

## D.5.1: report on user requirements for the EuroGEOSS Drought operating capacity

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## TABLE OF CONTENTS

1	INTRODUCTION .....	5
2	Synthesis of the existing situation.....	5
2.1	Summary of the WP2 questionnaire (Nativi 2009b) .....	5
2.2	Services described in WP2 Questionnaire .....	6
2.3	Requirements of different user categories/organizations .....	9
3	Scenarios.....	11
3.1	Scenario – Comparison and Validation of Multi-Scale Drought Information .....	11
3.2	Requirements .....	13
4	Annexes.....	16
	REFERENCES .....	22

## TABLES

Table 1: Using interoperable services of drought information.....	11
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## ACRONYMS AND ABBREVIATIONS

Abbreviation	Name
<b>AIP-2</b>	Architecture Implementation Pilot, Phase 2
<b>AOC</b>	Advanced Operating Capacity
<b>CHE</b>	Confederación Hidrográfica del Ebro, Spain
<b>CNIG</b>	Centro Nacional de Información Geográfica, Spain
<b>CSW</b>	Web Catalogue Service
<b>DMCSEE</b>	Drought Management Centre for Southeastern Europe
<b>DoW</b>	Description of Work
<b>DOPA</b>	Digital Observatory of Protected Areas
<b>EC-JRC</b>	European Commission, Joint Research Centre
<b>EDO</b>	European Drought Observatory
<b>FGDC</b>	Federal Geographic Data Committee
<b>FGUA-OSE</b>	Fundación General de la Universidad de Alcalá, Observatorio de la Sostenibilidad en España
<b>IDE</b>	Spatial Data Infrastructure
<b>IDEE</b>	Infraestructura de Datos Espaciales de España (National Spanish Spatial Data Infrastructure) Spatial Data Infrastructure of Spain
<b>IOC</b>	Initial Operating Capacity
<b>MARM</b>	Ministerio de Medio Ambiente y Medio Rural y Marino (Ministry of Environment, Rural and Marine Affairs), Spain
<b>ONS</b>	Observatorio Nacional de Sequía (National Drought Observatory), Spain
<b>OWS</b>	OGC Web Services
<b>SAIH</b>	Sistema Automático de Información Hidrológica (Automated hydrology information system for Spain)
<b>SBA</b>	Societal Benefit Area
<b>SEE</b>	Southeastern Europe
<b>SIA</b>	Sistema de Información del Agua (Water Information System), Spain
<b>SLD</b>	Styled Layer Descriptor
<b>ULBF</b>	Univerza v Ljubljani
<b>UMN</b>	University of Minnesota
<b>UNEP</b>	United Nations Environment Programme.

<b>Abbreviation</b>	<b>Name</b>
<b>UNIZAR</b>	Universidad de Zaragoza
<b>WCMC</b>	World Conservation Monitoring Centre
<b>WCS</b>	Web Coverage Service
<b>WCTS</b>	Web Coordinate Transformation Service
<b>WFS</b>	Web Feature Service
<b>WMC</b>	Web Map Context
<b>WMS</b>	Web Map Service
<b>WP</b>	Work Package

## 1 INTRODUCTION

This report (Deliverable 5.1) analyses the state of the art of systems dealing with drought monitoring and forecasting. The goal is to identify scenarios and use cases for the EuroGEOSS Initial Operating Capacity (IOC) on drought from the requirements regarding data, services, and models of existing drought monitoring systems.

Section 2 provides a synthesis of the existing situation regarding drought monitoring and forecasting systems. The existing situation was analyzed through questionnaires filled in by the following project partners: CHE, CNIG, FGUA-OSE, ULBF, UNIZAR, and EC-JRC.

Section 3 presents scenarios of use of drought monitoring and forecasting systems. A main goal of these scenarios is the integration of services and data on drought available on different scales (regional, national, continental scales). This integration allows the comparison of data and indices in order to improve analyses of past and potential drought events.

## 2 SYNTHESIS OF THE EXISTING SITUATION

### 2.1 Summary of the WP2 questionnaire (Nativi 2009b)

Work Package 5 involves partners that deploy services for drought monitoring and forecasting on regional, national, and continental scales. Other partners conduct research on drought indices (ULBF) and have extensive expertise in the development of OGC web services. UNIZAR established the services running at CHE and CNIG among other (cf. <http://iaaa.cps.unizar.es/showContent.do?cid=geoportales.EN>).

**Regional service provider:** CHE provides regional data on drought monitoring for the Ebro river basin in Spain. This data will be included in the SITEbro system and the IDE-EBRO system, which are geographic services provided by CHE.

**National service provider:** CNIG provides geographic data and services at national level for Spain through the IDEE viewer. FGUA-OSE established an infrastructure for spatial data (IDE-OSE) while SIA-MARM maintains an information system for water.

**Continental service provider:** The EC-JRC develops a European Drought Observatory (EDO) acting on a continental scale. ULBF contributes research on drought indices and will act as access point to national drought data in South East Europe (SEE) through DMCSEE; DMCSEE can be seen as an international sub-continental data provider.

The systems in general aim at collecting data and making spatial data accessible. State organizations such as CHE and OSE have the task to provide information on drought and sustainability issues to the public. National systems, such as OSE, work on linking observatories having similar goals. The services described here do not provide modeling functionality.

All service providers use **OGC Web services** (OWS) in some form. Web Map Services and Web Feature Services are the two services generally used. These services are complemented with Web Catalogue Systems and Gazetteer services in case of IDE-Ebro and IDEE. IDEE offers the full range of OWS including Web Processing Services and Web Coverage Services. Most of the

services are accessible through the Internet as OWS; the SITEbro system, SIA, and the EDO system are not (yet) published online.

These services offer information on **metadata** compliant to the ISO19115 standard or the FGDC standard. The only system not providing metadata according to a metadata standard is the EDO system; it is planned to implement the ISO19115 standard in the course of time.

The **data** offered by the systems can be either specifically drought related or non-thematic spatial data (e.g., IDEE) depending on the focus of the system. Some systems (like the IDE-Ebro or the SITEbro system) integrate internal and external OWS to provide the required information.

The problems or difficulties with the operation of the systems mentioned in the questionnaire are:

- Lack of suitable ways to describe metadata related to water (SITEbro) and to statistical and thematic data (IDE-OSE).
- Dealing with OGC and ISO drafts implies changes and ambiguities during the development of systems (IDEE).

## 2.2 Services described in WP2 Questionnaire

The following sections provide an overview of the drought monitoring systems provided by project partners. These services are to be federated by means of the EuroGEOSS brokering framework. The descriptions are based on the results of the WP2 Questionnaire; a table with the answers of the partners to the questions of the survey can be found in Annex A.

### 2.2.1 Services on Regional Level

CHE is the Ebro River Basin Authority dealing with the compilation and analysis of drought related data (<http://www.chebro.es/>). Their service integrates real-time data from an automated hydrology information system (SAIH). The two systems described in the questionnaire are SITEbro and IDE-EBRO. The CHE uses data provided by the SAIH (Automated Hydrology Information System) in real-time for providing data on droughts.

The **SITEbro system** (<http://iber.chebro.es/sitebro/sitebro.aspx>) is one of the systems maintained by CHE. It's the geographic service for the Ebro river basin. It includes several drought related resources together with other type of resources, and it will incorporate the drought monitoring indicators and indices. Own and external WMS and WFS services are incorporated in the system.

<b>SITEbro system</b>	<a href="http://iber.chebro.es/sitebro/sitebro.aspx">http://iber.chebro.es/sitebro/sitebro.aspx</a>
Metadata standard used	ESRI FGDC metadata; plan to use ISO standards Example: <a href="http://iber.chebro.es/sitebro/data/metadatos/aforos.shp.xml">http://iber.chebro.es/sitebro/data/metadatos/aforos.shp.xml</a>
OGC Web Services used	WMS 1.1 WFS (intranet, only for cadastral services)
Software used	ArcIMS, ArcGIS Server and own developments
Data provided	Raster and vector data related to the hydrography of the Ebro river basin

The **IDE-EBRO system** is another system maintained by CHE. It is the Spatial Data Infrastructure for Ebro river basin.

<b>IDE-EBRO system</b>	<a href="http://ide-ebro.chebro.es/">http://ide-ebro.chebro.es/</a>
Metadata standard used	Compliant to ISO19115
OGC Web Services used	CSW 2.0.2 WMS 1.1.1 WFS 1.1 Web Gazetteer Service
Software used	WMS and WFS based on Deegree
Data provided	Data related to WFD (water bodies, protected areas, monitoring points) and other data related to hydrology in Ebro catchment (geology, water abstractions, irrigation areas, ...).

### 2.2.2 Services on National Level

The national Spanish Spatial Data Infrastructure (Infraestructura de Datos Espaciales de España, IDEE) can be considered as a collective framework embracing a set of harmonised and standardized SDI at national, regional and local level in Spain. The national Geoportal ([www.idee.es](http://www.idee.es)) opened in 2004, is managed by CNIG as organization responsible for the coordination of National SDI and it has been designed from the very beginning as the main point of access to all the available geoservices in Spain, as well as to all the Regional SDIs operational in Spain. Among the existing clients in this Geoportal, the **IDEE viewer** allows access to more than 700 web map services with more than 14,000 layers from more than 400 different nodes, covering all themes in INSPIRE Annexes I and II and some of the themes from Annex III. IDEE offers some analysis applications in addition to the services listed below.

<b>IDEE – Infraestructura de Datos Espaciales de España (Spatial Data Infrastructure of Spain)</b>	<a href="http://www.idee.es">http://www.idee.es</a>
Metadata standard used	Compliant to ISO19115; use of metadata profile called NEM (Núcleo Español de Metadatos) based on ISO19115 and Dublin Core Metadata Initiative.
OGC Web Services used	WMS 1.1.0 and 1.3.0 WFS 1.1.0 and WFS-G (Gazetteer) WPS 0.2.0 CSW 2.0.0 SLD 1.1.0 WMC 1.1.0 WCS 1.0.0 WCTS 1.0.0
Software used	Most services are based on Deegree.
Data provided	Raster (e.g., Orthophotography) and vector data (e.g., from ORACLE database)

The Spanish institution OSE has the task to link observatories related to sustainability issues and similar on a national scale (<http://www.sostenibilidad-es.org/>). The **IDE-OSE** system is described in the questionnaire. IDE-OSE includes the cartography of different sustainability indicators about economic, social, environmental, global, cultural, and governance dimensions. Through the IDE-OSE, the cartography of these indicators is represented for the Autonomous Community, for national scale analysis, or by European countries, when the analysis is made for this scale (broader comparison). This project allows the user to visualize all the Indicators of the Annual Reports of Sustainability in Spain in a way that the data covers all the territory, even though it is managed by specific communities. It is a good way of compiling the information that exists about a concrete subject. Also, it presents the possibility of comparing the results among different European countries.

<b>IDE-OSE</b>	<a href="http://sostenibilidad-es.com/Observatorio+Sostenibilidad/esp/IDE/">http://sostenibilidad-es.com/Observatorio+Sostenibilidad/esp/IDE/</a>
Metadata standard used	Compliant to ISO19115
OGC Web Services used	WMS 1.1.0 SLD
Software used	MapServer
Data provided	Sustainability indicators including economic, social, environmental, global, cultural, and governance dimensions

**SIA** is the integrated water information system in Spain maintained by MARM (FGUA-OSE); this system was developed according to INSPIRE and WISE Technical Guidelines from the European Environment Agency. In addition, they are planning to start using Workflow tools in the course of 2010.

The SIA system does not yet support exporting SIA information in the format of OGC Web Services. This will be implemented in 2010.

<b>SIA</b>	<a href="http://servicios.marm.es:120/siagua/consultas">http://servicios.marm.es:120/siagua/consultas</a>
Metadata standard used	Compliant to ISO 19115
OGC Web Services used	WMS 1.1.0 WFS 1.1.0
Software used	Application server SAP WAS
Data provided	Raster and vector data related to hydrography.

### 2.2.3 Services on Continental Level

**DCMSEE** is the center for drought management in Southeastern Europe represented by the University of Ljubljana in the project (<http://www.dmcsee.org/>). This center provides access to data on droughts of Southeastern European countries.

<b>DCMSEE</b>	<a href="http://www.dmcsee.org/">http://www.dmcsee.org/</a>
Metadata standard used	ISO 19115
OGC Web Services used	WMS 1.1.0
Software used	UMN, Mapserver, Cartoweb
Data provided	Gridded meteorological data

**EDO** is the European Drought Observatory that is developed by the Land Management and Natural Hazards Unit of the EC-JRC (<http://ies.jrc.ec.europa.eu/land-management-and-natural-hazards-unit>). Currently EDO provides data on droughts on a continental level. These data are derived from data collected by drought observatories throughout Europe and from satellite data.

The EDO service is based on the University of Minnesota MapServer (UMN MapServer), which implements OWS specifications. The service is, however, not accessible as a WMS or WFS through the Internet.

<b>EDO</b>	<a href="http://desert.jrc.ec.europa.eu/action/php/index.php?action=view&amp;id=201">http://desert.jrc.ec.europa.eu/action/php/index.php?action=view&amp;id=201</a>
Metadata standard used	No metadata used at the moment; planned to use ISO19115 INSPIRE
OGC Web Services used	No
Software used	UMN MapServer
Data provided	Drought indices and parameters for Europe

### 2.3 Requirements of different user categories/organizations

This section summarizes the systems provided by the involved organizations and the main user requirements of these organizations.

#### Organization: CHE

CHE is working on the compilation and analysis of drought related data. They derive indices for the detection and monitoring of droughts and use threshold values for different drought situations. They have the task to keep the public informed about drought status by monthly reports.

- Current systems: SITEbro system and IDE-Ebro system
- Data collections: Data is integrated from various sources such as the SAIH system.

#### Organization: CNIG

CNIG, together with the National Geographic Institute of Spain (IGN), produce and distribute data, services and applications related to geographic information of Spain. The new data policy of CNIG-IGN, the main and reference geographic data provider stakeholder in Spain, defines a set of very basic data, the named National Reference Geographic Equipment, to be freely exploited with the only condition of mentioning the CNIG-IGN's authorship. The rest of digital data and services IGN produces are also free for non-commercial purposes.

CNIG-IGN is responsible for the implementation of the IDEE Geoportal, the promotion of SDI technology and SDI community, the cooperation with other SDI initiatives and the coordination of national projects as PNOA (National Plan for Aerial Orthophotography) or SIOSE (Spanish Land Cover & Land Use Information System), among others.

- Current systems: IDEE
- Data collections: IDEE, the National Spanish Spatial Data Infrastructure, covers a number of raster and vector datasets related to reference and also thematic geographic information.

### **Organization: FGUA-OSE**

OSE produces reports on sustainability and thematic reports on land cover, air quality, etc. for public use. They have the task to link observatories with similar goals. SIA-MARM publishes the Water e-book designed for the general public.

- Current systems: IDE-OSE, SIA-MARM
- Data collections: data related to sustainability including economic, social, environmental, global and cultural indicators at IDE-OSE. SIA-MARM incorporates several data sources from the different organizations that work in water planning and hydrological management.

### **Organization: DMCSEE**

DMCSEE provides drought data for countries in Southeastern Europe. This organization derives maps showing drought indices twice a month.

- Current system: provision of maps of drought indices
- Data collections: usage of precipitation data from the Global Precipitation Climatology Centre as basis for map production.

### **Organization: EC-JRC**

The Joint Research Centre of the EC is a continental organization developing a European drought observatory for drought detection, monitoring, and forecasting in Europe. EDO is supposed to integrated data from regional and national scales in the continental data available at the moment.

- Current systems: EDO
- Data collections: Collection of meteorological data from observatories throughout Europe and satellite data in order to derive drought indices.

The main tasks of almost all of the above mentioned institutions involved in data collection are the generation of data and indices for monitoring and analyzing droughts. Drought indices are derived from different data sources and provide information on precipitation, vegetation density, and hydrology in a region. Data required for calculating the drought indices are regularly provided by meteorological stations on different scales, by satellite sensors and as outputs from climate models or models of land surface processes. The generation of drought indices, therefore, requires the **processing of data** from different sources and possibly of data of different scales. The **analysis** of droughts requires that specific drought events can be accessed in the system for analysis. State organizations like CHE (IDE-EBRO, SITEbro), OSE (IDE-OSE), and MARM (SIA) need to **communicate information** on the drought situation to the public.

Using the EuroGEOSS system for drought management requires that data published in the services are accessible and restrictions on the use of data are known. For analysis purposes, specific drought events should be accessible, as said above.

An important aspect in the EuroGEOSS project is the inter-comparison of selected drought indices across scales (i.e., continental, national, regional scales). This implies an identification of common drought indices for all scales and hydrological systems as starting point for multi-scale comparison (cf. Annex B).

Long-term objectives that exceed the scope of the EuroGEOSS project, but are of interest to the drought community, are:

- the use of web processing services for the automatic generation of drought indices,
- the derivation of drought hazard and risk maps,
- the analysis of drought impacts on aspects like economy and similar.

### 3 SCENARIOS

Based on the description of the user requirements in the section before and in accordance with the objectives of the EuroGEOSS project, specific scenarios will be defined and implemented during the course of the project.

#### 3.1 Scenario – Comparison and Validation of Multi-Scale Drought Information

**Table 1: Using interoperable services of drought information**

<b>Brief Summary</b>
<p>The basis of the first generic scenario is the availability of multi-scale drought information. Accessing this information allows to compare and validate the representation of droughts by different drought indices.</p> <p>This scenario, identified within WP5, will exploit the up- and downscaling capabilities that will be enabled through an established interoperability between the European Drought Observatory and national and regional drought resources provided by WP5 partners. Up- and downscaling refers to the accessing and visualization of drought information on different spatial scale levels.</p>
<b>Community Objectives</b>
<p>The objective of the drought community is to improve the monitoring and detection of drought events.</p> <p>The European Drought Observatory under development at JRC provides consistent continental-scale drought information. This type of information is appropriate to acquire a fast overview on the hydric state of the environment in Europe. Due to limitations in data availability and spatial resolution, however, the level of detail of this type of information is restricted. On the other hand, national and regional information systems such as the Spanish National Drought Observatory or the operational water information systems of the Ebro Catchment Authority can provide drought information in higher spatial detail, and complement the picture with local observations not available at the continental scale.</p> <p>The interoperability between drought information systems at continental, national, and regional level will allow for a direct comparison and validation of various drought indicators and indices produced by the systems. An expert user gains the opportunity to compare drought indices and to depict a comprehensive picture of a drought event in a region. A non-expert user, e.g. at the policy level of the European Commission, receives a rapid overview in the entire continent, and at the same time more detailed information where required.</p> <p>Since droughts are not bound to administrative and political boundaries, in case of a drought event, a close collaboration and cross-border information exchange between neighboring regional or national users in affected European Union Member States can enhance the efficiency of mitigation measures.</p>
<b>Actors</b>
<p><b>Drought data user:</b> Users of drought data can be experts in this field or non-experts. Expert users focus on the detailed analysis of drought events. These experts users are called</p>

<p>EuroGEOSS users, because they use the EuroGEOSS broker as starting point of the acquisition of drought data.</p> <p>Non-experts or administrative users require a general assessment of the drought situation in a region; these users are referred to as EDO users, because their point of access to drought information is EDO.</p> <p><b>Portal of the European Drought Observatory (EDO):</b> EDO provides drought information at continental level for all of Europe. The provided drought data contain data on precipitation, vegetation density, and soil moisture.</p> <p><b>Drought data providers offering drought data through web services:</b> national and regional data providers supply drought information on more detailed scales than the EDO system.</p> <p><b>Drought Metadata Catalogue:</b> The data resources coming from EDO and national and regional data providers are registered in the metadata catalogue of WP5.</p>																							
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<p><b>Scenario Events</b></p>																							
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2	In a next step the user wants to get access to the drought data: for this purpose there is a button for the search of services providing access to the identified data.
2.1	The user selects a list of layers to be displayed.
2.2	Subsequently the layers are shown in a map viewer client (i.e., EDO map server). In the EDO map server the user can zoom in to regions of interest.
<b>Post-Conditions</b>	
The user is provided with data on droughts on different scale levels. Drought data for Europe provide her with an overview of the drought situation; national and regional drought data allow a more detailed assessment on the drought situation in a certain region.	
<b>Special Requirements</b>	
Data providers need to provide at least one drought index that is suitable for assessing the drought situation in their region of interest; the drought data need to be available through standard web services.	
<b>References</b>	
The data and services available for the drought thematic area can be found in the WP5 metadata catalogue: <a href="http://eurogeoss.unizar.es/Search/Search.html">http://eurogeoss.unizar.es/Search/Search.html</a> .	

## 3.2 Requirements

The requirements of users in the EuroGEOSS project are related to four issues: metadata, discovery services, access services, and data quality. The following information was provided by ULBF.

### Metadata

Metadata provide descriptions of data sets and services of the drought community. The metadata need to contain the INSPIRE metadata elements (See European Commission, 2008a). Metadata are used for searching data in the metadata catalogue; they are, therefore, most useful when they are up-to-date. A summary of metadata fields of interest is given below.

Human-generated textual description:

- unique identifier (definition of the topic and used keywords on the basis of controlled thesauri (In the Slovenian central register for spatial data at the moment the CEN/TC287 standard is used);
- business name of the agency or responsible party associated with the dataset;
- organization in which the person in charge of the dataset is working;
- description of the data (abstract including the following subheadings: purpose, dataset file content, data content, projection);
- extent of geographic coverage of the dataset;
- geographic bounding box;
- temporal context of spatial data (beginning and ending date of time series);

- spatial context of data representation (continental, national, regional);
- quality and validity of the dataset;
- search words (words likely to be used by a non-expert to find the dataset);
- access constraints.

Machine-generated data useful for software applications:

- stored data format (the most used formats for spatial data in Slovenia are ESRI formats);
- available data format;
- methods used for collecting, processing, and transforming data;
- standards used for the datasets;
- geo-referenced system with measurements and resolution.

### **Discovery services in relation to metadata**

The metadata catalogue should be predictable and reliable in both form and content. This is the only way for potential users to find information and to use it. Discovery services should deliver the minimum amount of information that needs to be provided to convey to the inquirer the nature and content of the data resource.

This falls into broad categories to answer the “what, why, when, who, where and how” questions about geospatial data. These questions led to the implementing regulations for discovery services (European Commission 2008b).

What: title and description of the data set.

Why: abstract detailing reasons for the data collection and its uses.

When: when the data set was created and the update cycles, if any.

Who: originator, data supplier, and possibly intended audience.

Where: the geographical extent based on latitude, longitude, co-ordinates, geographical names or administrative areas.

How: how it was built and how to access the data.

The discovery services should provide the key information to allow the researcher to decide if the dataset is potentially useful.

The level of metadata detail that will be documented depends on the type of data held and the methods used for accessing and applying the data. Different types of data (e.g. vector, raster, textual, imagery, thematic, boundary, polygon, attribute, point, etc.) will require different levels and forms of metadata to be collected. However, there is still a high degree of compatibility between most of the metadata elements required.

### **Access services**

Access constraint: Any restrictions or legal prerequisites that may apply to the access and use of the dataset including licensing, liability and copyright. The regulations to be applied are documented in (European Commission 2008b).

Where possible, access services should be organized and completed with the following subheadings:

- type of license: The type of license that the dataset is available under.
- download (only if applicable): It is very important that data are reachable in different forms in tables and maps or graphs.

## Data quality

The function of data quality is »fitness to purpose«, which means that the user of a dataset has to decide if a dataset can be used for a certain task. The user, therefore, needs the following pieces of information regarding the data quality of a dataset:

- Lineage: brief history of the source and processing steps used to produce the dataset;
- Positional accuracy: brief assessment of the closeness of the location of spatial objects in the dataset in relation to their true position of the Earth.

Where possible, data quality should be organized and completed with the following subheadings:

- Scale/resolution: scale or resolution of the dataset. This can also include the scale/resolution of the source data used to create the dataset.
- Planimetric accuracy: horizontal accuracy assessment against their real world features (e.g. +/- 100m);
- Attribute accuracy: brief assessment of the reliability assigned to features in the dataset in relation to their real world values. This can include an assessment of how well the significant attributes have been populated, and any limitation on the data's use as a source for attribution.
- Logical consistency: brief assessment of the degree of adherence of logical rules of data structure, attribution and relationships;
- Completeness: brief assessment of the extent and range in regard to the completeness of coverage, classification and verification. Where possible, completeness should be organized and completed with the following subheadings:
  - Spatial completeness: assessment of the spatial coverage of the dataset;
  - Attribute completeness: assessment of the completeness of significant attributes fields.

## **4 ANNEXES**

### **A Summary of the Expertise of WP5 Project Partners based on WP2 Questionnaire**

		DMCSEE	CNIG	CHE IDE Ebro	CHE SITEbro	SIA-MARM (OSE)	IDE-OSE	UniZar	JRC IES EDO
<b>Metadata Std</b>	Used	OGC WMS, since 2007	IDEE, compliant with ISO 19115 - NEM (like ISO19115, Dublin Core taken into account) since 2004	Standard ISO 19115 since June 2006	ESRI FGDC utilities	SIA (INSPIRE+WISE from EEA), ISO19115 compliant, OGC criteria compliant	ISO19115 since March 2009	ISO19115, Dublin Core, INSPIRE, NEM	Not
	planned				ISO19115 in short term				ISO19115 or Dublin core, INSPIRE compliant
<b>Quality Metadata</b>	Used		IDEE Metadata provides information about the lineage, with the description of the processes and sub-processes carried out and the accuracy achieved.		ESRI FGDC utilities	WISE profile (extending Dublin Core) and NEM (Nucleo Español de Metadatos), ISO19115 compliant	Not		Not
	planned								
<b>Geo Web Services</b>	Used	OGC WMS 1.1, since 2007	WMS, CSW, WFS-G, WFS, WCS, WMC, SLD, WCTS, WPS. WMS-C, SOAP services; since 2004	OGC WMS 1.1.1 • OGC WFS 1.1 • OGC-CSW 2.0.2 Web Gazetteer Service	3 WMS since march 2010, WFS (only intranet) since 2008	WMS 1.1.0, WFS 1.1.0 with limitations on exporting SIA information on OGC Web Services	OGC WMS 1.1.0 and SLD for legends since 2008	CWS, WMS, WCS, WFS, WFS-Gaz, WPS	Not
	planned	OGC WMS							OGC web services

		DMCSEE	CNIG	CHE IDE Ebro	CHE SITEbro	SIA-MARM (OSE)	IDE-OSE	UniZar	JRC IES EDO
	<b>SW</b>	UMN MapServer, Cartoweb	Server/client SW developed and maintained by IAAA (Univ. Zaragoza)	Server/client SW developed and maintained by IAAA (Univ. Zaragoza)	ArcIMS, ArcGIS server Own developments and maintenance	Software implemented by Spanish Ministry of Environment (both server and client). To integrate with Spanish Ministry IDE (IDEMA), since 2010	UMN MapServer + PostGIS (Linux, Apache, PHP)	Server/client SW developed and maintained by IAAA (Univ. Zaragoza)	UMN MapServer (client and planned as server)
	<b>Handled data</b>	Gridded meteorological data	Raster and vector (Oracle) regarding INSPIRE Annexes I and II, but also some of Annex III themes.	Data related to Water Framework Directive and other data related to hidrology in Ebro catchment	Ebro river basin general geographic and hydrology information. Water management related data.	Raster and vector data (Oracle DBs)	Sustainability indicators (social, environmental, global, cultural, governance). They are mainly vector data	administrative, environmental, physical, orthophotos	Planned: vector data (Oracle SDO); gridded data (Oracle SDO, shapefiles); raster images, also time-based
	<b>Projections</b>	Lambert Conformal UTM	WGS84 (geographic), ETRS89 (geographic), ETRS89-UTM (Spanish zones), ED50-UTM (Spanish zones), ED-50 (geographic).	Data are stored in UTM-ED50 (zone 30N), but services can provide them in (zone 30N), ETRS89, WGS84 and lat-lon ED50	Current: UTM-ED50 (zone 30N); Planned: ETRS89	WGS84, ED50-UTM (zones 29N, 30N, 31N), ETRS89	WGS84, ED50-UTM (zones 28N, 29N, 30N, 31N)	ED50 (geographic), ED50-UTM, ETRS89, WGS84	WGS84, ETRS89 Lambert Azimutal Equal Area (ETRF-LAEA), JRC internally-defined GISCO projection

		DMCSEE	CNIG	CHE IDE Ebro	CHE SITEbro	SIA-MARM (OSE)	IDE-OSE	UniZar	JRC IES EDO
	<b>Data encoding</b>	GeoTIFF, rasters + WLD file	<b>WMS</b> JPEG, PNG, GIF <b>WFS</b> XML:GML <b>WPS</b> XML:GML <b>CSW</b> XML <b>SLD</b> JPEG, PNG, GIF, TIFF, BMP <b>WMC</b> XML <b>WCS</b> AsciiGrid, FloatGrid, GeoTiff <b>WCTS</b> XML:GML	XML:GML; image:PNG, JPG; GIF	text/plain;;GML; image:PNG, JPG; shapefiles	JPEG, PNG, GIF for WMS; XML:GML for WFS	JPEG, PNG, GIF for WMS; JPEG, PNG, TIFF for SLD	XML, JPEG, GIF, PNG, AciiGrid, FloatGrid, GeoTiff, GML 3.1	not used
<b>Problems with std</b>			Yes	Not	Not	Not	Yes (ambiguities)		
<b>Modeling procedures</b>				Not	Not	Not		Not	0.2
<b>Workflow procedures</b>				Not	Not used. Planned since 2010	Not		Not	
<i>Questionary version</i>		0.1	0.2		0.2	0.2	0.2	0.1	0.2

**B Drought research questions identified in the 1<sup>st</sup> EuroGEOSS WP5 meeting, Zaragoza, 23/24 June 2009**

Topic	Spatial domain and scale	Potential partners	Relation to EuroGEOSS	Timeframe
Inter-comparison of (a) selected drought index (indices) such as SPI, derived e.g. from gridded continental-scale, representative national or station data, and high-density regional network data	Spain; regional, national, continental	CHE, OSE/SIA, JRC, CSIC, BRGM-Water	Supported by EuroGEOSS approach; within scope; within timeframe	By 2011
Improving the dissemination of drought information, benefitting from DMSEE and EDO experience and existing IDE Ebro	Ebro catchment area; regional	CHE, JRC, ULBF	Not core objective of EuroGEOSS, but partly supported through EuroGEOSS; achievable within timeframe	By 2011
Analyse various methods for drought forecasting from medium-range to monthly meteorological ensemble forecasts as well as seasonal prediction by statistical relationships with large-scale circulation patterns (e.g. NAO, classification of "Wetterlagen")	All Europe; continental to regional	EDO, CSIC, ULBF, CHE	Outside scope and timeframe	Long-time perspective of years
Case study on selected drought event(s) for inter-comparison of different drought indices derived from datasets of different spatial resolution, including impact information on vegetation, agriculture	Ebro catchment area; regional	EDO, CSIC, CHE, OSE/SIA, BRGM-Water, CNIG	Supported by EuroGEOSS approach; within scope; requires R&D resources probably beyond EuroGEOSS; achievable within timeframe	within few years
Identification of common drought indices for all scales and hydrological systems as starting point for multi-scale comparison	All Europe; continental to regional	OSE/SIA, CSIC, EDO, ULBF, BRGM-Water	Supported by EuroGEOSS approach; within scope; within timeframe	By 2011

<b>Topic</b>	<b>Spatial domain and scale</b>	<b>Potential partners</b>	<b>Relation to EuroGEOSS</b>	<b>Timeframe</b>
Application of drought information for improved assessment of sustainability (to be specified); derivation and application of drought hazard and risk maps as input to sustainability analysis	Spain; National	OSE/SIA, EDO, CHE, CNIG	Supported by EuroGEOSS approach; marginal to scope; achievable within timeframe; might require additional R&D resources	Within few years
Use of drought impact information within drought indicators, with special focus on economic impacts	Predominantly regional	CHE, EDO, CSIC	Outside scope and approach; requires additional R&D resources	Within (few) years
Inter-comparison of drought indices between national, international, and continental scale; evaluation of international/sub-continental focal point and respective information	SE Europe, national to continental	ULBF, EDO, BRGM- Water	Supported by EuroGEOSS approach, within scope; first results achievable within timeframe, to be continued for all DMCSEE MS	First results by 2011, to be continued

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