

**CONVENTION ON
BIOLOGICAL
DIVERSITY**Distr.
GENERALUNEP/CBD/SBSTTA/9/INF/30
3 November 2003

ENGLISH ONLY

**SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND
TECHNOLOGICAL ADVICE**Ninth meeting
Montreal, 10-14 November 2003**DRAFT GUIDE TO THE GLOBAL TAXONOMY INITIATIVE***Note by the Executive Secretary*

1. The Executive Secretary is circulating herewith, for the information of participants in the ninth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) the draft Guide to the Global Taxonomy Initiative, as prepared by the Secretariat of the Convention pursuant to the request of the Conference of the Parties in decision VI/8, paragraph 5. The draft will be reviewed at a meeting of the Coordination Mechanism, to be held in conjunction with the ninth meeting of SBSTTA, on 10 November 2003. It is expected that the Guide will be finalized in the light of the suggestions made by participants in the Coordination Mechanism meeting with a view to submission to the Conference of the Parties at its seventh meeting, to be held in Kuala Lumpur in February 2004.
2. It should be noted that a number of annexes to the Guide are proposed. These annexes would readers with background materials on the Global Taxonomy Initiative, including the complete texts of some decisions of the Conference of the Parties, meeting reports and documents prepared for meetings under the Convention. For reasons of economy, however, in the present draft, such complete texts have been excluded, as they are available from other sources.
3. Finally, it should be borne in mind that the attached draft Guide is a working document prepared for the consideration of the Coordination Mechanism. It is available in English only and has not been formally edited.

/...

DRAFT
GUIDE TO
THE
GLOBAL TAXONOMY INITIATIVE

GUIDE TO THE GLOBAL TAXONOMY INITIATIVE

CONTENTS

1. Introduction	
2. The Convention on Biological Diversity and the Global Taxonomy Initiative	
2.1. The Convention on Biological Diversity	
2.2. The ‘management’ of the CBD	
2.3. The Global Taxonomy Initiative to support implementation of the CBD	
3. The Work Programme of the GTI	
3.1. Introduction	
3.2. Priority taxonomic needs	
3.3. Taxonomic needs assessments	
3.4. Taxonomic capacity development	
3.5 The need for a global taxonomic information system	
4. Developing the GTI and monitoring its progress	
4.1. The SCBD and the GTI	
4.2. National Focal Points	
4.3. Outreach	
4.4. Roster of Experts	
5. Funding for GTI activities	
6. Taxonomic tools	
7. Relationships with other initiatives	
8. Literature	
8.1. References	
8.2. Further reading	
9. Glossary	
10. Useful contact addresses	
Annex 1. COP Decision III/10	
Annex 2. SBSTTA Recommendation II/2	
Annex 3. COP Decision IV/1.D	
Annex 4. COP Decision V/9	
Annex 5. COP Decision VI/8 programme of work	
Annex 6. Key elements of COP Decision sections particularly relevant to the GTI	
Annex 7. COP Decision VI/5 on the International Pollinators initiative	
Annex 8. COP Decision VI/9 on the Global Strategy for Plant Conservation	
Annex 9. Decision VI/24 on Access and benefit-sharing as related to genetic resources, including the Bonn Guidelines	
Annex 10. The Darwin Declaration	
Annex 11. SBSTTA information document 4-5	
Annex 12. SBSTTA information document 4-6	
Annex 13. SBSTTA information document 4-7	
Annex 14. SBSTTA information document 6-4	
Annex 15. SBSTTA information document 9-16	
Annex 16. SBSTTA information document 6-18 (part)	
Annex 17. Report of the GTI Coordination Mechanism	
Annex 18. Background document used by organizers of the first three regional GTI workshops	

1. INTRODUCTION

In its decision VI/8 on the Global Taxonomic Initiative, the COP requested the Executive Secretary to complete the guide to the Global Taxonomic Initiative, and provide information and Clarification to Parties and Governments concerning the Global Taxonomic Initiative, in particular on the process for developing projects aimed at implementing the programme of work, including existing guidance from the financial mechanism.

The Secretariat has prepared the present Guide, which reviews the work programme of the GTI. In the Guide, Chapter 1 contains the introductory remarks; Chapter 2 relates the Convention of Biological Diversity and the Global Taxonomic Initiative. Chapter 3 highlights the work programme of the GTI, Chapter 4 deals with developing the GTI and monitoring its progress, while Chapter 5 deals with funding for the GTI and Chapter 6 highlights the taxonomic tools. The relationship of the GTI with other initiatives is reviewed in Chapter 7. Important literature to the work of the GTI is reviewed in Chapter 8. Chapters 9 and 10 contain the glossary and useful contact addresses respectively. The draft document will also be considered by the Coordination Mechanism and finalized for the seventh Conference of Parties.

The Global Taxonomy Initiative (GTI) was put in place specifically to meet the crucial need identified by the participants in the Darwin Meeting.¹ The statement made by the participants in the Darwin meeting, and the commitments they made on behalf of their institutions, show clearly the importance of removing the taxonomic impediment to implementing the Convention on Biological Diversity.

The term “Taxonomy” is the science of the categorization of living things and includes the identification and naming of types of plants, animals and microorganisms of the world. It is the tool by which the components of biological diversity are identified and enumerated, and it therefore, provides the basic knowledge underpinning biodiversity management and implementation of the CBD. If identities of organisms are not known, there will be constraints on the provision of and access to any other information about them, and therefore, a potentially disastrous limitation to the ability to take informed management decisions. If Parties to the Convention do not know what species live within their national boundaries, they will find it difficult to enact effective legislation concerning them, plan for conservation and sustainable use or protect national or subnational rights concerning benefits of the genetic resources of their biodiversity.

Identification of some species may be easy, particularly in the case of large mammals, however this is not the case for most organisms. Not only can it be difficult to tell some organisms apart, but the majority of them have not been categorized into species and have yet to be given names. Although taxonomic work on some groups, such as birds, most mammals and some higher plants, is extensive, little is known of the distribution, biology, and genetics of the vast majority of species, even in those groups. Approximately 1.7 million species have so far been named, but there may be a total of between 4-15 million. Perhaps only 10% of vertebrates remain to be described, but much more than 50% of terrestrial arthropods and up to 95% of protozoa are undescribed. At the most conservative estimate, the subject of the Convention on Biological Diversity--the biota itself, comprises more unknown species than known ones.

Not only are there many species to be described, but there are far too few taxonomists to do the job, particularly in the countries where they are arguably most needed, the biodiversity-rich developing countries. Most taxonomists work in relatively biodiversity-poor countries in the North. Institutions in these countries also hold the largest reference collections of specimens from the biodiversity-rich tropics, as well as the books and scientific papers to help use them and identify species. The majority of developing countries lack taxonomists, collections of their flora and fauna, and adequate libraries and collections of scientific papers to assist the taxonomic process. Much of the information that is currently

¹ See the section on the Darwin Declaration on page 82 below.

being published is in formats and languages suitable for the needs of taxonomists in the regions where it is being done, but not sufficiently accessible either globally or in languages and styles useful to non-taxonomists.

Even where taxonomists working in biodiversity-rich countries, resource limitations can mean that they lack the infrastructure, for example libraries and collections to enable them to work the efficiently.

These issues make up the 'taxonomic impediment' to implementation of the Convention on Biological Diversity (CBD).

Taxonomic input is vital to enable many activities in Convention implementation. Monitoring and assessment of biodiversity cannot be done with any validity if the elements being monitored cannot be identified; sustainability cannot be assured if it is not known what is being sustained. Benefits from genetic resources cannot be fairly distributed if there is no clarity as to their nature and custodianship. Taxonomy provides a basic and vital tool to the Convention.

The range of taxonomic inputs required to convention implementation is probably as large as the range of taxonomic outputs that exist. The key characteristic of the taxonomy required is that it is in some way helping CBD implementation. Clearly any taxonomic activity will at some level assist in convention implementation, in that it clarifies the identities or simplifies recognition of entities, be they species, strains or ecosystems. However, there is a continuum of activities from the scholastic and academic at one extreme to the project at the other which is exemplified by taxonomic work fully integrated with work in other sectors and directed at an implementation issue. The work towards the latter end of the continuum is frequently more where the GTI emphasis is placed. Nevertheless, basic taxonomic research and discovery is necessary in many areas, both geographical and taxonomic. The majority of species are not yet described and named, and can therefore play no part in management plans, nor be assessed in terms of their genetic benefits. Taxonomy is fundamental to the thematic areas of the CBD through discovery, identification, and documentation of biological diversity.

The response of the CBD to the recognition of the taxonomic impediment has been to develop a 'cross-cutting' programme to address it, the 'Global Taxonomy Initiative' (GTI). As the GTI is a part of the CBD, it has the same aims, so that the taxonomic activities that it espouses are in support of the three aims of the Convention: conservation and sustainable use of biodiversity and fair and equitable sharing of the benefits arising out of the utilization of it genetic resources. The GTI is necessarily driven by user needs, those needs being identified in the context of CBD implementation. However, there are a number of problems in meeting these needs. The major issue is that there are inadequate global taxonomic resources to meet all the priorities that might be identified (let alone those which are already apparent). Even for the resources that are in place (extant museums, herbaria, university taxonomists and culture collections etc), there are a number of competing priorities, some more attuned to meeting CBD objectives, some less so. Moreover, in perhaps the majority of cases, taxonomic needs for CBD implementation are identified and met (or not met) on an ad hoc basis, and discussion on them does not extend beyond the project level. Practicing taxonomists are often asked to advise on identities of species or provide determinations for projects funded by multilateral or bilateral agencies where an original taxonomic component of the budget was either never considered, or even removed as unnecessary. This state of affairs is clearly not satisfactory, and does not encourage the setting up of systems that could deal with CBD needs most effectively. A key aim of the GTI must be to modify the manner in which at least an element of taxonomy is perceived and practiced.

Because the CBD is a legal and political framework, the GTI has the same characteristics; it provides the legal and political backing for taxonomic activities under the CBD rather than providing direct funding. The success of the GTI depends entirely on the participation of taxonomists and the successful integration of taxonomic work with other Convention activities.

Although much has been written about the GTI, the most authoritative statements and descriptions are in documents produced by the Conference of the Parties to the CBD (COP), or its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). Given the importance of helping those actually implementing the GTI to have access to all possible information about it, there is a need, recognised by COP6, for a Guide to the GTI written in a way that makes it simple to understand what is needed and how the needs are to be met. This volume is a response to that need.

Because the CBD is a political and legal agreement, activities under its aegis must spring from decisions taken by the signatory nations. Consequently, within this booklet reference is frequently made to international agreements and Decisions of the CBD's Conference of the Parties (COP). Although this style can be viewed as off-putting, reference to the documents and phraseology is important in developing projects for funding under the CBD. The reader is urged strongly to consult the original documents, which are listed in the 'further reading' section below. A glossary is provided to explain some of the terminology and remind the user of some of the numerous acronyms that have been developed around the topic.

Taxonomy is vital to maximize the efficacy of work in conservation and sustainable use; for the first time there is an international agreement at governmental level acknowledging this, and it is now up to the taxonomy, conservation and environmental management sectors to build on that agreement.

2. THE CONVENTION ON BIOLOGICAL DIVERSITY AND THE BASIS OF THE GTI

2.1. The Convention on Biological Diversity

The United Nations Convention on Biological Diversity was established following the 'Earth Summit' in Rio in 1992. It is the largest of the environmental conventions, and is so far signed and ratified by 186 Parties, including 185 countries. Through its 42 articles, the Convention promulgates three linked aims:

- Conservation of biological diversity;
- Sustainable Use of its components;
- Fair and Equitable Sharing of the benefits arising out of the utilization of genetic resources.

The Convention recognizes - for the first time - that the conservation of biological diversity is "a common concern of humankind" and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use. It also covers the rapidly expanding field of biotechnology, addressing technology development and transfer, benefit-sharing and biosafety. Importantly, the Convention is legally binding; countries that join it are obliged to implement its provisions.

The Convention reminds decision-makers that natural resources are not infinite and sets out a new philosophy for the twenty-first century, that of sustainable use. While past conservation efforts were aimed at protecting particular species and habitats, the Convention recognizes that ecosystems, species and genes must be used for the benefit of humans. However, this should be done in a way and at a rate that does not lead to the long-term decline of biological diversity.

The Convention also offers decision-makers guidance based on the precautionary principle that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat. The Convention acknowledges that substantial investments are required to conserve biological diversity. It argues, however, that conservation will bring us significant environmental, economic and social benefits in return.

Some of the many issues dealt with under the Convention include:

- Measures and incentives for the conservation and sustainable use of biological diversity.
- Regulated access to genetic resources.
- Access to and transfer of technology, including biotechnology.
- Technical and scientific cooperation.
- Impact assessment.
- Education and public awareness.
- Provision of financial resources.
- National reporting on efforts to implement treaty commitments.

The Convention on Biological Diversity, as an international treaty, identifies a common problem, sets overall goals and policies and general obligations, and organizes technical and financial cooperation. However, the responsibility for achieving its goals rests largely with the countries themselves.

Private companies, landowners, fishermen, and farmers take most of the actions that affect biodiversity. Governments need to provide the critical role of leadership, particularly by setting rules that guide the use of natural resources, and by protecting biodiversity where they have direct control over the land and water. Under the Convention, Governments undertake to conserve and sustainably use biodiversity. They are required to develop national biodiversity strategies and action plans, and to integrate these into broader national plans for environment and development. This is particularly important for such sectors as

forestry, agriculture, fisheries, energy, transportation and urban planning. Other treaty commitments include:

- Identifying and monitoring the important components of biological diversity that need to be conserved and used sustainably.
- Establishing protected areas to conserve biological diversity while promoting environmentally sound development around these areas.
- Rehabilitating and restoring degraded ecosystems and promoting the recovery of threatened species in collaboration with local residents.
- Respecting, preserving and maintaining traditional knowledge of the sustainable use of biological diversity with the involvement of indigenous peoples and local communities.
- Preventing the introduction of, controlling, and eradicating alien species that could threaten ecosystems, habitats or species.
- Controlling the risks posed by organisms modified by biotechnology.
- Promoting public participation, particularly when it comes to assessing the environmental impacts of development projects that threaten biological diversity.
- Educating people and raising awareness about the importance of biological diversity and the need to conserve it.

All of these commitments require, to a greater or lesser extent, the use of taxonomy.

The Convention has identified work to be carried out in six 'thematic' work programmes, addressing:

- Marine and coastal biodiversity;
- Agricultural biodiversity
- Forest biodiversity;
- Inland waters biodiversity;
- Dry and sub-humid lands biodiversity;
- Mountain biodiversity.

Each thematic programme sets out key issues for consideration, basic principles to guide the work necessary, identifies potential outputs; and suggests a timetable and means for achieving these outputs.

In addition to the Thematic Areas there are a number key cross-cutting issues of relevance to all thematic areas. Essentially these correspond to the issues addressed in the Convention's substantive provisions in Articles 6-20. They include:

- Access to genetic resources and benefit-sharing
- Traditional knowledge, innovations and practices;
- Biological diversity and tourism;
- Biosafety;
- Climate change and biological diversity;
- Economics, trade and incentives;
- Ecosystem approach;
- Global strategy for plant conservation;
- Global Taxonomy Initiative;
- Impact assessment, liability and redress;
- Indicators;
- Invasive Alien Species;
- Protected Areas;
- Public education and awareness;
- Sustainable use

Some cross cutting initiatives directly support work under thematic programmes, for example the work on indicators. Others are developing discrete products, which in some instances are quite separate from the thematic programmes - for example, the Biosafety Protocol. These cross cutting issues have an important role to play in bringing cohesion to the work of the Convention as they provide the substantive bridges or links between the thematic programmes.

The CBD does not itself fund projects, and does not provide grants. However, there are many sources of funding used by those seeking to implement the Convention. In particular, the interim financial mechanism of the CBD, the Global Environment Facility (GEF) can be applied to, under certain circumstances. The GEF, and other sources of funding, are discussed in more detail below.

2.2. The ‘management’ of the CBD

The Convention's ultimate authority is the Conference of the Parties (COP), consisting of all governments (and regional economic integration organizations) that have ratified the treaty. This governing body reviews progress under the Convention, identifies new priorities, and sets work plans for members. The COP can also make amendments to the Convention, create expert advisory bodies, review progress reports by member nations, and collaborate with other international organizations and agreements. The COP has taken a number of ‘Decisions’, setting out in detail how the various aspects of work of the Convention should be developed.

The Conference of the Parties is supported and advised by several other bodies that are established by the Convention:

- The Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). The SBSTTA is a committee composed of experts from member governments competent in relevant fields. It plays a key role in making recommendations to the COP on scientific and technical issues.
- The Clearing House Mechanism. This Internet-based network promotes technical and scientific cooperation and the exchange of information.
- The Secretariat. Based in Montreal, it is linked to United Nations Environment Programme. Its main functions are to organize meetings, draft documents, assist member governments in the implementation of the programme of work, coordinate with other international organizations, and collect and disseminate information.
- The COP also establishes ad hoc committees or mechanisms as it sees fit. For example, it created a Working Group on Biosafety that met from 1996 to 1999 and a Working Group on the knowledge of indigenous and local communities.

The texts of all recommendations of SBSTTA and of COP Decisions can be found on the web site of the CBD (see below for details).

2.3. The Global Taxonomy Initiative to support implementation of the CBD

The need for a special emphasis on taxonomy to enable activities under the CBD to proceed effectively was identified quite early in the Convention’s existence. Within the remit of the Convention the need for taxonomic input has been recognized in a number of areas:

- Developing National Biodiversity Strategies and Action Plans (Articles of the Convention 6, 7);
- Monitoring and assessing the effects of management practices and impacts of environmental and use changes (Articles 7, 14);
- Identifying appropriate *in-situ* conservation areas (Article 8);

- Developing protocols for sustainable use of biological resources (Article 10);
- Training and research programmes in conservation and sustainable use of biological diversity (Article 12);
- Promoting understanding of the importance of biological diversity (Article 13);
- Enabling access to genetic resources (Article 15);
- As part of technology transfer, information exchange and technical and scientific cooperation (Articles 16, 17, 18);
- Managing the distribution of benefits of biotechnology (Article 19);
- Addressing issues on biosafety (Cartagena Protocol); and
- Addressing the thematic and cross-cutting areas developed under the Convention on Biological Diversity, as recognized by SBSTTA and COP.

In all these areas there was been found to be a lack of available taxonomic expertise, data and national capacity among the majority of the Parties. Following this recognition, the COP authorised and developed a taxonomic component of Convention activities through a number of decisions, from their third meeting (decision III/10) to the sixth (decision VI/8). The last-mentioned decision provided a programme of work for the GTI, attempting to include all of the activities mentioned in earlier decisions (III/10, IV/1.D, V/9, VI/8). The relevant text of these four Decisions is given in Annexes 1, 3, 4 and 5.

Many of the problems and their possible solutions were also explored in a series of influential meetings and resultant publications (Anon, 1998, 1998b, 1998c, 1998d, 1999, 2000). These documents have been strongly influential in the development of the GTI, and were all submitted to the SBSTTA to provide information to help that body formulate its recommendations to the COP, or to the COP itself.

3. THE WORK PROGRAMME OF THE GTI

3.1. Introduction

As with other CBD cross-cutting issues, the COP has asked that the GTI meet certain goals, linked to other work of the CBD, and has summarized these in a programme of work (PoW) (Annex 5)². Whilst identifying certain priorities the PoW is not intended to be prescriptive, and there is a need to retain flexibility in order to meet the multitude of needs identified by individual Parties. As the CBD is not an implementing agency, but operates by facilitating the work of others, the PoW is intended to assist taxonomic efforts under the CBD by highlighting issues and activities, and gaining political approval for these through the COP.

The framework of the PoW can be used also to highlight needs within countries or regions. An example of this is the version developed by the participants of the Asian Regional Workshop in the GTI, held in 2002. An Asian PoW was produced, stressing some of the needs identified as particularly pressing in that region (Wilson et al, 2003; Shimura, 2003).

The work programme is designed to identify the needs for taxonomy to implement the Convention by means of country-based, regional and global taxonomic needs assessments, to build the capacity at the appropriate levels to address taxonomic questions, and to actually meet the needs of the thematic areas and other cross-cutting issues. It comprises 18 Planned Activities within five Operational Objectives (see text box 3-1)

3.2. Priority Taxonomic needs

There are three main elements of the GTI: the taxonomic work needed to enable implementation of the Convention, the resources required and timely dissemination of results. The work programme is designed to reflect these three elements.

A number of issues need to be addressed in order to emplace the taxonomic element so needed by the Convention. One of these is to identify and prioritize needs. With the priorities identified the most efficient way of addressing them - whether at national, regional or global levels – can be determined.

This identification and prioritization is taking place in several ways:

1. Through identification of national priorities for biodiversity among Parties to the CBD.
2. Through recommendations by SBSTTA and decisions by COP on the Thematic Areas and Cross-cutting Issues;
3. Through workshops conducted in appropriate regions within existing thematic work programs and cross-cutting issues, involving taxonomic experts to identify key taxa for inventory and monitoring programs.
4. Through regional and global workshops on the Global Taxonomy Initiative.

A notable factor in taxonomic work which applies to thematic areas, as to other aspects of the GTI, is that indigenous knowledge systems should be recognized where appropriate permission has been obtained.

A workshop was held under the auspices of DIVERSITAS in 1998, at which a global panel of experts made a number of recommendations (Anon, 1999³). The participants stressed the importance of a priority approach from the taxonomic perspective, and set some common criteria that could be applied at national as well as regional or global levels. These criteria are as follows:

² <http://www.biodiv.org/decisions/default.asp?lg=0&dec=VI/8>

³ This document was presented to SBSTTA as document UNEP/CBD/SBSTTA/4/INF6

1. TAXA of economic value. Because of interactions at both community and ecosystem levels, all species have a degree of economic value and, in some way, influence human welfare. Of greatest significance here, however, are species that have direct and immediate effects on human health, food supplies (including agricultural crops and fisheries), timber, biotechnology, and similar benefits. This includes both beneficial (e.g., pollinators, seed dispersers, scavengers) and non-beneficial species (e.g., disease vectors, crop pests, pathogens, invasive species that threaten indigenous biodiversity).

2. TAXA that characterize ecosystems. These species define the structure and function within an ecosystem. For example, among the plants, many species of the family Rubiaceae occur as shrubs or small trees in the wet-dry tropical regions of the world, the Ericaceae and Epacridaceae characterize shrublands or heathlands, while the Laminariales are important structural determinants of temperate near-shore marine ecosystems. In the animal kingdom, corals and sponges are key marine organisms while many invertebrates have important recycling roles in terrestrial and aquatic ecosystems.

Marine and fresh water ecosystems are poorly known yet are extremely important as fish habitats, water and food source for human consumption. It is critical that their structure and function be characterized and indicator species that signal health or specific problems be identified. Other ecosystems requiring attention are mountain areas, arid and semi-arid regions where organisms may have ephemeral lives associated with changes in moisture balance, and lowland tropical forest (both in South America and Asia), where habitat change is high. With a complete understanding of the species composition of each ecosystem and interspecific interactions, identifying areas for appropriate land uses, and developing methods for the restoration of degraded sites will be greatly accelerated.

3. TAXA living in threatened areas: This category includes: heavily exploited species, such as marine fishes, that are poorly known taxonomically; species that form the biota of rapidly deteriorating or disappearing habitats or ecosystems; species threatened with extinction; and narrow endemics and species with very limited distributions.

4. TAXA which are indicator species or species groups. Species or species groups that are highly sensitive to changes in both biotic and abiotic conditions in the environment, at local, regional, and global scales and that are useful in monitoring such change.

By using these criteria and indicating the existing gaps in our knowledge of biodiversity, expert groups have suggested tools necessary to develop regional or global priorities. Taxonomic priorities can be important but poorly studied taxa; or biogeographically little known taxonomic groups, or geographically less well studied taxa in most developing countries.. An assessment of national taxonomic priorities must precede the regional priority-setting process; that exercise will guide the identification of common criteria and priorities for regional cooperation.

Regional meetings on the GTI have been held in Central America, Africa and E. Asia; each of these highlighted some priority issues. These are most effectively dealt with in the context of the thematic areas and cross-cutting issues.

The GTI was originally developed in the face of problems in implementing Article 7: Identification and Monitoring. The need for identification of components of biological diversity, and for assessment and monitoring of their status, underpins much of the implementation activities under the Convention. It follows that, wherever identification and monitoring activities are called for in a work programme, there is an implicit, if not explicit, requirement for taxonomic support. In decision 1/2 the COP identified as one of the priorities for financial support for the financial mechanism of the Convention (para 4d of Annex I: Policy, strategy, programme priorities and eligibility criteria for access to and utilization of financial resources) "Identification and monitoring of wild and domesticated biodiversity components, in particular those under threat, and implementation of measures for their conservation and sustainable

use;”. Monitoring has been stated as necessary in the work on Marine and Coastal Biodiversity (COP II/10, IV/5, V/3, VI/3); Invasive Alien Species (COP V/8, VI/23); Agriculture (COP III/11, V/5, VI/5); Inland waters (COP IV/4); Forest Biodiversity (COP IV/7, IV/13, V1/22); Implementation of Article 8(j) (COP V/16); Biodiversity and tourism (COP V/25); and the Global Plant Conservation Strategy (CBD VI/9).

Forest biological diversity.

The needs associated with forests globally are immense. In the wet tropical forests in particular the number of undescribed species, particularly of the smaller organisms, is huge, estimated numbers in the millions. Moreover, the most biologically rich areas tend to be in the lesser-developed regions of the world, where taxonomic expertise is least accessible. The importance of taxonomy to forest biodiversity in terms of the CBD has been stressed, and the need for capacity building identified.

The particular needs for taxonomy in terms of forest biological diversity that have been highlighted through COP decisions are for taxonomic studies to support basic assessment and monitoring of forest biodiversity, and for inventories of forest species at the local and national levels (IV/7). Within the GTI Work Programme, the identification and selection of indicators of below-ground diversity in tropical, temperate, and boreal forests was highlighted (COP VI/8). Not only are such activities important for basic assessments, but also for identifying status and trends of forest biodiversity and for restoration of forest ecosystems and its conservation and sustainable use (COP V/4), but they may provide a guide in the selection of sites to be protected, and in the valuation of resources.

The outputs of work under the GTI will be, broadly, an increased knowledge of the species composition of forests, through both taxonomic studies and inventories. An expectation is that much of this work will be carried out at national level. Taxonomic resources additional to those currently available are forecasted to meet the needs imposed by identification of criteria and indicators through the Convention process.

Marine and coastal biological diversity.

Some 15% of all species described so far are marine, 80% of which belong to Phyla restricted to the seas. A high proportion of the marine micro fauna such as molluscs, crustaceans, polychaete worms and multicellular algae are already known, but the current knowledge of nematodes and protists is much less complete. The biomass of small deep-sea organisms such as the meiofauna (mainly nematodes) probably equals or exceeds the biomass of larger organisms; but data on comparative species richness are lacking.

Marine research lags behind terrestrial research because sampling and observing require the use of ships and equipment that are expensive to own and maintain. On the other hand, most marine ecosystems are essential for the economy of many islands and archipelagos, as well as countries relying heavily on biotic resources from the seas. Exploration of deep-sea systems and other marine ecosystems in international waters deserves special consideration, and the taxonomic component of this is of particular importance.

COP IV/5 noted that “Special efforts should be undertaken to support the Global Taxonomy Initiative in the marine and coastal environment in view of the importance of basic taxonomic work for the implementation of the objectives of the [Marine and Coastal Biodiversity] work programme.” The types of needs that were highlighted in this and other decisions on marine and Coastal Biodiversity explicitly in terms of taxonomy are to promote the strengthening of taxonomic expertise at regional and national levels (COP IV/5); for regional centres of taxonomic expertise (COP IV/5); the taxonomic efforts of intergovernmental programmes, agencies and relevant institutions (COP IV/5); capacity-building measures, including training of and career opportunities for marine taxonomists (COP V/3, COP VI/3). COP IV/5 noted the requirement “To develop a database of experts from the roster and other sources, to

be available for the development and implementation of specific elements of national policies on marine and coastal biological diversity, giving full recognition to the importance of taxonomy”.

Particular emphasis for taxonomic work has been given to three areas: (1) Ballast water organisms, focusing on the pelagic juvenile stages of benthic organisms (COP VI/8); (2) Key (invertebrate) organisms for monitoring the health of mangrove systems. (COP VI/8) and; (3) coral reefs, particularly in the context of coral bleaching (COP V/3).

The ballast water organism support is in the context of invasive alien species, which are transported globally in ballast water; taxonomic work in this area will require among other things a focus on pelagic juvenile stages of benthic organisms, and among the outputs will be identification guides for the identification of major groups, and of the appropriate taxa within them, to help non specialists identify and monitor such organisms, especially non-native fauna and flora. At least some of the work will be undertaken within the context of the GloBallast Programme. The Final Report of the mid-term evaluation of GloBallast (Vousden, & Okamura, 2003) noted “Identification of introduced species requires training and considerable expertise. It would be highly ambitious to expect any of the countries to be able to identify introduced species with any certainty without assistance from experts in the field of invasion biology and taxonomy. The methodology taught during the PBS [Project baseline survey] relies on identifying all specimens collected to least taxonomic unit. The PBS consultancy team provided the PCU [project coordination unit] with a list of global taxonomic experts for distribution to all participating countries.” The same report noted the importance of sustainability in the monitoring of ballast organisms, and in this context stated “countries also realise that they will need advice on the taxonomy and other pertinent scientific aspects of any invasive species as, by their very nature, such species will probably not be familiar to local or even regional experts.” (Vousden & Okamura, 2003).

The Coral reef work is founded in the need to assess the taxonomic, genetic, physiological, spatial, and temporal factors governing the response of corals, zooxanthellae, the coral-zooxanthellae system, and other coral-reef-associated species to increases in sea-surface temperature, and to implement and coordinate baseline assessments, long-term monitoring, and rapid response teams to measure the biological and meteorological variables relevant to coral bleaching, mortality and recovery (COP V/3).

DIVERSITAS, in its report ‘The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery’ submitted to SBSTTA⁴, included a Sample Framework Project on Marine waters (see text box 3-2).

Dry and sub-humid lands biodiversity.

COP decision V/23 on consideration of options for conservation and sustainable use of biological diversity in dryland, Mediterranean, arid, semi-arid, grassland, and savannah ecosystems, established a programme of work for this Thematic Area. This includes, among other things, assessment of the status and trends, identification of specific areas within dry and sub-humid lands of particular value for biological diversity and/or under particular threat, and the further development of indicators. SBSTTA 4, in its recommendation IV/3, noted the importance of including an indication of taxonomic requirements in this programme of work.

Key elements of these ecosystems, both in terms of sensitivity to disturbance and as indicators, are the organisms that maintain the crucial soil crust. Increasing the knowledge of what these organisms are, and how they are distributed and can be identified, is important for each of the areas of the work programme mentioned above. Correct identification of indicator taxa such as crust forming lichens often requires special identification aids and techniques, necessitated by the needs and skills of those likely to be undertaking most of the identification. The development of such tools is required for increasing the

⁴ document UNEP/CBD/SBSTTA/4/INF/1

capacity of rangeland managers to understand the species function in maintaining dry-land ecosystems. Increasing taxonomic capacity to identify lichens, and to then develop identification tools, is required in many parts of the world. Importantly such identification tools must be designed so that they are capable of being used by rangeland managers to help in identification of key organisms (COP VI/8).

In addition, there is a need for greater knowledge of the micro-organisms in nutrient cycling, and increased taxonomic information of pests and diseases (COP VI/8).

Inland waters biological diversity.

Some groups of animals and plants in inland waters (e.g., fresh water fish species to fisheries) are of great social and economic importance. There are also large gaps in taxonomic knowledge for many of the groups involved. The COP, therefore, decided that inland waters should be a specific focus of the capacity-building in taxonomy (COP IV/4). The significance of taxonomy to inland waters work under the Convention was highlighted further in decision IV/4 by the inclusion of a section ‘D’ to its programme of work on this issue⁵. This emphasis was subsequently re-iterated in the proposed revised programme of work on inland water biological diversity recommended to the COP by SBSTTA8 (UNEP/CBD/COP/7/3 – Annex 1, VIII/2).

The GTI Programme of Work on Inland Water Biological Diversity (decision COPVI/8 Annex, planned activity 11) proposes, *inter alia*: rapidly increasing worldwide knowledge of freshwater fish and invertebrates as a high priority activity; a series of regional guides to freshwater fish and invertebrates (including adult terrestrial forms where appropriate) as an input to ecosystem monitoring for river and lake health to be produced within two years for both professional and public use; national agencies and taxonomic institutions, especially museums, should play a principal role in the implementation of this activity; and, international support and coordination through the UNESCO key science activity “Water and Ecosystems” (where parataxonomists, in the form of interested members of the public and school students, in a number of countries, have been using the technique to monitor aquatic health) as an area to be built upon in relation to the GTI and inland water biodiversity. DIVERSITAS, in its report ‘The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery’ submitted to SBSTTA⁶, included two proposals on taxonomy and inventory of inland water biodiversity (see text box 3-3).

The proposed revised programme of work on inland water biological diversity recommended to the COP by SBSTTA8 (UNEP/CBD/COP/7/3 – Annex 1, VIII/2) in addition to re-iterating matters as above, includes, *inter alia*: encouraging Parties to support applied research to gain an improved understanding of the taxonomy of inland water biological diversity including in-line with the GTI (Goal 3.1: activities 3.1.1 and 3.1.3); support for efforts to achieve international consistency and interoperability of taxonomic nomenclature, databases and metadata standards, as well as data sharing policies (activity 3.1.4); noting that capacity building in taxonomy should focus on inland water biodiversity of economic importance (activity 3.2.3 c.). Subsequently, outcome oriented targets for this proposed revised programme of work (UNEP/CBD/SBSTTA/9/INF /XXX) include, *inter alia*: by COP8 - work on five regional guides to the taxonomy of freshwater fish and invertebrates in progress, and a report on gaps in taxonomic knowledge and capacity needs regarding the taxonomy of inland water species of economic importance is prepared and made available to Parties; by COP 10 - five regional guides to the taxonomy of freshwater fish, invertebrates and other taxonomic groups completed and made available, and all Parties with significant capacity needs regarding the taxonomy of inland water species of economic importance have addressed these through both in-country training and collaborative arrangements with appropriate centres of taxonomic excellence; and beyond COP10 - regional guides for additional taxa and elaboration of the existing guides, as appropriate, achieved on a sustainable basis, with regular assessments of inland water species of economic importance being conducted at the national level including where feasible and

⁵ “D. The urgency of needed action on taxonomy. [para.] 21. The Executive Secretary is requested to take decisive action to advance the Global Taxonomy Initiative as detailed in decisions III/10 and IV/1 D, which should be implemented as soon as possible.”

⁶ document UNEP/CBD/SBSTTA/4/INF/1

appropriate the involvement of local and indigenous peoples in assessments and monitoring as the option of first choice.

Agricultural biological diversity (ABd)

Agricultural biodiversity is a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biodiversity that constitute the agro-ecosystem (COP V.5). The CBD has also stressed the importance of mitigating the negative effects of agricultural systems and practices on other ecosystems (COP V/5). The Global Biodiversity Outlook (SCBD 2001) helpfully considers three functional groups within ABd:

- Producers (“the domestic, cultivated, farmed and semi-wild species (mainly flowering plants, fishes, birds and mammals) whose production provides human food, together with the varieties and wild relatives that expand the genetic resource base for future breeding improvements”);
- Support services (“the wild and semi-managed species (mainly micro-organisms and invertebrates) that provide services supporting agricultural production, notably the soil biota, pollinators and the predators that affect pest species”);
- Pests and pathogens (“the wild species (mainly micro-organisms and invertebrates) that decrease agricultural production by causing disease or damage to producers”).

Activities under the ABd programme of work needs some degree of taxonomic input and capacity on each of these functional groups in order to deliver fully on their objectives. This need ranges from classical taxonomy of the species living in agricultural ecosystems, to the taxonomy of wild relatives of agriculturally important species, to access of existing taxonomic information including basic knowledge on the functional relationships between organisms often recorded by taxonomists.

While the importance of broadening the genetic resource base of agricultural producers through wild relatives has been mentioned several times (COP III/11; V/5) there has been little discussion on what requires to be done, this perhaps being perceived as part of the work of the FAO under the various Plant and Farm Animal genetic resources programmes. However, the identities of the wild relatives of many crops are not well known, and considerable taxonomic work is still required. For example, Ethiopia represents one of the world’s eight major centres of crop plant diversity, the region providing the origin of 12 widespread crops and a number of others used within the area. However, the country’s flora and vegetation types are not fully known (Groombridge, 1992). This has led to a project proposed as a GTI Pilot from Ethiopia to complete a study of the country’s flora including that of the unexplored areas.

Decision III/11 points out the need to identify key components of biological diversity in agricultural production systems responsible for maintaining natural processes and cycles. A subsequent decision, in identifying elements of a programme of work, notes the continuing need for assessments, and mentions the requirement for assessment of microbial genetic resources, and the goods and services provided by agricultural biodiversity such as pest and disease regulation and pollination (COP V/5). Needs for GTI activities on support organisms fall at present into two main groups: soil biota and pollinators. The latter, as developed in the International Pollinators Initiative (COP VI/5), will be discussed in more detail below. The importance of soil micro-organisms is highlighted several times in decision III/11, as well as in V/5. A great deal of work was seen to be required on symbiotic soil micro-organisms, including their assessment an measurement of loss globally, identification, promotion and transfer of technologies for their detection, and the identification and promotion of conservation measures. All of these require a major taxonomic component, given the numbers of species and the taxonomic difficulties involved in distinguishing them. Notably, the report of the Asian GTI workshop in 2002 pointed out strongly the very low numbers of taxonomists of micro-organisms who were active in the region (Wilson et al, 2003). Decision IV/6 extended the focus on soil micro-organisms to address all soil biota and invited submission of case studies of soil biota in agriculture. One of the proposals submitted as a prospective GTI Pilot Project focussed on termites of significance to ABd, both as pest and beneficial insects, and included

collecting data on termites in major taxonomic collections at a global level in order to elucidate the distribution patterns of beneficial soil-inhabiting species linked in with existing studies on the role of such termites in soil quality and fertility, and assess the decline of beneficial species in agricultural lands. The GTI Programme of Work identifies as outputs in this area development of standard methods for identification of soil biodiversity to different taxonomic levels; and increased knowledge of soil biodiversity to aid in the identification of indicators of the “health” of below-ground biological diversity (COP VI/8).

COP in its Decision VI/5 decided to establish an International Initiative for the Conservation and Sustainable Use of Soil Biodiversity as a cross-cutting initiative within the programme of work on agricultural biodiversity, and invited the FAO, and other relevant organizations, to facilitate and coordinate this initiative. As with the IPI (see below), a considerable taxonomic input will be required if such an initiative is to be productive.

A major component of agricultural work all over the world has been associated with identifying the pests and diseases affecting domesticated plants and animals, and finding ways of treating them. COP V/5 notes as an activity collecting case studies of pest and disease control mechanisms, including the role of natural enemies and other organisms at field and landscape levels. The GTI PoW states that for organisms involved in pest and disease regulation, a scoping exercise should be undertaken to determine where the limitations exist in terms of taxonomic information, from basic alpha-taxonomy of pests and natural enemies, to how the information is presented and distributed. It suggests that the work could be carried out by farmers’ networks and research institutions, including the IARC system. Two needs assessment similar to this, in taxonomy and biosystematics in this context in countries of South East Asia, were produced in 2002, one for plant pathogenetic organisms (Evans et al, 2002) and one for arthropod pests of plants (Naumann and Jusoh, 2002). Both made a number of recommendations, focussed on the necessity of bringing the relevant collections of organisms held in countries of the region up to a standard appropriate to meet the identification needs identified, and provision of information. These reports are discussed in more detail below.

The Global Integrated Pest Management (IPM) Facility, based in Rome, which is a programme co-sponsored by FAO, UNEP, UNDP and the World Bank, was identified by COP as an organisation that might contribute to GTI activities in this area (COP VI/8).

The value of training and knowledge-sharing among researchers, extension workers, farmers and indigenous peoples is highlighted in decision V/5 of the Conference of the Parties to the Convention on Biological Diversity, and noted again in VI/8. Clearly knowledge held by the communities most engaged in ABd must be utilised where possible (and, naturally, with respect for IPR issues). Moreover, appropriate taxonomic training for farmers and ecosystem managers is an important element to consider in programmes, to cut costs, facilitate monitoring and assessment work, and save time in reacting to changes in biodiversity observed in agricultural systems (COP VI/8).

As the agricultural biological diversity work programme develops, significant taxonomic activities will need to be integrated within the proposals for work (Cop VI/8).

Agricultural biological diversity: The International Pollinators Initiative (IPI)

Pollination is an essential ecosystem service that depends to a large extent on symbiosis between species, the pollinated and the pollinator. In many cases, it is the result of intricate relationships between plant and animal, and the reduction and loss of either will affect the survival of both parties. Not all plants depend on animals for pollination. Many plants are wind pollinated, such as grasses and many staple food crops. However, at least one-third of the world’s agricultural crops depends upon pollination provided by insects and other animals. Diversity among species, including agricultural crops, depends on animal pollination. Therefore pollinators are essential for diversity in diet and for the maintenance of natural resources. The assumption that pollination is a “free ecological service” is erroneous. It requires

resources, such as refuges of natural vegetation. Where these are reduced or lost they become limiting and adaptive management practices are required to sustain livelihoods.

In fact, throughout the world, agricultural production and agro-ecosystem diversity are threatened by declining populations of pollinators. Many pollinators are bees, of which there are over 25,000 different species, and which visit and pollinate a diverse range of plants. Both the diversity of wild plants and the variability of food crops depend on this diversity. Though bees form the most important group of pollinators, other insects such as, butterflies and moths, flies and beetles, and vertebrates such as bats, squirrels, birds and some primates, also contribute. Some plants are visited by many different pollinators, while others have specific requirements. The same applies to the pollinators, some being generalists and others specialists. Therefore, pollination as a science requires detailed investigation, and the technological application of management practices is intricate. In most cases, there is a lack of knowledge about the exact relations between individual plant species and their pollinators, but studies in this field demonstrate that they are often quite specific.

Considering the urgent need to address the issue of worldwide decline of pollinator diversity, the Conference of the Parties to the Convention Biological Diversity established an International Initiative for the Conservation and Sustainable Use of Pollinators in 2000 (decision V/5, section II) and requested the development of a plan of action, which was adopted subsequently under ABd in COP VI/5 in 2002. One of the objectives of this plan is to address the lack of taxonomic information about pollinators.

The taxonomic requirements of the IPI are made explicit throughout the text of VI/5. Among the assessments needed to understand the nature of the problems and the means of dealing with it is taxonomic knowledge of pollinators, and this should accordingly be considered a part of general taxonomic needs assessments for the GTI in future. In the same section is a requirement to promote the development of identification keys for bee genera, having previously noted that the number of bee genera for which such keys are not available is ‘unacceptably high’. This activity forms part of the first stage of the activities on global monitoring of pollinators, which is hoped to be completed by 2005. The GTI PoW also notes necessary outputs as including easy-to-use keys to families, genera and species of pollinators, and automated identification systems for pollinators (VI/8). Although the text of the decision does not specify which pollinators, it must be remembered that other invertebrate groups than bees are also involved and, as appropriate, these may require identification guides to be produced.

Element 3 of the plan is capacity building, which states: “One major area which needs addressing is the capacity of countries to address the taxonomic impediment, which derives from serious shortfalls in investment in training, research and collections management. It seriously limits our capability to assess and monitor pollinator decline globally, in order to conserve pollinator diversity and to manage it sustainably. The global taxonomic impediment is costly, especially when expressed in terms of those research initiatives in pollination and conservation ecology which are wholly dependent on access to sound bee taxonomy and are rendered wholly non-viable in its absence. There is also a global taxonomic deficit, that is, the unacceptably high numbers of bee genera for which identification keys are not available.” (COP VI/5). As an action to meet this is to “Build taxonomic capacity to carry out inventories of the pollinator diversity and distribution in order to optimise their management, through, inter alia, the training of taxonomists and parataxonomists of bees and other pollinators.” Additional activities in this section which involve a strong taxonomic element are to “Develop tools and mechanisms for the international and regional exchange of information for the conservation, restoration and sustainable use of pollinators. This may include ...Developing and updating global and national lists of threatened pollinator species, and produce multilingual manuals on pollinator conservation and restoration for farmers.” (VI/5).

The activities on IPI need to be mainstreamed and integrated in sectoral and cross-sectoral plans and programmes, as part of the support of national plans and programmes. This integration should include, according to decision VI/5, strengthening national institutions to support taxonomy of bees and other

pollinators, through, inter alia: (a) Assessing national taxonomic needs; (b) Maintaining continuity of taxonomic and reference collections of bees and other pollinators; (c) Recognition of centres of excellence in bee taxonomy and establishment of centres of excellence as appropriate; (d) Repatriation of data through capacity-building and benefit-sharing.

The full text of Decision VI/5 is provided in Annex 7.

Mountain biological diversity.

Mountains are particularly fragile and important systems, and many of the Parties to the CBD have particular issues in conservation and sustainable use of mountain biodiversity. The areas, that the taxonomic needs associated with them, were highlighted at recent workshops directed at developing technical cooperation networks of taxonomic institutions in the Andean and South Asian subregions (ANDINONET and SACNET respectively). Development of GTI activity on this issues will be undertaken further following discussion of this thematic work area at the seventh meeting of the COP (COP VI/8). Within the proposed programme of work is a statement that the PoW of the GTI should be applied to mountain biodiversity wherever appropriate to develop work on identification, monitoring and assessment of mountain biological diversity.

Access and Benefit-sharing.

This is one of the key elements of the Convention itself. Fair and equitable sharing of the benefits arising from the exploitation of the genetic resources of biodiversity is one of the three aims of the CBD, and Parties need to develop measures to manage this and the access to such benefits. However, no action can be taken in this area if the genetic resources themselves are not known. A basic tool to enable this to happen is knowledge of the identity of species and strains and their distributions – inventories at subnational and national levels. These activities are of particular importance at the country level, since most arrangements regarding access to genetic resources must be, or are most effectively handled at, national level. The importance of inventories for access and benefit sharing issues was recognized by COP V/26, which identified “Assessment and inventory of biological resources as well as information management” as key activities in this context. Parties are already committed to developing inventories of their biodiversity under Art. 7 of the CBD.

There are, as the decision cited above implies, two elements to the work required. One is carrying out the inventory work itself, including both the sampling and the subsequent identification, the other the management of the information that is produced from the inventory. That information management extends beyond the inventory results, however, to specimens already collected and held in museums, herbaria and culture collections both inside and outside the country of origin, of which there are vast numbers.

The more each country can develop its capacity to properly inventory, collect, classify, and then commercialize its biological resources, the greater will be the return of benefits to that country. These four elements (inventory, collection, classification, commercialization) can be seen as a hierarchy of increasing capacity. The GTI is focussed on the first three of these.

The primary goal of the GTI in this respect is to assist countries in carrying out inventory work in a timely and efficient manner. Data for inventories can come from three sources:

1. Published data, including checklists, catalogues, taxonomic revisions etc. Access to these may involve working with natural history libraries held in major museums and herbaria. Increasingly major works are being digitised and placed on the internet (e.g. the *Biologia Centrali-Americana* for animals and plants of Mesoamerica, <http://www.sil.si.edu/bcaproject/index.htm>), but in most

cases these publications have not been and are unlikely to be digitised, and must be sought with the aid of specialists and librarians.

2. On-line databases which give names and the localities from which the species concerned have been collected. These may be drawn from collections held in museums (e.g. the European Natural History Specimen Information Network, ENHSIN <http://www.nhm.ac.uk/science/rco/enhsin/> or the Species Analyst <http://speciesanalyst.net/>), or be fully compiled lists (e.g. the list of trees of El Salvador held at <http://internt.nhm.ac.uk/cgi-bin/botany/ESTrees/index.dsml>). Parties to the CBD have agreed in decision IV/1.D that such access is a necessity, and an output for GTI in this area is interactive catalogues of material available, linked to taxonomic collections. This area is more fully discussed under the taxonomic information section below.
3. Collections held by museums and herbaria both in country and elsewhere in the region and the world, but for which no databases are as yet on line. Abstracting information from these may take considerable time and be costly. However, most large institutions now regard repatriation of information as an important area, and are very happy to work with countries to obtain grants to enable the data to be captured and made available.
4. Collecting and identifying fresh material. This may be done by nationals or as part of partnership work with non-nationals. The latter method is likely to be of particular value to countries with an under-developed taxonomic infrastructure. In the latter case, the memorandum of understanding that covers the work might specify that names of the organisms collected should be returned to a stated agency in the country of origin. Such agreements need to be realistic, as in many collecting enterprises some non-target taxa are collected in error and are unlikely to be identifiable by the collectors. Moreover, for collections of species-rich and poorly known organisms such as invertebrates and micro-organisms, most of the species collected will not be previously known and will need to be described before names are available, a time-consuming process.

Among other priorities, the Global Taxonomy Initiative will concentrate on developing capacity in the collection and classification of biodiversity. Projects in this area will be those designed to develop capacity in collecting and maintaining biological collections, as well as the proper classification and knowledge of the biological resources. Taxonomic information specifically including genetic level data will be critical in tracing the origin of resources and living modified organisms (LMOs).

A major element in increasing capacity to properly inventory and access biological resource information is effective information management. Therefore a key element of the GTI is the development of appropriate IT tools to allow access to existing data, as well as to provide efficient entry of new information generated.

5. Use of indigenous knowledge. Members of many indigenous communities will have detailed knowledge of elements of the biodiversity, and this may be used, with appropriate safeguards and prior informed consent, to assist in the compilation of inventories. In the case of subsequent exploitation of genetic resources, it can be important to associate indigenous knowledge of the use of a particular organism with the nomenclature used in the inventory. This provides evidence of prior art and is important to establish appropriate intellectual property rights.

The issues regarding collection, and subsequent taxonomic work on specimens collected, by non-nationals and taking place outside the country of origin, is of considerable importance. As a part of their implementation of the CBD, many countries are introducing permit systems for researchers. Whilst this is an important step to safeguard rights, if the system is too difficult, restrictive, expensive or time-consuming, researchers from elsewhere are unlikely to go through the system and may choose to carry out their work in other countries. This could then be ultimately negative in terms of hindering the development of inventories. This issue is of importance to regional and subregional initiatives, such as are encouraged by the GTI; for example, decision VI/8 requests Parties and other Governments to: Initiate the setting up of national and regional networks to aid the Parties in their taxonomic needs in

implementing the CBD. In the GTI Regional meeting in Asia in 2000 the issues of transborder research and permits was discussed at some length; the workshop called for a streamlined approach to obtaining permission to undertake taxonomic research under the GTI. It has also been highlighted by the Coordination Mechanisms of the GTI, who in the report of their meeting in 2000 noted: “Biological species do not observe national boundaries, and can only be understood and sustained if their variation can be studied and assessed in the natural habitats throughout their entire geographic range. Much taxonomic research depends on transnational activities and international cooperation involving joint fieldwork, travel of personnel, and the frequent exchange of data, samples, and biological specimens. The Coordination Mechanism advises the Executive Secretary to urge Parties to the Convention to facilitate such efforts of international cooperation for taxonomic research as are needed to help implementing activities of the Convention by *inter alia* establishing clear and unambiguous mechanisms for granting the necessary permissions for approved research projects, field work, collection of biological specimens, and free exchange of personnel, data and relevant materials.”

In an attempt to deal with this issue, among others, COP VI/24 endorsed the Bonn Guidelines on Access to Genetic Resources: Equitable Sharing of the Benefits Arising out of their Utilization. Among the objectives of these guidelines, which cover a very wide range of issues, is that “Taxonomic research, as specified in the Global Taxonomy Initiative, should not be prevented, and providers should facilitate acquisition of material for systematic use and users should make available all information associated with the specimens thus obtained.”. There are a number of clauses in the Guidelines which specifically cover taxonomic collections, and these are given in Annex 9 to this work. The Guidelines state specifically with respect to inventories that: “The following key [area], which require[s] capacity-building initiatives, should be considered in a flexible and transparent manner, based on a demand-driven approach, taking into account the different situations, needs, capabilities and stages of development of each country and should avoid duplication of efforts between various capacity building initiatives: Assessment, inventory and monitoring of biological resources, and traditional knowledge including taxonomic capacity, within the context of the Global Taxonomy Initiative;”. The guidelines themselves can be found on <http://www.biodiv.org/programmes/socio-eco/benefit/bonn.asp>. An important consideration is that permission for collection and research can be given for a particular set of uses, and that if there is any subsequent different use then further permission must be sought from the country of origin. Uses associated with taxonomic research in the development of inventories might include such aspects as to: conduct research; collect specimens; export specimens; retain specimens; conduct different types of analysis (e.g. molecular or genetic); exchange specimens freely outside the country; publish data about the specimens (particularly distributional); import necessary equipment and chemicals to carry out the research (preferably with tax exemption), etc.

An associated issue is for researchers to be able to obtain information on what regulations are in force regarding permits and collections, and the Executive Secretary has issued a Notification (<http://www.biodiv.org/doc/notifications/2001/ntf-2001-07-23-abs-en.pdf>) asking parties to designate a National Focal Point and one or more Competent National Authorities, as appropriate, to be responsible for access and benefit-sharing arrangements or to provide information on such arrangements, as requested in section A, paragraphs 1 and 2 of decision V/26 of the COP, and suggesting several other actions, including:

1. The NFP or CNA should take necessary steps at the national level for the requirements of taxonomic permissions to be taken into account.
2. To make details of Collecting and Export Permit requirements available on the appropriate national web site, together with appropriate contact points (Competent National Authorities).
3. To make copies of their Collecting and Export Permit requirements available at each of their Embassies or Consulates.
4. To make copies of Collecting and Export Permit requirements available through the National CBD/GTI Focal Point and Access & Benefit-Sharing Focal Point.
5. To send copies of Collecting and Export Permit requirements, or reference to a web site, to the Executive Secretary in order to facilitate exchange of information through the CHM.

6. CBD Focal Points to note that in any approval process of projects associated with the CBD the CBD focal point should require the matter of granting permissions to have been satisfactorily addressed.

Invasive Alien Species.

Invasive alien species (IAS) are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, out-compete natives and take over the new environments. They are widespread in the world and are found in all categories of living organisms and all types of ecosystems. The threat to biodiversity due to invasive alien species is considered second only to that of habitat loss.

Some of the marine issues linked to ballast water have been discussed above under the heading of Marine and Coastal Biodiversity. In terrestrial environments plants, mammals and insects comprise the most common types of invasive alien species.

Development of this activity was noted in the GTI Programme of Work (COP VI/8) as to be undertaken within the Convention Process based on priorities identified through GISP phase I, and the review of the status of invasive alien species, and of ongoing measures addressing invasive alien species under way within the CBD (COP VI/8). There has not been any clear development of this within the Convention process, and further clarification would be valuable. COP VI/23 on IAS urged “Parties, Governments and relevant organizations, at the appropriate level, with the support of relevant international organizations to promote and carry out, as appropriate, research and assessments on: Priorities for taxonomic work through, inter alia, the Global Taxonomy Initiative”. Moreover, in the Guiding Principles given in that decision Principle 5, on Research and Monitoring, states:

“In order to develop an adequate knowledge base to address the problem, it is important that States undertake research on and monitoring of invasive alien species, as appropriate. These efforts should attempt to include a baseline taxonomic study of biodiversity. In addition to these data, monitoring is the key to early detection of new invasive alien species. Monitoring should include both targeted and general surveys, and benefit from the involvement of other sectors, including local communities. Research on an invasive alien species should include a thorough identification of the invasive species and should document: (a) the history and ecology of invasion (origin, pathways and time-period); (b) the biological characteristics of the invasive alien species; and (c) the associated impacts at the ecosystem, species and genetic level and also social and economic impacts, and how they change over time.”

Guiding Principle 8, on Exchange of Information, states:

“States should assist in the development of an inventory and synthesis of relevant databases, including taxonomic and specimen databases, and the development of information systems and an interoperable distributed network of databases for compilation and dissemination of information on alien species for use in the context of any prevention, introduction, monitoring and mitigation activities. This information should include incident lists, potential threats to neighbouring countries, information on taxonomy, ecology and genetics of invasive alien species and on control methods, whenever available. The wide dissemination of this information, as well as national, regional and international guidelines, procedures and recommendations such as those being compiled by the Global Invasive Species Programme should also be facilitated through, inter alia, the clearing-house mechanism of the Convention on Biological Diversity.”

The Global Strategy on Invasive Alien Species was produced by GISP (McNeely et al 2001) based on the outcomes of Phase I. Element 2 of this, focusing on Building Research Capacity, noted that current knowledge on IAS must be further developed with a cross-sectoral and multi-disciplinary approach in order to provide the necessary tools. Consideration to such an approach may include a number of foci, including “Strengthening infrastructure for research on IAS (e.g. systematics, taxonomy, ecology) at

national and regional levels. An international committee to correlate and manage updated taxonomic nomenclature for all IAS would be a useful resource.” Considering Assessment and Prediction, the strategy states “Building the capacity to identify, record and monitor invasions and provide current lists of potential and established IAS.”

The capacity necessary to meet the information needs was outlined in the Davis Declaration, an output from a Workshop on Development of Regional Invasive Alien Species Information Hubs, held in Davis, USA in 2001 (see text box 3-4). The concept is to establish a global information network based on a series of regional information hubs providing information services on IAS. Each hub would develop a core set of information products, coordinate existing information systems and encourage new initiatives to meet regional needs, facilitate synthesis and integration of information from many countries and sources, ensure application of appropriate data standards and vocabularies, and provide quality control and documentation.

Other recommendations from Davis included:

- (i) Support of IAS information services by strengthening of the infrastructure for information technology and management, taxonomic identification, systematics research, vouchering and collections management worldwide.
- (ii) Development of tools to increase taxonomic capacity worldwide. These tools, which should be made available wherever possible in hard copy, on CD, and on the Internet, include, *inter alia*, a guide to taxonomic services for IAS; common nomenclatural standards; identification aids; searchable lists of floras and faunas; and training programs for new taxonomists and parataxonomists.
- (iii) Establishment of partnerships with key stakeholder groups, including industry, non-governmental organizations, and the general public, for developing and applying taxonomic services and information to combat IAS.

Further work on the information management element of the proposal was carried out at a joint meeting with the Clearing House Mechanism in Montreal in 2002 (SCBD, 2002). The elements of the report of this meeting (supplied to COP VI as an information document) pertaining to GISP, is provided here as Annex 16. The meeting endorsed the concept of regional hubs, and suggested that extant networks, such as those affiliated to BioNET-INTERNATIONAL, to explore opportunities to utilise their infrastructure in their development. A number of technical issues were discussed (see Annex 16), including standards for taxonomy, which were:

- (i) Increase the standardization of taxonomic usage within the network, taking into account the following:
- (ii) Encourage cooperation among hubs to ensure that all are using the same names for species;
- (iii) Recognize and communicate changes in taxonomic concepts of individual invasive species without delay across hubs;
- (iv) Encourage adoption by hubs of standard nomenclatures of higher taxonomic groups, where developed and accepted under the appropriate nomenclatural codes;
- (v) Use the taxonomic resources of GBIF, ITIS and/or Species 2000 that provide access to baseline taxonomic data to ensure interoperability;
- (vi) Enable the inclusion of unidentified or partially identified specimens in the information system;
- (vii) Allow species level updates of specimen-associated data, such as distribution and ecological impact, upon their eventual naming or re-identification in the information system;
- (viii) Encourage hubs to recommend to affiliated institutions to follow best practices, such as:

- i. Maintenance of voucher collections of invasive species (including genetic material), whether named or not;
 - ii. Specimen identification tracking systems with the potential of active links to the information network in the case of voucher specimens;
 - iii. Mechanisms for actively linking species-level data and the specimen-level data upon which they are based.
- (ix) Allow for multiple taxonomic interpretations by the information system. Where conflicting interpretations create confusion as to the status of a species as invasive, these should be flagged as requiring priority investigation.

A number of recommendations on capacity building were presented, including working through and building upon other capacity building initiatives, including those associated with the clearing-house mechanism, GTI (particularly in the context of its programme of work, planned activities 15, 5 and 6) and other thematic areas and cross-cutting issues under the CBD, those being developed in response to the UNDP Capacity Development Initiative, and those being developed by initiatives and organizations such as GBIF, BioNET INTERNATIONAL, the ALL-Species Foundation.

The GTI Asian Regional workshop in Malaysia made a number of recommendations in its proposed GTI programme of work for the region (Wilson et al, 2003).

Support in implementation of Article 8(j).

Article 8(j) concerns the knowledge, innovations and practices of local and indigenous communities relevant to implementation of the Convention.

Traditional knowledge systems include taxonomic information, which, if used in combination with Linnaean taxonomies, could be of wider value, and also serve to protect the rights of the originators. However, access to and use of traditional knowledge must have the prior informed consent of the holders of that knowledge and be based on mutually agreed terms. When this has occurred then comparison of indigenous taxonomies and Linnaean taxonomies in different regions could be made. Possible outputs in this area could be regional and subregional guides. These guides might be in the form of catalogues and species lists, or be more targeted resource material that provide interpretation material for a wide variety of environmental managers, and in particular protected area and conservation managers. A congruent need in this respect is to develop methods of depicting and correlating taxonomies based on traditional knowledge and those based on Linnean nomenclature.

The involvement of local and indigenous communities in all Convention implementation is encouraged, including the GTI. This is included within the GTI Programme of Work, and formed part of a report by UNESCO, DIVERSITAS and WWF (Anon, 2000). However, there is clearly a great deal of work to do in this area to ensure that such involvement is undertaken in the most effective manner and respects the rights of the peoples concerned.

Support for ecosystem approach and CBD work on assessment including impact assessments, monitoring and indicators.

The GTI originally came into being as a mechanism to aid implementation of Article 7 of the CBD on Identification and Monitoring and, as stated at the beginning of this section, is a part of all such activities under the Convention (CBD III/10). Capacity building in taxonomy has been recognized as fundamental to Identification, Monitoring, Indicators and Assessments in several Decisions (III/10, VI/7). The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of

appropriate scientific methodologies focused on levels of biological organization that encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems. Within the Convention the term 'ecosystem' is defined thusly: "'*Ecosystem*' means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit" (Article 2 of the Convention). As described by the COP, the ecosystem approach is the primary framework for action under the Convention.

Under the ecosystem approach, a key activity will be the Millennium Ecosystem Assessment (MEA). The MEA will require considerable scientific effort for the characterization of ecosystems, including better data on key species that comprise ecosystems and their role in maintaining ecosystem processes. In many regions taxonomic knowledge needed to fulfil these efforts are not available, and therefore will require specific activities to be undertaken (to be created under the GTI). The MEA seeks policy-relevant information; the GTI is a policy response to a recognized impediment in our system of biodiversity understanding. The GTI seeks to facilitate gathering of the pertinent species information that would be used to characterize ecosystems, including those that help to illustrate the value of goods and services flowing from ecosystems.

The MEA will be required to report on issues such as patterns of species and ecosystem diversity, and the activities of the GTI in facilitating better knowledge of species and their distribution will help provide this information. All information fed into the MEA will need appropriate geo-referencing – which is a key plank for all activities envisaged under the GTI. The GTI will also focus on taxonomic activity in areas of relevance to the Convention, especially the key ecosystem themes. Thus the products of the GTI can complement the MEA activity in thematic ecosystems, which in turn may illustrate the extent of removal of the taxonomic impediment – providing a positive feedback process.

The GTI also has relevance to the suite of associated environmental conventions (e.g., the Convention on Migratory Species (CMS), the Convention on International Trade in Endangered species of Flora and Fauna (CITES) and the Convention to Combat Desertification (CCD)) and to the Commission on Sustainable Development (CSD), all of which have a direct interest in the outcomes of the MEA. There is scope for linking envisaged work programmes under the MEA with the key action areas under the GTI.

Outputs in this area will be the production of taxonomic overviews to help guide the MEA to focus on key areas and issues of importance. These overviews can be compiled from work under the other operational objectives, but may need special focus for the global ecosystem context of the MEA. (CBD VI/8).

Protected Areas.

The GTI Programme of work does not make any specific recommendations with regard to Protected Areas, since development of this activity under the Convention is to be undertaken following discussion of this cross-cutting work area. (VI/8). However, a number of elements where work is required can be identified. Most important is related to the imbalance between the described and undescribed species of animals, plants and micro-organisms. Although some 1.78 million species have been described, an estimated 3-98 million remain to be named. The proportion of described species is not evenly spread across taxa, but rather concentrated in the larger organisms such as vertebrates and vascular plants (where perhaps 90% have been discovered and named). There are, however, huge gaps in the smaller organisms, such as insects, fungi, algae and protozoa, which are both far more species-rich and almost certainly far more important for ecosystem functioning. Moreover, listing of conservation status through the red databook system seems biased in favour of the larger organisms. Although there is no reason to believe that extinction rates are any lower for invertebrates than vertebrates, 24% of the 4,763 species of mammals are threatened, while only 0.06% of the 950,000 insects have so far been assessed as threatened (SCBD, 2001). The result of this is that protected areas established for the conservation of biota are likely

to be placed and managed in terms of the larger better known species not the much larger number of smaller species that may occur there. Several cases have shown that management for flagship species is not necessarily appropriate or beneficial for others, which leads to the scenario that one effect of management is to disadvantage a majority of species within the protected area. Moreover, the majority of species within a protected area may not be known. Finally, in terms of determining appropriate sites for protected areas, data on the fullest range of species available should be utilised to enable optimum placement; such data are either unavailable because of lack of description, or available only in large collections held in museums and herbaria.

Some protocols on how to meet these challenges need to be developed. These might include, for any actual or proposed protected area:

- access to known specimen data from that area (i.e. via GBIF and the taxonomic institutions), particularly of endemics and locally/regionally rare entities;
- knowledge of the role of the area in relation to the distribution of as many species as possible (using programmes such as WORLDMAP⁷, again dependant on taxonomic input and access to collections);
- rapid surveys on a selection of target groups of lower organisms, using initiatives such as Conservation International's Rapid Assessment system;
- rapid treatment of the survey results to produce (1) list of RTUs (recognizable taxonomic units, or morphospecies, which are likely to be species-level taxa but are not named and thus cannot be compared between sites) and their likely ecological roles; (2) list of species, including newly-described ones;
- long-term monitoring of these taxa with continuing description of new species as collected;
- easy sharing of these data, including identification aids, between geographically and ecologically related reserves.

This clearly requires incorporation of the protected area community into the data sharing and generating process exemplified by GBIF. It also demands close associations between the conservation community and taxonomy. Last but not least, of course, it demands focused capacity building of taxonomy (King and Lyal, 2003).

Global Strategy for Plant Conservation

This strategy, put in place by COP in Decision VI/9, includes a number of elements where taxonomic input will be required. The strategy is provided in Annex 8, and at the time of writing consultations are under way in how it should be implemented.

3.3. Taxonomic needs assessments

Meeting the challenges and needs presented by the requirements for taxonomic information, expertise and infrastructure necessary to implement the Convention and carry out the sort of work referred to in the preceding section is another factor underlying the GTI. A first step in meeting the needs is, of course, determining just what those needs are. For this reason the GTI Programme of Work includes a major objective to assess needs at National, Regional and Global levels. National assessments should inform the Regional assessments, which in turn will help enable the global assessment to be carried out. Regional Workshops on the GTI are also being carried out with the partial aim of developing Regional Assessments.

National taxonomic needs assessments for all Parties were called for in COP IV/1.D, V/9 and VI/8. While a specific timeframe has not been set, it was hoped that the results of such assessments could be presented to COP in 2002. However, thus far relatively few countries have been able to undertake them. The second National Reports to the CBD indicate that only four had been done. Assessments should be undertaken within the framework of undertaking the necessary planning to produce or update national

⁷ <http://www.nhm.ac.uk/science/projects/worldmap/>

biodiversity strategies and action plans (NBSAPs) under the Convention. To this end, a needs assessment will be required to clearly articulate how the lack of taxonomic capacity and / or information is an impediment to the implementation of the NBSAP.

Some valuable suggestions on how to proceed with needs Assessments on a national level were provided by the report of the DIVERSITAS/Systematics Agenda 2000 Workshop “The Global Taxonomy Initiative: Using Systematic Inventories to meet Country and Regional Needs” (Anon, 1998c), which was supplied to the fourth SBSTTA as an information document (see Annex 13). These suggestions are reproduced below, with some amendments:

In general, countries will need to carry out a four-step operation, ideally building on pre-existing information and undertaken within the context of national goals and existing national biodiversity strategies and action plans:

1. Assessment of existing taxonomic knowledge about national biodiversity;
2. Assessment of current national taxonomic infrastructure;
3. Assessment of current national human resources in taxonomy; and
4. Assessment of national user needs for taxonomy.

1. Assessing available taxonomic knowledge

Taxonomic information exists for all countries, but much of it is scattered in a myriad different sources, is of uneven quality, and may not be easily available electronically. Key categories of taxonomic information to be documented include:

a. Information on species known or assumed to occur in the nation or region

For relatively well-known groups such as vertebrates, vascular plants, and some of the more spectacular or economically important invertebrates, this task may be relatively straight forward since information can often be found in field guides and national or regional checklists. Other sources of information are taxonomic monographs, primary taxonomic literature and reports. For some groups, species information may be available in electronic databases, although coverage is at present very incomplete. For many taxonomic groups, nations, and/or regions the task will be extremely time consuming and may not be possible with available resources. In this case estimates of the species richness of such groups would be of most value with a view to planning future studies to acquire or develop the full information.

In addition to species lists, countries should attempt to collate data about species discussed in monographs, primary taxonomic literature, faunal or floristic lists, reports, or electronic databases and the representation of these sources in-country (or wherever internationally they might be found). This is likely to be beyond the scope of an initial assessment, but might be identified as a need to be met under the NBSAP.

b. Species representation in national and international natural history collections

Specimens in natural history collections provide the most reliable record documenting the distribution of a species nationally and regionally. Within the context of national needs and priorities, countries will want to identify collections that contain specimens of its biodiversity. This task may be easy if there is long-term scientific involvement of one or more international institutions within the country, or because of the existence of monographic works referring to specimens in particular museums or herbaria. Increasingly, collections are being databased, and thus information on specimens may be readily available. Countries need to locate collections considered to be most critical for meeting national needs. Indexes to many collections are already available on the World Wide Web (WWW) and the number is growing rapidly. However, as discussed below, locating specimens in international collections, and acquiring the data from them, can be a difficult and time-consuming operation. For the purposes of a National Assessment, key national and extra-national collections could be identified and asked for an indication of the holdings from the country concerned (although it must be remembered that provision of

such information may require considerable work on behalf of the collection-holding institutions, and the cost of this should be considered in the costing of the needs assessment, if it is to be included. This can be used as the basis for subsequent data-collection projects, the clear need to access such data having been identified in this phase of the assessment. The need might be noted in the NBSAP. A valuable exercise, possibly arising from the Assessment, might be to network relevant institutions and encourage them to pool collections data.

c. Data associated with specimens in collections

Information associated with specimens in natural history collections may facilitate conservation and sustainable use of biodiversity. Such associated information often includes: date of collection; precise geographic location (latitude, longitude, altitude, depth); sex; breeding condition; habitat type; host identification; food preferences; soil, water, or sediment type; as well as other types of information such as abundance, song types, behavioral displays, and genetic tissue samples. If this information is not accessible in electronic databases or at least in published monographs and reports (and much of it is not, or the publications themselves are unavailable), countries should consider plans to gather this information.

2. Assessing available taxonomic infrastructure

A survey of scientific infrastructure supporting taxonomic research is a key element of any national taxonomic assessment. Three broad categories of taxonomic infrastructure include collection facilities, libraries, and associated technical, management and other institutional support for taxonomists.

a. Collections facilities

Collections facilities include museums, herbaria, arboreta, zoos, botanical gardens, culture collections, and seed banks. These facilities might be housed in stand-alone institutions, universities, private institutions, or governmental agencies such as agricultural research stations. As part of any assessment, the following information should be gathered for each collection:

- taxonomic coverage and the type(s) of specimens housed;
- quality of collection (the proportion of specimens which are identified and / or sorted, and those which are available for research);
- capacity for growth, in terms of space and infrastructural support;
- quality of the facilities and physical curation (adequacy of cabinets, supplies, maintenance, specimen preparation areas, curatorial and staff office and research space);
- security (whether the collection is adequately protected from fire, pests, and other adverse conditions);
- information availability and communications infrastructure (printed catalogues, whether collection is databased and whether specimen tracking is effected, whether the collection is linked electronically to other collections and to systematic databases);
- institutional structure (relevant policies, quality of business management; budgetary support); and
- institutional long-term planning, particularly in terms of GTI goals.

b. Libraries

Taxonomic research requires access to libraries with reference collections. In compiling national taxonomic assessments, libraries in natural history institutions, universities, agricultural or medical research centers, and other agencies should be surveyed for their capacity to support taxonomic research. General information to be gathered will include:

- numbers and kinds of libraries;
- extent of holdings (books, monographs, journals, electronic databases relevant to the particular area of the world and group(s) being studied);
- communication capabilities (electronic access to holdings; electronic linkages to other libraries).

c. Associated scientific support (policies, infrastructure)

All scientific research, including taxonomy, requires a broad range of general support infrastructure. In preparing national taxonomic assessments, each nation may wish to consider the following broad categories:

- universities, relevant governmental and nongovernmental institutions, field stations, etc.;
- computing capacity and quality;
- molecular, biochemical, morphological, cytological and other laboratory facilities;
- general research equipment available (microscopes, field vehicles, etc.);
- ocean-going ships, other research vessels, and sorting gear; and
- existing strategies and frameworks to develop and promote in-country research (including funding procedures, agencies, project evaluation, legislation, permit access policies, and multilateral institutional agreements).

3. Assessing available human resources supporting taxonomy

National strategies and action plans to contribute to the GTI will often depend on strengthening the human resources supporting taxonomy. No country has all the taxonomists it needs, nor taxonomic expertise in all groups. Therefore, countries will want to assess current human resources in light of national goals and needs. The following types of information will be of use in order to evaluate capacity in human resources:

a. Professional research staff in each taxonomic institution (curators, research scientists):

- Numbers;
- Taxonomic coverage (expertise); and
- Status: training, age, participation in professional activities within country and internationally.

b. Support staff:

- Professional collection managers;
- Technicians or research assistants;
- Students (undergraduate, graduate, and postdoctoral);
- Parataxonomists (nonprofessionals having some curatorial or research responsibilities);
- Collectors;
- Interns and trainees;
- Volunteers (retired scientists, trained lay persons, etc.); and
- Financial support staff (with expertise in funding bodies, financial administration, etc.).

c. Capacity for education and training in taxonomy:

- Education or training available (taxonomic coverage, content);
- Level of education available (B.Sc, M.Sc., Ph.D., parataxonomy training, collections management, etc.);
- Numbers and kinds of trainees;
- Type of training (degree granting, undergraduate, graduate, postgraduate, etc.);
- Facilities for training;
- Prospects for productive employment (institutions, number and kind of posts available, stability).

While national human resources in taxonomy are being evaluated, countries should assess human resources at the international level that may have a relevant role in building in-country capacity. Critical areas of needed information include:

- a list of in-country specialists working in foreign countries;
- a list of foreign taxonomists working in-country;
- a list of foreign taxonomists expert in relevant groups; and
- the availability of training opportunities in foreign countries.

4. Assessing national or regional priorities for taxonomic information

When designing and implementing national strategies and action plans, it is important to determine what taxonomic information is required by a country or region in order to meet its needs under the CBD. The results can be compared to the assessments discussed above to help set goals and priorities for building capacity. If countries are involved in regional taxonomic networks with other countries, needs should also be assessed within the context of meeting obligations to those collaborations, especially when participation may include complementarity and sharing of research effort.

There are many user groups for taxonomic information, but some of the most significant from the point of view of the CBD are:

- Conservation and resource managers and protected area managers;
- Agencies involved in environmental protection, including Invasive Alien Species;
- Agriculture, horticulture, forestry, and fisheries agencies;
- Forest product industries;
- Biotechnology;
- Ecotourism;
- Applied health and medical research; and
- Research community (biological science, global change, environmental science).

Each user-group should be surveyed for current and expected future needs for taxonomic information. Some of the questions that might be asked include:

- What taxonomic groups are considered to be most critical?
- What kinds of taxonomic knowledge about those groups are most essential?
- What gaps in knowledge need to be filled?
- What kinds of problems need to be solved with taxonomic information?
- Where does the user-group currently obtain taxonomic information?

Whilst the above is designed particularly for action at the national level, it can be used in a modified form at regional level. Three regional workshops have been held to date, in Central America (Herrera, 2001) Africa (Klopper et al, 2001) and Asia (Shimura, 2003; Wilson et al, 2003). The basic background document provided to these workshops during development is reproduced in Annex 18. However, the three preliminary regional assessments so far undertaken, for focussed more on the taxonomic collections, infrastructure and staffing levels, although interpreting them in terms of GTUI implementation. Steenkamp and Smith (2002), in their assessment of the needs of users of botanical information, went further towards identifying user needs.

A global workshop was held in Pretoria in 2002 to attempt to identify global needs for demand-driven taxonomic capacity building; the full report from this is not yet available.

3.4 Taxonomic Capacity Development

The results of National and Regional Assessments will provide clear indications as to the needs for capacity development. Other evidence is available from the results of the UNDP Capacity Development Initiative, which in 2000/2001 carried out a global survey of capacity development needs in a variety of sectors, and noted the requirements of taxonomy in particular.

Even though most national assessments have, at the time of writing, not been completed, the COP was able at its fifth meeting to identify clear needs for taxonomic capacity building in developing countries (COP V/9). This has been elaborated upon in the GTI Work Programme (VI/8), and the need is noted

/...

under almost every Planned Activity. Broadly speaking, capacity development will include personnel training and employment, infrastructure [i.e. buildings, collection furniture, IT and laboratory equipment, utilities, management structure etc] development, and information availability. Such capacity development may be appropriate at both country and regional levels.

Several documents explore the methods of capacity development and how they should be appropriately employed. A workshop was held under the auspices of DIVERSITAS and Systematics Agenda 2000 that discussed the development of a national strategy in some detail (Annex 13). Some detail on how to build capacity was developed at the global workshop in Pretoria in 2002 and elaborated at a subsequent meeting in Paris in 2003, organised by SCBD, BioNET-INTERNATIONAL and UNESCO-MAB. A tabulated version of the strategy elements is in Annex 15.

Few nations can now contemplate maintaining sufficient taxonomic expertise and infrastructure to cover the whole of their biota. A method of dealing with this restraint is to develop capacity on a regional basis, building strong links at both operational and political levels between different institutes and Governments. This model works well with many conservation and sustainable use issues, since these are often regional in nature, and are best addressed through multi-national consortia. The discussion below can be read as applying both regionally and nationally. Even those countries which can deal more or less adequately with their own biota, generally the industrialised nations, have problems, because they often hold massive collections of organisms from other countries and thus wish to meet the obligations that this imposes. In these cases also there are capacity building needs, since extant resources are almost invariably insufficient for the task which they are called upon to undertake. There is no basis for the assumption that National museums and herbaria in developed countries can meet all requests for information and specimen loan that they are sent, without the provision of additional resources, however much they may wish to.

Training needs should be met at various levels, depending on the needs of individual countries, and should include vocational, technical and academic areas. The form that the training should take may include in-country and external courses, academic degrees, and joint work undertaken with appropriate individuals and teams. The objective is the development of a new cadre of taxonomists and parataxonomists, capable of independent work within their own countries, but also being part of regional and global networks. There are, of course, a number of issues to be met here. As was pointed out particularly by participants in the Asian regional GTI workshop, Relatively few students are interested in taking courses in taxonomy, and relatively few universities are now offering courses in the subject. These factors cannot be ignored in any capacity building exercise. If a taxonomic institution is to be successful, staff capabilities must encompass not only taxonomic, curatorial and information management skills, but also include skilled personnel and financial managers, and someone skilled in gaining grants and donor funding.

There is clearly little point in training personnel if there are no employment opportunities for them, and training should ideally be linked to the provision of jobs in taxonomy. Increasingly development agencies are insisting on this as a component of projects involving training, and the need was recognized by the COP in its decision IV/1. There is also a need to make such employment a sustainable matter, since continuing grants may be difficult to maintain. If a taxonomic institution is to be successful, staff capabilities must encompass not only taxonomic, curatorial and information management skills, but also include skilled personnel and financial managers, and someone with the skills required to develop projects fundable by national and international donor bodies.

Even with staff in place, the GTI relies on them undertaking the taxonomic project work that is necessary to support implementation of the convention. This is not necessarily the same as that which would gain taxonomists peer recognition in the international academic arena, and consequently taxonomic institutions that wish to undertake GTI – related work must ensure that their staff receive adequate internal recognition to encourage them in the work.

There are several models for the successful development of taxonomic capacity, chief among them the regional LOOPS of BioNET-INTERNATIONAL and GEF-funded networks such as SABONET and BOZONET. The GEF-funded Costa Rican project is a good example of international funding being provided directly to build up a national collection. These projects are discussed in more detail below.

The need for collection development

A key element in capacity building is development of collections. Such collections from a country or region are vital for local identification. Within them should be specimens that have been identified authoritatively, preferably compared with 'type' specimens and as broad a range of morphological variation from the same area as possible/reasonable/necessary. Newly collected specimens can then be compared directly with these, this being the best way of ensuring the correct names are applied. Identification keys and guides are valuable, but ultimately greater confidence in an identification can be gained though comparison with other specimens. Collections are, unfortunately, expensive to maintain, and require dedicated housing and high standards of environmental control. Although many countries have an institute holding some collections of its fauna and flora, these are often part of an agriculture or forestry ministry, and links between such collections and their associated personnel and those in dedicated taxonomic institutions and networks must be developed and maintained. Such collections may also lack the funding to be able to assist in meeting needs identified within NBSAPs for implementation of the CBD. Consequently COP IV/1 notes that "Parties and authorities responsible for museums and herbaria should invest, on a long-term basis, in the development of appropriate infrastructure for their national collections." At the same time, COP noted that "As part of that investment, donors, both bilateral and multilateral, in their commitment to the conservation and sustainable use of biological diversity in countries where they provide investment support, should support infrastructural needs of collection-holding institutions."

A difficulty arises in the location of specimens already collected from biodiversity-rich countries and subsequently identified. Many of these are deposited in collections in large Northern institutes. Therefore, developing countries have to deal with the issue of amassing sufficient identified specimens to make their designated national collections functional. Often there is a core of such specimens, but part of collection development will be the identification of material and the acquisition by various means of previously-collected and identified specimens.

In some cases some specimen repatriation agreements have been entered into, but in most cases this is unlikely to be the most practicable route. Many institutes operate a loan system, whereby specimens can be lent for various periods to users worldwide. An alternative is for users to visit the institutes and work through their collections identifying recently collected material. This can be additionally valuable in that it enables the researchers to access libraries which otherwise would be unavailable, and will foster north-south collaboration. Northern institutes should also facilitate availability of images of specimens, either in paper publications or on the web. As with all activities, each of these alternatives can be costly, either to the developing country or the northern institute. In a time of diminishing resources, these costs cannot be underestimated or ignored.

3.5 The need for a global taxonomic information system

A need referred to a number of times in preceding sections, and which has been raised at each of the regional GTI workshops so far held, and the global workshop in Pretoria in 2002, is the need to increased information provision. The information required includes the following:

- (i) Experts in the taxonomy of particular groups of organisms at a national, regional or global level;
- (ii) Contacts for collection access at collections in museums or herbaria worldwide;
- (iii) Bibliographic information to support taxonomic research;

- (iv) Contents of publications, either as copies or in digitised format;
 - (v) The whereabouts of specimens, both type specimens and specimens originating from individual countries or regions within countries;
 - (vi) The contents of collections at the species level;
 - (vii) Specimen-level information from collections, including all the data associated with the specimens held;
 - (viii) Names of organisms, in the form of authority files. Such databases might also include classification details;
 - (ix) Images of organisms, particularly of type specimens.
- (i) COP in decision IV/1.D called for a database of global expertise. There are currently a number of databases maintained or being developed at global, regional, national or taxon levels, providing contact details of taxonomists. The most complete is perhaps that maintained by the ETI (<http://www.eti.uva.nl/>), but others are developing rapidly. Details of such databases would be usefully exchanged through the CHM.
 - (ii) Contacts for collection access at collections in museums or herbaria worldwide are not stored in any coherent manner at present, although some interest groups have them, and increasingly major taxonomic centres are making them available on their web sites.
 - (iii) Bibliographic information to support taxonomic research is available through some special interest groups, but not in a centralised manner for all taxa or regions.
 - (iv) Contents of publications, either as copies or in digitised format. Copyright issues can prevent recent material being made available in digitised format. However, programmes of digitization and, more recently, transfer into XML as a working tool, are in place. The Global Biodiversity Information Facility (GBIF) has a programme which will work on this issue, although it is not yet in place.
 - (v) The whereabouts of specimens, both type specimens and specimens originating from individual countries or regions within countries. Whilst many specimens collected from developing countries are held in institutes outside those countries, there is relatively little information available as to where they are. Most institutes do not have full catalogues of their holdings and, where such catalogues exist, they often list only the names of the species held, not their country or region of origin, although this situation is changing with the advent of electronic catalogues. However, both paper and electronic catalogues are costly to develop and maintain, but are of great importance in assisting countries to learn what animals and plants have been recorded from within their borders. However, at present this information is generally available only through perusal of the original and subsequent literature dealing with individual species, and can be very difficult to obtain without very good library facilities. In all likelihood it will only become available through work on digitisation of collection information and the collection-level descriptive programme being undertaken by some institutions.
One model of dealing with this problem that might be followed is that pioneered by CONABIO of Mexico. Staff were sent to northern institutes where they databased specimens from Mexico. Both Mexico and the host institutes benefited. Mexico gained access to data on which species occur within the country and further information about them. The northern institutes gained databases of their holdings which otherwise could not have been compiled in the near future.
 - (vi) The contents of collections at the species level. This collections level information is available in a patchy manner, usually by searching the web sites of collections, or published catalogues of collection contents. Such catalogues are not readily available, and in some cases may never have been formally published. The issue is also covered in the preceding paragraph.
 - (vii) Specimen-level information from collections, including all the data associated with the specimens held. This information is beginning to be made available, particularly through gateways such as Species Analyst and ENHSIN, although institutions are also making such data available for individual collections. This level of data can be of great value, especially if

- associated with adequate nomenclatural information to ensure the identity of the taxa being covered is clear.
- (viii) Names of organisms, in the form of authority files. Such databases might also include classification details. Because of the nature of taxonomic work, there are changes in the names applied to species. There are various reasons for this, and taxonomists strive for stability in nomenclature, an aspiration echoed by COP in its decision IV/1, when it stated: “Institutions, supported by Parties and international donors, should coordinate their efforts to establish and maintain effective mechanisms for the stable naming of biological taxa.” Several initiatives are already under way, including the Global Biodiversity Information System (GBIF), Species 2000, Species 2000 Asia-Oceania, Ecoport, UBIO, ITIS and others. One important feature is the necessary facility to accommodate different systems of nomenclature. Although ideally for any one group of organisms a single Linnean classification would be accepted by all workers worldwide, in practice this rarely is the case, and different workers recognise different species and higher taxon categories. In these cases, it is important to be able to match the concepts to avoid misunderstanding. Similarly, and especially in the context of colloquial and traditional nomenclatures, it is important to be able to identify how the different concepts equate with one another, even when the concepts in different systems do not precisely match.
- (ix) Images of organisms, particularly of type specimens.

4. DEVELOPING THE GTI AND MONITORING ITS PROGRESS

The GTI is essentially participatory, and relies on activities initiated and carried out by people all over the world. It is in no sense a centralised organisation. The only structure that is present is that within the operation of the CBD – the Secretariat (SCBD) and the various means the SCBD has of supporting Parties in their development and implementation of the whole Convention.

4.1. The SCBD and the GTI

Responsibility for the operation of the GTI in terms of SCBD activities, and responding to the wishes of the COP, rests with the Executive Secretary of the SCBD in Montreal. On a day-to-day basis the GTI Programme Officer carries out the necessary activities, as part of the Scientific, Technical and Technological Matters Division of the SCBD.

In managing the GTI the Executive Secretary is assisted by a Coordination Mechanism, comprising delegates from ten countries as well as several international organisations (BioNET-INTERNATIONAL, FAO, GBIF, DIVERSITAS). This group was tasked by COP VI/8 to coordinate activities on matters pertaining to the implementation of the GTI, and in this role to provide overall monitoring and assessment of the activities undertaken as part of the GTI. Since its inception in 1999 it has met only once, although members have maintained contact via an e-mail listserve.

The only mechanism available for monitoring the GTI is the national reports made by Parties. However, the Second National Report has still not been completed by a sizeable minority of Parties, and monitoring is consequently extremely difficult.

4.2. National Focal Points

All Parties have a National CBD Focal Point. However, in order to provide a clear link between the SCBD and individual Parties with regard to GTI, Parties have been invited to designate National Focal Points by the Executive Secretary, in line with COP decisions V/9 and VI/8. These GTI Focal Points are individuals or institutes that can be contacted both by the SCBD and nationals of the country concerned (and others) to provide information on the GTI. Focal Points have been or will be designated for a number of activities under the Convention, including the GTI. The identities and contact points of the National Focal Points can be found on the CBD web site at <http://www.biodiv.org/doc/lists/nfp-gti.pdf>. The Focal Points can communicate via an e-mail listserve managed by the SCBD.

In order to help the GTI Focal Points be as effective as possible, aspects of the job have been summarized, as follows:

- To be the link between the Country and the GTI;
- To liaise with other National Focal Points within the Country (e.g., the CBD Focal Point) to ensure full awareness of matters affecting GTI;
- To participate in Regional Networks to facilitate information-sharing for GTI;
- To take responsibility for provision of information to the Secretariat of the Convention on Biological Diversity, initially on:
 - National taxonomic needs assessment, including reviews or studies on specific taxonomic needs,
 - National directory of taxonomic expertise,
 - National register of biological collections, and
 - National taxonomic initiatives and networks;

- To be involved with communities within the country relevant to the CBD, and having particular knowledge of taxonomic issues and institutes; and
- To be prepared to participate in international discussions aimed at furthering the aims of the GTI nationally, regionally and globally.

These activities are only a suggestion by the SCBD, and may be modified by Parties according to local needs and priorities.

4.3. Outreach

The need to raise awareness and to educate on the importance of taxonomy to underpin the Convention is critical to the success of the Global Taxonomy Initiative. Personnel in a variety of sectors, such as taxonomy, conservation, ecosystem management and national and international policy-makers, need to be informed as to the value of the discipline and of the need to properly integrate taxonomic endeavours with work in other sectors. This process has so far been undertaken through discussions at SBSTTA, the delivery of presentations on the GTI at a number of workshops and meetings by the GTI Programme Officer, and through three Regional Workshops on the GTI, in Costa Rica and South Africa in 2001 and Malaysia in 2002. The COP in Decision V/9 requested the GTI Coordination Mechanism to develop the GTI as a forum to promote the importance of taxonomy and taxonomic tools in the implementation of the Convention's programmes of work, and this booklet is a part of this aspect of the work.

A brochure on the GTI has been produced by the SCBD, and a web presence is maintained on the CBD site.

4.4. Roster of Experts

The CHM maintains a Roster of Experts in the various Thematic Areas and Cross-cutting Issues. The value of this listing is that Parties and others can rapidly find sources of expertise in the various matters, and that the Convention itself can draw upon the experts for advice in developing areas of its work. Members of the Roster of Experts therefore are eligible for membership of the various Ad Hoc Expert Groups that are required from time to time. The COP in Decision IV/1 suggested that a directory of taxonomic expertise was established, and Parties nominated a number of taxonomists. There is still a need for additional submissions, since as work of the GTI becomes further integrated with that of the Thematic Areas and other Cross-Cutting Issues, experts in taxonomy associated with the particular subject will be required.

5. FUNDING FOR GTI ACTIVITIES

Biodiversity activities are financed by different sources of funding, including domestic and international sources. Multilateral, regional and bilateral financial and development agencies have been the main sources of international assistance. Non-governmental organizations, the private sector and research institutions all are active in financing, or mobilizing finance for, the conservation and sustainable use of biological diversity. The Global Environment Facility, the designated financial mechanism of the Convention, has emerged to be one of the most important sources of funding for biological diversity.

The programme of work for the Global Taxonomy Initiative provides a comprehensive framework for programming international financial support, as well as a common ground for negotiating projects in the field of taxonomy. Many biodiversity project components have been designed to monitor the status and trend of biological diversity in project areas, and thus indirectly addressed the taxonomic needs in developing countries. These efforts need to be brought in line with the requirements of the programme of work for the Global Taxonomy Initiative. Donor and recipient governments should incorporate the need of the Global Taxonomy Initiative in negotiating and programming their financial support to biological diversity. Research institutions and non-governmental organizations are well positioned to convince and advise their respective governments of the taxonomic needs.

The Conference of the Parties has specifically mandated the Global Environment Facility to support the Global Taxonomy Initiative. Based on guidance from the Conference of the Parties, the Global Environment Facility issues operational policy/programs/criteria for project development. With respect to taxonomy, GEF funds a variety of project types, ranging from its Small Grants Programme and project preparation grants to enabling activities, medium-sized projects (MSPs), and full projects.

The Small Grants Programme, administered by UNDP, offers grants of up to \$50,000 directly to non-governmental organizations (NGOs) and community-based organizations (CBOs). A project proponent should contact their respective national coordinator for the Small Grants Program to prepare project concepts and proposals. A national steering committee (NSC) reviews and approves project proposals, and approved proposals enter the national UNDP/GEF-SGP work programme.

Grants for enabling activities are designed to help countries to prepare national strategies and action plans, and to assess needs, identify priorities and build consensus on particular issues. The total cost for the enabling activity under expedited procedures has been kept within US\$450,000 for development of national strategy and action plan, clearing house mechanism, and identification of needs of all thematic areas and crosscutting issues of the Convention on Biological Diversity. A particular country needs to select its priorities among various areas and issues, taxonomy could be one of the priority sectors for capacity building needs assessments.

A regular GEF-funded project normally starts with a project concept initiated by its proponents in collaboration with the project-hosting governments (that is, national focal points of the Global Environment Facility and the Convention on Biological Diversity) and relevant offices of the implementing agencies (the World Bank, the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP)) or the executing agencies under expanded opportunities (the Food and Agricultural Organization of the United Nations (FAO), the United Nations Industrial Development Organization (UNIDO), the African Development Bank (ADB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IDB), and the International Fund for Agricultural Development (IFAD)). Once an implementing agency(ies) agrees to consider further development of the project concept, they will advise how and what to do next with the proposal, and also provide funding for project preparation.

A successful application for GEF funding demonstrates the following features:

/...

- (i) Project hosting countries are developing country Parties to the Convention on Biological Diversity. A letter of endorsement from the national operational focal point of the Global Environment Facility is mandatory.
- (ii) The project concept addresses priorities identified in the Global Taxonomy Initiative and reflected in relevant national strategies and action plans. It also needs to fit with at least one of the following GEF operational programs: arid and semi-arid zone ecosystems (OP#1), coastal, marine, and freshwater ecosystems (OP#2), forest ecosystems (OP#3), mountain ecosystems (OP#4), conservation and sustainable use of biological diversity important to agriculture (OP#13), integrated ecosystem management (OP#12), operational program on sustainable land management (OP#15).
- (iii) The proposed project involves scientific communities, local and indigenous communities, non-governmental organizations, and other international and regional organizations. It will have to pass a review by an expert identified from a Roster of Experts established by the Scientific and Technical Advisory Panel (GEF/STAP). Large cofinancing from diverse sources is an indication of involvement and commitments of all relevant stakeholders.

Further information can be found at the following websites^{8,9 10 11}

5.1. Example projects funded by the GEF with major taxonomic components

The selection given below is not comprehensive, but gives an indication of the types of project which will develop the GTI, and which have received support from the GEF.

5.1.1. The Indonesian Biodiversity Collection Project

The Indonesian Biodiversity Collection Project received a \$7 million grant over six years from the GEF through the World Bank. The project's aim was to strengthen the institutional capacity of the Research and Development Center for Biology in Indonesia. The project has four components:

- Project Management and Coordination (staffing, management, institutional and sustainability issues);
- Systematic Collections and Research (storage, restoration, stabilization, and organization);
- Collections Information Systems Management (operation of the Indonesian Biodiversity Information System and development of IT skills); and
- Scientific Collaboration and Services (interns from Indonesian universities, mentors for specialist help in certain taxon groups, degree-and non-degree training, and publications).

In the Bogor Zoology Museum all specimens have been rehabilitated, moved and re-housed in a new 8,000 m², two-storey, purpose-built museum, donated by the Government of Japan. The new collection halls have state-of-the-art environmental control systems, with air conditioning system, dehumidifiers, hygroscopic wall panels, and all-new storage systems such as metal cabinets, drawers, unit trays and compactors. In the Bogor Herbarium nearly 200,000 specimens have so far been remounted on acid-free archival materials and re-stored in insect-proof metal cabinets. Air-conditioned rooms are provided for biosystematic studies. Type specimens are segregated and housed in a separate air-conditioned room. Nearly 1000 full-size, insect-proof metal cabinets have replaced the old metal boxes. The use of toxic chemicals for preservation has been stopped and replaced with drying and freezing technology in both institutes.

⁸ <http://www.biodiv.org/financial/default.asp>

⁹ <http://www.gefweb.org>

¹⁰ <http://www.undp.org/sgp/>

¹¹ <http://www.undp.org/gef/workshop/facilitation/english.htm>

Eighteen staff, including ten new recruits, are pursuing higher degrees (5 Ph.D.s and 13 masters) in taxonomy.

In both institutes all collection managers have been trained in collection management on short-term bases in leading institutes abroad. Specialists from around the world are coming to Bogor as 'mentors' to help organize parts of the collection and to share their experience with staff.

The specimen-based Indonesian Biodiversity Information System has been developed. It consists of two databases (plants and animals), containing about 240,000 plant and 80,000 animal specimen records respectively.

Interns from university herbaria across Indonesia have been hosted in the Herbarium and Museum for 3-6 months. This has stimulated interest in, and attention to, the roles of collections in biodiversity conservation and established firm relationships among national specialists.

The project has also facilitated a publication program, mainly of Indonesian-language field-guides to promote biodiversity awareness. Nineteen titles have been produced.

Further information can be found at the following web sites:

<http://www4.worldbank.org/sprojects/> (a search for 'biodiversity collections' reaches the project summary, which contains a further link to additional information) and <http://wbln0018.worldbank.org/essd/essd.nsf/f308a5a687dbdec8852567eb00658cb7/d03d4ca5fe5ffb0a8525695900690e7f>.

5.1.2. SABONET – the Southern African Botany Diversity Network

The Southern African Botanical Diversity Network (SABONET) is a capacity-building network of southern African herbaria and botanic gardens with the objective of developing local botanical expertise. The ten countries participating in SABONET are Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe. SABONET's objectives are to develop a strong core of professional botanists, taxonomists, horticulturists, and plant diversity specialists within the ten countries of southern Africa, competent to inventory, monitor, evaluate and conserve the botanical diversity of the region in the face of specific development challenges, and to respond to the technical and scientific needs of the Convention on Biological Diversity.

Although SABONET was not set up as a GTI project and, indeed, antedates the GTI, it meets a number of GTI objectives and can be used as a model. SABONET is a GEF Project implemented by the UNDP. South Africa's National Botanical Institute (NBI) is the Executing Agency, responsible for the overall management and administration of the project. In addition to the GEF/UNDP funding, the project is co-funded by the USAID/IUCN ROSA through the NETCAB (Regional Networking and Capacity Building Initiative) Programme. SABONET was started in 1996, mainly with funding provided through the NETCAB programme, and will continue with the present GEF/UNDP funding until the end of March 2002.

Southern Africa, as defined within the project, has a flora of over 30,000 species of flowering plants and ferns, including the whole of one of the world's six floristic kingdoms (the Cape Floristic Region, known locally as fynbos). The region also includes seventeen centres of plant diversity as identified by the IUCN/WWF:

- Arid and semi-arid ecosystems (with roughly half of the world's known succulents);
- Coastal, marine and freshwater ecosystems (including several RAMSAR and World Heritage Sites);
- Forest ecosystems (most of which are under some form of threat); and
- Mountain ecosystems.

Despite this great botanical diversity, the countries of the region are poorly equipped in both infrastructure and human resources to inventory, monitor, and evaluate this heritage. Over the last few decades, support for the national herbaria and botanic gardens of southern Africa has been intermittent and sub-critical. In addition, many plant species are threatened with extinction, mainly through agricultural, mining, industrial, and urban activities. The 1997 IUCN Red List of Threatened Plants lists 2,652 plant species as threatened in the ten countries of southern Africa.

SABONET enables the staff attached to the various botanical institutions within the region to share their expertise and skills with one another.

The project is aimed at developing human capacity in southern African national and university herbaria and botanic gardens. Close liaison is also maintained with government environmental departments, conservation agencies, and NGOs at regional, national and international levels.

SABONET is guided by a Steering Committee (SSC) comprising all ten participating countries and the donor agencies as ex officio members. The SSC is supported by the Coordinator's Office which is based in South Africa's National Herbarium, Pretoria. Each country has a National Working Group—comprising various government, university and NGO organisations—which coordinates in-country activities of the project and reports directly to the SSC.

Project activities include regional training courses for staff in herbaria and botanical gardens, workshops, collaborative collecting expeditions in various under-collected areas of the region, and computerisation of plant specimens in herbaria and living collections in botanical gardens.

The outputs of SABONET include a project newsletter, an occasional Report Series, trained southern African plant taxonomists, horticulturists and plant diversity specialists, electronic information systems on the region's plant diversity (including maps and relational databases), regional human and infrastructural inventories, regional and national plant checklists and Red Data lists, and a Regional Botanic Gardens Conservation Strategy.

Further information on SABONET can be found at:^{12 13}

5.1.3. Botanical and Zoological Taxonomic Networks in Eastern Africa (BOZONET): Linking Conservation to Taxonomy

This UNDP project is at present in the GEF pipeline for funding. The objective of is to support the countries of East Africa (Ethiopia, Kenya, Tanzania, and Uganda) to remove barriers to the flow of relevant taxonomic information, from networked centres of expertise, to the range of end-users of such information, and to assist those end-users in the use of this information for the sustainable conservation of biodiversity, through processes of inventory, description, monitoring, and dissemination.

Further information on BOZONET can be found on the World Wide Web.¹⁴

5.1.4. Biodiversity Resources Development Project for Costa Rica

The Biodiversity Resources Development Project for Costa Rica is funded by the GEF through the World Bank. Its objective is to demonstrate that increased knowledge and information about particular species enhance their value and increase the marketability of biodiversity services, by enhancing the knowledge of Costa Rica's species, testing methodologies for undertaking a cost effective inventory, and maximizing

¹² <http://www.sabonet.org/>

¹³ <http://www.undp.org/gef/write-up/afri-inv.htm>

¹⁴ http://www.gefweb.org/Projects/Pipeline/Pipeline_6/BOZONET.pdf

the value of those species and the social return to the investment in knowledge through conservation and sustainable use. The project's four components are:

- develop a framework for undertaking a biodiversity inventory of priority sub-groups within four major taxonomic groups at selected sites within five conservation areas;
- undertake collection and cataloguing activities related to the inventory;
- develop and test potential applications based on the inventory; and
- strengthen the institutional capacity at the National Biodiversity Institute (INBio).

The project builds on work previously carried out by INBio. The taxonomic groups included in this project are Hymenoptera, Coleoptera, Diptera, and fungi. These four groups were chosen because, together, they cover a wide spectrum of species richness and a broad range of niches and habitats. They also cover a range of collecting and cataloguing logistical challenges and represent a range of prior taxonomic knowledge and difficulty. Species from each group are represented at the national and international level, and will provide experience relevant to other countries. These four taxonomic groups are expected to generate a large number of potential applications and potential uses.

Five Conservation Areas have been chosen as sites for collection activities, selected because of their high coverage of Costa Rican biodiversity, significant endemism, and outstanding biological importance for Costa Rica and Meso-America, as well as their human, financial, and infrastructure resources. The regions include: [note that not all of the list are ecological regions]

- the driest region of Costa Rica;
- an important wetlands refuge;
- humid tropical forests, with a breadth of rainfall gradients and soil heterogeneity;
- the highest mountain ranges in the country, reaching 3,800 meters
- subalpine paramo vegetation; and
- montane forests dominated by oak.

Training of parataxonomists is being undertaken by international specialists and Costa Rican scientists. The project is notable for the close collaboration between staff of northern institutes and local personnel.

Further information on the project can be found at:

<http://www4.worldbank.org/sprojects/Project.asp?pid=P039876>

or from: Mr. Jesus UGALDE, Coordinator, National Biodiversity Inventory, Instituto Nacional de Biodiversidad, Apdo. Postal 22, 3100 SANTO DOMINGO DE HEREDIA, COSTA RICA. Tel : 506-244-0690 Fax : 506-244-2548 e-mail : jugalde@inbio.ac.cr

6. TAXONOMIC TOOLS

There are a number of tools available to assist taxonomists and others meet needs under the convention. While an exhaustive list cannot be given here, some of the more important and useful things can be mentioned.

Information about species

As noted above, the GTI Work Programme includes a requirement for a Global Taxonomic Information System. Some elements of this are already in place, and others are developing.

A key issue is methods of dissemination of data. Increasingly, electronic media are being used, because of ease of compilation and updating, and the complexity of relationships between different databases that can be employed. However, printed catalogues and other publications still contain most information about species. Difficulties arise in finding these, both from the point of view of knowing that they exist, and locating copies. To locate major catalogues and taxonomic treatments there are several strategies.

- Contact libraries of major taxonomic institutes, indicating the taxa and regions for which information is needed.
- Contact specialists in the groups concerned. Lists of such specialists can be found on the world wide web, for example the world taxonomist database maintained by the ETI, URL <http://www.eti.uva.nl/> and the plant taxonomy database maintained by the American Society of Plant taxonomists at <http://www.sysbot.org/>. There are others, and may be more in the future. A general point is, given web access, to do a search on key words to detect the up-to-date URLs.
- Use commercially-available abstracting sources, such as Zoological Record (obtainable from Biosis, the address of which is given below), CABI Abstracts (address given below) and others.

There is an increasing number of electronic databases, and a publication such as this cannot hope to give an exhaustive list. Databases are available both by CD-ROM and on the world-wide web. There are a number of global initiatives such as the catalogue of world Diptera (flies), (URL: <http://www.sel.barc.usda.gov/diptera/biosys.htm>), the International Legume Database & Information Service (ILDIS) (contact details given below) and Fishbase (URL: <http://ibs.uel.ac.uk/fishbase/> and <http://fishbase.org/home.htm>). Some of these are searchable together via a metadatabase system, Species 2000 (contact details below). There are also numerous regional databases or checklists covering a range of organisms, both by taxon (e.g., moths of Belize at <http://www.tropicalmoths.org/>) and some aspect of their biology (e.g., the US Invasive species information system at <http://www.invasivespecies.gov/>). Such databases also can in some cases be searched by metadatabases, such as the US Integrated Taxonomic Information System (ITIS) at <http://www.itis.usda.gov/access.html> and the UK National Biodiversity network at <http://www.nbn.org.uk/>.

A major need is to develop standards and protocols to allow electronic databases to be interoperable []. Initiatives such as ITIS and Species 2000 are working on this, as is the GBIF, which is discussed above.

In addition to the names of species, there is a need for workers in both developed and developing countries to know what is in collections held globally, and access the data associated with the specimens. A first step may be to contact the institutions individually. To gain more information on whom to contact, a list of collection managers of many major institutes maintained by the University of New Mexico can be consulted at <http://www.unm.edu/~museum/herb/cmo.htm>.

Many museums and herbaria are putting their collections on-line. A list of sites can be found at the University of Berkley, <http://www.ucmp.berkeley.edu/collections/otherent.html>, although a web search may reveal many of the databases. Some databases can be searched simultaneously; the Fishbase system already referred to does this, as does The Species Analyst, based at the University of Kansas Natural

History Museum and Biological Research Center in the USA, with the URL <http://habanero.nhm.ukans.edu/>. [is www.tsa.org the preferred url now?] <http://www.speciesanalyst.net/> and <http://tsadev.speciesanalyst.net/>

A valuable source of taxonomic tools, focusing on botany, is maintained by the University of Michigan at http://www.herb.lsa.umich.edu/tool_dir.htm. Another such site with a broader focus is maintained by the Smithsonian Institution, at <http://www.sil.si.edu/Subject-Guide/nhbibls.htm>.

7. RELATIONSHIPS WITH OTHER INITIATIVES

There are an increasing number of national and international initiatives with objectives supporting or congruent with those of GTI. Whilst a full listing is neither possible nor appropriate here, some of the key organizations should be mentioned to indicate the relationships and different functions. A listing here does not necessarily imply CBD support or affiliation.

BioNET-INTERNATIONAL

BioNET-INTERNATIONAL, the Global Network for Taxonomy, is a world-wide, inter-governmental initiative for capacity building in taxonomy (biosystematics) in developing countries. BioNET-INTERNATIONAL is dedicated to enabling developing countries to achieve realistic self-reliance in the skills of identifying and understanding the relationships of the different organisms that constitute our living environment. It is comprised of sub-regional LOOPs (Locally Organised and Operated Partnerships) of developing country institutions, supported by a consortium of developed country institutions, and managed by its Technical Secretariat. Its purpose is to enable developing countries to achieve realistic self-reliance in taxonomy to support regional and national programmes for eradication of poverty, via sustainable use of natural resources and agricultural development, and conservation of biodiversity (including implementation of the Convention on Biological Diversity). The Director of BioNET-INTERNATIONAL is a member of the GTI Coordination Mechanism.

Global Biodiversity Information Facility

The Global Biodiversity Information Facility (GBIF) came into being in March 2001. It will be an interoperable network of biodiversity databases and information technology tools that will enable users to navigate and put to use the world's vast quantities of biodiversity information to produce national economic, environmental, and social benefits.

The purpose of establishing GBIF is to design, implement, co-ordinate, and promote the compilation, linking, standardisation, digitisation, and global dissemination of the world's biodiversity data, within an appropriate framework for property rights and due attribution.

GBIF is working in close co-operation with established programmes and organisations that compile, maintain and use biological information resources. The participants, working through GBIF, will establish and support a distributed information system that will enable users to access and utilise vast quantities of new and existing biodiversity information to generate new knowledge, wealth, and ecological sustainability.

The CBD has an ex-officio seat on the GBIF governing board, and The Chair of GBIF is a member of the GTI Coordination Mechanism. Priorities identified by the GTI will be used to help determine priorities within GBIF.

Global Invasive Species Programme (GISP)

Both managed and natural ecosystems throughout the world are under siege by a growing number of harmful invasive species--disease organisms, agricultural weeds, destructive insects and others that threaten economic productivity, ecological stability and biodiversity. This problem is growing in severity and geographic extent as global trade and travel accelerate and as ecosystems are disrupted by fragmentation and by global climate change. In spite of the serious impacts of invasives, national and

international leaders remain under-informed regarding the scope and gravity of the invasive species problem, and no effective strategy has been developed to enable appropriate solutions.

An international team of biologists, natural resource managers, economists, lawyers, and policy makers are developing a global strategy to address the invasive species problem. The team's goal is to enable local, national, and multi-national communities to draw on the best available tools to immediately improve pest prevention and control systems, and to identify priorities for the development of new tools needed to achieve longer-term success. Further, the program will contribute to the capacity of nations to fulfill Article 8h of the Convention on Biological Diversity that prescribes that each contracting party should, as far as possible, "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species".

With these facts in mind, the Global Invasive Species Program will 1) draw together the best management approaches for pest prevention and control and make these readily accessible to all nations, and, 2) lay the groundwork for new tools in science, information management, education, and policy that must be developed through collaborative international action. In addition this program will assess the current status of the science dealing with invasive species. The overall structure of the program is provided in the following figure and the background motivation for the program follows below. The results of this work will be disseminated via published reports, international meetings, and, especially, through a new network of information exchange and training to be developed as part of this project.

The Global Invasive Species Program is a component of an international program on the science of biodiversity, DIVERSITAS, and is coordinated by SCOPE, Scientific Committee on Problems of the Environment, in conjunction with IUCN, UNEP, and CABI with initial financial support from the Global Environmental Facility, UNEP, ICSU and NASA.

Clearing House Mechanism

The clearing-house mechanism of the Convention on Biological Diversity seeks to support the Convention's thematic and cross-cutting programmes of work by promoting cooperation in six key areas: tools for decision-making, training and capacity-building, research, funding, technology transfer, and the repatriation of information. Its aims are to: Promote and facilitate technical and scientific cooperation, within and between countries; Develop a global mechanism for exchanging and integrating information on biodiversity, and; Develop the necessary human and technological network.

The clearing-house is based on the philosophy that broad participation and easy access must be a top priority. Its database can therefore be tapped through both traditional and electronic means of communication. Special efforts are made to ensure the participation of indigenous communities, whose unique knowledge and expertise are so important.

The clearing-house is coordinated by the Executive Secretary and overseen and guided by an Informal Advisory Committee (IAC) set up by the Parties to the Convention. The committee works in a transparent and cooperative manner to promote awareness of the multiple needs and concerns facing various communities, countries, and regions.

In addition, a network of national focal points for the mechanism is being established to address matters relating to technical and scientific cooperation. The Parties have recently emphasized the need to strengthen the role of these focal points. Building a network of non-governmental organizations and other institutions working on biodiversity could contribute to this goal. Establishing national, regional, subregional, and thematic clearing-house focal points for specific topics could also help.

The role of the Clearing-house with respect to the GTI is to facilitate the mechanisms for information sharing and technical cooperation, ensure the wide availability of extant information, and to help develop the linkages that will bring success to the GTI.

GloBallast

Invasive aquatic species are one of the four greatest threats to the world's oceans, and can cause extremely severe environmental, economic and public health impacts.

The GEF/UNDP/IMO Global Ballast Water Management Programme (GloBallast) is assisting developing countries to; reduce the transfer of harmful aquatic organisms and pathogens in ships' ballast water, implement the IMO ballast water Guidelines and prepare for the new IMO ballast water Convention.

<http://globallast.imo.org/index.asp>

8. LITERATURE

8.1. References

- Anon, 1998, *The Darwin Declaration*, Environment Australia, Canberra. ISBN: 0 642 21413 1. Available in printed form from: Australian Biological Resources Study, Environment Australia, Department of the Environment, GPO Box 636, Canberra, ACT 2601, Australia, and at the URLs: <http://www.biodiv.org/cross-cutting/taxonomy/darwin-declaration.asp> and <http://www.anbg.gov.au/abrs/flora/webpubl/darwinw.htm>
- Anon, 1998b, *The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery*, Environment Australia, Canberra. ISBN: 0 642 56803 0. Available in printed form from: Australian Biological Resources Study, Environment Australia, Department of the Environment, GPO Box 636, Canberra, ACT 2601, Australia, and at the URLs: <http://www.biodiv.org/cross-cutting/taxonomy/short-dist.asp> and <http://www.anbg.gov.au/abrs/flora/webpubl/london.htm>
- Anon, 1998c, *The Global Taxonomy Initiative: Using Systematic Inventories to meet Country and Regional Needs*, DIVERSITAS, Systematics Agenda 2000, New York. Available in printed form from the American Museum of Natural History, Central Park West at 79th St., New York, NY 10024, USA, and at the URL: <http://www.biodiv.org/doc/meetings/sbstta/sbstta-04/information/sbstta-04-inf-07-en.pdf>
- Anon, 1999, *Implementing the GTI: Recommendations from DIVERSITAS element 3, including an assessment of present knowledge of key species groups*. Available at the URL: <http://www.biodiv.org/doc/ref/gti-diversitas.pdf>
- Anon, 2000, Mechanisms for management of the GTI, with a consideration on inclusion of traditional and indigenous knowledge perspectives on current taxonomic systems. Available at the URL: <http://www.biodiv.org/doc/meetings/sbstta/sbstta-05/information/sbstta-05-inf-gti-en.pdf>
- Evans, G., Lum, K.Y. and Muroch, L., 2002, Needs assessment in taxonomy and biosystematics for plant pathogenetic organisms in countries of South East Asia. Unpublished report to AusAID, 67 pp.
- Groombridge, B. (Ed.), 1992, *Global Biodiversity. Status of the Earth's living resources*. Chapman and Hall, London, 585pp.
- King, N. and Lyal, C.H.C., Meeting the gaps in protected area management – overcoming the taxonomic impediment. Paper presented to the Vth World Parks Congress, Durban.
- McNeely, J.A., Mooney, H.A., Neville, L.E., Schei, P. & Waage, J.K., (eds), 2001, *A Global Strategy on Invasive Alien Species*. IUCN Gland, Switzerland, and Cambridge, U.K., in collaboration with the Global Invasive Species Programme. X + 50pp.
- Naumann, I.D. and Jisoh, M. Md., 2002, Needs assessment in taxonomy of arthropod pests of plants in countries of South East Asia: biosystematics, collection and information management. Unpublished report to AusAID, 118 pp.
- SCBD, 2001, *Global Biodiversity Outlook*. Montreal, 282pp.
- SCBD, 2002, *Scientific And Technical Cooperation And The Clearing-House Mechanism*. Report of the Joint Convention on Biological Diversity/Global Invasive Species Programme Informal Meeting on Formats, Protocols and Standards for Improved Exchange of Biodiversity-related Information. Note by the Executive Secretary. UNEP/CBD/COP/6/INF/18. URL:<http://www.biodiv.org/doc/meetings/cop/cop-06/information/cop-06-inf-18-en.doc>
- Shimura, J., (Ed.), 2003, *Global Taxonomy Initiative in Asia*. Report and Proceedings of the 1st GTI Regional Workshop in Asia. Putrajaya, Malaysia, September 2002. NIES, Japan.
- Steenkamp, Y. and Smith, G.F., 2002, Addressing the needs of the users of botanical information. South African Botanical Diversity Network Report 15: 52pp.

Vousden, D. & Okamura, B., 2003, GloBallast Project Independent Mid Term Evaluation (MTE): Final Report, 31 March 2003. IMO London.

Wilson, K., Shimura, J., Lyal, C.H.C. & Cresswell, I. (Eds.), 2003, Building Capacity: Bangladesh to Bali and Beyond. Report of First Global Taxonomy Initiative Workshop in Asia. 75pp NIES, Japan.

8.2. Further reading

A number of documents will be of use in understanding the CBD and GTI, and in developing projects. These generally can be accessed through the World Wide Web. If there is any difficulty, Country Focal Points may be able to help, or a request should be made to the Clearing-house Mechanism.

8.2.1. Background to GTI

The GTI is discussed in its web-site: <http://www.biodiv.org/cross-cutting/taxonomy>.
The Work Programme of the GTI is SBSTTA Recommendation VI/6 on the Web at: <http://www.biodiv.org/recommendations>.

Several published documents are of key importance in the development of the GTI, and give valuable background on its development and functioning. These include:

1. *The Darwin declaration*

Environment Australia 1998. The Darwin Declaration, Australian Biological Resources Study, Environment Australia, Canberra. ISBN: 0 642 21413 1

Building upon the recommendations and resolutions of previous conferences and studies, some leaders of key taxonomic institutions, policy makers, donors and ecologists/conservation managers, met in Darwin, Australia, in February 1998 to recognize the existence of a "taxonomy impediment". The Document was adopted by the fourth meeting of the Conference of the Parties. It is available in printed form from: Australian Biological Resources Study, Environment Australia, Department of the Environment, GPO Box 636, CANBERRA ACT 2601, AUSTRALIA

And on the Web at the locations given below:

<http://www.biodiv.org/cross-cutting/taxonomy/darwin-declaration.asp>

<http://www.anbg.gov.au/abrs/flora/webpubl/darwinw.htm>

2. *The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery*

Australian Biological Resources Study, 1998. *The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery*, Australian Biological Resources Study, Environment Australia, Canberra. ISBN: 0 642 56803 0

This document reports the outcomes of the meeting held in London, in September 1998, at the Linnean Society, and provides additional documentation to help policy makers in the CBD, UNEP and GEF to assist in the removal of the taxonomic impediment identified in the Darwin Declaration. This report examines certain aspects of GTI, including actions needed to progress GTI, implementing the GTI, components of GTI and the role of the World's large institutions. Two annexes give guidelines for incorporation of taxonomy in the CBD and sample framework projects. It is available in printed form from: Australian Biological Resources Study, Environment Australia, Department of the Environment, GPO Box 636, CANBERRA ACT 2601, AUSTRALIA. It is also on the Web at:

<http://www.biodiv.org/cross-cutting/taxonomy/short-dist.asp>

and <http://www.anbg.gov.au/abrs/flora/webpubl/london.htm>

3. *The Global Taxonomy Initiative: Using Systematic Inventories to meet Country and Regional Needs*

To build on the findings of the Darwin and London workshops and provide further scientific and technical advice regarding the implementation of the GTI, an international group of experts was convened by DIVERSITAS at the American Museum of Natural History in NY. The meeting took place in September 1998. This report reviews using inventories to build capacity and advance the GTI, gives recommendations for assessing taxonomic capacity, for preparing and implementing national strategies to support the GTI, and for building regional networks to support the GTI. It is available in printed form from the American Museum of Natural History, Central Park West at 79th St., New York, NY 10024, USA. It is also on the Web at:

<http://www.biodiv.org/doc/meetings/sbstta/sbstta-04/information/sbstta-04-inf-07-en.pdf>

4. *Implementing the GTI: Recommendations from DIVERSITAS element 3, including an assessment of present knowledge of key species groups*

The document, based on a meeting in Paris in February 1999, includes an assessment of present knowledge of key species groups. It is available on the web at: <http://www.biodiv.org/doc/ref/gti-diversitas.pdf>

5. *Mechanisms for management of the GTI, with a consideration on inclusion of traditional and indigenous knowledge perspectives on current taxonomic systems*

Report of meeting held 20 December 1999, UNESCO, Paris. It can be obtained on the Web at: <http://www.biodiv.org/doc/meetings/sbstta/sbstta-05/information/sbstta-05-inf-gti-en.pdf>

8.2.2. The CBD – background, activities

The homepage of the Secretariat of the Convention on Biological Diversity gives a great deal of information. It can be found at: <http://www.biodiv.org/>

The Convention itself is downloadable from: <http://www.biodiv.org/convention/articles.asp>

The Operation of the CBD is governed by decisions taken by the Conference of the Parties to the Convention. Decisions taken at the COP meetings are available at: <http://www.biodiv.org/decisions/>

8.2.3. Capacity Building

Much of the operation of the GTI depends on Capacity Building. This can be tied to the UNDP Capacity Development Initiative, details of which can be found at:

http://www.undp.org/gef/web_files/index.html

A report of the Capacity development Initiative has been completed, and can be obtained through the UNDP.

8.2.4. Funding

The Financial Mechanism of the CBD, the Global Environment Facility

The Global Environment Facility is the Financial Mechanism supporting the CBD (and therefore the GTI). An understanding of the processes, protocols and practices of GEF can be found at: <http://www.undp.org/gef/>. This web-site should be examined carefully. The GEF produces some valuable literature, including an information pack on the development of Medium-sized projects, with examples on how to complete the forms.

In order to advance projects using the GEF, the GEF Operational Focal Point in each country will need to be involved. A list of these individuals can be found in the web at

<http://www.gefweb.org/html/operational.html>

The CBD Focal Points must also approve projects for GEF; a list of these can be found at: <http://www.biodiv.org/world/map.asp>

The GEF (UNDP) has funded several taxonomy-based projects, and these can be examined to provide information on the approaches that should be taken. Some of these projects are discussed above.

8.2.5. Local Documents

In order for a project to be maximally effective it should fit with the National Biodiversity Action Plan of the Countries concerned. These should be obtained locally.

9. GLOSSARY

BioNET-INTERNATIONAL – The Global Taxonomic Network (see text for details)

CBD - Convention on Biological Diversity

CCD – Convention to Combat Desertification. URL: <http://www.unccd.int/main.php>

CITES – Convention on International Trade in Endangered Species of Wild Flora and Fauna. URL: <http://www.cites.org/>

CMS – Convention on Migratory Species. URL: <http://www.wcmc.org.uk/cms/>

COP - Conference of the Parties. The COP is the governing body of the Convention, and advances implementation of the Convention through the decisions it takes at its periodic meetings.

CSD – UN Commission on Sustainable Development. URL: <http://www.un.org/esa/sustdev/>

ETI – Expert Center for Taxonomic Identification. The ETI is a non-governmental organization in operational relations with UNESCO. Its stated mission is to develop and produce scientific and educational computer-aided information systems, to improve the general access to and promote the broad use of taxonomic and biodiversity knowledge worldwide. It maintains on its web site a list of taxonomists with a global basis. URL: <http://www.eti.uva.nl/>

GBIF – the Global Biodiversity Information Facility

GEF – Global Environment Facility. Interim Financial mechanism for the Convention on Biological Diversity. See text for more details.

GISP – Global Invasive Species Programme. See text for details.

GTI - Global Taxonomy Initiative

ITIS – the Integrated Taxonomic Information System. A source of taxonomic information for some groups of plants, animals, and microbes of North America and the world. ITIS is a partnership of U.S., Canadian, and Mexican agencies; other organizations; and taxonomic specialists. ITIS is also a partner of Species 2000 and the GBIF. More information can be found at <http://www.itis.usda.gov/index.html>.

MEA - The Millennium Ecosystem Assessment, which was launched in June 2001. This international initiative will examine the processes that support life on earth like the world's grasslands, forests, rivers and lakes, farmlands, and oceans. The \$21 million, four-year effort will involve 1,500 of the world's leading scientists. More detail can be found at <http://www.ma-secretariat.org/en/index.htm>

NSBAP - National Biodiversity and Action Plan.

Parties – The Countries, Organisations and Economic Units that have signed and ratified the CBD.

SABONET – The South African Botanical Network.

SBSTTA - Subsidiary Body on Scientific, Technical and Technological Advice. Its functions include: providing assessments of the status of biological diversity; assessments of the types of measures taken in accordance with the provisions of the Convention; and responding to questions that the COP may put to the body. How SBSTTA carries out its work is described in its modus operandi, which can be found in Annex 1 of decision IV/16 (as amended by decision V/20).

SCBD – Secretariat of the Convention on Biological Diversity

Type specimen – the specimen of a species used by the original describer as a basis for the identity. An international 'standard' to assess identity of the species.

UNDP – United Nations Development Programme. Acts as an implementing agency for the GEF.

UNEP – United Nations Environment Programme. Acts as an implementing agency for the GEF.

World Bank - Acts as an implementing agency for the GEF

10. USEFUL CONTACT ADDRESSES

BioNET-INTERNATIONAL

The Global Network for Taxonomy,
Technical Secretariat,
Bakeham Lane,
Egham,
Surrey,
TW20 9TY,
United Kingdom.
Telephone: + 44 (0) 1491 829036/7/8
Facsimile: + 44 (0) 1491 829082
E-mail: bionet@bionet-intl.org.
URL: <http://www.bionet-intl.org/>

BIOSIS

Two Commerce Square,
2001 Market Street,
Suite 700,
Philadelphia,
PA 19103-7095
USA.
phone: 1-800-523-4806 (USA and Canada),
215-587-4800 (Worldwide).
fax: 215-587-2016.
e-mail: info@mail.biosis.org,

BIOSIS UK

Garforth House,
54 Micklegate,
York,
UK. YO1 6WF
phone: +44 (0)1904 642816.
fax: +44 (0) 1904 612793.
e-mail: helpdesk@york.biosis.org.

CABI Publishing

CAB International
10 East 40th Street
Suite 3203
New York, NY10016
USA
Tel: +1 212 481 7018
Toll Free: +1 800 528 4841
Fax: +1 212 686 7993
E-mail: cabi-nao@cabi.org

CABI Publishing

CAB International
Wallingford
Oxfordshire
OX10 8DE
UK

Tel: +44 1491 832111

Fax: +44 1491 829292

E-mail: orders@cabi.org

URL: <http://www.cabi.org/Publishing/Products/Database/Abstracts/Index.asp>

Clearing-house Mechanism,

Secretariat of the Convention on Biological Diversity,

393 rue Saint-Jacques, suite 300,

Montréal,

Québec,

Canada H2Y 1N9.

Telephone: +1-514-288-2220

Facsimile: +1-514-288-6588

E-mail: secretariat@biodiv.org

URL: www.biodiv.org

ENBI Bureau

Zoological Museum of Amsterdam

P.O Box 94766

NL-1090 GT Amsterdam

The Netherlands

URL: www.enbi.info

GBIF Secretariat,

Universitetsparken 15,

DK-2100 Copenhagen,

Denmark

Tel: +45 35 32 14 70

Fax: +45 35 32 14 80

URL: www.gbif.org

Global Environment Facility

1818 H Street, NW,

Washington, D.C., 20433,

USA.

Tel: (+1) 202-473-0508.

Fax: (+1) 202-522-3240.

URL: <http://www.gefweb.org>

Global Invasive Species Programme

Greg Sherley, Director

Global Invasive Species Programme

C/o the National Botanical Institute

Private Bag X 7

Claremont CT 7735

South Africa

Tel: +685 21 929

Fax: + 685 20 231 e-mail: greg@sprep.org.ws

International Legume Database and Information Service

Judith Heald

ILDIS Co-ordinating Centre
Centre for Plant Diversity & Systematics
School of Plant Sciences
The University of Reading
Reading
RG6 6AS
United Kingdom
tel: +44 (0)118 931 6466
fax: +44 (0)118 975 3676
e-mail: ildis@ildis.org
URL: <http://www.ildis.org/>

Species 2000
School of Plant Sciences,
The University of Reading
Reading
RG6 6AS
United Kingdom
tel: +44 (0)118 931 6466
fax: +44 (0)118 975 3676
e-mail: sp2000@sp2000.org
URL: www.sp2000.org

United Nations Development Programme
GEF/Executive Coordinator,
One United Nations Plaza,
New York,
NY 10017,
USA.
Tel. (+1) 212 906 6112.
Fax: (+1) 212-906-6998.
URL: <http://www.undp.org> & <http://www.undp.org/gef/index.html>

United Nations Environment Programme

GEF Unit/UNEP,
Nairobi,
Kenya.
Tel. 254-2-621-234.
Fax: 254-2-520-825.
URL: <http://www.unep.org>

The World Bank
Global Environment Division,
1818 H Street, NW,
Washington, DC,
USA.
Tel. (+1) 202-473-1816.

Fax: (+1) 202-522-3256.

URL: <http://www.worldbank.org>

ANNEXES:

Annex 1. COP Decision III/10

[To be inserted on finalization]

Annex 2. SBSTTA Recommendation II/2

[To be inserted on finalization]

Annex 3. COP Decision IV/1.D

[To be inserted on finalization]

Annex 4. COP Decision V/9

[To be inserted on finalization]

Annex 5. COP Decision VI/8 Programme of Work

[To be inserted on finalization]

Annex 6

**KEY ELEMENTS OF DECISIONS OF THE CONFERENCE OF THE PARTIES
PARTICULARLY RELEVANT TO THE GTI**

The text below is simply extracted from the decisions cited, and in each case refers to the GTI. The relevant decisions should be consulted to ensure that the text is seen in full context.

1. General importance of the GTI

a. Decision II/8: Preliminary consideration of components of biological diversity particularly under threat and action which could be taken under the Convention

The Conference of the Parties,

7. *Further requests* the Subsidiary Body at its second meeting to address the issue of the lack of taxonomists, who would be needed for the national implementation of the Convention, and to advise the Conference of the Parties at its third meeting on ways and means to overcome this problem, taking into account existing studies and ongoing initiatives *while adopting a more practical direction of taxonomy linked to bioprospecting and ecological research on conservation and sustainable use of biological diversity and its components.*

b. Decision III/4: Clearing-house mechanism to promote and facilitate technical and scientific cooperation

The Conference of the Parties,

Noting also:

(a) The crucial part played by technical and scientific cooperation on all aspects of biological diversity, including *taxonomy* and transfer of technology, in ensuring the capacity of the clearing-house mechanism to play an important role in the implementation of the Convention;

c. Decision V/21: Cooperation with other bodies

The Conference of the Parties,

7. *Requests* the Executive Secretary to take the study into consideration and, in collaboration with the Secretariat of the Convention on Migratory Species, to develop a proposal on how migratory species could be integrated into the work programme of the Convention on Biological Diversity, and the role the Convention on Migratory Species could play in the implementation of the Convention on Biological Diversity with regard to, *inter alia*, the ecosystem approach, *the Global Taxonomy Initiative*, indicators, assessments and monitoring, protected areas, public education and awareness, and sustainable use, including tourism;

2. Forest Biological Diversity

a. decision IV/7: Forest Biological Diversity

The Conference of the parties:

6. *Calls upon* the Global Environment Facility (GEF) to provide financial support, in accordance with Article 7 of the Convention, *for* activities and *capacity building* for the implementation of the work programme for forest biological diversity and the use of the clearing-house mechanism, particularly for activities to halt and mitigate deforestation effects, *basic assessments and monitoring of forest biological diversity, including taxonomic studies and inventories, focusing on forest species, other important components of forest biological diversity and ecosystems under threat,*

Within the Work Programme, under

3. Methodologies necessary to advance the elaboration and implementation of criteria and indicators for forest biological diversity

42. The work related to indicators of forest biological diversity could also imply the need for an inventory to assess current status and trends in forest biological diversity, at the local and national level based on repeated measures of the selected indicators. The work under this programme element could also include, *inter alia*, capacity-building on taxonomy and inventories, taking note of the work under the Global Taxonomy Initiative.

And among the Activities in this section:

44. Taxonomic studies and inventories at the national level which provide for a basic assessment of forest biological diversity.

b. Decision V/4: Progress report on the implementation of the programme of work for forest biological diversity

The Conference of the Parties,

Stressing that, in the implementation of the programme of work for forest biological diversity, due consideration should be given to the role of all types of forests, including planted forests, and the restoration of forest ecosystems,

Noting the importance of supporting work on taxonomic, ecological and socioeconomic issues for the restoration of forest ecosystems and conservation and sustainable use of forest biological diversity,

3. Marine and Coastal Biodiversity

a. Decision IV/5: Conservation and sustainable use of marine and coastal biological diversity, including a programme of work

Within the Programme of Work, the 'Basic principles' include, under 'The importance of science':

6. Special efforts should be undertaken to support the Global Taxonomy Initiative in the marine and coastal environment in view of the importance of basic taxonomic work for the implementation of the objectives of the work programme, in accordance with decision IV/1 D.

The PoW includes, as *Operational objective 6.2*:

To develop a database of experts from the roster and other sources, to be available for the development and implementation of specific elements of national policies on marine and coastal biological diversity, giving full recognition to the importance of taxonomy and following closely the development of the Global Taxonomy Initiative and in accordance with decision IV/1 D. Special consideration should be given to regional perspectives and the setting up of regional centres of taxonomic expertise, as well as to the taxonomy efforts of other intergovernmental programmes, agencies and relevant institutions.

Activities:

- (a) To maintain and update regularly a database of experts on marine and coastal biological diversity;
- (b) To make the information available through the clearing-house mechanism;
- (c) *To promote the strengthening of taxonomic expertise at regional and national levels.*

Time schedule: Ongoing

Ways and means: Secretariat, also through relevant organizations, in particular those that deal with taxonomic issues.

Budgetary implications: Costs related to additional staff time within the clearinghouse mechanism unit associated with the design of the database and of the Jakarta Mandate on Marine and Coastal Biological Diversity home page.

b. Decision V/3: Progress report on the implementation of the programme of work on marine and coastal biological diversity (implementation of decision IV/5)

I Coral reefs

6. *Urges* Parties, other Governments and relevant bodies to implement response measures to the phenomenon of coral bleaching by:

(e) Supporting *capacity-building measures, including training of and career opportunities for marine taxonomists*, ecologists and members of other relevant disciplines, particularly at the national level;

Annex:

Priority areas for action on coral bleaching

A Information-gathering

Issue: Our ability to adequately project, and thus mitigate, the impacts of global warming on coral-reef ecosystems and the human communities which depend upon coral-reef services is limited by the paucity of information on:

(a) The *taxonomic*, genetic, physiological, spatial, and temporal factors governing the response of corals, zooxanthellae, the coral-zooxanthellae system, and other coral-reef-associated species to increases in sea-surface temperature;

Response:

(b) Implement and coordinate baseline assessments, long-term monitoring, and rapid response teams to measure the biological and meteorological variables relevant to coral bleaching, mortality and recovery, as well as the socio-economic parameters associated with coral-reef services. To this end, support and expand the Global Coral Reef Monitoring Network and regional networks, and data-repository and dissemination systems including Reef Base - the Global Coral Reef Database. Also, the current combined Sida-SAREC and World Bank programme on coral-reef degradation in the Indian Ocean, as a response to the 1998 coral-bleaching event, could be used as an example;

B Capacity-building

Issue: There is a substantial lack of trained personnel to investigate the causes and consequences of coral bleaching events.

Response: Support the training of and career opportunities for marine taxonomists, ecologists, and members of other relevant disciplines, particularly at the national and regional level.

c. Decision VI/3: Marine and coastal biological diversity

The Conference of the Parties:

3. *Invites* the Executive Secretary to continue developing further the work plan on physical degradation and destruction of coral reefs as contained in annex I to recommendation VI/2 of the Subsidiary Body on Scientific, Technical and Technological Advice;

SBSTTA recommendation VI/2: Marine and coastal biological diversity: progress report on the implementation of the programme of work, including the integration of coral reefs

Annex II to SBSTTA recommendation VI/2

Specific work plan on coral bleaching

Activities:

2. Capacity-building

(f) *Support the training of and career opportunities for marine taxonomists, ecologists, and members of other relevant disciplines, particularly at the national and regional level.*

4. *Biological diversity of inland waters*

a. Decision IV/4: Status and trends of the biological diversity of inland water ecosystems and options for conservation and sustainable use

The Conference of the Parties,

1. *Adopts*, on the basis of modified recommendation III/1 of the Subsidiary Body on Scientific, Technical and Technological Advice as contained in document UNEP/CBD/COP/4/2, annex I to the present decision as a work programme under the Convention on Biological Diversity, on the biological diversity of inland water ecosystems and the associated matters of identification and monitoring, assessment methodology and *taxonomy*;

5. *Urges* Parties and Governments to integrate those elements highlighted by the Subsidiary Body on Scientific, Technical and Technological Advice as important for Parties, contained in annex I, sections A, B, C and D, to the present decision (respectively concerning inland water ecosystems, identification and monitoring, *methodologies for assessment and taxonomy*), as appropriate, into their national and sectoral plans and to implement these as soon as possible;

C Review of methodologies for assessment of biological diversity (as pertaining to inland water ecosystems)

15. Suitable organisms should be identified as being particularly important in the assessment of inland water ecosystems. Ideally, such groups should meet the following criteria:

- (a) The group should contain a reasonable number of species with varied ecological requirements;
- (b) *The taxonomy of the group should be reasonably well understood;*
- (c) The species should be easy to identify;

16. In view of the great economic importance of some groups (eg inland water fish species), and of *the large gaps in taxonomic knowledge* for many species, the Conference of the Parties considers this as a specific focus of the capacity-building in taxonomy recommended by the Subsidiary Body on Scientific, Technical and Technological Advice in its recommendation II/2 and endorsed by the Conference of the Parties in decision III/10.

D The urgency of needed action on taxonomy

21. *The Executive Secretary is requested to take decisive action to advance the Global Taxonomy Initiative as detailed in decisions III/10 and IV/1 D, which should be implemented as soon as possible.*

b. Decision VI/2: Biological diversity of inland waters

The Conference of the parties:

3. *Emphasizes* the importance of review and elaboration of the programme of work on biological diversity of inland water ecosystems, as outlined in the progress report of the Executive Secretary on thematic programmes of work, and of the implementation of *activity 11 of the programme of work on the Global Taxonomy Initiative*;

5. *Agricultural biological diversity*

a. Decision V/5: Agricultural biological diversity: Review of phase I of the programme of work and adoption of a multi-year work programme

II International initiative for the conservation and sustainable use of pollinators

The Conference of the Parties

15. *Decides* to establish an International Initiative for the Conservation and Sustainable Use of Pollinators as a cross-cutting initiative within the programme of work on agricultural biodiversity to promote coordinated action worldwide to:

(a) Monitor pollinator decline, its causes and its impact on pollination services;

(b) *Address the lack of taxonomic information on pollinators*;

Annex:

Programme of work on agricultural biodiversity

A. Overall objectives, approach and guiding principles

3. The proposed elements of the programme of work have been developed bearing in mind the need:

(c) To ensure harmony with the other relevant programmes of work under the Convention on Biological Diversity, including those relating to forest biological diversity, inland water biological diversity, marine and coastal biological diversity, and dry and subhumid lands, as well as with cross-cutting issues such as access and benefit-sharing, sustainable use, indicators, alien species, *the Global Taxonomy Initiative*, and issues related to Article 8 (j);

b. Decision VI/5: Agricultural biological diversity

Annex II:

Plan of action for the International Initiative for the Conservation and Sustainable use of Pollinators

II Objectives and approach

6. The aim of the International Initiative for the Conservation and Sustainable Use of Pollinators is to promote coordinated action worldwide to:

(a) Monitor pollinator decline, its causes and its impact on pollination services;

(b) *Address the lack of taxonomic information on pollinators*;

7. The Initiative is to be implemented as a cross-cutting initiative within the programme of work on agricultural biodiversity, with appropriate links to other thematic programmes of work, particularly those on forest biological diversity and the biodiversity of dry and sub-humid lands, and with relevant cross-cutting issues, *particularly the Global Taxonomy Initiative* and work on invasive alien species. The Initiative provides an opportunity to apply the ecosystem approach.

III Elements of the Plan

Element 1. Assessment

Rationale

In addition to the “taxonomic impediment” (see element 3), there is also a global “taxonomic deficit,” that is, the unacceptably high numbers of bee genera for which identification keys are not available

Activities

1.3 Assess the state of scientific and indigenous knowledge on pollinator conservation, in order to identify gaps in knowledge and opportunities for application of knowledge; including:

(a) *Taxonomic knowledge*; and

(b) The knowledge, innovations and practices of farmers and indigenous and local communities in sustaining pollinator diversity and agro-ecosystem services for and in support of food production and food security.

1.4 *Promote the development of identification keys for bee genera.*

Element 3. Capacity-building

Rationale

One major area which needs addressing is the capacity of countries to address the taxonomic impediment, which derives from serious shortfalls in investment in training, research and collections management. It seriously limits our capability to assess and monitor pollinator decline globally, in order to conserve pollinator diversity and to manage it sustainably. The global taxonomic impediment is costly, especially when expressed in terms of those research initiatives in pollination and conservation ecology which are wholly dependent on access to sound bee taxonomy and are rendered wholly non-viable in its absence. There is also a global taxonomic deficit, that is, the unacceptably high numbers of bee genera for which identification keys are not available.

Activities

3.4. *Build taxonomic capacity to carry out inventories of the pollinator diversity and distribution in order to optimise their management, through, inter alia, the training of taxonomists and parataxonomists of bees and other pollinators.*

Ways and means

The taxonomic elements would also be promoted through the Global Taxonomy Initiative.

Element 4. Mainstreaming

Activities

4.3. *Strengthen national institutions to support taxonomy of bees and other pollinators, through, inter alia:*

(a) *Assessing national taxonomic needs (this would contribute to activity 1.3);*

(b) *Maintaining continuity of taxonomic and reference collections of bees and other pollinators;*

(c) *Recognition of centres of excellence in bee taxonomy and establishment of centres of excellence as appropriate;*

(d) *Repatriation of data through capacity-building and benefit-sharing.*

Ways and means

The taxonomic elements would also be promoted through the Global Taxonomy Initiative.

Timing of expected outputs

Progressively increased capacity at national level for taxonomy, information management, assessment and communication.

Consideration of pollinators and related dimensions of agricultural biodiversity incorporated into national biodiversity and/or agricultural sector plans in 50 countries by 2010.

6. Identification, monitoring and assessment

a. Decision III/10: Identification, monitoring and assessment

The Conference of the Parties

Reaffirming the central importance of the implementation of Article 7 in ensuring that the objectives of the Convention are met,

Stressing the fundamental role of taxonomy in identifying the components of biological diversity,

Recognizing the lack of taxonomic capacity in many countries,

Recognizing also the necessity of capacity-building to enable Parties to carry out identification, monitoring and assessment within the remit of the Convention,

Noting the review of methodologies for assessment of biological diversity contained in annex I of document UNEP/CBD/COP/3/13 and the discussion of indicators contained in annex II of that document,

1. *Urges* Parties to identify indicators of biological diversity and to develop innovative methods of implementing Article 7 as a high priority, in particular commending the value of rapid biological diversity assessment approaches as an efficient and cost-effective way of assessing biological diversity and identifying priorities for action, and recognizing also the role of remote sensing as a useful tool for monitoring;

2. *Endorses* the recommendation II/1 of the Subsidiary Body on Scientific, Technical and Technological Advice concerning indicators, monitoring and assessment of biological diversity;

3. *Endorses the recommendation II/2 of the Subsidiary Body on Scientific, Technical and Technological Advice concerning capacity-building for taxonomy;*

8. *Recommends to Parties that they explore ways to make taxonomic information housed in collections world-wide readily available, in particular to countries of origin;*

10. *Requests* the institutional structure of the interim financial mechanism of the Convention to provide financial resources to developing countries in order to address the need for capacity-building, *including taxonomy*, to enable them to develop and carry out an initial assessment for designing, implementing and monitoring programmes in accordance with Article 7, taking into account the special need of small island States.

Recommendation II/1:

Agenda item 3.1: Assessment of biological diversity and methodologies for future assessments

Agenda item 3.2: Identification, monitoring and assessment of components of biological diversity and of processes that have adverse impacts Agenda item 3.3: Review and promotion of indicators of biological diversity

1 General advice

4. *It was noted that improvement of taxonomic knowledge was fundamental to the development of indicators and assessments.*

Recommendation II/2:

Agenda item 3.4: Practical approaches for capacity building for taxonomy

***** see appendix

b. Decision VI/7: Identification, Monitoring, indicators and assessments

Annex: Guidelines for incorporating biodiversity-related issues into environmental impact assessment legislation and/or process and in strategic environmental assessment

4. Ways and means

(a) Capacity-building

36. Any activity aimed at the incorporation of biodiversity considerations into national environmental impact assessment systems should be accompanied by appropriate capacity development activities. *Expertise in taxonomy*, 45 conservation biology, ecology, and traditional knowledge is required as well as local expertise in methodologies, techniques and procedures. Environmental impact assessments should involve ecologists with extensive knowledge on the relevant ecosystem(s) in the assessment team.

7. Alien species that threaten ecosystems, habitats or species

a. Decision V/8: Alien species that threaten ecosystems, habitats or species

The Conference of the Parties

14. *Requests* the Executive Secretary to collaborate with the Global Invasive Species Programme, the Food and Agriculture Organization of the United Nations, the International Maritime Organization, the World Health Organization and other relevant organizations, and other relevant internationally and regionally binding and nonbinding instruments to assist the Parties to the Convention in:

- (a) Developing standardized terminology on alien species;
- (b) Developing criteria for assessing risks from introduction of alien species;
- (c) Developing processes for assessing the socio-economic implications of alien invasive species, particularly the implications for indigenous and local communities;
- (d) Furthering research on the impact of alien invasive species on biological diversity;
- (e) Developing means to enhance the capacity of ecosystems to resist or recover from alien species invasions;
- (f) Developing a system for reporting new invasions of alien species and the spread of alien species into new areas;
- (g) *Assessing priorities for taxonomic work;*

Annex I:

Interim guiding principles for the prevention, introduction and mitigation of impacts of alien species

Guiding principle 8: Exchange of information

States should support the development of database(s), such as that currently under development by the Global Invasive Species Programme, for compilation and dissemination of information on alien species

/...

that threaten ecosystems, habitats or species, to be used in the context of any prevention, introduction and mitigation activities. *This information should include* incident lists, *information on taxonomy* and ecology of invasive species and on control methods, whenever available. The wide dissemination of this information, as well as national, regional and international guidelines, procedures and recommendations such as those being compiled by the Global Invasive Species Programme should also be facilitated through, *inter alia*, the clearing-house mechanism.

Annex II

Outline for case-studies on alien species

To the extent possible, case-studies should be short and succinct summaries of experience on alien species at the country and regional levels. A case-study should focus on the prevention of introduction, control, and eradication of alien species that threaten ecosystems, habitats or species.

Case-studies should include the following sections (a summary of the information may be provided under each heading, and a more detailed paper may be attached; if the information were not available, this should be indicated in the appropriate section):

1. *Description of the problem*

(a) Location of the case-study

(b) History (origin, pathway and dates, including time-period between initial entry/first detection of alien species and development of impacts) of introduction(s)

(c) Description of the alien species concerned: biology of the alien species (*the scientific name of species should be indicated if possible*) and ecology of the invasion(s) (type of and potential or actual impacts on biological diversity and ecosystem(s) invaded or threatened, and stakeholders involved)

(d) Vector(s) of invasion(s) (e.g. of deliberate importation, contamination of imported goods, ballast water, hull-fouling and spread from adjacent area. It should be specified, if known, whether entry was deliberate and legal, deliberate and illegal, accidental, or natural.)

(e) Assessment and monitoring activities conducted and methods applied, including difficulties encountered (e.g. *uncertainties due to missing taxonomic knowledge*)

b. Decision VI/23: Alien species that threaten ecosystems, habitats or species*

(c) **Assessment, information and tools**

The conference of the Parties:

24. *Urges* Parties, Governments and relevant organizations, at the appropriate level, with the support of relevant international organizations to promote and carry out, as appropriate, research and assessments on:

(h) *Priorities for taxonomic work through, inter alia, the Global Taxonomy Initiative;*

Annex:

Guiding principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species

Guiding principle 5: Research and monitoring

In order to develop an adequate knowledge base to address the problem, it is important that States undertake research on and monitoring of invasive alien species, as appropriate. *These efforts should*

attempt to include a baseline taxonomic study of biodiversity. In addition to these data, monitoring is the key to early detection of new invasive alien species. Monitoring should include both targeted and general surveys, and benefit from the involvement of other sectors, including local communities. Research on an invasive alien species should include a thorough identification of the invasive species and should document: (a) the history and ecology of invasion (origin, pathways and time-period); (b) the biological characteristics of the invasive alien species; and (c) the associated impacts at the ecosystem, species and genetic level and also social and economic impacts, and how they change over time.

Guiding principle 8: Exchange of information

1. States should assist in the development of an inventory and synthesis of relevant databases, including taxonomic and specimen databases, and the development of information systems and an interoperable distributed network of databases for compilation and dissemination of information on alien species for use in the context of any prevention, introduction, monitoring and mitigation activities. This information should include incident lists, potential threats to neighbouring countries, information on taxonomy, ecology and genetics of invasive alien species and on control methods, whenever available. The wide dissemination of this information, as well as national, regional and international guidelines, procedures and recommendations such as those being compiled by the Global Invasive Species Programme should also be facilitated through, *inter alia*, the clearing-house mechanism of the Convention on Biological Diversity.

8. Article 8 (j) and related provisions

a. Decision V/16: Article 8 (j) and related provisions

Annex:

Programme of work on the implementation of Article 8 (j) and related provisions of the Convention on Biological Diversity

III Tasks of the second phase of the programme of work

Element 3. Traditional cultural practices for conservation and sustainable use

Task 13. The Ad Hoc Working Group to develop a set of guiding principles and standards to strengthen the use of traditional knowledge and other forms of knowledge for the conservation and sustainable use of biological diversity, taking into account the role that traditional knowledge can play with respect to the ecosystem approach, *in situ* conservation, *taxonomy*, biodiversity monitoring and environmental impact assessments in all biodiversity sectors.

9. Global Strategy for Plant Conservation

a. Decision VI/9: Global Strategy for Plant Conservation

Annex:

Global Strategy for Plant Conservation

A Objectives

5. Within the ultimate and long-term objective, a number of sub-objectives can be identified as follows:

(a) *Understanding and documenting plant diversity:*

(iv) Promote research on the genetic diversity, systematics, *taxonomy*, ecology and conservation biology of plants and plant communities, and associated habitats and ecosystems, and on social, cultural

and economic factors that impact biodiversity, so that plant diversity, both in the wild and in the context of human activities, can be well understood and utilized to support conservation action;

D The Strategy as a framework

14. The Strategy is not intended to be a “programme of work” analogous to existing thematic and cross-cutting programmes of work under the Convention. It does not, therefore, contain detailed activities, expected outputs, etc. Rather, the Strategy provides a framework by means of setting outcome-orientated targets (these differ from the “process” targets used so far under the Convention). It is envisaged that the activities necessary to reach those targets could be developed within this framework. In many cases, activities are already under way, or envisaged in existing initiatives. These include:

(c) Relevant activities under the programmes of work of the Convention on Biological Diversity, including those relating to agricultural biodiversity, forest biological diversity, inland water biological diversity, marine and coastal biological diversity, and dry and sub-humid lands, as well as activities involving cross-cutting issues such as access and benefit-sharing, sustainable use, indicators, alien species, *the Global Taxonomy Initiative*, and issues related to Article 8(j).

10. Access and benefit-sharing as related to genetic resources

a. Decision VI/24: Access and benefit-sharing as related to genetic resources

Annex:

Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization

E Objectives

11. The objectives of the Guidelines are the following:

(l) Taxonomic research, as specified in the Global Taxonomy Initiative, should not be prevented, and providers should facilitate acquisition of material for systematic use and users should make available all information associated with the specimens thus obtained.

C Responsibilities

16. Recognizing that Parties and stakeholders may be both users and providers, the following balanced list of roles and responsibilities provides key elements to be acted upon:

(b) In the implementation of mutually agreed terms, users should:

(viii) When supplying genetic resources to third parties, honour any terms and conditions regarding the acquired material. They should provide this third party with relevant data on their acquisition, including prior informed consent and conditions of use and record and maintain data on their supply to third parties. *Special terms and conditions should be established under mutually agreed terms to facilitate taxonomic research for non-commercial purposes;*

IV Steps in the access and benefit-sharing process

Specification of use

34. Prior informed consent should be based on the specific uses for which consent has been granted. While prior informed consent may be granted initially for specific use(s), any change of use including

transfer to third parties may require a new application for prior informed consent. Permitted uses should be clearly stipulated and further prior informed consent for changes or unforeseen uses should be required. *Specific needs of taxonomic and systematic research as specified by the Global Taxonomy Initiative should be taken into consideration.*

36. An application for access could require the following information to be provided, in order for the competent authority to determine whether or not access to a genetic resource should be granted. This list is indicative and should be adapted to national circumstances:

(f) *Accurate information regarding intended use (e.g.: taxonomy, collection, research, commercialization);*

1. Basic requirements for mutually agreed terms

42. The following principles or basic requirements could be considered for the development of mutually agreed terms:

(e) Different uses may include, *inter alia*, taxonomy, collection, research, commercialization;

2. Indicative list of typical mutually agreed terms

44. The following provides an indicative list of typical mutually agreed terms:

(a) Type and quantity of genetic resources, and the geographical/ecological area of activity;

(b) Any limitations on the possible use of the material;

(c) Recognition of the sovereign rights of the country of origin;

(d) Capacity-building in various areas to be identified in the agreement;

(e) A clause on whether the terms of the agreement in certain circumstances (e.g. change of use) can be renegotiated;

(f) Whether the genetic resources can be transferred to third parties and conditions to be imposed in such cases, e.g. whether or not to pass genetic resources to third parties without ensuring that the third parties enter into similar agreements except for taxonomic and systematic research that is not related to commercialization;

Appendix II:

Monetary and non- monetary benefits

2. Non-monetary benefits may include, but not be limited to:

(k) Access to scientific information relevant to conservation and sustainable use of biological diversity, including biological inventories and *taxonomic* studies;

Annex:

Draft elements for an Action Plan for capacity-building for access to genetic resources and benefit-sharing

2 Key areas requiring capacity-building

3. The following key areas, which require capacity-building initiatives, should be considered in a flexible and transparent manner, based on a demand-driven approach, taking into account the different situations, needs, capabilities and stages of development of each country and should avoid duplication of efforts between various capacity building initiatives:

(b) Assessment, inventory and monitoring of biological resources, and traditional knowledge including taxonomic capacity, within the context of the Global Taxonomy Initiative;

4 Means of implementation

5. The following mechanisms could be used for the implementation of capacity building measures for access to genetic resources and benefit-sharing:

(l) The Global Taxonomy Initiative;

11. Advice to the Financial Mechanism

a. Decision III/5: Additional guidance to the financial mechanism

The Conference of the Parties,

2. *Decides* to provide the following additional guidance to the Global Environment Facility in the provision of financial resources in conformity with decisions I/2 and II/6 of the first and second meetings of the Conference of the Parties. In this regard, the Global Environment Facility shall provide financial resources to developing countries for country-driven activities and programmes, consistent with national priorities and objectives, recognizing that economic and social development and poverty eradication are the first and overriding priorities of developing countries:

b) For capacity-building, including taxonomy, to enable developing countries to develop and carry out an initial assessment for designing, implementing and monitoring programmes in accordance with Article 7, taking into account the special need of small island States (Note: The Conference of the Parties endorsed recommendation II/2 of the Subsidiary Body on Scientific, Technical and Technological Advice, concerning capacity-building for taxonomy);

b. Decision IV/13: Additional Guidance to the financial mechanism

The Global Environment Facility should:

4. In accordance with decision IV/7 and with Article 7 of the Convention and also within the context of implementing national biological diversity strategies and plans, provide adequate and timely financial support to Parties for projects and capacity-building activities for implementing the programme of work of forest biological

diversity at the national, regional and subregional levels and the use of the clearinghouse mechanism to include activities that contribute to halting and addressing deforestation, *basic assessments and monitoring of forest biological diversity, including taxonomic studies and inventories, focusing on forest species, other important components of forest biological diversity and ecosystems under threat;*

c. Decision V/13: Further guidance to the financial mechanism

The Conference of the Parties,

2. *Decides* to provide the following additional guidance to the Global Environment Facility in the provision of financial resources, in conformity with decisions I/1, II/6, III/5 and IV/13 of the Conference of the Parties. In this regard, the Global Environment Facility shall provide financial resources to developing country Parties for country-driven activities and programmes, consistent with national priorities and objectives, recognizing that economic and social development and poverty eradication are the first and overriding priorities of developing countries. The Global Environment Facility, as the institutional structure operating the financial mechanism, should provide support:

k) *To continue promoting awareness of the Global Taxonomy Initiative in the relevant activities of the Global Environment Facility, such as the Country Dialogue Workshops, and to facilitate capacity-building in taxonomy, including in its Capacity Development Initiative;*

d. Decision VI/17: Financial mechanism under the Convention

The Global Environment Facility as the institutional structure operating the financial mechanism should provide financial resources:

(f) For national and regional taxonomic capacity-building, as a basis for implementing the programme of work for the Global Taxonomy Initiative, with particular attention to funding country-driven pilot projects identified under the Global Taxonomy Initiative, taking into consideration the special needs of least developed countries and small island developing States;

Annex 7. COP Decision VI/5 on the International Pollinators initiative

[To be inserted on finalization]

Annex 8. COP Decision VI/9 on the Global Strategy for Plant Conservation

[To be inserted on finalization]

Annex 9. Decision VI/24 on Access and benefit-sharing as related to genetic resources, including the Bonn Guidelines

[To be inserted on finalization]

Annex 10. The Darwin Declaration

[To be inserted on finalization]

Annex 11. SBSTTA information document 4-5

[To be inserted on finalization]

Annex 12. SBSTTA information document 4-6

[To be inserted on finalization]

Annex 13. SBSTTA information document 4-7

[To be inserted on finalization]

Annex 14. SBSTTA information document 6-4

[To be inserted on finalization]

Annex 15. SBSTTA information document on the GTI 9-?

To be added once editing completed

Annex 16. SBSTTA information document 6-18 (part)

The document below is the part of document UNEP/CBD/COP/6/INF/18, considered by SBSTTA 6, which deals particularly with the information needs of the GISP.

SCIENTIFIC AND TECHNICAL COOPERATION AND THE CLEARING-HOUSE MECHANISM

Report of the Joint Convention on Biological Diversity/Global Invasive Species Programme Informal Meeting on Formats, Protocols and Standards for Improved Exchange of Biodiversity-related Information

Note by the Executive Secretary

INTRODUCTION

A. Background

1. Article 18, paragraph 3, of the Convention on Biological Diversity established the clearing-house mechanism to promote and facilitate technical and scientific cooperation. In its decision V/14, the Conference of the Parties recommended that the Executive Secretary identify possible formats, protocols and standards for the improved exchange of biodiversity-related data, information and knowledge, including national reports, biodiversity assessments and Global Biodiversity Outlook reports and convene an informal meeting on this issue. Furthermore, in decision V/14 the Conference of the Parties also requested the Executive Secretary to develop a pilot initiative to assist work on the thematic issues within the work programme of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). In light of these decisions, the SBSTTA, at its sixth meeting, recommended to the Executive Secretary to continue cooperation with the Global Invasive Species Programme and to explore the development of arrangements for this further cooperation.
2. In response to these decisions and recommendation, the Executive Secretary in collaboration with the Global Invasive Species Programme, and with financial support from the Government of Belgium and the Government of the United States, organized the Joint Convention on Biological Diversity/Global Invasive Species Programme (CBD/GISP) Informal Meeting on Formats, Protocols and Standards for Improved Exchange of Biodiversity-related Information on 19-20 February, Montreal, Canada.
3. The purpose of the meeting was to identify formats, protocols and standards for more effective exchange of biodiversity-related data and information and to recommend the use of these formats in the establishment of the Global Invasive Species Information Network as a pilot initiative.

B. Attendance

4. This meeting was attended by 21 experts qualified in the fields of management of biodiversity-related issues, information sharing systems and database management, establishment of clearing-houses and/or the clearing-house mechanism of the Convention on Biological Diversity. Experts in issues related to invasive alien species were also invited.

[Paragraphs 6 – 40 and 1- 9 of Annex 1 omitted]

C. *Recommendations on formats, protocols and standards for the global invasive species information network*

10. The Meeting made the following recommendations in support of objectives identified in the GISP Phase II Implementation Plan with respect to establishment of the Global Invasive Species Information Network. Furthermore, the recommendations are in response to decisions made at COP V/14, and recommendations made by SBSTTA-6 and the IAC Meeting of 11 March 2001. There was agreement that implementation of these recommendations will enable the Global Invasive Species Information Network to provide users with timely and accessible information on invasive alien species to facilitate well informed policy and management decisions at all levels.
11. These recommendations are also based upon a series of GISP workshops held between 2000 and 2002 to develop the concepts for the Global Invasive Species Information Network and define the protocols, formats and standards for establishing an open, distributed, interoperable network of databases and information systems managed through regional information hubs.
12. Below are recommendations pertaining to the identification and use of formats, standards and protocols for the establishment of the Global Invasive Species Information Network:
 - (a) *Network structure:*
 - (i) Membership (Informatics Consortium):
 - (a) Ensure open membership at all levels (international, regional, sub-regional, national), across relevant sectors including environment, agriculture, health, trade, transport and travel, and actors including non-governmental organizations, indigenous and local communities and the private sector;
 - (b) Make use of the existing national clearing-house mechanism focal point network, as appropriate.
 - (ii) *Regional hubs:*
 - (a) Develop invasive species regional hubs building, where appropriate, on existing networks.
 - (b) Encourage the development of the network and its hubs, including new initiatives and projects, especially through regional and global meetings;
 - (c) Request BioNET INTERNATIONAL and other existing networks to explore opportunities for using their infrastructure to support development and management of the Global Invasive Species Information Network;
 - (d) Encourage communication and data sharing among regional hubs especially across shared borders, taxa and/or ecosystems.
 - (e) Develop mechanisms for reporting the status and the accomplishments of the network and its individual hubs, at least an annual basis, especially through regional and global meetings.
 - (b) *Network services:*
 - (i) Develop guidelines for validation and authentication of information that is shared, exchanged or contributed;

- (ii) Develop interactive tools and information systems to assist in the identification of invasive alien species;
 - (iii) Develop a standardized method for indexing and searching the content of the websites of regional hubs;
 - (iv) Support the urgent development and application of open early warning systems, models and analytical/forecasting tools to predict areas and impacts of invasions, through hub interoperability.
- (c) *Metadata and architecture:* Implement an early and robust application of the proposed formats, protocols and standards, including, particularly, the adoption of:
- (i) Open systems and open standards;
 - (ii) The philosophy of the semantic web in the development and establishment of the Network, including the use of XML at the syntactic level of the network, and Resource Description Framework at the structural level of the network;
 - (iii) FGDC, Dublin Core and other metadata standards, as appropriate, at the semantic level of the Network.
- (d) *Core content:*
- (i) Support the establishment and maintenance of invasive species information hubs and be supported to establish and maintain, in standard formats being developed by GISP, information on occurrences of invasive species, experts, datasets, projects, organizations, relevant laws and authorities, and best practices, within their regions;
 - (ii) Use established vocabularies and thesauri, when feasible, for such attributes as taxonomic names, geolocators, subject matter, pathways and vectors, habitat types, organization names, laws and regulations, and control methodologies. Encourage development and use of multi-lingual thesauri;
- (iii) *Taxonomy:*
- (a) Increase the standardization of taxonomic usage within the network, taking into account the following:
 - (b) Encourage cooperation among hubs to ensure that all are using the same names for species;
 - (c) Recognize and communicate changes in taxonomic concepts of individual invasive species without delay across hubs;
 - (d) Encourage adoption by hubs of standard nomenclatures of higher taxonomic groups, where developed and accepted under the appropriate nomenclatural codes;
 - (e) Use the taxonomic resources of GBIF, ITIS and/or Species 2000 that provide access to baseline taxonomic data to ensure interoperability;
 - (f) Enable the inclusion of unidentified or partially identified specimens in the information system;
 - (g) Allow species level updates of specimen-associated data, such as distribution and ecological impact, upon their eventual naming or re-identification in the information system;

- (h) Encourage hubs to recommend to affiliated institutions to follow best practices, such as:
 - (i) Maintenance of voucher collections of invasive species (including genetic material), whether named or not;
 - (ii) Specimen identification tracking systems with the potential of active links to the information network in the case of voucher specimens;
 - (iii) Mechanisms for actively linking species-level data and the specimen-level data upon which they are based.
- (i) Allow for multiple taxonomic interpretations by the information system. Where conflicting interpretations create confusion as to the status of a species as invasive, these should be flagged as requiring priority investigation.
- (iv) *Geospatial standards:*
 - (a) Ensure that occurrence data are geo-referenced to enable management from micro to global scales;
 - (b) Fully consider the adoption of guidelines/suggestions developed by geospatial working groups;
- (e) *Capacity-building:*
 - (i) Encourage and support capacity development by hubs in the application of standards, formats and protocols to ensure equitable and full participation by and within all regions of the world;
 - (ii) Work through and build upon other capacity building initiatives, including those associated with the clearing-house mechanism, GTI (particularly in the context of its proposed programme of work, planned activities 15, 5 and 6)¹⁵ and other thematic areas and cross-cutting issues under the Convention on Biological Diversity, those being developed in response to the UNDP Capacity Development Initiative, and those being developed by initiatives and organizations such as GBIF, BioNET INTERNATIONAL, the ALL-Species Foundation;
 - (iii) Encourage countries, institutions and initiatives to include invasive alien species information networking within other capacity development activities, and should harmonize aims with this priority issue;
 - (iv) Recommend to the above and other relevant international initiatives that they make information exchange on invasive alien species a priority issue;
 - (v) Work with the clearing-house mechanism in the future use of formats, standards and protocols to ensure interoperability among hubs;
 - (vi) *Training:*
 - (a) Undertake training and capacity-building activities, including workshops and projects to ensure harmonized participation in the establishment, implementation and use of the network;
 - (b) Develop training activities, when appropriate, and subject to available funding, in cooperation with the Convention on Biological Diversity clearing-house mechanism;

¹⁵ See the report of the sixth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (UNEP/CBD/COP/6/3).

- (vii) *Toolkit:*
 - (a) Develop and make available a toolkit of guidelines, procedures and protocols for establishing regional hubs;
 - (b) Include templates for the development of data and information resources and services;
- (f) *Funding.* Recognize the urgent need for additional funding to support planning and coordination of regional hubs in the implementation of the application of formats, standards and protocols.

Annex 17. Report of the GTI Coordination Mechanism

[To be inserted on finalization]

Annex 18. Background document used by organizers of the first three regional GTI workshops.

WORKSHOP ON THE GLOBAL TAXONOMY INITIATIVE – BACKGROUND PAPER

1. Introduction

Although the Convention on Biological Diversity has been signed and ratified by many countries, there problems remain in putting it into effect. Among these is the difficulty many Countries have in identifying and monitoring the species of animals, plants and microorganisms extant in their territories. This is the so-called ‘taxonomic impediment’.

The taxonomic impediment includes the following issues:

- gaps in knowledge of the fauna and flora already recorded from a region;
- difficulties in identifying specimens collected as part of CBD-linked activities in assessment and monitoring;
- difficulties in dealing with the large numbers of undescribed species;
- difficulties in locating and acquiring taxonomic literature;
- difficulties in locating and having access to type and other specimens;
- difficulties in accessing other forms of taxonomic information;
- the shortage of trained taxonomists and curators within the region;
- the shortage of availability of specialists regionally and worldwide;
- inadequate resourcing of National and Regional institutions
- difficulties in locating extant resources by those involved directly in CBD-related activities.

These deficiencies have a major impact in the ability of countries to conserve, use and share the benefits of biological diversity. In order to deal with this problem the Global Taxonomy Initiative (GTI) has been formed as part of the CBD.

As a basis to developing work under the GTI individual countries have decided to carry out assessments of the taxonomic impediments limiting their ability to undertake activities related to the implementation of the CBD, and what is needed to remove these impediments^{16,17}. From the beginning of the process it was recognized that these needs would often be best met on a regional rather than a national basis. In many regions of the world it will be advantageous to pool resources and act cooperatively in building taxonomic capacity to support conservation and decision-making. There are also situations where ecosystems or protected areas extend across national boundaries, and joint studies between two or more countries can act to meet Convention objectives much more effectively than disconnected initiatives from each of the countries concerned. The importance of this process was recognized both by the Conference of the Parties to the Convention on Biological Diversity (Decisions III/10, IV/1.D, V/9) and in the work plan of the GTI, recently endorsed by SBSTTA 6. More detail is given in Annex 1.

In order to achieve regional development a series of workshops have been instigated. These workshops should ideally comprise a mix of taxonomists, conservationists, environmental managers, government representatives (perhaps CBD Focal Points) and a representative of the Financial Mechanism (GEF). This mix is important because the emphasis is on removal of the

¹⁶ See the DIVERSITAS document ‘The Global Taxonomy Initiative: Using Systematic Inventories to meet Country and Regional Needs’, the reference for which is given below, for an outline of the methodology of such an assessment.

¹⁷ The GEF has allocated funding for carrying out National Taxonomic Needs Assessments under the Enabling Activities budget.

taxonomic impediment to implementation of the CBD, and therefore all major stakeholders in the implementation process must be involved, to present their perspective on the issues. The functions of the regional workshops are multiple. These functions include:

- informing key people about the CBD, the GTI and its role within the CBD, and the GEF;
- allowing key personnel in the relevant sectors to meet and prioritize issues;
- identifying regional impediments and needs;
- identifying the urgent taxonomic needs of extant biodiversity projects;
- assisting the development of regional initiatives and regional networks to support them.

Finally, the results of the workshops, in terms of regional needs assessments, will assist in the development of a Global taxonomic needs assessment, as requested by the Conference of the Parties.

2. Work Plan of Workshops

Two workshops have so far taken place: Central America (February 2001) and Africa (March 2001). Both used a template similar to that below.

2.1. Major objectives and outputs:

- A. To enable participating countries and collaborating institutions to gain clarity on the principles, role and mechanisms of the GTI.
- B. To initiate the compilation of regional, subregional or national taxonomic needs assessments, with the involvement of relevant Government bodies and Departments.
- C. To formulate specific national, subregional or regional projects aimed at meeting the most urgent taxonomic needs.
- D. To establish a comprehensive strategy and achievable workplan through which capacity development in taxonomic research in the region can be achieved.
- E. To produce a Report that can act as a guide to achieve these objectives.

Issues of funding have been discussed at length in the two workshops to date. In addition to discussing the Global Environment Facility (GEF), the workshops have also provided a forum for other potential funders of GTI initiatives to make delegates aware of opportunities.

2.2. Issues to be covered:

To achieve these objectives and outputs, the following issues will be covered during the Workshop:

A. To enable participating countries and collaborating institutions to gain clarity on the principles, role and mechanisms of the GTI.

This is best achieved through the participation of the GTI Programme Officer, who would give one or more presentations covering the issues, responding to questions, and participating in discussions. The issues covered would include:

- The background and basics of the Convention on Biological Diversity (CBD), including the principles embodied in the CBD philosophy, notably capacity-building, the “ecosystem approach” to funding applications (broadly conceived projects driven by taxonomic derivatives), applied systematics (e.g. establishing RDLs or biodiversity “hot spots” from checklists), sustainability and national vs. regional thrusts.
- Interpretation of the provisions for a Global Taxonomy Initiative (GTI), as articulated at meetings of the Conference of the Parties (COP) of the CBD.
- Implementation of the Programme of Work of the GTI.

- Increasing awareness of procedures or legislation applicable to access to genetic resources and benefit sharing.
 - Familiarization with the GEF's Operational Strategies to facilitate the processing of funding applications from developing countries.
 - Identification of potential co-funders prepared to support projects aimed at funding from the GEF, through the GTI.
 - Identification of other funding sources.
- B. To initiate the compilation of regional, subregional or national taxonomic needs assessments, with the involvement of relevant Government bodies and Departments.**
- Establish an appropriate framework according to which regions, subregions or countries could compile taxonomic needs assessments where these do not exist.
 - Identify areas of taxonomic/systematics endeavour in which capacity-building is required in order to enable implementation of the CBD (e.g. checklists, alpha-taxonomy, revisionary and monographic work, molecular systematics, editorial processes, databasing).
- C. To formulate specific national, subregional or regional projects aimed at meeting the most urgent taxonomic needs.**
- Prioritise a shortlist of significant "flagship" projects for urgent funding, as part of the GTI. For example, these could be driven by economically or biologically important taxa (orders, families, genera), ecosystems, or the impacts of invasive alien species.
- D. To establish a comprehensive strategy and achievable workplan according to which funding for building capacity in taxonomic research in the region can be accessed.**
- Decide on an implementation strategy for the GTI, in a Regional context.
 - Establish a sensible structure and approach for, and division of activities within, a Regional strategy aimed at accessing funding. This could be done on a taxon, subregional or regional basis.
 - Obtain acceptance and endorsement from delegates of the finalized GTI Workplan for the Region.
 - Gain clarity on concepts related to the desired approach to be followed when applying for funds from the GEF or other funding bodies for GTI initiatives.
 - Establish appropriate international links to maximize output-delivery, broad participation, data repatriation efforts and scientific networks.
- E. To produce a Report that can act as a guide to achieve these objectives.**
- Identify the concepts and contents that need to be included in a guiding report emanating from the Workshop.
 - Produce the Report.

From the two Regional Meetings that have so far taken place, it can be seen that the inclusion of personnel from different sectors is vital. The GTI exists in order to ensure the appropriate taxonomic component is present in Conservation and Sustainable Use activities. Omitting participation from these sectors limits the possibilities in which this can be developed, and misses an opportunity to discuss the real issues. It is also extremely important to have representation from the CBD Secretariat, in the person of the GTI Programme Officer, and the Financial Mechanism. This might be a representative of the GEF from Washington, or a National Focal Point from within the Region. Involvement of one or more of the Implementing Agencies (UNDP, UNEP, The World Bank, The Inter-American Development Bank) might also be valuable. Identification of suitable delegates can be by personal contact, and through the CBD

and GTI National Focal Points. The identities and contact details of these Focal Points can be found at the CBD web site, at <http://www.biodiv.org/world/parties.asp?lg=0>

There are a number of documents that delegates should be aware of, and if possible have read before the meeting. These are listed below.

3. Reference documents for participants in GTI regional workshops

A number of documents will be of use in understanding the GTI and developing funded projects for funding. These generally can be accessed through the World Wide Web. If there is any difficulty, the Country Focal Point may be able to help.

3.1. The Convention on Biological Diversity – background, activities

- The homepage of the Secretariat of the Convention on Biological Diversity gives a great deal of information. The URL is:

<http://www.biodiv.org/>

- The Convention itself is on the Web at the URL:

<http://www.biodiv.org/convention/articles.asp>

- The Operation of the CBD is governed by decisions taken by the Conference of the Parties to the Convention. Decisions taken at the COP meetings are available at:

<http://www.biodiv.org/decisions/>

3.2. Background to GTI

- The GTI is discussed in its web-site:

<http://www.biodiv.org/programmes/cross-cutting/taxonomy/default.asp>

- Several published documents are of key importance in the development of the GTI, and give valuable background on its development and functioning. These include:

1. *The Darwin Declaration*

Building upon the recommendations and resolutions of previous conferences and studies, some leaders of key taxonomic institutions, policy makers, funders and ecologists/conservation managers, met in Darwin, Australia, in February 1998 to recognize the existence of a "taxonomy impediment". The Document was adopted by the fourth meeting of the Conference of the Parties.

<http://www.biodiv.org/programmes/cross-cutting/taxonomy/docs.asp>

<http://www.anbg.gov.au/abrs/flora/webpubl/darwinw.htm>

2. *The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery*

This document reports the outcomes of the meeting held in London, in September 1998, at the Linnean Society, and provides additional documentation to help policy makers in the CBD, UNEP and GEF to assist in the removal of the taxonomic impediment identified in the Darwin Declaration. This report examines certain aspects of GTI, including actions needed to progress GTI, implementing the GTI, components of GTI and the role of the World's large institutions. Two annexes give guidelines for incorporation of taxonomy in the CBD and sample framework projects.

Contact: Australia Biological Resources Study, Environment Australia,
GPO Box 636, Canberra ACT 2601, Australia.

<http://www.biodiv.org/programmes/cross-cutting/taxonomy/docs.asp>
<http://www.anbg.gov.au/abrs/flora/webpubl/london.htm>

3. *The Global Taxonomy Initiative: Using Systematic Inventories to meet Country and Regional Needs*

To build on the findings of the Darwin and London workshops and provide further scientific and technical advice regarding the implementation of the GTI, an international group of experts was convened by DIVERSITAS at the Museum of Natural History in NY. in September 1998. This report reviews using inventories to build capacity and advance the GTI, gives recommendations for assessing taxonomic capacity, for preparing and implementing national strategies to support the GTI, and for building regional networks to support the GTI.

Contact: American Museum of Natural History, Central Park West at 79th St., New York, NY 10024, USA

<http://www.biodiv.org/programmes/cross-cutting/taxonomy/docs.asp>
<http://www.biodiv.org/doc/meetings/sbstta/sbstta-04/information/sbstta-04-inf-07-en.pdf>

4. *Implementing the GTI: Recommendations from DIVERSITAS element 3, including an assessment of present knowledge of key species groups*

The document, based on a meeting in Paris in February 2000, includes an assessment of present knowledge of key species groups.

<http://www.biodiv.org/programmes/cross-cutting/taxonomy/docs.asp>

<http://www.biodiv.org/doc/ref/gti-diversitas.pdf>

5. *Mechanisms for management of the GTI, with a consideration on inclusion of traditional and indigenous knowledge perspectives on current taxonomic systems*

Report of meeting held 20 December 1999, UNESCO, Paris

<http://www.biodiv.org/programmes/cross-cutting/taxonomy/docs.asp>

<http://www.biodiv.org/doc/meetings/sbstta/sbstta-05/information/sbstta-05-inf-gti-en.pdf>

3.3. Capacity Building

- Much of the operation of the GTI will depend on Capacity Building. This can be tied to the UNDP Capacity Development Initiative, details of which can be found at:

http://www.undp.org/gef/web_files/index.html

- The reports from this have been compiled, including that on Asia and the Pacific which, with the synthesis documents, can be found at the URL

http://www.gefweb.org/Site_Index/CDI/cdi.html

3.4. The Financial Mechanism of the CBD, the Global Environment Facility

- The Global Environment Facility is the Financial Mechanism supporting the CBD (and therefore the GTI). An understanding of the processes, protocols and practices of GEF can be found at their web site, which should be examined carefully. The URL is:

<http://www.undp.org/gef/>

- In order to progress projects using the GEF the GEF Focal Point in each country will need to be involved. A list of these individuals can be found at:

<http://www.gefweb.org/html/operational.html#b>

- The CBD Focal Points must also approve projects for GEF; as noted above, a list of these can be found at:

<http://www.biodiv.org/world/parties.asp?lg=0>

- The GEF (UNDP) has funded several taxonomy-based projects, and these can be examined to provide information on the approaches that should be taken. Two for which information can be found on the WWW are:

1. SABONET – the Southern African Botany Diversity Network

<http://www.sabonet.org/>

<http://www.undp.org/gef/write-up/afri-inv.htm>

2. Indonesia: restoration of biological collections and inventory work

Some information can be found at:

<http://wbln0018.worldbank.org/essd/essd.nsf/f308a5a687dbdec8852567eb00658cb7/d03d4ca5fe5ffb0a8525695900690e7f>

3.5. Local Documents

In order for a project to be maximally effective it should fit with the National Biodiversity Action Plan of the Countries concerned. This is a prerequisite for funding under the GEF, who will want to see as much linkage to National plans and programmes as possible. These should be obtained locally.

Annex 1. Official CBD documentation relating to Regional Workshops.

The text of the COP Decisions reproduced below are agreements by the Parties to the Convention; i.e. they are agreements by the Governments concerned to take action. Consequently, in organising a workshop we are assisting our Governments to carry out activities they have already committed themselves to. Use of the appropriate text can help government departments put the workshop in context. The full text of the COP Decisions on the Global Taxonomy Initiative (Decision III/10, with its Annex SBSTTA Recommendation II/2; Decision IV/1.D; V/9) can be found on the CBD web site, URL: <http://www.biodiv.org/decisions/>

In the Annex to its Decision IV/1. D on Suggestions for Action, the fourth Conference of the Parties suggested that “Parties and international donors should encourage partnerships between institutions in developed and developing countries so as to promote scientific collaboration and infrastructure rationalization. Such collaboration should include the development of national,

subregional, regional and global training initiatives. Taxonomic institutions in each nation, both individually and regionally, should develop national priorities in taxonomic training, infrastructure, new technology, capacity-building and market needs.” (paragraph 3).

Further, under the heading of ‘Implementing the Actions’ in the same Annex, the Conference of the Parties stated that Parties should “Assist institutions to establish consortia to conduct regional projects;” (paragraph 11(b)), and “Hold workshops to determine national taxonomic priorities, in the context of national biological-diversity studies and action plans. Once national priorities have been identified, support development of regional taxonomic priorities, including plans to database collections using mutually agreed software, quality control and core-data requirements.” (paragraph 11(j)).

In its decision V/9, the fifth Conference of the Parties urged Parties, Governments and relevant organizations to undertake a number of priority activities to further the Global Taxonomy Initiative, including:

“(a) The identification of national and regional priority taxonomic information requirements;

(b) Assessments of national taxonomic capacity to identify and, where possible, quantify national and regional-level taxonomic impediments and needs, including the identification of taxonomic tools, facilities and services required at all levels, and mechanisms to establish, support and maintain such tools, facilities and services;

(c) Establishment or consolidation of regional and national taxonomic reference centres;

(d) The building of taxonomic capacity, in particular in developing countries, including through partnerships between national, regional and international taxonomic reference centres, and through information networks;”

Further, the fifth Conference of the Parties requested that the Executive Secretary, with the assistance of the Global Taxonomy Initiative coordination mechanism: “Initiate short-term activities, including regional meetings of scientists, managers and policy makers to prioritize the most urgent global taxonomic needs and facilitate the formulation of specific regional and national projects to meet the needs identified, and to report thereon to the Conference of the Parties at its sixth meeting;” (paragraph 3 (b))

TEXT BOX 3-1:

The Global Taxonomy Initiative Programme of work

Operational objective 1: Assess taxonomic needs and capacities at national, regional and global levels for the implementation of the Convention.

Planned Activity 1: Country-based taxonomic needs assessments and identification of priorities.

Planned Activity 2: Regional taxonomic needs assessments and identification of priorities.

Planned Activity 3: Global taxonomic needs assessments.

Planned Activity 4: Public awareness and education.

Operational objective 2: Provide focus to help build and maintain the human resources, systems and infrastructure needed to obtain, collate, and curate the biological specimens that are the basis for taxonomic knowledge.

Planned Activity 5: Global and regional capacity building to support access to and generation of taxonomic information.

Planned Activity 6: Strengthening of existing networks for regional cooperation in taxonomy.

Operational objective 3: Facilitate an improved and effective infrastructure/system for access to taxonomic information; with priority on ensuring countries of origin gain access to information concerning elements of their biodiversity.

Planned Activity 7: Develop a coordinated taxonomy information system

Operational objective 4: Within the major thematic work programmes of the Convention include key taxonomic objectives to generate information needed for decision-making in conservation and sustainable use of biological diversity and its components.

Planned Activity 8: Forest biological diversity.

Planned Activity 9: Marine and coastal biological diversity.

Planned Activity 10: Dry and sub-humid lands biodiversity.

Planned Activity 11: Inland waters biological diversity.

Planned Activity 12: Agricultural biological diversity.

Planned Activity 13: Mountain biological diversity.

Operational objective 5: Within the work on cross cutting issues of the Convention include key taxonomic objectives to generate information needed for decision-making in conservation and sustainable use of biological diversity and its components.

Planned Activity 14: Access and benefit-sharing.

Planned Activity 15: Invasive alien species.

Planned Activity 16: Support in implementation of Article 8 (j).

Planned Activity 17: Support for ecosystem approach and CBD work on assessment including impact assessments, monitoring and indicators.

Planned Activity 18: Protected areas.

TEXT BOX 3-3

*DIVERSITAS SAMPLE FRAMEWORK PROJECTS:
Taxonomy and inventory of inland water biodiversity.*

Background and justification

Inland water ecosystems are among the world's most fragile, scarce and threatened ecosystems. Successful long-term conservation of such ecosystems relies on knowledge of their biological diversity.

It is generally assumed that the biodiversity of inland water bodies on the specific level is lower than that of marine ecosystems, whereas the rate of endemism is much higher.

There is an enormous amount of information to be found, often disseminated through many scientific papers, databases, museums collections, theses, reports and unpublished information but there is no inventory of the existing freshwater biodiversity, on either a world-wide and continental basis. As a consequence, many publications related to freshwater present and use inaccurate figures for biodiversity.

The objective of this project would be to provide a reference work on the existing knowledge, based on available data from various sources (publications, reports, data bases, etc.) and on the expertise of recognised specialists.

For each freshwater taxonomic group the project would aim to establish:

- the number of species, genera and families known and estimated worldwide;
- the number of species, genera and families known and estimated for each continent.

For major catchment areas an assessment would be made of what is known of the biota at a range of systematic levels, and of rates of endemism. The project would also identify sources of information (such as literature, institutions, web sites, etc.) and would provide a directory to those sources.

The findings of the project would be published in a CD-ROM and on the internet.

The project would be carried out in two parallel stages, and supervised by a Steering Committee.

- Preparation of lists of species, genera and families of freshwater organisms (including information on their distribution), using all published information and web sites. An additional product would be a directory of relevant web sites. Stage 1 would be completed within a 6-10 month period, by a qualified scientist situated in an institution with access to a large library and Internet communication.
- Organisation of five panels of 6-10 experts each. These panels would evaluate the information gathered in Stage 1, identify the gaps in knowledge and approach the relevant sources (governmental and international agencies, museums, experts, etc.) in order to complete the database.

Budget

Yet to be developed.

Timeline

Completion within 3 years.

Freshwater Fish Taxonomy Initiative For The Americas.

Background and justification

It is crucially important to develop a few new pilot projects, bringing together resources of governments, institutions and scientists that will address the critical areas of biodiversity. Ideally such a new initiative should:

- involve a taxonomic group that requires cooperation
- involve taxa with broad geographical distribution
- involve taxa that are relevant for the objectives and priorities of the Convention on Biological Diversity
- yield results in the short term

One group that has been proposed as a group that meets the above criteria are the freshwater fish of the Americas. Significant collections, taxonomic expertise and databases already exist, and any initiative should build upon these efforts in a cost effective manner. National and institutional priorities and capacities will be taken into account in developing this new effort. CONABIO, InBIO, and the Humboldt Institute working with other national institutions could be key partners.

Budget and Time frame

Yet to be developed.

UNEP/CBD/SBSSTA/4/INF/01: The Global Taxonomy Initiative: Shortening the Distance between Discovery and Delivery

TEXT BOX 3-2**DIVERSITAS SAMPLE FRAMEWORK PROJECTS:**
*International marine waters.****Background and justification***

The deep oceans are the largest biome on earth and oceanic organisms are responsible for half of all global production. The deep oceans are a key component of global biogeochemical cycles that deliver two-thirds of the essential ecosystem productivity needed to maintain our society, but they are one of the least known and most biologically diverse systems.

The developed and developing world jointly manage the resources of the deep oceans. The extent of these resources is only recently becoming appreciated through expeditions involving oceanographic ships and submersibles. Priority needs to be given to making the taxonomic results of these expeditions, especially for those taxa in danger of being lost, generally available to all nations. Coastal and island nations have a particular need for this information to fulfil their obligations under the CBD. Such a program would provide the means for capacity-building through a taxonomic identification support network, with infrastructure in both developed and developing countries. The product would be a geographically referenced database of deep-sea taxa.

Nations also have a collective responsibility to monitor change in deep-sea ecosystems and the only available method is the detection of change in taxonomic composition. First priority would be given to providing base-line data, identifying potential indicators and providing tools for future assessments. Such assessments are relevant both to processes of global change and to regional issues concerning economic development (eg. mining, biotechnology prospecting, hydrothermal vents etc.). A further component would be to increase awareness of the unusual life forms in the ocean, and to facilitate involvement of educational institutions and the public in the excitement generated by major discoveries.

Sub-projects

- Deep-sea sediment-dwelling organisms (\$1.5 million)
- Open-ocean primary producers (\$0.5 million)
- Hydrothermal vent organisms (\$0.5 million)
- Commercial fish & by-catch possibilities (\$0.5 million)

Budget

\$3 million

UNEP/CBD/SBSSTA/4/INF/1: The Global Taxonomy Initiative: Shortening the Distance
between Discovery and Delivery

TEXT BOX 3-4**DAVIS DECLARATION**

Workshop on Development of Regional Invasive Alien Species Information Hubs,
Including Requisite Taxonomic Services, In North America and Southern Africa
14-15 February 2001, Davis, California

We the participants in the aforementioned scientific workshop:

Recognize: The negative impacts of invasive alien species (IAS) on native biodiversity; ecosystem functions and services; the productivity of agriculture, forestry, wildlife, and fisheries; and human health are very costly to society. These costs are measured not just in economic terms, but also in damaged goods and equipment, food and water shortages, environmental degradation, loss of native species, increased rates and severity of natural disasters, disease epidemics, and harm to human welfare.

Every country has been impacted by IAS. Unless coordinated efforts involving the cooperation of all stakeholders are implemented to minimize the movement of IAS, invasions will become more frequent and their impacts more severe as the globalization of trade, transport and human travel increase.

Coordinated efforts to restrict the movement of IAS require that all nations have access to taxonomic capabilities, information services, and useful tools to support and implement prevention policies and develop effective response strategies.

Invasions of non-native species are greatly increasing the need for taxonomic services, while the number of taxonomists and resources for taxonomic capacity building are decreasing worldwide.

Initiatives relevant to strengthening IAS information services are proliferating, with agencies and organizations providing information for many purposes and on many geographic scales. These initiatives are not well coordinated. Some are overlapping or duplicative. Major gaps remain in coverage for some taxonomic groups and regions of the world.

Therefore, we

Conclude that: There is an urgent need to develop a comprehensive global strategy to strengthen and coordinate IAS taxonomic and information services.

Thus, we:

Encourage:

- Establishment of a global information system based on a network of regional information hubs for providing information services and tools relating to IAS and building wherever possible on existing efforts¹⁸.

¹⁸ Each hub would develop a core set of information products, coordinate existing information systems and encourage new initiatives to meet regional needs, facilitate synthesis and integration of information from many countries and sources, ensure application of appropriate data standards and vocabularies, and provide quality control and documentation.

- Support of IAS information services by strengthening of the infrastructure for information technology and management, taxonomic identification, systematics research, vouchersing and collections management worldwide.
- Development of tools to increase taxonomic capacity worldwide. These tools, which should be made available wherever possible in hard copy, on CD, and on the Internet, include, *inter alia*, a guide to taxonomic services for IAS; common nomenclatural standards; identification aids; searchable lists of floras and faunas; and training programs for new taxonomists and parataxonomists.
- Establishment of partnerships with key stakeholder groups, including industry, non-governmental organizations, and the general public, for developing and applying taxonomic services and information to combat IAS.

Note with Approval: The Global Invasive Species Programme's plans to promote taxonomy as a key component of national capacity in IAS prevention and management, encourage research to address taxonomic needs, and help coordinate a distributed IAS information network to include early warning and predictive functions.

Call upon:

- The Integrated Taxonomic Information System (ITIS), the Global Biodiversity Information Facility (GBIF), BioNET-INTERNATIONAL, and the Global Taxonomy Initiative (GTI) to make IAS a priority, establish global standards for IAS taxonomic classification, and improve the availability of accurate IAS taxonomic information.
- The Convention on Biological Diversity (CBD), International Plant Protection Convention (IPPC), and other relevant bodies to recognize the need and encourage support for better coordination, additional tools, and immediate capacity building in IAS information and taxonomic services.
- National, regional and international research and development agencies to make resources available to better coordinate and increase the capacity of IAS information and taxonomic services, in order to meet the immediate needs of both developing and developed countries.

Appendix

Background. The workshop brought together scientists from Africa, North America, and international organizations who are participating in national, regional and global efforts to develop taxonomic services and/or information networks to better inform work on invasive alien species (IAS). The objectives of the workshop were to share experience in developing distributed information networks relevant to IAS and to provide recommendations on concepts and criteria for developing and coordinating IAS regional information hubs and requisite taxonomic services in order to facilitate identification, assessment, and rapid response to IAS. The workshop was sponsored by the U.S. Geological Survey (USGS) in cooperation with the Global Invasive Species Programme (GISP). It was hosted by the University of California at Davis, which is providing technical support to various domestic and international efforts for developing and coordinating IAS information services. Workshop presentations assessed the need for a distributed IAS information system, supported by essential taxonomic services, and provided overviews of initiatives at the global level, in eastern and southern Africa, and in the Western Hemisphere. Working sessions focused on IAS information management and technical issues, and on issues at the interface between IAS taxonomic services and information systems.

The workshop produced the Davis Declaration to focus international attention and resources on development and coordination of IAS information and taxonomic services, and a report (in preparation) containing specific recommendations for strengthening IAS-related taxonomic capacity and for implementing a global network of regional information hubs. The workshop products will provide important support for ongoing taxonomic initiatives (e.g., ITIS, GTI, BioNET-INTERNATIONAL) and for GISP plans to develop a global IAS information network. They will also provide guidance for planning pilot regional invasive species hubs in Mexico and South Africa, for which seed grants are being provided through the Environmental Diplomacy Fund of the U.S. Department of State.
