

BIG_PICTURE

Developing data management and analytical tools to integrate and advance professional and citizen science camera-trapping initiatives in Europe

DURATION
1/04/2024 – 30/06/2027

BUDGET
199 424 €

PROJECT DESCRIPTION

General objectives and research questions:

The development of digital camera traps (CTs) in the last decade has revolutionized both professional and citizen-scientist collection of data on a broad range of terrestrial mammalian and avian species. Camera trapping has become the state-of-the-art method for monitoring many species and each CT could basically serve as a mini Earth-Observation unit. Unfortunately, the potential to utilize this rich data source is currently limited by a number of constraints:

- There are legal issues concerning intellectual property rights and privacy regulations
- The volume of images collected represents massive challenges for data processing
- Different professional users work with different databases and data formats which does not facilitate easy sharing. Additionally, nonprofessional users rarely enter their data into any form of database or secure storage
- The analytical tools for exploiting CT data are still under development, especially when it concerns integrating data across species, study sites or initiatives

In this project, we aim to:

- Address human, technological, and analytical bottlenecks in CT research. We will generate a set of tools that will permit the large-scale and efficient processing, sharing, analysis, and exploitation of CT data on an unprecedented scale.
- Link together professional scientists, citizen scientists, and stakeholders in a joint action to promote conservation and management of biodiversity.
- Produce a European solution that fits the European setting with transfer value to other settings beyond Europe.

Methodology and research questions:

We will organize our activities into 13 interlinked work packages within five thematic clusters (A-E):

- **Cluster A** will provide the societal and policy framework for the technical activities within clusters B, C and D. We will explore the legal (WP1) and institutional (WP2) issues related to data sharing, investigate the willingness and constraints of stakeholders and citizen-scientists to share data (WP3) and explore stakeholders' desires and needs in terms of tools and data access to ensure two-way cooperation (WP4).



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- **Cluster B** is designed to enhance the interoperability and functionality of the main systems used in Europe today. We will develop standards and pipelines to ensure interoperability and allow the different databases to produce data in formats that can be combined (WP5). We will enhance the functionality of artificial intelligence by retraining and fine tuning existing models (WP6). In this way, we will produce optimal results in recognizing species, species traits and background characteristics.
- **Cluster C** will optimize the extraction of information from CT data. We will explore and test existing tools, as well as develop new analytical tools to generate guidance about aligning different datasets (WP8) with suitable statistical analysis (WP7, WP9). This will allow us to draw accurate inferences about the state of the wildlife species or community under study.
- **Cluster D** will demonstrate the utility of our toolkits and the added value of pan-European data sharing. Each use case (WP10, WP11) will draw on multiple datasets that have never been combined to produce large-scale insights.
- **Cluster E** (WP12, WP13) will focus on communication, outreach and project management

Impact and Expected results:

This project is exceptionally application oriented as it aims to produce a toolkit of technological and statistical elements needed to harmonize data. This will allow us to produce scalable assessments of multiple biodiversity variables across the continent. We will build on the state-of-the-art in various fields and advance them some steps further through, for example, the iterative testing and modification of data standards, the accumulation of a unique training dataset for AI algorithm development, and the testing and advancement of existing statistical tools so that they can integrate data from different survey designs. Our approach will be applicable to a wide range of species (large predators, game, invasive or feral species, etc.). The products will involve the integration of harmonized datasets from a unique consortium of researchers and stakeholders providing data from >100 study sites across the entire continent to produce demonstration products on scope, scale and precision that has never before been attempted for multiple species in Europe.

The results of our project have the potential to make direct, and long-term contributions to policy formulation and agenda setting stages. These impacts can happen because (1) we will enhance the availability of data and accompanying ecological insights (2) the type of data (visual data of intrinsically charismatic animals that engage the public and lends itself to effective storytelling), and (3) the way of obtaining data through wide stakeholder engagement and citizen science. This project has very close alignment between the stakeholders with which we will engage and the policy relevant end-users, so that the wider stakeholder engagement process will facilitate the policy uptake.

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