administrative divisions of region, district, commune and villages; modern roads, hydro networks, modern habitation centres etc. The georeferenced raster layers consist of historical maps, topographical maps at scales of 1: 25,000 and 1: 10,000 and a partial collection of orthophotos taken through the years over the Albanian territory. The topographic maps were joined to form a mosaic, creating a single layer within the GIS platform.

Data stored in the database, representing a site, monument, or an area of historical and archaeological importance, are connected to the GIS platform through their geographical coordinates, and are displayed within a map as point, polygon, poly line, or Cad feature. To allow an assessment of the accuracy of these spatial co-ordinates, a field indicating the known level of precision has been added to the database. Within the GIS this can be expressed as a 'buffer zone', indicating the level of uncertainty for each location.

## 3. Case studies of the system's application

The resulting system has been intensively used in numerous projects of different scales. The following examples of recent studies illustrate the application of the system.

An analysis of archaeological data stored in the database according to Site Period and Site Type has drawn attention to the fact that sites relating to Hellenistic/Illyrian urban, late antiquity, medieval, early medieval, and Iron Age, are higher in number than those of other periods. Also, the majority of sites dating to late antique and medieval periods are mostly fortifications, settlements or churches, while those of the early medieval are cemeteries. This pattern was again recorded during the FoAP survey of the Berat region. It was found that from a total number of 108 sites, 37 date to the Hellenistic or Illyrian Urban Period, 19 to Late Antiquity, 19 to the medieval, 15 to the Iron Age, 7 to the early medieval, while 11 sites, an inconceivably small number, belong to the Mesolithic, Neolithic, Eneolithic, Bronze and Roman Periods. Interestingly, none of the sites identified in the area date to the Palaeolithic Period. The result obtained indicate the need for a debate as to whether these data are real, or the result of past survey strategies and research.

A statistical analysis of data stored in the database using the criteria of toponym names informs us that almost 90% of late antique and medieval settlements and fortification are located on hills not higher then 1,200 m and have mostly Slavic toponyms - Gradec, Gradishtë, Grazhdan etc., or their Albanian synonyms, Qytezë, Gjytezë and Gjytetzë, a term which refers to small fortified settlement. A similar predictive approach is also possible with late antique and medieval churches or monasteries, usually related to the toponym metohion, which refers to a land property around a monastery or church.

A virtual survey of topographic maps using the GIS has enabled the creation of predictive site maps, which combined with field survey, have helped identifying new archaeological sites that bear similar characteristics. A spatial analysis of archaeological site and monument distribution in Albania shows that 80% of them are located around the western lowlands, river valleys, lake sides and the south-eastern tableland. Also, it should be pointed out that a significant number of this group of sites are not listed as protected sites and are in areas that are currently undergoing extensive urban, industrial and agricultural development and infrastructural expansion. A survey undertaken last year by the FoAP team in the Shkodra region, part of the western lowlands, has identified the huge scale of damage caused as the result of this development. The database informs us that in the 1980s, an Archaeological Institute field survey of the tumuli cemetery at Shtoj recorded 140 tumuli monuments, occupying over a large area (KOKA, 1983). Today, only 16 tumuli were recorded and found to be in a considerably worse condition. This situation was largely the result of ongoing agriculture development, construction projects and the indifference of responsible bodies and their lack of intervention at the right moment. At a similar tumuli cemetery at Shkreli, while the number of tumuli surviving were the same as that recorded in the 1980s (JUBANI, 1983), the overall size of the cemetery was found to occupy a far larger area than had been previously thought, or indeed predicted by the GIS.

## 4. The future

The establishment of the national digital recording system by the FoAP project is a relatively new initiative and we hope to continue with collecting, digitizing, evaluating and monitoring the data of the countries sites and monuments. To date, only 40% of the territory has been systematically examined.

In the future we expect to further modify and evolve the database system. A recent objective is the creation of a GIS interface for browsing and data entry. We also intend to use the GIS data and geographical data layers to construct predictive models in the search for new sites and in identifying areas which bear important archaeological potential.

We are presently working to create a thesaurus of sites and monument terms, in line with emerging standards, which will be then integrating into the database system and also made accessible through the project's website.

The improvement of the website, and the continuous updating of the database and web-GIS map information is intended to not only to provide wider public access to the countries heritage, but in doing so to raise public awareness of the need to protect the countries heritage assets for future generations.

The project faces many challenges in terms of continuity and sustainability, the resolution of which may well lie in integration with central government and future heritage policy decision making. An important long-term objective is the embedding of the database and GIS platform within the central and local institutions responsible for recording and managing the cultural resource.

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