



## KINDRA DELIVERABLE D1.6

### EUROPEAN INVENTORY OF GROUNDWATER RESEARCH: EIGR

#### *Summary:*

This document presents the final KINDRA project EIGR OPEN Version. It details changes implemented to the EIGR until the end of the project, which include the functionalities in order to offer a proper tool for the consultation concerning the Gaps and Trends Analysis as well as the final version which includes all the relevant fields to complete for a resource to be uploaded according to the HRC-SYS standards. The template detailing the fields and tags to be filled for uploading a new record on the EIGR is also described. Examples used for the workshop with EFG National Experts is included as annex 1. A summary of the backlog produced during the project (Annex 2) and the updated version of User Manual v1.2 of EIGR (Annex 4) are included. Annex 3 includes the checklist for inserting different typologies of records.

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## TABLE OF CONTENTS

1. Executive summary	4
2. List of acronyms & abbreviations	4
3. EIGR Progress	4
4. Workshop results and requests	6
5. EIGR population phase	11
6. Final improvements of the EIGR	13
7. EIGR Template	17
ANNEX 1: EIGR WORKSHOP EXAMPLES	22
ANNEX 2: BACKLOG	31
ANNEX 3: Checklists for uploading publications, projects, reports, data-bases/maps to the EIGR	33
ANNEX 4: EIGR USER MANUAL v1.2	37

## **1. Executive summary**

This document provides a general presentation of the project European Inventory on Groundwater research “EIGR” describing the process followed leading from the initial version to the present one with the changes in functionalities implemented. The deliverable is the EIGR Online Data Catalogue itself. The changes arise from the Workshop celebrated in Seville on February 5<sup>th</sup> 2016 as well as the further improvements realized until the end of the project, which have been as necessary in order to deliver a functional tool, according to the need for assessment of the resources uploaded in order to carry out the Gaps and Trends Analysis regarding research in groundwater across Europe. The final version C of this deliverable features updated information on the EIGR population phase and the checklists (Annex 3) supplied in July 2016 to the National Experts. At the end of the project, the backlog (Annex 2) the final User Manual of EIGR (v1.2, Annex 4) have been produced, updating the previous versions of the manual (v1.0 and v1.1) for facilitating searches and insertions of records in the inventory.

## **2. List of acronyms & abbreviations**

HRC-SYS: Harmonised Terminology and Methodology for classification and reporting hydrogeology related research in Europe

EIGR: European Inventory of Groundwater Research and Innovation

EFG: European Federation of Geologists

## **3. EIGR Progress**

The KINDRA EIGR is a result of Task 1.4 “EIGR Programming” carried out under WP1 – Methodology framework development. The objective of this task is to provide the work package with a tool that will allow to inventory information sources regarding Hydrogeological Research Knowledge and Information according to the principles defined by D1.2 HRC-SYS: Harmonised Terminology and Methodology for classification and reporting hydrogeology related research in Europe, for which the project Online Data Catalogue will represent the core pillar.

At the end of September 2015, the EIGR DEMO VERSION “Alpha” was finalized (D1.5). This version consisted in establishing a functional Database based on Geonetwork in order to inventory resources related to Hydrogeological Research throughout Europe.

The next steps carried out consisted in testing the structure set up. Each partner was asked to provide 3 examples as tests in order to assess if the necessary information to be included was accounted for in the layout and template chosen for classifying and registering resources into the EIGR. The examples were to represent different types of resources as according to the HRC-SYS research and knowledge classes 1-4 (as illustrated in D1.3): articles in peer reviewed journals, conference proceedings, books, monographs, reports from research projects, national technical journals, etc.

At the beginning of October 2015 13 examples were provided KINDRA partners, 3 by GEUS, 3 by Universidad de la Sapienza, 3 by EFG, 3 by University of Miskolc and 1 by REDIAM. In October REDIAM proceeded to include the examples into the EIGR and then feedback from partners was requested in order to assess the results. From the proposed fields and tags for the final metadata template, the final list of adopted fields and tags was selected according to the structure presented. Not all tags are mandatory, and some may be left in blank in case the information is not available.

The template was then tested on three of the examples which were provided by the KINDRA project partners. These examples have been used practical exercises for the Workshop with the EFG National Experts (ANNEX 1). The information requested by the template was completed in **green**. Any information which wasn't available was withdrawn from the template examples, so as to indicate that the relevant tags in the EIGR were not to be filled out, just the text in **green**. Any information which was included or indicated in **red** was to indicate none was available for a determined section of the template, it was either supplementary (as is the case for the Topic Categories in the example templates) or indicated by default in the EIGR.

During the Workshop celebrated in Seville on February 5<sup>th</sup> 2016, the EIGR was presented to 19 of the National Experts identified by the European Federation of Geologists. The session was developed to provide them with a specific training session on how to operate the EIGR so that they can proceed to populate the EIGR with related and relevant contents and resources and according to the final metadata template drafted (see D2.1).

After Sevilla Meeting (February 2016), the structure and the content of the EIGR tool have been reviewed, implemented and optimized to adapt the general standard Geonetwork 2.10.4 to the KINDRA requirements.

Suggestions made by the National Experts and by the partners have been considered in realizing this current final version of the Inventory. All required steps for searching and for populating the EIGR were detailed and described in the User Manual v1.0, now updated in v1.2 (Annex 4).

#### **4. Workshop results and requests.**

The EIGR DEMO VERSION Online Data Catalogue was presented through a tutored session in which each one of the attendees had access to a computer and an internet connection in order to access the EIGR by means of a username and password which was provided to them on the day of the workshop. After having a virtual tour of the EIGR, the EFG National Experts had the opportunity to personally test EIGR by including the three examples which were selected for the workshop based on the previous work carried out the KINDRA project partners.

The exercise was not only focused on getting the EFG National Experts to be familiar with the EIGR, it's interface and the concepts it presents, but also for identifying any possible issues or errors in functioning that might arise for users when working with the Online Data Catalogue.

The following items were detected as necessary improvements and modifications in order to make the EIGR more practical for the population phase with resources in which the EFG National Experts are taking part. These modifications will also help improve future user interface experiences when operating the EIGR:

- 1) The access to the EIGR Online Data Catalogue Metadata Template needs to be clearer when distinguishing each tags and sections. Accessing via the <http://kindra.kindraproject.eu:8080/geonetwork/srv/eng/search> URL provides all the indicated tags according to the EIGR metadata template but the style sheet seems to limit visualization of different tags and items. This has been solved by providing the users direct access to metadata creation and edition via the <http://kindra.kindraproject.eu/geonetwork/srv/eng/main.home> . From here users will find a new interface which has every section of the metadata template clearly identified. Additionally a user's manual has been drafted according to the new interface which users will access for the creation and edition of their metadata records in the EIGR.
- 2) The definition of the THESAURUS for KINDRA from the list of keywords identified by the HRC-SYS (listed in D1.2) needs to be edited. The list includes a series of terms which are duplicated for classification purposes. Although this has a rather relevant significance when following the HRC-SYS criteria, it results

impractical when needing to associate terms by the identification of keywords by means of the EIGR. The THESAURUS needs to be modified, eliminating any duplicate entries. Some examples of modifications which have been included into the KINDRA Thesaurus are the addition of the terms Africa, Spring, Oceania and elimination of terms which might lead to confusion such as references to modelling and modelling. These changes have been carried out and users now account for a very detailed step by step explanation on retrieving the keywords from the KINDRA THESAURUS and including them into their metadata records.

- 3) The question concerning the inclusion of new keywords was raised. The users were explained that it is possible, although the keywords will not be associated to the THESAURUS, but rather later subject to assessment by the KINDRA project partners after the population phase has been completed by the EFG National Experts. This has also been implemented and detailed on a step by step process which is in the user manual which has been drafted. The keywords are not included in the THESAURUS but attached to the metadata record. The KINDRA Project partner will submit to review all of the “new keywords” that might have been included in the EIGR.
- 4) Make sure that only one metadata template is accessible when trying to create or edit a metadata in the EIGR, eliminating any previous standard templates that may exist in the system by default. This will reduce any possible errors when trying to create or edit metadata on behalf of the users. The EIGR now only has one default template which each user can access when creating a new metadata record.
- 5) The Map functionality needs to be corrected as the one available at present is causing certain interface errors or doesn't allow users to easily mark or locate an area by means of the map as originally intended. The map functionality now works correctly.

The above items are changes which have been implemented in the EIGR. Other items requested, but which have been included in a limited fashion depending on the possibility of modifying the ISO Metadata Template without compromising it for not complying its standards are as follows:

- 6) Under Resource Constraints, the Topic Categories of the KINDRA classification must be selected. Making simply three tags appear for the overarching categories as defined by the HRC-SYS as drop down menus, limiting the actions of the users to simply selecting 1 of the 5 options that exist in each overarching category. Three drop down menus have been included for this feature, but they comprise the complete

15 Topic Categories. The manual which has been drafted clearly indicates users to have caution at this point and to correctly assign and select in each case one of each Topic Category, Operational Action, Research Topic, and Social Challenges.

- 7) Under Data Quality Information (Lineage, Statement), the Knowledge Classes and the TRL level identified by KINDRA must be selected. Achieve for the lineage tag to appear as a drop down menu with the four existing options, instead of an editable tag for alphanumerical characters to include a descriptive text, has been required. The edition of this field has not been completed and is still a field which requires alphanumerical values to be included as a description of its value. The user manual drafted clearly addresses this issue and indicates users how to complete the fields of this section so that all the necessary information identified by KINDRA and related to the Knowledge Classification and to the TRLs are included in this section.

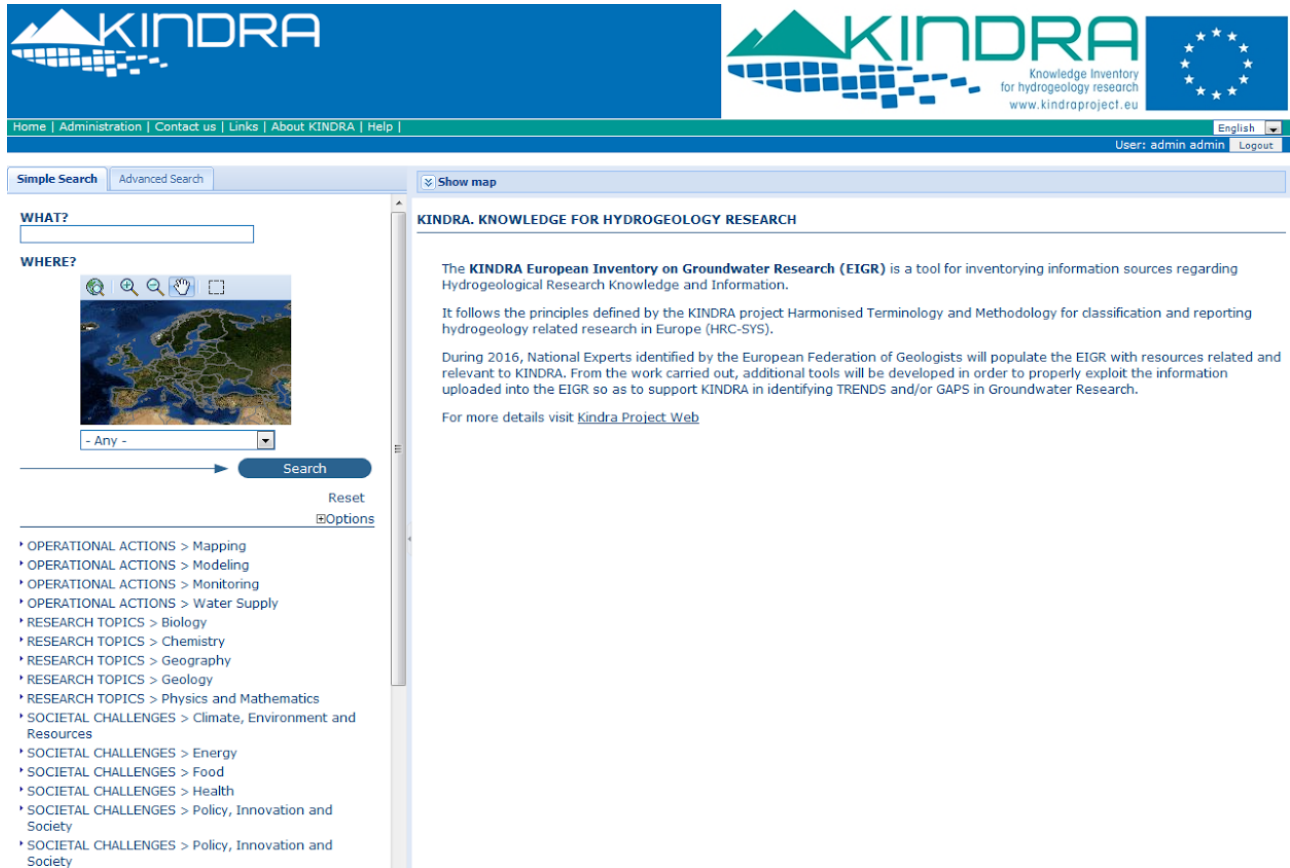
The development of points 6 and 7 have been carried out in this fashion to guaranty that the metadata ISO standard employed would not be compromised. These modifications could not lead to conflict with interoperability or in detriment to the ISO standard; the tags remain as defined for the purpose of the EIGR population phase during 2016.

An additional feature which has been added to the EIGR Online Catalogue is the inclusion of the Technological Readiness Levels (TRL) classification method as an indicator of innovation. As detailed in the Project deliverable D1.3 TRLs are based on a scale from 1 to 9, with 9 being the most mature technology. The use of TRLs enables consistent, uniform, discussions of technical maturity across different types of technology. For this reason, it has been adopted as an additional standard indicator of quality, supporting comparison with other TRL categories in groundwater science within the scope of KINDRA. The TRL details for resources included in the EIGR belong to the Data Quality Section, where users will detail in the statement field the TRL of a resource joint to the Knowledge Classification of the resource itself.

So the operative version of the EIGR breaks down into an online catalogue accessed by the following URL: <http://kindra.kindraproject.eu/geonetwork/srv/eng/main.home> (Figure 1)

The larger website “frame” includes the project logo in the header with the logo of the European Commission and the full title of the project. By clicking on the SIGN IN section which is located at the upper right side of the screen, users will identify themselves by specifying their username and password, and as a result be

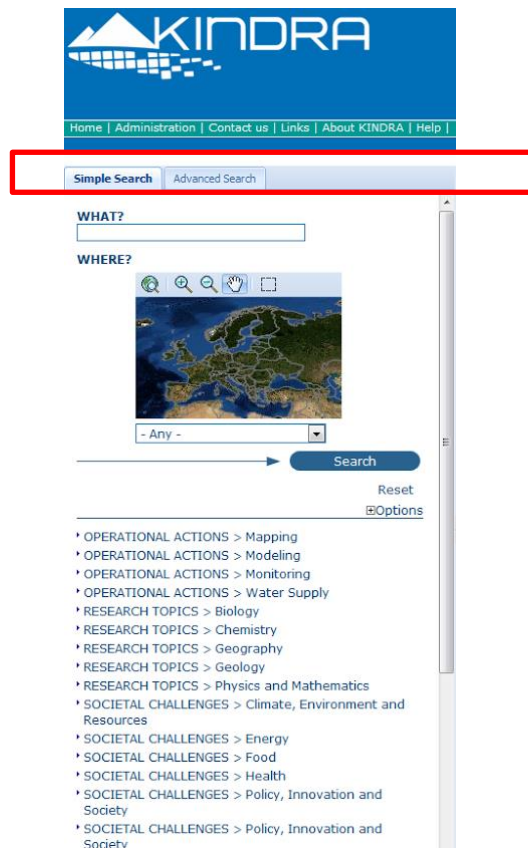
granted access to the EIGR DEMO VERSION Online Data Catalogue (this is specifically detailed in the ANNEX II EIGR User Manual). The screen centre offers a brief description of our project as well as a direct link to our project website.



**Figure 1 - EIGR Main Page:** <http://kindra.kindraproject.eu/geonetwork/srv/eng/main.home>

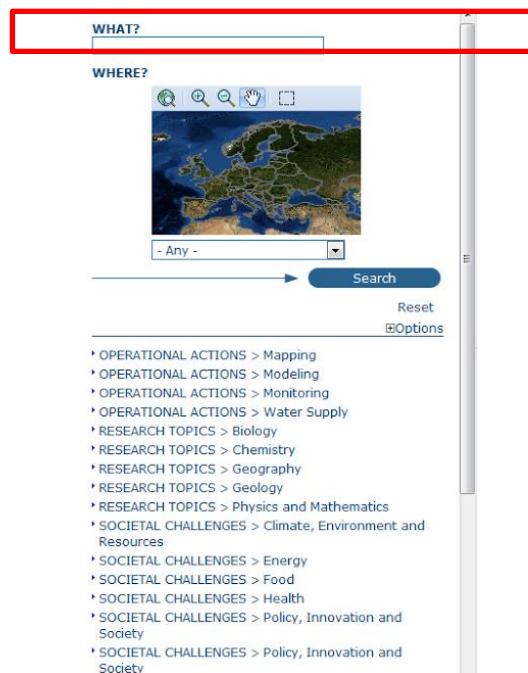
There are different sections which are accessible by selecting specific tabs which can be found at the upper left side of the screen (Figure 2):

- HOME: Main page for the EIGR, from where users can search and view the different resources uploaded to the EIGR (detailed in ANNEX II EIGR User Manual)
- ADMINISTRATION: From where users will be able to create and edit the resources they have uploaded to the EIGR
- CONTACT US: Section from where users will be able to access an email address that will send their petitions or queries to the Project Team in charge of administrating the EIGR.
- LINKS: Section dedicated to links of interest. At the moment the ones present refer to Geonetwork as it is the platform upon which the EIGR is based upon.
- ABOUT KINDRA: Section with more detailed information concerning KINDRA.



**Figure 2** - Detail of the different sections tabs accessible via the EIGR Main page

The users can quickly identify the simple and advanced search features which are further detailed in the ANNEX II. The ANNEX II goes through all of the different sections and features offered by the EIGR (Figure 3).



**Figure 3** - Detail of the Simple and Advanced search sections

## 5. EIGR population phase

The EIGR Online Data Catalogue has been subjected to a population phase during 2016 and 2017 on behalf of the EFG national experts. The technical setup of the server is operational and is properly hosting the EIGR Online Data Catalogue. In parallel another “test” server has been set up in order to allow KINDRA to carry out tests and possible improvements to the service the EIGR has to provide and to be able to start developing the applications necessary to help analyse the resources which are being incorporated into the catalogue. This is to avoid any changes or tests to affect the EIGR operability for users, and once the modifications have been properly tested, they are then applied to the functional EIGR where users are uploading resources. These steps are mandatory in order to be able to complete the functionalities of the interface and the catalogue.

An email address ([eigr@kindraproject.eu](mailto:eigr@kindraproject.eu)) has been provided to the EFG national experts in order for them to be able to contact KINDRA concerning queries and questions related to the functionalities of the EIGR and the populating of the catalogue with the corresponding and related resources. A User Manual is also available in order to provide the experts with clearer indications and instructions on how to populate the EIGR. This manual (annex 4) includes a step by step guided explanation of the type of fields available in the metadata template and what type of information is required.

The cooperation of the EFG National Experts in this “EIGR population phase” was fundamental as the amount and quality of the resources they uploaded to the EIGR Online Data Catalogue served as the basis for the development of the applications and tools for exploiting the data and information related to Hydrogeological research in Europe.

Therefore, the population process of the EIGR has been followed up by a scheduled assessment of the quality and number of resources uploaded into the EIGR throughout 2016 and 2017. Before the end of the project, collected information helped to define the most functional and appropriate tools for the exploitation of the information concerning the resources uploaded to the EIGR, supporting KINDRA in the identification of research trends and gaps as well as foreseen functionalities as per descriptions included in the annexes of D1.2. All has been subjected to the amount and quality of the resources identified and uploaded to the EIGR.

The interim assessments on the population phase was initiated before the Project management Meeting celebrated in Copenhagen during June 2016 as a first phase consisted in a thorough review on how the EFG partners were uploading resources, not on how much was being uploaded.

The assessment was performed by the revision of at least 5 resources uploaded by each of the EFG National Experts who had been actively working with the EIGR after the meeting celebrated in Seville.

As a result of the revision each EFG National Expert was provided with an in detail report of the necessary corrections which were needed in order to ensure that the quality of the information uploaded to the EIGR was according to the Project purpose and with a reminder of the proper procedure to upload resources to the EIGR according to the User Manual which was specifically drafted.

From then on, different “calendar check points” have been set for carrying out foresaid interim assessments on the progress of the “EIGR population phase” and to begin identifying opportunities for data exploitation tools. The following table indicates the progress of the population phase of the EIGR during 2016.

EIGR USER	CONTENTS 13/01/2017	CONTENTS 24/11/2016	CONTENTS 21/10/2016	CONTENTS 29/9/16	CONTENTS 21/9/16	CONTENTS 11/8/16	CONTENTS 15/6/16
EFGBELGIUM		29	29	29	29	6	6
EFGCROATIA		5	5	5	5	5	5
EFGCZECH		130	130	125	47	49	49
EFGDENMARK		10	10	10	4	6	6
EFGFINLAND		96	96	96	50	23	6
EFGFRANCE		5	3	0	0	0	0
EFGGERMANY		15	13	5	5	5	5
EFGGREECE		1	1	1	1	1	1
EFGHUNGARY		9	5	5	5	5	5
EFGIRELAND		7	7	7	7	7	6
EFGITALY		75	71	70	50	50	5
EFGNETHERLANDS		46	46	46	37	35	35
EFGPOLAND		12	5	5	5	5	5
EFGPORTUGAL		8	8	8	8	5	5
EFGSERBIA		6	6	5	5	5	5
EFGSLOVENIA		5	5	5	5	5	5
EFGSPAIN		5	5	5	5	0	0
EFGSWITZERLAND		0	0	0	0	0	0
EFGUKRAINE		8	8	8	6	5	5
EFGUK		2	2	2	2	2	2
SAPIENZA		2	2	2	2	2	2
		90	90	66	50	33	0
GEUS		4	3	3	3	3	3
EFG		18	18	11	11	11	7
UM		52	31	25	16	16	16
<b>TOTAL</b>		<b>640</b>	<b>599</b>	<b>544</b>	<b>358</b>	<b>284</b>	<b>184</b>

A final review of the resources uploaded was carried out in order to provide a final assessment of the efforts made in populating the EIGR throughout 2016. It has been provided to the EFG National Experts before January 20th 2017 with comments concerning the required modifications or issues detected.

During 2017 the amount and quality of uploaded resources has been checked every two months, starting from April when the EIGR became publicly available.

The total amount of metadata uploaded by EFG National Experts at the end of the project reached 1987 records.

## **6. Final improvements of the EIGR**

Additional changes have been implemented during and after the population phase, until the end of the project, in order to improve the functionalities of the inventory as a consultation tool and to allow for the gaps and trends analysis. The main changes performed, detailed listed in the BACKLOG document (Annex 2) during the project are the following:

- Insertion of 3 Topic Category Specific tags with drop down menu containing their corresponding 5 options of each one of the overarching categories. This replaced the repeatable tag that contained the 15 available options. This feature greatly improved the classification of resources in the EIGR allowing for better exploitation of information from inventoried elements.
- Inclusion of referencing to Digital Object Identifiers whenever available for resources uploaded to the inventory, providing a more reliable source of access to information regarding uploaded resources.
- Inclusion of specific tags for the classification of resources according to the KINDRA Project Knowledge Classification system which derives from the HRC-SYS as well as the implementation of tags for the Technological Readiness Level and the Policy Readiness Level, an indicator developed by KINDRA.
- Modification of the Advanced search features of the EIGR by adding the options for allowing specific queries to be carried out on, or by a combination of, the information related to the Topic Categories as well as for the Knowledge Classification classes, Technological readiness Levels and Policy Readiness levels. Additionally the queries can also be carried out on the organizations which have contributed with the resources and by country.
- Update of the User Manual to version v1.2, realized at the end of the project (Annex 4).

The KINDRA EIGR is a data catalogue based on Geonetwork 2.10.4 as it was the most stable version available when the KINDRA Project began. All works and efforts carried out on this version were with aim to provide the KINDRA Project with a functional and operative Inventory in order to proceed with the uploading of resources to carry out the necessary Project WP3 tasks linked with the Trends and Gaps Analysis concerning Hydrogeological Research across Europe.

The latest available and functional versions of Geonetworks that exist are 3.2.2 or 3.4. and the current version of the European Inventory on Groundwater Research (EIGR) can be updated to the latest Geonetwork versions 3.X by implementing changes in the configuration and customization of the metadata schema and user interface according to the following steps:

1.- The first step would be concerning the modifications carried out regarding the xml interoperable schema (ISO 19139) which has resulted in a modification of the metadata structure according to the Project Classification System requirements in order to be able to adapt and allow for a possible analysis of the trends and gaps concerning Hydrogeology Research. This resulted in the inclusion of new tags/fields as well as the elimination of others which were not valid for the uploading of information to the project inventory.

This change requires that the GN version 3.X be remodeled, affecting the configuration files of the uploaded schemas in the repository instance. As it concerns a modification or change in the structure of the "new repository", the implementation of the KINDRA xml schema will also require an in depth analysis of the schema structure and how to be able to carry out a "transposition" of the previous one to the new one.

The changes necessary would affect the following modules of the repository:

- ISO19139 Schema plugins Configuration (schema.xsd)
- Configuration of the Simple and Advanced Search panels (Config-summary)
- HTML5 Viewing adaptation (app-mini)
- LUCENE Index Configuration with the new tags/fields included in the Schema (config-lucene.xml)
- Modification of the value lists and codelists with the new values that are included in the new schema (Societal challenges, Operational actions, Research topics) and (Knowledge Classification, Technological Readiness level and Policy Readiness Level).

- Configuration of the CSV report with the new tags/fields.

2.- The second important step to adapt to the "new inventory" would require configuring the web user interface that affects system items related to the style sheets and templates as well as the banner configuration and web query surveys (index.html, gn\_search\_default.css, etc).

As an example, the following link leads to a repository instance for the LIFE Adaptamed Project which has also been developed with GN Opensource 3.2 Technology by the REDIAM:

<http://adaptamed.agenciamedioambienteyagua.es/geonetwork/srv/spa/catalog.search>

Foresaid interventions would have implied a lot of additional work and prohibited to proceed with the necessary set-up of search and analyses tools, delaying significantly the project's progress. The advantages were not considered relevant in view of the drawbacks they would cause to the project's progress. Nonetheless the issue has been put on the list of issues to be faced in the framework of the exploitation of KINDRA achievements.

The possibility of accessing the EIGR directly through the KINDRA Project website instead of accessed by a different URL was considered, as recommended by project reviewers. Regarding the incorporation of the repository/inventory into the KINDRA Project website, there exist two possibilities:

1. - By hyperlink. -

Which is the current option available and operational that takes users from the KINDRA Project website to the EIGR, taking them directly to the inventory's URL.

2. From one of the KINDRA projects website tabs.-

This would allow visualizing the EIGR without leaving the KINDRAproject website. This is by using an Iframe item embedded in the page. From this Iframe a user can operate the EIGR exactly as if they were at the GeoNetwork URL.

As an example please find the following link which shows how the OGC services catalogue of the REDIAM based on GN Opensource 2.4.6 is accessed.

[http://www.juntadeandalucia.es/medioambiente/site/rediam/menuitem.04dc44281e5d53cf8ca78ca731525ea0/?vgnextoid=3f8de247c1375210VgnVCM1000001325e50aRCRD&lr=lang\\_es](http://www.juntadeandalucia.es/medioambiente/site/rediam/menuitem.04dc44281e5d53cf8ca78ca731525ea0/?vgnextoid=3f8de247c1375210VgnVCM1000001325e50aRCRD&lr=lang_es)

Regarding option 2, the consideration on behalf of the IT department responsible for the Project website was that, although it is technically possible to transfer the EIGR to the project website"/Iframe" using one of the Iframe plugins of WordPress, it was strongly recommended "NOT to integrate EIGR into the project website in Iframe!" because "Iframe" is outdated. This can result in browsers like Google Chrome delivering "Connection not safe" notifications to users because the Iframe is linked to a site which is not ssl protected. Iframe might not be responsive and , although of least impact to our project, it is not esthetically attractive on mobile devices".

Therefore it was considered that it would be in the project's benefit to maintain the current link option. This also allows users to have a proper introduction to what EIGR is about, watch the tutorial movies, download the Users Manual before actually start using the system.

It should be noted that due to the nature of the resources uploaded throughout the population of the EIGR on behalf of the EFG LTP over the past year and a half it should be understood that the information which is included by users is in its majority static information, the only dynamic information fields that exists are the ones which can refer to possible "revision dates" and in certain cases those which refer to "distribution methods" for the resources, in case they might be updated in a future instance. It is something determined on a case per case basis and not subject to any general ruling.

In the following pages, the list of fields and tags to be compiled for uploading a resource on the EIGR is detailed by a metadata template (refer to D1.5 for additional information).

## EIGR METADATA TEMPLATE

### RESOURCE IDENTIFICATION INFORMATION

Title	Title of the resource (full name in English)
Alternative title	In case the resource has an acronym or other name under which it is also known (name of the document in its original language)
Date	Reference date for the resource, It can be according to one of the following options
Creation	
Publication	
Update	
Series	Should the resource be or belong to a publication, any relevant information concerning the following tags should be specified
Name	
Issue Identification	
Page	
Collective title	
ISBN	
ISSN	
Abstract	Brief summary which describes the resource
Purpose	Reason for which the resource was created
Credits	This is a tag which can be repeated as many times as necessary, it serve to indicate relevant information concerning any contributions to the resource, Program fundings, Budgets, cooperation on behalf of and between different organizations or parties, individuals
Status	Serves to indicate if the resource status, in development, is still in progress, has been finalized

**Point of Contact** Relevant information concerning the person and organization responsible of the resource

**Name** Person to contact concerning the resource

**Organization** Organization to which the person belongs to.

**Position Name**

**Role**

**Contact information:** (Phone and/or Fax numbers)

**Address:** (Street, City, Administrative area, Postal code, Country)

**E-mail address:**

**Linkage/Website**

**Descriptive Keywords (THESAURUS KINDRA)** List of Keywords identified by KINDRA's HRC-SYS, there also exists the option of inserting additional keywords which aren't present in the THESAURUS. These new keywords will be later on assessed by the KINDRA Project partners who will then decide if they should be included in the THESAURUS or simply be additional keywords for describing the metadata. In Annex 1 of the project deliverable D1.2 are listed the terms and a reference to their definitions.

**Resource constraints:** (Provides information about constraints that apply to the resources)

**Legal constraints:** (Restrictions and legal prerequisites for accessing and using the resource or metadata)

**Use limitations:** (Limitation affecting the fitness for use of the resource, for example if it is not apt to be employed for further research efforts due to specific conditions )

**Access constraints:** (Restrictions to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource: License, Patent, Pending Patent, restricted, Trademark, Copyright)

**Use constraints:** (Restrictions to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the resource: License, Patent, Pending Patent, restricted, Trademark, Copyright)

**Other constraints:** (Other constraints or legal prerequisites for accessing and using the resource)

**Topic categories:** These are the ones defined by the HRC-SYS under which each resource must be identified. In the metadata template, each resource must be assigned 1 Societal Challenge, 1 Operational Action and 1 research Topic.

- **SOCIETAL CHALLENGES:**
  - Health
  - Food
  - Energy
  - Climate, Environment and Resources
  - Policy, Innovation and Society
- **OPERATIONAL ACTIONS:**
  - Mapping
  - Monitoring
  - Modeling
  - Water Supply
  - Assessment and Management
- **RESEARCH TOPICS:**
  - Biology
  - Chemistry
  - Geography
  - Geology
  - Physics and Mathematics

Additionally to these, as each resource can belong to multiple categories and not exclusively to just one, the EIGR allows for further classification according to the categories, but this step is carried out once the resource metadata is created. This step is detailed in the final user manual included as Annex to the document.

**Extent:** (Spatial reference of the resource)

**Geographic Element:** (The geographic component of the extent referring to the resource)

**Geographic bounding box:** This is the geographic position of the resource given as a bounding box where the following items can be specified:

West longitude:

East longitude:

North latitude:

South latitude:

**Supplemental information:** (Any other descriptive information regarding the resource location or area)

### **DISTRIBUTION INFORMATION**

**Distribution format:** (Provides a description of the format of the data to be distributed)

**Format:** (Description of the availability of the resource, be it either a file, message, storage device or transmission method)

**Name:** (name of the data transfer format)

**Version:** (version of the format)

**Online resource:** (defines the online sources or link(s) from which the resource can be obtained)

**Linkage:** (Location (address) for online access using a Uniform Resource Locator (URL) address )  
Protocol: (Connection protocol to be used)

**Name of the resource**

**Description:** (Detailed text description of what the online resource is/does)

### **DATA QUALITY INFORMATION**

<b>Knowledge Classification:</b>	Assignment of one of the 4 classes.
<b>Technological Readiness Level:</b>	Assignment of one of the 9 TRL available.
<b>Policy Readiness Level:</b>	Assignment of one of the 4 PRL available.
<b>Statement:</b>	Generic description from the resource producer's knowledge concerning the lineage, according to the KINDRA project standards resources are classified according to the following list as detailed in the chart above:
<b>Process step:</b>	(Information concerning a specific event in the creation process of the resource)
<b>Description:</b>	(Detailed text description of the process step)
<b>Source:</b>	(Information about the source data employed in creating the resource)

### **METADATA INFORMATION**

<b>Hierarchy Level</b>	Dataset is selected by default by the EIGR
<b>Point of Contact</b>	Relevant information concerning the person and organization responsible of including the resource into the EIGR. Similar to the information format requested in the previous section.

Name

Organization

Position Name

Role

**Contact information:** (Phone and/or Fax numbers)

**Address:** (Street, City, Administrative area, Postal code, Country)

**E-mail address:**

**Linkage/Website**

## **ANNEX 1: EIGR WORKSHOP EXAMPLES**

### EXAMPLE 1

#### **RESOURCE IDENTIFICATION INFORMATION**

**Title:** Ancient groundwater reservoirs in buried valleys (BurVal) – sustainable water resources for the future

**Alternative title** BURVAL

<b>Date</b>	<b>Creation</b>	March 1, 2004
	<b>End</b>	December 31, 2006

<b>Series</b>	
<b>ISBN</b>	13978-3-00-020194-3

#### **Abstract**

The project BurVal ([www.burval.org](http://www.burval.org)) has been established to study systematically buried valleys of the North Sea Region. The BurVal Working Group was constituted during a workshop on buried valleys, held in Flintbek in September 2001. A project application was submitted to the Interreg North Sea Programme Secretariat in September 2003 and the activities of BurVal started January 2004. Since then intensive investigations have been conducted in six pilot project areas that would not have been possible without the co-funding by the European Union. The transnational aspect allowed the possibility to test and compare a wide range of methodologies.

#### **Purpose**

The aim of the project BurVal is to develop tools for the mapping of buried valleys under the aspect of the groundwater supply, to test and demonstrate these tools at selected Pilot project areas, and to show how these mapping results can contribute to a sustainable use of the water resources.

#### **Credits**

GEUS – the Geological Survey of Denmark and Greenland (Copenhagen)

Ringkøbing Amt (Ringkøbing)

Vejle Amt (Vejle)

Sønderjyllands Amt (Tønder)

LANU – Landesamt für Natur und Umwelt Schleswig-Holstein (Flintbek)

BSU – Behörde für Stadtentwicklung und Umwelt der Freien und Hansestadt Hamburg

BGR – Bundesanstalt für Geowissenschaften und Rohstoffe (Hannover)

GGA-Institut, Leibniz Institute for Applied Geosciences (Hannover)

TNO – Geological Survey of the Netherlands (Utrecht).

**Status** Finalised

#### Point of Contact

Dr. Bernhard Siemon

Phone: +49(0)511-643-3488

Fax: +49(0)511-643-3662

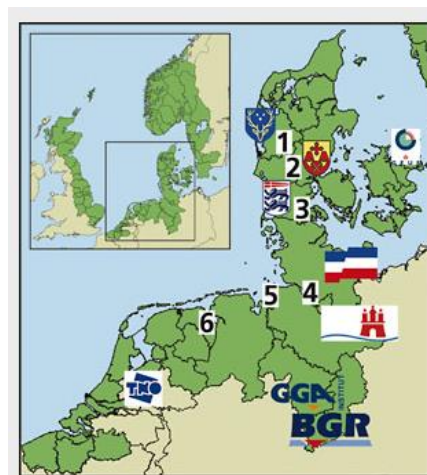
E-Mail: [Bernhard.Siemon@bgr.de](mailto:Bernhard.Siemon@bgr.de)

#### Descriptive Keywords (THESAURUS KINDRA)

Groundwater, seismic methods, electromagnetic methods, radar, geological and hydrological models, tracers, groundwater age

#### Topic categories\*:

- SOCIETAL CHALLENGES:
  - Climate, Environment and Resources
- OPERATIONAL ACTIONS:
  - Monitoring
  - Modeling
  - Assessment and Management
- RESEARCH TOPICS:
  - Geography
  - Geology
  - Physics and Mathematics



**Supplemental information:** The project areas are:

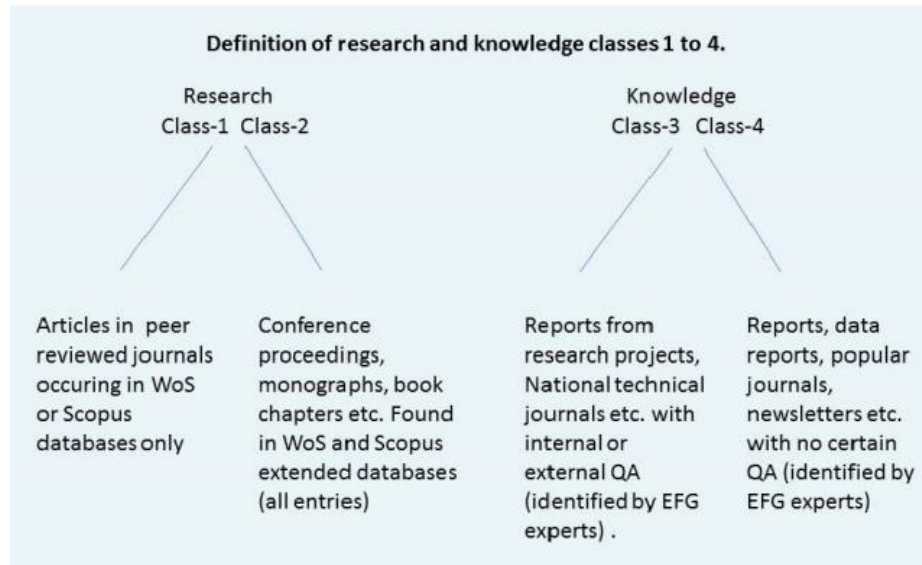
- |                     |  |
|---------------------|--|
| 1 Bording Valley,   | investigations coordinated by Ringkjøbing Amt    |
| 2 Tyrsting Valley,  | investigations coordinated by Vejle Amt          |
| 3 Rødekro Valley,   | investigations coordinated by Sønderjyllands amt |
| 4 Ellerbeker Rinne, | investigations coordinated by LANU and BSU       |
| 5 Cuxhavener Rinne, | investigations coordinated by GGA                |
| 6 Groningen Valley, | investigations coordinated by TNO.               |

BGR activities took place in four survey areas: Tyrsting Valley (DK), Groningen Valley (NL), Ellerbeker Rinne (D), and Cuxhavener Rinne (D).

## **DISTRIBUTION INFORMATION**

NONE

## **DATA QUALITY INFORMATION**



**Lineage:** (Information about the events and procedures to which the resource was subject)  
**Statement:** Knowledge Class-3

## **METADATA INFORMATION**

### **Point of Contact**

Contact information: Klaus Hinsby, GEUS (Geological Survey of Denmark and Greenland)  
 Phone: +4526294616 / +4591333618  
 Fax: +4538142050  
 Address: Øster Voldgade 10  
 City: Copenhagen  
 Postal code: 1350

## EXAMPLE 2

### **RESOURCE IDENTIFICATION INFORMATION**

**Title:** Numerical assessment of effective evapotranspiration from maize plots to estimate groundwater recharge in lowlands

**Alternative title:** AGWAT

<b>Date</b>	<b>Creation</b>	30/10/2009
	<b>Publication</b>	02/05/2010

#### **Series**

Name  
Issue Identification  
Page  
Collective title  
ISBN  
ISSN

#### **Abstract:**

To maximize the irrigation efficiency and to protect groundwater from agrochemical pollution, two variables must be known with good accuracy: effective evapotranspiration and infiltration, especially in lowland areas where the run-off is minimal. Three different experimental plots cultivated with maize were equipped with tensiometers and soil moisture probes to monitor every day the water movement in the unsaturated zone. Other relevant parameters of the various soil layers, as hydraulic conductivity and water retention curve, were obtained in laboratory experiments, while boundary conditions, as precipitations, temperature and root growth, were obtained on site. Inverse modeling was performed using HYDRUS-1D to assess the degree of uncertainty on model parameters. Results showed a good model fit of water content and head pressure at various depths, in each site, using Penman–Monteith formula for daily potential evapotranspiration calculation, but poor fit applying the Hargreaves and Turk formulas. Best performance of model fit was observed for S-shaped equation employed to simulate the root water-uptake reduction with respect to Feddes equation. The soil parameters uncertainty was limited and remained within analytical errors, thus a robust estimation of cumulative infiltration and evapotranspiration has been derived. This study points out that evapotranspiration is the most important variable in defining groundwater recharge for maize crops in lowlands

#### **Purpose**

The main goal of this study were to assess whether simple approaches to calculate the PET, like Hargreaves and Turk ones, can substitute complex ones like Penman–Monteith and to assess the variability of the groundwater recharge estimated with different PET formulas. The same assessment was performed for root water uptake reduction functions. In addition, simulations were run with minimum and maximum observed saturated hydraulic conductivities, to quantify its influence on groundwater recharge flux.

### Credits

The work was financially supported by AGRI-UNIFE and ENVIREN laboratory, respectively under Contratto di Programma (Delib. CIPEn° 202) and PRIITT funds.

### Credits

2.600.000, 00€

### Credits

Dr. Fabio Vincenzi Dr. Umberto Tessari and Dr. Corinne Corbau are acknowledged for their technical and scientific support.

### Credits

The Emilia-Romagna ARPA SIMC is acknowledge for the meteorological data and the Servizio Geologico Sismico e dei Suoli of Emilia-Romagna region is acknowledge for the pedological classification.

### Status

### Point of Contact

author: Nicolò Colombani  
Organization's name: "Sapienza" University  
Contact's position: Research fellow  
Contact information:  
Phone: (+39) 6 4991 4834  
Address: P.le A. Moro, 5  
City: Roma  
Postal code: 00185  
Country: Italy  
E-mail address: nicolo.colombani@uniroma1.it

Linkage/Website: <http://www.uniroma1.it/>

### Descriptive Keywords:

Recharge, Unsaturated zone, Infiltration, Evapotranspiration, Groundwater recharge, Modeling, Soil water flow.

**Resource constraints:** (Provides information about constraints that apply to the resources)

**Other constraints:** Limited access publication from Elsevier by subscribers or pay per view.

**Topic categories\*:**

- SOCIETAL CHALLENGES:
  - Climate, Environment and Resources
- OPERATIONAL ACTIONS:
  - Monitoring
  - Modeling
- RESEARCH TOPICS:
  - Geology
  - Physics and Mathematics



Supplemental information: Po Plain Lowlands

### **DISTRIBUTION INFORMATION**

Distribution format: (Provides a description of the format of the data to be distributed)

Format\*: PDF

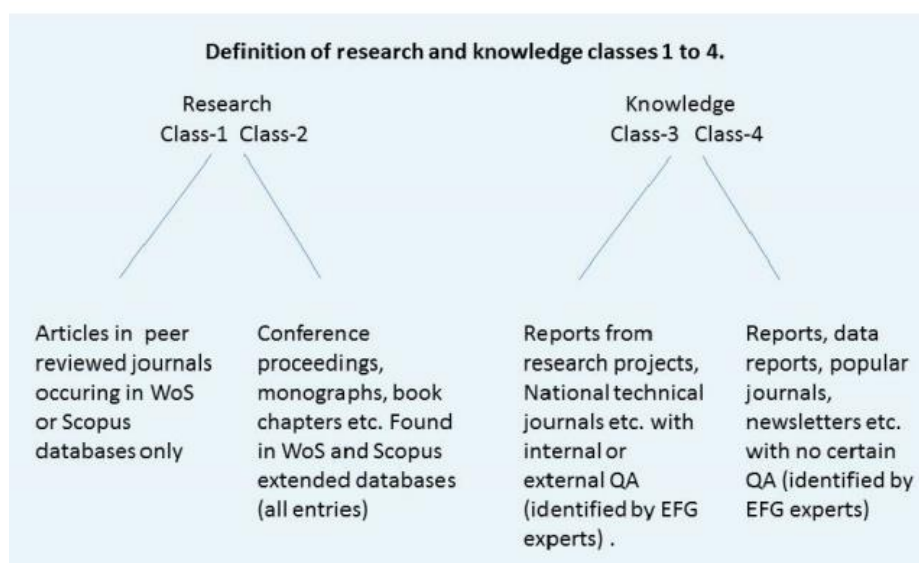
Linkage:

[https://www.researchgate.net/publication/231175152\\_Numerical\\_assessment\\_of\\_effective\\_evapotranspiration\\_from\\_maize\\_plots\\_to\\_estimate\\_groundwater\\_recharge\\_in\\_lowlands?ev=prf\\_pub](https://www.researchgate.net/publication/231175152_Numerical_assessment_of_effective_evapotranspiration_from_maize_plots_to_estimate_groundwater_recharge_in_lowlands?ev=prf_pub)

Name of the resource: Numerical assessment of effective evapotranspiration from maize plots to estimate groundwater recharge in lowlands

Description: Made available as “personal author copy before final publication” on Researchgate

## **DATA QUALITY INFORMATION**



Lineage:

Statement: Research Class-1

Process step:

When the process occurred: 2009/10/30 (1)

When the process occurred: year/month/day (2)

When the process occurred: 2010/04/07 (3)

When the process occurred: 2010/05/02 (4)

Description: 1. Resource created

Description: 2. Resource submitted to review

Description: 3. Review approval

Description: 4. Publication

Source: online data on climate data (Environmental agency), soil maps (Geological survey)

## **METADATA INFORMATION**

Point of Contact

author: Nicolò Colombani

Organization's name: "Sapienza" University

Contact's position: Research fellow

Contact information:

Phone: (+39) 6 4991 4834

Address: P.le A. Moro, 5

City: Roma

Postal code: 00185

Country: Italy

E-mail address: nicolo.colombani@uniroma1.it

Linkage/Website: <http://www.uniroma1.it/>

### EXAMPLE 3

#### **RESOURCE IDENTIFICATION INFORMATION**

**Title:** Development of groundwater related research potential based on applied and fundamental R&D activities at the University of Miskolc, Faculty of Earth Science and Engineering

**Alternative title:** Project WELL aHEAD

**Abstract:** The national New Széchenyi Plan assigns top preference to better utilization of groundwater resources. The research agenda of the Well aHead project mainly covers the engineering and water management aspects of the flow system theory applications. Covering issues such as sustainable thermal water-, mineral water-, cure water-, and drinking water management, anthropogenic effects on groundwater resources, ecohydrogeology, and complex multidisciplinary research of porous and karstic aquifers.

**Purpose:** The new European Planning period, launching in 2014 often referred to as Horizon 2020 has several priorities related to protection of water resources. Two out of the seven priorities of the national New Széchenyi Plan assigns top preference to better utilization of groundwater resources. The Health industry development program and the Green economy development program strongly relies on mineral-, cure- and thermal water resources of the Carpathian basin. The national health industry development program includes the investigation and utilization of Hungary's unique thermal- and curewater resources. The potential for the groundwater related development program is given in the globally unique mineral water, cure water quantity and quality of Hungary. The complex utilization of the available geothermal energy resources is also mentioned among the top priorities of the New Széchenyi Plan.

#### Credits

Funding Body: New Széchenyi Plan

#### Credits

1.600.000,00€

#### Point of Contact

Linkage/Website: <http://www.kutfo.uni-miskolc.hu/>

**Descriptive Keywords:** Geothermal energy, karst, mining, modelling, climate change, monitoring, heavy metal, multiphase flow, groundwater resources, hydrogeologic cycle

#### Topic categories\*:

- SOCIETAL CHALLENGES:
  - Climate, Environment and Resources
- OPERATIONAL ACTIONS:
  - Monitoring

- o Modeling
- o Assessment and Management
- RESEARCH TOPICS:
  - o Chemistry
  - o Geology
  - o Physics and Mathematics

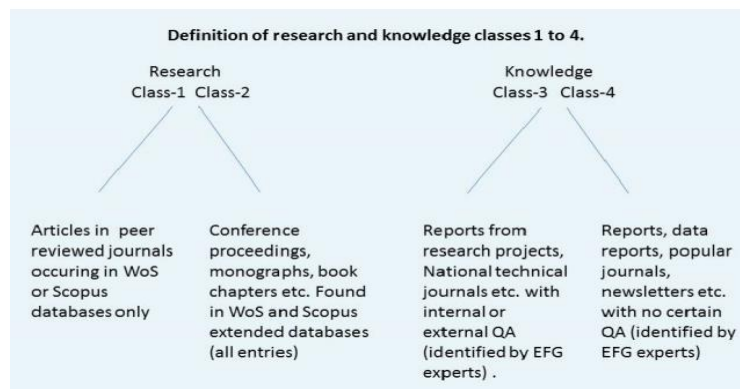


Supplemental information: North East Hungary

## **DISTRIBUTION INFORMATION**

NONE

## **DATA QUALITY INFORMATION**



Lineage: (Information about the events and procedures to which the resource was subject)  
 Statement: Knowledge Class-4

## **METADATA INFORMATION**

### Point of Contact

Tamás Madarász, UM (University of Miskolc)

Phone: +3646565072 / +36704903958

Fax: +3646565072

Address: Egyetemváros

City: Miskolc

Postal code: 3515

Country: Hungary

e-mail address: [hgmt@uni-miskolc.hu](mailto:hgmt@uni-miskolc.hu)

Linkage/Website: <http://mfk.uni-miskolc.hu/>

## **ANNEX 2: EIGR BACKLOG**

DATE	ACTION	DESCRIPTION
August 2016	KINDRA THESAURUS update	Update concerning the inclusion of keywords according to PM
September 2016	Inclusion of drop down tags for the KINDRA overarching topics	Three new tags have been included in the metadata schema in order to allow for the specific identification of Operational Actions, Research topics and Societal Challenges independently. These are included in the ISO19139 schema Topic Categories node, modifying the values and names of the tag.
September 2016	Inclusion of the tags for Knowledge Classification, TRL and PRL	Three new tags have been included in the metadata schema in order to allow for the specific identification of KINDRA KC, TRL and PRL employing the Report tag found in the Quality Information node of the ISO19139 schema.
October 2016	Management and maintenance of the EIGR user group as well as the metadata visualization privileges.	Management of the user profiles and roles as well as of the metadata visualization for the resources uploaded to the EIGR
October 2016	ISO19139 Metadata schema modification	Modification concerning the customization of the metadata schema from multilingual to English
November 2016	KINDRA EIGR template management	Control and supervision of the new EIGR templates. Deletion of the invalid templates and review of customized templates provided in harvesting from other organizations
November 2016	Tooltip message customization	Customization of the descriptions and visual aspect of template tags and buttons as well as for the EIGR editing and querying tools on operational and exploitation versions
DATE	ACTION	DESCRIPTION

November 2016	Customization of the EIGR Interface	Customization of the querying and editing interface on the stylesheet (xsl) and CSS design as well as of the fonts in the operational and exploitation versions
December 2016	Correction of the Country List Values in the KINDRA metadata schema	Corrections and improvements to the list of drop down values for the country tag which is included in the contact sections
January 2017	Modification of the Hierarchy level tag values	Modification of the existing values to exclusively offer 2 options: Geographic Dataset or Non Geographic Dataset.
February 2017	Edition tags in the KINDRA metadata schema	Affects the tags for ISBN ISSN, Author and Organization
March 2017	Inclusion of new fields for the advanced search functions	New search fields are included in the advanced search section in order to be able to carry out specific queries concerning HRC-SYS related values: SC, OA, RT, TRL, PRL, KC
April 2017	Improvements in the metadata BBOX search functions	Study and analysis on the improvement of the geographical referencing search or possible deletion of the BBOX in case no geographical reference is included in the. Not implemented
May 2017	Inclusion of new tags in the CSV exportation survey	Inclusion of new metadata tags in the CSV export functionality and in txt format.
June 2017	Modification to the KINDRA About and Help menus	Modification and editing of the texts included in the About and Help tabs of the EIGR interface in the exploitation and operational versions
July 2017	Control and Supervision of the EIGR published metadata	Revision of the user metadata and of the values included as well as the visibility of those assigned as published.



## **CHECKLIST FOR UPLOADING PUBLICATIONS TO THE EIGR**

*Recommended required fields to be filled for each type of product*

### **SECTION 1: IDENTIFICATION INFO**

- Title
- Publication/Revision dates
- Series (Name, Issue identification, Pages, Collective title, ISBN/ISSN)
- Abstract, Purpose (use the official abstract of the product or translate in english)
- Credits (one item per credit: collaborators, authors ...)
- Point of Contact (Name, Organization, Position, Role, Phone number, Address, e-mail, website URL, description)
- Keywords from KINDRA Thesaurus
- Resource constraints (Intellectual Property Rights, License, Copyright, Patent, etc...)
- Topic categories (One Operational Action, one Research Topic, one Societal Challenge)
- Geographical Extent (select area in map)
- Supplemental Information (additional geographical information: specific catchments, water bodies, regions...)

### **SECTION 2: DISTRIBUTION INFORMATION (Publication website, link to article, DOI, etc...)**

- Format (eg. Text, PDF, map format, etc.)
- Link URL (publication website, direct link to the article, DOI, etc.)
- Name of the link/resource
- Description

### **SECTION 3: DATA QUALITY INFO**

- Lineage Statement: Indicate Knowledge Class, TRL, PRL (Policy Readiness Level)
- Process step description: Describe reasons for including the resource in the specific classes

### **SECTION 4: METADATA (details of the person uploading the resource to the EIGR)**

- Point of Contact (Name, Organization, Position, Role, e-mail, website URL, description)



## **CHECKLIST FOR UPLOADING PROJECTS TO THE EIGR**

*Recommended required fields to be filled for each type of product*

### **SECTION 1: IDENTIFICATION INFO**

- Title
- Alternative title (acronym)
- Creation date
- Abstract, Purpose (use the official abstract of the product or translate in english)
- Credits (one item per credit: collaborators, project funding programme, budget #XX.XXX,XX€, project partners...)
- Point of Contact (Name, Organization, Position, Role, Phone number, Address, e-mail, website URL, description)
- Keywords from KINDRA Thesaurus
- Resource constraints (Intellectual Property Rights, License, Copyright, Patent, etc...)
- Topic categories (One Operational Action, one Research Topic, one Societal Challenge)
- Geographical Extent (select area in map)
- Supplemental Information (additional geographical information: specific catchments, water bodies, regions...)

### **SECTION 2: DISTRIBUTION INFORMATION (project website, downloadable information, multimedia, etc...)**

- Format
- Link URL (project website, reference to EU database as CORDIS, etc.)
- Name of the link/resource
- Description (downloadable information, multimedia, etc.)

### **SECTION 3: DATA QUALITY INFO**

- Lineage Statement: Indicate Knowledge Class, TRL, PRL (Policy Readiness Level)
- Process step description: Describe reasons for including the resource in the specific classes

### **SECTION 4: METADATA (details of the person uploading the resource to the EIGR)**

Point of Contact (Name, Organization, Position, Role, e-mail, website URL, description)



## **CHECKLIST FOR UPLOADING REPORTS TO THE EIGR**

*Recommended required fields to be filled for each type of product*

### **SECTION 1: IDENTIFICATION INFO**

- Title
- Alternative title
- Publication/Revision dates
- Series (Name, Issue identification, Pages, Collective title, ISBN/ISSN)
- Abstract, Purpose
- Credits (one item per credit: collaborators, funding programme, budget #XX.XXX,XX€, organizations...)
- Point of Contact (Name, Organization, Position, Role, Phone number, Address, e-mail, website URL, description)
- Keywords from KINDRA Thesaurus
- Resource constraints (Intellectual Property Rights, License, Copyright, Patent, etc...)
- Topic categories (One Operational Action, one Research Topic, one Societal Challenge)
- Geographical Extent (select area in map)
- Supplemental Information (additional geographical information: specific catchments, water bodies, regions...)

### **SECTION 2: DISTRIBUTION INFORMATION (link to the report)**

- Format (eg. Text, PDF, map format, etc.)
- Link URL (publication website, direct link to the report, DOI, etc.)
- Name of the link/resource
- Description

### **SECTION 3: DATA QUALITY INFO**

- Lineage Statement: Indicate Knowledge Class, TRL, PRL (Policy Readiness Level)

Process step description: Describe reasons for including the resource in the specific classes

### **SECTION 4: METADATA (details of the person uploading the resource to the EIGR)**

- Point of Contact (Name, Organization, Position, Role, e-mail, website URL, description)



## **CHECKLIST FOR UPLOADING DATABASES/MAPS TO THE EIGR**

*Recommended required fields to be filled for each type of product*

### **SECTION 1: IDENTIFICATION INFO**

- Title
- Alternative title (acronym, collective title, etc)
- Creation/Publication/Revision dates
- Series (Name, Issue identification, Pages, Collective title, ISBN/ISSN)
- Abstract, Purpose
- Credits (one item per credit: organizations and partners...)
- Point of Contact (Name, Organization, Position, Role, Phone number, Address, e-mail, website URL, description)
- Keywords from KINDRA Thesaurus
- Resource constraints (Intellectual Property Rights, License, Copyright, Patent, etc...)
- Topic categories (One Operational Action, one Research Topic, one Societal Challenge)
- Geographical Extent (select area in map)
- Supplemental Information (additional geographical information: specific catchments, water bodies, regions...)

### **SECTION 2: DISTRIBUTION INFORMATION (link to the database or map)**

- Format (graphic file format, etc.)
- Link URL
- Name of the link/resource
- Description

### **SECTION 3: DATA QUALITY INFO**

- Lineage Statement: Indicate Knowledge Class, TRL, PRL (Policy Readiness Level)

Process step description: Describe reasons for including the resource in the specific classes

### **SECTION 4: METADATA (details of the person uploading the resource to the EIGR)**

- Point of Contact (Name, Organization, Position, Role, e-mail, website URL, description)

# EIGR USER MANUAL v1.2

## INDEX

PREFACE	page 2
KINDRA Summary	
EIGR: European Inventory for Groundwater Research	
 BASIC CONCEPTS	page 3
Metadata: Concepts, definitions, standards, Schemas or Templates.	
Geonetworks: Metadata catalogue	page 4
 OPERATING THE EIGR	page 6
Accessing the EIGR	
User Profiles	page 7
Catalogue Based Search Tools	page 8
Creating a Metadata	page 12
Identification Information	page 15
Data Identification	
Point of Contact	page 16
Descriptive keywords	page 17
Resource Constraints	page 21
Topic Categories	page 21
Extent	page 23
Distribution Information	page 25
Data Quality Information	page 28
Metadata Information	page 30
 Editing Metadata and Additional Categories	page 32
Category Updating	page 33
Privilege Updating	page 34

## PREFACE

### KINDRA Summary

Hydrogeology-related research activities cover a wide spectrum of research areas at EU and national levels. The European knowledge-base on this important topic is widespread and fragmented into wider programs generally related to water, environment or ecology.

In order to achieve a comprehensive understanding on the groundwater theme, The KINDRA project (Knowledge Inventory for Hydrogeology Research) seeks to carry out an accurate assessment of the state of the art in hydrogeology research and to create a critical mass for scientific knowledge exchange of hydrogeology research, to ensure wide applicability of research results, including support of innovation and development, and to reduce unnecessary duplication of efforts.

The KINDRA project has focused its efforts in developing the Harmonized Terminology and Methodology for Classification and Reporting Hydrogeology related Research in Europe (HRC-SYS) as well as the European Inventory of Groundwater Research (EIGR).

Both tools, the HRC-SYS and the EIGR, are fundamental to achieve the main aim of the KINDRA project, in creating an overview of the scientific knowledge covering European countries, by an accurate assessment of hydrogeology research in various geographical and geo-environmental settings, allowing for a direct comparison and exploitation of existing synergies.

At the same time, the scope of the project includes identification of future trends, critical challenges and research gaps, to improve management and policy development for groundwater resources on a EU level coherently with the Water Framework Directive (WFD) and Groundwater Directive (GWD).

### EIGR: European Inventory for Groundwater Research

The purpose of the EIGR is to achieve the following three goals:

- 1) To become a repository on groundwater research and other available knowledge provided by National Experts cooperating with the EFG (KINDRA Project Third Parties);
- 2) To serve as a consultation tool during and after the project by experts and organizations dealing with groundwater research, as well as by non technical users;
- 3) To support the analysis of the collected data and stored information in order to help identify trends, challenges and gaps related to Groundwater Research on behalf of the KINDRA partners.

The EIGR is being developed as a Data Catalogue with geographical references.

The EIGR will not contain data itself, but **metadata** of research efforts and topic related knowledge deliverables (scientific reports, articles, projects, etc...) illustrating and providing links to research efforts carried out through Europe, indicating where they can be found, and at the same time allowing their classification according to the proposed HRC-SYS.

**The information inserted in the EIGR must be as complete as possible**, as this will allow the search engines and future user consultations carry out thorough information analysis. The EIGR will serve as a repository of this knowledge, functioning as a tool that will allow for queries and searches to be carried out by selecting keywords, generating statistics, diagrams and other functions to help support the exploitation of the catalogued information.

The initial EIGR version delivered was intended as a Beta version, to be tested and checked during the trial phase which took place during 2016 with the cooperation of the KINDRA project partners and later an improved version was delivered for the EFG National Experts, project Linked Third Parties, to allow for the inclusion or topic related resources.

After a considerable amount of records had been included into the system and these were validated, a variety of quick assessment tools and an improved advanced search interface for the exploitation of the information uploaded into the EIGR was released.

The ultimate purpose of the EIGR is to be deployed as a permanent public access service dedicated to ongoing hydro geological research and innovation across Europe.

The following technical guide is conceived as a user manual for all those whom will contribute and make use of the European Inventory of Groundwater Research (EIGR).

## BASIC CONCEPTS

### The concept of Metadata

The clearest definition we can find for the concept of metadata is «data about data ».

Metadata is a crucial element for any kind of Data Catalogue. In our specific case, dealing with information which refers to works and efforts carried out by different organizations and working groups, it is essential to be able to account for the information on how these resources have been obtained and according to what procedures.

Metadata allow for a better understanding of a set of data which has been recollected or developed by others. The more details that are available regarding a set of data, the more useful the data will be for future exploitation and treatment. It will even allow for a better sharing of information with others.

### Definitions: What are Metadata?

Metadata describe the contents, the quality, the format and other characteristics linked to specific resources allowing users to properly identify precise information and services available as well as on how to locate them.

They answer the basic questions, Who, What, When, Where, Why and How providing users with the characteristics of the data registered in a catalogue and information concerning:

The title and overall description of the data.

The purpose of the data and their usefulness.

The date of creation of the data set and, whenever applicable, the update process it is subject to.

The geographical extension of the data set.

The owner of the data set

The criteria and constraints, or restrictions, which apply to their use and exploitation.

The quality of the data set.

With this information, users have further access on the data available and are able to locate and select data sets which are more suited to their needs and requirements. This allows for a more efficient exploitation of data sets.

The purpose for creating metadata is to organize and maintain the information created by institutions; they seek to promote the **accessability** and **usability** of data.

When resources are published by means of a data catalogue, this provides other organizations the opportunity to find and use the information; it allows them to identify other organizations to share information, share the efforts of maintaining information and develop clients for the user community to better access and use the information in a more efficient manner.

Metadata should always be detailed for a resource as they provide information for accessing and obtaining it and making it interoperable. They help users and organizations in better processing, interpreting and storing data in their own internal registers.

Metadata are the responsibility of who create the data sets, of who provide the data sets and of the users of the data sets.

### Metadata Standards

A metadata standard is a document which identifies the required contents for the description of the resources of a catalogue. The standards are generally supported by common national or international regulations.

The standards concerning metadata are those included in the ISO 19115, which belongs to the ISO 19100 family. It provides the metadata schema and establishes common terminologies, definitions and procedures all related to metadata. ([http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_detail.htm?csnumber=26020](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=26020))

The ISO 19139 standard provides a series of XML templates which define the XML format for the inclusion of the required details concerning metadata according to the ISO 19115 metadata standard.

Additionally to the standards there are also some rules which help determine the minimum required elements for a metadata to be properly characterized and described. One example is the Dublin Core schema which is a small set of vocabulary terms that can be used to describe web resources (video, images, web pages, etc.), physical resources such as books or CDs, and objects like artworks. It is an example which is very suited for the simplest and most basic metadata.

## Metadata Schema or Template

The key issue regarding metadata is: is it necessary to create a new template for the metadata or are there any templates available that may be adapted to our needs?

Generally it is preferable that few templates exist for metadata. We turn to standards in order to improve interoperability and reduce the amount of useless differences. It is preferable and much easier to employ something which already exists, which is well conceived and internationally recognized.

If we build a new template, we will also be required to manage and maintain it during the duration of the catalogue. This also includes updating compatibility issues for past and future resources, the metadata contents themselves as well as their registration into the catalogue and the infrastructure employed.

**The ISO 19139 Geographic information Metadata XML schema:** This standard provides the XML implementation schema for ISO 19115 specifying the metadata record format and may be used to describe, validate, and exchange geospatial metadata prepared in XML. It includes information about the identification, constraints, extent, quality, spatial and temporal reference, distribution, lineage, and maintenance of the dataset. The EIGR will be employing a metadata template based on the ISO 19139 metadata schema and adapt it to the HRC-SYS requirements in order to allow for a later analysis of the information uploaded to the inventory.

## GeoNetwork: Metadata Catalogue

A metadata catalogue is a set of metadata which describes elements which are available from a wide variety of sources. These catalogues usually must follow a standard or schema as any information which is standardized is more easily understood, shared, used and employed by different communities and countries.

GeoNetwork is a decentralized geographical information management system based on different standards developed by the United Nation's Food and Agriculture Organization (FAO <http://www.fao.org/home/en/>) . The main purpose of this software is to promote the collaboration between organizations in order to minimize information duplicity, improve the consistency and quality of geographical information. This product allows for a standardized organization of information, which is an essential step for sharing information between different institutions

It provides services which allow users to search within metadata information and details ranging from keywords, authors, legal constraints concerning the use of information and resources available. The main characteristics of Geonetwork are:

- Catalogue based Search tools

- Upload and download of data and other contents

- An integrated map viewer

- An online tool to export in PDF format

- A metadata editor tool with an extensive range of templates

- A timer for programmed metadata harvesting and synchronizing with other catalogues

- A user and group based management system access control

- Multilingual availability

- Integrated metadata templates (ISO 19139, Dublin Core, etc...)

Possibility of creating and assigning different metadata editor profiles

CWS services

Java Servlets technology.

The KINDRA EIGR is a data catalogue based on Geonetwork 2.10.4 as it was the most stable version available when the KINDRA Project began.

All works and efforts carried out on this version were with aim to provide the KINDRA Project with a functional and operative Inventory in order to proceed with the uploading of resources to carry out the necessary Project WP3 tasks linked with the Trends and Gaps Analysis concerning Hydrogeological Research across Europe

The latest available and functional versions of Geonetworks that exist are 3.2.2 or 3.4. and the current version of the European Inventory on Groundwater Research (EIGR) can be updated to the latest Geonetwork versions 3.X by implementing changes in the configuration and customization of the metadata schema and user interface according to the following steps:

1.- The first step would be concerning the modifications carried out regarding the xml interoperable schema (ISO 19139) which has resulted in a modification of the metadata structure according to the Project Classification System requirements in order to be able to adapt and allow for a possible analysis of the trends and gaps concerning Hydrogeology Research. This resulted in the inclusion of new tags/fields as well as the elimination of others which were not valid for the uploading of information to the project inventory.

This change requires that the GN version 3.X be remodeled, affecting the configuration files of the uploaded schemas in the repository instance. As it concerns a modification or change in the structure of the "new repository", the implementation of the KINDRA xml schema will also require an in depth analysis of the schema structure and how to be able to carry out a "transposition" of the previous one to the new one.

The changes necessary would affect the following modules of the repository:

- ISO19139 Schema plugins Configuration (schema.xsd)
- Configuration of the Simple and Advanced Search panels (Config-summary)
- HTML5 Viewing adaptation (app-mini)
- LUCENA Index Configuration with the new tags/fields included in the Schema (config-lucene.xml)
- modification of the value lists and codelists with the new values that are included in the new schema (Societal challenges, Operational actions, Research topics) and (Knowledge Classification, Technological Readiness level and Policy Readiness Level).
- Configuration of the CSV report with the new tags/fields.

2.- The second important step to adapt to the "new inventory" would require configuring the web user interface that affects system items related to the style sheets and templates as well as the banner configuration and web query surveys (index.html, gn\_search\_default.css, etc).

As an example, the following link leads to a repository instance for the LIFE Adaptamed Project which has also been developed with GN Opensource 3.2 Technology by the REDIAM:

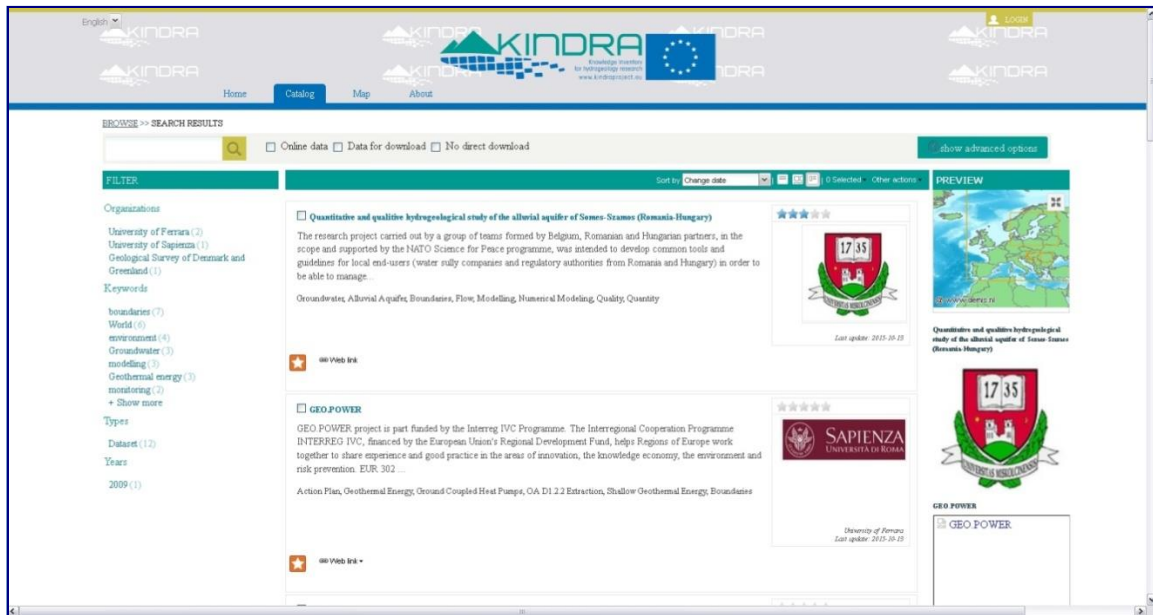
<http://adaptamed.agenciamedioambienteyagua.es/geonetwork/srv/spa/catalog.search>

## OPERATING THE EIGR

### Accessing the EIGR

As it is based on Geonetwork, the EIGR offers two possibilities for browsing the catalogue; a default viewer in HTML5 which all users can access through the following address:

<http://kindra.kindraproject.eu/geonetwork/srv/eng/search>



The other option for accessing the catalogue is through the traditional interface, immediately recognizable by users already familiar with the Geonetwork web catalogues, by visiting the following address:

<http://kindra.kindraproject.eu/geonetwork/srv/eng/main.home>



The steps to access and operate the KINDRA EIGR are described for the traditional Geonetwork interface, as it offers a clearer and more organized view of the template tags when completing the metadata of the resources.

<http://kindra.kindraproject.eu/geonetwork/srv/eng/main.home>

The following sections of the document provide users a step by step walkthrough of the EIGR functionalities and operability for searching and browsing metadata as well as for including new metadata records in the EIGR. Should any assistance be required you can contact [eigr@kindraproject.eu](mailto:eigr@kindraproject.eu) for technical support

## User Profiles

A user may be assigned one or more profiles, all depending on the roles they hold within the Geonetwork system. The profile determines their privileges and the tasks that may be carried out by each user. User profiles are hierarchical and heritage based, which means that a user with an “editor profile” can create and modify new metadata registries, but at the same time can access all the same functions just as any other registered user.

These are the rights and privileges linked to each profile:

### 1. Administrator

The Administrator holds special privileges which provide access to all the available functions. These include:

- Full rights to create new user groups and new users
- Rights to modify user groups and/or user profiles
- Full rights to create/edit/delete new/old metadata
- Carry out system administration and configuration tasks.

### 2. User Administrator

The User Administrator is allowed to administrate his own profile and group profiles with the following privileges:

- Full rights to create new users in his group
- Rights to modify user profiles within his group
- Full rights to create/edit/delete new/old metadata within his own group

### 3. Content Reviewer

The Content Reviewer is authorized to approve metadata for publication on the intranet and/or internet:

- Has rights to review metadata contents within his group and can authorize their publication

### 4. Editor

The Editor Works with metadata according to the following privileges:

- Full rights to create/edit/delete new/old metadata within his group (profile assigned to EFG National Experts, Linked Third Parties).

### 5. Registered User

The Registered User has more access rights than non-registered users, who simply access the catalogue as guests:

- Right to download protected data.

Each EIGR metadata editor will be linked to a group and will be provided a user name and password in order to include new metadata entries or to edit existing metadata.

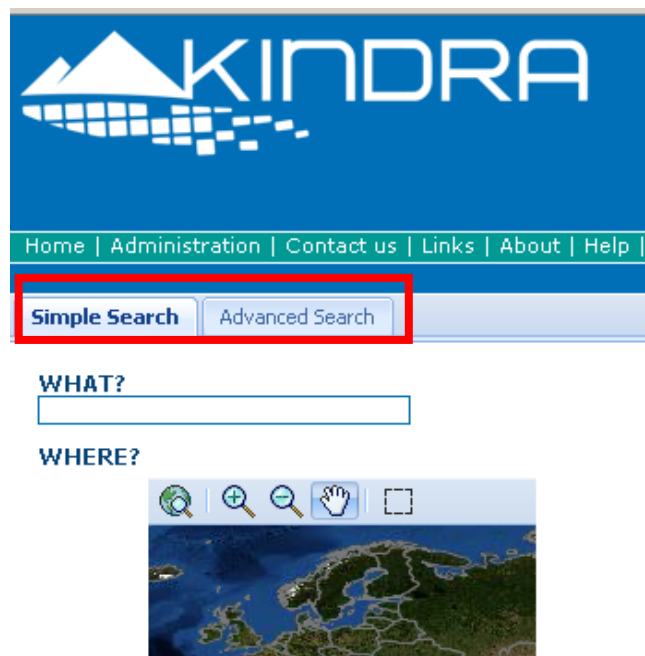


### Catalogue based Search tools

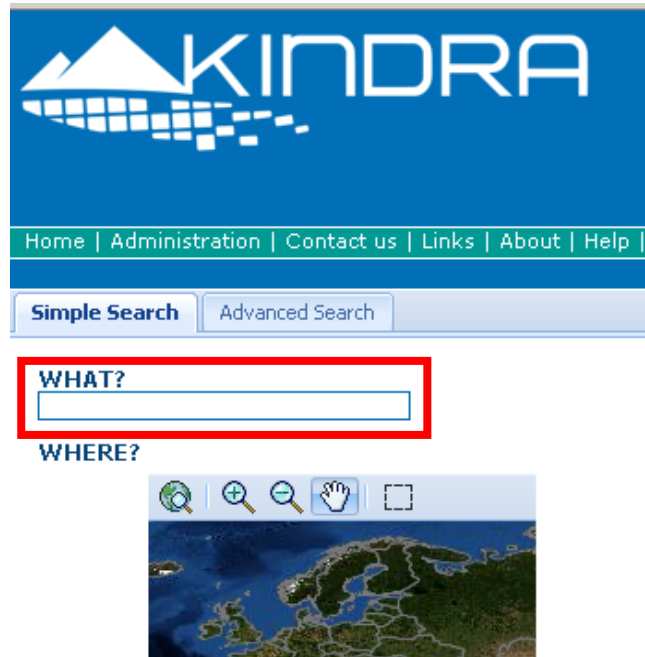
As mentioned in the description of the EIGR, it will act as a single repository of Knowledge on Groundwater Research.

The contents of the EIGR can be accessed at any given moment by means of the different search tools and functionalities the Geonetwork platform offers.

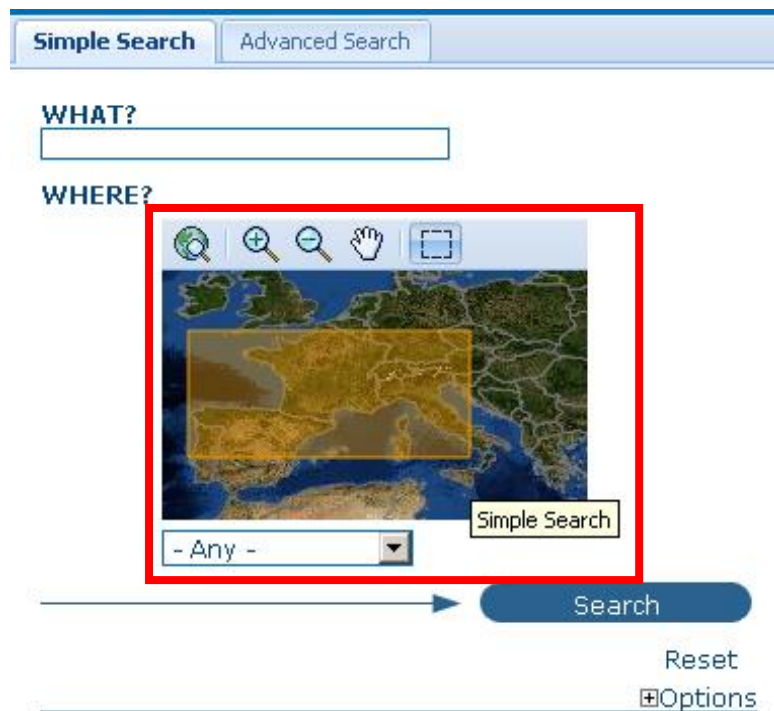
In order for any user to carry out a search or query within the EIGR, they must select on one of the search tabs on the EIGR Home page: [Simple Search](#) or [Advanced Search](#).



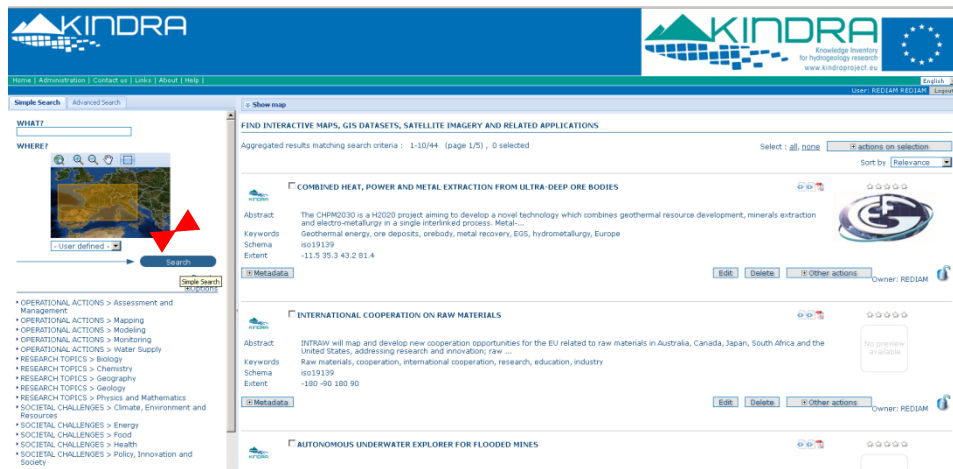
Through the Simple Search tab users can type in the text of a topic of interest in the field below the text indicating WHAT? and then clicks the search button.



There is also a map function which allows users to select a geographical extension and the search results will bring back any resource which has been identified geographically in its metadata. The map allows users to zoom in and out.



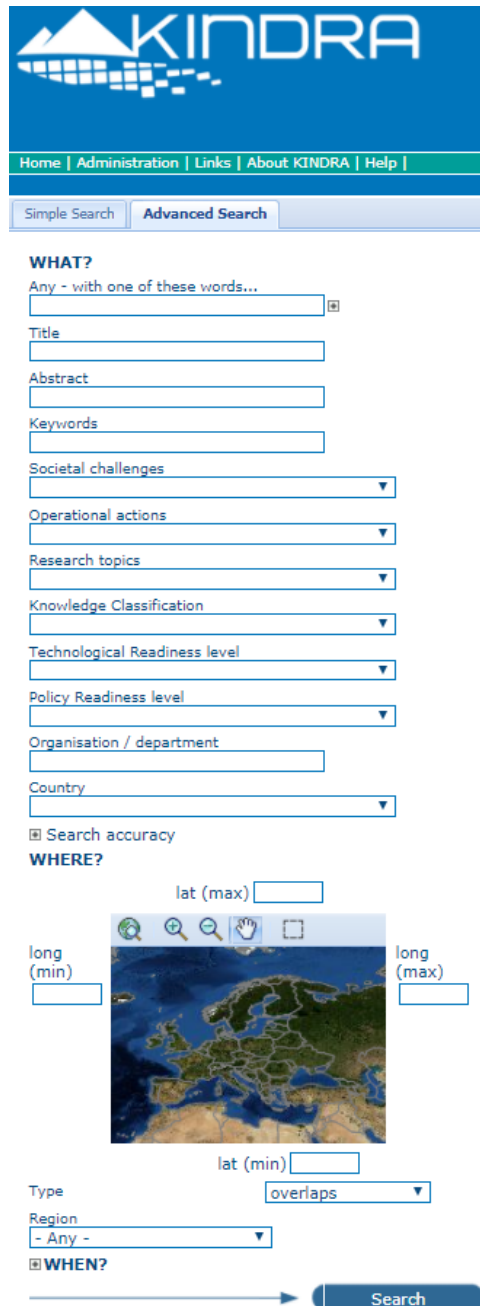
Clicking on the search button will bring back all the resources which have been cataloged within the selected map area:



Below the Simple Search menu we find a list of the Overarching categories which have been defined by the KINDRA Hydrogeological Research Classification System (HRC-SYS: 5 Operational Actions, 5 Research Topics and 5 Societal Challenges) and according to which resources should be classified. When selecting one of the categories listed, this will bring back as a result all the resources which have been classified according to the indicated category.



If we select the advanced search tab, it will open up a menu with more options, allowing us to query the EIGR according to specific terms concerning title, abstract or keywords, a combination of the HRC-SYS terms, typing in specific coordinates in the map bounding box or even by specifying a precise time interval which may be either according to the metadata change date or its temporal extent.



**KINDRA**

Home | Administration | Links | About KINDRA | Help |

Simple Search **Advanced Search**

**WHAT?**

Any - with one of these words...

Title

Abstract

Keywords

Societal challenges

Operational actions

Research topics

Knowledge Classification

Technological Readiness level

Policy Readiness level

Organisation / department

Country

☐ Search accuracy

**WHERE?**

lat (max)

long (min)

long (max)

lat (min)

Type

Region

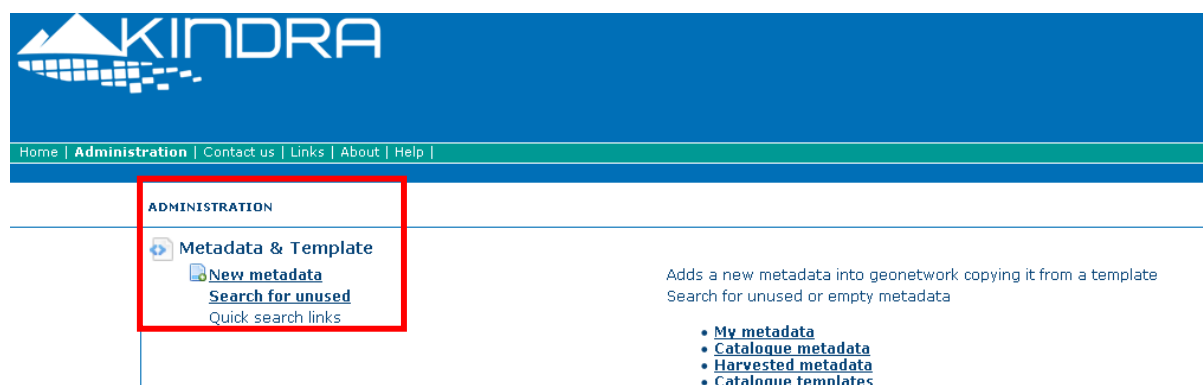
**WHEN?**

## Creating a Metadata

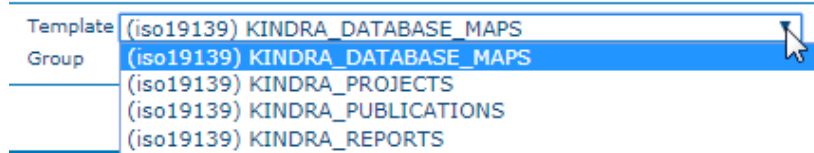
To be able to access the main functionality for which the EIGR has been designed and developed, Cataloging Resources linked to Hydrogeological Research throughout Europe, users will have to log in to the EIGR with their username and password and then proceed to click on the Administration tab. Remember, only Editors and higher profiles can Create and Edit metadata.



Doing so will take us to a new screen where we will be able to view a new menu which offers us the chance to add a new metadata to the EIGR by clicking on the New metadata option.



The interface will offer us a new window with a drop down menu which includes 4 preset the Templates according to the most common types of resources that are candidates to be included in the EIGR (Data Base Maps, Projects, Publications, Reports). Select one of the templates and click on the create button to proceed to include a new resource to the EIGR.



Users will reach the interface where to fill out the information requested by the EIGR in order to upload new contents.

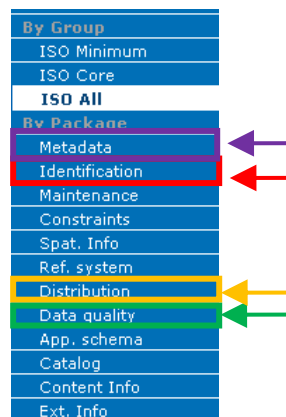
**PLEASE KEEP IN MIND THAT THE INFORMATION USERS INCLUDE MUST BE IN ENGLISH!**

Users will find that when filling out the different tags with the relevant information, some fields will be marked by a red asterisk \* which indicates that the tag is **mandatory** and must not be left blank. At the same time, users will be able to observe that many tags also include the following symbols:

☐ Allows users to duplicate the tags multiple times in case further details or information of the same type needs to be added

☐ Allows users to delete a tag which is unnecessarily duplicated or that has been added by mistake.

The information to be included in the EIGR for resource metadata is organized according to four different sections, which appear on the left side menu “**By Package**”. These are the only ones we will work with.



### IDENTIFICATION INFORMATION:

This section includes all relevant information regarding the resource title, acronym (when applicable), abstract, authors and their contact details, collaborating organizations and/or programs, funding sources and amounts, geographical extent covered as well as other relevant details which help identify or provide information regarding the resource (e.g. ISBN, ISSN, etc...) and if there might exist any legal restrictions or limitations to access the information.

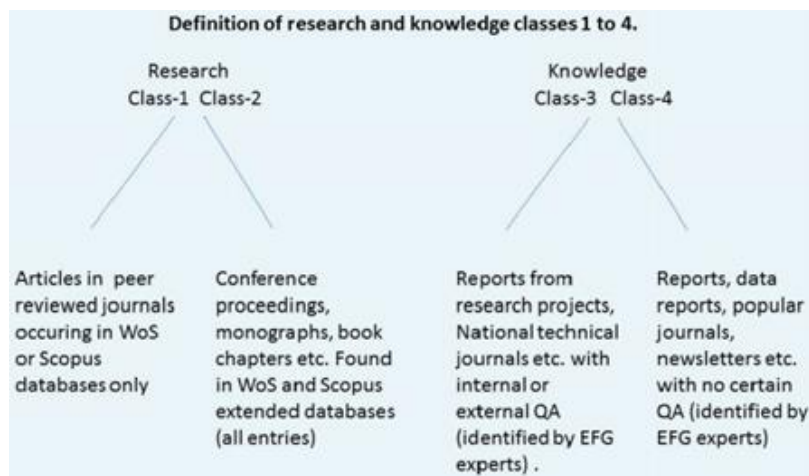
In this section is where the KINDRA HRC-SYS Keywords and Overarching Categories (Societal Challenges, Operational Actions and Research Topics) are defined and indicated for the resources which are being uploaded into the EIGR

### DISTRIBUTION INFORMATION:

This section indicates users the delivery or distribution methods available for the resource. It describes if there are any online or physical distribution methods that exist for the resource. Contents distributed online may be downloadable.

### DATA QUALITY INFORMATION:

This section provides an overall assessment on the quality of the resources by classifying the work according to Research and Knowledge classes defined by KINDRA, as specified below. Also other indicators as TRL and PRL are included in this section.



### METADATA INFORMATION:

This final section is dedicated to the overall information concerning the metadata, i.e. about the person/organization who insert the record into the EIGR.

The interface provides the exact same fields and tags to be completed as in the Resource Identification Information

**An appendix is included at the end of the manual with a checklist of the most relevant fields to be completed for the most recurrent types of resources to be included in the EIGR.**






## IDENTIFICATION INFORMATION:

It is the first section we encounter when we access the metadata template: It is divided into different subsections:

- DATA IDENTIFICATION
- POINT OF CONTACT
- DESCRIPTIVE KEYWORDS
- RESOURCE CONSTRAINTS
- TOPIC CATEGORIES
- EXTENT

### DATA IDENTIFICATION

▼ **IDENTIFICATION INFO**

Title *	<input type="text" value="KINDRA_DATABASE_MAPS"/>
Alternate title  	<input type="text" value="Alternate title"/>
Date *	<input type="text"/>  <input type="text"/> ▼
Date type *	<input type="text" value="Creation"/> ▼
Date *	<input type="text"/>  <input type="text"/> ▼
Date type *	<input type="text" value="Publication"/> ▼
Date *	<input type="text"/> 
Date type *	<input type="text" value="Revision"/> ▼

**Title (mandatory)**

Title of the resource, name in English.

**Alternative title**

In case the resource has an acronym and the name in its original language

**Date (mandatory)**  
options







Reference date for the resource; It can be according to one of the following

Creation: when the resource was created

Publication: when it was published

Revision: if it is an updated version

When the resource to be included in the EIGR is a publication of some sort (e.g. scientific article) and bibliographic references are available, the following fields are to be completed with the relevant details.

Name 	<input type="text" value="Name (Series)"/>	
Issue identification 	<input type="text" value="Issue identification (Series)"/>	
Page 	<input type="text" value="Page (Series)"/>	
Collective title 	<input type="text" value="Collective title"/>	The
ISBN 	<input type="text" value="ISBN"/>	follo
ISSN 	<input type="text" value="ISSN"/>	win
		g
		grou
		p of

tags is very important as they provide the basic frontline information which describes the resources included in the EIGR

Abstract \*

Abstract template KINDRA

Purpose ☒

Purpose

Credit + ☒

(one item per credit: collaborators, funding programme, budget #XX.XXX,XX€, organizations...)

**Abstract (mandatory)**

Brief summary which describes the resource

**Purpose**

Reason for which the resource was created

**Credits**

This is a tag which can be repeated as many times as necessary, it serves to indicate relevant information concerning any contributions to the resource, Program funding, Budgets, cooperation on behalf of and between different organizations or parties, individuals. **Each item must be included independently, one per credit!**

## POINT OF CONTACT

Information concerning the person and/or organization responsible for creating the resource has to be specified in this section.

▼ **Point of contact** + ☒

Individual name ☒	Individual name
Organisation name ☒	Organisation name
Position name ☒	Position name
Role *	Originator ▼

**Name** Person to contact concerning the resource

**Organization** Organization to which the person belongs to (mandatory for KINDRA purposes).

**Position Name** Functions or Position of the person at the organization

**Role (mandatory)** Here is where the role must be indicated, according to the options offered by the drop down menu: Author, Owner, Point of contact, etc.

---

Voice  	<input type="text" value="Voice"/>
Facsimile  	<input type="text" value="Facsimile"/>
Delivery point  	<input type="text" value="Delivery point"/>
City 	<input type="text" value="City"/>
Administrative area 	<input type="text" value="Administrative area"/>
Postal code 	<input type="text" value="Postal code"/>
Country 	<input type="text" value="Spain"/> <input data-bbox="887 562 1212 595" type="text" value="Spain"/>
Electronic mail address  	<input type="text" value="a@a.com"/>

---

▼ **OnLine resource**

URL *	<input type="text" value="www.a.com"/>
Protocol	<input type="text" value="WWW:LINK-1.0-http--relate"/> (Suggestions: <input data-bbox="879 763 1212 797" type="text"/>
Name of the resource	<input type="text" value="Name of the resource (Website)"/>

The information for the tags indicated in the previous image is self explanatory, but mention must be made to the website and online resource linkage. If there exists a website associated to the organization; the information must be completed as follows:

**URL (mandatory)** Web address of the organization or person of contact

**Protocol** From the drop down menu, we proceed to select the option "**Related link (URL)**".

**Name of the resource** Indicate the name of the website

## DESCRIPTIVE KEYWORDS

The descriptive keywords which are to be employed when uploading a resource into the EIGR are the ones defined by the HRC-SYS. The list of keywords has been included in the KINDRA THESAURUS. A thesaurus is a list of words (or concepts) from a specialized field of knowledge.

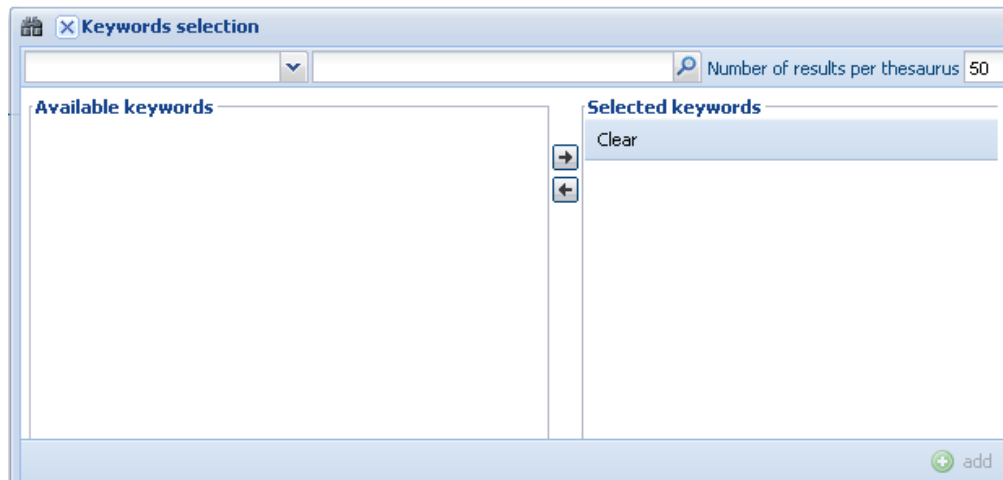
In a metadata catalog, words from a thesaurus can be assigned to a metadata record as keywords as a way of associating it with one or more concepts from a field of knowledge. For example, a record may be assigned a keyword 'MAPPING – remote Sensing' meaning that the record describes a resource or activity relating to remote Sensing in the field of Mapping.

**The user must choose keywords from the KINDRA thesaurus.**

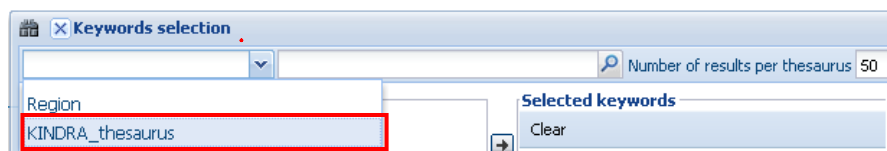
To assign a keyword, users must simply click on the binocular icon

▼ **Descriptive keywords**   

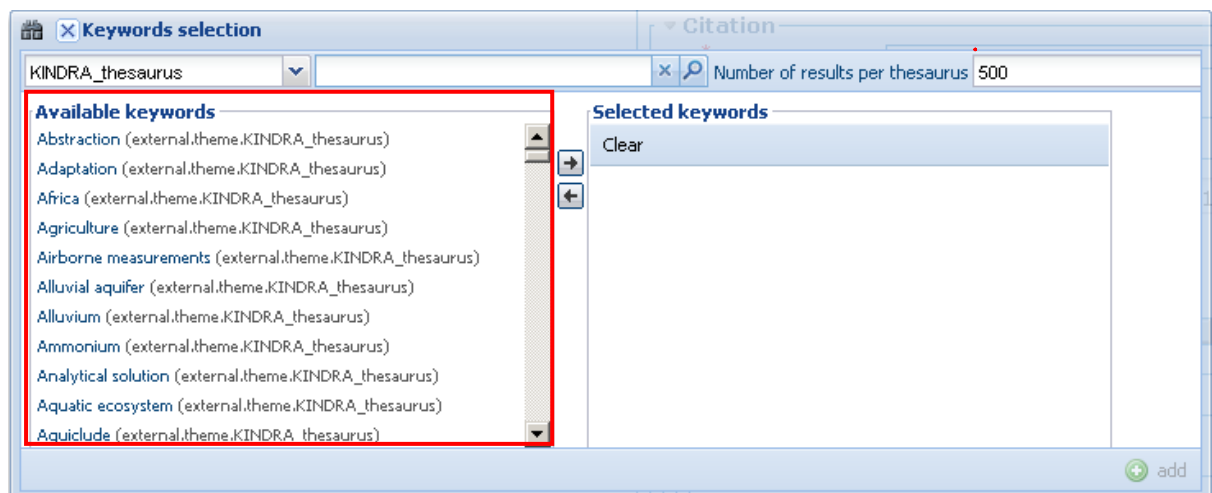
This will deploy the following dialog box, which will offer us the possibility to define the keywords to associate to the resource.



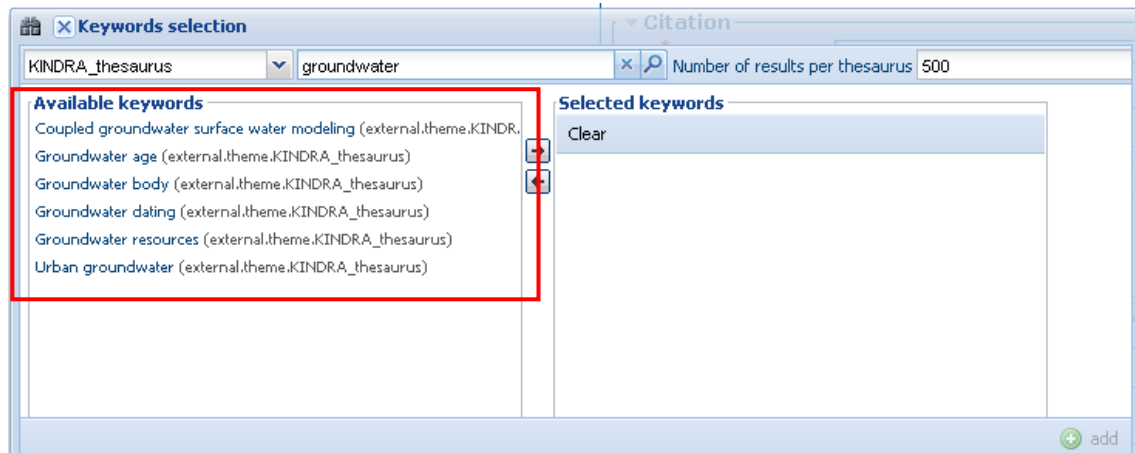
But first the drop down menu must be deployed and the KINDRA Thesaurus must be selected.



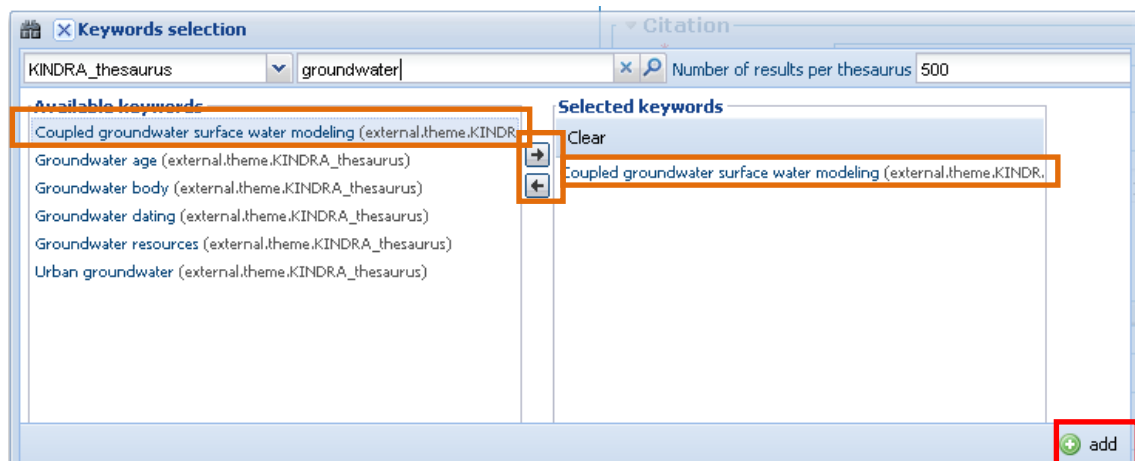
Doing so will load the list of keywords which are included in the Thesaurus. In order to be able to view the complete list of keywords, simply change the number of results per Thesaurus to a value of 500. As the KINDRA Thesaurus accounts for a total of keywords no greater than 320 terms, by setting the value to a greater number we ensure that all the keywords appear in the list.




Keywords can also be added from the Thesaurus by searching specific terms, for example, should we want to search for keywords related to groundwater, by typing “groundwater” into the blank field to the right of the Thesaurus selection tab and clicking on the magnifying glass icon, the dialog menu will bring back all keywords with the word groundwater.



To add the keyword to the metadata, simply double click on the keyword and it will pass to the selected screen.



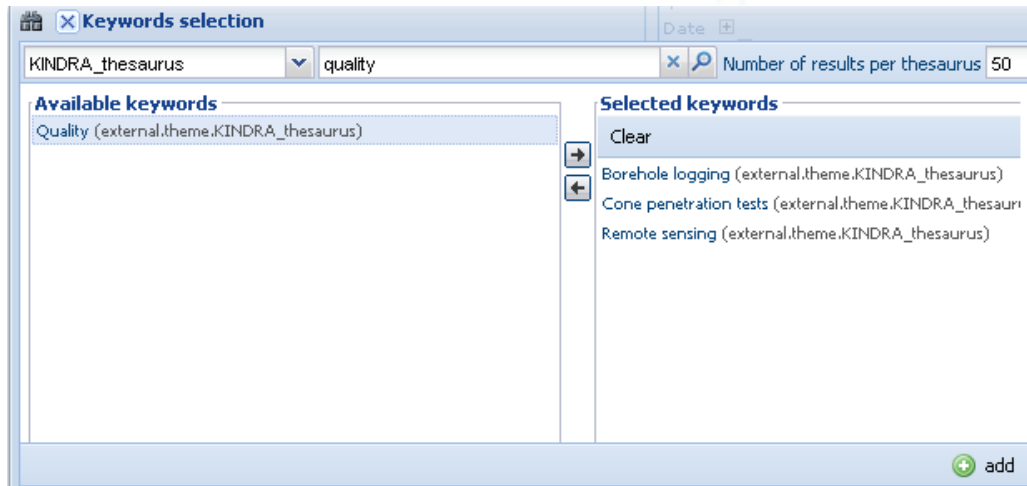
This can also be done by selecting the keyword and clicking on the arrows between both windows, , to either add or remove the keyword from the selected dialog box.

Then, when all the keywords that the user wants to assign from the KINDRA thesaurus have been included in the Selected Keyword window, the user simply needs to click on the add icon which is on the lower right corner of the dialog box, as indicated in the previous image.

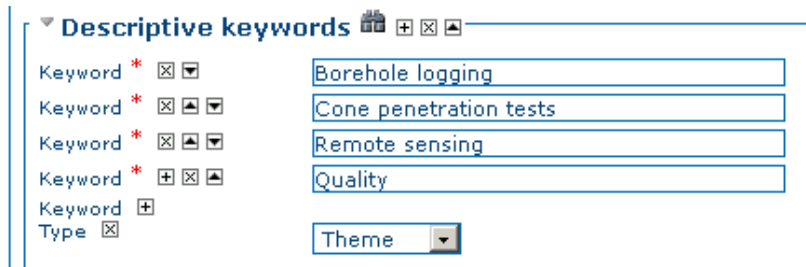
Once the keywords have been added to the metadata template, they will appear as follows:




Additional keywords may be added afterwards or at a later stage, independently by simply following the same procedure:



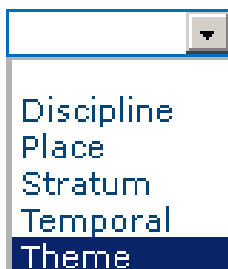
Bearing the same result as described for the previous example



Should a user desire **to add a keyword which is not found in the list of keywords included in the KINDRA THESAURUS**, all they need to do is click on the **+** symbol and it will deploy a new tag where we simply need to include the keyword we wish to add to the resource in the red box that will appear.



Then specify the **"Type"** field by selecting from the drop down menu the term **"Theme"**



## RESOURCE CONSTRAINTS

This provides information about any possible constraints that might apply to the resources loaded to the EIGR, such as legal restrictions or prerequisites for accessing the resource, use limitations indicating privacy or intellectual property. In this section is where we must include or indicate if there are any patents existing or pending, copyrights or licenses concerning the resource.



<b>Legal constraints:</b>	Restrictions and legal prerequisites for accessing and using the resource or metadata.
<b>Use limitations:</b>	Limitation affecting the fitness for use of the resource, for example if it is not apt to be employed for further research efforts due to specific conditions.
<b>Access constraints:</b>	Restrictions to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource: License, Patent, Pending Patent, restricted, Trademark, Copyright. (Dropdown menu)
<b>Use constraints:</b>	Restrictions to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the resource: License, Patent, Pending Patent, restricted, Trademark, Copyright. (Dropdown menu)
<b>Other constraints:</b>	Other constraints or legal prerequisites for accessing and using the resource.

## TOPIC CATEGORIES

The main feature of the classification system developed by KINDRA is the grouping of relevant research according to the overarching categories which consist of 5 societal challenges - 5 operational actions and 5 research topics.

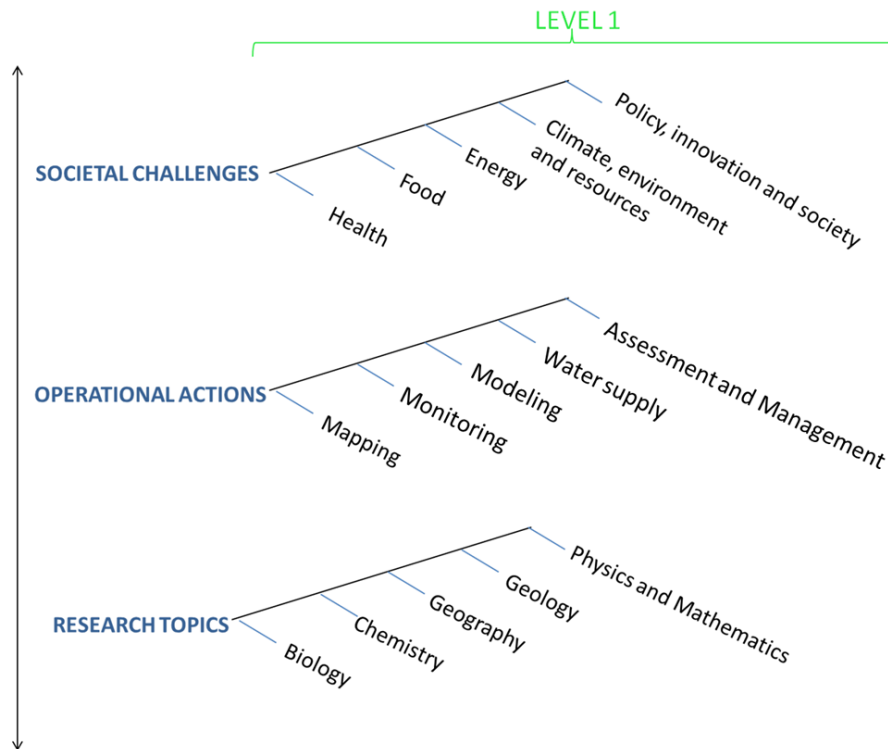
The selection was based on the most important general research topics and operational actions in relation to the major natural science disciplines or research topics to which groundwater research primarily belongs and relates: 1. Biology, 2. Chemistry, 3. Geography, 4. Geology, 5. Mathematics and Physics (alphabetical order).

For operational actions, the selection was made according to keyword searches in Web of Science, Scopus, Google Scholar, selected groundwater science journals and EU directives and guidances; primarily the Water Framework Directive, the Groundwater Directive and the Blueprint to Safeguard Europe's Water Resources as well as the KINDRA questionnaires completed by the 20 experts of national geological societies / the European Federation of Geologists. The overarching operational actions selected were: 1. Mapping, 2. Monitoring, 3. Modeling, 4. Water supply, 5. Assessment and Management

For societal challenges the references were taken from the Horizon 2020 EU Framework Program for Research and Innovation, in order to make the classification as relevant as possible to the main challenges of the EU research programs, and to facilitate the evaluation of groundwater research importance within the context of the Horizon 2020 challenges and visions.

There are 7 societal challenges in Horizon 2020, but SC4 is dedicated to transport which KINDRA has determined bears no groundwater relevance and SC6 and SC7 have many overlapping issues of relevance concerning groundwater research and KINDRA decided to merge them. This has resulted in the following five societal challenges for groundwater research classification and evaluation: 1. Health, 2. Food, 3. Energy, 4.

Climate/Environment/Resources (corresponds to SC5 of H2020), 5. Policy/Innovation/Society (corresponds to SC6 and 7 of H2020).



As most of the current and future research efforts should fit into at least one of the overarching societal challenges, operational actions and research topics, these will constitute the main classification reference in the EIGR. It is in this section of the EIGR is where we assign to each resource uploaded the main three topic categories, as defined by the HRC-SYS.

**Please be aware that these Three Topic Category Codes are MANDATORY!!!Users must select one Operational Action, one Societal Challenge and one Research Topic.**

By clicking on the drop down menu you can select one of the according categories.

▼ **Societal challenges** + ⊗

Societal challenges \*

▼

Societal challenges +

▼ **Operational actions** + ⊗

Operational actions \*

▼

Operational actions +

▼ **Research topics** + ⊗

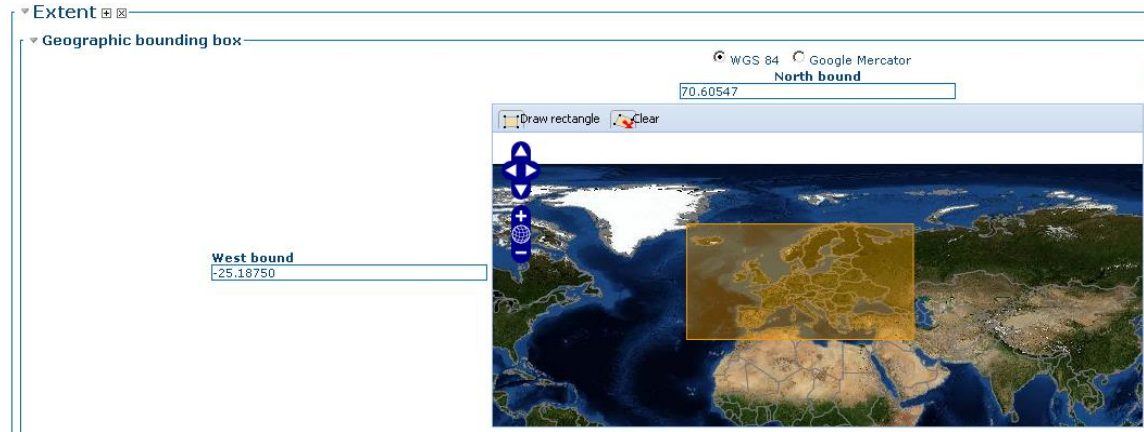
Research topics \*

▼

In cases where more than one of each Topic category could be assigned to a resource, later on in the manual (Editing Metadata and Additional Categories, page 30) this possibility is discussed and detailed. But this section is reserved to identifying the most relevant topic categories which are linked to the resource.

## EXTENT

This section allows users to assign a geographical reference to the resource uploaded to the EIGR. This can be either carried out by drawing a rectangle on the MAP, or by indicating the coordinates of the bounding box specifying the area of interest. It is highly recommended that all resources be geographically referenced.



To select a specific region or area by employing the map tool, users must in first place click on the clear button to avoid having any preselected default area appear on the map.

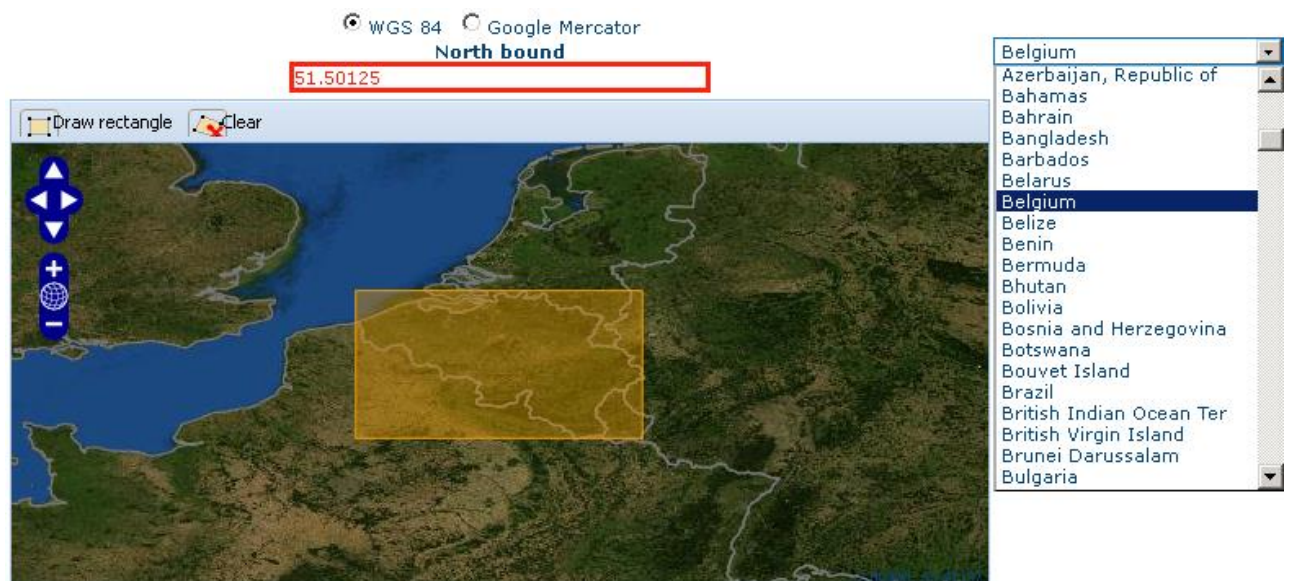


Once the map has been cleared, you can place the cursor on the map and use the mouse to both zoom in or out and drag the cursor in order to move around the map in order to search for the desired area.

Then simply proceed to click on the “Draw rectangle” button in order to be able to draw a rectangle on the area of your choice by clicking on the map and dragging the cursor to select the area of your choice.



An additional option is to select a predefined area which is included in the drop down menu that can be found on the upper right hand of the map.



An additional tag is included in this section:

Supplemental Information ☒

Supplemental Information

**Supplemental information:** Additional descriptive information regarding the resource location or area.

## DISTRIBUTION INFORMATION

This section specifies how the resource is made publicly available or under which format it is distributed or may be obtained. Resources may account for a **DOI (Digital Object Identifier assigned by the publisher)**, or have links to written reports, digital reports, and PDF files.

Other formats may also apply depending on the nature of the resource (Maps and cartography, shapefiles, images, etc.).

The first step is to assign a format to the information. The most recurrent type is text, but a dropdown menu offers various choices as a **Suggestion**. If a user is unsure then it is advisable they leave the default option **Text**.

▼ **DISTRIBUTION INFORMATION** ☒

▼ **Distribution**

▼ **Distribution format** ☒ ☒

▼ **Format**

Name \*  Suggestions:

Version \*

Amendment number ☒

Specification ☒

File decompression technique ☒

Format distributor ☒

**Name** (mandatory): Name of the data format, options may range from a variety of options which can be found in the suggestions drop down menu which can be found to the right (PDF, Text, ZIP, etc.)

(Suggestions: )

- Text
- ESRI Shapefile
- Mapinfo MIF/MID
- Mapinfo TAB
- KML
- GML
- GeoTIFF
- TIFF
- ECW
- JPEG2000
- ZIP
- PDF**
- PNG
- JPEG
- OGC:WMC
- OGC:OWS Context

**Version**: Version of the format. Generally refers to the version of the software which supports the distribution form. Although it is indicated as **mandatory**, simply include this information if it is accessible or leave the default value.

The **Linkage** information is where the user indicate the access to the resource Online,

**URL (mandatory)**: The Uniform Resource Locator for accessing the resource on the web, or what is most commonly known as the web address. The protocol is selected from the drop down menu offered by the suggestion box, if one is unfamiliar, the most recommendable option is to select Related link (URL).

▼ **OnLine resource** ☒ ☒

▼ **OnLine resource**

▼ **Linkage**

URL \*

Protocol  (Suggestions: )

Application profile ☒

Name of the resource

Description ☒

**Name of the resource:** Name of the resource, usually matches the title of the resource

**Description:** Detailed text description of what the online resource is/does

When the **DOI (Digital Object Identifier assigned by the publisher)** is available, we can find ourselves with two possible situations:

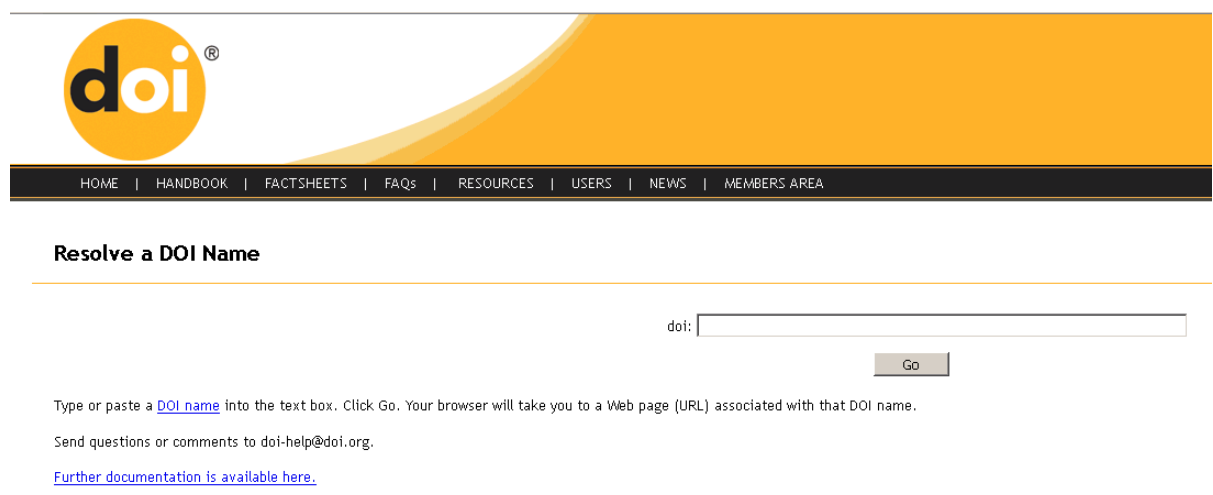
The direct DOI link to the resource is available.

Only the DOI reference number is available

If the direct DOI link to the resource is available, the user must simply include the link in the URL field and provide the name of the resource as well as the description:



In case that only the DOI reference number is available, to obtain the DOI link the user can visit the following link <http://www.dx.doi.org/>:



[DOI System Proxy Server Documentation](#)

doi®, DOI®, DOI.ORG®, and shortDOI® are trademarks of the International DOI Foundation.

The next step requires for the user to include the DOI reference in the search field:

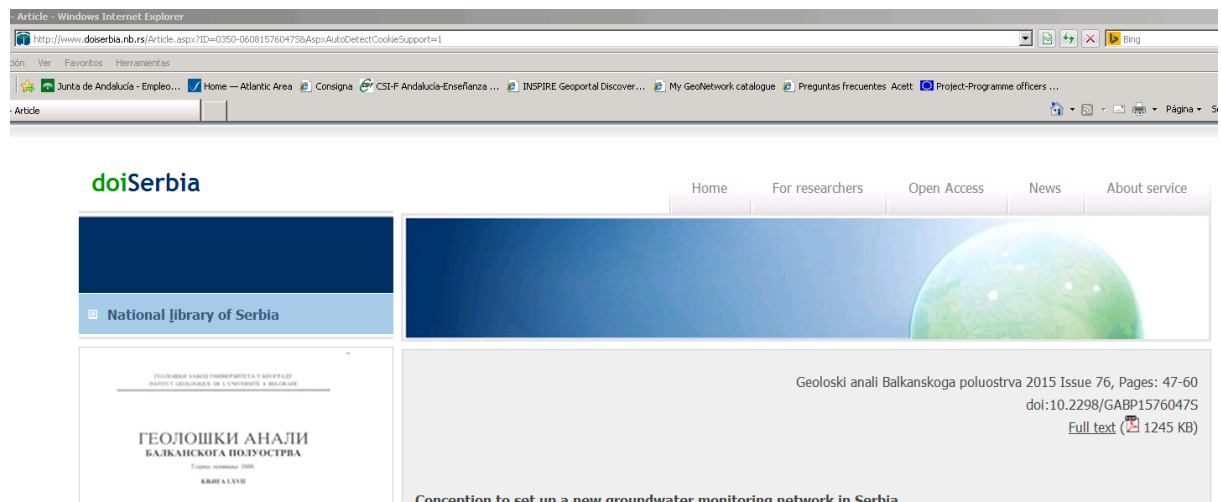
Example **DOI: 10.2298/GABP1576047S**



## Resolve a DOI Name

doi:

By clicking on the  button it takes us to the URL of the resource:



From there we obtain the URL, the complete the name and description which we use to complete the necessary fields of the metadata .



▼ Linkage

URL \*

Protocol  (Suggestions: )

Application profile

Name of the resource

Description ☒

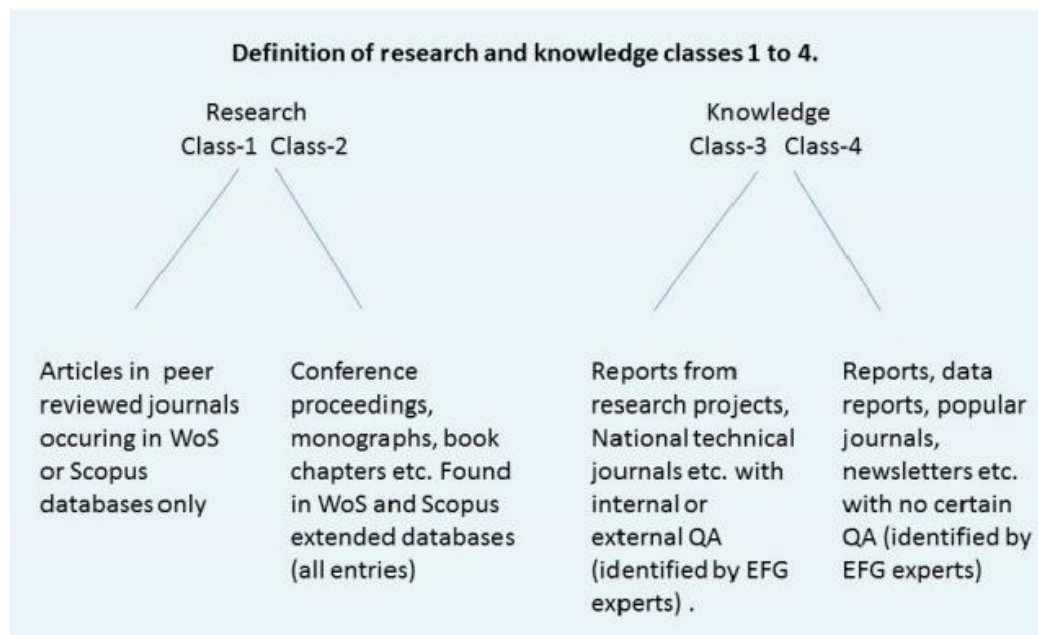
## DATA QUALITY INFORMATION

This is the next section which is directly linked with the **Hydrological Research Classification System, to the Technological Readiness Levels (TRL) and Policy Readiness Levels (PRL)**. It is here where users will indicate the type of knowledge classes, TRL and PRL to which the resource belongs to according to the following categories:

### KNOWLEDGE CLASSES

Class-1)	Research: Peer-reviewed papers (in Web of Science or Scopus and High Quality Assessment)
Class-2)	Research: Non-Peer-reviewed papers (Books, Proceedings and others searchable in Web of Science or Scopus and High Quality Assessment)
Class-3)	Knowledge: Quality assured or reviewed papers (not included in WoS or Scopus but Quality Assessed)
Class-4)	Knowledge: Non reviewed papers (Projects, Maps, others)

These classes have been specifically identified for this project, and it is **mandatory** to identify the class of your product. Class identification can be resumed by the following scheme:



### TECHNOLOGICAL READINESS LEVELS (TRL)

Description of the Technology Readiness Level (from TRL1 to TRL9, as classified by the European Community) can be included as additional indicator for estimating technology maturity of a product. It is **recommended** to include this indicator. The product to be inserted has to be assigned to one of the following levels:

TRL 1: basic principles observed

TRL 2: technology concept formulated

TRL 3: experimental proof of concept

TRL 4: technology validated in lab

TRL 5: technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 6: technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 7: system prototype demonstration in operational environment

TRL 8: system complete and qualified

TRL 9: actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

### POLICY READINESS LEVELS (PRL)

This is another indicator has been identified for the EIGR concerning resources included in the inventory. With it we seek to assess the conceptual maturity of a resource regarding how it can bring added value to the policies drafted by the European Commission, in this specific case focusing on the Water Framework Directive. The following are the different levels which have been defined as PRL:

PRL 1: Not relevant for EU policy implementation

PRL 2: Potentially relevant for EU policy but additional research needed

PRL 3: Relevant for implementation of EU policy, basic research conducted but guidance need to be developed

PRL 4: Guidance available: ready for implementation of EU policy (e.g. in river basin management plans)

This is the **information that must be included** by simply selecting the corresponding option from the drop down menus:

▼ Knowledge Classification

Knowledge Classification

▼ Technological Readiness level

Technological Readiness level

▼ Policy Readiness Level

Policy Readiness Level

A brief

description on the reason for including the resource in the specific classes should described in section **Process step**, in the tag indicated as **Description** (e.g. **Private and Public Research Project, technological concept developed**):

▼ Process step

▼ Process step

Description \*

Research Project born from the Private and Regional Public Sectors.

Development of new sensors for G.W.B. detection

## METADATA INFORMATION

The final section of the metadata template is dedicated to provide further details on the metadata and identifying the party who is responsible for including the resource into the KINDRA EIGR.

**METADATA**

File identifier: a94cb4f9-cec3-4fca-9b8c-126987f02d49  
 Metadata language: ISO Language code (gmd:LanguageCode) ▼  
 Character set: UTF8: 8-bit variable size UCS Transfer Format, based on ISO/IEC 10646  
 Parent identifier: Scope code (gmd:MD\_ScopeCode) ▼  
 Hierarchy level: Scope code (gmd:MD\_ScopeCode) ▼  
 Hierarchy level name: 2018-03-27T15:32:25  
 Date stamp: 2018-03-27T15:32:25  
 Metadata standard name: 2018-03-27T15:32:25  
 Metadata standard version: 2018-03-27T15:32:25

**Contact**

Individual name:   
 Organisation name:   
 Position name:   
 Role: Point of contact ▼

**Contact Information**

**Phone**

Voice:   
 Voice:   
 Facsimile:   
 Facsimile:

**Address**

Delivery point:   
 Delivery point:   
 City:   
 Administrative area:   
 Postal code:   
 Country:   
 Electronic mail address:   
 Electronic mail address:

Website:   
 Hours of service:   
 Contact instructions: Text (gco:CharacterString) ▼

For the EIGR users will simply have to fill out the tags related to the Contact section. Just as in the previous Identification Information section which was discussed in detail, the information which is requested to be completed is rather simple and self explanatory:

Individual name   
 Organisation name   
 Position name   
 Role \*

**Name** Editor responsible for creating the metadata record of the resource.

**Organization** Organization to which the Editor belongs to.

**Position Name** Functions or Position of the Editor at the organization

Although none of the previous three fields are marked as mandatory, the EIGR will require for the users who are editing a resource metadata to include the above information.

**Role (mandatory)** Here is where the role must be indicated, according to the options offered by the drop down menu: Author, Owner, Point of contact, etc.

▼ **Contact Information** ☒

▼ **Contact**

▼ **Phone** ☒

▼ **Telephone**

Voice ☒ ☒

Voice ☒  
Facsimile ☒ ☒

Facsimile ☒

▼ **Address** ☒

▼ **Address**

Delivery point ☒ ☒

Delivery point ☒  
City ☒

Administrative area ☒

Postal code ☒

Country ☒

Electronic mail address ☒ ☒

Electronic mail address ☒

▼ **Website** ☒

▼ **OnLine resource**

▼ **Linkage**

URL \*

Protocol  (Suggestions: )

Application profile ☒  
Name of the resource

Description ☒  
Function ☒

Hours of service ☒  
Contact instructions ☒

**URL (mandatory)** Web address of the organization or person of contact

**Protocol** From the drop down menu, we proceed to select the option Related link (URL).

**Name of the resource** Indicate the name of the website

When all the available information there exists for the resource has been provided according to the previous steps, the Editor simply needs to proceed to click on the **Save and Close** button.

Type

In this case, the **Type** option is set to Metadata; this must not be modified by Editors.

The **Reset** button offers Editors to clear all the information they have included into the Metadata template so they may proceed to begin anew. The **Check** button allows for the system to verify if the template is being completed accordingly and in case any errors are being made, these will be highlighted by the system. **Cancel** simply takes the user out of the Edition mode, bringing them back to the Administration menu.

The **Other actions** are not functions of use for the uploading of resources to the EIGR.

## Editing Metadata and Additional Categories

Once a metadata is created, in order to complete its inclusion into the EIGR users will have to assign the privileges it has. In order to proceed to do so, users will simply have to select a metadata record which has been created and completed according to the different information sections which have been detailed in the previous sections of this document.



English

User: admin admin Logout

Show map

KINDRA. KNOWLEDGE FOR HYDROGEOLOGY RESEARCH

Aggregated results matching search criteria : 1-4/4 (page 1/1) , 1 selected

Select : all, none actions on selection

Sort by Title

☒ KNOWLEDGE INVENTORY FOR HYDROGEOLOGY RESEARCH

Abstract: Practical and scientific knowledge related to hydrogeology research and innovation are scattered amongst various actors in Europe. Project objectives: 1. Create a uniform EU-harmonised categorisation...

Keywords: Hydrology, Monitoring, Europe, Policy, innovation and society, Research Topics, Hydrogeology

Schema: iso19139

Extent: -10.917479306459 34.788090229034 36.543458193541 66.428715229034

Metadata

Edit Delete Other actions

Owner: admin

The selection of a metadata record is carried out by ticking the checkbox which can be found on the upper left side of its title, marked by a red circle in the image above.

The next step consists in selecting the action which we will take next by choosing it from the drop down menu that is indicated by the actions on selection button, on the far right side of the screen.



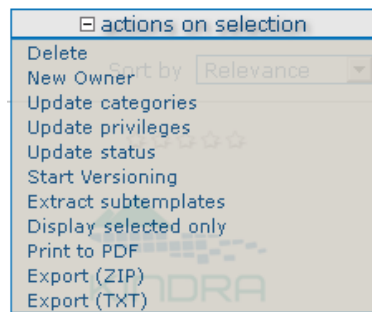
English

User: admin admin Logout

Select : all, none actions on selection

Sort by Title

The options deployed indicate all the actions which can be taken for editing a metadata record in the EIGR:



Related to the task of incorporating new contents and records into the EIGR, users will be dedicated to the following actions:

**Delete:** Eliminates the metadata record included in the EIGR. Each user is directly responsible for the metadata they insert and create. Users with an Editor profile can only edit their own metadata and can do so at any time. The only other users who can modify metadata for other users are those who have the Reviewer or Administrator privileges

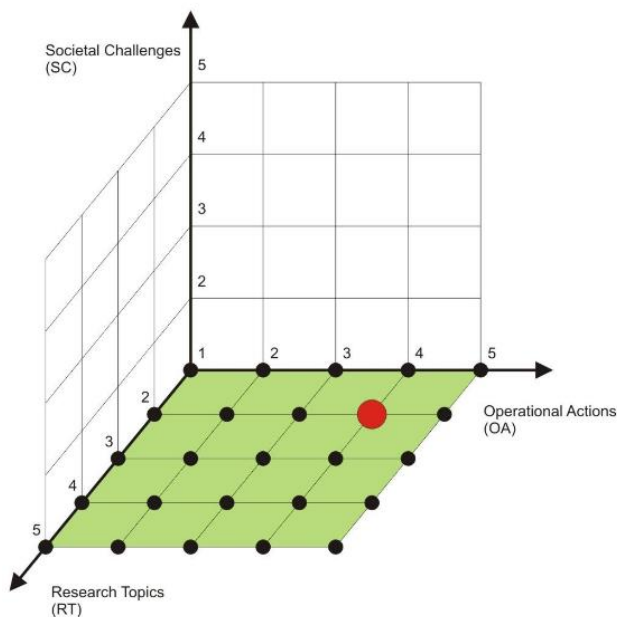
**Update categories:** Allows a user to assign multiple categories to the metadata resources uploaded

**Update privileges:** Allows a user to designate the kind of access the resource will have through the EIGR

The first action needs no further clarification but further details must be provided to clarify the remaining two action.

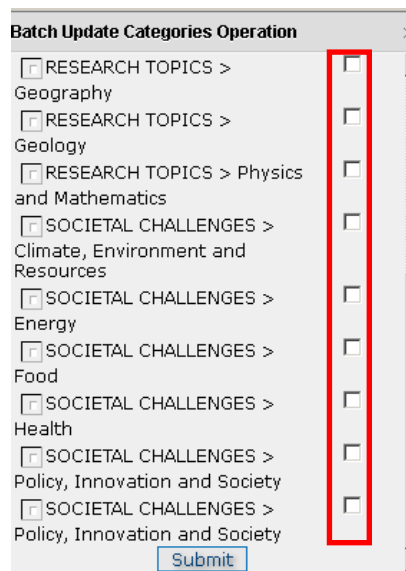
## CATEGORY UPDATING

As indicated in the Metadata creation, the main feature of the classification system developed by KINDRA is the grouping of relevant research according to the overarching categories, but in the creation only the three most relevant or representative categories are selected. This is to situate the resource within the 3D structure according to which the classification system is structured following the relation between the three main categories (CUBE).



In many cases a resources is liable to fall into more than one of the overarching categories which have been defined by the KINDRA HRC-SYS. And in order to include these possibilities, this is the section where users can assign multiple categories to a resource which is included in the EIGR.

The user selects the action from the menu indicated as Update categories and this will result in a new box opening up where the user can select the three categories previously included in the metadata record for the resource as well as those which are also related. This is done by checking the empty boxes on the right side of the menu:



**Batch Update Categories Operation**

☐ RESEARCH TOPICS > Geography

☐ RESEARCH TOPICS > Geology

☐ RESEARCH TOPICS > Physics and Mathematics

☐ SOCIETAL CHALLENGES > Climate, Environment and Resources

☐ SOCIETAL CHALLENGES > Energy

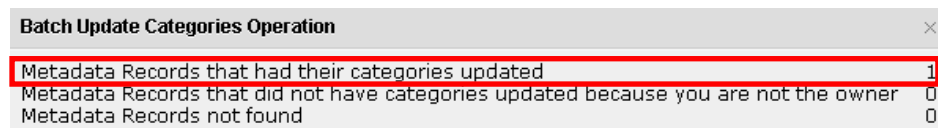
☐ SOCIETAL CHALLENGES > Food

☐ SOCIETAL CHALLENGES > Health

☐ SOCIETAL CHALLENGES > Policy, Innovation and Society

☐ SOCIETAL CHALLENGES > Policy, Innovation and Society

Once all the categories desired have been selected, the user must click on the submit button and should get a confirmation message indicating if the operation has been successful or not:

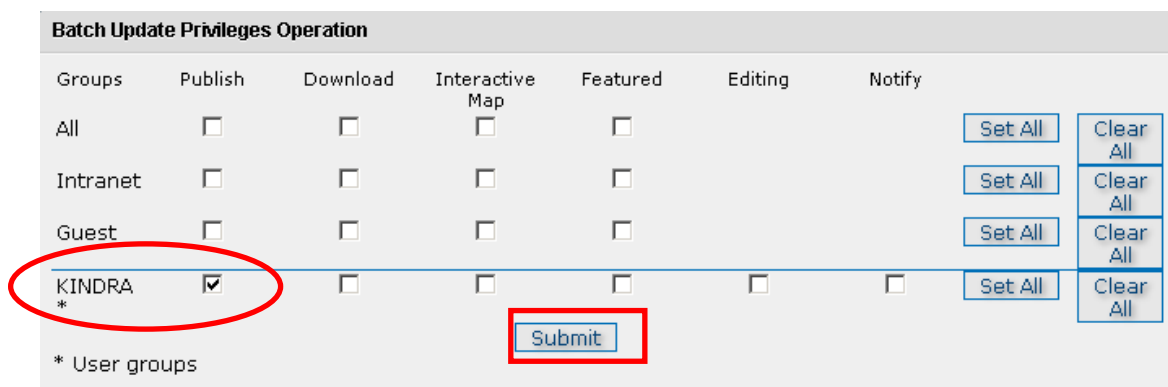


**Batch Update Categories Operation**

Metadata Records that had their categories updated	1
Metadata Records that did not have categories updated because you are not the owner	0
Metadata Records not found	0

## PRIVILEGE UPDATING

Through this section we allow for other registered users to view and access the resources we have uploaded into the EIGR. For Project purposes, and because we are describing the tasks of including resources into the EIGR, once an Editor has finished including a resource into the EIGR, the next step requires activating the **"Publish"** box for the KINDRA group of users. The Editor will finalize the operation by clicking on the submit button. Then, a reviewer from the KINDRA Project will need to validate the metadata.



**Batch Update Privileges Operation**

Groups	Publish	Download	Interactive Map	Featured	Editing	Notify		
All	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="button" value="Set All"/>	<input type="button" value="Clear All"/>
Intranet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="button" value="Set All"/>	<input type="button" value="Clear All"/>
Guest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="button" value="Set All"/>	<input type="button" value="Clear All"/>
<b>KINDRA *</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="Set All"/>	<input type="button" value="Clear All"/>

\* User groups