



Specialist indicators and farming systems data

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Lead Author and Institution: J. Masó and B. Giralt (CREAF)

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Deliverable Description & Contributors

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-
- **Contributors:** project partners who contributed to the task and/or deliverable:
 - Doug Warner (UOH)
 - John Tzilivakis (UOH)
 - Lisette Cantú Salazar (LIST)
 - Gerid Hager (IIASA)
 - Lindsay Crocket
 - Alastair Simmons (TAL)
 - Theodore Simmons (TAL)
 - Mark Young (HUTTON)
 - Graham Begg (HUTTON)

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1. Background to the FRAMEwork project

1.1 FRAMEwork Project Executive Summary (*abbreviated*)

Biodiversity is essential for agroecosystem resilience, sustainability, and long-term food security. Traditionally, management for short-term economic returns has taken priority over management for the environment. Current mechanisms for compensating and encouraging farmers to apply biodiversity sensitive management strategies are often inefficient, being applied at individual farm rather than landscape level, and tend to be generic solutions, imposed from the top down at an EU or national level. Monitoring is rarely carried out and there is therefore little scope for evaluating the success of strategies in achieving improvements to farmland biodiversity.

The FRAMEwork project has been designed and develop a novel alternative to this called the **FRAMEwork System for Biodiversity Sensitive Farming** to enable the transition of EU farming systems to a position where they can conserve biodiversity and benefit from the enhancement of ecosystem services, while mitigating agronomic or economic risks. The FRAMEwork System combines the following elements:

- **Advanced Farmer Clusters** – local farmer groups working as a collective to deliver landscape scale management, supported by a Cluster Facilitator with expertise in agriculture and the environment, and linked to a local Cluster Stakeholder Group to inform and promote policy and practice, organised into regional, national, and international networks.
- **Technical Resource** – technical specialists associated with the regional, national, international networks to provide technical information, methods, and tools to support agrobiodiversity monitoring, management and policy including the dedicated DSTs – FRAMEselect and FRAMEtest.
- **Scientific Innovation** – researchers associated with regional, national, international networks to provide knowledge on the ecology, sociology and economics that underpins the functioning of sustainable agricultural systems.
- **Citizen Observatory and Information Hub** – an open access platform to support FRAMEwork networks, sharing activities, information, data and resources between farmers, scientists, policy makers, and citizens.

The FRAMEwork project will design, build, test, and deploy a prototype of the FRAMEwork System for Biodiversity Sensitive Farming and will work with 3 concepts important to the success and delivery of the project: (i) promoting collective landscape management; (ii) applying the approach across a diversity of European farming systems; and (iii) understanding and supporting the social and ecological change associated with a transition to biodiversity sensitive farming.

1.2 Project Partners

No	Participant organisation name	Type	Country
1*	The James Hutton Institute (HUTTON)	Research Inst	UK
2	Game and Wildlife Conservation Trust (GWCT)	Non-profit	UK
3	Groupe de Recherche en Agriculture Biologique (GRAB)	Non-profit	FR
4	Universitaet fuer Bodenkultur Wien (BOKU)	University	AT
5	Eesti Maaulikool (EMU)	University	EE
6	Hoehere Bundeslehr- und Forschungsanstalt fuer Landwirtschaft Raumberg-Gumpenstein (AREC)	Research Inst	AT
7	Fundacion Artemisan (ARTEMISAN)	Non-profit	ES
8	Scuola Superiore di Studi Universitari e di Perfezionamento Sant'anna (SSSA)	University	IT
9	The University of Hertfordshire Higher Education Corporation (UNI OF HERTS)	University	UK
10	Centro de Investigacion Ecologica Yaplicaciones Forestales Consorcio (CREAF)	University	ES
11	Institut National de la Recherche Agronomique (INRA)	Research Inst	FR
12	Internationales Institut fuer Angewandte Systemanalyse (IIASA)	Research Inst	AT
13	Universiteit van Amsterdam (UvA)	University	NL
14	Luxembourg Institute of Science and Technology (LIST)	Research Inst	LU
15	Universitaet Osnabrueck (UOS)	University	DE
16	Taskscape Associates Limited (TAL)	SME	UK
17	Ceska Zemedelska Univerzita v Praze (CULS)	University	CZ
18	Nordisk Fond for Miljo og Udvikling (NORDECO)	SME	DK

*Coordinating institution

1.3 Executive Summary

Deliverable 5.5 focuses on creating an integrated, accessible data infrastructure that supports biodiversity monitoring, decision-making, and collaboration across the project. This report documents the processes, tools, and platforms required to capture, catalogue, and store expert biodiversity monitoring data and Citizen Science data within the FRAMEwork project. This includes identifying the data models and structures that have been used during the project.

As part of this deliverable, a primary platform, the Farmer Cluster Data Hub, based on the GeoNetwork catalogue, has been developed to serve as the central repository for biodiversity monitoring data and metadata of the project. This includes expert-collected monitoring data and Citizen Science data (e.g., observations from iNaturalist). Efforts have also been made to address data governance issues, such as licensing, and to create resources like video tutorials to facilitate stakeholder engagement.

Additionally, the report outlines progress on integrating the Farmer Cluster Data Hub with other project tools, such as the FEAST decision support tool, ensuring the data infrastructure supports the broader goals of the FRAMEwork project.

2. Setting up the Farmer Cluster Data Hub

2.1 The FRAMEwork Data Hub – A metadata and data catalogue

The [FRAMEwork Data Hub](#) has been set up as the primary platform for cataloguing and storing FRAMEwork biodiversity monitoring data, and Citizen Science observations collected in each Farmer Cluster. The Data Hub is a web service that serves as a comprehensive and secure repository for geospatial and biodiversity metadata records and datasets gathered by experts and Citizen Scientists across the eleven Farmer Clusters participating in the project (Figure 1). The Data Hub is designed for scientists, farmers, Farmer Cluster Facilitators, and policymakers with an interest in farmland biodiversity and biodiversity-sensitive farming practices allowing for efficient management, discovery, and sharing of spatially referenced biodiversity data.

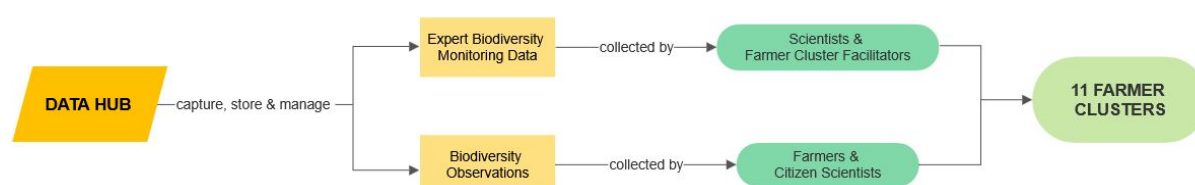


Figure 1. FRAMEwork biodiversity data captured, stored, and managed in the Data Hub.

The Data Hub consists of an instance of the [GeoNetwork](#) catalogue, a well-established open-source initiative of the [Open Source Geospatial Foundation \(OSGeo\)](#). It is a web-based application for managing spatially referenced resources. It offers a powerful editing and search functionalities enabling users to efficiently create, manage, and update detailed metadata records while it ensures discoverability through advanced search capabilities.

Metadata, commonly defined as “data about data” or “information about data”, is a structured set of information which describes data stored in data repositories or data clouds. Creating a comprehensive metadata catalogue for biodiversity datasets in the FRAMEwork project ensures that data is thoroughly documented, easily accessible, and clearly interpretable, enabling various audiences to effectively discover, understand, and utilize the data.

The primary objective of this metadata and the corresponding data is the implementation of the FAIR principles ensuring Farmer Cluster’s biodiversity data are:

- **Findable:** data is findable when described with rich metadata and registered in a searchable platform. Assigning a unique identifier enables persistent linkages to be established between the data and metadata to allow data discovery and reuse.
- **Accessible:** data is accessible when available through well-defined protocols that enable both human and machine access. While access to the data may require authorization, metadata should always be openly available, clearly stating data access conditions.

- **Interoperable:** interoperability is achieved when data and metadata follow standardised languages and vocabularies that align with community-recognized standards. This ensures data can be integrated, interpreted, and processed efficiently across different systems.
- **Reusable:** reusable data requires detailed metadata documenting provenance, collection methods, and any transformations. Clear usage licenses ensure users understand the conditions under which data can be accessed and applied.

These key attributes of the FAIR principles are essential to extract the full scientific value from data resources. The Data Hub ensures FRAMEwork biodiversity data is catalogued in a standardised and structured manner, giving data a greater value. The following sections outline how the Data Hub aligns with the FAIR principles to achieve this.

Figure 2 illustrates the main FRAMEwork Data Hub dashboard view, and Figure 3 shows a selection of the FRAMEwork biodiversity metadata records collection.

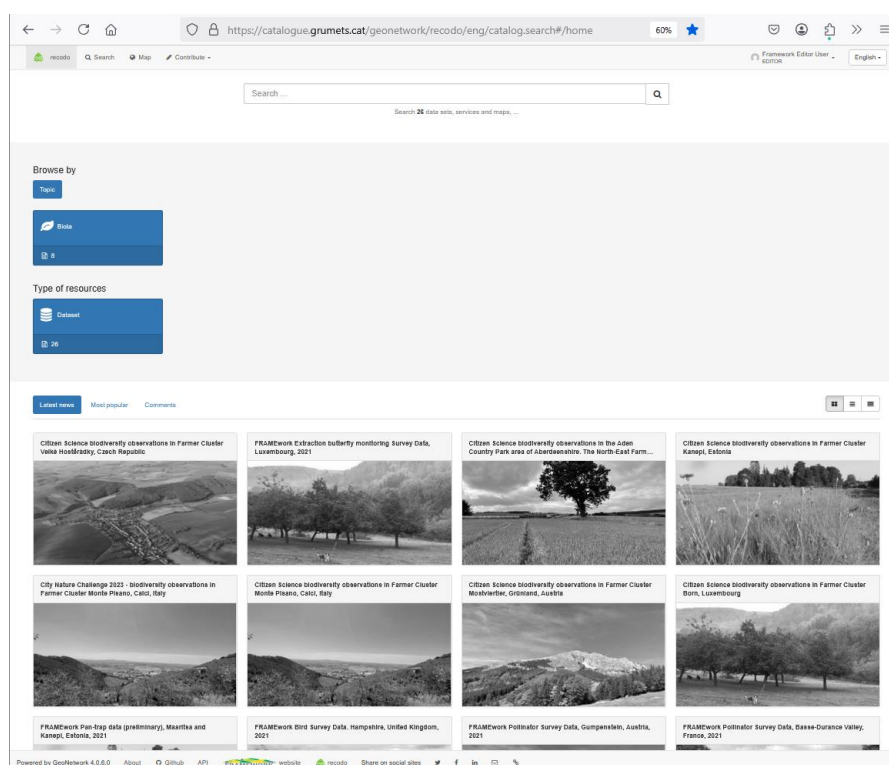


Figure 2. Main FRAMEwork Data Hub dashboard view.

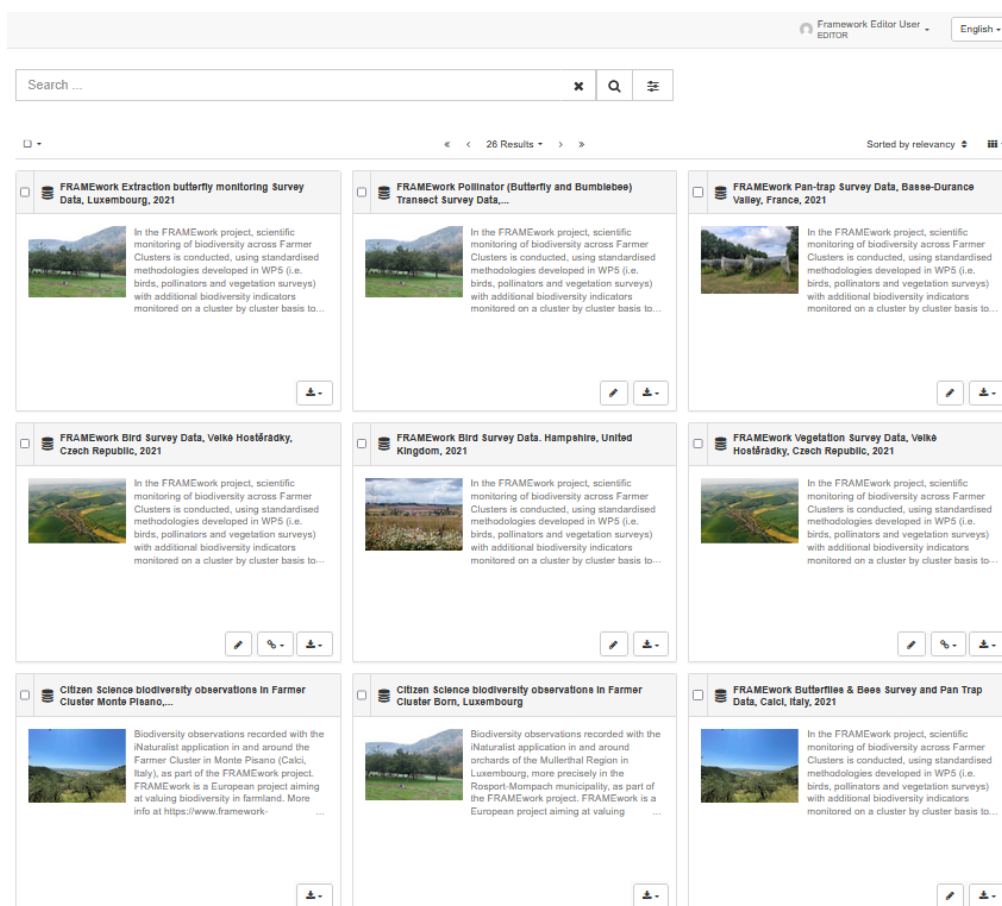


Figure 3. Data Hub dashboard showing a selection of the FRAMEwork biodiversity metadata records collection.

2.2 ISO19115 Metadata Standard

The GeoNetwork open-source catalogue primarily adheres to the International Standard ISO 19115 Geographic information, Metadata. This standard allows the description of geographic information and services and defines how metadata for spatial datasets and services should be structured. The adoption of ISO 19115 standard guarantees data is effectively discoverable, thus making data findable, a key attribute of the FAIR principles.

The ISO 19115 standard defines five key components for managing geographic data and metadata. These components provide a structured framework for describing and organizing spatial information. In GeoNetwork, one can effectively describe all this metadata information. The five key components are defined below, followed by a series of five Figures illustrating each component using the same metadata record as an example:

- **Identification:** this component refers to the essential information required to recognize and describe a dataset. This typically includes the dataset title, abstract,

keywords, and responsible party. It ensures users can understand what the dataset represents (Figure 4).

- **Distribution:** this component describes how the dataset can be accessed, including details on data formats, download links, and access protocols. It provides information on how users can retrieve the data (Figure 5).
- **Spatial Representation:** this component defines the method used to represent geographic data, such as vector (points, lines, polygons) or raster (grids, pixels) formats. This element helps users understand the structure of spatial data (Figure 6).
- **Reference System** specifies the coordinate reference system (CRS) used to define the dataset spatial positioning. This is crucial for ensuring data compatibility and proper alignment with other geospatial information (Figure 7).
- **Metadata:** it refers to the descriptive information that documents the dataset content, quality, condition, and other characteristics. It acts as a catalogue entry, facilitating data discovery, evaluation, and use (Figure 8).

ISO 19115 outlines a comprehensive collection of metadata elements, though typically only a selected subset is utilised. Nonetheless, it is crucial to maintain a minimum set of metadata elements to describe a dataset. Thereafter, there are a set of core metadata elements and a set of optional extended metadata.

Core elements ensure fundamental dataset information is documented, enabling users to discover, evaluate, and utilize data. Key elements include the title, providing the dataset's name; unique identifier, enabling persistent linkages to be established between the data and metadata; date, specifying creation, publication, or revision; and geographic location, outlining the dataset's spatial extent. Additionally, the data format details the file type and structure, while the responsible party element identifies the organization or individual responsible, ensuring clear points of contact. These elements are crucial for ensuring that geographic data is properly described, accessible, and fit for purpose.

Optional extended metadata elements provide more detailed dataset information, enhancing metadata completeness and supporting complex data discovery needs. Examples include keywords and themes, improving searchability by categorising datasets with relevant terms. While optional, they play an important role in enhancing metadata quality and ensuring users have the necessary context for informed data use.

Q Back to search

< Previous

Next >

Edit

Delete

Manage record

Download

Display mode

FRAMEWORK Butterflies & Bees Survey and Pan Trap Data, Calci, Italy, 2021

In the FRAMEwork project, scientific monitoring of biodiversity across Farmer Clusters is conducted, using standardised methodologies developed in WP5 (i.e. birds, pollinators and vegetation surveys) with additional biodiversity indicators monitored on a cluster by cluster basis to measure Cluster specific activities and interests. The following record refers to the results of the FRAMEwork pan-traps as well as butterflies and bees surveys conducted in the Italian Farmer Cluster, in Monte Pisano (Calci, Italy) during year 2021. FRAMEwork is a European project aiming at valuing biodiversity in farmland. More info at <https://www.framework-biodiversity.eu/>.


Download

FW Butterflies & Bees Survey and Pan Trap Data, Calci, 2021


Excel Spreadsheets

Excel Spreadsheets https://catalogue.grumets.cat/geonetwork/Framework/api/records/ca3e9018-5c20-4e76-b119-49f2d36c2c53/attachments/Database%20BUBE%202021%20Picchi%20Marini_def.xdsm

Overview



Spatial extent



Keywords

2021

Bees

Butterflies

Calci

Farmer Cluster

Italy


Monte Pisano

Pan trap

Pollinator

SSSA

Provided by



Share on social sites

Twitter

Facebook

LinkedIn

Email

Access to the portal

Read here the full details and access to the data.

Associated resources

Identification

Distribution

Spatial rep.

Ref. system

Metadata

Data identification

Citation

Date (Creation)

10-03-2022 00:00

Identifier

No information provided.

Processor

Scuola Superiore di Studi Universitari e di Perfezionamento Sant'anna -

Piazza Martiri della Libertà, 33 , Pisa PI , 56127 , Italy

<https://www.santannapisa.it/en>

Author

Scuola Superiore di Studi Universitari e di Perfezionamento Sant'anna - Virginia Bagnoni (Farmer Cluster Facilitator)

Point of contact

Scuola Superiore di Studi Universitari e di Perfezionamento Sant'anna - Camilla Moonen (Partner Contact)

Farmer Cluster

Monte Pisano

SSSA

Calci

Pollinator

Butterflies

Bees


Pan trap

Italy

2021

Keywords

Figure 4. Metadata record of a biodiversity dataset of Italian FC with “Identification” information.



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Identification	Distribution	Spatial rep.	Ref. system	Metadata
Distribution				
Distribution format				
OnLine resource				
FW Butterflies & Bees Survey and Pan Trap Data, Calci, 2021 (WWW.DOWNLOAD-1.0-http--download)				
Excel Spreadsheets				

Figure 5. Metadata record with “Distribution” information.

Identification	Distribution	Spatial rep.	Ref. system	Metadata
Georeferenceable				
Number of dimensions				
1				
Cell geometry				
Point				

Figure 6. Metadata record with Italian FC with “Spatial Representation” information.

Identification	Distribution	Spatial rep.	Ref. system	Metadata
Identifier				
Citation				
Date				
Unique resource identifier				
lat/long-WGS84 / EPSG:4326				

Figure 7. Metadata record with “Reference System” information.



Identification	Distribution	Spatial rep.	Ref. system	Metadata
Metadata				
File identifier				
ca3e9018-5c20-4e76-b119-49f2d36c2c53 				
Metadata language				
English				
Character set				
UTF8				
Hierarchy level				
Dataset				
Date stamp				
05-06-2024 18:07				
Metadata standard name				
ISO 19115:2003/19139				
Metadata standard version				
1.0				
Custodian				
 Centre de Recerca Ecològica i Aplicacions Forestals (CREAF) - Berta Giralte (Technical Assistant)				

Figure 8. Metadata record with “Metadata” information.

2.3 Linking data and metadata

In GeoNetwork, metadata records are directly linked to their corresponding data, ensuring efficient access for interested audiences. Implementing this connection between data and metadata is crucial for enhancing data accessibility and usability. In many cases, datasets are stored separately from their metadata catalogues maintained by different people, making the retrieval of data fragile, and subjected to failure if data is moved or the URL domain changes. Hence, this functionality offers considerable value to the FRAMEwork project by enhancing data management efficiency and facilitating effective data utilisation.

Depending on the access privileges assigned to each metadata record, metadata and datasets can be made available and downloadable. For downloading metadata records, users can simply click the “Download” button, which provides a selection of format options, including a [permalink](#), ZIP file, PDF, and XML (Figure 9). The permalink corresponds to the example metadata record shown below. Additionally, Appendix 1: Metadata record of biodiversity dataset collected Italian FC Monte Pisano in XML format presents an example of this metadata record in XML format for a dataset collected in the Italian Farmer Cluster Val Graziosa.

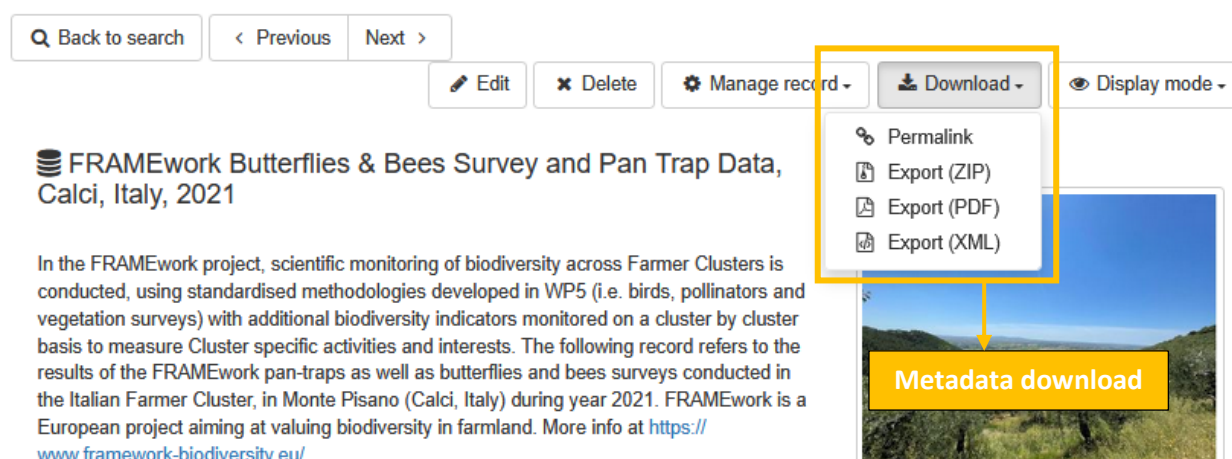
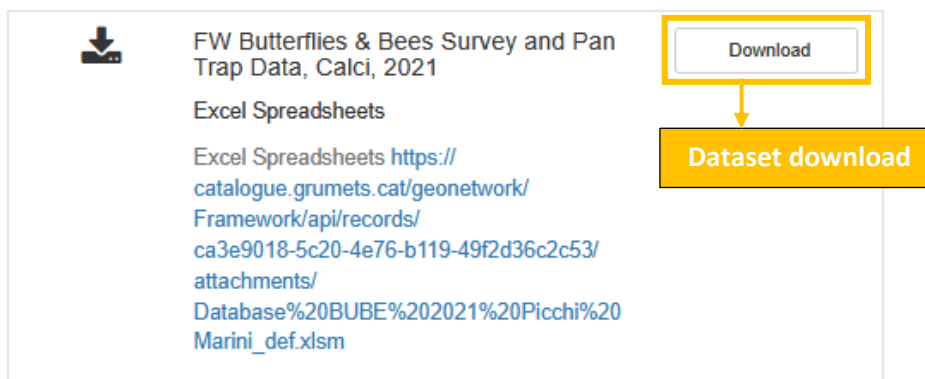


Figure 9. Metadata download options.

Retrieving data is a simple and efficient process. Within the “Download and Links” section of the metadata record, users can easily access the dataset (Figure 10).

Download and links



FW Butterflies & Bees Survey and Pan Trap Data, Calci, 2021

Excel Spreadsheets

Excel Spreadsheets https://catalogue.grumets.cat/geonetwork/Framework/api/records/ca3e9018-5c20-4e76-b119-49f2d36c2c53/attachments/Database%20BUBE%202021%20Picchi%20Marini_def.xlsm

Download

Dataset download

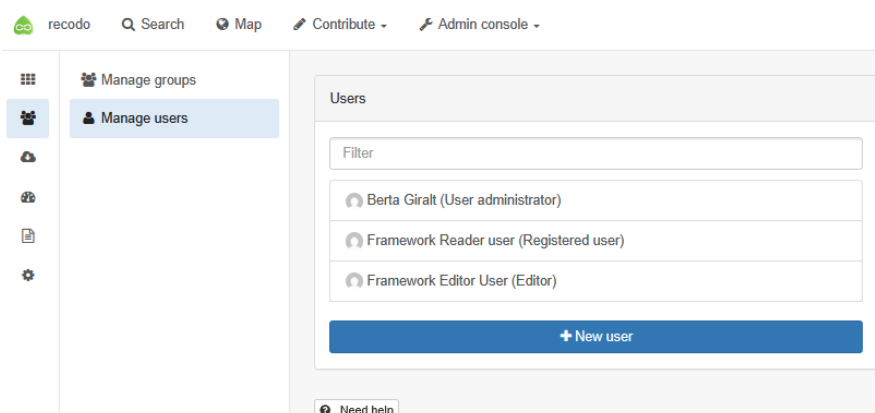
Figure 10. Dataset download option.

2.4. Data management

GeoNetwork uses a system of *Privileges*, *Roles* and *User groups*.

- **Privileges:** depending on the privileges set on a metadata record and on the role as an authenticated user, the user will be able to read about a resource and download or interactively browse data related to that resource.
- **Roles:** users with an editor role can create, import and edit metadata records. They can also upload data.
- **User groups:** every authenticated user is assigned to a particular work group and is able to view data within that work group.

There are no restrictions for users to search and access public information in a GeoNetwork open data-based catalogue. To get access to restricted information or advanced functionality, an account to log in is required. CREAf, the GeoNetwork administrator, has created two *User groups*, a “FRAMEwork Editor User” and a “FRAMEwork Reader User”, as shown in Figure 11:



recodo Search Map Contribute Admin console

Manage groups

Manage users

Users

Filter

Berta Giralt (User administrator)

Framework Reader user (Registered user)

Framework Editor User (Editor)

+ New user

Need help

Figure 11. FRAMEwork Data Hub user types.

The usernames and corresponding passwords of these groups were provided to all FRAMEwork partners according to their needs, thus making Farmer Cluster biodiversity monitoring datasets accessible for analysis by all FRAMEwork partners (Figure 12).

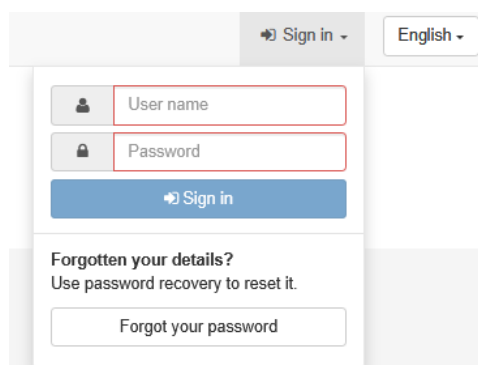


Figure 12. Sign in dialogue box in GeoNetwork.

Regarding sensitive biodiversity data related to expert monitoring in each Farmer Cluster, project partners were invited to provide feedback on the proposed FRAMEwork Data Licensing terms, which are outlined as follows:

1. Data generated by project partners funded through EU resources will be made publicly available under the CC BY 4.0 license, requiring only proper attribution.
2. Data generated independently by Farmer Clusters, either by individuals outside the consortium or after the project's conclusion, may follow the proposed Farmer Cluster license. This license restricts access to specific groups (e.g., other Farmer Clusters, scientists), enabling Farmer Clusters to better manage who can reuse their information.

Overall, the option of having different groups with different privileges, ensure data accessibility and reusability to designated user groups.

3. Data types in the Farmer Cluster Data Hub

3.1 Data Types stored in the Data Hub

The Data Hub serves as a centralised repository designed to manage diverse types of biodiversity data in various formats. Functioning as a Data Lake, the Hub is built to securely store, process, and manage structured, semi-structured, and unstructured data.

The Data Hub accommodates two key types of biodiversity data:

Biodiversity Monitoring Data: these data are collected by experts and Farmer Cluster (FC) facilitators across the eleven Farmer Clusters. The biodiversity survey data (for

Birds, Pollinators, Pan-traps, and Vegetation) were collected in standardised data encoding templates developed within the project, primarily Excel spreadsheets to ensure semantic interoperability. This format facilitates data consistency, integration, and ease of use across various analytical tools.

- **Citizen Science Observations:** the Hub also catalogues biodiversity observations contributed by Citizen Scientists within the Farmer Clusters. These datasets complement the expert-driven data collection efforts and enhance the overall biodiversity knowledge base.

By integrating these distinct data sources, the Data Hub provides a comprehensive and accessible resource to support biodiversity research, monitoring, and decision-making processes. The following sections provide an overview of the data types, their formats, and the methodologies employed for effective data management.

3.2 Expert Biodiversity Monitoring Data

The starting point for any survey database is the protocol which sets out the data to be collected and from this, data sheets and data file templates have been produced. This is an iterative process and data file templates may be subject to change if the protocol is altered. Data sheets are completed by partners out in the field and digitised on to the standardised template files. These template files are designed to standardise data input e.g. by providing standard species names, which helps later file processing. Partners are responsible for the quality control of their data. Once complete, data files they are sent to HUTTON for processing by software developed in MS Visual Studio and mounted onto SQL Server into relational databases using SQL scripts. This process acts as an additional check on consistency of data received.

Once the data from individual sites are mounted onto SQL server, they are concatenated into the data model shown in Figure 13. This process allows data to be standardised across experimental sites and years and allows consistent data files to be created for analyses or modelling etc. These processes have been developed for all surveys i.e. birds, pollinators, pan-traps, vegetation arable and vegetation grassland.

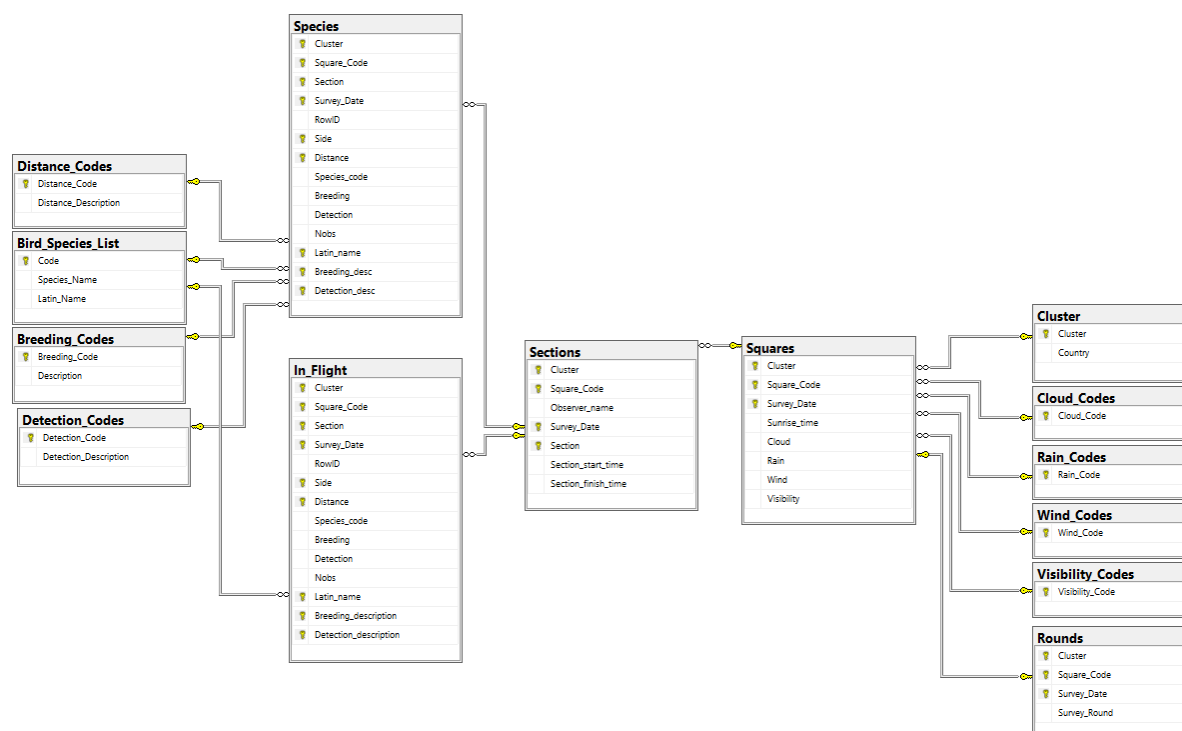


Figure 13. Example of SQL server relational database structure: FRAMEwork bird survey.

Figure 14 presents a high-level diagram illustrating the workflow of expert monitoring data within the FRAMEwork project. In this process, Farmer Cluster Facilitators are responsible for generating new data, which is eventually catalogued and uploaded to the Data Hub. Importantly, datasets are not uploaded directly from the experts or Farmer Cluster Facilitators to the Data Hub (GeoNetwork platform). Instead, they must first undergo evaluation and approval by the designated Quality Control responsible party, HUTTON, ensuring data accuracy, consistency, and reliability before integration of the datasets into the system. Quality controlled biodiversity monitoring data will be catalogued and uploaded in the Data Hub until the end of the project.

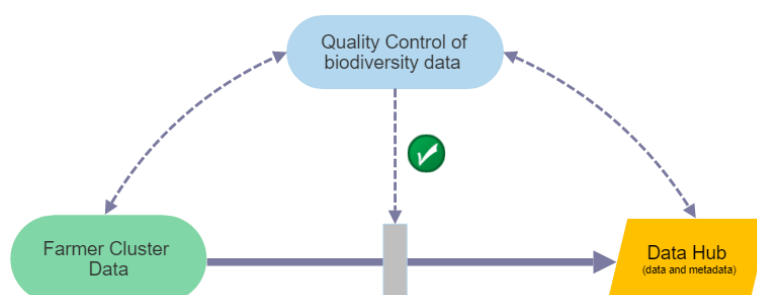


Figure 14. Workflow of expert biodiversity monitoring data within the FRAMEwork project.

3.3 Citizen Science Data

Citizen Science data collected in the Farmer Clusters through activities organised by IIASA and NORDECO is retrieved from the iNaturalist platform, which allows Umbrella Projects to be defined. The [FRAMEwork Citizen Biodiversity Observatory](#) project is associated with the data, and subsequently catalogued in the Data Hub. Metadata records corresponding to Citizen Science data gathered through this umbrella project are presented in Figure 15. These datasets are downloaded from iNaturalist in CSV format. Additional datasets generated by the end of the project will also be catalogued accordingly.

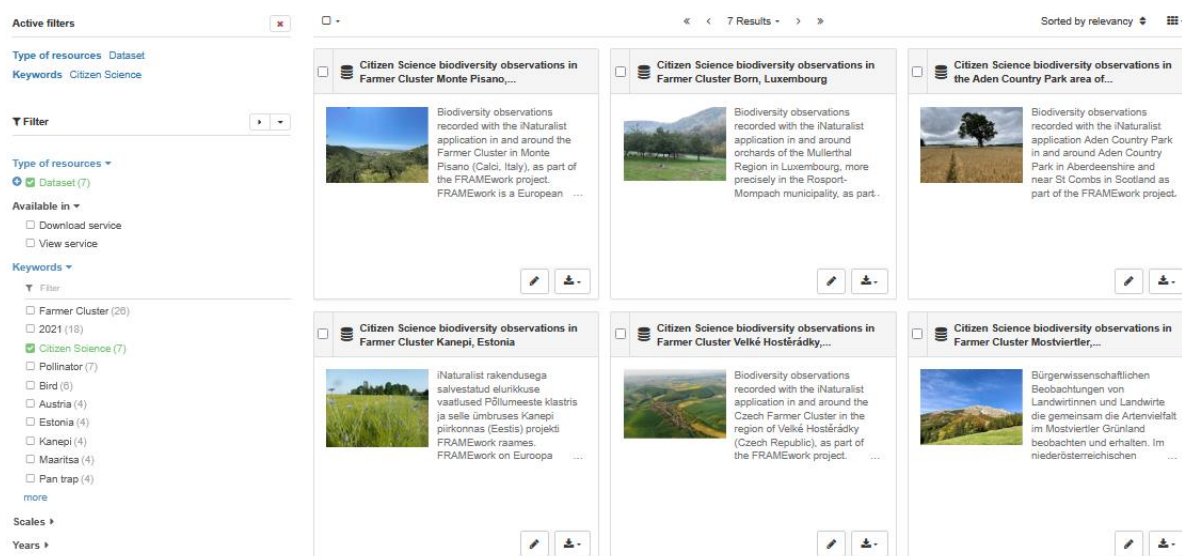


Figure 15. Metadata records of Citizen Science data collected through the iNaturalist umbrella project: “FRAMEwork Citizen Biodiversity Observatory”.

3.4 Farmer Cluster Data Hub Datasets

Table 1 presents the total number of expert biodiversity monitoring and Citizen Science datasets stored in the Data Hub for each Farmer Cluster, along with their corresponding metadata records.

Table 1. Total number of biodiversity datasets and their corresponding metadata records stored in the Farmer Cluster Data Hub.

Farmer Cluster	Expert monitoring data				Citizen Science data 2021-2024	Metadata records
	Birds	Pollinators	Pan-traps	Vegetation		
Mostviertel	1	1			1	3
Burgenland	1	1				2
Vélke Hostěrádky	1			1	1	3
Kanepi kihlkund	1	1	1		1	4
Cazadores de Aguilar	1					1
Cranborne Chase	1	1			1	3
Basse-Durance		1	1			2
Buchan	1				1	2
Born		1			1	2
Val Graziosa	1	1			2	4
Zeeasterweg			1			1
TOTAL	8	7	3	1	8	27

Before the end of the project, additional expert biodiversity monitoring data collected in the Farmer Clusters and subsequently quality controlled by the Data Manager will be catalogued and uploaded to the Data Hub (see section 3.2.).

4. Integrating Farmer Cluster Data Hub in the FRAMEwork project tool set

4.1 Connecting the Data Hub and the FEAST Decision Support Tool

Between April and September 2024, WP3 (IIASA) and WP5 (UNI OF HERTS, TAL, LIST, and HUTTON) participated in a series of Whiteboard sessions on map generation and mapping activities led by CREAM. These sessions aimed to identify and discuss interlinkages between the various mapping components within the FRAMEwork project (Figure 16).

The resulting diagram illustrates the data workflow for maps and mapping activities within the project. This collaborative exercise enabled the identification of a potential connection between the Data Hub and the [FEAST Decision Support Tool](#). Consequently, since January 2025, WP5 partners have been actively exploring these integration opportunities.

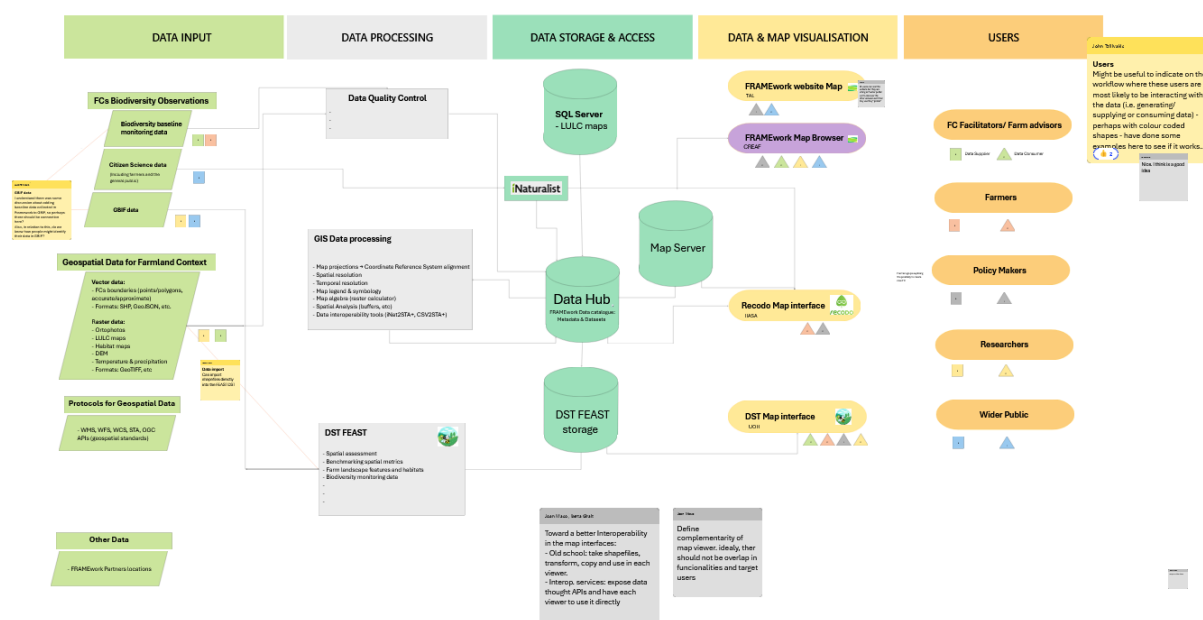


Figure 16. FRAMEwork data workflow for maps and mapping activities.

FEAST is a tool developed and designed to assess the performance of landscape features or whole landscapes in terms of ecosystem services and habitat suitability. It also enables users to view, create, edit, and assess data directly within its map interface, including biodiversity monitoring data and metrics for calculating the performance of landscapes. Connecting the FRAMEwork Data Hub with the FEAST tool aims to enhance user experience by facilitating access to relevant data, ensuring that interested audiences can efficiently utilise the tool for their assessments and analyses. Moreover, integrating both tools would enhance data flow, ensuring compatibility between different formats and data structures formats (e.g., CSV, Excel, Access, FEAST files). Two potential methods for establishing this connection are currently being explored.

Figure 17 illustrates an example of integration of the Data Hub and the FEAST tool.

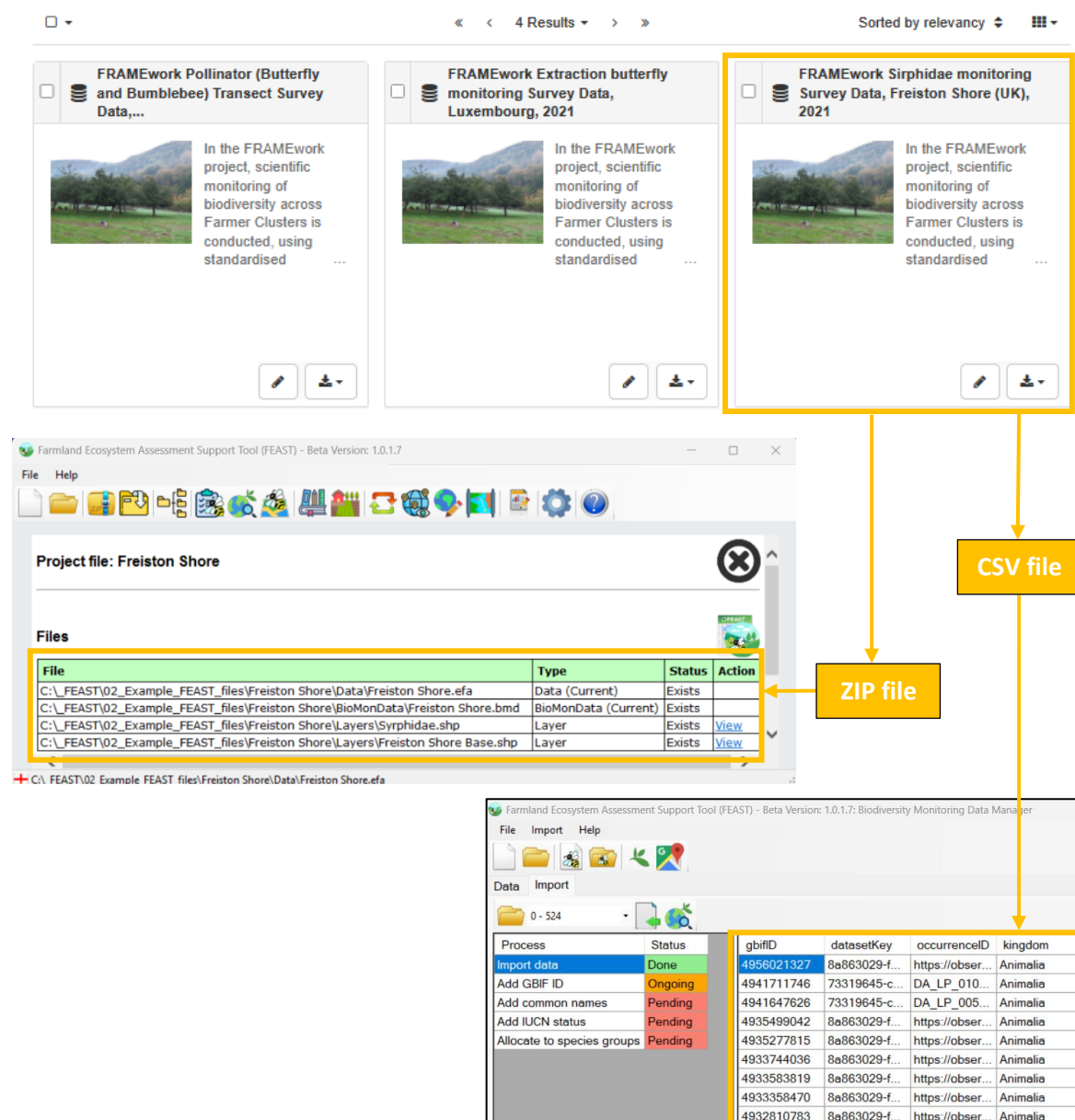


Figure 17. Example demonstrating integration of the Data Hub and FEAST using two approaches.

The first method involves importing a FEAST project saved as a ZIP file within the Data Hub. This ZIP file would contain the necessary files needed for a FEAST project, including FEAST, EFA (Feature Elements), and BMD (Biodiversity Monitoring Data) for a particular Farmer Cluster.

The second method consists of enabling FEAST to open a CSV file directly from the Data Hub, allowing monitoring data for a particular Farmer Cluster to be accessed and utilised within the FEAST interface without the need for additional file conversion or manual uploads.

Both approaches aim to facilitate data integration, improve accessibility, and enhance the overall user experience. Our goal is to develop a shared data ontology or standard schema

that can be adopted by both the Data Hub and the FEAST tools, making it easier to transfer and interpret data between the two tools.

5. Accessing the Farmer Cluster Data Hub

The Farmer Cluster Data Hub was set up to serve as the central repository for biodiversity monitoring data and metadata collected within the 11 Farmer Clusters of the FRAMEwork project.

The Farmer Cluster Data Hub can be accessed through the following link:

<https://catalogue.grumets.cat/geonetwork/recodo/eng/catalog.search#/home>

6. Disseminating the Farmer Cluster Data Hub via Recodo

The Data Hub has been made available as a featured resource on the [Recodo platform](#). Figure 18 illustrates the Data Hub landing page on Recodo. This approach allows Recodo to streamline access to the data on Farmer Clusters, enabling a greater focus on knowledge development. Additionally, a series of three introductory and tutorial videos about the Data Hub resource has been developed in collaboration with TAL. These videos are available on the Data Hub resource landing page on Recodo and are designed to facilitate the effective use of the platform. They provide guidance on discovering, querying, and extracting FRAMEwork biodiversity datasets, as well as creating, editing, and publishing metadata records and datasets.

- [Using the Data Hub: Introduction to Key Features](#)
- [Using the Data Hub: Discover, Query, Extract!](#)
- [Using the Data Hub: Create, Edit, Publish!](#)

Future clusters that join Recodo will also be able to use the Data Hub to publish their metadata and to upload data. The Data Hub hosted in CREAM will be maintained after the end of the project. New Farmer Cluster will be able to learn about how to use the Data Hub through the created dissemination materials. CREAM will also provide them with credentials to manage their own assets in the Data Hub.

Recodo and the Farmer Cluster Data Hub have been promoted through a blog post on CREAM's website entitled "[Unveiling Recodo, an online platform to promote biodiversity-sensitive farming through collaboration](#)".

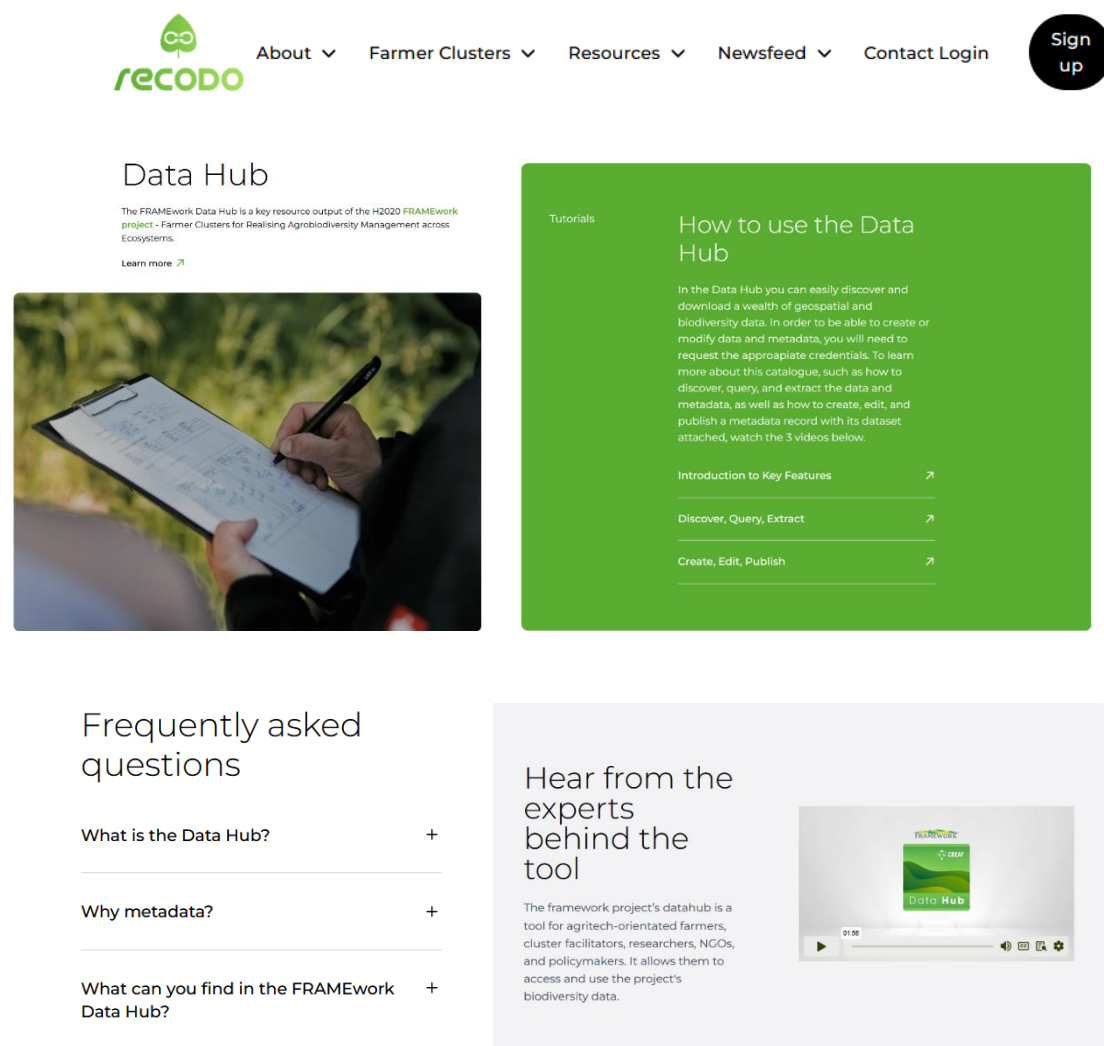


Figure 18. Recodo Data Hub landing page.

7. References

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GeoNetwork OpenSource, Open Source Geospatial Foundation. [Online]. Available: <https://geonetwork-opensource.org/>. (Last accessed: 14/03/25).

International Organization for Standardization. (2003). ISO 19115:2003 - Geographic information — Metadata. ISO. <https://www.iso.org/standard/26020.html>

8. Disclaimer

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10. Citation

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Appendix 1: Metadata record of biodiversity dataset collected Italian FC Monte Pisano in XML format

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In the FRAMEwork project, scientific monitoring of biodiversity across Farmer Clusters is conducted, using standardised methodologies developed in WP5 (i.e. birds, pollinators and vegetation surveys) with additional biodiversity indicators monitored on a cluster by cluster basis to measure Cluster specific activities and interests. The following record refers to the results of the FRAMEwork pan-traps as well as butterflies and bees surveys conducted in the Italian Farmer Cluster, in Monte Pisano (Calci, Italy) during year 2021. FRAMEwork is a European project aiming at valuing biodiversity in farmland. More info at <https://www.framework-biodiversity.eu/>.

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