



# Spatial Data Infrastructures in Turkey: State of play 2011



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## Executive summary

The NSDI scene in Turkey has for a long time been scattered. Over the past years several initiatives were taken to develop components of the NSDI and to implement INSPIRE. Examples are the efforts of the General Directorate of Land Registry and Cadastre (GDLRC) and Turksat A.S. to establish a project "National Geographic Information Infrastructure" for the collection and presentation of geographic information by relevant institutions and organizations in Turkey. More recently the Ministry of Environment and Forestry began the coordination of the INSPIRE & NSDI implementation at the national level. Within this context the Ministry launched a geoportal ([http://gis.cevreorman.gov.tr/cob2011/?page\\_id=440&lang=en](http://gis.cevreorman.gov.tr/cob2011/?page_id=440&lang=en)) according to the INSPIRE principles in order to provide access to the spatial data related to the 34 themes of the three annexes of the Directive. Although the different initiatives could be further streamlined, it is clear that in general the different NSDI stakeholders started to collaborate more and more.

A coherent vision is currently being developed and legal initiatives are being prepared to better coordinate production of GI with a view to better satisfy public user needs at all administrative levels. The term SDI is frequently used in the mentioned information sources. The act for National Spatial Data Infrastructure (NSDI) is designed in Act Plans for 2006-2010 which is attached to Strategy for National Information Society. NSDI in Turkey is named as "Act 75" under "Modernization in Public Administration". In this concept two big subprojects are executed. One of them is Metadata Portal Project where metadata can be register coming from all map related institutions and organizations using ISO 19115 standards <http://hbb.tkgm.gov.tr/metadatas/>. The other project is CORS-TR (Continuously Operating Reference Stations) Project.

The Military Mapping Agency is one of the main data producers, and has a visible internet presence, but offering limited metadata for its own products. Cadastral and other large scale geodata are produced by the (civil) General Directorate of Land Registry and Cadastre. Details on products and services of this Directorate could however not be found. Moreover, GDLRC have created the TAKBIS portal where cadastral solutions and applications are provided (<http://takbisbilgi.tkgm.gov.tr/takbis.portal>). The Ministry of Environment and Forestry has many data sets related to the environment and several specific initiatives in view of monitoring the status of the environment saw light over the past few years. At the same time The Ministry of Environment and Forests provides a number of network services with thematic environmental data.

Despite the clear progress, there are still several persisting problems in the field of GI: the coordination between institutions could be improved; no standardization with regard to the reference system, the data quality or exchange of data; data duplication; the majority of large scale data is still not in digital format; interoperability only start to emerge; lack of expert personnel and budget; and difficulties to share data.

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## Abbreviations and acronyms

ARIP	Agricultural Reform Implementation Project
CBC	Cross Border Collaboration
CGM	Computer Graphics Metafile
CORS	Continuously Operating Reference Stations
CT	Core Thematic Data
DSI	General Directorate of Hydraulic Works
GCM	General Command of Mapping
GCP	Ground Control Points
GDLRC	General Directorate of Land Registry and Cadastre
GDRS	General Directorate of Rural Services
GI	Geographical Information
GIS	Geographical Information System
GISEE	GIS Technology and Market in South Eastern Europe
GPS	Global Positioning System
HBB	Map Information Bank
ICT	Information and Communication Technologies
ICU	Istanbul Culture University
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
IPA	Instrument for Pre-Accession Assistance
ISO	International Organization for Standardization
LIS	Land Information Systems
LRCDD	Land Registry and Cadastre Directorate (or GDLRC)
LSMMIPR	Large Scale Maps and Map Information Production Regulation
MoEF	Ministry of Environment and Forest
MPMC	Map Production Monitoring Centre
MPWS	Ministry of Public Works and Settlement
MTA	General Directorate of Mineral Research and Exploration
NSDI	National Spatial Data Infrastructures
NTGIS	National Transit Geographic Information System
PSI	Policy and legislation on access to public sector information
PPP	Public-private partnerships
REF	Reference data
RTK	Stationary Real-Time Kinematic
SDI	Spatial Data Infrastructures
SIS	State Institute of Statistics
TABIS	Disaster Information System of Turkey

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TABKIS	Turkey's Land Registry and Cadastre Information system
TÜBİTAK	Scientific and Technological Research Council of Turkey
TUTGA	National Primary GPS Network of Turkey
UVDF	National Spatial data Exchange Standard

## GENERAL INFORMATION

### 1.1 Method

This report aims at summarizing the state of play of SDI in Turkey, and at reflecting the degree to which the SDI situation in Turkey is similar to the ideas set out in the INSPIRE Directive, the INSPIRE implementing rules and related documents.

The report is based on information found on websites, in documents and received during workshops and conferences. The old versions of the report have been completed by integration and consolidating the comments received between 2003 and 2007 from various INSPIRE & NSDI experts.

In this 2011 version obsolete information was removed and the report was restructured to bring it more in line with the topics assessed.

### 1.2 The GI- and SDI-scene in Turkey

For a long time the SDI-like activities were dispersed among several key stakeholders. Over the last years, the different stakeholders started to collaborate more and more and recently the Ministry of Environment and Forestry started the coordination of the INSPIRE & NSDI implementation at the national level. Within this context the Ministry launched a geoportal ([http://gis.cevreorman.gov.tr/cob2011/?page\\_id=440&lang=en](http://gis.cevreorman.gov.tr/cob2011/?page_id=440&lang=en)) according to the INSPIRE principles in order to provide access to the spatial data related to the 34 themes of the three annexes of the Directive.

Other important players at the national level are mainly with the General Command of Mapping, depending of the Ministry of National Defence (GCM). A condensed version in English of the GCM web site is available at <http://www.hgk.mil.tr/english/english.htm>. GCM produces a variety of topographic map products at scales 1:25.000 and smaller, aerial and orthophotographs. It is in the process of converting them to digital form with already a number of series being available as raster and vector data. GCM have changed its website to <http://www.hgk.msb.gov.tr/index.asp> and has turned into a civil national mapping agency. GCM is the Turkish member of Eurogeographics.

For scales 1:25.000 and larger scaled mapping, an important role is played by the General Directorate of Land Registry and Cadastre (GDLRC) (<http://www.tkgm.gov.tr>) and by the General Directorate of Provinces (<http://www.ilbank.gov.tr/>). GDLRC has developed Turkey's Land Registry and Cadastre Information system TABKIS together with an accompanying portal (<http://takbisbilgi.tkgm.gov.tr/takbis.portal>).

Also the National Institute for Statistics plays an important role in the development of the Turkish SDI.

All provinces and many municipalities have a presence on the internet. They are users and producers of GI.

The private sector is mainly active in contracting work for municipalities for large scale mapping

An important actor in the research/service sector includes the Istanbul Technical University (<http://www.itu.edu.tr>) which provides Satellite data as SPOT and RADARSAT and operates a Satellite Ground Receiving Station.

NTGIS, is the recent national association for GI. It will cover the whole GI community. It adopts the role to open up a discussion forum for various national and international GI topics and to promote SDI.

A variety of projects supporting Land Information Systems (LIS) were taken into effect by LRCD, such as Land Registry and Cadastre Information System (TAKBIS), The Continuously Operating Reference Stations -Turkey (CORS-TR), Map Information Bank (HBB), Land Registry Archive Information System (TARBIS), and Agriculture Reform Implementation Project (ARIP). As one aspect of SDI, LRCD collects and manages land registry and cadastre data with all sub-directorates in Turkey, including 22 of Regional Directorates, 1018 of Land Registry Directorates, 325 of Cadastre Directorates, and 122 of Cadastre offices (Mataraci et al., 2009).

## 2 Details of the GI-sector in Turkey

### 2.1 General information

Between the start of the INSPIRE State of Play study (2002) and 2009, the NSDI developments were scattered over different organisations with a clear line with regard to coordination, responsibilities, activities, etc. Between 2009 and 2010 the GDLRC and Turksat A.S. established a project "National Geographic Information Infrastructure" for the use of common purpose of collection and presentation of geographic information by relevant institutions and organizations in Turkey. With the protocol signed on December 16, 2009, the project's feasibility study was been initiated. Under the Project, by establishing geographic information systems infrastructure at the national level and appropriate technological developments, responsible public institutions and organizations will submit their geographic information and specified content and exchange standards to respond to the needs of institutions and sector users.

At the same time, Turkey's Geographic Information Infrastructure is predicted to be prepared in accordance with the International standards of the European Union's INSPIRE Directive. It is further envisaged that copyright and access rights, such as pricing issues will be resolved, and that e-government applications will be completed in spatial component (<http://www.turksat.com.tr/english/v2/news-room/2010/february/18/id/48>).

Turksat is a private firm, though government-owned – operator of Turkey's communication satellite system and distributor of satellite-based remote sensing data (via an on-line portal). The company's ICT Division also has the mandate to coordinate implementation of Turkey's e- Government programme, under which more than 110 projects are now being developed as part of the Turkish government's Information Society plans. The Turkish NSDI programme falls under this e-Government umbrella. Information of the project along with the future geoportal structure can be found (in Turkish) at: <http://www.turksatglobe.com/Views/Geoportal/CBSATanim.aspx?ContentId=0>.

Since 2011, the Ministry of Environment and Forestry plays a more prominent role in the establishment of the NSDI and especially in the implementation of INSPIRE.

### 2.2 Component 1: coordination and organizational issues

There were until recently two primary governmental organizations working on the Turkish NSDI at the national level: the Coordination and Planning Committee for Map Works among Ministries and the Prime Ministry State Planning Organization – Information Society Department. Other players such as the Ministry of Environment and Forestry played also an important role. The lack of coordination between institutions was one of the problems for the development of the SDI.

Since 2010, the coordination of the Turkish SDI has been attributed to the Ministry of Environment and Forestry. They are responsible for the policy. On the other hand they started the development of a national geoportal that will serve as a one stop portal to access spatial data sets falling under the INSPIRE themes.

The act for National Spatial Data Infrastructure (NSDI) is designed in Act Plans for 2006-2010 which is attached to Strategy for National Information Society. NSDI in Turkey is named as “Act 75” under “Modernization in Public Administration”. In this concept two big subprojects are executed.

Several projects are being developed by different key stakeholders. It is not always clear if these are coordinated efforts to support the development of INSPIRE & the NSDI, or if they rather separate efforts of different organisations.

### 2.2.1 Conclusions of Component 1

The Turkish SDI approach is truly national. SDI building blocks though have not yet reached a significant level of operability. The act for National Spatial Data Infrastructure is designed in Act Plans for 2006-2010 which is attached to Strategy for National Information Society. NSDI in Turkey is named as “Act 75” under “Modernization in Public Administration”. Currently the GDLRC and Turksat A.S. have established a project "National Geographic Information Infrastructure" for the use of common purpose of collection and presentation of geographic information by relevant institutions and organizations in Turkey. With the protocol signed on December 16, 2009, the project's feasibility study has been initiated. Turksat is a private firm, though government-owned. Based on these conclusions we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national
- One or more components of the SDI have reached a significant level of operability (No)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (Not so clear)
- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (Not so clear)
- An organisation of the type ‘national GI-association’ is involved in the coordination of the SDI (No)
- Producers and users of spatial data are participating in the SDI (Not so clear)
- Only public sector actors are participating in the SDI

## **2.3 Component 2: Legal framework and funding**

### **2.3.1 Legal framework**

Turkey is currently working on implementing a strategy for the NSDI and preparing a proposal for a law on the spatial data infrastructure.

The Prime Ministry for State Planning and Organization proposed a number of Action Items in the course of the e-Transformation Turkey Initiative during 2005 and 2006, to prepare the set-up of the NSDI:

- Action Item 47 (A Preliminary Work to setup the National GIS / NSDI) (Dec 4, 2003 –Feb 2005): this action item included a survey of stakeholders, the identification of problems and recommendations. The study was executed by the General Directorate of Land Registry and Cadastre, in cooperation with public bodies, universities, the private sector and the municipalities (G. Yalcin, B. Erkek, S. Bakici and N. Ahn, Through Spatial Data Infrastructure in Turkey, [http://www.fig.net/pub/fig2009/papers/ts01b/ts01b\\_yalcin\\_etal\\_3460.pdf](http://www.fig.net/pub/fig2009/papers/ts01b/ts01b_yalcin_etal_3460.pdf)).
- Action Item 36 (Policy& Strategy Document of the National GIS/NSDI) (May 2005 –Feb 2006). The goals of this item were to determine standards for classification data, metadata, producing, storing and sharing data; to prepare a strategy document, and to determine the requirements for the legal framework.

This action item led to the following SDI vision: “to allow geospatial data users in the country on-line access to quality and up-to-date geospatial information they need for their geo-related decision support processes, projects and applications”. It identified responsibilities for the different data categories, and gave recommendations on standards and metadata.

It proposed an independent national Committee for NSDI, and a special SDI unit within the National Mapping and Cadastral Agency. A strategy in 6 stages was proposed:

- STAGE 1: Realize legal regulation covering Policy, data content and organizational responsibilities for the NSDI.
- STAGE 2: Develop the National Spatial data Exchange Standard (UVDF) in compliance with ISO standards.
- STAGE 3: Let the institutions prepare geospatial metadata for their area of responsibility and present at their metadata portals.
- STAGE 4: Let the NSDI Organizational Infrastructure (e.g. Committee or Unit) prepare geospatial data standards according to the NSDI policy and strategy document (i.e. Action Item 36 –Report)

- STAGE 5: Let the institutions prepare geospatial data for their area of responsibility.
- STAGE 6: Let the institutions present their data their data portals according to the legal framework defined at Stage 1.
- Action Item 75 (Creating National GIS Infrastructure/ NSDI) - (Jul 2006 –Dec 2007) was the result of the National Information Society Strategy and its Action Plan for 2006-2010. Its objective was the establishment of the Geographic Information Infrastructure.

Next to these Action items, the following instruments are also important:

- Municipality Law 5216 and Metropolitan Law 5272 oblige municipalities to build GIS and urban GIS
- Interoperability circular 2005: this contains standards to build information systems in all central and local public institutions (A. Aydinoglu, W. Quak, T. Yomralioglu, Some Spatial Data Management Issues towards Building SDI, [http://www.i3mainz.fh-mainz.de/FIG-Workshop/programme2-Dateien/TS%206.2\\_Aydinoglu,etc.\\_Some%20Spatial%20Data%20Management%20Issues%20towards%20Building%20SDI.pdf](http://www.i3mainz.fh-mainz.de/FIG-Workshop/programme2-Dateien/TS%206.2_Aydinoglu,etc._Some%20Spatial%20Data%20Management%20Issues%20towards%20Building%20SDI.pdf))
- 2005 Cadastre law: this law gives a mandate to create the Turkish NSDI.

### **2.3.2 Public-private partnerships (PPPs)**

PPPs between the public and the private sector for the operation of the cadastre are accepted in theory, but are not fully operational yet. The government is working together with the company Turksat to develop the Turkish SDI.

### **2.3.3 Policy and legislation on access to public sector information (PSI)**

The Turkish law on the right to information dates from October 9, 2003. The object of the law is to regulate the procedure of the right to information according to the principles of equality, impartiality and openness that are the necessities of a democratic and transparent government. Next to the Act, a circular on 'The exercise of the right of petition and access to information' was issued by The Prime Ministry in 2004 (see <http://www.epractice.eu/en/document/288415>).

The law on the right to information gives natural and legal persons the right to obtain information from public institutions and private organisations that qualify as public institutions.

### **2.3.4 Legal protection of GI by intellectual property rights**

Turkey has had a modern copyright law since 1951. It was amended in 1995 in order to harmonize it with European Union copyright principles. The amended Copyright Law contains a number of significant improvements: expanding the term of protection to 70 years, broadening coverage to include software, and sharply increasing penalties for infringement. However, further amendments are needed to bring the law into compliance with TRIPs, Berne. In 2001, the Copyright law was amended in order to make it more compliant with international conventions.

### **2.3.5 Restricted access to GI further to the legal protection of privacy**

Section Five of the 1982 Turkish Constitution is entitled “Privacy and Protection of Private Life”. Article 20 of the Turkish Constitution deals with the “Privacy of the Individual’s Life”, whilst article 22 deals with the “Secrecy of communication”.

The Turkish Ministry of Justice has been working on data protection legislation for several years without success. In mid 2003, a draft law on the protection of personal data (Kisisel Verilerin Korunmasi Kanunu Taslagi) was completed. It is based on the 1981 Council of Europe Convention and Directive 95/46 on the protection of personal data. The draft was sent to the National Assembly in 2008, and it is still pending (<http://www.epractice.eu/en/document/288415>). The By-law on privacy in the telecommunications sector was adopted in 2004 and the By-law on electronic communication security in 2008.

### **2.3.6 Licensing framework**

GISEE (2004, p.30) states that the use of small and medium scale data (presumably the data provided by the GCM) requires permission from the military. No more recent information has been found.

### **2.3.7 Funding model for the SDI and pricing policy**

Funding of data production and related services is mainly by the central government and, to a limited extent, by international donors (GISEE, 2004). No more recent information has been found.

### **2.3.8 Conclusions of Component 2**

Turkey is currently working on implementing a strategy for the NSDI and preparing a proposal for a law on the spatial data infrastructure. The government is working together with the company Turksat to develop the Turkish SDI. Funding of data production and related services is mainly by the central government and, to a limited extent, by international donors.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or – development (In Preparation)
- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects (No Information found)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (No Information found)
- GI can specifically be protected by copyright (No Information found)
- Privacy laws are actively being taken into account by the holders of GI (No Information found)
- There is a framework or policy for sharing GI between public institutions (No Information found)
- There are simplified and standardised licences for personal use (No Information found)
- The long-term financial security of the SDI-initiative is secured (No)
- There is a pricing framework for trading, using and/or commercialising GI (No Information found)

## 2.4 Component 3: Data for themes of the INSPIRE annexes

### 2.4.1 Data sets at different resolutions covering the INSPIRE and other themes

The General Command of Mapping (GCM) produces topographic maps and related digital raster and vector products at scales 1:25.000, 1:50.000, 1:100.000, 1:250.000, 1:500.000 and 1:1.000.000.

- 1 : 25 000 Scale Digital Elevation Maps (YUKPAF25)
- 1 : 250 000 Scale Digital Elevation Maps (YUKPAF250)
- 1 : 25 000 Scale Raster Maps (RHEG25)
- 1 : 50 000 Scale Raster Maps (RHEG50)
- 1 : 100 000 Scale Raster Maps (RHEG100)
- 1 : 250 000 Scale Raster Maps (RHEG250)
- 1 : 500 000 Scale Raster Maps (RHEG500)
- 1 : 1 000 000 Scale Raster Maps (RHEG1000)
- 3" x 3" Digital Terrain Data (DTED1)
- 1" x 1" Digital Terrain Data (DTED2)

Large Scaled Maps, 1/5000 and larger, are produced by Land Registry and Cadastre Directorate (LRCD) and the State Provincial Bank. Other public institutions and municipalities also produce maps serving their own needs, depending on their responsibilities and rights legalized by the laws.

The current situation of cadastre works are presented in number of units (districts in urban areas and villages in rural areas) and their percentages. Table 1 shows the distribution of units where cadastre works are completed, continuing or remaining.

Completed and continuing works indicate 98% of cadastre coverage (Mataraci et al., 2009).

Table 1. Realization of the Turkish cadastral works (LRCD, 2009)

Current Situation	Cadastre in Urban Areas		Cadastre in Rural Areas		Cadastre in Both (Urban & Rural) Areas	
	No. of Units (District)	%	Number of Units (Village)	%	No. of Units (Village or District)	%
Completed	17534	97,2	30728	88,7	48262	91,6
Continuing	401	2,2	2941	8,5	3342	6,3
Problematic	32	0,2	487	1,4	519	1,0
Remaining	66	0,4	502	1,4	568	1,1
<b>Total</b>	<b>18033</b>	<b>100</b>	<b>34658</b>	<b>100</b>	<b>52691</b>	<b>100</b>

The 1:25.000 scale digital elevation maps contain the contour lines (5 meter interval), elevation points and their heights as derived from the 1:25.000 topographic maps. The spatial coverage is not clear (populating database about to start).

The 1" x 1" Digital Terrain Dataset comprises the terrain elevations defined by points in intervals of 1" latitude and 1" longitude, as derived from the contour lines and elevation spots at the 1:25.000 topographic map. Again spatial coverage is not specified.

Work is going on in the following fields, of which several are themes of the annexes of the INSPIRE Directive:

- **Land Registry & Cadastre Information System (TAKBIS)** by General Directorate of Land Registry and Cadastre: <http://takbisbilgi.tkgm.gov.tr/takbis.portal>;
- **Agricultural Reform Implementation Project (ARIP)** by General Directorate of Land Registry and Cadastre: <http://www.tkgm.gov.tr/turkce/dosyalar/diger/proje12.doc>;
- **National Topographic Databases (vector, raster, gazetteer)** by General Command of Mapping): <http://www.hgk.mil.tr/english/english.htm>;
- **e-Commerce of Geospatial Information** by General Command of Mapping: <http://www.hgk.mil.tr/english/english.htm>;
- **International e-Roads, Trans European South-North Motorway Project, Trans Turkey Highway Project** by General Directorate of Highways: <http://www.kgm.gov.tr/Sayfalar/KGM/SiteEng/Root/MainPageEnglish.aspx>;
- **Geologic Data Bases (vector)** by General Directorate of Mineral Research & Exploration: <http://www.mta.gov.tr/v1.0/english/index.php/>;
- **Biological Diversity & Natural Resource Management Project** by General Directorate of Environmental Protection & National Parks: <http://www.gef-2.org/tr/index.asp>;
- **Forest Resource Information System** by General Directorate of Forestry: [http://www.ogm.gov.tr/birim12\\_2.htm](http://www.ogm.gov.tr/birim12_2.htm);
- **National Information System and Statistical Development Project** by Turkish Statistical Institute: <http://www.die.gov.tr/PROJECTS/NIS/nis.html>;
- **Soil & Water Resources National Information Centre** by General Directorate of Rural Services: <http://www.khgm.gov.tr/nic.htm>;
- **Turkey Flood and Earthquake Recovery Project** by General Directorate of State Water Works: <http://www.dsi.gov.tr/english/service/cevree.htm>;
- **Disaster Information System of Turkey (TABIS)** by General Directorate of Disaster Affairs: <http://www.deprem.gov.tr/Sarbis/Shared/Anasayfa.aspx>.

The majority of the large scale maps ( $\leq 1:5.000$ ) are not in digital format.

## Responsibilities for the different data themes:

Feature Category	Feature(s)	Responsible Institution(s)
Geodetic data	National Networks	General Command of Mapping
	Densification Networks	General Directorate of Land Registry and Cadastre
	Densification Networks	İller Bankası
Topography	Physiography	General Directorate of Mineral Works
	Hypsography (1:5.000 and greater)	General Directorate of Mineral Research & Exploration
	Hypsography (1:25.000 and smaller)	General Command of Mapping
	Physiography	General Directorate of Land Registry and Cadastre
	Hypsography(1:25.000 and smaller)	İller Bankası
	Bathymetry	Ministry of National Defense

Feature Category	Feature(s)	Responsible Institution(s)
Vegetation	Agricultural	General Directorate of Agriculture & Rural Affairs
		General Directorate of Rural Services
	Non-Agricultural	General Command of Mapping
		General Directorate of Land Registry and Cadastre
		General Directorate of Forestry
		General Directorate of National Properties
Hydrography	Hydrography Hydrographic structures	General Directorate of State Water Works
		General Directorate of Rural Services
		General Directorate of Land Registry and Cadastre
		General Directorate of Highways
Population	Open Areas	
	Buildings	

Feature Category	Feature(s)	Responsible Institution(s)
Transportation	Highways Highway Structures	General Directorate of Highways
		General Directorate of Land Registry and Cadastre
		General Directorate of Rural Services
		Municipalities
	Railroads	General Directorate of Railways
	Maritime lines	General Directorate of Maritime Transportation
	Air lines	General Directorate of State Airports Administration
Administrative Areas	Administrative units Administrative boundaries	General Directorate of Cities Administration
		Governorships
Properties	Properties	General Directorate of Land Registry and Cadastre
Address Data	Address Data	Municipalities
Orthoimages/ Orthophotos	Orthoimages/ Orthophotos	General Command of Mapping

Feature Category	Feature(s)	Responsible Institution(s)
Planning & Project Regions	Region Plan	General Directorate of Forestry
	Environment Plan	Special Environment Protection Committee
	City Environment Plan	Governorships, Municipalities
	Public Works Plan	
Restricted & Security Areas	Restricted Areas Security Areas	Ministry of National Defence
Protected Areas	Urban Protected Areas	General Directorate of Environmental Protection & National Parks
	Special Environmental Protected Areas	
	Historical – natural Protected Areas	
	River Basin Protected Areas	General Directorate of Water Works, Municipalities

Feature Category	Feature(s)	Responsible Institution(s)
Infrastructure Networks	Drinking Water Network	General Directorate of Agriculture & Rural Affairs, Municipalities
	Sewerage Network	ILLER BANKASI, Municipalities
	Communication Network	TURK TELEKOM, General Directorate of Wireless, PTT
	Electricity Network	TEDAS
	Geothermal Water Network	General Directorate of Mineral Research & Exploration
	Petroleum Pipe Network	General Directorate of Petroleum Works
	Natural Gas Network	Ministry of Energy and Natural Resources
Geologic Data	Underground Resources	General Directorate of Mining Affairs
	Geologic Formations, Faults	General Directorate of Mineral Research & Exploration
	Tectonic movements	General Directorate of Disaster Affairs

There is also intensive collaboration in international projects: VMAP Level 1, SABE, EuroGlobalMap, GeoNames.

### 2.4.2 Geodetic reference systems and projections

There are three different types of reference frames: Local, ED-50, TUTGA (National Primary GPS Network of Turkey).

### 2.4.3 Language and culture

Most of web sites are in Turkish language. However more and more are found to provide an English version or at least an English summary such as the GCM, DSI, Turkstat, MTA and TCK.

## 2.4.4 Conclusions of Component 3

Already from the previous TR's SoP report a number of Geodatasets existed which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes, but many of the INSPIRE themes are not yet covered. The geodetic reference system and projection systems are not standardised, documented and interconvertible. For certain themes e.g. cadastre there is 98% coverage but is not clear to what extent datasets exist. Most of web sites are in Turkish language. However more and more are found to contain an English version or at least an English summary such as the GCM, DSI, Turkstat, MTA and TCK.

Based on these conclusions we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components (Partially)
- The geodetic reference system and projection systems are standardised, documented and interconvertible (No)
- There is a documented data quality control procedure applied at the level of the SDI (No Information found)
- Concern for interoperability goes beyond conversion between different data formats (No Information found)
- The national language is the operational language of the SDI
- English is used as secondary language (Partially)

## 2.5 Component 4: Metadata

### 2.5.1 Metadata availability

The website <http://www.hgk.msb.gov.tr/urunler/satis.asp> from the General Command of Mapping (GCM) provides a description of the offered analogue and digital products. An important part of the spatial data sets have metadata. The process of metadata creation is an ongoing process.

### 2.5.2 Metadata catalogues

A metadata catalogue is available and accessible through the geoportal of the Ministry of Environment and Forests (now Ministry of Forestry and Water Affairs) and its department of Information Technology.

[http://gis.cevreorman.gov.tr/cob2011/?page\\_id=440&lang=en](http://gis.cevreorman.gov.tr/cob2011/?page_id=440&lang=en).

“Metadata Portal for Maps” that is named as “Map Information Bank” is established by General Directorate of Land Registry and Cadastre (GDLRC). The aim is to Monitor Map Production in Turkey in one way and to prevent duplicate mapping activities. Metadata Portal in Map Production Monitoring Centre (MPMC) is based on Articles 103, 104 and 105 in Large Scale Maps and Map Information Production Regulation (LSMMIPR) legally and the duty to establish this metadata portal is referred to GDLRC. Technically MPMC is embedded in Information System for Land Registry and Cadastre (TAKBIS). The web interface is designed accordance to the ISO 19115/TC 211 Digital Geographic Information System Standards.

The general options of the Metadata User Interface are to register, publish, query and access to the spatial information. At the same time the type of functions on Metadata User Interface are: Administration functions, online metadata registration functions, query metadata functions. In addition to these Ground Control Points (GCP) Function is developed to search information related to GCP. Metadata and GCPS are integrated with Google Earth to provide broad visual capabilities (Yalçın and Bakıcı, 2008).

### 2.5.3 Metadata implementation

The portal website is <http://hbb.tkgm.gov.tr/metadata/MetadataSearch.aspx?Deger=1> (only in Turkish). As stated by Mataraci et al., 2009 the current condition of the project is:

- The education is provided to the other map related public institutions and entry of metadata has started.
- Entry of metadata of 1/5000 scale Standard Topographic Map is completed.
- The updating of the Sheet Registration System and then the integration to MPFC are aimed for metadata of cadastral sheets.
- Searching Ground Control Points (with Datum ED50 and ITRF) is possible.

- Metadata areas and Ground Control Points are integrated with Google Maps.
- Currently, organizations producing large scale map have been continuing submission of their data by using web based Map Information Bank Interface.

## 2.5.4 Conclusions of Component 4

Turkey is currently running projects to intensify and unify the metadata production. For example, the metadata created by the Ministry of Environment and Forestry. Through the geoportal a catalogue of spatial data resources can be searched for. The “Metadata Portal for Maps” that is named as “Map Information Bank” is established by General Directorate of Land Registry and Cadastre (GDLRC). Metadata Portal in Map Production Monitoring Centre (MPMC) is based on Articles 103, 104 and 105 in Large Scale Maps and Map Information Production Regulation (LSMMIPR) legally and the duty to establish this metadata portal is referred to as GDLRC. Technically MPMC is embedded in Information System for Land Registry and Cadastre (TAKBIS). In this scope a web based prototype has been developed. All institutions that are dealing with map production in Turkey are members of this study. On test phase at the moment and only in Turkish the portal <http://hbb.tkgm.gov.tr/metadata/MetadataSearch.aspx?Deger=1>.

Based on these conclusions we score the indicators as follows:

- Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes (Partially)
- One or more standardised metadata catalogues are available covering more than one data producing agency (Partially)
- There is a coordinating authority for metadata implementation at the level of the SDI (No)

## 2.6 Component 5: Network Services

### 2.6.1 Geoportals

A number of portals exist, mainly dispersed to its institutions while most of them deal with environmental data. The geoportal that most probably will become the national NSDI & INSPIRE portal is the one from the Ministry of Environment and Forests (now Ministry of Forestry and Water Affairs) and its department of Information Technology [http://gis.cevreorman.gov.tr/cob2011/?page\\_id=440&lang=en](http://gis.cevreorman.gov.tr/cob2011/?page_id=440&lang=en). The GeoPortal provides an entry point to access remote sensing, geospatial static and in-situ data, information and services.

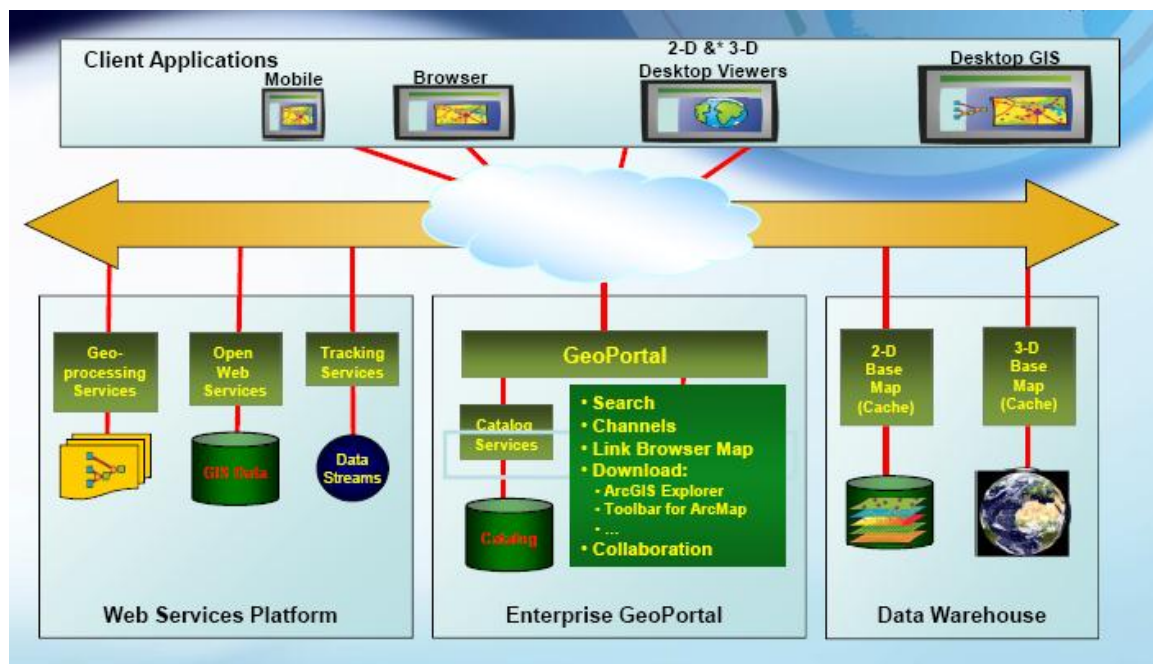


Figure 1: Geoportal Architecture of Turkish NSDI (Serter, 2011)

The portal provides access to a the catalogue with metadata, some geodata services and web mapping client applications. It also provides the possibility to publish spatial data sets and their metadata and validate the latter. The geoportal is under full development. There is also a security management layer. While the portal itself is developed in Turkish, part of it and the background information is also in English. A number of data layers are available already – according to the INSPIRE specifications - through GIS map functionalities such as zoom in/out, info, crop, take a snapshot etc.

Among others, following functions will be made available:

- Searching for the published geo-information resources;
- Spatial information content and viewing the results of queries;

- Analyse data according to the location;
- Authorization of users to access the Portal resources;
- Personalize portal applications.



Figure 2: The geoportal allows to search/discover, view, download and use spatial data (Serter, 2011).

The ministry also provides the:

<http://www.yildizdagiprojesi.cevreorman.gov.tr/cob2/denemetestpage.aspx> portal and the <http://agmcas.cevreorman.gov.tr/COB/MainPageFW/index2.aspx?HideMenus=1>.

Moreover, GDLRC have created the Takbis portal where cadastral solutions and applications are provided (<http://takbisbilgi.tkgm.gov.tr/takbis.portal>). TARBİS project collects all land registry titles on digital format and indexes all titles since Ottoman Empire. The project is creating a “Land Register and Cadastre Information System” throughout the country.

Main objectives of TAKBİS are providing accurate, valid and reliable land information required for land and land – related activities of decision makers, transforming land register and cadastral survey works and associated information into a multi – purpose land information system. So far, 370 land registry offices and 32 cadastre offices have been integrated with the TAKBİS. In these land registry offices, information on 25 million real estates and 45 million active right holders (owners) has been integrated with the TAKBİS (Mataraci et al., 2009).

The GCM website <http://www.hgk.mil.tr/english/english.htm> provides a description of the offered analogue and digital products.

## 2.6.2 Network services

### 2.6.2.1 Discovery services

Within the above mentioned geoportal of the Ministry of Environment and Forestry, users can search and discover metadata for spatial data sets in the catalogue. However, although it is mentioned by Serter that discovery services will be developed within the context of the geoportal according to CSW, it is not clear whether this is already operational (the metadata could not be accessed at the time of writing this report).

MINISTRY OF ENVIRONMENT, FORESTRY AND URBAN OF TURKEY

Page 1 of 1

HOME SEARCH GEOCATALOG DOWNLOAD MAP VIEWER 

This page shows a sample implementation of a browse tree that you can customize. The users to browse a subset of classified resources in the catalog.

**Catalog**

**Content Type**

**ISO Topic Category**

- Administrative and Political
- Agriculture and Farming
- Atmosphere and Climatic
- Biology and Ecology
- Business and Economic
- Cadastral
- Cultural, Society and Demographic
- Elevation and Derived Products
- Environment and Conservation
- Facilities and Structures
- Geological and Geophysical
- Human Health and Disease
- Imagery and Base Maps
- Inland Water Resources
- Locations and Geodetic Networks
- Military
- Oceans and Estuaries
- Transportation Networks
- Utilities and Communications

12 results  Filter Clear

Showing 1-10 **1** 2

**Vahsi Depolama Sahalari**  
Kati atiklarin rastgele döküldüğü alanlardır. Bu verinin geometri tipi alan sinirlari içerisindeki tüm vahsi depolama sahalarini kapsar.

[Open](#) [Preview](#) [Globe \(.kml\)](#) [ArcGIS \(.nmf\)](#) [ArcGIS \(.lyr\)](#) [Add Metadata \(.GML\)](#)

**Tesis Tehlikeli**  
Kimyasallar yönetimi tarafından belirlenmiştir. Noktasal olarak bu veri t

[Open](#) [Preview](#) [Globe \(.kml\)](#) [ArcGIS \(.nmf\)](#) [ArcGIS \(.lyr\)](#) [Add Metadata \(.GML\)](#)

**Tesis Desarj Yerleri**  
Bu verinin geometri tipi noktadır. Türkiye sinirlari içerisindeki tüm desa

[Open](#) [Preview](#) [Globe \(.kml\)](#) [ArcGIS \(.nmf\)](#) [ArcGIS \(.lyr\)](#) [Add Metadata \(.GML\)](#)

**Process Alanlari**  
Kimyasallar yönetimi tarafından belirlenmiş alanlardır. Türkiye içerisindeki alanlarini kapsar. Bu verinin geometri tipi noktadır.

Geoportal 2010 - 2011 © Ministry of Environment, Forestry and Urban of Turkey

http://geoportal.cob.gov.tr/geoportal/catalog/search/browse/browse.page

11/01/2012

**Figure 3: Catalogue – list of datasets under the facilities and structures theme**

### 2.6.2.2 View services

Several viewing services are made available according to the WMS OGC standard. Spatial data sets can be previewed after being discovered. However, the function was not working at the time of writing the report.

In other projects WMS starts to emerge as well. In the Noah's Ark National Biological Diversity Database WMS is mentioned as part of the architecture of the system (see [http://www.nuhungemisi.gov.tr/Giris/index\\_en.aspx](http://www.nuhungemisi.gov.tr/Giris/index_en.aspx)).



### 2.6.2.3 Download services

These are foreseen according to WFS, but not yet implemented at the time of writing this report.

### 2.6.2.4 Transformation services

No information available

### 2.6.2.5 Invoking services

No information available

### 2.6.3 Spatial data and other services

Other services that will be developed and made available through the geoportal include WCS (Web Coverage Service), WPS (Web Processing Services) and tracking services. Based on LDAP, a authentication / security mechanism will manage access to the portal.

### 2.6.4 Use of software and SDI applications

The development of applications is a key building block for the Turkish SDI. Besides the geoportal to have access to the data, metadata and services, several types of applications are foreseen, including mobile applications and dedicated applications for particular purposes (2D as well as 3D).

### 2.6.5 Conclusions of Component 5

A number of portals exist, mainly dispersed to its institutions while most of them deal with environmental data. The Ministry of Environment and Forests and its department of Information Technology, provide geodata services at [http://gis.cevreorman.gov.tr/sayfalar/ana\\_sayfa.html](http://gis.cevreorman.gov.tr/sayfalar/ana_sayfa.html). A number of data layers are available and discovery and viewing services are available but could not be tested at the time of writing. Download service are not yet available but are considered, while no information could be found on transformation and invoking services.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata (Partially)
- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes (Partially)
- There are one ore more on-line download services enabling (parts of) copies of datasets (No)
- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (No information found)
- There are middleware services allowing data services to be invoked (No information found)

## 2.7 Component 6: Thematic environmental data

MTA (Mineral Research & Exploration General Directorate), established in 1935 with the aim of conducting scientific and technological research on mineral exploration. It provides a number of Geology, Geophysics, and Mineral maps (<http://www.mta.gov.tr/v1.0/english/maps.php>).

The Ministry of Environment and Forests has the responsibility for co-ordinating the studies conducted related to the Environment Chapter of EU legislation. The Law on Establishment and Duties of Ministry of Environment and Forestry No. 4856 (Official Gazette: 08 May 2003, No. 25102) defines the mandate of the MoEF as identifying appropriate technologies for environmental protection and pollution prevention; setting the environmental standards and develop waste management policies among other duties (<http://www.cevreorman.gov.tr/COB/Bakanlik/bakanlikGorevleri.aspx?sflang=en>).

The ministry regulates its own GIS department ([http://gis.cevreorman.gov.tr/sayfalar/ana\\_sayfa.html](http://gis.cevreorman.gov.tr/sayfalar/ana_sayfa.html)).

A number of web map services and datasets are available in the ministry website (<http://gis.cevreorman.gov.tr/cob/index.aspx>) providing Water data, Meteorological data, Forest and Preserved Areas.

### 2.7.1 Conclusions of Component 6

A number of web map services and datasets are available in the ministry website (<http://gis.cevreorman.gov.tr/cob/index.aspx>) providing Water data, Meteorological data, Forest and Preserved Areas..

Based on the information provided on the previous paragraph we score the indicator as follows:

- Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI (Partially)

## 2.8 Component 7: Standards

In recent NSDI developments, more attention is paid to the application of geo-standards. Specifications that are being applied in the context of data harmonization, metadata development and geoportal development include:

- ISO/TS 19103 (Geographic Information - Conceptual schema language)
- ISO 19131 (Data Product Specifications)
- ISO/TS 19139 (Geographic Information-Metadatas-XML Schema Implementation)
- ISO/CD 19142 (Web Feature Services)
- ISO Metadata Application(ISO19115/19119) ISO 19139 v1.0 (XML encoding of ISO 19115/19119)
- OGC WMS, WFS and CSW

Metadata portal web interface is designed accordance to the ISO 19115/TC 211 Standards. MPMC data sets and web services are saved in GIS PORTAL TOOLKIT of ESRI. (Yalçin et al., 2010).

### 2.8.1 Conclusions of Component 7

Because the application of geo-standards just started to emerge and is still in its initial stage we score the indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues (Partially)

## 2.9 Use and efficiency of SDI

Since Turkey has not yet an established SDI is not easy to pinpoint areas of usage and efficiency on the different sectors. Apart from obvious data/maps availability a major efficiency example would be the Cross Border Collaborations established such as the Bulgaria - Turkey IPA Cross-border Programme which is financed by the European Union through the IPA (Instrument for Pre-Accession Assistance) Fund and co-financed by Bulgaria and Turkey through contributions from state budgets.

Furthermore, Turkey participates in the ENCI CBC (Cross Border Collaboration) Sea-Basin Programme 2007-2013 Black Sea ([http://www.ipacbc-bgtr.eu/eng/page/programme/strategic\\_goals](http://www.ipacbc-bgtr.eu/eng/page/programme/strategic_goals)).

### 3 Annexes

#### 3.1 List of SDI addresses / contacts for Turkey

Table: SDI contact list			
SDI Name (full)	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
Ministry of Environment and Forestry	<a href="http://www.cevreorman.gov.tr">http://www.cevreorman.gov.tr</a>	Türkiye Cumhuriyeti Orman ve Su İşleri Bakanlığı Söğütözü Cad. No:14/E Beştepe 06560 Yenimahalle - ANKARA	
General Command of Mapping (GCM)	<a href="http://www.hgk.ms.gov.tr/index.asp">http://www.hgk.ms.gov.tr/index.asp</a>	HARİTA GENEL KOMUTANLIĞI TIP FAKÜLTESİ CADDESİ 06100 DİKİMEVİ/ANKARA	
Prime Ministry State Institute of Statistics (SIS)	<a href="http://www.die.gov.tr/ENGLISH/index.html">http://www.die.gov.tr/ENGLISH/index.html</a>	Yücestepe Mah.Necatibey Cad. No:114 06100 Çankaya/ANKARA	Phone:+90 312 410 0 410
General Directorate of Cadastre and Land Registry ( GDCLR-	<a href="http://www.tkgm.gov.tr/tkgm/index.php">http://www.tkgm.gov.tr/tkgm/index.php</a>	Dikmen Yolu No:14 (06100) Bakanlıklar/Ankara	Phone:+90 312 413 60 00
Ministry of Public Works and Settlement (MPWS)	<a href="http://www.bayindirlik.gov.tr/turkce/">http://www.bayindirlik.gov.tr/turkce/</a>		
SAGRES under Istanbul Technical University ITU .	<a href="http://www.itu.edu.tr">www.itu.edu.tr</a> .		
TURKSAT	<a href="http://www.turksat.com.tr">http://www.turksat.com.tr</a>	Turksat A.S. 40 KM. Konya Yolu 06839 Golbasi Ankara / Turkey	Geographic Information Technologies Director, TURKSAT Dr. Hayati Tastan

			Tel: +90 (312) 615 3000 Fax: +90 (312) 499 51 15
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### 3.2 List of references for Turkey

Table: list of references used to compile the Country Report	
<b>Web sites:</b>	
	<a href="http://www.privacyinternational.org/survey/phr2002/phr2002-part3.pdf">http://www.privacyinternational.org/survey/phr2002/phr2002-part3.pdf</a>
	<a href="http://test.ddl.org/figtree/events/fig_2002/fig_2002_abs/Ts8-1/TS8_1_turk_abs.pdf">http://test.ddl.org/figtree/events/fig_2002/fig_2002_abs/Ts8-1/TS8_1_turk_abs.pdf</a>
	<a href="http://www.toprak.org.tr/isd/isd_02.htm">http://www.toprak.org.tr/isd/isd_02.htm</a>
	<a href="http://wwwlmu.jrc.it/ginie/doc/ginie_book.pdf">http://wwwlmu.jrc.it/ginie/doc/ginie_book.pdf</a>

<b>Publications:</b>	
	M. Craglia and J. F. Dallemand: Geographic Information and the Enlargement of the European Union. EUROGI-European Commission Workshop. Brussels, 16-17/11/2000. Technical Report. EUR 19824 EN <a href="http://www.ec-gis.org:8080/wecgis/docs/F22346/IMPAGINATO.PDF">http://www.ec-gis.org:8080/wecgis/docs/F22346/IMPAGINATO.PDF</a>
	Spatial Data Infrastructures in South East Europe, Country Report Turkey (GISEE deliverable D 4.2.1TR), GISEE Consortium, May 2004
	S. Bakiki and B. Erkek, 2009. National spatial data infrastructure related projects in Turkey. eGOVshare2009.
	O. Mataraci, A. Ç. Aydinoğlu, T. Yomralioğlu, H. İ. İnan, 2009. Turkey National LIS Actions towards Building SDI. GSDI 11 Rotterdam, the Netherlands, 15-19 June 2009.
	G. Yalçın, B. Erkek, S. Bakici and N. Ahin, 2009. Through Spatial Data Infrastructure in Turkey. FIG Working Week 2009. Surveyors Key Role in Accelerated Development. Eilat, Israel, 3-8 May 2009
	G. Yalçın, B. Erkek and S. Bakici, 2010. Spatial Data Infrastructure in Turkey and Projects. FIG Congress 2010 Facing the Challenges – Building the Capacity Sydney, Australia, 11-16 April 2010

<b>Other possible information sources</b>	<b>Web sites:</b>
	<a href="http://www.privacyinternational.org/survey/phr2002/phr2002-part3.pdf">http://www.privacyinternational.org/survey/phr2002/phr2002-part3.pdf</a>
General Command of	<a href="http://www.hgk.mil.tr/">http://www.hgk.mil.tr/</a>

Mapping (GCM): Topographic Databases (1:25.000, 1:250.000, 1:1 million)	
Mine Technical Resource General Administration MTA: Geologic Maps (Geologic Databases)	<a href="http://www.mta.gov.tr/jeoloji/RS/urunler.html">http://www.mta.gov.tr/jeoloji/RS/urunler.html</a>
Ministry of Agriculture, GIS and RS Centre: Turkish Agriculture Information System Project.	<a href="http://www.tarlabitkileri.gov.tr/english/cografi_bilgi_s.htm">http://www.tarlabitkileri.gov.tr/english/cografi_bilgi_s.htm</a>
General Directorate of Cadastre and Land Registry (GDCLR): Cadastre and Land Registry Information System Project	<a href="http://www.tapu.gov.tr/tapu/takbis.html">http://www.tapu.gov.tr/tapu/takbis.html</a>
Prime Ministry: National Information System	<a href="http://www.bybs.gov.tr/kitap/ubs_kitabi/index.htm">http://www.bybs.gov.tr/kitap/ubs_kitabi/index.htm</a>
Ministry of Internal Affairs (MIA): Turkish Disaster Information System (TABİS)	<a href="http://www.icisleri.gov.tr/strateji/download/diger/genelge.htm">www.icisleri.gov.tr/strateji/download/diger/genelge.htm</a>
General Directorate of Forestry (GDF): Source of Forestry Information System	<a href="http://www.ogm.gov.tr/birim12.htm">http://www.ogm.gov.tr/birim12.htm</a>
General Directorate of Highway: Highway GIS	<a href="http://www.netas.com.tr/cs_NNN_turk_4.html">http://www.netas.com.tr/cs_NNN_turk_4.html</a>
General Directorate of Village, Source of Soil and Water National Information Centre: Soil Database (1:25.000), Rural and Agriculture Infrastructure Database (1:250.000), Turkish General Soil Map (1:1 million), Land Cover and Land Use Database (1:25.000)	<a href="http://www.tb-yayin.gov.tr/turktarim/sayi144/kapak08.htm">http://www.tb-yayin.gov.tr/turktarim/sayi144/kapak08.htm</a>
General Directorate of National Property National	<a href="http://www.milliyeplak.gov.tr/projelerimiz/meop/meop.htm">http://www.milliyeplak.gov.tr/projelerimiz/meop/meop.htm</a>

Property Automation Project	
Ministry of National Defence Property Information System	<a href="http://www.msb.gov.tr/Birimler/InsEmlD/InsEmlDEmlIskanFaal.htm">http://www.msb.gov.tr/Birimler/InsEmlD/InsEmlDEmlIskanFaal.htm</a>
Ministry of Environment (ME) National Environment Database	<a href="http://www.tai.com.tr/homepage.swf">http://www.tai.com.tr/homepage.swf</a>
	<a href="http://test.ddl.org/figtree/events/fig_2002/fig_2002_abs/Ts8-1/TS8_1_turk_abs.pdf">http://test.ddl.org/figtree/events/fig_2002/fig_2002_abs/Ts8-1/TS8_1_turk_abs.pdf</a>
	<a href="http://www.toprak.org.tr/isd/isd_02.htm">http://www.toprak.org.tr/isd/isd_02.htm</a>