ORCaSa
Because soil carbon matters

User sketches - List of existing resources

Deliverable 5.2

Document Information

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History

Date	Version	Submitted by	Reviewed by
29/08/2023	N°1	Emilie Vrot	Julien Demenois, Carla Biscotti, Mathieu Nogues, Suzanne Reynders

The ORCaSa project has received funding from the Horizon Europe Programme under grant agreement n° 101059863.

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Abbreviations and acronyms

Acronym	Description
PU	Public
MRV	Measurement, Reporting, Verification
SOC	Soil Organic Carbon

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Introduction

The following document outlines the knowledge platform user sketches and list of existing resources for the ORCaSa project. CIRAD is responsible of this deliverable. The due date is set on month 12 (August 2023).

As a reminder of the user specifications document (milestone 3 of task 5.1), the platform will contain the following modules:

- **Map layers/Geospatial information (previously named "Map4C"):** Mapping to increase transparency on historical, current and future trends of soil carbon stocks;

- **Scientific evidence (previously named "Review4C"):** Reviewing evidence-based knowledge to monitor and measure the impact of practices on soil carbon and align research efforts;

- **Practices (previously named "Practices4C"):** Sharing land-management practices to manage soil carbon;

- **Network (previously named "Network4C"):** Sharing networks to boost collaborations, sharing relevant research activities and projects identified in WP3;

- **Datasets (previously named "Data"):** Sharing data to increase re-use of existing data on soil carbon and boost open scientific collaboration and to contribute to WP4 MRV (Measurement Reporting and Verification) framework.

The purpose of this deliverable is to work on the user sketches (prototypes) of the knowledge platform and to determine, for each module, which existing resources will be reused. To ease the reading of this document, we have chosen to make a presentation module by module (both the user sketches and the existing resources reused for each module).

All our work has been conducted in compliance with the GDPR and ethics requirements (WP7) and the Data Management Plan (D5.1).

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General note: This version of the user sketches is not the final one. As we are working in an Agile mode, it is continuously being improved. The main functionalities are presented on the sketches. Yet they can evolve regarding the platform's name, its design, the wording and functional improvements during the development phase.

1. Homepage

The idea on the homepage is to highlight the 5 main functionalities of the platform as well as showing the international scope of the platform with the map in the background. Each block is reusing the color of the ORCaSa logo. Overall, the platform reuses the colors and typo of the ORCaSa website (ORCaSa Home - ORCaSa (irc-orcasa.eu)).

Figure 1 – User sketches: Homepage

2. Map layers/ Geospatial information

2.1 User sketches

Five main categories are displayed as layers, as well as high-resolution maps resulting from the work of the WP4 on MRV:

- **Soil Carbon**: current, past and future SOC stocks, SOC change, Uncertainty maps for SOC / Sequestration
- **Soil properties**: soil classes and clay contents
- **Land use / Land cover**: grasslands, croplands, wetlands, urban growth, forest, forest loss and forest gain
- **Biophysical properties:** high resolution net ecosystem productivity, high resolution crop biomass, high resolution C budget map for cropland
- **Climate** (to be confirmed during development phase)

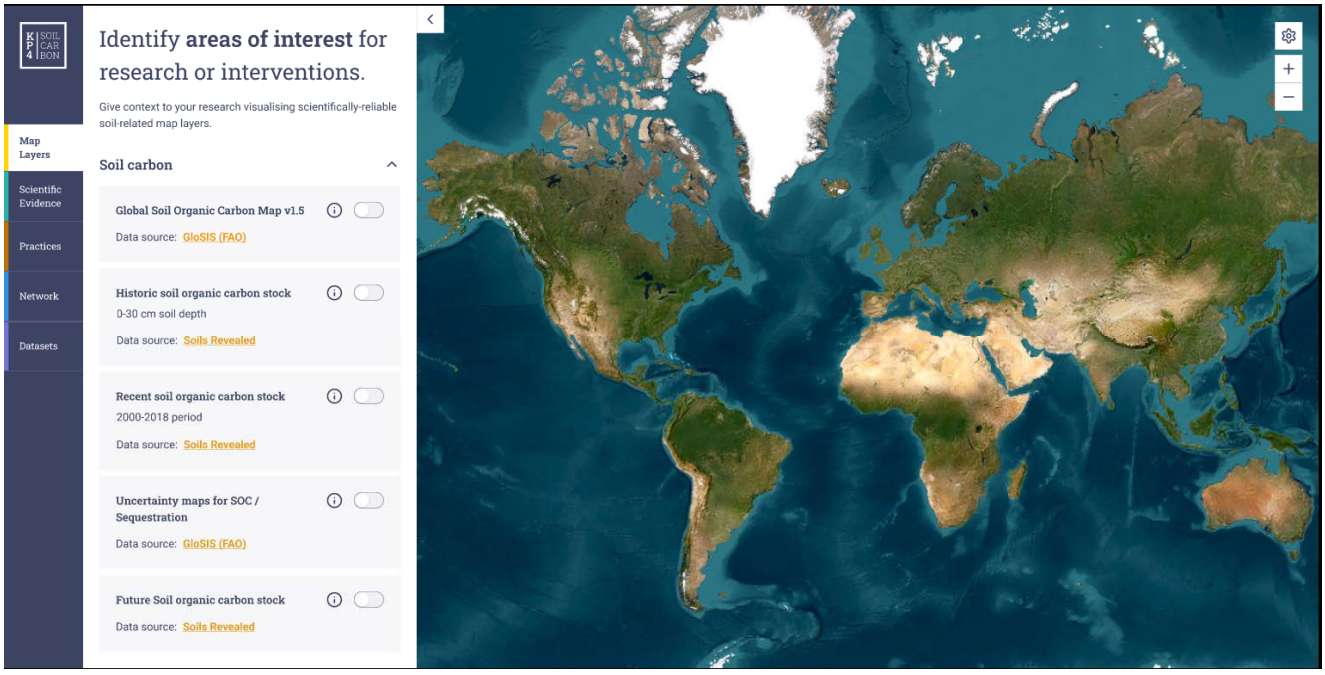

Figure 2 – User sketches: Map layers/Geospatial information

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2.2 Existing resources reused

Map layers		
Category	**Layer**	**Pre-selected sources** *(might change during implementation aiming improvement)*
Soil Carbon	Current SOC stock	GloSIS
	Past SOC stock	SoilsRevealed
	Future SOC stock	SoilsRevealed
	SOC change	SoilsRevealed
	Uncertainty maps for SOC / Sequestration	GloSIS for Current SOC stock / SoilsRelevealed for Future SOC stocks
Soil properties	Soil classes	SoilsGrids
	Clay content	SoilsGrids
Land use / Land cover	Grasslands	SoilsRevealed or FAO
	Croplands	SoilsRevealed or FAO
	Wetlands	SoilsRevealed or FAO
	Urban growth	SoilsRevealed
	Forest	Global Forest Watch (GFW): layer "Couvert terrestre"
	Forest loss	Global Forest Watch (GFW): layer "Perte de la couverture arborée"
	Forest gain	Global Forest Watch (GFW): layer "Gain de couvert forestier"
Biophysical properties	High resolution Net Ecosystem Productivity (i.e. net annual CO2 flux) for cropland	*No existing source. Will be produced by the project members.*
	High resolution crop Biomass	*No existing source. Will be produced by the project members.*
	High resolution C budget map for cropland (doing hypothesis on farm management i.e. organic amendments/straw management)	*No existing source. Will be produced by the project members.*
Climate	To be defined (e.g., soil moisture of the surface and in the root zone, rainfall, temperature / rain variance, water availability / droughts, carbon emissions...)	ERA5-Land

Table 1 – Existing resources: Map layers/Geospatial information

Description of the selected existing sources:

Soils Revealed: This site is presented with a world map that can display different layers, including carbon stocks but also the agricultural soil cover and its risk of erosion, the population and tree carbon biomass. Soils Revealed allows to see the evolution during time (past, present and future). The spatial resolution is 250 m for future scenarios and current data. Data are estimated based on the IPCC method. SoilsRevealed presents data up to 2018. Founder and partners: The Nature Conservancy; Cornell University, ISRIC, Woodwell Climate research Center. https://soilsrevealed.org

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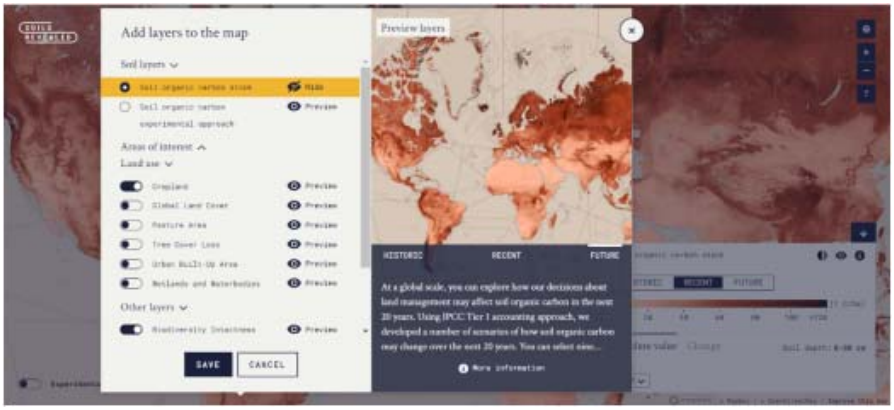
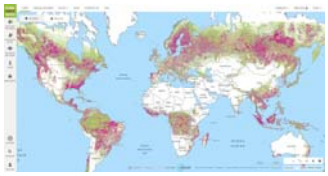


Figure 3 – Existing resource: Soils Revealed

SoilGrids: created by ISRIC, it combines database and geo maps and provides access to the chemical and physical properties of soils as well as their classes of soils. The site lists approximately 83,000 soil profiles in the Americas, 42,000 in Oceania, 36,000 in Europe, 25,000 in Africa, 8,000 in Asia and 5 in Antarctica. https://soilgrids.org



Global Forest Watch (an initiative of the World Resources Institute): is a dynamic online forest monitoring system designed to enable better management and conservation. Global Forest Watch allows to measure and visualise changes to the world's forests; users can synthesise data from over the past decade or receive alerts about possible new threats in near-real-time. The map allows to display several layers of data on top of each other. One layer is related to the density of soil organic carbon from 0 to 30 cm deep with a 30 m spatial resolution (source: SoilGrids database). Launched in 2014, it's now used by corporations, non-profits, governments, and indigenous groups for applications as diverse as protecting against illegal logging and ensuring supply chain transparency. https://www.globalforestwatch.org

GloSIS, the Global Soil Information System of the FAO Global Soil Partnership is a one-stop-shop for global soil information and data. GloSIS is a platform created to provide easy access to dynamic soil resource information as a federated, country-driven and globally harmonised Global Soil Information System. The development of GloSIS is overseen by the International Network of Soil Information Institutions (INSII) and the system is being populated by data provided by INSII members. GloSIS represents a stepping stone in the assessment of soil resources to guide effective and knowledge-based policymaking to combat land degradation.

https://data.apps.fao.org/glosis/?share=f-6756da2a-5c1d-4ac9-9b94-297d1f105e83

Era5-Land provides a consistent view of the water and energy cycles at surface level during several decades. It contains a detailed record from 1950 onwards, with a temporal resolution of 1 hour. The native spatial resolution of the ERA5-Land reanalysis dataset is 9km on a reduced Gaussian grid (TCo1279). The data in the CDS has been regridded to a regular lat-lon grid of 0.1x0.1 degrees. The temporal resolution is monthly. They are distributed operationally by the Copernicus service and produced by ECMWF (Europe).

https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-land-monthly-means?tab=overview

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3. Scientific evidence

3.1 User sketches

Scientific evidence module allows users to have an updated science-based picture on soil organic carbon. It simply presents the results of a comprehensive qualitative and quantitate analysis of more than 10,000 scientific papers used in meta-analysis on soil carbon, from 1900 to 2022. It can be used by a scientific or non-scientific public.

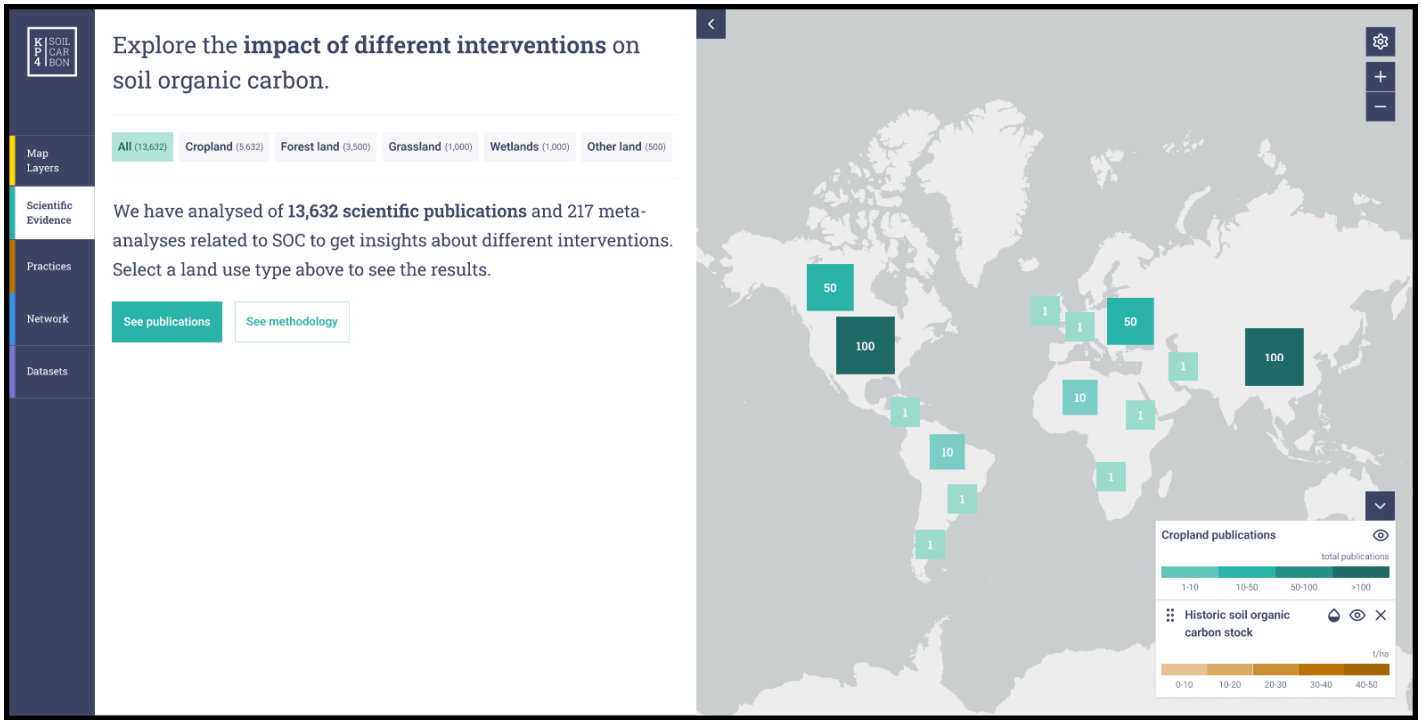

Figure 4 – User sketches: Scientific evidence

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Users can filter their research based on land-use type (Cropland, Forestland, Grassland, Wetland, Other land, and Land use change) and intervention type (land use change, climate change and management). Publications are also geolocalized at country-scale.

This module helps users understand the effect that the different types of interventions have on soil carbon.

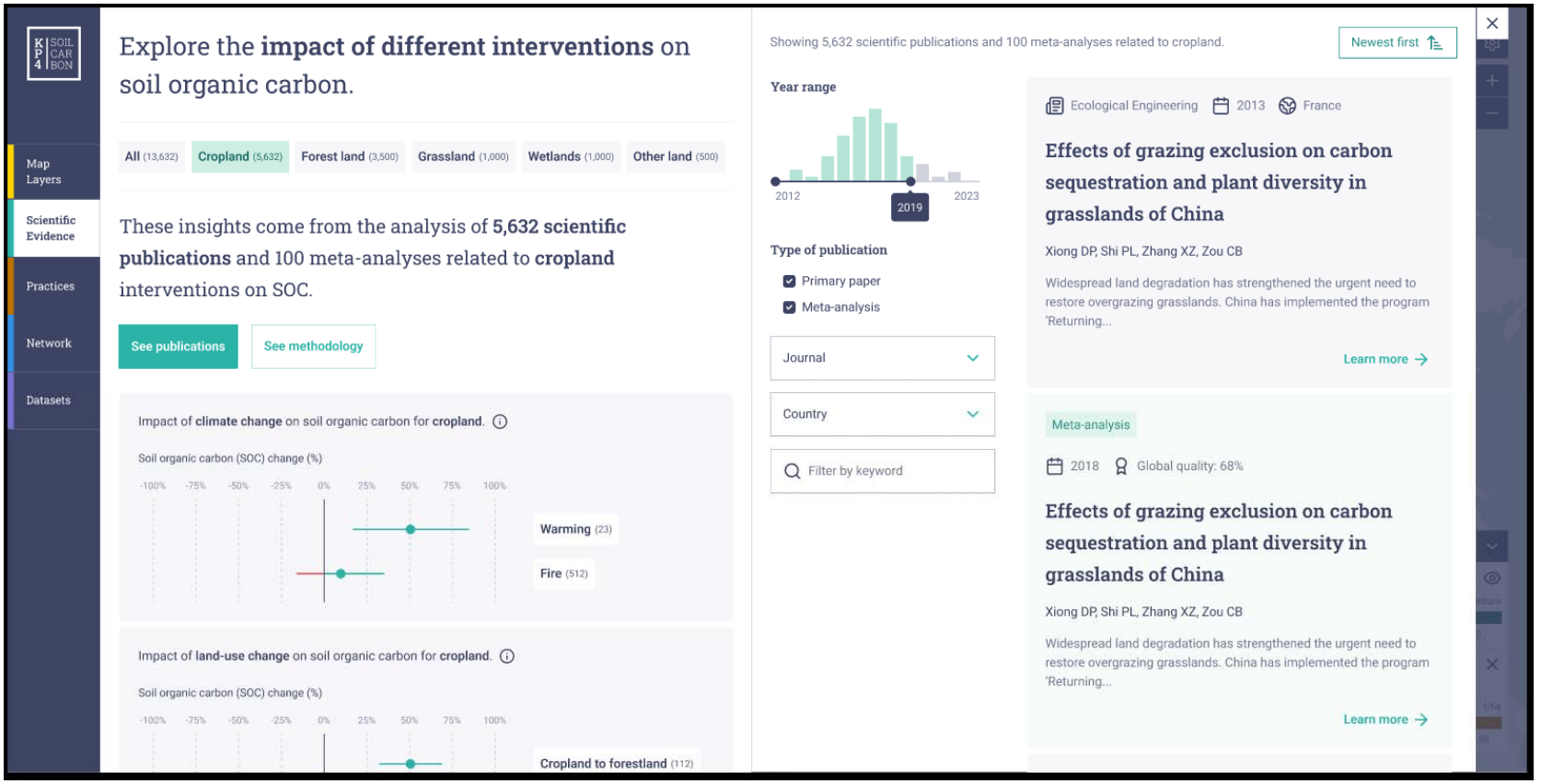

Figure 5 – User sketches: Scientific evidence - Analysis

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3.2 Existing databases reused

A string search based on keywords is done in various databases (described below). In these databases, relevant papers are identified (based on their scope, accessibility and the fact that there are meta-analysis).

The **Web of Science (WoS) Core Collection database** is a selective citation index of scientific and scholarly publishing covering journals, proceedings, books, and data compilations. It is a paid-access platform that provides access to multiple databases that provide reference and citation data from academic journals, conference proceedings, and other documents in various academic disciplines. Until 1997, it was originally produced by the Institute for Scientific Information. It is currently owned by Clarivate.

Scopus is Elsevier's abstract and citation database launched in 2004. Scopus covers nearly 36,377 titles (22,794 active titles and 13,583 inactive titles) from approximately 11,678 publishers, of which 34,346 are peer-reviewed journals in top-level subject fields: life sciences, social sciences, physical sciences and health sciences. It covers three types of sources: book series, journals, and trade journals. All journals covered in the Scopus database are reviewed for sufficiently high quality each year according to four types of numerical quality measure for each title; those are h-Index, CiteScore, SJR (SCImago Journal Rank) and SNIP (source normalized impact per paper). https://www.scopus.com/home.uri

Ovid delivers thousands of full-text journal articles, eBooks, database resources and workflow tools in a single integrated solution. https://ovidsp.ovid.com

Google Scholar is a freely accessible web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines. Released in beta in November 2004, the Google Scholar index includes peer-reviewed online academic journals and books, conference papers, theses and dissertations, preprints, abstracts, technical reports, and other scholarly literature, including court opinions and patents. https://scholar.google.com

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4. Network

4.1 User sketches

This collaboration module will display a directory. The idea behind is to list a comprehensive view of the stakeholders around a scientific project, or an initiative to better understand "who does what".

Network will display:

- Projects/Actions/initiatives: scientific project, official entities from UN, consortium of different companies, public-private partnership, and maybe also living labs, long term experiments, and flow measurement sites.
- Organisations: research institutes, funding agencies, and other organizations (such as companies, associations, NGO, etc.) that will use monitoring methods, practices, research results displayed on the platform.

The module is presented as a search engine of organisations and projects with filters of results and a search by keywords. When the user clicks on a result, it displays a geographical mapping of the network.

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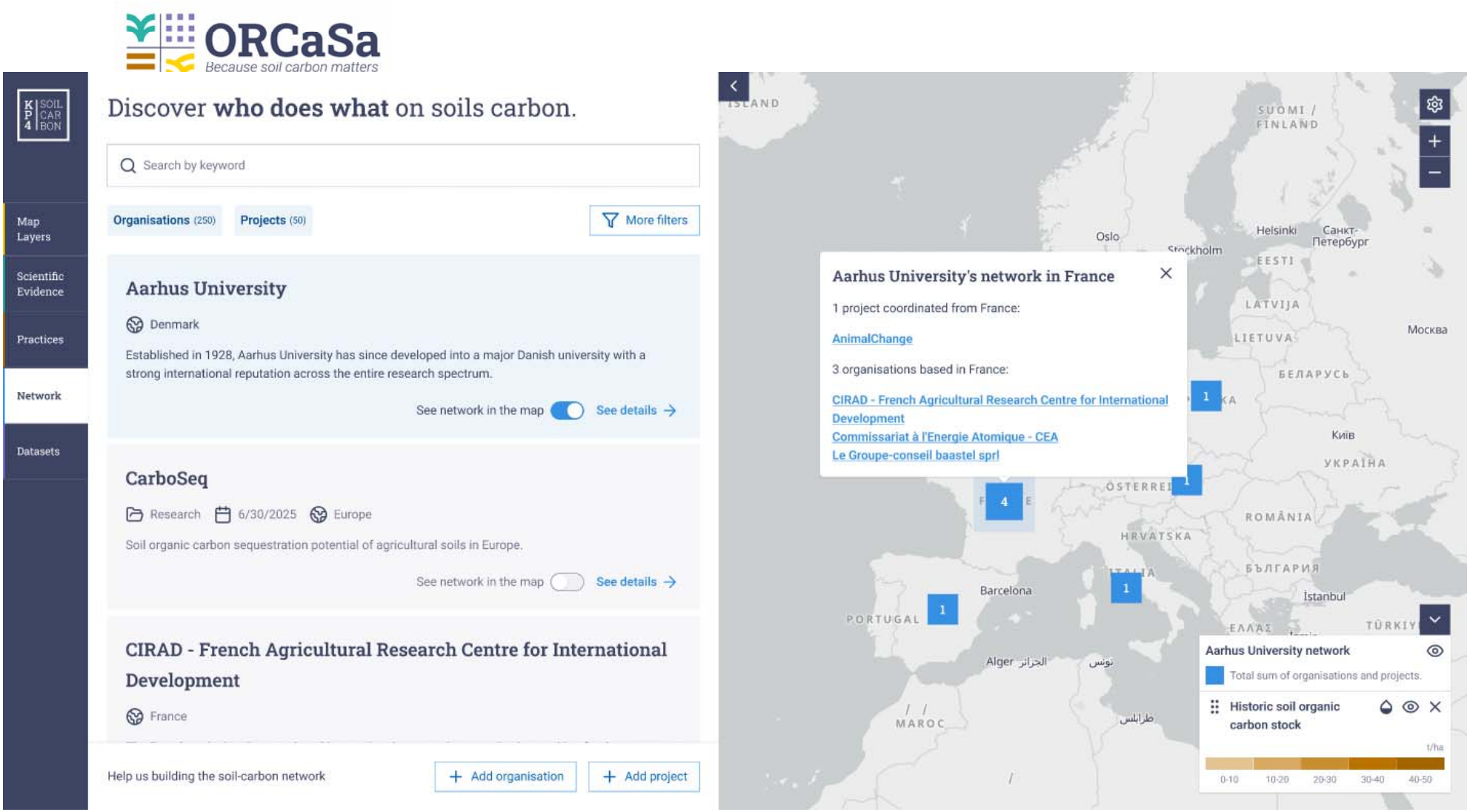

Figure 6 – User sketches: Network – Search engine and relational mapping

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When the user clicks on a result, the complete file of the entity is displayed, with its relation to other organisations and/or projects.

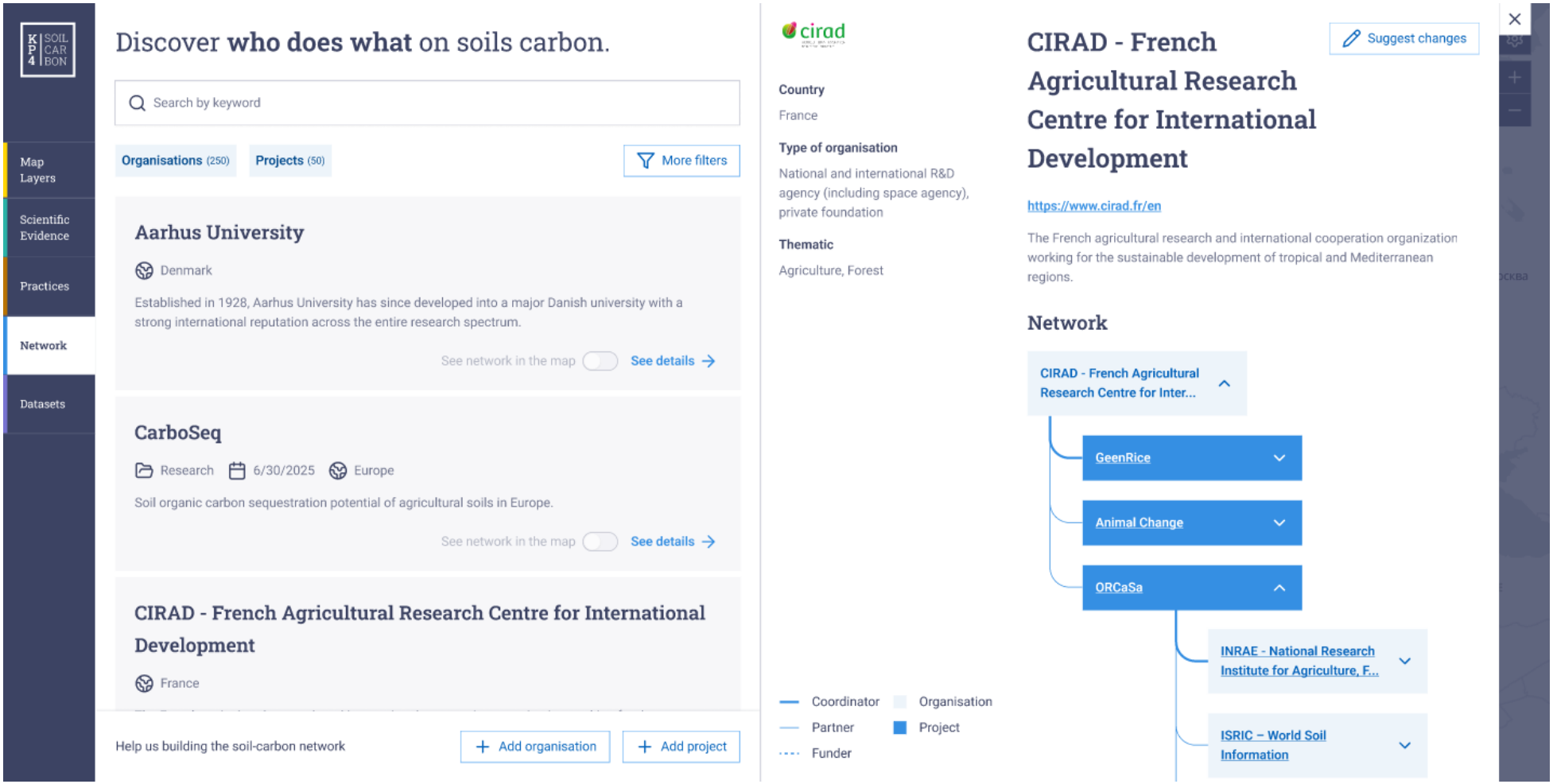

Figure 7 – User sketches: Network – Detailed file of an organisation

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The relational mapping allows users to navigate through the relationships of referenced entities in the network (organisations and projects). It works in the same way as a geographical mapping. A click in the entity opens the complete file of the entity and the other organisations or projects with which it is in relation. Users may have access to a global relational mapping of all the organisations and projects registered. They can also use filters to refine the relational mapping on criteria that are of interest to us (location, type of organisation, thematic, etc.).

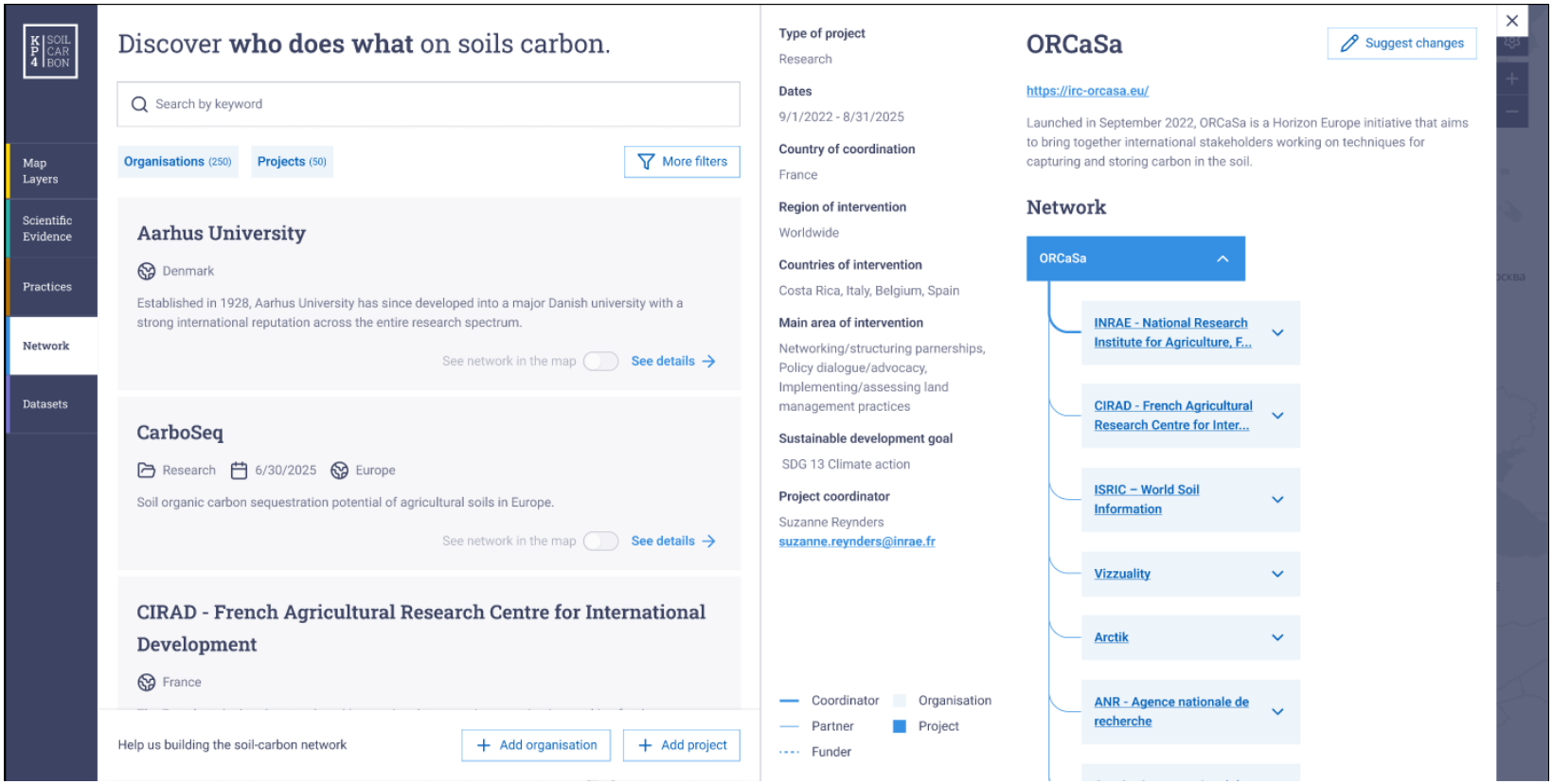

Figure 8 – User sketches: Network – Detailed file of a project

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On the platform, a form will be accessible by users to register/edit an organisation or a project. This form will be simple and ergonomic to use for a non-technical profile. A user can create several entities (entity = organisation or project). Each time an organisation or a project will be created or edited, a validation is asked to the future functional administrator of the platform that can accept, edit or refuse what has been created/modified.

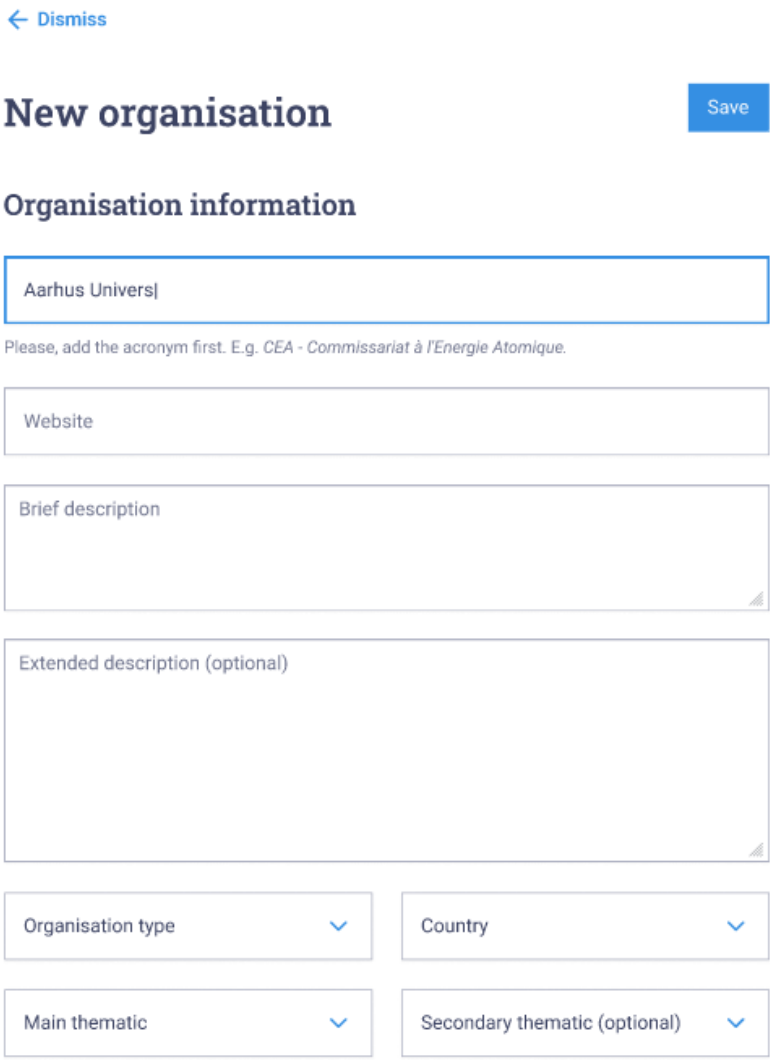

Figure 9 – User sketches: Network – Creation form of an organisation

4.2 Existing resources reused

No existing resources will be used. Data will be provided by WP3 results and the project team. Data will be updated continuously by the users of the platform.

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5. Practices

5.1 User sketches

Users are able to quickly display a list of prefiltered practices from recognized sources. On the map, users visualize the countries of application of the practices.

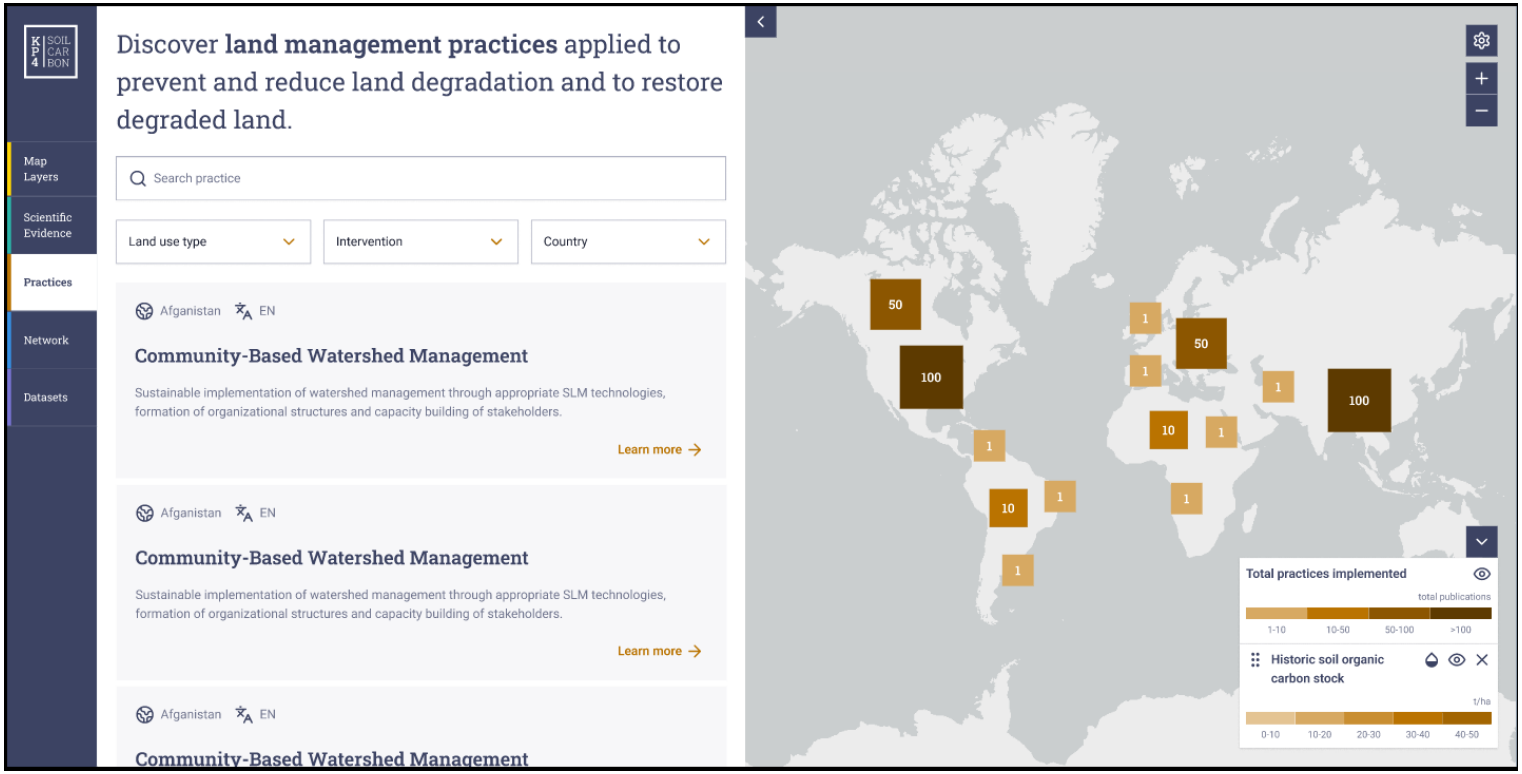

Figure 10 – User sketches: Practices module

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These practices will be prefiltered through text-mining, based on a machine learning approach. List of interventions from Scientific evidence module will be the identifier used to select the practices in the sources. Users will also be able to make a search by keyword, land-use type, interventions or country.

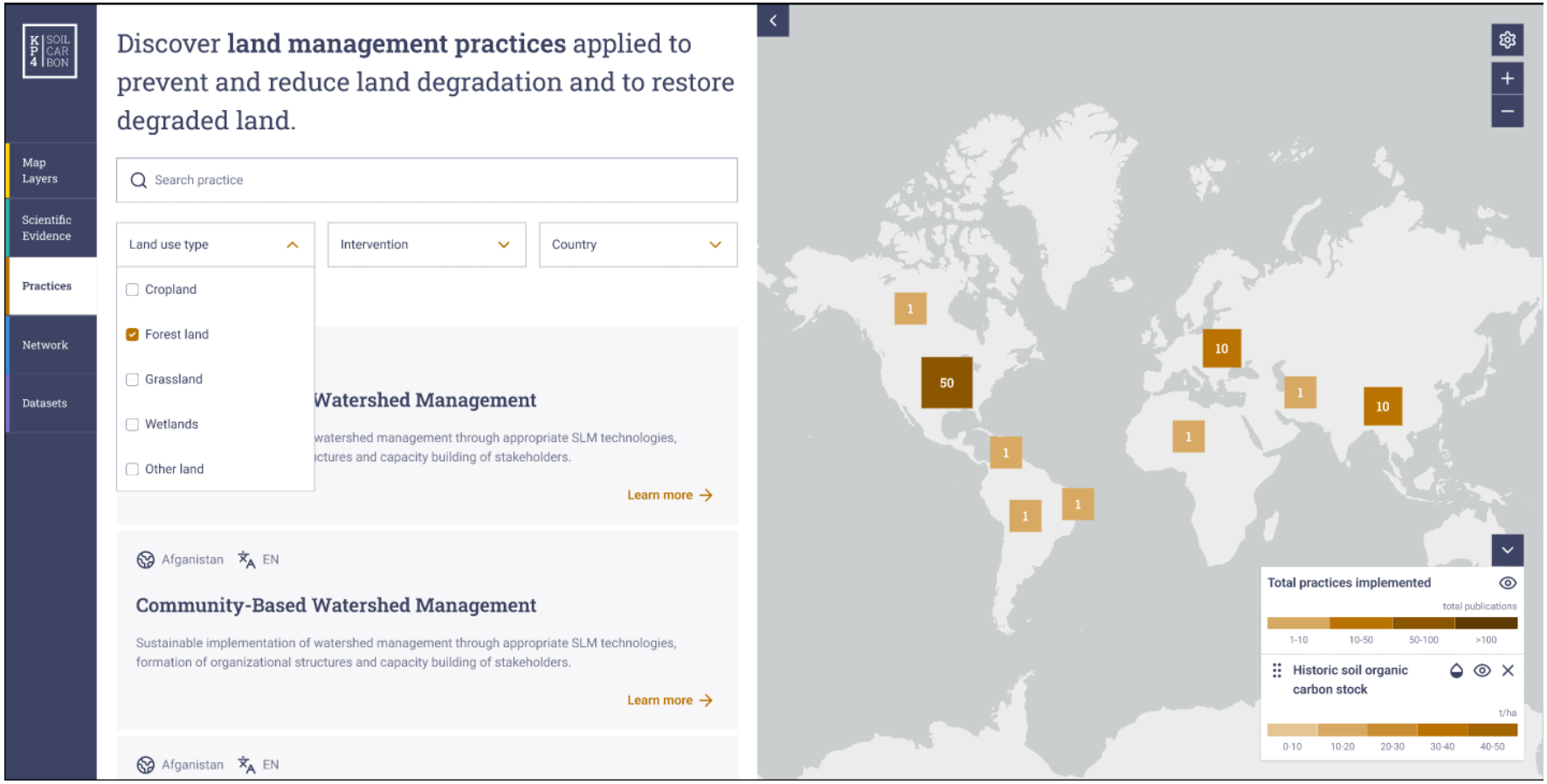

Figure 11 – User sketches: Practices filters

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In the details section, key information related to the practice is displayed: date, language, institution, implementation and impacts.

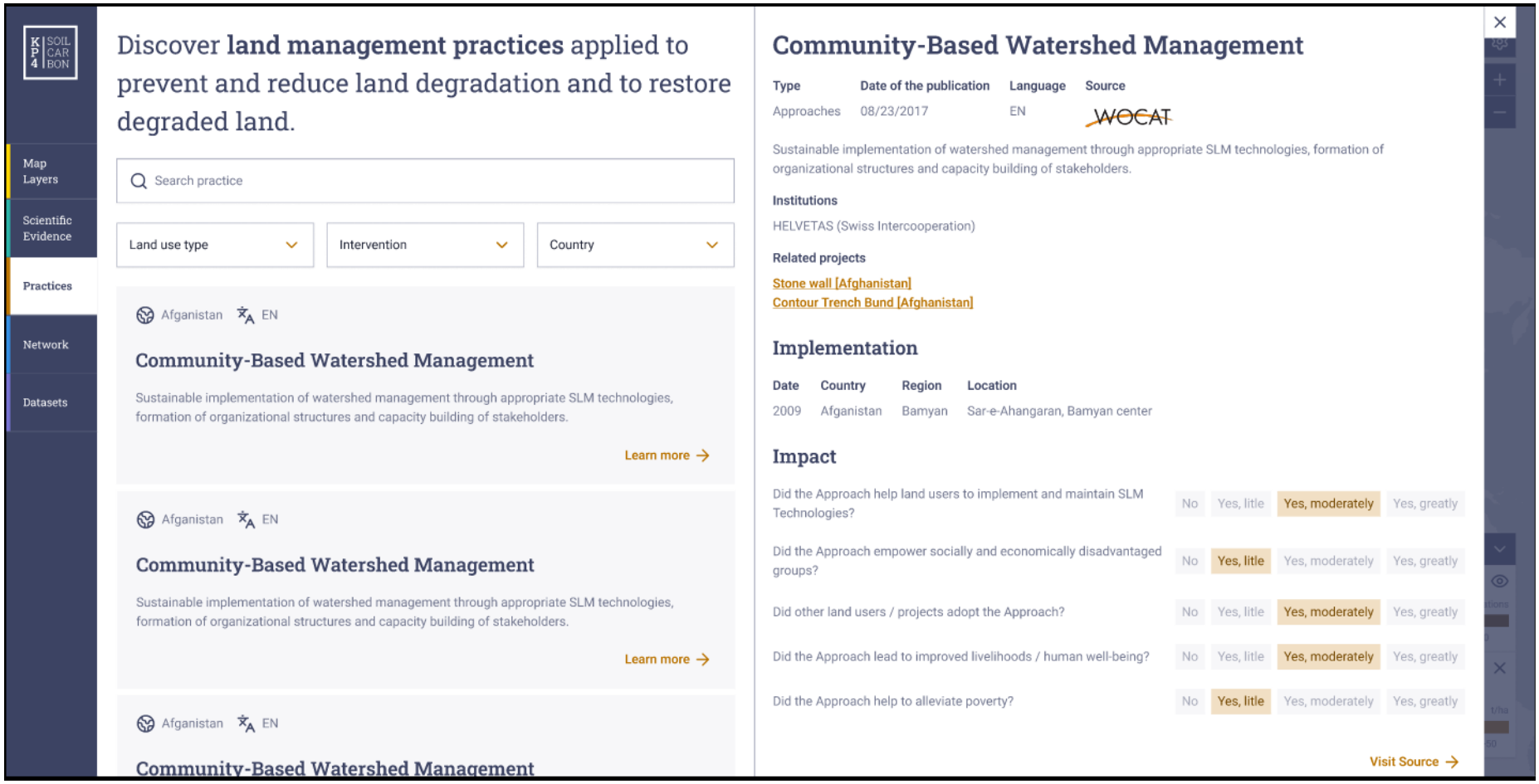

Figure 12 – User sketches: Practices details

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5.2 Existing resources reused

Two sources have been selected:

WOCAT is a global network on Sustainable Land Management (SLM). It has developed a platform for sharing experiences, knowledge, and technologies, based on SLM. The purpose of the site is to compile, document, evaluate, share, and disseminate knowledge on SLM. In the SLM database, there are about 86 articles concerning the soil conservation. Many countries are concerned in Asia, Europe, and Africa. WOCAT has been officially recognised by the UNCCD as the primary recommended Global Database for SLM best practices. https://www.wocat.net/en/global-slm-database

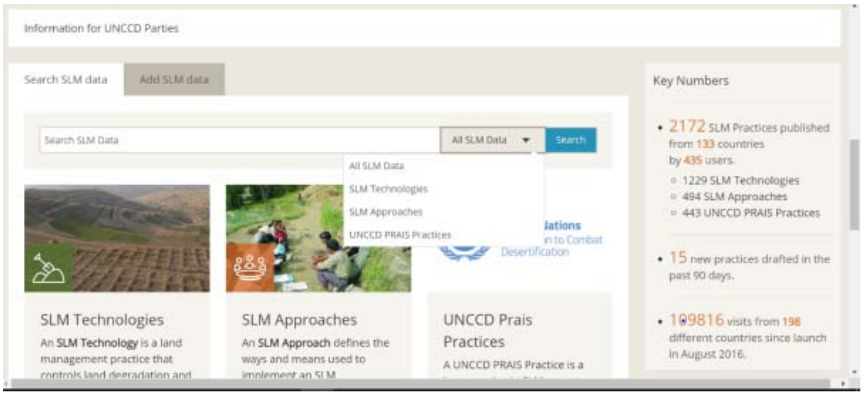

Figure 13 – Existing resource: Database of articles related to sustainable land management

FAO Agroecology Knowledge Hub: this web-based platform aims to highlight and share relevant knowledge on agroecology. A database provides a starting point to organize the existing knowledge on agroecology, collecting articles, videos, case studies, books, and other important material in one place. The objective is to support policy-makers, farmers, researchers and other relevant stakeholders through knowledge exchange and knowledge transfer. The database is a 'living process' that is constantly being updated.

Knowledge | Agroecology Knowledge Hub | Food and Agriculture Organization of the United Nations (fao.org)

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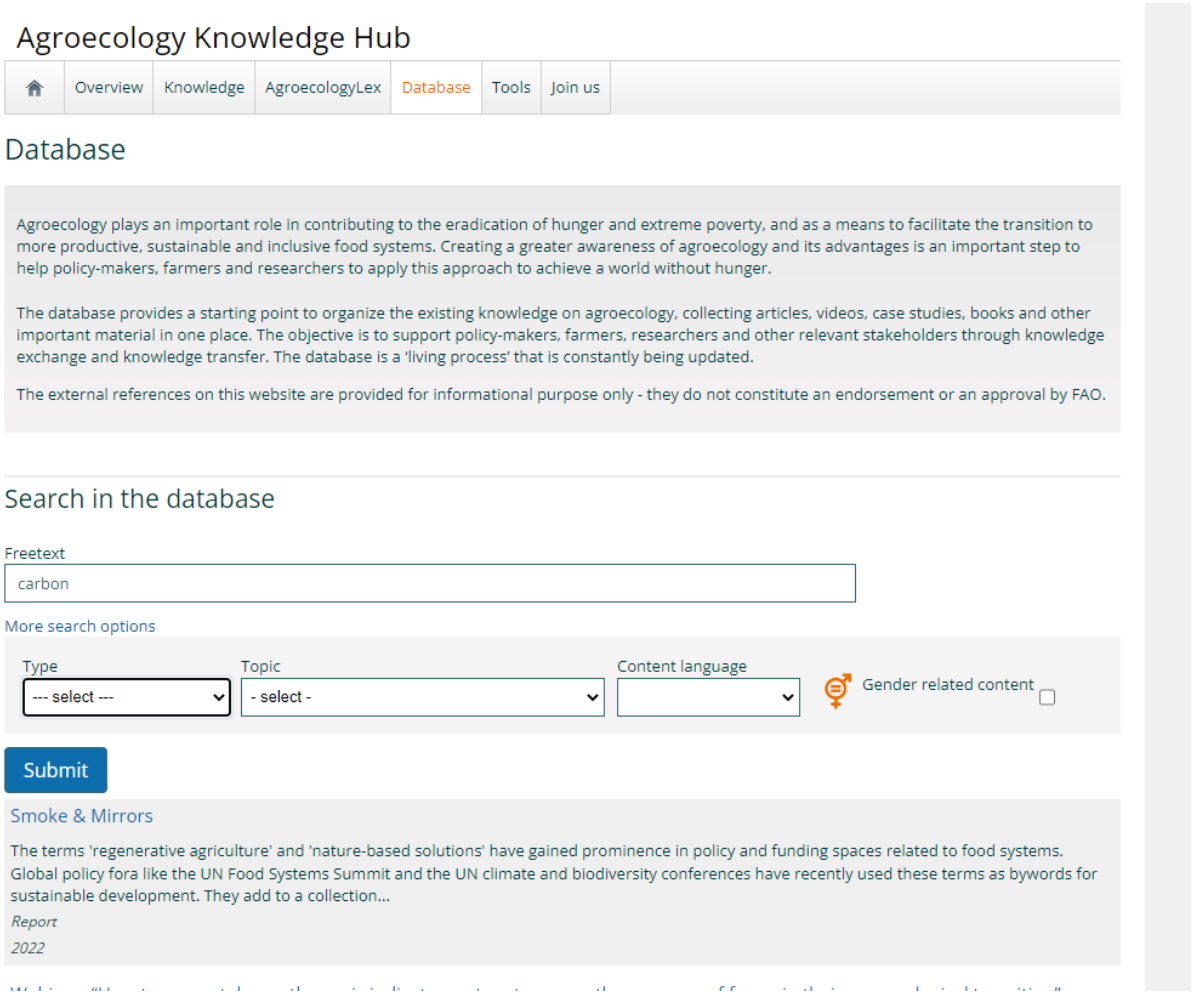

Figure 14 – Existing resource: Database of the FAO

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6. Datasets

6.1 User sketches

Datasets give user the ability to have a quick and easy access to different datasets on soil organic carbon, all at the same place. Results are sorted by date and can be filtered by source (name of the source), date, and keywords. Results show the title of the dataset, the publication date, the source, the authors, the DOI, and a short description.

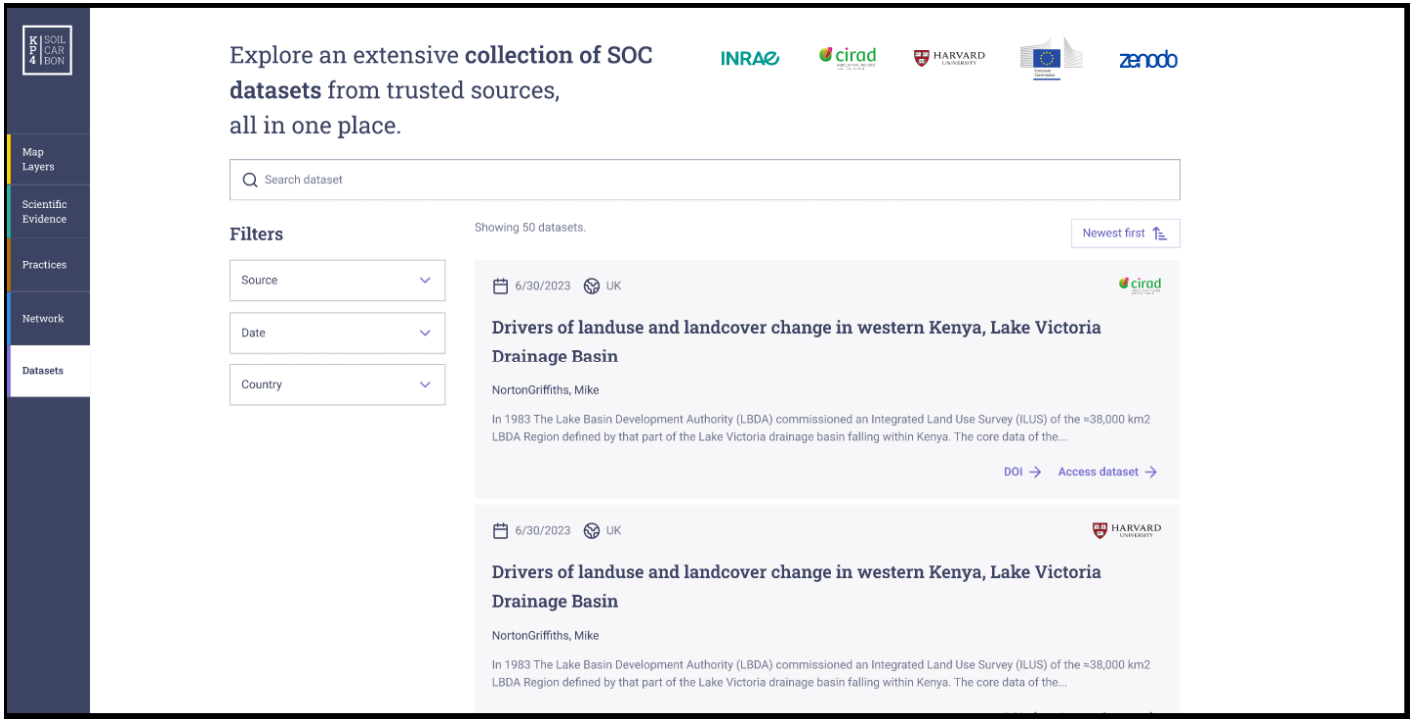

Figure 15 – User sketches: Datasets

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6.2 Existing databases reused

INRAE dataverse: Data INRAE's institutional collection hosts data produced by or in collaboration with INRAE. These can be experimental, simulation and observation data, omics data, survey and text data related to the institute's domains. https://entrepot.recherche.data.gouv.fr/dataverse/inrae

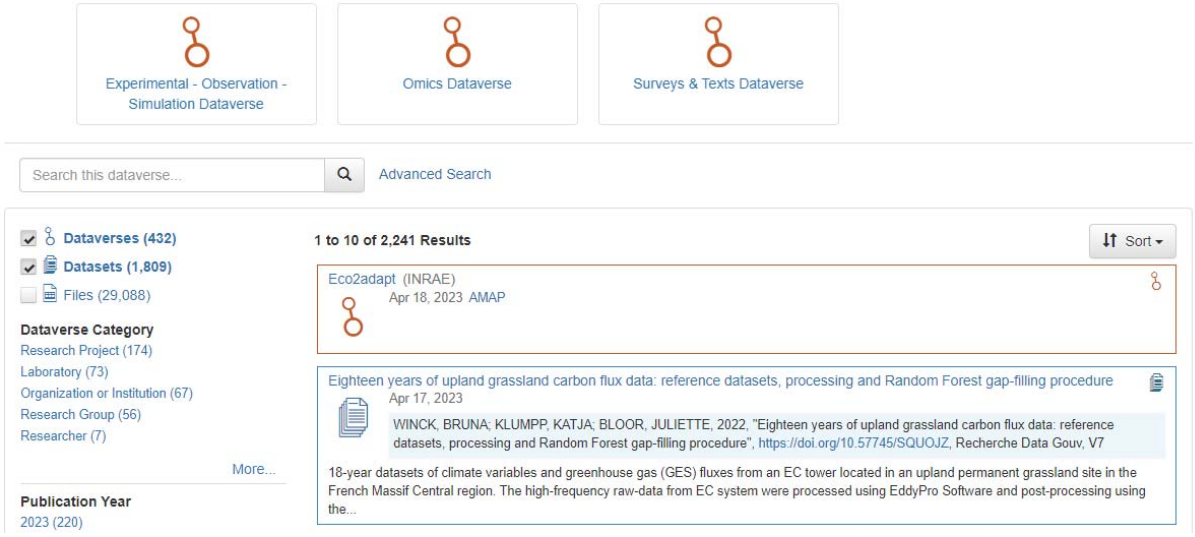

Figure 16 – Existing resource: INRAE dataverse

CIRAD dataverse allows CIRAD's researchers and partners to store data produced or co-produced in the framework of collective research work or projects. https://dataverse.cirad.fr

Harvard dataverse is a free data repository open to all researchers from any discipline, both inside and outside of the Harvard community, where they can share, archive, cite, access, and explore research data. Each individual Dataverse collection is a customizable collection of datasets (or a virtual repository) for organizing, managing, and showcasing datasets.

https://dataverse.harvard.edu

The **Joint Research Data Center Catalogue** gives access to the multidisciplinary data produced and maintained by the Joint Research Centre, the European Commission's in-house science service providing independent scientific advice and support to policies of the European Union.

https://data.jrc.ec.europa.eu/dataset

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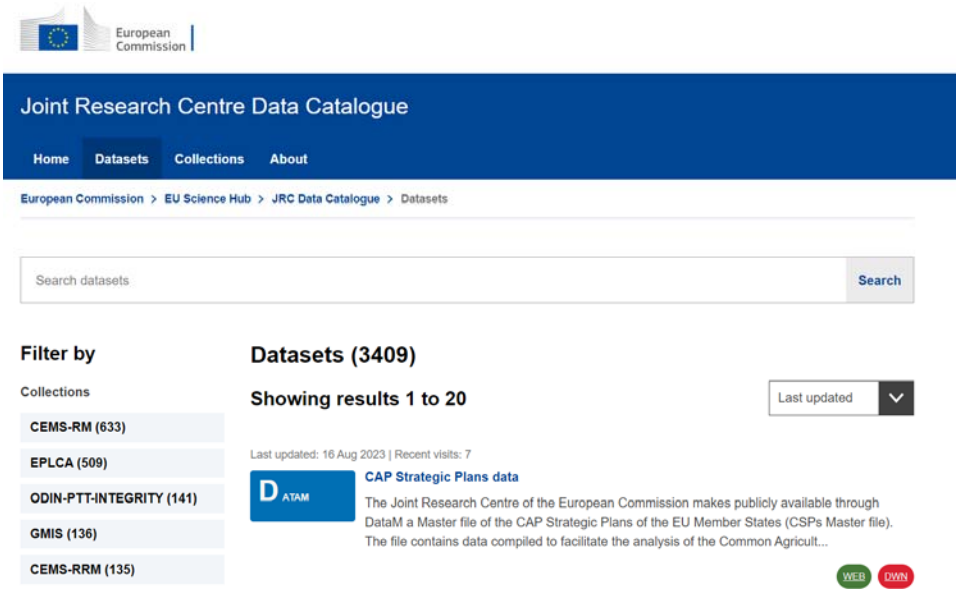

Figure 17 – Existing resource: The Joint Research Centre Data Catalogue

Zenodo is a general-purpose open repository developed under the European OpenAIRE program and operated by CERN. It allows researchers to deposit research papers, data sets, research software, reports, and any other research related digital artefacts.

https://zenodo.org

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Conclusion

In the next steps, we will be working on the development of the platform. The release date is planned on mid-2024. The first prototype of the platform will be presented during the launch of the IRC and the annual meeting in November.

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