

## THE NEW NATIONAL ATLAS OF SPAIN ON INTERNET

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### **1. BACKGROUND AND OBJECTIVES**

In 2009, the National Atlas of Spain (ANE, the Spanish acronym), released the digital facsimile DVD publication which includes all thematic groups of the Atlas published between 1986 and 2008. In addition the content of this DVD is available online at the website of the National Geographic Institute (<http://www.ign.es/ane/ane1986-2008/>). This publication allows an interactive visualization of the documental information of ANE General Series thematic groups. Following this publication lineage, another edition facsimile of the first National Atlas of Spain (1965) was produced in 2010.

A new thematic structure has been created for the New National Atlas of Spain (also called National Atlas of Spain in XXI century or ANE-XXI). In this new structure, themes already included in previous projects (transport, trade, energy ...) are taken into account, and other new issues are added. This change is due to the fact that nowadays the attention focuses on other aspects such as the cultural and natural heritage or the comparison of Spain and other countries in Europe and in the world.

The following, shows a table with the new ANE-XXI thematic structure:

SECTION (Thematic grouping level 1)	SECTION TITLE	THEME (Thematic grouping level 2)	GROUP (Thematic grouping level 3)
SECTION I	GEOGRAPHIC KNOWLEDGE AND CARTOGRAPHIC REPRESENTATION	The cartographic representation of territory and geographical knowledge	Historical development of cartographic representation in Spain New geographic information technologies National Geographic Institute and National Center for Geographic Information Other mapping agencies of the State Administration
		The general map of Spain and other cartographic references 1:1.000.000	General cartographical references Tables of geographic data Spain General Map 1:1.000.000 Toponymical indexes maps of cartographic references maps and the map 1:1.000.000
SECTION II	ENVIRONMENT	Land structure, surface modeling, climate and water	Geophysics Relief Geomorphology Climatology Hydrology
		Biogeography and soil science	Biogeography Soil science
SECCIÓN III	History	History of Spain	
SECTION IV	POPULATION, SETTLEMENT AND SOCIOLOGY	Demography and human settlements	Demography Settlements: towns and rural habitat
		Sociology	Familiar sociology Cultural sociology Labour sociology Electoral sociology
SECTION V	RURAL AND MARINE	Farming and fishing	Agriculture Forestry Cattle Aquaculture Fishing
		New functions in rural areas	Recreation and tourism Conservation of natural and cultural heritage Rural development programs
SECTION VI	INDUSTRY, TOURISM AND TRADE	Mining, energy, industry and construction	Mining industry Energy Industry sector Construction
		Tourism and trade	Tourism Interior trade Exterior trade
SECTION VII	SERVICES AND EQUIPMENT	Advanced and innovative services, business and finances and public treasury	Advanced and innovative services Business Finances and public treasury
		Education, science, culture and sport	Education Science and technology Culture Sport
		Work, social protection, health and security policies	Work Social protection and social services Health Defense Security Justice
SECTION VIII	TRANSPORT AND COMMUNICATIONS SYSTEMS	Transport and communications	Road transport Railway transport Air transport Maritime transport Urban transport and other system of transport Communications
SECTION IX	SPATIAL STRUCTURE	Territorial components	Biophysical land cover Landscape Natural and cultural heritage Environmental quality
		Territorial articulation	Territorial and institutional organization of the State Settlement systems: functional organization Territorial policies and planning
SECTION X	A GLOBAL WORLD	Spain in the world	New insights, new cartographic projections Environment Population, settlement and sociology Economic activities Services and equipment Transport and communications system Components and articulation of the territory

Table 1. New thematic structure of the New National Atlas of Spain (ANE-XXI)

At the end of 2010, the first objects (digital assets in SIANE terminology) of the ANE-XXI were published on Internet, these contents were produced using the National Atlas of Spain Information System (SIANE) and published using a module which is called siANeweb. SIANE is designed to produce and publish the new ANE objects with the quality and efficiency which is established in its publication standards and it allows, fast and continuous updating, using the Internet as the main dissemination media.



Figure 1. New ANE-XXI thematic structure as presented in siANeweb

The new objects that the user can browse on Internet have been chosen according to different criteria:

- They must be highly significant. For example, physical and political maps of Spain at 1:1,000,000 scale.
- They must synthesize geographic and human reality. For example, population maps at municipal level
- Data can be updated. For example, the labour market map in 2009 with data of 2010

These new objects form a homogeneous core. At this moment, we are working in this core, and it is part of what is called ANE\_core project. In February 2011, there are contents available into the following thematic groups:

SECTION (Thematic grouping level 1)	SECTION TITLE	THEME (Thematic grouping level 2)	GROUP (Thematic grouping level 3)
SECTION I	GEOGRAPHIC KNOWLEDGE AND CARTOGRAPHIC REPRESENTATION	The general map of Spain and other cartographic references 1:1.000.000	General cartographical references
SECTION II	ENVIRONMENT	Land structure, surface modeling, climate and water	Relief
SECTION IV	POPULATION, SETTLEMENT AND SOCIOLOGY	Demography and human settlements	Demography
		Sociology	Familiar sociology
			Cultural sociology
			Labour sociology
SECTION V	RURAL AND MARINE	Farming and fishing	Agriculture
			Cattle
SECTION VI	INDUSTRY, TOURISM AND TRADE	Mining, energy, industry and construction	Energy
			Industry sector
		Tourism and trade	Tourism
			Interior trade
SECTION VII	SERVICES AND EQUIPMENT	Advanced and innovative services, business and finances and public treasury	Finances and public treasury
		Education, science, culture and sport	Culture
		Work, social protection, health and security policies	Work
SECTION VIII	TRANSPORT AND COMMUNICATIONS SYSTEMS	Transport and communications	Road transport
			Railway transport

Table 2. Thematic Groups with content available on Internet in February 2011.

## **2. APPROACH AND METHODS**

The Web application allows the user to browse objects in a catalogue presentation form and gives special relevance to maps. It has some interactive and multimedia capabilities, and allows the searching, querying, viewing and downloading of objects. The application is designed to public administrations staff, private professionals, researchers, teachers, students of middle and higher education and adult audiences who are aware of geographical themes or Spanish culture in general and with a basic knowledge on Internet.

The web application is accessible from a link provided in the homepage of the National Geographic Institute (IGN, in Spanish acronym) (<http://www.ign.es/siane/>) or from the ANE website (<http://www.ign.es/ign/layout/ignane.do>), both included in the IGN website.

### ***2.1 SIANE***

The SIANE consists of three subsystems: Input, Production and Publication.

#### ***2.1.1 Objectives of Input subsystem***

In the Input subsystem, an application has been developed to transform original data (generally Excel tables) in a structure recognized by the system through the name or an identifier of the geographical units of reference. In addition, the system can detect mistakes in the information and makes corrections easier.

#### ***2.1.2. Objectives of Production subsystem***

Nowadays, the Production subsystem has only internal use tools (it is not available for external users of the National Atlas of Spain department)

This subsystem allows the user:

- To manage, classify and store ANE objects (maps, statistical graphs, 3D views, images, texts, illustrations, photographs, animations, audios, videos, etc.).
- To generate statistical variables and operations with them.
- To create and update thematic maps in a semi-automatic way.
- To manage, classify, catalog and store metadata for all objects.
- To provide the management and development of drafts of the layout for printed publications.
- To copy objects, created in the Production subsystem, on the Publication subsystem immediately.

#### ***2.1.3 Objectives of Publication subsystem (objects on the Web: siANWeb)***

This subsystem allows to search, view, open and download via Internet, ANE contents, created through Production subsystem. In addition to a classic single search text field and a search by the ANE thematic structure, an advanced search has been included with the aim of having a flexible thematic index. Thus, the contents can be grouped and related depending on the interest of the user.

### ***2.2 siANWeb***

Functionalities available to the user in the Publication subsystem are explained below:

- Search
- Pre-visualization of contents and their metadata
- Examine objects with specific viewers
- Download of objects
- Contact, subscribe and send suggestions

#### ***2.2.1 Search***

The user can access the content by choosing one of three types of searches that the system provides:

- Search by ANE thematic groups

The user can navigate by thematic structure of the Atlas. The website shows a list of ANE sections, each section consists of themes and each theme consists of thematic groups. If a thematic group is selected, an objects list is obtained.



Figure 2. Search by ANE thematic groups

- Single text field search

This is the fastest search type. The search is performed on a solid and representative number of metadata (Title, Alternative title, Abstract, Keywords, and ANE theme).

To limit the number of objects found, the user can use the drop-down list to filter by ANE theme or group.

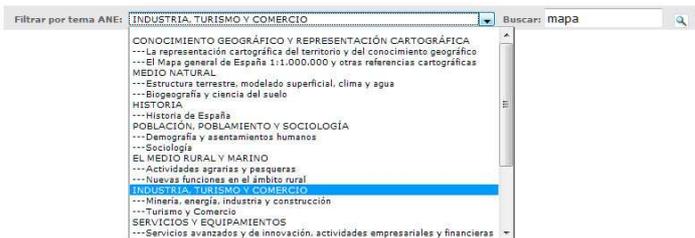


Figure 3. Single text field search

- Advanced Search

It allows the user to do more detailed searches in order to get faster what we are looking for.

This type of search includes some important metadata for classification of ANE contents. Most of them are part of ISO 19115 metadata standard. See Figure 4.

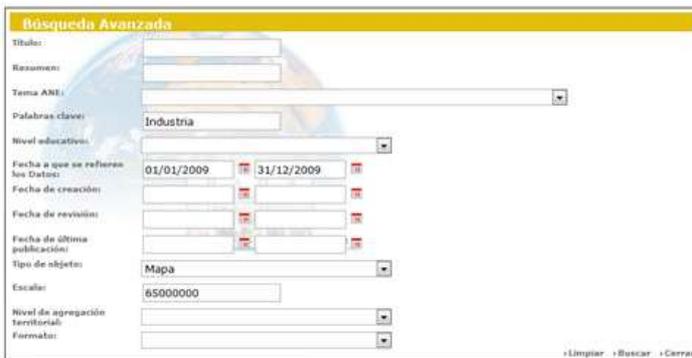


Figure 4. Advanced search

For example, you can search the map object types (Object Type: map) related to a particular subject (Keyword: Industry) and having a certain scale (Scale: 1:6,500,000).

2.2.2 Pre-visualization of objects and their metadata

siANWeb has two preview screens called Thumbnails view and Detail view.

2.2.2.1 Objects preview in Thumbnails view

After searching, a list of results is opened in Thumbnails view. This screen consists of the following areas: List of results, Object preview and Object description.

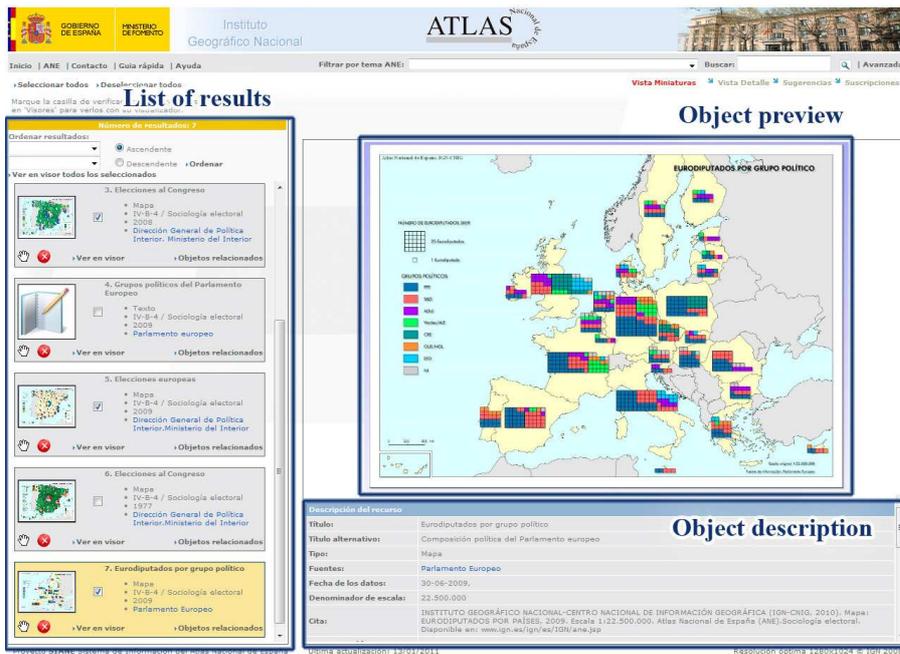


Figure 5. Thumbnails view.

### 2.2.2.1.1 List of results

In this part of the screen we can do a quick scan. It shows the names of contents with a Thumbnail view and the main metadata (object type, ANE group they belong to, temporal extent and a link to the data source).



Figure 6. Thumbnails view - List of results.

These objects can be sorted (either manually or according to several criteria, including title, date, ANE theme, etc.), moved, deleted, and Related objects can be added to the first List of results.

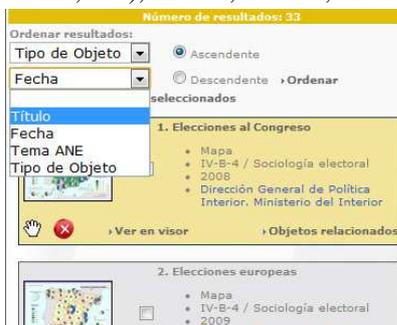


Figure 7. Thumbnails view - List of results – Sorted objects.

ANE objects are related thematically to each other. An option to allow the user expands the List of results by adding Related objects has been included.

For example, a "Concentration retail trade (2007)" map has the following Related objects: one image-"Textile Trade (2007)"; three maps, "Retail Trade (2007)", "Employment retail trade (2007 )" and "Retail trade area (2007)"; and one text "Domestic Trade (2007)".



Figure 8. Thumbnails view - List of results – Related objects.

2.2.2.1.2 Object preview selected in the List of results.

2.2.2.1.3 Object description selected in the List of results

Includes the metadata that best describe the object with no screen space restrictions as in the Thumbnails view.

For example, the following metadata appears in a map object: title, alternative title, object type, source, temporal extent, scale denominator, bibliographic citation, location, abstract, ANE theme, thematic variables.

Descripción del recurso			
Título:	Comercio mayorista		
Título alternativo:			
Tipo:	Mapa		
Fuentes:	Ministerio de Industria		
Fecha de los datos:	31-12-2007,		
Denominador de escala:	3.000.000		
Cita:	INSTITUTO GEOGRÁFICO NACIONAL-CENTRO NACIONAL DE INFORMACIÓN GEOGRÁFICA (IGN-CNIG, 2010). Mapa: Comercio mayorista, 2007. Escala 1:3.000.000. Atlas Nacional de España (ANE). Comercio interior. Disponible en: <a href="http://www.ign.es/ign/es/IGN/ane.jsp">www.ign.es/ign/es/IGN/ane.jsp</a>		
Area Geográfica:	España		
Resumen:	<p>Representa el número de establecimientos comerciales mayoristas en el tamaño de las figuras y la densidad comercial minorista (en establecimientos por 1.000 hab.) en los colores de las figuras.</p> <p>Variables representadas:</p> <ul style="list-style-type: none"> <li>- Comercio_mayorista_densidad_comercial (2007). Nivel de agregación territorial: Municipios. Técnica de representación: Color aplicado a simbología puntual. Escala de medida: Proporción. Unidad de medida: número/1.000 hab.</li> <li>- Comercio_mayorista_establecimientos (2007). Nivel de agregación territorial: Municipios. Técnica de representación: Símbolos proporcionales - Esferas. Escala de medida: Proporción. Unidad de medida: número de establecimientos</li> </ul>		
Tema Ane:			
Sección:	Tema:	Grupo:	Epígrafe:
VI / INDUSTRIA, TURISMO Y COMERCIO	VI-B / Turismo y Comercio	VI-B-2 / Comercio interior	
Variables			
Variable:	Comercio_mayorista_densidad_comercial		
Variable:	Comercio_mayorista_establecimientos		

Figure 9. Thumbnails view – Object description.

2.2.2.2 Objects preview in Details view

You can also display the results through the Detail view screen (pressing the button at the top right of the screen in Thumbnails view). This screen shows the results in two tables, the Table of results and the Table

of related objects to the one selected in the former table. The bottom of the screen includes the Description and the Thumbnail view of the selected object in a similar way than in Thumbnails view.

The screenshot shows the ATLAS web application interface. At the top, there are logos for the Spanish Government and the National Geographic Institute, along with the ATLAS logo. Below the navigation bar, there are two main tables:

- Table of results:** A table with columns for 'Fecha de los datos', 'Tipo', 'Fecha de publicación', 'Título', 'Tema ANE', 'Fuente de los datos', 'Serie', 'Publicación', 'Nivel educativo', and 'Territorial'. It contains 7 rows of data related to elections.
- Table of related objects:** A smaller table with columns for 'Título', 'Tipo', 'Tema ANE', 'Fecha de los datos', 'Fecha de publicación', 'Fuente de los datos', 'Serie', 'Publicación', 'Nivel educativo', and 'Territorial'. It contains 4 rows of related data.

Below the tables, there are two panels: 'Object description' and 'Thumbnail of object'. The 'Object description' panel shows details for 'Elecciones europeas', including alternative titles, type, sources, and scale. The 'Thumbnail of object' panel shows a small map of Spain.

Figure 10. Detail view

The objects in each table can be sorted according to any field (Title, Object Type, ANE Theme, temporal extent, Date of publication, Source of data, Publication series, Publication, Educational level and Territorial for Statistics level). The user can also remove objects; add objects from the Table of related objects to the Table of results, move columns, and use several filters simultaneously.

This screenshot shows the 'Table of results' with several annotations indicating user functionalities:

- Order results:** An arrow points to the 'Congreso' column header.
- Filter results:** An arrow points to the 'Congreso' column header.
- Select results:** An arrow points to the red 'x' icon in the first column.
- Delete results:** An arrow points to the red 'x' icon in the first column.
- Selected result:** An arrow points to the row for 'Elecciones europeas'.

At the top of the table, there are buttons for 'Seleccionar todos' and 'Deseleccionar todos'. The table itself has the same columns as in Figure 10.

Figure 11. Detail view – Functionalities 1

This screenshot shows a filter menu for 'Tema ANE'. The menu is titled 'Filtrar todos' and has a dropdown menu for 'Tema ANE' currently set to 'cultural'. Below the dropdown, there is a list of items: 'Sociología', 'Sociología', 'Sociología', 'Sociología', 'Sociología', 'Sociología', 'Sociología', 'Sociología', 'Sociología', 'Sociología'. Each item has a 'Tipo' dropdown menu with options for 'Texto' and 'Imagen'. At the bottom, there is a 'seleccionar todos' button and a 'Tema ANE' dropdown menu set to 'cultural'.

Figure 12. Detail view – Functionalities 2

Detail view has more options for sorting objects than Thumbnails view. The bigger number of objects, the more useful Detail view will be.

### 2.2.3 Examine objects with specific viewers

From the Viewers screen, the objects are opened in specific viewers. Users must select the objects previously on the Thumbnail view or Detail view screen to access the Viewer screen.

The screen is divided into two areas: Results Area and Viewers Area.

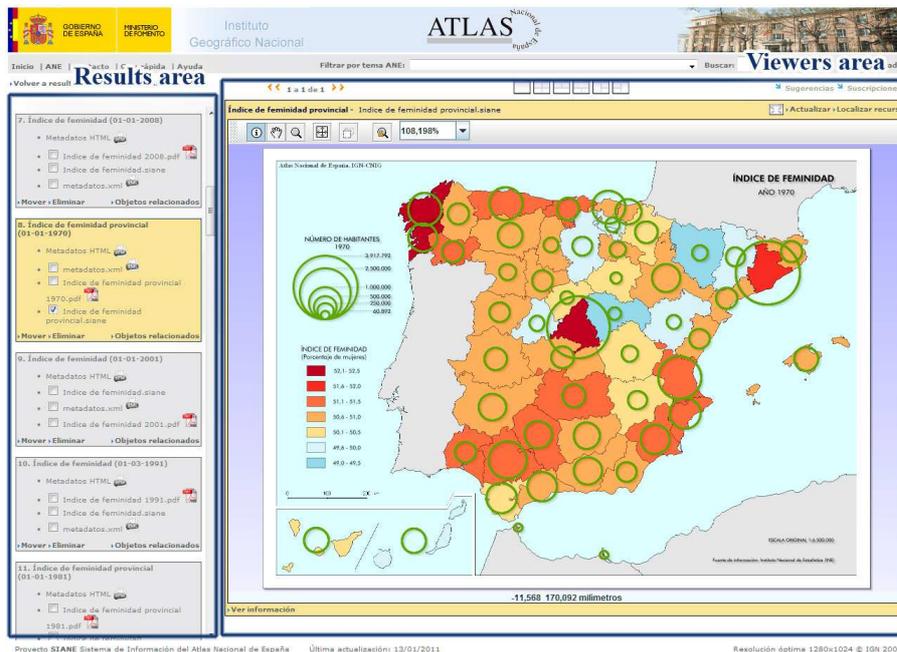


Figure 13. Viewers screen

#### 2.2.3.1. Results area

The results can be visualised in the Standard view or ANE theme view.

##### 2.2.3.1.1 Standard view

The contents of the objects that the user can view (for example, html, siane and pdf file) and download (for example, pdf and xml file).

The siane format file is an xml file which contains thematic variables with identifiers and definition of base and thematic layers, due to its drawing on the fly is possible. However, this file does not store the position of the symbols or the radius of the circles. They are very light files that occupy about 200 kB.

In Standard view, each object, depending on its type (map, image, text ...) contains different data files (contents). The most common types of objects and data files are shown in the table below:

Object	Contents	Example
Map	metadata.html metadata.xml map.siane map.pdf	
Image	metadata.html metadata.xml image.jpg	
Text	metadata.html metadata.xml text.pdf	
Statistical graph	metadata.html metadata.xml graphic.pdf	

Table 3. Types of objects and data files

### 2.2.3.1.2 ANE theme view

The objects are opened in Standard View by default; clicking the button at the top of the Results area can access the ANE Theme view. This view includes a tree with sections, themes and thematic groups of the ANE and the objects included in each group; the user can add Objects related to List of results.



Figure 14. Viewers screen, Results area in Standard view and in ANE theme view

### 2.2.3.2 Viewers area

More than one object can be displayed in the same window using the Organizer window.

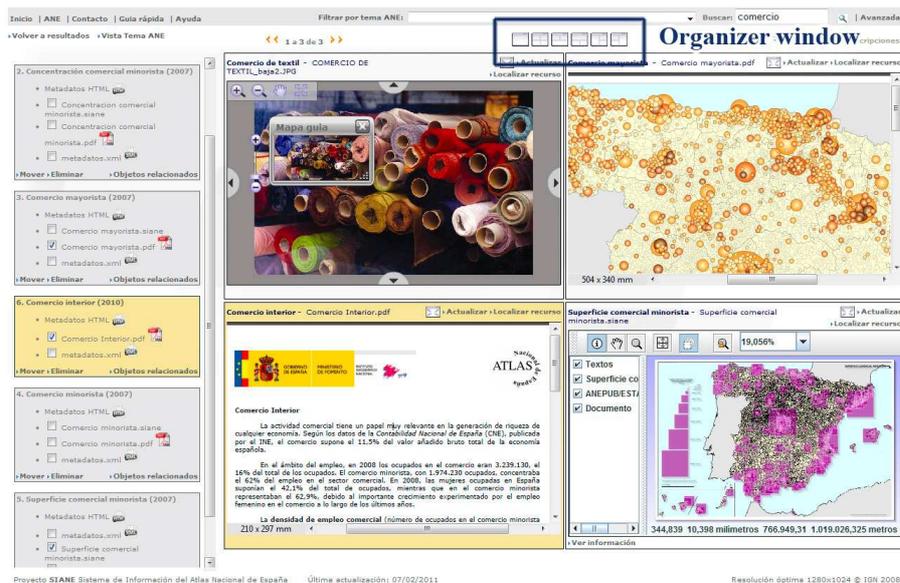


Figure 15. Viewer screen - Organizer window

The object contents are visualized in default viewers. These viewers are:

- Flash viewer
- Acrobat viewer
- Map viewer (Siane format)
- Html viewer

#### 2.2.3.2.1 Flash viewer

The plug-in Adobe Flash Player must be installed on your computer. Operations such as zoom move and pan the image can be done with this viewer. It also has a guide map.



Figure 16. Viewers screen – Flash viewer

#### 2.2.3.2.2 Acrobat viewer

The plug-in for Adobe Acrobat Reader must be installed on your computer. PDF files can be displayed with this viewer.

#### 2.2.3.2.3 Map viewer (Siane format)

Java Runtime Environment must be installed on your computer. The display of maps with interactive properties is possible through this viewer.

Main features of the Map viewer (Siane format):

- Pop-up window with essential information of the map: title, scale, source, date of data and point of contact.

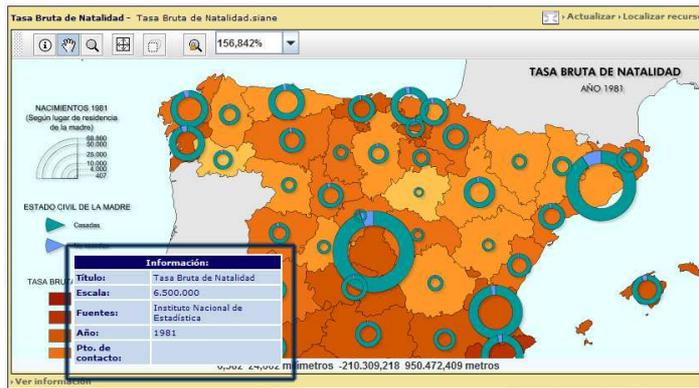


Figure 17. Map viewer. Information Window.

- Pop-up window with information of the selected symbol on the map: image of the symbol, name of the geographical entity and name, temporal extent and value of the thematic variables represented in the symbol.

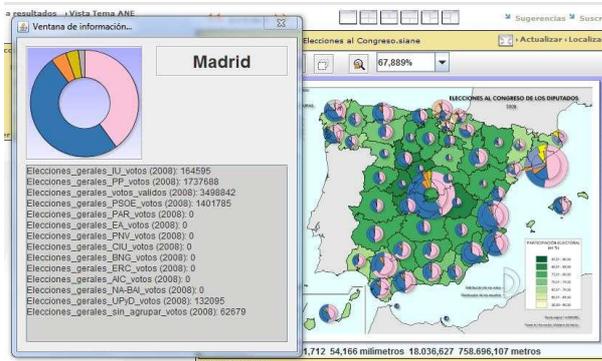


Figure 18. Map viewer. Symbol information.

- Layers contained on the map: for example base maps, thematic maps, texts .... Turn on and off layers is possible.

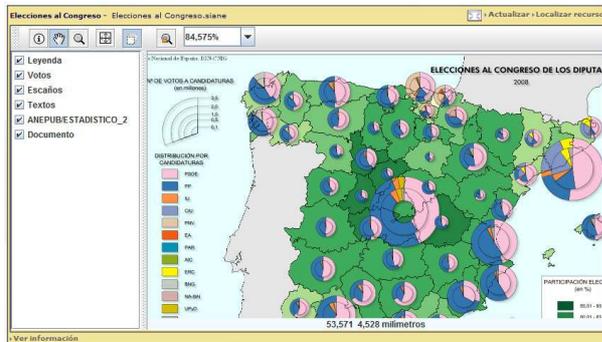


Figure 19. Map viewer. Layers list.

- Buttons to activate pan, zoom, zoom extents and another special zoom to keep symbols scale.

The zoom that keeps the scale of the symbols is very useful when the user is visualizing maps where overlap of the symbols is very high, for example a proportional symbol map with municipal aggregation level. If this zoom is activated, the size and position of symbols is maintained while the base map is expanded. Thus the overlap is minimized and municipal boundaries can be visualized. Users can create custom maps in an easy way.

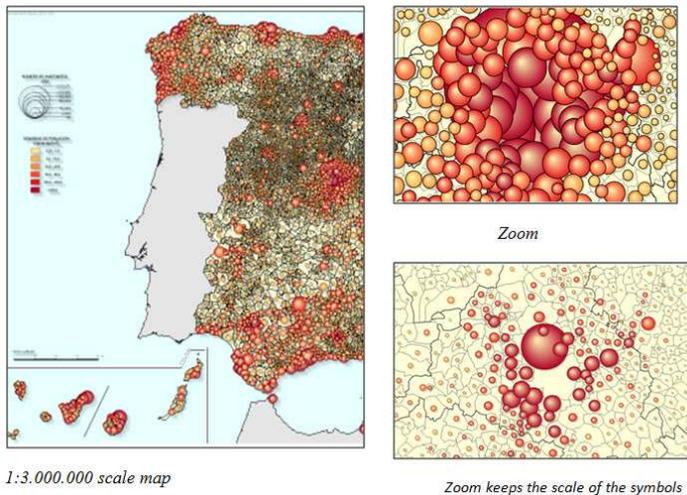


Figure 20. Map viewer. Zoom

#### 2.2.3.2.4 Html format

The metadata of objects can be displayed in html format through the browser without downloading the file.

#### 2.2.4 Download of objects

Pdf format objects and their metadata in XML format can be downloaded.

All the objects have metadata; the majority is part of ISO 19115 metadata standard. There are certain metadata frequently used in the ANE that are not included in such standard. Xml file which the user can download contains all the metadata.

The ANE metadata Thematic Variables, Bibliographic Reference, Section, theme and Group ANE, which are not included in ISO standard, are automatically included in the following section: Abstract, Constraints and Supplemental Information. This mechanism provides the access to that kind of metadata trough an xml file conform to the standard.

#### 2.2.5 Contact, subscribe and send suggestions

##### - Contact

Through the Contact link, the user can send a mail with general information to the ANE department.

##### - Subscribe

A user can subscribe to contents, queries or thematic groups. Thus, when a new version or temporal extent related to that subscription appears, the user receives a notification via email.

##### - Suggestions

A user can send suggestions related to objects, queries or thematic groups via email.

### 3. RESULTS

SIANE has enabled that the National Atlas of Spain has began the publication of contents on Internet through this powerful tool that makes possible to search, show, print, unload and subscribe to contents. The tool is continuously updated and increased.

### 4. CONCLUSIONS AND FUTURE PLANS

The New National Atlas of Spain on Internet offers the user products and significant, reliable and updated contents in an easy way: Internet. In the near future the objects will be increased progressively and uniformly in the different themes of the new thematic structure.

The future plans are:

- 1.- Increase of Objects core homogeneously in the different themes.
- 2.- Improvement the design and usability of the subsystems.
- 3.- Optimization of system performance. It will be done with output and load texts that will be applied to the publishing and Production Subsystems.
- 4.- Development of Web services to supply statistical data in a standardized format in the Input subsystem
- 5.- Improvement and creation of functions in the Production Subsystem:
  - Creation of new tools to improve the management of metadata.
  - Improvement of the treatment of the legends.
  - Improvement of the functionality of the map editor.

6.- Improvement and creation of functions in the Publication of objects on the Web subsystem (siANÉweb):

- Inclusion of options of user and password that will be necessary if you want to manage data unloads. Inclusion of a new section with the latest published objects.
- Addition of new options in advanced search.
- Broaden of the type of downloadable files such as alphanumeric data related to cartography.
- Publication of maps on the IDEE by means of interoperable services .

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