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# **Taxonomic Needs Assessments Support Pack**

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**Lessons Learned and Suggested Best Practice for Conducting Taxonomic Needs Assessments as Called for by the Parties to the Convention On Biological Diversity as part of the Global Taxonomy Initiative Implementation**

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## **1. Introduction**

One hundred and ninety-three nations around the world are Party to the Convention on Biological Diversity. All have made commitments on conservation, sustainable use, and fair and equitable access to the genetic benefits of biological diversity – the three aims of the Convention. In order to meet these commitments, and manage their biodiversity, they need to be able to identify what that biodiversity is made up of. This process needs taxonomy – the identification, naming and classification of organisms.

For most countries in the world, there is too little taxonomic expertise, information and infrastructure available to enable them to work with their biota in the way they need. This deficiency is known as the ‘Taxonomic Impediment’ to implementing the Convention on Biological Diversity. The *Taxonomic Impediment* is therefore specifically about the *Taxonomic Needs* of non-taxonomists: conservationists, environmental managers, quarantine officers, foresters etc. It is different from the *Taxonomic Capacity* of a country, which refers to what taxonomy can be done, and the levels of expertise, information and infrastructure, without considering needs.

Understanding the Taxonomic Impediment in a country or region so that it can be removed can only be done by working with the users of taxonomy, and identifying their taxonomic needs and the way they use taxonomy. This process is known as a *Taxonomic Needs Assessment*.

The Parties to the Convention on Biological Diversity (CBD) have repeatedly identified the importance of National Taxonomic Needs Assessments. The Global Taxonomy Initiative (GTI) Programme of Work<sup>1</sup> (SCBD suggests that National Governments, with the support of national and international organizations and institutions as needed, should play a leading role in carrying out assessments. While some countries have completed at least partial assessments, others have used national biodiversity strategies and action plans (NBSAPs) as well as National Reports under the CBD to indicate their need for taxonomic capacity. The information summarised by the CBD Secretariat (SCBD 2006; SCBD 2010) shows many countries have conducted a basic Assessment or plan to do so, but also that much of the work done has been assessing capacity in the absence of a detailed appreciation of needs. Even where countries have carried out large scale Assessments the Assessment generally does not cover all possible stakeholders with an interest in taxonomic information, since resources have been too few to allow such a comprehensive process.

In recognition of some of the problems, the CBD has called for the development of “an Assessment Support Pack to be made available through the GTI Portal by the end of 2009, building on the assessments done on the BioNET-

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<sup>1</sup> <http://www.cbd.int/gti/pow.shtml>

INTERNATIONAL Web site. Suggested actors may include Parties, BioNET-INTERNATIONAL; the Coordination Mechanism of the Global Taxonomy Initiative, and other compilers of taxonomic needs assessments.” (SCBD 2008)

The first steps in creating such a support pack were taken in preparing a package for the Taxonomic Needs Assessment in Ghana (Lyal, Smith *et al.* 2006; Oteng-Yeboah, Kwapong *et al.* 2010), based on the preceding UK Taxonomic Needs Assessment (Taylor 2006), which itself built on methodology previously described by the CBD (SCBD 2008) and by DIVERSITAS (Anon 1998). The Support Pack now presented is the result of lessons learned during Taxonomic Needs Assessments carried out in the UK, Ghana and on Invasive Alien Species at the Global level (Smith, Aradottir *et al.* 2008).

The intent of the Support Pack is to outline a simple set of guidelines and resources for carrying out a taxonomic needs assessment, and thus simplify the process for any body or individual wishing to carry one out.

## **2. Why do a taxonomic Needs Assessment?**

Providing the right taxonomic information at the right time to enable non-taxonomists to do their work can be vital for good biodiversity and environmental management. To enable this, taxonomists need to know what to provide and how to provide it, and non-taxonomists need to know what is available and how to obtain it. There must be taxonomists available and these taxonomists must have the necessary resources or contacts to create the information. Once the needs are known the available capacity for delivery of that information can be assessed. Comparing what is needed and what can be provided allows goals to be set for building necessary capacity. These goals can be prioritised according to national or other policy and added to the National Biodiversity Strategies and Action Plans.

Without an assessment users of taxonomic information may not be able to obtain that information and taxonomists will not know what to produce. There will be no clear policy governing the situation, and funders will not have guidance on what to fund. Overall there will be a poor match to needs of biodiversity management, and the *status quo* of the taxonomic impediment will persist.

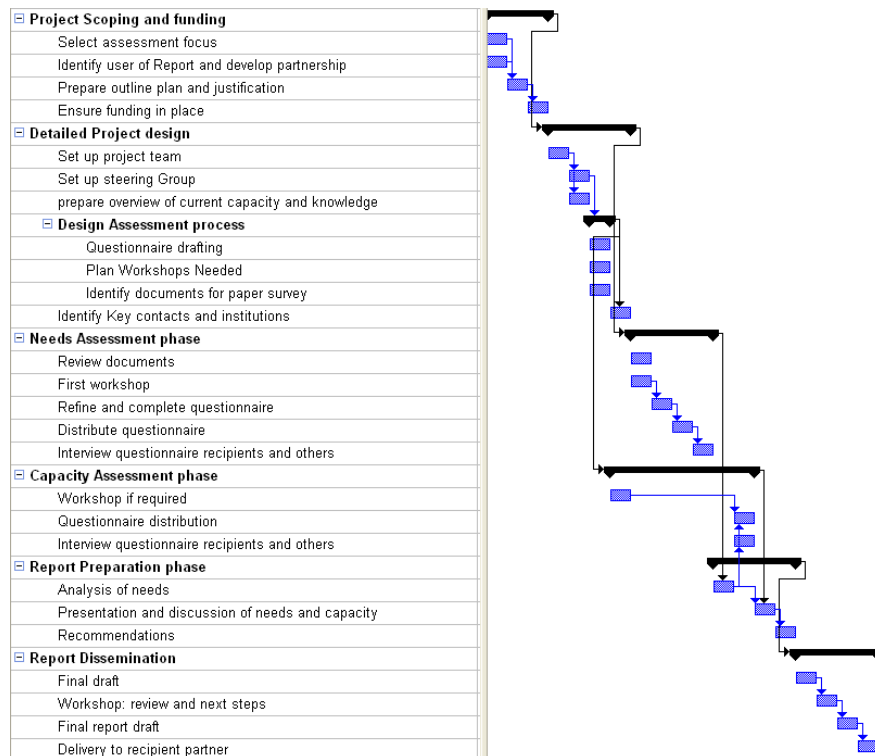
## **3. Roadmap for a TNA**

The process can be broken down to these stages:

1. Select assessment focus
2. identify who report will be used by (generally a Government Department) and form partnership
3. Develop project plan
4. Needs assessment phase
  - a. Appoint project team
  - b. Set up steering group
  - c. Put together overview of current taxonomic knowledge within and about country, and extant resources
  - d. Design assessment process

- i. Questionnaire
    - ii. Interviews
    - iii. Workshops
    - iv. Paper survey
  - e. Identify key contacts and institutions (augment Steering Group is necessary)
  - f. Review documents (government reports, workshop reports, CBD National Reports, scientific papers, etc) for relevant identified problems and previous assessments
  - g. Hold workshop to test questions and refine ideas
  - h. Distribute questionnaire
  - i. Follow-up questionnaire with interview
5. Capacity assessment (current resources and their sustainability)
  - a. Workshop if needed
  - b. Distribute questionnaire
  - c. Follow-up questionnaire with interview
6. Analysis
7. Recommendations for action
  - a. Appropriate for users of taxonomic information
  - b. Appropriate for providers of taxonomic information
  - c. Appropriate for policy makers and funders
8. Propose next steps
9. Publish report and deliver to government and / or other bodies

These activities can be turned into a project plan as in Fig. 1 below.



## **4. Project activity details**

### **4.1 Project Scoping and Funding**

#### **4.1.1 *Select the Assessment Focus***

##### ***Why and what***

To assess all taxonomic needs of a country is likely to be too large a project. Because of this it may be better to focus on one area, such as conservation or agriculture. If Government is the destination of the report, Government may have a view of the priority focus. This step needs to be taken at the same time as the step below – identifying the Primary User. This may well be a Government Department.

The question to ask is “What is the highest priority activity that uses taxonomic information?”

##### ***Detail***

The focus of the assessment may be one or more of the focal areas of the CBD (‘Thematic Areas’ and ‘Cross-cutting Issues’). Alternatively, it might be an area such as ‘Conservation’. Identifying the subject focus will enable the project to:

- Target Policy priorities;
- Appoint a knowledgeable Steering Group;
- Identify the appropriate people and institutions to question.

If one or more CBD focal areas are selected as the focus of the Assessment then:

- Enables mapping of questions and recommendations to CBD COP Decisions.
- Helps prioritisation of resource needs as a response to the Assessment.
- Assists the National CBD Focal Point in reporting on activities to the CBD, since these are organised by CBD Thematic Areas and Cross-Cutting Initiatives.

Within the Assessment Focus there may be many non-taxonomist users of taxonomic information. Each might have different needs, and different sources for the information they use. The users might include:

- Government bodies at policy level (e.g. Departments responsible for environment, agriculture, biosafety, genetically modified organisms; Access and Benefit-sharing legislation);
- Government bodies at implementation level (e.g. Quarantine and environmental bodies, involved in intercepting and managing invasive alien species and pests; agriculture, horticulture, forestry, and fishery advisory services; agricultural extension workers; environmental managers; resource managers; protected area managers);
- Non-Governmental Organisations (NGOs)
- Research bodies (e.g. universities; government research bodies);

- Business and industry (e.g. Forest product industries; Biotechnology industries; Ecotourism industries; developers requiring environmental impact assessments)
- Amateur societies (in many countries amateurs contribute to government policies for the environment by carrying out monitoring and assessment work, for example).

Ultimately, taxonomic information is used by individuals, and it is individuals who determine what is useful and desirable. Consequently, a Taxonomic Needs Assessment may include gathering information from people ranging from Government heads of department to lecturers to quarantine officers to extension workers to village communities.

Having produced a report on one area, assessment of the needs of other areas is likely to be much easier.

***It is very important that the results of the Assessment can be linked to particular user types and sectors, if more than one is covered. If this is not done it can be very difficult to provide clear priorities. This must be remembered in data collection and analysis.***

#### **4.1.2 Primary User of report and partnership**

##### ***Why and what***

The purpose of a Taxonomic Needs Assessment is to provide information so that problems can be fixed. Generally the bodies who can fix them are:

- Policy-makers (usually Government)
- Funding bodies
- Taxonomic institutions
- Users of taxonomic information

Broadly, Policy provides the framework for all the rest, so the Primary User is likely to be policy-level. However, in particular circumstances the Primary User may be another body. Whoever it is, it is important to form a partnership with this body at the most senior level possible, to maximise the likelihood of the results of the assessment and the recommendations being acted upon. This partnership may be in the form of a contract, and MoU, joint application for funds or other association. The Primary User should be represented on the Steering group.

##### ***Detail***

There is a commitment under the CBD to undertake Taxonomic Needs Assessments, and the National CBD Focal Point is asked in the National Report to say whether an Assessment has been done and what the results were. This responsibility may be passed on to the Global Taxonomy Initiative National Focal Point, in line with a Notification from the Executive Secretary of the CBD Secretariat (<http://www.cbd.int/doc/notifications/2004/ntf-2004-073-gti-en.pdf>)

The GTI Focal Point may be tasked with ensuring such an assessment is carried out. Thus the CBD Focal Point might be a Primary User (a list of the National Focal Points can be found on the CBD website at



<http://www.cbd.int/convention/parties/list/> (select the Country name to show details).

A major implement for National implementation of the CBD is the National Biodiversity Strategy and Action Plan (NBSAP). When these have been compiled they are often available on the CBD website at <http://www.cbd.int/convention/parties/list/> (select the Country name to show details). The results of a Taxonomic Needs Assessment will probably have to be incorporated into the NBSAP at some point, and the Department or Agency responsible for its compilation may be an appropriate Primary User.

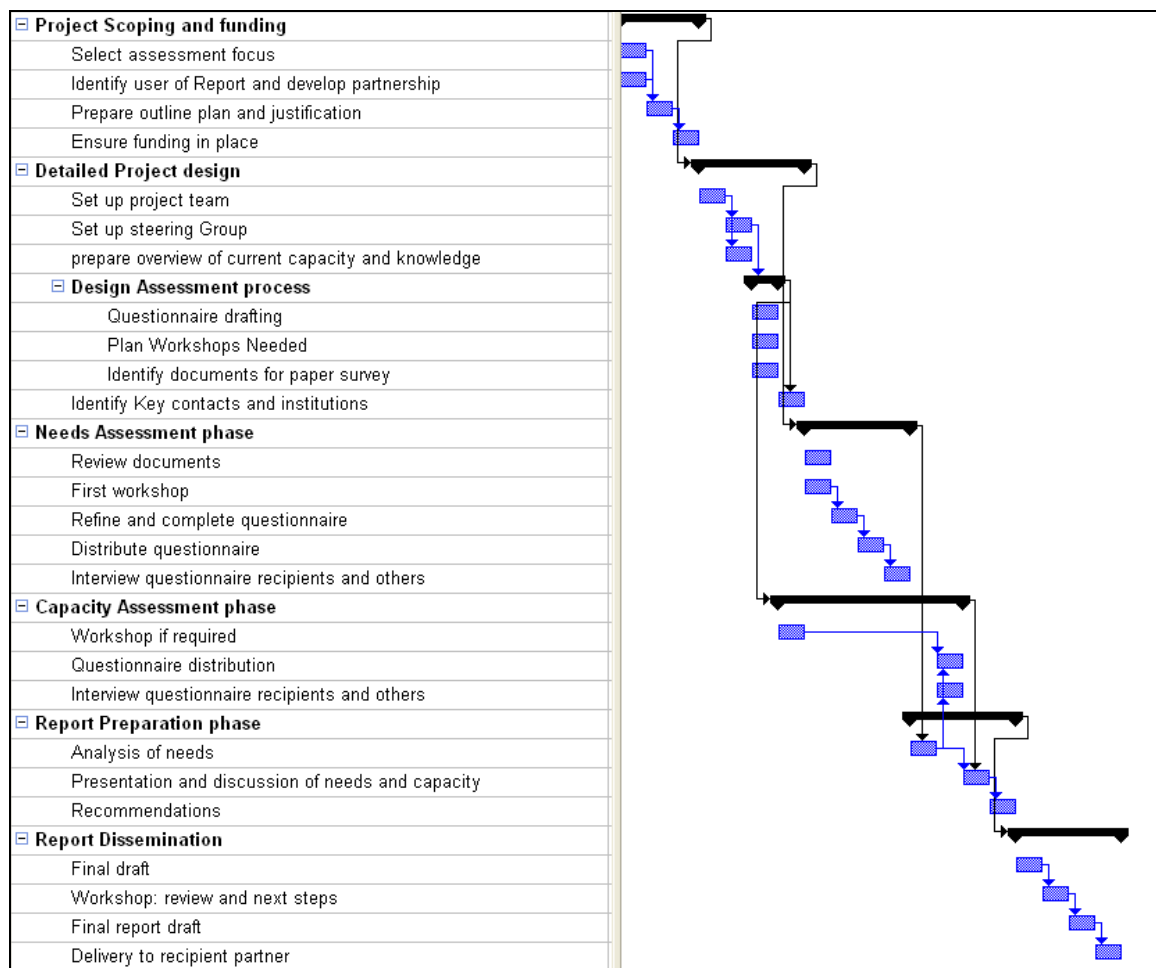
### 4.1.3 Prepare outline plan and justification

#### Why and what

An outline plan will be required to secure funding and other resources to carry out the Assessment.

#### Detail

The outline plan can be based on the Project Plan in Fig 1, but will need local detail. The justification will use national priorities and CBD commitments. The format and detailed contents will depend upon local conditions.



**Fig. 1.** Project plan for a Taxonomic Needs Assessment.

The plan in Fig 1 includes the main step headings as discussed in this pack. However, there is no reason that planning should not be at a more detailed level within these headings. The figure also includes a 'Gantt chart' (on the right of the figure), which indicates the order in which tasks need to be carried out. Some tasks have to be completed (or nearly so) before another can be started, and assessing the time taken by each step of the project will help determine the length of the project overall. Project designers may find it very useful to create such a chart.

Different funding bodies may require different types of plan.

**4.1.4 Ensure funding in place**

***Why and what***

The process will inevitably cost money. A full budget cannot be provided in this document, but an outline checklist is provided in Appendix 2.

A grant may have to be sought. The next phase cannot start without funding, although it may be advisable to submit a proposal to potential Steering Group members to ensure that the plan includes all necessary elements.

***Detail***

Funding for the Assessment may come directly from the Government of the country concerned. Alternatively, it may be necessary to approach other donors. Although in the first development of the CBD COP Decisions on the GTI the funder for such Assessments was assumed to be the Global Environment Facility (GEF), this is not the only (or even the best) funder to approach. Individual countries may offer bilateral aid to support an Assessment. In approaching many donors for funding, the more the carrying out of the Assessment can be shown to be in line with Government policy the more likely that they will be able to provide support.

**4.2 Needs Assessment Design and Operation**

**4.2.1 Set up Project Team**

***Why and what***

The project team will comprise a team leader and possibly others, although a single person can carry out an assessment. The person(s) carrying out the Assessment should be a taxonomist in order to identify appropriate taxonomic outputs and skills that relate to problems raised by users. Secretarial assistance may be needed, at least for part of the project.

***Detail***

There are no rules about how the project team should be made up. The recommendation that the person or persons carrying out the Assessment is a taxonomist is based on the experience that many of the non-taxonomists interviewed or participating in workshops are unaware of the potential uses of

taxonomic information to their work, and the more informed the interviewer / workshop facilitator is about taxonomy the greater the value to the Assessment.

#### **4.2.2 Set up Steering group**

##### ***Why and what***

To provide expert insights to the area being assessed, and on needs of the principle partner (the body for whom the Assessment is being prepared). The steering group might meet regularly through the project or only at the beginning and during the report drafting, according to need. The Terms of Reference might include:

- To advise the Project Team on key issues in the area under assessment;
- To advise the Project team on institutes and individuals to contact, and provide introductions where helpful to do so;
- To monitor progress in the assessment and identify any areas where likely needs had not been fully identified;
- To give key stakeholders a means of guiding and 'owning' the assessment;
- To form a link between the primary partner and the project team.

##### ***Detail***

The composition of the Steering Group will vary between Assessments. With a good group of senior personnel both a good oversight of the area being assessed, and introductions to key figures who can be interviewed and in turn identify others who will be able to contribute. The involvement of these people in the Steering group will mean that they have an interest in the success and impact of the final report, and will help to see recommendations implemented. They will also be able to comment on the recommendations to assist in making them realistic and functional. It is also helpful to have a representative of the Primary User of the report (relevant government department) on the Steering Group.

#### **4.2.3 Overview of current taxonomic knowledge within and about country, and extant resources**

##### ***Why and what***

Some information is important before the Assessment begins, in order that:

- How users employ currently-available information and facilities can be questioned;
- In discussion the project team is knowledgeable about current taxonomic resource availability;
- To provide a basis to build the report;
- To assist in asking known institutions how they respond to needs from the area being assessed.

##### ***Detail***

Compiling a baseline assessment of capacity may be possible from the knowledge of the project team. Additional information may be forthcoming from their colleagues and from internet searches. The National Reports of the Country

to the CBD may also have some information (<http://www.cbd.int/convention/parties/list/> - select the Country name to show details). Some basic knowledge can be used to assist in interviews and workshops, and will help to understand the knowledge and understanding of interviewees. Part of the basic review would helpfully be to understand the sustainability of the resources available.

#### **4.2.4 Design assessment process**

##### ***Why and what***

The Assessment may use four tools:

Questionnaire. See Annex 3 for example.

Interviews. These should be structured around the questionnaire, particularly Part 2, but also used to investigate in more detail how the area being assessed relies on taxonomy. ***Notes taken during interviews will be very important in preparing the final report.***

Workshops. An initial workshop to try out the questionnaire questions may be helpful. Based on the understanding and comments of the participants questions may need to be changed. A final workshop can be helpful to expand on needs identified.

Paper survey. Review documents (government reports, workshop reports, CBD National Reports, scientific papers, etc) for relevant identified problems and previous assessments.

##### ***Detail***

Questionnaire. The form is in three parts. The first part of collects information about the organisation being questioned, including their status. Different types of organisations may use taxonomic information in different ways, so this classification will assist analysis. A classification not included on the draft of the questionnaire but which users may wish to add is the nature of the 'customers' of the organisation. For example, an organisation may need taxonomic information because its staff manage the environment directly, because they advise those who do, because they advise government, or because they create analyses that are used by other researchers. The person filling the questionnaire is asked to identify the unit on behalf of which the response is being made. This may be the whole organisation, a single department, or a single project, for example. Clarity on this will help interpret the results.

A potentially useful figure is the number of people in the organisation that are working on the focal area. For example, the questionnaire may be completed by someone working in a one-man ecotourism business, or a government body with several hundred staff who might be using the resources. Such a figure, appropriately scaled, will assist in providing levels of need.

Although the focus of the Assessment will have been determined by this stage, the users selected might be asked to identify the areas of CBD implementation they are focussed on. It may be that their interpretation differs from that of the

Assessment Team, or that their interests (and resources) extend more widely than anticipated. Experience shows that people can find it difficult to complete the first part of the questionnaire because the CBD terminology is not widely understood. In some of the cases in Annex 3 a short explanation has been added to help the users. In addition, a short Presentation is provided for use in Workshops or in a one-to-one discussion (Annex 4).

The Thematic Areas of the CBD are referred to in the draft questionnaire as Ecosystems. However, this breakdown is quite possibly insufficiently detailed to account for sectoral interests in a given country, and a more detailed term for the ecosystem or environment may be useful (e.g. 'mangroves', 'savannah', 'desert' etc.).

In addition to the ecosystem the draft questionnaire has a table investigating the higher groups of organisms the users may be interested in. This table is grouped by broad ecosystem, and it might be useful to change this grouping. In addition, not all users may be interested in groups as set out; 'forest pests', or 'grassland herbivores' are equally valid groups from a non-taxonomist user point of view, and the questionnaire may need to be modified to accommodate such assemblages. Certainly this will be an area to investigate in interviews.

The draft questionnaire also seeks to establish to what extent the activities of the user involve different taxonomic activities and tools. This table is essentially about what the organisation does rather than what is needs; needs, however, may be inferred from the responses, and investigated during an interview.

The Second part of the questionnaire is focussed on what taxonomic products the organisation uses or needs. Before finalising the questionnaire the various categories and items should be considered carefully to see if any should be omitted or more added. For example, currently the form includes a set of ecological information elements which, although they fall under the heading of the GTI (taxonomy operating at ecosystem, species and genetic levels) may be outside the remit of most taxonomic organisations.

The questionnaire contains little about taxonomy at the genetic or ecosystem levels. Users may wish to add appropriate questions to deal with needs at these levels. The respondent is asked to indicate which level is of most interest to his organisation.

The third part of the questionnaire deals with taxonomic capacity. This will not apply to all recipients, but will provide valuable information for the taxonomic capacity component of the Assessment. As with other parts of the questionnaire, this should be considered and if necessary modified before it is sent to recipients. Recipients other than those contacted for the User Needs part of the Assessment may be sent the form to assess taxonomic capacity.

Finally, the questionnaire includes a blank page where the user is invited to add more detail to their taxonomic needs. This space can be used by institutions with taxonomic capacity to state their needs.

Not all questions in the exemplar questionnaire are relevant to all countries or assessments, and users should review each question in the questionnaire, deleting those they do not need and adding others if relevant.

In order to refine the questions in the questionnaire to make sure they are appropriate for your country or assessment target two mechanisms might be used:

- a) Appoint a Steering Committee to review the questions
- b) Hold an inaugural workshop with participation by members of the user sectors under assessment and work through the questions with them. The questionnaire can be modified accordingly.

In the UK and Europe, legislation gives people certain rights over data about them held electronically. For this reason the questionnaire includes a form on which the person filling it in can signify their agreement to the use of the data. Countries using the questionnaire in this resource may or may not have similar legislation, but it might be useful to include on the form a statement of the use of the information collected, and its distribution.

Interviews. Interviews are important to ensure that the recipient of a questionnaire understands the questions. They should also be used to explore the taxonomic needs of an organization more deeply than the questionnaire allows, including helping the interviewee understand aspects of taxonomic information provision that he might not be aware of. Not all interviews need to be conducted with questionnaire recipients; anyone interviewed can be asked questions to help the assessment team understand the nature of the interviewees needs for taxonomic information and any blocks and barriers that currently are hindering access. It is very important to take notes during interviews, since these can illuminate the questionnaire results and help target the needs identified in a much more detailed way. ***In the Needs Assessments taken under this model so far, the most valuable information has come from discussions at workshops and from interviews.***

Workshops. Workshops can have several functions for an Assessment. These include:

- helping to refine the questions posed in the questionnaire;
- providing additional information to identify needs and help focus questions asked later in interviews;
- suggesting documents to study;
- broadening the study base;
- providing additional interpretation and support for conclusions reached in the Assessment;
- providing an increased stakeholder group supporting the Assessment and with an interest in seeing it adopted and solutions implemented.

There may therefore be an initial workshop to comment on the questionnaire and a final workshop to comment on and add to the recommendations, and to suggest (and perhaps be partners in) projects to meet the needs identified.

Additional workshops might be attended by project staff during the assessment in order to capitalise of gatherings of the target sector(s), perhaps by making a presentation on the assessment and conducting interviews. Use of workshops held by other organisations and at which people needed for the assessment will attend can be very useful to reduce the cost of the Assessment.

Paper survey. This is discussed below.

### **4.3 Needs Assessment Phase**

#### **4.3.1 *Review Documents***

##### ***Why and what***

Much relevant information will be contained in documents, although some may be out of date. Review documents (government reports, workshop reports, CBD National Reports, scientific papers, etc) for relevant identified problems and previous assessments. Content can be discussed in interviews and workshops.

##### ***Detail***

For any sector under study for the assessment there will be documents exploring problems that might include a taxonomic impediment. These may include government documents (policy documents and others), institutional reports, the Country's National Reports to the Convention on Biological Diversity and other Conventions, the National Biodiversity Strategy and Action Plan, scientific papers and other sources. Since one of the benefits of carrying out a taxonomic needs assessment is to inform policy, and allow policies to be put in place to meet the needs identified, particular attention needs to be paid to extant policy documents. These might contain information on taxonomic needs, either explicitly or by inference (any call for 'monitoring and assessment', for example, implies a need for a taxonomic resource to identify the organisms being monitored). For several regions of the World (Africa, Central America, Asia) there have been regional Global Taxonomy Initiative Workshops, the reports of which contain much useful information. All these documents should be studied to extract any relevant information for the report. Any issues arising might also be added to discussions at interviews or in workshops. It might be helpful to have conducted at least part of this assessment before the first workshop, so that the findings can be used in discussion. This process will probably continue throughout the assessment, including the report writing phase.

Documents studied will probably give details of taxonomic capacity as well as taxonomic needs.

#### **4.3.2 *First workshop***

##### ***Why and what***

The first workshop will:

- Serve to formally launch the project;

- Enable the questionnaire questions to be tested;
- Provide additional information that may lead to adding questions in the questionnaire;
- Provide information for the final report;
- Start to gain 'ownership' of the Assessment by the users of taxonomy and by taxonomic information providers.

### ***Detail***

The first workshop will be valuable to obtain comments and refinements on the questionnaire. It can also be used to introduce the Assessment to some of the key institutions and individuals that might be involved in the Assessment as users whose needs are to be evaluated. Presentations that can be adapted for use in the workshop are given in Annex 4. A further use of the workshop can be to launch the project, with attendant publicity and involvement of key stakeholders.

It may be useful to invite the Primary User (ideally represented by a Minister or someone of senior rank) to open the Workshop.

#### ***4.3.3 Refine and Complete Questionnaire***

##### ***Why and what***

From feedback at the workshop the questions can be modified if necessary.

#### ***4.3.4 Distribute Questionnaire***

##### ***Why and what***

The questionnaire is a primary form of information gathering. However it cannot be assumed that all questionnaires distributed will be returned. There are various techniques to maximise the number returned, and these should be tried as much as possible.

### ***Detail***

In order to maximise the number of questionnaires returned the following steps should be taken:

- a) Target the dispatch of the questionnaires appropriately: always send to a named person. Always try to contact the recipient first to help him / her understand the value of the assessment to them.
- b) If sent to a head of department ask him/her to direct the questionnaire to the most appropriate person or people within the organisation (and ask to know who they are, to avoid bothering him in the future). Let him know that you will be following up the questionnaire with an interview to ensure that his organisation benefits as much as possible.
- c) Carry out interviews (see below) to assist people complete the form and gain additional information.
- d) Capitalise on the initial workshop and ask all participants to complete the revised questionnaire. Suggest that they ask colleagues within their organisation to do likewise.



- e) If English is not the first language of the country, it should be translated into the appropriate language.
- f) It may be helpful to indicate to the recipients by when the questionnaire should be returned (and to make a follow-up contact before that date).

It can be helpful to send the questionnaire to different people in an organization in different roles, to ensure that the maximum spectrum of response and understanding of needs is obtained (e.g. Director, Unit manager, Technician).

#### **4.3.5 Interview questionnaire recipients and others**

##### ***Why and what***

While questionnaires are valuable to obtain quantifiable data, experience shows respondents do not always understand the questions, and rarely put in additional explanation. Interviews are an important tool to help understanding and to gain additional insights of taxonomic needs. It is important to take full notes during the interviews, and use these when the data are being analysed and the report is being written.

##### ***Detail***

Ideally, the questionnaire and interviews should be used in conjunction, so that the subject can think about the questionnaire and enter data that, being of a standard format, is more simply analysed, and then interviewed to discover aspects that either do not fit on the questionnaire, or can be prompted by the questions. As the assessment continues, the interviewer will become increasingly aware of issues and needs that were not recognised initially, and can use the interviews to explore these. Although such issues may be discovered, the questionnaire should not be changed, since this will make subsequent analysis more difficult.

It is very important to take notes during interviews, since these can illuminate the questionnaire results and help target the needs identified in a much more detailed way.

Within the interview more detailed questions asked to clarify or explore problems and needs. For example:

- The interviewee should be encouraged to think of both current and expected future needs for taxonomic information.
- Where do they currently obtain taxonomic information, and are these sources adequate and sustainable?
- What kinds of taxonomic knowledge (e.g. species lists, identification tools, authoritative images, data from specimens in collections) are most essential?
- In what format (e.g. field guides, formal taxonomic publications, dedicated reports, dynamic web-based) do they prefer the information to be?
- What gaps in knowledge need to be filled?

It is difficult, and probably counter-productive, to set a prescriptive list of questions.

## **4.4 Capacity Assessment phase**

### **4.4.1 Methodology**

#### ***Why and what***

As with the Needs Assessment phase, information gathering can use a questionnaire, interviews, paper studies and workshops. The exemplar questionnaire in this pack includes questions about taxonomic needs. The methodology given above is not repeated in full here; the sections above should be consulted. Sections 4.4.2. – 4.4.5. indicate the sources of information in more detail.

#### ***Details***

Review Documents. There may be documents available outlining taxonomic capacity. These might, as with needs, include the National Biodiversity Strategy and Action Plan, National Reports to the CBD, including a report on the Global Taxonomy Initiative, reports on particular areas such as Invasive Alien Species. In some areas (Africa, Asia and Central America) there have been the subject of Regional meetings for the Global Taxonomy Initiative, and in each of those an assessment of taxonomic capacity was made. Although these assessments are now out of date, they will provide a helpful starting point.

Questionnaire. The questionnaire section three covers taxonomic capacity. It may be completed by any of the respondents, since some organizations with a primary responsibility for non-taxonomic work may maintain some elements of taxonomic capacity. All of the sections include a question asking the recipient what they would do with additional resources. The intent of this question is to find out what their priorities are. The questionnaire should also be sent to institutions known to have taxonomic capacity within the country.

Interviews. In the interviews consider not only the absolute taxonomic capacity present but how much of that capacity is used to meet the non-taxonomic needs being identified. This will mean that ideally at least some of the non-taxonomic needs will have to be known before interviews of taxonomic providers take place.

Workshops. As with capacity assessments, use should be made of any meetings taking place where taxonomists will be present, and side meetings or symposiums organised. Taxonomic institutions may also welcome a visit with an appropriate presentation made to staff. A suitable presentation may be compiled from the presentations provided in Annex 5.

### **4.4.2 Information and its sustainability**

At least some taxonomic information about national biota exists for all countries, but this is scattered over a myriad of different sources, is of uneven quality, and may not be easily available electronically. Moreover, where it exists it may not be in a format or language that makes its employment simple for non-taxonomic users or even many taxonomists, especially in the country of origin. Consequently an assessment of availability must include its main formats and the possibilities of distributing it to the appropriate personnel (Lyal, 2004). The types

of knowledge that might be considered arise from the Needs Assessment Phase, but are likely to include:

- (i) species lists for the country and areas within it, particularly protected areas;
- (ii) taxonomic literature (both paper and digital) relevant to the biota of the country;
- (iii) identification aids (both paper and digital);
- (iv) detailed data associated with specimens.

Two key data sources for species lists are existing literature and specimens held in collections. An important consideration is that taxonomic names do change through time, and consequently any source must be checked and corrected if it is to be of value.

Some information from the literature may be relatively easy to retrieve. This is most likely to be so for well-known groups, such as many vertebrates, some groups of vascular plants, and some of the more spectacular or economically important invertebrates. Such information can often be found in field guides, extant national or regional checklists and reports, and electronic databases. On the other hand some faunal or floristic lists, reports, and databases may be unavailable within the country, and will need to be sought elsewhere. More difficult to collect are species data discussed in detailed and specialist sources, such as monographs and primary taxonomic literature, both because of the distributed nature of the information within the publications, and the likelihood that they will not be available within the country.

Biological collections in museums, herbaria, botanic gardens and culture collections potentially provide the most reliable records of species distribution, whether at national or other geographic scales, and thus have a role in compilation of species lists. A benefit of data from these sources is that records can be associated with voucher specimens, the identity of which can be checked. For the purposes of a national assessment, key national and extra-national collections could be identified and information of the holdings requested from the institution concerned. Routes to identifying these key collections are

- (a) asking institutions within the country about contacts and long-term scientific involvement with extra-national institutions;
- (b) searching the internet for relevant collections information;
- (c) checking the major web portals to such information (see section 6<sup>2</sup>);
- (d) checking available taxonomic literature for references to specimen repositories
- (e) asking the major world collection-holding institutions, which can generally be named by any competent taxonomist.

Provision of the information by collection-holding institutions may, however, require a considerable amount of work, not least because many institutions do

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<sup>2</sup> Many specimen records from numerous institutions are accessible through the Global Biodiversity Information Facility: <http://www.gbif.org>

not keep records of their holdings associated with geographic origin. Information delivery might therefore involve a cost, which should be factored into the budget of the needs assessment if such requests are to be made. A valuable exercise that might arise from this part of the assessment could be networking relevant institutions to pool collections data.

For many taxonomic groups, information retrieval will be extremely time consuming and may not be possible with available resources. In such cases, estimates of species richness of such groups would be valuable so that plans can be made to acquire or develop additional information subsequently. Moreover, the information that is gathered may highlight gaps in data availability, and provide the basis for subsequent data- or specimen-collection projects. Plans for subsequent projects could be included within the NBSAP.

The creation of a list of species found within a country is not an academic exercise. Apart from supporting implementation of Article 7 of the Convention, it underpins many other aspects of Convention implementation. One key aspect is that of Access and Benefit-Sharing (ABS), where knowledge of the species, subspecies, varieties and strains within a country's borders is a vital prerequisite to protecting genetic resources and their benefits.

Detailed data associated with specimens can be of value for a number of reasons, including ecological modelling of species distributions. This system has been used to great effect in Mexico for example, where databases of specimen-level information have informed government policy on a number of issues including invasive alien species, living modified organisms, and protected areas. The assessment will determine what collections are readily available and what can be found outside the country. Plans and priorities can then be developed for data repatriation. Issues regarding location of collections apply here also.

Taxonomic literature is a necessary tool for the majority of users. In order to maintain any functional taxonomic activity there must be access to the appropriate specialist literature. This is covered under 'libraries' below. Literature of a more generalist type including field guides and electronically-mediated information pertaining to the biota of the country is also of considerable value, particularly to non-taxonomists charged with implementation work. A review of field guides that deal with biota of the country would be comparatively simple, and stem perhaps from responses to questions by the users targeted in the assessment.

#### **4.4.3 Infrastructure**

A survey of scientific infrastructure supporting taxonomic research is a key element of any taxonomic assessment. Three broad categories of taxonomic infrastructure include:

- i) collection facilities,
- ii) libraries, and
- iii) associated technical, management and other institutional support for taxonomists.

### i) Collections facilities

These include museums, herbaria, arboreta, zoos, botanical gardens, culture collections and seed banks. The 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 kind(s) of specimens housed;
- curation of collection (the proportion of specimens which are identified and / or sorted, those which are available for research, and whether specimen tracking systems are in place);
- capacity for growth, in terms of space and infrastructural support;
- quality of the facilities (e.g. adequacy of collection housing such as 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 (e.g. printed catalogues, electronic database(s) and electronic links to other databases);
- institutional structure (e.g. relevant policies, quality of business management, budgetary support, sustainability, whether loans of specimens can be received from other institutions); and
- institutional long-term planning, particularly in terms of GTI goals.

### ii) Libraries

Taxonomic research requires access to libraries with reference collections. Thus the libraries in natural history institutions, universities, agricultural or medical research centres, 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 (e.g. books, monographs, journals, electronic databases etc relevant to the particular area of the world and group(s) being studied);
- financial support to enable continued purchase of relevant journals and books;
- communication capabilities (e.g. electronic access to holdings; electronic linkages to other libraries, ability to receive books on interlibrary loan).

### iii) Associated scientific support

All scientific research, including taxonomy, requires a broad range of general supporting infrastructure. An assessment might include the following broad categories:

- universities with appropriate expertise, relevant governmental and nongovernmental institutions, field stations, etc.;
- computing capacity and quality;

- molecular, biochemical, morphological, cytological and other laboratory facilities;
- 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).

#### **4.4.4 Human resources**

For the taxonomy to contribute adequately to the implementation of National Strategies, action may be needed to strengthen the human resources supporting taxonomic work. No country has all the taxonomists it needs, nor taxonomic expertise in all groups. Therefore, countries will want to assess current human resources in the light of national goals and needs, taking into account accessibility of expertise at regional levels. The following information will be useful in evaluating capacity:

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

- Numbers;
- Demography (age structure of experts in the various areas of work);
- Taxonomic coverage (expertise); and
- Status: (e.g. qualifications, participation in professional activities within the country and internationally).

*b) Support staff:*

- Professional collection managers;
- Technicians or research assistants;
- Students (undergraduate, graduate, and postdoctoral);
- Parataxonomists (non-professionals having some curatorial, research or collection responsibilities);
- Collectors;
- Volunteers (retired scientists, trained lay persons, amateurs etc.).

*c) Capacity for education and training in taxonomy:*

- Education or training available (taxonomic coverage, content, course titles);
- Level of education available (B.Sc, M.Sc., Ph.D., other qualification, parataxonomy training, collections management, etc.);
- Numbers and kinds of trainees;
- Facilities for training; and
- Prospects for productive employment in relevant taxonomic work (institutions, number and kind of posts available, sustainability).

The results of such a survey could be used to inform prospective students and trainees through publication either as hard copy or on the internet.

#### **4.4.5 Overseas links**

While national human resources in taxonomy are being evaluated, countries could 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 experienced in relevant groups; and
- the availability of training opportunities in foreign countries.

### **4.5 Report preparation phase**

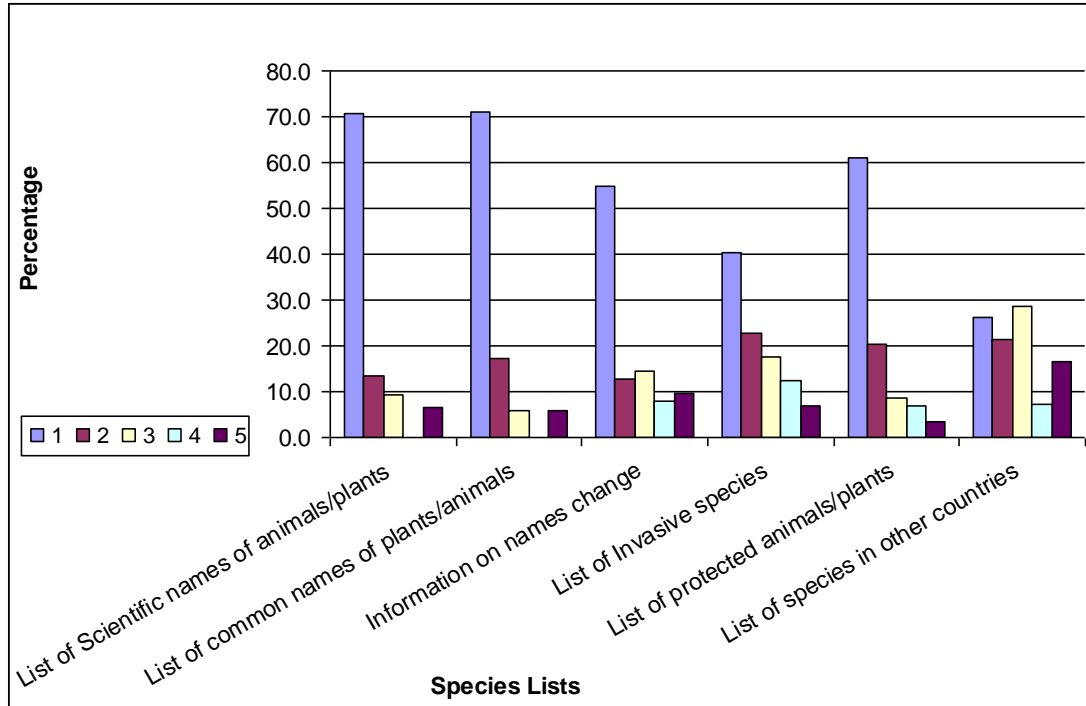
#### **4.5.1 Analysis of needs**

##### ***Why and What***

The analysis of needs will form the major part of the final report, so must be clear to non-technical users. It will enable clarity of issues and simple ranking of needs or sources, for example.

##### ***Detail***

The detail of the analysis will differ between assessments, but will need to provide quantified information where this is available (from the questionnaire responses) as well as qualitative explanation and illustration. An example of the illustration of a quantitative analytical component is given in Fig 2. below. It comes from the Taxonomic Needs Assessment for Ghana (Oteng-Yehboah *et al.*, 2010). The chart was created by MS Excel™, although other spreadsheet packages can produce similar charts.



**Fig. 2.** Relative importance of different species lists to questionnaire respondents, ranged from '1' (very important) to '5' (unimportant). (After Oteng-Yeboah *et al.*, 2010)

Such quantification will assist in prioritising needs, although even a need that is supported by comparatively few respondents may be of significant importance when matched with National Policy.

#### **4.5.2 Presentation and discussion of needs and capacity**

Building on the quantitative analysis of needs and the information gained from other sources (interviews, workshops, literature, internet) the needs can be identified and prioritised. The report must include adequate discussion and analysis of the rationale for the needs being identified and the importance of the information required by the users. Although the document review phase may be formally completed, experience shows that further document investigation and even interviewing form part of this report preparation proves. Annex 4 gives the Table of Contents of two Taxonomic Needs Assessments as examples. Throughout the report focus must be maintained on the needs of the users of taxonomy; the needs of taxonomy itself can be assessed in relation to meeting user needs. It is also important to link any needs identified to National policies and the National Biodiversity Strategy and Action Plan, where possible. This will assist any Government Departments that may use the report to fit it to extant policies and see where they might be extended.

#### **4.5.3 Recommendations**

The recommendations of the Assessment report may be directed at a variety of bodies. The users of taxonomy themselves may be informed from the report of the potential of taxonomic information for their work, and also the range of



taxonomic information available within the country. Taxonomists and institutions that provide taxonomic information may also use the report to better understand the needs of the users of the information that they produce. Governments will use the report to inform their National Biodiversity Strategy and Action Plan, and perhaps other policies. Funding agencies may also use the report to understand requirements, and other bodies may use the report in their discussion with such funders. Because of all these users, the report has to be written in an accessible fashion. Moreover, the recommendations need to make reference to National and International policies where possible. It may be advisable to separate recommendations to fit different users. The assessment on Invasive Alien Species, for example, separated recommendations into those to meet the needs of the users of taxonomic information, the needs of the providers of taxonomic information in order to meet user needs, and the policy needs that enable the information providers to change their activities (if necessary) to meet user needs. Alternative arrangements will be appropriate for different Assessments.

## **4.6 Report Dissemination**

### **4.6.1 *Final draft***

Before the final workshop a draft of the report can be circulated to the attendees. While a major re-writing of the report is not anticipated from the workshop, the report written at this stage is likely to be close to the final version.

### **4.6.2 *Workshop: review and next steps***

The final workshop may help refine the recommendations, and will at least provide a test of the conclusions. Invitees should include members of the user groups questioned, and may include those who responded to the questionnaire. They might also include representatives of the key partner – the government body who is due to receive the report.

As parts of the final workshops presentations of the final recommendations and on individual sections may be given. As a check on conclusions, the workshop participants may be asked to discuss such questions as:

- a) Where do you find information (of a specific type, depending on the part of the report being discussed) now?
- b) What additional information or tools would you like to have?
- c) Who should be responsible for providing the information?
- d) Would you pay for this information?
- e) What should happen to make things better?

The issue of 'payment' is to attempt to discover who the workshop believes should take financial responsibility for information provision. In the past the availability of a 'free' identification service was greater than now. However, the employers of the identifiers were (and are) paying for these identifications, since they are funding staff time and resources.

## 5. References

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## 6. Annex 1: Glossary

| Acronym used in text       | Full Name  | URL; Notes   |
|----------------------------|--|--|
| ABS                        | Access and Benefit-Sharing (Cross-cutting issue of the CBD)                        | <a href="http://www.cbd.int/abs/">http://www.cbd.int/abs/</a>  |
| Biodiversity               |  | The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (CBD definition)   |
| CBD                        | Convention on Biological Diversity   | <a href="http://www.cbd.int/">http://www.cbd.int/</a> Within the text of this pack the CBD is sometimes simply referred to as ‘the Convention’.  |
| CBD Focal Point            |  | Parties to the Convention have appointed National Focal Points to act as links between the Countries and the Convention, and lead their country’s political work with the Convention. Focal Points can be found at <a href="http://www.cbd.int/convention/parties/">http://www.cbd.int/convention/parties/</a>   |
| CITES                      | Convention on Trade in Endangered Species of Wild Fauna and Flora                  | <a href="http://www.cites.org/">http://www.cites.org/</a>  |
| COP                        | Conference of the Parties (to the CBD, although other Conventions also have a COP) | The COP takes ‘Decisions’ at each of its meetings, relating to the detailed operation and implementation of the CBD. These are often referred to by numerals, so that COP V/9 is the Decision 9 of the fifth meeting of the Conference of the Parties to the Convention on Biological Diversity.   |
| COP Decisions (CBD)        |  | The Conference of the Parties to the CBD meets approximately every two years to debate and decide on the means required to advance and implement the Convention. At each meeting the COP takes Decisions, which as non legally-binding agreements.   |
| Cross-Cutting Issues (CBD) |  | The Conference of the Parties (COP) has initiated work on key matters of relevance to all thematic areas. These cross-cutting issues correspond to the issues addressed in the Convention's substantive provisions in Articles 6-20, and provide bridges and links between the thematic programmes. Some cross cutting initiatives directly support work under thematic programmes, for example, the work on indicators provides information on the status and trends of biodiversity for all biomes. Others develop discrete products quite separate from |

|                    |  |   |
|--------------------|--|---|
|                    |  | the thematic programmes. The work done for these cross-cutting issues has led to a number of principles, guidelines, and other tools to facilitate the implementation of the Convention and the achievement of the 2010 biodiversity target. The Cross-Cutting Issues are: 2010 Biodiversity Target; Access to Genetic Resources and Benefit Sharing; Biodiversity for Development; Climate Change and Biodiversity; Communication, Education and Public Awareness; Economics, Trade and Incentive Measures; Ecosystem approach; Global Strategy for Plant Conservation; Global Taxonomy Initiative (GTI); Identification, Monitoring, Indicators and Assessments; Impact Assessment; Invasive Alien Species; Liability and Redress; Protected Areas; Sustainable Use of Biodiversity; Technology Transfer & Cooperation; Tourism and Biodiversity; Traditional Knowledge, Innovations and Practices. |
| Defra              | UK Department of the Environment, Food and Rural Affairs | <a href="http://www.defra.gov.uk/">http://www.defra.gov.uk/</a>   |
| FAO                | Food and Agriculture Organisation of the United Nations  | <a href="http://www.fao.org/">http://www.fao.org/</a>   |
| GBIF               | Global Biodiversity Information Facility                 | <a href="http://www.gbif.org/">http://www.gbif.org/</a>   |
| GEF                | Global Environment Facility                              | <a href="http://www.gefweb.com">http://www.gefweb.com</a>   |
| GSPC               | Global Strategy for Plant Conservation (CBD)             | <a href="http://www.cbd.int/programmes/cross-cutting/plant/">http://www.cbd.int/programmes/cross-cutting/plant/</a>   |
| GTI                | Global Taxonomy Initiative                               | <a href="http://www.cbd.int/gti/">http://www.cbd.int/gti/</a>   |
| IAS                | Invasive Alien Species                                   | <a href="http://www.cbd.int/invasive/">http://www.cbd.int/invasive/</a>   |
| NBSAP              | National Biodiversity Strategy and Action Plan           |   |
| NGO                | Non-Governmental Organisation                            |   |
| NHM                | Natural History Museum, UK                               | <a href="http://www.nhm.ac.uk">http://www.nhm.ac.uk</a>   |
| Party (to the CBD) |  | Term given to a country or other entity that has ratified the Convention on Biological Diversity.   |
| Primary            |  | The term used in this document for the main partner in a Taxonomic Needs Assessment, which will be the  |

|                      |  |  |
|----------------------|--|--|
| User                 |  | ultimate recipient of that Assessment. Usually a Government Department.  |
| SBSTTA               | Subsidiary Body for Scientific, Technical and Technological Advice (to the Conference of the parties of the CBD) |  |
| SCBD                 | Secretariat of the Convention on Biological Diversity  |  |
| Taxonomic Impediment |  | The problems caused to implementation of the CBD (among others) by difficulty in accessing necessary taxonomic information and expertise.  |
| Taxonomic needs      |  | The needs of non-taxonomists for taxonomic information and expertise.  |
| Taxonomy             |  | The science of identification, naming and classification of organisms.   |
| Thematic Area (CBD)  |  | The Conference of the Parties (COP) has established seven thematic programmes of work (listed below) which correspond to some of the major biomes on the planet. Each programme establishes a vision for, and basic principles to guide future work. The seven are: Agricultural Biodiversity, Dry and Sub-humid Lands Biodiversity, Forest Biodiversity, Inland Waters Biodiversity, Island Biodiversity, Marine and Coastal Biodiversity, Mountain Biodiversity. |
| TNA                  | Taxonomic Needs Assessment   | Understanding the Taxonomic Impediment in a country or region by working with the users of taxonomy, and identifying the requirements they have for taxonomic information and expertise, and the way they use taxonomy.  |

## 7. Annex 2: Outline budget checklist

| Item                                | travel   | Person days  | Other  | Unit cost | Full cost |
|-------------------------------------|--|--|--|-----------|-----------|
| Project team                        | Will they need travel money to meet?   | How many people needed? Ideally they should have taxonomic expertise. Will office staff be needed for all or part of the time? | Office equipment needed?   |           |           |
| Steering group                      | Required for meetings: how many meetings will be needed?   | Will steering group require costs?   |  |           |           |
| Capacity outline                    |  | Drafting time  |  |           |           |
| Construction of questionnaire       |  | Drafting time; Time revisit after first workshop   |  |           |           |
| Planning for workshops and contacts |  | May involve steering group meeting   |  |           |           |
| Document review                     |  | Will probably continue throughout assessment phase as more documents identified. Estimate number of days' work.                |  |           |           |
| Workshops                           | How many workshops needed? Travel for participants. Will experts from other countries be invited? Food and accommodation will be needed. | Staff time to set up, manage and wrap up. Secretarial / assistant needed?  | Postage for invitations. Subsistence costs for participants. Venue hire. |           |           |
| Distribution of questionnaires      |  | Secretarial assistance? Project team.  | Postage, telephone, duplication.   |           |           |

|                                      |  |                   |   |  |  |
|--------------------------------------|--|-------------------|---|--|--|
| Interviews                           | Travel for project team. Using other meetings, symposia, conferences etc can save money by providing opportunities to interview more than one person on a single trip. | Project team time | Registration fees if attending conferences? |  |  |
| Analysis                             |  | Project team time |   |  |  |
| Report preparation and dissemination | Meeting / workshop?  | Project team time | Printing, duplication, postage.             |  |  |
|                                      |  |                   |   |  |  |

## **8. Annex 3: Exemplar Questionnaire**

Below is a questionnaire similar to the ones used in the UK and Ghana taxonomic needs assessments. It will need adjustment for each Country.

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### **Draft Questionnaire for Taxonomic Needs Assessment**

The purpose of this assessment is to identify the taxonomic information that is required for [*focus to be identified*] in [*Country*]. The assessment is focussed on the needs of [*Country*] organisations involved in [*focus to be identified*]. The results of this assessment will help to inform the priorities of interested taxonomic organisations in [*Country*] and elsewhere, and of the wider biodiversity conservation community. Results will be made available to the Government of [*Country*] so that national policy may be informed.



## IMPORTANT

**The personal details you provide are protected by the provisions of the Data Protection Act. Under the terms of this legislation the [institution collecting the data], our data controller, is responsible for processing this information fairly and lawfully.**

### **How will my information be used?**

Some of the information on taxonomic needs that is collected will be made available publicly in the form of a report that may be published on the World Wide Web. This will include the names of the organisations consulted and key needs identified by particular groups of organisations.

This information will only be made available with your explicit permission, all other information will be kept private and only used for statistical purposes.

Please tick this box if you are happy for the information outlined above to be made available

You may withhold permission for *any* of your details to be published via the internet at any time.

By submitting the form enclosed you consent to the Museum collecting and processing the data you provide within the terms of the Data Protection Act and using that data only for the purposes outlined above.

You have a right to access or amend these data at any time by contacting the [*relevant individual in the project team*].

***[N.B. This component was incorporated into the UK Needs Assessment in order to comply with UK and EU law. Similar legal constraints may or may not apply to other countries.]***

## Part 1 – About your organisation

Please can you respond to the following questions answering on behalf of the most relevant group of people within your organisation. These should be people who share the same specific purpose (i.e. your own unit or project team if you work in a larger organisation). If you work in a small institute with a more defined goal (or a multi-institutional project) then respond on their behalf.

| 1. Details of Organisation  |  |
|---|--|
| Name and Address of the Unit/Project/Team or organisation for whom you are responding |  |
| What is the “business”, “mission” or purpose of your organisation / team / project?   |  |
| Homepage (URL)  |  |
| How many staff work in your unit/team or project?                                     |  |

| 2. Person who has filled in questionnaire  |  |
|--|--|
| Name   |  |
| Position in organisation   |  |
| What are your own responsibilities within your organisation? (Check ALL boxes that apply)<br>Management                  Research                  Managing Data and Information<br>Technical advice to others outside the organisation                  Customer Services<br>Technical advice to others within the organisation<br>Other (please specify) |  |
| Phone/Fax  |  |
| Email  |  |

| 3. Is your organisation (please tick all boxes that describe the organisation)     |   |
|--|---|
| <input type="checkbox"/> A statutory agency  | <input type="checkbox"/> A private company                      |
| <input type="checkbox"/> A government department                                   | <input type="checkbox"/> A research institution                 |
| <input type="checkbox"/> A national non-governmental organisation                  | <input type="checkbox"/> An amateur society                     |
| <input type="checkbox"/> A regional non-governmental organisation                  | <input type="checkbox"/> A University or other Educational body |
| <input type="checkbox"/> An environmental management body                          | <input type="checkbox"/> A small business                       |
| Other (please specify);  |   |
| 4. Please Provide a brief statement of the role and interests of your organisation |   |
|  |   |

| 5. Please indicate the Ecosystem(s) to which your activities relate.  |   |   |   |   |   |     |
|---|---|---|---|---|---|-----|
| Please indicate in each section of this question whether Most of the Organization's time (M), Some of the Organization's time (S), very little of the Organization's time (L), None of the Organization's Time (N) is related to the ecosystem given. If you don't know, please tick the (?) column and if not applicable the (N/A) column. |   |   |   |   |   |     |
|   | M | S | L | N | ? | N/A |
| Agriculture<br>(CBD: Agricultural biodiversity)   |   |   |   |   |   |     |
| Dry and sub humid environments<br>(CBD: Dry And Sub-Humid Lands Biodiversity)   |   |   |   |   |   |     |
| Forests and woodlands<br>(CBD: Forest Biodiversity)   |   |   |   |   |   |     |
| Freshwater ecosystems<br>(CBD: Inland Waters Biodiversity)  |   |   |   |   |   |     |
| Islands<br>(CBD: Island Biodiversity)   |   |   |   |   |   |     |
| Marine or coastal ecosystems<br>(CBD: Marine and Coastal Biodiversity)  |   |   |   |   |   |     |
| Mountains<br>(CBD: Mountain Biodiversity)   |   |   |   |   |   |     |
| Other or More detailed term(s) (one-4 words only)   |   |   |   |   |   |     |

| 6. Please indicate the CBD Cross-cutting Issue(s) to which your activities relate. For those not familiar with CBD terminology, an approximate alternative term is given.   |   |   |   |   |   |     |
|---|---|---|---|---|---|-----|
| Please indicate in each section of this question whether Most of the Organization's time (M), Some of the Organization's time (S), very little of the Organization's time (L), None of the Organization's Time (N) is related to the work indicated. If you don't know, please tick the (?) column and if not applicable the (N/A) column.  |   |   |   |   |   |     |
|   | M | S | L | N | ? | N/A |
| CBD: Access to genetic resources and benefit-sharing (Management of the rights to genetic or biological information, import and export of biological material etc.)   |   |   |   |   |   |     |
| CBD: Traditional knowledge, innovations, and practices (Biological Intellectual Property Rights, Traditional Knowledge)   |   |   |   |   |   |     |
| CBD: Climate change and biodiversity  |   |   |   |   |   |     |
| CBD: 2010 Biodiversity target (Work linked to the achievement of the 2010 Biodiversity target of the Millennium Goals: to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth.)  |   |   |   |   |   |     |
| CBD: Ecosystem approach (A resource planning and management approach that recognizes the connections between land, air, water and all living things, including people, their activities and institutions.)  |   |   |   |   |   |     |
| CBD: Impact Assessment (Environmental impact assessment, in any ecosystem)  |   |   |   |   |   |     |
| CBD: Liability and redress (Includes restoration and compensation, for damage to biological diversity, except where such liability is a purely internal matter) <sup>3</sup>  |   |   |   |   |   |     |
| CBD: Public education and awareness   |   |   |   |   |   |     |
| CBD: Technology transfer and cooperation (This refers to countries providing and/or facilitating access for and transfer to other countries technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment. This is a very broad concept, and may be part of any international research partnership.) |   |   |   |   |   |     |
| CBD: Invasive Alien Species   |   |   |   |   |   |     |
| CBD: Biodiversity and tourism   |   |   |   |   |   |     |
| CBD: Economics, trade and incentive measures  |   |   |   |   |   |     |
| CBD: Global Strategy for Plant Conservation (A set of targets for actions to support plant conservation)  |   |   |   |   |   |     |
| CBD: Identification, Monitoring, Indicators and Assessments (Identifying components of biological diversity important for its conservation and sustainable use. It also indicates which components countries might need to focus on when designing biodiversity monitoring programmes)  |   |   |   |   |   |     |
| CBD: Protected areas  |   |   |   |   |   |     |
| CBD: Sustainable use of biodiversity  |   |   |   |   |   |     |
| Other or More detailed term(s) (one-4 words only)   |   |   |   |   |   |     |
| Were you familiar with the CBD terms?   |   |   |   |   |   |     |

<sup>3</sup> This is a developing field and, unless there is a particular interest in the Assessment, can be omitted. Further information can be found on <http://www.cbd.int/liability/introduction.shtml>

| 7. With which of the following groups of species is the work of your organisation most concerned (please tick one or several and if appropriate specify species)  |   |   |   |   |   |     |
|---|---|---|---|---|---|-----|
| Please indicate in each section of this question whether Most of the Organization's time (M), Some of the Organization's time (S), very little of the Organization's time (L), None of the Organization's Time (N) is related to the organisms given. If you don't know, please tick the (?) column and if not applicable the (N/A) column. |   |   |   |   |   |     |
|   | M | S | L | N | ? | N/A |
| <b>Terrestrial species</b>  |   |   |   |   |   |     |
| Micro-organisms   |   |   |   |   |   |     |
| Algae   |   |   |   |   |   |     |
| Mosses, lichens, ferns etc  |   |   |   |   |   |     |
| Plants (vascular)   |   |   |   |   |   |     |
| Fungi   |   |   |   |   |   |     |
| Insects, spiders and other arthropods   |   |   |   |   |   |     |
| Slugs, snails and other invertebrates   |   |   |   |   |   |     |
| Reptiles and amphibians   |   |   |   |   |   |     |
| Birds   |   |   |   |   |   |     |
| Mammals   |   |   |   |   |   |     |
| Invasive species  |   |   |   |   |   |     |
| Other (please state)  |   |   |   |   |   |     |
| <b>Marine Species</b>   |   |   |   |   |   |     |
| Micro-organisms   |   |   |   |   |   |     |
| Algae   |   |   |   |   |   |     |
| Mosses, lichens, ferns etc  |   |   |   |   |   |     |
| Plants (vascular)   |   |   |   |   |   |     |
| Fungi   |   |   |   |   |   |     |
| Invertebrates   |   |   |   |   |   |     |
| Fish  |   |   |   |   |   |     |
| Reptiles  |   |   |   |   |   |     |
| Birds   |   |   |   |   |   |     |
| Mammals   |   |   |   |   |   |     |
| Invasive species  |   |   |   |   |   |     |
| Other (please state)  |   |   |   |   |   |     |
| <b>Freshwater species</b>   |   |   |   |   |   |     |
| Micro-organisms   |   |   |   |   |   |     |
| Algae   |   |   |   |   |   |     |
| Mosses, lichens, ferns etc  |   |   |   |   |   |     |
| Plants (vascular)   |   |   |   |   |   |     |
| Fungi   |   |   |   |   |   |     |
| Insects, spiders, crustaceans   |   |   |   |   |   |     |
| Snails and other invertebrates  |   |   |   |   |   |     |
| Fish  |   |   |   |   |   |     |
| Reptiles and amphibians   |   |   |   |   |   |     |
| Birds   |   |   |   |   |   |     |
| Mammals   |   |   |   |   |   |     |
| Invasive species  |   |   |   |   |   |     |
| Other (please state)  |   |   |   |   |   |     |

| 8. Which of the following activities is your organisation involved in (please tick one or several)   |   |   |   |   |   |     |
|--|---|---|---|---|---|-----|
| Please indicate in each section of this question whether Most of the Organization's time (M), Some of the Organization's time (S), very little of the Organization's time (L), None of the Organization's Time (N) is related to the activity given. If you don't know, please tick the (?) column and if not applicable the (N/A) column. |   |   |   |   |   |     |
|  | M | S | L | N | ? | N/A |
| Advising farmers, foresters, fisheries etc (please specify)  |   |   |   |   |   |     |
| Analysing species distribution   |   |   |   |   |   |     |
| Assessment and monitoring of biodiversity  |   |   |   |   |   |     |
| Assessment of phylogenetic diversity   |   |   |   |   |   |     |
| Biodiversity Inventory compilation   |   |   |   |   |   |     |
| Biodiversity Inventory use   |   |   |   |   |   |     |
| Biological reference collection manager / institution  |   |   |   |   |   |     |
| Capacity building  |   |   |   |   |   |     |
| CITES  |   |   |   |   |   |     |
| Climate change monitoring  |   |   |   |   |   |     |
| Conservation   |   |   |   |   |   |     |
| Disease control  |   |   |   |   |   |     |
| Ecotourism   |   |   |   |   |   |     |
| Environmental consulting   |   |   |   |   |   |     |
| Environmental impact assessment  |   |   |   |   |   |     |
| Environmental monitoring   |   |   |   |   |   |     |
| Environmental research   |   |   |   |   |   |     |
| Government policy: development   |   |   |   |   |   |     |
| Government policy: enforcing   |   |   |   |   |   |     |
| Habitat restoration  |   |   |   |   |   |     |
| Identification service   |   |   |   |   |   |     |
| Identifying wild relatives of crop species   |   |   |   |   |   |     |
| Indicator species: 'taxonomy of' or 'use of'   |   |   |   |   |   |     |
| Legislation and species protection   |   |   |   |   |   |     |
| Molecular assessment methods   |   |   |   |   |   |     |
| Natural resources exploitation   |   |   |   |   |   |     |
| Protected areas: management  |   |   |   |   |   |     |
| Protected areas: selecting/designating sites   |   |   |   |   |   |     |
| Providing information to Government  |   |   |   |   |   |     |
| Publishing educational materials   |   |   |   |   |   |     |
| Species reintroductions  |   |   |   |   |   |     |
| Taxonomic identification aids/tools: production  |   |   |   |   |   |     |
| Training / teaching: other (please specify)  |   |   |   |   |   |     |
| Training: Professional/accredited  |   |   |   |   |   |     |
| Training: Taxonomy   |   |   |   |   |   |     |
| Other (please state)   |   |   |   |   |   |     |

9. Please indicate the taxonomic level at which you work.

Please indicate in each section of this question whether Most of the Organization's time (M), Some of the Organization's time (S), very little of the Organization's time (L), None of the Organization's Time (N) is related to the taxonomic level given. If you don't know, please tick the (?) column and if not applicable the (N/A) column.

|                                      | M | S | L | N | ? | N/A |
|--------------------------------------|---|---|---|---|---|-----|
| Ecosystem level                      |   |   |   |   |   |     |
| Species level                        |   |   |   |   |   |     |
| Subspecies, cultivar or strain level |   |   |   |   |   |     |
| Genetic level                        |   |   |   |   |   |     |

## Part 2 – About your organisation’s use of taxonomic information and how you access it

| 10. People working with taxonomy in your organisation  |          |                     |
|--|----------|---------------------|
| How many people in your unit / team work directly with scientific names or other taxonomic information, including taxonomic names? (give approximate number) |          |                     |
| How many people in your unit / team depend upon / use taxonomic information without being responsible for creating it? (give approximate number)             |          |                     |
| Do you employ taxonomists?   | Yes / No | If 'yes', how many? |
| Do you employ people who carry out identifications?  | Yes / No | If 'yes', how many? |

| 11. Your organisation’s access to taxonomists         |  |  |
|---|--|--|
| Do you find access to taxonomists in your country:    | Easy / difficult / impossible / don't know<br>(please delete as necessary) | Comments:  |
| Do you find access to taxonomists in other country:   | Easy / difficult / impossible / don't know<br>(please delete as necessary) | Comments:<br>Which countries in particular do you use? |
| Are you aware of taxonomic networks in your region?   | Yes / No   | Which networks?<br>Comments:                           |
| Do you make use of taxonomic networks in your region? | Yes / No   | If not, why not?<br>Comments:                          |
| What use does your institution make of taxonomists?   |  | Comments:  |



12. Your access to taxonomic information and services

Please read through the following list of information and services. Please identify which of these services are most important for the work of your organisation and in column 2 rank them according to importance from 1 (very important) to 5 (unimportant). In column 3 state whether the resources are available or unavailable. In column 4 please identify the source of the resources (For example: professional in other countries, in-country professionals, amateurs, library, university, government research station, internet), and in column 5 indicate whether the source is in your view sustainable. Column 6 is for your comments.

| 1. Taxonomic information and services you use, or would use if they were available  | 2. Importance | 3. Available (y/n) | 4. Source | 5. Sustainable (y/n/?) | 6. Additional Comments |
|---|---------------|--------------------|-----------|------------------------|------------------------|
| <b>Species Lists</b>  |               |                    |           |                        |                        |
| Lists of scientific names of animals/plants   |               |                    |           |                        |                        |
| Lists of common names of animals/plants   |               |                    |           |                        |                        |
| Information on name changes   |               |                    |           |                        |                        |
| Lists of invasive alien species   |               |                    |           |                        |                        |
| Lists of protected animals/plants   |               |                    |           |                        |                        |
| Lists of species in other countries (e.g. neighbouring countries, sources of pests) |               |                    |           |                        |                        |
| Other (please specify)  |               |                    |           |                        |                        |

| <b>Identification Tools and Services</b>                           |  |  |  |  |  |
|--|--|--|--|--|--|
| Field Guides (paper)   |  |  |  |  |  |
| Identification keys (paper)  |  |  |  |  |  |
| Identification tools (CD-ROM)                                      |  |  |  |  |  |
| Identification tools (web based)                                   |  |  |  |  |  |
| Images/Photographs of animals/plants (web, paper or CD-ROM)        |  |  |  |  |  |
| Specialised Identification Services (taxonomic)                    |  |  |  |  |  |
| Taxonomists not participating in dedicated identification services |  |  |  |  |  |
| Formal (taxonomic) Plant/Animal Descriptions in scientific papers  |  |  |  |  |  |
| Specimens of animals/plants  |  |  |  |  |  |
| Other (please specify)   |  |  |  |  |  |

| <b>Ecological Information</b> (relevant data can sometimes be obtained from taxonomic institutions, although this is generally not the primary source of information) |  |  |  |  |  |
|---|--|--|--|--|--|
| Habitat requirements of animals/plants  |  |  |  |  |  |
| Phenological information (periodic life-cycle events as influenced by climate, season etc)  |  |  |  |  |  |
| Conservation status of species  |  |  |  |  |  |
| Animal/Plant interactions   |  |  |  |  |  |
| Other (please specify)  |  |  |  |  |  |
| <b>Species Distributional Information</b>   |  |  |  |  |  |
| Point data from specimens (via the web)   |  |  |  |  |  |
| Point data from specimens (other source)  |  |  |  |  |  |
| Information on species distributions locally  |  |  |  |  |  |
| Information on species distributions regionally   |  |  |  |  |  |
| Information on species distributions nationally   |  |  |  |  |  |
| Distribution maps   |  |  |  |  |  |
| GIS data  |  |  |  |  |  |

|   |  |  |  |  |  |
|---|--|--|--|--|--|
| Other (please specify)  |  |  |  |  |  |
| <b>Taxonomic training and information supporting taxonomic training</b> |  |  |  |  |  |
| Training courses run by your institution                                |  |  |  |  |  |
| Training courses run by other institutions                              |  |  |  |  |  |
| What literature is available and suitable                               |  |  |  |  |  |
| Where to find literature  |  |  |  |  |  |
| Materials other than literature to support education in taxonomy        |  |  |  |  |  |
| Specimens for student examination                                       |  |  |  |  |  |
| Other (please specify)  |  |  |  |  |  |

### Part 3 – About your organisation’s provision of taxonomic information

Products of your organization

Is the function of your institution

| 13. Please indicate the purposes of your organization   |                                      |   |   |   |   |          |
|---|--------------------------------------|---|---|---|---|----------|
| Please indicate in each section of this question whether Most of the Organization’s time (M), Some of the Organization’s time (S), very little of the Organization’s time (L), None of the Organization’s Time (N) is related to the purpose level given. If you don’t know, please tick the (?) column and if not applicable the (N/A) column. |                                      |   |   |   |   |          |
|   | M                                    | S | L | N | ? | N/A      |
| Taxonomic research  |                                      |   |   |   |   |          |
| Non-taxonomic research  |                                      |   |   |   |   |          |
| Education / training  |                                      |   |   |   |   |          |
| Managing a biological collection  |                                      |   |   |   |   |          |
| Managing a library  |                                      |   |   |   |   |          |
| Providing taxonomic information to non-taxonomists  |                                      |   |   |   |   |          |
| If you provide taxonomic information of any kind to non-taxonomists,  |                                      |   |   |   |   |          |
|   | What kind(s) of information is this? |   |   |   |   |          |
|   | Who do you provide it to?            |   |   |   |   |          |
|   | Do you make a charge?                |   |   |   |   | Yes / No |

| 14. Taxonomic Capacity: taxonomic literature available in your organization |          |   |  |
|---|----------|---|--|
| Do you have a library with taxonomic or related biodiversity literature?    | Yes / No |   |  |
| Is it currently acquiring books or journals                                 | Yes / No | If 'Yes', approximately how many each year? |  |
| Approximately how many volumes does it hold?                                |          |   |  |
| It is indexed?  | Yes / No | If 'Yes', is this index digital?            |  |
| What would you do with the library if you had more resources?               |          |   |  |
| Other comments  |          |   |  |

| 15. Taxonomic Capacity: biological collections available in your organization |          |                                   |          |
|---|----------|-----------------------------------|----------|
| Do you have a biological collection?  | Yes / No |                                   |          |
| How would you describe it?  |          |                                   |          |
| What groups does it cover?  |          | Approximately how many specimens? | Comments |
| Mammals   | Yes / No |                                   |          |
| Birds   | Yes / No |                                   |          |
| Reptiles  | Yes / No |                                   |          |
| Amphibians  | Yes / No |                                   |          |
| Fish  | Yes / No |                                   |          |
| Insects and other arthropods  | Yes / No |                                   |          |
| Other invertebrates   | Yes / No |                                   |          |
| Plants (dead)   | Yes / No |                                   |          |
| Plants (live)   | Yes / No |                                   |          |
| Seed bank   | Yes / No |                                   |          |
| Fungi   | Yes / No |                                   |          |
| Micro-organisms   | Yes / No |                                   |          |
| Other (please specify)  | Yes / No |                                   |          |
| Is the collection databased at species level?                                 | Yes / No | Approximately how many species?   | Comments |
| Is the collection databased at specimen level?                                | Yes / No | Approximately how many specimens? | Comments |
| What would you do with the collection if you had more resources?              |          |                                   |          |
| Other comments  |          |                                   |          |

| 16. Taxonomic Capacity: biological collections available in your organization |          |          |
|---|----------|----------|
| Do you have taxonomic staff?  | Yes / No |          |
| If so, how many at the following levels:                                      |          | Comments |
| PhD   |          |          |
| BSc   |          |          |
| Technician  |          |          |
| Other   |          |          |
| What groups do they specialize in?  |          | Comments |
| Mammals   |          |          |
| Birds   |          |          |
| Reptiles and Amphibians   |          |          |
| Fish  |          |          |
| Insects and other Arthropods  |          |          |
| Other invertebrates   |          |          |
| Plants (mosses, lichens, algae, ferns etc)                                    |          |          |
| Plants (vascular plants)  |          |          |
| Fungi   |          |          |
| Micro-organisms   |          |          |
| Other   |          |          |
| What would you do if you had more money to spend on taxonomic staff?          |          |          |
| Other comments  |          |          |



| 17. Taxonomic Capacity: Training in taxonomy                  |          |           |
|---|----------|-----------|
| Do you offer training in taxonomy?                            | Yes / No | Comments: |
| If so, at what level?   |          | Comments: |
| parataxonomist  | Yes / No |           |
| Technician  | Yes / No |           |
| undergraduate   | Yes / No |           |
| post-graduate   | Yes / No |           |
| professional (in-service)                                     | Yes / No |           |
| Vocational Qualification                                      | Yes / No |           |
| Approximately how many students do you train each year?       |          |           |
| What would you do if you had more money to spend on training? |          |           |

18. Please use the following page to provide more detailed information on the taxonomic information or services you require for biodiversity conservation which are currently unavailable (e.g. specific species/areas, or other types of information not included in the above list).

If you provide taxonomic information, please use this space to record needs and any other relevant points.

Empty response area for providing detailed information on taxonomic information or services required for biodiversity conservation.

Many thanks for your time

## **9. Annex 4: Tables of Contents of two Taxonomic Needs Assessments**

Taxonomic Needs Assessment on Invasive Alien Species (Smith *et al*, 2009)

|       |  |
|-------|--|
| 1     | Executive Summary  |
| 2     | Introduction   |
| 2.1   | Purpose of the assessment  |
| 2.2   | Global context   |
| 2.2.1 | Global importance  |
| 2.2.2 | Habitat change   |
| 2.2.3 | IAS and Islands  |
| 2.2.4 | Biosecurity  |
| 2.3   | Policy context   |
| 2.3.1 | Convention on Biological Diversity   |
| 2.3.2 | International Plant Protection Convention  |
| 2.3.3 | The World Trade Organisation Sanitary and Phytosanitary agreement  |
| 2.3.4 | Ballast water convention   |
| 2.4   | Taxonomy and Invasive Species  |
| 2.4.1 | The nature of taxonomy   |
| 2.4.2 | Taxonomy in the context of IAS management  |
| 3     | Approach and Methodology   |
| 3.1   | The nature of a needs assessment   |
| 3.2   | Scope of Assessment  |
| 3.3   | Documentary sources  |
| 3.4   | Expert consultations   |
| 3.5   | Limitations of methodology   |
| 4     | Taxonomic needs  |
| 4.1   | Type I needs - Taxonomic outputs and services  |
| 4.1.1 | <i>Taxonomic need I/3: Lists of species</i>  |
| 4.1.2 | <i>Taxonomic needs I/5 and I/6: Distribution information and Pathway maps</i>  |
| 4.1.3 | <i>Taxonomic need I/1: Identification support</i>  |
| 4.1.4 | <i>Taxonomic need I/2: Identification tools and guides</i>   |
| 4.1.5 | <i>Taxonomic need I/4: Surveys and monitoring</i>  |
| 4.1.6 | <i>Access to information</i>   |
| 4.2   | Type II needs – Taxonomic capacity, information resources and institutional prioritisation required by the taxonomic sector to deliver the required outputs and services |
| 4.2.1 | <i>Taxonomic needs II/1-3: Taxonomic Capacity-Building: Personnel</i>  |
| 4.2.2 | <i>Taxonomic needs II/1, II/4, II/8: Taxonomic Capacity-Building: Collections and Facilities</i>   |
| 4.2.3 | <i>Taxonomic need II/7: Access to expertise, and Identification services</i>   |
| 4.2.4 | <i>Taxonomic need II/5: Nomenclature and classification</i>  |
| 4.2.5 | <i>Taxonomic needs II/6 and II/9: Digitisation of data and data standards.</i>   |
| 4.2.6 | <i>Taxonomic need II/8: Access to taxonomic literature</i>   |
| 4.3   | Type 3 needs - Organisational needs to promote the prioritisation and application of taxonomy to tackle IAS  |
| 4.3.1 | <i>Taxonomic need III/1: Taxonomic needs assessments and prioritisation.</i>   |
| 4.3.2 | <i>Taxonomic needs III/2 and III/3: Collaboration and strategies</i>   |
| 4.3.3 | <i>Taxonomic need III/4: Research</i>  |
| 4.3.4 | <i>Taxonomic need III/5: Education and training</i>  |
| 4.3.5 | <i>Taxonomic need III/6: Awareness-raising</i>   |
| 4.3.6 | <i>Taxonomic need III/7: Funding</i>   |
| 5     | The role of Taxonomy in IAS management   |
| 5.1   | Prevention   |

- 5.2 Early detection
- 5.3 Eradication / control
- 5.4 Impact of limited accessibility of taxonomic resources on actions to address IAS
- 6 Recommendations
- 7 Acknowledgements
- 8 About the organisations
- 9 IAS Bibliography

## **Taxonomic needs Assessment for Ghana (Oteng-Yehboah *et al*, 2010)**

### Contents

- 1 Executive Summary
- 2 Introduction
  - 2.1 'The Taxonomic Impediment'
  - 2.2 The Convention on Biological Diversity and the Global Taxonomy Initiative
  - 2.3 Taxonomic Needs Assessments
    - 2.3.1 Examples of taxonomic needs
    - 2.3.2 History of Assessments
      - 2.3.2.1 UK Assessment
      - 2.3.2.2 The 2001 African Meeting
    - 2.4 Assessment Methodology
  - 3 Ghanaian needs and priorities for taxonomy
    - 3.1 Organisations contributing information
    - 3.2 Assessment responses
      - 3.2.1 Classes of taxonomic information
        - 3.2.1.1 Species Lists
        - 3.2.1.2 Identification tools
          - 3.2.1.2.1 Sources of Identification tools used
        - 3.2.1.3 Ecological Information
          - 3.2.1.3.1 Sources of Ecological and related information used
        - 3.2.1.4 Species Distribution Information
          - 3.2.1.4.1 Sources of Distributional information used
        - 3.2.1.5 Educational Information
          - 3.2.1.5.1 Sources of Educational information and materials used
  - 4 Taxonomic Capacity in Ghana
    - 4.1 Collections and Infrastructure
    - 4.2 Molecular facilities and DNA Barcoding
    - 4.3 Education, training and staffing
    - 4.4 Networks and collaborations
      - 4.4.1 WAFRINET
      - 4.4.2 Forest Invasive Species Network for Africa - FISNA
      - 4.4.3 International Centre for Tropical Agriculture (CIAT)
      - 4.4.4 African Pollinator Initiative (API)
        - 4.4.4.1 The API in Ghana
      - 4.4.5 West African Regional Network (WARN)
  - 5 Discussion
    - 5.1 Increasing awareness and building communication
    - 5.2 Data management and analysis: Mapping, modelling and databasing
    - 5.3 Biological Collections
    - 5.4 Libraries and Journals
    - 5.5 Training
    - 5.6 Provision of Taxonomic expertise and information
    - 5.7 Ecological and distributional information
  - 6 Priorities and Recommendations
    - 6.1 Overarching vision
    - 6.2 Increasing awareness and building communication

|            |  |
|------------|--|
| 6.3        | Training   |
| 6.4        | Developing Collections                                   |
| 6.5        | Data management and analysis                             |
| 6.6        | Provision of taxonomic information                       |
| 6.7        | Identification and Identification Tools                  |
| 6.8        | Ecological and distributional information                |
| 7          | Lessons Learned  |
| 8          | Acknowledgments  |
| 9          | References   |
| 10         | Annexes  |
| Annex 1    | Ghana Taxonomic Needs Assessment Resource Pack           |
| Annex 1.1. | Resource Pack Contents                                   |
| Annex 1.2. | Project Summary and Outline                              |
| Annex 1.3. | Terms of reference for Project Partners                  |
| Annex 1.4. | Taxonomic Needs Assessments: Introductions and Guidance  |
| Annex 1.5. | Draft Questionnaire for Taxonomic Needs Assessment       |
| Annex 1.6. | Presentation on Taxonomic Needs Assessment               |
| Annex 2    | Individuals and institutions providing input             |
| Annex 3.   | Sources of information used by Questionnaire respondents |
| Annex 4.   | Membership of Ghanaian network within WAFRINET           |
| Annex 5.   | Glossary of Acronyms                                     |

## **10. Annex 5. Presentations: 10.1 The Convention on biological Diversity and the Global Taxonomy Initiative**

Slide 1

This presentation is intended to give you some background on the Convention on Biological Biodiversity (CBD) and the Global Taxonomy Initiative (GTI).

It is intended to be used in the First Workshop and any subsequent occasions where an introduction to the CBD would be helpful.

It is intended to assist understanding of the GTI Taxonomic Needs Assessment background.

The presentation can be cut to whatever length seems appropriate.

Slide 2

The presentation will cover the following areas:

An introduction to the Convention on Biological Diversity;

How the CBD functions at a policy and administrative level;

The different Areas of work of the CBD ('Thematic Areas' and 'Cross-cutting Issues');

One of the Cross-cutting Issues, The Global Taxonomy Initiative.

Slide 3

The CBD was agreed at the 1992 Earth Summit in Rio de Janeiro.

The Convention entered into force on 29 December 1993

Currently it has 193 'Parties' (April 2010)

A country becomes a Party to the CBD once it has made a formal declaration of its willingness to be legally bound by the CBD. This process is called ratification.

Slide 4

The CBD is essentially a political agreement.

It sets out a framework for action. The Convention itself does set out list of activities for Parties. The text takes the form of a series of legally-binding 'Articles'.

Slide 5

The CBD has three main objectives:  
To conserve biological diversity;  
To use biological resources sustainably; and  
To share the benefits arising from the use of genetic resources fairly and equitably.

The CBD defines biological diversity (biodiversity) as "Biological diversity means the variability among living organisms from all sources including *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"

Slide 6

There are 42 Articles to the Convention. Of these, Articles 6-19 set out objectives for biological conservation, sustainable use and access to genetic resources and sharing of benefits.

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A particularly important Article gives the rights of States over their biodiversity resources. Implications of this include:

the need for permits to carry out research on biota of a country

the development of Mutually Agreed Terms for investigation of genetic resources

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The CBD Articles dealing with biological issues include implicit requirements for taxonomic work in their support.

Most significant is Art. 7, Identification and Monitoring, which reads:

Each Contracting Party shall, as far as possible and as appropriate, in particular for the purposes of Articles 8 to 10:

(a) Identify components of biological diversity important for its conservation and sustainable use having regard to the indicative list of categories set down in Annex I;

(b) Monitor, through sampling and other techniques, the components of biological diversity identified pursuant to subparagraph (a) above, paying particular attention to those requiring urgent conservation measures and those which offer the greatest potential for sustainable use;

(c) Identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques; and

(d) Maintain and organize, by any mechanism data, derived from identification and monitoring activities pursuant to subparagraphs (a), (b) and (c) above.

The requirements of this Article led to the setting up of the GTI

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For clarity of implementation the Convention has set up seven Thematic Areas, broadly equivalent to ecosystems.

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Because many issues affect more than one thematic area, the Convention has identified a range of 'Cross-Cutting Issues'. One of these is the Global Taxonomy Initiative. Another with a high level of taxonomic involvement is the Global Strategy for Plant Conservation.

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As noted, Art 7 clearly has a need for taxonomic input to enable the Parties to implement it

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Monitoring in particular requires taxonomy

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This led to the Darwin Declaration in 1998, which underlies the development of the Global Taxonomy Initiative.

The 'Taxonomic Impediment' is the lack of access to taxonomic skills and information that prevents efficient and full implementation of the Convention.

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The Global Taxonomy Initiative was put in place by the COP with the same objectives as the whole Convention. It is not to support taxonomy in isolation, but rather to remove the taxonomic impediment to implementing the Convention.

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The GTI is fundamentally a political process; this applies to the whole Convention.

It promotes technical cooperation and the type of work required to meet issues that are raised. As a set of policies agreed to by all of the Parties to the Convention it can be used by those Parties both to develop policies at national level and to identify the type of work and capacity building required.

There is currently no funding body called 'The Global Taxonomy Initiative', although there are a very few bilateral funding bodies that focus on GTI.

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The GTI can also be used as a term for the activities undertaken to implement the policies.

Such activities rely on participation by many people and institutions, and are in no sense run centrally.

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The Conference of the Parties has taken a number of Decisions on the Global Taxonomy Initiative, setting out in particular a Programme of Work and Deliverables expected as outputs of that Programme.

These Decisions are worth examining, because they are commitments that our Government has agreed to.

Whilst Government is not necessarily able to carry out the work required to meet the commitments, individuals can and should. In doing so, by use of the policy statements in the Decisions, Government may be encouraged to support work.

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A Key Decision created a Programme of Work for the GTI. This is given in more detail in the next slide, but it is worth looking at the full text at the URL given.

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Work Programme includes 5 Operational Objectives, building on COP Decisions -

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

Provide focus to help build and maintain the systems and infrastructure needed to collate and curate the biological specimens that are the basis for taxonomic knowledge.

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.

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.

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 7 has a number of suggested deliverables:

*Output 3.7.2.* Develop an internationally-accepted standard for collections-level descriptions to enable clarity on collections holdings by 2012 before all specimens are included in the database.

*Output 3.7.3.* Produce a widely accessible checklist of known species, as a step towards a global register of plants, animals, microorganisms and other organisms, by 2012.

*Output 3.7.4.* Make 1 billion specimen records digitally available by the end of 2008.

*Output 3.7.5.* Increase the means and rate of digitisation of taxonomic literature, incorporating simple and effective interfaces for location and access to biological content; interoperable with major biological projects; and structured in accordance with appropriate data standards.

*Output 3.7.6.* Develop at least five Web-based taxonomic treatments covering large taxonomic groups, ecosystems or regions to be completed by 2010 in order to enable comparison of their utility.

*Output 3.7.7.* Develop a prototype for an openly accessible Global Species Information System (GSIS) as requested by the Potsdam Initiative 2010 by 2010, and a comprehensive GSIS version with information on all species by 2020.

*Output 3.7.8.* Develop a system of species Web pages, with community involvement, and a programme for their growth and sustainability by 2010.

*Output 3.7.9.* Sustainably populate one or more systems with links and references to extant keys, guides and other identification tools, to cover all regions, by 2012.

Despite some of the dates being past, the deliverables are still required.

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Taxonomic Needs Assessments are the focus of this meeting, and will be discussed separately.

The main point is that they must first Assess the needs of non-taxonomic sectors for taxonomic information.

Only after this is it possible to accept the taxonomic capacity available and required to meet those needs.

*Planned activity 1: Country-based taxonomic needs assessments and identification of priorities*

*Output 1.1.1.* Develop an Assessment Support Pack to be made available through the GTI Portal by the end of 2009, building on the assessments done on the BioNET-INTERNATIONAL Web site. Suggested actors may include Parties, BioNET-INTERNATIONAL; the Coordination Mechanism of the Global Taxonomy Initiative, and other compilers of taxonomic needs assessments.

*Output 1.1.2.* A taxonomic needs assessment in at least one sector to have been completed by 10% of Parties by 2010, and by 25% of all Parties by 2012.

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Having conducted national Assessments, it is then possible to do the same regionally.

Some Regional Workshops have taken place (Asia, Africa, Meso-America.)

Great need to develop regional networks – lack of national capacities

*Planned activity 2: Regional taxonomic needs assessments and identification of priorities*

*Output 1.2.1.* Complete at least one pilot regional assessment within a United Nations subregion, integrated with implementation of a thematic area or cross-cutting issue of the CBD, by the end of 2009. Results and lessons learned can be placed before the fourteenth meeting of the SBSTTA and disseminated by the Clearing-House Mechanism.

*Planned activity 5: Global and regional capacity-building to support access to and generation of taxonomic information*

*Output 2.5.1.* Create an online registry of repositories of biological collections that provides globally unique identifiers for these collections, and initiate an analysis of countries and regions that lack essential collection infrastructure by 2012. Suggested actors may include FAO, CBOL, GBIF, CETAF, NSCA, MOSAIC, Species 2000 and ITIS Catalog of Life.

*Output 2.5.2.* All Parties to develop national and regional priorities and action plans for taxonomic capacity-building by 2012, based on national and regional taxonomic needs assessments. Suggested actors may include FAO, national Governments, with assistance from taxonomic institutions and networks and GTI National Focal Points and the GTI Coordination Mechanism.

*Output 2.5.3.* Increase long-term positions for taxonomists with the goal to establish adequate taxonomic expertise for all major organism groups in all regions, and to double the taxonomic workforce by 2020. Suggested actors may include all Parties and Countries, FAO.

*Output 2.5.4.* Formulate and promote international standards for maintaining and curating biological specimens/cultured organisms as resource for taxonomic studies by 2012.

*Output 2.5.5.* Develop and maintain taxonomic collections as basic knowledge infrastructure for CBD implementation with the goal of each Party by 2020 to maintain or have access to at least one institutional centre of taxonomic excellence at national or, where appropriate, at regional level.

*Output 2.5.6.* Identify national biological reference collections for all Parties by 2010.



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Capacity-building includes human  
capacity

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Institutional capacity-building

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As noted, Capacity building needs to  
be in the context of meeting needs for  
taxonomic information.

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Within Programmes of Work and COP Decisions of many of the Thematic Areas and Cross-Cutting Issues there are statements of the taxonomic information needed to facilitate implementation.

Deliverables for Forest Biodiversity include:

*Planned activity 8: Forest biological diversity*

*Output 4.8.1:* Establish an inventory of species with economic and ecological values for forest biological diversity, their conservation status, ecology, and distribution, including potential indicators of below-ground biodiversity, and appropriate sampling systems, by 2015. Suggested actors may include national Governments, forest departments, taxonomic institutions, GBIF, the Tropical Soil Biology and Fertility Programme of the CGIAR;

*Output 4.8.2.* Create a mechanism to address data on forest extent and specimen data accessible through TDWG standards, to facilitate inventory work, by 2010.

*Planned activity 12: Agricultural biological diversity*

*Output 4.12.1.* Create a centre for exchange of information on taxonomic guides and other identification tools for pollinators by 2010, populated with all available information.

*Output 4.12.2.* Produce keys to all genera of bees of the world by 2012. Suggested actors may include FAO, taxonomic institutions.

*Output 4.12.3.* Develop and begin testing DNA barcodes by 2010 as an identification system for pilot taxa (e.g. tephritid fruit flies or scale insects) in the view of agricultural border inspection

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*Planned activity 10: Dry and sub-humid lands biodiversity*

*Output 4.10.1:* Establish an inventory of species with economic and ecological values for dry and sub-humid lands biodiversity, their conservation status, ecology, and distribution, including potential indicators of below-ground biodiversity, and appropriate sampling systems, by 2015. Suggested actors may include national Governments, taxonomic institutions, GBIF;

*Output 4.10.2.* Produce and trial one identification toolkit for one dryland habitat, including lichens and other crustal biota, by 2012. Suggested actors may include IPCC.

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*Planned activity 9: Marine and coastal biological diversity*

*Output 4.9.1.* Create a centre for exchange of information on taxonomic guides and other identification tools for invertebrates of mangroves by 2010, populated with all available information. Suggested actors may include FAO, EOL, taxonomists, Census of Marine Life, OBIS, Species 2000 and ITIS Catalog of Life, the clearing-house mechanism.

*Output 4.9.2.* Produce a guide to the major groups of marine algae by 2012. Suggested actors may include FAO, taxonomic institutions, OBIS.

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*Planned activity 11: Inland waters biological diversity*

*Output 4.11.1.* Create a centre for the exchange of information on taxonomic guides and other identification tools for freshwater fish by 2010, populated with all available information. Suggested actors may include FAO, EOL, taxonomists, the clearing-house mechanism.

*Output 4.11.2.* Generate a gap analysis on a global basis of identification guides to freshwater fish by 2010. Suggested actors may include FAO, EOL, taxonomists, the clearing-house mechanism.

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*The slides show waterways choked by Salvinia from South America. This fern effectively kills lakes and rivers by making them eutrophic. The weevil is a biocontrol agent, Cyrtobagous salviniae, introduced after taxonomic study. The second lake picture was taken a year after the weevil was released.*

*Planned activity 16: Invasive alien species (IAS)*

*Output 5.16.1: Provide IAS lists/information for all countries by 2010.*

*Output 5.16.2: Provide relevant taxonomic information (ID tools, including keys and DNA-barcodes) for customs and quarantine services on invasive alien species at national and regional levels, by 2012.*

*Output 5.16.3: Identify species with high potential to become IAS and prepare customs/quarantine information by 2012, as described in the annex of VIII/3 as additional planned activities.*

*Output 5.16.4. Complete the online information system for actual and potential invasive species for each continent and assess threats by future potential invasive species by 2010.*

*Output 5.16.8. Correlate and manage updated taxonomy for all known invasive species, following the call in the Global Invasive Species Programme (GISP) Global Strategy by 2010.*

*Output 5.16.9. Develop protocols (including precision and rapidity) for IAS identifications, preferably building on relevant standards under the International Plant Protection Convention already in place and being developed. Protocols should be agreed by 2010.*

*Output 5.16.10. Produce and disseminate working identification keys for known IAS associated with at least one key invasion pathways by 2010.*

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*Planned activity 15: Access and benefit-sharing*

*Output 5.15.1.* Provide guidelines on benefits of taxonomy in the context of access to genetic resources and benefit-sharing, and outline requirements for applicable international obligations relating to prior informed consent and material transfer agreement for taxonomic institutions by the tenth meeting of the Conference of the Parties. Suggested actors may include national Governments, the Convention, taxonomic institutions.

*Output 5.15.2.* Convene an international workshop of competent national authorities and national focal points for GTI and access and benefit-sharing to discuss the obstacles to international transfer of biomaterials for non-commercial research in line with national law and applicable international obligations relating to prior informed consent by the time not later than the SBSTTA prior to COP10. Suggested actors may include national Governments, the Secretariat, EDIT, CETAF, NSCA, taxonomic institutions, CBOL, BioNET-INTERNATIONAL, Species 2000 and ITIS Catalog of Life.

*Output 5.15.3.* Information be made easily and clearly accessible on relevant national legislation and means to obtain permits for collecting, transborder movement, research and other issues of significance to work on specimens in the context of the Global Taxonomy Initiative by 2010. Suggested actors may include Parties, through CBD focal points and national competent authorities, clearing-house mechanism.

## **Annex 5. Presentations: 10.2 Taxonomic needs assessments; Why and How?**

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## **Annex 5. Presentations: 10.3. Taxonomy; its practice, products and outputs**

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## **Annex 5. Presentations: 10.4. Questionnaire**

This presentation contains just the images of each form, and will not be reproduced here to save space. It can be downloaded from [URL].

## 11. Checklist of actions

To ensure that everything is in place during the Assessment, the following Checklist may be of assistance.

| Item  | Done   |  |
|---|--|--|
| Partnership made with Government Department which will use report                       |  |  |
| Do you know who you will give the report to when it is completed?                       |  |  |
| Do you understand how it will be used by Government?                                    |  |  |
| National Biodiversity Strategy and Action Plans reviewed for policy priorities and gaps |  |  |
| Assessment Focus decided  |  |  |
| Outline Project Plan developed  |  |  |
| Funding in place  |  |  |
| Project Team appointed  |  |  |
| Steering group appointed and meeting schedule agreed                                    |  |  |
| Overview of current taxonomic capacity created  |  |  |
| Draft Questionnaire prepared  |  |  |
| First workshop planned and participants invited   |  |  |
| Document review; have you seen  |  |  |
|   | The National Biodiversity Strategy and Action Plan     |  |
|   | National Reports to the CBD                            |  |
|   | Other relevant national policy documents               |  |
| First workshop held   |  |  |
|   | Workshop report distributed to participants and others |  |
|   | Questionnaire refined following workshop feedback      |  |
| Questionnaire distributed   |  |  |
| Interviews completed  |  |  |
| Time for questionnaire return and interviews completed                                  |  |  |
| Document review completed   |  |  |
| Questionnaire results analysed  |  |  |
| Final Report drafted  |  |  |
| Are needs linked to appropriate user groups?  |  |  |
| Plan Final Workshop and invite participants   |  |  |
| Final Workshop held   |  |  |
|   | Final report revised                                   |  |
|   | Workshop report distributed to participants            |  |
| Final Report delivered to Government partner  |  |  |
| Final Report delivered to other key recipients  |  |  |
| Project completion  |  |  |