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THE PROTECTION AND USE OF TRANSBOUNDARY  
WATERCOURSES AND INTERNATIONAL LAKES

Working Group on Monitoring and Assessment

Ninth meeting  
Geneva, 17–18 June 2008

**UNECE METADATA DATABASE ON THE TRANSBOUNDARY WATERS  
IN THE COUNTRIES OF EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA**

Prepared by the International Water Office of France

## Introduction

1. Easy access to information on the status and evolution of water resources and uses is one of the keys to a successful water policy. Water resource managers need to be able to get hold of reliable, up-to-date and relevant information on issues such as regulations, planning, risk management and informing the public.

2. Thus, the sound governance of water issues is ensured by the organisation of effective information systems that meet the expectations of the information users.

3. The necessary information only exists, either at international or national level, in a fragmented, incomplete dispersed and heterogeneous way: the recent assessments done at the level of transboundary basins under the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) were particularly dealing with this problem of data identification and data access.

4. Therefore it is necessary to make an effort to rationalize and make this information readable, easily accessible and available.

5. Considering this context, the principle of a metadata database for the water sector in the UNECE region (see Picture 1) was initially envisaged during the fourth meeting of the Parties to the Water Convention (Bonn, 20-22 November 2006).



Figure 1: Map of the UNECE region

6. Further to this, the eighth meeting of the Working Group on Monitoring and Assessment (Helsinki, 25-27 June 2007) considered the presentation on the subject delivered by the International Water Office (France), and requested it to prepare for the Group's next meeting a concept note on the development of the Metadata database on the transboundary waters in countries of Eastern Europe, Caucasus and Central Asia (EECCA). The present document was prepared following this request. The document is aimed to facilitate the discussion on the relevant agenda item. Countries interested to participate in the pilot project on the implementation of metadata database are encouraged to inform the secretariat about their interest prior to the meeting.

7. This preliminary conceptual document presents some of the principles that could be considered for the implementation of a UNECE Metadata database of the Water Sector in the EECCA Countries, named UMEWAS<sup>1</sup> in this document. It includes:

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<sup>1</sup> UMEWAS: acronym is not validated and to be confirmed in due course.

- (a) A presentation of the main UMEWAS concepts (definition, objective description, target groups);
- (b) A concrete proposal for the implementation and development of UMEWAS through 2 successive projects, including a presentation of the objectives and components of each one, as well as some overall recommendations and a scenario of planning for their implementation.

## **I. PRESENTATION OF THE UNECE METADATA DATABASE OF THE WATER SECTOR IN THE EECCA COUNTRIES**

### **A. Objectives of the UMEWAS**

8. UMEWAS is **a tool for cooperation between the EECCA countries of the UNECE region** promoting a collaborative approach of water-related data management.
9. Implemented in coherence with European Union tools and policy (WISE<sup>2</sup>, Water Framework Directive, INSPIRE Directive<sup>3</sup>, etc.), this tool could particularly aim to:
  - (a) Facilitate the **identification and access to the data and information** necessary for the integrated water management programmes of the region (data on objects/bodies of water management, status of water, pressure on uses, etc.), and, in particular, for the programmes related to transboundary water bodies;
  - (b) Promote the **distributed production of comparable metadata** by the various data producers whatever their level of intervention (local, national, basin, international level) allowing each organization to inform on its activities related to water data and information production and administration;
  - (c) Develop **network services to promote the handling and the sharing of metadata and information necessary to integrated water resources management**;
  - (d) Support **the assessments done under the UNECE Water Convention and for the World Water Assessment Programme (WWAP)**;
  - (e) Contribute to a **coherent development of the national water information system** in each partner country.
10. Its setting up implies an **active participation of each country and the sharing of water-related metadata by the partners** involved in the system.

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<sup>2</sup> Water Information System for Europe.

<sup>3</sup> Infrastructure for Spatial Information in the European Community.

## B. Some definitions

11. Hereafter are some definitions<sup>4</sup>:

<b>Terminology</b>	<b>Definition</b>
Data	The physical representation of information in a manner suitable for communication, interpretation, or processing by human beings or by automatic means
Data administrator	A person responsible for managing the metadata about data elements
Data dictionary	A description of a set of data elements usually associated with a single data set
Data file	An organised collection of related records of data
Data set	Any organised collection of data
Database	A data file or set of data with relationships expressed among data. Data stored in the database are independent of any particular application
Documentation	Descriptive text used to define or describe an object, design, specification, instructions, or procedure
Information	Knowledge concerning any object such as facts, events, things, processes or ideas including concepts that within a certain context has a particular meaning (ISO/IEC 2382-1 ;1992)
Information system	A system which supports decision-making concerning some piece of reality, the object system by giving the decision makers access to information concerning relevant aspects of the object system and its environment.
Metadata	Data and other documentation that describes objects in a formalised way
Statistical data	Data that are collected and/or generated by statistics in process of statistical observations or statistical data processing.
Statistical metadata	Metadata describing statistical data
Thesaurus	A controlled set of terms covering a specific domain of knowledge formally organised so that the a priori relationships between concepts are made explicit

## C. UMEWAS description

12. From a technical point of view, the definition of UMEWAS could be presented as follows:

UMEWAS is an information system based on a shared metadata database facilitating the identification and access to data and information necessary for integrated water resources management in the EECCA countries. This definition includes 6 significant concepts that are described below.

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<sup>4</sup> Terminology on Statistical metadata, UNECE, 2000.

## 1. An information system

13. The definition above could be completed by the statement that an information system includes not only the technical resources (software, hardware) but also all the human resources necessary for the capture, management and enhancement of data into information.

## 2. A metadata database

14. A metadata database is different from a simple database in the sense that it firstly gives access to metadata and then possibly to the data itself, if made available by the data producers and following the access right given by the data administrator to the various groups of users. A shared metadata database means that:

- (a) Metadata are provided and updated directly by the countries themselves or by international information sources that participate in the system;
- (b) The populating of metadata is decentralized and the data itself remains, as far as possible, at the level of the data producer and are not centralized in a central data base;
- (c) The medium-term objective is to get a decentralised database system including a regional node, national nodes and possibly local nodes.

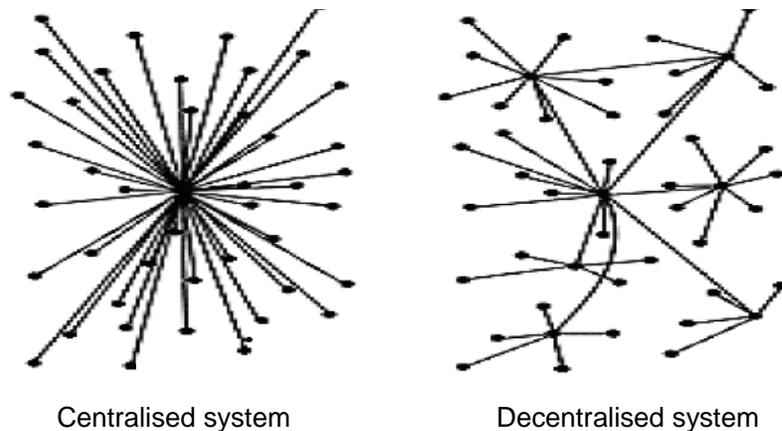


Figure 2: Examples of Database Systems

15. As a result, each country contributes to feed the regional meta database and has the possibility of developing its own metadata database and its own network of meta databases within its own national water information system. The definition of sharing rules and procedures to ensure comparability of the metadata produced and interoperability of meta databases is necessary. This implies, in particular, to specify:

- (a) Harmonised metadata profiles;

- (b) Common keywords for geographic and thematic classification;
- (c) Rules for interoperability of services;
- (d) Sharing rules;
- (e) Other...

### 3. Focus on EECCA countries

16. Two other projects of a regional metadata database related to water were identified in the UNECE region:

- (a) A first one is being studied at EU level by the European Environmental Agency (EEA), within the Water Information System for Europe/Shared Environmental Information System (WISE/SEIS) project implementation;
- (b) Another one is presently being tested at the level of the Mediterranean countries in the Euro Mediterranean Water Information System (EMWIS) activities under the Mediterranean Water Information Project (MEDWIP).

17. So, a close collaboration has to be established with these projects in order to avoid duplication of activities and to ensure interoperability and complementarities of the systems.

18. A first contact was made with EEA by EMWIS Technical Unit, and one of the potential scenarios envisaged could be to organise complementarities of the WISE system: (a) with countries of the Southern Europe through the MEDWIP metadata catalogue and (b) with EECCA countries through the UMEWAS metadata database.

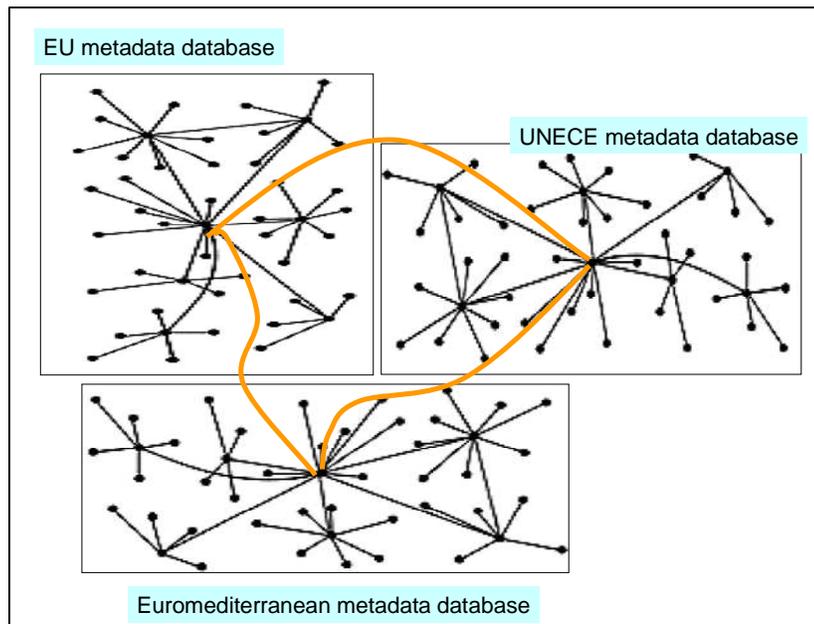


Figure 3: Examples of Metadata Databases.

19. In order not to duplicate activities, the geographical extension of this UMEWAS metadata database could be limited to the EECCA countries of the UNECE region, and should be developed in close relation with the EEA and EMWIS.

20. The twelve concerned countries would then be the following: Armenia, Azerbaijan, Belarus, Georgia, Kyrgyzstan, Kazakhstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.



Figure 4: Map of the EECCA sub region

#### 4. Facilitating the identification and access to data and information

21. The first objective of this tool is to propose services for easy identification of the existing information and, according to the access right given by the data producers, for an easy access to the data and information themselves.

22. This implies, among other issues, **to ensure the production of comparable/interoperable metadata**, and then to develop a user-friendly interface including search tools using keywords (definitions); thesaurus and geographic interface adapted to the needs:

- (a) Classification by river basins;
- (b) Thematic key words covering all the aspects of integrated water resource management;
- (c) Classification of the data sources on a regional, national, local scale;
- (d) Other...

23. Once this first objective is achieved, complementary services related to data handling and processing could be envisaged at a later stage.

## **5. Information related to transboundary water resource management**

24. The first priority of the metadata database will be to manage metadata of the data used for assessing the status of transboundary waters in the UNECE region, with, in particular, the hydrological data and the pressure factors (e.g. crops and animal production, mining and quarrying, manufacturing, hydropower generation, sewerage and waste management, transportation and storage, tourist activities).

25. The second priority could be to manage the metadata of the data used for the WWAP (to be specified at a latter stage)

26. However each country will also have the possibility of including all the other national or local water data.

## **6. Target groups**

27. UMEWAS mainly addresses national authorities, international organisations, non-governmental organisations (NGOs). However, inconformity with the EU INSPIRE directive, the access to information made available through the system could be open to anyone who is interested in water management issues" (association, media, and the public in general).

# **II. PROPOSAL FOR THE IMPLEMENTATION OF UMEWAS**

## **A. An implementation programme through two main projects**

28. The setting up of UMEWAS can only be achieved by way of a simple, pragmatic, progressive and feasible strengthening programme. This programme must emphasize, from the start, the advantage of the system and allow for progressive integration of the partners. Moreover, this programme must be of real interest for the identified target group, and the economic sustainability of the project must be ensured. Thus, it is suggested to structure the UMEWAS implementation in two projects described below.

### **1. Proposal for a first short term project**

29. The first two-year project (2008-2009) could have the two following main objectives: (a) generate the metadata database concerning some pilot transboundary basins (to be selected in voluntary countries), and; (b) support the development of national metadata databases within the voluntary countries.

30. After a preliminary phase aiming to define the global organisation of the project, the following should take place:(a) identification of the countries voluntary to participate in the

UMEWAS first phase implementation; (b) identification of the pilot transboundary basins in voluntary countries (e.g. Dniester, Kura), and; (c) definition of the working groups members.

31. The project could include three main components:
- (a) Developing tools and procedures to allow for the production of comparable metadata (e.g. defining rules for metadata production, developing the regional infrastructure, drafting technical guidelines);
  - (b) Organising the metadata production and its enhancement on the pilot basin area, per topic and/or per type of information. As an example, the four following data topics could be dealt with successively: water resource identification, water management context description; administrative and environmental data; hydrological data and water quality data; and pressure factors and impacts. This component could also conclude with actions for promoting the main results (e.g. leaflet publication) and could include reporting actions;
  - (c) Supporting the voluntary countries to develop their national water information system. According to the needs of each voluntary country this could include: organisational support such as diagnostic/ analysis of the existing situation and supporting the organisation of a National Water Information System; as well as technical support for the implementation of a national metadata database.

## **2. Proposal for a medium-term project**

32. Upon successful completion of the first project, the main objectives of the second project could be as follows: (a) extension of the metadata database to the other basins of the EECCA region of UNECE, and (b) development of the conditions for interoperability of data and services at regional level, and at national level with voluntary countries, in order to facilitate the production of common indicators on water status and pressure analysis.

33. For that, this second project could focus, among other things, on:
- (a) The establishment of favourable conditions to develop interoperability of data and services;
  - (b) The development, at national level, of data interoperability between the information systems of the national institutions;
  - (c) The effective implementation and enhancing of data interoperability with the production of common indicators and common services facilitating integrated water resource management for transboundary resources in particular.

### **3. Some recommendations for organising these projects**

#### **3.1 Voluntary countries**

34. Project should firstly be developed with voluntary countries. UMEWAS shall be built upon metadata, tools and procedures established and/or operated by voluntary countries with a win/win approach.

35. In a first step, voluntary countries should be involved in the definition, and validate the rules aiming to produce comparable metadata. Thereafter, they should take the necessary measures to ensure that metadata are produced and completed with a quality sufficient to fulfil the purpose of the metadata database. Then, they could adopt national rules for sharing the metadata between their public authorities and with other users (subnational or local).

36. In return, a voluntary country could benefit from a specific support and technical assistance in order to develop its metadata as well as its own metadata databases and its own water related information system (including national data services for the sharing of water related data between its public authorities).

#### **3.2 Working groups**

37. The establishment of three working groups with at least one representative of each voluntary country in each group is recommended for this project. Each respective group will be responsible for: (a) coordination of UMEWAS activities; (b) content, and (c) issues related to information technology. Each country will be requested to designate a representative in each working group.

#### **3.3 Rules for interoperability**

38. The development of network services will imply to implement rules laying down technical arrangements for the interoperability of data, metadata and services, and, whenever possible, for the harmonization of water-related data set and services.

#### **3.4 Collaborative tools**

39. ECOWAS implementation will also imply the development of at least two main types of collaborative tools:

- (a) A metadata database management tool allowing for: the organisation of various groups of users; the capture of the metadata by the national institutions themselves, organised within the groups of users; an easy interface facilitating the research identification of the existing data; the downloading of the datasets made available, according to the access right given by the data producer; the management of access right of each group of user; and the integration of the various national metadata database within a regional metadata database;

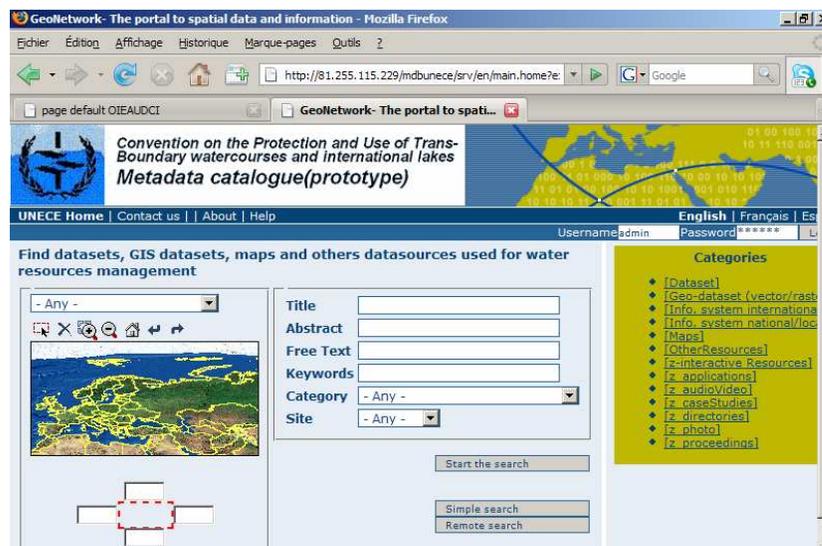
- (b) A web portal integrating the functionalities of the metadata database management tools and allowing each project partner to complete the information available on the various topics.

40. These tools should be firstly implemented and managed at regional level and then could be adapted to use at national level. In each case, a specific operator should be identified as responsible for managing the system.

### 3.5 Prototype for demonstration

41. Within the preparation of this project proposal, prototypes for demonstration of these two main tools were developed and made accessible on-line (see Figure 5).

Prototype of the web-page on metadata database:  
<http://81.255.115.229/mdbunece/srv/en/main.home>



Prototype of the web portal:

<http://www.aquacoope.org/UNECE>

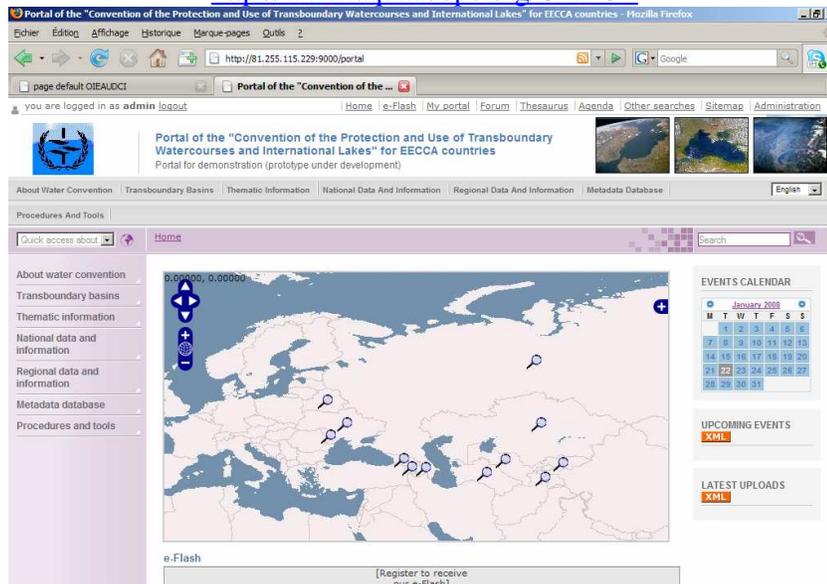


Figure 5: Prototype for demonstration.

### 3.6 Monitoring and reporting

42. Indicators for monitoring the efficiency of the system should be established and regular reporting of the obtained results should be organised

### 4. Issues of concern

43. The following issues should be considered:

- (a) The willingness of the countries to participate in such project should be formalized;
- (b) The funding mechanism should cover the project costs in a long term;
- (c) The project sustainability must be validated (whether it could sustain without permanent external funding), specifying: the commitment from EECCA countries, and the availability of human, financial and technical capacities to manage the project;
- (d) Technical coordination at regional level should be done in cooperation with other regional activities (e.g. currying out by EEA, EMWIS, WWAP);
- (e) Agreements must be obtained on common activities, particularly on:
  - (i) the principles of metadata sharing at national level and regional level;
  - (ii) the willing to develop national water information system;

- (iii) the priority topics;
  - (iv) defining a multilingual terminology;
  - (v) the harmonization of indicators/comparability;
  - (vi) quality insurance scheme;
  - (vii) defining criteria for “public” information, security and confidentiality.
- (f) Long term commitment must be reached to improve accessibility to data. This includes digitalizing metadata and data using common language, and accessibility of data through the Internet using agreed formats.

**B. Proposed overall planning for the implementation of the two projects**

44. A proposed workplan that could be envisaged for the implementation of the main components of the two projects can be found in the table below.



**DEVELOPMENT OF THE UNECE METADA DATA BASE FOR THE WATER SECTOR IN EECCA**

Task name	Year 1												Year 2												Year 3	Year 4
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
1.3.4. Topic 4 : Example : Pressure factors and impact																										
1.3.5. Promotion of results and reporting																										
1.4. Supporting the voluntary countries in developing their national information systems following needs (3 to 5)																										
1.4.1. Organisational support																										
1.4.1.1. Diagnostic / analysis of existing situation																										
1.4.1.2. Supporting the organisation of National Water Information System																										
1.4.2. Technical support for the implementation of a national metadata database																										
1.4.3. Promotion of results and reporting																										
<b>Project II</b>																										
2.1. Preliminary actions																										
2.2. Organising conditions for interoperability of data and services																										
2.3. Implementing and enhancing result of data interoperability																										
2.4. Supporting national level: development of interoperability between national institutions IS.																										

### C. Cost estimate for the first project<sup>5</sup>

45. The budget proposal includes three main components:
- (a) **The "International Level" component** should cover the setting-up and operating costs of the coordination structures at international level (project management and coordination, design programming, hosting and maintaining the regional tools (human resources and technical means));
  - (b) **The "National level" component** should cover some investments and operating costs (estimated average value) that could be directly incurred by the setting up of UMEWAS in the voluntary countries (excluding premises and wages); It could support the feeding of the metadata databases, the organisation of national seminars, etc., promotion of UMEWAS in the countries;
  - (c) **The "Technical Assistance/Training/Evaluation" component** could cover general expenses regarding technical assistance or specific activities (interoperability rules definition, development and customisation of tools, diagnostic and technical assistance to the countries, etc.) and the organisation of training sessions with representatives of all the involved countries to ensure content homogeneity of the metadata as well as interoperability of tools.
46. Possible sources of financial support could include the Global Environment Facility (GEF), French Funds for Global Environment (Fonds Français pour l'Environnement Mondial) and appropriate funds of the European Union (e.g. EuropeAid Co-operation Office, other funds to support neighboring with EU countries).

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<sup>5</sup> To be completed at a later stage in accordance with the identified project.