

## POLICY BRIEF

# Aligning European taxonomic capacity with biodiversity policy needs

## Executive summary

Taxonomy provides the fundamental language of biodiversity policy and underpins evidence-based monitoring, reporting, and biosecurity. A recently published Europe-wide analysis of taxonomic capacity shows that patterns of taxonomic research effort are associated with EU policy priorities, including signals linked to the Habitats Directive, while major gaps persist for marine biodiversity, several hyperdiverse taxa, and parts of Europe with fewer taxonomists. These gaps risk constraining delivery of the EU Biodiversity Strategy for 2030 and meeting the Global Biodiversity Framework targets.

This brief, developed in the context of TETTRIs<sup>1</sup> (skills and training) and B-Cubed<sup>2</sup> (data linkages and standards), supports a shift from reactive “gap-filling” to strategic, policy-aligned capacity building, supported by open data workflows (OpenAlex, Wikidata, GBIF) that allow capacity gaps to be monitored over time.

## The TETTRIs and B-Cubed synergy

The TETTRIs project strengthens the human infrastructure of taxonomy: training pathways, career development, and institutional capacity. Whereas on its side, the B-Cubed project reinforces the data infrastructure: standardising taxonomic concepts and identifiers so information can move efficiently into policy and monitoring workflows.

Combined, these approaches show how open data can support evidence-based decisions about where European taxonomic expertise is sufficient—and where it is not to meet the requirements for a sound and comprehensive monitoring process at scale.

<sup>1</sup> TETTRIs: Transforming European Taxonomy through Training, Research and Innovations (<https://tettris.eu/>)

<sup>2</sup> B-cubed: Biodiversity Building Blocks for Policy (<https://b-cubed.eu/>)

## Key findings: the supply–demand mismatch

### 1 POLICY ATTENTION ALIGNS WITH RESEARCH EFFORT, BUT UNEVENLY

The research explored the associations between policy-related drivers and taxonomic research effort. It revealed patterns that are consistent with a two-way interplay: policy priorities can elevate attention to particular taxa, while existing scientific capacity and data availability can also shape what becomes visible and actionable in policy, monitoring programmes, and assessments.

There is a positive association between taxonomic effort and variables linked to policy initiatives, such as the Habitats Directives. However, this alignment is not universal:

- **The marine void:** Marine-related policy variables show a significant negative association with research effort, despite the monitoring requirements of the Marine Strategy Framework Directive. This highlights a potential mismatch between monitoring obligations and available expertise for marine biodiversity relative to terrestrial groups.
- **The conservation “catch-22”:** A substantial fraction of European Red List species are flagged as needing taxonomic research or remain Data Deficient. Limited taxonomic capacity can constrain the number of red list assessments, and where taxa remain unassessed, they may attract less attention of funding, training, and monitoring systems, thus widening the gap.



Image. *Mesoplodon europaeus*. Source: WikiCommons

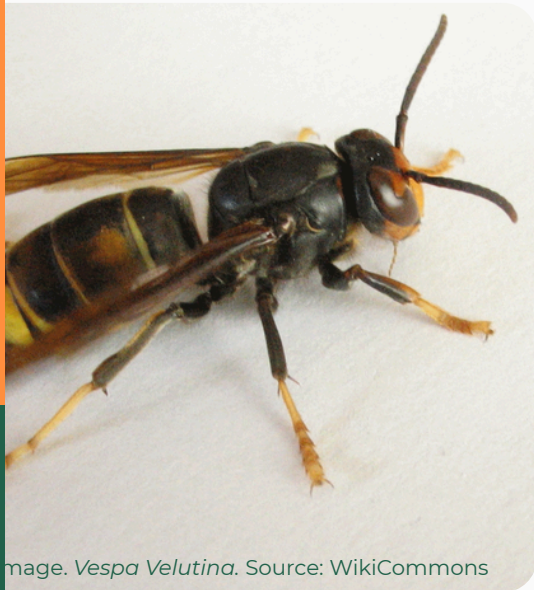


Image: Vespa Velutina. Source: WikiCommons

## 2 BIOSECURITY GAP FOR INVASIVE ALIEN SPECIES

Taxonomy is the first line of defence against invasive species, but readiness is uneven:

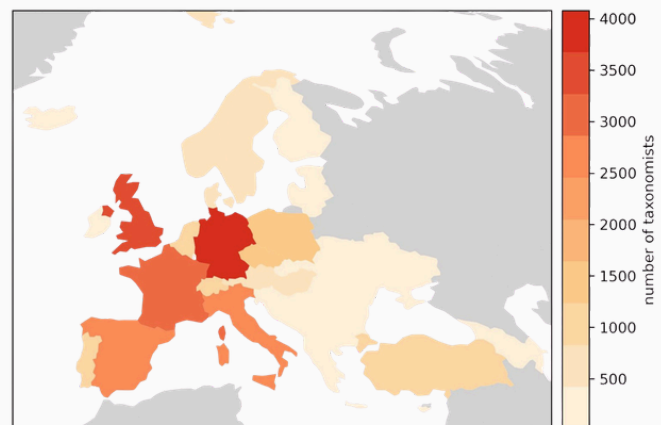
- ↘ Capacity aligns relatively well with well-known regulated species (often vertebrates and plants), **but horizon threats, especially invertebrates and aquatic organisms, face persistent expertise shortages.**
- ↘ Europe is comparatively well equipped to recognise species already on lists, but **is less prepared to detect novel or emerging threats at an early stage.**

## 3 TAXONOMIC AND GEOGRAPHIC BIAS IN EXPERTISE

European taxonomic effort is unevenly distributed across taxa and geography, and does not consistently align with where knowledge gaps are greatest:

↘ **Taxonomic bias:** Publishing effort remains disproportionately focused on vertebrates and vascular plants, while many ecologically critical and hyperdiverse groups, particularly non-insect invertebrates, fungi, algae, and soil biota, remain underserved.

↘ **Geographic divide:** A pronounced east-west divide persists. Northern and Western Europe host a larger share of taxonomists and biodiversity observers, while parts of Eastern Europe have fewer experts both in total and per capita, which can weaken pan-European monitoring coverage and create geographic blind spots.



The number of taxonomists per country in Europe. Note that there is a strong correlation between the population of the country and the number of people, rather than a correlation between the number of species in that region and the number of taxonomists.

## Implications for CETAF institutions

The findings indicate a strategic case for better aligning how taxonomic capacity is valued and deployed across Europe's taxonomic institutions.

### Value policy-relevant outputs:

Policy needs are often met through checklists, identification keys, Red List reassessments, verification of monitoring records, reference libraries, and advisory work, not only through high-impact journal papers. Evaluation systems should recognise these outputs as core scientific contributions and utilise them as a critical baseline.

### Treat collections as monitoring infrastructure:

Specimens, identifications, and reference collections, held in collections at CETAF member museums and herbaria, are essential for validating biodiversity observations and supporting consistent reporting, especially where regional institutional capacity is weaker.

## Recommendations

### 1 STREAMLINE STRATEGIC PRIORITISATION OF FUNDING

**Shift from general “gap-filling” toward targeted capacity building where policy demand most exceeds supply.**

- ▼ Launch joint funding calls and training pipelines for marine biodiversity (especially marine invertebrates) and chronically underserved groups (e.g., fungi, algae, aquatic non-insect invertebrates, soil organisms).
- ▼ Direct resources to reduce the east-west capacity gap, including mobility schemes, shared infrastructure access, career development pathways, and co-funded posts or networks in under-resourced regions.

### 2 INTEGRATE TAXONOMY INTO THE POLICY CYCLE

**Break the Data Deficient cycle by embedding expertise in decision-making and implementation.**

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- Formalise secondments and joint appointments of taxonomists with environmental agencies and statutory bodies supporting reporting, monitoring, surveillance and assessment.
- Establish national or regional taxonomic advisory councils to guide resourcing based on societal and legal needs, not only academic tradition.
- Support the development of European comprehensive platforms to identify joint resources by expertise groups and geographical coverage.
- Recognise that effective taxonomy depends on sustained international collaboration and long-term capacity building processes, especially with small countries that harbour high biodiversity, and that biodiversity distributions and threats routinely transcend political borders.

### 3 MODERNISE DATA LINKAGES

#### Make taxonomic knowledge policy-ready and traceable.

- Adopt persistent identifiers (e.g., Catalogue of Life / GBIF-aligned identifiers where appropriate / CETAF registries) in reporting guidance, checklists, and taxonomic outputs, enabling automated tracking of capacity gaps and trends.
- Develop identification resources such as reference (distributed) collections, diagnostic keys, validated reference libraries, barcodes where appropriate, for likely future invasive species before establishment.

### 4 IMPROVE IMPACT MEASUREMENT

#### Use reliable systems to create, assess and streamline impact derived from taxonomic work.

Advocate for the implementation of institutional and funding metrics that explicitly credit policy-grade taxonomy, such as identification, curation, checklists, keys, assessments and advisory roles, as essential research infrastructure.

Image courtesy of INC-STEP

## BOX: Europe's Position on Taxonomy Beyond Europe

### A STRATEGIC CHOICE IS NEEDED

European taxonomy has never been confined to Europe. For more than two centuries, European institutions have developed world-leading expertise on tropical and extra-European biodiversity, supported by specialist knowledge, long-term collaborations, and collections at CETAF member museums and herbaria. This capacity remains globally significant and is particularly important for many biodiversity-rich countries with small populations and limited taxonomic infrastructure. The European role for global taxonomic endeavours is pivotal to ensure a comprehensive knowledge base.



#### SUPPORT REMAINS ESSENTIAL.

Reliable taxonomy is foundational for conservation planning, Red List assessment, ecosystem restoration, sustainable use, and biosecurity. Yet, many tropical countries face an acute capacity challenge: species richness and endemism are high, but national research communities and reference infrastructures are often small. European partners can therefore play a critical role by contributing expertise, training, reference resources, and identification tools in ways that build lasting local capacity.



#### COLLABORATION AND PARTNERSHIPS LOWER KNOWLEDGE BARRIERS.

Access and benefit-sharing (ABS) frameworks are vital for equity and sovereignty, but they have also introduced practical and legal uncertainty into taxonomic research and specimen-based work. In the absence of clear and harmonised national guidance, institutions and researchers must navigate complex and sometimes inconsistent ABS interpretations. This uncertainty can slow or deter collaboration and research, and can fragment long-standing partnerships.



#### POLICY BRIDGES CAPACITY GAPS.

Europe holds globally important taxonomic capacity, but lacks a coherent mandate specifying when, where, and how that capacity should be deployed beyond Europe in a way that is legally robust, ethically sound, and mutually beneficial. A robust system and a clear mandate for European institutions is strategic to understand how taxonomy outside Europe is positioned within biodiversity diplomacy, development cooperation, research funding, and the Global Biodiversity Framework. It will facilitate to effectively use a core scientific strength at the moment when global biodiversity governance most depends on reliable taxonomy.

### Conclusions

**Taxonomy is a critical enabling infrastructure for biodiversity policy:** it underpins defensible species lists, reliable monitoring, effective reporting, and early warning for biosecurity risks. While taxonomic capacity and policy priorities are closely associated, the alignment is uneven both taxonomically and geographically. These mismatches risk creating persistent blind spots in assessment and surveillance, and can delay action where knowledge and identification capacity are most needed.

**A strategic response is therefore needed** to focus on measurable, policy-aligned capacity building that will require investing in priority taxa and regions, embedding expertise in assessment and regulatory workflows, and ensuring that taxonomic knowledge is traceable and interoperable through persistent identifiers and shared standards. This approach can help break reinforcing cycles of under-assessment and under-investment, and improve the resilience of Europe’s biodiversity knowledge base over time and across borders.

Finally, **achieving biodiversity goals also depends on sustained international collaboration**—especially with small though biodiversity-rich countries—reflecting that biodiversity does not follow political borders. Structural support to collective, supra-national organizations in the taxonomic domain will help overcome isolation and the fragmented allocation of critical taxonomic resources, thereby bridging the gap between what is needed and what is currently available. It will equally facilitate strengthening the position of European taxonomy to extra-regional coverage, with a perspective both global and long-term to address biodiversity understanding and preservation (see BOX).

Source material:

Groom Q, De Nolf M, Estupinan-Suarez LM, Meeus S. *Balancing the supply and demand for taxonomy: an analysis of European taxonomic capacity and policy needs.* (PLoS One, revised)



Transforming European Taxonomy through training, research and innovations



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Catalogue of Life

ecsa

