

# Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East, and Balkans and Developing Links with GEO related initiatives towards GEOSS



#### D2.5 User Need Analysis Report I

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# **1** Executive summary

This report is a synthesis of the findings of interviews carried out with end user organisations in the following countries: Albania, FYROM, Serbia, Romania, Bulgaria, Turkey, Greece, Morocco, Tunisia, Egypt, Israel, UAE and Saudi Arabia.

While the interview reports received from the various countries varies in quality and quantity, certain emerging patterns allow for the conclusion (to be further refined) that all end users across the analysed region need geo-information about the built and natural environment and natural resources. We deduct from the interviews that for geo-information services to be relevant to end users, they need to include non geo-data (e.g. demographics, information on land available for sale etc).

End users need the information to be accessible, shared and shareable, precise, open and free. This is seldom the case. Such geo-information is the basis on which the public bodies take decisions and carry out their managing duties. These include delivering permits for industrial and construction activities, planning urbanisation or the use of natural resources, handing out subsidies for agriculture and so on. Such geo-information is also the basis for interactions between the public and the private sector.

Indeed, the private sector is often under the obligation to provide proofs, reports, and assessments of their activities to public organisations. It also needs geo-information internally to help the organisation assess opportunities to maximise income while spending less. Unlike some public sector organisations, the private sector seldom has access to public data sources, and when they do, they are charged. When this is the case, they prefer to circumvent the problem by accessing free, international data sources (which paradoxically are often simply the data that national public bodies report in the first place). This interface between the public and private sector, and the needs they have in common, is an opportunity when it comes to conceiving of a tool (a regional data hub), which can serve both.

Across countries we note common, recurrent constraints such as data inaccessibility, even to that produced by institutions with a public mandate to do so. On a sub-national level, and to compensate for that inaccessibility, more advanced end users often cater for their own needs, thanks to aerial remote sensing, in situ sensors and field visits.

Another recurrent constraint is the fact that many of the surveyed end users count on punctual project funding to obtain geo-information, or to test geo-information services. This indicates a lack of sustainable, repeatable, consistent and operational services in these regions.



We conclude that a data hub would be useful in these regions, with a few caveats: the data must be free and open, explicitly described and catalogued, if possible containing indications as to its applications (i.e. in relation to the GEO-CRADLE thematic areas). It should be complementary to other sources of data, many of which are already quoted by the end users in the interviews. The hierarchy of the level of the processing of the data (from raw to geo-information products (maps) should also be made clear, since most end users will need to rely on a service provider to be able to benefit from such a data hub. Finally, it should be recognised as a standard, legitimate source of data by users.

# 2 Objective, scope and structure of this document

This document is an overview of the needs expressed by end users in the interviews carried out as part of the work package 2.4 of the GEO-CRADLE project. Its objective is to provide some insights into the market segment situated at the end of the data value added chain. It thus aims to inform the analysis of the value-added chain itself, and to offer some recommendations as to a potential focus of the pilot activities (case-studies) envisaged in the GEO-CRADLE project.

This document is set to evolve during the lifetime of the project, by being completed and amended into the end deliverable of the work package 2.4.

## 2.1 Structure of the document/methodology

The analysis was focused on groups of two or more countries, for three reasons:

- 1. in order to add value to the interviews (not simply reproduce the text in the interviews)
- 2. to outline regional patterns in needs, in line with the objectives of GEO-CRADLE to serve regional (rather than simply national) objectives
- 3. to have workable samples for this and the subsequent work packages

Without being a dogmatically fixed segmentation, the choice of the groups of countries chosen for the analysis was oriented by:

- the patterns emerging from interviews
- some similarities in socio-economic and political situation (including for instance whether or not the countries belonged to the EU, or were in the process of adhering to it), geographic proximity, similarities in climate



On this basis, in each group of countries the following aspects were investigated:

- general observations on the use of geo-information in the region, especially in terms of patterns in the needs of the interviewees, and how these connect to those in the pairing countries
- information needs: list of geo-information and data needs as quoted by the interviewed end users
- data sources: list of data sources quoted by the end users; where available, specifications as to the format of the data used (format specifications are limited in the report). However, should partners need to investigate further, it was a way to underline that the information exists, in some cases).
- constraints: specifically, non technical constraints in accessing the information, procuring it, but also any type of constraints and objectives beyond the strict use of geodata e.g. lack of policies on climate change, insufficient implementation of rules and regulations, red tape, lack of financing and so on
- awareness of GEO/COPERNICUS
- funding schemes: when listed as having enabled the end user to procure geoinformation
- potential benefits from a data hub

The observations related to the aspects listed above provided the content and arguments on which the conclusions and recommendations in this report were based. In some cases, open questions and notes were left in the text deliberately as a way to flag up areas for future investigation, ahead of the final deliverable.

The authors have deliberately abstained of going any further in their analysis at this point, since it is deemed that more information, desktop research (and time) are needed to accomplish that.

# 3 Main activities carried out in the reporting period

Eurisy coordinated an interview-based qualitative research from February to June 2016. After defining the target group (end users of geo-information data), partners were asked to submit eight interviews from their countries. This threshold is consistent with (and even goes beyond) the key performance indicators as set out in the project description.



The profiles of the interviewees could cover local, national or regional stakeholders, and the four thematic areas of the project: climate change, access to raw materials, energy and food security. We expected 152 interviews to be carried out by all partners with the exception of CIMA, EARSC, Eurisy, and PMOD. We received 100 interviews, out of which 70 were deemed valid for a meaningful analysis as per the criteria set out in the beginning of the process.

Eurisy provided project partners with guidelines and an extensive list of examples of interview questions. Following the common guidelines, partners were asked to submit a report of maximum 2,500 words for each interviewee. The objective of the guidelines and of the interviews was to outline the context and challenges facing end users, in order for GEO-CRADLE partners to capture the potential of the geo-information market, locally.

Using common guidelines allowed project partners to be completely autonomous in identifying and carrying out the interviews, with the task leader coordinating the overall process and intervening only were necessary. This improved the workflow, cut through language and cultural barriers, and led to a tailored approach to the interviewees. Indeed, partners were advised to use their knowledge of the local environment and adjust the interviews according to their needs.

During the first round of interviews, from February to March, 42 reports were received from 17 organisations from 11 countries in the region. Thus despite the targeted number of interviews being achieved —i.e. 40 interviews in the first round— only 30 of them were eligible for this task. Research organisations, GIS and raw data providers were excluded from the analysis. In addition, Bulgaria, Turkey and Cyprus did not submit any interview reports by the first deadline.

The first round of interviews revealed a set of challenges. Difficulties in targeting and reaching end users were registered across the region. This led partners to have to intensively enrich interviews with desktop research. Although desktop research is not to be excluded, it cannot be a substitute for one-to-one interviews.



During the second round, the challenge was to determine and support partners in reaching eligible end users. Particular focus was given to the countries from which few or no submissions were received (Bulgaria, Turkey and Cyprus). Based on the stakeholder entries supplied by partners, Eurisy provided the above mentioned partners with shortlists of eligible interviewees to complete the panorama of end users. In addition, Eurisy, the task leader, lent its support by directly contacting some of them.

Finally, a very well attended and particularly useful session dedicated to end users, was held during the <u>GEO-CRADLE workshop organised in Novi Sad</u>. The workshop has been an opportunity to further enrich the picture on geo-information needs in the Balkans.



## 3.1 Interview reports received

See here a link to all interview reports.



**Interviews received** 

Note: For Bulgaria, even though no interview reports were received, a representative of the Executive Forest Agency gave a presentation during the user session at the Belgrade workshop.





# Sample composition validated interviews



Between February and July 2016, following two rounds of interviews a total of 100 reports from 12 countries were received. Following their analysis a total 70 interviews were retained as



being valid. Drawing on the validated reports, 64% of the interviewed organisations were identified as end users while the remaining 36% consisted of inhouse GIS providers. Those reports which did not target end users as per the definition agreed on were invalidated. A total of 30 reports were invalidated throughout the two rounds. In some cases, the replies of research organisations were taken into account when they gave an indirect feedback on the local context, even though they were not considered valid for the purposes of this graph.

**Institutional end users were predominant**. They are easier to access by the interviewers, and also a significant part of the market.



# 4 Serbia, Romania, Bulgaria

## 4.1 Interviewees (validated)

Reports on the following organisations were received and validated:

Organisation Name	Department	Country	Туре
National Environment Agency	Local Agency for Environmental Protection	Romania	institutional
DaKia Association for Sustainable Development		Romania	commercial
Magurele City Hall		Romania	institutional
Tractebel Engineering SA GDF SUEZ		Romania	commercial
R.A.ROMATSA (Romanian Air Traffic Services Administration)	Operational Department	Romania	institutional
S.C. Agro DECVRM SRL, Romania		Romania	commercial
CEZ TRADE		Romania	commercial
Government of the Autonomous Province of Vojvodina	Secretariat for Agriculture, Forestry and Water	Serbia	institutional
Public Company VojvodinaSume (Forest Company)		Serbia	institutional
Ministry of Agriculture and Environmental Protection	Group of Viticulture and Wine Production	Serbia	institutional
Ministry of Agriculture and Environmental Protection	Climate Change Unit (CCU)	Serbia	institutional
Ministry of Mining and	Sector for Geological	Serbia	institutional



Energy	Research and Mining		
City of Belgrade	Secretariat for Environmental Protection, City Administration	Serbia	institutional
Institute for Field and Vegetable Crops		Serbia	commercial
SrbijaSume		Serbia	institutional
Urban and Spatial Planning Institute of Vojvodina		Serbia	institutional
Public Water Management Company VodeVojvodine		Serbia	institutional
Mountain Rescue Service		Serbia	institutional
Generali Osiguranje Serbia	Product Development Technical Department	Serbia	commercial
Galenika Fitofarmacija		Serbia	commercial
Ministry of Interior	Sector for Emergency Management	Serbia	institutional

## 4.2 Overall observations

When it comes to energy and the environment, private and public stakeholders use a lot of the same kind of information on the natural and built environment.

We have observed two mechanisms that bind the public and private sectors in this interaction, as follows: regulation compliance in energy projects, and subsidy control in agriculture.

## **4.2.1** Regulation compliance in energy projects

Public authorities deliver building permits, report on environmental parameters and risks, manage public assets (forests, waterworks etc.). They are also bound to report regularly to EU institutions (almost all public end users interviewed).



**These responsibilities link them up with the private sector.** For instance, public authorities require environment impact assessments in all energy projects. In Serbia, the Ministry of Agriculture and Environment gives approvals for the exploitation of mineral and water resources based on impact assessments carried out by candidate companies.

Furthermore, private organisations must obtain permits issued by Institute for Nature Conservation of Serbia and Institute for the Protection of Cultural Heritage of Serbia.

Tractebel Romania —an energy company — reports similar regulation constraints, as well as CEZ Trade Romania —an electricity trading company, which must report on any intentions of extending energy distribution networks.

Companies report that compliance and reporting involve extra cost, at a time when price pressure during public calls for tender is particularly strong. Both the public and private sector respondents point to building authorisations causing unnecessary delays and obstacles.

## 4.2.2 Subsidy control and agriculture

The Secretariat for Agriculture, Forestry and Water of the Government of the Autonomous Province of Vojvodina in Serbia has reported subsidy control activities. Even though in Romania and Bulgaria no farms have been interviewed so far, both countries are part of the EU, and EU subsidy control is compulsory under the Common Agricultural Policy. Still, in Romania, SC Agro DECVRM SRL—a farming land trading company—could benefit from information on the subsidy eligibility of the land, since the information could influence its value.

The objective of subsidy control is to prevent misreporting. For example, a farmer can declare he will sow 2ha of maize in springtime and receive subsidies for it, while he in fact sowed only 1ha. Crop control is also important. In Vojvodina, lease agreements have provisions to maintain soil quality by restricting monocrops on the same plot of land in successive years. It is costly to enforce these provisions with field visits. In this case, using EO makes sense. Farmers plant high-value crops on leased land to push profit. They have no incentive to upkeep soil quality of



parcels they do not own. This effect of this incentive mechanism, if left uncontrolled, damages the productive potential public lands (e.g. by depletion of organic matter).

## 4.3 Information needs (as quoted)

The information needs quoted in the interviews are as follows:

- Land use maps in particular for the interaction between the built and un-built areas.
- Infrastructure maps, including transportation ways
- CO<sub>2</sub> /greenhouse gas emissions
- Weather and climate information: temperature, rainfall, snowfall, snowstorms, hail, spring frost, in particular in the context of risk assessment for both private and public companies and also for energy potential assessment (hydro, solar, wind).
- Natural risks: floods, soil erosion, landslides, fire
- Biodiversity: protected sites, protected and invasive species, pressure points, conservation status
- Contaminated areas and sites, issued and transferred pollutants (E-PRTR)
- Crop types (wheat, maize, oil rape, sugar beet, soya and sunflower in Serbia) and crop succession (to avoid monocultures) & vineyards
- Terrain suitability for plant production
- Biotic and abiotic stress and yield in agriculture
- Agriculture yield changes, pest invasion
- Forest types
- Wood types and growth to determine annual harvesting rates
- Soil quality and terroir categorizations (for vineyards)



- Water quality
- Air quality
- City noise
- UV radiation
- Wind speed data (CEZ Trade, Generali Osiguranje Serbia)

End users also quoted non-geographic data, such as:

- land ownership
- agriculture census
- Information on touristic attraction
- Information on public tenders in the area, fair market, legislation changes
- Vineyard specific collected from associations of vineyards (Serbia)
- Energy strategic plans

## 4.4 Current data sources and data access

The level of information on the data sources we received varied from country to country.

## 4.4.1 International sources

- US Geological Survey (https://www.usgs.gov/ for forestry management projects in Serbia)
- WAFC: World Area Forecast Centre (real-time meteorological information broadcasts for aviation purposes) Romania Air Traffic Services Administration
- NMA—Romania Air Traffic Services Administration
- Eumetsat Romania Air Traffic Services Administration



Google Maps

## 4.4.2 Geo-sources in Romania

- Integrated Environmental Portal (IEP): the main portal used for data management. (No links available, to be clarified.) It is described as a single point of online interaction between the public and the environment agency. Through the IEP all environmental data from Romania are reported to the European Union, ensuring also issuance of environmental regulators at national level. Through the IEP are issued regulatory acts (opinions, agreements, environmental permits, etc). The platform is used to collect data on economic and environmental parameters: pollution control, protection of the atmosphere, waste, biodiversity, genetically modified organisms and climate change etc.
- Meteo forecasts, topography information (Google maps, cadaster, geo-technic prospections) SC Agro DECVRM

## 4.4.3 Geo-sources in Serbia

- National:
- Republic Geodetic Authority of Serbia (<u>www.geosrbija.rs</u>) is the body with a state mandate to provide maps to Serbian users. Some users deplore the fact that maps are not open and expensive despite the fact that it is financed by the state. During the user session organised in Novi Sad, the Geodetic Authority announced the availability of free and open data for institutional users. Specifically, the digital cadaster maintained by the Geographical Institute would be of great use.
- Hydrometeorological Service of Serbia
- KV WEB (no link provided)
- Serbian Agency for Environmental Protection (Greenhouse Gas emissions)



- Climate Change Unit of the Ministry of Agriculture and Environmental Protection communications within UNFCCC (documents, reports, tables). Note: To be clarified whether UNFCCC has data for Serbia, or if the Serbian Ministry also communicates with UNFCCC, if relevant.
- Statistical Office of Serbia
- Ministry of Science and Technology: soil map provided
- Ministry of Agriculture and Environmental Protection Group of Viticulture and Wine Production:
  - Vineyards register: geo-referenced data about vineyard parcels (size, location), graphical representation, grape variety (cultivar), rootstock, training system. Every year data on grape yield, chemical composition of wine, quality and quantitative wine analysis are collected from the producers and fed to the database. The data from the database are not public, due to the Law on the Personal Data Protection. Still, some data can be obtained upon a justified request, usually by an Association of the wine and grape producers with geographic indications. Limitations: insufficient and not precise enough georeferenced data, ignorance of some wine and grape producers.
  - Viticulture zoning database: climate data, pedological data, statistical data, grape variety, topographic data. This data is publicly available at the web site of the Ministry in the form of text, maps and tables. However, raw data (such as daily meteorological observations used for the zoning) are not publicly available and cannot be obtained from this organisation.
- Climate Change Unit (CCU), Ministry of Agriculture and Environmental Protection: all data they produce is freely available online. They also use only government produced data they do not pay for from their own budget.



- National Forest Inventory
- Forest GIS GIS JP "Vojvodinašume" http://213.198.241.143:85/sume
- The Sector for Geological Research and Mining of the Ministry of Mining and Energy develops and uses <a href="http://geoliss.mre.gov.rs">http://geoliss.mre.gov.rs/beware/.</a> Most of the data available for public use is made available through the web portals. Informative maps in different resolutions from 1:25000 to 1:1000000, such as geotectonic maps, maps showing different aspects of geological research, landslides, geological risk and hazard maps, maps for urban planning are available. Most of the maps are in vector format, but some are geo-referenced raster maps. Not all are available on-line as some are still waiting for validation. Some of the maps are available only as a preview, and are not downloadable.
- The Sector for Geological Research and Mining from the Ministry of Mining and Energy sells geo-referenced raster maps. They provide a cadaster of exploitation fields, permits for research of mineral resources and groundwater. Basic information about the permits organisation performing research, locality of the research, etc. Other information is available transparently, based on the program or project agreement. The sector (which has a double function of user and provider) also relies on remote sensing, aerial imagery, topographic data, LANDSAT data and in-situ data. Budget limits the campaigns to surface samples which are collected and chemically analyzed. Drilling for samples has been performed in the past.
- Seismological Survey of Serbia
- Public Company Ski Centres of Serbia
- Department for emergency situations Serbia
- Ministry of Internal Affairs

Local (geo-) information:



- The Agricultural Extension Service of AP Vojvodina collects meteorological data on over 40 sites to feed a disease and abiotic stress prediction model that is disseminated via television and the internet. In this case, the Service operates as a data provider.
- VojvodinaSume: external high-resolution satellite data (archive or up-to-date, according to task) is sourced through public procurement from private companies that resell data obtained from foreign companies. (Would be interesting to reference the data resellers) & own sources, such as in-house aerial data (drone- and aircraft-mounted sensors)
- City of Belgrade: <u>https://gisbiotopa.beograd.gov.rs</u>, <u>www.beoland.com</u>, gis2.beoland.com, <u>https://gisbiotopa.beograd.gov.rs</u> - a geo-spatial data base maintained by Secretariat for Environmental Protection of the City
- Associations of Grape and Wine Producers
- Digital urban plans, orthophotos as procured by public authorities in Serbia.
- Public Company SrbijaSume: data received from local municipalities who collect it for their own work, on an informal basis ("from friends")
- The Urban and Spatial Planning Institute of Vojvodina
- drones

## 4.4.4 Formats

**End users generally use common file formats**, such as .txt, .xls, .tiff, shape files .sri, GIS maps, and GIS web.

In Serbia, the Group for Viticulture and Wine Production of the Ministry of Agriculture and Environmental protection needs to map existing and potential future winegrowing and wine producing regions. The initial data for these maps are: alpha-numerical geospatial data from cadaster, land-use and soil data, climate data, ecological and anthropogenic data in viticulture. Data are geo-referenced and raw, so it requires further processing. However, it is not clear from



the interview what is the format the group itself and/or the wine-makers use and who does the processing for them. The users need very high spatial resolution images for precise mapping of winegrowing estates, including their terroir categories.

The Vojvodina Government receives data in shape files but also .wms from the Geographical Institute of Serbia, as the latter moves towards offering geo-data services rather than products.

The Public Company SrbijaSume would need images of a 1m spatial resolution.

Spatial resolution ranges from a few tens of kilometers (when are used global models) to a few kilometers (when are used local models or satellite images) in the case of the Romanian Air Traffic Administration.

## 4.5 Regulations driving geo-information use (as quoted)

## 4.5.1 Supra-national

- United Nations Framework Convention on Climate Change (UNFCCC)
- *European acquis* for accessing countries: e.g. in Serbia, though the country is not yet part of the EU, the country is in the process of aligning itself with the European acquis (chapter 11: agriculture and rural development, chapter 12: food safety, veterinary and phytosanitary policy, chapter 13: fisheries, and chapter 27, environment). The set date to close all these chapters is 2020.
- Common Agriculture Policy for Romania and Bulgaria (CAP): EO use not only optimises the use of public funds, but supports the agriculture strategy overall. For example, if the government identifies that maize prices will rise in the foreseeable future they will support production growth to profit from the market opportunity.
- EU Protected Denomination of Origin (PDO) and Protected Geographical Indication (PGI definitions inscribed in the EC Community Law.
- <u>EU Emission Trading System (EU-ETS)</u>



- Forest Stewardship Council certifications (<u>https://ic.fsc.org/en/certification</u>, Public Forest Company Vojvodina Sume Serbia)
- Geology: JUS standard
- Aviation standards (Romanian Air Traffic Services Administration)
- Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC

## 4.5.2 National

- Serbia:
- NPAA (the National Programme of Adoption of the Acquis Communitaire)
- National Communication (NC) to the UNFCCC, Biannual Update Report (BUR) and Intended Nationally Determined Contributions (INDCs), all part of different activities within the Convention applied by the Ministry of Agriculture and Environmental Protection
- Local wine certifications (Protected Denomination of Origin (PDO) and Protected Geographical Indication (PGI).
- Law on Planning and Construction. NB. does not take into account all available information regarding the categorisation of the terrain, geological hazards and risks. There is a lack of understanding of the underlying problems in the civil engineering community.
- Law on Administrative Procedure, Law on Geological Research (Geology)
- Obligation by Ministry of Agriculture and Environmental Protection to approve and validate 10-year forest management plans (forest management)
- Insurance Law, under the authority of the National Bank of Serbia



- Romania
- Law no. 544/2001, Law no. 52/2003, Law no. 86/2000, GD. 878/2005, 123/2002 and HG
  Ord. nr. 1182/2002 are mentioned.

## 4.6 Constraints

Romanian energy companies deplored that the **costs** related to environmental regulation compliance are burdensome. Based on the task leader's previous knowledge of end users in the country, **government data is seldom open and free to access in the country**.

In Serbia, some users deplored **limited access to data produced by the National Geodetic Authority** —the national mapping agency. Another example quoted was that of the Serbian Laws on Administrative Procedure and the Law on Geological Research which define a 2-month period for analysis of requests for mining authorisations etc. or 1 month if the documentation is complete: there are still maps which have not been validated for lack of staff and resources.

Other constraints quoted include:

- Lack of staff with adequate skills and expertise in data processing (Group for Viticulture and Wine Production, Ministry of Agriculture and Environmental Protection); and in geological risks, notably landslides (Min. Energy, Serbia)
- Financial constraints to hire such skilled staff, or procure geo-information or software
- Lack of staff for the collection and further analysis of the data, lack of computer resources, lack of professional GIS software and databases, lack of GPS measuring devices (Serbia)
- The need to generate public awareness on climate change and sustainability: e.g. in Serbia, some climate change mitigation strategies and plans are not well understood by the general public. Actors in both Serbia and Romania quoted this constraint/objective e.g. the Climate Change Unit of the Ministry of Agriculture and Environmental Protection of Serbia, which tackles these challenges through <u>www.klimatskepromene.rs</u>;



in Romania, all activities of Dakia—the sustainable development NGO are concerned by this objective. When it comes to communication with the citizens, in the case of the City of Belgrade, citizens often request to have information on-line in a real time, but in general it is very hard for the City to provide and maintain this kind of information.

- In the case of energy in Serbia, the end user quotes a lack of understanding of the underlying problems in the civil engineering community (geological risks and impacts).
- Forestry exploitation: the imperative of keeping a steady supply of wood through regrowth, intelligent plantations and cuts, disease and stress warnings
- Data quality, quantity (short time series especially in some sectors e.g. biodiversity, health and availability. In some cases (forestry, agriculture), <u>seasonal limitations</u> are noted: only data from spring to autumn can be used. Increased <u>cloudiness</u> during spring and autumn also pose physical limits. Summertime is dry and cloud cover is not problematic.
- Data delivery delays (Romanian Air traffic Administration, Generali Osiguranje Serbia) sometimes due to connectivity
- Lack of agriculture land to be purchased (or sufficient information about it), land fragmentation, or ownership fragmentation which prevents agriculture on a large scale; organic production costs very high, but a real market opportunity; natural crop risks SC Agro DECVRM
- In the case of Mountain Rescue Service Serbia—distance from victims to rescue, insufficient rescue gear
- Societal constraints about the use of pesticides in agriculture (Serbia)
- Lack of multi-stakeholder consultation and operational coordination; politics are often an obstacle



# 4.7 Funding schemes that have allowed users to obtain geoinformation

Research and other kinds of institutional funding support projects on a case by case basis. The sustainability of such projects — and therefore of the provision of geo-information services to final users —is not clear: for instance, a crop monitoring project in Vojvodina, carried out from 2013 to 2015 by the Biosense Institute, is not sure to be continued. However, another project for using EO in forestry was successful; it led to the user organisation hiring the staff.

The Climate Change Unit (CCU), Ministry of Agriculture and Environmental Protection in Serbia quote the use of grants from GEF (Global Environmental Facility) or the EU grants or the United Nations Development Programme support.

Funds provided for projects related to the EU strategy for the Adriatic and Ionian Region and the EU strategy for the Danubian Region are used by the Public Company Vojvodina Sume. This company also mentions financing from the Norwegian Forestry Group.

A donation from the government of Japan made it possible to map 27 municipalities affected by floods thanks to experts from the Sector for Geological Research and Mining of the Ministry of Mining and Energy, the University of Belgrade and Geological Survey of Serbia. However, the end user notes, this type of map of hazards and risks should be made for the whole territory of Serbia. It is unclear whether the data exists, but is not aggregated, or if simply does not.

EU IPA (Instrument for Pre-Accession Assistance) funding has covered mining waste-related projects. NB. The same instrument is available for Montenegro, FYROM and Turkey.

## 4.8 Awareness of Copernicus and GEO

Only one end user (VojvodinaSume) seemed to be fairly acquainted with the two, as they are more advanced in EO exploitation (plans to introduce use of Sentinel data on a regular basis).



## 4.9 How the region may benefit from a free and open data hub

The interviewed organisations have wide-ranging networks which may profit directly or indirectly by the additional data the former may access. For instance, private companies often serve a wider geographic pool of clients than national and sub-national authorities. Tractebel — an electricity company— covers Romania, Bulgaria, Moldavia, Ukraine and Serbia. In Serbia, NS SEME, the commercial branch of the Institute for Field and Vegetable Crops is active not only in Serbia, but throughout the Balkans, China, EU, Ukraine, Russia, Argentina, India etc.

Private companies often complain that they encounter obstacles in accessing public geoinformation: from weather data to cadastre to socio-economic indicators. When they can get some access, they are systematically charged for the data (unlike some public organisations, which are not). Open Data policies are very gradually introduced in EU countries, but the full set up has yet to take place. However, private companies are less constrained by an obligation to certify the geo-information they use, if they use it for their own purposes. Even if the data source is not certified, a geo-information service proves its worth (or not) through hands-on use.

This introduces complexity in the kind of (geo-)information these companies need, but it is also an opportunity for regional (supra-national) data hubs to be useful. In particular, it may make company and other users less reliant on government data sources, in cases when they are able to process the data themselves.

In the case of public authorities, introducing new sources of geo-information (like a data hub) is made more difficult by the fact that these organisations already have formal processes in place to produce or procure data. In some cases only data obtained through formal sources is valid for compliance reporting. For instance in Serbia, the Government of the Autonomous Province of Vojvodina— Secretariat for Agriculture, Forestry and Water— can only use official data and information for its work and in its reports. The only source of official geo-data is the Geographical Institute of Serbia (RGZ), which asks high prices for their data services.



So complementing, or changing the data sources these organisations use would involve reshaping public data procurement processes, or making a data hub formally recognised as a valid source for public organisations.



# 5 FYROM and Albania

Organisation Name	Department (if applicable)	Country	Туре
National Food Authority		Albania	institutional
Ministry of Environment, Sector of Climate Change		Albania	institutional
National Agency of Natural Resources		Albania	institutional
National Environment Agency of Albania	Statistical and Information Directorate/GIS Section	Albania	institutional
General Directory of Civil Emergencies		Albania	institutional
Ministry of Environment		Albania	institutional
Ministry of Agriculture, forestry and water economy	Land Policy Unit, Dept for Land Parcel Identification system	FYROM	institutional
Spatial Planning Agency		FYROM	institutional

## 5.1 Interviewees (validated)

## 5.2 Overall observations

The interviews provided for FYROM gave a sufficient level of detail, though further information on the end user needs may be useful in the future. In the case of Albania, the information received was very scarce, and so the market needs in the country could be only inferred. The interviews should be enriched with additional information in the future.

On the basis of the interviews received, analysis for the two countries could be oriented to climate change and the agriculture sector, especially to the extent to which they are related (agriculture generates water pressure, food production can suffer from the effects of increased natural hazards as a consequence of climate change, and so on).



Aligning both countries' policies with those of the European Union plays an important role in driving the Ministries' activities and long term policy planning. Compliance obligations, such as the INSPIRE Directive, have played a positive role in networking and harmonizing national datasets both in Albania and FYROM.

In Albania climate change is only an emerging theme. According to interviews, efforts are only now beginning to include the notion of climate change in national policies and regulations. Since the notion has yet to be transposed into policy, it can be assumed that procedures and processes for obtaining climate change data are not yet in place. This means that the country may benefit immediately from additional sources of climate change data —so potentially from the GEO-CRADLE Data Hub.

In FYROM on the other hand, climate change seems to have a slightly higher profile (at least according to interviews), since geo-information on climate change is already used by the Spatial Planning Agency in connection with energy, access to raw materials and agriculture. Going back to the connection between climate change and agriculture, the FYROM Ministry of Agriculture, Forestry and Water Economy delivers data products used as input for the quantification of pressures arousing from/on agriculture (water scarcity, natural phenomena and so on).

In FYROM a good system for agriculture seems to be in place. The Department of Land Parcel Identification System of the Ministry of Agriculture is permanently tasked to provide the Paying Agency with information on the identity of producers, types of crops, identification of land use, agricultural practices. It performs periodical controls of land use of agricultural area on a parcel level, by the means of RS data (orthophotos). All data are used to check subsidy eligibility. This is common with Serbia. It would be worth exploring the synergies for the two countries in this direction.



## 5.3 Information needs (as quoted)

Both geo and non-geo information needs are quoted below, to highlight that end users would usually need more complex information products than just datasets. Geo-data is of course an essential and the main part of the mix.

Information needs quoted in the interview are as follows:

- Land use maps in particular for the interaction between the built and un-built areas (1:1000 forms for FYROM's Spatial Planning Agency)
- Infrastructure maps (energy and energy infrastructure for FYROM Spatial planning Agency)
- Agriculture: identification of crop types (for subsidies the primary producers in FYROM) and delimitation of parcel boundaries.
- CO<sub>2</sub> /greenhouse gas emissions;
- Surface water and underground water quality, water discharges data;
- Weather and climate information: temperature, rainfall, snowfall, snowstorms, hail, spring frost, in particular in the context of risk assessment for both private and public companies and also for energy potential assessment (hydro, solar, wind)
- Data on waste, GHG emissions, data on vulnerabilities and adaptation
- Soil composition and quality
- Earth Observation for energy and risk management (floods, fire and soil erosion), as well as landscape and heritage monitoring.
- Natural protected areas and cultural heritage sited.

Non-geo information quoted:

• Information on industry stakeholders (raw materials users)



- Demographic and socio-economic data, including population, housing and ownerships of agricultural plots (FYROM's SAP)
- Tourism

## 5.4 Current data sources and data access 5.4.1 FYROM (supranational, national, local) geo-information sources

In FYROM, the Spatial Planning Agency acts as an in-house GIS towards various national institutions, notably by providing the national spatial plan, GIS services, thematic maps (construction, forestry and agriculture) and so on.

Main users of their data are the Ministry of Environment and Spatial Planning and the Ministry of Transport and Connections. Municipalities also use geo-information to a certain extent (not specified).

As the National Spatial Plan is a public good, some of the data are available for free download on the SPA web portal. For scientific purposes, for governmental purposes, or within the Infrastructure for spatial data, the Spatial Planning Agency (SPA) provides all its final geoinformation products for free.

However, the databases from which the geo-information products are derived and from which the plans are developed are not for public use, thus are not available for free. According to interviewees, both individual and legal entities have access to the data <u>based on a Cooperation</u> <u>Memorandum or on request by the end user (individuals and legal entities)</u>. For these services they charge certain fees.

In the case of the Ministry of Environment, the stored data is accessible for public use through their web portal, but only for viewing. <u>No data can be downloaded for public use</u> except for projects and studies related to the main areas of interest of the Ministry of Agriculture and other governmental bodies.



- Supranational
  - European Environment Agency Geo-Portal
  - Bing maps, Google maps, Landsat etc.

## • National

- Real Estate Agency WEBGIS Portal (<u>http://gis.katastar.gov.mk/arec/</u>).
- WEBGIS Portal for Macedonian Soil Information System (<u>www.maksoil.edu.mk</u>) developed and managed by GDI DATA, an external provider
- National Infrastructure for Spatial Data FYROM
- Geo-Portal of the Real Estate Cadaster

#### 5.4.2 Albania (supranational, national, local) geo-information sources

- ASIG/Albanian Geospatial Information Agency reports that the Albanian General Directory of Civil Emergencies still does not use GIS. The situation is expected to change soon through the implementation of component 2 "Upgrading civil defense preparedness and disaster risk reduction" of the EU Recovery Programme for Floods under the Instrument for Pre-Accession Assistance (IPA). (http://ec.europa.eu/europeaid/prag/document.do?locale=en)
- National Food Authority Geo-portal (<u>www.Aku.gov.al</u>)
- ASIG Geo-portal (<u>http://geoportal.asig.gov.al/en/Default.aspx</u>)
- Demography, including housing
- Transport and traffic
- Tourism figures and interest points

#### 5.4.3 Data access

No details were provided by interviewees from Albania with regards to data accessibility.



In FYROM, the National Spatial Plan is available for free on the SPA web portal for scientific purposes or governmental purposes. However, the raw data on which the plans are based are not made available. SPA charge for specific data products requested by individuals, legal entities and institutions.

SPA is not only a provider, but also a user of geo-information data. As users, they rely on certain geo-portals, such as the National Infrastructure for Spatial Data, the geo-portal of the Real Estate Cadaster as well as the European Environment Agency geo-portal.

For FYROM, it is noted in the interviews the need for improving the visibility and linking up complementary existing digital data bases, like, Real Estate Agency database, Soil Information System database etc. Under the new Law on national infrastructure of spatial data (NIPP), they expect that all existing databases will be networked and harmonised in a line with the INSPIRE Directive.

## 5.4.4 Formats

## • FYROM:

In FYROM, the Ministry of Agriculture works extensively with digital orthophotos of 50cm (0.5 m/pix.) resolution, which corresponds to orthophoto maps in a scale 1:5000, RGB and CIR, with horizontal accuracy of RMSE <1.5 m. and DTM with 5m. Resolution and vertical precision of RMSE < 2m. Every 3-4 years, this dataset is regularly updated with new set of orthophotos in order to detect changes of land use. Validation of the accuracy of the performed photo-interpretation is performed with auxiliary high resolution satellite images. No additional data sources have been used in their work so far. In the case of urban planning, the level of required data is very detailed, mostly in 1:1000 forms.

FYROM's Ministry of Agriculture Department for Land Parcel identification system (LPIS), uses aerial data and field data collected by their branch offices.



#### • Albania:

In the case of Albania, a lot of the reporting seems to be still done in written formats (word and excel), and sometimes hard copies. Interviewees did not mention of any types of data in particular, with the exception of the Directorate General of Civil Emergencies (GDCE) which underlined the importance of using a GIS system in the field of civil protection and the need to develop such a system in Albania.

## 5.5 Regulations driving geo-information use (as quoted)

#### 5.5.1 Supra-national

- EU Legislation INSPIRE DIRECTIVE
- Joint Research Centre (JRC) standards for agriculture
- European *acquis communitaire*: both countries declared to have started working on aligning their policies with EU
- ISO 9001:2008 International quality management system;
- The Gauss-Krugger system of map projection;
- IPA Programme EU Recovery Programme for Floods (Albanian General Directory of Civil Emergencies)

#### 5.5.2 National

- FYROM:
- The Department for Land Parcel identification system (LPis), Ministry of Agriculture, Forestry and Water Economy functions on the base of the Law on agriculture and rural development and the Law which established the Agency to provide financial support of agriculture and rural development
- Law for Spatial and Urban Planning



- A new Law on national infrastructure of spatial data (NIPP) is expected to connect and harmonise existing national public data sets; and provide the ministry with access to additional national digital data bases, like, Real Estate Agency, Hydromet Service, Spatial Planning Agency etc.
- Albania:
- National Strategy on Development and Integration 2015-2020.
- National Sector Strategies
- National Cross-Cutting Strategies
- National Plan for European Integration

Interviewees did not mention particular laws or legislations that drive their mission. However, all interviewees declared that they have annual reporting responsibilities together with obligations to respect standards and regulations.

## 5.6 Constraints

**Lack of personnel:** Both countries have reported constraints related to the lack of permanent skilled and trained staff, together with the lack of periodical training programs for the staff on advanced techniques of geo-data processing. A lack of professional personnel in the IT sector has also been identified.

**Budget constraints**: Limited budgets to purchase geo-information data and equipment, together with the lack of technical capacities to conduct field work;

Lack of cooperation: an insufficient interaction with other departments regarding data sharing has been highlighted by interviewed candidates. In the case of FYROM, respondents have commented on their restricted access to other public agencies' data, such as, the Real Estate Agency database, Soil Information System database, Hydromet Service or the Spatial Planning Agency;


**Data gaps and limited formats**: Both countries have underlined the low quality of existing national data sets and the lack of standardization procedures in data collection between public institutions. The Spatial Planning Agency of FYROM reports that less than 40% of the data it needs from other public institutions is received in an appropriate format. A lot of the public data is still available only in an analogue format.

**Burdensome public tendering procedures**: entities in FYROM highlighted that the long tender procedures affect the timeliness of their activities and the quality of the prepared data.

# 5.7 Funding schemes that have allowed users to obtain geoinformation

No funding schemes were mentioned by the interviewees in both Albania and FYROM. The Albanian Ministry of Environment declared to have received data through different projects, however no details were given with regards to the financing structure.

Between 2012 and 2013, the General Directory of Civil Emergencies mentioned taking part in the project "Increasing resilience using earth observation". The project took place under the 7th Framework Programme, European Commission's Work Programme 2012, Cooperation, Theme 9, Space, Support to emergency response management (SPA.2012.1.1-04), Collaborative project Grant agreement no.: 312461, Coordinator: Dr. Marc Mueller (Astrium GEO-Information Services [SISA]).

Name	Institution
Florence Beroud	EC/REA
Consortium	SISA, geomer, ITD, MF, GeoVille, ROSA, ITC, NIMH & UNESCO
Users	Albanian Ministry of Interior, Civil Protection Veneto region, DGSCGC,
	SCHAPI, VKKI, MDRT and WFP
Associated	CIMA, BGR, Allianz, BBK and ECMWF
partners	



## 5.8 Awareness of Copernicus and GEO

#### • Albania:

Among the entities interviewed in Albania, only the General Directory of Civil Emergencies declared to have knowledge of both Copernicus and GEO. This could be explained through the Directory's previous participation in an FP7 Programme" Increasing resilience using earth observation" (see above). The rest of the interviewees declared to have no knowledge of Copernicus or GEO.

#### • FYROM:

The Department for Land Parcel identification system (Ministry of Agriculture) are aware that EO programmes exist, but the Department has never used any in particular. The same can be said about the National Spatial Planning Agency, which also declared as being aware of the existing EO programs, but has never been part of any programme.

# 5.9 How the region may benefit from a free and open data hub

In Albania, the Ministry of Environment's Department of Climate Change declares receiving geo-spatial data through different externally funded projects as no national system is in place to ensure a regular stream of geo-information data. This consolidates the idea that formal recurrent procedures for data provision are not yet in place (to be confirmed).

Since climate change is not a priority, investing in obtaining climate-change related data is not reported. Thus, the region would benefit from a free and open source for such information.

However, it should be noted that interviewees operate mostly locally; no international or regional interests were mentioned, even though National Spatial Planning Agencies, like in the case of FYROM, provide data to a variety of different stakeholders. The organisations can be an entry point to enable stakeholder communities to benefit from it; however, the right spatial resolution for the information to be useful should be considered.



Users of maps from the National Spatial Planning Agency FYROM —so potential indirect beneficiaries of such data — include:

- Ministry of Environment and Spatial (Physical) Planning and the Ministry of Transport and Connections
- Paying agency and other Governmental and non-Governmental bodies, agencies and institutions
- Ministry of Agriculture, Rural Development and Management of Water
- Local and regional governments
- Private companies (Energy companies, mining companies, agriculture companies, food producers)



# 6 Greece, Cyprus and Turkey<sup>1</sup>

# 6.1 Interviewees (validated)

Organisation Name	Department (if applicable)	Country	Туре
Atlantis Consulting Ltd.		Cyprus	commercial
AC Nestos (Farming cooperative)		Greece	commercial
AC Nespar (Farming cooperative)		Greece	commercial
Croop Xanthi (Farming cooperative)		Greece	commercial
Aeiforiki S.A		Greece	commercial
Aneth S.A (Development Agency of Thessaloniki)		Greece	institutional
AKKT S.A		Greece	commercial
Directorate of Agricultural Affairs of East Macedonia- Thrace		Greece	institutional
Bank of Greece	Climate Change Impacts Study Committee	Greece	institutional
Centre for Renewable Energy Sources and Savings (CRES)		Greece	institutional
Independent Power Transmission Operator (IPTO or ADMIE)		Greece	institutional
Draxis Environmental SA		Greece	commercial
LDK S.A.	Environment Department	Greece	commercial

<sup>&</sup>lt;sup>1</sup> Turkey to be filled in when interviews are carried out



Municipality of Thessaloniki	Environment Department	Greece	institutional
Public Power Corporation S.A.	Hydroelectric Generation Department	Greece	institutional
Ministry of Environment, Energy and Climate Change (YPEKA)	Special Secretariat for Water	Greece	institutional
Ministry of Environment, Energy and Climate Change (YPEKA)		Greece	institutional

## 6.2 Overall observations

Greek interviews focused on two main themes: energy and agriculture. By comparison to their Balkan neighbours the geo-information and satellite technology market seems more mature, with several service providers available on the market.

However, there is a need for a better understanding of the market needs and potential exploitation of environmental data in particular.

Although the legislative background in terms of rules and regulations is quite solid, interviewees have on several occasions mentioned the lack of control and implementation mechanisms.

In addition, the financial crisis coupled with tight austerity measures has considerably affected the purchasing power of EO products by public institutions.

Shrinking budgets, although a threat to private companies, could also represent an opportunity to shift behaviour towards the use of open data sources. Most interviewees feel that the state should strengthen the dissemination and availability of EO data to potential end users by establishing a transparent and user friendly interface with key contact points for different market sectors.



In the agriculture and environment sectors, many users are dependent on external EU funding and subsidies. In some cases, up to 60% of an organisation's budget could be dependent on EU projects funding. As for farmers and agricultural cooperatives, their decisions on what crops to grow are heavily dependent on the subsidies available per crop on a yearly basis.

Existing environmental rules are deemed to be appropriate for the most part, however, the lack of enforcement and control of these standards has also been highlighted by Cyprus interviewees.

# 6.3 Information needs (as quoted)

Among the information needs quoted by the interviewees we can highlight:

- Weather and water data (air temperature (oC); wind speed (m/s); wind direction (degrees); relative humidity (%); dew point (oC); light Intensity/solar Irradiation (W/m2); cloud cover (continuous variable as a percentage), flood risks
- Soil spectra data (e.g. spectral libraries for all subsidised crops. According to farmers the maps would help improve measured parameters for accreditation standards, will provide better tracking and add value in terms of product quality, traceability and ease of use)
- Infrastructure information (e.g. roads & pipes, bridges, energy networks)
- Environmental noise (e.g. traffic noise)
- Industrial pollution and location of pollution sources (mines, industries, Seveso facilities, livestock units etc.)
- Air quality and air pollution (aerosols, characterization of natural and anthropogenic aerosols, dust aerosols, biomass burning aerosols, and short-lived greenhouse gases and pollutants)
- Biodiversity
- Phytoremediation
- Wind and photovoltaic energy potential production maps
- Flood monitoring and mapping of flood extent, flood type (rainfall, fluvial, coastal, groundwater, depth, velocity)
- Global Horizontal Irradiance (GHI) and Direct Normal Irradiance (DNI) in W/m2 in map and table formats (monthly & seasonal climatology values) GHI and DNI in KWh/m2 in map and table formats for energy potential estimations



- Ultramembrane filtration
- High performance counter-current chromatography

End users also quoted non-geographic data, such as:

- Environmental conformance and permits
- EU Environment legislation and standards
- Annual fertilizing limits and standards
- Socio-economic indicators
- Livestock units
- Historical monuments location

#### 6.4 Current data sources and data access

In Cyprus, data sources have been mentioned by ATLANTIS Consulting. However, the company has highlighted in their interview that restricted access to public datasets is often a problem for private companies in the country. Thus, in order to avoid interaction with the public sector, they will sometimes refer to external sources for the needed data.

In Greece, data accessibility varies. Some institutions follow open data and open access principles; some do not and will only release data on demand after evaluating the scope of its use. For example, the Special Secretariat for Water, within the Ministry of Environment and Energy offers only parts of its data freely for public use. Hydro meteorological data is also not always open and interested parties need to go through request procedures in order to obtain it. A similar case can be identified with the Centre for Renewable energy sources and Savings. The centre offers 90% of their data for free to the public, while the rest remains confidential due to contract constraints.

#### 6.4.1 Supranational geo-information sources quoted:

- Airbus (private procurement)
- CORINE Land Cover Database (European Environment Agency)
- Databases created through EU projects: AOGCMS and RCMs data bases (Bank of Greece)



- Weather data, own data collection. They need to buy most of the information, as most local EO data are not archived or collected in a site (OPEN.GUV, ELSAT) etc. /hub and not all digitised.
- <u>https://www.openstreetmap.org</u>
- <u>https://asterweb.jpl.nasa.gov/gdem.asp</u>

## 6.4.2 National geo-information sources quoted

- National Cadastre Data (free high resolution aerial imagery)
- National Information System for Energy: <u>http://195.251.42.2/cgi-bin/nisehist.sh</u>
- <u>http://geodata.gov.gr</u>
- <u>http://www.protectedplanet.net/</u>
- <u>https://www.eionet.europa.eu/</u>
- <u>www.thessaloniki.gr/opendata</u>
- <u>www.envdimosthes.gr</u>
- <u>http://www.ypeka.gr/Default.aspx?tabid=252&language=el-GR</u>
- <u>http://maps.ypeka.gr/flexviewers/gis/</u>
- <u>http://floods.ypeka.gr/http://www.ktimatologio.gr/sites/en/Pages/Default.aspx</u>
- (<u>http://www.ktimatologio.gr/sites/en/Pages/Default.aspx</u>)
- National Data Bank of Hydrological & Meteorological Information: <u>http://ndbhmi.chi.civil.ntua.gr/en/index.html</u>, <u>http://www.hydroscope.gr/</u> (rainfall, water level, discharge);
- Greek hydrologic data-base "ETYMII" or "HYDROSCOPE"



• External high-resolution satellite data (archive or up-to-date, according to task) is sourced through public procurement from private companies that resell data obtained from foreign companies.

Several interviewees highlighted a limited access to real-time or near-real-time EO data. It is unclear though if the end users themselves are missing this data or not, since they may not be able to exploit it.

Furthermore, **there is limited availability of EO data for urban areas and urban scale use**. In addition, EO data with high spatial and temporal resolution at regional and local scale concerning air pollution and climate (especially ozone, particulate matter and dust) is also needed, according to the Municipality of Thessaloniki.

Some respondents have also underlined gaps in national datasets, as well as difficulties in finding harmonized data. Draxis Environmental SA —a Greek consultancy, also called for an easy and user-friendly access to open data in near-real time and stronger recommendations from the General Secretariat for Research and Technology for data providers to follow open data protocols.

#### 6.4.3 Formats

- Arc GIS
- Hardcopy and digitised archived material from public authorities
- Online/ Google Maps, Free satellite Earth Observation data
- RAW data, raw measurements, RASTER files etc.
- Spreadsheets and PDFs (e.g. Directorate of Agricultural Affairs of East Macedonia-Thrace)
- Ascii formats, mxds, shps, mdbs (.txt etc) and excel worksheets(.xlsx)
- Word Documents



#### • GIS platforms (<u>http://maps.ypeka.gr/flexviewers/gis/</u>)

Spatial resolution quality is directly connected with the available technical equipment. The Special Secretariat for Water, Ministry of Environment & Energy mentioned that they need more advanced technical equipment. Currently the resolution of the maps they use is between 1:25.000 and 1:200.000 (depending on the land uses e.g. rural areas, urban areas).

All information collected from the relevant authorities and stakeholders for the management of floods is provided in hardcopy, which sometimes creates delays in responding to emergency situations.

In addition, according to interviewed farmers, crops, fields localisation and traceability is still done by paper trail. The Greek Centre for Renewable Energy Sources and savings (CRES) receives meteorological data from the Hellenic National Meteorological Service in excel format. Although this information is distributed via their national GIS systems (ILOTS) it is not accessible for public domain.

Many of the interviewed end users prefer reports and maps in doc/pdf/jpeg/excel files in either digital or hard-copy. In other cases mxds, shps, mdbs formats are preferred.

For Public Power Corporation S.A, studies and reports are needed in doc files, excel and texts files as well as in the form of maps, either digital or hard-copy.

#### 6.4.4 Frequency of use

Updates (do not necessarily coincide with routine use) vary from annually to every 6 years for the Special Secretariat for Water, Ministry of Environment & Energy: http://maps.ypeka.gr/flexviewers/gis/

For Cyprus's Atlantis Consulting, new datasets might be required up to five times a year, depending on their projects and customers. Occasionally, temporal or spatial resolution of monitoring data could represent an issue. Metadata quality is often an issue. For private sector representatives, such as Atlantis, data acquisition constraints translate into missed business opportunities.



# 6.5 Regulations driving geo-information use (as quoted)

As we have validated only one interviewee from Cyprus, the below legislations and directives cover mainly the Greek market.

#### 6.5.1 Supranational

#### Agriculture:

- International Quality Standards: Environmental Management Systems (ISO 14001, EMAS) & Quality Management Systems (ISO 9001);
- System Certification BS EN ISO 9001:2008;
- European Waste Catalogue (EWC);
- International and EU Agriculture Standards: GLOBALGAP, ISO, HACCP (Hazard analysis and critical control points), BRC (British Retail Consortium Food Standards), IFS (International Featured Standard is a GFSI benchmarked standard for auditing food safety and quality of processes and products of food manufacturers)

#### Energy:

- In Greece, the Independent Power Transmission Operator (IPTO or ADMIE) S.A. was established in compliance with the European Union Directive 2009/72/EC and National Law 4001/2011 regarding the adoption of common rules in the organization of EU electricity markets. According to Law 4001/2011 ADMIE undertakes the role of Transmission System Operator for the Hellenic Electricity Transmission System and as such performs the duties of System operation maintenance and development so as to ensure Greece's electricity supply in a safe, efficient and reliable manner.
- Directive 2001/77/EC Electricity produced from Renewable Energy Sources (RES)
- Directive 2009/28 EC

#### Environment:

- EU Floods Directive;
- EU Water Directive;
- NATURA 2000;
- European Waste Catalogue (EWC);



#### 6.5.2 National

#### Agriculture:

• Integrated Management AGROCERT protocols;

#### Energy:

- Law 2773/1999 on renewable hydropower renewable energy (Upcoming amendments in the Greek Grid and Exchange Code will require renewable sources to participate in the electricity market)
- National Action Plan (reports to the European Commission on progress in the promotion and use of energy from renewable sources with regard to the target to achieve a 20 % share of energy from renewable sources in the Community's gross final consumption of energy in 2020)
- Law 3851/2010, Art 6 on the development and coordination of the off-shore wind parks
- Law 3851/2010, on green growth and green entrepreneurship.

#### 6.6 Constraints

**Legislation constraints**: Interviewees have reported on the lack of a coherent national agricultural strategy. In Northern Greece, agricultural cooperatives have pointed out the government's lack of support towards helping them promote their products externally.

Furthermore, like in Serbia, EU CAP subsidies drive the crops farmers will favour, since agriculture in Greece is heavily dependent on legislation and funding. This may lead to soils losing qualities and therefore weaker yields.

According to ATLANTIS Consulting, the environmental sector in Cyprus generally lacks standards and protocols. Competition is tough and the market is rapidly changing.

**Budget constraints**: the majority of Greek interviewees have underlined the short to long-term negative effects of their country's austerity measures. For example, some end users believe that the current economic crisis in Greece has shifted social interest from environmental issues to financial issues. Furthermore, the need to cut costs have pushed organisation to cut staffing



budgets. Public sector budget cuts have also resulted in less financial support being allocated to use and purchase of new Earth Observation data;

Lack of awareness & know-how: on the use of Earth Observation for Environment and Agriculture. As expected, end users have little knowledge of geo-information data and its potential, thus targeted awareness campaigns and greater support should be offered to them by either private or governmental bodies. The Greek company Draxis also suggested that the *"state should strengthen the dissemination and availability of EO data to the potential end users by establishing a transparent and user friendly interface with key contact points for different market sectors"*.

**Serious data gaps**: In Greece, interviewed authorities have underlined the government's lack of incentive to digitalize national data sets and archives from municipalities and decentralised administration offices. In addition, some of the interviewees have highlighted serious gaps in nationally archived and collected data.

**Lack of cooperation**: Among the interviewees, several public authorities have underlined the existing difficulties with regards to internal communication and interaction between departments within national ministries.

**Burdensome public tendering**: public tender procedures are seen not as an opportunity but rather as a burdensome process that creates delays and issues for both private and public entities.

Lack of capacities: respectively, technical equipment and specialised personnel.

# 6.7 Funding schemes that have allowed users to obtain geoinformation

- EU LIFE funding schemes (supporting environmental, nature conservation and climate action projects in the EU);
- EU INTERREG Programmes;
- OPAAH (Integrated Development Programmes for Rural Areas);



- EU FP7 framework and its successor Horizon 2020;
- ESA & EDA funds;
- Greek national R&D funds;
- EU Cohesion Funds;
- European Regional Development Fund

# 6.8 Awareness of Copernicus and GEO

• Greece

By comparison to its regional neighbours, Greek entities, especially private ones have a higher degree of knowledge of Copernicus and its services. This is also due to a greater EO market maturity and the proliferation of knowledge through EU projects and directives.

Knowledge of GEO is however weaker, with respondents stating that a major challenge relates to raising awareness of all these services and tools towards stakeholders. The more local we go, the fewer end users are aware of these two programmes.

For end users, such as the Municipality of Thessaloniki, there is a need for more information about the Sentinel products especially for urban planning purposes.

• Cyprus

The interviewed SME was aware of Copernicus, but was not familiar with GEO activities.

#### 6.9 How the region may benefit from a free and open data hub

Private companies often complain that they encounter obstacles in accessing public geoinformation, which leads to missed business opportunities. As Greece has an established experience in dealing with EU funds, several databases seem to have been set in place throughout the years. Thus, the regional data hub should consider bringing together previously created datasets. Particular care should also be given to not duplicating existing data.

Given the constraint of shrinking budgets, the hub could also be seen as a platform enabling similar stakeholders to mutualise the use of relevant information.



# 7 Morocco, Tunisia, Egypt, Israel

Organisation Name	Department (if applicable)	Country	Туре
Water river basin agency for the Bouregreg and the Chaouia		Morocco	institutional
Settat Urban Agency, Province of Settat - Province of Khouribga		Morocco	institutional
Ministry of Town and Land Planning	Land Planning Directorate	Morocco	institutional
Office for Agriculture Promotion of the Gharb (ORMVAG)		Morocco	institutional
Water Basin Agency of the Oum and the Rabia		Morocco	institutional
National Water Public Company (SONEDE)	GIS Unit	Tunisia	institutional
Tunisian Electricity and Gas Company		Tunisia	institutional
National Rural Engineering Research Institute (INGREF)		Tunisia	institutional
Ministry of Agriculture and Water	General Directorate of Farmland Planning and Protection (DG ACTA)	Tunisia	institutional
Agency for Protection and Coastal Planning (APAL)		Tunisia	Institutional

# 7.1 Interviewees (validated)



Egyptian Environmental Affairs Agency	Waste Management Department	Egypt	Institutional
Ministry of Agriculture	Agriculture and Food security Department	Egypt	Institutional
EMATIC Consulting Company		Egypt	Commercial
Ministry of Agriculture and Irrigation	Central Laboratory for Environmental Quality Monitoring	Egypt	Institutional
General Authority for Fisheries		Egypt	Institutional
Keren Kayemeth Lelsrael – Jewish National Fund (KKL- JNF)		Israel	Commercial

Sixteen interviews were received from Egypt, out of which eleven were invalidated as they did not fall within the established target end user group required for this task. However, the messages and challenges reported by these research organisations do hold importance and thus have been included in the observations below.

# 7.2 Overall observations

On the basis of the user interviews submitted, **water** seems to be a good potential common thread to be exploited in Morocco and Tunisia in particular, through its implications in agriculture, in energy production, in risk management. See diagram below:



	CRTS	Ministry of Town and Land Planning		CNCT	Ministry of Agriculture water	
National	National Electricity and Water Office National Drinking Water Office	Land Planning Directorate	Electricity and water distributors Mineral extracting companies	National Water Public Company (SONEDE) National Rural Engineering Research Institute (INGREF) Agency for Protection and Coastal planning (APAL) Littoral Observatory	General Directorate of Farmland Planning and Protection (DG ACTA)	Tunisian Electricity and Gaz Company
Sub-national	Water Basin Agency of the Bouregreg and the Chaouia Water Basin Agency of the the Oum and the Rabia	Office for Agriculture Promotion of the Gharb (ORMVAG) Forest and Water Directorate				
Local	Farmers	The Settat Urban Agency, Province of Settat - Province of Khouribga			GDA (Farmers' association)	



Possible synergies concern the following pairings, chosen according to relevance for the GEO-CRADLE themes:

#### Climate change/food security — water in agriculture:

- In Morocco: Land Planning Directorate, Water Basin Authorities, ORMVAG, farmers
- in Tunisia: General Directorate of Farmland Planning and Protection, National Rural Engineering Research Institute, Ministry of Agriculture and Water (not interviewed, but coordinating the General Directorate of Farmland Planning and Protection)

Also in Tunisia, coastal risk protection—managed by the Agency for the Protection and Coastal Planning—is determined by climate change.

In Morocco, the Water Basin Directories are very strong actors with wide-ranging responsibilities for managing water use in the private and public sector (including by the general public). This means that they are linked with a whole range of organisations and companies which are dependent on the Directories' management of water, and likely to need or use the same type of data and information. Water Basin Directories can be seen as focal points and demand aggregators. In Tunisia, it can be assumed that the General Directorate of Farmland Planning and Protection can withhold a similar role, and that it can offer a gateway to organisations similar to the Water Directorates in Morocco.

#### Energy — water for electricity production:

• In Tunisia: The Tunisian Electricity and Gas Company was interviewed, while respondents from water basins in Morocco stated being in touch/interacting with electricity and water distributors and mineral extracting companies as well as with the National Electricity and Water Office.

**Raw materials**: it is to be noted that the biggest mining pole of Morocco (for phosphate) is located in the Oum Rabia River basin (whose Directorate was interviewed for this survey).

#### 7.3 Information needs

In Morocco, users mentioned the following data needs (a detailed account is available in the interview reports):

• land use and change monitoring



- mapping of public water resources and water users, with their rights
- mapping of extraction sites
- mapping of irrigation sites
- mapping of water spring drilling sites
- river basin erosion, topography
- identifying industrial discharges
- flood risk monitoring, damage monitoring
- salty water penetration in coastal areas
- water quality, quantity, speed of water courses
- pollution
- environment impact assessment
- dams
- water evaporation and humidity evapotranspiration
- snow coverage
- coastal area monitoring
- water resources
- bathymetry
- protected sites
- forest coverage

In Tunisia, the following were quoted:

- geographic distribution of gas and gas pipes
- renewables potential (esp. Solar)
- environmental impact of pipe networks
- natural resources (water)
- water pumping stations
- coast and coastal monitoring data: seashore, beaches, dunes, sand, island, cliffs, wetlands, estuaries,
- soil and water quality
- land degradation and priority areas for mitigating it

# 7.4 Current data sources and data access

In Morocco, the interviews were carried out by the CRTS (Royal Remote Sensing Centre) – a key actor in Morocco with a formal mandate to procure satellite data for the country, to provide



remote sensing expertise, data and value-added products to final users. The CRTS have a very strong end user focus and a large network of user organisations. Many of the Moroccan end users interviewed use satellite-derived information provided by the CRTS. Some are advanced enough to process data to a certain extent. CRTS procures satellite data for the entire country, but also acts as a service provider in some cases, including by responding to calls for tender.

The Water Basin Directorates own and use data from monitoring systems for groundwater and rivers, hydrological stations, but users also quoted aerial images, radar data, and Google Earth.

In Tunisia, the CNCT agency seems to have an equivalent role to the CRTS.

Drawing on the interviews received from Egypt, availability to recent geo-information data remains limited due to economic constraints. In some cases, authorities or research centres could spend up to 60 % of their budget towards acquiring satellite data, though it is unclear if the 60% is the share of the overall data mix (i.e. 60% satellite, xx% aerial, xx% in situ) they purchase, or if it is a share of their total budget. The former seems most likely. Often interviewees have reported that due to budget constraints they had to resort to older outdated data sets.

#### Supranational

- LandSat and RadarSat images;
- Ikonos high-resolution images
- Egyptian Survey Authority for Maps
- SPOT images;
- In-situ measurements;
- Nile River Water Quality Index maps;



# 7.5 Regulations driving use

- Morocco:
- national Law 10-95 on Water (applies to all levels of water management)
- obligation to set up integrated water monitoring plans (Plan Directeur d'Aménagement Intégré des Ressources en Eau
- environmental regulations

In Egypt, under the Government's legislation, the Environmental Affairs Agency must issue monthly public information reports, based on geo-information.

## 7.6 Constraints

For users in Morocco and Tunisia, the following constraints have been quoted:

- Data on natural resources is difficult to collect and hard to verify
- Data changes quickly and is sometimes inaccurate
- In the case of Tunisia: legally every tender must go through the CNCT for validation and approval > too much red tape and delays
- Lack of GIS expertise, limited staff
- Data cost (In Egypt, some research centers could spend up to 60% of their budget on data)

In Egypt, the following additional difficulties have been noted:

 a struggling political environment led to a weak implementation of environmental protection and conservation laws and policies. Interviewees have reported industry irregularities in respecting legal standards coupled with the inability of public authorities to monitor breaches due to budget cuts and lack of monitoring capabilities



- outdated rules and legislations that obstruct the use and development of geoinformation use within the public sector
- lack of cooperation: The Waste Management Department within the Egyptian Environment Agency report that inter-departmental cooperation is an issue within the ministries, together with lack of data collection standards and data sharing
- legislation: In Egypt, it is regarded as an endemic obstacle to economic growth. One of the interviewees mentioned that *"natural reserves constitute major obstacles to mining, which reduces the mining activity in this sense"*

# 7.7 Funding schemes

None mentioned in particular.

Organisation Name	Copernicus Awareness	GEO Awareness
Keren Kayemeth LeIsrael – Jewish National Fund (KKL-JNF), Israel	No	No
River Basin Agency for the Bouregreg and the Chaouia, Morocco	No	No
The Settat Urban Agency, Province of Settat - Province of Khouribga, Morocco	No	No
Land Planning Directorate of the Ministry of Town and Land Planning, Morocco	No	No
Office for Agriculture Promotion of the Gharb (ORMVAG), Morocco	Yes	Yes
Water Basin Agency of the the Oum and the Rabia, Morocco	No	No
National Water Public Company (SONEDE), Tunisia	Yes	Yes
Tunisian Electricity and Gas Company	Yes	Yes

# 7.8 Awareness of Copernicus and GEO



National Rural Engineering Research Institute (INGREF), Tunisia	NA	NA
General Directorate of Farmland Planning and Protection (DG ACTA), Tunisia	NA	NA
Agency of Protection and Coastal Planning (APAL), Tunisia	NA	NA
General Authority for Fisheries , Egypt	Yes	No
Egyptian Environmental Affairs Agency	Yes	Yes
Ministry of Agriculture, Egypt	Yes	Yes
EMATIC Consulting Company, Egypt	No	No
Ministry of Agriculture and Irrigation, Egypt	Νο	Νο
General Authority for Fisheries, Egypt	No	No

# 7.9 How the region may benefit from a free and open regional data hub

In Morocco and Tunisia, CRTS (Royal Remote Sensing Centre) and CNCT (The National Mapping and Remote Sensing Centre of Tunisia) respectively, have a state mandate to provide geoinformation to users in both countries. This also means that they procure data for such users. Thus, the two are key entry points to final users, can federate their needs (including around water) and get them involved in communicating their needs.

If the data hub gave access to relevant additional data (from the point of view of the temporal and spatial resolution, of the thematic focus and so on) it would be useful to the whole chain of



users. The hub could potentially be a platform where users that have common stakes (water managers for instance) can mutualise the use of some data that may be relevant for both countries.

Furthermore, in Tunisia, some users deplore that being dependent on the CNCT creates red tape and therefore delays in receiving their data. It can be envisaged that some users might benefit accessing additional data directly. Depending on the processing status of the data available on the hub, they may or may not require training (including from the CNCT).

In Egypt the situation is more difficult, where in some cases research centers can even lack a basic internet connection. Furthermore, Egyptian interviewees report on the poor quality of existing data sets (outdated data, wrong formats and wrong corrections on geographical locations). Thus, Egypt would greatly benefit from using open data sources provided in a free and open data hub.



# 8 Saudi Arabia, United Arab Emirates

Organisation Name	Department (if applicable)	Country	Туре
Abu Dhabi Urban Planning Council	GIS Section	UAE	Institutional
Abu Dhabi Environment Agency	Environmental information, Science and Outreach management section	UAE	Institutional
Dubai Municipality	GIS Department	UAE	Institutional
Department of Municipal Affairs and Transport	Geographic Information Systems Office	UAE	Institutional
Government of Dubai - Road and Transport Authority	Corporate Technical Support Services Sector	UAE	Institutional
Government of Abu Dhabi, Abu Dhabi Systems and Information Centre (ADSIC)	Abu Dhabi Spatial Data Infrastructure (AD-SDI)	UAE	Institutional
Saudi Arabian Oil Company (ARAMCO)		Saudi Arabia	Commercial
The National Water Company (NWC)		Saudi Arabia	Institutional

# 8.1 Interviewees (validated)

# 8.2 Overall observations

While only one major oil company was included in the interviews —the Saudi Arabian Oil Company — **it is difficult to ignore that access to raw materials and resources is a major stake in this region**. Transport and other infrastructure, as well as environmental sustainability topics the other respondents work on—can be related to access to raw materials too.

Sustainability appears to drive the majority of Saudi Arabia's and UAE's public policies, whether they cover environmental, water, energy or access to raw materials. This can be explained through their strong economic dependence on natural resources and also the need to supply their growing population with water and agricultural products.



Water scarcity is an issue for both Saudi Arabia and UAE. In Saudi Arabia, the National Water Company has initiated a TSE (Treated Sewage Effluent) initiative to address water shortage challenges in the Kingdom. Meanwhile, the coast of the United Arab Emirates in the Persian Gulf hosts some of the largest desalination plants in the world (in 2011 it was the second producer of desalinates sea water, after Saudi Arabia). Thus, environmental and water quality monitoring are central to ensuring sustainable access to water resources, both for citizens and industry.

# 8.3 Information needs (as quoted)

- High spatial resolution Earth Observation data (e.g. interferometric data)
- Land cover and land use maps, (plots, buildings, zoning, land use, etc.)
- Infrastructure maps, including transportation ways and drainage networks
- Soil composition
- Weather and climate data
- Air quality
- Water quality parameters

The end users also quoted non-geographic data, such as:

- Socio-economic data
- Fish Development and Management plans

# 8.4 Current data sources and data access

Both the UAE and the Kingdom of Saudi Arabia use and operate their own Earth Observation satellite systems (DubaiSats and SaudiSats). Additional data sets are acquired from private retailers and no data access challenge has been recorded by interviewees.



#### 8.4.1 United Arab Emirates

#### National

Interviewed public authorities manage their own geo-portals, making parts of their data available for public use. Furthermore, both the governments of Abu Dhabi and Dubai manage national databases containing various types of high spatial resolution data.

The government of Abu Dhabi provides public authorities with a national geo-portal: <u>http://geoportal.abudhabi.ae/geoportal</u>

In the case of Dubai Municipality, 100% of the primary information used comes from spatial sources, remote sensing, aerial photos, field surveys and mobile mapping. In the case of the Abu Dhabi Environment Agency approximately 80-90% of the information required by the Agency reportedly comes from Earth Observation data.

Additional portals:

- UAE Planning Urban Planning Council Geo-Portal (Standards & Manuals: <u>http://www.upc.gov.ae/guidelines/manuals-and-guidelines.aspx?lang=en-US</u>). Their GIS system, GeoPlanner, is available for use by other 3 municipalities, development companies and consultants. The portal is based on the latest ArcGIS technology and combines multiple sources of data including planning policies and regulatory constrains for any location or area.
- Earth Observation data (multispectral, hyper spectral etc.) in various resolutions.
- Abu Dhabi Environment Agency (<u>http://enviroportal.ead.ae/geoportal/catalog/main/home.page</u>)
- Dubai Municipality Geographic Information Systems Department <u>https://portal.dm.gov.ae/SCWebUI/Sections.aspx?DeptId=16</u>
- DubaiSat2data



- Remote sensing, aerial photos (usually contracted to the private sector in UAE and Saudi Arabia)
- Field surveys and mobile mapping

## 8.4.2 Saudi Arabia

No data sources have been reported by representatives in the KSA. The reports are the results of desk research and no interviews have been conducted.

#### 8.4.3 Frequency of use

Depending on the institution and their mandate updated geo-information data could be needed from a weekly to a yearly basis. The Abu Dhabi Environmental Agency updates its environmental indicators on a yearly basis, while in the case of Urban Planning Agencies, maps are updated on a very frequent basis as they are a central tool for real estate developers and consultants.

# 8.5 Regulations driving geo-information use (as quoted)

#### 8.5.1 Supra-national

No supra-national regulations were mentioned.

#### 8.5.2 National

In the case of UAE and Saudi Arabia, interviewees report on the need for public authorities to comply with strict national regulations. However, little details were given as to what the regulation standards are.

#### • United Arab Emirates

The Abu Dhabi Urban Planning Council is responsible for the implementation of the *Capital* 2030 Urban Structure Framework Plan and the 2030 Plans for Al Ain, Al Gharbia and the Emirate's maritime areas. Under these plans the public authority is required to present subsequent reports to the government and executive council.



#### • Saudi Arabia

The National Water Company follows national and international standards for Treated Sewage Effluent (TSE). The company—the result of a PPP— reports on its activities on a frequent basis to the government and to board members.

# 8.6 Constraints

- Lack of skilled staff constraints: both countries report a lack of skilled staff and their dependence on foreign expertise. Long-term retention of international staff represents a recurring challenge for the sustainability of the authorities.
- Reporting requirements: In the case of the Saudi Arabia, the National Water Company—a public-private enterprise— reported that it pays high penalties if reports are not delivered on time.
- Fluctuating oil prices: both Saudi Arabia and UAE have reported a strong linkage between fluctuating oil prices, foreign expertise and available budgets for training. In the case of the Abu Dhabi Environmental Agency strong budgetary cuts (up to 40%) due to low oil prices have resulted in the curtailing of major projects, such as, the Abu Dhabi 2030 Climate Change Action Plan. The Dubai Municipality is also reported to have frozen some of its projects due to budget constraints.
- Lack of long-term management strategies: organisational policies can change along with the vision of new managers. In the KSA, the director or the manager of an organisation is the one who makes all the decision.
- **Climate change**: the Gulf countries' economic and population growth pose constraints on the sustainable use of natural resources (water, oil, gas etc.)

# 8.7 Funding schemes that have allowed users to obtain geoinformation

No particular funding schemes have been offered as examples from the three countries.



# 8.8 Awareness of Copernicus and GEO

In the case of the United Arab Emirates there is little to no knowledge reported on the Sentinels programme. None of the interviewed public authorities uses any Sentinel data.

The UAE have recently become a GEO member, which could result in future awareness raising campaigns.

The interviews received from Saudi Arabia are not very conclusive as to whether there is an awareness and/ or use of Copernicus and Sentinel Data & GEO resources.

# 8.9 How the region may benefit from a free and open data hub

Both Saudi Arabia and UAE state having equipped their public authorities and companies with the latest technical equipment and software solutions. This would enable them to be able to benefit from new geo-information sources.

In that context, the region may benefit from a dedicated workshop to investigate this topic further.



# 9 Conclusions

The choice of the interviewed organisations has clearly influenced the focus of this survey. This is not a problem, since its objective was not to do an exhaustive analysis of end user needs, but to identify examples which could help the consortium understand the context in which the project can be relevant and useful.

The conclusions below are a synthesis of the chapters above in terms of general observations, information needs, data sources, and usefulness of a data hub.

# 9.1 General observations and constraints

The political and economic context, the geographic location and landscape of the countries, determine (relative) cohesion areas of uniform needs and contexts.

Serbia, FYROM Macedonia, Albania are all candidates to the EU, so in the process of implementing the EU *acquis communautaire*, as mentioned in most interviews. This generates common environmental monitoring needs which are therefore easier to understand and relate to GEO-CRADLE topics. They apply to both the private and public sector: public authorities verify compliance of private institutions, the latter report to public institutions. This common link helps define common information needs.

The *acquis* —in addition to geographic proximity— link up these countries with Romania, Bulgaria, Greece and Cyprus, which as EU members all apply already EU Directives. These EU regulations and directives create a common reporting framework, which makes it easy to go more in-depth in understanding the geo-information needs of the reporting organisations.

Agriculture and forestry are very prominent themes in all these countries, not only because a lot of the interviewed organisations work in these areas, but because they are important sources of economic revenue there. These themes have wide-ranging implications in terms of climate change and food security.



In Turkey, North Africa and the Middle East, the specificities of the political and economic context pose challenges that are quite different from the Balkan countries. However, a common predominant topic there is climate change—and in its water management aspects (the use of water for irrigation, or in risk management and coastal zone management).

Such common environmental concerns, with their regional specificities, are both a constraint and an opportunity for organisations using geo-information. A constraint in that they generate information needs which sometimes cannot be met (because of cost, red tape, fragmentation of sources, and lack of cooperation). An opportunity in that they generate a common framework of needs for which data can sometimes be mutualised.

Constraints identified across all countries are similar, though to varying degrees:

- the data and/or maps available is not up to date, not detailed enough, too expensive, or it takes too long to obtain it; in some cases (e.g. Greece), its availability is highly dependent on externally-funded projects
- organisations with common interests don't share the information, or the organisations with a public mandate to provide the information do not, or charge for it
- open data principles are not applied
- users (GIS providers) lack qualified personnel to process the data for the final users; they
  are often dependent on externally-funded projects when it comes to benefiting from
  expertise, which is more often than not provided by research organisations (so no
  mandate for continuous service provision, outside the research scope)
- companies suffer from long delays in obtaining authorisations for various activities (construction, renewable energy infrastructure, mining, road building etc.) from public authorities; reporting obligations generate time-consuming red tape



- in some countries (e.g. Egypt) there are even more stringent concerns than the lack of data: some research labs sometimes don't have an internet connection, or the necessary IT infrastructure
- although some more advanced GIS formats are quoted by in-house GIS providers, at the end user level (e.g. forester going in the field), the use of paper maps is widely spread, with the exception of some more experienced users
- regulations are poorly enforced; in agriculture, subsidies drive monocultures leading to soil degradation

# 9.2 Geo-information needs

Some users quoted very specific data needs (e.g. high-performance counter current chromatography), while most quoted geo-information needs (e.g. soil quality for vineyards, urbanization maps, risk maps and so on).

It is not yet clear (at least not in each case) the extent to which those users quoting data sources can process the data. In some cases, it may be that the data requirements included in the reports were unwillingly influenced by the provider who carried out the interview, who knew how the information needs translated into data needs, and included the latter in the report. This could be further clarified by pilot activities in the framework of pilot activities.

Another important aspect to be taken into account is the need for annex information, which many users also mentioned, i.e. census, socio-economic indicators, environmental regulations, eligibility to subsidies, livestock units and so on. This points to the need for integrated services (rather than just data).

According to theme and focus, quoted information needs went along these main lines:

- information on air, soil, water, natural vegetation and crops
- natural risks, notably draught, floods, coastal erosion, vegetation disease



- man-made infrastructure and its impact on the environment (e.g. urban sprawl)
- human activities and their impact on the environment (pollution industrial, from transport, from heating, from noise, from agriculture and so on)
- potential of natural resources for energy (renewables, mining)

For a regional focus on information needs, and pilot recommendations, see further.

# 9.3 Geo-information sources in use, and potential benefits from a free and open data hub

Respondents quoted a number of databases which are listed <u>here</u>. However, many respondents declared obtaining data from field surveys, from ground sensors of their own, and some even carry out their own aerial campaigns. Some international databases were also quoted, including the use of Landsat images; however, their application to the field of work of the end users is limited by the available resolutions.

The usefulness of any data hub should therefore take into account <u>both</u> international sources which are already known to more advanced users, and local sources, which cannot be matched or replaced because of the specific resolution requirements.

In light of that, an interesting aspect of a regional data hub would be its free and open data policy, which would consequently encourage local and regional stakeholders to make their data available under such conditions. This would remove the barriers users quoted in accessing data, including red tape (which is considerable) so it would be a significant impact in the region.

In the case of public organisations, their use of free and open data sources may be limited by their obligation to use only officially endorsed and certified ones – should a data hub not be certified for quality.

Depending on the processing stage of the data made available in the hub, some public organisations may also lack the processing skills to benefit from it.



In the case of private companies— i.e. end user companies, not only service providers— they could choose to use such databases for their operational purposes, and verify their quality as they go along. Since data cost and accessibility is particularly a problem for companies, it could be envisaged that removing that obstacle for them would stimulate companies and their activities.

# 9.4 Recommendation for further exploration of end-user needs

The recommendations are made both on the basis of thematic needs of the surveyed countries, and the potential for cooperation in these countries to the pilot activities, based on their degree of involvement so far. See here a link to all interview reports.

These recommendations outline the general contours of potential groups of users and their needs that could constitute the object of further investigations.

They are grouped according to the topics of the anticipated pilot activities, but with the understanding that they simply provide some indications to be validated (or not) in the subsequent stages of the project.

For instance, the next work packages in the project may investigate if there currently exist services which can satisfy the information needs of the identified users, or not. If not, it would be interesting to further explore if the data components of such services exist. If they do, the future pilot activities may investigate the feasibility of setting up such services by combining the available datasets.

Starting from grassroots examples of service needs would allow for a prioritisation of data needs on the basis of the service needs of the end-users. This would meaningfully anchor data provision (through a regional Data Hub) into the regional needs.

One limitation of the current version of the user needs analysis is that the format and the process of the interviews meant that sometimes we received feedback on data needs, rather than information needs. It is hoped that over the next stages of the project, including through



exploratory workshops allowing the partners to interact with the end-users directly, may compensate for this limitation in the future version of this deliverable.

#### 9.4.1 Food security and water extremes management

Greece could provide the critical user mass for a pilot study into the potential for geoinformation sources to support agriculture practices and to decrease the impact of extremes on agriculture. This is due to the high number of interviewed farm and agriculture organisations, and a good balance of private and institutional organisations. I-Bec is close to the end users with a history of working with them, so in a good position to take their needs into account.

Countries as Greece, Albania, Serbia but also Tunisia and Turkey were subjected in the past to water extremes with consequent adverse impacts and damages to agriculture and crop production; these common needs would all recommend these countries as good candidates for gap analyses and feasibility studies.

The agriculture needs of stakeholders from the following countries can also be considered:

- Serbia (including Galenika Fitofarmacija—a farming consultancy and seed seller, Generali Osiguranje Serbia—an insurance company, and the Group of Viticulture and Wine Production of the Ministry of Agriculture)
- Romania (in particular with S.C. Agro DECVRM SRL —a farming land trading company)
- Morocco (River Basin Agencies, which manage irrigation water, ORMVAG)
- Albania (National Food Authority, which participated in the Belgrade workshop)
- FYROM (Ministry of Agriculture, forestry and water economy)
- Egypt (Agriculture and Food Security Department of the Ministry of Agriculture)

Agriculture stakeholders from other countries could inform gap analyses and feasibility studies as required. Such stakeholders are not just farms, but also insurance companies, farming consultancies, land planning authorities, public authorities which manage subsidies.


## 9.4.2 Climate change and water management

Morocco could provide the critical user mass for a pilot study into the potential for geoinformation to support climate change assessment, monitoring and mitigation, in particular when it comes to water resources and water pressure factors and water risks.

The Water Basin Agencies interviewed have wide-ranging responsibilities and a large network of further stakeholders. Most of them are quite experienced in the use of geo-information, including those derived from satellites, having close working relationships with the Royal Remote Sensing Centre—the institution with a national mandate to provide geo-information and data.

Water-related stakes – in particular in terms of risk and coastal management have been quoted in Tunisia (with SONEDE — the National Water Distribution Utility and the Agency of Protection and Coastal Planning). The countries share some similarities in organisational structures.

Egypt (with in particular the Ministry of Agriculture and Irrigation and General Authority for Fisheries) and Israel would also be concerned by the pilot. Finally, Saudi Arabia with the National Water Company (NWC) and Turkey could be considered.

## 9.4.3 Energy

Potential candidates on the topic of energy can be:

- Greece with: Independent Power Transmission Operator (IPTO or ADMIE), Public Power Corporation S.A., the Ministry of Environment - Hydroelectric Generation Department, Energy and Climate Change (YPEKA), Centre for Renewable Energy Sources and Savings (CRES)
- Egypt with the Ministry of Electricity Renewable Energy
- Romania with CEZ Trade —an electricity distribution company, and Tractebel Engineering SA GDF SUEZ—an engineering and energy consultancy
- Tunisia with: the Tunisian Electricity and Gas company



- Morocco Water Basin agencies quote working relations with the National Electricity Office as well as electricity distributors
- Saudi Arabia with Saudi Arabian Oil Company (ARAMCO)

## 9.4.4 Access to raw materials

There was less of an emphasis on this topic in the interviews received.

In Morocco, the Oum-Rabian Water River Basin Agency quotes the presence a significant phosphate mining site in the basin, though the stakeholders have not been identified.

## **10 Future steps**

According to the needs of the pilots and other work packages and feedback on this document, this overview of needs can be fine-tuned and completed in the next phases of work package 2.4, notably in preparation of the final deliverable.