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Consortium of European Taxonomic Facilities

POLICY BRIEF

TAXONOMY AS AN INSTRUMENTAL COMPONENT IN THE IMPLEMENTATION OF ACTIONS AND POLICIES DEVELOPED UNDER THE GLOBAL BIODIVERSITY FRAMEWORK

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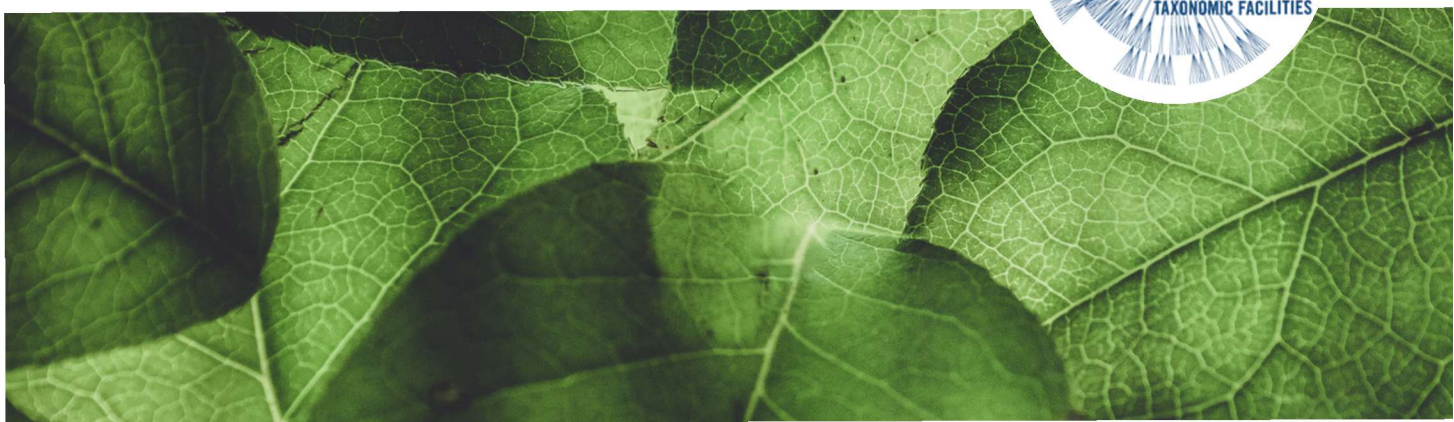
CETAF
CONSORTIUM OF EUROPEAN TAXONOMIC FACILITIES



Urgent global action for a global problem

On the 18th of December 2022 the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted during the fifteenth meeting of the Conference of the Parties (COP 15) under the Convention for Biological Diversity. This historic and ambitious framework outlines 23 targets for 2030 and 4 goals for 2050 that support the achievement of the global Sustainable Development Goals and provide a pathway to reaching the global vision of a world living in harmony with nature by 2050[1].

The GBF builds on the successes, gaps, and lessons learned to stimulate and guide the transformative actions needed at national, regional and local governmental levels, in partnership with societal actors, to effect change.

Taxonomy at the core of the Global Biodiversity Framework

Taxonomy, the science that deals with discovering, describing, naming, classifying and documenting species, in an evolutionary context, is fundamental to global efforts to understand past, present and future biodiversity. Under the premise that each species is a scientific hypothesis, taxonomic knowledge of species is an essential component in monitoring biodiversity, managing natural resources sustainably, identifying alien and invasive species, restoring nature and conserving natural habitats or threatened species.

Taxonomic research is the prerequisite for understanding species in an evolutionary framework. It forms the foundations for species circumscription, recognition and identification in nature. Robust environmental assessment actions that rely on species or the use of species-level indicators in monitoring, for example, all depend on solid and robust taxonomic foundations as well as the availability of the skills and tools needed to enable the recognition and naming or identification of biological entities. Taxonomic efforts lead to numerous outcomes, such as taxonomic treatments, floras or faunas, checklists and inventories that can be used as practical tools at different geographical levels; robust phylogenies that retrace evolutionary relationships and allow for the assessment of relatedness, genetic diversity and species diversity, amongst others.

Natural history collections contain biological specimens that provide historical records of species and their occurrences. Natural history specimens are a crucial source of information used by taxonomy scientists (taxonomists) to synthesise taxonomic knowledge on past and present biological entities. These same scientists also transmit information on species (scientific species names, circumscriptions, concepts, definitions and key characteristics) that is needed in applied research, such as genetics, ecology, conservation and environmental planning, as well as in the broader fields of crop science, forestry and fisheries, animal and human health, emerging diseases or food security, to name a few.

[1] https://www.cbd.int/gbf/targets/

Taxonomists, a red-listed species?

Taxonomists conduct research on specific taxonomic groups and species (e.g. taxonomic treatments) or taxonomic groups or species that are found in named geographical regions (e.g. floras or faunas), with the aim of understanding what species are, how they are defined, how they interact, where they are distributed and how they can be recognized. Taxonomic studies involve the examination of specimens and the analysis of all sorts of biological information derived from them, such as morphology, anatomy, chemistry, DNA, structure and composition. Analyses can be based on traditional techniques of observation, measurement, comparison, and scientific illustration as well as on innovative technologies that facilitate scientific experimentation and discovery. These can include using Artificial Intelligence and Machine-Learning tools, digital technologies, computer analysis programs, advanced DNA sequencing and analysis methodologies, high-resolution scanning and photographic image capture techniques, and spatial and geographic interpretation packages.

Specific scientific skills in taxonomy are linked to the analysis and interpretation of the different types of biological information on species followed by the synthesis and transmission of the scientific findings and hypotheses. Apart from efforts to understand species themselves, taxonomists aim to increase the body of taxonomic knowledge by transmitting their scientific findings. In doing so they mobilise and connect taxonomic knowledge intending to make it openly available to a broad user community, adhering to open access, open science and FAIR (findability, accessibility, interoperability, reusability) data principles. The generation of taxonomic knowledge is supported by publishing mechanisms that are used to contribute to the body of knowledge and diffuse scientific findings to a wide public. Of special importance are the open access and freely available scientific journals that facilitate publishing for the scientists and the accessibility of the data or information for the end users.

Fostering taxonomic skills

Recognising and fostering the importance of taxonomic research, sustaining taxonomic expertise and the encouragement of new generations of scientists that engage in describing, documenting and understanding species and their relationships will be key to ensuring that the competencies that are needed within the GBF are mobilised and available both now and in the future.

Taxonomy training and capacity building, reinforcing the taxonomy workforce in natural history institutions and science centres, and the promotion of taxonomic skills in different segments of society are key actions to foster through the funding of research programmes, taxonomy initiatives and outreach or engagement activities. Taxonomic work and findings, together with the increased availability of modern tools and technologies for data analysis and species recognition as well as for data mobilisation, sharing and inter-interconnectivity, need to be integrated into funding mechanisms and policy making.

To ensure that investments are both fruitful and sustained, strong and efficient taxonomic infrastructures are required at local, national, regional and global levels to support the multiple layers of taxonomy and foster interactions between stakeholders and practitioners. Supporting scientists in their work ensures the accessibility of taxonomic knowledge to stakeholders in a sustained, coordinated and collaborative manner.

A lack of sufficient taxonomic expertise will be a major obstacle in effecting impactful conservation actions, implementing sustainable use strategies and in any actions aimed at the monitoring or management of biodiversity under the GBF. As the outcomes of taxonomic endeavours, and more specifically the taxonomic expertise and experts, are essential in the achievement of the 23 targets and 4 goals under the GBF, a transformative change is needed to integrate taxonomic knowledge into political thinking and provide adequate resources to support taxonomic endeavours, taxonomic expertise and taxonomy initiatives.

CETAF - the voice of an instrumental expert community

The Consortium of European Taxonomic Facilities (CETAF), with its 44 members representing 77 natural history institutions from 25 European countries and Associated states, stimulates scientific exchange, the development of collaborative research projects and common initiatives in the realm of biodiversity sciences. It acts as a united voice for taxonomy in and across Europe and is the principal interlocuter for the community at the science-policy interface.

The natural history institutions that are members of CETAF collectively curate an estimated 1.5 billion natural history specimens that represent around 80% of the biodiversity described worldwide. CETAF also unites Europe's taxonomic expertise with about 5000 scientists conducting research within CETAF member institutions. One of the fundamental competencies of natural history institutions is that of taxonomy, the practice of taxonomy, fostering taxonomic expertise and ensuring taxonomy training and capacity building. CETAF gathers the European community of taxonomic expertise with a representative and united voice. The association supports the integration of taxonomy, the practices of taxonomy, taxonomic expertise and taxonomic knowledge into political thinking, policy making, scientific education and societal scientific literacy.

Ultimately, CETAF recognises that the taxonomic knowledge and expertise needed to study and protect biodiversity across Europe, and beyond, must be easily and openly accessible, sustained over time, and integrated into decision-making processes at all levels of society. Inspired by the goals of conservation and sustainability of life on Earth set out in the 2030 Biodiversity Strategy for Europe and fine-tuned in light of the global biodiversity landscape as outlined in the GBF, CETAF claims for the recognition of the importance of taxonomy in the GBF, the necessity of fostering taxonomy and taxonomic expertise, and the political and financial backing for collections-based research organisations. CETAF pledges its resources, knowledge, and expertise in support of the realisation of the GBF within the context of European policies and implementation actions.

RECOMMENDATIONS FOR A MULTIDIMENSIONAL APPROACH TO TAXONOMY

Taxonomy-policy interface

Acknowledging the key role of taxonomy and taxonomic expertise under the GBF and the importance of taxonomic knowledge in supporting related policymaking.

1. Taxonomy, taxonomic expertise and taxonomic knowledge should be integrated into strategic thinking, planning and policymaking on biodiversity, recognising the need for taxonomic competencies to implement the Kunming-Montreal Global Biodiversity Framework (e.g. allocating "taxonomy" in biodiversity-related strategies and providing the necessary financial, technical and infrastructural support).

2. Taxonomy and taxonomic research should be provided with the necessary resources through the funding of framework programmes, special initiatives and related mechanisms (such as in LIFE and Horizon Europe calls), and targeted actions (e.g., Red List of Insect Taxonomists extended to other organisms).

3. Taxonomic expertise should be strengthened, sustained and channelled through specific initiatives developed at the European level (e.g., the Transforming European Taxonomy through Training, Research and Innovations - TETTRIs project, the development of a Taxonomy Platform, coordinated contributions to the Biodiversity Knowledge Hub, creation of multidisciplinary research teams to address key scientific questions, strengthening of partnerships such as with Biodiversa+, BioAgora and others) as well as integrated into strategic biodiversity assessments or actions (e.g. monitoring, restoration and conservation initiatives).

Scientific taxonomic knowledge

Moving towards connected and widely available, understandable, taxonomic knowledge with data generation, analysis, interpretation, mobilisation, capture and linkage fully supported.

4. Taxonomic knowledge, once acquired through research, is assembled, linked, curated and diffused using systems of reference collections, registries, databanks and data aggregators that use agreed processes and standards, with support for linking to European research infrastructures (such as Distributed System of Scientific Collections - DiSSCo). The generation, mobilisation and connectivity of taxonomic knowledge should be encouraged through the strategic development of the research on and digitisation of natural history collections.

5. The mobilisation and use of taxonomic knowledge should be promoted by the implementation of new advanced technologies for data capture, analysis and diffusion, to develop and implement new methods for species identification and recognition (e.g., as developed under TETTRIs for sound and image recognition, or the use of geospatial satellite images), and to establish linkages between observations and data aggregators.

6. The open and freely available publication of taxonomic knowledge should be supported through the wide implementation of new research assessment indicators, the encouragement of open-access journals (such as the European Journal of Taxonomy) and the availability of the necessary publishing tools and data release mechanisms

Taxonomic expertise

Creating the conditions needed to sustain taxonomic expertise and attract new generations of skilled professionals and engaged citizens.

7. Taxonomic expertise should be recognised as an essential scientific skill in the European research landscape, integrated into academic curricula (e.g., through a European Agency of Taxonomy, development of coordinated and funded taxonomy discovery and training initiatives) and sustained through a recognised and financed training and capacity building platform (e.g., the CETAF-DEST, Distributed European School of Taxonomy).

8. Taxonomic literacy and competencies should be increased through taxonomy-related initiatives (e.g through TETTRIs knowledge transfer mechanisms) focussing on sampling, identifying, and studying biological specimens and on co-creating taxonomic knowledge with amateurs, engaged citizens, and students.

9. Taxonomic capacity should be increased by creating jobs and promoting career opportunities to maintain and increase the number of skilled taxonomists in the workforce (e.g by replicating the EUPoMS schema and developing transition schemas to the private sector such as Taxonomists in Residence).

In partnership, we need to ensure the sustained generation, curation and diffusion of taxonomic knowledge that is harmonised, understandable and accessible to all user communities as well as facilitating the integration of scientific findings on biological organisms into political thinking, funding mechanisms and policymaking to more effectively attain the targets and goals outlined in the 2022 Global Biodiversity Framework.

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