Apostolos Arvanitis, Associate Professor
Asterios Asteriadis, Rural - Surveying Engineer
Thomai Sotireli, Rural - Surveying Engineer

Aristotle University
School of Rular and Surveying Engineering
Department of Cadastre, Photogrammetry and Cartography
U.B. 439 54006 Thessaloniki, Greece

E-mail: aparva@eng.auth.gr , asthenis@hotmail.com , st_bertha@hotmail.com

RETRIEVING CADASTRAL INFORMATION VIA INTERNET

ABSTRACT

The aim of this project was to find a way to publish cadastral information on the Internet in order for Internet users to retrieve this information. Towards that goal, a database with cadastral data and a cartographic subbase were created. These two elements were combined and the result was a GIS with a structure suitable for the Internet.

The GIS includes a series of maps with information about the Cadastre, in different cartographic levels. An important goal that has been achieved was to enable users to retrieve information from this application in an easy way. Actually, information is available by entering only one code or password.

In general, this application was created in a friendly environment. Extra care was given in making the use of the application as easy as possible.

INTRODUCTION

After the completion of the Cadastre rises the question of disposing cadastral information to the public. The amount of information that will eventually arise will be enormous and have a complicated form. Part of that information should be protected for the safety of the owners' interests. On the other hand, it would be ideal for the public to have immediate access to cadastral information at any time. Furthermore, appropriate cadastral maps should accompany cadastral information, since this information is directly related to space.

A suggestion that responds to the needs and conditions of today's world is retrieving cadastral information from the Internet. In the past few years, Internet has become very popular to many subjects and holds an important position in every project. It has abilities that can be very well applied in the case of disposing cadastral information. Through the Internet, a public service could administer information without the help of employees.

In order the information to be public on the Internet, it should constitute a database. That database would be related to cadastral maps of the ownership that the information describes. Therefore, a Geographic Information System (GIS) that relates maps with information should be created. In this project a suggestion is made about the way an Internet user could retrieve cadastral information and locate his property on a map.
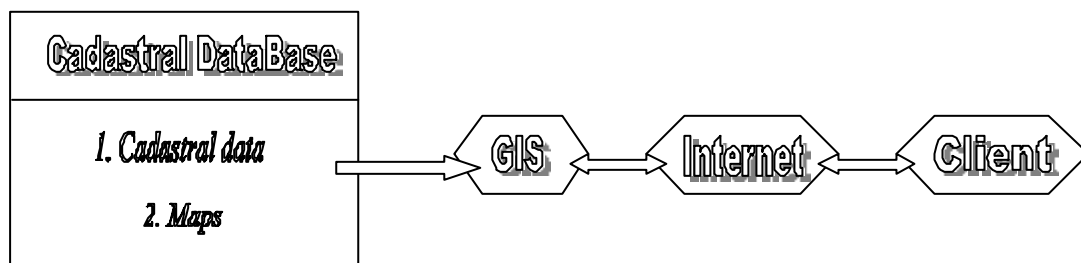

Figure 1:
Cadastre on the Internet

PRINCIPLES OF ORGANIZING CADASTRAL INFORMATION

Organizing and coding. The organization of cadastral data follows the main principles – specifications of the National Cadastre of Greece that refer to the creation of a database as well as data codification. The database that was created was slightly reformed in order to adjust better to the needs of our application.

Simplicity in navigation. The operation of the WebPages goes through predefined cartographic levels. That fact accommodates the client who receives "ready to use" information. The client is not forced to go through a thinking process about the way he should reach the information he wants, since he is led to it.

Secureness of information. The disposal of cadastral information must be done under security measures because of the involvement of interests related to ownership. Namely, information should be protected from the exploitation from a non-licensed third party. The way of its disposal ensures the protection of citizens' rights. Information protection is provided mainly by two means:
1. an access code is required for the general use of the application
2. in order to retrieve cadastral information about owners and ownership, an appropriate code number must be entered. That number is provided by the National Cadastre.
If a client ignores the codes that are mentioned above, the desired information cannot be retrieved.

Simplicity of retrieving information. The nature of cadastral information requires its disposal not only in a secure, but also in an easy way. By entering one code alone, complete spatial and descriptive information is retrieved.

BACKGROUND DATA

Cadastral data. Cadastral data is organized in a database[2] that was created according to the specifications of the National Cadastre[4]. For simplicity reasons, the database does not follow exactly these specifications in order to adjust better to the specific application. Additionally, the data of the database is not real. It was originated for the needs of the project and does not correspond to existing people and real estate. Starting point for the creation of the database was a table containing real data that was modified.

Cartographic background. The maps that are published on the Internet come from two different sources:
1. The map of Greece[6]. The cartographic levels of the map, among others, were regions, prefectures, organizations of local administration (OTA) before the implementation of the program "Kapodistrias" (CD / MD*) and OTA after the implementation of that program (Municipalities). All the cartographic characteristics are acompanied by their geometrical data and some topological information, as it happens with every GIS program.
2. The map of an urban area[3]. This map included streets, land parcels and buildings. There was also a seperation between private and public buildings and land parcels (parks etc).

Other types of data. Some further information that is available during the navigation among the maps, comes from two sources mainly:
1. According to the publication of the newspaper "Imerisia" 20/02/1999, information about the progress of cadastral phases in certain OTA, were retrieved.
2. From the Department of the Interior (http://www.ypes.gr/kapodistrias) information was received about CD / MD and Municipalities.

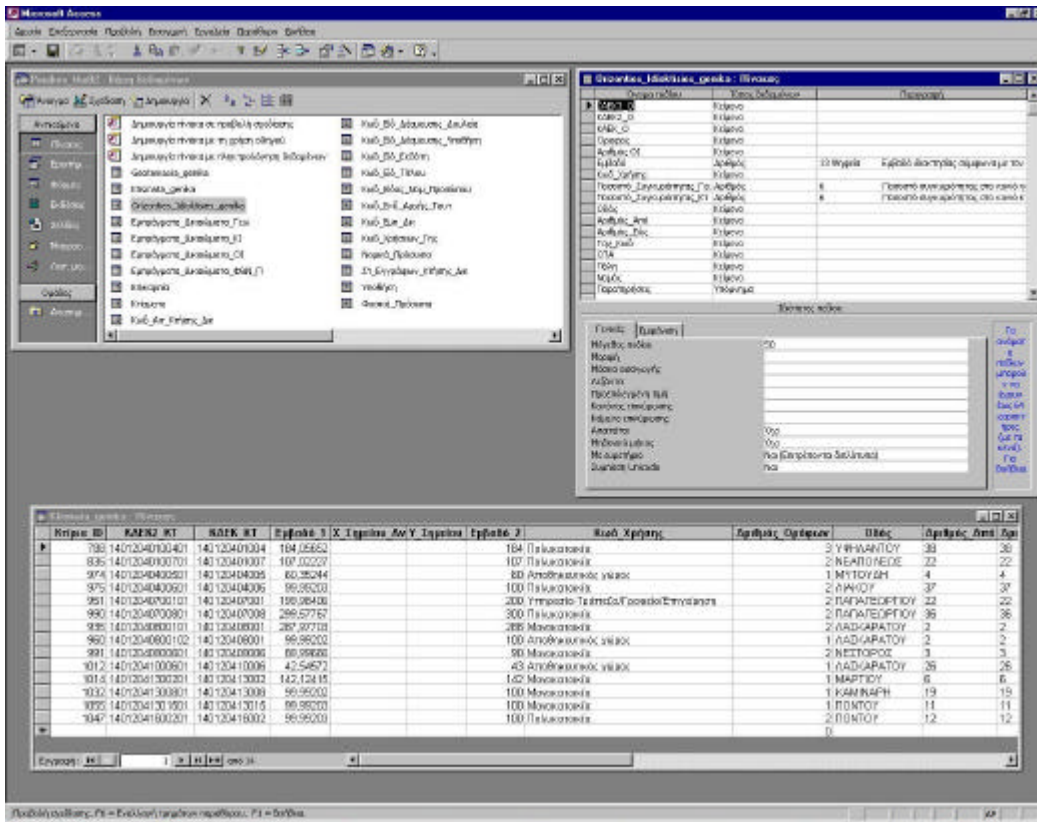* CD = Community Department(s)
* MD = Municipal Department(s)

Image 1:
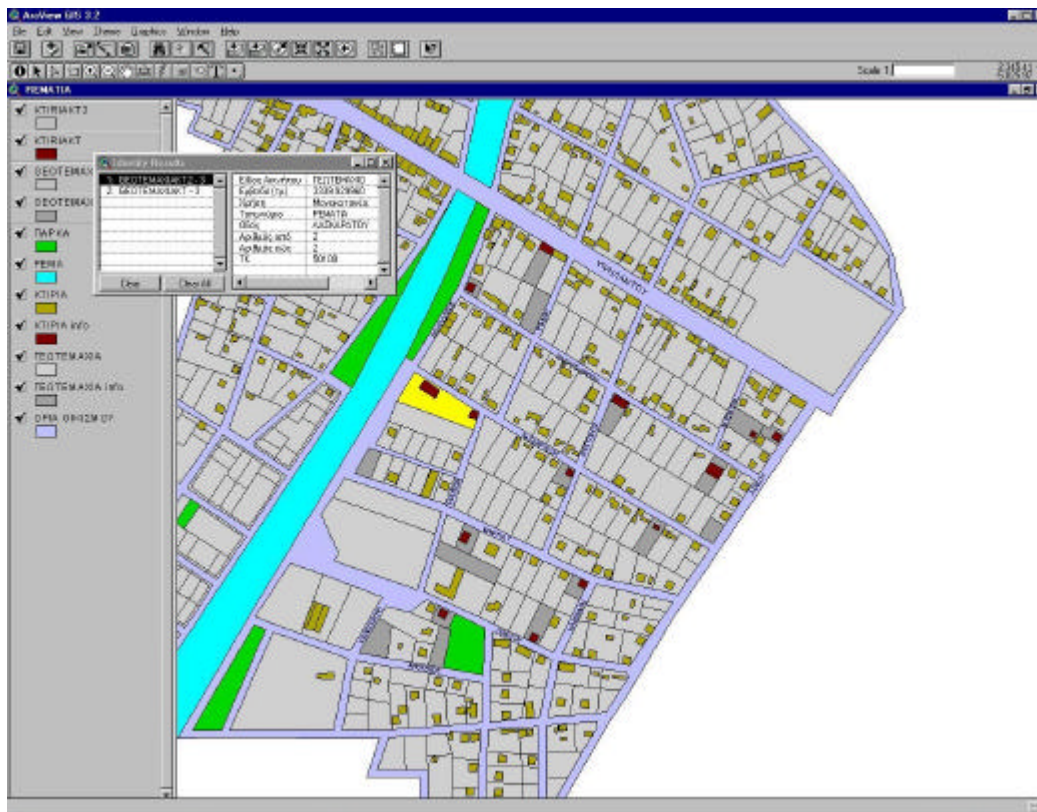Cadastral data organized in a database (MS Access)

Image 2:
Cartographic background in ArcView

ORGANIZING THE INFORMATION

The development of the project required the combination of programs and programming languages, in order to achieve the desired outcome. That outcome is a correctly organized GIS that is published on the Internet in a friendly environment.

MS Access. The database, which was created with MS Access, contains the entire cadastral data organized in tables, according to the specifications of the National Cadastre. In this database lies the cadastral data that can be retrieved from the Internet. The information comes from queries suitably created in Access, in order to describe completely the subject that the client searches.
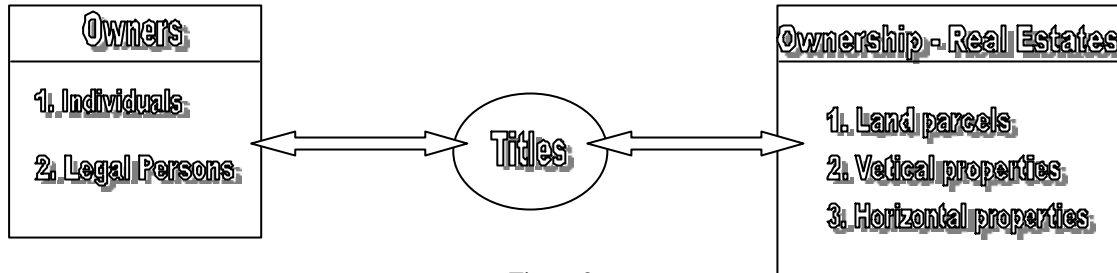

Figure 2:
Logical Schema of a Database

ArcView. The GIS software that was used is ESRI ArcView. Using the initial cartographic background created all the maps of the application. The GIS was enhanced with the appropriate extra data from the database that was created with MS Access.

ArcView Internet Map Server (IMS). The maps of the application were created with ArcView and were presented on the Internet with ArcView IMS program. Therefore, all the maps are "dynamic", except for the map of Greece, which is an image (jpeg). That means that the maps on the Internet are constantly interactive with those in ArcView and are always updated. By defining several operations to the maps, a client – user has the opportunity to manipulate them and retrieve information from them.

HTML. The documents that appear on the Internet and include the maps, the cadastral information and the rest of the WebPages that were created, were written with the HTML programming language. HTML is a code that defines the appearance and structure of scripts on the Internet.

Java. Java is a programming language that provides the Internet with dynamic information. It is widely used by ArcView IMS, in order for the maps to be published on the Internet and to be "dynamic" and interactive with a user at any time.

CGI, PERL. Cadastral data that is disposed on the Internet and controlled transference to a WebPage with a password operate with the help of a CGI (Common Gateway Interface) application with Perl programming language[7, 8]. In this way the communication between the database in MS Access and the maps in ArcView – ArcView IMS is succeeded. The proper code, according to the kind of information, is entered to a specific part of the WebPage outside the map.
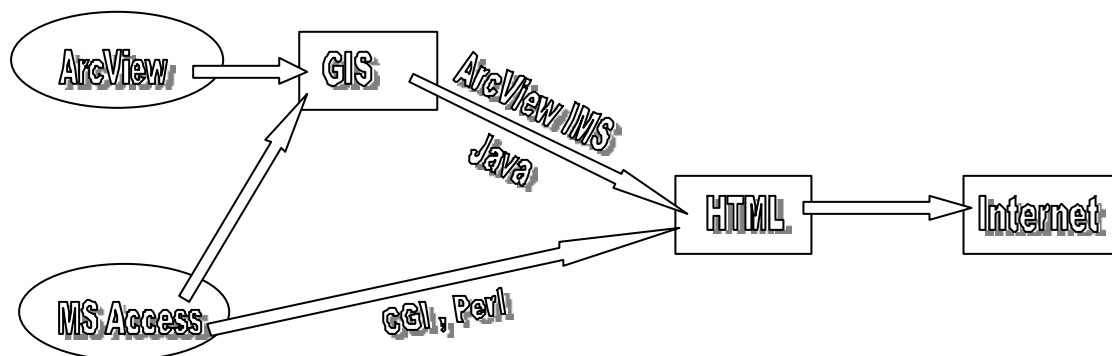

Figure 3:
Means of setting up information on the Internet

The main part of the project consists of the Website on the Internet. The URL is http://ael.topo.auth.gr/gis -net.html.

During the navigation in the Website, two information levels are noticed:
1. The information that is at the disposal of all clients – users of the application and concerns the evolvement of the cadastral phases. That was considered necessary in order for someone to find out if the Cadastre is in progress in the area of his or her interest.
2. The cadastral information that is only at the dis posal of the owners who are familiar with the codes of the National Cadastre.

The Website consists of the following WebPages:

Initial page. There are links to other WebPages and instructions for the better operation of the application.

Greece. Here appears the map of Greece. On that map, the 13 regions that the country is divided to, can be selected. Furthermore, a user can select the name of a municipal or community department and go directly to the respective map where cadastral information is available, avoiding the cartographic levels in-between.

Regions. On the 13 maps of the regions, appears the progress of the cadastral phases. The phases refer to the CD / MD (before the implementation of the program "Kapodistrias"). However, the Municipalities (after the implementation) are also depicted.

Regions of Northern Greece. In these regions additional information about CD / MD is available. This information can be retrieved by "clicking" on a CD / MD in which Cadastre is in progress. Specifically, the available information is about the cadastral phase, population and area of the CD / MD and the names of both CD / MD and Municipality.

Prefecture. On this map the municipals and communities that consist the prefecture are depicted.

Municipality. Here are depicted the CD / MD (Community or Municipal Departments) that may consist the new Municipality.

CD / MD. The Cadastral Units (CU) in which a Community / Municipal Department might have been divided to, are visible.

Entering Access Code. By choosing a CU, a new browser window appears on the screen requesting the entrance of an access code (password) that will allow a user to visit the next WebPage. This page has been created with the prospect of controlling the access of users and allowing a limited number of entrances per user in the application. Thus, the application could be exploited by selling entering codes to those who want to retrieve cadastral information from the Internet.

Cadastral Unit. The navigation among the maps ends here. In this state, users can retrieve general information about land parcels and buildings. Additionally, if a user knows the codes of his real estate or his own identification code, he can retrieve general information about owners and horizontal property, or complete cadastral information. Ending, he can find the land parcel's or building's position on a map.

According to the above description, it is obvious that map succession is strictly predefined. Users are not allowed to interfere with maps, with the exemption of very few cases. That happens in order to allocate the information. The allocation, however, requires an appropriate cartographic subbase, which is expected to be provided by digital maps that have or are going to be created in the range of cadastral cartography.
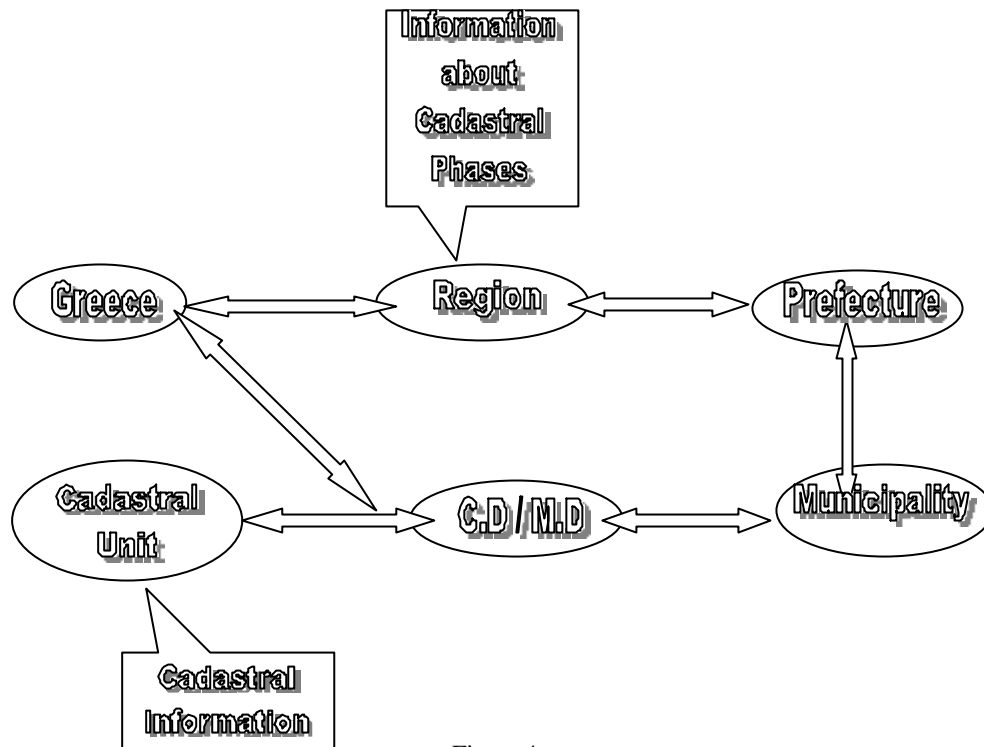
Figure 4:
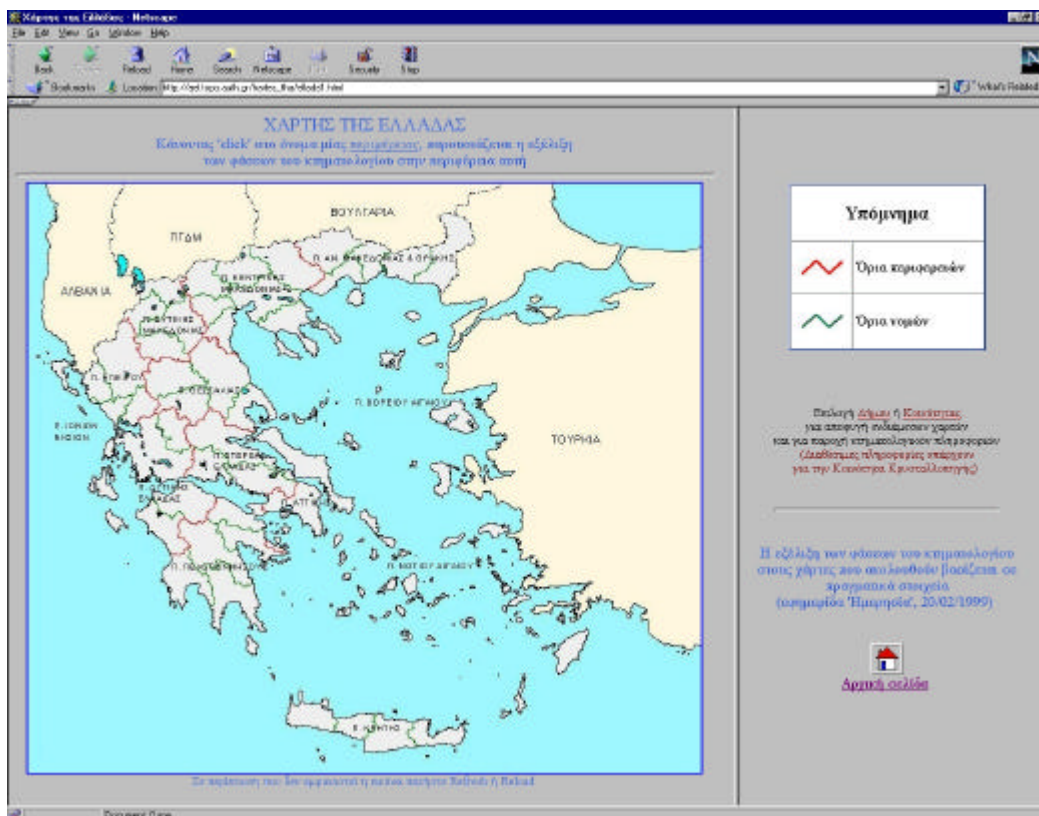From Greece to a Cadastral Unit – the Website

Image 3:
Map of Greece with the 13 regions
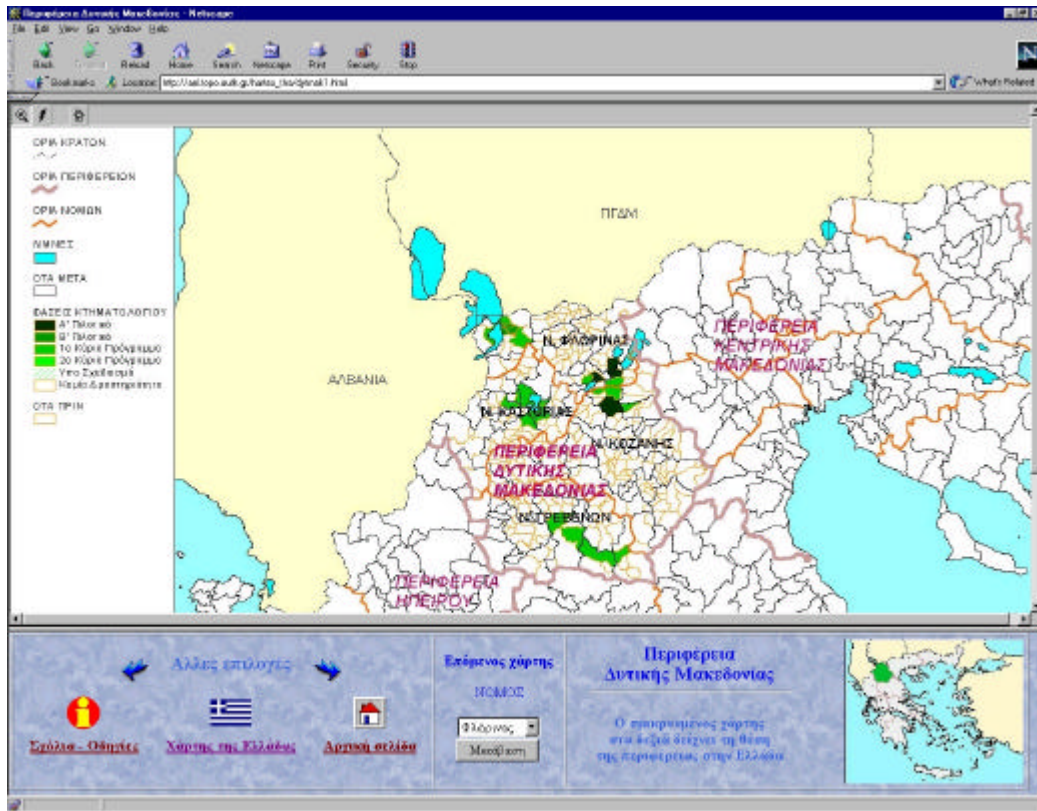On the right, link for direct visit to an OTA

Image 4:
The region of Western Macedonia In the bottom: Link to a prefecture
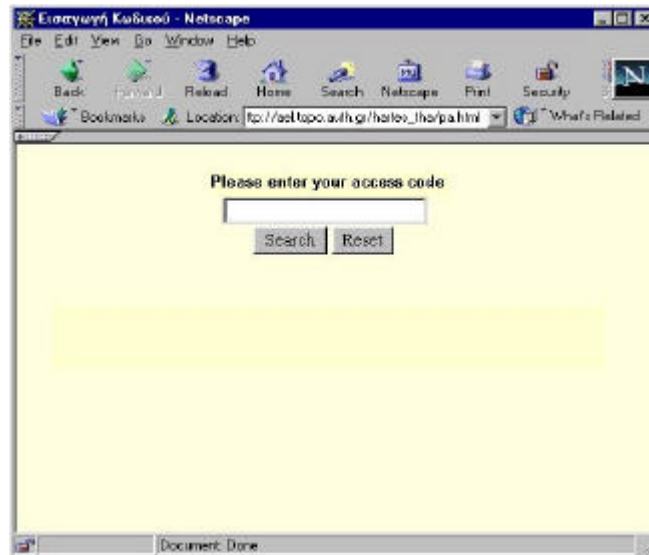

Image 5:
Access code requirement

Image 6:
A cadastral unit with information available

CONCLUSIONS

After the completion of this project and the functioning of the application on the Internet, some overall notes can be reported.

1. The aim of setting up information on the Internet was its allocation in small groups. Going from one map to another and retrieving cadastral information can be accomplished with the selection of a simple name or the insertion of a code. By this way, the usage of the application is being simplified and the client – user is not "lost" in the enormous body of information of a GIS.
2. The separation of maps in several levels and the passing from an upper to a lower administration level is turning out indispensable, if we take into account that the application has been designed theoretically for the whole of Greece. Cadastral information is provided separately for every cadastral unit. A cadastral unit is reached from the corresponding map of upper administration level. (community / municipal department, municipality, prefecture, region). By this way, a greater speed in retrieving information is being obtained.
3. Information updating is being held in tables that contain a very small body of elements. Checking for the correct registration is easily made via the KAEK*, so the possibility for a mistake is eliminated (the first nine numbers are common for the same cadastral unit).
4. A client just has to know the cadastral unit where his real estate lies and its KAEK or his Identification Code, in order to retrieve cadastral information (if not the cadastral unit, then the community or municipal department in which the cadastral unit is coming under). By knowing his IC, he can get the KAEK of his ownership. In contrary, with the use of KAEK he will not get his IC but he can find the exact location of the real estate on the map.

The usage of the Website is simple and well understandable even for someone without knowledge of the Internet.

* KAEK = Code Number of National Cadastre

PROSPECTS

The present application could be modified so that it would cover a greater spectrum of operations. For the expansion of its usage, various proposals are being provided:
1. Completion of an ownership return from distance (via the Internet)
2. Submission of an objection from distance
3. Information updating from distance
4. Enhancement of data with elements in point of real estate values and extraction of relevant information
5. Extraction of statistical information with proper data processing

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23. WorldWide Language Institute http://netglos.com/greek.php êáé http://netglos.com/english.php

* DoCPaC = Department of Cadastre, Photogrammetry and Cartography
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