

## The UVIMA Project

### *Uchambuzi wa Viumbe kwa Maendeleo* Taxonomy for Development in East Africa

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UVIMA Tools and Products Consultancy  
*Draft Report*

**REPORT #:1**

**REPORTING PERIOD:**

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<b>Countries Covered by Project:</b>	UGANDA
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**List of Acronyms and Abbreviations**

FFNC:	Faculty of Forestry and Nature Conservation
GBIF:	Global Biodiversity Information Facility
MAAIF:	Ministry of Agriculture, Animal Industry and Fisheries
MUIENR:	Makerere University Institute of Environment and Natural Resources
MUH:	Makerere University Herbarium
NARL:	National Agricultural Research Laboratories
NBDB:	National Biodiversity Databank
NaFORRI:	National Forestry Resources Research Institute
NARO:	National Agricultural Research Organisation
NaCRRI:	National Crop Resources Research Institute
NEMA:	National Environment Management Authority
UNCST:	Uganda National Council for Science and Technology
UQIS:	Uganda Quarantine and Inspection Service
UWA:	Uganda Wildlife Authority

## 1. Background

In spite of all the initiatives that have been undertaken by a number of stakeholders to address the issue of collecting and disseminating taxonomic information, availability of information, sharing of capacity and experiences and networking - are still unresolved. Two aspects of the taxonomic impediment in Africa will be addressed by this project, thereby providing timely and relevant solutions to the crises and challenges in African agriculture, food security and environmental conservation.

First, there is a need for mobilization of biodiversity information and secondly there need to be improved tools that add value to that information, package it into appropriate formats and make it amenable to key target audiences. These tools include biodiversity informatics tools that enhance access to biodiversity data and ability to produce tailored taxonomic outputs for end-users. The policy and strategy documents that have been identified highlight the inadequacy of taxonomic information needed to underpin conservation action and planning, promote sustainable agriculture and secure ecosystems on which the livelihoods are dependent. In addition, there is a paucity of relevant tools and technologies for interlinking taxonomy to conservation and sustainable use, creating up-stream constraints in meeting the national, regional and international commitments including the implementation of the NEPAD Action Plan on the Environment with respect to IAS, the African Plant Protection Strategy with respect to pests and the African Pollinator Initiative, among others.

It is also quite clear that there is additional need to generate taxonomic tools and products, to further support the implementation of the Conventions on Biological Diversity (CBD), the International Plant Protection Convention (IPPC) and World Trade Organisation Sanitary and Phytosanitary Agreement (WTO-SPS). A critical contribution is to the Convention on Biological Diversity's 2010 target; *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.* In addition, taxonomic expertise, resources, research, information and services are needed to backstop action aimed at achieving some of the MDGs such as lessening poverty and hunger (Goal 1), combating disease (Goal 6 and indirectly Goals 4 and 5) and to environmental sustainability (Goal 7).

### 1.2. Project Objectives and Priorities

The overall objectives of UVIMA are to consolidate and mobilise crucial **information on Uganda's known/named plants and animals** that is fundamental to support decision making, policy development and action as well back-stop research, agricultural extension work and biodiversity conservation in three countries in Eastern Africa: Kenya, Tanzania and Uganda. Secondly, to develop user friendly tools and products [e.g. charts, keys, publications, databases, DVDs/CD-ROMs] to mobilize the available technical information, packaged in appropriate formats for end users such as local communities, farmers, entrepreneurs, policy makers, conservation practitioners and regulatory agencies concerned with trade, pests and other controlled organisms.

The project will therefore focus on four major priorities including developing taxonomic databases, developing locally optimised taxonomic tools and products, disseminate and promote tools and products in appropriate formats and strengthen institutional capacity in East Africa to deliver timely tools and products and enhance sustainability.

#### **Priority 1: Taxonomic knowledge bases**

The first step is to develop taxonomic knowledge bases of biodiversity in accessible formats for selected IAS, pests and pollinator species. Working in the context of the Global Strategy on Invasive

Alien Species, the NEPAD Action Plan on the Environment, the African Plant Protection Strategy, the African Pollinator Initiative, the African Chapter of the International Association of Agricultural Information Specialists and the Global Biodiversity Information Facility; the project will seek to develop baseline reference datasets and databases on selected taxa using global and regional standards and supplementing already available data from world-wide sources. The outcome will be an interoperable platform of national databases for selected taxa that can be used as the reference for national planning, prioritisation; conservation action; and investment for trade, food security, health agriculture and economic development.

**Priority 2: Deliver locally optimised taxonomic tools and products**

The second priority is to develop user friendly tools that mobilize the available technical information, packaged in appropriate formats for end users. For example, to enhance ecosystem functioning and resilience, especially to sustain livelihoods for rural communities that rely directly on natural habitats and communities, there is an urgent need to provide information on invasive alien species, including national lists, invasion pathways, prevention and management. To strengthen biodiversity based agriculture, there is need for lists and publications/handbooks on pollinators, their identification, conservation and monitoring. Likewise, using the models of PEST-NET, in order to support the farmers, with agriculture being the main stay of the national economies in the region, there is need to provide relevant updated electronic references for pests. To support trade, there is need for technical information support implementation of the Conventions such as updated information on the lists of pests of quarantine importance, updated information on national invasive species lists and checklists for pollinators.

**Priority 3: Disseminate and promote tools and products in appropriate formats**

While most of the national research institutes, universities and museums hold representative natural history collections, with valuable information such as presence data, distribution, use and related indigenous knowledge, this knowledge is not directly available to the end users. Yet, the end products of taxonomy have to be demand driven and client responsive if the taxonomic sector is to compete successfully for investment.

Taxonomists are often not trained to develop such products, but working in interdisciplinary partnerships and networks is an opportunity to mobilize the massive technical information hosted by the various museums, universities, government agencies and research institutes and present it in user friendly and accessible formats. Using the knowledge base generated under priority one and the tools and products under priority two, and collaborating with initiatives such as RAIN and IAALD, the project will work with communication experts to disseminate pertinent information on IAS, pest and pollinators in easily accessible, user friendly, appealing platforms, including low-tech. Again, the project will seek to share experiences with BioNET-ASEANET, and others.

**Priority 4: Strengthen institutional capacity in East Africa to deliver timely tools and products and enhance sustainability.**

The underlying challenge is that biodiversity conservation, sustainable agriculture and ecosystem management is hampered by the lack of application of taxonomic information in Africa. The key sectors of agriculture, trade, health, development, regulatory agencies, implementers of key policies and strategies such as Poverty Reduction Strategies and Millennium Development Goals, as well as local communities and NGOs in the development sector, all need relevant taxonomic information delivered in a timely and appropriate format. In Eastern Africa, BioNET-EAFRINET is purpose built to mobilize such information.

Already, EAFRINET has demonstrated its potential, having been a key player in the development of regional initiatives such as BOZONET and the African Pollinator Initiative. IAS, Pests and Pollinators are just some of the challenges requiring taxonomic intervention. There are other needs

for mobilizing taxonomic information, such as conservation planning, climate change impact prediction and mitigation work, bio-diversity bioprospecting, biological control, biodegradation of agricultural wastes, diversity studies, disease control, environmental education; and many other secondary uses. This truly is the ultimate goal of BioNET – to build the capacity of regional taxonomic networks to generate locally optimized and relevant tools, products and services in response to national, regional and international obligations. The project will provide national institutions with ICT equipment, training, technical partnerships and opportunities for show casing how EAFRINET can mobilize and build capacity for long term sustainability of strategic institutions in East Africa.

### 1.3. Aim of the Consultancy

Against the above background, the main aim of this assignment is to develop user friendly tools and products to mobilize the available taxonomic technical information, packaged in appropriate formats for end users such as local communities, farmers, entrepreneurs, policy makers, conservation practitioners and regulatory agencies concerned with trade, pests and other controlled organisms.

### 1.4. Key project achievements during the reporting period

In this reporting period, the team has achieved the following:

#	Key Consultancy Achievements
	<insert a short summary of not more than 30 words for each achievement>
1	Carried out a stakeholder analysis to define institutional landscape and categories of end-users for IAS /pests/pollinators thematic areas at national level and undertook an end user Needs Assessment for taxonomic tools and products for the three themes with special emphasis on those needed by farmers and local communities, for training Para-taxonomists and taxonomists and for use by regulatory agencies e.g. plant health and quarantine, and conservation institutions.
2.	Documented existing tools and products e.g. national checklists, guides, species lists appended to National Legislation, identification keys, etc of the IAS /pests/pollinators and analysed the gaps therein.
3.	Recommended other relevant tools and products that will improve in knowledge, identification and / or use of IAS/pests/pollinators at national level in Kenya, Uganda and Tanzania.
4.	Assessed priority tools and products needed for efficient delivery of the UVIMA project objectives, within participating institutions and identified gaps in infrastructure needs of taxonomic institutions for each theme and outline options for further development including useful partnerships and linkages needed for their development at national, regional and international levels.
5.	Made recommendations on opportunities for and potential for creating and/or strengthening synergies at institutional level in the three themes and collaborations between institutions to reduce duplication of efforts.

### 1.5. Tools/methodologies used in the review

Being a qualitative study, the team reviewed relevant literature including UVIMA project documents, In-depth interviews were undertaken face to face using interview guides. Given the busy schedules of other stakeholders, some guides were filled in and sent back to the team through email. Reference by the team was made on existing online resources as well as national databases

## 2. Documented Existing Tools and products

### 2.1 Background

One of the tasks of this assessment was to document existing tools and products e.g. national checklists, guides, species lists appended to National Legislation, identification keys, etc of the IAS /pests/pollinators and analyse the gaps therein. The team identified the following national taxonomic data formats that are available to the different institutions that were visited. Additionally, stakeholders were asked for the extent to which the available data met the needs and expectations of their institutions. The table below provides a summary of the existing tools and products that are available to end users in Uganda.

**Table 1: Summary of existing tools and products**

CATEGORY Of existing tools and products	What the tool or product /facility is	Where it is developed	Where it is maintained	Why developed	Target audience	How - approach/method/ design/platform
IAS						
Reference tools	Electronic databases / keys e.g. List of East African Plants (LEAP)	Royal Botanic ? Gardens, Kew, UK	Kew, UK?	Research reference; facilitate identificatio n of plants by scientists and conservation players; provide a record for East Africa's	Researchers, taxonomists in East African region	Collaboration between Scientists from East Africa and U.K.

				flora		
	The National Herbarium, Department of Botany, Makerere University	Department of Botany Herbarium, Makerere University	Department of Botany, Makerere University	Teaching, reference collection for research	Researchers, lecturers	Specimens collected during research projects
<b>Pests</b>						
Reference tools	Plant specimen collections that include weedy species; Herbarium	Department of Botany Herbarium, Makerere University	Department of Botany, Makerere University	Teaching, reference collection for research	Researchers, lecturers	Specimens collected during research projects
Reference tools	arthropod collections; Musea	Zoology Dept. Museum Makerere University; Insect Museum at NARL-NARO; NaFORRI	Zoology Dept., Makerere University; NARL-NARO; NaFORRI	Teaching, reference collection for research; record keeping	Researchers, lecturers	Specimens collected during research projects
	Electronic compendia (CD-ROMs)	CABI, UK	CABI, UK	Help identify pest species, reference material,	Researchers, quarantine officials, lecturers	

				assist with teaching		
Identification tools	Identification keys	Foreign labs	NARL-NARO	Enable identification of insect species	Researchers, taxonomists	Donations to the insect museum
	parataxonomists	NARL-NARO	NARL-NARO	Help to identify specimens	Researchers	Basic training and experience
<b>Pollinators</b>						
Identification tools	Identification keys	Foreign experts		Enable identification of pollinator insect species	Researchers, taxonomists	

The specimen (arthropod, plant) collections at Makerere University are of a general nature in the sense that they are not organized into a particular group e.g. pests. Rather they are organized into taxonomic groups (orders, families, genera, species). The exception are the insect collections held at NARL-NARO and NaFORRI; these are largely pest species but also include beneficial groups like predators and parasitoids. There is no specific collection of IAS but a list of IAS in Uganda is available and appended. The only extant collection of arthropod pollinator species are those done during the course of two doctoral studies by Kajobe, R. (2004) on stingless bees and Munyuli, T. (2008) that includes over 600 species.

Identification keys are available for insects at the insect museum but these are very old/out-dated and most are unusable because they are published in French. Keys also available for plants at the MUH.

There is a dearth of professional taxonomists and a very limited number of specialists (= parataxonomists?) who have some knowledge of particular taxa acquired during the course of their work. The most skilled insect specialists are at the insect museum at NARL-NARO and at NaFORRI. On the botanical side, there is considerably more expertise for a broader range of plant groups (e.g. grasses, trees, bryophytes).

Existing tools and products could also include:

1. Collections
2. Information
  - (i) Databases and literature
3. Specialists (NB.Experts are also end users)

**Information about species**

- a. Libraries of major taxonomic institution
- b. Databases. databases could about information sources e.g. of funders of taxonomic projects, etc

**Tools and facilities**

- a. Tailor-made software for members

**End users of taxonomic tools or target audience**

- a. Conservation and resource managers
- b. Environment protection agencies
- c. Also will focus according to man and biosphere
- d. List all others encountered during the consultancy

**Key Conclusion**

While work on alien species work has just started, data that has been collected is not exhaustive for some taxa. There are existing facilities like the National Herbarium, Department of Botany, Makerere University; however, this facility does not meet the needs of most stakeholders. Moreover, most data is fragmented among various scientists and with no specific format. Hence, end users have to specify the data they want and then identify the right scientist is there to provide the required information either verbally or print out from his/her storage device.

## **2. 2.2 Desired Tools and products**

The team was also asked to recommend other relevant tools and products that will improve in knowledge, identification and / or use of IAS/pests/pollinators at national level in Kenya, Uganda and Tanzania. This consultancy identified a number of tools and products including electronic databases for the relevant taxa within the NARO and universities; videos on topical issues and adapted to communities to stimulate discussion and learning. A summary of the desired needs for tools and products are outlined below.

**Table 2: Summary of desired tools and products identified for UVIMA**

Category	Stakeholder	Desired tools and products
IAS		
	Academia, researchers/scientists	Reliable Internet connectivity; Transport for fieldwork; Specimen storage facilities; microscopes; field surveys to describe species distribution and update collections; Experts, particularly in Taxonomy, Ecology, Conservation biology, Ethnobotany, Genetics, Ecophysiology, molecular biology. Regularly updated databases e.g. LEAP; species/check lists; reference manuals/publications e.g. monographs, identification keys
	Educators/trainers/extension service agents	Illustrated field guides and easy to use identification keys, posters, videos,
	Farmer groups/farmers	Illustrated field guides; Demonstration/botanic gardens; posters; videos, radio spots;
	Conservation advocates/managers and other practitioners	Appropriate and timely information packs;
	Regulatory agencies e.g. UQIS, NEMA	

Pests		
	Researchers/academia	Identification keys; specimen storage facilities and handling tools; microscopes; Reliable Internet connectivity; Transport for fieldwork; field surveys to update collections; taxonomists; relevant training; formal linkages/collaboration between relevant institutions; additional physical space e.g herbaria/museum and laboratories, species distribution maps
	Local communities/general public	Posters and similar simple visual aides of taxa
	Farmers and farmer groups	Field guides;
	Extension service agents	Illustrated Field guides; illustrated brochures/leaflets in non-technical language; videos; posters
Pollinators		
		Identification keys; specimen storage facilities and handling tools; microscopes;

The previous BOZONET activities identified a range of taxonomic tools and products that are required by a wide range of end-users. These are given in Table 3 below. Many of these tools and products are also relevant for pests, pollinators and IAS but would have to be specifically adapted, for instance, ‘a field guide to pollinators’.

Table 3: Taxonomic tools required by various categories of stakeholders as identified during the BOZONET project

No	Stakeholder	Desired Tools
01	POLICY MAKERS	<ul style="list-style-type: none"> <li>• Distribution maps</li> <li>• Conservation status of species</li> <li>• Identification keys</li> <li>• Guidelines and other policies related to the subject</li> <li>• Checklists (for economically useful plants, Animals micro organisms and invasive species)</li> <li>• Database on biodiversity</li> <li>• Handbooks / guides</li> </ul>
02	EIA SPECIALISTS	<ul style="list-style-type: none"> <li>• Pictorial guides</li> <li>• Descriptive information</li> <li>• Distribution maps / atlas</li> <li>• Specimen collection</li> </ul>
03	FARMERS	<ul style="list-style-type: none"> <li>• Checklist for plants and pests that commonly affect crops (Banana-checklists of beetles and nematodes of Uganda).</li> <li>• Illustrated guide of beetles and Nematodes</li> <li>• Illustrated hand books</li> <li>• Pictorial identification keys</li> <li>• Specimen collection</li> <li>• Checklist of medicinal plants for poultry and cattle.</li> <li>• Pictorial keys/checklists of plant varieties</li> </ul>
04	FIELD RESEARCHERS /SCIENTISTS	<ul style="list-style-type: none"> <li>• Biodiversity guide-common birds of Uganda</li> <li>• Forest birds calls of Uganda</li> <li>• Checklists for different species</li> <li>• Handbooks</li> <li>• Identification keys / pictorial</li> <li>• Specimen collections-digitized data</li> <li>• Molecular techniques</li> <li>• Illustrated guides</li> <li>• Database and GIS/RS Equipment</li> <li>• Reference materials</li> <li>• Conservation status</li> </ul>
05	TEACHERS	<ul style="list-style-type: none"> <li>• Pictorial Identification keys</li> <li>• Handbooks</li> <li>• Checklists</li> <li>• Distribution maps</li> <li>• Audio visuals</li> <li>• Charts.</li> <li>• Field guides</li> <li>• Museums</li> <li>• Herbaria</li> <li>• Zoos</li> </ul>
06	HERBALISTS	<ul style="list-style-type: none"> <li>• Illustrated guide of validated medicinal plants</li> </ul>

		<ul style="list-style-type: none"> <li>• Distribution maps</li> <li>• Species key.</li> <li>• Pictorial maps</li> <li>• Audio visuals</li> </ul>
07	TRADERS	<ul style="list-style-type: none"> <li>• Pictorial keys / charts</li> <li>• Handbooks fully illustrated</li> <li>• Distribution maps</li> <li>• Guidelines</li> <li>• Molecular lab.</li> <li>• Specimen collections</li> <li>• Checklists of export zones.</li> </ul>
08	CROSS CUTTING	<ul style="list-style-type: none"> <li>• Inclusion of vernacular names and English names</li> <li>• Museums</li> <li>• Herbaria</li> <li>• Gardens</li> <li>• Zoos</li> </ul>
09	PLANT INSPECTORS	<ul style="list-style-type: none"> <li>• Checklists</li> <li>• Descriptive characteristics (digitized information)</li> <li>• Molecular tools</li> <li>• Pictorial guides</li> </ul>
10	TOUR GUIDES.	<ul style="list-style-type: none"> <li>• Illustrated guide / handbooks</li> <li>• Checklists.</li> </ul>
11	General Taxonomic tools	<ul style="list-style-type: none"> <li>• Dioramas</li> <li>• Museums</li> <li>• Herbaria</li> <li>• Botanical Gardens</li> <li>• Wildlife centers</li> <li>• Community based forest reserves</li> <li>• Community / village tour centers.</li> </ul>

*Source: Kigoolo and Behangana (2006)*

Following on from the BOZONET project little to no improvement in infrastructure or human capacity building is evident. No progress has been made in improving awareness or use of taxonomic information.

## Key Conclusion on Need Assessment

Knowledge of identity of plants is one of the major limiting factors in understanding their use and conservation, farmers need simple visual aid tools (pictorial) in describing plant characteristics same applies to local communities, para taxonomists and taxonomists, field exposure and field guides, regulatory agencies, visual aids like posters and easy to understand booklets. Most taxonomic information is required for planning purposes at community and farmer levels especially for community action planning. Most end users need readily accessible, user friendly tools and products to aid in day to day classification of all species in question. Yet, many of the tools and products are still lacking to translate information at all level including technical people at the ministries, trainers, farmers and regionally. In particular, farmers need charts and keys so do communities, taxonomists need keys, publications and databases and regulatory agencies databases and keys. Para taxonomists and taxonomists need taxonomic tools that they can use to identify invasive alien species and pollinators. Regulatory agencies need

taxonomic tools that they can use to monitor introduction of any invasive alien species and pollinators in the country

Geographical information needs have to be taken into consideration for example different plants are valued differently in different regions for example some plants are used for animal health in the north while in the central region they are used for human medicine. Yet, end users want to know what plants they use and the various by products from plants. Other need include generation of taxonomic indices, capacity building, setting up museums/infrastructure and recruitment of personnel to manage collections for the museums.

### **THE PRIORITIZATION OF TOOLS, INFRASTRUCTURE AND PRODUCTS**

- Expertise: taxonomists and parataxonomists to maintain collections and respond to end-user requests.
- Formal institutional linkages such as MoUs, joint planning programmes other forms of collaboration to minimize/eliminate duplication of effort while synergizing effort and resources, improve knowledge of the capabilities of institutions.
- Identification keys, both manual and electronic;
- Various manuals that describe major groups of taxonomic interest, checklists
- Audio-visuals such as posters, illustrated field guides, videos to improve dissemination of messages on topical issues e.g conservation of pollinators, utilization of certain taxa.
- Centralized but fully accessible databases on categories of interest that could serve as reference material
- Expanded, updated and well maintained collections as well as digitizing them

A summary of the priority tools and products is given in Table 'Y'.



### 3. Target users (Stakeholder Analysis)

The team was tasked to carry out a stakeholder analysis to define institutional landscape and categories of end-users for IAS /pests/pollinators thematic areas at national level and undertook an end user Needs Assessment for taxonomic tools and products for the three themes with special emphasis on those needed by farmers and local communities, for training Para-taxonomists and taxonomists and for use by regulatory agencies e.g. plant health and quarantine, and conservation institutions. (Stakeholder matrix) in each case spells out the name of the stakeholder, the taxonomic tools and products produced to enhance food security, ecosystem services, trade, agricultural productivity and ultimately human well being, environmental integrity and sustainability.( Please fill-in the following table: Make sure the information give covers the whole country. Address)

Name of Strategic Stakeholder Institution (Govt institutions, Statutory agencies, Research institutions, Teaching and Training, International Organisations, National NGOs, Private companies, Community based organizations, etc)	Roles Of the stakeholder	Mandates Of the stakeholder	Tools and or Products produced (e.g. Species lists, Identification tools, Ecological information, Educational information, Species distributional information, etc)	Status Of the tools & products	ISSUES Description of problems encountered; Issues that need to be addressed; Decisions / Actions that can be taken
NALIRRI	Research	Livestock Resources	Technical Publications	Technical only accessible to fellow researchers	Limited funding, lack of expertise, unreliable internet connection, inadequate library and lab facilities
National Forestry Resources Research Institute	Research	Forestry Resources	Posters, collections of forest pests		
NAFIRRI	Research				
Uganda National Farmers' Federation	End User and Possible data collection	Promoting favorable policies for farmers empowerment and strengthen farmer organizations	Publications and Posters Training Manuals	Poor frequency Too scientific Not applicable at farmer level	Most information is not demand driven and formats are not easy to interpret for ordinary  Names of species not farmer friendly  Structures are already existent at UNFFE but have not been explored for dissemination  Coordination with NARO,

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				Makerere and other research institutes; there appears to be a lot of duplication
Caritas Uganda				
National Environment Management Authority				
Ministry of Agriculture, Animal Industry and Fisheries	Regulation		CA	
Wetlands Management Department, Ministry of Water and Environment			Wetland Inventory Guide National Wetland Information System	Provides information on the location of invasive alien species which is very important in designing strategies for wetland management at various levels  Information is not adequate especially at community level which is needed for generating community based wetland management plans  The main challenge is institutional mandates of different stakeholders who “operate in boxes” leading to inadequate coordination
National Agricultural Research Laboratories; Plant Genetic Centre				
Uganda Association of Impact Assessors	Undertake environment and social impact assessments	Assessments	Environmental Impact Statements	
Uganda Association of Florist.....				

SNV
NOGAMU



## **Institutional Challenges related to generation of tools and products**

The main challenge regarding generation and dissemination of taxonomic information relates to the institutional mandates which results in institutions operating in boxes with inadequate coordination. Furthermore, limited funding impedes collaboration among institutions and lack of institutional strategic focus on particular subjects. Other challenges include:

- Bureaucratic systems in accessing taxonomic information impedes the use of services
- Inadequate awareness on such services above among stakeholders
- There are very few well trained taxonomists in the country
- There are few trained taxonomists in the country; some people do not even know that there are people who undertake such studies
- Lack of internet services since bills are not paid on time
- Databases not updated
- Lack of computers, funds to subscribe to international organisations and treaties

Other factors that impede the provision of such service include inadequate skills in taxonomic work, inadequate funding, lack of interest about taxonomy by students, few specialists' skilled to do this work and lack of multidisciplinary approach (scientists should work with extension workers or field frontline staff in existing structures like NAADS, UNFFE and other community based organizations.)

Lack of technical capacity to develop and manipulate data formats, low interest in taxonomic information (it has increased tremendously in the last 5 years), lack of equipment such as computers archived data and field equipment to collect all required data, inadequate funding taxonomy related data because priorities are projects that directly impact on people, sensitize public about the importance of taxonomic information

Formal institutional linkages lacking but there is evidence of interactions between institutions. For example, officials of Makerere University do work with (by way of exchanging information, generating data) with officials from NEMA, NARO, UWA, MTII, e.t.c; similarly officials within such institutions do work with those from other institutions. These collaborations are however driven by individuals who know of someone with the capacity to do or knowledge of what is needed but are not formally entrenched arrangements.

There is plenty of scope to synergize effort as there is clearly duplication of effort in a number of cases. A case in point is the maintenance of collections at disparate locations but with no opportunity to harmonize effort or share responsibility. For instance, two herbaria one of which lacks budgetary/institutional support. Similarly, three musea (at NARL, at Makerere University, and the national Uganda Museum). The natural history section is lacking at the Uganda museum while that at NARL also lacks budgetary/institutional support. The issue of data or information storage is another opportunity for developing synergies. Raw and processed data on various taxa including pests, IAS and pollinators exists within some institutions to varying detail as well as with individuals, mainly researchers. There is however no mechanism to inform others about what is held or readily exchange it among institutions. Underlying issues that will need to be resolved relate to 'ownership' of the data or information and compensation for effort put into gathering the data (intellectual property rights?). The NBDB has some expertise, hardware and software and data; NatureUganda



#### 4. Dissemination for existing products and tools

CATEGORY	Name List all means of disseminating tools & products you have come across in your country	Successes	Failures	Challenges
IAS				
Pests				

Pollinators				
-------------	--	--	--	--

**5. Recommendation of new tools & products**

CATEGORY	Name List all new tools & products you have come across elsewhere good for your country not listed above	What for potential applications	Where Where best to develop it	Target Group/stakeholder	Recommendation how to disseminate
IAS					
Pests					
Pollinators					

6. Suitability of all tools & products

CATEGORY	Name of the tool or product produced	Target audience	Suitability	Why? If unsuitable	Mitigation measures
IAS					Improve on cataloguing/digitise collection
					Revise identification keys to user friendly type. Involved non botanists in its review
					Keys information may be summarised in pamphlets/posters in simple language or even in local dialect
					Kept simple and attractive

Pests					
Pollinators					

### 7. Infrastructure for tools and products

Current and potential infrastructure for developing these tools and products to identify the Niche for the UVIMA project (is the infrastructure such as software and imaging technologies robust enough or does UVIMA need to build on, enhance or otherwise, if so what information / training / software etc is need?) documented. (These may include Collections and Databases, Hardware, Software, Technologies, Communication resources, Secondary e.g. keys, literature, publications and tertiary, Expertise, Programmes, Projects and partnerships etc for each thematic area)

CATEGORY	Current &/Potential infrastructure for developing these tools and products	Gaps	Future plans
IAS	Publications	None for the majority; some posters developed for a select few plant species	Develop more of these; develop an effective communication strategy that reaches the majority
	Collections	No specific collection	Institute a specific collection
	Databases	none	

UVIMA- The BioNET-EAFRINET Project, Country Consultancy Report

Pests	Museums in place such as NARL with collections of key pests	Cataloging not fully done; not up-to-date; collections not available for teaching purposes; institutional ownership and support debatable	UVIMA could improve specimen handling and storage facilities; assist with expanding and digitizing the collections at NARL, support the development of collections at Makerere University
	National Biodiversity Databank	No data on pests; not fully accessible/compatible with other users	Develop one and perhaps incorporate into the NBDB; explore feasibility of linking with planned GBIF node at the UNCST
Pollinators			
	No current infrastructure	Importance of pollinators not recognised	UVIMA needs to invest in simple publications on the pollinators.

**8. Existing communication strategies and dissemination channels for tools & products**

CATEGORY	Name List all strategies and channels you have come across in your country)	Institution List the all institutions in your country where these are located	CONTACTS Give contact details of the Institution and focal person
IAS			

Pests			
Pollinators			

### 9. Defining specific challenges, constraints, key gaps and opportunities for UVIMA

#	Issue/Category	specific challenges	constraints	key gaps	opportunities	Proposed Solution

	IAS					
		existing policies do not address IAS; capacity to manage IAS very limited; distribution and impact of IAS on national economy not fully described	funding	Policy on IAS	Awareness within NARO/ MAAIF as a result of the the project on removing barriers..... - draft policy on IAS prepared	
	Pest					
	Pollinators					



## References

Isabirye-Basuta, G., Odong, R., Kisakye, J., Baranga, D., Akol, A., Kizito, Y. and Bwanika, G. (2006). *Needs Assessment, Conservation and Development of Taxonomic Tools in Zoology*. Draft final report submitted to MUIENR (Uganda) for the BOZONET project, November 2006.

Kigoolo, S. and M. Behangana (eds) 2006. BOZONET (Uganda), “Linking Conservation to Taxonomy”: Proceedings of the First National Stakeholders Workshop held at Hotel Africana, Kampala, Uganda, 13th September 2006. *Botanical and Zoological Network – Country Report (Uganda)* No. 3

The Cost of Invasive Alien Species to Uganda: a briefing paper.

<http://www.invasivespecies.co.ug/Reports/Cost%20of%20Invasive%20Alien%20Species%20to%20Uganda.pdf>. Accessed June 10<sup>th</sup> 2009

Kiwuso, P. and Otara, E. (undated). Status of invasive alien species in Uganda.

<http://www.fao.org/forestry/media/12732/1/0/>. Accessed June 23<sup>rd</sup>, 2009

## Appendix: Terms of Reference

1. Prepare the tools/methodologies for the review and agree them with Project Team.
2. Carry out a stakeholder analysis to define institutional landscape and categories of end-users for **IAS /pests/pollinators thematic areas at national level.**
3. Carry out an end user Needs Assessment for taxonomic tools and products for the three themes with special emphasis on those needed by farmers and local communities, for training Para-taxonomists and taxonomists and for use by regulatory agencies e.g. plant health and quarantine, and conservation institutions.
4. Document existing tools and products e.g. national checklists, guides, species lists appended to National Legislation, identification keys, etc of the **IAS /pests/pollinators** and analyse the gaps therein.
5. Recommend any other relevant tools and products that would improve in knowledge, identification and / or use of **IAS/pests/pollinators** at national level in Kenya, Uganda and Tanzania.
6. Assess priority tools and products needed for efficient delivery of the UVIMA project objectives, within participating institutions.
7. Identify gaps in infrastructure needs of taxonomic institutions for each theme and outline options for further development including useful partnerships and linkages needed for their development at national, regional and international levels.
8. Make recommendations on opportunities for and potential for creating and/or strengthening synergies at institutional level in the three themes and collaborations between institutions to reduce duplication of efforts.
9. Scope out options for linking with and effectively disseminating tools and products to end-users e.g. farmers and local communities, government agencies, organizations and taxonomic institutions.
10. Document and address any other relevant issues concerning tools and products for **IAS /pests/pollinators** needs not mentioned above.

## 10. Checklist of persons in the country with knowledge in Taxonomy including (Pollinators, Pests and IAS)

Please provide updated list of Taxonomists in your thematic area (list the UVIMA members and specialists first): Prepare this in an Excel file as well.

Name	Title	Category	Courier Address	Phone-Mobile	Email1	Email2
Allan P. Lugoloobi	Mr	Pests			<a href="mailto:aplugoloobi@yahoo.co.uk">aplugoloobi@yahoo.co.uk</a>	
Paul Ssegawa	Dr	IAS			<a href="mailto:pssegawa@botany.mak.ac.ug">pssegawa@botany.mak.ac.ug</a>	
James Kalema	Dr	IAS			<a href="mailto:jkalema@botany.mak.ac.ug">jkalema@botany.mak.ac.ug</a>	
Olivia ?	Ms	IAS				
Theo Munyuli	Mr	Pollinators			<a href="mailto:tmunyuli@muienr.mak.ac.ug">tmunyuli@muienr.mak.ac.ug</a>	
Phillip Nyeko	Dr	Forest insect Pests				
P. Kiwuuso		Forest insect pests				

The majority of these people are more of specialists that have good working knowledge of the taxonomy of particular taxa rather than professional taxonomists

**11. Related Projects**

Please report on the status of projects whose objectives are more or less similar to UVIMA Project in your country along the lines of your thematic area using the table below

<b>Project Name</b>	<b>Implementing institution</b>	<b>Source of funding</b>	<b>Status (project beginning, mid-term, ending)</b>	<b>Focal person</b>	<b>Contact details</b>
Conservation and Sustainable Management of Below ground Biodiversity	Makerere University	UNEP/GEF	Ending December 2009	Mary J.N. Okwakol, Prof.	
Removing Barriers to Invasive Plant Management in Africa, Uganda	CABI/NARO	UNEP/GEF	Ending November 2009	Gad Gumisiriza, PhD	

**ANNEXES**

**Annex 1: Reference electronic and printed materials**

**Annex 2 List of persons met**

Name	Title	Institution	Courier Address	Phone-Mobile/desk	Email1	Email2/website
Augustine Mwendya	Mr.	Uganda National Farmers' Federation	P. O. Box 6213 Kampala	0414 340249	unfa@starcom.co.ug	www.unffe.org
Paul Mafabi	Mr.	Wetlands Management Department				
Karyeija Robert	Mr.	MAAIF		0712985542		
Euphrance Tumubwine	Mr.	MAAIF		0392823060		
Robert Kajobe	Dr.	NALIRRI		0772590482		
Katumba Balikitenda	Mr.	NaFORRI		0772675333		
Dismas Mutabazi	Dr.	NAFFIRRI		0772393452		
Elizabeth Balyejusa Kizito	Dr.	National Agricultural Research Laboratories, Plant Genetic Centre		0712141377		
Tumusiime Alfred	Mr.	Opep Consult		0782335405		
M. Nakibuka	Ms	National Biodiversity Databank, Makerere University Institute of Environment and Natural		0772524011		



Annex 4. (a) Key species in the various categories

No	Species name	Common name	Taxa Group	Category/Comments
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3.				
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**Annex 4. (b) Invasive and alien species in Uganda**

1. *Lantana camara*
2. *Parthenium hysterophorus*
3. *Senna spectabilis*
4. *Eichhornia crassipes* (water hyacinth)
5. *Acacia mearnsii*
6. *Acacia hockii*
7. *Mimosa pigra*
8. *Broussonetia papyrifera* (paper mulberry)
9. *Pistia stratiotes*
10. *Azolla filiculoides*
11. *Cymbopogon nardus*
12. *Striga* spp (witch weed)
13. *Bactrocera* spp. (Tephritid Asian fruit flies)
14. *Leptocybe invasa* (Blue Gum Chalcid)
15. *Cinaria cupressi* (Cypress aphid)
16. *Tetrableps raoi* (Pine Woolly aphid)
17. *Heteropsylla cubana* (Leucaena psyllid)
- 18.

## Annex 5: Interview Guide

### Appendix: Interview Guide

#### General Information

*As appropriate, complete this information prior to interview.*

1. Name of person being interviewed: \_\_\_\_\_
  
2. Occupation \_\_\_\_\_ Institution: \_\_\_\_\_
  
3. Phone number: \_\_\_\_\_
  
4. Date of interview: \_\_\_\_\_

The overall objectives of UVIMA are to consolidate and mobilise crucial taxonomic information [information on known and/or named plants and animals] that is fundamental to support decision making, policy development and action as well back-stop research, agricultural extension work and biodiversity conservation in three countries in Eastern Africa: Kenya, Tanzania and Uganda. Secondly, to develop user friendly tools and products [e.g. charts, keys, publications, databases, dvds/CD-ROMs] to mobilize the available technical information, packaged in appropriate formats for end users such as local communities, farmers, entrepreneurs, policy makers, conservation practitioners and regulatory agencies concerned with trade, pests and other controlled organisms.

The aim of this study is to develop user friendly tools and products to mobilize the available taxonomic technical information, packaged in appropriate formats for end users such as local communities, farmers, entrepreneurs, policy makers, conservation practitioners and regulatory agencies concerned with trade, pests and other controlled organisms. I will be asking you about your Institution's participation collecting and storing taxonomic information. I will also be asking you questions about management of this information as well as on collaborative partnerships with other stakeholders in collecting and disseminating this information. Every effort will be made not to disclose the [personal] identity of respondents in the synthesised reports, and all information gathered in this interview will be used solely for enabling the outcomes of UVIMA. The data collected from this interview will be presented as an aggregate compilation of all responses from participating institutions.

#### 1. Availability of Taxonomic Information

- 1.1. What are the national taxonomic data formats available to your institution for use?
- 1.2. To what extent does the available data meet the needs and expectations of your clients? (Probe for the data on invasive alien species, pollinators and pests)

#### 2. Needs Assessment

- 2.1. In your view, what are the end user needs for taxonomic tools and products? (Probe for needs of farmers, local communities, for training para-taxonomists and taxonomists; for regulatory agencies e.g plant health, conservation institutions amongst others) (Probe for the data on invasive alien species, pollinators and pests)
- 2.2. What do you think are the factors relating to institutional arrangements that facilitate or impede the provision of such services? (Probe for challenges relating to data formats, availability of timely data or limited capacity)
- 2.3. What do you think can be done to address the barriers or limitations you have described? (Review barriers mentioned above...)

### **3. Tools and Products, Infrastructure needs and Gaps**

- 3.1. What tools/information sources/facilities related to taxonomy are available in your institution? (Probe for the data on invasive alien species, pollinators and pests)
- 3.2. How do you think the project can effectively manage and disseminate its data? (Probe for proposed actions especially related to data formats). (Probe for the data on invasive alien species, pollinators and pests)
- 3.3. In your view what is the long term capacity of your institutions in continuing the dissemination of such information?
- 3.4. What tools/information sources/facilities, coordinating mechanisms and institutional arrangements related to taxonomy would improve your service delivery/?
- 3.5. What partnerships regarding generating and storing of taxonomic information have you had/have? What have been the experiences and gaps?

### **4. Recommendations on Opportunities for Synergy**

- 4.1. In your view, what potential exists for creating and/or strengthening synergies at institutional level in the three themes and collaborations between institutions to reduce duplication of efforts? (Probe for the data on invasive alien species, pollinators and pests)

### **5. Options for Dissemination**

- 5.1. In your view, what options exist or do you propose for linking with and effectively disseminating tools and products to end users.

Probe for dissemination to farmers and local communities, government agencies, organisations and taxonomic institutions

Do you have any other comments you would like to add?