

## **National Report: Existing Activity in Geoinformatics and the Need for a NSDI in Greece**

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The main cartographic activity in Greece, for a hundred and ten years, has been concentrated and implemented under the responsibility of the *Hellenic Military Geographical Service (HMGS)*, which belongs to the *Ministry of Defence* [1]. Among its other activities, HMGS is the responsible service in Greece for the compilation and maintenance of the main map series, that cover the whole country, scales 1:5,000 and 1:50,000. Most of them are by now digitized (the scale series 1:50,000 is already finished) to create the Digital Elevation Database covering the whole country.

HMGS is also active for many geodetic field surveying, and photogrammetric work, such as:

- establishment and maintenance of trigonometric networks,
- compilation of the leveling measurements,
- gravimetric networks,
- use of GPS technology and the revision of the map series through GPS measurements,
- establishment of magnetic stations,
- digitizing of the existing map series in analog format and
- photogrammetric work concerning flights for the acquisition of aerial photography, printing of air photos, magnification, and production of diapositives to meet requirements of HMGS or other public and private agencies, aerial triangulation, digital stereorestitutions, production of orthophotomaps, and production of photomaps and mosaics from satellite images.

HMGS is also carrying out a digital cartography project for the compilation and the revision of the following map series using digital methods: 1:100,000, 1:50,000 of military use, 1:500,000 of military use, 1:1,000,000 of general use, 1:1,000,000 touristic map, production of relief maps of 1:100,000, production of VMAP project at the scale of 1:250,000, production of Digital Terrain Model at 100m resolution for the whole country, and at 30m resolution for smaller areas.

In the year 1986, the *Hellenic Mapping and Cadastre Organization (HEMCO)* was established, by Law 1647 [2]. HEMCO is a new public organization, which belongs to the *Ministry of Environment, Physical Planning and Public Works*, and, according to that Law, it is responsible for the mapping of the country, the implementation and the running of the Cadastre, and for the creation of Databases for the national resources and the environment. The most serious activity that HEMCO ever undertook began in July 1994, when the big project for the establishment of the Hellenic Cadastre (HC) was ratified, by the Hellenic State and the European Union. The HC is planned to be a Spatial Information System for the whole jurisdiction, which will improve

the efficiency of land transactions and guarantee the land tenure. In addition it will provide all levels of information to both private and public sector, necessary for land management/ administration, urban/ rural planning, agricultural policy, and environmental monitoring. Responsible for the compilation of the HC project is KTIMATOLOGIO SA, a private company, which belongs to the Ministry of Environment, Physical Planning and Public Works and is supervised by the Ministry of Environment, Physical Planning and Public Works. The basic mapping work for this purpose is produced photogrammetrically, at scales 1:1,000, in urban areas, and 1:5,000, in rural areas. The scale 1:5,000 is already used for the topographic map series for general use produced by HMGS and which cover the whole Greece. Parallel to that, a series of forest orthophotomaps at the scale of 1:5,000 are been compiled for the whole jurisdiction. All cartographic and textual information collected through this project is in digital form. During the period 1994-2000, through the compilation of the HC, cadastral spatial data are collected for a total of approximately 850,000 hectares, which represents approximately the 6% of the total area of Greece. These data refer to the areas, which are under cadastral survey and are scattered over most of the Greece.

In addition to the above project, HEMCO also produced the project CORINE-LAND COVER for Greece, which is a digital SIS for the land cover of the whole jurisdiction, derived from satellite images and air photos of the period 1987-1990, at the scale of 1:100,000 with a resolution of 30m on the ground. This project is similar with the projects executed in most European countries. HEMCO was also responsible for the European project LACOST, for monitoring the land use of European coasts, at a width of 10km along the coastline, at the scale of 1:100,000. HEMCO has also prepared a database for the digital administrative data of the country with the accuracy of the scale 1:50,000, the road network with the accuracy of the scale 1:250,000 [3].

Significant cartographic and SIS activity can also be found at other divisions of the Ministry of Environment, Physical Planning and Public Works, like:

1. the *Athens Planning Division*, where orthophotomaps of the area of Attica, at the scales of 1:50,000, 1:150,000, 1:25,000, 1:5,000 etc, are available
2. the *Environmental Planning Division*, where there is a SIS with the digital information of the map series 1:50,000 at various layers available, produced by HMGS, in combination with the administrative data produced by HEMCO and other necessary information derived from urban planning studies and other sources. Also, there is digital information available referring to the program NATURA. This Division also undertook some activity within the 2<sup>nd</sup> Community Support Framework, [4] for:
  - a. The creation of a National Environmental Information Network, which is an integrated information system for registration and processing of data concerning a wide range of topics related to the environment at local, regional and national level. This network will become the main

mechanism for the maintenance and management of national information with regard to European issues, providing input, at the same time, to the European Environment Agency.

The National Environmental Information Network is by nature extendable and, in its final structure, it will include all existing environmental monitoring networks. The system will be inter-connected with other relevant networks, like the Physical Planning Network and YDROSKOPIO (IS of hydrological data), as well as the European EIONET network. A pilot operation is tested in two regions.

- b. The implementation of an IS for a decision making Physical Planning System at local, regional and national level. The progress of this project so far includes the compilation of the Technical Specifications for the IS, the implementation of the Physical Planning Observatory Network, the compilation of digital maps at the scales of 1:250,000 and 1:50,000. The database also includes basic information related to the environment, basic information included at the program YDROSCOPIO, program NATURA, the basic road network, archaeological sites, general urban planning maps for cities larger than 5,000 citizens, etc. The total volume of digital data of the system is 4,5 G bytes. This project is in coordination with the relevant European spatial planning observatory network, ESPON
  - c. The implementation of an information system for Transportation management at national level but with an emphasis on the big cities of Athens and Thessaloniki and the surrounding areas.
  - d. The creation of operational risk assessment centres equipped with a powerful SIS for major industrial accidents management by providing quantitative estimation of the accident consequences and proposals of a reliable course of actions to be undertaken automatically. So far, three systems have been established, at the regions named: Thriasion Pedion of Attica, Perama and Thessaloniki [5].
  - e. Categorization and mapping of ecosystems at areas of European and national interest. A geographic database for the various types of flora and fauna is created.
  - f. A database for hydrological and meteorological data at national level (YDROSCOPIO) is created.
3. the *Topographic Division*, where there are urban topographic maps of 1:1,000, used for the compilation of the urban planning studies in the whole country.

Relevant activity exists at the *Ministry of Agriculture* and especially at the *Surveying Department*, where there are maps that cover almost the 35% of

the rural land. The total rural land in Greece is estimated to be 4,000,000 hectares. These maps are:

- digital orthophotomaps, available at the scale 1:5,000 (but with the accuracy of 1:10,000) acquired from airphotos of 1:40,000 taken in the year 1996. These orthophotomaps cover 60,000 square kilometers of rural land and constitute the basic map series for the monitoring and management of the cultivated land according to the reformed common agricultural policy of the European Union.
- DTM is also produced during the compilation process of these digital orthophotomaps
- A similar size project is being compiled for olive trees and vineyards
- Land consolidation maps (1:5,000 and 1:2,000) for more than 1,000,000 hectares of rural land

The *Department for Forests and Natural environment* of the Ministry of Agriculture has also produced analog orthophotomaps of 1:20,000 for the period 1970-85 and 1960-70, and maps of 1:200,000, for the period 1987-97, which contain information about the vegetation, the climate and the ground, etc.

A great amount of work has been done at the *Institute of Geology and Mineral Exploration* of the *Ministry of Development*:

- existing analog, color geological maps of 1:50,000, which cover the whole country, are at the moment being digitized
- map series of varying scales (1:20,000 up to 1:1,000,000) for special studies

At the *National Statistical Service of Greece*, which belongs to the *Ministry of National Economy*, the available data are:

- color geophysical maps at a scale of 1:1,000,000
- Color maps of all prefectures at a scale of 1:200,000
- Topographic urban maps (1991) at the scales of 1:5,000, 1:2,500, 1:1,000
- New thematic map of land uses at a scale of 1:100,000 is under preparation
- The 2001 census, will be based, for the first time, on GIS technology and all the collected data will be in digital form. As an example the agricultural census will include 17 land use/land cover categories.

At the *Hydrographic Service* of the *Ministry of Defense* the available data are:

- General nautical maps at scales from 1:4,200,000 up to 1:500,000
- Nautical maps at the scales of 1:300,000, 1:250,000, 1:150,000, 1:100,000, 1:95,000 up to 1:50,000, and from 1:45,000 up to 1:2,000 of the Ionian and Aegean Seas

- Diagrams of 1:1,000 and 1:500 of the coast line of the country are being prepared

A great amount of digital data also exists at the *Local Authorities* or in *private companies*, which are involved in studies like surveying, urban planning, utility networks etc, especially for the local authorities, public services or research programs.

The Hellenic Government and the Ministry of Environment, Physical Planning and Public Works are very well aware of the rapidly increasing prominence of spatial data handling within all the above mentioned organizations and the urgent need and usefulness of a NSDI. The concept of efficient coordination and data sharing is mature enough, and at the near future an action plan by HEMCO, will try to transform the traditional approach to *a new spatial data collection, coordination, management and sharing system* [6]. A preliminary pilot study has been prepared, which describes in some detail the potential requirements, components and functions, which will contribute to a NSDI implementation plan. According to the main concept, the national spatial infrastructure will encompass the basic data and metadata, sources, systems, network linkages, standards and institutional and personnel issues, like agreements between member organizations/ agencies, access mechanisms, delivering and pricing policy to the widest possible group of potential users. The goal of this project is to integrate all available spatial information, define and eliminate existing problems, reduce duplications of effort in basic mapping by end-users, enhance the linking together of major sources and users into a network, encourage the cooperation between private agencies, local authorities and public organizations, that are responsible for the management of land-related information, and improve spatial data exchange and availability of information for the common benefit.

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