

# Deliverable 3.1

## Report for existing services

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## Introduction

In the context of the Global Earth Observation System of Systems (GEOSS), this deliverable lists and analyses a selection of data and product services regarding Essential Variables (EVs) and/or Sustainable Development Goals (SDGs) in terms of accessibility, usability and content to highlight opportunities, gaps and limitations for the use of remote sensing to develop indicators for monitoring. The sources of this analysis are, mainly, GEOSS, Copernicus and Thematic Exploitation Platforms (TEP) data products.

The services were selected according to the main themes of the GEOEssential project, namely Ecosystem and Biodiversity, Nexus Climate-Food-Water-Energy, Extractives Industry and Light Pollution. A matrix of the selected services and their relationship with GEOEssential themes is proposed below (Table 1). The services are then presented from global, down to European to national scales.

ID	Extent	Short name	Responsible	Biodiversity Ecosystem	Climate	Food	Water	Energy	Extractives	Light
GS1	Global	GEGs	UN-GRID	x	x	x	x	x		
GS2	Global	GFW	WRI	x						
GS3	Global	WDPA	WCMC	x						
GS4	Global	PREVIEW	UN-GRID		x		x			
GS5	Global	WDI	WB	x	x	x	x	x	?	?
GS6	Global	GCCA+	JRC							
GS7	Global, EU	Agri4Cast	JRC		x	x				
GS8	Global	GHSL	JRC							
GS9	Global	DOPA	JRC, WCMC	x						
GS10	Global, EU	GDAC	JRC							
GS11	Global	WAD	JRC		x	x	x			
GS12	Global	CCI	ESA		x		X			
GS13	Global	GEOBON	GEOBON	x						
GS14	Global	Earth Engine	Google	x	x	x	x	x	x	x
GS15	Global, regional, national, local	MAPX	UN Environment, UNEP/GRI D-Geneva	x	x		x	x	x	
GS16	Global	TEPS	ESA			x	X			
EUS1	EU	Water Portal	JRC		x		x			

ID	Extent	Short name	Responsible	Biodiversity Ecosystem	Climate	Food	Water	Energy	Extractives	Light
EUS2	EU	Urban population	JRC							
EUS3	EU	FishPop Trace	EC	x						
EUS4	EU	EDO	EC							
EUS5	EU	EFDAC	JRC							
EUS6	EU	WISE	EEA		x		x			
EUS7	EU	BISE	EEA	x						
EUS8	EU	Eurostat SDG	Eurostat	x	x	x	x	x		

## Selected Global Services

### GS1. Global Environmental Goals (GEGs) Live Tracker

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://geodata.grid.unep.ch/gegslive/">http://geodata.grid.unep.ch/gegslive/</a>	UN environment	Not directly	Global	Yes	No	Not directly	??	??

There are a multitude of internationally-agreed environmental goals and objectives, which are part of outcome documents of relevant United Nations summits and conferences, resolutions of the General Assembly, decisions of other global intergovernmental conferences, multilateral environmental agreements and decisions of their governing bodies. The compendium of those goals and objectives is called the *Global Environmental Goals* (GEGs).

The purpose of the GEGs-Live website is to provide up-to-date information on the progress towards achieving these GEGs. In addition, it puts the information into the context of the currently elaborated Sustainable Development Goals (SDGs). The variables and data are mainly drawn from UNEP's Environmental Data Explorer.

#### Accessibility

Users can access the information they are searching for either through the GEGs or the SDGs, as parallel points of entry. Users can also explore by theme: Air pollution and air quality, Biodiversity, Chemicals and waste, Climate change, Energy, Environmental governance, Forests, Freshwater, Land, and Oceans and seas.

## Usability

Based on the user's choice, the website shows the direct interlinkages between politically-agreed goals and targets on the one hand, and relevant underlying data for monitoring these on the other.

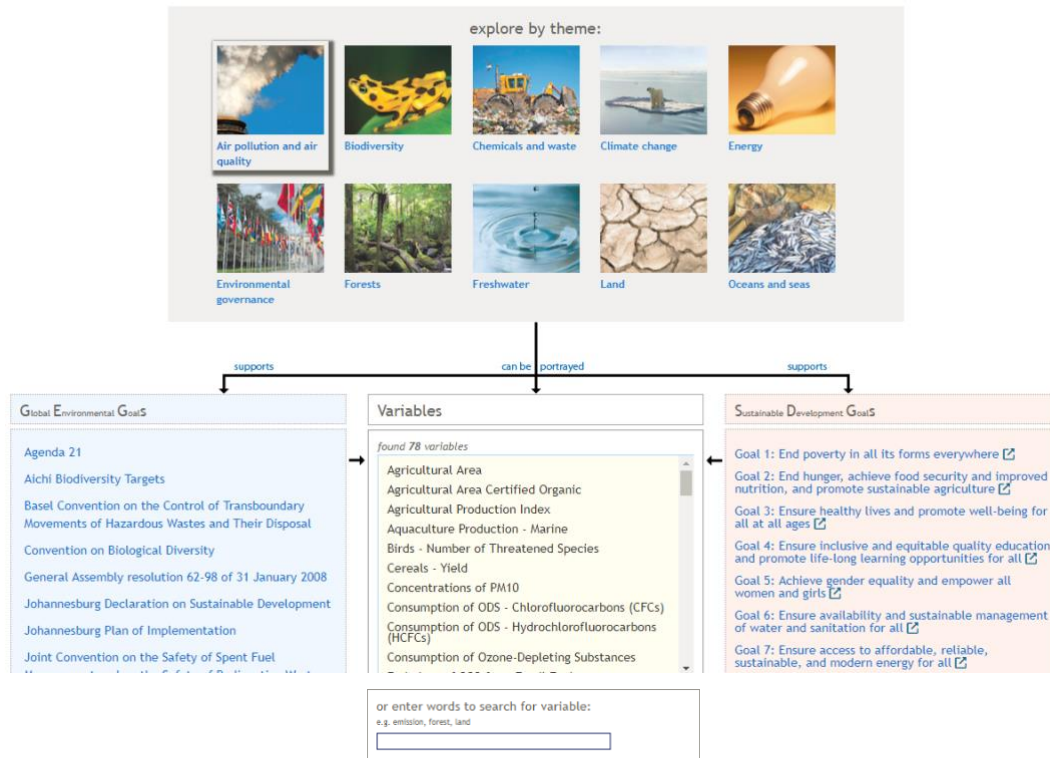


Figure 1. Interactive accessibility schema of the Global Environmental Goals (GEGs) Live Tracker

When a variable is selected, a graph with the available statistics for that variable is shown, for instance Figure 2.

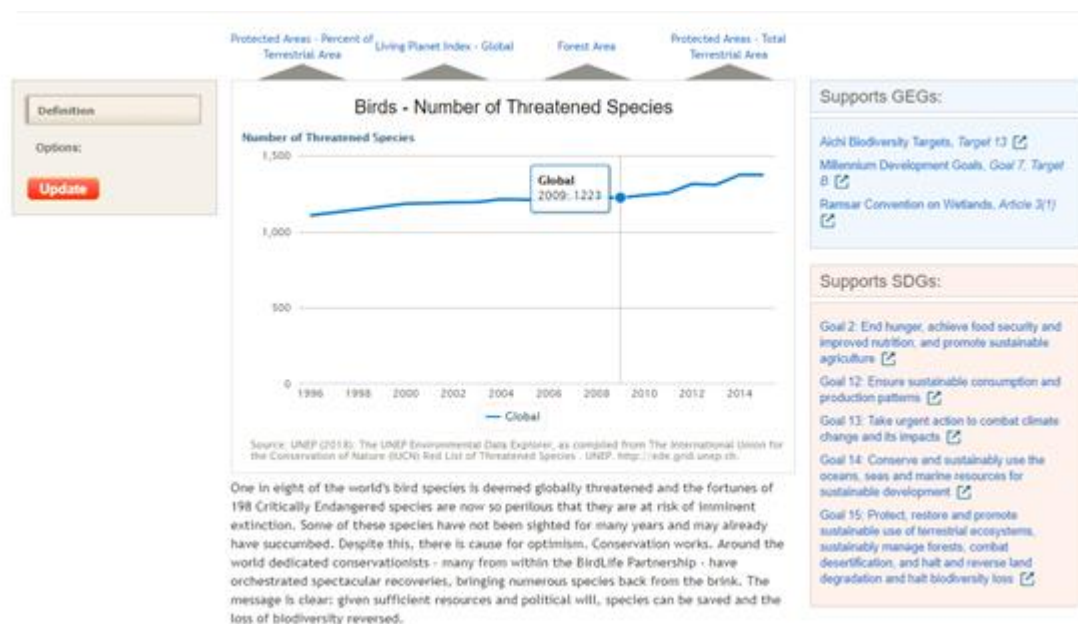


Figure 2. Graph showing the number of bird threatened species from 1996 to 2014. On the right the SDGs related to this variable, as well as other goals

## GS2. Global Forest Watch

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://www.globalforestwatch.org">http://www.globalforestwatch.org</a>	World Resources Institute	Yes, specially to EBV	Global	Yes	No	Not directly	??	??

Global Forest Watch (GFW) is an online platform that provides data and tools for monitoring forests. By harnessing cutting-edge technology, GFW allows anyone to access near real-time information about where and how forests are changing around the world.

### Accessibility

More than 100 global and local data sets to learn about conservation, land use, and forest communities.

The service offers a map with online analysis on variables such as cover loss (Figure 3), a dashboard (Figure 4) showing statistics and graphs and a blog to share knowledge on forest and land management among experts.

### Usability

Thousands of people around the world use GFW every day to monitor and manage forests, stop illegal deforestation and fires, call out unsustainable activities, defend their land and resources, sustainably source commodities, and conduct research at the forefront of conservation.

Using GFW's public Application Programming Interface (API) and open source code, anyone can build on GFW data and technology to create customized web-based or mobile applications. This section contains the tools and information you need to develop applications that harness Global Forest Watch data and technology.

Map Builder is an easy tool to help you build your own mapping portal, complete with powerful analytical tools.





Figure 3. Statistics on tree cover loss over Catalunya from 2001 to 2012



Figure 4. Dashboard screenshot over Democratic Republic of the Congo

## GS3. Protected Planet (World Database on Protected Areas)

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="https://www.protectedplanet.net/">https://www.protectedplanet.net/</a>	UNEP-WCMC, IUCN, and WCPA	Not directly	Global	Yes	Yes	No	??	??

Protected Planet is the most up to date and complete source of information on protected areas, updated monthly with submissions from governments, non-governmental organizations, landowners and communities. It is managed by the United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC) with support from IUCN and its World Commission on Protected Areas (WCPA).

It is a publicly available online platform where users can discover terrestrial and marine protected areas, access related statistics and download data from the World Database on Protected Areas.

### **Accessibility**

To make the database more accessible and user-friendly, in 2015 and again in 2016 the United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC) made some improvements to the online platform, including streamlining the download process and making improvements to the search function. Now, users can access statistics and other information on specific countries, and compare between countries. The website improvements have led to an eight-fold increase in the number of dataset downloads from the site, from 6,000 in 2014 to 47,348 in 2015.

Basic information on the legal status of the protected areas can be downloaded in GIS formats (Figure 5).

### **Usability**

Protected Planet enables a spectrum of users to use existing protected area data for information-based decision making, policy development, and business and conservation planning. Businesses in a range of sectors including mining, oil and gas, and finance can use WDPA data to identify biodiversity risks and opportunities of a given project. Conservation planners can use the information to predict the outcomes of various proposals and focus on initiatives and areas that are most likely to result in positive impacts. The US Agency for International Development (USAID) uses the Millennium Challenge Corporation's (MCC) annual policy performance scorecards to inform decisions on allocations on funds; MCC uses the WDPA in its indicator to measure the effectiveness of policies related to Natural Resource Protection. The goals of Protected Planet are that:

- The Protected Planet Initiative informs decision-making and enhances action;
- The Protected Planet Initiative is the global platform for the communication, exchange, acquisition and analysis of knowledge and data on the status and trends of protected areas;
- The Protected Planet Initiative provides the world's policy-makers with the best possible information on protected areas and their value for conserving biodiversity and ecosystem services, and supporting human communities.

In addition to serving as a business, conservation and aid investment planning tool, Protected Planet provides the basis for monitoring and reporting on progress towards international environmental targets such as the Aichi Biodiversity Targets and the 2030 Sustainable



Development Goals. Every two years, UNEP-WCMC releases the Protected Planet Report on the status of the world's protected areas and recommendations on how to meet international goals and targets.

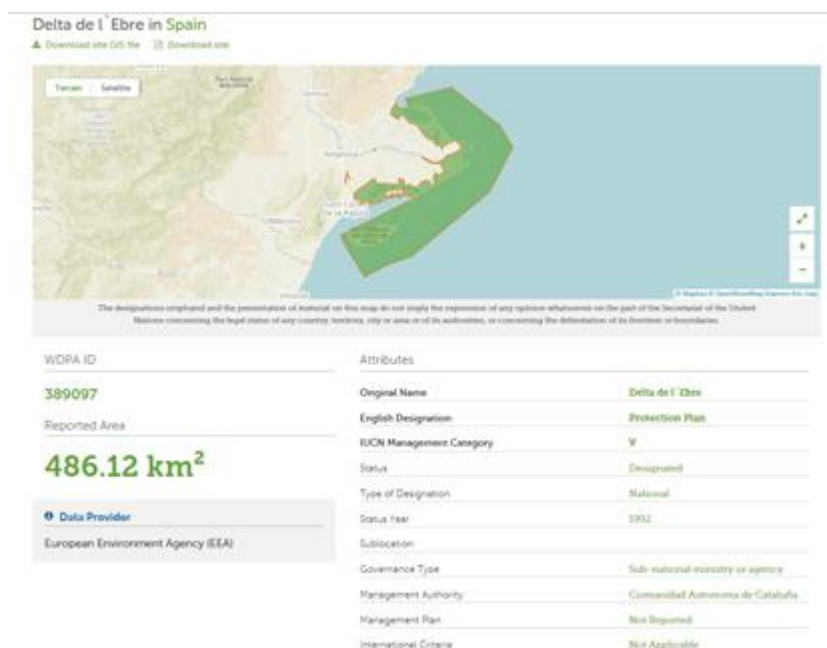


Figure 5. Legal information on the Delta de l'Ebre Protected Area

## GS4. Global Risk Data Platform

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://preview.grid.unep.ch/">http://preview.grid.unep.ch/</a>	UNEP/GRID-Geneva	Not directly	Global	Yes	No	No	??	??

The PREVIEW Global Risk Data Platform is a multiple agencies effort to share spatial data information on global risk from natural hazards. Users can visualise, download or extract data on past hazardous events, human & economical hazard exposure and risk from natural hazards. It covers tropical cyclones and related storm surges, drought, earthquakes, biomass fires, floods, landslides, tsunamis and volcanic eruptions. The collection of data is made via a wide range of partners. This was developed as a support to the Global Assessment Report on Disaster Risk Reduction (GAR) and replace the previous PREVIEW platform already available since 2000. Many improvements were made on the data and on the application.

### Accessibility

The users can visualise, download or use the data live in a GIS software. All datasets on PREVIEW can be available for free for non-commercial purpose (governments, international organisations, universities, non-governmental organisations, civil society according to the terms of the following disclaimer.

## Usability

The Global Risk Data Platform allows the visualisation of data on natural hazards, exposure (both human and economic) and risk (**Error! Reference source not found.**). Users may perform zooms, pan to a particular area, add different layers of general data including cities, national parks, etc... Different backgrounds can be chosen to highlight different components reflecting vulnerability, such as population distribution, GDP per capita, elevation, land cover. Layers of natural hazards can be added for both events and yearly average for tropical cyclones, droughts, earthquakes, biomass fires, floods, landslides and tsunamis.

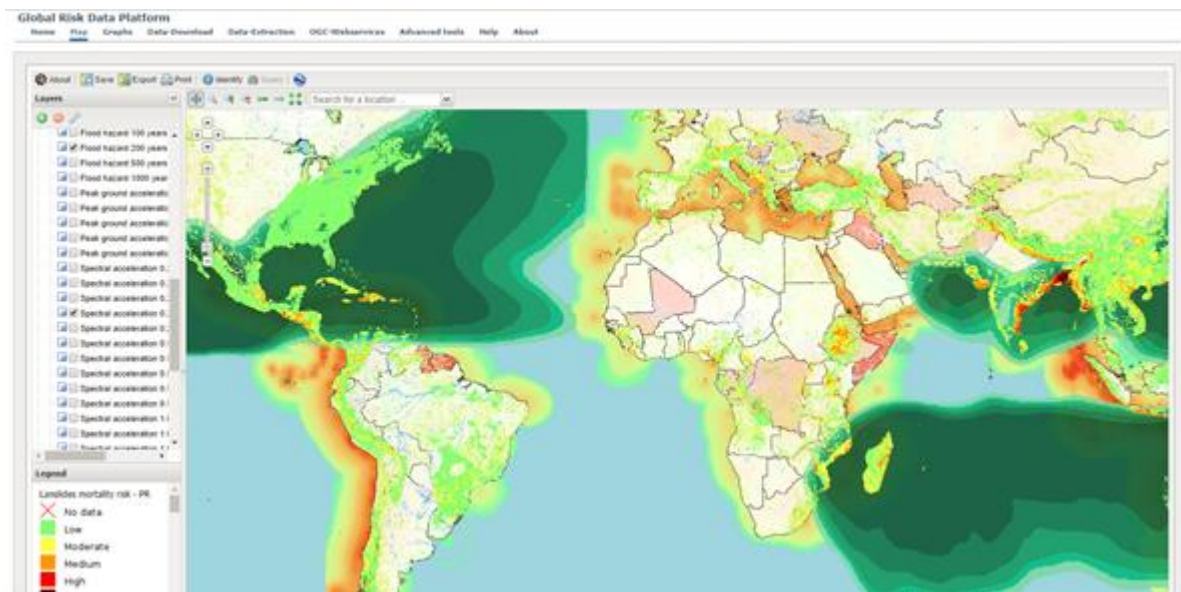


Figure 6. Map tool of the Global Risk Data Platform

## GS5. World Development Indicators 2017. Sustainable Development Goals

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://datatopics.worldbank.org/sdgs/">http://datatopics.worldbank.org/sdgs/</a>	World Bank	Not directly	Global	Yes	Yes	No	??	??

These dashboards present data from the World Development Indicators (WDI) that help to monitor the Sustainable Development Goals (SDGs).

## Accessibility

Graphs on World Development Indicators (WDI) are represented for every country and related to its corresponding SDG (**Error! Reference source not found.**).

## Usability

Users can choose *Explore* to explore all the Goals and Targets, or *Selected Indicators* to compare two economies side-by-side for a selection of indicators. Each graph can be consulted individually and get more information and access to download via CSV, XML, EXCEL. Indicators can also be visualized in map format (**Error! Reference source not found.**).

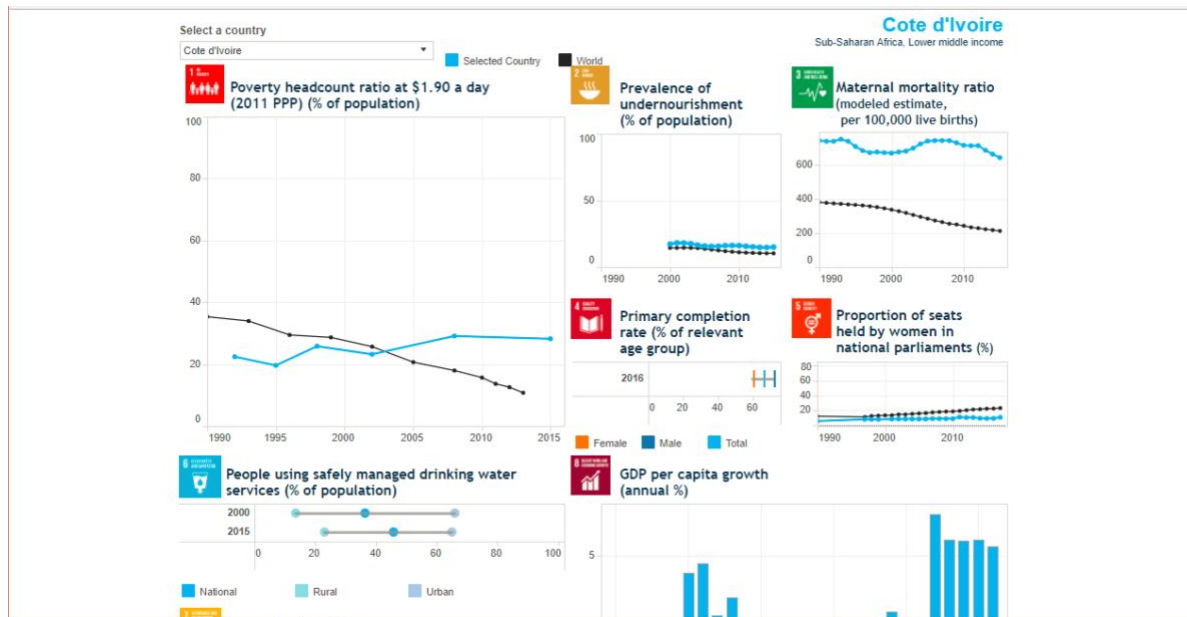


Figure 7. Statistics on different SDGs for Cote d'Ivoire

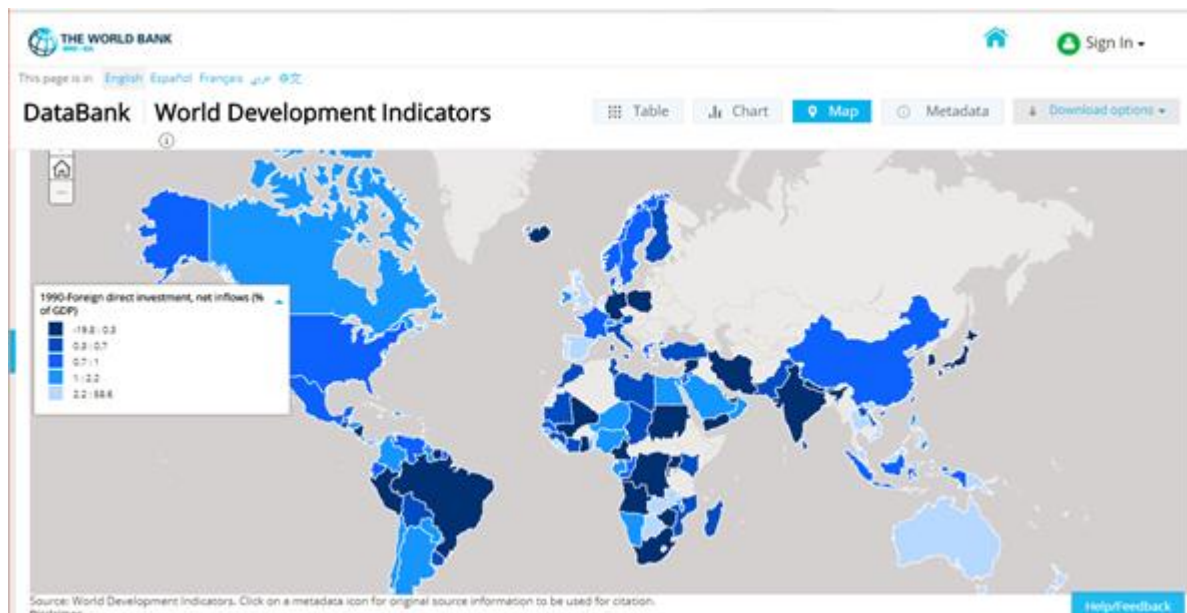


Figure 8. Map representation of the foreign direct investment (net inflows) indicator

## GS6. GCCA+ Index

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://www.gcca.eu/about-the-gcca/jrc-gcca-index">http://www.gcca.eu/about-the-gcca/jrc-gcca-index</a>	JRC	Not directly	Global	Yes	Yes	No	??	??

The European Commission's Joint Research Centre (JRC) has created a tailored index to support the Global Climate Change Alliance Plus (GCCA+) in its efforts to help the most vulnerable countries mitigate and adaptation to the worst impacts of climate change.

The new GCCA+ index – made up of 34 country-specific indicators – covers social, economic and environmental aspects critical in helping Least Developed Countries and Small Island States achieve 'climate-resilient' development. GCCA+ index is a climate resilient development index developed by JRC in line with the Sustainable Development Goals (SDGs). The lowest rank is the highest score for the objective of the index and it indicates the most vulnerable countries to climate change.

The GCCA+ Index is a "fit for purpose" and open source index that addresses the policy objectives of boosting the efficiency of response to climate change for the most vulnerable countries. It has been developed by the JRC to support the EU Global Climate Change Alliance Flagship Initiative (GCCA+) and aims to provide knowledge to support the reconciliation of climate change policy objectives with development goals, by ensuring that climate change is systematically integrated into development strategies.

### Accessibility

The GCCA+ index has been applied to 5 samples of countries:

- GCCA+ Index: rank for the sample of countries including Least Developed Countries (LDCs) and Small Island Developing States (SIDS)
- GCCA+ Index: rank for the sample of countries including Least Developed Countries (LDCs)
- GCCA+ Index: rank for the sample of countries including Small Island Developing States (SIDS)
- GCCA+ Index: rank for the sample of countries including African, Caribbean and Pacific Group of States (ACP)
- GCCA+ Index: rank for the sample of countries including LDCs, SIDS, low-income countries and lower-middle-income countries, and territories from the OECD's Development Assistance Committee (DAC) list of Official Development Assistance (ODA) Recipients (excluding Tokelau, Singapore, and Bahamas)

### Usability

The open source index is accessible via a web platform that serves as an interface between science and policy. A map allows users to visualize the status of these countries in relation to the index (**Error! Reference source not found.**).

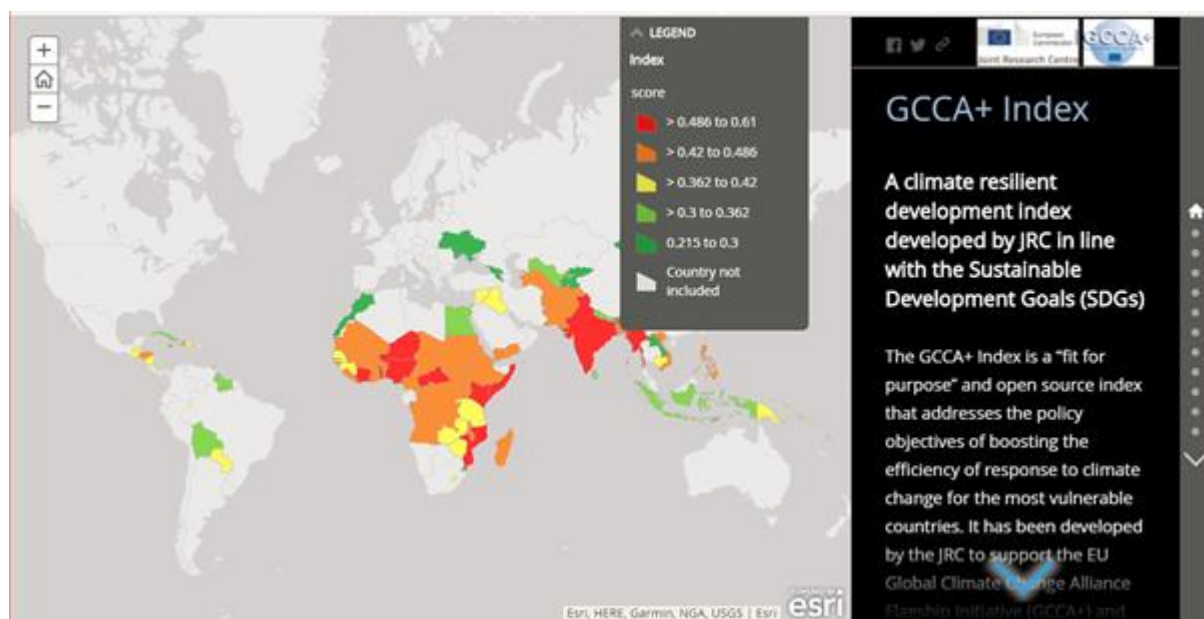


Figure 9. In the map the highest score for the objective of the index indicates the countries the most vulnerable to climate change

## GS7. Agri4Cast Data Portal

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://agri4cast.jrc.ec.europa.eu/DataPortal/Index.aspx">http://agri4cast.jrc.ec.europa.eu/DataPortal/Index.aspx</a>	JRC	Yes	Global, mainly European	Yes	Some datasets	Indirectly	??	??

Datasets of the MARS Crop Yield Forecasting System and related activities in crop monitoring and modelling are made freely available to the public for access and reuse.

Available data:

- **Gridded Agro-Meteorological Data in Europe (CGMS).** CGMS database contains meteorological parameters from weather stations interpolated on a 25x25 km grid from 01/01/1975 to 31/12/2017. Meteorological data are available on a daily basis from 1975 to the last calendar year completed, covering the EU Member States, neighbouring European countries, and the Mediterranean countries. Complete specification of the product:
  - [http://data-staging.jrc.it/licence/com\\_reuse](http://data-staging.jrc.it/licence/com_reuse),  
[http://marswiki.jrc.ec.europa.eu/agri4castwiki/index.php/Weather\\_Monitoring#Interpolation](http://marswiki.jrc.ec.europa.eu/agri4castwiki/index.php/Weather_Monitoring#Interpolation)
- **Monthly Cooling and Heating degrees indexes in Europe.** Monthly Cooling and Heating degrees indexes in Europe from 1974/1 to 2017/12. Administrative Region of EU28 with Norway and Switzerland. Complete specification of the product:



- [http://agri4cast.jrc.ec.europa.eu/DataPortal/Resource\\_Files/PDF\\_Documents/10.pdf](http://agri4cast.jrc.ec.europa.eu/DataPortal/Resource_Files/PDF_Documents/10.pdf)
- **Yearly modeled crop area in EU-28 at regional level.** From 1975 to 2017. Complete specification of the product:
  - [http://agri4cast.jrc.ec.europa.eu/DataPortal/Resource\\_Files/PDF\\_Documents/31\\_rationale.pdf](http://agri4cast.jrc.ec.europa.eu/DataPortal/Resource_Files/PDF_Documents/31_rationale.pdf)
- **Yearly modeled crop area in EU-28 at grid level.** From: 1975 to 2017. Complete specification of the product:
  - [http://agri4cast.jrc.ec.europa.eu/DataPortal/Resource\\_Files/PDF\\_Documents/31\\_rationale.pdf](http://agri4cast.jrc.ec.europa.eu/DataPortal/Resource_Files/PDF_Documents/31_rationale.pdf)
- **NetCDF Lat-Lon regular grid Meteorological data in Europe.** The 0.31x0.31 degrees lat-lon regular grid data is mainly designed for meteo-climate applications/users. This resource is based on the 25X25km gridded agro-meteorological data set. From: 1975 to 2016. Complete specification of the product:
  - [http://marswiki.jrc.ec.europa.eu/agri4castwiki/index.php/Weather\\_Monitoring#Interpolation](http://marswiki.jrc.ec.europa.eu/agri4castwiki/index.php/Weather_Monitoring#Interpolation)
- **Gridded Remote Sensing Data in Europe.** Remote Sensing data for vegetation monitoring in Europe. The aggregation procedure considers only pixel with a given threshold of land cover according to Genovese et al. methodology [2001 - Agronomie 21, 91–111]. From 11/03/2007 to 31/12/2016. Time Resolution: ten-daily.
- **Gridded Remote Sensing Long Term Average in Europe.** Remote Sensing long term average for vegetation monitoring in Europe. The aggregation procedure considers only pixel with a given threshold of land cover according to Genovese et al. methodology [2001- Agronomie 21, 91–111].
- **ISIMIP weather scenarios 1981-2099 RCPs 4.5/8.5 for South America – EUROCLIMA-2.** The resource consists of the ISIMIP weather scenarios for the EUROCLIMA 2 project: (5 Models x 2 Representative Concentrations Pathway: 4.5/8.5). Ref.: Euroclima2 Scientific component Final Report, JRC Technical Reports (not yet available). From 01/01/1981 to 31/12/2099.
- **Weather scenarios for Latin America and the Caribbean – EUROCLIMA-1.** The resource consists of the future weather scenarios generated for the EUROCLIMA 1 project. Ref.: Euroclima Scientific component Final Report, JRC Technical Reports 2014 66 pages. From 01/01/1989 to 31/12/2010.
- **Daily weather data for crop modelling over Europe derived from climate change scenarios.** The resource consists of consolidated and coherent future daily weather data for Europe on a 25x25 km grid designed for crop modelling. The dataset is based on three time horizons (2000, 2020 and 2030), each represented by 30 synthetic years created using the weather generator ClimGen and the statistical distribution of meteorological variables around these time horizons. Some of these meteorological variables are taken



directly from dynamically downscaled and bias-corrected regional climate simulations (from the FP6 ENSEMBLES project), while others are collected from historical series or re-estimated based on the former ensuring consistency within daily records. For more detailed information please refer to: Duveiller et al. 2015. A dataset of future daily weather data for crop modelling over Europe derived from climate change scenarios. Theoretical and Applied Climatology.

- **Crop Calendar.** This resource contains 3 PDF files. They report the crop calendars in the European Union (EU28) at national level for: winter wheat, (soft and durum), grain maize and rice. The calendars are defined according to three macro-phenological phases 1) from planting to early vegetative stages 2) from vegetative to reproductive stages 3) from ripening to harvest stages. The data are coming from expert knowledge evaluation. Format: text/csv.
- **Crop yield simulations on RCP.** Results of crop yield simulations on Representative Concentrations Pathway (RCP) aggregated at NUTS 2 level for EU28 with Norway and Switzerland.

### Accessibility

The data offered in the portal is accessible through a previous registration.

### Usability

Data is contained in files which users have to download. These are offered in several formats: SHP for the geospatial data, and text/csv for tabular data.

## GS8. GHSL - Global Human Settlement Layer

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://ghslsys.jrc.ec.europa.eu/">http://ghslsys.jrc.ec.europa.eu/</a>	JRC, DG REGIO EC, GEO Human Planet Initiative	Yes, especially EV related to socioeconomic data	Global	Yes, especially related to socioeconomic data	Yes	Indirectly	??	??

The Global Human Settlement (GHS) framework produces global spatial information about the human presence on the planet over time. This in the form of built up maps, population density maps and settlement maps. This information is generated with evidence-based analytics and knowledge using new spatial data mining technologies. The framework uses heterogeneous data including global archives of fine-scale satellite imagery, census data, and volunteered geographic information. The data is processed fully automatically and generates

analytics and knowledge reporting objectively and systematically about the presence of population and built-up infrastructures.

## Accessibility

The Global Human Settlement Layer operates in an open and free data and methods access policy (open input, open method, open output). The atlas of the Human Planet offers the following datasets: the 2018 – City centres database, the 2017 – Global Exposure to Natural Hazards, and the 2016 – Mapping Human Presence on Earth.

The general methodology behind GHSL data introduces concepts of GHS BUILT-UP, GHS POP, and the GHS Settlement Model. The slideshow below shows the basic concepts.

The main datasets are offered for download as open and free data. The GHS P2016 suite consists of multitemporal products that offers an insight into the human presence in the past: 1975, 1990, 2000, and 2014. The European Settlement Maps are pan-European built-up layers derived from higher resolution imagery.

The experimental products are available to the members of the GEO Human Planet Initiative of the GEO Human Planet Initiative community, including GHSL analytics extracted from Sentinel 1, the GHSL Label data (an experimental LandCover product from Landsat imagery), and past GHSL Landsat products.

The GHSL datasets available for open and free download can be found at <http://ghslsys.jrc.ec.europa.eu/datasets.php>:

- Landsat
  - GHS BUILT-UP GRID (LDS). Multitemporal information layer on built-up presence as derived from Landsat image collections (GLS1975, GLS1990, GLS2000, and ad-hoc Landsat 8 collection 2013/2014).
  - GHS BUILT-UP QUALITY (LDS). Complementary to the multitemporal GHS built-up grid (1975, 1990, 2000 and 2014), these two datasets contain: confidence map about built-up area presence, and a data mask layer that supports the main product.
  - GHS POPULATION GRID (LDS). This spatial raster dataset depicts the distribution and density of population, expressed as the number of people per cell.
  - GHS SETTLEMENT GRID (LDS). This data package contains settlement layers generated according to the degree of urbanization model adopted by EUROSTAT that combines the population and built-up grids in each four epochs.
- Copernicus
  - GHS BUILT-UP GRID (S1). Information layer on built-up presence as derived from Sentinel1 image collections (S1A 2016). It contains two experimental datasets, made with different set of parameters: ESM training (Europe only), GHSL training (World).

- ESM 2016 and ESM 2014. The European Settlement Map is a spatial raster dataset that is mapping human settlements in Europe based on the GHSL methodology applied to SPOT5 and SPOT6 satellite imagery.

## Usability

### City centres database

The database in the form of a map browser containing the total number of people living or working in the city centre (<http://ghslsys.jrc.ec.europa.eu/ccdb2016Overview.php>). Users can navigate through the Atlas and get statistics of more than 10000 urban centres (**Error! Reference source not found.**). Metadata information about the datasets forming the city centres database can be consulted here: <http://ghslsys.jrc.ec.europa.eu/ccdb2016MetaData.php>

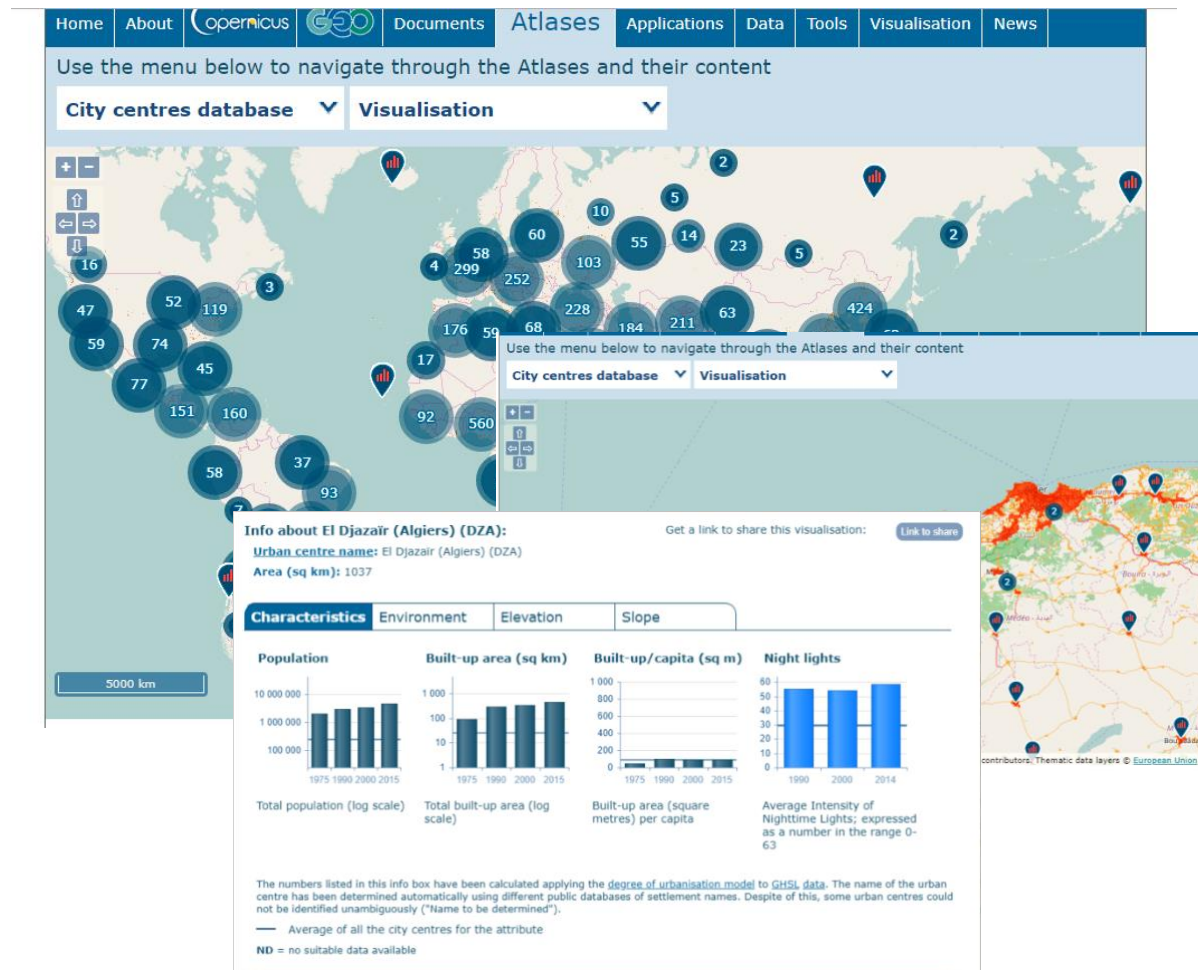


Figure 10. Socioeconomic statistics over the most important the city centres of the world

### Atlas of the Human Planet 2017 - Global Exposure to Natural Hazards

The Atlas of the Human Planet 2017 - Global Exposure to Natural Hazards summarizes the global multi-temporal analysis of exposure to six major natural hazards: earthquakes,

volcanoes, tsunamis, floods, tropical cyclone winds, and sea level surge. The exposure focuses on human settlements assessed through two variables: the global built-up and the global resident population. The two datasets are generated within the Global Human Settlement Project of the Joint Research Centre. They represent the core dataset of the Atlas of the Human Planet 2016 which provides empirical evidence on urbanization trends and dynamics.

The value of the GHSL layers used to generate the figures in this Atlas of the Human Planet is that the data are available at fine scale and exposure and the rate of change in exposure can be computed for any area of the world. Researchers and policy makers are now allowed to aggregate exposure information at all geographical scale of analysis from the country level to the region, continent and global.

Information on this Atlas is available in the form of documents:

- Atlas of the Human Planet 2017 - [here](#)
- GHSL Basic facts – [here](#)
- Atlas of the Human Planet 2016 - Key findings – [here](#)

#### *Atlas of the Human Planet 2016 - Mapping Human Presence on Earth*

The Atlas of the Human Planet 2016 is the first outcome of the Human Planet Initiative and aims to support the monitoring of the implementation of the post-2015 international frameworks: the UN Third Conference on Housing and Sustainable Urban Development (Habitat III, 2016), the post-2015 framework on Sustainable Development Goals (SDGs), and the UN Framework Convention on Climate Change, and the Sendai Framework for Disaster Risk Reduction 2015-2030 (DRR).

Information on this Atlas is available in the form of a document:

- Atlas of the Human Planet 2016 - [here](#)
- Atlas of the Human Planet 2016 - Exec. summary - [here](#)
- GHSL Basic facts – [here](#)
- Atlas of the Human Planet 2016 - Key findings – [here](#)

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The GHSL framework also aims to provide new spatial data mining technologies for the automatic processing, analytics and knowledge extraction from large amount of heterogeneous spatial data. In these sense, they are offering new tools used by GHSL to produce new global information that is contributing to new global findings (<http://ghslsys.jrc.ec.europa.eu/tools.php>).

- AAXY - Associative Analysis between X and Y. AAXY stands for associative analysis between X and Y. The AAXY is a general tool allowing to perform associative analysis between any spatial data instances (continuous, or symbolic) X and abstract (symbolic) spatial data instances Y.

- DUG - Degree of Urbanisation Grid. DUG is a public tool for applying the “Degree of urbanisation” (DEGURBA) model at one kilometre grid. The tool uses population and built-up grids as input data, and optionally a water mask.
- LUE - Land Use Efficiency. Estimation of the land use efficiency from the Global Human Settlement Layer (GHSL). This indicator allows measuring the Land Use Efficiency (LUE), which consists in the analysis of the evolution of the relation between the use of land and the growth of population. It works with input raster data on population and built-up. The GHSL baseline data is proposed as a show case. The user can define the area of interest for the analysis of the Land Use efficiency.
- MASADA - Massive Spatial Automatic Data Analytics. MASADA is a public tool for the detection of built-up areas from remote sensing data. The tool builds on the Symbolic Machine Learning (SML) classifier; a supervised classification method of remotely sensed data which allows extracting built-up information using a coarse resolution settlement map or a land cover information for learning the classifier. The image classification *workflow* incorporates radiometric, textural and morphological features as inputs for information extraction. Though being originally developed for built-up areas extraction, the SML classifier is a multi-purpose classifier that can be used for general land cover mapping provided there is an appropriate training data set.
- Smart Dissolve toolbox. SmartDissolve is a polygon aggregation tool developed in the frame of the Global Human Settlement Layer (GHSL) project and it is used to dissolve polygons below a given areal threshold.

## GS9. Digital Observatory for Protected Areas (DOPA) explorer

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://dopa-explorer.jrc.ec.europa.eu/dopa_explorer">http://dopa-explorer.jrc.ec.europa.eu/dopa_explorer</a>	JRC	Not directly	Global	Yes	No	No	??	??

The DOPA Explorer is the Joint Research Centre’s web based information system on the world's protected areas, which helps the European Commission and other users to assess the state of and the pressure on protected areas at multiple scales.

Using global reference datasets, the DOPA supports monitoring and reporting through a broad range of consistent and comparable indicators at country, ecoregion and protected area level. These indicators are particularly relevant for Aichi Biodiversity Target 11 (Protected Areas) of the Convention on Biological Diversity, and the UN Sustainable Development Goals 14 (Life below Water) and 15 (Life on Land).

Indicators proposed in DOPA are related to several SDG indicators. These indicators are:

B1. Terrestrial Coverage by Protected Areas

B2. Marine Coverage by Protected Areas





- C1. Connectivity
- D1. Species lists and statistics
- E1. Terrestrial Habitat Diversity
- E2. Marine Habitat Diversity
- F1. Climate and Elevation
- G1. Land Cover
- G2. Inland Surface Water
- G3. Forest Cover
- H1. Agricultural Pressure
- H2. Road pressures
- H3. Population Pressure
- H4. Built up pressure

For each indicator, extended information is given at <http://dopa.jrc.ec.europa.eu/en/factsheets>. For instance, in the case of “Agricultural pressure<sup>1</sup>”:

<sup>1</sup> [http://dopa.jrc.ec.europa.eu/sites/default/files/DOPA%20Factsheet%20G1%20Land%20Cover\\_0.pdf](http://dopa.jrc.ec.europa.eu/sites/default/files/DOPA%20Factsheet%20G1%20Land%20Cover_0.pdf)



## Agricultural pressure

Indicator name	Agricultural Pressure Indicator (API).
Indicator unit	The API assesses the percentage of the surface of a protected area that is covered by cropland.
Area of interest	API has been calculated, in DOPA Explorer 2.0, for each terrestrial protected area of size $\geq 50 \text{ km}^2$ and for the terrestrial parts of each coastal protected areas of size $\geq 50 \text{ km}^2$ .
Related targets	 <a href="#">Sustainable Development Goal 15 on life on land</a>  <a href="#">Aichi Biodiversity Target 5 on natural habitats</a>  <a href="#">Aichi Biodiversity Target 11 on protected areas</a>  <a href="#">Aichi Biodiversity Target 12 on species</a>
Policy question	How much potential impact may agriculture land use in a protected area have on the habitats, species and ecological processes therein? By identifying protected areas with low pressure from agriculture, it is possible to highlight locations that are likely to better conserve the ecosystems, species and ecological processes that are associated to more pristine conditions and that are more sensitive to the direct and indirect impacts from this form of human land use. On the other hand, by identifying protected areas with a relatively high percentage of cropland, it is possible to suggest in which locations it is a priority to implement measures that enhance the compatibility of crop production with biodiversity conservation. These measures may include promoting less intensive agricultural practices or retaining natural vegetation remnants within and between crops, which may contribute to provide habitat resources and to facilitate the movement of species across otherwise impermeable landscapes.
Use and interpretation	API can be used to assess the potential impact that agriculture may have on the biodiversity and ecological integrity of a protected area. There are several reasons why agricultural land use in a protected area may be of concern and lead to negative outcomes for the conservation of many of the habitats, species and ecological processes therein (see e.g. Green <i>et al.</i> , 2005; Balmford, Green & Phalan, 2012; Cai & Pettenella, 2013). First, agriculture expansion is one of the main drivers of deforestation and habitat loss worldwide. Second, the input of pesticides and fertilizers may decrease habitat quality and cause declines in population sizes for many species, even at significant distances from the croplands. Third, agricultural activities such as tillage may affect soil structure and biodiversity. Fourth, agricultural land use can favor the abundance of more generalist, cosmopolitan species in detriment of the specialist species that are associated to largely undisturbed habitats, which are usually those species of

## Accessibility

DOPA Explorer 2.0 provides simple means to explore and compare protected areas, with regard to their species and ecosystems, and the pressures they are exposed to through human development. DOPA Explorer 2.0 is a web-based assessment tool where information on nearly 24,000 protected areas (all protected areas  $\geq 50 \text{ km}^2$ , covering more than 95% of the global protected surface) has been processed automatically to generate a set of indicators on ecosystems, climate, species and pressures.

Users can also access to the input data used to generate the indicators (services and data sources), which in some cases can be downloaded: <http://dopa.jrc.ec.europa.eu/en/services>. To access to DOPA REST Services, users have to use an ECAS login.

## Usability

Users can access the data through the map browser and they can search by protected area, country or region (Figure 11).

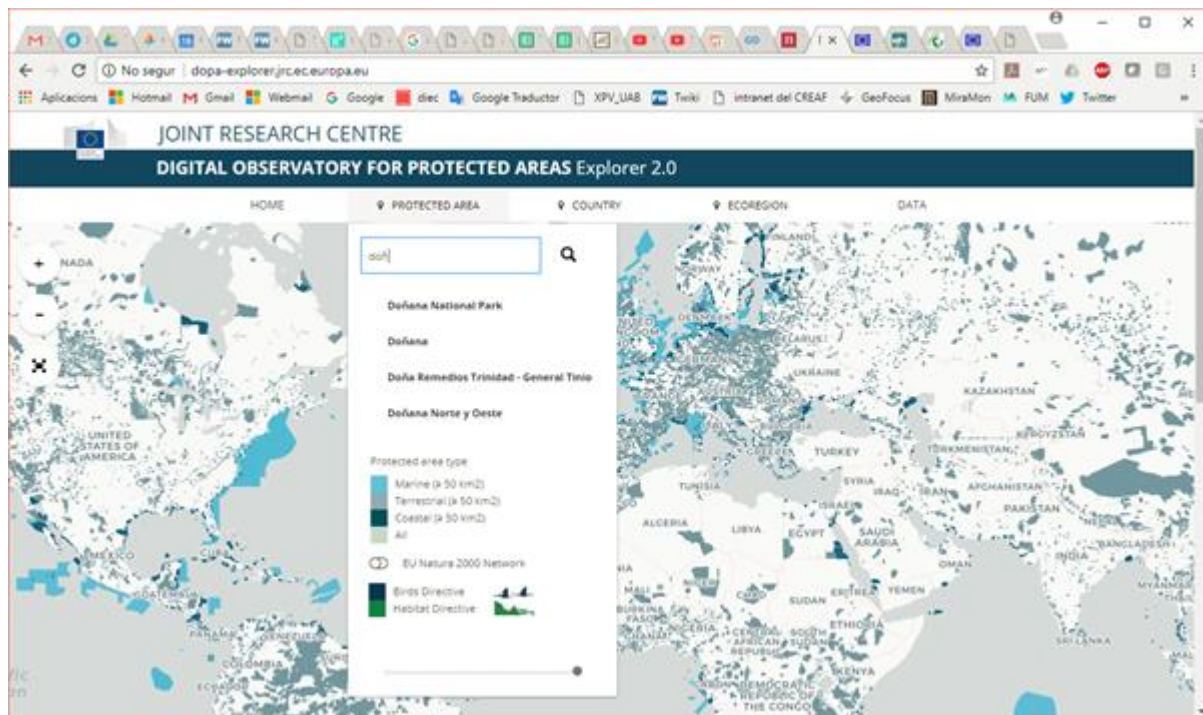


Figure 11. Searching for the Doñana protected Area in the DOPA map server

For each protected area, a review is created with information on the legal profile of the PA, the environment, the coverage, the species and the pressures. For each of these information, graphics are created showing the statistics, as well as the source data can be show in the map (Figure 12).



Figure 12. Diagram bar on the anthropogenic pressures over Doñana PA

## GS10. Global Flood Detection System

The Global Flood Detection System monitors floods worldwide using near-real time satellite data. Surface water extent is observed using passive microwave remote sensing (AMSR-E and TRMM sensors). When surface water increases significantly (anomalies with probability of less than 99.5%), the system flags it as a flood. Time series are calculated in more than 10000 monitoring areas, along with small scale flood maps and animations.

It's an experimental system to detect and map in near-real time major river floods based on daily passive microwave satellite observations. The purpose is to identify and measure floods with potential humanitarian consequences after they occur.

## Accessibility

Users have access in a single portal to several information regarding floods, volcanoes, cyclones, and health crises:

- Global Disaster Alert and Coordination System
  - o TRMM extreme rainfall (>100mm)

- NASA cloud coverage
- GDACS events
- Volcanoes (Global Volcanism Program)
- Copernicus
  - Activations Non Rush RSS feed
  - Activations Rush RSS feed
- Floods
  - JRC Current Surface Water
  - Rivers
  - NASA NRT MODIS Global Flood Mapping
  - University of Mariland Global Floods
  - GDAC Active Floods
  - JRC Current Flood
  - eTRaP extreme rain
  - TRMM Extreme Rainfall (>25mm)
  - GFDS Areas in Alert
- Volcanoes
  - Volcanoes in the world
  - 18h forecast (VAAC)
  - 12h forecast (VAAC)
  - 6h forecast (VAAC)
  - Current situation (VAAC)
  - Volcanoes (Global Volcanism Program)
- Cyclones
  - eTRaP extreme rain
  - TRMM extreme rainfall (>100mm NASA)
  - Cloud coverage (JRC)
  - Tropical cyclones (GDACS and JRC)
  - GDACS events
  - Earthquakes (GDACS)
  - Floods (GDACS and DFO)
  - EMM Flooding News
  - Cyclone alerts (GDACS)
- Health crises
  - European Centre for Disease Prevention and Control (ECDC) News feed
  - World Health Organisation RSS feed
  - MedISys (Medical Information System) RSS feed
  - Eurosurveillance RSS feed
- Emergencies. Chile 2010
  - Earthquakes Chile since 27.02.2010 with magnitude  $\geq 8$  (Red alert)
  - Earthquakes Chile since 27.02.2010 with magnitude  $\geq 6$
  - Earthquakes Chile since 27.02.2010

Some data can be downloaded, depending on the source service.

## Usability



Users can select which collection they want to consult and for a certain date (**Error! Reference source not found.**).



Figure 14. Extreme rainfall episode on June the 17<sup>th</sup> 2018 over Eastern Europe

## GS11. World Atlas of Desertification (WAD)

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://wad.jrc.ec.europa.eu">http://wad.jrc.ec.europa.eu</a>	JRC	water, biodiversity	Global	Yes	Yes	Not directly	??	??

In 1977, the United Nations Conference on Desertification (UNCOD) adopted an action plan to Combat Desertification informed by a map of desertification made by FAO, UNEP and UNESCO. In 1991, UNEP concluded that the problem of land degradation in arid, semi-arid and dry sub-humid areas had intensified. This was based on the GLASOD map compiled in 1990, which was used in WAD1 in preparation for the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992.

Based on the recommendation of UNCED, the United Nations General Assembly, established the UN Convention to Combat Desertification (UNCCD). The Convention was adopted in 1994 and entered into force in 1996. As decided in 2007, the Committee for Science and Technology convened three scientific conferences in 2010, 2013 and 2015. At the 2007 UNCCD COP8, a ten-year strategic plan was adopted, inviting stakeholders to compile a new atlas and, in response, the JRC accepted the task of coordinating the compilation of WAD3.

### Accessibility

The Atlas is accessible in pdf format (<https://wad.jrc.ec.europa.eu/download>). Maps can be downloaded in jpeg file without georeference.

## Usability

The third edition of the World Atlas of Desertification focuses on land degradation and global environmental change under five major subject headings:

- *Global Patterns of Human Domination*. Highlighting the role of Homo sapiens as the major driving force of global environmental change;
- *Feeding a Growing Global Population*. The ability to feed 10-12 billion humans by the end of the century is one of the great challenges facing humanity, creating enormous burdens on the land;
- *Limits to Sustainability*. The Brundtland Commission defined sustainable development as “development which meets the needs of the present, without compromising the ability of future generations to meet their own needs”. There are numerous obstacles that must be overcome to achieve this goal;
- *Converge of Evidence*. Many of the anthropogenic-induced environmental changes can be measured and their combined effect are indicative of the multiple stresses humans exert on the land. WAD3 draws on this complexity by adopting the concept that evidence or signals from multiple sources may “converge”, thus leading to the development of testable hypotheses and/or conclusions that are supported by data. Convergence of evidence maps replace ‘maps of desertification’ as per WAD1-WAD2;
- and *Solutions*. Potential solutions to land degradation need to be identified and implemented within the context of local social, economic, and political conditions.

## GS12. ESA Climate Change Initiative (CCI)

URL	Responsible	Related to EVs	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://maps.elie.ucl.ac.be/CCI/viewer/index.php">http://maps.elie.ucl.ac.be/CCI/viewer/index.php</a> <a href="http://cci.esa.int/">http://cci.esa.int/</a>	ESA	Aerosols, biomass, clouds, climate, fire, GhG, glaciers and ice, ocean color, ozone, permafrost, land cover, sea salinity, sea ice, soil moisture, sst, lst, water vapour	Yes	Some datasets	Indirectly	??	??

The European Space Agency (ESA) has initiated a new programme, Global Monitoring of Essential Climate Variables (known for convenience as the ESA Climate Change Initiative) to



provide an adequate, comprehensive, and timely response to the extremely challenging set of requirements for (highly stable) long-term satellite-based products for climate, that have been addressed to Space Agencies via the Global Climate Observing System (GCOS) and the Committee on Earth Observation Satellites (CEOS). It is exclusively concerned with addressing the explicit needs of UNFCCC.

## Accessibility

Information is accessible for visualisation, query and download through the map browser (Figure 15 as an example for land cover), but also via HTTPS, FTP and OpenDAP. The maturity of the individual variables is very different, e.g. a daily soil moisture product from 7 (in future possibly 9) spaceborne microwave sensors has been prepared for the years 1978-2016. In contrast, the work to generate a snow data set (snow cover area and a snow water equivalent) will be kicked-off in September 2018. In order to present a mature example about ESA CCI data services, the land cover information system is presented in the following. It contains:

- *MERIS time series reflectances.* The surface reflectance (SR) products consist of MERIS global time series covering the 2003-2012 period. The spectral content encompasses the 13 surface reflectance channels – the atmospheric bands 11 and 15 being removed – and the spatial resolution is of 300 m for the Full Resolution (FR) and 1000 m for the Reduced Resolution (RR). The time series are made of temporal syntheses obtained over a 7-day compositing period. In order to simplify the handling and analysis of global datasets, the MERIS SR time series are delivered in 5°x5° tiles.
- *Global Land Cover Maps.* Three global LC maps for the 2000, 2005 and 2010 epochs. The CCI-LC team has produced and released its 3-epoch series of global land cover maps at 300m spatial resolution, where each epoch covers a 5-year period (2008-2012, 2003-2007, 1998-2002). These maps were produced using a multi-year and multi-sensor strategy in order to make use of all suitable data and maximize product consistency. The entire 2003-2012 MERIS Full and Reduced Resolution (FR and RR) archive was used as input to generate a 10-year 2003-2012 global land cover map. This 10-year product has then served as a baseline to derive the 2010, 2005 and 2000 maps using back- and up-dating techniques with MERIS and SPOT-Vegetation time series specific to each epoch.
- *Seasonality products.* Three global climatological 7-day time series describing the natural variability of the vegetation, the snow cover and the burned areas. On a per pixel basis, these LC seasonality products reflect, along the year, the average dynamics and the inter-annual variability of the land surface over the 1998-2012 period. They are expressed as 7-day time profiles of the average and standard deviation for the vegetation greenness (NDVI) or as temporal series of occurrence probabilities for the snow and the burned areas.
- *Global Water Bodies Products.* Global map of open permanent water bodies at 300m spatial resolution derived from the full ENVISAT-ASAR dataset between 2005 and 2010. In an attempt to improve the characterization of inland water bodies in global LC products, a SAR-based approach has been implemented. Multi-temporal acquisitions of Envisat ASAR Wide Swath Mode with local gap fillers based on Image Mode and Global Monitoring Mode from the years 2005 to 2010, MERIS data and

auxiliary datasets have been used to generate a single epoch map of permanent open water bodies at 300 m.

## Usability

The CCI map browser is a dedicated user tool for allowing fitting land cover products to climate models by sub-setting, projection resampling re-projecting and re-sampling and by converting land cover classes into Plant Functional Types according to default or user-defined cross-walking tables. Other data services are available in fixed grids on file-base only. A dashboard clarifies the different specifications of the variables provided.

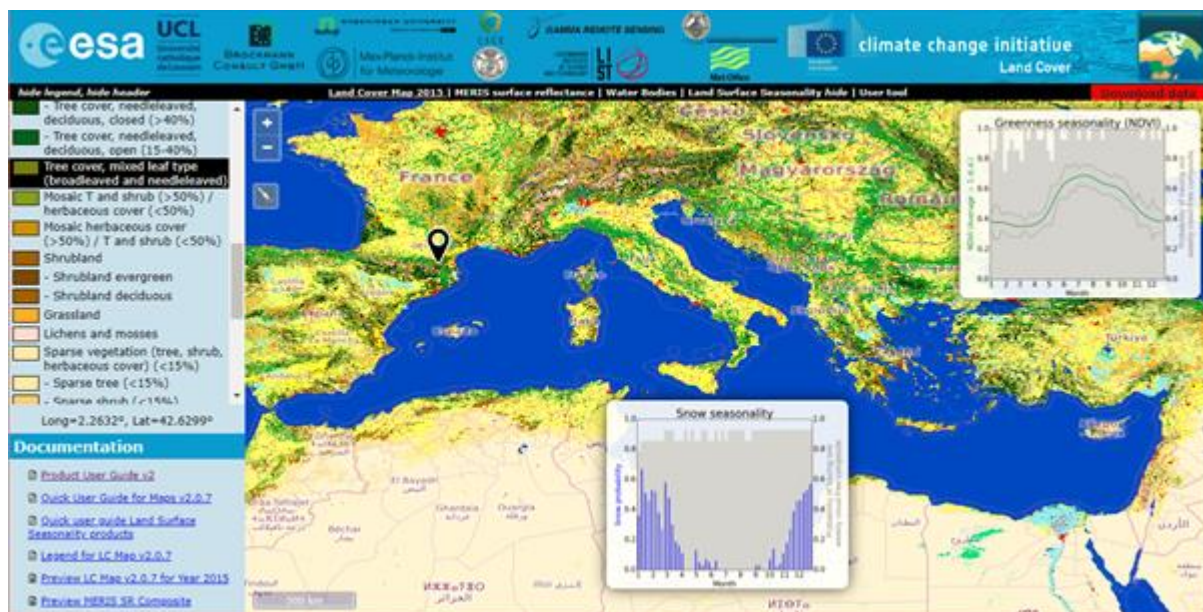


Figure 15. Land cover map of 2015 with information on the land cover, the greenness seasonality (NDVI) and snow seasonality for the area selected with a point

## GS15. MAPX

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://www.mapx.org">Website: www.mapx.org</a> <a href="http://app.mapx.org">Web application: app.mapx.org</a>	Lead: UN Environment Technical lead: UNEP/GRID-Geneva	Yes	Global	Yes	No	Indirectly	Under development	Under development

MapX was developed by UN Environment and the Global Resource Information Database (GRID-Geneva) to capitalize on the use of new digital technologies and cloud computing in the sustainable management of natural resources. One of the founding principles was to equalize information held by different stakeholders as a prerequisite to better dialogue, decision-making and monitoring. MapX evolved from an initial focus on extractive resources

to include a range of different resource types and themes, where spatial data can help inform stakeholder dialogue, prioritization of investments and impact monitoring such as disaster risk reduction, chemicals management, biodiversity planning, renewable energy and environmental security.

## Accessibility

Users can access the products and tools from [app.mapx.org](http://app.mapx.org). MapX offers three main services. First, it provides an impartial platform for multiple parties to share and access a common catalog of the best available geospatial data. This includes a data integrity assessment framework to ensure data quality, as well as the ability to create a secure data sandbox for sensitive information. Second, it is a suite of online tools where geospatial data can be analyzed, visualized and monitored. These include overlap analysis, heat mapping and time sliders. Finally, MapX offers a series of dynamic communication products and services that help breathe life into data, to engage people and compel action. This includes dashboards, story maps, social media links and the ability to develop customized applications.

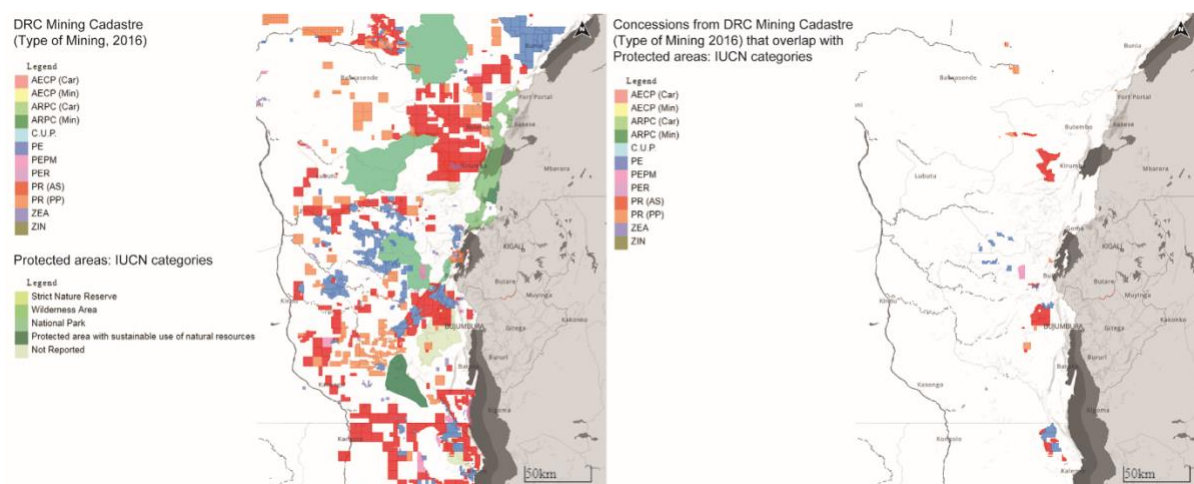


Figure 16. *Overlap analysis between mining concessions and protected areas in DRC, with (A) overlay of the two layers and (B) results of the overlap analysis (red areas).* Source:

<https://app.mapx.org?project=MX-MMN-3EH-CLM-KI7-EG9&views=MX-OD60Y-0XHH1-NUQLJ,MX-1LCIL-QRNLH-OCF2L,MX-NAXHL-ZRS68-RNVJA>

In terms of user management system, MapX offers incremental user access levels to data layers, story maps, dashboards and functions. Each user is assigned a role of "public", "member", "publisher" or "admin". A role defines the access to the application's different components and grants permissions to read, publish, and edit content. "Members" of a particular secure sandbox can share datasets in a dedicated space, which can be public or private. By default, a user is public and has limited privileges on data layers, story maps, dashboards and functions. To be upgraded to 'publishers', 'public' users must self-register by sending their email address. To be upgraded to 'members' of a sandbox, users must be invited by the administrator of this sandbox.

## Usability



MapX is a full-web platform. Users can access data layers that can be either stored locally (in a PostgreSQL/PostGIS database) or streamed into MapX from an external API or in WMS. As of August 2018 several hundreds of data layers are available. These data layers can be filtered by project/sandbox, by type (vector, WMS, story map, dashboard, time-series), and by collection (risk, pollution, trans-boundary analysis, hazards, ocean, climate, Minamata convention, high atmosphere etc.).

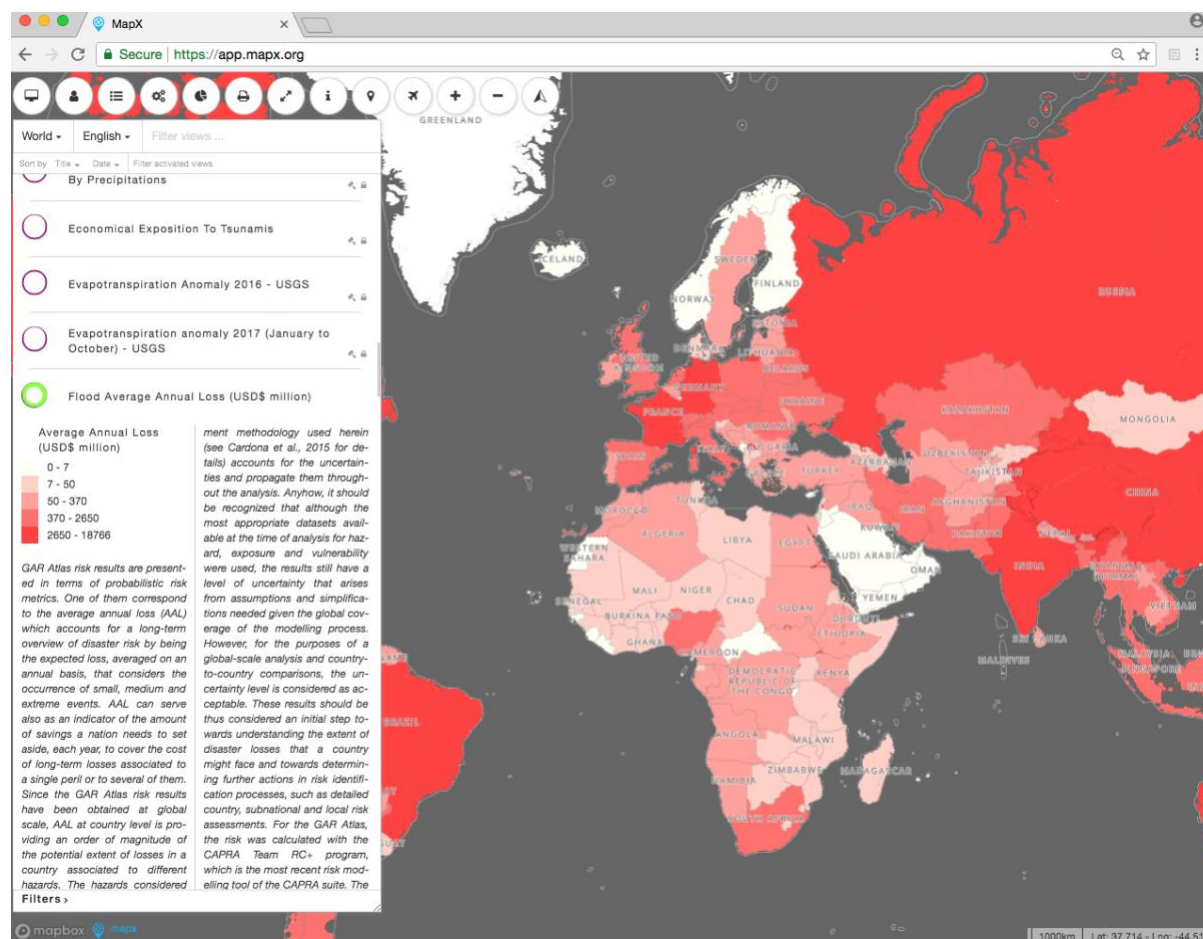


Figure 17. MapX data catalogue and map viewer. Source: <https://app.mapx.org?project=MX-3ZK-82N-DY8-WU2-IGF&views=MX-VKNFM-06Z8L-RVZ8P>

## GS16. Copernicus TEPS

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="https://tep.eo.esa.int/about-tep">https://tep.eo.esa.int/about-tep</a>	ESA	yes	Global	Yes		yes	TEP specific	yes

In 2014 the ESA has started the EO Exploitation Platforms (EPs) initiative, a set of R&D activities that in the first phase (up to 2017) aims to create an ecosystem of interconnected Thematic Exploitation Platforms (TEPs) on European footing, addressing:

Coastal, Forestry, Hydrology, Geohazards, Polar, Urban themes; and Food Security.

### Accessibility

An overview of the TEP can be accessed via the [TEP Platform](#). At this platform the links to the different thematic platforms can be found.

TEP	Link	registration	status
Coastal	<a href="https://users.coastal-tep.eu/auth/realms/coastal-tep/">https://users.coastal-tep.eu/auth/realms/coastal-tep/</a>	yes	pre-operational
Forestry	<a href="https://forestry-tep.eo.esa.int/ app/#/">https://forestry-tep.eo.esa.int/ app/#/</a>	ESA-SSO	operational
Geohazards	<a href="https://geohazards-tep.eo.esa.int/geobrowser/">https://geohazards-tep.eo.esa.int/geobrowser/</a>	ESA-SSO	operational
Hydrology	<a href="https://hydrology-tep.eo.esa.int/geobrowser/">https://hydrology-tep.eo.esa.int/geobrowser/</a>	ESA-SSO	operational
Polar	<a href="https://portal.polar-tep.eo.esa.int/ssportal/pages/p_dataSe arch.jsf">https://portal.polar-tep.eo.esa.int/ssportal/pages/p_dataSe arch.jsf</a>	ESA-SSO	operational
Urban	<a href="https://urban-tep.eo.esa.int/geobrowser/">https://urban-tep.eo.esa.int/geobrowser/</a>	ESA-SSO	operational
Food Security	<a href="https://foodsecurity-tep.eo.esa.int/analyst/">https://foodsecurity-tep.eo.esa.int/analyst/</a>	ESA-SSO	pre-operational

The platform are built on the Exploitation Platforms Open Architecture. It is the joint effort of all the Thematic Exploitation Platforms to produce a high-level architecture for the building of an Exploitation Platform, based on Open Source Software components and Open Interfaces. The document is released under CC BY-SA license, freely usable for commercial and non-commercial use.

### Usability

Each TEP has an own WEB application. The Service allows to define specific regions and shows an overview of existing pre-processed Copernicus data or in some cases already existing products. Furthermore some of the TEPs contain processors to calculate products for the selected area of interest based on the implemented routines.

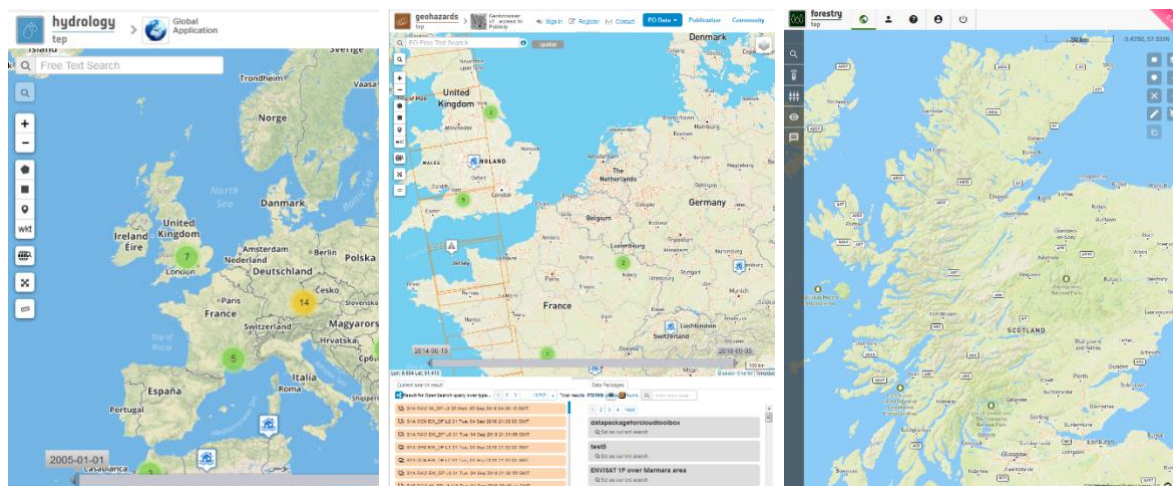


Figure 18. Exemplary representation TEP Web applications for Hydrology, Geohazards, and Forestry

## Selected European Services

### EUS1. WATER PORTAL

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://water.jrc.ec.europa.eu/waterportal">http://water.jrc.ec.europa.eu/waterportal</a>	JRC	water	EU	Yes	Yes	Indirectly	??	??

The JRC water portal serves as the gateway to JRC's products on freshwater and marine water resources, providing access to water data, publications, and maps, as well as to water projects and events. The portal brings together the products on freshwater resources, FATE, Water & Ecosystems, Water & Development, GMIS, EMIS, EFAS, GloFAS, Droughts-EDO & GFDS.

#### Accessibility

Users can access the products and tools without any previous registration. Results on the statistical tools can't be downloaded. The WDF database server has currently an error and can't be consulted ([http://water.jrc.ec.europa.eu/wiser/wfd\\_search/](http://water.jrc.ec.europa.eu/wiser/wfd_search/)).

#### Usability

The portal offers **statistical tools** to calculate statistics (average, sum, min and max value) for NUTSO, NUTS1, and River Basin Districts (**Error! Reference source not found., Error! Reference source not found.**), and **WFD Methods**. The WFD (Water Framework Directive) database contains information about the national assessment methods used to classify the ecological status of rivers, lakes, coastal and transitional waters. Member States of the



European Union apply these methods in their monitoring programmes according to the EU Water Framework Directive. The information in this database was provided by the Member States.

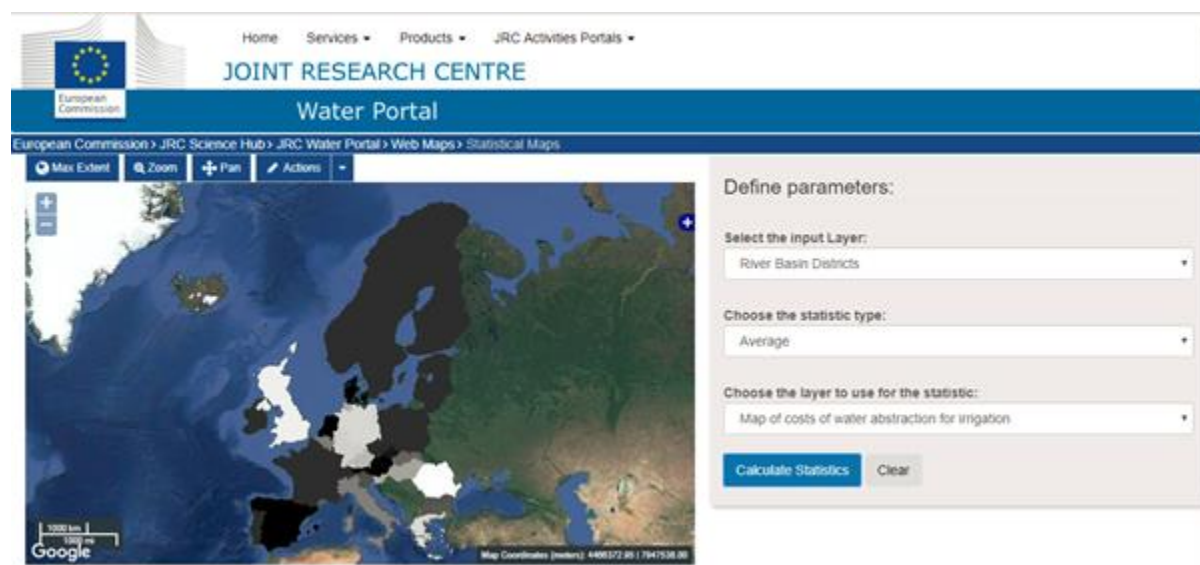


Figure 19. Example of a statistics query: Average on the map of costs of water abstraction for irrigation over the river basin districts

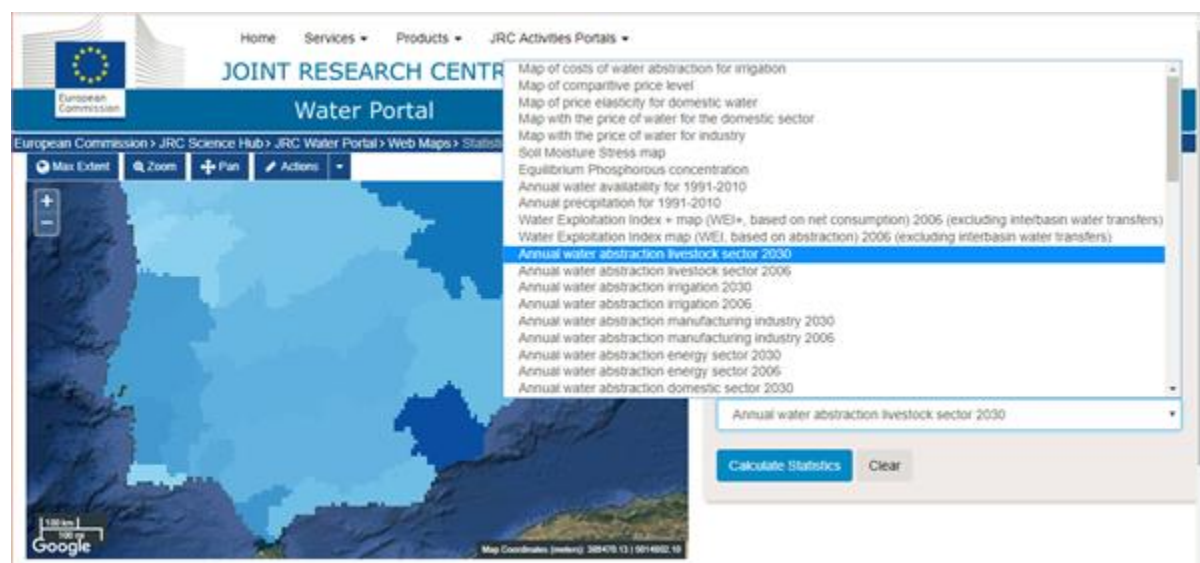


Figure 20. Possibilities of layers to use to calculate the statistics

## EUS2. URBAN DATA PLATFORM

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://urban.jrc.ec.europa.eu/">http://urban.jrc.ec.europa.eu/</a>	EC	socioeconomic data	EU	SDG indicators	Yes	No	??	??

Data sharing and visualization platform for European cities and regions.

## Accessibility

Users can access data through a map browser where information can be filtered by country and city. Several layers, related to SDG indicators, can be visualized, queried and downloaded (Figure 21). These available layers are:

### DEMOGRAPHY

- Population (inhabitants)
- Population density (person/km<sup>2</sup>)
- Population Weighted Density (person/km<sup>2</sup>)
- Population change by metro regions (percentage, %)
- Historical population, 1961-2011 (inhabitants)
- Age structure by metro regions (share of population aged 20-64 years old, %)
- Migrated population by metro regions (percentage, %)
- Non EU-born population by metro regions (percentage, %)
- Foreign-born population by metro region (percentage, %)
- Population 65 and older by metro region (share of total population in percentage, %)

### URBAN DEVELOPMENT

- Built-up areas per inhabitant (m<sup>2</sup> per inhabitant)
- Residential, industrial and commercial areas per inhabitant (m<sup>2</sup>/per inhabitant)
- Share of residential, industrial and commercial areas (percentage, %)
- Artificial areas per inhabitant (m<sup>2</sup>/per inhabitant)
- Land annually taken for built-up areas per inhabitant (m<sup>2</sup>/per inhabitant)
- Urban Proportion (percentage, %)
- Annual rate of urbanisation (per mile, ‰)

### ECONOMIC DEVELOPMENT

- Population by metro regions (inhabitants)
- Total employment by metro regions (employees)
- Total GDP by metro regions (million Euros)
- GDP per Capita (thousand Euros)
- GDP per person employed (thousand Euros)
- Tertiary education by metro regions, Share of population aged 25-64 (%)
- Employment rate by metro region (Share of population aged 20-64 employed, %)
- High-growth enterprises by metro region (per thousand persons)
- Patents by metro region (patents per million inhabitants)

### TRANSPORT AND ACCESSIBILITY

- Average Travel Distances (meters)
- Length of local roads per inhabitant (meters per inhabitant)

- Accessibility to passenger flights (daily number of flights)
- Car passenger transport activity (billion passenger kms)
- Road traffic fatalities (deaths per 100,000 inhabitants)

## ENVIRONMENT AND CLIMATE

- NOx emissions (100 kg/year)
- PM10 Emissions (100 kg/year)
- PM2.5 emissions (100 kg/year)
- NO2 concentration ( $\mu\text{g} / \text{m}^3$ )
- PM10 concentrations ( $\mu\text{g} / \text{m}^3$ )
- Population exposed to NO2 (person)
- Population exposed to PM10 (person)
- Urban flood risk (dimensionless)
- Dwellings exposed to noise (degurba) (percentage of population, %)

## RESOURCE EFFICIENCY

- Nature based recreation opportunities (dimensionless)
- Share of green infrastructure (percentage, %)
- Green infrastructure per capita ( $\text{m}^2/\text{person}$ )
- Access to green urban areas (hectares)
- Urban form efficiency (dimensionless)
- Share of old buildings (percentage, %)
- Share of new buildings (percentage, %)

## SOCIAL ISSUES

- At risk of poverty by degree of urbanisation (percentage of population, %)
- Severe material deprivation by degree of urbanisation (percentage of population, %)
- Very low work intensity by degree of urbanisation (percentage of population, %)
- Poverty or social exclusion risk by degree of urbanisation (percentage of population, %)
- Residential overcrowding by degree of urbanisation (percentage, %)
- Housing costs burden by degree of urbanisation (percentage of population, %)
- Tenants by degree of urbanisation (percentage, %)
- EU2020 index by degree of urbanisation (dimensionless)
- People aged 30-34 with a tertiary education by degree of urbanisation (percentage of population, %)
- Participation in education by degree of urbanisation (percentage of population, %)
- Early school leavers by degree of urbanisation (percentage of population aged 18-24, %)
- Physical security by degree of urbanisation (percentage, %)
- Living in an area with crime, violence or vandalism by degree of urbanisation (percentage, %)

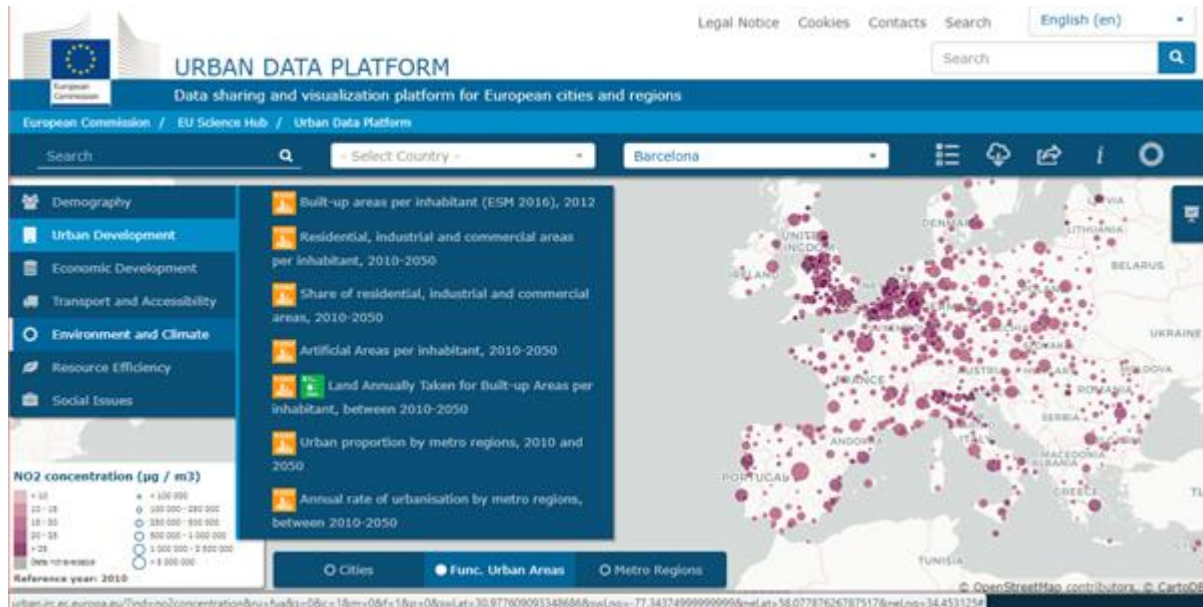


Figure 21. Overall overview of the map browser. Layers related to SDG indicators

## Usability

Layers can be visualized and queried, but also comparison statistics can be obtained between regions, countries and cities (Figure 22). Download can only be done as a picture in PNG or PDF, but GIS formats are not offered.

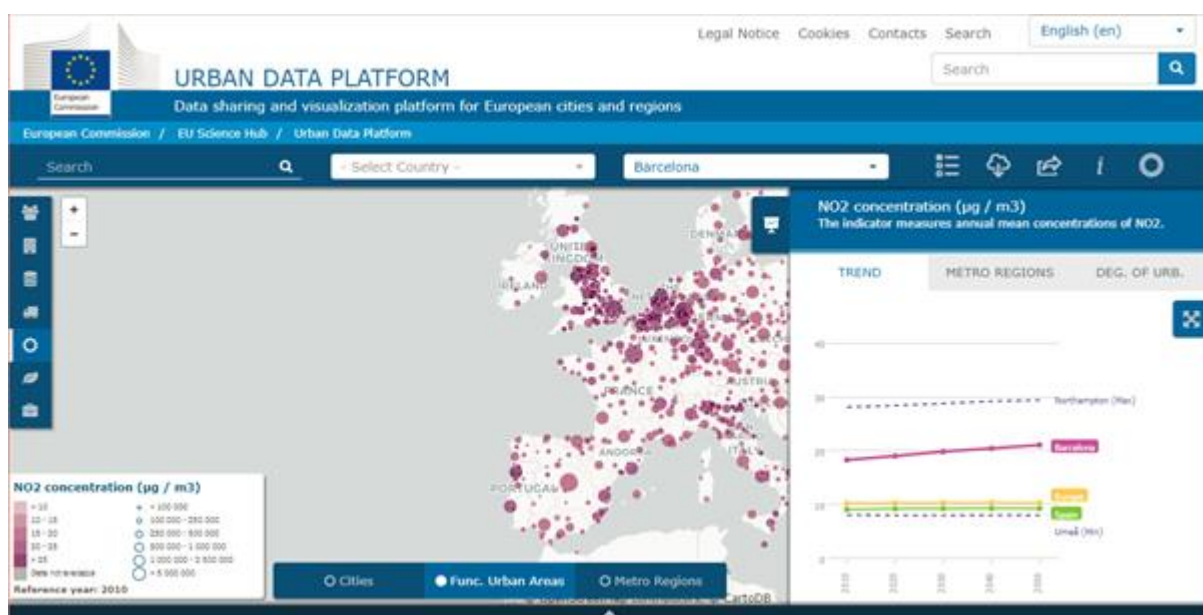


Figure 22. Statistics of NO2 concentration of Barcelona in comparison to Spain, Europe and Northampton

## EUS3. Marine Fish Population Geobrowser

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
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<a href="https://fishpoptrace.jrc.ec.europa.eu/map/genetics_geobrowser/">https://fishpoptrace.jrc.ec.europa.eu/map/genetics_geobrowser/</a>	EC	genetic population of fishes	EU	Yes	No	No	??	??
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FishPopTrace is an international project aiming at the construction of a Pan-European framework, built on advanced technologies, for product traceability and policy related monitoring, control and surveillance (MCS) in the fisheries sector.

Pursuing a holistic approach, FishPopTrace can contribute to fisheries management and conservation measures in line with the global attempt to move towards sustainable fisheries.

The samples collected and analyzed as part of FishPopTrace are stored in a series of carefully constructed databases. Different aspects of this data, concerning sampling, analysis, and reporting and uploading of data are accessible through 3 different interfaces provided here. Data access rights and the visibility of the data vary depending on the interface. We wish to make the scientific data generated available to non-scientific stakeholders such as fishery managers and policy makers. Meanwhile, access to some of the scientific raw data and analysis is currently restricted to FishPopTrace partners. In addition to the 3 information access interfaces, a website “Member Area” acts as an online secure file store, allowing FishPopTrace partners to collaborate on documents and to distribute files amongst each other.

### Accessibility

Access to the information describing the samples used for analysis, stored in the central sampling database, is currently provided only to the collectors of this information through a password protected Web-based portal. The interface allows scientists to check the information on samples currently in the database, edit the information and add information on new samples. The information can be queried according to numerous parameters. Records are displayed through the web-based interface, but can also be downloaded and manipulated in a spreadsheet. While access to this portal is currently highly restricted, it is envisioned to provide read-only access to a set of this information to accompany the information accessible through the geobrowser. The combined information in text and visual, map-based formats provide valuable information for informed decision making by fishery managers and policy makers.

### Usability

The primary means of information dissemination is through a publicly accessible Web-based geobrowser (Figure 23). Information on the samples taken during FishPopTrace, and their genetic characteristics are visualized in an interactive map. The data visible through this interface is publicly accessible and has a limited degree of access to the genetic analysis information in the databases. Environmental parameters such as sea surface temperature chlorophyll concentration and ocean currents, along with important international boundaries and economic zones are also available through this interface. This allows possible inferences regarding the effects of environmental parameters on the genetic characteristics of a species



to be generated, while also considering what economic or management areas are involved. Data in the map browser can't be downloaded.



Figure 23. FishPopTrace map browser interface

## EUS4. European Drought Observatory (EDO)

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1000">http://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1000</a>	EC	climate and biodiversity	EU	Yes	No	Yes	??	??

The EDO pages contain drought-relevant information such as maps of indicators derived from different data sources (e.g., precipitation measurements, satellite measurements, modelled soil moisture content).

### Accessibility

There are 2 services to access drought data generated by the observatory (Figure 24). The two services provided create maps in the Lambert Equal Area (LAEA) projection system or in a Geographic Plate Carree projection.

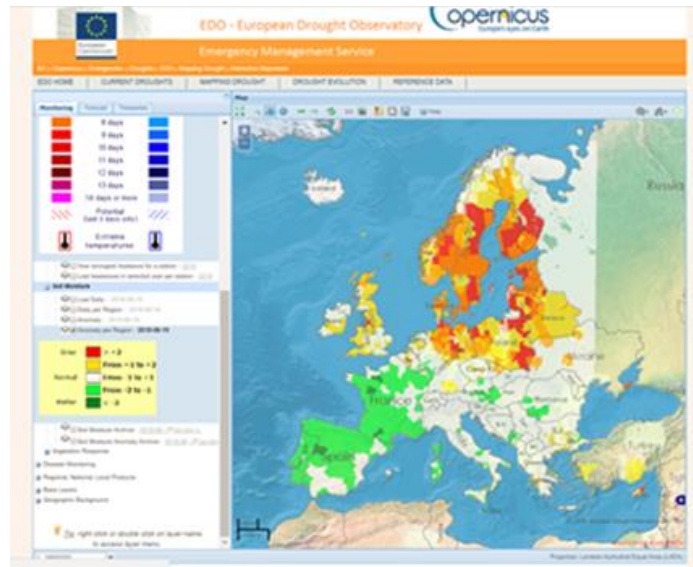


Figure 24. Interactive map viewer of the EDO showing the soil moisture anomaly per region

Users can also generate their own map from the Database containing large amounts of Geographic data regarding Climate and Hydrology. The maps are generated using the current content of the database but are of high quality.

## Usability

Different tools, like graphs and compare layers (Figure 25), allow for displaying and analysing the information and irregularly published "Drought News" give an overview of the situation in case of imminent droughts. Maps can be saved as PNG images but no GIS formats are offered.

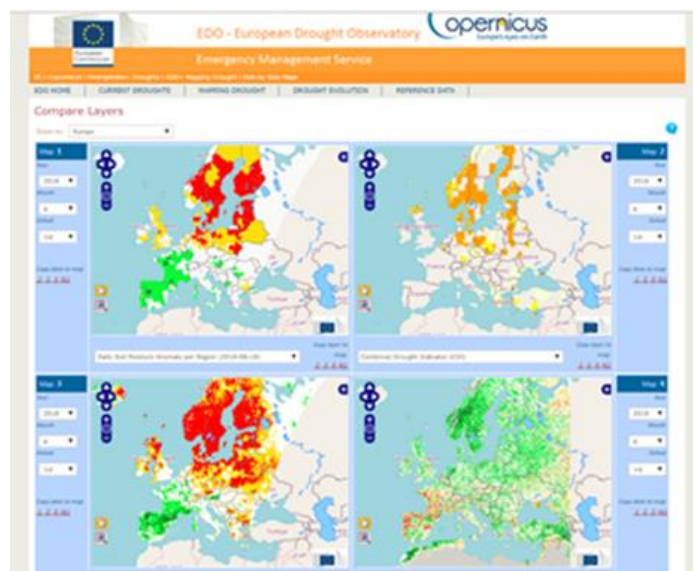


Figure 25. Layers comparison offered through the map viewer. A zoom can be done to a particular country

## EUS5. Forest pattern map viewer

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://forest.jrc.ec.europa.eu/efdac/applications/viewer">http://forest.jrc.ec.europa.eu/efdac/applications/viewer</a>	EC	biodiversity	EU	Yes	No	Indirectly	??	??

The forest pattern viewer, provided by EFDAC, displays the level and type of forest presence within Europe. The interactive tool allows the user to navigate through different themes and indicators. EFDAC is a central point for forest information at the European level, and supports relevant EU policies.

### Accessibility

Information is accessible through a map viewer where several layers are shown: the forest area, the atlas of tree species, the forest condition, the forest pattern, and the forest biomass (Figure 26).

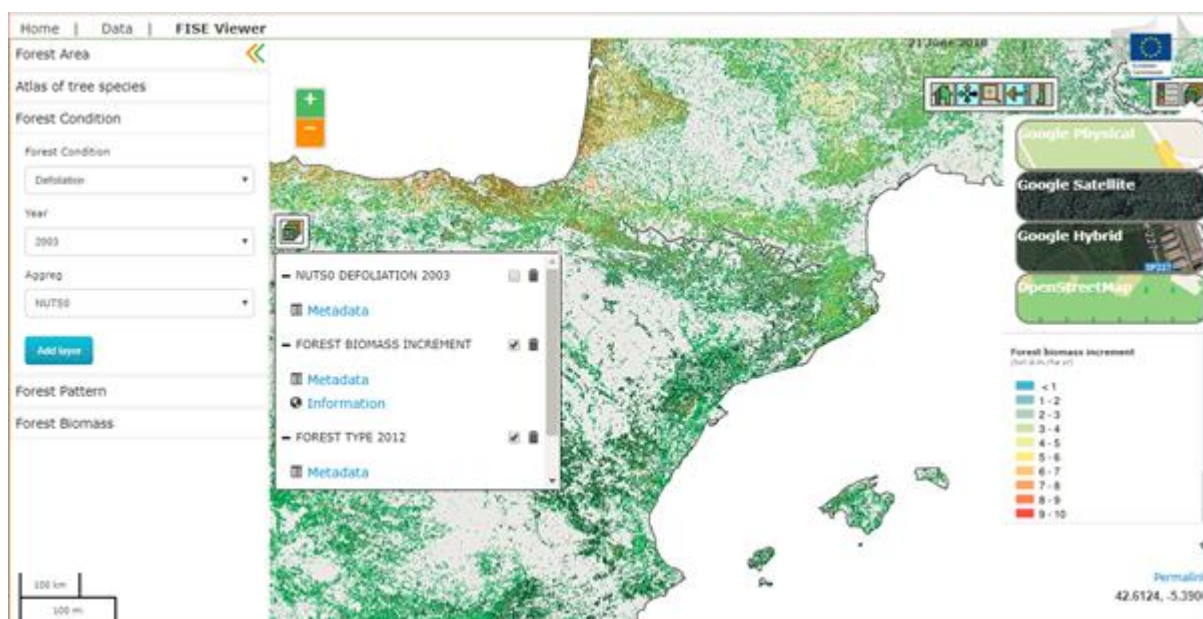


Figure 26. Forest type and biomass increment over eastern Spain

### Usability

Information can be visualized, queried, but not downloaded.

## EUS6. Water Information System for Europe (WISE)

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="https://water.europa.eu">https://water.europa.eu</a>	EEA	Climate, Water, Ocean	EU	Yes	Yes	Not directly	Yes	Yes

The Water Information System for Europe (WISE) is a partnership between the European Commission (DG Environment, Joint Research Centre and Eurostat) and the European Environment Agency.

WISE addresses several user groups:

- EU institutions as well as Member States national, regional and local administrations working in water policy development or implementation
- Professionals working in the water field from public or private organisations, with a technical interest on water
- Scientists working in the water field
- General public, including in this group those working in private or public entities not directly related to water policy but with an indirect interest in water (regular or sporadic)

WISE was launched for public use as a web-based service on 22 March (World Water Day) 2007 providing a web-portal entry to water related information ranging from inland waters (WISE FRESHWATER) to marine (WISE MARINE). The web-portal is now grouped into sections for EU water policies (directives, implementation reports and supporting activities,..), data and themes (reported datasets, interactive maps, statistics, indicators,..), modelling (now - and forecasting services across Europe..), projects and research (inventory for links to recently completed and ongoing water related projects and research activities..).

## **WISE FRESHWATER**

### **Accessibility**

The Water Data Centre, hosted at the European Environment Agency (EEA), provides a central access point to several web-services: interactive maps, data viewers, European datasets and indicators. These services are mostly based on reporting from countries as part of implementation of EU directives or via the Eionet framework ([www.eea.europa.eu/themes/water/dc](http://www.eea.europa.eu/themes/water/dc)).

The Water Statistics website, hosted at Eurostat, gives access to the results of the reporting from countries to the Eurostat/OECD Joint Questionnaire on Inland Waters:

[http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/main\\_tables](http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/main_tables),  
<http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/database>, and  
general explanations on:  
[http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Water\\_statistics](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_statistics)

Monitoring of pollutants campaigns. In addition to the reporting from countries, monitoring of pollutants released to surface waters or within the aquatic environment is conducted by JRC in cooperation with a network of laboratories:

<http://fate.jrc.ec.europa.eu/monitoring/monitoring-overview>

The thematic web page on water provides an overview and easy access to publications and data services as well as general information and illustrations on water topics:

<http://www.eea.europa.eu/themes/water>

### Usability

The portal has not a clear entry point for visualizing all the information contained. Most of the data is in tabular and statistical form, though could be easily shown geographically. A dashboard system will be really useful in this case.

## WISE MARINE

### Accessibility

WISE-Marine is a portal and infrastructure for sharing information with the marine community on the marine environment at European level. Focusing on the state of the marine environment at the European scale, WISE Marine shows the information and knowledge gathered or derived through the MSFD process and other key marine policy drivers. WISE-Marine fits in the landscape of existing Directive reporting and associated portals, European Data infrastructures and Regional Sea Convention's – all of which are heavily dependent on data and information coming from EU member states.

### Usability

The portal offers a map viewer where to gather all the information contained: <https://maps.eea.europa.eu/wab/wise-marine-map/>. From there, data can be viewed but not downloaded.

Data on MSFD can be searched in a search engine. Information is given per country, it can be consulted but not downloaded. It is shown in tabular form, though could be easily shown geographically. A dashboard system will be really useful in this case.

## EUS7. Biodiversity Information System for Europe (BISE)

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="https://biodiversity.europa.eu">https://biodiversity.europa.eu</a>	EEA	Biodiversity	EU	Yes	No	Not directly	Depends on the service	Depends on the service

The Biodiversity Information System for Europe (BISE) is a single entry point for data and information on biodiversity supporting the implementation of the EU strategy and the Aichi targets in Europe. Bringing together facts and figures on biodiversity and ecosystem services, it links to related policies, environmental data centres, assessments and research findings from various sources. It is being developed to strengthen the knowledge base in support of



the implementation of the EU biodiversity strategy and the assessment of progress in achieving the 2020 targets.

BISE is a partnership between the European Commission, DG Environment - Directorate B and the European Environment Agency, supporting the knowledge base for the implementation of the EU 2020 Biodiversity Strategy. It also serves as the Clearing House Mechanism for the EU within the context of the United Nations Convention on Biological Diversity (CBD) and as such it is supported by the collaboration of the European CHM network and the CBD Secretariat.

### **Accessibility**

BISE is a collaborative IT tool, building on operating systems at European level. It provides information at the European level in relation to the EU 2020 Biodiversity targets as well as under five entry points:

- Policy: policy, legislation and supporting activities related to the Common Implementation Framework of the EU strategy, pan- European and global policies
- Topics: state of species, habitats, ecosystems, genetic diversity, threats to biodiversity, impacts of biodiversity loss, evaluation of policy responses
- Data: data sources, statistics and maps related to land, water, soil, air, marine, agriculture, forestry, fisheries, tourism, energy, land use, transport
- Research: important EU-wide research projects related to biodiversity and ecosystem services, improving the science-policy interface
- Countries: links to information available from European countries and to the Biodiversity fact sheets for EU Member States
- Networks: links to Europe- wide networks supporting information sharing across national borders

The Biodiversity data centre (BDC) managed by the European Environment Agency (EEA) provides access to data and information on species, habitat types and sites of interest in Europe and to related products for biodiversity indicators and assessments. Priority is given to policy-relevant data and information for European and national institutions, professionals, researchers and the public.

### **Usability**

The portal offers a single entry point for the European biodiversity data but it doesn't offer a unique map browser where getting all these information, so usability depends on each product. Most of the data isn't available as an OGC service either exists an API to connect. Moreover, most of the data is only shown for visualization but no downloading is possible.

## **EUS8. EUROSTAT SDGs**

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URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://ec.europa.eu/eurostat/web/sdi">http://ec.europa.eu/eurostat/web/sdi</a>	Eurostat	ALL	EU	Yes	NO	No	No	Yes (SDMX)

The Sustainable Development Indicators allows Eurostat to monitor progress towards SDGs in an EU context with the EU SDG indicator set (<https://ec.europa.eu/eurostat/web/sdi/indicators>). These indicators can be viewed interactively on the indicator platforms and are available as national time series in zipped files.

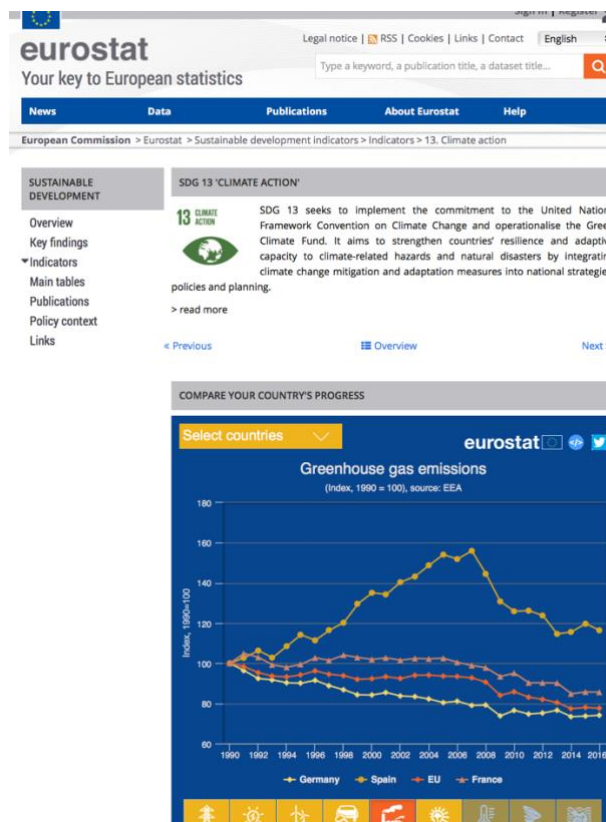


Figure 27. Eurostat EU SDG indicators on GHG emissions per countries

## Accessibility & Usability

The data is directly accessible as zipped files on the server as well as SDMX web services. SDMX is a standard (<https://sdmx.org>) for exchanging statistics data and metadata using web services.

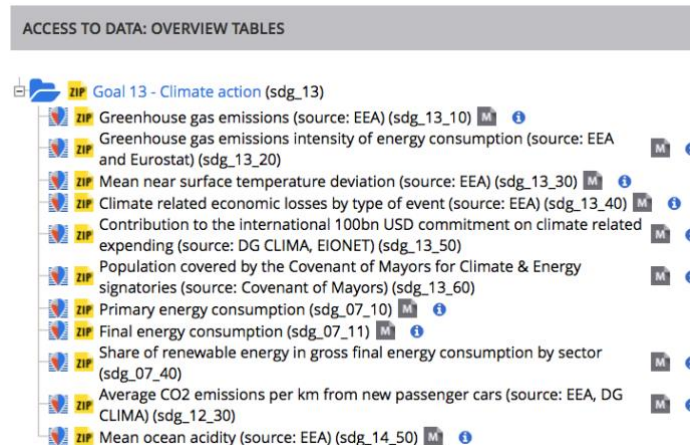


Figure 28. Eurostat EU SDG indicators on Climate action available as zip files

## Selected National Services

### NS1. Swiss Data Cube

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://www.swissatacube.org">http://www.swissatacube.org</a>	UNEP/GRID-Geneva	Not directly	CH	Not directly	No	No	??	??

The main objectives of the Swiss Data Cube (SDC) is to support the Swiss government for environmental monitoring and reporting and enable Swiss scientific institutions (e.g., Universities) to facilitate new insights and research using the SDC and to improve the knowledge on the Swiss environment using EO data.

#### Accessibility

**SDC Web Interface.** This allows users to explore the potential of the Data Cube technology and run different algorithms using a web-based graphical user interface. <http://sdc.unepgrid.ch>

- The SDC contains 5 years of Landsat Analysis Ready Data (1984, 1990, 2000, 2010, 2016) corresponding to more than 800 scenes, for the whole Switzerland.
- The SDC also includes continuous time series (2013-2016) of Landsat 8 Analysis Ready Data for the Western Switzerland area (Leman Lake).

**SDC Jupyter Notebook.** This Notebook allows to use the Data Cube Python API to develop tailored algorithms and applications. Compared to the web interface, this is for more advanced users and requires having an account to get access to it. <http://sdc.unepgrid.ch:8080/login>

## Usability

The SDC contains 33 years of Landsat 5, 7, 8 Analysis Ready Data (1984-2017) corresponding to more than 3300 scenes. A prototype platform is running and allows testing and visualizing several algorithms. Soon Sentinel 1 and 2 data will be available.

The SDC is powered by the Open Data Cube architecture. This is an open-source analytical framework that helps users organise and analyse large, standardised satellite data collections.

## NS2. Germany

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="https://code-de.org">https://code-de.org</a>	DLR		Germany	yes	planned	yes	yes	yes

The Copernicus Data and Exploitation Platform for Germany" - CODE-DE is the German national platform to explore, and access Sentinel data and Copernicus services for Germany. The data are free available for government, science and commercial use.

## Accessibility

*CODE.DE Web Interface.* This allows users to explore the data of Sentinel-1, Sentinel-2 and Sentinel at different processing level using a web-based graphical user interface.

- CODE.DE contains all available S1, S2, and S3 data for Germany and data for Europe for the last 12 months.

The data can be accessed also via API using the Copernicus Data-access and Exploitation platform for Germany (CODE-DE) - user tools (<https://github.com/dlr-eoc/code-de-tools>). For downloading data via the web platform or API an account is necessary.

## Usability

Information and data products are accessible through a web map viewer where several layers are shown. Furthermore tool can be applied on the data.

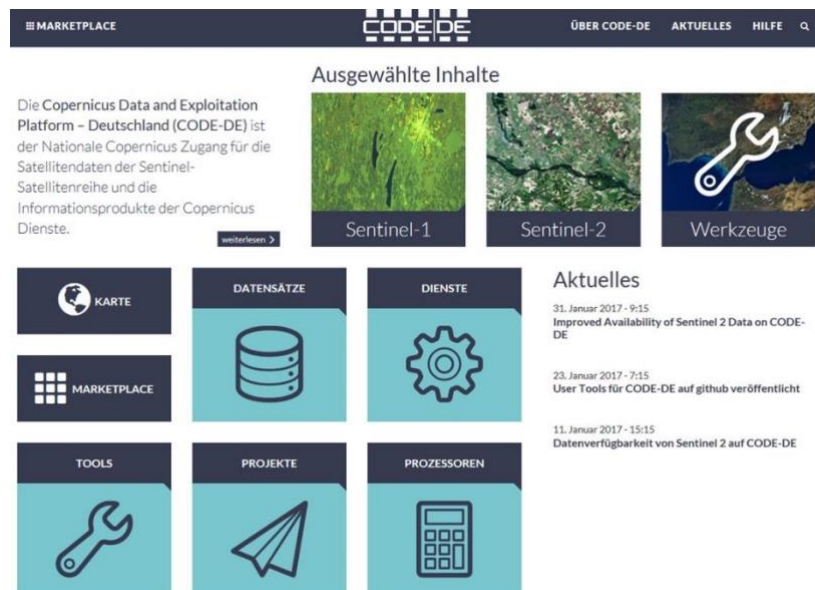


Figure 29: CODE.DE starting main page.

## NS3. Spain

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://datos.gob.es/es">http://datos.gob.es/es</a>	Spanish Government	Not directly	Spain	Not directly	?	Not directly	Yes	Yes

This is an initiative being promoted by the Spanish Ministry of Economy and Business, through the Public Corporate Entity Red.es, and in partnership with the Spanish Ministry of Territorial Policy and Public Function that was launched in 2009 to promote the open information culture in Spain. The objective is to provide a link between all those that form part of the data ecosystem:

- Users, citizens or professionals that demand the information.
- Public bodies that provide and use public information.
- Re-users and infomediaries that create products and services based on the data.

### Accessibility

The data catalogue includes 19691 datasets, organised in the following categories:

Environment (3928)	Culture and leisure (1184)	Healthcare (737)
Public sector (3727)	Treasury (1052)	Science and technology (650)
Society and welfare (2936)	Employment (1050)	Rural environment (523)
Economy (2606)	Tourism (862)	Security (503)
Demography (2225)	Transport (808)	Housing (482)
Education (1212)	Town planning and infrastructures (790)	Commerce (457)



Energy (449)

Legislation and justice  
(411)

Industry (257)  
Sport (232)

The available most popular formats are: CSV (9200), XLS (6148), JSON (5929), HTML (4985), and PDF (3910).

All datasets can be downloaded directly from the website.

## Usability

The service doesn't include a data viewer, but only a catalogue datasets can be queried, search and shared.

An API service is offered. The information available via the API can be obtained in different formats. The formats available are: json, xml, rdf, ttl y csv. JSON is the default response format; for example: if the following API resource is accessed via the browser <http://datos.gob.es/apidata/catalog/dataset>, the result will be shown in JSON format. All the information regarding the usability of this API service can be found at <http://datos.gob.es/en/accessible-apidata>.

Users can also configure their own queries using SPARQL language about the datos.gob.es RDF graphs. This is the most flexible and powerful option for querying the data catalogue. The datos.gob.es semantic database has two graphs:

- <http://datos.gob.es/catalogo>: this graph contains the entire Data Catalogue for datos.gob.es
- <http://datos.gob.es/nti>: has the URIs corresponding to the primary sector taxonomy and the identification of geographical coverage defined in Annexes IV and V of the Technical Interoperability Regulations on the Re-use of Information Resources (NTI)

The query results are obtained in different formats that can be processed automatically (csv, xml, rdf, json...) and re-used directly.

## NS4. Greece

Greece is strongly committed to the 2030 Agenda and its 17 SDGs. The SDGs form an ambitious and transformative framework as well as an element of the roadmap to exiting the crisis and a way to reshape economy, society and resources.

One of the first data service that was made available in Greece was the Hellenic National Meteorological Service (HNMS) maps, providing data on numerous climate variables. These services still exist, and are accompanied by the National Observatory of Athens (NOA) "Meteo View" platform. Data on climate variables for these services are mainly from ground stations. Furthermore, NOA has made important efforts to the creation of other data product services such as a fires Web Map Service (WMS), a solar energy WMS and a flood WMS. During the last years, Greece has also made important progress on the full digitalization of land-uses in land and sea, for controlling urbanisation and facilitating investments, leading to the creation

of services such as the National Cadastre & Mapping Agency's WMS and the Ministry of Rural Development and Food WMS. Home of 40% of the plant species and of 18% of the animal species of Europe's biodiversity, Greece is also working on the creation of a national service that will provide information on biodiversity variables. Specifically, efforts have been made by the Greek Biotope/Wetland Centre. Additionally, Greece is part of the European environment information and observation network (Eionet). Web mapping services also exist in the fields of renewable energy (by the Regulatory Authority for Energy), soil data (by the Institute of Industrial and Forage Crops) and water resources (by the Institute of Geology and Mineral Exploration).

### **Hellenic National Meteorological Service (HNMS)**

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://stratus.meteo.noa.gr/front">http://stratus.meteo.noa.gr/front</a>	NOA	Directly	Greece	Not directly	No	No	No	??

One example of Greek national services, providing data on Essential Climate Variables, is the Hellenic National Meteorological Service (HNMS) maps. The platform is a web Geographic Information System (GIS) tool created and hosted by the "Meteo" weather service ([www.meteo.gr](http://www.meteo.gr)). It has been developed for monitoring and analysis of the meteorological stations network set up by Meteo, the Institute of Environmental Research and Sustainable Development (IERSD) and NOA. It offers live and historical data which are updated once or twice a year.

### **Accessibility**

"Meteo View" provides free data for citizens. Users can access the data or products from the maps portal (<http://stratus.meteo.noa.gr/>), where they can choose which WMS to access between:

- Stations' live data and database (with variables such as Temperature, Humidity, Barometer, Dew Point, Rain Rate, Wind Speed and Direction, Solar Radiation and UV Index).
- Now-casting reports for Greece.
- Attica's live meteorological conditions.
- Lightning strikes live monitoring.
- Convective Rainfall Rate monitoring.
- Precipitation Probability Level.
- Swimming conditions on Greek beaches.
- Wildfires live monitoring.
- Weather events with socio-economic impact.
- Average lightning strikes.

### **Usability**



- Lakes, river and coastal zones
- Nitrate polluted areas
- NATURA 2000 areas
- etc.

## Usability

Users can pan on the map layer and choose specific land elements, search by Regions, Regional Units, Municipality and Toponyms, or they can browse by ILOT or LPIS number. The background layer can be either aerial orthoimages from 1998, Quickbird or IKONOS images from 2008 or recent cadastral orthoimages. Furthermore, users can select which vector layers they wish to display such as ILOTS, SUBILOTS, GAEC, LPIS and Ecological Sensitive Areas. For a specific element chosen, users can view information displayed as vector attributes. There is also the possibility of generating basic statistics (ex. Percentage of cover type) for each element.

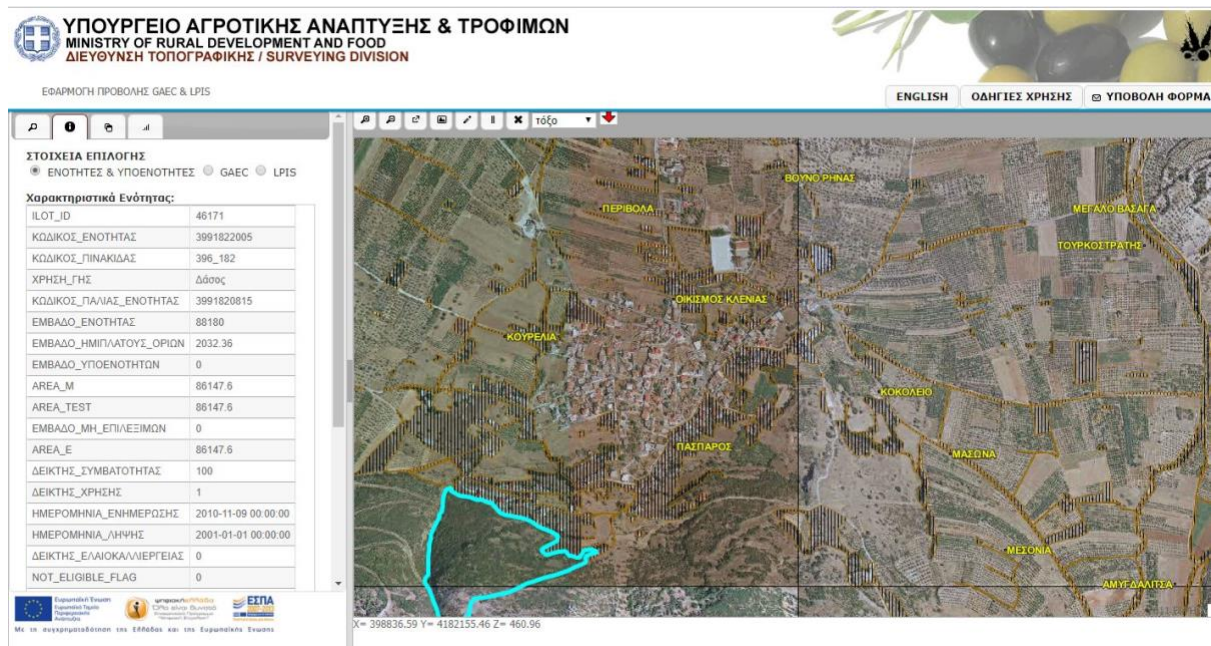


Figure 31. Information displayed as vector attributes for a specific land element, in the GAEC & LPIS Web portal.

## References

[http://www.hnms.gr/emy/en/index\\_html](http://www.hnms.gr/emy/en/index_html)  
<http://stratus.meteo.noa.gr/front>  
<http://195.251.203.238/seviri/>  
<http://beyond-eocenter.eu/solarapp/>  
<http://195.251.203.238/floodhubweb/>  
[http://www.ktimanet.gr/CitizenWebApp/Entrance\\_Page.aspx](http://www.ktimanet.gr/CitizenWebApp/Entrance_Page.aspx)  
[http://gaec.topographiki.gr/gaec\\_web/#](http://gaec.topographiki.gr/gaec_web/#)  
<http://ekbygis.biodiversity-info.gr/map/>  
<https://www.eionet.europa.eu/countries/greece>



<http://www.rae.gr/geo/>  
[http://qgiscloud.com/tsitalex/Soil\\_data/](http://qgiscloud.com/tsitalex/Soil_data/)  
<http://www.igme.gr/geoportal/>

## NS5. Austria Open Data Portal

URL	Responsible	Related to EVs	Extent	Related to SDGs	Included in GEOSS	Copernicus service related	API available	OGC services
<a href="http://www.umweltbundesamt.at/umweltsituation/umweltinfo/opendata/">http://www.umweltbundesamt.at/umweltsituation/umweltinfo/opendata/</a>	umweltbundesamt	Yes	Austria	Yes	No	Yes	No	No

### Accessibility

The aim is to make environmental data for Austria open and freely available. Personal data is not included in these datasets. Data is available for download via url. Meta-data is included.

### Usability

The data is not particularly user-friendly. It covers only the topics of nature protection, land cover and air quality. All the data is stored separately, either at individual urls, or specific data portals. Much of the data is old and static, with no clear information on when or if it will be updated.

## Conclusions

Some conclusions from the services analysed in the previous section are shown below. It has to be said that the report done here is not a comprehensive list of the existing services, but has been done from the standpoint of the GEOEssential partners and from an internet and publication research. For this reason, it is possible that we have omitted some important services. In this case, we suggest the reader, to upload the google spreadsheet created for this purpose with other content which might be relevant to this deliverable:

<https://docs.google.com/spreadsheets/d/1xerrUEZwBWpPyYsYOtk3iWCU2XJJ-z48WVR4mzu3GsM/edit?usp=sharing>

From the 30 services described, only 8 are known to be included in the GEOSS Dab and hence accessible via the GEOPortal tool (Figure 32). Most of these services are somehow related to SDGs (24/30), see Figure 33, and regarding EVs, 19/30 services are directly related to EVs while 8/30 of the services contain data that can be used to derive some (Figure 34) EVs. Finally, 14/30 of the services analysed are from a global extent and 8/30 are from European extent, see Figure 35.



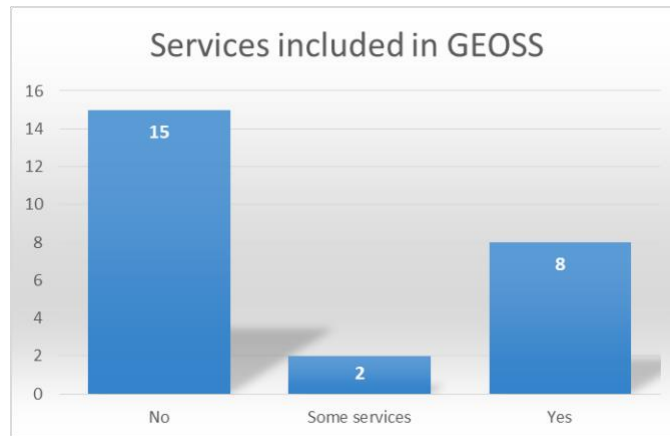


Figure 32. Number of services included in GEOSS



Figure 33. Number of services related to SDGs

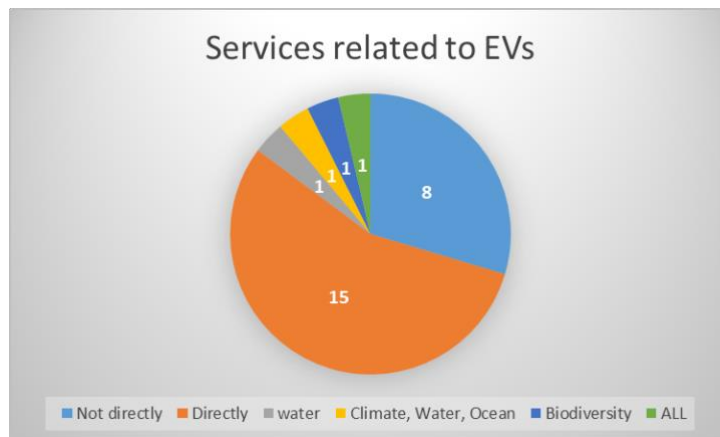
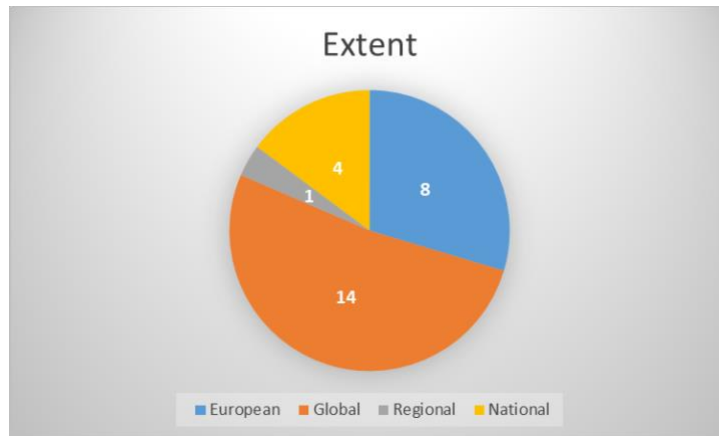


Figure 34. Number of services related to EVs



*Figure 35. Extent of the services analysed*

Services have been analysed in terms of usability and accessibility. In this sense, most of the services are easy to access and data is well shown and visualized. However, downloading the data is not always offered, although having the raw data is of critical importance when using data to derive indicators and EVs. This should be overcome, especially when the data is offered by a “public” organisation.