

## POLICY BRIEF

# Unlocking Biodiversity: European Campaign for Taxonomic Annotation

## Executive summary

Biodiversity research requires data with consistent references to the taxonomy of organism groups (e.g. species), which in most cases are represented by scientific (Latin) names that circumscribe these groups. Yet, these names may be used inconsistently or even ambiguously. This is limiting interoperability, automation, and long-term reproducibility of policy-relevant indicators. Systematic taxonomic annotation using stable identifiers is therefore essential for producing reliable evidence in support of European and global biodiversity policy frameworks. Building on the foundations established by the TETTRIS project, we are calling for a coordinated European annotation campaign embedded in existing research-data infrastructures. Such an effort would align taxonomic backbone services, support efficient annotation workflows, and strengthen the evidence base for biodiversity-related decision-making.

## Policy context

Semantic taxon links allow heterogeneous datasets to be aggregated and compared consistently, supporting coordinated reporting under frameworks such as the Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework, and Sustainable Development Goals. In particular, by resolving synonyms and indicating taxonomic change, annotated data ensure that biodiversity indicators remain reproducible over time, which is an essential requirement for legally and politically binding policies (e.g. EU nature legislation under the European Green Deal). Taxonomic annotation is also a prerequisite for automated alignment of research data with regulatory species lists (e.g. invasive species, protected taxa), facilitating evidence-based implementation across environment, agriculture, health, and trade policies.

## From annotation to integration

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Biodiversity data are collected across a wide range of research contexts and include, for example, observations from citizen-science platforms, natural history collections, monitoring data, as well as trait data, experimental data, and molecular sequence data. An essential parameter of almost all these data types is a taxonomic reference, which is used, for instance, to document the species that was observed or from which measurements or samples were taken.

In countless research data resources, these taxonomic references are traditionally established by providing Latin scientific taxon names. However, this name-based approach represents a major obstacle to data integration, as names are not used consistently and may refer to different taxonomic circumscriptions (Berendsohn & Geoffroy 2007).

Data interoperability and automated analysis would benefit enormously if taxonomic references were systematically annotated using stable identifiers from established taxonomic backbone services (e.g. Catalogue of Life, World Flora Online, EU-nomen). Such annotation processes typically require local, domain-specific knowledge of the respective data resources, for example from curators of research collections or coordinators of regional monitoring programmes.

## Key Requirements for a European Annotation Campaign

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Building on very positive experiences in the annotation of collection data coordinated under the umbrella of CETAF (Güntsch et al. 2021), we see a Europe-wide campaign for the annotation of taxonomic references in research data as a key instrument for turning distributed scientific data into policy-ready evidence. Coordinated by the European taxonomic community, such a campaign would bring together relevant data providers and define a coherent strategy for taxonomic data annotation. A central element of this effort would be the alignment of the taxonomic backbone services used for different organism groups and their systematic integration into the annotation process.

Complementary to the taxonomic and conceptual coordination, providers of taxonomic backbone services should, based on the specifications developed within the EU project TETTRIs, advance the harmonisation of the interfaces they offer for the reconciliation of scientific taxon names. Building on these interfaces, dedicated software tools and services will ultimately be required to effectively support taxonomic annotation in local research data repositories, for example by enabling the clustering and simultaneous annotation of similar datasets.

## Recommendations

The TETTRIs project as well as CETAF coordinated pilot activities have laid an important foundation for a broad annotation campaign by comprehensively documenting services and methods for aligning biodiversity research data with taxonomic name services (TETTRIs 2023-). To fully realise the potential of such a campaign, we recommend the following measures:

### 1 RECOGNISE DATA ANNOTATION AS A CORE, FUNDABLE ACTIVITY

- ↘ Treat the taxonomic annotation of biodiversity data as an essential research-infrastructure function, rather than an optional add-on to research projects. The use of persistent identifiers for referencing taxa should be mandated, replacing reliance on free-text name references.

### 2 STRENGTHEN NATIONAL AND EUROPEAN COORDINATION

- ↘ Embed annotation activities within coordinated research-data infrastructures to avoid fragmentation and duplication across projects and institutions. National funding schemes should explicitly take international requirements into account, while European programmes should actively integrate and build upon existing national services and activities.

### 3 PROMOTE A DEDICATED EUROPEAN ANNOTATION CAMPAIGN

- ↘ Establish a clear coordination structure accompanied by a series of community workshops to align shared annotation principles, semantic resources, and methodological approaches. This campaign should be supported by targeted tool and interface development that enables convergence between existing taxonomic backbone services and facilitates efficient, high-quality annotation workflows.

### 4 INVEST IN SKILLS AND CAPACITY BUILDING

- ↘ Support training in semantic and taxonomic annotation, the development of best-practice guidance, and the establishment of communities of practice for data stewards, curators, and researchers.

## Final Statement

Without coordinated action, unannotated taxonomic name references will continue to limit the integration and reuse of biodiversity research data. Investing in systematic taxonomic annotation is a high-impact measure that strengthens the reliability and reproducibility of policy-relevant evidence. A coordinated European annotation campaign can build on existing infrastructures to ensure biodiversity data are fit for current and future policy needs

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Source: Image from Getty Images

### Glossary

- Scientific names: Scientific names provide a standardised, internationally governed system for referring to organisms, enabling unambiguous communication across languages, regions, and disciplines. However, because names can change in meaning over time due to new scientific insights and may be applied inconsistently, they do not by themselves uniquely identify biological taxa.
- Semantic Annotation: Semantic annotation is the process of enriching data with explicit, machine-readable references to shared concepts, identifiers, and vocabularies. By making the meaning of data elements explicit, semantic annotation enables interoperability, automated integration, and reliable reuse of research data across systems, disciplines, and policy domains.

84%

65%

20%

### References

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Catalogue of Life

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