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Geo-portal for drought and climate risks in the region of Murcia: GOSYD project

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SUMMARY – The management of climate risks, in particular drought management, requires handling a wide range of data, generally from different sources, sharing a common spatial component that makes it possible to map it. In this sense, and under the INSPIRE directive of the European Commission establishing an Infrastructure for Spatial Information in the European Community, different Spatial Data Infrastructures (SDI) are being developed at different levels. These SDIs can be accessed through Internet geo-portals, whose primary objective is to facilitate access to geographic data (geo-data) and related information. Under this approach, the GOSYD project is a first step to build an SDI for the region of Murcia capable of providing an integrated infrastructure for querying and managing data related to climate, drought and desertification risks. This SDI, based on the Web Map Services (WMS) developed by the Open Geospatial Consortium (OGC), will assist the technicians of the regional administration in their decision-making processes.

Key words: Geographical Information Systems, geo-portal, climate risks, water resources management, drought, spatial data infrastructures.

RESUME – *"Géoportail pour la sécheresse et les aléas climatiques dans la région de Murcie : Le projet GOSYD". La gestion des aléas climatiques, et, notamment, la gestion de la sécheresse nécessite de travailler avec une grande quantité de données diverses, généralement issues de sources différentes, dont le point commun est d'avoir une composante spatiale qui permet de les situer dans le territoire. Dans ce sens, et dans le cadre de l'initiative INSPIRE de la Commission Européenne, différentes Infrastructures de Données Spatiales (IDS) sont en cours d'élaboration à plusieurs niveaux. Ces IDS sont accessibles à travers des géoportails Internet dont l'objectif premier est de faciliter l'accès aux données géographiques (géodonnées) et aux informations qui y sont associées. Suivant cette approche, le projet GOSYD est un premier pas vers la mise en place d'une IDS pour la région de Murcie, qui pourra fournir une infrastructure intégrée de consultation et de gestion de données concernant les aléas liés au climat, à la sécheresse ou à la désertification. Cette IDS, basée sur les services cartographiques WMS (Web Map Services) développés par le consortium OGC (Open Geospatial Consortium), servira de support aux techniciens de l'administration régionale dans les procédures de prise de décisions.*

Mots-clés : *Systèmes d'Information Géographique, géoportail, aléa climatique, gestion de la ressource en eau, sécheresse, infrastructures de données spatiales.*

Introduction

Geographical information has become increasingly important in today's information society. It is a crucial factor in economic development, helping to improve the management of resources and to protect the environment.

In this context, the INSPIRE directive was adopted at the end of 2007 by the European Union. This directive lay down policies on spatial information and its accessibility, with the primary aim of maximizing the effective use of this information for the benefit of the public. In other words, the directive includes the definition of standards both for geographic information (source, homogenization, metadata, storage, etc.) and for easy and understandable data access (implementation of various services via the Internet).

Numerous Spatial Data Infrastructures (SDIs) have been developed in recent years under the INSPIRE initiative. Its objectives and scope being different, the extent of the coverage of the INSPIRE model by each SDI is also diverse. Thus, from a hierarchical point of view, we can distinguish several types of SDIs: (i) global SDIs, composed of forums for collaboration and exchange of SDIs; (ii) regional SDIs for the management of geographic information for large regions; (iii) national SDIs (IDEE, 2007), which are responsible for the management initiatives of sets of national information; and finally, (iv) local or sectoral SDIs, which are responsible for day-to-day operational needs and are especially in charge of the services for accessing data by means of different tools: search engines for geographical names, data downloading or, for the most part, through the implementation of WMS (Web Map Service) mapping services, which are the most popular service proposed by the Open Geospatial Consortium (OGC, 2004).

Description of the system

We will focus first on the geo-portal of the GOSYD project, which, as far as possible, has been designed to comply with the INSPIRE objectives and the derived standards, these latter defined as "norms to which geographical information, data exchanges and geographical systems interoperation must conform" (IDEE, 2007). At the time of the birth of the application, these standards had not yet got their current development and acceptance, and were therefore not considered as a requirement for the system but rather a medium-term objective, that is, a further stage in the evolution of the GOSYD geo-portal.

Among the objectives of the GOSYD project, we can point out the will to do the first steps towards the creation of a local SDI which, through the implementation of an online geo-portal based on the SDI approach, will offer its services (accessing, displaying and querying data), in particular those based on the OGC WMS specification, as an interface for consultation and analysis of geographic information. In this sense, WMS services are in fact Internet GISs allowing the creation of a server network which provides a set of maps that any client can combine by means of different software in order to generate custom maps.

As for the software being used in the GOSYD project, Oracle® 10g is the database management system, Oracle® Portal is the integration tool for web applications, ArcIMS® 9.2 delivers dynamic maps and GIS data and services via the Internet (such as the Open Geospatial Consortium's WMS, approved as ISO standard), ArcSDE manage geographic data in databases and ESRI®'s GIS Portal Toolkit (ESRI, 2007) is the solution for implementing SDIs portals. As for the hardware, the system is distributed over three servers: the first one is the web applications' server and contains also the repository of alphanumeric data, the second server delivers dynamic maps and OGC services, and the third one is the geographic data server.

The implementation of the system is being conducted in several stages, some of which have been developed in parallel. From the beginning we worked as well on application programming as on collection and standardization of data, including a repository of Landsat satellite imagery for the 2000-2007 period. One of the most interesting aspects of this project is the development of drought indicators derived from the surface temperature based on remote sensing (Wang *et al.*, 2001), such as the Normalized Difference Vegetation Index (NDVI) applied for the Segura basin by García *et al.* (2007). In addition, we are evaluating several indexes for monitoring erosion processes, such as those developed by Montesinos (1995).

Results and discussion

Now that the first stages of the project have been completed, resulting in a high degree of application development and information adaptation, the system evolves towards the adoption of the inter-operational standards defined by the OGC. Therefore, the design of the GOSYD geo-portal is closely related to that of SDIs, and thus provides the Murcia community with a valuable set of specific services and data for consultation and management of drought and climate risks, helping technicians and users in their decision-making processes. All this is delivered through a distributed and remote working environment. The geo-portal is available online at http://idei.imida.es/idei/index.htm (Fig. 1).

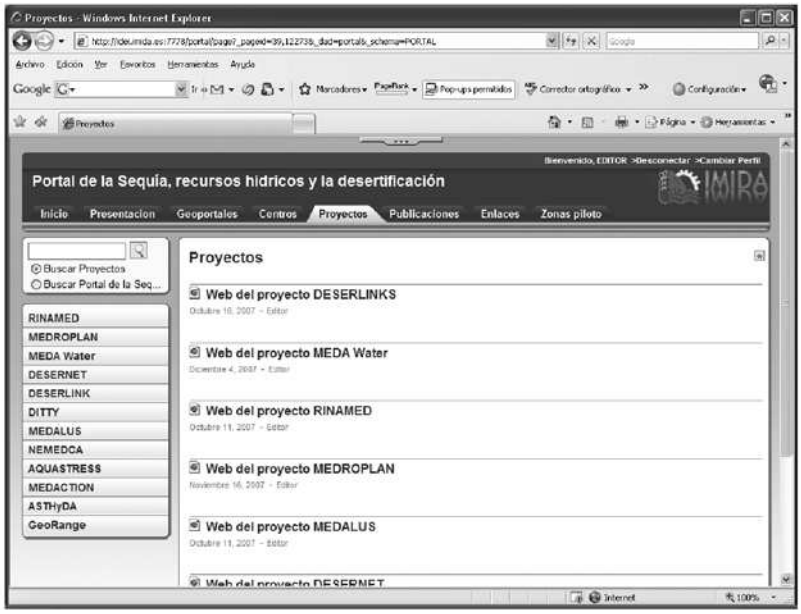

Fig. 1. Screenshot of the GOSYD portal.

Information will be easily accessed and updated thanks to the adoption of standards, the integration of services and the distribution of the information management. The use in the region of geographical information related to natural risks will be therefore clearly improved.

The system represents a starting point for the integration into a regional SDI oriented to the more efficient management of natural resources, thus providing a response to the needs of users from regional institutions involved in planning and management of water resources. At the same time, it should assist policy-making in relation to policies and activities that may have an impact on this environmental issue.

In order to query and display the cartographic information offered by the geo-portal (Fig. 2), the user must have Internet access and a web browser. The address of the portal is http://sigyt.imida.es/website/demosigi/viewer.htm.

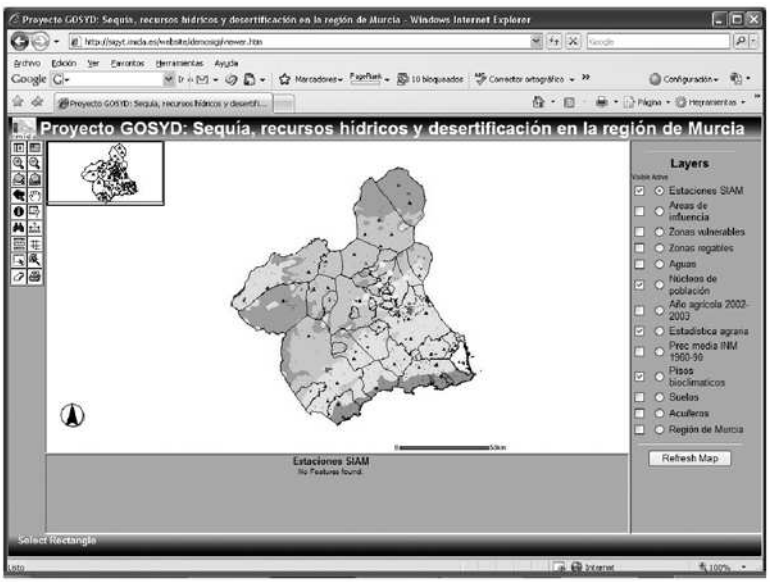

Fig. 2. Map viewer of the GOSYD portal.

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