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The Special Fund for the GTI - Case for Support Phase 1

Green paper with vision text on scope and use of the Special Fund for the Global Taxonomy Initiative 25.08.2010

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00. Background

Through the United Nations, the governments of the world that undersigned the Convention on Biological Diversity (CBD) have acknowledged that the taxonomic impediment seriously hinders the implementation of the Convention's objectives. To remove this obstacle, it has been suggested that the standing taxonomic community receives increased support, that new cohorts of young taxonomists be trained and installed according to modern standards and that the infrastructure of taxonomic institutions is enhanced so that access to and generation of taxonomic data is facilitated.

With the Global Taxonomy Initiative (GTI), the CBD has installed its mechanism to remove the taxonomic impediment. Both at the political and the scientific level, the GTI has resulted in significant progress. Unfortunately though, the taxonomic impediment continues to exist, especially in, but not limited to, developing countries where funding for pure taxonomic projects and long-term positions remains very problematic. This seems to be due, among others, to the Operational Strategy of the Global Environment Facility (GEF, CBD's financial body) that only implicitly addresses the taxonomic impediment, and this through issues such as the ecosystem approach or protected areas.

In COP Decision VIII/3, parties to the CBD asked to explore other options than GEF funding to address the need for long-term sustainable funding of human and institutional taxonomic capacity. BioNET INTERNATIONAL together with a few other relevant organizations and in consultation with the Coordination Mechanism for the GTI, were invited to establish a *Special Fund for the Global Taxonomy Initiative* (SF for the GTI).

In COP Decision IX/22 parties to the CBD welcomed the progress made toward the establishment of this Special Fund and encouraged BioNET-INTERNATIONAL and the Interim Steering Committee of the GTI Special Fund to operationalise the Fund prior to 2010 and this by taking into account the objectives of capacity-building, the promotion of technology transfer and the acceleration of the build up of taxonomic knowledge.

At COP 10 in Nagoya, Japan (October 2010), parties may expect the Special Fund for the GTI to be formally announced as a functional entity. This is clearly not a straightforward endeavour. Hence the need for the lead actor, BioNET INTERNATIONAL, to get the support from independent, but knowledgeable third parties, prior to COP 10. With the financial support of the European Community, BioNET INTERNATIONAL worked out several routes to attain this goal: a call for a case for support being one of them.

01. A Case for Support: phase I

The aim of the first phase (the green paper) is to deliver a concise vision text on the potential scope and the use of the SF for the GTI.

The second phase (the white paper) will build on the previously delivered vision text with an analysis of the most important existing resources and good practices in taxonomy. This will allow priority setting on what types of taxonomic capacity building and taxonomic research are most urgently needed, especially by developing countries. Through an analysis of existing training resources, the white paper will also provide recommendations on best practices in knowledge and skill transfer, especially to developing countries.

02. What could be the scope of the Special Fund for the GTI?

Taxonomy is the science of discovering, collecting, describing, naming and classifying taxa (*i.e.* groups of organisms which a taxonomist adjudges to be a unit). In this process, natural history collections are made, developed, maintained and comparatively studied so as to expand our knowledge of biodiversity.

It is our proposal that funding should be allocated only to taxonomic research and collection management.

Other fields of research (*e.g.* ecology, physiology, conservation biology) that have linkages with taxonomy but that potentially can receive funding from a wide range of donors should be ineligible.

This may seem trivial but, to the taxonomist who has been defending his trade since decades, and who is used to hide his taxonomic research questions in projects that appeal to the funding bodies, it is quite a bit of a paradigm shift.

The scope of the SF for the GTI could therefore be best encapsulated in a clear and simple message that breathes the will to advance taxonomy and collection management *per se*. A phrase to catch the scope of the Special Fund for the GTI[1] could be:

The Special Fund for the GTI finances taxonomic capacity building, taxonomic research and collection management and acts as a catalyst to lever additional funding for long-term careers in taxonomy and collection management.

An important question that will have to be addressed is whether or not the Special Fund to the GTI will be open to the least developed countries only or also to the other developing countries, countries with economies in transition, and even to industrialised countries.

We believe the option to have the LDCs as sole beneficiaries to be the most operational, at least in the initial phase. This would enable the Trust Fund to meet some of the most pressing needs. It could also well be a pragmatic solution in case of limited financial resources. However once the Special Fund is well established, it might be useful to open it up to other countries as well to allow a better build up of partnerships and the exchange of taxonomic information.

03. What activities *could* the Special Fund for the GTI support?

With the scope of the SF in mind, a number of legitimate activities can be listed.

DETECTING AND COLLECTING TAXA

All taxonomic research starts with the discovery of taxa which can be done in the field but also in existing natural history collections.
Priority for exploration projects could go to:

- ⇨ Poorly known taxa
- ⇨ Poorly studied collections; especially those rich in types
- ⇨ Taxa of particular importance (*e.g.* invasive species, endangered species, endemic species, indicator species)
- ⇨ Taxa with particular economic value (*e.g.* for food, for biopharmaceutics, for biocontrol)
- ⇨ Poorly explored or special regions, ecosystems, or habitats
- ⇨ Areas in LDCs with known high biodiversity.

In order for natural history collections to grow, specimens must be collected in the field. For collection to be as good as possible, appropriate equipment and supplies must be available to the collector.
The SF for the GTI could foresee funding for:

- ⇨ Travel and sampling
- ⇨ Sampling and storage equipment and supplies
- ⇨ Transportation of collected material to relevant taxonomic institutions
- ⇨ Organization of expedition
- ⇨ First sorting of collected specimens
- ⇨ Organizing training workshops in sampling and sample-processing techniques.

COLLECTION MANAGEMENT

Natural history collections, be it specimens or cultures, provide the vouchers for taxonomic research and education. They also give account of genetic and morphological variation and of species distributions at a given time and some, the type specimens, form the international standards on which scientific names are based.
The SF for the GTI could foresee funding for:

[1] We have deliberately chosen to omit funding for the workings of the GTP Secretariat and for running the campaign. This is also the reason why we employ SF and not GTPF. Using SF is also in line with the COP Decisions.

- ⇨ Management, conservation and care of existing natural history collections
- ⇨ Activities that link existing natural history collections, *i.a.* through support of inter-institutional partnerships
- ⇨ Activities that provide better access to natural history specimens and derived collections such as DNA libraries and digital images
- ⇨ Training of collection managers, technical assistants and encoders
- ⇨ Long term positions for collection managers and technical assistants
- ⇨ Build up of new and derived collections.

IDENTIFICATION / NAMING

Natural history collections have their largest value when the composing specimens are correctly identified and labelled with the correct/valid scientific name. Identification is done through the usage of tools such as identification keys or barcodes, but also through the comparative study of voucher specimens and the literature describing them.
The SF for the GTI could foresee funding for:

- ⇨ The digitization of existing and valued identification keys
- ⇨ The making of new identification keys; on paper and in electronic form
- ⇨ The making of local to regional field guides
- ⇨ The generation of barcodes or other identifiers
- ⇨ Exchange of duplicate vouchers
- ⇨ Travel grants to natural history collections, both to have senior taxonomists reliably identify reference collections and to have beginning taxonomists learn from reliably identified specimens as well as from types
- ⇨ Cleaning of nomenclatural databases
- ⇨ Training workshops in identification
- ⇨ Training workshops in nomenclature.

DESCRIPTION / PUBLICATION

Identified material must be described and published so that fellow-biologists can recognize the taxon. For new (sub)species and higher taxa this is mandatory to make the scientific name available.
The SF for the GTI could foresee funding for:

- ⇨ Training workshops in scientific writing, both via traditional means and via emerging e-tools (*e.g.* scratchpads) and e-platforms (*e.g.* Zookeys)
- ⇨ Publishing taxonomic work at best option (*e.g.* for enabling publication of color pictures; for providing open access, etc.).

CLASSIFICATION

Once specimens are correctly identified, they have to be stored in a hierarchical classification system that reflects the evolution of the group. This means that the phylogenies must be deciphered.

The SF for the GTI could foresee funding for:

- ⇨ Phylogenetic study of biodiversity for the purpose of understanding character evolution, causal biogeography, co-evolution and natural classification of taxa.

04. What activities are currently supported by existing funding schemes?

We decided to answer to this question by analyzing the efforts of three countries that fund taxonomic capacity building and taxonomic research.

This analysis will be further elaborated in the white paper so that gaps in existing types of funding for (a) taxonomic capacity building and (b) taxonomic work and output become clearer. This analysis will also allow us to put a price on the desired activities.

04.1. The US through its National Science Foundation

Without doubt the US National Science Foundation is at the forefront of financing taxonomy. Six of its programs touch directly on taxonomy.

- ⇨ **The Partnerships for Enhancing Expertise in Taxonomy.** A program that in partnership with academic institutions, botanical gardens, freshwater and marine institutes, and natural history museums, seeks to enhance taxonomic research and help prepare future generations of experts. Through its Special Biennial Competition in Systematic Biology, the NSF has supported competitively reviewed projects that target groups of poorly known organisms for modern monographic research. Projects train new taxonomists (two per project minimally) and translate current expertise into electronic databases and other products with broad accessibility to the scientific community.
  Project duration is five to six years; average funding per project is around 600,000 $.
- ⇨ **The Dimensions of Biodiversity Initiative.** This new program seeks to characterize biodiversity on Earth by using integrative, innovative approaches. It focuses on the integration of genetic, taxonomic, and functional dimensions of biodiversity.
  Project duration and amount of funding per project could not be retrieved.
- ⇨ **Planetary Biodiversity Inventories (PBI).** To accelerate the discovery and study of the world's biodiversity, proposals are invited from teams of investigators to conduct a worldwide, species-level systematic inventory of a major group of organisms. Each project should conduct fieldwork necessary to fill gaps in existing collections, produce descriptions, taxonomic revisions, web-searchable databases, and interactive keys (or other automated identification tools) for all new and known species in the targeted group, analyze their phylogenetic relationships, and establish predictive classifications for the group. Proposals may target any particular group of organisms, from terrestrial, fresh-water, or marine habitats, at any feasible level in the taxonomic hierarchy, but must be global in scope.
  Project duration ranges from 6 to 8 years, funding per project is around 3,550,000 $.
- ⇨ **The Systematic Biology Program** supports the scientific study of biological diversity and phylogeny, for all groups of organisms and for all habitats on Earth, including marine environments. Activities include the discovery and description of species, the organization of taxonomic information into hierarchical predictive classifications associated with efficient, reliable identification keys, and the analysis of evolutionary and biogeographic relationships among groups of species and across the tree of life. This program also supports revisionary and monographic research on species that fully utilize modern information technology at all stages from data capture and analysis to electronic dissemination of results.
  Project duration and amount of funding very variable.
- ⇨ **The Biodiversity Inventories Program** supports expeditionary work to discover, describe, and document plant, animal, and microbial diversity throughout the world, whether terrestrial, freshwater, or marine, and with emphasis on well-vouchered natural history collections, or stocks and cultures including associated databases. Supported surveys may be primarily area-based (i.e., focusing on species inventory and discovery, including biogeographic or evolutionary hypothesis testing), clade-based (i.e., continental-scale to global species inventory for a particular taxonomic group, including evolutionary hypothesis testing), or guild-based (i.e., surveys that couple species inventory and discovery with ecological hypothesis testing). DNA inventory projects that do not address organismal diversity are discouraged in this program.
  Project duration and amount of funding very variable.
- ⇨ **Assembling the Tree of Life (AToL)** is an annual special competition to construct a phylogenetic tree that includes all major groups of organisms, the "Tree of Life." Proposals are invited that either focus on a particular taxonomic group or on the development of a tool, methodology or theory that supports the mission of AToL.
  Project duration on average 5 years, funding per project ranges from 55,000 $ to more than 5,000,000 $.

Next to these six programs, the US NSF also has a program for equipping off-campus research facilities.

- ⇨ **The Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Laboratories** (FSML). FSMLs support biological research and education by preserving access to study areas and organisms, by providing facilities and equipment in close proximity to those study areas, and by fostering an atmosphere of mutual scientific interest and collaboration in research and education. To fulfill these roles, FSMLs must offer modern laboratories and educational spaces, up-to-date equipment, appropriate personal accommodations for visiting scientists and students, and modern communications and data management systems for a broad array of users.
  Funding per project ranges from 23,000 $ to 1,000,000 $ with a project duration of 3 years.

Strengths: The US NSF programs in taxonomy can safely be called very comprehensive; expeditions are conducted, collections are built and cared for, descriptions and keys are constructed and made widely available, phylogenies are made to underpin classification, new cohort of taxonomists are trained, worldwide inventories are made, and funds are in place to provide infrastructure.

Weaknesses: (i) no funding for long-term positions in taxonomy and collection management; (ii) priority setting of the taxon to be studied rests with the available expertise; (iii) there's no specific mobility fund foreseen (but this is countered by other initiatives such as the Ernst Mayr Travel Grants)

04.2. The UK through The Department for Environment, Food and Rural Affairs

DEFRA's program for biodiversity, which touches on taxonomy and collection management, is called 'the Darwin Initiative' (DI). It assists countries that are rich in biodiversity but poor in financial resources to meet their objectives under the Convention on Biological Diversity (CBD); the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); and the Convention on the Conservation of Migratory Species of Wild Animals (CMS). The DI funds collaborative projects that draw on UK biodiversity expertise.

Darwin projects address issues in the areas of institutional capacity building, training, research, work to implement the CBD and environmental education or awareness.

To enhance the legacy and impact of the Darwin Initiative three types of Darwin funding that complement the normal Darwin projects have recently been introduced: a fellowship, a grant and post-project funding.

Strengths: the Darwin Initiative is active since 1992. Its focus is on developing countries that can benefit from UK-based expertise and partnerships. Exit strategies lever the possibility of acquiring long-term positions.

Weaknesses: the focus is not on taxonomy per se, although some of the Darwin projects explicitly fund capacity building and taxonomic research.

04.3. South Africa through its Department of Science & Technology, its National Research Foundation and the Department of Environmental Affairs

South Africa's taxonomic capacity building initiative is called the South African Biosystematics Initiative (SABI). Its vision is: "To develop a representative community of biological systematists - well supported by government and society - that addresses exciting and important issues relevant to South Africa's rich biological heritage". The South African Department of Science & Technology and the National Research Foundation jointly support the activities of SABI.

SABI (i) addresses dwindling national capacity in systematics, (ii) provides leadership and co-ordination to promote innovative research in the field of systematics, (iii) empowers South African systematists to employ and develop modern scientific technologies and approaches with regard to the documentation and use and of biological resources, (iv) enhances the ability of South African systematists to contribute to the National System of Innovation and the information society, and thus to respond to national priorities in agriculture, health, sustainable development and conservation, assists the broader scientific community and government in the fulfilment of national and global

biodiversity-related commitments, and (v) promotes awareness of the importance of systematic research in the broader community through education and outreach projects.

SABI is organised into four main but interlinking thrusts namely: (i) research; (ii) education and training (student bursaries, student international travel grants, and workshops/training courses); (iii) infrastructure (not funded directly through SABI); (iv) public understanding of science.

Next to SABI, there's also SANBI: South African National Biodiversity Institute. SANBI is a public entity under the Department of Environmental Affairs. Biosystematics research at SANBI focuses on morphological, molecular and anatomical observational studies, and is mostly carried out in SANBI's three herbaria i.e. the National Herbarium (PRE) in Pretoria, the Compton Herbarium (Kirstenbosch NBG) incorporating the South African Museum Collection (SAM) in Kirstenbosch, and the KwaZulu-Natal Herbarium (NH) in Durban.

Strengths: SABI represents a very comprehensive program that addresses many of the hurdles taxonomists encounter. Funding is in place to sustain inter-institutional research projects that make possible the exploration and the integrative taxonomic revision of S. African biota. Funding is also specifically foreseen for products such as taxonomic keys, whereby emphasis is put on the production of digital keys, be they dichotomous or matrix-based. Through bursaries and fellowships beginning as well as advanced taxonomic researchers are enabled to build capacity. Mobility and outreach of young and upcoming taxonomists is encouraged by issuing international travel student awards. Assistantships and fellowships enable employment of different levels of staff (for the duration of the project). The SABI program is also a showcase of transparency in the criteria used for rating. SANBI has a permanent staff, some of them taxonomists.

Weaknesses: focus is on taxonomic study of South African biota only.

05. How should the Special Fund for the GTI work?

This question will be the object of the white paper that will provide suggestions on how the SF for the GTI can complement existing funding for taxonomic capacity building (including education), taxonomic research, and careers; especially when taking into account the outcome-oriented deliverables for the program of work of the GTI.

Priority criteria and funding criteria for allocation of the SF for the GTI will also be discussed.

06. Conclusions of the Green paper

A lot of funding bodies exist for supporting biodiversity research (see also the Catalogue of Funding Sources as compiled by the Secretariat to the CBD, annex 1; List of funding sources as compiled by the Belgian GTI, annex 2). However, relatively little of the available money goes directly to taxonomy, nomenclature or collection management.

Our first analysis showed that the paucity of permanent positions in taxonomy and collection management hinders progress; a fact also noted by the COP (c.f. COPIX/22; annex: output 2.5.3 notes that the taxonomic workforce must be doubled by 2020). We are convinced that the SF for the GTI could, at least partially, alleviate this need by acting as: (i) a source of funding for short term job positions (fellow-and assistantships) and, (ii) a catalyst to lever additional funding allowing the build up of an adequate, sufficiently large and sustainable taxonomic workforce.