



**NATIONAL CADASTRE  
& MAPPING AGENCY S.A.**



## **Country report of Greece**

## **National Spatial Data Infrastructure**

**Submitted To the United Nations Committee of Experts  
On Global Geospatial Information Management (UN\_GGIM)**

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## **ACRONYMS**

N.C.M.A S.A	National Cadastre and Mapping Agency S.A
HE.M.C.O	The Hellenic Mapping and Cadastral Organization
H.M.G.S	Hellenic Military Geographical Service
N.S.D.I	National Spatial Data Infrastructure
G.I	Geographic Information
N.G.C	National Geoinformation Committee
F.P.N	Focal Point Network
N.F.G.S.I	National Framework for Geoinformation and Services Interoperability
HE.PO.S	Hellenic Positioning System
P.D	Presidential Decree
G.I	Geographical Information

## **1. Executive summary**

Spatial data is crucial and widely used in the modern society as an important source of information for visualization, analysis and decision making.

Currently, spatial data is produced by many different organisations on national, regional and local level. Efficient production, maintenance and use of the information imply co-ordinated actions between the different stakeholders.

The data is currently stored in different database systems, are based on different specifications or has undefined quality. It can also be difficult to find data of interest or to get the access rights to such data. Therefore, it is of vital interest to facilitate the users to search, find and get access to data needed. The users should also only have to go to one single point – the national portal for spatial information to find both information about the spatial data available, their quality and the usage rights.

Therefore, the need remains in Greece for the establishment of the National Spatial Data Infrastructure (N.S.D.I) that will coordinate and create interoperable spatial data and services within the framework of INSPIRE Directive.

Today, the information and knowledge for the necessity of this national task has spread widely while the preparedness of the main players has been improved in order for them to be able to contribute to it within the framework of INSPIRE Directive and e-Government activities.

Recent institutional and organizational reforms (2013-2015), integrated the cadastral, mapping and N.S.D.I legal responsibilities, under one authority, the National Cadastre and Mapping Agency S.A (N.C.M.A S.A).

Speeding up the reorganization of the N.C.M.A S.A, the compilation of its strategic and business plan, securing financial sustainability, enactment of legal and administrative measures for the sharing of spatial data and services among public authorities, proceeding to the completion of the national cadastre and of the of forest maps towards the creation of the N.S.D.I of the country within the European and global context are essential for better decision making and for meeting broad national and international objectives such as economic growth, emergency preparedness and response, social cohesion and well-being as well as responsible resource management. It is important to have a long-term approach, but at the same time work with step wise actions and show concrete results.

In the coming years, access to spatial data will be essential both for a digital public administration, for innovation and value creation, for efficient and rational policy making under rapidly changing conditions, providing new opportunities for businesses.

## 1. Introduction

Greece, covering an area of 132.000 sq. kms, is strategically located at the crossroads of Europe, Asia and Africa and situated on the southern tip of the Balkan peninsula.

Greece has the longest coastline on the Mediterranean Basin and the 11th longest coastline in the world at 18.400 km in length, featuring a vast number of approximately 2.000 islands (a total of 9.800 including small rocky islands), 228 of which are inhabited. The area of Hellenic seas is 470.000 sq. kms. Eighty percent of Greece is mountainous, Mount Olympus being the highest peak at 2,917 m.

The modern Greek State, which was established in 1830, following the war of independence from the Ottoman Empire, traces its roots to the civilization of Ancient Greece, which is considered the cradle of Western civilization. As such, Greece is the birthplace of democracy, Western philosophy, the Olympic Games, Western literature, historiography, political science, major scientific and mathematical principles and Western drama.

According to the 2011 census, Greece's population is around 11 million. Athens is the nation's capital and largest city, followed by Thessaloniki, which is the second largest city and it is commonly referred to as the co-capital.

A founding member of the United Nations, Greece was the tenth member to join the European Communities (precursor to the European Union) and has been part of the Eurozone since 2001. It is also a member of numerous other international institutions, including the Council of Europe, NATO, OECD, OSCE and the WTO. Greece, which is one of the world's largest shipping powers, has the largest economy in the Balkans, where it is an important regional investor.

The current administrative structure, established by "Kallikratis Program", introduced on the 1<sup>st</sup>/1/2011, by Law 3852/2010, includes seven Regional Administrations, thirteen Regions and 325 Municipalities.

The mapping activity in Greece has been and, to a relatively large extent, still is dispersed in various public agencies and bodies under the auspices of several Ministries while the production and management of geoinformation remains under no uniform technical and institutional framework.

The main cartographic activity in Greece -for more than a hundred and ten years- had been undertaken by the Hellenic Military Geographical Service (H.M.G.S).

The Hellenic Mapping and Cadastral Organization (H.E.M.C.O) had been founded by Law 1647/1986, as the Civilian National Mapping Agency, under the auspices of the Ministry of Environment, Physical Planning and Public Works of that time. Its purpose had been the compilation and maintenance of the national cadastre, the geodetic coverage and the mapping of the country, the assessment and mapping of the natural resources and the creation of a land and environment data base.

In 2000, the H.E.M.C.O made a concrete proposal for the development of the National Spatial Data Infrastructure (N.S.D.I) called Nagii or NaGi2: National Geographic Information Infrastructure. Since then there has been an increasing level of awareness and move towards launching a formal N.S.D.I initiative with wide participation and linkages to the e-government activities, and other relevant European initiatives, such as INSPIRE.

At that time, due to the lack of a general national or European framework for an Interoperable Spatial Data Infrastructure, no coordinated national activities took place towards the creation of the N.S.D.I, due, mainly, to the lack of information and resources and to the reluctance of the public agencies to cooperate and exchange spatial data, considering them as their own property. Whichever attempts to digitize analog data or to produce new digital ones were taking place as non-coordinated, heterogeneous and non-interoperable activities. This situation was also due to the limited penetration of modern technologies in the Public Sector, a fact which stunted the various agencies to take advantage of using digital spatial data through the development of specialized applications.

Subsequently, through the gradual penetration of modern technologies in the Public Sector and due to new funding tools under the European Structural Funds, a considerable number of activities took place that led to the gradual modernization of the spatial data infrastructures. The most coordinated attempt towards the development of a uniform N.S.D.I took place through the funding under the European Structural Funds and especially the Third Community Support Framework : Operational Program – Information Society (O.P.I.S), Action 2; Citizens and Quality of Life, Measure 2.4: Regional Geographic Information Systems and Innovative Actions. This was planned following the directions of e-Government and e-Europe and of European and Global Spatial Data Infrastructures as well as the (then) INSPIRE initiative.

In 2003, mainly due to the lack of the necessary legal framework for the establishment of the N.S.D.I, this initiative was decided to be materialized by the "Information Society S.A" ([www.ktpae.gr](http://www.ktpae.gr)) itself by providing funding to some of the major national geographical information (G.I) producers and distributors, under the condition that they will contribute to the N.S.D.I.

The attempts to implement projects contributing to the application of INSPIRE Directive, through the Operational Program "Information Society," were the most coordinated, focused and of the highest ever budget for similar projects. The implementation of these projects has created innovative procedures within the various public agencies, simplifying the every day work through automation and allowing the systematic updating of spatial data optimizing, at the same time, the decision making processes. Moreover, it increased the effectiveness of the agencies improving the level of services provided to the citizens, enhancing and promoting the upgrade of the public administration.

Within the above framework, agencies like the Hellenic Military Geographical Service, the Hellenic Mapping and Cadastral Organization, the Special Secretariat for Water, the Directory of Road Infrastructure, the Institute for Geology and Mineral Exploration, the Directory of Surveying of the Ministry of Agriculture etc have digitized and made their spatial data sets accessible through the Internet.

The knowhow acquired, improved the management of digital spatial data at a national, inter-regional and local level and contributed to the realization, by most stakeholders, of the need for the establishment of the N.S.D.I and for coordinating the activities required for the purpose.

### **3. The National Spatial Data Infrastructure (N.S.D.I)**

#### **3.1 INSPIRE Directive**

EU INSPIRE Directive (2/2007/EU) aiming at the creation of a European Spatial Data Infrastructure is legally binding 27 Member States individually, including Greece. The intention is that the combined actions of the Member States should lead to greater interoperability among their geospatial data and licensing regimes.

INSPIRE Directive requires the compliance of Member States National Spatial Data Infrastructures with the provisions of the Directive at institutional, organizational and technical level. INSPIRE is a Directive of the European Parliament and Council which lays down general rules aimed at the establishment of an INfrastructure for SPatial InfoRmation in the European Community, for the purposes of Community environmental policies and policies or activities which may have an impact on the environment. The rules should improve sharing of spatial information among public sector organisations and also facilitate public access.

The Member States are required to take action in a number of related areas:

- Comply with 34 data theme specifications (reference geographies and environmental– datasets), harmonising data and services in order to make these "interoperable"
- Provide catalogues that allow users to identify what information is available– (metadata);
- Create an access point that makes it possible to find data and services;
- Provide online services such as discovery (to find out what data exists), view (to– display, navigate, zoom in/out, pan, or overlay viewable spatial data sets), download (to obtain the data) and transform (to enable data interoperability);
- Authorities within the Member States to have licensing arrangements that allow information to be shared between themselves and with institutions at EU-level, accessed and used in accordance with Freedom of Information legislation, the Environmental Information Regulations and the Public Sector Information Regulations;
- Set up e-commerce arrangements where charging is applicable;
- Monitor the implementation and use of their infrastructures and to report on the implementation to the Commission;
- Introduce co-ordination mechanisms to ensure effective operation of the infrastructure.

#### **3.2 The national legal framework for the establishment of the N.S.D.I**

In 2007, when INSPIRE Directive came into force, the Ministry of Environment, Physical Planning and Public Works of that time was responsible for the transposition of the Directive into national legislation and for establishing the organizational scheme and the coordination structure for the effective implementation of the Directive throughout the public sector.

The Hellenic Mapping and Cadastral Organization (HE.M.C.O), the Civilian National Mapping Agency, under the jurisdiction of the Ministry of Environment, Physical Planning and Public Works, was assigned by the Secretary General of the Ministry (Decision no 168237/14-6-2007) as the national contact point between

European Commission and Greece representing the country in INSPIRE Committee of article 22 of INSPIRE Directive.

In the period 2007-2010, the Hellenic Mapping and Cadastral Organization (HE.M.C.O), representing Greece at the INSPIRE Committee of the E.U, carried out several awareness raising activities, including presentations at the national parliament, undertook the editing of the translated Implementing Regulations and Decisions of the Directive, participated in the working group of the Ministry of Environment for drafting the law transposing the Directive into Greek legislation, compiled an inventory of the public services producing and maintaining spatial data falling within the scope of INSPIRE Directive.

In 2010, based on a new draft, **Law 3882/2010 transposed INSPIRE Directive into Greek legislation**, defining the Hellenic Mapping and Cadastral Organization (HE.M.C.O) as the legally mandated body to develop and operate the National Spatial Data Infrastructure (N.S.D.I).

The scope of Law 3882/2010 (article 15) was extended with respect to the scope of INSPIRE Directive, comprising even non-georeferenced, analog and local topographic diagrams and maps, irrespective of their currency, reliability and usability.

The organizational structure foreseen by Law 3882/2010 comprises:

**a) the National Geoinformation Committee (N.G.C)**, a high level political body, chaired by the Minister of Environment and amenable to the Prime Minister. The N.G.C is competent to decide, recommend and express opinions, concerning the national geoinformation policy, ensuring the necessary coordination of the entire public sector for achieving the objectives of Law 3882/2010. It is comprised of 15 members: the Minister of Environment, nine General Secretaries of respective Ministries, the President of the Hellenic Statistical Authority, the Commander of the Hellenic National Meteorological Service (or the Commander of the Hellenic Military Geographical Service or the Commander of the Hellenic Navy Hydrographic Service), the President of HE.M.C.O, the Legal Counsel of the Ministry of Environment and the Director of the Political Bureau of the Prime Minister. The composition of the N.G.C, presents gaps and overlaps with respect to the main players in the production and maintenance of spatial data sets and services within the scope of INSPIRE Directive, depends on the current structure of the Government while its members are personally nominated. As a result, every change in the composition of the Committee leads to a time consuming formal reconstitution procedure.

Moreover, the need for frequent reconstitution of the N.G.C adversely affects the consistency and continuity of the decision making process as well as the effectiveness of the planning and implementation of the N.S.D.I.

The N.G.C was constituted for the first time by the Decision of the Minister of Environment 57880/2010 and convened only twice, in 2011 and 2012.

**b) a Focal Point Network (F.P.N)**, a coordination structure of 350 committees of a total of 2.500 members, spread through Ministries, Municipalities and Regional Authorities that contributed to the compilation and maintenance of the national catalog of existing spatial data sets and services and their metadata. Since the structure of the F.P.N corresponds to the current structure of the government, there is a frequent need for a time consuming reformation of these

committees by decisions of the respective public bodies. Since 2013, following an incomplete attempt for its reorganization, the F.P.N has been rendered inactive.

The enactment of Law 3882/2010 requires the compilation and adoption of its following two **Implementation Acts** (not foreseen by INSPIRE Directive) that will be legally binding for all public agencies whose legal responsibilities fall within the scope of Law 3882/2010. These Implementation Acts would be compiled by HE.M.C.O, then introduced to the N.G.C for its consent and finally to the Cabinet for final approval. These documents are supposed to be reviewed at least once a year, or modified, if necessary, following the above procedure:

**a) the National Framework for Geoinformation and Services Interoperability (N.F.G.S.I)**

The N.F.G.S.I defines the technological measures for securing the interoperability of spatial data sets and services. It will specify the provisions of Law 3731/2008 (article 27), concerning e-government services, as applied to spatial data sets and services. The technological interoperability standards that will be implemented for the sharing of N.S.D.I geospatial data sets and services will be included in the N.F.G.S.I, ensuring compliance with the standards adopted by INSPIRE Directive.

**b) The National Geoinformation Policy (N.G.P)**

The N.G.P will define the rules governing the production, maintenance, sharing, re-use and -where applicable- the pricing of public geoinformation, since no single geoinformation licencing framework exists in the country. The quality assurance of procedures and the quality standards of geoinformation and services will be determined in the N.F.G.S.I and the N.G.P.

The drafting of the N.F.G.S.I and the N.G.P, the development and initialization of the N.S.D.I information system and of the National Geoportal would be co-funded by the European Union and the Greek State, through the Fourth Community Support Framework ("Digital Convergence" Operational Program NSRF 2007-2013), but they were finally excluded from the Program due to delays in the procurement procedures.

**3.3 Implementation and status of the N.S.D.I**

Since September 2010, following the adoption of Law 3882/2010, the HE.M.C.O undertook awareness raising and supportive actions for the enactment of this Law. Especially for **monitoring and reporting purposes**, according to Commission Decision 2009/442/EC, a spreadsheet application (excel) was developed, with built-in macro code language Visual Basic for Applications (VBA), to compile the catalog of existing spatial data sets and services including all the necessary metadata elements according to INSPIRE Regulation 1205/2008. Moreover, at the beginning of 2012, 837 **metadata files** were created by the members of the F.P.N and were submitted to the HE.M.C.O. These have not been updated since, not checked nor have they been made accessible through an operational discovery service on the Internet, according to INSPIRE Directive.

Applying Monitoring and Reporting requirements, according to Commission Decision 2009/442/EC, Reports on the implementation of INSPIRE Directive in Greece Indicators for 1600 datasets and 60 web services can be found in: <http://inspire.ec.europa.eu/index.cfm/pageid/182>.

Nevertheless, the creation and official approval of the **National Catalog of spatial sets and services** and the corresponding officially assigned respective "owners", that is, the public authorities responsible for their production, maintenance and dissemination, as foreseen by Law 3882/2010, will be part of the N.G.P.

Towards the creation of the N.S.D.I and of the National Geoportal (article 25 of Law 3882/2010), a number of information systems have already been developed that gather valuable information about the environment, energy, natural assets, land cover etc. Users should refer to the websites of the public authorities (see Appendix) operating and maintaining them. In many cases there are no suitable programming interfaces (APIs) so that data could be integrated into other applications. A limited number of operators make their data available through interoperable web services, as for example: the Regulatory Authority for Energy (<http://www.rae.gr/geo/>) and the Special Secretariat for Water (<http://thyamis.itia.ntua.gr:8080/geonetwork/srv/en/main.home>), both belonging to the Ministry of Reconstruction of Production, Environment and Energy.

Despite the transposition of INSPIRE Directive, the planning and implementation of the N.S.D.I has not made satisfactory progress, neither in technical nor organizational aspects. The N.G.C and the F.P.N, comprising the organizational scheme, remain to be reconstituted and enacted through the respective formal procedures in order to contribute to the gradual implementation of the legal, administrative and technical requirements of the Directive throughout the public sector at all levels of government.

Moreover, the Country has not yet responded to the timely adoption of the Implementation Regulations of INSPIRE Directive, nor has introduced measures for sharing spatial data sets and services among public authorities. The slow progress in the implementation of INSPIRE Directive inhibits the country from participating in European programs and initiatives and broader spatial data infrastructures.

In summary, the main reasons for the delay in the design and implementation of the N.S.D.I in Greece have been:

- the complexity of the procedures introduced by Law 3882/2010
- the expansion of the scope of Law 3882/2010
- the ineffectiveness of the organizational scheme
- the additional need for compiling the Implementation Acts
- the lack of collaboration and agreements among public stakeholders
- the need for a comprehensive planning based on appropriate project management concepts and practices
- the need for soliciting and securing adequate funding for planning and implementation of the N.S.D.I

### **3.4. Recent legal and organizational reforms for the establishment of the N.S.D.I**

Recently, important legal and organizational reforms took place concerning the integration and access regime to spatial information held by public authorities:

**1)** Law 4164/2013 (article 1) that modified Law 3882/2010 "National spatial data infrastructure – Conformance with Directive 2007/2/EC (INSPIRE) of the European Parliament and the Council".

**2)** Presidential Decree (P.D) 28/2015 "Codification of regulations for the access to public documents and data" (especially articles 56-59), issued according to the provisions of Law 4305/2014 that transposed Directive 2013/37/EU for the reuse of Public Sector Information.

**3)** Law 4269/2014 (article 11) which foresees the digitization and recording of the boundaries delineating the areas under public law restrictions to be overlaid on base maps produced by the National Cadastre and Mapping Agency S.A (N.C.M.A S.A) and the creation of the respective thematic information systems, by 2020. The public law restrictions, as approved by Decisions of the respective Ministers, include: a) the approved regional and city plans, b) the protection of the environmental, cultural architectural and national characteristics, c) land expropriation land consolidation projects and d) the delineation of the official seashore line.

**4)** Law 4281/2014 foreseeing the definition of the official seashore line and the official old seashore line on color orthophotos, at scale 1:1.000, produced by the National Cadastre and Mapping Agency S.A (N.C.M.A S.A) between 2008-2009 and depicting a 300m zone along the country's coast.

### **3.5 The National Cadastre and Mapping Agency S.A (N.C.M.A S.A)**

Further recent institutional and organizational reforms, integrated the cadastral, mapping and N.S.D.I legal responsibilities, under one authority, the National Cadastre and Mapping Agency S.A (N.C.M.A S.A):

**1)** The Hellenic Mapping and Cadastral Organization (H.E.M.C.O) was abolished (Law 4164/2013, article 1).

**2)** The State Company Ktimatologio S.A (Cadastre S.A) was renamed to National Cadastre and Mapping Agency S.A (N.C.M.A S.A) and its scope was broadened to cover not only the compilation of the national cadastre but also the geodetic and mapping coverage of the country (Law 4164/2013 , article 1).

**3)** Two distinct sectors are foreseen within the N.C.M.A S.A: the Sector for Cadastre and the one for Geospatial Information and Mapping (Decision of the Minister of Environment 45264/2013, issued according to article 1 of Law 4164/2013).

**4)** All the required legal, organizational and technical measures for the establishment of the N.S.D.I, such as the compilation of the N.F.G.S.I and the N.G.P, the coordination and support of public authorities for the application of the Implementation Regulations, the compilation the national catalog of spatial data sets and services, the **creation and operation of the National Geoportal**, the compilation of the technical specifications of newly collected spatial data, in cooperation with the respective legally mandated public authorities, were **assigned to the N.C.M.A S.A** (P.D 28/2015, articles 60-63,66, 71-73, 74-75 and 77-78, in combination with Law 4164/2013 , article 1).

**5)** The responsibility of Monitoring and Reporting, according to Commission Decision 2009/442/EC, remained to the Ministry of Reconstruction of Production, Environment and Energy (P.D 28/2015, article 67).

Following the above legal and organizational reforms, the need still remains for the N.C.M.A S.A to seek and secure the required financial resources, to compile its Strategic and Business Plan, to reform its organizational scheme in order to incorporate its newly undertaken responsibilities and to adequately staff the Geospatial Information and Mapping sector.

#### **4. National Core Spatial Data Sets and Services of the N.C.M.A S.A**

##### **4.1 Geodetic Reference System and the Hellenic Positioning System (HE.PO.S)**

Since 1990, the Hellenic Geodetic Reference System (HGRS'87) has reached widespread use in the country. The existing spatial data of the public authorities are referenced to this System while those collected and maintained in the framework of European or Global mapping projects, like EuroGlobal Map, EuroRegional Map, EuroDEM etc, are referenced to WGS'84.

The Hellenic Geodetic Reference System (HGRS'87) is a local geodetic reference system adjusted to the satellite station of Dionyssos (Athens) as its basic reference point. HGRS'87 has defined a geodetic datum for the country which was best adjusted to the geoid of the Greek territory using GRS-80, as the reference ellipsoid ( $a = 6378137$  m,  $f = 1/298.2572221$ ,  $e^2=0.0066943800$ ), oriented in parallel to the geocentric International Terrestrial Reference System 1989 (ITRF '89) with the following coordinates of the central station of Dionyssos:

$$\begin{aligned}\varphi &= 38^{\circ} 04' 33''.81070 \\ \lambda &= 23^{\circ} 55' 51''.00950 \\ N &= 7.000 \text{ m}\end{aligned}$$

This position of the Ellipsoid corresponds to an eccentricity with respect to ITRF'89 (and practically with respect to the Global Geodetic Reference System WGS'84) given by the following values( in m):

$$\begin{aligned}dX &= - 199.695 \text{ m} \\ dY &= + 74.815 \text{ m} \\ dZ &= + 246.045 \text{ m}\end{aligned}$$

Therefore, the two Systems (HGRS'87 and ITRF'89 ) are essentially parallel and have the same scale with an uncertainty of the order of  $\pm 2 \times 10^{-7}$  .

HGRS'87 is implemented by the coordinates given to 26.000 trigonometric points of the national Trigonometric Networks of 1<sup>st</sup> and 2<sup>nd</sup> order which have been adjusted as a single network on the surface of the above mentioned ellipsoid so that a uniform accuracy is achieved on all the surface of the country's territory.

At the same time, the projection system used is the Universal Transverse Merkator (UTM) with a central meridian and with the parameters:

$$\begin{aligned}\lambda_0 &= 24^\circ \\ K_0 &= 0,999600 \\ X_0 &= 500000\end{aligned}$$

The coordinates of the vertices of the trigonometric networks of all orders are available in this projection.

In 2008, the National Cadastre and Mapping Agency S.A (N.C.M.A S.A) initiated the operation of the Hellenic Positioning System (HE.PO.S), co-funded by the European Union and the Greek State, through the Third Community Support Framework. This System facilitates accurate surveying measurements for all the territory of the country in a faster and more economical way. The main fields of application of the System are cadastral surveying and geodetic projects, construction works, research, high accuracy spatial data collection for GIS applications.

In the framework of maintenance and operation of the HE.PO.S, the N.C.M.A S.A, in cooperation with the National Technical University of Athens and the Atristoteles University of Thessaloniki, developed a coordinate transformation model between HTRS07 and HGRS '87.

The HE.PO.S allows a highly accurate positioning by exploiting the Global Positioning System (GPS). It is consisted of 98 permanent satellite reference stations and a Control Center located at the Headquarters of the N.C.M.A S.A, in Athens. The Control Center processes the data of the reference stations and sends to the user the data required for the accurate positioning.

The HE.PO.S constitutes a modern positioning system similar to the ones operating during the last years in most of the European Union Member States and it is widely used by public authorities, private surveying companies, geoinformation scientists and professionals, engineers, academia etc.

The HE.PO.S has many advantages, such as:

- A few centimeters accuracy in real time positioning
- Reduction of the cost corresponding to the provision of the reference sensor
- Increase in economy and efficiency in every day surveying practice
- Simplicity of measurement procedure
- Ensuring a homogeneous mapping accuracy for all the country 's territory.

More information is available in [www.ktimatologio.gr](http://www.ktimatologio.gr) and [www.hepos.gr](http://www.hepos.gr).

## **4.2 The National Cadastre**

The National Cadastre, a parcel-based land information system, together with the other spatial data produced by N.C.M.A S.A, can be regarded as the major building block and a major test case and effort for the establishment of the National Spatial Data Infrastructure (N.S.D.I).

### **History**

Ktimatologio S.A ( Cadastre S.A), former name of the National Cadastre and Mapping Agency S.A (N.C.M.A S.A), has been a Legal Entity of Private Law, a State owned Company established in 1995, by a Common Decision of the Ministers of Economy, Finances and Environment with the mission of planning, developing and operating the National Cadastre of Greece under the auspices of

the Ministry of (then called) Environment, Physical Planning and Public Works and, the sole shareholder of the Company.

After a long history of unsuccessful attempts to compile the National Cadastre of Greece, a series of EU co-funded projects started in 1995 to establish a fully digital cadastral system, as a collaborative effort of Ktimatologio S.A, other public institutions and the private sector.

The legal framework for the establishment of the national cadastre mainly includes:

- 1) Law 2308/1995 "Cadastral Surveying for the Creation of the National Cadastre and other regulations"
- 2) Law 2664/1998 "National Cadastre and other regulations", mainly concerning the operation of the national cadastre.
- 3) Law 4046/2012 stating that "the government provides adequate resources for the acceleration of the completion of the national cadastre until 2020. There will be full and systematic recording of all real properties of the country, including state owned real properties, in order to exercise in a documented way the development policy and the rationalization of the fiscal policy".

Ktimatologio S.A has had its Headquarters in Athens and a Regional Administrative Centre in Thessaloniki. It has been managed by a seven member Board appointed by the Minister of Environment for a three year term.

In the period 2007-2009, Ktimatologio S.A had successfully implemented and completed a series of important spatial data infrastructure projects, co-funded by the European Union and the Greek State, with a total budget of 83.370.000 EURO, including: the Hellenic Positioning System (HE.PO.S), a country wide series of large scale color orthophotos (resolution 50 cm on the ground) and Digital Elevation Model (D.E.M), very large scale true orthophoto imagery (resolution 20 cm on the ground) and Digital Surface Model (D.S.M) in 58 urban centers, very large scale color orthophotos (resolution 25 cm on the ground) of the coastal zone and of riparian zones of big rivers and lakes, computerization of the Dodekanese Cadastre, digitization of land consolidation data in rural areas and preliminary delineation of forests in the whole country (1:10.000). The N.C.M.A S.A maintains, in its state of the art data centre and through specialized, in house developed, innovative applications, one of the major information infrastructures to support the compilation and the operation of the National Cadastre.

### **Recent legal and organizational reforms for the National Cadastre**

- 1)** The State Company Ktimatologio S.A (Cadastre S.A) was renamed to National Cadastre and Mapping Agency S.A (N.C.M.A S.A) (Law 4164/2013, article 1).
- 2)** The legal framework for the cadastral surveying tendering process was simplified constraining the possibility of candidate contractors to use the litigation process by 70% (Law 4164/2013, article 5).
- 3)** A link is currently being built between the cadastral database and the taxation database in order to develop a more comprehensive and fair taxation system (Law 4164/2013, article 9), while the terms and conditions for this connection are defined by the Common Decision 50697/2013 of the Ministers of Finance and Environment.

**4)** The regional Cadastral Offices belong to the Ministry of Reconstruction of Production, Environment and Energy. A Decision of the Minister will be issued concerning their Operation Regulation defining the services for the citizens, their internal operational procedures and their organizational and operational supervision (P.D 28/2015, article 82, Law 4198/2013, Law 4277/2014).

**5)** The N.C.M.A S.A remains responsible for the organization, structuring and technical support of the operation of the regional Cadastral Offices (P.D 28/2015, article 82).

**6)** The compensatory fees entitled to the N.C.M.A S.A for issuing cadastral map extracts, for no more than twenty nine euro and thirty five cents (29,35 euro) ( P.D 28/2015, article 84), will be defined by a Common Decision of the Ministers of Finance, Justice and Environment.

**7)** A possibility is introduced so that the responsibility of updating of the cadastral information may be assigned to the respective municipalities after the issue of Presidential Decrees (P.D), following a proposal of the N.C.M.A S.A and of the Ministers of Internal Affairs, Justice and Environment (P.D 28/2015, article 82).

**8)** Concerning the 104 Cadastral Offices, currently operating as transitional ones, from the old System of Registration of Deeds to the National Cadastre System, the Decision of the Minister of Environment 21096/2014 (issued according to article 3 of Law 2664/1998) imposes the creation and maintenance of an electronic archive of all newly registered deeds and documents.

**9)** The N.C.M.A S.A, in partnership with the Ministry of Justice and the associations of Notary Publics, has started the planning of the procedure for the electronic submission to the national cadastre of all newly compiled deeds of real rights, while the technical implementation of the plan will be co-funded by national and European funds through the Fourth Community Support Framework. All deeds to be registered by law in the current Land Registration Offices, not yet included in the National Cadastre, will be at the same time electronically submitted to the central information system of the National Cadastre, effective after 21/12/2015, according to the Decision of the Minister of Environment 55776/2014, issued according to Law 2308/1995 (article1) and Law 4164.2013 (article 3).

The required Decision of the Minister of Environment that will regulate technical and other details as well as the Common Decision of the Ministers of Internal Affairs, Justice, Finance and Environment for the electronic submission of the requests for deed registration and the electronic payment of fees are still pending.

The National Cadastre e- services being in their planning phase, include also the electronic submission of the vector topographic diagrams accompanying the deeds, a reform that still needs to be introduced by law. These topographic diagrams should be compatible to uniform technical specifications to be compiled by the N.C.M.A S.A and will be included in a data base created for the purpose, receiving a unique identifier mentioned in the respective deed.

### **Current status of the National Cadastre**

The National Cadastre that has already reached the "operational" status corresponds to 9.498 sq. kms and 8.141.760 real rights that correspond to 22% of the estimated total number of 37 million real rights. Currently, cadastral surveying, contracted to the private sector, corresponds to 21,4% of the total

number of real rights while the rest 57,7% corresponds to cadastral surveying projects under procurement procedures.

The N.C.M.A S.A supports the operation of the National Cadastre through the 104 regional cadastral offices in terms of information systems, counselling and training.

Given the fact that the regional Land Registration Offices, operating as transitional cadastral offices, are not staffed with Surveying Engineers, they are technically supported by the headquarters of the N.C.M.A S.A the maintenance and update of the spatial data of the cadastral information system, according to the Common Decision of the Ministers of Justice and Environment 5469/2004.

The process of developing the cadastre has brought to the surface many administrative problems that have plagued Greece for the last 200 years. The State can now resolve these problems such as determination of the extent of the State property, the illegal construction and the lack of an authoritative spatial data base depicting a series of public law restrictions on land.

Moreover, the thematic spatial data of "Buildings", required by INSPIRE Directive, although collected during cadastral surveying to assist in the identification of real properties, it not included, maintained and updated in the cadastral information system, due to the lack of adequate legislation.

A well functioning National Cadastre, included as a requirement in Laws 4046/2012 and 4336/2015, introducing the respective Memorandums of Understanding between European Institutions and the Greek State for its Financial Support, can help the Country in finding a way out of its debt crisis through a well functioning property market, fair property taxation and more investment in real estate and infrastructural projects.

#### **4.3 Recent base maps produced by the N.C.M.A S.A**

The N.C.M.A S.A has 362 full time employees, 70% of whom have university education and 30% hold a graduate degree.

The N.C.M.A S.A is officially certified for its adequacy in the management of projects funded by the Fourth Community Support Framework. Through this European and national co-funding mechanism, the new series of country wide, large scale, high quality, digital color orthophotos, with a resolution of 25 cm on the ground and Digital Elevation Model with a resolution of 2m on the ground are produced. **This color orthophoto series, to be completed by the end of 2015, constitutes the most up to date uniform accurate base map of the country.**

The N.C.M.A S.A, through its innovative in house developed applications, already provides free viewing through the Internet to a uniform highly accurate digital color orthophoto series (2008-2009). It has developed in-house a spatial web Application Programming Interface (A.P.I) that can be used in order to create spatially enabled websites. The web A.P.I provided lots of tools and functionality including viewing of basemaps, digitization, geocoding e.t.c. and has been offered and used by more than 500 other public agencies.

#### **4.4 Forest mapping, mapping of environmentally protected zones and land cover mapping**

**1)** Law 3818/2010 assigned to the N.C.M.A S.A the compilation of forest maps in fire ravaged areas of Attica and of other regions of the country covering 35.000 sq. kms, many of which were environmentally protected zones. This latter project, co-financed by the Greek State and E.U, through the Fourth Community Support Framework, is currently in the execution phase and will be completed by the end of 2015.

**2)** The recent institutional arrangements, introduced by Law 4164/2013 (article 7) (modifying Law 3889/2010), included the assignment to the N.C.M.A S.A the exclusive responsibility of compilation of forest maps, independently from cadastral surveying, and the processing of objections to the published draft forest maps by the respective formal committees. The responsibility of officially validating these forest maps remains with the Secretary General of the respective Regional Authority.

**3)** The N.C.M.A S.A currently is in the process of compiling a country wide spatial data infrastructure, at scale 1:5.000, for depicting the protected areas of the mainland belonging to the network "NATURA2000", co-financed by the Greek State and E.U funds, through the Fourth Community Support Framework, is currently in the execution phase and will be completed by the end of 2015.

Law 4164/2013 (article 8), foresees the issuance of a Decision of the Minister of Environment that will assign to the N.C.M.A S.A the responsibility of maintenance of this thematic country wide data set.

The current status of forest mapping of the Country is as follows: completed for 23% of the Country, contacted out for 32% of the Country and remaining to be procured for 45% of the Country.

The N.C.M.A S.A created a website, based on a the Spatial Web A.P.I, for viewing and submitting objections against the published draft forest maps.

In 2014, the N.C.M.A S.A undertook the responsibility of compiling land cover maps of the country of GIO Land Cover 2006 & 2012, co-funded by the Greek State and the European Environment Agency (EEA). This project was successfully completed in June 2015.

#### **5. Use cases on the combination of spatial information from different governmental agencies**

**1)** Building Capacity For a Centre of Excellence for EO-based monitoring of Natural Disasters (BEYOND) project (1/6/2013 to 31/5/2016) of the Institute of Astronomy, Astrophysics, Space Applications and Remote Sensing of the National Observatory of Athens, a project funded by the European Commission (FP7 program).

BEYOND aims to maintain and expand the existing state-of-the-art interdisciplinary research potential, by Building a Centre of Excellence for Earth Observation based monitoring of Natural Disasters in south-eastern Europe, with a prospect to increase its access range to the wider Mediterranean region through the integrated cooperation with twining organizations.

The research portfolio covers a broad spectrum of phenomena such as earthquakes, volcanoes, extreme weather events, fires, fire smoke and toxic gasses, emission concentrations, manmade hazards, dust storms, air quality and impacts to human health, which are described under the three research domains of BEYOND.

BEYOND focuses on improving the interdisciplinary approach which is necessary for disaster management, crossing the boundaries between the traditional academic disciplines, technological expertise, and research methodologies.

Moreover, through BEYOND, the National Observatory of Athens enhances its international collaborations, via twinning with high excellence partners at European level, drawing new creative perspectives in the Relevant Research Area and allowing sustainable collaborative schemes to be formed and synergies to flourish in the future.

## **2) Exploitation of the data set of urban transport connections**

The Athens Urban Transport Organization posted city bus connections. The fire brigade operators, being aware of the routes of large vehicles like city buses they can better schedule the itinerary of fire brigades, a fact that is extremely important in emergency cases. By extending the use of this geoinformation, for example to the National Emergency Center (ambulance fleet) one can say that geospatial information can even save lives.

## **3) Transparency and actual participation of citizens in governmental decisions**

In recent years, it is common practice to consult on draft laws and Presidential Decrees (P.D) aiming to achieve the actual participation of citizens in governmental decisions. In 2011, the draft P.D on the protection of small island wetlands by the Ministry of Environment was set in public consultation. The draft P.D was accompanied by about 380 maps of the wetlands for which regulations were to be set out. These maps were published in pdf form. It is easily understood that citizens, who were invited to participate in the consultation would have great difficulty in identifying the area around each wetland, especially in this wetland was depicted in A4-dimension map, on a 1:2.500 scale and covers an area of about 0.5 hectares. For this reason, HE.M.C.O had upgraded the consultation process by setting in consultation the digital file (shape file) of the wetlands polygons and posted it on an appropriate web application for the mapping of geospatial data which provides the possibility to download a copy. In this way the interested parties could navigate the broader area, identify their property, if any, combine the file with other data and be able to actively participate in the consultation.

## **6. Access to public sector information**

In the last decade Greece adjusted and modernized its legal framework affecting the access to public geoinformation by transposing European Directives into its legal system and practices:

**1)** Presidential Decree (P.D) 28/2015 "Codification of regulations for the access to public documents and data", issued according to the provisions of Law 4305/2014, defining:

- the access to meteorological data and services (articles 50 to 54)
- the restrictions to the access to geospatial data and services by third parties (article 64)
- the access to geospatial data and services by third parties (article 65, 76 and 78)
- the terms and restrictions in the access to the maps of the Hellenic Military Geographical Service (articles 79-80 in combination with articles 12-13 of the Legislative Decree 1013/1971)
- the access to cadastral data (articles 81-84)
- the access to statistical data (articles 85-91)

**2)** Law 3448/2006 for the "Further use of public sector information" that transposed Public Sector Information Directive 2003/1998.

**3)** Law 4305/2014 "Open access and further use of public sector documents, information and data, modification of Law 3448/2006, adaptation of national legislation to the regulations of directive 2013/37/EU of the European Parliament and the Council".

**4)** Common Decision 11764/653/2006 of the Ministers of Internal Affairs, Public Administration and Decentralization, Economy, Finance and Environment, Physical Planning and Public Works and Justice that transposed Directive 2003/4/EC of the European Parliament and the Council for public access to environmental information.

**5)** Common Decision of the Ministers of Interior, Finance, Environment and Justice that transposed European Directive 2003/4/EC aims at securing the right of access to environmental information held by public authorities and the broad and systematic dissemination of environmental information using modern technology. The European initiative for the creation of the Shared Environmental Information System – S.E.I.S contributes to covering the needs for data and information for the environment within the framework of the above Directive.

In general, restrictions to the access of spatial data sets that are mainly imposed by the respective public bodies include: intellectual property rights, protection of privacy, public security, national defense, confidentiality of statistical information, competition, need for official approval, unspecified digital spatial data policy.

## **Intellectual property rights**

Greek legislation for the protection of intellectual property rights includes Laws 2819/2000, 3057/2002 and 3966/2011 that transposed European Directives 1996/9/EC, 2001/29/EC and 2004/48/EC, respectively.

## **Data protection**

Law 2472/1997 for the protection of the individual from the processing of personal data that transposed European Directive 95/46/EC created the Hellenic Data Protection Authority. Personal data protection is foreseen by the Constitution (articles 9A and 101A).

## **Electronic identification**

European Regulation 910/23-7-2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market, as directly applied to all EU countries, is in effect in Greece where the responsible public agency is the Hellenic Telecommunications and Post Commission, the National Regulatory Authority.

## **Legal and Policy context**

An agreement, defining rights and responsibilities to simplify data sharing between different public organisations, as foreseen by INSPIRE Directive, has not been developed and implemented yet.

Moreover, a clear and harmonized national licensing and pricing policy concerning spatial data sets and services, either among public authorities or for public access, has not yet emerged. There are wide variations in the pricing schemes among government departments and also within the private sector. Each agency calculates the pricing on the basis of its own criteria and in its own way and there is no homogeneous method for determining the price of various forms of spatial data.

## **7. International Representation**

Many public authorities in Greece producing and maintaining spatial and thematic data under the scope of INSPIRE Directive closely cooperate with their European and international counterparts.

Examples are the National Cadastre and Mapping Agency S.A (N.C.M.A S.A) that is represented and actively participating in the works of the following European and international bodies: EuroGeographics, Permanent Committee for Cadastre of the European Union (P.C.C), United Nations Committee of Experts for Global Geospatial Information Management (UN\_GGIM), European Environment Agency (E.E.A) and the International Union of Forest Research (IUFRO).

The Hellenic Military Geographical Service is also a member of EuroGeographics and its other European and Global counterparts.

The Ministry of Reconstruction of Production, Environment and Energy is represented in the INSPIRE Maintenance and Implementation Group (M.I.G) of the European Commission.

## **Representation of Greece to UNGGIM**

Greece has actively participated in the different initiatives of UNGGIM and UNGGIM Europe. By a Decision of the Minister of Environment (Ref.no 4101/3-9-2014) the Representative of Greece to UNGGIM was appointed from the National Cadastre and Mapping Agency S.A (N.C.M.A S.A). A communication network was formed among public authorities producing, maintaining and administering geospatial information in Greece like the Ministry of Reconstruction of Production, Environment and Energy, the Ministry of External Affairs, the Ministry of National Defence, the General Secretariat of Civil Protection, the Ministry of Economy and Infrastructures, the Hellenic Statistical Authority etc, assigning the respective contact person.

This network contributed to the active participation and coordination in order to respond to the various questionnaires sent by the working groups of UNGGIM.

Moreover, the Representative of Greece is an active member of the Working Group A/Subgroup 2: Core Data, formed by UNGGIM Europe.

## **APPENDIX: Main public agencies producing and maintaining spatial data sets and services within the scope of INSPIRE Directive**

### ***Main N.S.D.I-related actors and initiatives in Greece***

#### **1. Ministry of Reconstruction of Production, Environment and Energy** ([www.minenv.gr](http://www.minenv.gr))

**1.1 The General Directory of Environment**, has established the National Environmental Information Network (<http://www.e-per.gr>), co-funded by national and European Structural Funds, comprising spatial environmental information (noise, mining stations, aquaculture facilities, atmospheric quality, habitats and biotopes, protected sites etc.) depicted on a map at scale 1:250.000 and accessed through the Internet.

Non profit organizations, as for example World Wide Fund for Nature (WWF) and especially the Greek national office, have also developed portals with a viewing service to protected sites, biotopes etc ([www.oikoskopio.gr/map](http://www.oikoskopio.gr/map)).

**1.2 The General Directory of Development and Protection of Forests and Natural Environment** produces and maintains digitized maps of vegetation types at scale of 1:20.000, country wide soil maps and soil cross sections at scale 1:50.000 and digitized maps of protected sites and habitats and biotopes (national forests, aesthetic forests and wild life sanctuaries).

**1.3 The General Directory of Natural Resources** provides access to the sites of quarries of the country through the web ([www.latomet.gr/ypan/Default\\_GIS.aspx](http://www.latomet.gr/ypan/Default_GIS.aspx)).

**1.4 The National Cadastre and Mapping Agency S.A (N.C.M.A S.A)** ([www.ktimatologio.gr](http://www.ktimatologio.gr)) produces and maintains the following geospatial data: Cadastral parcels (1:1.000, 1:5.000), GIO Land Cover maps (1:100.000), forest maps (1:5.000 to 1:25.000), country wide digital color orthophotos (1:5.000) of the years 2008-2009 and of the year 2015, Digital Elevation Models (resolution 80 cm, 2m and 5m), true orthophotos (1:1.000) and Digital Surface Model in 58 urban centers of the country, preliminary delineation of the official shoreline on large scale color orthophotos (1:1.000) of the country's foreshore zone and of riparian zones of buoyant rivers and big lakes, preliminary delineation of forests and forest lands in the whole country (1:10.000).

The N.C.M.A S.A has developed an innovative service providing free viewing to its orthophoto series (<http://gis.ktimanet.gr/wms/ktbasemap/default.aspx>).

It has also developed and operates the Hellenic Positioning System (HE.PO.S) (<http://www.hepos.gr>) offering real time services for high accuracy positioning.

**1.5 The Institute of Geology and Mineral Exploration** ([www.igme.gr](http://www.igme.gr)) fully covered the country with digitized geological maps at scale 1:50.000, mineral deposits maps (1:5.000 to 1:25.000), digital hydrogeological maps (1:250.000), soil maps including a series of digital soil maps belonging to the Geochemical Atlas of Europe at scale 1:5.000.000, digital maps of various scales for the energy sources (mainly geothermal energy sources, 1:50.000), maps of mineral resources as well as seismic hazard maps, volcanic risk maps and maps of

aesthetic geotopes. The Institute has developed a viewing service on the web for providing access to its rich map archive ([http://maps.igme.gr/website\\_ext/igme\\_master\\_ext/viewer.htm?ln=en](http://maps.igme.gr/website_ext/igme_master_ext/viewer.htm?ln=en)).

**1.6 The Special Secretariat for Water** is responsible for maintaining the National Hydrological and Meteorological Information Bank, for quality control and homogenization of the hydrological, meteorological and hydrogeological data, stations for monitoring the quality of surface waters etc. It has developed a discovery, view and downloading service for the above spatial data through the "Hydroscope Geoportal":

(<http://thyamis.itia.ntua.gr:8080/geoportal/catalog/search/search.page>)

**1.7 The Organization for Payments and Control of the Community Aid and Indemnity** ([www.opekepe.gr](http://www.opekepe.gr)) maintains land holdings in the framework of the Integrated System for Managing and Control of the Community Agricultural Subsidies LPIS/GIS (1:5.000) from 2006 to 2013. Moreover, a Geographical Information System in agricultural areas depicting the Digitized Cadastral parcels distributed to farmers as well as cadastral parcels of land consolidation projects across the country. (These agricultural areas are covered by cadastral surveying program currently executed by the N.C.M.A S.A).

The **Directory of Surveying** of the former Ministry of Agriculture had produced, in the framework of the Integrated System for Managing and Control of the Community Agricultural Subsidies LPIS/GIS, orthophotos (1:10.000) of the periods (1991-2001) and 2003 (1:10.000) and the respective Digital Elevation Models. The geoportal <http://geoportal.topographiki.gr/portal/page/portal/Topo> provides access to geospatial data produced and maintained by this Directory.

**1.8 The Regulatory Authority for Energy** (<http://www.rae.gr>) together with the **Center for Renewable Energy Sources and Saving** (<http://www.cres.gr>) have developed the National Information System for the Energy (<http://195.251.42.2/cgi-bin/nisehist.sh?objtype=xartes>) and (<http://www.rae.gr/geo/>) representing on electronic maps on the Internet the major characteristics of the country's energy system that is, its infrastructure, the size and composition of the individual sectors as well as the energy types and use. The elements of the Energy System are structured per energy product and they include: oil and gas, electricity and renewable sources. This Observatory for the Energy presents the high and medium voltage networks of the Public Power Corporation S.A, the thermal and of hydroelectric stations, the wind energy installations, the stations of energy production from biomass, the gas and oil distribution networks and the position of geothermal and lignite fields.

The purpose of the system is to create an infrastructure for allowing access through electronic services to the energy information and to develop a modern tool for supporting decision making on Energy Policies.

**1.9 The Public Power Corporation S.A**, has developed a country wide map of the aquifer, the underground water resources and respective monitoring stations, the electric production stations, the mining stations e.t.c.

Public Power Corporation and Renewable Sources S.A have produced digital spatial data (1:100.000) with licenced centers of renewable energy production and co-production of electricity and heat.

## **2. Ministry of National Defence**

**2.1 The Hellenic Military Geographical Service** ([ww.gys.gr](http://www.gys.gr)) which, in 1962, having taken the legal mandate from the State for the "Mapping of Greece" has produced a series of maps at various scales for satisfying the needs of the Armed Forces and of civilian tasks throughout the years.

It has created a rich digital data base for geographical names, administrative boundaries, elevation (resolution 30, 100, 250 m), transport networks, hydrographic network, etc

More over, it has developed a discovery and view service (<http://web.gys.gr/GeoSearch/> for a series of its products (aerial photography, geodetic, topographic, cartographic data etc) for providing access to its spatial data.

**2.2 The Hydrographic Service** (<http://www.hnhs.gr>) of the Hellenic Navy constitutes a military service performing mapping activities of marine areas.

It has developed a digital data base for geographical names along the seashore, rock islands, bays, capes etc. Moreover it has created and maintains digital spatial data depicting the official shore line of the country (1:50.000), bathymetry at various scales, maps with the composition of surface sediments of marine areas of Greece and maps with geological data of sea beds, maps of buildings of port authorities (1:250.000) etc. Moreover, it has developed a discovery service (<http://www.hnhs.gr/portal/page/portal/HNHS/GeoSearch>) for general maps, maps for shipping, maps with ports and coves etc.

**2.3 The National Meteorological Service** ([www.hnms.gr](http://www.hnms.gr)) maintains and constantly updates spatial meteorological data for the weather conditions and the respective measurements as well as for the physical conditions of the atmosphere. Moreover, it has developed a view service ([http://www.hnms.gr/hnms/greek/index\\_html](http://www.hnms.gr/hnms/greek/index_html)) for providing access to the above information.

The, co-financed by the European Regional Development Fund (ERDF) and the Greek State, research project Geoclimate ([www.geoclima.eu/node/30](http://www.geoclima.eu/node/30)) aims at developing an integrated Geographic Information System (GIS) allowing the user to manage, analyze and visualize the information which is directly or indirectly related to climate and its future projections in Greece. The project's final product will be an interactive open access GIS web application through which users will be able to analyse and visualize the climate information.

## **3. Ministry of Interior and Administrative Reconstruction**

The Ministry has developed discovery, viewing and downloading services (<http://geonet.ypes.gr:8080/geonetwork/srv/eng/main.home>) for providing access to information concerning geographical names of municipalities and settlements, boundaries of municipalities of the Program Kallikratis (Law 3852/2010), data on the real property of municipalities etc.

The former administrative structure of Law 2539/1997 (Program Kapodistrias) can also be accessed through: [www.ypes.gr/kapodistrias/greek/kapo/nomoi.htm](http://www.ypes.gr/kapodistrias/greek/kapo/nomoi.htm).

**3.1 The General Secretariat for Civil Protection** maintains thematic maps ranking hazard from natural, technological and biological risks, fires etc as well

as maps with the civil protection sites in case of disasters, accessed through the web ([www.civilprotection.gr/el/xartes](http://www.civilprotection.gr/el/xartes)).

#### **4. Ministry of Economy, Infrastructures, Shipping and Tourism**

**4.1 The Hellenic Statistical Authority** ([www.statistics.gr](http://www.statistics.gr)) maintains geospatial data with administrative boundaries (1:50.000), settlements (1:50.000), statistical units etc. It also provides access (<http://www.statistics.gr/portal/page/portal/ESYE/PAGE-maps>) to digital maps of settlements (1:5.000) with street axes and names, outline of blocks and buildings. Moreover it has developed a discovery and viewing service (<http://www.statistics.gr/portal/page/portal/ESYE/PAGE-ultrasearch>) for administrative boundaries, statistical data and other information.

**4.2 The General Secretariat of Public Property** ([www.gspp.gr](http://www.gspp.gr)) has compiled a Registry of the real property of the State (Ministries, Public Authorities etc) that can be accessed through: <https://www1.gsis.gr/taxisnet2/ggdp/estatesInfo.htm>. Moreover, it maintains maps of cadastral parcels (1:1.000) of state lands. The State "Public Properties Company S.A" ([www.etasa.gr](http://www.etasa.gr)) provides access through the web to the large public properties and to thematic maps of touristic properties ([www.etasa.gr/page.aspx?itemID=SPG158](http://www.etasa.gr/page.aspx?itemID=SPG158)).

**4.3 The General Directory of Transportation Works**, Directory of Road Infrastructure, has developed an electronic service providing access through a geoportal to the digitized country wide road network, at scales 1:25.000 to 1:50.000.

**4.4 The General Directory of Hydraulic Works**, Directory of Water Supply and Sewage Works, maintains large scale digital maps for the water supply and sewage networks of various municipalities, except the ones of Attica region, while the Directory of Land Reclamation Works maintains large scale digital maps of irrigation networks, at a local level.

**4.5** The State company for **Water Supply and Sewage of Athens S.A**, and especially the Directory of Informatics and Technology, has developed a Geographical Information System for the Attica region with the water supply and sewage networks as well as stations for measuring water quality etc.

**4.6** The State company for **Water Supply and Sewage of Thessaloniki S.A** has developed a Geographical Information System with the water supply and sewage networks of the greater Thessaloniki area.

**4.7 GAIA OSE** ([www.gaiaose.com](http://www.gaiaose.com)) manages the real estate of the Hellenic Railways Corporation (OSE S.A). It has developed a Geographical Information System (<http://gaiaose.maps.arcgis.com/home>) accessed through the web depicting the railway network, the land parcels and buildings belonging to OSE S.A.

**4.8** The State Company **ERGOSE S.A** ([www.ergose.gr](http://www.ergose.gr)) of the Hellenic Railways Corporation currently manages all ongoing or under procurement railway projects co-financed either by the Operational Programme "Accessibility Improvement", the National Strategic Reference Framework (NSRF) 2007-2013, the Transport Sector of

the 2nd Cohesion Fund and the Regional Operational Programmes (ROP), or financed solely by national resources. A map can be accessed through the web ([www.ergose.gr/images/erga-ergose/Yfistameni\\_katastasi\\_large.jpg](http://www.ergose.gr/images/erga-ergose/Yfistameni_katastasi_large.jpg)) showing the existing and the planned country wide railway network.

**4.9** The State company **EGNATIA HIGHWAY S.A** (<http://www.egnatia.eu/page>) has developed a Geographical Information System accessed through the web ([http://www.egnatia.eu/files/maps/EO\\_Project\\_Status.jpg](http://www.egnatia.eu/files/maps/EO_Project_Status.jpg)) depicting the highway and the road axes perpendicular to it.

**4.10** The State company **ATTIKO METRO S.A** ([www.ametro.gr/page/](http://www.ametro.gr/page/)) has developed a Geographical Information System with large scale maps of the Athens and Thessaloniki METRO line and station network and maps of the TRAM line of Athens.

**4.11** The **Hellenic Post** ([www.elta.gr](http://www.elta.gr)) has developed maps at scale 1:5.000 with street axes and street numbers (addresses).

**4.12 The National Committee for Telecommunications and Posts** ([www.eett.gr/](http://www.eett.gr/)) is initiating the operation of a Geographical Information System, accessed through the Internet, providing information on the telecommunications network, on the quality of network services and depicting the stations providing high speed and broadband Internet, IP TV etc (<http://mapsrv2.terra.gr/eettutilities/map.aspx>).

**4.13** The state company **THEMIS CONSTRUCTION INC.** ([www.themis.com.gr/](http://www.themis.com.gr/)) maintains maps of imprisonment and court infrastructures. The Company has developed a viewing service with sites of courts of all levels (<http://bit.ly/IPmtZI>).

**4.14** The **Earthquake Planning and Protection Organization** ([www.oasp.gr](http://www.oasp.gr)) has developed an electronic service through which it provides access through the Internet to the Map of Seismic Hazard of the various regions of Greece, together with the preparation of geological - geotechnical studies at local level.

## **5. Ministry, Civilization , Education and Religious Affairs**

**5.1** The Ministry has created maps at scales of 1:5.000 and 1:50.000 with the position of archaeological sites of prehistoric, classical and byzantine periods. An interactive application has been developed with the positions and detailed characteristics of the archaeological sites of the country: ([http://odysseus.culture.gr/map/CulturalMap\\_gr/cultural\\_map\\_gr.html](http://odysseus.culture.gr/map/CulturalMap_gr/cultural_map_gr.html))

**5.2 The National Observatory of Athens** ([www.noa.gr](http://www.noa.gr)) maintains spatial data for seismic hazard, atmospheric conditions, meteorological and climatological characteristics (<http://www.meteo.noa.gr/WeatherOnLine>) etc. Moreover, its Institute of Astronomy, Astrophysics, Space Applications and Remote Sensing has developed a real time fire monitoring service through satellites (<http://195.251.203.94/seviri>). Its Institute of Geodynamics has developed a map of real time seismicity accessed through the web (<http://www.gein.noa.gr>).

**5.3 The Hellenic Center for Marine Research** (<http://www.hcmr.gr>) has produced spatial data for bathymetry, oceanography, sea regions and ecological characteristics of the marine environment, mostly within the framework of research studies. A Monitoring, Forecasting and Information System for the Greek Seas has been developed accessible through the web ([www.poseidon.hcmr.gr/weather\\_forecast.php?area\\_id=gr](http://www.poseidon.hcmr.gr/weather_forecast.php?area_id=gr)).

**5.4** The State company **School Buildings Organization S.A** ([www.osk.gr/](http://www.osk.gr/)) has developed a Geographical Information System depicting the position of public schools (1:5.000), maps (1:2.000) with the buildings owned by the Ministry of Education, maps depicting the position of State athletic installations (1:50.000) and of athletic installations belonging to municipalities (1:5.000).

**5.5** The **Greek Atomic Energy Commission** ([www.eeae.gr](http://www.eeae.gr)), the national competent regulatory authority, in the fields of radiation protection and radiological and nuclear safety, provides access through the internet to the network of sites for measurement of radiation ([www.eeae.gr/gr/index.php?pvar=php/enviro/telemetrymap](http://www.eeae.gr/gr/index.php?pvar=php/enviro/telemetrymap)).

**6. Ministry of Health and Social Solidarity** maintains a rich statistical base with georeferenced data concerning the infectious diseases and other health and safety data. The Ministry has developed a geographical information system ("Health Guide") accessed through the web (<http://live3.telenavis.com/healthguideapps/healthguide/default.aspx>) for discovering the position of hospitals and other central and regional public health services.