

CULTURAL HERITAGE NETWORK OF WESTERN ANATOLIA BY USING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM

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ABSTRACT:

There is no doubt that Anatolia (Asiaminor) is the motherland of the civilizations with numerous cultures it has possessed. This land has great values not only for Turkey but also for all of the world since historical and cultural understanding of past cultures and events shed light on today and the future. So it is our mission to determine, protect and promote the cultural heritage on selected lands in order to let new generations know about them and have enough capability to make cultural and historical analysis for the future. In this proto type studies remote sensing (RS) and geographic information system (GIS) have supported the study with necessary tools to determine the geographical positions of the archaeological places and excavations. Remote Sensing technology have let to view the changes and uncontrolled business on the heritage areas. Satellite images and aerial photos were used as a part of this process as a based map. Also registration and vectorization of existing local maps are essential part of the project. All the data were superimposed by GIS technologies to have inquires for different purposes such as construction areas planning, infrastructure zones determinations etc. Database modeling was the basic of the project and an architecture specifically designed to organize all the data coming from different resources and also different technologies in a very organised and comprehensive way to form a superposed solution at the end. As a result, with the information gathered and organized from all these studies, a web portal, educational CD-ROM will be designed, a documantary film will be prepared and workshops will be organized to disseminate information to Europe and to the world.

1. INTRODUCTION

It is thought that, numerous cultures have occupied in both Asiaminor and Greece and their remains as monuments, old cities are seen even in every step (Akurgal, 1961; Akulgal, 1987) Civilization and technology are the parameters need for devolpment of cultures, but it is seen that the new cultures destroy the older ones. Technological development gives human being new opportunities that can be used against these destructions. Remote sensing, geographic information system and computer technology are the new tools for human beings that can be used for this field (Avery and Berlin, 1992)

A new project is proposed about this mentioned area (Figure 1). The mission of this project is to determine, protect, promote the cultural heritage in order to let new generations know about them and to make cultural and historical analysis for the future by using RS, GIS and computer technologies.

Here, the proto type of the main study which covers only Western Anatolia is tried to take into account. The aim of the proposed project and the application steps which have been used are explained. A senario is written for very small restricted area for this proto type study. RS and GIS are applied to demonstrate the applicability of these new

techniques to determine, protect and promote the cultural heritage in the selected area.



Figure 1. Location map of the proposed project.

2. AIM OF THE PROJECT

The aim and motivation behind this project can be explained as follows:

1. To determine, protect and promote the cultural heritage in targeted areas.

2. To design a specific database management system so that all collected data from archaeological places can be put into same formats. By this way the data which are dispersed in different museums, libraries, universities and archaeological institutions can be assembled in one and unique database format. This database also can be reached through the internet. As a result people can make use of this information for different purposes.
3. To give rise to the correct determination for construction areas planning and infrastructure zones.
4. To help educating future generations about world cultural heritage and to inform tourists which are coming to these lands both through the internet and mobile applications.

3. OVERVIEW

In order to have a very clear view the preliminary proto type study designed by in layers. Since the historical treasures are countless in these targeted areas it has focused to the era of B.C. 1200 - A.C. 395. The targeted areas was Western Anatolia (Thrakia, Bithynia, Mysia, Troas, Aiolia, Ionia, Caria, Lykia, Pisidia, Pamphilya, Lydia, Phrygia) (Sevin, 2001)(Figure 2).



Figure 2. The target areas on the Western Anatolia.

There are five different sources of data format such as raster format (pictures, photographs, satellite images, aerial photographs and maps), vector format (digitized CAD files), text files (Word, Excel, Access), multimedia format (animations, 3D modelling, Macromedia Shockwave Flash animations), audio-visual formats (avi, movie, mpeg, cdi etc). There is no doubt that these five different formats for digitization and interactive publishing becomes difficult to handle. This brings us a conclusion that we need a **Cultural Heritage Information Management System (CHIMS)** in order to keep all information orderly and integrated. Our project will employ all these mentioned technologies in such a harmony that each technology will support others' findings, the outcomes of each technology will be in compliance with each other. At the end, all these different technologies will be integrated in one web site.

Moreover, the outcomes of this project will also be used as a content for educational CD-ROM and mobile applications.

Before we go on to explain the methodology of the project we need make one point very clear. Since this project concentrated on many different areas and serves as an integrator among these different areas for unique and simple format our team must have a very good project management system within itself. Moreover there are many project teams in different areas functioning independently but the project management team must follow everything at the same time, properly and in a unique format. Thus, our team design a special web based project management system specific to this projects needs.

5. METHODOLOGY OF CHIMS

If we briefly explain the methodology of CHIMS.

5.1 Archaeological data collection

Archaeological data collection which is the foundation of the project will be done in two different methods. These are Library Office Study and Area Study. The parameters such as historical developments, geographical conditions, research history, ancient settlements (cities) etc. will be reached through library office work. Sub parameters will be organized according to these main parameters. By area study photographs, videos, animations, satellite and aerial photographs, geographical coordinates will be prepared from the archaeological excavations and ancient cities. The data collected from the targeted areas using by these two different methods will be integrated finally.

5.2 Database Modeling

Database modeling is the basis for the systematic of the project. During this process, archaeologists, database, GIS and web based application experts are going to cooperate all together to form the database. Database modeling is an architecture specifically designed to organize all the data coming from different resources and also different technologies in a very organised and comprehensive way to form a superposed solution at the end. Archaeological map of the studied area was vectorized and prepared for GIS application and then joined with the related database.

5.3 Global Positioning System (GPS) and Remote Sensing Studies

Global Positioning System studies enables accurate geographical location of data through satellites. By Remote Sensing technology, archaeological places are tracked and any changes in the surrounding will be realised when occurred which will help us to protect this environment. Satellite images are going to be used as a part of this process as a based map (Figure 3). In addition to ordinary satellite data, high resolution satellite images (Figure 4) and aerial photographs (Figure 5) of the interested areas will be used in the project. Also registration and vectorization of existing local maps are essential part of the project. There are more than 5.000 1:25.000 scale maps existing in Turkey, some of these

maps have vectorized format and others not. If the interested area have only ordinary type map, these maps will be vectorized and registered.

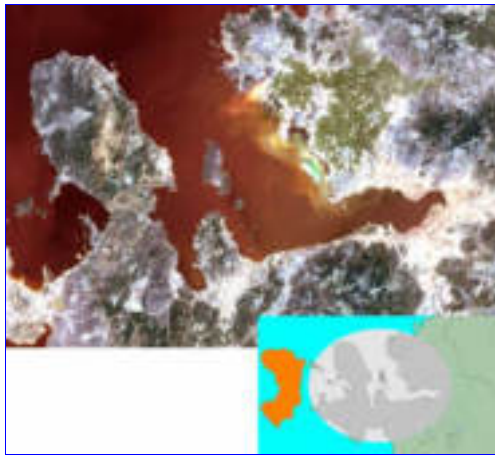


Figure 3. Satellite image of the interested location.



Figure 4. High resolution satellite images of the interested location.



Figure 5. High resolution aerial photos of the interested location (Deveci, Altan, Ayday, 1999).

5.4 GIS Studies

Geographical Information Systems (GIS) can help us to store, manage and display geographically referenced data so that geographically positioned archaeological sites are going to be listed under database which is linked to the vector type features on the maps and this information

help us to determine suitable places for infrastructure constructions (Korte, 1992) (Figure 6, 7 and 8).



Figure 6. Information of archaeological site are linked to the graphical data.



Figure 7. Information and photographs of the monuments are linked to the graphical map in GIS.

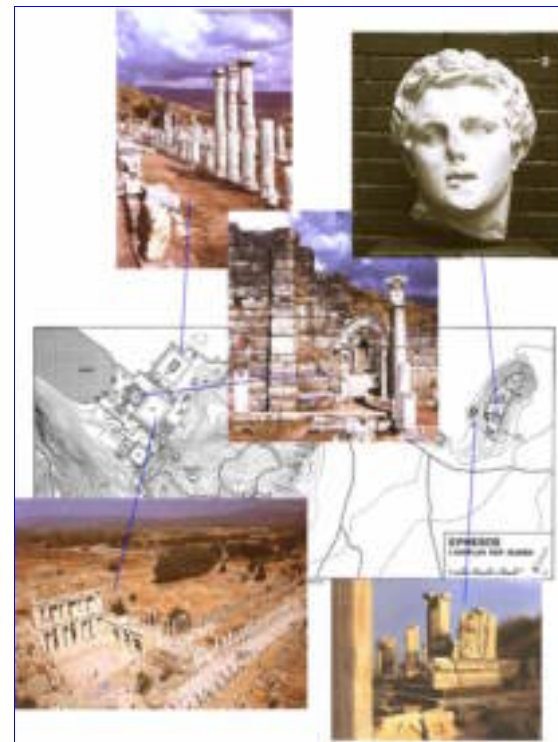


Figure 8. Registered map of the ancient city linked to the important monuments and views in the GIS environment (Hueber, 1997; Karwiese, 1995; Scherrer, 1995)

5.5 Web Studies

A web portal will play an intermedia role for web based applications and a presentable interface to disseminate and display all the information in databases, videos, photos, documents, geographical reference points, maps, plans and graphic informations.

5.6 Using and Sharing the Obtained Results

For the benefit of the future generations there are other ways to disseminate the information obtained from this project. The following will show the other ways our team will employ:

- a. Our team will design a special historical game covering the results, photos, satellite maps, animations, graphics we obtained from this project. This way not only the future generations but also the adults will make a fun way to learn more about the history of this area.
- b. Our team will also concentrate on the education of children. The valuable information obtained from this project must be presented in educational CD-ROMs and via internet as distance learning project. This way public make use of this valuable knowledge. In education we have to consider two different levels: First level is the primary school level and the second level is high school level. The information must be presented according to the necessities of this two different levels.

5.7 Mobile Applications of the Obtained Results

Mobile applications are playing crucial role for the foreign visitors who are hungry for information Especially if they have their mobile phones or PDA's with the internet access they can easily reach the historical data of the region that they are in and they will learn about the archaeological excavations, artifacts, museums geographical coordinates and other valuable information (Figure 9). If we consider that European people's mobile telephone high penetration numbers this application will a lot to do for these people.



Figure 9. Photos and information about the archaeological site can be get by using mobile phones and PDAs.

5.8 Other Studies

During the area studies and reviews with the archaeological experts the video team will record all the valuable information in audio-visual formats which can be edited for a documentary film.

Workshops will be organized to disseminate information and to form discussion environments for the proceedings and the results of this project.

The results and achievements of this project will be published after the project will be completed.

6. CONCLUSION

This project will not only enhance the public's understanding of cultural values and their roots but also educate them to be respectful of cultural values. Therefore people become more aware of the their environment and cultural affairs. Remote sensing and geographical information systems with the other leading technologies of protection help us watching the state of the historical places and warned us if any change happened. The cultural values are protected and preserved by this way. There is another benefit also brought by this project is any infrastructural construction process plan will be adjusted according to the maps of cultural heritages. This project also plays a great role in the education of the children since the web site and the CD-ROMs distributed will show them cultural heritages in an multi media environment and in an interactive way. Game desgined for this specific project will also help the dissemination of this project's results.

In terms of touristic benefits this project will enhance the enthusiasim towards these cultures and these lands. So Turkey will have an increased number of tourists and web portal and mobile applications will donate tourists with necessary information such as historical information, location, coordinates, accomodation, transportation, related ancient city mythos and etc.

This project also helps to the construction of an archaeological network between the scientists, archaeologists and respective disciplines and related firms. This network will promise us future successes and future benefit of this project. The technologies and approaches will constitute a model for other research areas.

This project will also help the ministries or governmental agencies such as Cultural Affairs, Tourism, Environment, Public Works and municipalities in many aspects. Some of the information gathered from this project will only be shared by these governmental institutions and others will be disseminated publicly.

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