



## KINDRA DELIVERABLE D1.5

### EUROPEAN INVENTORY OF GROUNDWATER RESEARCH: EIGR DEMO VERSION

#### *Summary:*

This document presents the KINDRA project EIGR Online Data Catalogue Demo Version: <http://operational.kindraproject.eu:8080/geonetwork/srv/eng/main.home>. It incorporates background information on its development, design, structure and technical aspects of the “Alpha” version of the EIGR (European Inventory of Groundwater Research).

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## 1. Executive summary

This document provides a general presentation of the KINDRA Project EIGR DEMO VERSION “Alpha” describing its format, design, the development process and functionalities. The deliverable is the EIGR Online Data Catalogue itself (available at <http://kindra.kindraproject.eu:8080/geonetwork/srv/eng/main.home>) rather than a formal paper. Nevertheless, this document presents an overview of the activity carried out corresponding to the task (Task 1.4) and of the EIGR DEMO VERSION (as of September 2015 – M9).

## 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

## 3. Objectives of the EIGR

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. The first steps taken which have led to setting up the EIGR DEMO VERSION have consisted in:

- ✓ Setting up a server with the technical specifications to support the installation of the online platform for the EIGR;
- ✓ Configuring and adjusting the online platform to define an interface which will allow for the initial uploading of contents into the EIGR DEMO VERSION.

During 2016, the National Experts identified by the European Federation of Geologists, who will be receiving a specific training session on how to operate the EIGR DEMO VERSION, will cooperate with KINDRA by populating it with related and relevant contents and resources.

#### 4. Technical aspects

The EIGR DEMO VERSION Online Data Catalogue has been prepared through the cooperation between LPRC and REDIAM and is hosted by LPRC. The server specifications system setup has been carried out according to the following installation:

- ✓ Distributor ID: Ubuntu
- ✓ Description: Ubuntu 14.04.3 LTS
- ✓ Release: 14.04
- ✓ Codename: trusty
- ✓ Tomcat7 (port:8080)
- ✓ OpenJDK7
- ✓ PostgreSQL 9.3 + postgis
- ✓ Postfix mailing system
- ✓ Daily backup
- ✓ Logcheck
- ✓ Softraid reporting
- ✓ Firewall
- ✓ SSH with rsa key based authentication.

The Tomcat server (Fig. 1) can be accessed at the following URL:  
<http://kindra.kindraproject.eu:8080/welcome.html>

The Administrator Section is accessed through the following URL:

<http://kindra.kindraproject.eu:8080/manager/html>

The screenshot displays the Tomcat Manager interface. At the top, there's a message box and navigation links. Below is a table titled 'Aplicaciones' with the following data:

Traectoria	Versión	Nombre a Mostrar	Ejecutandose	Sesiones	Comandos
/	Ninguno especificado		true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar > 30 minutos
/docs	Ninguno especificado	Tomcat Documentation	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar > 30 minutos
/examples	Ninguno especificado	Servlet and JSP Examples	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar > 30 minutos
/geonetwork	Ninguno especificado	geonetwork	true	2	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar > 180 minutos
/host-manager	Ninguno especificado	Tomcat Host Manager Application	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar > 30 minutos
/manager	Ninguno especificado	Tomcat Manager Application	true	1	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar > 30 minutos

Below the table is a 'Desplegar' section with a link to 'Desplegar directorio o archivo WAR localizado en servidor'.

Figure 1: Tomcat Server Administration Section

The software employed for installing and setting up the EIGR DEMO VERSION, according to the previously indicated server specifications, is Geonetwork (open source) <http://geonetwork-opensource.org/> . It was developed as a pilot project on behalf of the Food and Agriculture Organization of the United Nations and is widely used by different administrations and organizations throughout the world. Although the latest version available when discussing the preparation for the EIGR Online Data Catalogue was 3.0, we proceeded to the installation of version 2.10.4 as it was the most stable version available at the time. The possibility to upgrade the EIGR to the Geonetwork 3.0 will be evaluated at the end of the project, if the inventory will remain active for future uses.

The Geonetwork site has available user and developer manuals alike <http://geonetwork-opensource.org/docs.html> .

Geonetwork is the recommended solution for the KINDRA project EIGR as it has many features which adjust to the required conditions as per the description of Task 1.4 included in the KINDRA Project Grant Agreement. It allows for information to be available, accessible and usable through services implementing relevant INSPIRE catalogue and download services. It serves as a data catalogue that allows for searching, consulting and downloading information which has been collected and stored. The catalogue can contain metadata records. It can act as a “distributed catalogue” where Users and Data Providers can create and modify their own metadata. It allows for the definition of ETL tools (Extract, Transform and Load), provides the capacity for query functions for data evaluation and the production of statistics, diagrams, Web Services, a Client application that allows viewing Web Services by different users, it follows ISO standards and guidelines for organizing and structuring information and metadata. It allows for the creation of categories and groups and it also allows for the creation of a specific Thesaurus (a list of thematic keywords).

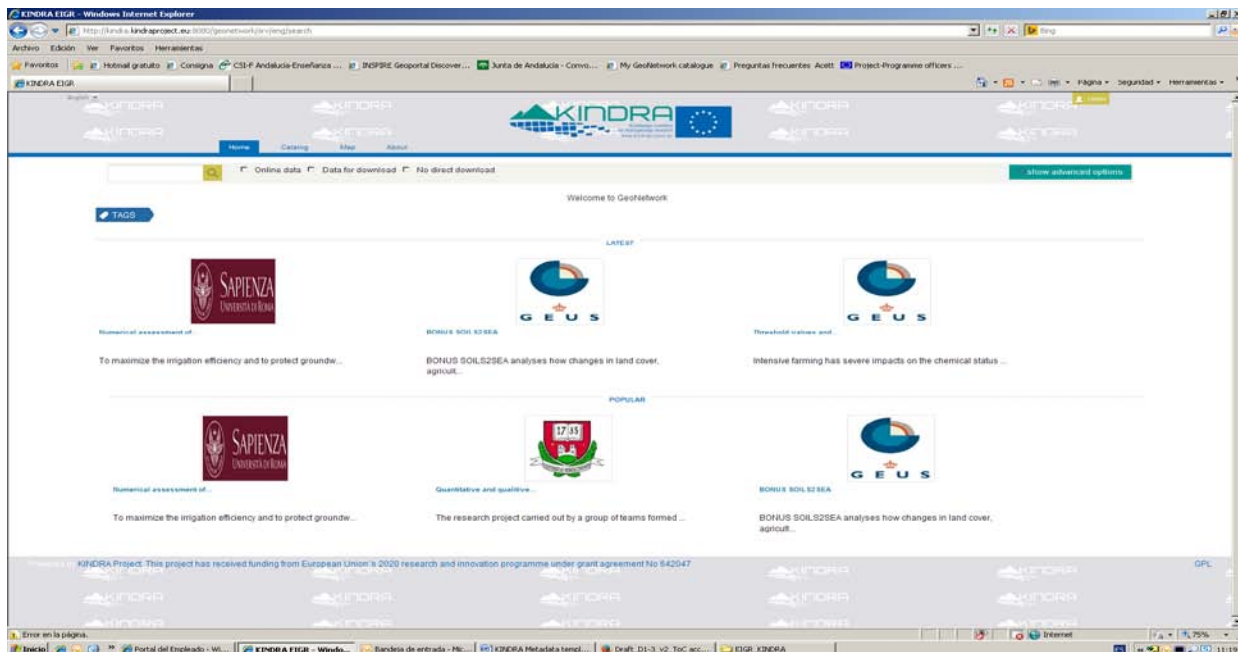
Although Geonetwork allows for working with a great variety of metadata profiles, based on different schemas and templates, KINDRA has opted for working with the one which is the most extended on an international level and which also follows the INSPIRE directive specifications, the ISO 19139 multilingual template. The purpose is to create the opportunity for editing and publishing a multilingual Data Catalogue.

After having installed Geonetwork 2.10.4, we proceeded to edit the interface and the contents to adjust it to the requirements for setting up the KINDRA Project EIGR DEMO VERSION Online Data Catalogue and according to the HRC-SYS premises. The appearance of the EIGR DEMO VERSION Online Catalogue reflects the community image of KINDRA. The EIGR can be accessed directly through the KINDRA project website interface (<http://dev.kindraproject.eu/eigr/>) by clicking on the Access the EIGR option. At the moment, the access to the inventory is limited to the project partners, the members of the Joint Panel of Experts and the national experts of the Linked Third Parties. Single usernames and passwords have been provided to the users.

## 5. Structure & design

The EIGR offers two possibilities for browsing the catalogue; one of which is the default viewer in HTML5 (Fig. 2) which all users find when accessing the catalogue through the following address:

<http://kindra.kindraproject.eu:8080/geonetwork/srv/eng/search>



**Figure 2: EIGR DEMO VERSION default HTML5 home page**

The larger website “frame” includes the project logo in the header with the logo of the European Commission and the reference to the Grant Agreement “*This project has received funding from the European Union’s Horizon 2020 Research and Innovation Programme under grant agreement number 642047*” is indicated in the footer.

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 (Fig. 3), and as a result be granted access to the EIGR DEMO VERSION Online Data Catalogue:



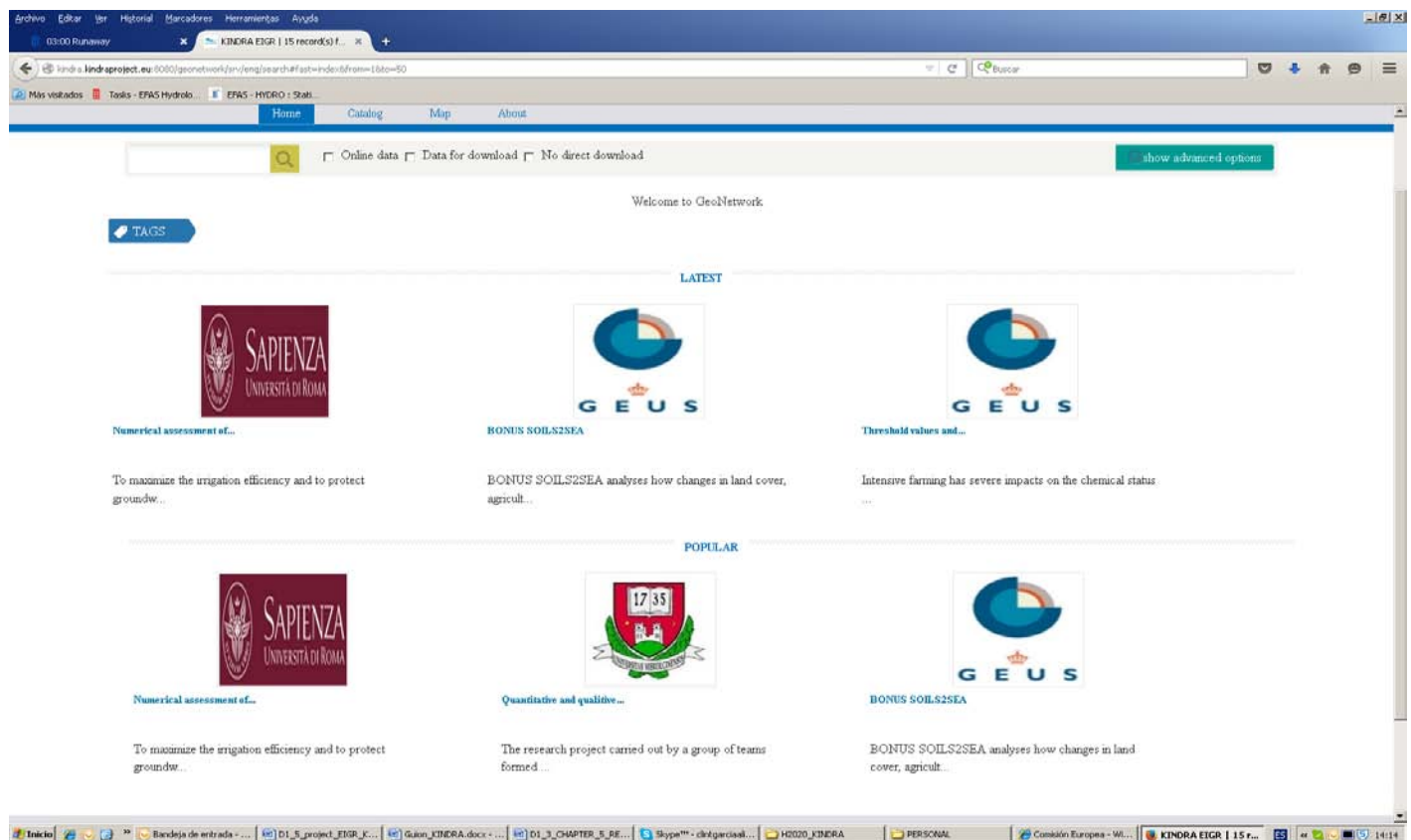
**Figure 3: EIGR DEMO VERSION Sign in dialog box**

There are different sections which are accessible by selecting specific tabs (Fig. 4):



**Figure 4: EIGR DEMO VERSION tabs**

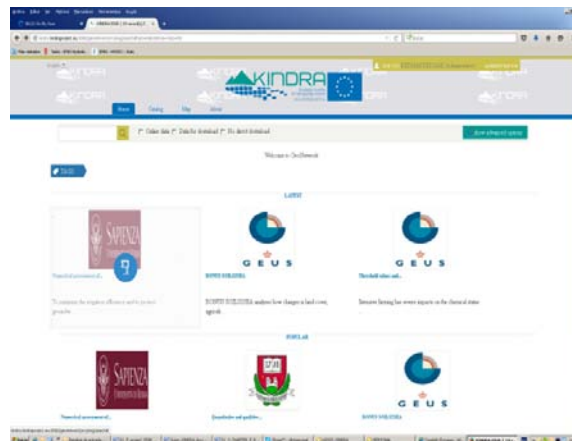
The Home tab takes users to the welcome page (Fig. 5) where they can view the latest contents uploaded to the EIGR DEMO VERSION as well as the most popular ones.



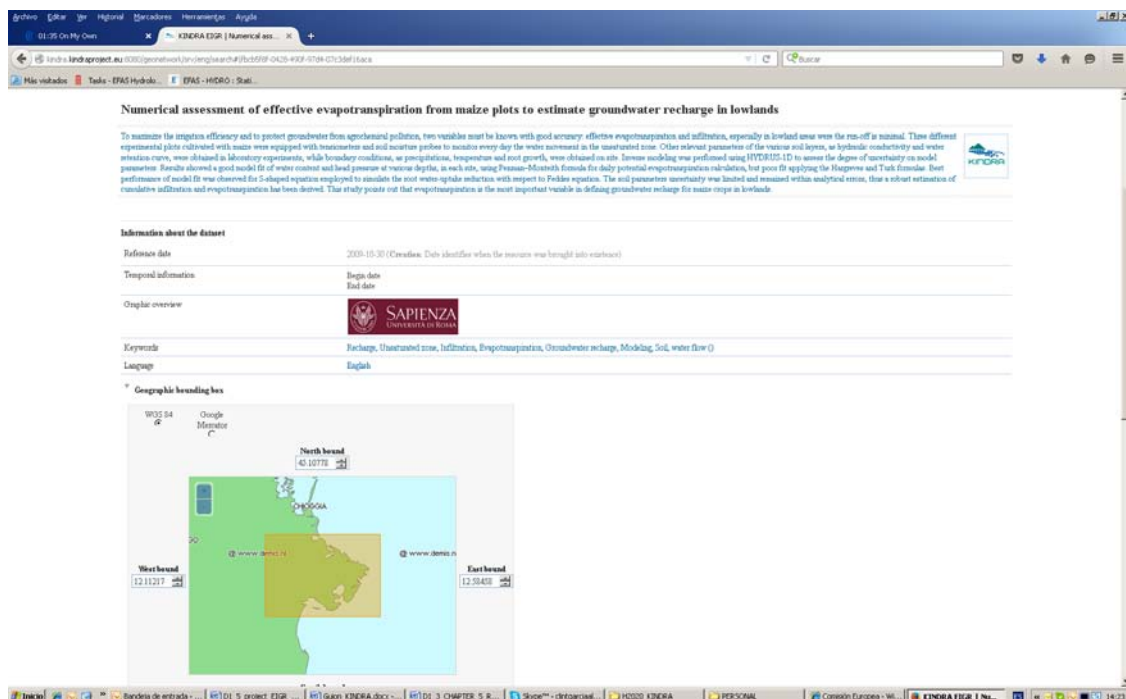
**Figure 5: EIGR DEMO VERSION welcome page**



Users can select any one of the contents shown, which will then lead them to the registry selected (Figs. 6 and 7):



**Figure 6: EIGR DEMO VERSION selection of one of the registries**



**Figure 7: EIGR DEMO VERSION registry generic information**

There is also a search tool which can be accessed under two different options.

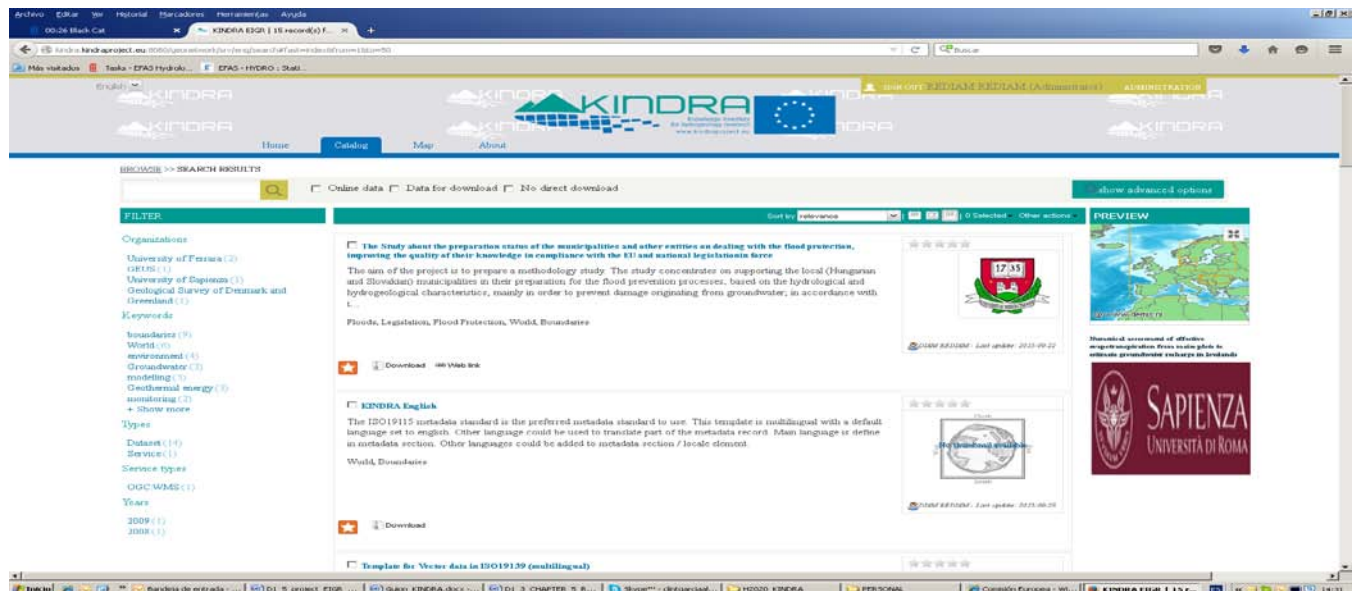
The default one which is directly available upon access (Fig. 8): users can fill out the field with a term and click on the magnifying glass icon to carry out the search. Specific options are available for restricting search results depending on if the contents are requested to contain Online Data, have Data Available for Download or No direct download.





**Figure 8: EIGR DEMO VERSION default search tool**

This leads to the Catalogue section (Fig. 9) which will directly show results according to the criteria indicated or selected. These results are brief descriptions of the resources queried for.



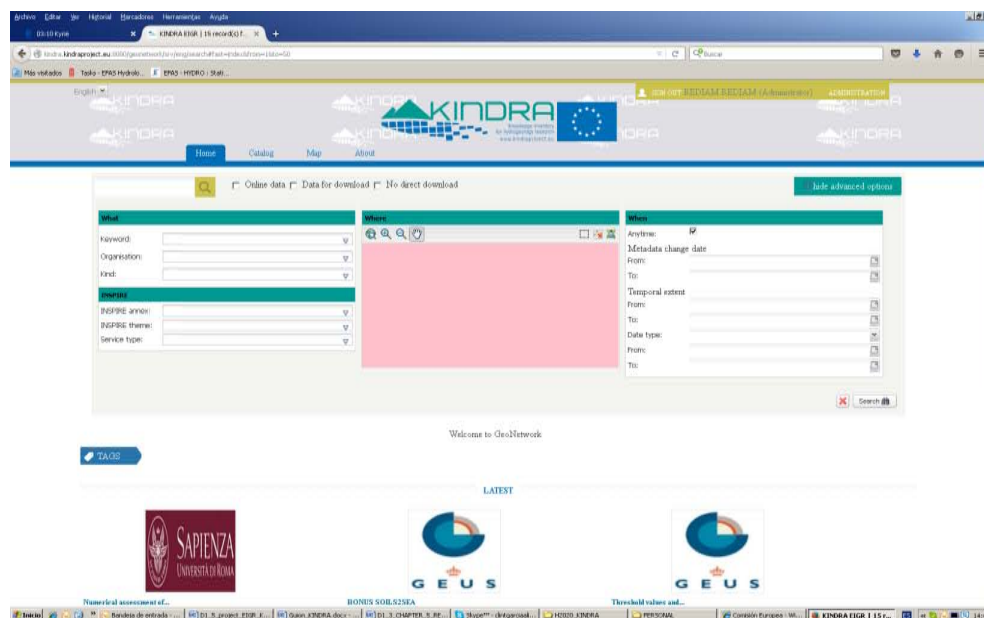
**Figure 9: EIGR DEMO VERSION default search result**

There exists the possibility to access an advanced search tool by clicking on the show advanced options button which is located on the right side of the screen (Fig. 10).



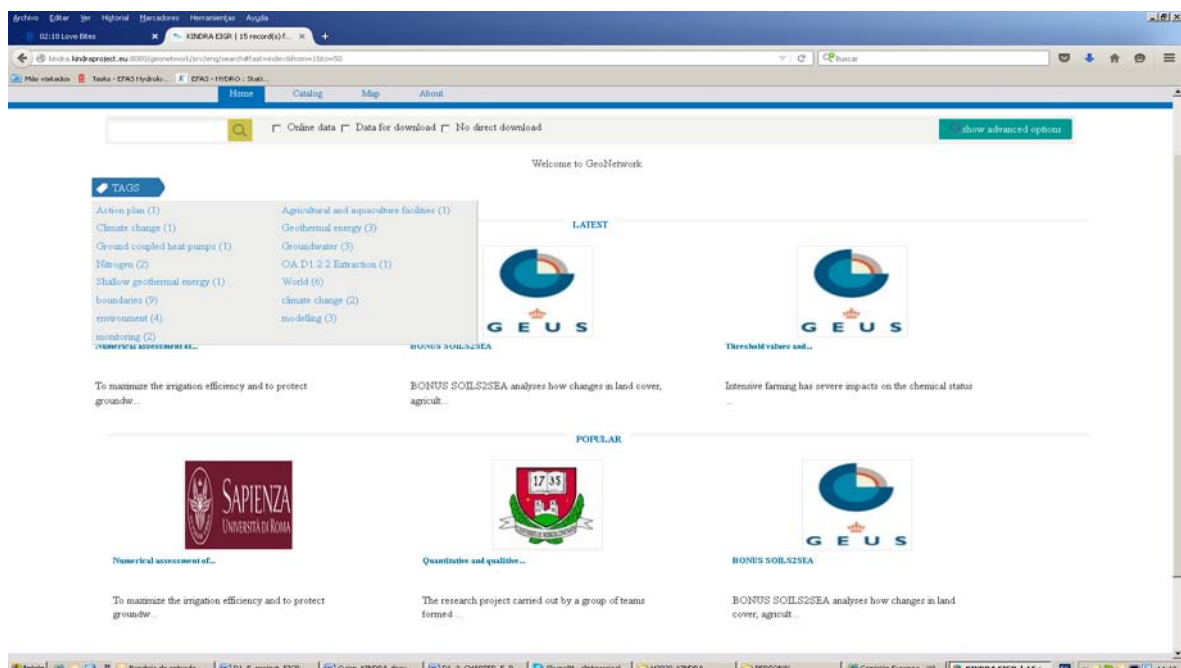
**Figure 10: EIGR DEMO VERSION advanced search options**

This deploys an advanced menu which offers a larger amount of search criteria (Fig. 11) that may be defined simultaneously in order to provide a narrower and more specific search on the resources uploaded to the EIGR (specific keywords, organizations, geographical location, etc.).



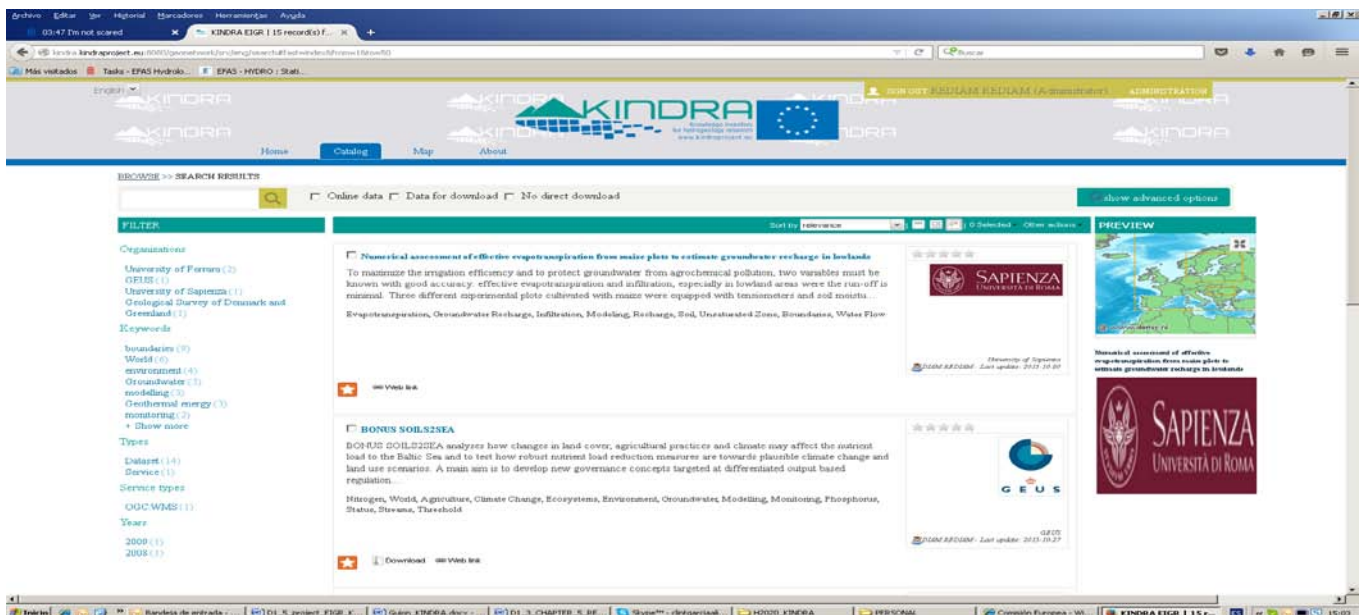
**Figure 11: EIGR DEMO VERSION advanced search options menu**

By clicking on the TAGS tab, it deploys the list of keywords (Fig. 12) which have been employed in the description of the contents uploaded to the EIGR with the amount of times they have been included in the registries present:

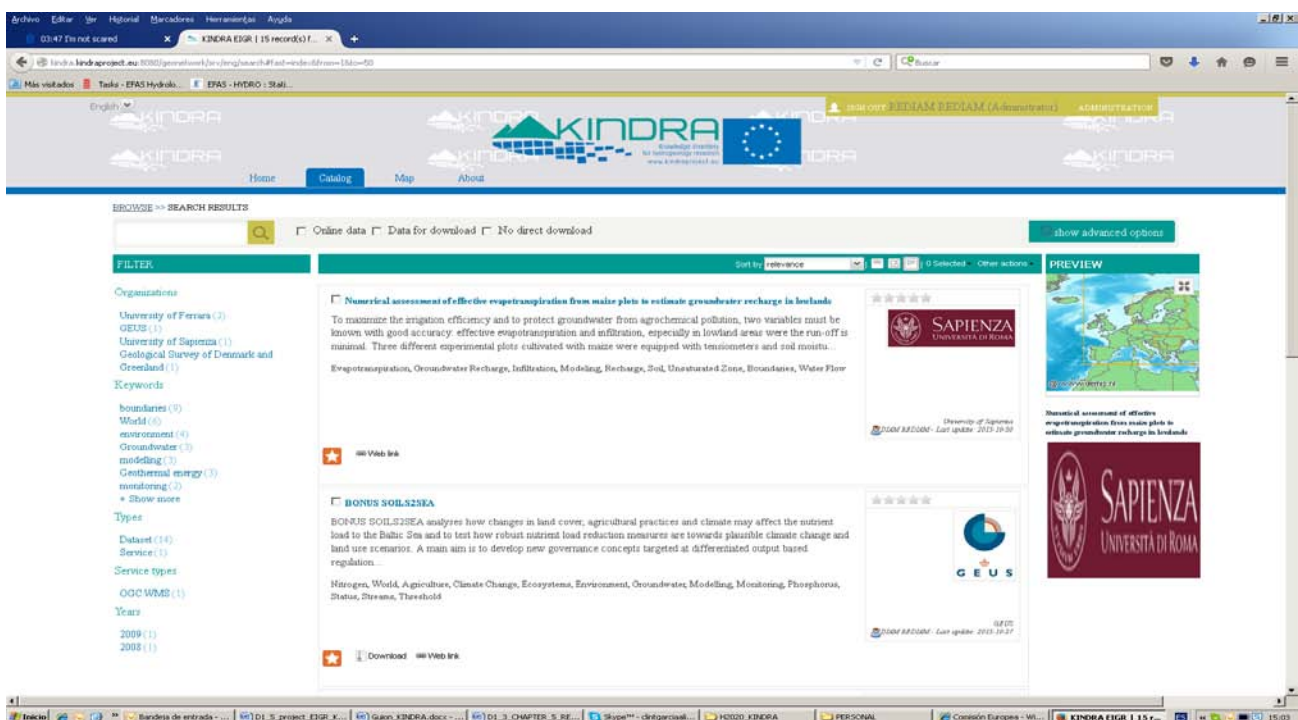


**Figure 12: EIGR DEMO VERSION TAGS menu**

Selecting the Catalog tab brings users to the screen to access resources which have been uploaded to the EIGR DEMO VERSION. The centre contains the different resources uploaded with their summary (Figs. 13 and 14).

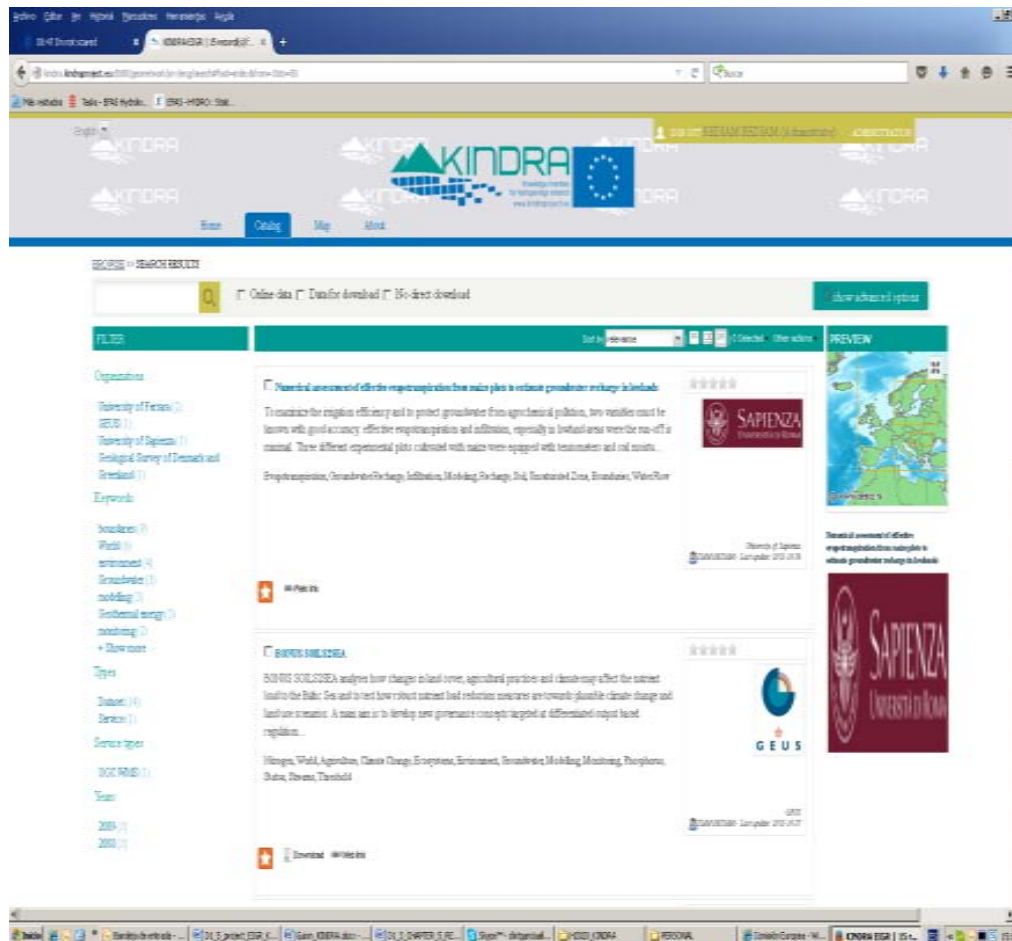


**Figure 13: EIGR DEMO VERSION Catalog section**



**Figure 14: EIGR DEMO VERSION detail of the resource summary descriptions which appear in the centre of the Catalog section**

The left side of the screen will show more specific filter options, such as further keyword selection, organizations, according to the information contained in the resources uploaded to the EIGR DEMO VERSION (Fig. 15).



**Figure 15: EIGR DEMO VERSION detail of the filters which appear on the left of the Catalog section**

The right side of the screen in this section shows a small map (Fig. 16) which serves as a shortcut to access the Map section of the EIGR DEMO VERSION.



**Figure 16: EIGR DEMO VERSION detail of the shortcut to the Map section**

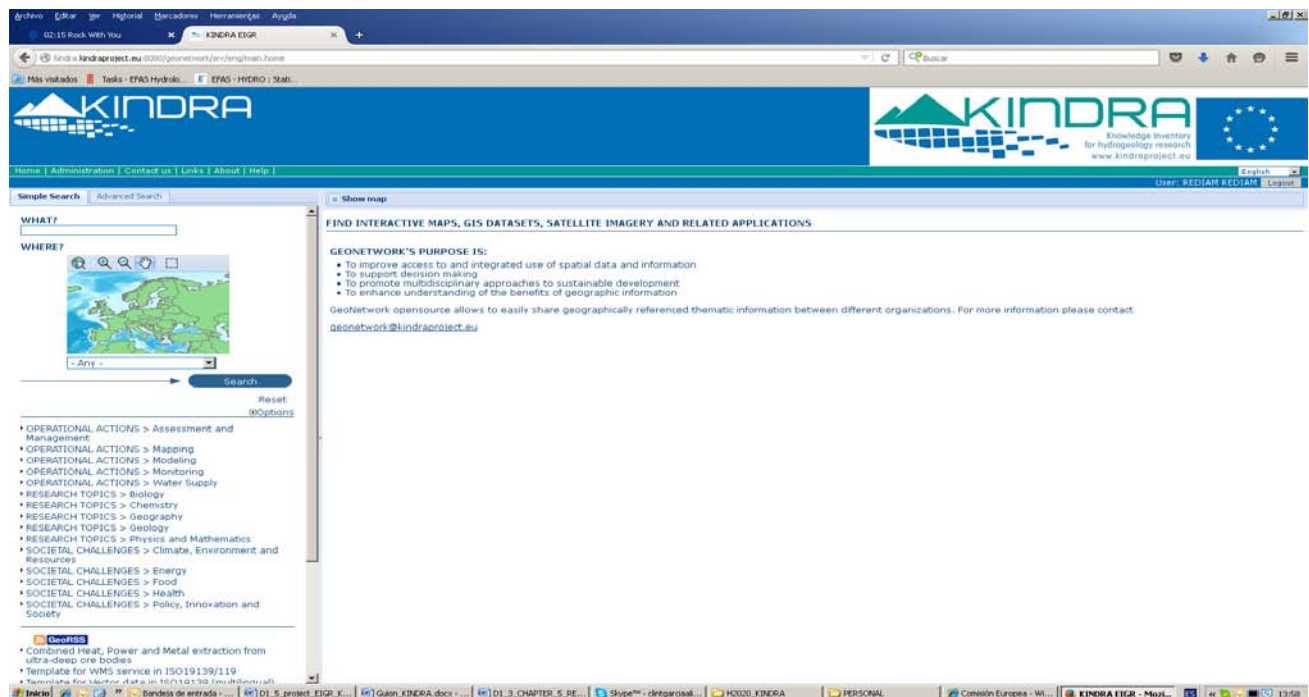


The Map tab leads to the section of the EIGR DEMO VERSION Online Data Catalogue which is still under development. Its main function will be to serve as a visual geographical reference of the resources uploaded to the EIGR and will support further functionalities for supporting the identification of research trends and gaps.

The About tab is a direct link to the home page of the Geonetwork: <http://geonetwork-opensource.org/>

The other option for viewing and browsing the catalogue is accessing the traditional Geonetwork interface (Fig. 17). When you access the catalog administration through the HTML5 view, it will switch to this one. It can also be accessed through the following address:

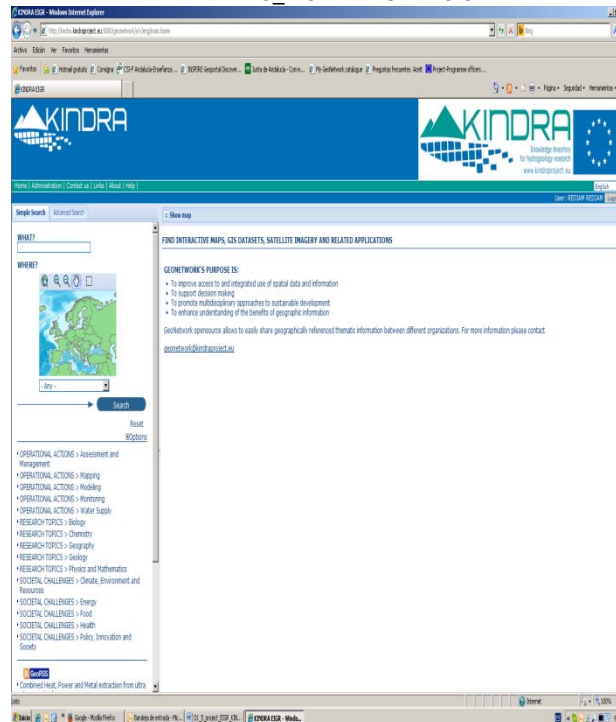
<http://kindra.kindraproject.eu:8080/geonetwork/srv/enq/main.home>



**Figure 17: EIGR DEMO VERSION access through the traditional Geonetwork interface**

The tabs accessible through this alternative are basically the same, although the distribution of the contents differs from the alternate access.

The right side of the screen has the quick access to the map function to be implemented. It also offers two tabs for selecting the simple search functions or the advanced search functions of the EIGR (Fig. 18).



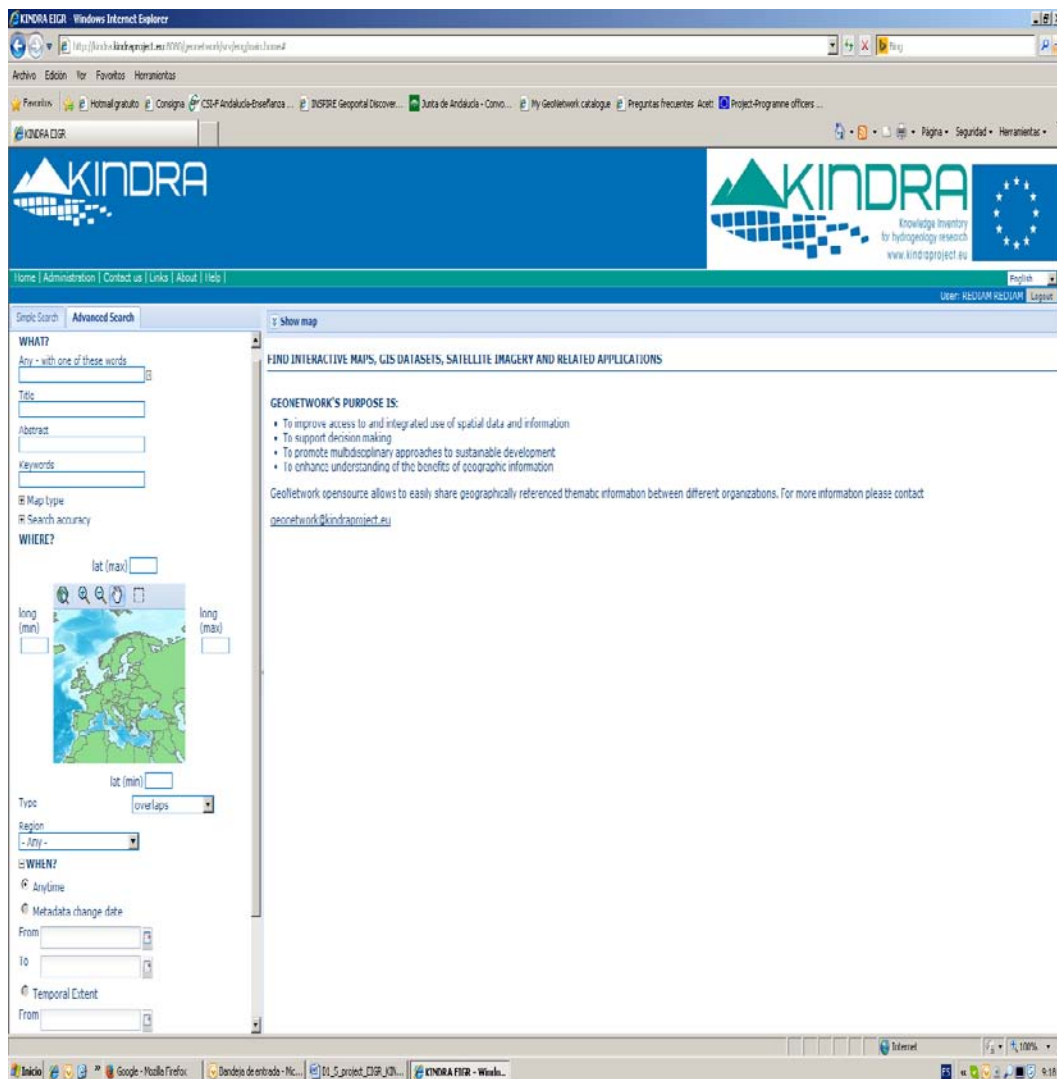
**Figure 18: EIGR DEMO VERSION access to the simple and advanced search tabs as well as quick access to the map search function**

Below this section one can find an options menu (Fig. 19) which offers users the possibility to define basic quick search criteria options such as: sorting by relevance, number of hits per page and the type of output (full content of the resource or simply a text version). Additionally we find the list of overarching categories which have been defined by the HRC-SYS. By clicking on one of them a user has quick access to the list of resources which have been uploaded to the EIGR DEMO VERSION Online Data Catalogue which have been categorised in the selected classification branch.



**Figure 19: EIGR DEMO VERSION simple search options and list of HRC-SYS categories under which the resources are classified**

The advanced search tab opens a menu (Fig. 20) in which the users can define the search criteria by indicating specific terms, title, abstract, keyword, geographical location (either setting coordinates of the bounding box area or selecting a specific area or region on the map) and even by defining the temporal extent of either the metadata record uploaded to the EIGR or the timestamp of the resource itself.



**Figure 20: EIGR DEMO VERSION advanced search options**

These are the most relevant functionalities developed for the Alpha EIGR DEMO VERSION Online Data Catalogue. Further developments are underway in order to have a Beta version of the EIGR DEMO VERSION Online Data Catalogue in order for its population on behalf of the group of national experts identified by the EFG, who will cooperate throughout 2016 with the identification and inclusion of relevant resources to be uploaded to the EIGR.



## 6. Further developments foreseen: From Alpha to Beta version

The EIGR Online Data Catalogue is conceived as a tool which will support KINDRA not only as a repository of knowledge for resources linked to Hydrogeological Research throughout Europe, it has also been defined as a tool which must help implement the HRC-SYS as well as provide additional means to support carrying out assessments for identifying existing trends and gaps which are related to Hydrogeological Research. In order to achieve this, the first steps taken have been focused on defining and setting up the core structure of the EIGR Online Data Catalogue by identifying the most suitable options available, main purpose of the development of the Alpha version of the EIGR DEMO VERSION.

This Alpha version is basically the frame of the EIGR, where KINDRA has defined a basic template according to ISO standards and compatible with INSPIRE Directives, and criteria defined in the HRC-SYS, in order for users to be able to upload resources to the EIGR DEMO VERSION. To this date efforts have basically consisted in the technical setup of the server which will host the EIGR Online Data Catalogue as well as the platform which will serve as basis for developing the functionalities desired.

Below are the steps necessary for completing the functionalities of the interface, in order to allow users to populate the EIGR with resources which meet the criteria defined by the D1.2 HRC-SYS as well as those indicated in the D1.3 EIGR Guidance Manual. By the end of January 2016 a Beta version of the EIGR DEMO VERSION was made available (Fig. 21). This Beta version has fully implemented all functionalities related to cataloguing and uploading contents to the EIGR Online Data Catalogue by the community of users composed by the National EFG Experts who are actively identifying resources for the EIGR and populating the EIGR.

AUGUST 2015

OCTOBER

2015

FEBRUARY 2016



**Figure 21: EIGR preparation steps into KINDRA project**

A workshop was held in Seville on February 5<sup>th</sup> 2016, where one of the sessions was dedicated to "how to operate the Beta EIGR DEMO VERSION" for capacitating the EFG National Experts in populating and consulting resources uploaded to the EIGR. It mainly focused on the user interface,

the Template which must be completed for the upload of resources to the EIGR according to the HRC-SYS which has been defined by KINDRA and the basic consultation tools the EIGR will offer. The National Experts will be populating the EIGR throughout 2016.

This process is a crucial step for the finalization of the works related to the EIGR Online Data Catalogue, bringing it from its Beta version to its “live” version. After 2016, the amount of resources uploaded to the EIGR will serve 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 will be subject to the amount and quality of the resources identified and uploaded to the EIGR.

## 7. Possible tools for information exploitation

The initial proposal of possible tools for the exploitation of the information uploaded to the EIGR will focus on the information included in the template tags which have been defined for the upload of resources in the EIGR and will be based on the initial assessment carried out by the KINDRA Project Partners and described in D1.2. These include the following examples:

- 1) A Keyword analysis based on the frequency and recurrence of the use of selected keywords by KINDRA project for its Project specific THESAURUS. This is an example (Fig. 22) selected from the Keyword analysis offered by SciVal which is being developed for the EIGR.



**Figure 22: example of keyword analysis**

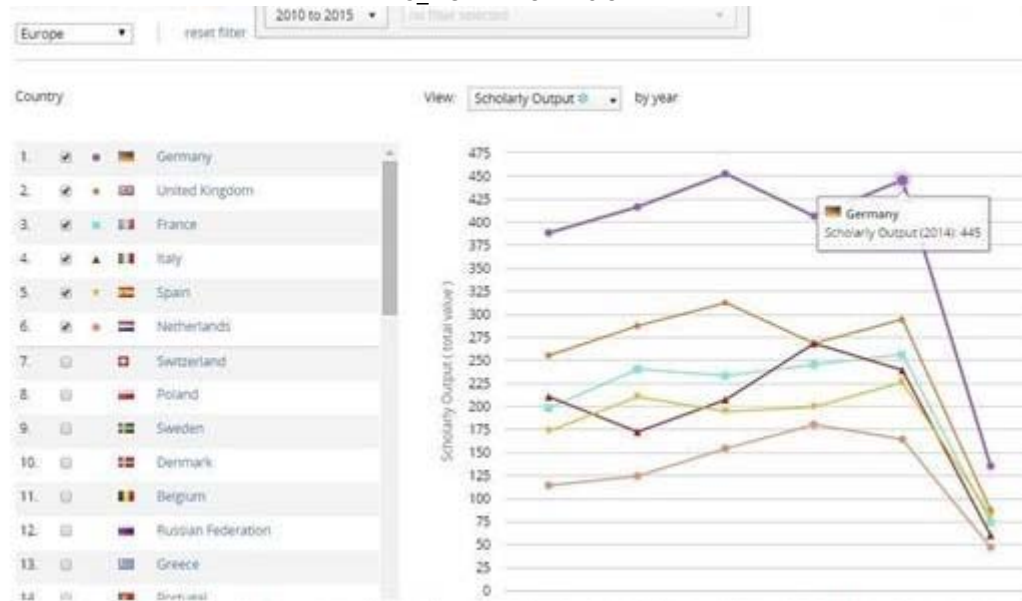
The size and color of the words represent the relevance of keywords according to the number of resources in which they have been included or associated to in the EIGR: blue-less frequency; red-growing frequency. It should be noted that ideally the keywords will be the ones belonging to the revised glossary of the Thesaurus that will be developed by the end of the project, as has been described in the works of the KINDRA Project Deliverable 1.1. A dedicated glossary of the KINDRA keywords including a corpus of relevant definitions will be released before the end of the project, to be compared with existing glossaries.

- 2) A map where the contents of the EIGR are distributed throughout EU countries can be visually identified (Fig. 23), either by size and/or color (the image below is a Bubble Diagram approach, an indication of what is trying to be accomplished by KINDRA based on the resources uploaded to the EIGR).



**Figure 23: example of map**

- 3) A graphical representation (Fig. 24) of the resources or contributions on behalf of organizations or countries over a specific period of time concerning different Topic Categories or Keywords (Output similar to what is currently available by Google Scholar).



**Figure 24: example of resources respect with time**

- 4) Visualization of queries resulting in the combination of various tags which are included in the EIGR template (Fig. 25), according to the following example, by cross referring data uploaded to the EIGR (Total number of contributions from specific countries or organizations over a certain period of time, on a specific topic and keyword or topic category for estimating the most active institutions or countries).

Most active Institutions in this Research Area

Show top 10: contributing institutions in Europe In this Research Area, by number of publications

	Publications	Authors	Citations
1. Helmholtz Zentrum für Umweltforschung	272	309	1,728
2. CNR	222	299	1,883
3. Wageningen University and Research Center	216	285	1,425
4. ETH Zurich	204	176	1,715
5. Swiss Federal Institute of Aquatic Science and Technology (Eawag)	176	137	1,503
6. CNR	163	220	969
7. British Geological Survey	159	148	1,105
8. Geological Survey of Denmark and Greenland	158	91	896
9. Delft University of Technology	155	137	726

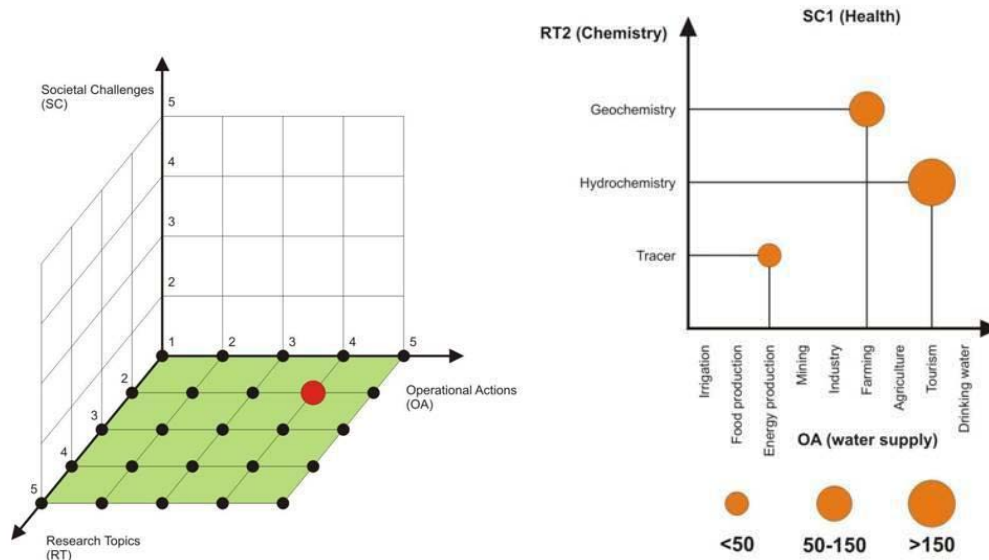
**Figure 25: example of queries results**

- 5) Graphic representation of the EIGR contents according to the HRC-SYS 3D-2D System based on the three main axis (Fig. 26):

**“Operational Actions”** (Assessment and management, Mapping, Modeling, Monitoring, Water Supply)

**“Research Topics”** (Physics and mathematics, Biology, Chemistry, Geology, Geography)

**“Societal Challenges”** (Climate Environment and Resources, Energy, Food, Health, Policy Innovation and Society)



**Figure 27: example of graphic representations of the HRC-SYS**

## 8. Backlog

The KINDRA EIGR Online Data Catalogue has been in development since the beginning of the KINDRA Project. The initial phase consisted in the proposal of a suitable alternative which met the requirements according to the project DOA. After the meeting celebrated in Rome with the Joint Panel of Experts, efforts were carried out to implement the EIGR under the GEONETWORKS platform as described previously. The following table includes a track of the different steps carried out for the setting up the EIGR as well as the relevant dates, updated June 30th 2016. The backlog section will be regularly updated until the end of the project.

DATE	TASK	DESCRIPTION
10/09/2015	SERVER, DATA BASE, GEONETWORK 2.10.4 INSTALLATION AND SETUP	Setup of the test and development environments for the EIGR. This consisting in two Tomcat Apache Servers, two Postgres Data Bases as well as two open source GEONETWORK 2.10.4 instances which
20/11/2015	INTERFACE CUSTOMIZATION, TEST CATALOGUE, KINDRA EIGR DEVELOPMENT	Customization of the user interface according to the KINDRA Project image, personalization of menus, buttons, banners, style sheets (css)
10/12/2015	KINDRA METADATA TEMPLATE	Customization of the KINDRA metadata template with the specific tags related to the KINDRA HRC-SYS
18/01/2016	KINDRA PROJECT THESAURUS	Creating the KINDRA Thesaurus with over 500 registries available for project purposes.
20/01/2016	EIGR BETA VERSION	Making the Alpha version of the EIGR operational for the workshop celebrated in Seville in order to train the EFG National Experts for the population of the EIGR throughout 2016
15/03/2016	MAP FUNCTIONALITY	Implementation of the Mapview and Mapsearch functions for locating and visualizing information in the EIGR
21/03/2016	TOPIC CATEGORY CUSTOMIZATION	Customization of the list of values visualized through the drop down menus for Topic Categories.

## 9. Conclusions

The KINDRA EIGR Online Data Catalogue is a work in progress, highly dependent on the active collaboration of the EFG National Experts who are carrying out the “EIGR population phase” which is being carried out during 2016. The cooperation of the EFG National Experts in this “EIGR population phase” is critical as the amount and quality of the resources they upload to the EIGR Online Data Catalogue will serve as the basis for the development of the applications and tools for exploiting the data and information related to Hydrogeological research in Europe. **Therefore**, during 2016 different “calendar check points” **have been** set for carrying out interim assessments on the progress of the “EIGR population phase” and to begin identifying opportunities for data exploitation tools.

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 9.1 indicates the progress of the population phase of the EIGR.

A final review of the resources uploaded will be carried out in order to provide a final assessment of the efforts made in populating the EIGR throughout 2016. It will be 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 will be checked every two months, starting from the month that the EIGR will become publicly available.



EIGR USER	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>

Table 9.1: Progress in record insertion by single users