

GLOBAL TAXONOMY INITIATIVE FORUM
Online, 2-4 December 2020

DRAFT GLOBAL TAXONOMY INITIATIVE IN SUPPORT OF THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

Background

1. The Conference of the Parties at its thirteenth meeting requested the Executive Secretary to commission an independent evaluation of the impacts, outcomes and effectiveness of the short-term action plan (2017-2020) to enhance and support capacity-building for the implementation of the Convention and its Protocols, including recommendations for improvement, to be submitted to the Subsidiary Body on Implementation for its consideration at its third meeting (paragraph 15(g) of decision [XIII/23](#)).
2. Further to the decision above, the Subsidiary Body on Scientific, Technical and Technological Advice requested the Executive Secretary at its twenty third meeting, pursuant to decision [14/24](#) and subject to the availability of resources, to develop proposals for an inclusive process to review and renew technical and scientific cooperation programmes, including the Bio-Bridge Initiative, the Forest Ecosystem Restoration Initiative and the **Global Taxonomy Initiative**, in order to support the post-2020 global biodiversity framework (paragraph 2 of recommendation [23/6](#)).
3. The same recommendation further requested the Executive Secretary to provide an initial compilation and analysis of information on relevant institutional arrangements, and networks at the global, regional and/or subregional levels relating to different thematic topics (paragraph 5(c) of the same recommendation).
4. In response to the recommendation [23/6](#) and the relevant decisions above, the Executive Secretary convened a Global Taxonomy Initiative Forum (hereafter, 'the Forum', notification [2020-089](#)) to collect information on the institutional arrangements, networks, underlining the importance of robust technical and scientific cooperation and other means of implementation in supporting the implementation of the post-2020 global biodiversity framework, and inform the process of the third meeting of the Subsidiary Body on Implementation.
5. The Forum is organized, in collaboration with the Government of Germany through the co-hosting Museum für Naturkunde Berlin, Germany. The outcome will be published in the form of CBD Technical Series No. 96 with generous financial support from the Government of Japan through the Japan Biodiversity Fund for the purpose of sharing and using taxonomic knowledge and tools widely on the ground.
6. The annex I to this document contains the working material of the Forum, which is composed of the following sections: (i) Introduction, (ii) Theory of Change – GTI for the Post-2020 Global Biodiversity Framework, (iii) New approaches and emerging opportunities for taxonomy, (iv) Taxonomic tools for biodiversity identification and conservation, (v) sharing taxonomic information and knowledge of species globally, (vi) engaging with broader sectors, (vii) mobilizing resources and collective support and (viii) support for monitoring the status of biodiversity and progress of the implementation of the Post-2020 Global Biodiversity. All participants to the Forum are invited to provide information and insight that will review the activities of the Global Taxonomy Initiative and propose renewed activities for informing the Subsidiary Body to review and renew the activities to submit updated proposals for consideration (paragraph 4 of the recommendation).
7. The annex I to this document was prepared by the organizers of the Forum and covers the information of the Global Taxonomy Initiative captured by the Secretariat over the last decade under the Capacity-building Strategies for the Global Taxonomy Initiative (annex to decision [XI/29](#)).

8. The Secretariat will incorporate the submissions from the participants of the Forum into the draft “*The Global Taxonomy Initiative in Support of the Post-2020 Global Biodiversity Framework*” in annex I, in order to collectively inform the Subsidiary Body on Implementation on the effective technical and scientific cooperation and capacity building that enable Parties to implement the global biodiversity framework and achieve associated targets.

9. All participants to the Forum may wish to review annex I and submit information in writing using the form in annex II to this document, as soon as possible and no later than the third day of the Forum, 4 December 2020 to secretariat@cbd.int.

Advance unedited

**THE GLOBAL TAXONOMY INITIATIVE IN SUPPORT OF THE
POST-2020 GLOBAL BIODIVERSITY FRAMEWORK**

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FOREWORD

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LIST OF PARTICIPANTS TO THE GTI FORUM 2020

EXECUTIVE SUMMARY

ABBREVIATION and ACRONYMS

Advance unedited

I. INTRODUCTION

The Global Taxonomy Initiative

1. The Global Taxonomy Initiative (GTI) was established by the Conference of the Parties to the Convention in 1996 at its fifth meeting (decision [V/9](#)) to advance taxonomy and provide capacity-building opportunities for countries where limitations in taxonomic capacity (taxonomic impediment) hinder the implementation of the Convention on Biological Diversity. The GTI Programme of Work was drafted with the GTI Coordination Mechanism composed by taxonomic experts with the terms of reference annexed to decision V/9, and adopted at the sixth Conference of the Parties in 1998 (annexed to [decision VI/8](#)).

2. Parties have designated the GTI National Focal Points by 2000, and in accordance with the programme of work for the GTI and later decisions ([VII/9](#), [VIII/3](#), [IX/22](#), [X/39](#) and [XI/29](#)), the GTI activities shaped over the time by voluntary contributions made by the GTI National Focal Points and the GTI partners. The GTI community has developed and share the outcome oriented deliverables (decision IX/22) include, but are not limited to:

- (a) Assessment of taxonomic needs at the national or regional levels;
- (b) Exhibition, species lists, databases to increase public awareness on biodiversity;
- (c) Capacity building in taxonomy through various forums, networks and bodies;
- (d) Taxonomic information systems;
- (e) Linking taxonomic information to thematic areas and cross-cutting issues under the Convention

3. At its 10th meeting of the Conference of the Parties, the Strategic Plan for Biodiversity 2011-2020 (decision X/2) with 20 Aichi Biodiversity Targets was adopted. To address the taxonomic impediment for Parties to achieve the Targets globally, the Capacity-Building Strategy for the Global Taxonomy Initiative was set with time-bound actions (annex to decision XI/29). The activities undertaken by expert organizations, networks, taxonomic institutions and among others have implemented the planned actions described in the Capacity-Building Strategy for the GTI, for example:

- (a) Workshops and training to address the taxonomic impediment;
- (b) Open access materials and their related platforms to share taxonomic tools;
- (c) Information infrastructure at the national and regional levels;
- (d) Specimen/culture collection infrastructure;
- (e) Engagement of young taxonomists/systematists to conservation, biodiversity monitoring programmes.

Achievements and lessons learned in 2010-2010

Global level

4. In line of the Programme of Work of the Global Taxonomy Initiative (annex to decision [VI/8](#)) and relevant decisions ([VII/9](#), [VIII/3](#), [IX/22](#), [X/39](#) and [XI/29](#)), progress was made by Parties, other Governments and relevant organizations to address the taxonomic impediment since the Strategic Plan for Biodiversity with associated Aichi Biodiversity Targets (decision [X/2](#)) was adopted. Target 19 in particular, which states by 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied to Parties, saw large contributions over the last 10 years by dedicated expert organizations, individual taxonomists and systematists. The [fifth edition](#) of the Global Biodiversity Outlook showed six targets have been partially achieved (Targets 9, 11, 16, 17, 19 and 20) at the global level. There has been a substantial increase in the amount of data and information on biodiversity available to the public, researchers and policy makers, including through the efforts of citizen science.

5. Consequently, according to the Catalogue of Life¹, the number of species known to science has increased from 1,257,735 in 2010 to 1,854,034 in 2020, and 38,278 species that were already extinct were added. Moreover, The Global Biodiversity Information Facility² reached a total of 1,633,212,433 biodiversity occurrence records in 2020. The Biodiversity Heritage Library³ made 58,939,912 pages of biodiversity literature accessible by 2020. The Barcode of Life Database systems (version 4)⁴ contains > 8,995,000 barcodes of animals, plants and fungi. The Encyclopedia of Life⁵ now compiles the biodiversity data and knowledge mentioned above to visualize life on Earth for the public.

The Sixth National Report

6. In its decision [XIII/27](#), the Conference of the Parties adopted guidelines to assist Parties in the preparation of their sixth national report. In its paragraph 5 the Conference of the Parties invited Parties to provide and develop indicators and use scientifically sound data for reporting and the assessment of progress in the achievement of national targets. Unfortunately, there is little consensus in the data collected and measured, as well as the format in which the data is presented among the national reports. Many Parties took broad approaches, often at the ecosystem level, to report qualitative progress made towards the national targets. The lack of quantitative data and baseline values made concrete assessments of changes in biodiversity rather difficult. The assessments of the effectiveness of measures taken by Parties to implement the National Biodiversity Strategies and Action Plans (NBSAPs) are often difficult. Those Parties where information and tools available and well applied were able to document and report the changes in species and ecosystems with evidence. However, indicators to monitor the progress of their conservation actions have not been successfully developed.

7. The suggested modular approach to build global knowledge with all countries being able to participate and strategically build their contributions has great potential. Each Party will require the taxonomic tools and knowledge that has so far been mostly achieved in, and with the aid of, developed countries. Existing regional strategies should be exploited to promote collaborations and to fast-track crucial action, particularly in less-developed countries currently lacking the capacity to monitor their evidence-based progress towards national action plans.

8. [Participants to the Forum are invited to supplement the 6th national reports in the context of the removing taxonomic impediment in the table, below.]

Table 1. Information on taxonomic capacity to supplement the sixth National Reports submitted by Parties.

Country/region name	Supplemental information to the sixth national reports on existing taxonomic capacity	Supplemental information to the sixth national reports on taxonomic needs and activities to help remove taxonomic impediment	Describe what mission target(s) become achievable in your country/region if the need or taxonomic impediment is resolved

¹ <http://www.catalogueoflife.org/>

² <https://www.gbif.org/>

³ <https://www.biodiversitylibrary.org/>

⁴ <http://www.boldsystems.org/>

⁵ <https://eol.org/>

9. The IPBES Global Assessment Report on Biodiversity and Ecosystem Services in 2019 has revealed the unprecedented rate of species extinctions and decline of wildlife population sizes as a result of human activities. The global community has been alerted by the scientific evidence that indicates that slowing species loss by 2030 and beyond may only be achieved through transformative change across economic, social, political and technological sectors.

10. As the GTI partners recognize and record biodiversity in the environment, evidence of the impact of human activities on the planet, such land use and climate change, the spread of invasive alien species, pollution and resource over-exploitation has accumulated. The contrast between the significant advancements in the field of taxonomy and the current status of biodiversity under threat seems to indicate that our knowledge and technologies in taxonomy, systematics and related bioinformatics are not being adequately applied to the efforts of conservation and sustainable use of biodiversity on the ground. The capacity of Parties to apply scientific knowledge and tools to address drivers of biodiversity loss is widening. Rapid changes in taxonomic methodologies and the advancement of related instruments will only widen the capacity gap between developed and developing countries unless effective action is taken.

11. Under the Convention on Biological Diversity there is an on-going process to develop the tPost-2020 Global Biodiversity Framework to set goals and targets for biodiversity in the next decade and create a stepping-stone for the 2050 vision of "living in harmony with nature".

12. To support the effective implementation of the Post-2020 Global Biodiversity Framework, the Global Taxonomy Initiative Forum, held online from 2 to 4 December 2020 in collaboration with the Government of Germany through the Museum für Naturkunde, Berlin, reviewed the activities undertaken by taxonomic institutions, relevant expert organizations, networks and other entities, including citizen science groups and indigenous peoples and local communities, and exchanged information on renewing activities of the Global Taxonomy Initiative and prepared proposals for the enhancement of technical and scientific cooperation and capacity development under the Convention.

13. This issue of Technical Series No. 96 contains the outcome of the Forum as the Global Taxonomy Initiative Framework 2021-2030 to support Parties by removing taxonomic impediment and enhancing capacity development in collective actions of taxonomic institutions, expert organizations, Governments, relevant international organizations and communities and beyond at all levels.

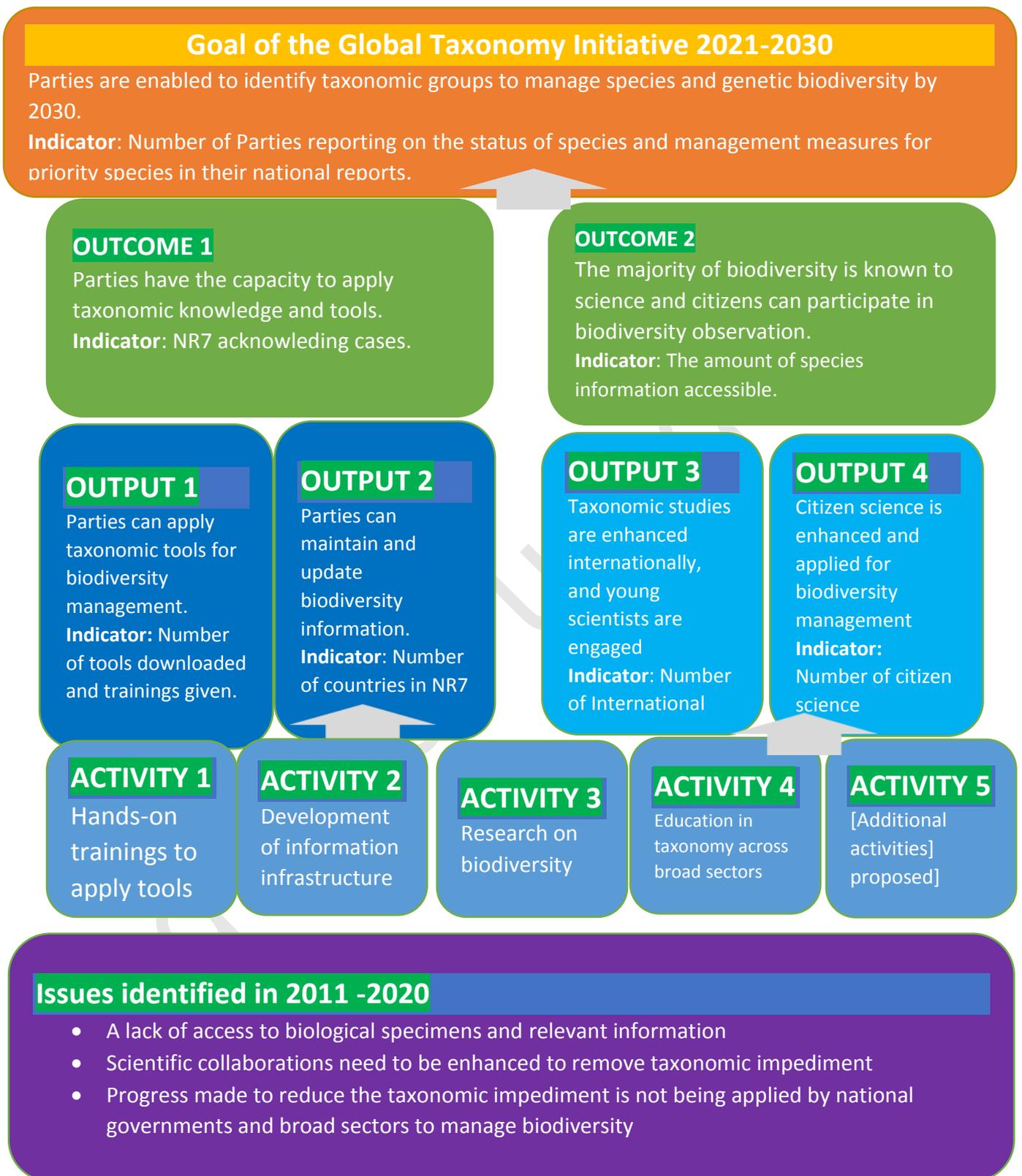
II. THEORY OF CHANGE – GTI FOR THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

14. This section presents the Theory of Change underlying the actions of the Global Taxonomy Initiative to support Parties to implement the Post-2020 Global Biodiversity Framework.

15. Aichi Biodiversity Target 19 states, by 2020, knowledge, the science base and technologies relating to biodiversity, its values, functions, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied. Across the world, taxonomic institutions, networks and international organizations have made tremendous gains in the discovery, description and sharing of biodiversity data through the use of advanced technologies and collaborative efforts. This accumulated knowledge however is not evident in many Parties' national reports, particularly in the those less developed countries where taxonomic expertise may not be sufficient to underpin the national management of biodiversity. Further encouragement for the application of those tools and appropriate technical and scientific cooperation as well as technology transfer seem to be needed to remove the so called taxonomic impediment in developing countries. To support the implementation of Post-2020 Global Biodiversity Framework it is vital to remove technical capacity gap, especially in the areas using DNA technologies and informatics, as the cost of such technologies has significantly decreased and the relevant tools are increasingly used as a standard method to observe and analyze biodiversity in many parts of the world, rapidly. The closing of technical capacity gap will therefore enable Parties to accelerate to achieve the goals of the Post-2020 Global Biodiversity Framework without leaving anyone behind. At the same time understanding of biodiversity in science also advances with active participation of biodiversity rich countries, once international collaboration and capacity development is sufficiently in place.

16. The figure below shows the overall elements considered by the Forum. The issues identified in the analysis of the sixth national reports and the findings of the fifth edition of Global Biodiversity Outlook highlight where the Global Taxonomy Initiative should focus its action in the next decade (2021 to 2030). To address the identified issues the outputs of the actions/projects of the Global Taxonomy Initiative 2021-2030 are aligned based on the informed activities. The outputs include: (i) the outputs of activities that need to be continued and scale up; and (ii) the outputs of activities that need to be renewed. The outputs that bring the meaningful change in technical capacity / readiness of Parties to implement the Post-2020 Global Biodiversity Framework are summarized as the outcome of the Global Taxonomy Initiative 2021-2030. Finally, the goal of the Global Taxonomy Initiative 2021-2030 in globally enabling Parties' technical capacity by 2030 is indicated with suggested indicators.

Figure 1. Theory of Change for the development of the Global Taxonomy Initiative 2021-2030 Framework.



NEW APPROACHES AND EMERGING OPPORTUNITIES FOR TAXONOMY

New genomics

17. The rapid development of molecular methods and proliferation of DNA and genome sequencing technologies over the past 20 years has brought about immense opportunities and power to document and study life on Earth. The molecular revolution has established a new era for taxonomy, from rapid, fully automatic identification of organisms based on DNA barcodes to documenting and monitoring the presence of large numbers of organisms in material samples and substrates via meta-barcoding approaches. The discovery and identification of new species does not necessarily require the traditional phenological description as in the past, enabling new areas for the application for taxonomy. The application of metabarcoding to environmental samples (i.e., eDNA) is leading to major advancements in agriculture, biomonitoring, and forensic sciences such as the detection of invasive alien species and illegal plant and animal use. It is now possible to non-destructively survey the species richness or genetic diversity of entire biological communities and track changes in composition over time. Through new genetic technologies, we are gaining biodiversity data at fine genetic, spatial and temporal resolutions.

Informatics and artificial intelligence

18. The automation of some part of the taxonomic workflow can accelerate and optimize species identification and naming. Automated species identification through the application of machine learning tools to images and molecular sequence data can recognize regularities and irregularities in character datasets and identify data clusters representative of phylogenetic and taxonomic groups. This method requires careful consideration to train models with the appropriate dataset, and the help of experts for verification and control. However, the advancement of automated technologies across many fields indicates this technique holds much interest and promise as a reliable approach for taxonomic initiatives.

19. Cloud-based services and programmes for data sharing, storage and use can provide cost-effective solutions for biodiversity monitoring. Data can be processed efficiently without downloading onto local computers where infrastructure may not exist. Compared to traditional personal computers and servers, cloud platforms also offer high computing efficiency, performance and storage capacity. By compiling and mobilizing taxonomic data at local and regional levels, global progress towards biodiversity targets can be realized.

Citizen science

20. Engaging volunteers and the public in recording biodiversity are low-cost, large-scale, and long-term options to detect, monitor, and surveil species. The processes itself not only raises awareness about the consequences of biodiversity loss but collects invaluable data. Citizen scientists with smartphones, geo-spatial and photographic applications like iNaturalist and SEEK (inaturalist.org) are aiding in the recording of species distribution changes. The co-operation between experts and non-experts for example, is capturing and increasing our knowledge of phenological changes in species activity as a result of climate change. As these technologies are shared, the amount and quality of citizen data is expected to increase, and place the future of biodiversity management and conservation more actively in the hands of the public.

III. TAXONOMIC TOOLS FOR BIODIVERSITY IDENTIFICATION AND CONSERVATION

21. The reliable and accurate identification of organisms and their objective placement in an established hierarchical classification system for unequivocal referencing and information exchange lies at the heart of taxonomy and biological systematics. As for any consideration or dealing with biodiversity, the identification of the respective organisms is a basic requirement. Taxonomy and taxonomic knowledge provides essential services that inform biodiversity assessments and conservation policy.. This section documents and describes invaluable taxonomic resources.

Taxonomic keys and field guides made accessible for taxonomic identification

Table 2. A non-exhaustive summary of important publicly available taxonomic keys.

Country /region	Name of the taxonomic keys	Provider name	Taxonomic group	URL
Australia	Plant identification aid	Australian National Botanic Gardens	Plantae	http://www.cpbr.gov.au/cpbr/cd-keys/index.html
USA	MICHIGAN FLORA ONLINE	University of Michigan Herbarium	Fern family Seed plants	https://michiganflora.net/family-key.aspx#key-a

Field guides made accessible for taxonomic identification

22. [Place holder for participants to inform on field guides accessible freely or printed and distributed for Parties, organizations and citizens]

23. The table below summarizes the field guides available for the public.

Table 3. Field guides made accessible for taxonomic identification.

Country/region name	Title of the guide	Taxonomic group	Contributors	URL, ISBN
ASEAN	Field guide to the Pteridophytes in Chiang Mai, Thailand	Pteridophytes	ASEAN Center for Biodiversity	https://aseanbiodiversity.org/wp-content/uploads/2017/05/FieldGuide-02-Pteridophytes.pdf
ASEAN	Guide to the bryophytes in the limestone glass house of Queen Sirikit Garden	Bryophytes	ASEAN Center for Biodiversity	https://aseanbiodiversity.org/wp-content/uploads/2017/05/FieldGuide-01-Bryophytes.pdf

DNA sequence-based taxonomic identification

24. [Place holder for participants to inform on the DNA sequence based taxonomic tools]

25. The table below summarizes the tools for DNA sequence based taxonomic tools.

Table 4 DNA sequence-based taxonomic identification.

Country/region	Organization/ name of the tool	Taxonomic group covered	Application	Platform/manual
Global	International Barcode of Life /DNA Barcoding	Animalia, Plantae Fungi	eDNA regulated species identification species inventory	BOLD systems (v3) http://v3.boldsystems.org/
Global	Tree of Life / Phylogenetic analysis	Animalia Plantae Fungi Chromista Protozoa		http://tolweb.org/tree/
USA with international collaboration	sppIDer	<i>Saccharomyces</i> <i>Lachancea</i> <i>Drosophila</i>	Hybrid genome identification	http://sppider.readthedocs.io

Biological collections and taxonomic institutions

26. Taxonomic collections have important role to preserve biological specimens, such as type specimens and equivalents. Those ex-situ preservation assures scientific researches and support the international collaborations. Access to, and exchange of the specimens for scientific research is indispensable for advance biodiversity sciences. This section indicates the status of such functions of specimen collections.

27. [place holder to report on the status, number of specimens, number of specimen loans in 2011-2020]

28. The table below summarizes the status of the number of specimens in museums, herbaria and culture collections and loans in 2011-2020.

Table 5. Summary status of the number of *specimens in museums, herbaria and culture collections and loans in 2011-2020.*

Country name	Collection name and collection ID	A total number of specimens / type specimens / referenced specimens	Specimen loans in 2011-2020	Remarks, if any

Special taxonomic interest groups and service providers

29. This section covers the information on broader data/service providers in relevance with taxonomic identification and related sciences.

30. [place holder for other initiatives, such as Red List, invasive alien species data sets, pests, pathogens, pollinators, protected areas, production land/water security]

31. The table below summarizes the tools produced by broader sectors in relevance with taxonomic identification and related sciences that are accessible for the public.

Table 5 Summary of tools produced by broader sectors in relevance with taxonomic identification and related sciences that are accessible for the public

Country name	Name of the tool	Name of the producer(s)	Description of the tool	URL
Global	Global Registry of Introduced and Invasive Species	Global Invasive Alien Species Information Partnership ; IUCN - Invasive Species Specialist Group	Alien species, invasive species occurrence information valid in science with information on their impacts, presumed pathways and occurrences	

SHARING TAXONOMIC INFORMATION AND KNOWLEDGE OF SPECIES GLOBALLY

32. Natural history collections have started digitizing specimen catalogs and historical data, and many type specimens have high-resolution images on the web. At the time of this publication, there are over 1.6 billion occurrence records available through the Global Biological Information Facility (gbif.org), and numerous curated species databases have been compiled for the Catalogue of Life (catalogueoflife.org). Collaborative scientific communities are driving the world's largest online database of images, specimen records, and natural history information on species of algae (Algaebase, algaebase.org), ants (AntWeb, antweb.org), birds (Avibase, avibase.bsc-eoc.org), fish (FishBase; fishbase.org) and marine organisms (World Register of Marine Species, WoRMS; marinespecies.org) to name a few. Genetic sequence data in the INSDC databases (GenBank, <https://www.ncbi.nlm.nih.gov/genbank/>), European Nucleotide Archive (ENA, ebi.ac.uk), DNA Data Bank of Japan (DDBJ, ddbj.nig.ac.jp), Barcode of Life Database (BOLD, bold.org) and SILVA ribosomal RNA database is growing fast and hold valuable resources for taxonomists. The proliferation of these data are excellent examples of what can be achieved in our progress towards identifying the world's biodiversity.

33. Numerous museums and herbaria have developed , digital high-resolution image datasets for their specimen collections.

34. It is important to identify the gap of taxonomic group and geographic coverage in the available datasets to improve the usage of taxonomic information and knowledge for the implementation of the Post-2020 Global Biodiversity Framework.

35. [place holder for participants to add information on databases available for the public, type of knowledge, use for biodiversity management etc]

36. The table below summarizes biodiversity databases and their application for biodiversity management/]

Table 6 Databases

Country/Region	Name of organization	Data standard	Taxonomic coverage And identified information gap, if any	Application	Platform / URL
Global	Global Biodiversity Information Facility	Darwin core (TDWG standard?)	Animalia Plantae Fungi Chromista Protozoa Bacteria Archaea	To collect species occurrence in locations	https://www.gbif.org/
Global	Catalogue of Life	(1) Accepted scientific name with references (2) Synonyms with references (3) Common names with references (4) Classification above genus (5) Distribution (6) Life Zone/Environment (7) Current and Past Existence (8) Additional data (optional) (9) Latest taxonomic scrutiny (specialist	Animalia Plantae Fungi Chromista Protozoa Bacteria Archaea	Checklist for species name with ranks	http://www.catalogueoflife.org/

		name and date) (10) Source database name and version (11) Link to online resource			

37. Fauna and Flora projects provide important information for biodiversity conservation that are produced by professional taxonomists. The below summarizes the status of Fauna and Flora projects, globally

38. [Place holder for participants on Fauna and Flora projects]

39. The table below summarizes the information of Fauna and Flora projects that are available for the public

Table 7 Fauna and Flora information shared

Country/Region	Name of organization	Taxonomic coverage	Application	Platform / URL
International	World Flora Online (WFO) project	All Plantae	Compendium of world's plant species	http://www.worldfloraonline.org/

V. ENGAGING WITH BROAD SECTORS

Environment sector

40. Under the Post-2020 Global Biodiversity Framework it is important that the environmental authorities at the National level are in close cooperation to conduct the activities of the Global Taxonomy Initiative. In collaboration with the Secretariat, actors of the Global Taxonomy Initiative need to be able to communicate the national implementing authority of the Convention, National Biodiversity Strategies and Action Plans, as well as national goals and targets. These should be considered at an early stage of project development and prior to the implementation of activities. Relevant government authorities should be consulted, especially when biological specimens are exchanged beyond national jurisdictions. Communication with the Global Environment Facility (GEF) focal point is vital to develop a project proposal to be incorporated in the national portfolio under the GEF-7 with clear linkage to the national biodiversity policy and project formulation. Suggested areas of renewal projects may include:

- a. Capacity building for identification of priority species for the country, such as threatened species (see also agriculture sector, below), invasive alien species, economically important species;
- b. National biodiversity status monitoring;

- c. National biodiversity information sharing;
- d. National biodiversity restoration and its information sharing.

Education sector

41. Universities, museums, botanical gardens and culture collections are the center of excellence in biodiversity science. Meeting conservation targets rely on local education and capacity building. Education is important to raise awareness on biodiversity in the public through sharing knowledge on life on Earth, its status and the potential of nature-based solutions. Boosts in science education, particularly towards domestic biodiversity is of high interest among students. Activities of the GTI have thus aimed to engage citizens to take stock of their own biodiversity. Research on biodiversity that includes taxonomy and systematics however, needs to be enhanced to inform on the status of biodiversity to environment management authority and related broad sectors, in particular to address the impact of climate change and other human activities that contribute to biodiversity loss. The targeted organisms include bacteria, other microbes, marine invertebrates, algae, as well as eggs, cysts and larvae of various species.

Agriculture sector

42. Taxonomic input is needed for basic identification of species in agricultural ecosystems, including those species with beneficial (e.g., pollinators) and harmful (pests) effects. The Identification of invasive alien species, pests and pathogenic agents are necessary for safe international trade and biosecurity at the borders. The National Plant Protection Organization and the Veterinary Authorities are immediate users of users of taxonomic identification tools. Often these officials require prompt species identification services to prevent entries of regulated species. Provision of training for the border officials and species identification services may facilitate the process of removing the taxonomic impediment in this sector. Regarding the border control on trade commodity which may contain living organisms or biological specimens requires close collaboration with the national Customs and the national authority for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The identification of crop wild relatives and accessing specimens, including seeds are strong needs in this sector to address food security. There is a clear link between crop yield, genetic resources and pests have prioritized taxonomic research in the agricultural sector.

Financial sector

43. Investment for biodiversity by the national budget and financial institutions, including development banks have an important role in mobilizing resources for biodiversity conservation. The green economy that is understood to provide long-term benefits and reduce underlying risks associated with biodiversity loss should be promoted with sound evidence on biodiversity and solid cost-estimation of each activity. Informing the financial sector on the status of biodiversity and ecosystem services is therefore critically important for the implementation of the Post-2020 Global Biodiversity Framework. For example, nature-based solutions, such as climate change adaptation and mitigation, stewardship of natural ecosystems, application of indigenous knowledge systems (ethno-botanies and zoology) and regenerative land use and circular economy all require close collaboration and input from biodiversity science to ensure the efficacy and efficiency of the funded measures.

44. The national Customs are first line of defense for unwanted biodiversity components to enter from outside countries. In collaboration with national authorities for agriculture and environment, taxonomic identification services for illegal trade commodity and suspected commodity to harm health of biodiversity, agriculture and human health.

Land use and landscape development sector

45. [place holder for participants to add]

Energy and transport sector

46. [place holder for participants to add]

Maritime sector

47. The UN Convention on the Law of the Sea (UNCLOS) provides the global framework by requiring States to work together, “to prevent, reduce and control human caused pollution of the marine environment, including the intentional or accidental introduction of harmful or alien species to a particular part of the marine environment.”

48. The uptake and discharge of ballast water, sediment and the transport of biofouling organisms by ships facilitate the worldwide spread of invasive aquatic species that threaten aquatic biodiversity. The International Convention for the Control and Management of Ships’ Ballast Water and Sediments under the International Maritime Organization (IMO) entered into force in 2014. In accordance with Article 6 of the Convention, Scientific and Technical Research and Monitoring calls for Parties individual or jointly to promote and facilitate scientific and technical research on ballast water management; and monitor the effects of ballast water management in waters under their jurisdiction with 14 sets of guidelines. The collaboration of taxonomic institutions and relevant research community with the maritime authority and shipping industry has led to effective technical assistance and personnel training to undertake appropriate inspection and monitoring of the coastal marine environment

49. The Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines)⁶ required research and trainings on the impact and control of invasive aquatic species in ships’ biofouling. Future taxonomic research is needed in the prevention of micro-fouling, the geographic distribution of biofouling invasive aquatic species and diagnostic tools and eradication methods in the rapid response to invasive aquatic species incursions.

50. A new legally binding instrument on the conservation and sustainable use of marine life in areas beyond national jurisdiction (BBNJ) has progressed under the United Nations Convention on the Law of the Sea. An intergovernmental conference for the adoption of a legally binding instrument was established in 2020 and the evaluation of marine protected areas or other area-based management projects, the harmonization of the criterion for the designation of protected areas, and the monitoring of the surveillance and management of those areas are currently considered by the intergovernmental process. It is likely that data on marine biodiversity and capacity development activities for developing countries to implement the future instrument will be necessary and considered in the process.

Industry

51. [place holder for participants to add]

Indigenous peoples and local communities

⁶ The Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines)

52. Public support and the involvement of the local communities that utilize and live amongst native resources and biodiversity is key to conservation-effective action. Dialogue between local and scientific communities empower local communities to monitor and respond to environmental change.

53. Hands-on training on taxonomic identification for the indigenous and local communities with proximity to the local ecosystems are expected to increase awareness on local biodiversity and integrate the indigenous peoples and local community in citizen science activities. In the implementation of the Post-2020 Global Biodiversity Framework this activity may contribute to: (i) spotting and reporting on invasive alien species; (ii) enhancing the sustainable use of wild species; and (iii) promoting education and sharing of related to biodiversity

Women and youth

54. [place holder for participants /gender expert to fill in]

VI. RESOURCES AND COLLECTIVE SUPPORT

55. In response to recommendation of the Subsidiary Body on Scientific, Technical and Technological Advice [23/6](#), this section reviews the effectiveness of taxonomic capacity building activities undertaken in the last decade and proposes the renewal of effective activities along the line of Theory of Change for the Global Taxonomy Initiative 2021-2030.

56. The Secretariat, in collaboration with the International Barcode of Life Consortium, has undertaken a programmatic capacity development in 2015-2020. Briefly, the programme took a ‘training for trainers’ approach, that began with an online training course on basic DNA barcoding with hands-on laboratory training (2015-2016), and project development training (2017). The trained trainer then implemented regional or national training courses in their home countries (2018), in ten developing countries⁷. By the end of 2018, a total of 195 trainers were working in developing countries with 166 new trainers from 91 institutions. In 2019 and 2020, the programme introduced meta-barcoding technique and was extended further to include border control officials in the Latin American and Caribbean Group (GRULAC).

57. [place holder for some examples, such as GBIF Biodiversity Information for Development-BID, CETAF projects removing taxonomic impediment, The GTI project undertaken by ASEAN Center for Biodiversity other regional projects, and among others]

58. Numerous projects have been undertaken to remove taxonomic impediment, globally. The table below summarize the project activities with estimated costs if the activities are continued or renewed.

Table 8. Summary of activities, subject to the financial resources, to continue or renew the project scale and elements in 2021-2030

Activity category	Project name (providers/actors)	Country /region	Cost to continue / to scale up/ to newly propose	Output indicator and	Funding source

⁷ CBD/SBSTTA/23/INF/18 <https://www.cbd.int/doc/c/6ad1/da5a/ddb684c5c9b0491c89d35872/sbstta-23-inf-18-en.pdf>

Activity 1 Training for trainers to apply DNA barcoding for conservation and regulation of biodiversity	GTI-DNA tech (Secretariat in collaboration with International Barcode of Life)	Global	To continue: \$20K/country To scale up to approach broad sector (e.g. agriculture) \$40K/country	Trained trainers will be engaged to national biodiversity management Indicator: Number of trained trainers involved in national conservation programme/projects	CBD Trust fund Potentially GEF-7 biodiversity allocation in collaboration with National GEF focal points
Activity 1	GBIF BID	Global			
Activity 2					
Activity 3					

VII. SUPPORT FOR MONITORING THE STATUS OF BIODIVERSITY AND PROGRESS OF THE IMPLEMENTATION OF THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

59. This section will connect the theory of change of the Global Taxonomy Initiative 2021-2030 and its renewed activities to the post-2020 goals relevant to the GTI (i.e., species conservation and enabling activities).

60. According to the zero draft for the Post-2020 Global Biodiversity Framework available as of December 2020⁸ (the next version of the Post-2020 Global Biodiversity Framework is planned to be posted in January 2021), the following preliminary goals and mission targets contained in Annex 1 to the CBD/WG2020/2/3 would be relevant to the activities of the Global Taxonomy Initiative:

Goals

- (a) No net loss by 2030 in the area and integrity of freshwater, marine and terrestrial ecosystems, and increases of at least [20%] by 2050, ensuring ecosystem resilience;
- (b) The percentage of species threatened with extinction is reduced by [X%] and the abundance of species has increased on average by [X%] by 2030 and by [X%] by 2050;
- (c) Genetic diversity is maintained or enhanced on average by 2030, and for [90%] of species by 2050;

Relevant mission targets

- (a) **Reducing threats to biodiversity:** the rate of new introductions of alien species (Global Registry of Introduced and Invasive Species via Global Biodiversity Information Facility);
- (b) **Meeting people's needs through sustainable use and benefit-sharing:** International collaboration for non-commercial scientific researches that include research and trainings in taxonomy;
- (c) **Tools and solutions for implementation and mainstreaming:** (i) Resources, including capacity-building, for implementing the framework; and (ii) promote education and the generation, sharing and use of knowledge relating to biodiversity;

⁸ CBD/WG2020/2/3, <https://www.cbd.int/doc/c/efb0/1f84/a892b98d2982a829962b6371/wg2020-02-03-en.pdf>

- (d) **Implementation support mechanisms:** (i) Capacity-building, particularly nationally determined and/or country-driven capacity-building; (ii) The generation and sharing of scientific information and knowledge important to the effective implementation, monitoring and review of the framework; (iii) Technical and scientific cooperation, technology transfer and innovation relevant to the implementation of the framework;
- (e) **Enabling conditions:** (i) The participation of all relevant stakeholders, including women, youth, civil society, local and subnational authorities, the private sector, academia and scientific institutions; and (ii) Partnerships to leverage activities at the local, national, regional and global levels.

61. To monitor the progress of the implementation of the Post-2020 Global Biodiversity Framework indicators that are under consideration by the process of the Open Ended Working Group, such as species conservation and enabling activities. The following table provides the potential progress indicators for the Post-2020 Global Biodiversity Framework, mission targets.

62. [place holder for participants to insert possible indicator for a relevant target and data sources useful to monitor the progress of implementations]

Table 9 Potential indicators for the Post-2020 Global Biodiversity Framework that the GTI partners may contribute

Target	Indicator	Data source	Data providers
Reducing threats to biodiversity	Number of introduced alien species par year	Global Registry of Introduced and Invasive Species via Global Biodiversity Information Facility	The Global Invasive Species Information Partnership, IUCN-ISSG, GBIF

Annex II

Participants are invited to submit information and comments using this form by email attachment. The form should be sent to secretariat@cbd.int as soon as possible but **no later than 4 December 2020**.

This submission is prepared by:

First name (middle initial)	Last name	Name of organization	Country	Email address

The form below is for comments and suggestions to the text in annex I

Page	Paragraph number	Comments	Suggested text to insert or delete

Kindly fill the information with your experience and knowledge in each section of the tables 1-9 below. Please indicate available information using concise language.

Table 1 Information on taxonomic capacity to supplement the sixth National Report submitted by Parties.

Country/region name	Supplement information to the sixth national report on existing taxonomic capacity	Supplement information to the sixth national report on taxonomic need / what type of activity can help remove taxonomic impediment	Explain if the need/taxonomic impediment is resolved which mission target(s) becomes achievable in your country /region

Table 2. Taxonomic keys

Country /region	Name of the taxonomic keys	Provider name	Taxonomic group	URL

Table 3. Field guides made accessible for taxonomic identification

Country/region name	Title of the guide	Taxonomic group	Contributors	URL, ISBN

Table 4. Specimens in museums, herbaria and culture collections supporting taxonomic identification

Country name	Collection name and collection ID	A total number of specimens / type specimens / referenced specimens	Specimen loans in 2011-2020	Remarks, if any

Table 5. DNA sequence based taxonomic identification

Country/region	Organization/ name of the tool	Taxonomic group covered	Application	Platform/manual

Table 6. Databases

Country/Region	Name of organization	Data standard	Taxonomic coverage And identified information gap, if any	Application	Platform / URL

Table 7. Fauna and Flora information shared

Country/Region	Name of organization	Taxonomic coverage	Application	Platform / URL

Table 8. Summary of activities, subject to the financial resources, to continue or renew the project scale and elements in 2021-2030

Activity category	Project name (providers/actors)	Country /region	Cost to continue / to scale up/ to newly propose	Output indicator and	Funding source

Table 9. Potential indicators for the Post-2020 Global Biodiversity Framework that the GTI partners may contribute

Target	Indicator	Data source	Data providers

Advance unedited