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"Preparation of a metadata catalogue of water information sources"
SIME981
-
Task 2 - Structuring the metadata content

VERSION 1.1 - FINAL

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Disclaimer:

“This report was drawn up with the assistance of the European Commission. The contents of this document are the sole responsibility of the International Office for Water mandated by EMWIS Technical Unit under the contract “Towards a Mediterranean Water Information Mechanism compatible with WISE” ref. 21.0401/2007/485730/UB/D2 and may not be deemed to be reflecting the opinion of the European Union.”

EXECUTIVE SUMMARY

EMWIS Technical Unit is managing a project funded by the DG Env of the European Commission, entitled “Towards a Mediterranean Water Information Mechanism compatible with the Water Information System for Europe (WISE)”.

The objective of this project is to prepare a Mediterranean information mechanism on water which is compatible with the Water Information System for Europe – WISE- and that will support the Med Joint Process between the EU Water Initiative and the Water Framework Directive. This mechanism will stream line the access to comparable data related to water in the Mediterranean Partners Country (MPC).

The project should provide among others **an online metadata catalogue of water information sources in Med Partner Countries.**

Metadata is information describing datasets and data services and making it possible to discover, inventory and evaluate their suitability for different purpose and to know the conditions applicable for their use.

Various international metadata standards exist: metadata describing geographical information are defined in ISO 19115 standard and its revisions, and ISO 15836 (Dublin Core) is one of the most intensively used to describe metadata on textual information. These norms are defining various hundred of **metadata elements** and give generally the possibility to define its own metadata elements, extending the proposed lists in order to answer to specific needs.

Thus, each organisation producing metadata has to specify which standard and which list of metadata elements they will use, defining their own **metadata profile**.

In addition, in order to facilitate cooperation between institutions at regional level, a harmonisation of the profiles and of the way to fulfil each metadata element is necessary.

The main objective of this study is to present some first draft recommendations on the most adapted metadata profile for the Med-WIS initiative and to suggest domains of values that could be used for some metadata elements, in order to reinforce the interoperability of existing and future catalogues.

These recommendations could be used as a basis for discussion between the various national and regional partners involved in this project.

For this study, EMWIS needs, as regard to metadata content, were identified and completed with others identified constraint such as:
- the INSPIRE implementing rules on metadata
- the WISE guidance on metadata profile as defined in the latest version of WISE GIS guidance document,

From this analysis of needs, this report proposes to consider the metadata elements of the **WISE metadata profile** to describe the water related datasets and data services in the Mediterranean context.

In order to go through semantic interoperability between the catalogues existing at Euro Mediterranean level, an analysis of domains values used in various water related metadata catalogue was done, and **proposals are presented concerning the domains values of some metadata elements.**

These proposals concern:

- The domain values of the “Keyword” metadata elements used to identify the “**topics”** and **“places”** of the datasets/data services , with
    - 2 potential metadata elements “keyword” for the “topic” (i.e. theme)
        - Water data domain keyword: using specific acronym for a global classification within the water sector (i.e. short closed list of values more adapted than GEMET),
        - Thematic keyword: using GEMET thesaurus (as requested by INSPIRE specifications)
    - 3 potential metadata elements “keyword” for the “place”
        - River Basin keyword: using free text in a first stage and establishing progressively an homogeneous list of values
        - Aquifer keyword: using free text in a first stage and establishing progressively an homogeneous list of values
        - Country & Region: using the ISO3166 norm for the list of countries + use of some specific values for the regions

- The domain values for others metadata elements such as:
    - ‘Topic category’
    - ‘Originating controlled vocabulary’
    - ‘Specification’ & ‘Degree’
    - ‘Metadata standard name’ (additional WISE metadata)
    - ‘Metadata standard version’ (additional WISE metadata)

LIST OF ACRONYMS

EEA	European Environment Agency
EPSG	European Petroleum Survey Group
FGDC CSDGM	Federal Geographic Data Committee - Content Standard for Digital Geospatial Metadata[1]
GEMET	GEneral Multilingual Environmental Thesaurus[2]
GIS	Geographic Information System
IANA	Internet Assigned Numbers Authority
INSPIRE	Infrastructure for Spatial Information in the European Community
ISARM	Internationally Shared Aquifer Resources Management
IR	Implementing Rule
NEM	Núcleo Español de Metadatos (Spanish Core Metadata Element structure)
MPC	Mediterranean Partner Country
RBD	River Basin District
UNEP	United Nations Environment Program
WFD	Water Framework Directive
WHYMAP	Worldwide Hydrogeological Mapping and Assessment Programme

1 http://www.fgdc.gov/metadata/csdgm/
2 http://www.eionet.europa.eu/gemet

I. INTRODUCTION

EMWIS Technical Unit is managing a project funded by the DG Env of the European Commission, entitled “Towards a Mediterranean Water Information Mechanism compatible with the Water Information System for Europe (WISE)”.

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Thus, each organisation producing metadata has to specify which standard and which list of metadata elements they will use, defining their own **metadata profile**.

In addition, in order to facilitate cooperation between institutions at regional level, a harmonisation of the profiles and of the way to fulfil each metadata element is necessary.

The main objective of this study is to present some first draft recommendations on the most adapted metadata profile and to suggest domain of values that could be used for some metadata elements, in order to reinforce the interoperability of the catalogues.

These recommendations could be used as a basis of discussion between the various national and regional partners involved in this project.

With that in mind, this document presents:

- The main requirements on metadata content considering EMWIS’ needs, INSPIRE implementing rules on metadata and the WISE metadata profile as defined in the latest version of WISE GIS guidance document,
- A proposal of metadata profile (mandatory and recommended metadata elements) related to the description of water related dataset and data services in the Mediterranean region.,
- Proposals of domains values to be used for some metadata elements, taking into account domains values already used in some identified metadata catalogue.

II. REQUIREMENTS ON METADATA

A. EMWIS requirements on metadata

A previous project lead by EMWIS gave the possibility to develop a first prototype of a metadata catalogue.

Considering this first experience and the objective of this project, EMWIS representatives identified 3 main needs related to the metadata content.

EMWIS requirement on metadata n°1:
Being compatible with Inspire, WISE and Eurostat metadata specifications

As mentioned in Task 1 report “Review of existing tools”, EMWIS technical unit aims to be fully interoperable with main existing metadata catalogues.
This interoperability encompasses two levels:

- Technical interoperability has already been addressed in Task 1 (see Task 1 report “Review of existing tools” report chapter VIII),
- Semantic interoperability implies using the same metadata elements and compatible metadata content. Specific attention will be focused on the metadata elements required by INSPIRE Implementing Rules –IRs- and by WISE’s metadata Profile.

EMWIS requirement on metadata n°2:
Enable multilingual searches.

One of the most important needs is to enable multilingual search throughout EMWIS multilingual metadata sheets.
This need is coherent with INSPIRE requirement on metadata (Inspire requirement n°4 in this report) ensuring a language neutral name for each value defined in part II.B. of the present document.

In order to have multilingual editing and search, two main concepts have to be implemented:

- Enable multilingual metadata editing as defined in ISO19115. This point is addressed by Task 1 report “Review of existing tools” - INSPIRE requirement concerning Metadata management tool n°4,
- The use of multilingual thesaurus (eg. GEMET): addressed by INSPIRE requirements concerning Metadata (Inspire requirement n°2 in this report).

Multilingual editing allows one metadata editor to translate part of the metadata record (eg. Only the title).

ISO standard defines how to store multilingual content in one metadata record:

- One main language (using gmd:language element),
- n other languages (using gmd:locale element).

Once multilingual content is available then choices have to be defined in catalogue applications:

- Indexing: due to technical implementations, each language contents need to be indexed separately (i.e. One index by language). This implies having multilingual search capabilities in the search engine. The main reason for this is the use of stopwords list, sorting and tokenizer process.
- Viewing: Display information in the language of the user interface when possible :
  - If user interface language is available in the metadata, the element is displayed in this language,
  - Else the element is displayed in metadata default language.

EMWIS requirement on metadata n°3:
Facilitate dataset identification

To facilitate dataset identification, metadata catalogue tools can search information using various ways: plain text research, keyword research and spatial research (via metadata extent information).

In the set up of the former EMWIS metadata catalogue prototype, two simple keywords lists were produced to suit EMWIS needs: “TOPIC” (thematic) and “PLACE” (geographic).

Interviews with EMWIS technical unit have confirmed that this distinction between the ‘Topic’ and ‘Place’ notions should be kept.

A clear need to allow a two level based organization of the ‘Topic’ keyword has been raised.
It has been proposed that the first level, entitled ‘Water data domain’, should contain keywords having a vast and complete scope.
The second one, ‘Thematic’, should allow a much more precise definition of the topic concerned by the metadata.

The need to refine the use of geographic keywords was also presented. The former unique list (“PLACE”) should be refined by splitting it into three sub-lists concerning ‘River basins’, ‘Aquifer’ and ‘Countries/Region’.
The main goal is to link the information to water management units. It is easier to link to a unit via its name rather than using codes which, in most cases, are only meaningful at country level (unless specific codification rules are defined at

EMWIS level and that they are understandable by all possible user of the metadata catalogue tool).
It is also aimed to have homogeneous information available on those units across EMWI Euro Mediterranean and non Euro Mediterranean countries.

B. INSPIRE implementing rules on metadata

1. Global requirements from Inspire Directive

INSPIRE Metadata Draft Implementing Rules - Version 3, 26/10/2007[3] gives a good overview of the Directive's requirement for Metadata in its chapter 1.2. ("The Directive's Requirements on Metadata"). In order to define precisely the context, some important parts of this chapter are presented hereafter:

*"The general principle informing the need for metadata is expressed in Paragraph (6) of the Directive's preamble, i.e. that the "infrastructures for spatial information in the Member States should be designed to ensure that [….] **it is easy to discover available spatial data, to evaluate their suitability for the purpose and to know the conditions applicable to their use**".*

*Metadata is defined in Art. 3, point (6) as: "**information describing spatial data sets and spatial data services and making it possible to discover, inventory and use them.**"*

The Directive covers the spatial data sets that fulfill the conditions defined in Article 4, and in particular (Art. 4-1):

> *"(a) they relate to an area where a Member State has and/or exercises jurisdictional rights;*
> *(b) they are in electronic format;*
> *(c) they are held by or on behalf of any of the following:*
> *(i) a public authority, having been produced or received by a public authority, or*
> *being managed or updated by that authority and falling within the scope of its*
> *public tasks;*
> *(ii) a third party to whom the network has been made available in accordance with Article 12;*
> *(d) they relate to one or more of the themes listed in Annex I, II or III."*
>
> *Art. 5 is dedicated to Metadata and requires the following:*
> *"1. Member States shall ensure that metadata are created for the spatial data sets and services corresponding to the themes listed in Annexes I, II and III, and that those metadata are kept up to date.*

- *Metadata shall include information on the following:*
  (a) the conformity of spatial data sets with the Implementing Rules provided for in
  Article 7(1);

[3] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf

(b) conditions applying to access to, and use of, spatial data sets and services and, where applicable, corresponding fees;
(c) the quality and validity of spatial data sets;
(d) the public authorities responsible for the establishment, management, maintenance and distribution of spatial data sets and services;
(e) limitations on public access and the reasons for such limitations, in accordance
with Article 136

-. Member States shall take the necessary measures to ensure that metadata are complete and of a quality sufficient to fulfill the purpose set out in point (6) of Article 3.

- Rules for the implementation of this Article shall be adopted by one year following the date of entry into force of this Directive in accordance with the regulatory procedure referred to in Article 22(2). These rules shall take account of relevant, existing international standards and user requirements, in particular with relation to validation metadata.”

The timetable for the creation of metadata is set out in Art. 6, and indicates that metadata for the data themes in Annexes I and II of the Directive should be created no later than 2 years following the adoption of the IRs (i.e. by May 2010) and for Annex III no later than 5 years following the adoption of the IR (i.e. May 2013).

2. Requirements from INSPIRE Implementing Rules

INSPIRE Implementing Rules for metadata have been successfully adopted on May 2008 14th and were published in December 2008 4th (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:326:0012:0030:EN:PDF).

They are made up of 10 categories, with a total of 27 metadata elements.

They entered into force on December 2008 24th (20 days later). It means that public authorities will have to provide INSPIRE compliant metadata by December 2010 24th for datasets concerned by INSPIRE annex n°1 and by December 2013 24th for datasets concerned by INSPIRE annexes n° 2 and 3 (INSPIRE annexes I, II and III are summarized in Annex I of the present document).

Here after are mentioned the main requirements having a direct impact on EMWIS definition of metadata structure.

INSPIRE requirements concerning Metadata n°1 :
Implement metadata elements listed in Annex I of this document and respect their multiplicity.

The first requirement from INSPIRE IRs is to implement metadata elements listed in Annex I of this document and respect their multiplicity (see INSPIRE requirement n°2 in Task 1 report “Review of existing tools”).

Two tables extracted from the Implementing Rules summarizing the metadata elements required by INSPIRE are presented in Annex II.
Each metadata element presented in those tables is further defined in the Implementing Rules documentation.

INSPIRE requirements concerning Metadata n°2 :
If a resource is a spatial data set or spatial data set series, at least one keyword shall be provided from the general environmental multilingual thesaurus (GEMET) describing the relevant spatial data theme as defined in Annex I, II or III to Directive 2007/2/EC.

INSPIRE IRs second requirement was already evoked in Task 1 (see Task 1 report “Review of existing tools” - INSPIRE requirement n°7). At least one keyword should come from GEMET multilingual thesaurus. It should be decided whether a new keyword list should be added to EMWIS ones or existing EMWIS code list could be adapted to fit this new need.

INSPIRE requirements concerning Metadata n°3 :
The metadata element ‘Topic category’ is Mandatory

This element is a “*high-level classification scheme to assist in the grouping and topic-based search of available spatial data resources*”[4].
Based on a value domain defined in INSPIRE IRs, this will be a new code list to be used in EMWIS metadata.

INSPIRE requirements concerning Metadata n°4 :
Where code lists are defined: *The value domain of each metadata element is necessary to ensure interoperability of metadata in a multilingual context and that value domain should be able to take the form of free text, dates, codes derived from international standards, such as language codes, keywords derived from controlled lists or thesauri, or character strings.*

As presented in INSPIRE IRs on Metadata:
In relation to a particular domain, each value is defined by:

a. *a numerical identifier,*
b. *a textual name for humans which may be translated in the different Community languages,*
c. *a language neutral name for computers (the value expressed between parenthesis),*
d. *an optional description or definition.*

The numeric identifier and language neutral name will be kept with every translation of the same value ensuring multilingual understanding.

[4] source: voted INSPIRE IRs on Metadata.

C. Summary of WISE metadata profile as defined in the latest GIS guidance

Latest WISE GIS Guidance (2008 11 25th)[5] advises that:
"*The WISE metadata profile should support the functions of discovery and usage. The original WFD GIS Guidance Document (Vogt 2002) defined a metadata profile based on the draft version of ISO19115 that existed at the time, and further work was undertaken with the SDIGER-project.*
Since the majority of WISE datasets and services will fall under the scope of INSPIRE, this guidance recommends the adoption of a profile which ***extends the INSPIRE metadata to include all those additional elements already agreed by the WISE community****."*

This guidance recommends the **use of INSPIRE terminology for element names** wherever possible, thus ensuring compatibility with metadata created in other environmental policy areas.

GIS Guidance Appendices 10 provides the older WISE metadata profile (coming from the 2006 SDIGER project[6]).

The most up to date specifications for WISE metadata can be found in Appendix 11. In this, WISE metadata profile is clearly presented with a mapping with both INSPIRE IRs and ISO-19115 metadata elements ("*As the WISE metadata profile is an extension of Inspire, it is important to refer to the INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119 for additional guidance on these elements*")

WISE metadata profile integrates all INSPIRE IRs metadata elements with respect to INSPIRE multiplicity. The only difference concerns implementing instructions related to WFD reporting issues (i.e some INSPIRE IRs have been detailed to suit WISE context).

WISE metadata profile also adds to INSPIRE IRs 12 other elements coming from ISO-19115.

Among those 12 added elements, 3 are mandatory:
- 'Distribution format': Provides a description of the format of the data to be distributed (ex : cd, shapefile),
- 'Metadata standard name': Name of the metadata standard (including profile name) used,
- 'Metadata standard version': Version (profile) of the metadata standard used.

Eventually, the non-use of extra-metadata elements defined in Inspire data specification for Hydrography is justified as follows: "*WISE metadata profile described does not include metadata elements required of the Inspire data specification for Hydrography as this data specification is not yet finalised. WISE profile may be extended as an outcome of the INSPIRE data specification process in the future".*

[5] http://eea.eionet.europa.eu/Public/irc/eionet-circle/eionet-telematics/library?l=/technical_developments/wise_technical_group/updated_2nd-edition&vm=detailed&sb=Title
[6] http://www.idee.es/sdiger/index.vm?page=public-docs&lang=en

III. PROPOSAL OF A METADATA PROFILE FOR EMWIS

Considering EMWIS requirements, the metadata catalogue need to be fully semantically interoperable with INSPIRE and WISE metadata catalogues thus allowing those catalogues to harvest it.

As mentioned in the previous part, WISE metadata profile is an extension of INSPIRE metadata.

Implementing the latest WISE metadata profile will then ensure this semantic interoperability with both INSPIRE and WISE metadata profile.

Metadata elements needed in WISE metadata profile are summarized in the following table (extracted from the latest WISE GIS Guidance).

Notes:
- Metadata elements marked in italics are only relevant for metadata covering service,
- When the ‘Value Domain’ refer to a part of INSPIRE IRs (ex : Part D.1. of the MD IR), the relevant information is available in the voted document Implementing Rules (please refer to the link given in the part II.B of the present document)

Category	Element Name	Description	Condition	Value Domain	Multiplicity
IDENTIFICATION	1.1 Resource title	This is a characteristic, and often-unique, name by which the resource is known.	Mandatory	Free text	1
	1.2 Resource abstract	This is a brief narrative summary of the content of the resource	Mandatory	Free text	1
	1.3 Resource type	This is the type of resource described by the metadata	Mandatory	Part D.1. of the MD IR	1
	1.4 Resource locator	The resource locator defines the link(s) to the resource and/or the link to additional information about the resource	Mandatory if a URL is available to obtain more information on the resource, and/or access related services	Character string expressed by a URL	0..*
	1.5 Unique resource identifier	A value uniquely identifying the resource	Mandatory	Character string + character string namespace	1..*
	1.6 Coupled resource	*Identification of the target spatial data set(s) of the services trough their Unique Resources Identifiers (URI)*	*Mandatory if linkage to the service is available*	*Character string code + character string namespace*	*0..**
	1.7 Resource language	The language(s) used within the resource	Mandatory if the resource includes textual information	ISO 639-2	0..*
CLASSIFICATION OF SPATIAL DATA	2.1 Topic category	High-level classification scheme	Mandatory	Part D.2 of the MD IR	1..*

Category	Element Name	Description	Condition	Value Domain	Multiplicity
SETS & SERVICES	*2.2 Spatial data service type*	*This is a classification to assist in the search of available spatial data services*	*Mandatory*	*Part D.3 of the MD IR*	*1*
KEYWORD	3.1 Keyword value	A commonly used word, formalized word or phrase used to describe the subject	Spatial data set or spatial data set series: at least one keyword from GEMET	Free text	1..*
			Spatial data service: at least one keyword from Part D.4 of the MD IR	*Part D.4 of the MD IR*	*1..**
	3.2 Originating controlled vocabulary	The citation of the originating controlled vocabulary shall include at least its title and a reference date (publication, last revision or creation)	Mandatory if the keyword originates from a Controlled vocabulary	Free text + date	1..*
GEOGRAPHIC LOCATION	4.1 Geographic bounding box	Extent of the resource in the geographic space	Spatial data set or spatial data set series: Mandatory	Decimal degrees with at least two decimals	1..*
			Spatial data service: Mandatory for services with an explicit geographic extent	*Decimal degrees with at least two decimals*	*0..**
TEMPORAL REFERENCE	5.1 Temporal extent	Time period covered by the resource as an individual date, an interval of dates or a mix of both	At least one of the metadata elements referred to points 5.1 to 5.4	ISO 8601	1..*
	5.2 Date of publication	Date of publication or entry into force of the resource	At least one of the metadata elements referred to points 5.1 to 5.4	ISO 8601	1..*
	5.3 Date of last revision	Date of last revision of the resource	At least one of the metadata elements referred to points 5.1 to 5.4	ISO 8601	1
	5.4 Date of creation	Date of creation of the resource	At least one of the metadata elements referred to points 5.1 to 5.4	ISO 8601	1
QUALITY & VALIDITY	6.1 Lineage	Statement on process history and/or overall quality of the spatial data set	Mandatory	Free text	1
	6.2 Spatial resolution	Level of detail of the dataset: it shall be expressed as a set of zero to many resolution distances or equivalent	Mandatory (for datasets)	Equivalent scale expressed as an integer; resolution	0..*

Category	Element Name	Description	Condition	Value Domain	Multiplicity
		scales		distance expressed as a numerical value	
CONFORMITY	7.1 Specification	Citation of the implementing rules adopted under Article 7(1) of Directive 2007/2/EC or other specification to which a particular resource conforms	Mandatory	Free text + date	1..*
	7.2 Degree	Degree of conformity of the resource to the implementing rules adopted under Article 7(1) of Directive 2007/2/EC or other specification	Mandatory	Part D.5 of the MD IR	1
CONSTRAINT RELATED TO ACCESS & USE	8.1 Conditions applying to access and use	Conditions for access and use of spatial data sets and services, and where applicable, corresponding fees	Mandatory	Free text + URL if applicable for information on any fees	1..*
	8.2 Limitations on public access	Limitations on public access and the reasons for them	Mandatory	Free text	1..*
ORGANISATIONS RESPONSIBLE FOR THE ESTABLISHMENT, MANAGEMENT, MAINTENANCE AND DISTRIBUTION OF SPATIAL DATA SETS AND SERVICES	9.1 Responsible party	Description of the organisation responsible for the establishment, management, maintenance and distribution of the resource	Mandatory	Free text + e-mail address as a character string	1..*
	9.2 Responsible party role	Role of the responsible organisation	Mandatory	Part D.6 of the MD IR	
METADATA ON METADATA	10.1 Metadata point of contact	Description of the organisation responsible for the creation and maintenance of the metadata	Mandatory	Free text + e-mail address as a character string	1..*
	10.2 Metadata date	Date the metadata record was created or updated	Mandatory	ISO 8601	1
	10.3 Metadata language	Language in which the metadata are expressed	Mandatory	ISO 639-2	1
WISE METADATA	11.1 Distribution format	Provides a description of the format of the data to be distributed	Mandatory	Free text	1..*
	11.2 Metadata standard name	Name of the metadata standard (including profile name) used	Mandatory	Free text	1
	11.3 Metadata standard version	Version (profile) of the metadatastandard used	Mandatory	Free text	1
	11.4 Metadata file identifier	Unique identifier for this metadata file	Optional	Free text	0..1
	11.5 Metadata character set	Full name of the character coding standard used for the dataset	Optional	MD_CharacterSetCode <<CodeList>> (B.5.10)	0..1

Category	Element Name	Description	Condition	Value Domain	Multiplicity
	11.6 Reference system	Description of the spatial and temporal reference systems used in the dataset	Optional	MD_ReferenceSystem (B.2.7)	0..*
	11.7 Spatial representation type	Method used to spatially represent geographic information	Conditional: if the resource is a dataset or dataset series	MD_SpatialRepresentationTypeCode	0..*
	11.8 Credit	Recognition of those who contributed to the resource(s)	Optional	Free text	0..*
	11.9 Presentation form	Mode in which the resource is represented	Optional	CI_PresentationFormCode	0..*
	11.10 Purpose	Summary of the intentions with which the resource(s) was developed	Optional	Free text	0..*
	11.11 Specific usage	Brief description of the resource and/or resource series usage	Optional	Free text	0..*
	11.12 Vertical extent	Provides vertical component of the extent of the referring object	Optional	EX_VerticalExtent	0..*

Table 1 - Overview of the WISE metadata profile

IV. PROPOSAL OF VALUE DOMAINS FOR SOME EMWIS’ METADATA ELEMENTS

Once the metadata structure has been defined, the content of the various metadata elements has to be taken into account.

Following the WISE Metadata profile, the code lists already defined (and refined) at ISO-19115, INSPIRE and WISE levels will be used.

In order to facilitate water related dataset and data services identification at Euro Mediterranean level and to enable semantic interoperability,, the domain values of some metadata elements should be specified.

A. Code lists used in some identified metadata catalogs

Semantic interoperability at Mediterranean and Euro Mediterranean level also implies not redefining what others have already done.
Thus, domain values used in the metadata catalogue developed by some organizations have been surveyed.

1. International level

- UNEP (United Nations Environment Programme): this metadata catalog is not using any specific metadata profile, thus no code list could be reused,

- FAO (Food and Agriculture Organization): FAO metadata do not use keywords coming from code lists. When a thesaurus is used, this is in general the Agrovoc maintained by FAO,

- WHO (World Health Organization GIS Resources): WHO has been contacted to know whether specific code lists are defined at their level. No reply received at the time of editing this report,

- CGIAR-CSI (Consortium for Spatial Information): CGIAR-CSI has been contacted to know whether specific code lists are used. No reply received at the time of editing this report,

2. European level

- INSPIRE-JRC: uses code list defined in INSPIRE IRs,

- WISE – SDIGER project : code lists can be retrieved in INSPIRE/WISE profile,

- ESA – Kopernicus: The answer provided by the Geoportal team is the following “*The GEOportal development and resources classification aims to provide support to the 9 GEO Societal Benefit Areas (SBAs). The SBAs classification has been defined in the GEOSS Ten Years Implementation Plan Reference Document. In particular the GEOportal, for each resource classified*

and published, takes into consideration the geographical area of application and both the SBAs categories and sub-categories.
To better meet the user needs, a revision of the SBAs sub-categories definition may take place in the future and the opportunity of such revision process is under discussion at the GEO Secretariat level". The detailed SBA categories and sub-categories provided by the Geoportal team is available in Annex III.

- NatureSDI Plus: NATURE-SDIplus will define a common multilingual and multicultural approach for a simpler, and standard, access to spatial data. A specific metadata profile for nature conservation will be set up. It is not available for the time being.

3. Country level

- France
  - Geocatalogue : The only ISO-19115 code list extension is the extension of codelist CI_DateTypeCode with 'validity' and 'UseBy' values allowing to express a 'Date of validity' and an 'Expiry date',
  - OIEau - Sandre: The French Thesaurus on Water (source: International Office for Water),
  - IFREMER – Sextant: Use ISO-19115 metadata standards

- Spain – IEES: Infraestructura de Datos Espaciales de España[7]. Spain defined in 2005 its Core Metadata Element structure (NEM : *Núcleo Español de Metadatos*[8]). The answer provided by IESS team is the following :
  "*The NEM is defined essentially based on ISO 19115:2003 "Geographic Information-Metadata" and Dublin Core Metadata. It also takes in account other catalogs and metadata profile standards recommended at European level: the proposed spatial metadata Dublin Core profile performed by the Center for European Normalization (CEN) [CWA 14858:2003* Dublin Core Spatial Application Profile*], the recommendations made inside Inspire and the geographical information systems guidelines by the WFD.*"
  It has been set up so that elements coming from ISO 19115 or other norms could be used. As stated in NEM v1.0 documentation: "*for the time being all the necessary identified elements have been defined by ISO-19115. But in the future elements could also come from other metadata standards.*" (See NEM.pdf p28 : 'Definido por' descriptor definition). NEM elements defined can also be interactively consulted via Internet[9].
  Code lists are doing extensive use of ISO 19115 code lists. Code list coming from other standards are also recommended in the NEM (See table 2 below). In those cases Metadata elements are still free text, the use of an external code list is just recommended:

[7] http://metadatos.latingeo.net/metadatos/bfcomo-se-crean/2-a-estandares-perfiles-y-recomendaciones/nem-1
[8] http://www.idee.es/resources/recomendacionesCSG/NEM.pdf
[9] http://metadatos.latingeo.net/metadatos/bfcomo-se-crean/2-a-estandares-perfiles-y-recomendaciones/nem-1/a-2-nem-elemento-a-elemento

Metadata element name:decription in NEM	Correspondance with WISE profile	Metadata element type in NEM	Recommended code list source in NEM
MD_Format.formatName : *name of the data transfer format(s)*	11.1 Distribution format	Free text	- IANA_MIMEMediaTypesCode (for MimeTypes) , - CSDGM_FormatNameCode - CSDGM_BrowseGraphicFileTypeCode
CI_ResponsibleParty.organisationName: *name of the responsible organization*	9.1 Responsible party and 10.1 Metadata point of contact	Free text	CSIC_AuthorityCode (Centro Superior de Investigaciones Científicas)
MD_CRS : *metadata about a coordinate system in which attributes have been derived from SC_CRS as defined in ISO 19111 – Spatial referencing by coordinates*	11.6 Reference system	Free text with a structured example provided	EPSG code
CI_Address.administrativeArea : *state, province of the location*	9.1 Responsible party and 10.1 Metadata point of contact	Free text	INE_AdministrativeUnitCode (Instituto Nacional de Estadistica)
CI_Address.city: *city of the location*		Free text	INE_AdministrativeUnitCode (Instituto Nacional de Estadistica)

Table 2 – NEM elements where external code list are defined.

Given that WISE metadata profile should provide the domains in schema for the ‘Distribution format’ metadata element (element 11.1 in Table 1) it is advised that EMWIS waits for this action before implementing specific code list for this element. Apart from MD_CRS metadata element which will be addressed in part IV.B, the other code lists are too specific from the Spanish context to be reused in EMWIS’.

- Kosovo – Kosovo Water Information System: the same code list defined in the framework of EMWIS first metadata catalogue prototype are used(“TOPIC”, “PLACE”),

- Romania – Hungaria – KOCRIS: the same code list defined in the framework of EMWIS first metadata catalogue prototype are used (“TOPIC”, “PLACE”),

- Holland - Geonovum: The only thesaurus planned to be used is GEMET. No specific code list will be set up,

- Slovakia – Enviroportal: GEMET keywords are already used in a specific list. They have been contacted to know whether other code lists are used.

B. Domain values proposals for the implementation in EMWIS metadata catalogue.

The definition of domain values is particularly important in the '**KEYWORD' metadata element** used to identify the topics and places concerned by the datasets. As suggested in EMWIS requirement on metadata (n°3), the keyword metadata element in EMWIS metadata catalogue could be made up of five different keywords with

- 2 metadata elements "keyword" for the theme
  - Water data domain,
  - Thematic (Gemet keyword),
- 3 metadata elements keyword for the place
  - River Basin,
  - Aquifer,
  - Country & Region.

Apart from the keyword element, other code lists are used in metadata. Some of those defined at INSPIRE and WISE level can be narrowed to better suit EMWIS needs. Such restriction will facilitate metadata management

1. Metadata elements "keyword" for the topic (i.e. theme)

a) 'Water data domain' keyword

The list of 'Water data domain' is a first level classification list, **specific to water management.**

The aim is to facilitate water related dataset identification following the main "water data domains" .Based on acronyms; it also **answers to the need concerning multilingual searches.**

The proposed following list was tested and proved its efficiency in the former prototype :

EMWIS 'Water data domain' keyword value	EMWIS 'Water data domain' keyword meaning	Example
AD	**AD**ministrative context	National boundary, administrative boundaries, main towns, list of projects ….
ENV	**ENV**ironmental data	DEM, Soil occupation
HYE	HYdrological Entities	Basin, river , lakes, aquifers
IUD	**I**ntake-**U**se-**D**ischarge	Quantity of water intake for irrigation, quality of water discharge from WWTP
MO	**MO**nitoring	Monitoring networks, monitoring stations, data on water levels, data on water quality
UP	**U**ser **P**olluter (including user polluters characteristics and description of infrastructures)	List of industries using water, characteristics of dams, list of WWTP
WSS	**W**ater **S**upply **S**anitation services	Data on population connected to drinking water, efficiency of water distribution, water price

Table 2 – 'Water data domain' keyword value domain

In the tool interface, both the ‘Water data domain’ keyword value and meaning could be displayed and, if a translation is available, translated into the user interface language (ex: “AD - ADministrative context” and “AD - contexte administratif”).

b) ‘Thematic’ keyword

‘Thematic’ keyword refers to the topic concerned by the data answering to the INSPIRE requirements concerning the use of, at least, one word from GEMET multilingual thesaurus.

Instead of producing a new code list at EMWIS level it has been decided that this list will display all the content of GEMET multilingual thesaurus thus fulfilling both EMWIS requirement mentioned above and INSPIRE requirement on Metadata n°2.

GEMET thesaurus provides three functionalities that should be reused in EMWIS context. Those functionalities are visible in the following web page: http://www.eionet.europa.eu/gemet/concept?cp=7495&langcode=en&ns=1 :

- A definition is available for each GEMET concept. Importing also the definition in EMWIS metadata catalogue interface will be useful for the user,

- Each GEMET term provides translations in various languages (see the right part of the web page). Importing this logic in the metadata catalogue would also answer to EMWIS requirement on metadata n°2.

It has to be defined whether all the available translations should be displayed in a single information panel or if the translation displayed should be based on the language chosen by the user at the metadata catalogue level,

- Each GEMET concept also provides proposals of related concepts via the notions of ‘broader’, ‘narrower’ and ‘related’.

On the web page quoted above the information displayed could be summarized the following way:

1. ‘hydrosphere’ is a broader term than ‘sea’ which means that ‘sea’ is contained in the ‘hydrosphere’ concept (which also contains concepts of ‘lake’, ‘water body’, …),
2. ‘deep sea’, ‘ocean’, ‘ocean sea’ are narrower terms for ‘sea’. It means they are contained in the ‘sea’ concept.

These notions are the basis of GEMET hierarchical structure.
EMWIS metadata catalogue tool should allow the user to search inside GEMET structure when using the ‘Thematic’ keyword.

In the prototype, GEMET thesaurus has been loaded into the catalogue. Keywords could be stored in a metadata record by reference (ie: Using concept ID) in one or more languages according to metadata content or value.

More work is required to use GEMET broader/narrower/related concepts through search. Moreover, some points remain to be cleared. For example: GEMET is in constant evolution. How is the concept evolution managed: when a concept has to disappear or to be renamed is the precedent id frozen?

Another thematic thesaurus is being used on EMWIS web portal. It was developed in the framework of EDEN-IW project (Environmental Data Exchange Network for Inland Water: http://www.semide.net/initiatives/fol060732/proj827096).
It is based on:
- The French Thesaurus on Water (source: International Office for Water),
- A mapping with GEMET terms,
- A UNESCO work which helped adding further 150 words with Arabic translation.

This one, rich of hundreds of words, is not used in EMWIS Metadata. It has been decided not to try to use it for this project given its lack of structure (only one level available that would make difficult the thematic keyword use).

2. Metadata elements "keyword" for the place

Only a global 'geographic' keyword ("PLACE") is used for the time being on the prototype. It has the following values: "WORLD", "EUROPE", "NAME OF THE COUNTRY").
No major requirement, apart from the already quoted involving the use of GEMET, comes from INSPIRE IRs on Metadata on the use of geographic related keyword.
Three major potential evolutions have been identified for this category of keyword in collaboration with EMWIS technical unit (see EMWIS requirement on metadata n°3):
- River Basin,
- Aquifer,
- Country & Region.

As mentioned in this need, the dataset concerned by the metadata has to be linked to water management units in a homogeneous way across Mediterranean countries (mainly across European and non-European ones). Given that 'Thematic' keyword already implies the use of GEMET and that GEMET only contain concepts (and not code lists such as country names), we will make an inventory of the other possibly existing data sources for those three geographic keyword lists.

A second objective, which is less a priority than the precedent one, is to automatically fill the 'GEOGRAPHIC LOCATION' category (see the element '4.1 Geographic bounding box' in Table 1 - Overview of the WISE metadata profile) in order to ease metadata management. Thus, using geo-referenced layers as basis for those three geographic keyword categories and produce geographic thesauri from them could solve this extra-need.

a) 'River basin' keyword

i. Existing information sources:

Various sources of information have been examined for this keyword value domain.
For Euro- Mediterranean countries :
- The JRC pan-European River and Catchment Database version 2.0[10](CCM-2),
- The EEA, European river catchments (ERC) version 2[11],
- WISE river basin districts[12],
- UNEP/GRID Drainage Basins[13].

[10] http://ccm.jrc.ec.europa.eu/php/index.php?action=view&id=23
[11] http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1053&i=1
[12] http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1041
[13] http://geodata.grid.unep.ch/results.php

For non Euro- Mediterranean countries:

- The JRC pan-European River and Catchment's Database version 2.0 (CCM-2),
- UNEP/GRID Drainage Basins,
- EMWIS former collection of river basin for several of its Mediterranean Partners Countries,
- FAO layers on Hydrological Basin in Africa[14],
- UNEP Plan Bleu – Regional Activity Center[15] having geographic information on river basins in the Mediterranean,
- The Sahara and Sahel Observatory (OSS) maps of river basins sharing the Northern Sahara Aquifer System ("Système Aquifère du Sahara Septentrional").

ii. Existing information sources analysis:

A thorough analysis was carried out in order to identify which information sources are best suitable to EMWIS needs.

- **For Euro- Mediterranean countries:**

JRC-CCM-2:

Generated from a 100m resolution Digital Elevation Model, this geographical database identified primary catchments all across Europe and also Lakes, River Networks.

The information provided about catchments is really rich. *These can be aggregated to drainage basins at different hierarchical levels, forming, for example, about 650 river basins of more than 1000 square kilometers*[16]

This geographical database is purely hydrographically based and not directly related to management units. As a result, a several small catchments have been identified (mainly in coastal regions).

Not all the catchments have been given a Name, especially the coastal ones.

This layer is a rich source of information for Euro Mediterranean countries but also provides information for some EMWIS non European countries (mainly in the Balkans).

This database provides also some information (but not complete) for Jordan, Israel and Palestinian Authority.

ERC V2 :

ERC was created using as main input the CCM River and Catchment Database (source: JRC, 2006) version 2.0.

It only covers European Countries.

This geographic datasets is much cleaner than CCM-2 on coastal areas (coastal catchments are not taken into account given that only CCM2 watersheds order 5 have been extracted).

It is still purely hydrographic and not related to water management units.

Not all the catchments have been given a Name.

[14] http://www.fao.org/geonetwork/srv/fr/metadata.show?id=296&currTab=simple
[15] http://www.planbleu.org/indexUK.html
[16] Source : JRC Reference Report "A pan-European River and Catchments Database"

WISE River Basin Districts (RBDs):
“*River Basin Districts (RBDs) are the main units for the management of river basins and have been delineated by Member States under Article 3 of the Water Framework Directive. The geographic area of some RBDs span more than one country (such as the Danube) and these are known as International RBDs. Others are contained completely within a country and are known as National RBDs*." (source: EEA – dataservice web site).
It only covers European Member State and correspond to their water management units. All RBDs have a Name provided.
The dataset can be downloaded using either a geographical file (enabling automatic calculation of the ‘Geographic bounding box’ element) or a tabular file (only containing names and other pieces of information).

UNEP/GRID Drainage Basins:
This dataset *was created by reprojecting each of the HYDRO1k continental databases to geographics and merging them to form a single drainage basin data set. This global database was partitioned into the UNEP regions, was gridded to conform to companion data sets, and was colored to highlight the drainage basins at different levels of complexity. HYDRO1k, developed at the U.S. Geological Survey's (USGS) EROS Data Center, is a geographic database providing comprehensive and consistent global coverage of topographically derived data sets.*
It provides a homogeneous river basins delimitation for all Mediterranean countries but the delimitation is not related to water management units and only descriptive information is provided (no name is available).

- **For non Euro- mediterranean countries:**

EMWIS:
EMWIS has already collected in former study (having other objectives than the present one) information on river basins from several of its Mediterranean Partners Countries.
Datasets collected do not concern all non Euro Mediterranean countries related to EMWIS.
Each dataset provided contains a list of the various river basins defined by the EMWIS Mediterranean partner. Each partner has given a name to its river basins. Only Algeria provided codes in addition to the name.
None of the datasets provided is a geographic file (enabling automatic calculation of the ‘Geographic bounding box’ element).

FAO - River Basin :
This geographic source of information has a good coverage for the Maghreb coast of EMWIS countries.
Names and Sub-Names are provided for all river basins.
No information is available for Jordan, Israel and Palestinian Authority and only a part of Egypt river basins is available.

UNEP Plan Bleu:
Only an outline of the dataset has been consulted in the framework of the present project. A more complete analysis of its structure including its geographical layer has to be carried out to check whether the information is suitable to EMWIS needs.

From the outline provided, we can conclude that :

- River basin information provided (Based on BRGM Jean-Margat river basins) seems to have the best coverage for the Middle-East Coast of EMWIS countries,
- Some countries are only presented as a unique River Basin (e.g : Albania, Bosnia and Herzegovina, Croatia).

OSS:

The information available collected by OSS is very specific to their own needs It spreads across Algeria, Libya and Tunisia.
This source of information was not taken into account in the rest of this study.

Summary table:

Table 3 below summarizes the information available at EMWIS non Euro Mediterranean countries level.

Based on table 3 a compilation of multiple layers has been attempted.
Main conclusions are the following:

- Combining CCM-2 and FAO River basins: CCM-2, where available, only provides name information whereas FAO River Basin layer can also provide SUB_NAME enabling then a hierarchy in the thesaurus.

  This aggregation lacks information on Jordan and only a small part of Egypt, of Israël and Palestinian Authority river basins are available,

- The former aggregation could be completed by Plan Bleu dataset but overlapping issues between layers will then appear,

- Given that River Basins are not following countries border, aggregating datasets from various work having different objectives leads to inconsistencies.

Non European Union EMWIS countries	CCM2 (Complete, Partial, / = nothing)					EMWIS (Complete, Partial, / = nothing)					FAO (Complete, Partial, / = nothing)				
	Availability	One/Multiple Basins	Code	Name	Geographical Layer	Availability	One/Multiple Basins	Code	Name	Geographical Layer	Availability	One/Multiple Basins	Code	Name	Geographical Layer
Algeria	/	/	/	/	/	C	Multiple	Ok	Ok	/	C	Multiple	/	Ok	Ok
Egypt	/	/	/	/	/	/	/	/	/	/	P	Multiple	/	Ok	Ok
Israel	P	Multiple	Ok	Ok	Ok	C	Multiple	/	Ok	/	/	/	/	/	/
Jordan	P	One	Ok	Ok	Ok	/	/	/	/	/	/	/	/	/	/
Lebanon	C	Multiple	Ok	Ok	Ok	C	Multiple	/	Ok	/	/	/	/	/	/
Morocco	/	/	/	/	/	C	Multiple	/	Ok	/	C	Multiple	/	Ok	Ok
Palestinian Authority	P	One	Ok	Ok	Ok	/	/	/	/	/	/	/	/	/	/
Syria	C	Multiple	Ok	Ok	Ok	/	/	/	/	/	/	/	/	/	/
Tunisia	/	/	/	/	/	/	/	/	/	/	C	Multiple	/	Ok	Ok
Turkey	C	Multiple	Ok	Ok	Ok	C	Multiple	/	Ok	/	/	/	/	/	/
Albania	C	Multiple	Ok	Ok	Ok	/	/	/	/	/	/	/	/	/	/
Bosnia and Herzegovina	C	Multiple	Ok	Ok	Ok	/	/	/	/	/	/	/	/	/	/
Croatia	C	Multiple	Ok	Ok	Ok	/	/	/	/	/	/	/	/	/	/
Montenegro	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Mauritania	/	/	/	/	/	/	/	/	/	/	C	Multiple	/	Ok	Ok
Libya	/	/	/	/	/	/	/	/	/	/	C	Multiple	/	Ok	Ok

Non European Union EMWIS countries	Plan Bleu data (Complete, Partial, / = nothing, ? = with doubt)				
	Availability	One/Multiple Basins	Code	Name	Geographical Layer
Algeria	P ?	Multiple	/	Ok	/
Egypt	P ?	Multiple	/	Ok	/
Israel	C	One	/	Ok	/
Jordan	/	/	/	/	/
Lebanon	C	One	/	Ok	/
Morocco	P	Multiple	/	Ok	/
Palestinian Authority	C	Multiple	/	Ok	/
Syria	C	Multiple	/	Ok	/
Tunisia	C	Multiple	/	Ok	/
Turkey	C	Multiple	/	Ok	/
Albania	C	One	/	Ok	Ok
Bosnia and Herzegovina	C	One	/	Ok	Ok
Croatia	C	One	/	Ok	Ok
Montenegro	/	/	/	/	/
Mauritania	/	/	/	/	/
Libya	P ?	Multiple	/	Ok	/

Table 3 - Analysis of possible information sources for a river basin information on EMWIS non Euro- mediterranean countries

iii. Recommendation for the 'River Basin' keyword:

As already mentioned above, the main objective is to link the metadata to water management units using the names of those units.

The analysis of the existing information sources highlighted that, for EMWIS Euro Mediterranean countries, JRC-CCM-2, ERC V2 and UNEP/GRID Drainage Basins are not made up of water-management units. Moreover a name is not always provided.
WISE River Basin Districts provides all the information needed; it is thus advised, for EMWIS Euro Mediterranean countries to reuse this information source. A geographical datasets being available, automatic calculation of the 'Geographic bounding box' element will also be possible.

This analysis also highlighted a lack of harmonized information source for EMWIS non Euro Mediterranean countries river basins. Combining information from various work sources having different goals proved to be inefficient.
A completion work will have to be carried out by EMWIS technical unit with the involvement of National Focal Points.
This work could start from the already collected information by EMWIS. It should aim to have a homogeneous definition of river basins across all EMWIS countries (Euro Mediterranean and non Euro Mediterranean).
Collecting geo-referenced layer to ease metadata management at this keyword level could also be a secondary objective.

b) 'Aquifer' keyword

i. Existing information sources:

Two possible sources of information have been identified for this keyword.
- An ongoing UNESCO work on this subject: the WHYMAP project[17],
- Groundwater reporting for WFD[18].

ii. Existing information sources analysis:

UNESCO – WHYMAP:
The Worldwide Hydrogeological Mapping and Assessment Programme (WHYMAP) provides a global identification of groundwaters at supra-regional and continental scales.
An extract from the global dataset was evaluated (see Figure 1 below).

[17] http://www.whymap.org/
[18] http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1040

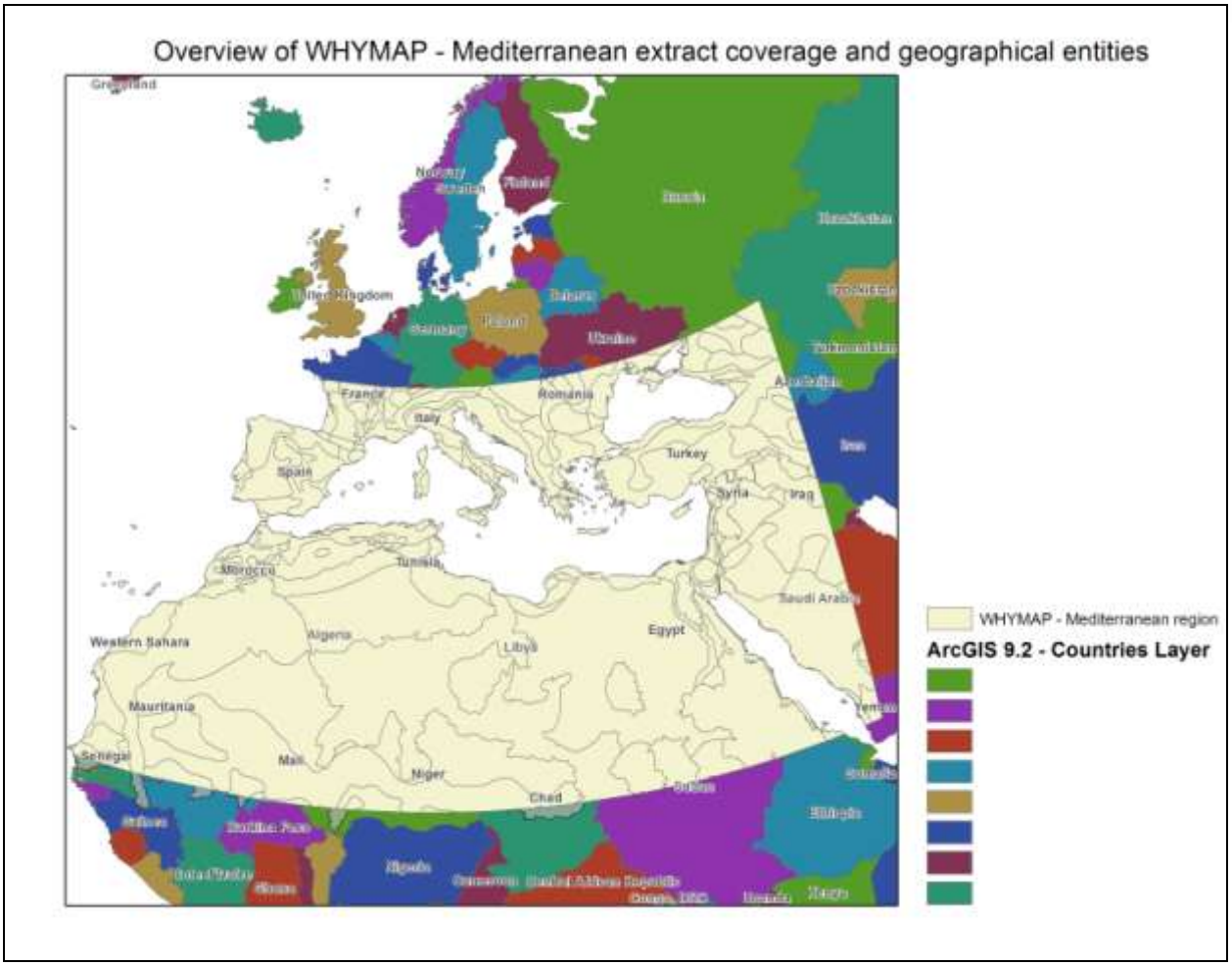

Figure 1- WHYMAP Mediterranean coverage example

The only information available (object attribute) concerns each groundwater recharge rate.
Names of (transboundary) aquifers have been identified by the different regional ISARM activities[19] while preparing inventories of transboundary aquifer systems. These data have not yet been incorporated into the WHYMAP GIS layers and it's hardly possible to link them directly to the basic WHYMAP layer, which does not show single aquifers but groundwater resources.

WFD-Groundwater:
The EEA Waterbase – Groundwater layer is made up of information collected through WISE-SoE data collection process. Thus, relevant information for European countries is available but only concerns EMWIS Euro Mediterranean countries.
For the time being, only an attribute table is available in this layer. A GIS layer will be produced in 2009.
On the basis of the information provided by each member state, codes and names are available but, for the time being, not all groundwater bodies have received a name.

[19] http://www.isarm.net

iii. Recommendation for the ‘Aquifer’ keyword:

Having no name or identifier information for each groundwater entity, UNESCO – WHYMAP datasets won’t be usable in the framework of this EMWIS task.

No name being available for every groundwater body, WFD-Groundwater layer is partly suitable to create a thesaurus on Aquifers but only for European countries.

Given that, no reference dataset that encompasses both EMWIS requirements and geographical scope is available, a completion work will have to be carried out by EMWIS technical unit with the involvement of regional focal points.

Thus it has been decided not to provide an ‘Aquifer’ keyword in the metadata catalogue tool prototype that has to be set up in the framework of the present study.

c) ‘Country & Region’ keyword

A legal reference is needed for this keyword.

It is advised to use short country names and alpha-2 code elements officially published by ISO in ISO-3166. As quoted on ISO-3166 web site: ‘*the country names used in ISO 3166-1 are all from United Nations sources. Using these country names officially notified by the countries to the UN Secretary General helps in keeping ISO 3166-1 politically neutral and thus acceptable to as many users as possible*’[20]
The corresponding list is available on the following web page: http://www.iso.org/iso/country_codes/iso_3166_code_lists.htm

This ISO list will then have to be completed by EMWIS technical unit with Region names defined at EMWIS level.

It is difficult to find or produce a geo-referenced layer providing country borders recognized globally.
Using a geo-referenced layer to produce an automatic calculation of the ‘Geographic bounding box’ element not being a main objective, we won’t take into account such information for this keyword.

3. Other metadata elements with value domains

Metadata elements defined in WISE profile (see Table 1 - Overview of the WISE metadata profile) where values could be refined in EMWIS context by specific code lists have been identified.
The main objective of this restriction is to narrow code lists content down to EMWIS requirements in order to ease metadata management.
Each sub-part name below is the ‘Element Name’ of the metadata element presented in Table 1 that could be refined (ex: a) ‘Topic Category’).

[20] http://www.iso.org/iso/country_codes/background_on_iso_3166/iso_3166_and_the_un.htm

Note that also non-mandatory elements could be refined. For example element '11.6 Reference system' implementing instructions specify which reference system properties shall be provided. The following sub-parts only concerns mandatory elements.

a) 'Topic category'

'2.1 Topic category' element is included in the 'CLASSIFICATION OF SPATIAL DATA SETS & SERVICES' category and is mandatory.
It is "*a high-level classification scheme to assist in the grouping and topic-based search of available spatial data resources*"[21].
Its content already defined by INSPIRE Metadata IRs Annex D-2[22] could be reduced in EMWIS context to a sub-selection of Annex D-2 terms:

Numerical identifier	Textual name	Language neutral name for computers
2.2	Biota	biota
2.4	Climatology / Meteorology / Atmosphere	climatologyMeteorologyAtmosphere
2.7	Environment	environment
2.12	Inland Waters	inlandWaters *(could be used as default value)*
2.14	Oceans	Oceans

Table 4 - Sub selection of INSPIRE IRsTopic Category relevant for EMWIS

b) 'Originating controlled vocabulary'

'3.2 Originating controlled vocabulary' element is included in the 'KEYWORD' category. Its use is "*mandatory if the keyword originates from a Controlled vocabulary*"[23].

Given that the 'Thematic' keyword defined in part IV.B. will come from GEMET, this metadata element should only have the following value when the 'Thematic' keyword is used:
- Title: "GEMET Thesaurus version 1.0"
- Date:
  - dateType: publication
  - date: 2009-06-30 (date of the thesaurus implementation in the metadata catalogue tool).

This rational could also possibly apply to the four other keywords used at EMWIS level provided they are based on commonly recognized list (ex : using 'ISO-3166 completed by EMWIS for region names' for the 'Country & Region' keyword).

[21] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf
[22] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf
[23] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf

c) ‘Specification’ & ‘Degree’

‘7.1 Specification’ and ‘7.2 Degree’ elements are included in the ‘CONFORMITY’ category. Both are mandatory.
They refer to the need to validate the dataset conformity against a common ‘Specification’ and precise the ‘Degree’ of conformity reached by the dataset[24].
The specification is *a citation of the implementing rules adopted under Article 7(1) of Directive 2007/2/EC or other specification to which a particular resource conforms. This citation shall include at least the title and a reference date (date of publication, date of last revision or of creation) of the implementing rules adopted under Article 7(1) of Directive 2007/2/EC or of the specification.*[25].

It has to be defined at EMWIS level whether dataset conformity will be evaluated.
If no, given that this element is mandatory, it should be automatically filled with
- ‘Specification’ = a reference to INSPIRE implementing rules.
- ‘Degree’ = 5.3. Not evaluated (notEvaluated)[26].

d) ‘Metadata standard name’ - additional WISE metadata

‘11.2 Metadata standard name’ is contained in ‘WISE METADATA’ category.
This element is additional in WISE metadata (it is not contained in INSPIRE IRs) and is mandatory.

WISE profile implementation instruction is the following: “ISO 19115 Geographic information – Metadata; WISE Metadata profile”.

It is advised to implement the standard text defined at WISE level.

e) ‘Metadata standard version’ - additional WISE metadata

‘11.3 Metadata standard version’ is also contained in ‘WISE METADATA’ category.
This element is additional in WISE metadata (it is not contained in INSPIRE IRs) and is mandatory.

WISE profile implementation instruction is the following: “ISO 19115:2003”.

It is advised to implement the standard text defined at WISE level.

[24] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf
[25] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf
[26] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf

V. CONCLUSION

EMWIS requirements as regard to metadata content have been identified and taken into account together with the following others requirements:

- the INSPIRE implementing rules on metadata
- the WISE guidance on metadata profile as defined in the latest version of WISE GIS guidance document,

From this analysis, it is proposed to consider the metadata elements of the **WISE metadata profile** to describe the water related datasets and data services in the Mediterranean context.

In order to go through semantic interoperability between the catalogues existing at Euro Mediterranean level, an analysis of domains values used in various water related metadata catalogue was done and **proposals are presented concerning the domain values of some metadata elements.**

These proposals concerns:

- The domain values of the “Keyword” metadata elements used to identify the “**topics”** and **“places”** of the datasets/data services , with
    - 2 potential metadata elements “keyword” for the “topic” (i.e. theme)
        - Water data domain keyword: using specific acronym for global classification within the water sector (more adapted than GEMET),
        - Thematic keyword: using GEMET thesaurus (as requested by Inspire specifications)
    - 3 potential metadata elements “keyword” for the “place”
        - River Basin keyword: using free text in a first stage and establishing progressively an homogeneous list of values
        - Aquifer keyword: using free text in a first stage and establishing progressively an homogeneous list of values
        - Country & Region: using the ISO3166 standard for the list of countries plus the use of some specific values for the regions

- The domain values for others metadata elements such as:
    - ‘Topic category’
    - ‘Originating controlled vocabulary’
    - ‘Specification’ & ‘Degree’
    - ‘Metadata standard name’ (additional WISE metadata)
    - ‘Metadata standard version’ (additional WISE metadata)

VI. ANNEX I - INSPIRE DIRECTIVE ANNEXES

ANNEX I

SPATIAL DATA THEMES REFERRED TO IN ARTICLES 6(A), 8(1) AND 9(A)

1. Coordinate reference systems

   Systems for uniquely referencing spatial information in space as a set of coordinates (x, y, z) and/or latitude and longitude and height, based on a geodetic horizontal and vertical datum.

2. Geographical grid systems

   Harmonised multi-resolution grid with a common point of origin and standardised location and size of grid cells.

3. Geographical names

   Names of areas, regions, localities, cities, suburbs, towns or settlements, or any geographical or topographical feature of public or historical interest.

4. Administrative units

   Units of administration, dividing areas where Member States have and/or exercise jurisdictional rights, for local, regional and national governance, separated by administrative boundaries.

5. Addresses

   Location of properties based on address identifiers, usually by road name, house number, postal code.

6. Cadastral parcels

   Areas defined by cadastral registers or equivalent.

7. Transport networks

   Road, rail, air and water transport networks and related infrastructure. Includes links between different networks. Also includes the trans-European transport network as defined in Decision No 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community Guidelines for the development of the trans-European transport network (1) and future revisions of that Decision.

8. Hydrography

   Hydrographic elements, including marine areas and all other water bodies and items related to them, including river basins and sub-basins. Where appropriate, according to the definitions set out in Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (2) and in the form of networks.

9. Protected sites

   Area designated or managed within a framework of international, Community and Member States' legislation to achieve specific conservation objectives.

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(1) OJ L 228, 9.9.1996, p. 1. Decision as last amended by Council Regulation (EC) No 1791/2006 (OJ L 363, 20.12.2006, p. 1).
(2) OJ L 327, 22.12.2000, p. 1. Directive as amended by Decision No 2455/2001/EC (OJ L 331, 15.12.2001, p. 1).

ANNEX II

SPATIAL DATA THEMES REFERRED TO IN ARTICLES 6(A), 8(1) AND 9(B)

1. Elevation

   Digital elevation models for land, ice and ocean surface. Includes terrestrial elevation, bathymetry and shoreline.

2. Land cover

   Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies.

3. Orthoimagery

   Geo-referenced image data of the Earth's surface, from either satellite or airborne sensors.

4. Geology

   Geology characterised according to composition and structure. Includes bedrock, aquifers and geomorphology.

ANNEX III

SPATIAL DATA THEMES REFERRED TO IN ARTICLES 6(B) AND 9(B)

1. Statistical units

   Units for dissemination or use of statistical information.

2. Buildings

   Geographical location of buildings.

3. Soil

   Soils and subsoil characterised according to depth, texture, structure and content of particles and organic material, stoniness, erosion, where appropriate mean slope and anticipated water storage capacity.

4. Land use

   Territory characterised according to its current and future planned functional dimension or socio-economic purpose (e.g. residential, industrial, commercial, agricultural, forestry, recreational).

5. Human health and safety

   Geographical distribution of dominance of pathologies (allergies, cancers, respiratory diseases, etc.), information indicating the effect on health (biomarkers, decline of fertility, epidemics) or well-being of humans (fatigue, stress, etc.) linked directly (air pollution, chemicals, depletion of the ozone layer, noise, etc.) or indirectly (food, genetically modified organisms, etc.) to the quality of the environment.

6. Utility and governmental services

   Includes utility facilities such as sewage, waste management, energy supply and water supply, administrative and social governmental services such as public administrations, civil protection sites, schools and hospitals.

7. Environmental monitoring facilities

   Location and operation of environmental monitoring facilities includes observation and measurement of emissions, of the state of environmental media and of other ecosystem parameters (biodiversity, ecological conditions of vegetation, etc.) by or on behalf of public authorities.

8. Production and industrial facilities

   Industrial production sites, including installations covered by Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control [1] and water abstraction facilities, mining, storage sites.

9. Agricultural and aquaculture facilities

   Farming equipment and production facilities (including irrigation systems, greenhouses and stables).

10. Population distribution — demography

    Geographical distribution of people, including population characteristics and activity levels, aggregated by grid, region, administrative unit or other analytical unit.

11. Area management/restriction/regulation zones and reporting units

    Areas managed, regulated or used for reporting at international, European, national, regional and local levels. Includes dumping sites, restricted areas around drinking water sources, nitrate-vulnerable zones, regulated fairways at sea or large inland waters, areas for the dumping of waste, noise restriction zones, prospecting and mining permit areas, river basin districts, relevant reporting units and coastal zone management areas.

[1] OJ L 257, 10.10.1996, p. 26. Directive as last amended by Regulation (EC) No 166/2006 of the European Parliament and of the Council (OJ L 33, 4.2.2006, p. 1).

12. Natural risk zones

Vulnerable areas characterised according to natural hazards (all atmospheric, hydrologic, seismic, volcanic and wildfire phenomena that, because of their location, severity, and frequency, have the potential to seriously affect society), e.g. floods, landslides and subsidence, avalanches, forest fires, earthquakes, volcanic eruptions.

13. Atmospheric conditions

Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations.

14. Meteorological geographical features

Weather conditions and their measurements; precipitation, temperature, evapotranspiration, wind speed and direction.

15. Oceanographic geographical features

Physical conditions of oceans (currents, salinity, wave heights, etc.).

16. Sea regions

Physical conditions of seas and saline water bodies divided into regions and sub-regions with common characteristics.

17. Bio-geographical regions

Areas of relatively homogeneous ecological conditions with common characteristics.

18. Habitats and biotopes

Geographical areas characterised by specific ecological conditions, processes, structure, and (life support) functions that physically support the organisms that live there. Includes terrestrial and aquatic areas distinguished by geographical, abiotic and biotic features, whether entirely natural or semi-natural.

19. Species distribution

Geographical distribution of occurrence of animal and plant species aggregated by grid, region, administrative unit or other analytical unit.

20. Energy resources

Energy resources including hydrocarbons, hydropower, bio-energy, solar, wind, etc., where relevant including depth/height information on the extent of the resource.

21. Mineral resources

Mineral resources including metal ores, industrial minerals, etc., where relevant including depth/height information on the extent of the resource.

VII. ANNEX II - EXTRACT FROM THE VOTED INSPIRE IMPLEMENTING RULES ON METADATA

Table 1: Metadata for spatial data sets and spatial data set series

Reference	Metadata elements	Multiplicity	Condition
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	
1.4	Resource locator	0..*	Mandatory if a URL is available to obtain more information on the resource, and/or access related services.
1.5	Unique resource identifier	1..*	
1.7	Resource language	0..*	Mandatory if the resource includes textual information.
2.1	Topic category	1..*	
3	Keyword	1..*	
4.1	Geographic bounding box	1..*	
5	Temporal reference	1..*	
6.1	Lineage	1	
6.2	Spatial resolution	0..*	Mandatory for data sets and data set series if an equivalent scale or a resolution distance can be specified.
7	Conformity	1..*	
8.1	Conditions for access and use	1..*	
8.2	Limitations on public access	1..*	
9	Responsible organisation	1..*	
10.1	Metadata point of contact	1..*	
10.2	Metadata date	1	
10.3	Metadata language	1	

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Table 2: Metadata for spatial data services

Reference	Metadata element	Multiplicity	Condition
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	
1.4	Resource locator	0..*	Mandatory if linkage to the service is available.
1.6	Coupled resource	0..*	Mandatory if linkage to data sets on which the service operates are available.
2.2	Spatial data service type	1	
3	Keyword	1..*	
4.1	Geographic bounding box	0…*	Mandatory for services with an explicit geographic extent.
5	Temporal reference	1..*	
6.2	Spatial resolution	0..*	Mandatory when there is a restriction on the spatial resolution for this service.
7	Conformity	1..*	
8.1	Conditions for access and use	1..*	
8.2	Limitations on public access	1..*	
9	Responsible organisation	1..*	
10.1	Metadata point of contact	1..*	
10.2	Metadata date	1	
10.3	Metadata language	1	

VIII. ANNEX III – CATEGORIES DEFINED AT ESA-KOPERNICUS LEVEL

Category code	Sub-category code	Value
1		Disasters
	1	Pollution Events
	2	Coastal Hazards, Tsunami
	3	Sea and Lake Ice
	4	Tropical Cyclones
	5	Extreme Weather
	6	Floods
	7	Landslides, Subsidence
	8	Volcanoes, Volcanic Ash and Aerosols
	9	Earthquakes
	10	Wildland Fires
2		Health
	1	Infectious diseases
	2	Cancers
	3	Respiratory Problems
	4	Environmental Stress
	5	Nutrition
	6	Accidental Death and Injury
	7	Birth Defects
3		Energy
	1	Oil and Gas Exploration
	2	Refining and Transport Operations
	3	Renewable Energy Operations
	4	Electricity Generation
	5	Global Energy Management
4		Climate
	1	Understanding
	2	Assessing
	3	Predicting
	4	Adapting to
	5	Mitigating
5		Water
	1	Water Cycle Research
	2	Resource Management
	3	Impacts of Humans on Water Cycle
	4	Global Biogeochemistry
	5	Ecosystem and Water Quality Assessment
	6	Land Use Planning
	7	Production of Food
	8	Weather Prediction
	9	Heavy Rainfall and Flood Prediction
	10	Drought Prediction
	11	Climate Prediction
	12	Human Health
	13	Fisheries and Habitat
	14	Management

	15	Telecommunication/Navigation
6		Weather
	1	Nowcasting (0-2 hours)
	2	Very and Short-range Forecasts (2-72 hours)
	3	Medium-range Forecasts (3-10 days)
	4	Extended Forecasts (10-30 days)
7		Ecosystems
	1	Land, River, Coast and Ocean Management
	2	Agriculture, Fisheries, Forestry
	3	Carbon Cycle
8		Agriculture
	1	Food Security
	2	Fisheries
	3	Timber, Fuel and Fiber
	4	Agricultural Economy and Tradex
	5	Grazing Systems
9		Biodiversity
	1	Conservation
	2	Invasive Species
	3	Migratory Species
	4	Natural Resources and Services