USING INTERNET – BASED G.I.S. TECHNOLOGY TO HANDLE GEOMORPHOLOGICAL DATA AND ENVIRONMENTAL DATA

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ABSTRACT

Geographical information systems can offer vast possibilities to analyze and represent various data types, but traditionally are used by a small group of people or even one person that has access to the system. Internet–based G.I.S. environment, provides multiple information exchange at low costs between a central data base and the end users. This kind of approach is applied to study geomorphological and environmental problems giving access through an Internet connection to many users, all around the world. More over, all the users have a GIS functionality to treat data and thematic maps.

ΠΕΡΙΛΗΨΗ

Τα Γεωγραφικά συστήματα πληροφοριών μπορούν να προσφέρουν πλήθος δυνατοτήτων για να αναλύσουν και να παρουσιάσουν διαφορετικά είδη δεδομένων. Παραδοσιακά τα συστήματα αυτά χρησιμοποιούνται από έναν μόνο χρήστη ή ένα μικρό αριθμό χρηστών που έχουν πρόσβαση. Τα γεωγραφικά συστήματα πληροφοριών που βασίζονται στο δίκτυο, παρέχουν στους χρήστες τη δυνατότητα ανταλλαγής πληροφοριών σε πολύ μικρό κόστος ανάμεσα σε μία κεντρική βάση δεδομένων και τον τελικό χρήστη. Αυτό το είδος προσέγγισης εφαρμόστηκε σε αυτή την εργασία για τη μελέτη γεωμορφολογικών και περιβαλλοντικών δεδομένων παρέχοντας πρόσβαση μέσω της σύνδεσης με το διαδίκτυο, σε πολλούς χρήστες ανά τον κόσμο. Επιπλέον όλοι οι χρήστες έχουν τη λειτουργικότητα ενός γεωγραφικού συστήματος πληροφοριών για να διαχειριστούν τα δεδομένα και τους θεματικούς χάρτες.

INTRODUCTION

The last decades show the massive expansion of GIS applications. On the other hand the Internet is becoming the most popular mass medium. If these facts are taken into account the current directions of GIS uses must integrate internet connectivity. The aim of this paper is to discuss an Internet supported GIS application.

METHODOLOGY

The basic structure of the Internet is consisted of a large number of Interlinked computer networks, which transmit digitized data using a unique protocol, e.g. TCP/IP. The software package which we used is MapXtreme software and the including Hahtsite language (Fig.1).
The application that we developed is using the Applets that we mainly programmed in VisualBasic and Visual-C languages. Through the HahtSite software (HahtSite IDE Programmer's Guide, 1998), we created both, the static and the dynamic WWW pages, nessecary for the interaction of the end-user and the MapXtreme GIS core. The dynamic WWW pages, are pages that are constructed by the HahtSite, each time the end-user sends a request to the MapXtreme. The results are being built by the HahtSite, depending on the output of the MapXtreme subroutines. Finally, the generated WWW page, is send to the end-user's computer, as a simple static page, and displayed by the browser.Our application requires one of the common browsers, such as Netscape's Navigator and Microsoft's Internet Explorer, and supports both a frame and non-frame mode.

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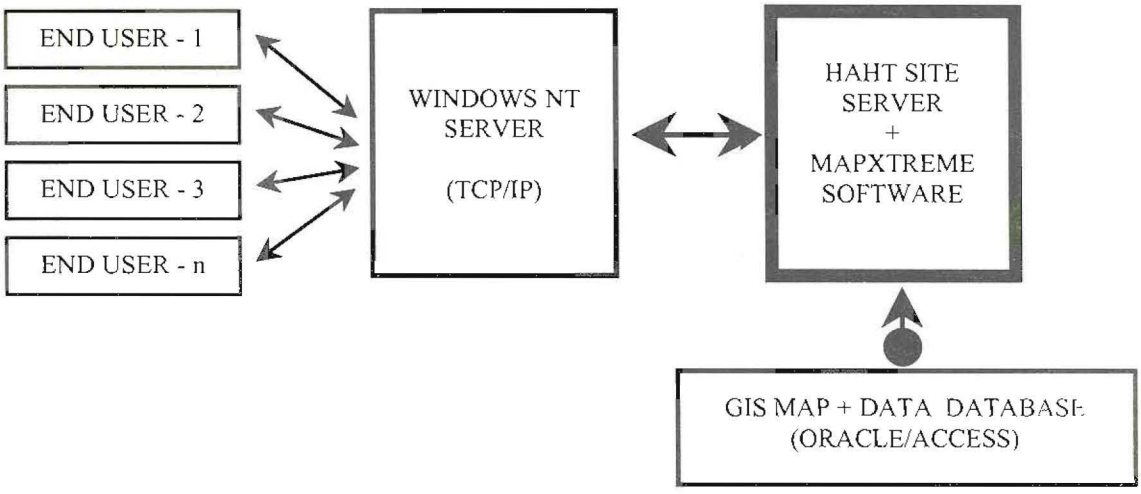


Fig. 1 : MapXtreme's responses to the End-user's requests. Data flow diagram, from the initial database to the end-user's web browser.

The internet-based GIS system has its own software and hardware. The software, described above, is able to send the end-user's request to the MapXtreme GIS core, which responds with image and data information directly to Hahtsite's dynamic pages. The hardware, is consisted of a Windows NT server, and a powerful PC system, as unlimited users have the ability to process and visualize large amounts of data at the same time. The basic elements of this Internet-based Geographical Information System are illustrated in fig. 1

CASE STUDY

The island of Zakynthos has been chosen as case study because of the availability of many geological and geomorphological data (Dermitzakis, M. D., Papanikolaou, D., Karotsieris, Z., 1977, Dermitzakis, M., 1977, Livaditis, G., 1987, Livaditis, G., Alexouli, A., 1993, Mirkou, R.M., 1974) and thematic maps (Gonrnellos, Vassilopoulos, Evelpidou, 1997).
The working scale for both topographical and geological maps is 1:50.000. The general stages to create this application have been: the input of data (geology, topography, vegetation, natural hazards) the analysis and visualization of data and the output diagrams and maps. The initial and some other w-pages are presented (Fig. 1,2,3,4) from the Zakynthos database. It is evidente that all data of Zakynthos can be accesed by any user.

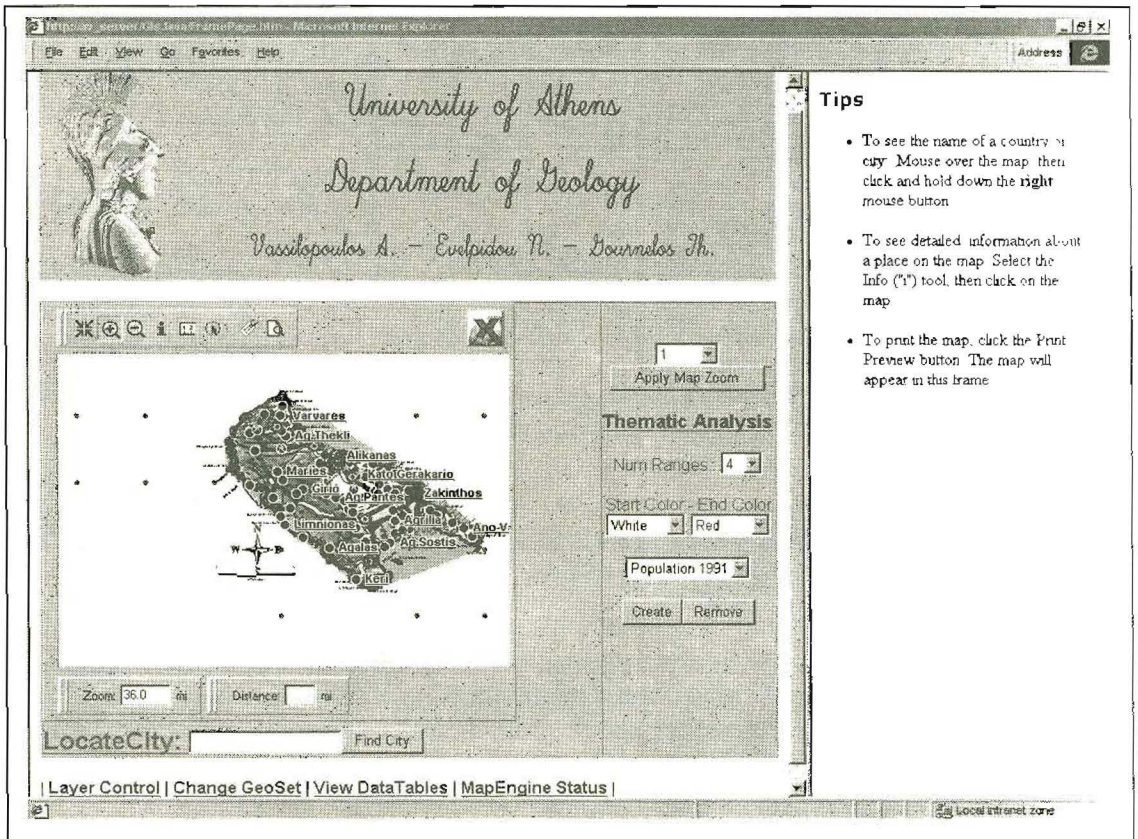


Fig. 2 : The initial Web Page of the 'GisJava' application, accessed from the Internet Explorer browser.

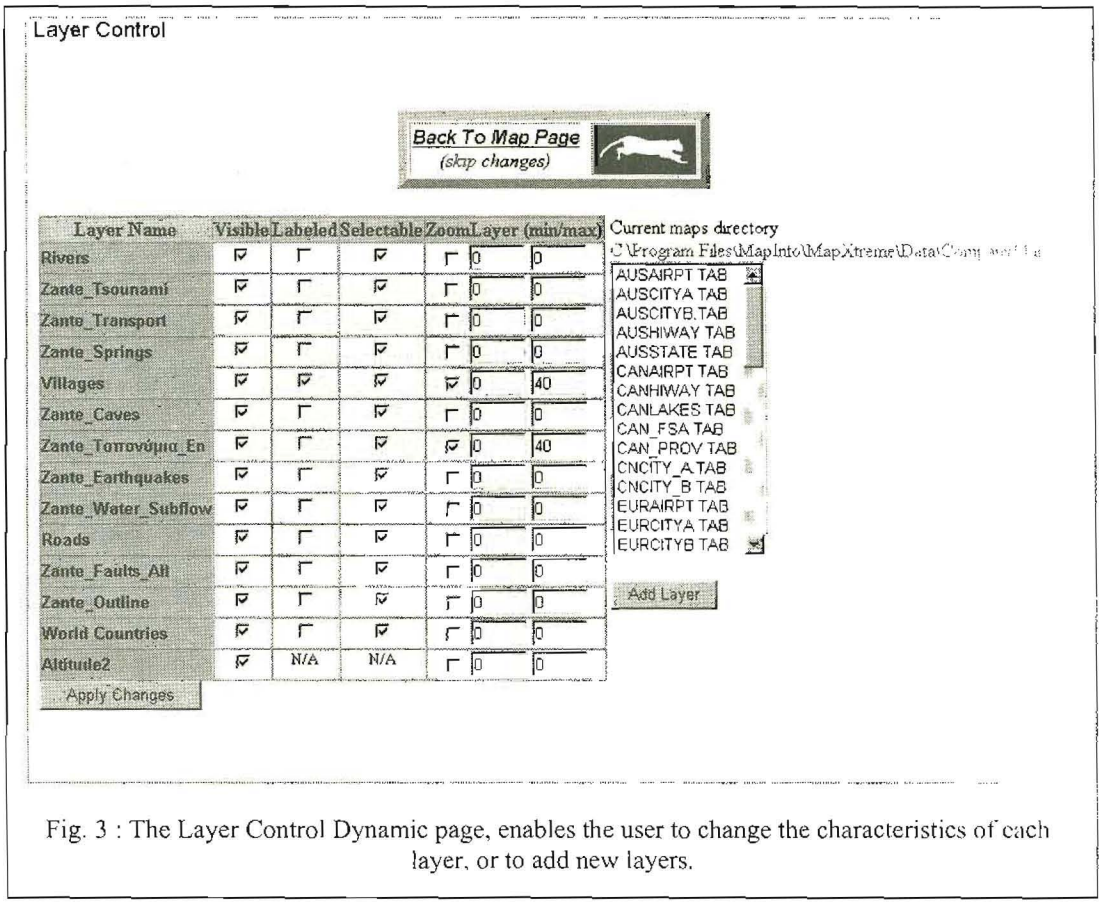
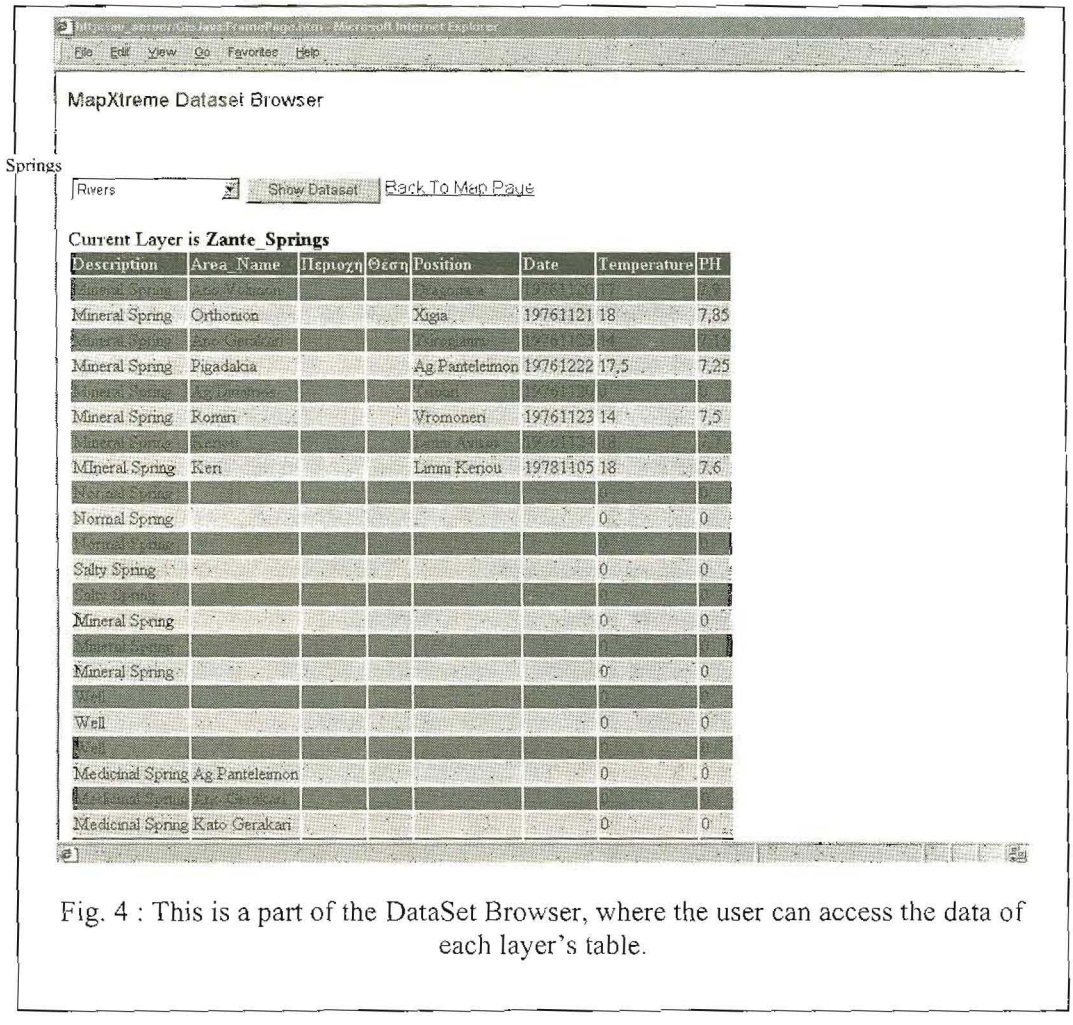


Fig. 3 : The Layer Control Dynamic page, enables the user to change the characteristics of each layer, or to add new layers.



Description	Area_Name	Περιοχη	Θεση	Position	Date	Temperature	PH
Mineral Spring	Orthonion			Xigia	19761121	18	7,85
Mineral Spring	Pigadakia			Ag.Panteleimon	19761222	17,5	7,25
Mineral Spring	Roman			Vromoneri	19761123	14	7,5
Mineral Spring	Keri			Limni Keriou	19781105	18	7,6
Normal Spring						0	0
Salty Spring						0	0
Mineral Spring						0	0
Mineral Spring						0	0
Well						0	0
Medicinal Spring	Ag.Panteleimon					0	0
Medicinal Spring	Kato Gerakari					0	0

Fig. 4 : This is a part of the DataSet Browser, where the user can access the data of each layer's table.

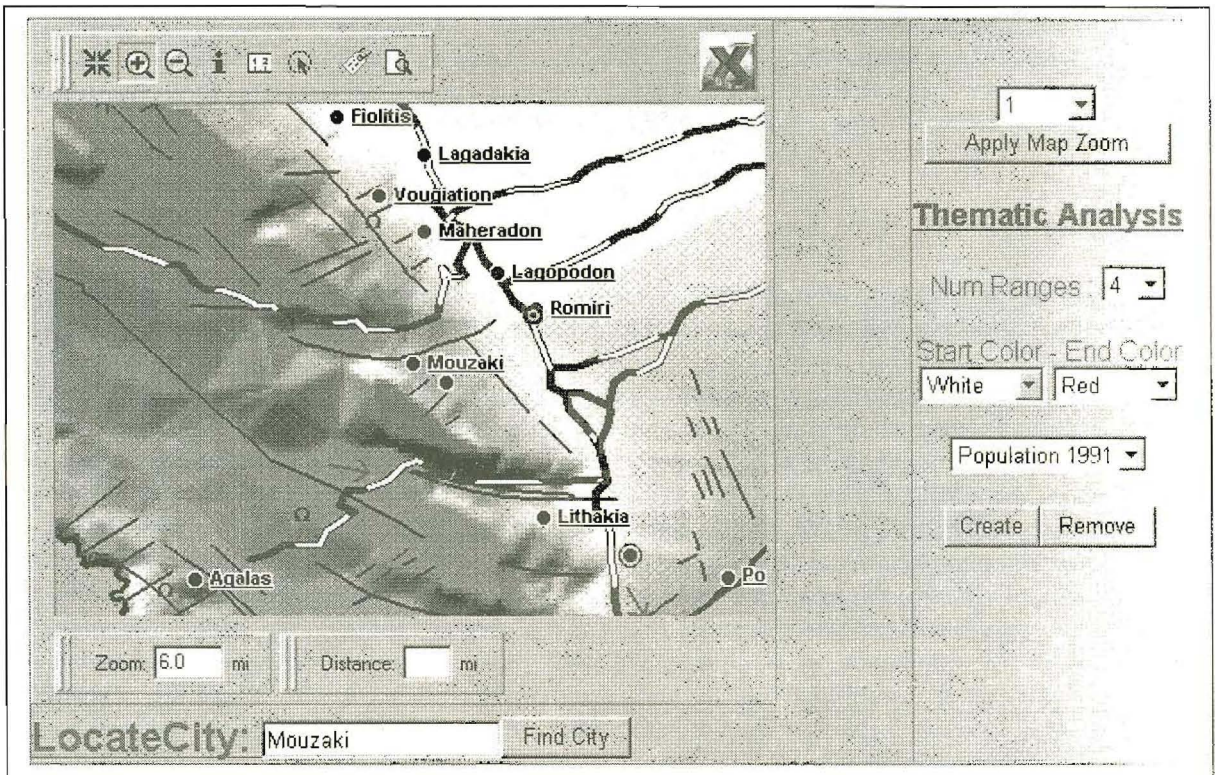


Fig. 5 : This is the main Map Java Applet, where the user has requested both, a ZOOM-IN and a LocateCity function. The located city is displayed at the center of the map window. The current zoom factor is displayed at the lower left part of the screen.

CONCLUSION

This Internet-supported GIS work is a preliminary information system of geological, geomorphological and environmental data. This technology provides a new way to exchange information between local administrative centers and develop appropriate strategies for environmental protection and planning.

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