KINDRA DELIVERABLE D1.4

IN-HOUSE INVENTORY OF INFORMATION SOURCES

Summary:

With the participation of experts from 20 European countries a survey has been carried out by EFG in order to identify the information sources for hydrogeology-related research and knowledge at national level. The survey included 12 questions and the questionnaire was filled by the National Experts identified by the EFG member associations.

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1. INTRODUCTION

One of the main aims of the KINDRA project is to carry out a Europe-wide assessment of existing groundwater-related practical and scientific knowledge focusing on international (in EU dimensions), national and regional scientific activities. The data collection and assessment will be implemented with the help of the member National Associations of the European Federation of Geologists. Based on the data provided by the National Associations a European Inventory (database) of Groundwater Research (EIGR) will be created in form of a web-service.

Before collecting data about the existing practical and scientific knowledge on groudwater research, it sould be clarified where the information comes from. That is why an *inventory of information sources* has been created concerning national and international projects, documents, databases, initiatives, reports and scientific publications. The data were gathered by a survey in collaboration with the EFG's National Associations in 20 European countries.

This deliverable summarises the results of the work carried out in the frame of WP1, Task 1.2. The work comprises the following stages:

- Identification of the 20 countries/National Associations which take part in the data collection (EFG Third Parties);
- Identification of hydrogeologist experts in hydrogeology, one by National Association, who collect and provide data for the inventory of information sources (WP1, Task 1.2). In the second year of the project the same experts will work in WP2 – Data collection and processing;
- Implementation of a survey by creating a questionnaire on groundwater-related information sources and sending it to the hydrogeologist chosen as experts in the previous stage;
- Assessment of the survey results and compiling them into a report.

2. COUNTRIES INVOLVED IN DATA COLLECTION – EFG THIRD PARTIES

Experts in hydrogeology from 20 countries were identified by the member National Associations to participate in the data compilation for the in-house inventory of information sources. In *Table 1* the National Associations and the identified experts are indicated. In the later phase of the project, in the frame of WP2, these experts will provide information at national level for the European Inventory of Groundwater Research (EIGR).

Table 1 EFG's KINDRA Third Parties with the participating experts, their contact details and background

	Country	**Organisation**	**Expert's name**	**Expert's contact**	**Expert's background**
1	Belgium	Belgo-Luxembourg Union of Geologists, http://www.blug-ublg.be/	(1) Alain Dassargues (2) Dirk Decoster	alain.dassargues@ulg.ac.be dirk.decoster@vdcmilieu.be	(1) Professor at Hydrogeologie et Geologie de l'Environnement, Universite de Liege, Chair of the IAH Belgian Chapter, (2) hydrogeologist, VDC Milieu Consulting Company, Belgium
2	Croatia	Croatian Geological Society, http://www.geologija.hr/	Kosta Urumović	kurumovic@hgi-cgs.hr	PhD, hydrogeologist, research associate at Department of Hydrogeology and Engineering Geology, Croatian Geological Survey
3	Czech Republic	Czech Association of Economic Geologists, http://www.calg.cz/	Michal Vaněček	vanecek@isatech.cz	Hydrogeology expert, director of ISATECH s.r.o.
4	Denmark	Geological Society of Denmark, http://2dgf.dk/dgf_uk/main.html	Lisbeth Flindt Jørgensen	lfj@geus.dk	Senior Geologist, Department of Hydrology, GEUS - Geological Survey of Denmark and Greenland, Danish Ministry of Climate, Energy & Building
5	Finland	The Finnish Union of Environmental Professionals, http://www.ykl.fi/	Ulpu Väisänen	ulpu.vaisanen@gtk.fi	PhD, Hydrogeologist, senior specialist, Geological Survey of Finland, Department of Land Use and Environment
6	France	French Geological Society, http://www.sgfr.org/	Patrick Lachassagne	patrick.lachassagne@danone.com	Phd, Hydrogeologist, Head of the Environment and Water Resources Division, Danone Waters, France
7	Germany	Professional Association of German Geoscientists, http://www.geoberuf.de/	Walter Lenz	walter.lenz@buero-hg.de	Phd, Geologist, CEO, authorized expert on gwcontamination, HG Büro für Hydrogeologie und Umwelt GmbH
8	Greece	Association of Greek Geologists, http://www.geologist.gr/	Triantafillos Kaklis	kaklis@geo.auth.gr	Geologist, PhD, MSc, Aristotle Univ. of Thessaloniki, Dept. of Geology, Lab. of Engineering Geology & Hydrogeology
9	Hungary	Hungarian Geological Society, http://www.foldtan.hu/	Nóra Gál	gal.nora@mfgi.hu	Hydrogeologist at Geological and Geophysical Survey of Hungary
10	Ireland	Institute of Geologists of Ireland, http://igi.ie/	Henning Moe	moeh@cdm.com	Hydrogeologist, CDM Smith Ireland Ltd
11	Italy	Italian National Council of Geologists, http://www.cngeologi.it/	Andrea Del Bon	andrea.delbon@libero.it	Hydrogeologist, Ordine dei Geologi del Lazio n. 1522
12	The Netherlan	Royal Geological and Mining Society of the	Jan Stafleu	jan.stafleu@tno.nl	PhD, EurGeol, TNO – Geological Survey of the Netherlands

	ds	Netherlands, http://www.kngmg.nl/			
13	Poland	Polish Association of Minerals Asset Valuators, http://www.polval.pl/	Barbara Tomaszewska	tomaszewska@min-pan.krakow.pl	Phd, Associate Professor at the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences
14	Portugal	Portuguese Association of Geologists, http://www.apgeologos.pt/	Mónica Sousa	msousa@apgeologos.pt	APG Board member; Geologist, PhD candidate, Dep. Of Geosciences, Environment and Territory Management, Porto University
15	Serbia	Serbian Geological Society, http://www.sgd.rs/	Vesna Ristic Vakanjac	vesna_ristic2002@yahoo.com	PhD, Associate Professor at University of Belgrade, Faculty of Mining & Geology
16	Slovenia	Slovenian Geological Society, http://www.geoloskodrustvo.si/	Mihael Brenčič	mihael.brencic@geo.ntf.uni-lj.si	PhD, Department of Geology, Faculty of Natural Sciences and Engineering, University of Ljubljana
17	Spain	Official Spanish Association of Professional Geologists, http://www.icog.es/	Silvino Castaño Castaño	silvino.castano@cedex.es	Hydrogeology expert, Centro de Estudios de Técnicas Aplicadas, Centro de Estudios y Experimentación de Obras Públicas (CEDEX)
18	Switzerland	Swiss Association of Geologists, http://www.chgeol.ch/	Pierre Christe	pierre.christe@admin.vs.ch	Geologist, Head of the Groundwater Group at the Environmental Protection Agency of Canton Valais, Switzerland
19	Ukraine	Ukrainian Association of Geologists, http://www.geolog.org.ua/en	Mykhailo Heychenko	geich@ukr.net	PhD, Head of the research department of the Tutkovsky Institute, former Deputy Director of the Department of Geology, Geological Survey of Ukraine.
20	United Kingdom	Geological Society of London, http://www.geolsoc.org.uk	Andrew McKenzie	aam@bgs.ac.uk	Manager of Groundwater Information, British Geological Survey, Groundwater Science Programme

3. METHODOLOGY

In order to collect the information sources related to groundwater knowledge and research in Europe a survey was carried out in 20 European countries.

The questionnaire for the survey was prepared in Word format. We decided to do so because we expected not only yes/no replies but also comments by the experts, and we also requested to fill tables. The questionnaire involves 12 questions. The questionnaires were sent to the experts by e-mail and we received the answers through this channel as well.

In the questionnaire the questions concern on the following topics:
(1) Institutions dealing with groundwater research/survey
(2) Groundwater withdrawal, availability of data
(3) Groundwater monitoring, availability of data
(4) Journals/archives focused on hydrogeology

The answers by the national experts were collected in Word and Excel files and summarised by using graphs.

4. SURVEY RESULTS

In total there were 20 countries participating in the KINDRA survey for the Inventory of information sources: Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, The Netherlands, Poland, Portugal, Serbia, Slovenia, Spain, Switzerland, UK and Ukraine *(Fig.1).*

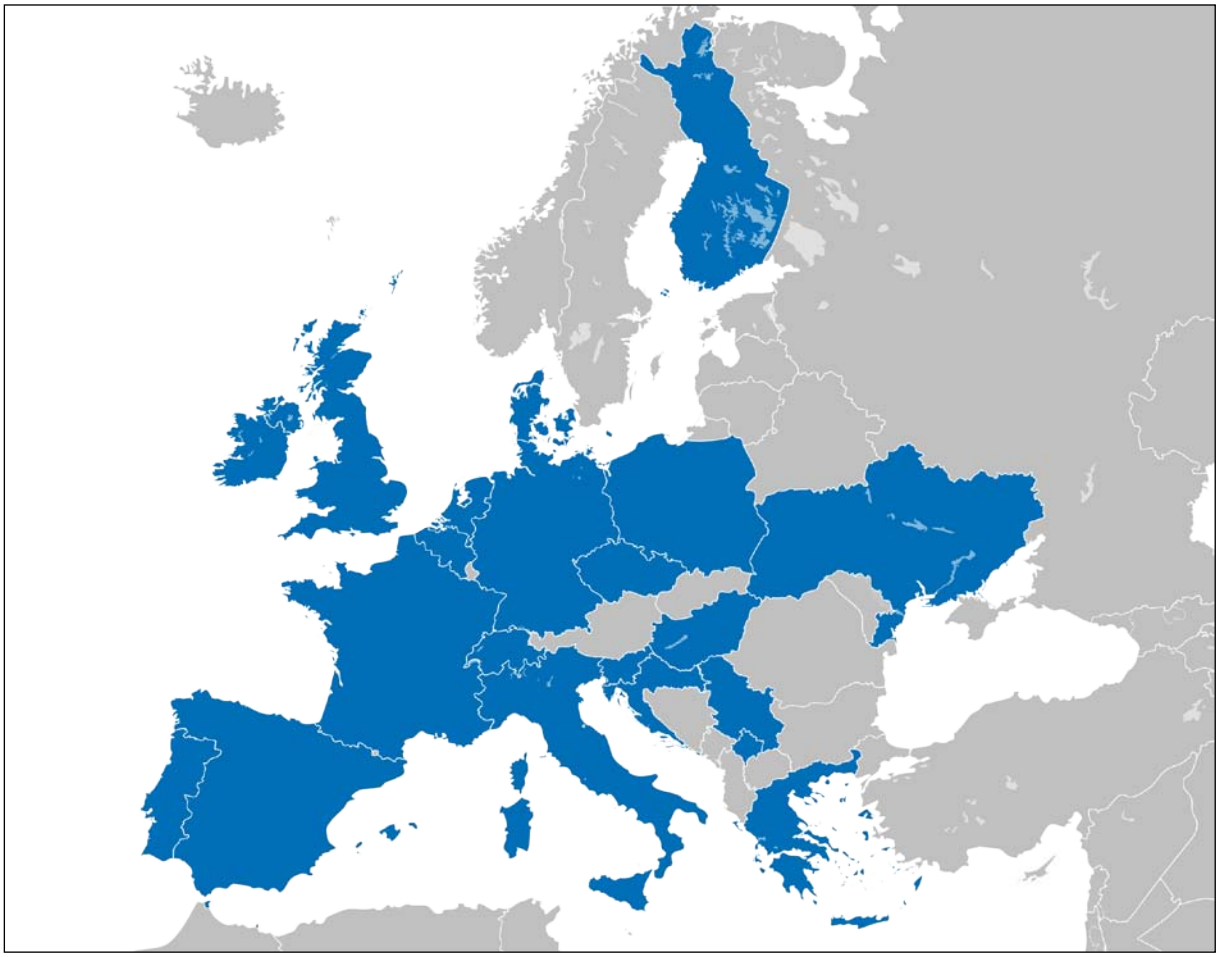

Fig. 1 Countries represented in the survey

Below the questions and answers of the survey are summarised according to the four topics mentioned in the Methodology: (1) Institutions dealing with groundwater research/survey, (2) Groundwater withdrawal, availability of data, (3) Groundwater monitoring, availability of data, (4) Journals/archives focused on hydrogeology.

4.1 Institutions dealing with groundwater research/survey

Question 1: How many institutions deal with groundwater research/survey in your country?

a. less than 10
b. between 10 and 20
c. more than 20

In all countries the number of institutions dealing with groundwater research/survey is above 10. The number of these institutions is between 10 and 20 in 8 countries (these countries indicated only the most important institutions), and above 20 in 12 countries *(Fig. 2).*

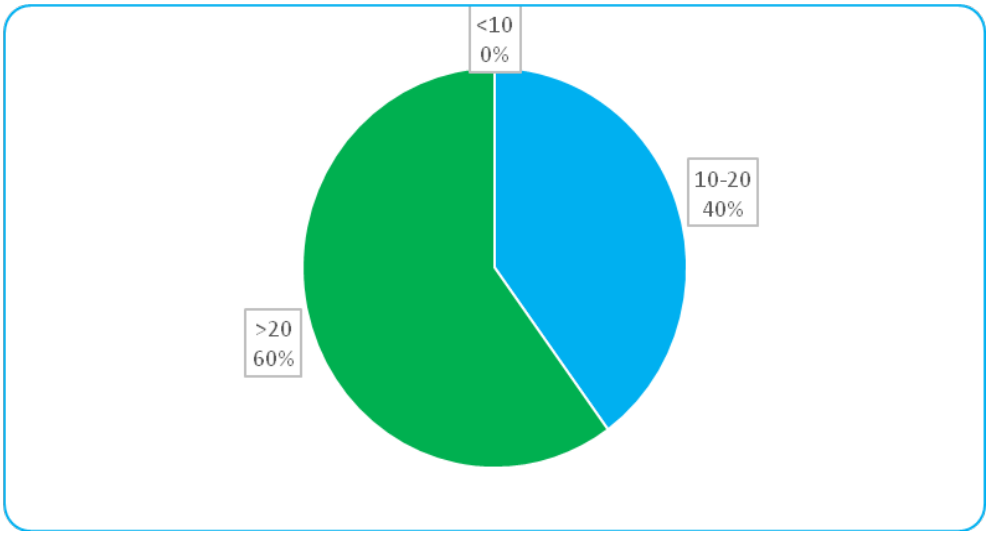

Fig. 2 Number of the most important institutions dealing with groundwater research/survey.
Between 10 and 20: Croatia, Germany, Ireland, Netherlands, Slovenia, Belgium, UK, Ukraine;
More than 20: Czech Republic, Denmark, Finland, France, Greece, Hungary, Poland, Portugal, Serbia, Spain, Switzerland, Italy

Several countries (Czech *Republic, Italy, Portugal, Slovenia, Ukraine*) noticed that the number of institutions was difficult to define because there are several independent R&D programs where universities, research centres and private companies are involved, and there are different institutions, small companies, where hydrogeologists are employed and hydrogeological groups exist. These countries indicated only the most important institutions.

In *Denmark* at least 5 universities and other research institutions deal with groundwater research. At least 100 public bodies (the ministry of the environment and its agencies as well as 5 regional authorities and 98 municipalities do groundwater surveys), more than 2000 water supply companies and at least 50 private companies deal with groundwater matters.

The *Italian* territory is divided administratively into 21 government authorities (19 Regions and 2 Autonomous Provinces), each of which has its own Regional/Provincial Environmental Protection Agency (ARPA/APPA). Each ARPA/APPA is responsible for the establishment of the monitoring network required by European Directives on surface water and groundwater.

Regional/Provincial Authorities are also responsible for issuing permits for water research and concessions, as well as the determination of the environmental flows. The Institute for Environmental Protection and Research (ISPRA) acts under the vigilance and policy guidance of the Italian Ministry for the Environment and the Protection of Land and Sea (MATTM). ISPRA is part of the network known as National System for Environmental Protection, which is made up of the above mentioned 21 Territorial Environmental Protection Agencies (ARPA/APPA). The National Environmental Information System Network (ISPRA – SINAnet) manages the Italian data and information repository that is required by the EEA as Eionet priority data flows related to the different environmental topics. There are also Universities and Research Institutes (of the Italian National Research Council - CNR), which are actively involved in water monitoring projects at regional and national level. The National Institute of Statistics (ISTAT) is in charge of the decennial inventory on water uses.

In *Poland* the systematic observations of the quantity and quality of groundwater carried out by the Polish Hydrogeological Survey. There are also a lot of special, national institution laboratory, for example Inspection for Environmental Protection and State Sanitary Inspection. Controlling of drinking water quality is also released by waterworks plant laboratory (MPWiK or ZWiK) and a lot of universities and private laboratories.

Question 2: Please fill the table for the institutions related to groundwater research/survey in your country, indicating the level, the type and the data accessibility at the institution:

Name and website of institution	Level				Type					Data accessibility			
	International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format

Originally we asked both for the name and website of institutions but later we focused only on the websites because most of the names were given in the national languages. As it was mentioned at *Question 1*, the National Experts indicated only the most important institutions, but a certain rate of subjectivity has to be taken into account because it is difficult to define the level of "most important". The summarisation of the website, level, type and data accessibility of these institutions can be found in Annex 2.

The number of indicated institutions by country is as follows:
Belgium 16, Croatia 8, Czech Republic 24, Denmark 9, Finland 23, France 6, Germany 6, Greece 9, Hungary 27, Ireland 11, Italy 51, The Netherlands 12, Poland 53, Portugal 6, Serbia 7, Slovenia 8, Spain 33, Switzerland 11, UK 15 and Ukraine 16 *(Fig. 3).*

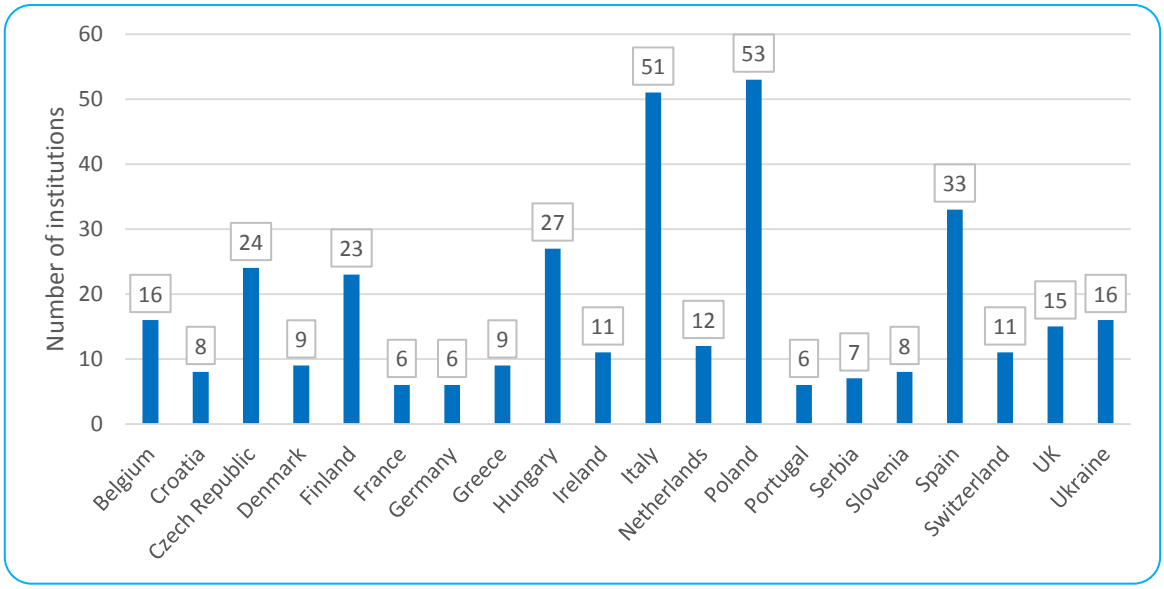

Fig. 3 Number of institutions dealing with groundwater research/survey in the examined countries.

4.2 Groundwater withdrawal, availability of data

Question 3: What percentage of the drinking water derives from groundwater in your country?

a. less than 30 %
b. 30-70 %
c. more than 70 %

The rate of groundwater in the drinking water supply is less than 30% only in 3 countries. It is 30-70% in 6 countries and higher than 70% in 11 countries *(Fig. 4).*

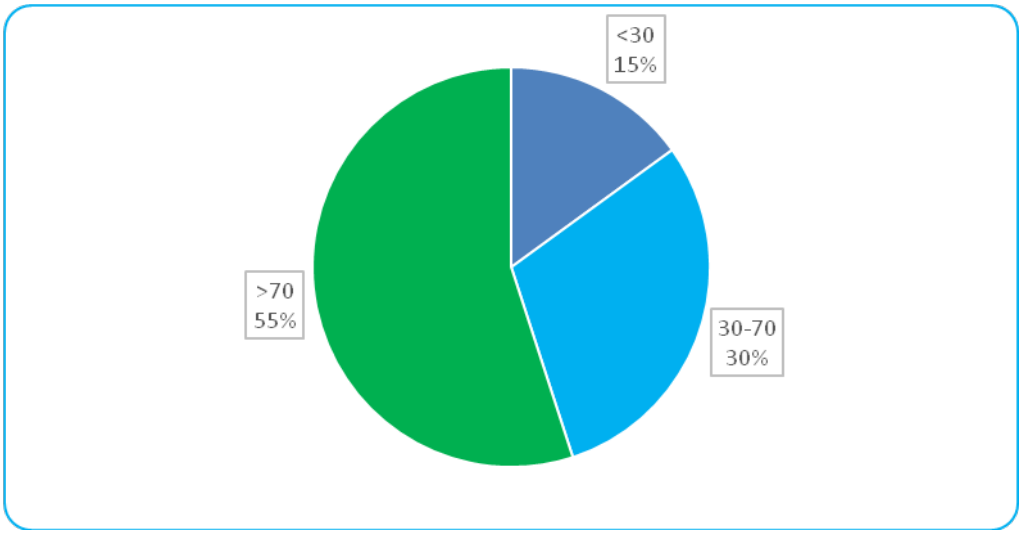

Fig. 4 The rate of groundwater in the drinking water supply. Less than 30 %: Spain, Ireland, Ukraine. Between 30-70 %: Belgium, Czech Republic, Finland, France, Portugal, UK. Higher than 70 %: Croatia, Denmark, Germany, Greece, Hungary, Italy, Netherlands, Poland, Serbia, Slovenia, and Switzerland.

In *Belgium* this rate is 51% in the Flanders region, 78% in the Walloon region, and 100% in the Brussels region.

In the *Czech Republic* 42% of the drinking water derives from groundwater, 32% from surface sources and 26% from mixed sources.

In *Denmark* 100 % of drinking water derives from groundwater.

In *Hungary* more than 96 % of drinking water is groundwater or bank filtered water and less than 4 % is from surface water, like Balaton, Tisza, and various water reservoirs.

In *Ireland* for the public water supply the rate of groundwater is <30%. However, private wells are the main sources of water outside areas served by public water supplies, and remain important even in areas that are served by public water, e.g. for use on farms

In *Italy*, according to the latest statistics published by ISTAT and dating back to 2008, 9.11 billion cubic meters of water are withdrawn for human consumption, 85.6% of which comes from groundwater, 14.3% from surface water and 0.1% from sea or brackish water. The breakdown by type of supply resource shows that the 49.8% is extracted from wells, the 35.7% from springs, 8.4% from reservoirs, the 5.4% from water courses and 0.5% from lakes. In 2008, the per capita volume of water, corresponding to 72.9 m^3/year per capita (equal to 199.7 liters per capita per day), has decreased by 9.2% compared to 1999.

In *Slovenia*, the share of groundwater in the total water supply is more than 90%.

Question 4: Are there any official data about anthropogenic groundwater withdrawals?

a. yes
b. no

The data are related to quantity of withdrawals for different uses.

All of the 20 indicated “yes”. There are official data for anthropogenic groundwater withdrawals in each participating countries.

Question 5: If yes, please indicate those withdrawal types where data are accessible:

a. domestic
b. industrial
c. irrigation
d. public supply
e. mining
f. other (please specify)

The withdrawal data are accessible in the *domestic* sector in 11 countries: Denmark, Finland France, Germany, Greece, Italy, Portugal, Slovenia, Spain, Switzerland, UK, and Ukraine.

In the *industrial sector* the withdrawal data are accessible in 15 countries: Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Portugal, Slovenia, Spain, UK, Switzerland, and Ukraine.

The withdrawal data for *irrigation* are accessible in 12 countries: Belgium, Denmark, France, Germany, Hungary, Netherlands, Portugal, Slovenia, Spain, Italy, UK, and Ukraine.

In the public supply the withdrawal data are available in 18 countries: Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Portugal, Serbia, Slovenia, Spain, Switzerland, UK, Ukraine.

In the *mining* sector the groundwater withdrawal data are accessible in 8 countries: France, Germany, Hungary, Netherlands, Poland, Portugal, Slovenia, and Ukraine.

In the *other* category 6 countries indicated accessible data: Denmark, Germany, Hungary, Portugal, Switzerland and Ukraine *(Fig. 5).* In this category the following types of groundwater use were specified: non-irrigation agricultural usage, bath, reinjection, geothermal energy, fish farming, and bottled water.

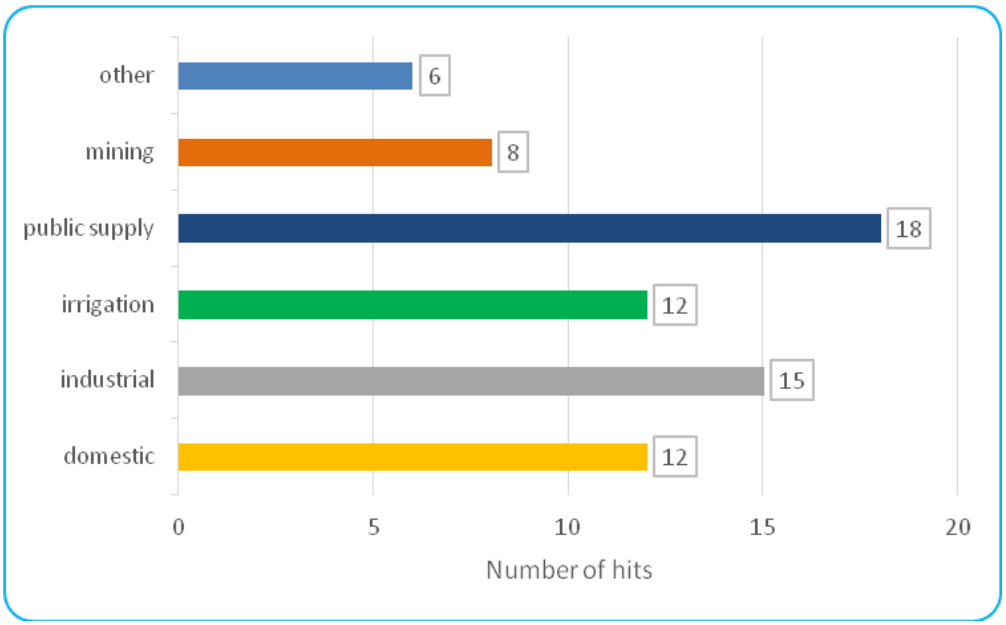

Fig. 5 Number of countries indicating the data accessibility of groundwater withdrawal in different sectors.

The additional remarks to the different groundwater withdrawal types are summarised below:

In *Greece* the domestic use refers to the data derived from the urban water supply companies. Data for the irrigation use in most of the cases are derived from statistical methods in relation to the type of the agricultural use.

In *Ireland* there are reasonable estimates of public supplies. There are less reliable estimates of domestic and industrial supplies. There are no reliable (surveyed) data on irrigation supplies. Mines are few, but the dewatering data are well known. Quarries are significant abstractors, but data are mostly not registered.

In *Italy* the information on the withdrawals is often patchy, because of the institutional framework that governs the management of water resources. Depending on the different regional and local contexts, the dataset can range from detailed quantitative and qualitative values, to estimates of these values or in some cases no information is still available. Even in the best case, available datasets need to be homogenized and harmonized to allow comparisons on a regional and national level.

In *Poland* the main hydrogeological problems are connected with the exploitation of coal in mines of the Upper Silesian Coal Basin.

In *Portugal* about 60% of groundwater withdrawal is used for agriculture; the rest is almost equally divided between the domestic, industrial, public supply and mining sector, bottle waters, spa, recreational use, and energy/geothermal.

In *Slovenia* the data are available at the Environmental Agency (formally public domain data). However the data base is not user friendly and collecting data requires a lot of efforts – depending on the data level.

In *Spain* the data are provided by the National Statistic Institute for autonomous communities by means of survey (2012 for irrigation and urban use and 2006 for industrial use). Some data are available from water authorities.

In the *UK* summarised national and regional data are available, and detailed data on licensed withdrawals are accessible. The actual abstraction quantities may be commercially sensitive and data access fees may be applied.

In *Ukraine* “domestic” and “public supply” withdrawal types are counted together. In 2013, the distribution was as follows: domestic and public supply 52%, industrial 8.5%, agriculture-6.4%, irrigation 1%, mining 32%, bottle waters 0.1%.

4.3 Groundwater monitoring, availability of data

Question 6: How many observation sites are there in the strategic groundwater monitoring network in your country?

a. less than 50
b. between 50 and 100
c. more than 100

The strategic groundwater monitoring networks are related to the application of Water Framework Directive and Groundwater Directive. The number of observation sites in the monitoring network is above 50 in each country. Two countries mentioned observation sites between 50 and 100. There are more than 100 observation sites in 18 countries *(Fig. 6).*

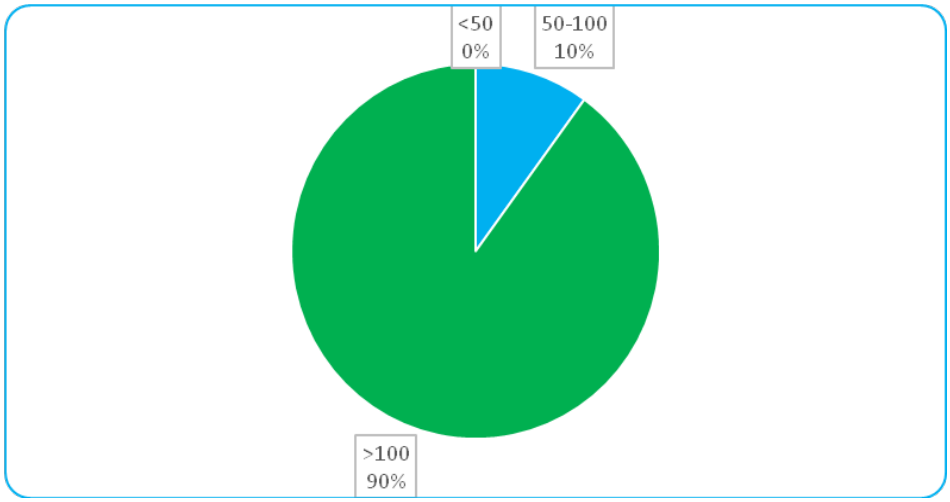

Fig. 6 Number of groundwater monitoring observation sites in the examined countries. Between 50 and 100: Serbia and Slovenia. Above 100: Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Netherlands, Poland, Portugal, Spain, Switzerland, Italy, UK, and Ukraine.

The groundwater monitoring systems are quite complex in the different countries as it is shown by the additional comments:

In *Denmark* there are around 1200 wells, the main part of these are clustered around 70 monitoring areas. About 25% of the wells are outside these areas, and this part is still growing.

In *Greece* there is no clear regime regarding the institution that is responsible for the monitoring network. An institution might have a local network for a specific area and in the meantime at the same area another institution might have a different observation network. A normalisation of the network across the country must be considered as a major factor that has to be made in the near future.

In *Hungary* there are over 2000 points of surveillance and there is an operative monitoring system of WFD (Water Framework Directive). Furthermore, water supply monitoring networks and pollution source networks also exist.

In *Ireland* the Irish Environmental Protection Agency carries out groundwater monitoring regularly at more than 220 sites across the country for Water Framework Directive monitoring purposes. The EPA also conducts monitoring for drinking water supplies, which includes wells and springs.

In *Italy*, following the European Directives on surface water and groundwater, 775 groundwater bodies have been identified all over the country. Most of them have their own quantitative and qualitative monitoring network, which it is constituted at least by one observation point.

In *The Netherlands* there is no strategic groundwater monitoring network. Each province has two networks (heads and quality). For groundwater quality there is in addition a national strategic network.

In *Poland* in 2014 hydrological observations were carried out at 1112 points. All observation points are arranged in a sustainable way.

In *Spain* there are 8995 observation sites (4274 surveillance monitoring programme; 1955 operational monitoring programme; 2761 quantity monitoring)

In the *UK* there are more than 6000 monitoring observation sites.

In *Ukraine* the state-level groundwater monitoring network includes 911 sites. In 2014 observations were conducted only at 354 observation sites due to lack of funding.

Question 7: How much of your country is covered by groundwater monitoring network?

a. less than 50 %
b. between 50-100 %
c. 100 %

The National Experts had to consider the area covered by the monitoring network referring to the water bodies (or groundwater bodies). They separately specified if the areas were not monitored due to the absence of groundwater bodies, or for lacking of the network, or for limited extension of the network.

In 2 countries less than half of the country's territory is covered by monitoring network. In 8 countries the covered area is between 50 and 100%. In the case of 10 countries their territory is completely covered by groundwater monitoring network *(Fig. 7).*

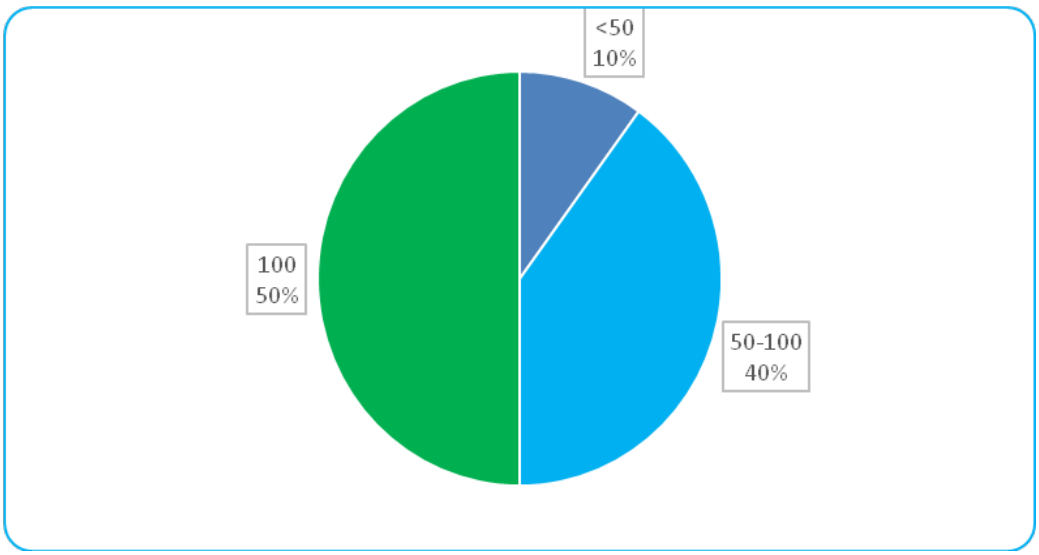

Fig. 7 Rate of area in percentage covered by groundwater monitoring network in the examined countries. Less than 50 %: Croatia, Serbia. Between 50-100 %: Belgium, Czech Republic, Greece, Italy, Poland, Portugal, Spain, UK. 100 %: Denmark, Finland, France, Germany, Hungary, Ireland, Netherlands, Slovenia, Switzerland, Ukraine.

In *Denmark* beside the national groundwater monitoring programme, the water supply companies also do analysis of the groundwater in their abstraction wells. In this way, around 1500 water supply wells are additionally analysed (quality, mainly the same parameters as in the national programme) every year and the data uploaded to the national database with public access.

In *Finland* the monitoring network is more sporadic in Northern Finland than in the other parts of the country, due to sparse population of the northern areas.

In *Italy* the percentage of coverage will not probably reach the maximum value (100%) because of the morphology of the Italian territory, largely mountainous and of difficult access. Monitoring networks cover mainly the lowland/plain areas, where human impacts are more relevant.

In *Slovenia* the situation is rather specific due to hydrogeological conditions in the country. Approximately 20 % is covered by alluvial deposits in tectonic depressions. These areas are monitored by classical monitoring network and are well covered. Recently the Environmental Agency is implementing a significant EU funded project - BOBER which aims to improve the groundwater monitoring network. 50 % of the country is characterised by the presence of karstic aquifers where monitoring is difficult to perform. At all important karstic springs monitoring exists, and although spatial coverage is not complete, the monitoring is managed. The rest of the country is represented by small aquifers or areas without significant groundwater bodies. In those areas small private or community water works exist where groundwater data are partially accessible.

In the *UK* only those areas are not monitored which have no groundwater bodies.

***Question 8**:* What types of data are collected by the groundwater monitoring network/s?

a. quantitative
b. qualitative
c. both

Quantitative monitoring includes water level, spring discharge and other volumes adding information on groundwater flow. Qualitative data include chemical and physical parameters. In the survey all countries indicated that both quantitative and qualitative data are collected by the groundwater monitoring network.

In *Hungary* quantitative data are collected on water level and water withdrawal, qualitative data are monitored on all waterbodies. However the monitoring network is not evenly distributed spatially.

In *Poland* in 2014, quantitative data were collected at 1112 points, but water qualitative measurements were carried out only at 601 observation sites.

In the *UK* there are separate monitoring networks for groundwater quality and level. More than 6000 sites are monitored for groundwater level and more than 300 sites for groundwater quality.

***Question 9*:** Are you aware of any parameters that are presently not monitored, but should be (in addition to those which are recommended by the European Commission)?

a. yes
b. no

15 countries indicated that all necessary parameters are monitored *(Fig. 8)*. However, among them, *Slovenia* and *Ukraine* added that presently there have been problems with the regular monitoring due to budgetary reasons. Denmark mentioned that hormones and medicine residuals are under consideration to be put into the monitoring programme. In the *UK* a risk-based approach is taken to determine what (quality) parameters to monitor.

5 countries (*Greece, Italy, Serbia, Spain and Switzerland*) stated that the monitoring system was not complete as there are parameters which are not monitored, but should be.

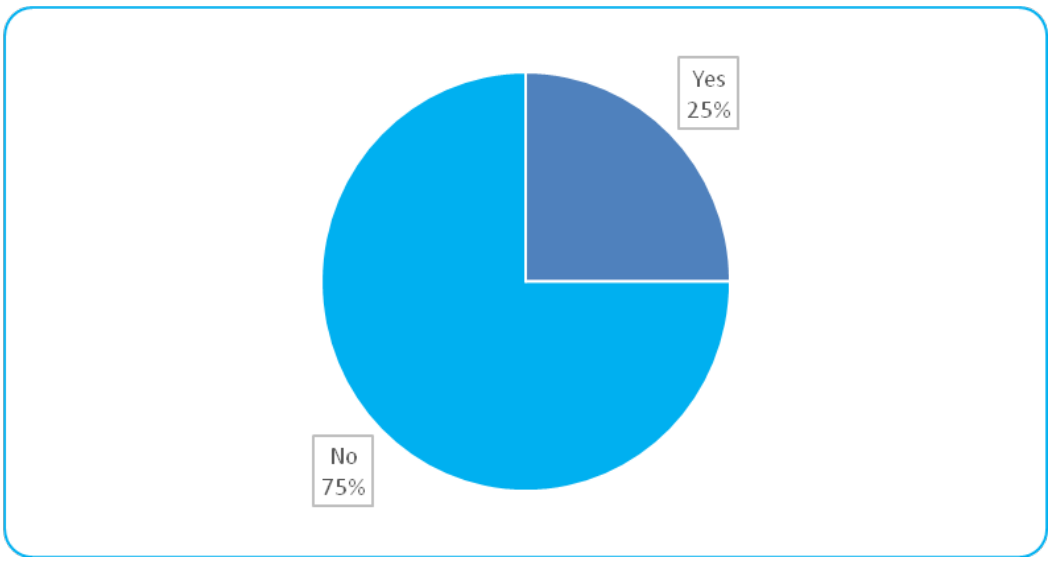

Fig. 8 Lack of completeness of the monitored groundwater data in the examined countries. Yes: there are parameters which are not monitored but should be (Greece, Italy, Serbia, Spain and Switzerland. No: all needed parameters are monitored (Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Netherlands, Poland, Portugal, Slovenia, UK, Ukraine).

In *Greece* not all parameters recommended by European Union are monitored. The observation and monitoring of heavy metals would be needed across the country and especially near to industrial zones and close to the area of mining activities. Furthermore, Fe, Mn, As and F should be monitored especially close to domestic areas or in places that are heavily stressed especially during the touristic season where there is overpopulation during the summer months.

In *Italy* the following parameters are suggested to monitor: emergent contaminants, parapharmaceutical contaminants (e.g. hormones), and sweeteners.

Serbia indicated that the Fe and Mn content in the alluvium would be necessary to be monitored as well as nitrate (NO^3) and turbidity in karstic areas.

In *Spain* recently a great effort has been made to adjust parameters with water regulations. However, networks are not suited to the geological characteristics and size of the aquifers. There is a need for establishing a groundwater radiological network, which exist in surface water.

In *Switzerland* qualitative measurements should be carried out on specific micro-pollutants (mainly tracers of agriculture & industrial practices). Quantitative data would be needed about temperature and electrical conductivity.

Question 10: Are the monitored data available online?

d. yes
e. no

13 countries indicated that the monitored groundwater data are online available. In 2 countries only a part of the data are available. In 5 countries the groundwater monitoring data are not available online *(Fig. 9).*

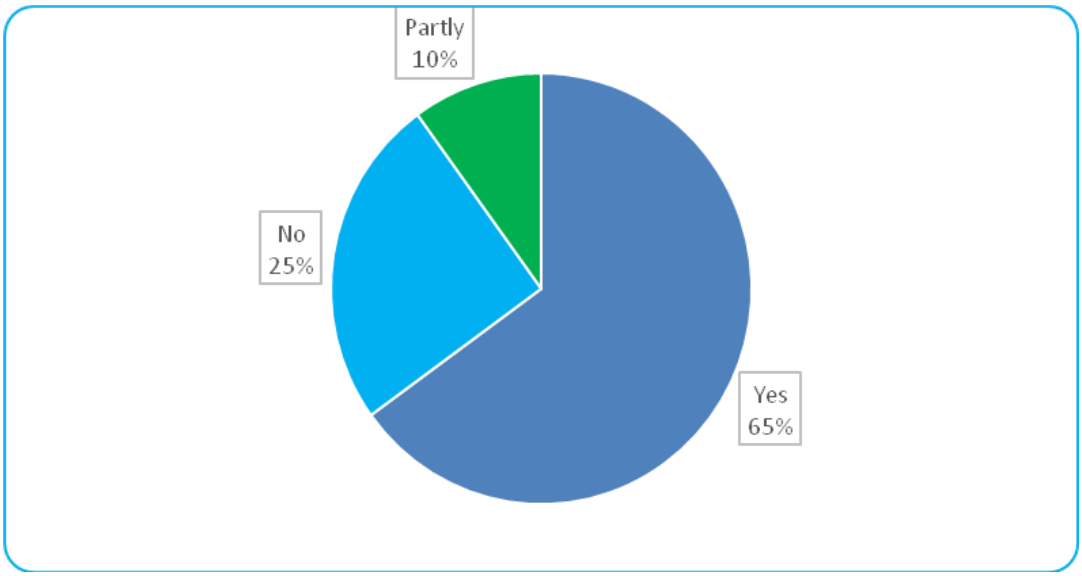

*Fig. 9 O*nline availability of groundwater monitoring data. Yes: data are online available (Belgium, Denmark, Czech Republic, Finland, France, Italy, Netherlands, Poland, Portugal, Slovenia, Spain, Switzerland, UK). No: data are not available online (Croatia, Greece, Hungary, Ireland, Ukraine). Partly: data are only partly available online (Germany, Serbia).

In the *Czech Republic* the monitoring data are available online but access has to be paid and there is no difference if the source is a public body or a private company.

In *Denmark* the data are publicly available, free of charge, at the national groundwater database JUPITER.

In *Finland* the data of monitoring network are also free and online available on the website of the Finnish Environment Institute (SYKE).

In *Germany* the data are only partly available, depending on the providing institution. There are 16 federal states in the country and each has its own practice. In some states (agencies) one can find almost everything online while in others the request has to be sent by email.

In *Hungary* the monitoring data are available only for the Water Management Directorates; data collection, storage and evaluation are coordinated by General Directorate of Water Management. Monitoring data can be available for evaluation work for other users by special request.

In *Ireland* the WFD data are not available online. Regional water quality information and summaries can be reviewed in a series of EPA-published ambient water quality reports as well as integrated water quality assessment reports (accessible on the EPA website). Regional water quality data can also be compared at European level using the European Environment Agency "Water Data Centre".

In *Italy* the web searches highlighted how in several cases the groundwater monitoring data, collected mainly by regional agencies for environmental protection, are available online. In some cases the data access is not free, but they are available under request of specific permits or of membership to public bodies. In particular two large databases are available on-line: SINAnet (ISPRA on-line national geodatabase) and TANGRAM (on-line geodatabase with about 40 000 records/wells of the Po River Basin).

In *Poland* the results of monitoring data are presented in the "Hydrogeological Annual Report" prepared by the Polish Hydrogeological Survey. As a part of the implementation of the Nitrates Directive in Poland 21 areas particularly exposed to nitrates from agricultural sources were identified. This data are available on the website of the National Water Management Authority.

In *Spain* the types and formats of the monitored data are very different (GIS, worksheets, adobe acrobat, database, etc.) and not all of them are available.

In *Switzerland* raw data are only partly available and there are different consultation standards (open / restricted / confidential status).

In the *UK* the data are partially available, telemetered data and regional summaries are accessible online.

The National Experts in the countries where the groundwater monitoring data are not or partly available have no information if these data are accessible through the European Commission's website.

4.4 Journals/archives focused on hydrogeology

Question 11: Are there any journals/archives focused on hydrogeology in your country?

a. yes
b. no

Almost all the examined countries indicated that they had journals or archives focused on hydrogeology (Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Serbia, Slovenia, Spain, Switzerland, UK, Ukraine). Only the Portuguese National Expert noticed the there is no journal specialised for hydrogeology in Portugal.

Question 12: Please list the names of these journals/archives, indicating if they are on-line/printed and English/national language.

The list of the names and websites of the hydrogeology-related journals and archives can be found in Annex 3. Altogether 92 journals/archives were identified by the experts.

The online/printed availability of these journals/archives in the 19 examined countries is as follows:

- 24 is only online available,
- 25 is published only in printed form,
- 42 is available both in online and printed form.

The language of the hydrogeology-related journals:

- English: 19,
- National language: 51,
- Both English and national language: 21.

5. CONCLUSIONS

In the frame of the WP1, Task 1.2, the European Federation of Geologists carried out a survey in order to identify the information sources for hydrogeology-related research and knowledge at national level in 20 European countries. The questionnaire for the survey included 12 questions and it was filled by the National Experts identified by the EFG Member Associations. In the survey the following countries were involved: Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, The Netherlands, Poland, Portugal, Serbia, Slovenia, Spain, Switzerland, UK, and Ukraine.

The survey questions concerned on the following issues: (1) institutions dealing with groundwater research/survey, (2) groundwater withdrawal, availability of data, (3) groundwater monitoring, availability of data and (4) journals/archives focused on hydrogeology.

The number of institutions dealing with groundwater research/survey is between 10 and 20 in 8 countries and above 20 in 12 countries. However, the number of institutions was difficult to define because there are several R&D programs where universities, research centres and private companies are involved, and there are different institutions, small companies, where hydrogeological groups exist. That is why we asked to take only the most important institutions into consideration. The total indicated number of hydrogeology-related institutions in the 20 countries is 351.

The drinking water supply is groundwater-dominated in the examined countries. Only Spain, Ireland and Ukraine indicated less than 30% groundwater in the supply. The accessibility of withdrawal data is different in the different user sectors. The highest accessibility is characteristic in the public water supply.

The strategic groundwater monitoring networks are managed according to the Water Framework Directive and Groundwater Directive. The number of observation sites in the monitoring network is above 50 in each country and there are more than 100 observation sites in 18 countries. In several countries the number of observation sites is even a magnitude higher. Most of the countries are completely covered by groundwater monitoring network, only 7 countries indicated coverage less than 100%. In these countries only those areas are not monitored which have no groundwater bodies.

In the groundwater monitoring networks both quantitative and qualitative data are collected. In most of the countries all necessary parameters are monitored; only 5 National Experts mentioned that additional parameters would be necessary to measure in their countries (Fe, Mn, As and F content, emergent and parapharmaceutical contaminants, micro-pollutants). The monitored groundwater data are generally online available (in 13 countries). In 2 countries only a part of the data are available and in 5 countries the groundwater monitoring data are not available online.

Almost all examined countries indicated that they had journals or archives focused on hydrogeology. Portugal is the only country where there is no journal/archive relevant for hydrogeology. The Experts named a total of 92 journals/archives in the 19 countries. Almost

half of them are available both online and in printed form and a quarter of them both in English and national language. Half of the journals are accessible only in the national language.

In the following phase of the project, a Europe-wide assessment of the existing groundwater-related practical and scientific knowledge, the European Inventory (database) of Groundwater Research (EIGR) will be created in form of a web-service. With the identification of the information sources, the recent survey results provide a substantial basement for this work.

Annex 1: Questions on information sources for groundwater research/survey

Please underline the right answer for the following questions and add your comments if necessary

1. How many institutions deal with groundwater research/survey in your country?
    a. less than 10
    b. between 10 and 20
    c. more than 20

_____
_____

2. Please fill the table for the institutions related to groundwater research/survey in your country, indicating the level, the type and the data accessibility at the institution:

Name and website of institution	Level				Type					Data accessibility			
	International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format

3. What percentage of the drinking water derives from groundwater in your country?
    a. less than 30 %
    b. 30-70 %
    c. more than 70 %

_____
_____

4. Are there any official data about anthropogenic groundwater withdrawals?
    a. yes
    b. no
5. If yes, please indicate those withdrawal types where data are accessible:
    a. domestic
    b. industrial
    c. irrigation
    d. public supply
    e. mining
    f. other (please specify)

_____
_____

6. How many observation sites are there in the strategic groundwater monitoring network in your country?
    a. less than 50
    b. between 50 and 100
    c. more than 100

_____
_____

7. How much of your country is covered by groundwater monitoring network?
    a. less than 50 %
    b. between 50-100 %
    c. 100 %

_____
_____

8. What type of data are collected by the groundwater monitoring network/s?
    a. quantitative
    b. qualitative
    c. both

_____
_____

9. Are you aware of any parameters that are presently not monitored, but should be (in addition to those which are recommended by the European Commission)?
    a. yes
    b. no

_____
_____

10. Are the monitored data available online?
    a. yes
    b. no

_____
_____

11. Are there any journals/archives focused on hydrogeology in your country?
    a. yes
    b. no

12. Please list the names of these journals/archives, indicating if they are on-line/printed (O/P) and English/national language (E/N) (add rows if necessary):

Name of journal/archive	O/P	E/N

Explanatory notes to the questions:

1. Types of institutions include university, research centre, public body, private company, or others.
2. Add rows or additional sheets if necessary.
3. You can refer to the percentage respect with total drinking water supply or to the percentage of citizens served by groundwater. If data are not totally available, please indicate why and to what part of the country you refer.
4. Data are related to quantity of withdrawals for different uses.
5. Among other withdrawals please specify to what type you refer (e.g. bottle waters, spa, recreational use, energy/geothermal, etc.).
6. The strategic groundwater monitoring network/s are related to the application of Water Framework Directive and Groundwater Directive; if you know other monitoring networks please additionally indicate them.
7. You can consider the area covered by the monitoring network referring to the water bodies (or groundwater bodies); please separately specify if the areas not monitored are due to the absence of groundwater bodies, or for lacking of the network, or for limited extension of the network.
8. Quantitative monitoring include water level, spring discharge and other volumes adding information on groundwater flow. Qualitative data include chemical and physical parameters.
9. Please indicate the parameters which in your opinion can be useful, or which are under discussion in your country to be added to the monitoring network.
10. Online availability can be free of charge, or under request, or under fee payment; please specify.
11. A journal is considered focused on hydrogeology when its main topic is hydrogeology, or at least one of the main topics is related to hydrogeology (e.g. a journal dedicated to environmental issues facing groundwater topic, as a journal dedicated to applied/engineering geology facing groundwater topic too).
12. Archives include official monitoring network data.

You can use the three lines after each question to add your comments, or use additional sheet if necessary.

Annex 2: Institutions related to groundwater research/survey in the participating countries

Country	Website of institution	Level					Type				Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Belgium	www.dov.vlaanderen.be		x					x			x			
	www.environnement.wallonie.be		x					x			x			
	www.environnement.brussels		x					x			x			
	www.vivaqua.be		x						x			x		
	www.swde.be		x						x			x		
	www.dewatergroep.be/		x						x			x		
	www.vmm.be		x					x				x		
	www.ovam.be		x					x				x		
	www.vub.ac.be/hydr	x	x	x	x	x	x	x					x	
	www.ulg.ac.be/	x	x	x	x	x	x	x				x		x
	www.umons.ac.be/	x	x	x	x	x	x	x				x		x
	https://www.unamur.be/en	x	x	x	x	x	x	x				x		x
	http://agriculture.wallonie.be/apps/spip_wolwin/		x		x			x				x		x
	http://www.issep.be/		x		x			x				x		x
	http://www.bruxellesenvironnement.be/		x		x			x					x	
	www.spaque.be/				x				x			x		x
Croatia	www.hgi-cgs.hr/eng/	x	x	x	x		x					x		
	http://meteo.hr/index_en.php			x	x			x				x		
	www.unizg.hr/homepage/		x	x	x	x	x	x				x		x
	www.unios.hr/		x	x	x	x	x	x				x		x
	http://www.unist.hr/		x	x	x	x	x	x				x		x
	http://www.inf.uniri.hr/hr/?lang=english		x	x	x	x	x	x				x		x
	http://www.unizd.hr/		x	x	x	x	x	x				x		x
	http://www.unidu.hr/index_eng.php		x	x	x	x	x	x				x		x
Czech Republic	www.geology.cz			x				x				x		x
	www.aquatest.cz	x							x					
	www.geotest.cz	x							x					
	www.1progeo.cz			x					x					
	www.opv.cz			x					x					
	www.vz.cz	x							x					
	www.hgf.vsb.cz			x		x								
	www.vuv.cz			x			x					x		x
	www.watrad.cz	x							x					
	www.deconta.cz	x							x					
	www.ehgzitny.cz			x					x					
	www.sensordds.cz	x							x					
	www.chmi.cz			x				x				x		x
	http://www.vumop.cz/			x				x				x		x
	http://www.hbu.cas.cz/			x				x				x		x
	http://www.vurh.jcu.cz/			x				x				x		x
	http://www.ih.cas.cz/web_new/cs/			x				x				x		x

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Denmark	http://ign.ku.dk/english	x	x	x	x	x						x		x
	http://geo.au.dk/en/	x	x	x	x	x						x		x
	http://www.env.dtu.dk/english	x	x	x	x	x						x		x
	http://www.geus.dk/UK/	x	x	x	x		x				x			x
	http://eng.naturstyrelsen.dk/			x	x			x			x			x
	http://miljoeogressourcer.dk/index.php?id=3&lang=uk			x	x			x			x			x
	The 98 Danish Municipalities				x			x				x		
	www.danva.dk and www.fvd.dk				x				x		x			x
	Private (consultancy) companies				x				x		(x)			x
Finland	www.ymparisto.fi			x				x			x			
	Regional Centres for Economic Development, Transport and the Environment (15 centres in different parts of Finland)		x					x			x			
	www.gtk.fi						x	x				x		
	www.helsinki.fi					x						x		
	www.utu.fi					x						x		
	www.oulu.fi/yliopisto					x						x		
	www.poyry.fi	x							x			x		
	www.ramboll.fi	x							x			x		
	www.fcg.fi								x			x		
	www.lvt.fi								x			x		
	http://www.nablabs.fi/								x				x	
	www.sweco.fi	x											x	
	www.maintpartner.fi								x				x	
	www.lsvsy.fi				x				x				x	
	www.geo-hydro.fi								x				x	
	www.fulfil.fi								x				x	
	www.luvy.fi				x								x	
	www.svsy.fi/oy				x				x				x	
	www.metropolilab.fi				x								x	
	www.geobotnia.fi								x					
	www.amtele.se	x							x				x	
	www.pohjavesi.fi								x				x	
	www.doranova.fi								x				x	
France	www.brgm.fr and infoterre.brgm.fr	x					x	x			x			x
	http://www.lesagencesdeleau.fr/en/les-agences-de-leau/les-six-agences-de-leau-francaises/?lang=en			x				x				x		
	www.ades.eaufrance.fr/			x				x			x			x
	www.cfh-aih.fr			x						x		x		
	sigessn.brgm.fr sigescen.brgm.fr sigesaqi.brgm.fr sigespoc.brgm.fr		x					x			x			x
	www.sage-nappes33.org		x					x			x			x

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Germany	www.tzw.de			x			x					x		
	http://www.gwz-dresden.de/dgfz-ev/			x			x					x		
	http://www.ufz.de/	x					x					x		
	http://www.bgr.bund.de/DE	x						x			x			
	http://www.gfz-potsdam.de/sektion/hydrogeologie/themen/grundwasser-rohstoff-und-ressourcen/	x					x					x		
	http://iww-online.de/			x			x					x		
Greece	http://www.ypeka.gr/Default.aspx?tabid=245&language=en-US			x				x				x		
	http://www.igme.gr/portal/page?_pageid=33,56803&_dad=portal&_schema=PORTAL			x			x					x		
	http://www.nagref.gr/index_uk.htm	x		x	x		x					x		
	http://www.geol.uoa.gr/index.php/en/faculty-welcome.html	x		x		x						x		
	www.geo.auth.gr	x		x		x						x		
	http://www.geology.upatras.gr/?lng=en	x		x		x						x		
	http://www.ntua.gr/index_en.html	x		x		x						x		
	http://www.eydap.gr/en/Home/				x			x	x			x		
	http://www.eyath.gr/index.jsp?extLang=LG				x			x	x			x		
Hungary	http://www.ovf.hu/en/	x	x	x	x					x	x			x
	www.mfg.hu	x		x	x		x					x		x
	www.geochem.hu	x		x	x		x					x		x
	www.elte.hu				x	x						x		
	www.bme.hu				x	x						x		
	www.uni-miskolc.hu/en				x	x						x		
	www.u-szeged.hu				x	x						x		
	www.unideb.hu				x	x						x		
	www.uniwest.hu				x	x						x		
	www.sziu.hu				x	x						x		
	www.ejf.hu				x	x						x		
	www.uni-pannon.hu				x	x						x		
	http://www.hidrologia.hu/mht/index.php?option=com_content&task=view&id=13&Itemid=36			x	x			x				x		
	www.nyuduvizig.hu		x							x		x		x
	www.eduvizig.hu		x							x		x		x
	www.kdtvizig.hu		x							x		x		x
	www.kdvvizig.hu		x							x		x		x
	www.evizig.hu		x							x		x		x
	www.ddvizig.hu		x							x		x		x
	www.aduvizig.hu		x							x		x		x
	www.fetivizig.hu		x							x		x		x
	www.ativizig.hu		x							x		x		x
	www.tivizig.hu		x							x		x		x
	www.kovizig.hu		x							x		x		x
	www.smaragd.hu		x						x			x		x
	www.hydrosys.hu		x						x			x		x
	GWIS Kft.								x			x		x

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Italy	http://www.arpa.vda.it/it/acque-sotterranee				x			x			x			
	https://www.arpa.piemonte.it/approfondimenti/temi-ambientali/acqua/acque-sotterranee				x			x				x		
	http://www.arpal.gov.it/homepage/acqua/banche-dati-acqua.html				x			x				x		x
	http://ita.arpalombardia.it/ita/settori/acque/index.asp				x			x				x		x
	http://www.arpa.veneto.it/temi-ambientali/acqua/acque-interne/acque-interne				x			x				x		x
	http://www.provincia.bz.it/agenzia-ambiente/acqua/acqua.asp				x			x					x	
	http://www.appa.provincia.tn.it/acqua/				x			x				x		
	http://www.arpa.fvg.it/cms/tema/acqua/				x			x				x		
	http://webbook.arpa.emr.it/				x			x			x			x
	http://www.arpat.toscana.it/temi-ambientali/acqua				x			x			x			x
	http://www.arpa.marche.it/index.php/temi-ambientali/acqua				x			x				x		
	http://www.arpalazio.gov.it/ambiente/acqua/				x			x				x		
	http://www.artaabruzzo.it/				x			x				x		
	http://www.arpacampania.it/web/guest/20				x			x				x		x
	http://www.arpamolise.it/#nogo				x			x				x	x	
	http://www.arpa.puglia.it/web/guest/acqua_monitor				x			x				x		
	http://www.arpab.it/				x			x					x	
	http://www.arpacal.it/index.php?option=com_content&view=article&id=73&Itemid=77				x			x				x		
	http://www.arpa.sicilia.it/temi-ambientali/tematiche-ambientali/				x			x				x		
	http://www.sardegnaambiente.it/monitoraggi/acqua/				x			x				x		
	http://www.direttivaacque.minambiente.it/distretti_idrografici.html			x				x					x	
	http://www.isprambiente.gov.it/en/national-system-for-environmental-protection			x				x			x			x
	http://www.alpiorientali.it/			x				x				x		
	http://www.adbpo.it/on-multi/ADBPO/Home/PianodiGestioneepartecipazionepubblica.html			x				x				x		
	http://www.appenninosettentrionale.it/dist/			x				x				x		
	http://www.autorita.bacinoserchio.it/pianodigestione			x				x				x		
	http://www.abtevere.it/			x				x				x		
	http://www.ildistrettoidrograficodellappenninomeridionale.it			x				x				x		
	http://www.regione.sardegna.it/speciali/pianogestionedistrettoidrografico/			x				x				x		
	http://www.regione.sicilia.it/arra/piano_acque/piano08_index.htm			x				x				x		
	http://www.irsa.cnr.it/ShPage.php?lang=en&pag=home			x			x						x	
	http://www.tangram.samit.unimib.it/ and http://www.idpa.cnr.it/index_en.html			x			x					x		x
	http://www.pa.ingv.it/monitor_h2o_sott/pianoditutela.html				x		x					x		
	http://myunito.cineca.it/unitoWAR/page/dipartimenti2/D011_en/D011_en%20Main%20Book1			x		x							x	
	http://www.diati.polito.it/il_dipartimento/strutture_interne/laboratori/cartografia_tematica_e_idrogeologia_applicata			x		x						x		x
	http://www.tangram.samit.unimib.it/ and http://www.disat.unimib.it/index.php?option=com_content&view=article&id=182&Itemid=225&lang=it			x		x						x		x
	http://www.dipterra.unimi.it/ecm/home/ricerca/temi-e-linee/risorse-idriche			x		x							x	
	http://www.dica.polimi.it/ricerca/sia/			x		x							x	

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Italy	http://www.geoscienze.unipd.it/			x		x							x	
	http://www2.difest.unipr.it/?q=node/507			x		x							x	
	http://www.bigea.unibo.it/it/ricerca/ambiti-di-ricerca/idrogeologia			x		x							x	
	http://www.dsfta.unisi.it/en/research/labs-eng/hydrogeology-gis-and-hydrogeology-modeling-labs			x		x							x	
	http://www.simau.univpm.it/			x		x							x	
	http://www.fisgeo.unipg.it/joo3x/index.php/it/ricerca.html#G2			x		x							x	
	http://www.deb.unitus.it/web/interna.asp?idCat=1312			x		x							x	
	http://www.dst.uniroma1.it/strutture/laboratori/laboratorio-di-idrogeologia-quantitativa			x		x							x	
	http://host.uniroma3.it/laboratori/idrogeologia/			x		x							x	
	http://dicea.dip.unina.it/it/dipartimento/presentazione/			x		x							x	
	http://www.distabif.unina2.it/it/ricerca/64-uncategorised/61-gruppi-di-ricerca			x		x							x	
	http://www.geo.uniba.it/settori-scientifico-disciplinari.html			x		x							x	
	http://dipartimenti.unica.it/ingegneriacivileambientaleearchitettura/			x		x							x	
Ireland	www.epa.ie			x			x	x			x			x
	www.gsi.ie			x			x	x			x			x
	www.teagasc.ie			x			x	x			x			x
	www.icrag.ie	x		x			x					x		x
	https://www.tcd.ie/civileng/research/environmental/hydrogeology&hydrology.php	x		x		x						x	x	
	http://www.nuigalway.ie/biogeoscience/	x		x		x						x	x	
	http://www.ucd.ie/geology/	x		x		x						x	x	
	http://icarus.nuim.ie/	x				x						x	x	
	www.opw.ie			x				x			x			
	http://www.nra.ie/nra-research/			x				x					x	
	www.ioti.ie				x					x		x	x	
Netherlands	https://www.tno.nl/nl/aandachtsgebieden/energie/geological-survey-of-the-netherlands/	x		x						x	x			x
	https://www.deltares.nl/	x		x						x				
	http://www.wageningenur.nl/en/Expertise-Services/Research-Institutes/alterra.htm	x		x				x						
	http://www.kwrwater.nl/	x		x	x				x					
	http://www.rivm.nl/en/			x				x			x			
	http://www.pbl.nl/en/			x				x						
	http://www.uu.nl/	x				x								
	http://www.tudelft.nl/en/	x				x								
	https://www.wageningenur.nl/en.htm	x				x								
	http://www.vu.nl/en/index.asp	x				x								
	https://www.unesco-ihe.org/	x				x								
	http://www.itc.nl/	x				x								

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Poland	http://www.psh.gov.pl/en/			x			x	x			x			
	http://mjwp.gios.gov.pl/		x	x				x				x		
	http://www.wsse.waw.pl/PageContent.aspx?SubMenuID=100		x	x				x				x		
	http://wsselublin.pis.gov.pl/		x	x				x				x		
	http://wsse.krakow.pl/strona2/index.php/obszary-dzialan/uslugi-laboratoryjne/118-badania-wody		x	x				x				x		
	http://wsse-poznan.pl/index.php/badamy/22-laboratorium-badania-wody		x	x				x				x		
	http://wsse-poznan.pl/index.php/badamy/22-laboratorium-badania-wody		x	x				x				x		
	http://wssewroclaw.pis.gov.pl/		x	x				x				x		
	http://www.pca.gov.pl/english/		x	x				x				x		
	http://www.wsse.gda.pl/laboratoria/laboratorium-badan-wody-i-gleby?fb1f82e9ebfcd756bfce357be16ae206=bb94fc3fc6442c65985447aa67d0b75d		x	x				x				x		
	http://pssejeleniagora.pis.gov.pl/		x	x				x				x		
	http://www.wsse.katowice.pl/viewpage.php?page_id=129		x	x				x				x		
	http://www.gig.eu/en			x			x	x					x	
	http://pl.wessling-group.com/en/	x	x						x				x	
	http://www.khgi.agh.edu.pl/?page_id=97	x		x		x	x						x	
	http://en.obiks.pl/		x	x					x				x	
	http://www.sgs.pl/en/Office-Directory.aspx	x							x				x	
	http://www.hamilton.com.pl/en/drinking-water		x	x					x				x	
	http://www.ekoserwis.info.pl/badania-wody.php		x	x					x				x	
	http://www.mpwik.com.pl/o-firmie/zaklad-laboratoriow		x	x	x				x			x		
	http://www.mpwik.krakow.pl/55/Badania-laboratoryjne		x	x	x				x			x		
	http://www.mpwik.bedzin.pl/obsluga-klienta.html		x	x	x				x			x		
	http://www.mpwik.wloclawek.pl/192,laboratorim-badania-wody-i-sciekow.html		x	x	x				x			x		
	http://www.mpwik-leszno.pl/index.php?option=com_content&view=category&id=17&Itemid=106		x	x	x				x			x		
	http://www.wodociagi.lebork.pl/laboratorium/o-nas/		x	x	x				x			x		
	http://www.mpwik-skarzysko.eu/?p=pl/top/61/index		x	x	x				x			x		
	http://www.mpwik.pulawy.pl/certyfikaty.html		x	x	x				x			x		
	http://www.mpwik.wloclawek.pl/192,laboratorim-badania-wody-i-sciekow.html		x	x	x				x			x		
	http://www.wodociagi.torun.com.pl/index.php?lang=ENG		x	x	x				x			x		
	http://www.zwik.lodz.pl/laboratoria-lodzkiego-zwik-posiadaja-certyfikat-polskiego-centrum-akredytacji/		x	x	x				x			x		
	http://www.wodociagi.katowice.pl/spolka/woda00.html		x	x	x				x			x		
	http://www.mpwik.lublin.pl/index.php?option=site&id=33&sid=68		x	x	x				x			x		
	http://www.mpwikzdw.com.pl/uslugi.php?zakladka=laboratorium		x	x	x				x			x		
	http://mpwik.kamiennagora.pl/?page_id=11		x	x	x				x			x		
	http://www.mpwik.rzeszow.pl/index.php/laboratoria		x	x	x				x			x		

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
Poland	http://www.mpwik-zywiec.pl/		x	x	x				x			x		
	http://opwik.com/uslugi-zewnetrzne/laboratorium/		x	x	x				x			x		
	http://www.pwik.czest.pl/en			x	x				x			x		
	http://www.pwik.oswiecim.pl/index.php/laboratorium/modernizacja-laboratorium			x	x				x			x		
	http://zghboleslaw.org/pl/laboratorium			x	x				x			x		
	http://www.wodociagi.pl/web/artykul/laboratorium			x	x				x			x		
	http://lab-bl.com.pl/uslugi/			x	x				x			x		
	http://www.laboratorium-proxima.pl/wody-i-scieki.html			x	x				x				x	
	http://labnews.pl/laboratoria/1161			x	x				x				x	
	http://www.zwikgost.cc.pl/jakosc.html			x	x				x			x		
	http://www.aqua.com.pl/?Page=Uslugi/Laboratorium			x	x				x				x	
	http://www.labwarka.pl/en/index.html			x	x				x				x	
	http://www.pgkielce.pl/oferta/badania-laboratoryjne.html			x	x				x				x	
	http://puik.lukow.pl/laboratorium/			x	x				x			x		
	http://www.wik.dzierzoniow.pl/laboratorium.php			x	x				x			x		
	http://salubris.pl/?badania			x	x				x				x	
	http://www.emitor.com.pl/laboratorium-badania-wody-i-sciekow			x	x				x				x	
	http://www.womp.mw.mil.pl/index.php?lok=7&akcja=lbziw		x	x				x					x	
Portugal	https://sigarra.up.pt/fcup/en/web_page.inicial				X	X						X		
	Institute of Earth Sciences			X			X					X		
	http://www.ict.uevora.pt/													
	http://www.lneg.pt/Default.aspx			X				X				X		X
	http://www.dgeg.pt/			X				X				X		
	http://www.apambiente.pt/index.php?ref=x178			X				X				X		X
Serbia	http://www.rgf.bg.ac.rs/?lang=en	x		x		x						x		
	http://www.gzs.gov.rs/	x		x				x				x		
	http://www.jcerni.org/	x		x			x					x		
	http://www.hidmet.gov.rs/index_eng.php	x		x				x			x			
	http://www.nis.eu/en/		x						x			x		
	Numerous waterworks				x			x				x		
	Numerous of small companies for consultancy and drilling companies				x				x			x		
Slovenia	http://www.geo-zs.si/podrocje.aspx?langid=1033			x			x					x		x
	http://www.arso.gov.si/			x				x				x		x
	http://www.irgo.si/			x					x				x	x
	http://izrk.zrc-sazu.si/#v			x			x						x	x
	http://www.ntf.uni-lj.si/og/index.php?page=static&item=130					x							x	
	http://www.ntf.uni-lj.si/ogr/index.php?page=static&item=134					x							x	
	http://www.vo-ka.si/							x				x		x
	http://www.geologija.si/				x				x				x	

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital format
Spain	http://www.magrama.gob.es/es/			x				x			x			x
	http://www.chminosil.es/			x				x				x		x
	http://www.chcantabrico.es/			x				x				x		x
	http://www.chduero.es/			x				x			x			x
	http://www.chtajo.es/			x				x				x		
	http://www.chguadiana.es/			x				x				x		
	http://www.chguadalquivir.es/			x				x				x		
	http://www.chebro.es/			x				x			x			x
	http://www.chj.es/			x				x			x			x
	http://www.chsegura.es/			x				x				x		
	http://augas.cmati.xunta.es/		x					x					x	
	http://www.uragentzia.euskadi.eus/		x					x			x			x
	http://aca-web.gencat.cat/aca		x					x				x		x
	http://www.juntadeandalucia.es/medioambiente/site/rediam/		x					x			x			x
	http://www.caib.es/sacmicrofront/home.do?mkey=M080801111218572932 3&lang=es		x					x				x		x
	http://www.aguaselhierro.org/				x			x			x			x
	http://www.lapalmaaguas.es/				x			x				x		
	http://www.aguasgomera.es/				x			x				x		x
	http://www.aguastenerife.org/				x			x				x		
	http://www.aguasgrancanaria.com/				x			x				x		x
	http://www.aguasfuerteventura.com/				x			x				x		
	http://www.aguaslanzarote.com/				x			x				x		x
	http://www.igme.es			x			x	x			x			x
	http://www.csic.es/			x			x	x				x		x
	http://www.cedex.es			x			x	x			x			
	https://www.ucm.es/hidrogeologia/			x		x						x		
	http://www.agua.imdea.org/	x					x				x			x
	http://www.fcihs.org/pub2/eng/			x						x		x		x
	http://www.h2ogeo.upc.es/			x		x						x		x
	http://www.iiama.upv.es/iiama/			x		x	x					x		
	http://cehiuma.uma.es/			x		x	x						x	
	http://www.institutodelagua.es/			x		x	x						x	
	http://www.geama.org/			x		x	x					x		
Switzerland	http://www.kvu.ch/fr/home		x		x			x				x		x
	http://www.bafu.admin.ch/wasser/13465/13483/14097/index.html?lang=en	x	x	x				x			x			x
	http://www.geologieportal.ch/internet/geologieportal/en/home/topics/water.html	x	x	x				x			x			x
	http://www.naturalsciences.ch/organisations/geosciences	x	x	x	x	x	x					x		x
	http://www.nfp61.ch/E/Pages/home.aspx	x	x	x	x	x	x					x		x
	http://www2.unine.ch/chyn/lang/en/unine	x	x	x	x	x	x					x		x
	http://www.isska.ch/	x	x	x	x	x	x					x		x
	http://www.crealp.ch/en/	x	x	x	x	x	x					x		x
	http://www.eawag.ch/en/	x	x	x	x	x	x					x		x
	http://www.nant-de-drance.ch/accueil/		x		x				x			x		x
	https://www.stadt-zuerich.ch/dib/de/index/wasserversorgung.html		x		x				x		x			x

Country	Website of institution	Level				Type					Data accessibility			
		International	Federal/ Regional	National	Local	University	Research centre	Public body	Private company	Other	Yes	Partly	No	Digital Format
UK	https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs			x				x				x		x
	https://www.gov.uk/government/organisations/environment-agency		x					x				x		x
	http://www.environment-wales.org/		x					x				x		x
	http://www.sepa.org.uk/		x					x				x		x
	http://www.dardni.gov.uk/rivers		x					x				x		x
	www.bgs.ac.uk	x					x				x			x
	https://www.ukwir.org/site/web/content/home			x						x			x	
	http://www.sniffer.org.uk/			x						x		x		
	http://www3.imperial.ac.uk/ewre					x						x		
	https://www.ucl.ac.uk/earth-sciences					x						x		
	http://www.ncl.ac.uk/ceg/					x						x		
	http://www.birmingham.ac.uk/schools/gees/index.aspx					x						x		
	https://www.strath.ac.uk/civeng/pg/hydrogeology/					x						x		
	https://www.shef.ac.uk/civil/pg/conhyd					x						x		
	http://www.qub.ac.uk/research-centres/cerc/ResearchGroups/GroundwaterEnvironmentalSystems/	x					x					x		x
Ukraine	http://geonews.com.ua			x			x			x		x		x
	http://geoinf.kiev.ua/			x						x		x		x
	http://www.geolog.org.ua/en/		x							x		x		x
	Pivdenukrgeologiya State Enterprise		x							x		x		
	Black SeaState Regional Geological Company		x							x		x		x
	http://www.rada.com.ua/eng/catalog/18170/		x							x		x		
	Donetskgeologiya State Regional Geological Company		x							x		x		
	Eastern StateRegional Geological Company		x							x		x		
	Nadra UkraynyNational JointStock Company		x							x		x		
	http://igs-nas.org.ua			x			x					x		
	http://www.univ.kiev.ua			x		x						x		x
	http://www.nmu.org.ua			x		x						x		
	http://www.univer.kharkov.ua			x		x						x		
	http://onu.edu.ua/en/			x		x						x		
	http://onu.edu.ua													
	http://nuwm.edu.ua			x		x						x		

Annex 3: Hydrogeology-related journals/archives in the participating countries

(O: on-line, P: printed, E: English, N: national language)

Country	Name of journal/archive	O/P	E/N
Belgium	Etat des nappes d'eau souterraine, http://environnement.wallonie.be/de/eso/atlas/	O	N
Croatia	Croatian waters (Hrvatske vode), http://www.voda.hr/	O+P	N
	Geologia Croatica, http://www.geologia-croatica.hr	O+P	E
	Environmental Engineering (Inženjerstvo okoliša), http://www.gfv.unizg.hr	O+P	N
	Hrvatska vodoprivreda, http://www.voda.hr/	O+P	N
	Rudarsko-geološko-naftni zbornik	O+P	E
Czech Republic	www.geology.cz/extranet-eng	O+P	E+N
	http://eagri.cz/public/web/en/mze/water/	O	E+N
	http://www.dibavod.cz/	O+P	N
	http://www.chmi.cz/portal/dt?portal_lang=en&menu=JSPTabContainer/P1_0_Home	O	E+N
	http://www.statistikaamy.cz/2015/06/vody-je-dost-zatim/	O+P	N
	http://www.ih.cas.cz/web_new/en/	O	E+N
Denmark	JUPITER – national well database http://www.geus.dk/departments/geol-info-data-centre/jupiter-uk.htm	O	N
	Groundwater reports database	O	N
	Model database, http://www.geus.dk	O	N
	Groundwater analyses (based on data from Jupiter), partly English, http://www.geus.dk	O	E
	Geological Survey of Denmark and Greenland Bulletin, http://www.geus.dk/UK/publications/geol-survey-dk-gl-bull/Pages/default.aspx	O	E
	Vand & Jord (Water & Soil), partly online, http://www.vand-og-jord.dk/	O	N
	danskVAND (Danish Water) http://www.danva.dk/Medlemmer/Kommunikation/danskVAND.aspx	O	N
	Vandposten (The water tap), http://fvd.dk/nyt-og-presse/vandposten.aspx	O	N
Finland	Vesitalous (journal), www.vesitalous.fi	P	N
	Monthly Hydrological Report, www.ymparisto.fi	O	E+N
	Annual Hydrological Report, www.ymparisto.fi	O	E+N
	Database of Finnish Environment Institute (OIVA)	O	N
	Vesiposti (journal, partly online)	P	N
	Pisaroita (journal, partly online)	P	N
	Ympäristö (journal by Finnish Environment Institute SYKE)	P	N
	Ympäristö ja terveys, www.ymparistojaterveys.fi (journal)	P	N
France	Hydrogéologie. This was published until the 1990's	P	N
	Géologues. Journal of the French Geological Society. It publishes yearly a special N° dedicated to groundwater in association with the French Chapter of the International Association of Hydrogeologists	P	N
Germany	Grundwasser	P	N
	Wasser und Abfall	P	N
	Korrespondenz Wasserwirtschaft	P	N
	Wasserwirtschaft / Wassertechnik	P	N
	Wasserwirtschaft	P	N
Greece	Bulletin of the Geological society of Greece (is available periodically after Congresses of the geological Society of Greece, and there are chapters regarding the hydrogeological research in areas around the country) (http://www.geosociety.gr/index.php/publications-gr/1951-2000) & (http://www.geosociety.gr/index.php/publications-gr/2000	O+P	E+N
	Journal of the Hydro technical Association	O+P	E+N

	(http://ejournals.lib.auth.gr/hydrotechnica/issue/archive)		
Hungary	Hidrológiai Közlöny /Journal of the Hungarian Hydrological Society , http://www.hidrologia.hu	O+P	N
	Hidrológiai Tájékoztató/Review of the Hungarian Hydrological Society, http://www.hidrologia.hu	O+P	N
	Országos Hidrológiai Vándorgyűlés kötetei/ National Hydrological Proceedings, http://www.hidrologia.hu	O+P	N
	Drinking water cadastre	P	N
	Thermal water cadastre	P	N
Ireland	GSI Groundwater Newsletter (published by Geological Survey of Ireland), http://www.gsi.ie/Newsletters/	O	E+N
Italy	Acque Sotterranee - Italian Journal of Groundwater, http://www.acquesotterranee.it	O+P	E+N
	Associazione Idrotecnica Italiana – L'Acqua	P	E+N
	CE.RI. University of Rome La Sapienza - Italian Journal of Engineering Geology and Environment, http://www.ijege.uniroma1.it/	O+P	E+N
	AIGA Giornale di Geologia Applicata, http://www.aigaa.org	O+P	N
	Bollettino della Società Geologica Italiana e del Servizio Geologico d'Italia - Italian Journal of Geosciences https://archive.org/details/bollettinodella10unkngoog	O+P	E
	Rendiconti Online della Società Geologica Italiana, http://rendiconti.socgeol.it/	O	E
	Environnement - Ambiente e Territorio in Valle d'Aosta, http://www.regione.vda.it	O	N
	IRSA – CNR Notiziario dei Metodi Analitici (per le acque), http://www.irsa.cnr.it	O	N
	Società Italiana di Geologia Ambientale – Geologia dell'Ambiente,	P	N
	Consiglio Nazionale dei Geologi – Geologia Tecnica e Ambientale,	P	N
The Netherlands	Stromingen, http://www.nhv.nu/	O+P	N
	H_2O	P	N
	DINOloket (web portal of the Geological Survey), https://www.dinoloket.nl/	O	N
Poland	Przegląd Geologiczny/Polish Geological Review, http://www.pgi.gov.pl/	O+P	N
	Geological Quarterly, https://gq.pgi.gov.pl/	O+P	E
	Geologos, www.geologos.com	O+P	E
	Archives of Environmental Protection, http://aep.czasopisma.pan.pl/	O+P	E+N
	Polish Journal of Environmental Studies, http://www.pjoes.com/	O+P	E
	Gospodarka Surowcami Mineralnymi/ Mineral Resources Management, http://www.degruyter.com	O+P	E+N
	Technika Poszukiwań Geologicznych Geotermia Zrównowazony Rozwój/Geological Exploration Technology, Geothermics, Sustainable Development, http://www.min-pan.krakow.pl	O+P	N
	Geology, Geophysics and Environment	P	E
	Biuletyn PIG/PIG Bulletin, http://www.pgi.gov.pl/	O+P	N
	Journal of Sustainable Mining, http://kwartalnik.gig.eu/	O+P	E
Serbia	Geological annals of Balkan Peninsula (Geološki anali Balkanskog poluostrva), Faculty of Minig and Geology, https://archive.org/details/geoloshkianalib00zavogoog	O+P	E+N
	Reports of Serbian Geological Society (Zapisnici Srpskog Geološkog društva), Serbian Geological Society, http://www.sgd.rs	O+P	E+N
	Water management (Vodoprivreda), Serbian Irrigation and Drainage Society	P	N
	Water Research and Management, Institute for the Development of Water Resources "Jaroslav Černi"	P	E
	Journal of the Geographical Institute "Jovan Cvijić", Serbian Academy of Sciences and Arts	P	E+N
	Proceedings of the Committee on Karst and Speleology (Zbornik Radova Odbora za Kras i Speleologiju), Serbian Academy of Sciences and Arts	P	N
Slovenia	Geologija, http://www.geo-zs.si/	O+P	E+N
	Acta Carsologica, http://ojs.zrc-sazu.si/carsologica/	O+P	E
	RMZ – Materials and Geoenvironment, http://www.rmz-mg.com/journal.htm	O+P	E+N
	Acta Geographica, http://ojs.zrc-sazu.si/ags	O+P	E
	Acta Hydtotechnica, http://ksh.fgg.uni-lj.si/ksh_ang/acta/	O+P	E+N

Spain	Hidrogeología y Recursos Hidráulicos (Proceedings of the National Hydrogeology Conference). Every 4 years.	P	N
Switzerland	Swiss Journal of Geosciences, http://link.springer.com/journal/15	O+P	E
	PNR 61 Gestion durable de l'eau (Newsletter), http://www.snf.ch	O	E+N
	Publications de la Société Suisse d'Hydrogéologie (SSH), http://www.hydrogeo.ch/fr/publications	O	N
	Aqua et Gas, http://aquaetgas.svgw.ch/	O	N
	Publications de l'Institut Suisse de Spéléologie et Karstologie (ISSKA), http://www.isska.ch	O+P	E+N
UK	Quarterly Journal of Engineering Geology and Hydrogeology https://www.geolsoc.org.uk/qjegh	O+P	E
	BGS National Groundwater Archive (data + reports), www.bgs.ac.uk	O+P	E
	Water and Environment Journal http://www.ciwem.org/information-and-resources/publications/water-and-environment-journal.aspx	O+P	E
	Environment Agency Data Archive (monitoring data) http://www.geostore.com/environment-agency/	O	E
Ukraine	Groundwater status in Ukraine Annual State Geological Information Fund of Ukraine edition	P	N
	Archives of monitoring network data State Geological Information Fund of Ukraine	-	N
	Geological journal (with English annotations) http://www.igs-nas.org.ua	O+P	N
	Mineral resources of Ukraine (with English annotations) http://mru.gov.ua	O+P	N
	Scientific proceedings of Ukrainian State Geological Research Institute (with English annotations) http://mru.gov.ua	O+P	N