CBSG

CONSERVATION ASSESSMENT AND MANAGEMENT PLANNING (C.A.M.P.) WORKSHOP FOR SELECTED PLANT SPECIES OF THE EAST USAMBARA MOUNTAINS, TANZANIA

National Museums of Kenya-Darwin Course:
Plant Conservation Techniques for East Africa

Saintpaulia difficilis

2-6 March, 1998,
Hosted by: East Usambara Catchment Forest Project, Amani Nature Reserve, East Usambara Mountains, Tanzania

TUNZA MISITU YA HIFADHI - ITAKUHIFADHI

Cover illustration reproduced with kind permission of the artist: Reinhild Raistrick.
Saintpaulia difficilis.

National Museums of Kenya-Darwin Course:
Plant Conservation Techniques for East Africa

Edited by
Mwasumbi, L.[1], Johansson, S.[2], Luke, Q.[3], Simiyu, S.[4], Mashauri, S.[2], Ipulet, P.[4], Maunder, M.[5], Clubbe, C.[6] and Hankamer, C.[5]

Editorial support
Good, K. and Naleppa, B.[5]

Training Workshop co-ordinated by

The East African Herbarium, National Museums of Kenya, Nairobi
&
The Royal Botanic Gardens, Kew, UK

[1]Department of Botany, University of Dar es Salaam, Tanzania.
[2]East Usambara Catchment Forest Project, Tanga, Tanzania.
[3]Coastal Forest Conservation Unit, National Museum of Kenya, Nairobi.
[4]East Africa Herbarium, National Museum of Kenya, Nairobi.
[5]Conservation Projects Development Unit, Royal Botanic Gardens, Kew, UK.
[6]Education Department, Royal Botanic Gardens, Kew, UK.

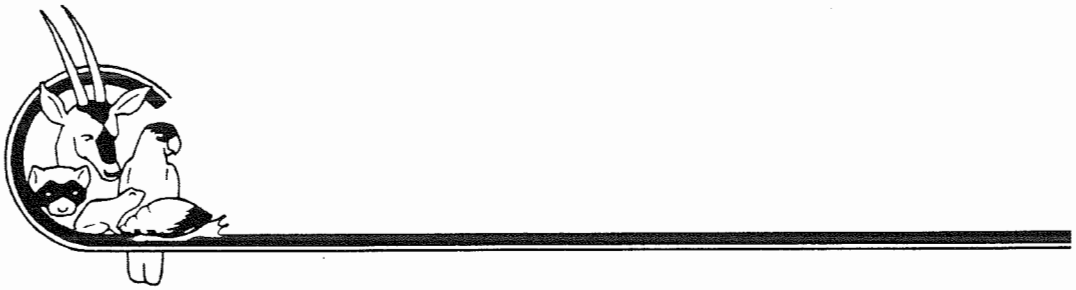
Conservation Assessment and Management Plan (CAMP)

for selected species of the Kenya Coastal Forests

Produced by the participants

Using the format and methodology developed by the Conservation Breeding Specialist Group (IUCN/SSC)

Conservation Breeding Specialist Group
Species Survival Commission
IUCN - The World Conservation Union



12101 Johny Cake Ridge Road, Apple Valley, MN 55124-8151, USA
Tel: 1-612-431-9325 fax: 1-612-432-2757 e-mail: office@cbsg.org
web site: http:/ / www.cbsg.org

Donors and Supporters

Funded by:

The Darwin Initiative for the Survival of Species

The British Council

With additional support for scholarships from:

The British Council

DFID Department For International Development

East Usambara Catchment Forest Project

IPGRI

Supported by:

AFRICAN WILDLIFE FOUNDATION

East Usambara Catchment Forest Project, Tanga, Tanzania
University of Dar es Salaam, Tanzania
Coastal Forest Conservation Unit, National Museums of Kenya, Nairobi
Elder Group, Muheza District, Tanzania
Women's Groups, Muheza District, Tanzania
East Usambara Tea Company, Commonwealth Development Corporation

IUCN-Species Survival Commission (IUCN-SSC)
Reintroduction Specialist Group of the IUCN/SSC

RSG

Contents

List of Acronyms

AWF	African Wildlife Foundation
BRU	Biological Recording Units
CAMP	Conservation Assessment and Management Plan
CBSG	Conservation Breeding Specialist Group, of the Species Survival Commission of the World Conservation Union
CFCU	Coastal Forest Conservation Unit, National Museums of Kenya
DFID	Department for International Development, UK
FAO	Food and Agriculture Organisation
FTEA	Flora of Tropical East Africa
ICIPE	International Centre for Insect Physiology and Ecology
ICRAF	International Centre for Research in Agroforestry
IPGRI	International Plant Genetic Resources Institute
IUCN-SSC	Species Survival Commission of the World Conservation Union
KARI	Kenya Agricultural Research Institute
KEFRI	Kenya Forestry Research Institute
KWS	Kenya Wildlife Service
NARO	National Agricultural Research Organisation
NMK	National Museums of Kenya
PCP	Plant Conservation Programme, National Museums of Kenya
TPRI	Tanzania Pesticide Research Institute
WWF	World Wide Fund for Nature

Executive Summary

Participants looking at *Cynometra longpedicellata*
Harms with Leonard Mwasumbi

Executive Summary

The 1998 Conservation Assessment and Management Plan (C.A.M.P.) Training Workshop was held at Amani Nature Reserve, East Usambara Mountains, Tanzania from 2-6 March. The Workshop focused on eleven endemic and near endemic plant species to the East Usambaras, Eastern Arc mountains and the East African coastal forests. It was opened by the District Commissioner and was followed by a Discussion Forum involving local community stakeholders. The Plan was produced by the 1998 course participants of the National Museums of Kenya-Darwin Plant Conservation Techniques Course for East Africa, in conjunction with the East Usambara Catchment Forest Project (EUCFP).

The C.A.M.P. Training Workshop aims to equip participants with the tools to assess the status of plant species in the wild. It uses the protocol established by the Conservation Breeding Specialist Group (CBSG) of the IUCN/SSC (Ellis & Seal, 1995). It was developed to provide a participatory approach; utilising local, community and institutional expertise to provide a rapid and effective means of assessing threats to species using the IUCN Categories of Threat. The process prioritises species for conservation management.

The 1997 IUCN Red List of Threatened Plant Species (Walter & Gillett, 1998) lists over 10,000 species of vascular plants found in Tanzania of which over 4% are threatened. Given that many areas in Tanzania have had little or no plant surveys, this may be a sizeable underestimate. The East Usambaras are an IUCN recognised Centre of Plant Diversity (Davis *et al.*, 1994), forming part of the Eastern Arc mountains which span from the Taita Hills, Kenya to the Mahenge Mountains, southern Tanzania. 25-30% of Eastern Arc plant species are endemic (Lovett, 1993) with the East Usambara Mountains containing the highest number.

Although the Amani Nature Reserve (ANR) was gazetted in 1997, protecting 8,380 ha of sub-montane rainforest, the East Usambaras have experienced approximately 50% loss of forest cover over the last 100 years. Forest fragmentation, due to clearance for subsistence agriculture and tea estates, poses a major threat to the rich biodiversity of this region. In addition, Amani Botanical Garden has been the site of introduction, during the colonial administration, of a number of the most invasive exotic plant species. The EUCFP is addressing these issues and is n
ear completion of the Amani Nature Reserve Management Plan.

This C.A.M.P. Training Workshop was planned and developed with Shedrack Mashauri, Nature Reserve Officer, ANR EUCFP, to carry out an assessment of eleven sub-montane and dry lowland forest species (see table 1). Some coastal forest species selected were also assessed in the 1996 CAMP Workshop (Luke, 1996): *Cephalosphaera usambarensis* (Warb.) Warb., *Gigasiphon macrosiphon* (Harms) Brenan and *Ficus faulkneriana* C.C. Berg. This gave the opportunity to study the Tanzanian populations of these species and to reassess the threats in the light of this

Table 1 Summary of Categories of Threat for Selected Plant Species of the East Usambara Mountains

Species	Family	Category of Threat	
		Listing	Criteria
Beilschmiedia kweo (Mildbr.) Robyns & Wilczek	Lauraceae	Vulnerable	B 1 & 2 a, c
Cephalosphaera usambarensis (Warb.) Warb.	Myristicaceae	Vulnerable	B 1 & 2 a, b, c
Coffea mongensis Bridson	Rubiaceae	Vulnerable	A1 c
Coffea sp. A (of FTEA)	Rubiaceae	Critically Endangered	B 1 & 2 b, c
Cola usambarensis Engl.	Sterculiaceae	Endangered	B 1 & 2 b, c
Cynometra brachyrrachis Harms	Leguminosae-Caesalpiniaceae	Vulnerable	B 1 & 2 a, b, c
Cynometra longipedicellata Harms	Leguminosae-Caesalpiniaceae	Critically Endangered	B 1 & 2 a, c
Ficus faulkneriana CC Berg	Moraceae	Critically Endangered	D
Gigasiphon macrosiphon (Harms) Brenan	Leguminosae-Caesalpiniaceae	Endangered	B 1 & 2 b
Saintpaulia grotei Engl.	Gesneriaceae	Critically Endangered	B 1 & 2 b, c
Saintpaulia difficilis/confusa complex B. L. Burtt	Gesneriaceae	Critically Endangered	B 1 & 2 a, c

new information. It is hoped that this information will consolidate regional collaboration on the protection and management of the East African coastal flora.

A summary of the status of the species covered in the Workshop is given in Table 1. This information will be incorporated into the Amani Nature Reserve Management Plan. A number of key issues arose from the Workshop discussions which will impinge on the effectiveness of forest conservation and management in Amani Nature Reserve:

- taxonomic revisions are urgently required for some of the species covered i.e. *Coffea* sp., *Cynometra* sp. and *Saintpaulia* sp.
- lack of information on the status and distribution of populations of these species in other Eastern Arc localities and even within the East Usambaras. This will require species specific surveys for the Uzungwas and Ulugurus where comparatively little survey work has been done (Burgess and Fjeldså, 1997).
- species specific focus required notably for:
    - economically important species where it is not known whether their rarity is as a result of unsustainable use or other habitat factors,
    - creation of community awareness of rare/endemic species,
    - production of species management and recovery plans,
- concern over the critical status of Tanzanian populations of the lowland and coastal regional endemics: *Gigasiphon macrosiphon* and *Ficus faulkneriana,* which are not located in protected areas.
- exploration of the development of the East Usambara endemic wild coffee species with the Genebank, National Herbarium, Arusha.
- Frontier surveys provide a rich source of data, and could be utilised further to obtain species distribution data.

The recommendations from this Workshop highlight the importance of endemic species management within the Amani Nature Reserve and of the continuing community involvement in EUFCP activities to conserve these valuable rainforests. The C.A.M.P. workshop methodology may provide the way forward for monitoring the status of populations of East Usambara endemic species by collating Frontier survey data and utilising the expertise and knowledge of the local community.

For more information contact:

Perpetua Ipulet
East African Herbarium, NMK, Nairobi
Fax: 284 2 741424
E-mail: nmk@AfricaOnline.co.ke

Clare Hankamer
Royal Botanic Gardens, Kew, U.K.
Fax: 0044 (0)181 332 5582
E-mail: C.Hankhamer@rbgkew.org.uk

References

Burgess, N. and Fjeldså, J. (1997) The Biological Importance of the Eastern Arc in an African context. *The Arc Journal* **6**:6-7.

Davis, S.D., Heywood, V.H. and Hamilton, A.C. (eds) (1994) *Centres of Plant Diversity: A guide and Strategy for their Conservation*, Vol.**1**, *Europe, Africa, South West Asia and the Middle East*. IUCN Publications Unit, Oxford: WWF and IUCN.

Ellis, S. and Seal, U.S. (1995) Tools of the Trade to aid Decision making for Species Survival. *Biodiversity and Conservation* **4**(6):553-72.

Lovett, J.C. (1993) Eastern Arc moist forest flora. In *Biogeography and ecology of the rainforests of Eastern Africa*, (Lovett, J.C. and Wasser, S.K., eds), pp. 33-55. Cambridge University Press.

Luke, Q. (ed) (1996) *Conservation Assessment and Management Planning (CAMP) Workshop for Selected Species of the Kenya Coastal Forests*. National Museums of Kenya - Darwin Plant Conservation Techniques Course for East Africa, 20-25 November 1996, Coastal Forest Conservation Unit, Ukunda, Kenya.

Walter, K.S. & Gillett, H. J. (eds) (1998) *1997 IUCN Red List of Threatened Plants*, Species Survival Commission, IUCN - The World Conservation Union, Switzerland

C.A.M.P WORKSHOP

Opening Ceremony: Opened by Tanga Regional Commissioner,
Captain George H. Mkuchica

List of Participants

Lead Botanists

Mr Leonard Mwasumbi, Department of Botany, University of Dar es Salaam

Mr Quentin Luke, Project Executant, Coastal Forest Conservation Unit, NMK

Saintpaulias

Stella Simiyu, Plant Conservation Programme, East African Herbarium, NMK

Discussion Forum

Dr Stig Johansson, Chief Technical Adviser, EUCFP

Dr Felician Kilahama, Farm/Agroforestry Advisor, EUCFP

Mr C. Msonde, Elder group, Muheza District

Mrs M. Shelutete, Women's groups, Muheza District

Mr B. Amrithanan, East Usambara Tea Company, Commonwealth Development Corporation, Tea Estates

Workshop Facilitators

Shedrack Mashauri, Nature Reserve Officer, Amani Nature Reserve, EUCFP

Mike Maunder, Head of the Conservation Projects Development Unit, Royal Botanic Gardens, Kew

Colin Clubbe, Graduate Studies Training Co-ordinator, Royal Botanic Gardens, Kew

Perpetua Ipulet, Course Co-ordinator, NMK-Darwin Plant Conservation Techniques Course for East Africa, NMK

Peggy Olwell, Endangered Species Co-ordinator, National Park Service, USA

Clare Hankamer, International Projects Co-ordinator, Conservation Projects Development Unit, Royal Botanic Gardens, Kew

NMK-Darwin Plant Conservation Techniques Course for East Africa
1998
Course Participants

Tanzania
Wazael Hillary Ntundu
Scientific Officer, Genebank, Tropical Pesticide Research Institute, Arusha
Daniel Kambei Sitoni
Technician, National Herbarium, Tropical Pesticide Research Institute, Arusha
Ahmed Selemani Mndolwa
Forester in Charge, Amani Botanic Garden, Tanzania Forestry Research Institute, Tanga
Raymond Roman Killenga
Co-ordinator of Surveys, East Usambara Catchment Forest Project, Tanga
Donatus Bayona
Ecologist, Ruaha National Park, Tanzania National Parks

Kenya
Shadrack Kengere Sanganyi
Technician, Genebank, Kenya Agricultural Research Institute
Alsen Otieno Oduwo
Co-ordinator, Community Mobilization Against Desertification (C-MAD)
Hamisi Juma Mududu
Agriculturalist, Coastal Forest Conservation Unit, National Museums of Kenya
David Nyakundi Okebiro
Senior Technologist, East African Herbarium, National Museums of Kenya
Lucy Muthoni Mwaura
Technician, Seed Centre, Kenya Forestry Research Institute

Uganda
Aggrey Rwetsiba
Warden, Kibale National Park, Uganda Wildlife Authority
Joel John Asega
Agriculturalist, Entebbe Botanical Gardens, National Agricultural Research Organisation
Jane Frances Nyafuno
Curator, Herbarium, Forest Department

C.A.M.P. Training Workshop Timetable

Week 5	FEB/MAR	0830-1030	1100-1300 (LUNCH) 1400-1600	1600-1800	1930-
Friday	29	Depart NMK for Moshi, Tanzania			Overnight at Moshi
Saturday	28	Depart Moshi for Amani			Short introduction to Amani, CAMP and domestic arrangements.
Sunday	1	Mbomole Hill Trail - introduction to Amani Nature Reserve and issues for Workshop - Mr Shedrack Mashauri	Preparation for Opening Ceremony		
Monday	2	Opening Ceremony (QL - survey of *Gigasiphon macrosiphon* site at Kiuhui)	Overview of project and presentations by stakeholders		CAMP process, Categories of Threat and Timetable - Mike Maunder and Clare Hankamer
Tuesday	3	**Site visit 1** - Kwamkoro Forest Trail *Saintpaulia difficilis* - Gp 1 *Cephalosphaera usambarensis* - Gp 2 *Beilschmiedia kweo* - Gp 1 **Site visits 2** - Ndola Trail *Cynometra longipedicellata* - Gp 1	Groups assign Categories of Threat for species worked on for that day (IUCN Building, Amani)		Groups assign Categories of Threat for species worked on for that day
Wednesday	4	**Site visit 3** - Mbomole Hill Trail *Cola usambarensis* - Gp 1 *Cynometra brachyrrachis* - Gp 1	Gp 2 - *Coffea mongensis*, *Coffea* sp. A (FTEA)		ditto
Thursday	5	**Site visit 4** - Monga Forest Trail *Saintpaulia grotei* - Gp 1 Amani Botanical Gardens - *Cephalosphaera* exptl. plantation	Gp 2 - *Gigasiphon macrosiphon, Ficus faulkneriana*		ditto
Friday	6	Groups work on finalisation of Categories of Threat and production of Management reports	Discussion and consensus on Categories of threat for the 10 species studied - involving resource people, key botanists.		Official close of workshop
Saturday	7	Group departs for Nairobi, via Moshi			Stay overnight Moshi
Sunday	8	Depart Moshi			Arrive at NMK

Official Opening Ceremony of Conservation Assessment and Management Plan Training Workshop
NMK-Darwin Plant Conservation Techniques Course for East Africa
Amani Nature Reserve,
Monday 2nd March, 1998

Convenor: Mr Shedrack Mashauri, Nature Reserve Officer, Amani Nature Reserve

Introduction: Philemon Shelutete, Muheza District Commissioner

Opening Speech
given by the Tanga Regional Commissioner, Capt. George H. Mkuchika

Dear organisers, Our Distinguished Guests, The Muheza District Commissioner, Ladies and Gentleman,

1. First of all, may I take this opportunity to join my fellow Tanzanians in welcoming to our country our distinguished guests who have come from different parts of the world in order to come and participate in this course. I have been informed that the majority of course participants are from East Africa and some course organisers and resource persons come from America, Europe and Africa. To all of you I say welcome to Tanga Region, Tanzania and in particular at Amani Nature Forest Reserve in Muheza District. It is my sincere hope that you will enjoy the pleasant weather, environment, and the hospitality of our local people around Amani.

2. Secondly, may I take this opportunity to thank the organisers of this course for inviting me to participate at the opening ceremony and also by being kind enough to give me the opportunity to speak a few words: I am also told that you had formal training in Nairobi at the National Museums of Kenya which was conducted in collaboration with Royal Botanic Gardens - Kew and you have come here for fieldwork scheduled for one week. I don't need to over-emphasise the importance of this course. The world today is experiencing obvious and rapid extinction of plants and animal species. This kind of biodiversity erosion and many other forms of environmental degradation is threatening human survival and the situation is worse in developing countries like Tanzania. So, holding this course at this time and choosing Kenya and Tanzania as practical training grounds is quite timely.

3. Dear course participants, there is a clear cause-and-effect relationship between poverty and environmental degradation. That environmental degradation leads to widespread poverty and poverty is a habitual course of environmental degradation. As people struggle to satisfy their basic needs for survival aspects of environmental concerns may not be relevant. What matters is survival while environmental protection receives marginal attention.

4. Ladies and Gentlemen, today you witness the product of good protection and conservation efforts of the Amani Nature Forest Reserve. This product is one of the fourteen biodiversity hot spots in the world. I am told that in the Eastern Arc Mountains, East Usambara and in particular the Amani area where you have chosen to conduct your field work, ranks high within Tanzania in terms of biological diversity and endemism. However, because of high population pressure certain species of plants are already threatened by human interference.

5. Since your course focuses on plant conservation techniques, I am convinced that by the time you leave this place you will have acquired relevant knowledge and skills in the conservation of the already threatened plant species. Not only that, but also you will attempt to suggest different management systems in order to improve their number and frequencies. I also believe that what you have learnt as far as plant conservation techniques are concerned will be of great benefit to you as individuals, your organisations and your country as well.

6. Honourable guests, ladies and gentlemen, conservation knowledge is very vital especially to our Amani Nature Forest Reserve which is the first Nature Reserve to be established in the history of forestry industry in Tanzania. It will help to make sure that strategies for protecting these plants are in place and followed for maximum impact. One big challenge to any conservationist of biodiversity or any other form of ecosystem, is an ability to tie the conservation values and efforts together and convincing local communities and decision makers to visualise and appreciate those values. It will be of no use and waste of resources if local communities and decision makers, won't understand your conservation language. The importance of community involvement and participation in environmental conservation work cannot be over-emphasised. I therefore call upon you to seriously consider the aspects of local communities' involvement in the conservation of flora and fauna. Furthermore, local communities indigenous knowledge and techniques in conservation be applied in order to complement scientific knowledge. It is also important to ensure that the conservation efforts are sustainable and that local communities are benefiting.

7. Ladies and Gentlemen, before I declare this field work officially opened, may I again take this opportunity to thank the organisers of this important course, the management of East Usambara Catchment Forest Project, who are our host here at Amani, the East Usambara Conservation and Agricultural Development Project and local residents whom you will stay with for a week long field practical, for their warm welcome and willingness to have you here. It is my hope that you will enjoy your fieldwork and gain new techniques in plants conservation for the benefit of today and future generations.

With these few remarks, I declare the CAMP on plant conservation techniques officially opened.
THANK YOU.

Welcoming Speech and an Overview of the East Usambara Catchment Forestry Project (EUCFP) Activities

Given by the Acting Project Manager, Mr Evarest Nashanda, EUCFP

1. Guest of Honour, Regional Commissioner for Tanga, Honourable Captain George Mkuchika, District Commissioner for Muheza, Honourable Fillemon Shelutete,

Distinguished Guests,
Ladies and Gentlemen

2. In front of you are the course participants for the Darwin Course for Plant Conservation Techniques for East Africa and all are coming from East African states. Resource persons are from Kenya, Tanzania, Uganda, United Kingdom and United States. First of all let me take this opportunity to welcome you all in East Usambara Catchment Forest Project and in particular the Amani Nature Forest Reserve, KARIBUNI SANA.

3. Guest of Honour;
The East Usambara Catchment Forest Project is one among several Catchment Forestry Projects implemented by the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism. The project is getting technical and financial support from the Finnish Government. The long-term development objective for the project is Effective conservation of forests in the East Usambara for preservation of biological diversity and promotion of sustainable catchment forestry and land use management, for the benefit of local and global communities.

4. Guest of Honour;
The immediate objectives of the phase II of the project are:

1. Establish Management of Amani Nature Reserve to promote biological diversity preservation.
2. Establish new catchment forests and consolidate existing ones through improvements in watershed management practices.
3. Encouraging and assisting local communities to undertake farm forestry and improve land management practices, to reduce pressure on natural forests and women's' workloads in fetching forest produce.
4. Improve institutional capacity to plan for and manage forests on a sustainable and collaborative basis.
5. Strengthened research and monitoring on forest ecosystems and their management.

In order to address all these objectives the project has identified five components, the Amani Nature Reserve component, Catchment forestry components, Farm forestry component, Institutional Component and Research and Monitoring. All these components work together to achieve the above mentioned objectives.

5. Guest of Honour;
The Phase I of the project started in 1991 and ended in 1994, this is the last year of the phase II which started in 1995. In terms of achievements the project has managed to legally establish Amani Nature Forest Reserve, the area of which is 8,380 ha and was officially gazetted in May 1997. The Management Plan for Amani Nature Forest Reserve is in the final stage. The project is striving hard to raise its status to attain an international standard.

Through enlargement and establishing of new forest reserves, vegetation cover with legal protection in East Usambaras has increased by 11,800 ha which is 35% of the existing forest cover. Illegal activities inside forest reserves such as cultivation, mining, pitsawing, etc. have been reduced to a greater extent. Regulation of local climate, water discharge and quality has improved tremendously.

6. Guest of honour;
The local communities in the East Usambaras depends on forests and forest products for their livelihood. In order to ensure that forest products and services are sustainably obtained without jeopardising the conservation objectives, the project has initiated farm forestry activities such as: tree planting, agroforestry, beekeeping and fish farming as alternative sources of forest products to the villagers neighbouring the forest reserves. To consolidate conservation effort, the project is also involving local people in forest management through joint forest Management and elders in conservation programme, whereby indigenous conservation knowledge and techniques are taught to school children.

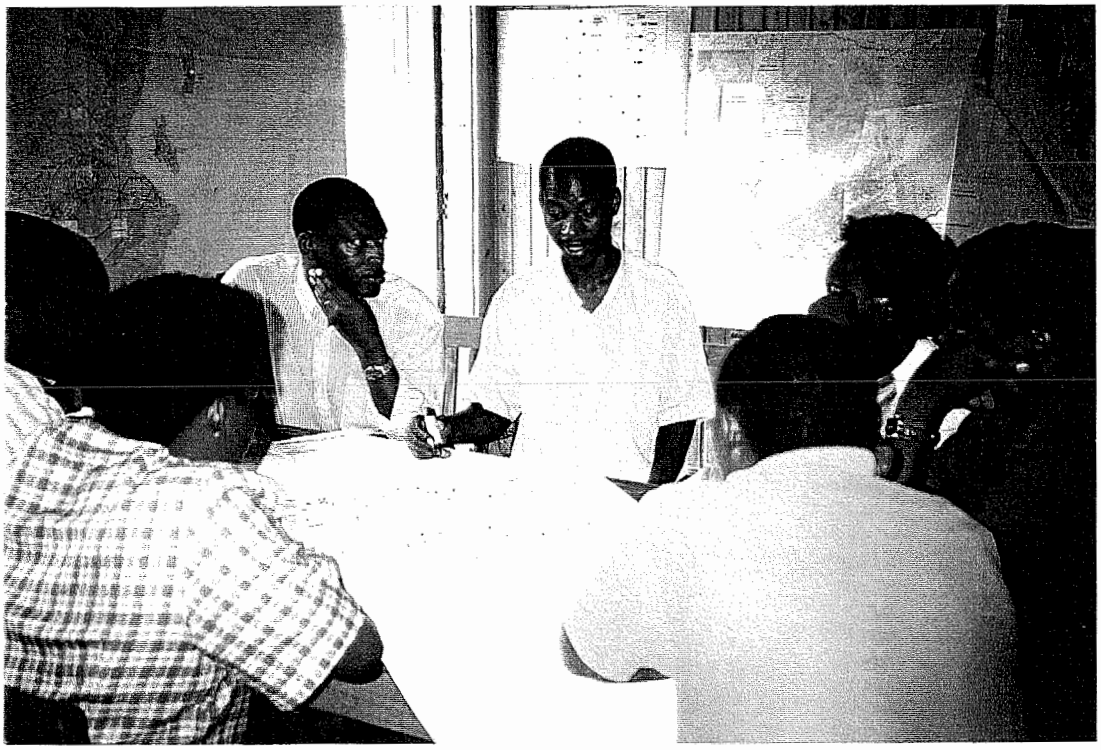
7. Guest of honour;
To ensure better management of forest resources on public land by the local people, about 176 ha of forests in East Usambara are managed by villages as Village Forest Reserves. These villages are Hemsambia, Vuga and Mgambo. There are requests from other villages to be assisted to reserve their own forest reserves.

8. Guest of honour;
The major challenge facing the project is financial sustainability as all these forest resources here in this East Usambaras and especially Amani Nature Forest Reserve are for conservation purposes. To solve this problem the project has various strategies among which are promotion of ecotorism in the Nature Reserve and link the area with Northern Circuit (Mkomazi Game Park, Kilimanjaro, National Reserve, Arusha, National Parks: Ngorongoro and Serengeti). Currently, there is high potential of tourism at this area if developed to tourism standards.
Local community will also be involved in the business and they will benefit in a way. A by term plan is to make Amani an Ecological Centre for the Eastern Arc Mountains whereby ecologists and various scholars can come and do various research and training. To ensure that various conservation and interested groups are involved in the conservation of Amani Nature Forest Reserve, the project has proposed establishment of the Amani Nature Reserve Conservation Fund and forwarded to Forest and Beekeeping Division for further steps. We presume that your office will be the first donor of the fund after it is legally established.

9. Guest of honour;
The major problems with conservation effort in East Usambaras, are the fragmentation of forest reserves and land scarcity for local people. Although the possibilities of solving these problems exist, the major drawback has been financial resources that could be used to compensate people along the corridors.

Guest of honour with those few remarks, I repeat Karibuni sana and feel at home.

DISCUSSION FORUM: PLANT CONSERVATION ISSUES FOR THE EAST USAMBARA MOUNTAINS



Workshop Discussion Group working on Management Recommendations

DISCUSSION FORUM: PLANT CONSERVATION ISSUES FOR THE EAST USAMBARA MOUNTAINS

MONDAY, 2 MARCH 14:00-17:30, LOCATION: IUCN BUILDING - AMANI

Aim: to highlight the threats to plant biodiversity in the East Usambaras and to discuss the role of local stakeholders in forest conservation and management.

CHAIR

Perpetua Ipulet, Course Co-ordinator, NMK-Darwin Plant conservation Techniques Course for East Africa

1. CONSERVATION OF BIODIVERSITY IN THE EAST USAMBARAS:

Approaches and experiences from the East Usambara Catchment Forest Project, Tanzania

Johansson, S.G., Katigula, M.I.L., Mashauri, S. & Mndolwa, A.

Introduction

The East Usambaras form part of the Eastern Arc, a chain of isolated forested mountains in Tanzania. They are located near Tanga town, at the north-eastern coast of Tanzania. These forests are a globally known biodiversity "hotspot" and among the centres of plant diversity (Myers 1988; WWF & IUCN 1994). The diversity of flora and fauna is considerable and the forests are important because of an exceptionally high degree of endemism. This has been associated with relatively stable environmental conditions for perhaps more than 30 million years (Rodgers & Homewood 1982; Kingdon 1990; Lovett & Wasser 1993). Moreover, this uniqueness of the flora is associated with isolation from and linkage to the larger central African forest blocks over millions of years, and the presence of large numbers of phytogeographical elements, particularly the Afromontane archipelago-like centre of endemism and the Somalia-Masai regional centres of endemism (Iversen 1991b; Rodgers & Homewood 1982). Iversen (1991b) estimated that out of a total of 2,855 plants about 25% are endemic to the Usambaras; perhaps the best-known endemic plant species are the three or four sub-species of African violets (*Saintpaulia* spp.). Biologically the richest elevational zone is between 800-1200 m a.s.l. The East Usambara forests are considered among the most valuable areas for conservation in Africa (e.g. Newmark 1992; Rodgers 1993) and some authors have compared its biological importance to the Galapagos Island (Rodgers & Homewood 1982; Kingdon 1990). Furthermore, the forests also form the catchment for Sigi River and are crucial for the Tanga water supply.

The present land use situation in the East Usambaras is partly derived from the relatively low population density during early colonisation, which enabled Germans to take over large parts of the Amani plateau at the southern tip of the Usambaras. The forests of these German estates have over time developed into the present network of forest reserves, while the agricultural areas developed mainly into the present tea estates, which cover about 3,000 ha on the plateau. In a similar progression the lowland foothill areas developed into sisal and other large-scale agricultural estates forcing local small-holders to carve out their living along the slopes. Small-holder agriculture in the Usambaras is still in a semi-shifting cultivation stage, where pressures on land and productivity have been moderated by clearing new forest areas into cultivation, and where cash crops such as cardamom have played a major role in the expansion of agriculture into the forests (AFIMP 1988, Atampugre 1991).

The biological and conservation value of the forests was realised already in the late nineteenth century by the German colonial administration (Schabel 1990; Iversen 1991b). They contain valuable timber species and commercial logging was started late last century,

[1] This paper was originally prepared for the conference on African rainforests and the conservation of biodiversity 17—24 January, 1997, Limbe, Cameroon.

while simultaneously large-scale forest clearing was done to create coffee and tea plantations, which partly continued up to independence. Simultaneously small-scale agriculture has expanded, often at the expense of forests (Hamilton & Bensted-Smith 1989; Iversen 1991a). Commercial harvesting continued until mid-1980's but was stopped in 1987 due to environmental concern but pitsawying continue until early 1990's. Rodgers & Homewood (1982) estimated that 50% of the public land forests in Amani have disappeared between 1954 and 1978, while AFIMP (1988) estimated that only slightly over 5,000 ha were intact by 1988. Clearing for agriculture has also increased forest fragmentation, and some authors consider this a major threat to biological diversity in the East Usambaras (Newmark 1992, 1993). Presently, only 4—5 major blocks of forests remain and proposals for establishment of corridors between these have been made (EUCFP 1995; Newmark 1992, 1993).

The establishment of a nature reserve in Amani, which is the area with the highest frequency of endemic plants, was officially proposed in 1988 by the Amani Forest Inventory and Management Plan Project (AFIMP 1988). Large parts of the area was formerly gazetted in six forest reserves managed by the Forestry and Beekeeping Division (FBD). The proposal was to combine these reserves into a nature reserve with an explicit biodiversity conservation aim. An important part of the Amani Nature Reserve is the Amani Botanical Garden which was initially developed as the trial plantations of the "Biologisch Landwirtschaftliche Institut, Amani" established in 1902 by the Government of German East Africa (*Der Pflanzer* 1914). Between 1902 and 1914 about 200 ha, of the total area of 300 ha, were developed as trial plantations, including close to 1,000 different exotic species from similar ecological zones in the tropics in a development parallel to the development of the Limbe Botanical Garden in Cameroon. These plantations now form what is known as the Amani Botanical Garden, more appropriately perhaps termed an arboretum, which still is one of the largest botanical gardens in Africa.

The East Usambara Catchment Forest Project (EUCFP) has worked in the East Usambaras mountains since 1990 with the mission to protect these natural forests. The project aims at establishing the Amani Nature Reserve (ANR); protecting water sources; establishing and protecting forest reserves; sustaining villager's benefits from the forest; and rehabilitating the Amani Botanical Garden. The project is implemented by the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism (MNRT) with financial support from the Government of Finland, and implementation support from the Finnish Forest and Park Service (FPS). The total financial support for the two first phases 1991-98 amounts to a total of 6.1 million USD or about 3.6 billion Tshs.

The general approach of the project

The project tries to address primarily two major issues: the management of Amani Nature Reserve as a protected biodiversity conservation area; and the pressure on the protected forests caused by the local agricultural land use and forest dependency.

The assumption is that eventually conservation will not be possible unless the Tanzanian government has a genuine interest in doing this, which means allocating sufficient resources to do so. This will only be possible if the conservation area is sufficiently well known – in an ideal situation will become another Ngorongoro or Serengeti – and that there is both a local and international commercial and economic interest, and pressure to preserve the area, while

this simultaneously would generate revenue and foreign exchange for the country. The area would be associated with the image Tanzania present to the international community. For the project this means focus on publicity and public relations work, bringing the East Usambaras to stand out of the "mass of national parks and conservation areas" - giving it an identity of its own. The focus on visitors, many of which come for a specific interest in flora and fauna, also means that the area would have a permanent presence of people, who by their presence would control and notice developments which are not in line with the conservation objectives. Finally the governments capacity in managing market linked functions such as tourism in protected areas, is weak. One approach may be to privatise, through franchise or other similar arrangements, parts of or the whole protected area service activities.

Secondly, in order for the local communities to appreciate conservation and accept the general restrictions caused by a more strict conservation management there has to be benefits which are associated with conservation. This could be revenue sharing, support to local small-scale business to provide tourist oriented services, in a transition stage a support to other community defined needs to help the local villages adapt to a changed land use situation. The focus on farm forestry and community participation are the strategies in which the project tries to address these needs.

Conservation of the East Usambaras - some achievements and experiences

New protected forests

In 1993 a land use mapping was done, which covered a total area of about 83,601 ha, including all submontane areas and most of the lowland forest areas except north of the main East Usambara range. In this classification about 50% of the area was classified as forest, while about 19,713 ha of the natural forest, roughly 50% of both the sub-montane and lowland forest, was within the legally protected forest reserves (Hyytiäinen 1995). Despite problems associated with the protection of forests in forest reserves, it appeared obvious that without a legal basis for protection the remaining forests in the un-reserved public lands would disappear from the East Usambaras. Hence the project choose to survey as much as was feasible, within the limitations of the socio-economic context, and bring these forests into the forest reserves or Amani Nature Reserve.

Between 1992 and 1996 EUCFP surveyed more than 12,000 ha of forests as parts of enlargement of old or establishment of new reserves. Much of this is, however, still in the process of being gazetted (Johansson & Sandy 1996). The inclusion of some of the northern areas which were not included in the AFIMP aerial survey in 1986, brought the forest area up to 45,137.7 ha. Presently about 32,000—35,000 ha or 75% of the total forest area is or will be within the Amani Nature Reserve or the gazetted forest reserves (Table 1). Presently the Amani Nature Reserve and 13 of the 17 forest reserves (four are teak plantations) in the East Usambaras are managed with support from EUCFP, covering a total area of 29,351 ha.

Table 1. Distribution of the East Usambara forests into forest types, density classes, and between reserved (Forest Reserves) and non-reserved forest lands including the surveyed and the proposed forest reserve enlargements but excluding the proposed forest corridors.

Forest class/sub-class	Total, ha	Outside F.R., ha	% of total	Inside F.R., ha	% of total
Sub-montane rain forest					
Dense forest	6,940.2	839.1	12.1	6.101.1	87.9
Poorly stocked forest	470.6	453.9	96.5	16.7	3.5
Cultivation under forest	5,505.8	3,269.7	59.4	2,236.1	40.6
sub-total	*12,916.6*	*4.562.7*	*35.3*	*8,353.9*	*64.7*
Lowland forest					
Dense forest	15,179.6	348.8	2.3	14.830.8	97.7
Poorly stocked forest	8,756.7	2,582.7	29.5	6,174.0	70.5
Cultivation under forest	5,561.1	3,611.6	64.9	1,949.5	35.1
sub-total	*29,497.4*	*6,543.1*	*22.2*	*22,954.3*	*77.8*
Plantations					
Eucalyptus	493.4	491.7	99.7	1.7	0.3
Maesopsis	529.0	20.5	3.9	508.5	96.1
Teak	1,682.6	11.2	0.7	1,671.4	99.3
Other species	18.6	18.6	100.0	0.0	0.0
sub-total	*2,723.6*	*542.1*	*19.9*	*2,181.5*	*80.1*
TOTAL	**45,137.6**	**11,647.9**	**25.8**	**33,489.7**	**74.2**

Mapping biodiversity

Baseline biodiversity surveys were initiated by EUCFP in July 1995, executed by Frontier Tanzania, under contract to the EUCFP. The aim of the surveys was to provide baseline information on the biological values of different forests as a basis for management planning and long-term monitoring, as well as training in the use of biological inventory techniques. The programme has been carried out over four ten-week phases. Altogether this will provide systematic inventory information on the flora and fauna of eight forest reserves or more than 9,000 ha in the East Usambaras. Earlier work (during 1994/95) by Frontier, using a slightly different method provides additional information on the biodiversity values of a few other forests. The field work involves short-term expatriate volunteer Research Assistants, as well as permanent EUCFP, Frontier and University of Dar es Salaam staff as well as an international network of taxonomists and other experts. The work has become progressively more systematic and quantitative. The project has already resulted in the discovery of several taxa previously unknown to science, and this will undoubtedly raise awareness of the unique biodiversity values of the East Usambaras. According to an evaluation which was conducted in August 1996, the field work generates an enormous amount of potentially useful data in a highly cost-effective manner (Howard 1996). Presently, a biodiversity database, linked to the national database, is developed.

The surveys have proved to be quite useful and they have already had a considerable impact. Firstly, they provide information on new species and range discoveries, which are used in the argumentation for and publicity on the conservation of the East Usambaras. Secondly, they are providing information for the zoning and management of the individual forest reserves so that areas with priority conservation value can be protected. Thirdly, the exposure and

training that the forestry staff has received while participating in the 10-week field surveys have considerably changed their perspective on biodiversity and conservation.

Containing pitsawying and agricultural encroachment

A major effort has been made to contain pitsawying, agricultural encroachment, mining and other illegal activities, which were rampant within the reserved areas until the early 1990's, through re-establishment of reserve borders, patrolling, awareness and extension activities in the villages. This has been rather successful and reported incidents are presently rather few. Despite problems, the forest reserve system must be credited for having maintained much of the forests in the East Usambaras (Hamilton & Bensted-Smith 1989). One reason for this may be that already several generations have lived with the forest reserves and are aware of the restrictions imposed. For example in a study by Kajembe & Mwaseba (1994) about 95% of respondents in 14 villages were aware of the forest reserves. Some of the most frequently mentioned benefits were rains, building poles and fuelwood, while the problems were related to availability of land and supply of forest products.

A recent study on the various approaches adopted by the EUCFP on the control of utilisation of forest reserves indicates that the consultative approaches used in villages where pilot village forest management has been tested is more successful than the more traditional enforcement approach (Kidombo1997). However, from the experience in the East Usambaras, it seems that without the initial enforcement with court cases and fines for illegalities, the consultative approach may be too slow in containing a situation where control has been lacking for several years.

On the other hand it is obvious that only setting boundaries without considering the problems affecting people with increasing conservation restrictions, will cause increasing tension between forest managers and the communities, and erode the respect for the protected areas. The experience from the East Usambaras speak for the benefits of a strong involvement of the local political and administrative system. Continuous contacts and discussions with Regional, District and village administrative and political authorities both during gazettment as well as when containing forest disturbance have proved quite effective and useful in moderating the problems.

Joint forest management of government forest reserves

A major challenge for the EUCFP is participatory management of the protected forests. Management means mainly discussing and agreeing with the local communities on their needs and how these needs should be met, whether from the public land forests or from the forest reserves. A dialogue and interaction with the communities is particularly important in the areas where new forest reserves have been established or old ones have been enlarged. EUCFP has made some efforts to strengthen villagers rights to manage their own forests while a model for joint forest management of government reserves is drafted but yet to be tested (Johansson 1996, 1997). These proposals are based among other things on the following hypothesis:

- Local community management of non-reserved forest will not succeed unless provided with sufficiently strong legal and institutional basis for administration and management which also recognises the tenure to forest resources;
- Joint forest management of government forest areas is only possible if the roles and aspirations of the partners are defined and understood in a practical and concrete manner, where especially the authority and legal mandate of the forest service is accommodated, and where there are concrete benefits and where the integrity for all partners, especially the local communities, are secured and sustained;
- Ownership is a pre-requisite for good resource management but land ownership and tenure can be substituted by rights to concrete economic benefits from or well defined incentives linked to the forest, especially if those concrete benefits are directly retained at the village level;
- There will be no sound forest management neither sustained agroforestry-based land husbandry unless there is a price or value on the forest resources, especially formerly free commodities such as fuelwood, polewood etc.;
- A price on the forest resources is an incentive to tree planting, forest management, and agroforestry-based land husbandry by local, forest adjacent surrounding communities.

The approach would call for discussions with the villages; village authorities, and forest products user groups in the villages, where criteria are defined for collection of specific forest products. A method to determine village collection ranges will be developed and tested, and the ranges would be determined. A village institution is identified, which will have the authority to issue permits to villagers, and which will have the responsibility to control and collect revenue from utilisation. Prices are defined for different products; fuelwood, polewood, etc. These should have to consider the ability of villagers and users to pay, and the actual availability and cost of alternatives. Moreover, the village should determine a pricing and control system also to forests outside the forest reserves but within the village land husbandry. The revenue collected from the utilisation of the forests reserves would be split between the village, while the revenue from the "public land forests" would be retained by the village. An arrangement for reporting and accounting has to be drafted between the village and FBD and the forest officer in charge of the forest reserve will review the reporting and accounts together with the village authority, and discuss problems, issues requiring attention etc.

This arrangement could have several merits. It would give the authority and responsibility of utilisation and control to the village. It will reduce the distance between the foresters, the forest and the villagers, and it would de-criminalise villagers entering forest reserves. It develops a price for previously free commodities and hence creates an incentive for people to cater for their own needs e.g. by tree planting. It creates an incentive for the village to control and use the resource in a sound manner as it will generate revenue for village development. It has a potential of considerably reducing the amount of time and funds paid on forest reserves patrolling and enforcement.

There may also be several risks. People may refuse to pay even nominal fees. The revenue may not be seen as an incentive because it primarily circulates and re-distributes funds within the village rather than bringing new economic resources to the village disposal. FBD or the Districts may not accept a split of the revenue or propose a split which is unattractive to the villages. There are always risks that the revenue will be mismanaged both at the village and

in the arrangements between the village and the forest authorities. Selected groups in villages may become marginalised etc. However, this model, which undoubtedly is far from complete nor ideal, will be tested in 1997 and will provide us some ideas of what may be possible within the Tanzanian and the East Usambara context.

Village forest management and farmer-to-farmer extension

Traditionally farmers have always been exchanging knowledge on growing crops. The project found it difficult to work with villagers using external professional forestry knowledge only partly because of limited staff numbers and partly because foresters have not been trained to deal with farmers problems, which mostly are concerned with growing crops or raising livestock. The use of local knowledge, using farmer-to-farmer extension, seemed a more promising approach, both in village forest management and farm forestry. The approach is based on the notion that a farmer will readily appreciate information and experience only from someone who is faced by the same constraints and situation as he or she is in, and on issues which seem to bring a positive change for his farming or household income. In this context farmer-to-farmer extension means that the project's role is primarily in facilitating communication, discussion and analysis between farmers in order for them to develop their own ways to deal their land use problems and opportunities. The project also tries to challenge farmers with new information and new situations by taking them on study visits to other areas. The follow up is based on transferring farmer experience by facilitating discussions among farmers from other villages, sometimes distant and far apart (Kijazi *et al.* 1996; Johansson & Kijazi 1997).

The farmer-to-farmer approach was used to conserve village forests and has been tried in Mpanga and Handei village forests. Vuga and Hemsambia are two villages sharing a 30 ha forest known as the Mpanga forest. The Mpanga village forest belonged to the "Wakilindi" clan, and was used for worshipping and ritual purposes. In 1993 the villagers requested the EUCFP to gazette the area as a central government forest reserve so that it could be rescued from exploitation. Instead the project decided to make Mpanga into a pilot case to develop a model for local management of village forests. The approach was to facilitate discussions in the villages about the forest and how it should be managed, and to provide technical advise and inputs if required. In a joint effort with the villagers, the Mpanga forest was surveyed, the boundary was demarcated and planted with *Grevillea robusta*, and a boundary map was drawn. This map also was an attachment to the by-law and thus has a legal function. The villages drafted rules to guide the management of the forest and these were approved as a by-law by the District Council.

The Mgambo village in Amani Division, was also experiencing similar problems with the management and protection of their own forest. Partly because of uncertainty of the intentions of the project, which simultaneously was gazetting forests in the same area, and partly because of inconsistent signals from other projects, the villagers were initially suspicious and reluctant. However, rather than trying to convince the farmers through traditional means, the project assisted by facilitating a discussion between the farmers involved in the Mpanga forest management and those in Mgambo village. Farmers from Vuga and Hemsambia were taken to Mgambo village where they presented what they had done in their own forests. They discussed with and advised the Mgambo farmers on the problems, and the concerns they were facing. Later a number of Mgambo villagers were taken to Mpanga to see what had been done. Very

intensive and practical discussions followed in the village and inside the forest. Eventually the villagers started the process to develop the management procedures, rules and restrictions. They also requested for a formal survey of the forest, which was completed in early October 1996. Now Mgambo village is working on the drafting of rules, which as in the Mpanga case will be given legal authority by having them adopted as a by-law in the District Council. Now there are requests for similar assistance from other villages.

Similar approaches are used in the establishment of on farm tree nurseries, where species are selected by the villagers themselves according to their end uses. Women have been involved in various forestry and land use activities, including small tree nurseries, in attempts to assist them in solving problems of land availability for tree planting. Pilot groups are used to facilitate the process in other villages (Shelutete 1996). EUCFP has also started to work with environmental education in primary schools by involving elders and "forest specialists" in the villages (Kigula *et al.* 1996).

Conclusions

Many of these approaches and ideas are still at a very early stage or yet to be tested in practice. There are, however, indications that the general assumptions and some of the approaches may work. The rationale for the gazettment of new areas was based on the assumed rapid loss of public land forests in the Usambaras but on the other hand the capacity of FBD to manage forest reserves is weak without a considerable external support as is the case in the East Usambaras. However, the other rationale for the gazettment was one from agricultural development, which indicates that changes in land husbandry emerges from a combination of force (e.g. limited availability of land) and incentive (extension, technical assistance to farmers, market development etc.). In this perspective the reservation of land may be justified, if this is followed-up by a genuine effort to understand the farmers' situation and a willingness to assist them in the adaptation in a new land use situation. This is the main challenge both for joint forest management, as well as village forest management and farm forestry. Whether this will work or the project effort is sufficient remains to be seen. Some reservations have to be made as the experience from other rural development efforts based on conservation in the East Usambaras do not seem to have produced many lasting impacts.

It also seems that a pre-requisite for proper land management or conservation is a clear legal authority to land management; whether in terms of by-laws or possibly land titles for village forest management or gazettment of the forest in case of protected areas. Unless such a basis is developed most participatory or joint management arrangements may remain temporary social contracts. Another aspects, is the need to ensure transparency at all levels of developing broad-based community arrangements to avoid that secluded groups assume resource access under the "community responsibility" blanket. Along the same line is the need to look for means of strong incentives and linkages between individuals or groups and the asset or resource that they manage; whether through direct privatisation or other commercial arrangements.

Ideally in the farmer-to-farmer approach decisions made at the household and farm level are products of local people's ideas, views, needs, arrangements and agreements. Decisions are also based on a local analysis with arguments which are developed by farmers and hence are more easily understood by other farmers. Farmers have appreciated opportunities to visit other areas

and talk to each other; implementation is done by people themselves and the projects role is more in facilitating the process, providing ideas and technical support, monitoring and evaluation of the programme. Another advantage of this has been to involve both farmers and field staff in farmer-to-farmer activities to create a more conducive environment between professional extension staff and the farmers, which helps staff to understand the concerns and problems of farmers.

Why has this not taken place before, why has local management initiative not developed without the facilitation of the project? Local management systems are breaking while there are increasing pressures on the resources. It seems, that the project functions as a mediator, while it also brings ideas, new perspectives and innovations into the communities. Probably the process, such as the development of village forest management, also helps the communities to regain some strength to solve their own problems and establish a legal framework for management and control of their own resource.

However, it is yet far too early to say whether this would work in the long run. Can foresters assume this role in extension, is this sustainable? The projects' role in an activity such as farm forestry can only be one of a catalyst and several reservations must be made on the capacity for forest extension to change scope especially under normal circumstances without external support. The purpose of the farmer-to-farmer approach is to facilitate exchange of information and to bridge information and innovation gaps. Generally, profitable and useful techniques do not need extension, information travels on its own. Hence the reasoning is that, if this is found a useful method, where farmers develop suitable techniques and approaches which will benefit themselves, the information will soon travel on its own, and farmers will find their own ways of passing on or acquiring information. Then no transporters or facilitators are required. If this would not happen, the information or the knowledge does not make sense to the farmers, and in such a case extension probably would not pay off anyway. Therefore, the use of local knowledge, using the farmer-to-farmer extension approach, seems to be crucial for a successful conservation programme in the East Usambara mountains.

REFERENCES

Amani Forest Inventory and Management Plan Project. 1988. East Usambara Mountains - Forests and Forestry; Forestry and Land Use; Maps and Diagrams. – Forest Division of Tanzania & Joint Venture Finnmap-Silvestria, Dar es Salaam & Helsinki.

Atampugre, N. (ed.). 1990. Whose trees? – The Panos Institute, London.

EUCFP. 1995. East Usambara Catchment Forest Project - Project Document Phase II 1995—98. – Ministry of Finance & Dept for International Development Co-operation, Dar es Salaam & Helsinki.

Hamilton, A.C. & Bensted-Smith, R. (eds.) 1989. Forest conservation in the East Usambara Mountains, Tanzania. – IUCN, Gland.

Howard, P.C. 1996. Baseline biological surveys in selected East Usambara forest reserves and forests, 1995-96 - project evaluation report. – East Usambara Catchment Forest Project Techn. Pap. 21, Forest and Beekeeping Division & Finnish Forests and Park Service, Dar es Salaam & Vantaa.

Hyytiäinen, K. 1995. Land use classification and mapping for the East Usambara Mountains. - East Usambara Catchment Forest Project Techn. Pap. 12, Forest and Beekeeping Division & Finnish Forests and Park Service, Dar es Salaam & Vantaa.

Iversen, S.T. 1991a. The Usambara mountains, N.E. Tanzania: history, vegetation and conservation. – Uppsala Univ., Uppsala.

Iversen, S.T. 1991b. The Usambara mountains, N.E. Tanzania: phytogeography of the vascular plant flora. – Ph.D. thesis, Uppsala Univ.

Johansson, S. 1996. Joint forest management - if there is a will there is a way. In: L. Mshana& G. Rweyemamu (eds.), Focus on farmers. Workshop on farm forestry and village forest management in the East Usambara, Panori Motel, 8 May 1996. – East Usambara Catchment Forest Project Working Pap. 17. Forest and Beekeeping Division and Finnish Forest and Park Service, Dar es Salaam and Vantaa.

Johansson, S.G. 1997. Joint Forest Management in the EUCFP. *Misitu ni Mali (Forestry is wealth)* 3 (2): 32—34.

Johansson, S. & Kijazi, M. 1997. Farmer-to-farmer extension. Village forest management in East Usambara Catchment Forest Project. *Misitu ni Mali (Forestry is wealth)* 3 (1): 7—9.

Johansson, S & Sandy, R. 1996. Protected areas and public lands. Land use in the East Usambara. – East Usambara Catchment Forest Project Technical Paper 28. Forest and Beekeeping Division and Finnish Forest and Park Service, Dar es Salaam and Vantaa.

Kajembe, G.C. & Mwaseba, D. 1994. The extension and communication programme for the East Usambara Catchment Forest Project. - East Usambara Catchment Forest Project Techn. Pap. 11, Forest and Beekeeping Division & Finnish Forests and Park Service, Dar es Salaam & Vantaa.

Kidombo, P.K. 1997. Policy instruments and peoples responses in natural forest management. Examining the effectiveness of combining participatory and regulatory policy instruments. A study in Maramba Division - East Usambara, Tanzania. M.Sc. Thesis, Dept of Land Resources Survey and Urban Sciences. International Institute for Aerospace Survey and Earth Sciences (ITC), Enchede.

Kigula, J.J., Kijazi, M., Msonde, C. & Katigula, M.I.L. 1996. Elders in conservation. Report of an East Usambara elders workshop held 24 July 1996, Hotel Ambassador, Muheza. – East Usambara Catchment Forest Project Working Paper No. 30. - Forestry and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.

Kijazi, M., Johansson, S., & Mmasi, S. 1996. Farmer-to-farmer extension: Experiences from farm forestry and village forest management in the East Usambara Catchment Forest Project, Tanzania. Paper prepared for the 5th Regional Conference "Integrating Research, Extension and Farmer Needs: Challenges and Opportunities of Farming System Approaches" 23—25 September, 1996, Arusha, Tanzania.

Kingdon, J. 1990. Island Africa. – Collins, London.

Lovett, J.C. & Wasser, S.K. (eds.). 1993. Biogeography and ecology of the rain forests of Eastern Africa. – Cambridge Univ. Press, Cambridge.

Myers, N. 1988. Threatened biotas: "hot spots" in tropical forests. – *Environmentalist* 8: 1—20.

Newmark, W.D. 1993. The role and design of wildlife corridors with examples from Tanzania. – *Ambio* 22 (8): 500-504.

Newmark, W.D. 1992. Recommendations for wildlife corridors and the extension and management of forest reserves in the East Usambara mountains, Tanzania. – East Usambara Catchment Forest Project Techn. Pap. 4, Forest and Beekeeping Division and Finnish Forests and Park Service, Dar es Salaam and Vantaa.

Der Pflanzer. 1914. Jahresbericht des Biologisch-Landwirtschaflichen Instituts Amani für das Etatsjahr vom 1. April 1913 bis 31. März 1914 zugleich ein Rückblick auf die früheren Jahre. Der Pflanzer 10 (3): 1—115 (1914). Deutsch-Ostafrikanische Zeitung G.m.b.H., Dar es Salaam.

Rodgers, W.A. 1993. The conservation of the forest resources of eastern Africa: past influences, present practices and future needs. *In:* J.C. Lovett & S.K. Wasser (eds.), *Biogeography & ecology of the rainforests of Eastern Africa,* pp. 283—330. – Cambridge Univ. Press.

Rodgers, W.A. & Homewood, K.M. 1982. Species richness and endemism in the Usambara mountain forests, Tanzania. – *Biol. J. of the Linnean Soc.* 18: 197—242.

Schabel, H.G. 1990. Tanganyika forestry under the German colonial administration, 1891—1919. – *Forest & Conservation History* 34 (3): 130—141.

Shelutete, M. 1996. Women in focus. Report of a consultancy on conservation and women in East Usambara. – East Usambara Catchment Forest Project Techn. Pap. 27, Forest and Beekeeping Division and Finnish Forests and Park Service, Dar es Salaam and Vantaa.

WWF & IUCN. 1994. Centres of plant diversity. A guide and strategy for their conservation. 3 volumes. – IUCN Publ. Unit, Cambridge.

Questions

Q. Initial timber harvesting: selective or clear felling?

SJ. *Mostly selective, e.g. Milicia excelsa → high quality timber.*
20,000 ha → 5,000 ha reasonably undisturbed
→ ? v. few areas (tiny islets) relatively undisturbed
→ systematic utilisation goes back ~ 1,000 years
→ few big trees.

*AREA SO **FRAGMENTED***

Q. Farmer to Farmer Approach? Time Compensation?

SJ. *Base intervention in areas of interest to farmer - e.g., establish teak shamba if interested in timber.*
*Need to develop cadre of people who can make it a **business** → repertoire of survival*

FK. *Held series of Discussions and Agreements:*

WORK IN THE SPIRIT OF HELPING EACH OTHER

GIVES PRIDE

DON'T GO STRAIGHT TO MONETARY BENEFIT

Villagers don't expect so much from government anymore → Need to develop survival instincts.

Q. Any alternative resources being developed for communities?

SJ. *Exclude pit-sawing, but not exclude Traditional Rights, e.g. medicines need to establish and agree Rights. Which products freely available?*

Amani Nature Reserve — *Small business developed associated with Visitors*
e.g. guide services
provide raw material for veg/food.

Milk — *need for zero-grazing schemes*
Link tree-planting to agroforestry

⇒ *Identify Primary incentives which link to interests*

THEORY vs. PRACTICE

⇒ *Too early to say whether working but hopeful.*

Q. Sustainability of Management? Post-project

SJ.

- *Need for Partnerships*
- *Flexibility*
- *Conservation Funds*
- *Cross-Interests. Transparency / Accountability, Financial Sustainability*
- *Place on Advisory Board*
- *Need to break Inflexibility of Institutions*

Q. Why have youths (most destructive) been excluded?
SJ. *Weakness but some involved in farmer to farmer process.*

2. CHANGES IN PLANT BIODIVERSITY OF THE EAST USAMBARA MOUNTAINS

Leonard Mwasumbi, Department of Botany, University of Dar es Salaam

The plant biodiversity of the East Usambara mountains is part of the rich flora of the Eastern Arc Mountains: stretching from the Taita hills, Kenya, including the East and West Usambara mountains, Tanzania, and south to the Udzungwas.

The East Usambara mountains have a high value of plant diversity - 2,250 species. Biological diversity is the interdependance of species biodiversity, ecosystem biodiversity and genetic biodiversity. Disturbances i.e. through deforestation cause a loss of biodiversity. Habitat disturbance occurs through clearance of land for farming and for timber. Trees are not as important as herbs and shrubs but from the foresters point of view they are. The East Usambara mountains are rich in endemics, however, there is no monetary value in these *per se*. The area is very rich in the type of endemic species found. 450 new species have been described from the East Usambara Mountains. *Saintpaulias* - 22 species occur in the world; 19 in Tanzania and 7 in the East Usambara Mountains. In 1983 2 new taxa were described: *Uvaria tanzania* found in a tea plantation and *Coffea mongensis*.

Causes of threat to biodiversity:

Population pressure, Finnish logging (6 sawmills involved), clearance to provide land for farming and exotic plantations (Teak, Eucaliptus), vulnerable habitats which are subject to deleterious catastrophic events e.g. some of the *Saintpaulia grotei* sites were washed away in the recent El Ninio rains and climatic changes.

Dr Poach studied Orchidaceae in the 1970's. Leaf size of certain species considerably larger than those found in 1977. Reduced genetic make-up of species therefore reduced vigour. Whole habitats are vulnerable to extinction as a result of logging. *Saintpaulias* are also subject to illegal harvesting.

Questions

Q. Actual Projects?
LM. - *Frontier Surveys. - species level*
- *Medicinals*
- *Edible Wild Mushrooms - Trad. Uses*
- *Annonaceae spp. survey → anti-malarial activity*

Q. Future of Forests in 50 years time?
LM. *Expanding population threat*
Lack of trained botanists
Problem of Exotic species

Q. Impact of Companies collecting Plant Genetic Resources (PGRs) ?
LM. *No knowledge of commercial companies?*
Sorghum PGR for science *Lack taxonomic expertise.*

Very few trained people able to provide specialist botanical services.

Individual responsibilities to envision what forest will look like in future?
⇒ CHALLENGE FOR WORKSHOP

Q. How can local people benefit from 'non-useful' plants such as Saintpaulias*?*
LM. *Need for thorough Biodiversity studies*
Theoretical:- develop licensing system for 'ecovarieties' of Saintpaulias*?*
Proceeds go to Conservation fund → provide community benefits.
African Violets - Flagship species for E. Usam. → potential for Ecotourism → return benefits.

Q. How much biodiversity lost?
LM. *Lack of detailed baseline information against which to quantify extent of loss of biodiversity.*
- spot information
e.g. some species reported in past and can no longer be found. Therefore, quantification very difficult.

? 100,000 ha forests - 100 - 200 years ago
? 45,000 ha forests - now
? ~ 50 % loss of forest cover
→ Most of area not in Forest Reserve now gone.

3. THREATS TO THE EAST USAMBARA BIODIVERSITY

By Dr. F.B. Kilahama, Principal Forest Officer and Farm Forestry Advisor to the East Usambara Catchment Forest Project, Tanga Region. March 1998.

Introduction

The East Usambara mountains are a home of the important Tropical Sub-Montane Rain Forests which are not only unique to Tanzania but also to the rest of the world in terms of catchment and biodiversity values. In terms of catchment value water used by the surrounding local communities and over 200,000 residents in the Municipality of Tanga originate from the East Usambara montane forests. The biological diversity value is quite high such that the East Usambaras are sometimes referred to as the "Galapagos Islands of Africa" (Howell, 1989). What does this imply? This means that the floristic composition in one hectare is extremely high compared to other protected areas in the country. Not only that but also contain a significant number of flora and fauna including the African Violet (*Saint paulia*) which are endemic to the area and therefore, attracts global attention. Due to proximity to the Indian Ocean (about 70 km away) combined with high elevation, the East Usambara mountains receive more rainfall compared to other areas in the Tanga Region. Such suitable climatic conditions together with good structured and fertile soils do favour the growth of a variety of plant species.

Towards the end of the 18th century German explorers and Missionaries entered Tanga Region and were attracted by the spectacular climate and the forests in the East Usambara. The German rulers (Deutche Ost Afrika) and the settlers identified the Amani area as a unique place for plant and genetic resources conservation. Thus, in 1893 a small Botanical Garden was started which later paved way for the current Amani Botanical Garden (ABG) covering an area of about 300 Ha. Within the ABG various indigenous and exotic plant species were planted.

In terms of local significance, the forests have been and still are a valuable source for the forest based (wood and non-wood) products which are deemed necessary for the peoples survival and well-being. Thus, for many years the local communities have depended on these forests for their day-to-day livelihood. When the forests are well protected, it means people's benefits and values are conserved as well. This is so because forest protection aims at safeguarding the environment and sustaining the local community benefits from the forests.

The East Usambara forests were once a large block of continuous forests stretching for about 40 km in length and 10 km in width. However, today the forests are segmented due to human influence. About 30,000 Ha are now being protected for catchment and biodiversity values.

During the colonial era first the Germans and later the British, some considerable efforts were made to map, explore and develop forest resources in the East Usambara mountains. For example, in 1904 the Germans started exploiting the forests for timber to their country. A small sawmill being operated at the Zigi River near the Kisiwani

village and a railway line to facilitated transportation of timber was built from there to Muheza.

The main timber species in demand at that time were Mvule (*Milicia excelsa*) and Mfimbo (*Beilschmiedia kweo*). European settlers also started moving into the Amani area and began opening up the forest for agricultural production focusing on cash crops mainly coffee, tea and sisal. The Imperial Government also started the Agricultural Research Station at Amani in 1902. Research efforts were centred on coffee, tea and sisal (*Agave sisalana* and *A. Amaniensis*). Tea and sisal became the main cash crops in the area as a result of the research efforts. Other cops which were introduced included cocoa; spices (e.g. karafuu - *Eugenia aromatica*, iriki - *Elettaria cardamonum*); tobacco (*Nocotiniana tabaccum*) and rubber (*Manihot glaziovii*).

These agricultural developments in the Amani area became a nucleus for human settlements. Large scale farms for tea and sisal demanded for more land and labour input also increased. Thus, many people from other parts of the country (e.g. Kigoma, Tabora, Morogoro and Iringa) regions migrated into the area as labourers. As the population in and around the sisal and tea estates continued to rise (from natural births, migrants from other places either looking for new habitable sites or for employment), demand for new settlements, farming areas and utilisation of forest products also increased. This was the beginning of the race as far as threats to biodiversity resources in the East Usambara are concerned. In this context, threats are considered to be human activities that lead to biodiversity degradation and/or species extinction due to loss of habitable sites or climatic changes as result of human interference.

In this short analysis, human impact to biodiversity conservation in terms of wood and non-wood species extraction from the forests, farming, livestock production, hunting, mineral prospecting and fire are examined and discussed.

Demand For The Forest Products

Natural forests are under pressure and species being threatened because of population increase and desires for quick economic gains. Once human activities inside the forest increase, chances of some flora and fauna species becoming extinct also increase. Demand for the forest products is directly related to population increase and when other viable options are limiting. As the number of people in a particular area increase while other options such as. bricks, kerosene or modern medicines) are lacking, pressure on natural forests would increase. For instance, majority of the villagers are unable to construct their residential houses using mud or cement bricks because of some technical and financial difficulties. Thus, many people are forced to depend on the nearby forest for obtaining needed building poles a situation that leads to increased pole cutting. Currently the ANFR is surrounded by some 4896 families in 16 villages with a total population of about 25,489 (Appendix 1). This implies a minimum of about 5000 houses in the villages adjacent to the ANFR in practice there are more units of houses because majority of the families have more than one house. In reality a homestead has at least two house units. Experience shows that an average house of three bedroom requires about 100 poles (average size of 10 - 15cm dbh excluding withies. Larger poles (>15cm dbh) are quite few and are used to support and reinforce the building at strategic positions (e.g. corners and roofing angles).

Assuming that there are about 10,000 house units in the vicinity of the ANFR and at a consumption rate of 100 poles house^{-1}; it means that there would be a potential demand of one million poles. Although not every household undertakes new construction every year, a substantial amount of poles and other building materials (e.g. withies and ropes) may be used during repairs and maintenance of the existing buildings.

According to Owen (1992) grass or coconut leaves thatched houses are repaired after every three years, compared to over 10 years for those houses thatched with corrugated iron sheets. This clearly indicates that every year a substantial amount of poles is removed from the forests for house construction purposes. Since the poles are cut when they have not fully matured (e.g. reaching flowing and fruiting stages), it means a draw-back in biodiversity conservation especially gene preservation and therefore a decline in biodiversity future resources.

A survey conducted and involving 16 villages adjacent to the ANFR revealed that tree species that are considered to be important building poles are getting scarce. The villagers perceptions of the availability of the appropriate pole species indicate that in the past it was easy to obtain them nearby as they were plenty (Appendix 2) but now they are quite few and difficult to find. Instead of getting such species in the vicinity of the settlements, one has to go up to three kilometres inside the forest. The demand for the poles continues to be quite high as seen in Appendix 3 for the villages adjacent to the ANFR. Demand for the firewood and medicinal materials is rated moderate to high for the medicine and firewood respectively. Accordingly, these products are becoming scarce year after year. Consumption rates are always increasing because alternative options for firewood and medicinal plants are a limiting factor and therefore pausing a greater threat to the existence of species in high a demand. Some species are more threatened than others especially those of multiple uses. Examples of such tree species are indicated in Appendix 4. If a species is on high demands that means people don't give it a chance to propagate itself through the natural process. Thus, such a species faces a greater threat and soon or later it may disappear due to over-utilization. For example, according to Hamilton and Bested-Smith (1986) *Anonidium usambarensis* was recorded as one of the endemic plants in the Amani area. However, today this species is hardly seen. This may be due to over-cutting such that enough time to complete the regeneration cycle or as a result of great changes in its habitat as a result of human activities.

Apart from cutting of poles, uncontrolled logging operations contribute significantly to forest degradation and species extinction. Certain species face more danger than others for example, *Blachlaena hutchensii* (Mkarambati) which is found in the lowlands of East Usambara but being under logging pressure. The logs are used for sculpture work and the market is very lucrative in Kenya. Thus, a lot of these trees are illegally cut and taken to Kenya. On the other hand, large scale logging between 1970 and 1987 which was undertaken in the Amani Division opened up the canopy and paved the way for the colonising (invasive) species to occupy the area. A good example of this phenomenon is the case of *Maesopsis eminii* which, in the past, was introduced as a nesting tree for *Cephalosphaela usambarensis*. However, as years advanced *M. eminii* became an invasive species and colonised the gaps because site ecological conditions

were altered, thereby inhibiting spontaneous natural regeneration of the indigenous species. Furthermore, *Maesopsis eminii* does not completely close up the canopy in order to maintain a high degree of moist micro-climatic conditions which are desirable for the growth of cryptogamic plants such as bryophytes and epiphytes for example Asplennium ferns and *Saintpaulia* species. Thus, invasive tree species such as *Maesopsis Eminii* become a threat to other species.

Farming Activities

Requirements for additional farming land are also linked with the population growth rates. As the family expands by having more people, food consumption also increase hence more farming land needed. The situation being aggravated by poor land husbandry practices that lead to poor crop yields. In order for the family to realise sufficient food supply for its members cultivating large areas becomes inevitable. Experience shows that encroachment in Forest Reserves has been a chronic problem because the forests are seen as alternative and good farming land once the families run out of farmland or as yields decline. High biodiversity values in forest lands means that they are suitable areas for farming and other agricultural activities (e.g. livestock production). This is because in forest areas the rainfall is quite good and soils are fertile and having good structure factors which are relevant for crop and livestock production. Some farmers do hide and undertake farming activities inside the forests. For example, in 1996 more than 60 Ha of bhang (marijuana) were found growing deep inside Nilo Forest Reserves (northern part of the East Usambara mountains). Farming inside the forest reserves is detrimental to biodiversity resources because natural tree species including fauna are replaced with agricultural crops which in most cases are mono-culture. This alters the original ecological condition of the affected site hence a major source of biodiversity loss. It is believed that forests in the Amani areas have been reduced to about 50% due to agriculture through opening up of large scale farms in the 1920s to 1950s.. This means that the biodiversity value within the area has been altered by a much more percentage. Apart from clearing land for agriculture the use of agrochemical (pesticides and herbicides) in most cases have a negative impact to biodiversity (e.g. retard growth rates or kill some of the flora and fauna) and peoples' health.

Animal Hunting

Adjacent local communities to forest reserves hunt animals either for meat or to control vermin. Hunting is a male social activity which could b e done individually or in groups. Animals which cause trouble in farming areas (eat or destroy crops) include bush pigs (*Potamochoerus purcus larvatus*); Mangooze (*Viverridae* spp) and Monkeys (*Cercopithecus* spp). These animals are either scared off the farms or killed. In most cases killing is the main option as a means of solving the problem once and for all.

Game meat is popular particularly in villages where availability of meat from domesticated animals is scarce. A study in the Amani Division (Owen, 1992) listed about 13 animals that are being hunted in the area. These include Grey Duiker (*Nesotragus Moschatus*); Red Duiker (*Cephalophus natalensis*); Blue monkey (*Cercopithecus mitis*) vervet monkey (*C. aethiopsis*) African civet (*Viverra civetta*)

and Dik Dik (*Rhynchotragus kirki*). According to Owen (1992) the type of method adopted in hunting gives an indication of the availability of animals in terms of numbers. When the animals are plenty - individual hunting is viable. However, as the number of animals decline then group hunting become viable.

It is reported by the local communities in the Amani area that in the past wild animals were many compared to existing numbers today and other types are no long found in the area. For example, some forty years ago buffalo's (*Syncerus caffer*) or lions (*Panthera leo*) were found in Amani. Today such animals are no longer found there. They either have migrated to other places or killed. Although some wild-pigs are still found in the are their numbers have declined such that they are nowadays hard to find compared to when they were spotted regularly in villages some 30 - 40 years ago. Thus animals hunting is directly linked with species decline and extinction. In National Parks, poaching of animals such as elephants (*Loxodonta africana*) and the Rhino (*Diceros bicornis*) for their trophies becomes a threat to their existence and therefore biodiversity.

Mineral Extraction

Prospecting for minerals such as Green Armalic in the East Usambara areas (e.g. Mtai Forest Reserves) is a potential threat to the biodiversity in the area. Prospecting and ultimate extraction process means clearing of portions of forests which end-up altering the ecological condition and therefore species compositions in terms of their numbers and varieties (types).

Fire

Traditionally fire is used by people in African societies for cooking or space warming. It is also used in the field for meeting various needs (e.g. clearing cropping fields - the slash and burn cultivation) or as a resource management tool (e.g. early burning to reduce litter in forest plantations).

Nevertheless, fire destroys biodiversity by killing both flora and fauna. For example, from June 1996 to March 1997 most areas in Tanzania faced critical dry conditions such that most of the grasses and other herbaceous plants dried up and many trees were left leafless. Due to such dry conditions about 2000 hectares of the East Usambara forests including fauna were burnt. The minimum value of the biodiversity lost due to fire is estimated to be about 20 million T.shillings or about 33,000 US Dollars. Experiences show that fire reduces floristic values (composition of plant species) of the forest more than any other human activity (e.g. timber or pole cutting. This is because, the fire kills seeds and young seedlings hence inhibiting natural regeneration and also affects growth rates for the various plant species.

What Are The Implications?

Stable and reliable environmental conditions are a key to the survival and well-being of both flora and fauna including man-kind. Now the question is how do we ensure that stable and conducive environmental conditions that are desirable for a good living are

in place? The importance of flora and fauna to people cannot be over-emphasised. However, over-utilisation of some species threatens the existence of those species. This should be a concern of all people and some efforts be made to find some strategies which could be used to contained the situation for the benefits of present and for the generations to come.

The following are recommended:

- identify what type of species are mostly used by the adjacent local communities and establish whether alternatives to the species in question could be found;
- through extension and community collaboration initiatives ensure that people are aware that species extinction is possible unless used on a sustainable basis;
- community participation and collaboration as a viable strategy that would lead to improved plant conservation should be emphasised and adopted in planning and resource management;
- the international community particularly from the North should make every efforts to assist conservation efforts in the South through technical and financial support. Majority of the local communities in developing nations like Tanzania are very poor. To them the concern is survival. It is through the vicious circle of poverty that the environment is destroyed. Protection of the endemic flora and fauna in the Amani area will be meaningful to the local communities if these endemic species are used to uplift the standard of living of the people in the area. This is where the international community has a role to play in the sense that by supporting conservation efforts in areas of very significant biodiversity like the ANFR, it would not only improve species richness but also the support should benefit the adjacent local communities through direct donations or such arrangements like dept swap for nature conservation. Through such efforts, a conservation fund could be established. The fund then be used to support communities by directly supporting community development efforts and also supporting individual, groups (e.g. women groups) or households projects through establishing credit facilities (e.g. for acquiring land or purchase of farming inputs;
- increase on-farm interventions through extension and capitalising on the farmers' interests (e.g. income or increased crop yields through soil conservation measures);

Literature Cited

Hamilton, A.C. and Bensted-Smith, R. (1987) cited in Mashauri, S.M. (1997) Assessment of the categories of the threats of three endemic timber species of East Usambara. A thesis submitted in partial fulfilment for the Darwin International Certificate in Plant Conservation Techniques for East Africa. East Usambara Catchment Forest Project, Tanga, Tanzania.

Howell, K. (1989) The East Usambara Fauna. In: A.C. Hamilton and R. Bensted-Smith (eds.), Forest Conservation in the East Usambara Mountains, Tanzania. Pp. 57-72. IUCN - The World Conservation Union, Gland, Switzerland.

Owen, M. (1992) East Usambara Conservation and Development Project - Product Survey. Bellerive Foundation, Nairobi, Kenya.

Appendix 1: NUMBER OF HOUSEHOLDS AND POPULATION PER VILLAGE MAJOR LAND-USES AND ACTIVITIES

VILLAGE	No. OF H/H	POPULATION	AVERAGE H/H SIZE	PERCENTAGE LAND DISTRIBUTION	MAJOR ECONOMY ACTIVITIES
GEREZA	120	666	6	75% Agriculture 25% Residential	Farming Livestock keeping Petty business
IBC-MSASA	350	1900	5	39% Agriculture 24% Forest 11% Pasture 26% 'Residential	Farming Livestock keeping Petty business Seasonal employment in Tea Estates
KIMBO	260	1145	4	75% Agriculture 25% Residential	Farming Livestock keeping Petty business
KISIWANI	627	4410	7	75% Agriculture 25% Residential	Agriculture Livestock keeping Petty business Seasonal employment in Tea Estates Institution
KWAGUNDA	400	2600	7	45% Agriculture 30% Residential 20% Psture 5% Forests	Farming Animal husbanday Beekeeping Petty business
KWAMZINDAWA	82	466	6	75% Agriculture 25% Residential	Farming Petty business Livestock keeping

VILLAGE	No. OF H/H	POPULATION	AVERAGE H/H SIZE	PERCENTAGE LAND DISTRIBUTION	MAJOR ECONOMY ACTIVITIES
POTWE-NDONDONDO	570	3134	5	70% - Agriculture 27% - Residential 3% - Forest	- Farming - Fish farming - Petty business - Livestock keeping
SHAMBA KAPORI	136	686	5	75% Agriculture 25% Residential	- Farming - Petty business - Livestock keeping
UBIRI	93	610	7	50% - Agriculture 20% - Pasture 20% - Forest 10% - Residential	- Farming - Petty business - Livestock keeping - Seasonal employment (Tea Estates)
TOTAL	4896	25489	5		

Appendix 2: BUILDING POLES (ROUND WOOD) - THEIR AVAILABILITY NOW
TREE SPECIES UNDER THREATS COMPARED IN THE PAST

LOCAL NAME	BOTANICAL NAME	AREA I		AREA II		AREA III		AREA IV		COMMENTS
		PAST	NOW	PAST	NOW	PAST	NOW	PAST	NOW	REMARKS
Mwitza	*Bridelia micrantha*	plenty	very few	plenty	few					Mostly collected by men
Mohoyo	*Afrossersalisia cerasifera*	plenty	very few							- do -
Mzumba	*Englerodendron usambarensis*	plenty	very few	plenty	few	plenty	few	plenty	few	- do -
Mkanye	*Allanblackia stuhlmannii*	plenty	very few	plenty	few	plenty	few	plenty	few	- do -
Mhondohondo	*Allangium chinensis*	plenty	very few			plenty	few			- do -
Mlama	*Combretum molle*	plenty	very few	plenty	few	plenty	few	-	-	- do -
Mlanga	*Milletia sacieuxii*	plenty	very few	plenty	very few					- do -
Mkingu	*Albizia versicolor*	plenty	few	plenty	few	plenty	few	plenty	few	- do -
Mzindanguruwe	*Blighia unijugata*	plenty	few	plenty	few					- do -
Mkole	*Grewia goetzeana*	plenty	few	plenty	few					- do -
Mkwingwina	*Sorindeia madagascariensis*	plenty	few	plenty	few	plenty	few	plenty	few	- do -
Mtumbili	*Lonchocarpus bussei*	plenty	few							- do -
Mkenge	*Albizia gummefera*	plenty	few	plenty	few	plenty	few	plenty	few	- do -
Klimboti	*Funtumia africana*	-	-	plenty	very few					- do -
Mtalawanda	*Markhamia hildebrondtii*	-	-	plenty	very few					- do -
Mkwe	*Cynometria engleri*	-	-	plenty	very few	plenty	few	plenty	few	- do -
Msambia	*Pachystella msolo*	-	-	plenty	very few	plenty	few			- do -
Ng'wati	*Greenwayodendron suaveolens*	-	-	plenty	very few	plenty	few	plenty	few	- do -

Appendix 3: DEMAND FOR FOREST PRODUCE VILLAGES ADJACENT TO THE ANFR

	AREA *				
DEMAND	I	II	III	IV	REMARKS
Timber	Moderate	Moderate	High	Moderate	Ban of licences and no other sources
Poles	High	High	Moderate	High	Poor alternatives
Woodfuel	High	high	High	High	Poor alternatives
Medicinal Plants	high	Moderate	Moderate	Moderate	
Vegetables	Low	Moderate	Low	Low	
Natural Fruits	Low	Low	Low	Low	
Natural Ropes	Low	Moderate	low	Low	
Withies	High	High	High	High	
Animal Hunting	Low	Moderate	Low	Low	
Honey Hunting	Low	Low	Very low	Very low	
Fodder collection	Low	Low	High	High	
Fire protection	High	High	Low	Low	Destroys crops
ANFR Management	Low	Low	Low	Low	No community property
Tree Seed and Nursery	High	High	High	High	Need alternative

* Some villages grouped together as Follows:

Area I: These are the villages in the lowland area but adjacent to the ANFR and administratively fall under Korogwe District. The villages are westwards (Leeward side) of the ANFR hence in a relatively dry zone. The villages are: Gereza, Kwagunda, Mkwakwani, Kwamzindawa, Mnyuzi and Shamba - Kapori.

Area II: These are the villages alos found in the lowland area but on the windward side hence relatively wetter than those in area I. Administratively fall under the Muheza District and adjacent to the ANFR. The are: Potwe - Mpirani, Potwe - Ndondondo, Kimbo and Mashewa.

Appendix 4: TREE SPECIES OF MULTIPLE USES ACCORDING TO RESPONCES FROM THE COMMUNITIES ADJACENT TO THE ANFR

NAME OF SPECIES	FAMILY	USES				
		POLES	F/WOOD	MEDICINE	FRUITS	WITHIES ROPE
Allanblankia stulhmanii	Guttiferae	V	V	-	V	
Markhamia hildebrendtii	Bignoniaceae	V	V	roots		Withies .....
Newtonia buchananii	Mimosaceae	V	V			
Pachystela msolo	Sapotanceae	V	V	-	V	home utensils
Blighia unijugata	Sapindaceae	V	V	roots and leaves		
Lonchocarpus bussei	Papilionaceae	V	V			
Bridetia micrantha	Euphobiaceae	V	V			
Grewia goetzeana	Tiliaceae	V	V			
Dombeya shupangae	sterculiaceae	V		roots and leaves		ropes
Combretum molle	Combretaceae	V	V	roots and leaves		
Albizia versicolor	Mimosaceae	V	V			Home tools
Greenwayodendron suaveolens	Annonaceae	V	V			Withies
Cynometra engleri	Caesalpiniaceae	V	V			

Area III: These are the villages in the Muheza District but located in the upper wetland area within the enclaves. These are Mlesa and Mikwinini.

Area IV: These villages are also found in the Muheza District except Ubiri village which fall under Korogwe District but also in the upper wetland area however, they are outside the enclaves found within the ANFR. These villages are Mbomole, Kisiwani, Ubiri and IBC - Msasa.

The ratings for demand (high, Moderate, low and very low) as far as dependency on a particular forest produce is concerned, are based on the responces fonn the villagers and given in percentages as follows:

1 - 25% - Very low; 26 - 50% - Low; 51 - 75% - Moderate; 76 - 100% - High

Questions

Q. What is the community perception of biodiversity?
FK. *Need to link biodiversity to community benefits in broadest sense*
Test after 10 yr.

Q. What lessons learnt?
FK. *People in communities have great strength*

Q. Monkey population size? Pressure on crops?
FK. *Monkeys very clever - not dependant on numbers*
Selective cropping?

We are living in a Changing Society → but have problems coping with the changes.

4. THE ROLE OF THE ELDER GROUP IN ENVIRONMENTAL CONSERVATION IN THE EAST USAMBARAS

Mr C. Y. K. Msonde, Elder Group

A summary of the presentation is given below.

1. Forests

Forests are important; they maintain people's livelihoods. 50% of species live in forests.

Elders, from olden times, knew about the uses of the forests:

- medicine,
- fuelwood,
- timber,
- foreign currency,
- food,
- worship.

2. Rules and regulations for forest wealth

Not written down, but there are certain groups of elders who know the laws and customs:

- No one allowed to cultivate:
    - near a water source,
    - near forests.
- The place of worship is a sacred place - one must go there with all the correct manners.

Everyone who breaks the rules is penalised.

The Elders held traditional informal schools.

3. Threat to biodiversity

Logging: lots of trees cut with no replacements.

Lushoto District, Lala - virgin forest cleared. People demanded land and it is being worked on to improve it. However, because of huge rains (November 1996, February 1998) the soil was almost washed away.

This was because the rules were not being followed.

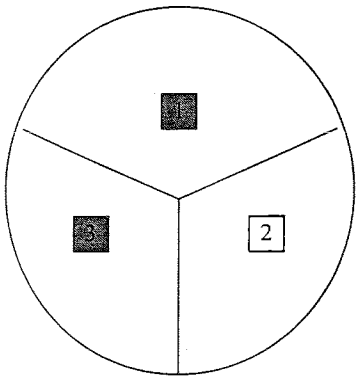
4. Roles of elders in Management of plants

Elders upset that forests were being cut down. With help of East Usambara Catchment Forest Project, they plan to use the elders to assist in this.

They have lived long, so they know a lot and they have seen the environmental changes.

How will they help? They have divided the community into three groups:

1. elders
2. youth
3. school children



Group 1 and 3 merged. How to get information into primary schools? The elders have very good stories to offer and knowledge of medicines.

stories
songs } some elders are good at these things and go to elementary schools
herbalists

in e.g. Kwagunda, Ubiri, Muheza, Kisiwani

After July 24 1996, the elders held a seminar to exchange views and information from different villages. They are just getting environmental education into the curriculum.

5. Achievements

- Get elders into schools,
- held second conference - invited elders, teachers, school managers

Director of Muheza opened this conference. The Director of Education, in his closing speech, said, 'make sure that this programme continues..'

The aim of the second conference is to get information across to children; to invest in future generations. Whatever we do today will affect future generations.

In November 1974, the decision was made to provide universal primary education. For this need teachers, classrooms, materials.
Boys complete Form 6, work 2 years and then go to University. Girls go straight to university after Form 6.

At the 1997 Conference wanted to put environment into the curriculum. Made suggestions to government. Members of parliament lobbied successfully by concerned groups.

Questions

Q. How strong are elders now?
CM. *Elders ideas old-fashioned*
'Old is Gold' - still respected

Q. Some societies, e.g. Masai - no school - still respect elders.
vs. Some e.g., Kilimanjaro - school - reject tradition?

CM. *Bring 'old'/traditional knowledge into school to raise its status - equivalent to new way.*

Elders should sit down with younger people to review what is 'old-fashioned' & should be rejected. But must be careful to reject old and retain good.

Q. How strong is community kinship in East Usambaras?
CM. *Very weak.*

HM. Kaya tradition - train young man to take over.
Therefore, very strong tradition.

5. A BRIEF NOTE OF A CONSULTANCY ON CONSERVATION AND WOMEN IN EAST USAMBARA

MARY SHELUTETE AT A DISCUSSION, AMANI MUHEZA ON 2ND MARCH, 1998

- Hon. Regional Commissioner for Tanga Region
- Project Manager EUCFP
- Invited Guests
- Ladies and Gentlemen

May I thank the EUCFP project management for extending this opportunity to me to appear infront of you so that I may deliver this brief note of findings of my consultancy work with women and conservation.

The consultancy work took me 2 months between January and March, 1996. The aim of my work was seeking for possibilities of involving rural women in conservation, farm forestry agroforestry activities and income generation activities . A total often sampled villages was used as models.

In short, I found out that the role of Women in food production and cultivation has a continued effect to the biodiversity of the forest as far as

- Fuel wood
- Wild fruits
- Cutting trees for farm clearing
- Mushroom
- Forest vegetable

The perceived threats to forest species include;-

- Fires set on farm clearing
- Fires set by hunters for wild meat
- Fires set by charcoal makers
- Fires set by honeyhunters

Other threats are:-

- pit sawyers
- trees for poles
- opening new farmland

Generally I found out that most of the women groups and the community as a whole had little awareness on forest conservation as well as preservation of various wild lives found on their environment. The common man sees the forest conservation as a government forest conservation donor/institutional concern.

After my technical consultancy to women's group within the sampled area and other individuals have increased awareness on agroforestry, and some have already started tree nurseries.

One example can be seen at Ubiri village where women groups had been fetching fuelwood from long distant bushes, have now started tree nurseries in order to plant trees for fuel and other uses in their vicinity.

This is a good indication of future success in protection of forest species among the women's group and the rural community as a whole.

May I thank you, once more for your keen listening to my brief outline of my consultancy work on conservation and women.

Mary Shelutete
WOMEN CONSULTANT

Questions

Q. You presented the results of a 1996 consultancy - how effective are women now?

↘

MS. *This was an advisory report. Extension officers are following this up*

10 women's groups identified
3 villages 'councils' → land issues

Q. Conservation: asset or liability for women's perspective?
MS. *Asset. Women understand importance, but need assurance that can have reliable access to firewood.*

6. THE ROLE OF THE TEA ESTATES IN PLANT BIODIVERSITY CONSERVATION

G.M. Albert Amrithanan, Commonwealth Development Corporation Tea Estates, East Usambara Tea Company

A summary of the presentation is given below.

The East Usambara Tea Company is a joint venture with the Commonwealth Development Council (DFID) and the Tanzania Tea Authority.

Commonwealth Development Council principles:

- economically sound,
- meet social and environmental standards - maintain and sustain ecological standards

The estates have attached 1,000 ha of forest to the Amani Nature Reserve. They are aware of the rainforest around the tea estates as a beautiful but fragile environment. The business mission of the Company addresses an integrated environmental policy:

- conservation of teas fields to ensure there is an industry,
- conservation of soil,
- weed control - tolerate weeds in tea fields (don't eradicate just suppress them),
- conserve weather because of conservation of forests
- conserve economic status of communities around tea estates

We are the custodians for our children and our children's children. It is the everyday commitment of the managers to work daily with field workers - we don't want to lose the soil.

The relationship between the tea estates and the forests

The forest is integral to the tea estates. Tea is a rain dependent crop. We do not have irrigation of the tea fields therefore we understand the connection between the forests and crops. Irrigation is expensive. A tea crop is a long-term crop.

Questions

Q. How sustainable are the economics for tea workers?
BA. *Tea pickers paid higher than minimum agricultural wage for Tanzania. Paid annual leave to return home.*

Q. Tea Estates:- Uganda also friendly to forest conservation.
BA. ***30% of consultancy costs for developing nature trails in Amani Nature Reserve provided by tea company.***

Q. How is tea sold? Fair-trade?
BA. *Awaiting inspection for fair-trade. Fully expect to get Fair-trade label.*

7. SUMMING UP AND VOTE OF THANKS: Perpetua Ipulet

Species list

Beilschmiedia kweo (Mildbr.) Robyns & Wilczek	Lauraceae
Cephalosphaera usambarensis (Warb.) Warb.	Myristicaceae
Coffea mongensis Bridson	Rubiaceae
Coffea sp. A (of FTEA)	Rubiaceae
Cola usambarensis Engl.	Sterculiaceae
Cynometra brachyrrachis Harms	Leguminosae-Caesalpiniaceae
Cynometra longipedicellata Harms	Leguminosae-Caesalpiniaceae
Ficus faulkneriana CC Berg	Moraceae
Gigasiphon macrosiphon (Harms) Brenan	Leguminosae-Caesalpiniaceae
Saintpaulia grotei Engl.	Gesneriaceae
Saintpaulia difficilis-confusa complex	Gesneriaceae

Taxon Data Sheets

Binocular Survey of *Saintpaulia grotei* site

C.A.M.P. Summary Information Workshop 1998

1A. Group: 1	1B. Group Members: Lucy Mwaura, Wazael Ntundu, Raymond Killenga, Shadrack Sanganyi, David Okebiro, Joel Asega, Peggy Olwell, Stella Simiyu, Colin Clubbe	Date Completed: 5 March 1998

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled:
***Beilschmeidea kweo* (Mildbr.) Robyns & Wilczek**

2B. Synonyms (if any): *Tylostemon kweo* Mildbr.

2C. Common/ Vernacular name(s) (specify language): Mfimbo/Shambaa (Kisamba)

2D. Trade Name(s) (specify language): Mfimbo (Kisamba)

2E. Family: Lauraceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: East and West Usambara Mts., Mwanihana Forest, Uzungwas?, Nguru South and Ruaha Valley

3B. Habit of Taxon: Tree

3C. Habitat of the taxon: Evergreen Rainforest - submontane and montane forests

3D. Habitat specificity (niche):

4. ESTIMATED EXTENT OF OCCURRENCE of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☐ < 100 sq. km. | ☐ 101 - 5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☑ > 20,001 sq. km. | ☐ unknown

5. ESTIMATED AREA OF OCCUPANCY of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☐ < 10 sq. km. | ☐ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☑ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 5 **6B.** Number in Protected Areas: 4

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50 ☐ < 250 | ☐ < 2,500 ☐ > 2,500 | ☑ Unknown

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease ☐ Increase | ☐ Stable ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?:

☐ Unknown | ☐ < 20 % ☐ > 20% | ☑ > 50 % ☐ > 80 % in the last 100 years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?:

☐ Unknown | ☐ < 20 % ☐ > 20% | ☐ 50 % ☐ 80 % in the next _____ years

10. Threats

☑ Past ☑ Present ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F].

- ☐ Disease/ Pathogens
- Flooding/ Scouring
- ☑ Harvest [P,Pr,F]
- ☑ Trade [P,Pr,F]
- ☐ Catastrophic Events
- ☐ Hybridisation
- ☐ Edaphic factors
- ☑ Loss of habitat [P,Pr,F]
- ☐ Predation
- ☑ Competition from exotics
- ☐ Pesticides
- ☐ Pollution
- ☑ Habitat fragmentation [P,Pr,F]
- ☐ Successional changes
- ☑ Other, please specify: Fire

10B. Are these threats resulting in population decline?

☑ Yes | ☐ No

11. Trade/ Harvesting

11A. Is the taxon harvested or in trade?

☑ Yes | ☐ No | ☐ Unknown

If Yes, is it

☑ Local Harvesting (non-commercial)
☑ Local Trade (Commercial)
☑ National Trade (Commercial)
☑ International Trade (Commercial)

11B. Parts in Trade/ Harvested:

☐ Roots	☐ Bark	☐ Products (gums, resin, etc.)
☐ Leaves	☐ Stem / twigs / branch	☐ Whole plant
☐ Fruits	☑ Wood/ Timber	☐ Others (please specify):
☐ Seeds		

11C. Is the harvesting:

☑ Destructive to individual plants ☐ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

☑ Yes (Killenga, pers. comm.) ☐ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

☐ Declining ☐ Stable
☑ Increasing ☐ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

☐ Unknown ☐ 50 %
☐ < 20 % ☑ > 80 %
☐ > 20 % in the last ___100_____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

☑ Unknown ☐ > 50 %
☐ < 20 % ☐ > 80 %
☐ > 20 % in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

☑ Census or monitoring	☐ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study	☑ Indirect information such as from trade, etc. [confiscation of timber]	☐ Hearsay/popular belief
☑ Informal field sighting		

14. IUCN Category of Threat (state criteria used): Vulnerable, B1, 2a, c

15A. Research recommendations necessary for the taxon:

☑ Survey	☐ Taxonomic studies	☐ Limiting factor management
☑ Monitoring	☑ Life history studies [possible predation?]	☑ Habitat management [enrichment planting]
☑ Genetic studies	☐ Limiting factor research	☐ PHVA
		☐ Others (taxon specific)

15B. Management recommendations:

1. Comprehensive review of the distribution of the species and conduct field surveys where necessary
2. Protect and monitor the existing populations
3. Cultivate in botanic gardens and villagers' farms
4. Develop an education program for forest managers and villagers
5. Develop alternative crop

16. Is Cultivation required:

☑ Yes ☐ No

If yes, is it for

☑ Conservation Research ☑ Support for Wild Populations e.g. Reintroduction
☑ Horticultural Research ☐ Sustainable utilisation
☑ Education ☐ Others (please specify):

17. Does an *ex situ* conservation programme already exist

☐ Yes ☑ No

If yes,
Give details:

18. Level of understanding of cultivation of the taxon

☐ Techniques known for taxon or similar taxa ☐ Horticultural techniques need to be established
☑ Some techniques known for taxon or similar taxa

19. Other comments related to status and conservation of the species:

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 2	1B. Group Members: Hamisi Mududu, Daniel Sitoni, Donatus Bayona, Alsen Oduwo, Aggrey Rwetsiba, Jane Nyafuno, Ahmed Mndolwa, Perpetua Ipulet, Clare Hankamer	Date Completed: 6/3/98

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled:
***Cephalosphaera usambarensis* (Warb.) Warb.**

2B. Synonyms (if any):
Brochoneura usambarensis Warb.

2C. Common/ Vernacular name(s) (specify language):
Mtambaa (Sambaa, Zigua and Bondei, Swahili)

2D. Trade Name(s) (specify language):

2E. Family: Myristicaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: East Usambara Mountains (including Amani NR) (T3), W.Usambara Mtns. (T3), Shimba Hills National Park (K7) and Udzungwa Mt. NP (T6/T7)

3B. Habit of Taxon: tree

3C. Habitat of the taxon: Wet evergreen submontane forest

3D. Habitat specificity (niche): Rocky riverine valleys

4. ESTIMATED EXTENT OF OCCURRENCE of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☐ < 100 sq. km. | ☐ 101 - 5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☑ > 20,001 sq. km. | ☐ unknown

5. ESTIMATED AREA OF OCCUPANCY of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☐ < 10 sq. km. | ☑ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 4 **6B.** Number in Protected Areas: 3

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**

☐ < 50 | ☑ < 2,500 | ☐ Unknown
☐ < 250 | ☐ > 2,500

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☐ Decrease | ☑ Stable
☐ Increase | ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?:

☐ Unknown | ☐ < 20 % ☐ > 20% | ☐ > 50 % ☐ > 80 % in the last ____ years

9D. If stable or unknown do you predict a decline in habitat (approximately, in percent) over years ?:

☑ Unknown | ☐ < 20 % ☐ > 20% | ☐ > 50 % ☐ > 80 % in the next ____ years

10. Threats

☑ Past ☑ Present ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F].

☐ Disease/ Pathogens	☐ Edaphic factors	☐ Pollution
☐ Flooding/ Scouring	☑ Loss of habitat [P,Pr,F]	☑ Habitat fragmentation [P Pr,F]
☑ Harvest [P,Pr]	☐ Predation	☐ Successional changes
☑ Trade [P,Pr]	☐ Competition from exotics	☐ Other, please specify
☐ Catastrophic Events	☐ Pesticides	
☐ Hybridisation		

10B. Are these threats resulting in population decline?

☐ Yes | ☑ No

11. Trade/ Harvesting

11A. Is the taxon harvested or in trade?

☑ Yes | ☐ No | ☐ Unknown

If Yes, is it

☑ Local Harvesting (non-commercial) | ☐ National Trade (Commercial)
☐ Local Trade (Commercial) | ☐ International Trade (Commercial)

11B. Parts in Trade/ Harvested:

- ☐ Roots
- ☐ Leaves
- ☐ Fruits
- ☐ Seeds
- ☐ Bark
- ☐ Stem / twigs / branch
- ☑ Wood/ Timber
- ☐ Products (gums, resin, etc.)
- ☐ Whole plant
- ☐ Others (please specify):

11C. Is the harvesting:

- ☑ Destructive to individual plants
- ☐ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

- ☑ Yes
- ☐ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

- ☐ Declining
- ☐ Increasing
- ☐ Stable
- ☑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

- ☐ Unknown
- ☐ < 20 %
- ☐ > 20 %
- ☐ 50 %
- ☐ > 80 %

in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

- ☐ Unknown
- ☑ < 20 %
- ☐ > 20 %
- ☐ > 50 %
- ☐ > 80 %

in the next __20____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

- ☑ Census or monitoring
- ☑ General field study (Luke, pers. com.)(Mashauri, pers. com)
- ☑ Informal field sighting (Mududu pers. com.)
- ☐ Living Collections/records/literature
- ☐ Indirect information such as from trade, etc
- ☑ Herbarium/records/literature
- ☐ Hearsay/popular belief

14. IUCN Category of Threat (state criteria used): **Vulnerable; B1, 2a,b,c.**

15A. Research recommendations necessary for the taxon:

- ☑ Survey
- ☑ Monitoring
- ☑ Genetic studies
- ☐ Taxonomic studies
- ☐ Life history studies
- ☑ Limiting factor research
- ☑ Limiting factor management
- ☑ Habitat management
- ☐ PHVA
- ☐ Others (taxon specific)

15B. Management recommendations:

-*In situ* conservation should lay emphasis on habitat management. The Kwamkoro area is already protected or is within the protected region.
-Continue monitoring the regeneration of *C.usambarensis* under *Maesopsis*.
-Life history studies including research is required to determine dispersal dynamics.
-An attempt should be made to assess/survey the population status of the species. This will generate a baseline for future studies.
-Enhance habitat protection in all areas of occurrence.
-Enhance population of Shimba hills e.g. by fencing.

16. Is Cultivation required

- ☐ Yes
- ☑ No

If yes, is it for

- ☐ Conservation Research
- ☐ Horticultural Research
- ☐ Education
- ☐ Support for Wild Populations e.g. Reintroduction
- ☐ Sustainable utilisation
- ☐ Others (please specify):

17. Does an ex *situ* conservation programme already exist

- ☑ Yes
- ☐ No

If yes,
Give details:
Coastal Forest Conservation Unit (NMK), Ukunda nursery. Enrichment planting - Amani Nature Reserve. Ongoing monitoring experiment of plantation, Tafori, Amani Botanic Garden.

18. Level of understanding of cultivation of the taxon

- ☐ Techniques known for taxon or similar taxa
- ☑ Some techniques known for taxon or similar taxa
- ☐ Horticultural techniques need to be established

19. Other comments related to status and conservation of the species:
No known trade. Most occur in protected areas.

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 2	1B. Group Members: Hamisi Mududu, Daniel Sitoni, Donatus Bayona, Alsen Oduwo, Aggrey Rwetsiba, Jane Nyafuno, Ahmed Mndolwa, Perpetua Ipulet, Clare Hankamer	Date Completed: 6/3/98

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: ***Coffea* sp. A (of FTEA)**

2B. Synonyms (if any):

2C. Common/ Vernacular name(s) (specify language): Wild coffee (English common name)

2D. Trade Name(s) (specify language): -

2E. Family: Rubiaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: Morogoro (T6); Restricted to Kimboza Forest - Morogoro.

3B. Habit of Taxon: Shrub

3C. Habitat of the taxon: Evergreen lowland forest (coastal lowland)

3D. Habitat specificity (niche): limestone

4. ESTIMATED EXTENT OF OCCURRENCE of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☑ < 100 sq. km. (Simiyu, pers. com.)	☐ 101 - 5,000 sq. km.	☐ 5,001 - 20,000 sq. km.	☐ > 20,001 sq. km.	☐ unknown.

5. ESTIMATED AREA OF OCCUPANCY of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☐ < 10 sq. km.	☐ 11 - 500 sq. km.	☐ 501 - 2,000 sq. km.	☐ > 2,001 sq. km.	☑ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 1 **6B.** Number in Protected Areas: 1

7A. Are the locations or populations:

☑ Contiguous | ☐ Fragmented

8. Number of **Mature Individuals**:

☐ < 50	☐ < 2,500	☑ Unknown
☐ < 250	☐ > 2,500	

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease	☐ Stable
☐ Increase	☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?

☑ Unknown	☐ < 20 % ☐ > 20%	☐ > 50 % ☐ > 80 % in the last _____ years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☑ Unknown	☐ < 20 % ☐ > 20%	☐ > 50 % ☐ > 80 % in the next _____ years

10. Threats

☑ Past ☑ Present ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F]

☐ Disease/ Pathogens	☐ Edaphic factors	☐ Pollution
☐ Flooding/ Scouring	☑ Loss of habitat [P,Pr]	☑ Habitat fragmentation [P,Pr]
☑ Harvest [P,Pr]	☐ Predation	☑ Successional changes
☐ Trade	☐ Competition from exotics	☐ Other, please specify :
☐ Catastrophic Events	☐ Pesticides	
☐ Hybridisation		

10B Are these threats resulting in population decline?:

☑ Yes | ☐ No

11. Trade/ Harvesting

11A. Is the taxon harvested or in trade?

☐ Yes | ☐ No | ☑ Unknown

If Yes, is it

☐ Local Harvesting (non-commercial)	☐ National Trade (Commercial)
☐ Local Trade (Commercial)	☐ International Trade (Commercial)

11B Parts in Trade/ Harvested:

- ❑ Roots
- ❑ Leaves
- ❑ Fruits
- ❑ Seeds
- ❑ Bark
- ❑ Stem / twigs / branch
- ❑ Wood/ Timber
- ❑ Products (gums, resin, etc.)
- ❑ Whole plant
- ❑ Others (please specify):

11C. Is the harvesting:

- ❑ Destructive to individual plants
- ❑ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

- ❑ Yes
- ☑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

- ☑ Declining (inferred)
- ❑ Increasing
- ❑ Stable
- ❑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

- ☑ Unknown
- ❑ < 20 %
- ❑ > 20 %
- ❑ 50 %
- ❑ > 80 %

in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

- ❑ Unknown
- ❑ < 20 %
- ❑ > 20 %
- ❑ > 50 %
- ❑ > 80 %

in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

- ❑ Census or monitoring
- ☑ General field study (Mwasumbi)
- ❑ Informal field sighting
- ❑ Living Collections/records/literature
- ❑ Indirect information such as from trade, etc.
- ☑ Herbarium/records/literature
- ❑ Hearsay/popular belief

14. IUCN Category of Threat (state criteria used): Critically Endangered B1 & 2 b,c.

15A. Research recommendations necessary for the taxon:

- ☑ Survey
- ❑ Monitoring
- ❑ Genetic studies
- ☑ Taxonomic studies
- ❑ Life history studies
- ❑ Limiting factor research
- ❑ Limiting factor management
- ❑ Habitat management
- ❑ PHVA
- ❑ Others (taxon specific)

15B. Management recommendations:

Taxonomic and genetic studies of primary importance
A review of the genus is needed (wild coffee) so as to assess the potential of coffee breeding.
Genebank, National Herbarium, Arusha, should earmark this species

16. Is Cultivation required:

- ❑ Yes
- ☑ No (dependent on the above studies)

If yes, is it for

- ❑ Conservation Research
- ❑ Horticultural Research
- ❑ Education
- ❑ Support for Wild Populations e.g Reintroduction
- ❑ Sustainable utilisation
- ❑ Others (please specify):

17. Does an ***ex situ*** **conservation programme** already exist

- ❑ Yes
- ☑ No

If yes,
Give details:

18. Level of understanding of cultivation of the taxon

- ☑ Techniques known for taxon or similar taxa
- ❑ Some techniques known for taxon or similar taxa
- ❑ Horticultural techniques need to be established

19. Other comments related to status and conservation of the species:

The species is likely to be harvested for fuelwood and building poles.
Edaphic factors may be important

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 2	1B. Group Members: Hamisi Mududu, Daniel Sitoni, Donatus Bayona, Alsen Oduwo, Aggrey Rwetsiba, Jane Nyafuno, Ahmed Mndolwa, Perpetua Ipulet, Clare Hankamer	Date Completed: 6/3/98

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: ***Coffea mongensis* Bridson**

2B. Synonyms (if any): -

2C. Common/ Vernacular name(s) (specify language): Wild coffee (English common name)

2D. Trade Name(s) (specify language): -

2E. Family: Rubiaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: East Usambaras (specifically Amani Nature Reserve, Monga) (T3), West Usambara (Shume FR, Lushoto) (T3), Uzungwa Mountains NP (Mwanihana FR above Sanje village) (T6/T7)

3B. Habit of Taxon: Shrub

3C. Habitat of the taxon: Submontane forest

3D. Habitat specificity (niche): Shallow soils on hill slopes/steep slopes

4. ESTIMATED **EXTENT OF OCCURRENCE** of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☐ < 100 sq. km. | ☐ 101 - 5,000 sq. km | ☐ 5,001 - 20,000 sq. km. | ☐ > 20,001 sq. km | ☑ unknown

5. ESTIMATED **AREA OF OCCUPANCY** of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☐ < 10 sq. km. | ☐ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☑ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 3 **6B.** Number in Protected Areas: 2

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50 ☐ < 250 | ☐ < 2,500 ☐ > 2,500 | ☑ Unknown

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease ☐ Increase | ☐ Stable ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?:

☑ Unknown | ☐ < 20 % ☐ > 20% | ☐ > 50 % ☐ > 80 % in the last ____ years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown | ☐ < 20 % ☐ > 20% | ☐ > 50 % ☐ > 80 % in the next ____ years

10. Threats

☑ Past ☑ Present ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F].

☐ Disease/ Pathogens	☐ Edaphic factors	☐ Pollution
☐ Flooding/ Scouring	☑ Loss of habitat [P,Pr,F] popn. pressure	☑ Habitat fragmentation [P,Pr F]
☐ Harvest	☐ Predation	☐ Successional changes
☐ Trade	☐ Competition from exotics	☐ Other, please specify
☐ Catastrophic Events	☐ Pesticides	
☐ Hybridisation		

10B. Are these threats resulting in population decline?

☑ Yes | ☐ No

11. Trade/ Harvesting

11A Is the taxon harvested or in trade?

☐ Yes | ☑ No | ☐ Unknown

If Yes, is it

☐ Local Harvesting (non-commercial) ☐ Local Trade (Commercial) | ☐ National Trade (Commercial) ☐ International Trade (Commercial)

11B. Parts in Trade/ Harvested

❑ Roots	❑ Bark	❑ Products (gums, resin, etc.)
❑ Leaves	❑ Stem / twigs / branch	❑ Whole plant
❑ Fruits	❑ Wood/ Timber	❑ Others (please specify):
❑ Seeds		

11C. Is the harvesting:

❑ Destructive to individual plants ❑ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

❑ Yes ❑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

❑ Declining ❑ Stable
❑ Increasing ☑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

❑ Unknown ❑ 50 %
❑ < 20 % ❑ > 80 %
❑ > 20 % in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

☑ Unknown ❑ > 50 %
❑ < 20 % ❑ > 80 %
❑ > 20 % in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

❑ Census or monitoring	☑ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study	☑ Indirect information such as from trade, etc.	❑ Hearsay/popular belief
☑ Informal field sighting		

14. IUCN Category of Threat (state criteria used): **Vulnerable; A1 c**

15A. Research recommendations necessary for the taxon:

☑ Survey	☑ Taxonomic studies	☑ Limiting factor management
☑ Monitoring	☑ Life history studies	☑ Habitat management
☑ Genetic studies/research	☑ Limiting factor research	☑ PHVA
		❑ Others (taxon specific)

15B. Management recommendations:

-There is need to make surveys in order to establish the distribution and population dynamics and to ensure no loss of habitat in identified areas in Tanzania.
-It is a wild relative of cultivated coffee variety therefore can be used to improve the quality of cultivated coffee.
-Field surveys of Tanzania populations is required as well as areas to determine extent of occurrence.
-Establish contacts with Coffee Research Foundations to determine the potential use in coffee plant breeding.
-*Ex situ* conservation in Arboreta and Botanic Garden.

16. Is Cultivation required:

☑ Yes ❑ No

If yes, is it for

☑ Conservation Research ❑ Support for Wild Populations e.g. Reintroduction
☑ Horticultural Research ❑ Sustainable utilisation
☑ Education ❑ Others (please specify):

17. Does an ex *situ* conservation programme already exist

❑ Yes ☑ No

If yes,
Give details.

18. Level of understanding of cultivation of the taxon

❑ Techniques known for taxon or similar taxa ☑ Horticultural techniques need to be established
❑ Some techniques known for taxon or similar taxa

19. Other comments related to status and conservation of the species:

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group:1	1B. Group Members: Lucy Mwaura, Wazael Ntundu, Raymond Kilenga, Shadrack Sanganyi, David Okebiro, Joel Asega, Peggy Olwell, Stella Simiyu, Colin Clubbe	Date Completed: 5 March 1998

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: ***Cola usambarensis Engl.***

2B. Synonyms (if any):

2C. Common/ Vernacular name(s) (specify language): Muungu (Shambaa)

2D. Trade Name(s) (specify language): Muungu (Shambaa)

2E. Family: Sterculiaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: East Usambara Mts. (Kambai, Bamba, Mtai, Kwamarimba and Amani Forest Reserves) [$$consistency over definition of location: 1 or 5??$$]

3B. Habit of Taxon: Tree

3C. Habitat of the taxon: Evergreen Rainforest

3D. Habitat specificity (niche): low: steep hilly slope

4. ESTIMATED **EXTENT OF OCCURRENCE** of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☐ < 100 sq. km. | ☑ 101 - 5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☐ > 20,001 sq. km. | ☐ unknown.

5. ESTIMATED **AREA OF OCCUPANCY** of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☐ < 10 sq. km. | ☑ 11 - 500 sq. km. | 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 5 **6B.** Number in Protected Areas: 5

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50 | ☐ < 2,500 | ☑ Unknown
☐ < 250 | ☐ > 2,500
Mashaun (1996) less than 100

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease | ☐ Stable
☐ Increase | ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?

☐ Unknown | ☐ < 20 % | ☑ > 50 %
☐ > 20% | ☐ > 80 %
in the last 100 years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown | ☐ < 20 % | ☐ > 50 %
☐ > 20% | ☐ > 80 %
in the next _____ years

10. Threats

☑ Past | ☑ Present | ☑ Future (predicted)

10A What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F]

☐ Disease/ Pathogens	☐ Edaphic factors	☐ Pollution
☐ Flooding/ Scouring	☑ Loss of habitat [P,Pr,F]	☑ Habitat fragmentation [P,Pr,F]
☑ Harvest [P,Pr,F]	☐ Predation	☐ Successional changes
☐ Trade	☑ Competition from exotics [P,Pr,F]	☑ Other, please specify Fire
☐ Catastrophic Events	☐ Pesticides	
☐ Hybridisation		

10B Are these threats resulting in population decline?:

☑ Yes | ☐ No

11. Trade/ Harvesting

11A Is the taxon harvested or in trade?

☑ Yes | ☐ No | ☐ Unknown

If Yes, is it

☑ Local Harvesting (non-commercial) | ☐ National Trade (Commercial)
☐ Local Trade (Commercial) | ☐ International Trade (Commercial)

11B Parts in Trade/ Harvested

☐ Roots | ☑ Bark | ☐ Products (gums, resin, etc.)

☐ Leaves ☐ Fruits ☐ Seeds	☑ Stem / twigs / branch ☐ Wood/ Timber	☑ Whole plant ☐ Others (please specify):

11C. Is the harvesting:

☑ Destructive to individual plants	☐ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

☑ Yes	☐ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:
12A. Is the population size / numbers of the taxon:

☑ Declining	☐ Stable
☐ Increasing	☐ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

☐ Unknown	☑ 50 %
☐ < 20 %	☐ > 80 %
☐ > 20 %	in the last ___100___ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

☐ Unknown	☐ > 50 %
☐ < 20 %	☐ > 80 %
☐ > 20 %	in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

☑ Census or monitoring	☐ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study	☐ Indirect information such as from trade, etc.	☐ Hearsay/popular belief
☑ Informal field sighting		

14. IUCN Category of Threat (state criteria used): Endangered B1, 2b,c

15A. Research recommendations necessary for the taxon:

☑ Survey	☐ Taxonomic studies	☐ Limiting factor management
☑ Monitoring	☑ Life history studies	☑ Habitat management
☐ Genetic studies	☐ Limiting factor research	☐ PHVA
		☐ Others (taxon specific)

15B. Management recommendations:
1. Survey and monitor the forest reserves.
2. Provide more protection to the existing populations.
3. Involve local communities in cultivation of the taxon by on-farm cultivation
4. Educate forest managers on management of all endangered species within the Amani Nature Reserve. Also educate the local community.
5. Cultivate the species in botanical garden.

16. Is Cultivation required:

☑ Yes	☐ No
If yes, is it for	
☑ Conservation Research	☑ Support for Wild Populations e g Reintroduction
☐ Horticultural Research	☑ Sustainable utilisation
☑ Education	☐ Others (please specify):

17. Does an *ex situ* **conservation programme** already exist

☐ Yes	☑ No

If yes,
Give details.

18. Level of understanding of cultivation of the taxon

☐ Techniques known for taxon or similar taxa	☐ Horticultural techniques need to be established
☑ Some techniques known for taxon or similar taxa	

19. Other comments related to status and conservation of the species:
Mashuri, S. (1996) Assessment of categories of threat of three endemic timber tree species of East Usambara. Project in partial fulfilment of Plant Conservation Techniques Course for East Africa international certificate.

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 2	1B. Group Members: Hamisi Mududu, Daniel Sitoni, Donatus Bayona, Alsen Oduwo, Aggrey Rwetsiba, Jane Nyafuno, Ahmed Mndolwa, Perpetua Ipulet, Clare Hankamer	Date Completed: 6/3/98

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: *Cynometra brachyrrachis* Harms

2B. Synonyms (if any): -

2C. Common/ Vernacular name(s) (specify language): Mkwe (Samba)

2D. Trade Name(s) (specify language):

2E. Family: Caesalpiniaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: Amani Nature Reserve (Mbomole and Kwamarimba FR) (T3), Not known elsewhere
(? Pugu Hill - collected in 1915 - L Mwasumbi (pers. com.) carried out field work in this area in 1994-1995 and could not locate it)

3B. Habit of Taxon: Tree

3C. Habitat of the taxon: Lowland to submontane rainforests.

3D. Habitat specificity (niche): Dense forest

4. ESTIMATED EXTENT OF OCCURRENCE of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one) estimated approx 34,000 sq. km.

☐ < 100 sq. km. | ☑ 101-5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☐ > 20,001 sq. km. | ☐ unknown.

5. ESTIMATED AREA OF OCCUPANCY of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☐ < 10 sq. km. | ☐ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☑ unknown

6A. Number of known Locations or **Populations** in which the taxon is distributed: one (T3) **6B.** Number in Protected Areas: 1

7A. Are the locations or populations

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☑ < 50 | ☐ < 2,500 | ☐ Unknown
☐ < 250 | ☐ > 2,500

9. Habitat Quality:

9A Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease | ☐ Stable
☐ Increase | ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?

☑ Unknown | ☐ < 20 % | ☐ > 50 %
☐ > 20% | ☐ > 80 %
in the last ____ years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown | ☐ < 20 % | ☐ > 50 %
☐ > 20% | ☐ > 80 %
in the next ____ years

10. Threats

☑ Past | ☑ Present | ☑ Future (predicted)

10A What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F].

☐ Disease/ Pathogens	☐ Edaphic factors	☐ Pollution
☐ Flooding/ Scouring	☑ Loss of habitat [P]	☑ Habitat fragmentation [P, F]
☑ Harvest [Pr] handles, tools	☐ Predation	☐ Successional changes
☐ Trade	☐ Competition from exotics	☐ Other, please specify :
☐ Catastrophic Events	☐ Pesticides	
☐ Hybridisation		

10B Are these threats resulting in population decline?:

☑ Yes | ☐ No

11. Trade/ Harvesting

11A Is the taxon harvested or in trade?

☐ Yes | ☐ No | ☑ Unknown

If Yes, is it

☑ Local Harvesting (non-commercial) | ☐ National Trade (Commercial)
☐ Local Trade (Commercial) | ☐ International Trade (Commercial)

11B. Parts in Trade/ Harvested:

☐ Roots	☐ Bark	☐ Products (gums, resin, etc.)
☐ Leaves	☐ Stem / twigs / branch	☐ Whole plant
☐ Fruits	☑ ?Wood/ Timber	☐ Others (please specify):
☐ Seeds		

11C. Is the harvesting:

☐ Destructive to individual plants	☑ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

☐ Yes	☐ No ☑ unknown

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. **Population trends:**

12A. Is the population size / numbers of the taxon:

☐ Declining	☐ Stable
☐ Increasing	☑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

☐ Unknown	☐ 50 %
☐ < 20 %	☐ > 80 %
☐ > 20 %	in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

☑ Unknown	☐ > 50 %
☐ < 20 %	☐ > 80 %
☐ > 20 %	in the next _____ years

13. **Data Quality** -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

☑ Census or monitoring	☐ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study	☐ Indirect information such as from trade, etc.	☐ Hearsay/popular belief
☐ Informal field sighting		

14. IUCN Category of Threat (state criteria used): **Vulnerable B 1 & 2 a,b,c**

15A. **Research recommendations** necessary for the taxon:

☑ Survey	☑ Taxonomic studies	☑ Limiting factor management
☑ Monitoring	☑ Life history studies	☑ Habitat management
☐ Genetic studies	☑ Limiting factor research	☐ PHVA
		☐ Others (taxon specific)

15B. **Management recommendations:**

-Monitoring the existing population.
-Research on Taxonomy and phenological studies
-If taxonomic issues resolved, consider propagation for *ex situ* conservation

16. Is **Cultivation** required:

☑ Yes	☐ No
If yes, is it for	
☑ Conservation Research	☑ Support for Wild Populations e.g. Reintroduction
☑ Horticultural Research	☐ Sustainable utilisation
☐ Education	☐ Others (please specify):

17. Does an ***ex situ* conservation programme** already exist

☐ Yes	☑ No

If yes,
Give details:

18. **Level of understanding** of cultivation of the taxon

☐ Techniques known for taxon or similar taxa	☑ Horticultural techniques need to be established
☐ Some techniques known for taxon or similar taxa	

19. **Other comments** related to status and conservation of the species.

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 1	1B. Group Members: Lucy Mwaura, Wazael Ntundu, Raymond Kilenga, Shadrack Sanganyi, David Okebiro, Joel Asega, Peggy Olwell,Stella Simiyu, Colin Clubbe	Date Completed: 5 March 1998

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: ***Cynometra longipedicellata* Harms**

2B. Synonyms (if any):

2C. Common/ Vernacular name(s) (specify language): Mkwe

2D. Trade Name(s) (specify language):

2E. Family: Leguminoseae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes ☑ No

If, Yes please specify:

3A. Geographic distribution: East Usambara Mts. (Kwamarimba, Kwamkoro, Amani Nature Reserve (Mbomole, Ndola)) [Definition of location - 1 or 3 - consistency for all spp??$$]

3B. Habit of Taxon: Tree

3C. Habitat of the taxon: Evergreen Rainforest

3D. Habitat specificity (niche): low; hill slopes associated with *Allenblackia stuhlmannii, Newtonia sp., Maranthes sp.*

4. ESTIMATED EXTENT OF OCCURRENCE of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☑ < 100 sq. km. ☐ 101 - 5,000 sq. km. ☐ 5,001 - 20,000 sq. km. ☐ > 20,001 sq. km. ☐ unknown.

5. ESTIMATED AREA OF OCCUPANCY of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☑ < 10 sq. km. ☐ 11 - 500 sq. km. ☐ 501 - 2,000 sq. km. ☐ > 2,001 sq. km. ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 3 **6B.** Number in Protected Areas: 3

7A. Are the locations or populations:

☐ Contiguous ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50 ☐ < 250 ☐ < 2,500 ☐ > 2,500 ☑ Unknown

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes ☐ No

9B. If, Yes

☑ Decrease ☐ Increase ☐ Stable ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?:

☐ Unknown ☐ < 20 % ☐ > 20% ☑ > 50 % ☐ > 80 % in the last 100 years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown ☐ < 20 % ☐ > 20% ☐ 50 % ☐ > 80 % in the next _____ years

10. Threats

☑ Past ☑ Present ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F]

☐ Disease/ Pathogens
☐ Flooding/ Scouring
☑ Harvest [P,Pr,F]
☐ Trade
☐ Catastrophic Events
☐ Hybridisation
☐ Edaphic factors
☑ Loss of habitat [P,Pr F]
☐ Predation
☑ Competition from exotics [P,Pr,F]
☐ Pesticides
☐ Pollution
☑ Habitat fragmentation [P,Pr,F]
☐ Successional changes
Other, please specify Fire

10B. Are these threats resulting in population decline?:

☑ Yes ☐ No

11. Trade/ Harvesting

11A. Is the taxon harvested or in trade?:

☑ Yes ☐ No ☐ Unknown

If Yes is it

☑ Local Harvesting (non-commercial)
☐ Local Trade (Commercial)
☐ National Trade (Commercial)
☐ International Trade (Commercial)

11B Parts in Trade/ Harvested:

❑ Roots	❑ Bark	❑ Products (gums, resin, etc.)
❑ Leaves	☑ Stem / twigs / branch	❑ Whole plant
❑ Fruits	❑ Wood/ Timber	❑ Others (please specify):
❑ Seeds		

11C Is the harvesting:

☑ Destructive to individual plants	Non-Destructive to individual plants

11D. Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

☑ Yes	❑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. **Population trends:**

12A Is the population size / numbers of the taxon:

☑ Declining	❑ Stable
❑ Increasing	❑ Unknown

12B If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

❑ Unknown	☑ 50 %
❑ < 20 %	❑ > 80 %
❑ > 20 %	in the last __100___ years

12C If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

❑ Unknown	❑ > 50 %
❑ < 20 %	❑ > 80 %
❑ > 20 %	in the next _____ years

13. **Data Quality** -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

☑ Census or monitoring	❑ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study	❑ Indirect information such as from trade, etc.	❑ Hearsay/popular belief
☑ Informal field sighting (Mwasumbi, pers. com.)		

14. IUCN Category of Threat (state criteria used): **Critically Endangered B1, 2a,c**

15A. **Research recommendations** necessary for the taxon:

☑ Survey	☑ Taxonomic studies	❑ Limiting factor management
☑ Monitoring	☑ Life history studies	☑ Habitat management
☑ Genetic studies	❑ Limiting factor research	❑ PHVA
		❑ Others (taxon specific)

15B. **Management recommendations:**

1. Survey
2. Conduct taxonomic study
3. Habitat management
4. Create awareness with the local community

16. Is Cultivation required:

☑ Yes	❑ No

If yes, is it for

☑ Conservation Research	❑ Support for Wild Populations e.g. Reintroduction
❑ Horticultural Research	☑ Sustainable utilisation
❑ Education	❑ Others (please specify):

17. Does an *ex situ* **conservation programme** already exist

❑ Yes	☑ No

If yes,
Give details:

18. **Level of understanding** of cultivation of the taxon

❑ Techniques known for taxon or similar taxa	❑ Horticultural techniques need to be established
☑ Some techniques known for taxon or similar taxa	

19. **Other comments** related to status and conservation of the species:

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 2	1B. Group Members: Hamisi Mududu, Daniel Sitoni, Donatus Bayona, Alsen Oduwo Aggrey Rwetsiba, Jane Nyafuno, Ahmed Mndolwa, Perpetua Ipulet, Clare Hankamer	Date Completed: 6/3/98

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: ***Ficus faulkneriana* C.C.Berg.**

2B. Synonyms (if any): -

2C. Common/ Vernacular name(s) (specify language): Mkuyu (Usamba), Mvumo (Swahili)

2D. Trade Name(s) (specify language):

2E. Family: Moraceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: Kenya (K7) and Tanzania(T3): Gongoni FR. (K7), Dzirihini (K7), Lwengeia valley (Kwagunda sisal estate) (T3) [? Mwera sisal estate, Pangani (T3), ? Longo Mwagandi (Shimba Hills NP.) (K7) - not found at either site (Luke, pers. comm. 1998)]

3B. Habit of Taxon: epiphytic tree

3C. Habitat of the taxon: Coastal bushland and wooded, wet forest

3D. Habitat specificity (niche): Epiphytic on *Hyphaene* sp.

4. ESTIMATED **EXTENT OF OCCURRENCE** of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☐ < 100 sq. km. | ☐ 101 - 5,000 sq. km. | ☑ 5,001-20,000 sq. km. | ☐ > 20,001 sq. km. | ☐ unknown.

5. ESTIMATED **AREA OF OCCUPANCY** of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence').(tick one)

☑ < 10 sq. km | ☐ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 3 **6B.** Number in Protected Areas: 1

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☑ < 50 | ☐ < 2,500 | ☐ Unknown

☐ < 250 | ☐ > 2,500

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease | ☐ Stable

☐ Increase | ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?

☑ Unknown | ☐ < 20 % | ☐ > 50 %

☐ > 20% | ☐ > 80 %

in the last _____ years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown | ☐ < 20 % | ☐ > 50 %

☐ > 20% | ☐ > 80 %

in the next: _____ years

10. Threats

☑ Past | ☑ Present | ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F]

☐ Disease/ Pathogens	☐ Edaphic factors	☐ Pollution
☐ Flooding/ Scouring	☑ Loss of habitat [P,Pr,F]	☑ Habitat fragmentation [P,Pr,F]
☐ Harvest	☐ Predation	☐ Successional changes
☐ Trade	☐ Competition from exotics	☐ Other, please specify :
☐ Catastrophic Events	☐ Pesticides	
☐ Hybridisation		

10B. Are these threats resulting in population decline?:

☑ Yes | ☐ No

11. Trade/ Harvesting

11A. Is the taxon harvested or in trade?

☐ Yes | ☑ No | ☐ Unknown

Although, *Hyphaene* harvested for fencing poles

If Yes, is it

☐ Local Harvesting (non-commercial) | ☐ National Trade (Commercial)

☐ Local Trade (Commercial) | ☐ International Trade (Commercial)

11B. Parts in Trade/ Harvested:

❑ Roots	❑ Bark	❑ Products (gums, resin, etc.)
❑ Leaves	❑ Stem / twigs / branch	❑ Whole plant
❑ Fruits	❑ Wood/ Timber	❑ Others (please specify):
❑ Seeds		

11C. Is the harvesting:

❑ Destructive to individual plants ❑ Non-Destructive to individual plants

11D: Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

❑ Yes ❑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

☑ Declining	❑ Stable
❑ Increasing	❑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

☑ Unknown	❑ 50 %
❑ < 20 %	❑ > 80 %
❑ > 20 %	in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

❑ Unknown	❑ > 50 %
❑ < 20 %	❑ > 80 %
❑ > 20 %	in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

❑ Census or monitoring	☑ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study/survey	❑ Indirect information such as from trade, etc.	❑ Hearsay/popular belief
☑ Informal field sighting		

14. IUCN Category of Threat (state criteria used): Critically endangered; D

15A. Research recommendations necessary for the taxon:

☑ Survey	☑ Taxonomic studies	☑ Limiting factor management
☑ Monitoring	☑ Life history studies	☑ Habitat management
❑ Genetic studies	☑ Limiting factor research	❑ PHVA
		❑ Others (taxon specific)

15B. Management recommendations:

-*Ex situ* conservation by establishment of nurseries so that it could be introduced in protected areas.
-Can be propagated by layering and cutting. This is being done already in Kenya because it has a potential as an ornamental. It is being sold to hotels in Kenya.
-Surveys required to establish distribution and population densities.
-Research on pollination/seed set urgently required.

16. Is Cultivation required:

☑ Yes ❑ No

If yes, is it for

☑ Conservation Research	☑ Support for Wild Populations e.g. Reintroduction
☑ Horticultural Research	❑ Sustainable utilisation
☑ Education	❑ Others (please specify):

17. Does an *ex situ* conservation programme already exist

☑ Yes ❑ No

If yes,
Give details:
Coastal Forest Conservation Unit, Ukunda, Kenya. Propagules (approx. 30). Sold to hotels on South Coast.

18. Level of understanding of cultivation of the taxon

❑ Techniques known for taxon or similar taxa	❑ Horticultural techniques need to be established
☑ Some techniques known for taxon or similar taxa (see 19 below)	

19. Other comments related to status and conservation of the species:

Propagated by stem cuttings. Other methods should be explored. Germination has been tried but without success. Loss of pollinator - species specific fig wasp? Phenological/pollinator research required.

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 2	1B. Group Members: Hamisi Mududu, Daniel Sitoni, Donatus Bayona, Alsen Oduwo, Aggrey Rwetsiba, Jane Nyafuno, Ahmed Mndolwa, Perpetua Ipulet, Clare Hankamer	Date Completed:

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled:
***Gigasiphon macrosiphon* (Harms) Brenan**

2B. Synonyms (if any): *Bauhinia microsiphon* Harms Brenan, *Gigasiphon humblotianum sensu* KTS

2C. Common/ Vernacular name(s) (specify language): Mnyanza (Digo, Kenya)

2D. Trade Name(s) (specify language): -

2E. Family: Leguminosae (sub-family Caesalpiniaceae)

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: Kenya - K7, Tanzania - T8
Gongoni FR (K7), Kaya Muhaka National Monument (K7), Rondo Plateau - Michinjiri (T8) and Buda Mafisini (Fr)
? Amani Nature Reserve (Kiuhui) (T3) [Initial search carried out by Luke, 2/3/98 but not found
? Reported by Greenway (1951?) to have been planted in Amani Botanic Garden, but unknown location.
[Extensive surveys carried out of Mnma FR (K7) and Marenje FR (K7) (Luke, pers. com.) but *G. macrosiphon* not found].

3B. Habit of Taxon: tree

3C. Habitat of the taxon: Moist semi-decidous/evergreen lowland forest.

3D. Habitat specificity (niche): lowland (100-810m), moist evergreen (100-250m).

4. ESTIMATED EXTENT OF OCCURRENCE of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☐ < 100 sq. km. | ☐ 101 - 5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☑ > 20,001 sq. km. | ☐ unknown.

5. ESTIMATED AREA OF OCCUPANCY of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☑ < 10 sq. km. | ☐ 11 - 500 sq. km | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: _4_____ **6B.** Number in Protected Areas: _3_____
Note: protected areas noted in K7 subject to illegal logging and land-grabbing.

7A. Are the locations or populations.

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50
☐ < 250
☐ < 2,500
☐ > 2,500
☑ Unknown
Mbinda (1996): 44 mature individuals surveyed in transects in Gongoni FR, Buda Mafisini FR and Kaya Muwaka FR

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs.

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease
☐ Increase
☐ Stable
☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?:

☐ Unknown
☐ < 20 %
☑ > 20%
☐ > 50 %
☐ > 80 %
in the last __1 25___ years (Luke, pers. com. 1998, Mbinda, 1997)

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown
☐ < 20 %
☐ > 20%
☐ > 50 %
☐ > 80 %
in the next _____ years

10. Threats

☑ Past | ☑ Present | ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F].

☐ Disease/ Pathogens
☐ Flooding/ Scouring
☑ Harvest [P]
☐ Trade
☐ Catastrophic Events
☐ Hybridisation
☐ Edaphic factors
☑ Loss of habitat [P, Pr, F]
☑ Predation [P, Pr, F]
☐ Competition from exotics
☐ Pesticides
☐ Pollution
☑ Habitat fragmentation [P, Pr, F]
☑ Successional changes [P, Pr, F]
☐ Other, please specify

10B. Are these threats resulting in population decline?

☑ Yes | ☐ No

11. Trade/ Harvesting

11A. Is the taxon harvested or in trade?
☑ Yes ☐ No ☐ Unknown

If Yes, is it
☑ Local Harvesting (non-commercial)
☐ Local Trade (Commercial)
☐ National Trade (Commercial)
☐ International Trade (Commercial)

11B. Parts in Trade/ Harvested:
☐ Roots ☐ Bark ☐ Products (gums, resin, etc.)
☐ Leaves ☐ Stem / twigs / branch ☐ Whole plant
☐ Fruits ☑ Wood/ Timber ☐ Others (please specify):
☐ Seeds (Mbinda i996)

11C. Is the harvesting:
☑ Destructive to individual plants ☐ Non-Destructive to individual plants

11D. Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:
☐ Yes ☑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:
12A. Is the population size / numbers of the taxon:
☐ Declining ☐ Stable
☐ Increasing ☑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:
☐ Unknown ☐ 50 %
☐ < 20 % ☐ > 80 %
☐ > 20 % in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years
☑ Unknown ☐ > 50 %
☐ < 20 % ☐ > 80 %
☐ > 20 % in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:
☐ Census or monitoring ☐ Living Collections/records/literature ☑ Herbarium/records/literature
☑ General field study ☐ Indirect information such as from trade, etc. ☐ Hearsay/popular belief
☐ Informal field sighting

14. IUCN Category of Threat (state criteria used): Endangered; B1, 2 b

15A. Research recommendations necessary for the taxon:
☑ Survey ☐ Taxonomic studies ☑ Limiting factor management
☑ Monitoring ☑ Life history studies ☑ Habitat management
☐ Genetic studies ☐ Limiting factor research ☑ PHVA
☐ Others (taxon specific)

15B. Management recommendations:

-Surveys required to establish the extent of occurrence of the populations in Tanzania.
-*Ex situ* conservation. It has attractive flowers hence has a high potential as an ornamental.
-Establish nurseries for commercial use (Currently grown for sale to the hotel industry by the Coastal Forest Conservation Unit, NMK, Kenya South Coast)
-The seeds are orthodox therefore it is easy to multiply/grow
-It is a legume and therefore needs research on possibilities on multiple use in farms.

16. Is Cultivation required:
☑ Yes ☐ No

If yes, is it for
☑ Conservation Research ☑ Support for Wild Populations e.g. Reintroduction
☑ Horticultural Research ☑ Sustainable utilisation
☐ Education ☐ Others (please specify):

17. Does an ***ex situ* conservation** programme already exist
☑ Yes ☐ No

If yes,
Give details:
Coastal Forest Conservation Unit (NMK), Ukunda, Kenya. Grown from seed, for enrichment planting and for sale to Hotels. (Hamisi J Mududu, pers. com. Mbinda, 1997).

18. Level of understanding of cultivation of the taxon
☑ Techniques known for taxon or similar taxa ☐ Horticultural techniques need to be established
☐ Some techniques known for taxon or similar taxa

19. Other comments related to status and conservation of the species:
Harvested for timber. Seeds eaten by bush pig (Mbinda, 1996)
Mbinda, J.M. (1996) survey for the conservation of G Mackosiphon (Harms) Brenan (Caesalpiniaceae) at Muhaka, Gongoni and Buda Mafisini. Project in part fulfilment of Plant Conservation Techniques Course East Africa International certificate

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 1	1B. Group Members: Lucy Mwaura, Wazael Ntundu, Raymond Kilenga, Shadrack Sanganyi, David Okebiro, Joel Asega, Peggy Olwell, Stella Simiyu, Colin Clubbe	Date Completed: 5 March 1998

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: ***Saintpaulia difficilis-confusa*** complex

2B. Synonyms (if any):

2C. Common/ Vernacular name(s) (specify language): African Violet (Dughulishi)

2D. Trade Name(s) (specify language): African Violet

2E. Family: Gesneriaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If. Yes please specify:

3A. Geographic distribution: East Usambara Mts. (Amani Nature Reserve: Kwamkoro, Ndola)

3B. Habit of Taxon: Perennial herb

3C. Habitat of the taxon: : Evergreen Rainforest on rock cliffs and leaf moulds facing stream/river (riverine spp.)

3D. Habitat specificity (niche): High; on rock cliffs (closed canopy, high humidity, water level critical)

4. ESTIMATED **EXTENT OF OCCURRENCE** of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☑ <100 sq. km. | ☐ 101 - 5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☐ > 20,001 sq. km. | ☐ unknown.

5 ESTIMATED **AREA OF OCCUPANCY** of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☑ <10 sq. km. | ☐ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: ____1 (4_known popns)____ **6B.** Number in Protected Areas: ____1___

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50 | ☑ < 2,500 | ☐ Unknown
☐ < 250 | ☐ > 2,500

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If. Yes

☑ Decrease | ☐ Stable
☐ Increase | ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?:

☐ Unknown | ☐ < 20 % | ☑ > 50 %
☐ > 20% | ☐ > 80 %
in the last _100_ years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?:

☐ Unknown | ☐ < 20 % | ☐ > 50 %
☐ > 20% | ☐ > 80 %
in the next _____ years

10. Threats

☑ Past | ☑ Present | ☑ Future (predicted)

10A What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F].

☐ Disease/ Pathogens
☑ Flooding/ Scouring
☑ Harvest
☐ Trade
☑ Catastrophic Events
☐ Hybridisation
☐ Edaphic factors
☑ Loss of habitat
☑ Predation - not **presently serious**
☐ Competition from exotics
☐ Pesticides
☐ Pollution
☑ Habitat fragmentation
☐ Successional changes
Other, please specify FIRE

10B Are these threats resulting in population decline?

☑ Yes | ☐ No

11. Trade/ Harvesting

11A Is the taxon harvested or in trade?:

☑ Yes | ☐ No | ☐ Unknown

If Yes, is it

☑ Local Harvesting (non-commercial)
☐ Local Trade (Commercial)
☐ National Trade (Commercial)
☐ International Trade (Commercial)

11B Parts in Trade/ Harvested:

☐ Roots | ☐ Bark | ☐ Products (gums, resin, etc.)

❑ Leaves ❑ Fruits ❑ Seeds	❑ Stem / twigs / branch ❑ Wood/ Timber	☑ Whole plant ❑ Others (please specify):

11C. Is the harvesting:

☑ Destructive to individual plants | ❑ Non-Destructive to individual plants

11D. Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

☑ Yes | ❑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

☑ Declining | ❑ Stable
❑ Increasing | ❑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

❑ Unknown | ☑ 50 %
❑ < 20 % | ❑ > 80 %
❑ > 20 % | in the last ___100__ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

❑ Unknown | ❑ > 50 %
❑ < 20 % | ❑ > 80 %
❑ > 20 % | in the next _____ years

13. Data Quality -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

❑ Census or monitoring ☑ General field study ☑ Informal field sighting	☑ Living Collections/records/literature ❑ Indirect information such as from trade, etc	☑ Herbarium/records/literature ❑ Hearsay/popular belief

14. IUCN Category of Threat (state criteria used): **Critically Endangered B1, 2a, c**

15A. Research recommendations necessary for the taxon:

☑ Survey ☑ Monitoring ☑ Genetic studies	☑ Taxonomic studies ☑ Life history studies ☑ Limiting factor research	❑ Limiting factor management ❑ Habitat management ❑ PHVA ❑ Others (taxon specific)

15B. Management recommendations:

1. Survey all current habitat and potential habitat for populations
2. Protect known populations of the species and its current habitat
   Monitor land use upstream of population
   Develop a training program to educate the forest managers and the local people about the value of the species as an endemic and critically endangered plant and its specific management needs
3. Conduct taxonomic study of the species
4. Develop ex situ conservation collection at the Amani Botanic Garden and the Tanzanian Genebank for conservation

16. Is Cultivation required:

☑ Yes | ❑ No

If yes, is it for

☑ Conservation Research ☑ Horticultural Research ☑ Education	❑ Support for Wild Populations e.g. Reintroduction ☑ Sustainable utilisation ❑ Others (please specify):

17. Does an *ex situ* conservation programme already exist

❑ Yes | ☑ No

If yes,
Give details:
No, but a few individuals are cultivated at Kew, London, England

18. Level of understanding of cultivation of the taxon

☑ Techniques known for taxon or similar taxa | ❑ Horticultural techniques need to be established
❑ Some techniques known for taxon or similar taxa

19. Other comments related to status and conservation of the species

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

C.A.M.P. Summary Information Sheet for Darwin Workshop 1998

1A. Group: 1	1B. Group Members: Lucy Mwaura, Wazael Ntundu, Raymond Kilenga, Shadrack Sanganyi, David Okebiro, Joel Asega, Peggy Olwell, Stella Simiyu, Colin Clubbe	Date Completed: 5 March 1998

2A. Scientific Name w. author citation of the taxon for which this sheet is being filled: *Saintpaulia grotei* Engl.

2B. Synonyms (if any):

2C. Common/ Vernacular name(s) (specify language): African Violet (Dughulishi)

2D. Trade Name(s) (specify language): African Violet

2E. Family: Gesneriaceae

2F. Is the taxon protected by National and/ or International legislation:

☐ Yes | ☑ No

If, Yes please specify:

3A. Geographic distribution: East Usambara Mts. (Kimbo; Mlinga; Kwamkuya; Kihuhwi, ANR)

3B. Habit of Taxon: Perennial herb

3C. Habitat of the taxon: Evergreen Rainforest on rock cliffs and leaf moulds facing stream/river

3D. Habitat specificity (niche): High; on rock cliffs

4. ESTIMATED **EXTENT OF OCCURRENCE** of the taxon. (Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known , inferred or projected sites of present occurrence of the taxon) (tick one)

☑ < 100 sq. km. | ☐ 101 - 5,000 sq. km. | ☐ 5,001 - 20,000 sq. km. | ☐ > 20,001 sq. km. | ☐ unknown.

5. ESTIMATED **AREA OF OCCUPANCY** of the taxon (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'):(tick one)

☑ < 10 sq. km. | ☐ 11 - 500 sq. km. | ☐ 501 - 2,000 sq. km. | ☐ > 2,001 sq. km. | ☐ unknown

6A. Number of known Locations or Populations in which the taxon is distributed: 4 **6B.** Number in Protected Areas: 4

7A. Are the locations or populations:

☐ Contiguous | ☑ Fragmented

8. Number of **Mature Individuals**:

☐ < 50 ☐ < 250 | ☐ < 2,500 ☐ > 2,500 | ☑ Unknown

9. Habitat Quality:

9A. Is there any change in the habitat where the taxon occurs:

☑ Yes | ☐ No

9B. If, Yes

☑ Decrease ☐ Increase | ☐ Stable ☐ Unknown

9C. If Decreasing, what has been the decrease in habitat (approximately in percent) over years ?

☐ Unknown | ☐ < 20 % ☐ > 20% | ☑ > 50 % ☐ > 80 % in the last 100 years

9D. If stable or unknown, do you predict a decline in habitat (approximately, in percent) over years ?

☐ Unknown | ☐ < 20 % ☐ > 20% | ☐ > 50 % ☐ > 80 % in the next _____ years

10. Threats

☑ Past ☑ Present ☑ Future (predicted)

10A. What are the threats to the taxon ? Indicate which are Past [P], Present [Pr], and/or Future [F]

- ☐ Disease/ Pathogens
- ☑ Flooding/ Scouring [P,Pr,F]
- ☑ Harvest [P,Pr,F]
- ☐ Trade
- ☑ Catastrophic Events
- ☐ Hybridisation
- ☐ Edaphic factors
- ☑ Loss of habitat [P,Pr,F]
- ☐ Predation
- ☐ Competition from exotics
- ☐ Pesticides
- ☐ Pollution
- ☑ Habitat fragmentation [P,Pr,F]
- ☐ Successional changes
- ☐ Other, please specify . FIRE

10B Are these threats resulting in population decline?:

☑ Yes | ☐ No

11. Trade/ Harvesting [consistency for harvesting are both spp harvested to same extent??$$]

11A. Is the taxon harvested or in trade?

☐ Yes | ☑ No | ☐ Unknown

If Yes, is it

☐ Local Harvesting (non-commercial) ☐ Local Trade (Commercial) | ☐ National Trade (Commercial) ☐ International Trade (Commercial)

11B Parts in Trade/ Harvested:

☐ Roots | ☐ Bark | ☐ Products (gums, resin, etc.)

❑ Leaves ❑ Fruits ❑ Seeds	❑ Stem / twigs / branch ❑ Wood/ Timber	❑ Whole plant ❑ Others (please specify)

11C. Is the harvesting:

❑ Destructive to individual plants | Non-Destructive to individual plants

11D. Is Trade/ Harvesting (in any form) resulting in a perceived or inferred population decline:

❑ Yes | ❑ No

(If you have more information regarding trade, harvest of this taxon, please explain in Section 19 (other comments)

12. Population trends:

12A. Is the population size / numbers of the taxon:

☑ Declining	❑ Stable
❑ Increasing	❑ Unknown

12B. If Declining, what has been the decline in population (perceived or inferred in percents due to habitat loss, threats, trade, etc.) over years:

❑ Unknown	☑ > 50 %
❑ < 20 %	❑ > 80 %
❑ > 20 %	in the last _____ years

12C. If Stable or Unknown, do you predict a decline in population (due to factors such as habitat loss, threats, trade, etc.) over years

–

❑ Unknown	☑ > 50 %
❑ < 20 %	❑ > 80 %
❑ > 20 %	in the next __100___ years

13. **Data Quality** -- Are the above perceived, inferred, predicted educated/qualified estimates based on:

☑ Census or monitoring	❑ Living Collections/records/literature	☑ Herbarium/records/literature
☑ General field study	❑ Indirect information such as from trade, etc.	❑ Hearsay/popular belief
☑ Informal field sighting		

14. IUCN Category of Threat (state criteria used): **Critically Endangered B1, 2b, c**

15A. Research recommendations necessary for the taxon:

☑ Survey	☑ Taxonomic studies	❑ Limiting factor management
☑ Monitoring	❑ Life history studies	☑ Habitat management
☑ Genetic studies	❑ Limiting factor research	❑ PHVA
		❑ Others (taxon specific)

15B. Management recommendations:

1 Survey all current habitat and potential habitat for populations
2 Protect known populations of the species and its current habitat
Monitor land use upstream of population
Develop a training program to educate the forest managers and the local people about the value of the species as an endemic and critically endangered plant and its specific management needs
3 Conduct taxonomic study of the species
4 Develop *ex situ* conservation collection at the Amani Botanic Garden and the Tanzanian Genebank for conservation

16. Is **Cultivation** required

☑ Yes | ❑ No

If yes, is it for

☑ Conservation Research	❑ Support for Wild Populations e.g. Reintroduction
❑ Horticultural Research	☑ Sustainable utilisation
☑ Education	❑ Others (please specify)

17. Does an ***ex situ*** **conservation programme** already exist

❑ Yes | ☑ No

If yes
Give details
No, but a few individuals are cultivated at Amani Botanic Garden

18. **Level of understanding** of cultivation of the taxon

❑ Techniques known for taxon or similar taxa | ❑ Horticultural techniques need to be established
☑ Some techniques known for taxon or similar taxa

19. Other **comments** related to status and conservation of the species:

Modified from CBSG/SSC by Amani Darwin Workshop Team, Amani Nature Reserve, Tanzania, 1998

Supporting Data for Taxon Data Sheets

Published and unpublished Reports

Cunneyworth, P. (1996) Kambai Forest Reserve - a lowland forest in the Sigi-Muzi valley. *East Usambara Catchment Forest Project Technical Paper* No.**34**. Forestry and Beekeeping Division & Finnish Forest and Park Service & National Soil Service, Dar es Salaam & Vantaa.

Cunneyworth, P. (1996) Kwamarimba Forest Reserve - a lowland forest bordering the Sigi River. *East Usambara Catchment Forest Project Technical Paper* No.**32**. Forestry and Beekeeping Division & Finnish Forest and Park Service & National Soil Service, Dar es Salaam & Vantaa.

Cunneyworth, P. (1996) Mtai Forest Reserve *East Usambara Catchment Forest Project Technical Paper* No.**37**. Forestry and Beekeeping Division & Finnish Forest and Park Service & National Soil Service, Dar es Salaam & Vantaa.

Cunneyworth, P. and Stubblefield, L. (eds) (1996) Bamba Ridge Forest Reserve. *East Usambara Catchment Forest Project Technical Paper* No.**30**. Forestry and Beekeeping Division & Finnish Forest and Park Service & National Soil Service, Dar es Salaam & Vantaa.

Luke, Q. (ed) (1996) Conservation Assessment and Management Planning (CAMP) Workshop For Selected Species of the Kenya Coastal Forests. National Museums of Kenya, Darwin: Plant Conservation Techniques for East Africa, Coastal Forest Conservation Unit, Ukunda, Kenya.

Luke, Q.,Pakia, M.,Mududu, H. (1998) *Report on Status of Tanzanian populations of Ficus faulkneriana*. Coastal Forest Conservation Unit, National Museums of Kenya

Mashauri, S.M. (1997) Assessment of Categories of Threat of three endemic timber species of East Usambara. A thesis submitted in partial fulfilment for the Darwin International Certificate in Plant Conservation Techniques for East Africa. East Usambara Catchment Forest Project, Tanga.

Mbinda, J.Munge (1997) Survey of the conservation of Gigasiphon macrosiphon (Harms) Brenan (Caesalpiniaceae) at Muhaka, Gongoni and Buda Mafisini forests. Report submitted for the Darwin International Certificate in Plant Conservation Techniques, Coastal Forest Conservation Unit, National Museums of Kenya, Ukunda.

Luke, Q. (ed) (1996) Conservation Assessment and Management Planning (CAMP) Workshop For Selected Species of the Kenya Coastal Forests.

Executive Summary

The National Museums of Kenya - Darwin Plant Conservation Techniques Course for East Africa is funded by the Darwin Initiative of the British Government (Department of the Environment, Transport and the Regions), and run by the National Museums of Kenya (NMK) in collaboration with the Royal Botanic Gardens, Kew (RBG, Kew). It is funded for three years: April 1996-99.

The course has two components: a four week taught component and a one week Conservation Assessment and Management Plan (CAMP) training workshop. The latter, adopted from the Conservation Breeding Specialist Group (CBSG) of the Species Survival Commission (SSC) of the IUCN, is an intensive and interactive information-collecting technique and a comprehensive means of assessing priorities for management of threatened species. The CAMP workshop was conducted from 20-25 November 1996 at the Kenya coastal forests, south coast. It was organised by the core Darwin team (From RBG, Kew and NMK) and the Coastal Forest Conservation Unit of the NMK. Initially, each participant was allocated one of 14 selected threatened plant species, to compile a species profile by undertaking a thorough literature search (see Appendix II, page 49).

These forests exist as isolated patches and many as sacred forests or Kayas. Despite apparent legal protection through National Reserve or National Monument status, many of these are under threat from development for tourism and from illegal timber harvesting. The workshop began with a discussion forum, based on these issues, attended by local government officials from relevant institutions (Kenya Wildlife Service and Forest Department) and representatives of the Kaya elders.

Field work was planned such that a site was within easy reach from our work station and had several of the C.A.M.P. species. At the site, the participants were divided into two groups, each with more than two resource persons. As much information as possible was gathered at the site. This included population counts (noting any evidence of regeneration), description of the habitat (including a list of associated species), habit of the species and economic uses. Observations were made at the site about threats to the plant species and discussions held about management recommendations for their conservation. The group transferred this information on to the field data sheets back at the work station and afterwards the whole CAMP team reconvened for the final presentation and discussion of each taxon data sheet. This is the basis of this document and contains the most comprehensive information so far recorded for any one of the species.

Additional information from literature (see Appendix III, page 50) has also been included in this report. We welcome further comments.
Perpetua Ipulet *Course Co-ordinator*

Summary Table of Categories of Threat assigned to Kenya Coastal Forest Species Selected for CAMP Workshop

Species	**Family**	**Category of Threat**	
		Listing	**Criteria**
Ancistrocladus robertsoniorum J. Léonard	Ancistrocladaceae	Endangered	B 1 & 2c)
Bauhinia mombassae Vatke	Caesalpiniaceae	Endangered	B 1 & 2c)
Cephalosphaera usambarensis (Warb.) Warb.	Myristicaceae	Critically Endangered	B 1 & 2e)
Cynometra greenwayi Brenan	Caesalpiniaceae	Critically Endangered	B 1 & 2b, c, e)
Diospyros shimbaensis F.White	Ebenaceae	Endangered	B 1 & 2c)
Euphorbia tanaensis Bally	Euphorbiaceae	Critically Endangered	B 1 & 2 c); D
Euphorbia taruensis S. Carter	Euphorbiaceae	Critically Endangered	B 1 & 2 a, b, c d)
Ficus faulkneriana C.C. Berg	Moraceae	Critically Endangered	C 2 a); D
Gigasiphon macrosiphon (Harms) Brenan	Caesalpiniaceae	Endangered	B 1 & 2 a, b, c, d, e)
Keetia lukei Bridson	Rubiaceae	Critically Endangered	B 1 & 2 a, b, c, d, e)
Oxyanthus pyriformis (Hochst.) Skeels ssp. *longitubus* Bridson	Rubiaceae	Endangered	B 1 & 2c)
Phyllanthus sacleuxii A.R.-Sm.	Euphorbiaceae	Critically Endangered	B 1 & 2 a, b, c, d); A 1 c)
Synsepalum subverticillata (E.A. Bruce) Pennington	Sapotaceae	Endangered	B 1 & 2 c)
Ziziphus robertsoniana Beentje	Rhamnaceae	Endangered	B 1 & 2 a, b, c, d, e)

TAXON DATA SHEET-KENYA COAST

Taxon: *Cephalosphaera usambarensis* (Warb.) Warb. Family: Myristicaceae
Common name: Mtambara (Kiswahili), Mtambaa (Usambara).
Distribution (at BRU and within national hierarchies): K7, T3.

Habit: Tree (20-40 m).
Habitat: High humidity, riverine vegetation progressing into rocky boulders in lowland (upper range) coastal forest associated with *Milicia excelsa* (Welw.) C.C. Berg, *Aporrhiza paniculata* Radlk., *Ficus exasperata* Vahl, *Ixora narcissodora* K. Schum., *Tabernaemontana* sp., *Saba comorensis* (Bojer) Pichon, *Entada rheedii* Spreng, *Byttneria fadenii* Dorr. ined.

Status
Distribution: Endemic: K7: Shimba Hills National Reserve; T3: Amani.
Range: approx. 4,500 km^2.
Area occupied: Approx. 5 ha in Shimba Hills National Reserve; Tanzanian population unknown.
Number of locations: 2 - Shimba Hills National Reserve (Buffalo Ridge Valley & Risley's Ridge), Kenya; Amani Nature Reserve, Tanzania.

Population trends
% change in years or generations: Not known.
% decline: Not known, but observed decline in numbers of mature individuals.
Time/rate (year or generations): Not known.
No. of mature individuals: Not known.

Threats: Genetic erosion; habitat destruction due to increasing populations of large mammals, especially elephants; *Maesopsis eminii* Engl. invasion in Tanzania, over-exploitation in Tanzania before 1986.
Status of habitats: Legally protected, but not well enforced in Kenya.
Harvesting: Timber used for veneer (high quality).
Data quality: Reliable for Kenya. Reliable but inadequate for the Tanzanian population (Shedrack Mashauri, pers. com., 1996).

IUCN Category of Threat: Critically Endangered; B 1 & 2e)
Proportion of population within protected areas: thought to be 100%.
Cultivated populations: Approx. 50 ha enrichment plantation in Tanzania (Amani).
Management and research recommendations:

- Enhance protection of its habitats (only mature individuals and very young seedlings found; no other age classes),
- Enhance protection of Shimba Hills populations (alert management),
- Enhance public awareness,
- Further field surveys to see whether the species occurs in other similar habitats,
- Develop research on the impacts of *Maesopsis eminii* Engl. on Tanzanian populations,
- Establish the provenance of the enrichment plantings in Tanzania,
- *Ex situ* conservation: arboretum, botanic garden.

TAXON DATA SHEET-KENYA COAST

Taxon: *Ficus faulkneriana* C.C. Berg Family: Moraceae
Common name: Unknown.
Distribution: (at BRU and within national hierarchies): K7 - Kwale District; T3 - Pangani, Korogwe.

Habit: Tree - epiphytic/strangler.
Habitat: Not accurately determined; degraded coastal dry open bushland (edge of mangroves, wooded grassland and wet forest).

Status
Distribution: Endemic to K7 and T3.

Range: approx. 9,300 km^2.
Area occupied: Not known.
Number of locations: 5 - K7: Dzirihini, Gongoni Forest Reserve; 1 collection from Langoya Nwagandi (Longomwagandi) in 1968. T3: Pangani (Mwera sisal estate; Mkwaja locality), Korogwe (Magunga sisal estate).

Population trends: Decline due to habitat degradation. Clear data not available.
% change in years or generations: Not known.
% decline: Not known.
Time/rate (year or generations): Not known.
No. of mature individuals: Unknown - 2 in Dzirihini population; 2 in Gongoni Forest Reserve.

Threats: Habitat degradation.

Status of habitats: Highly degraded, danger of complete clearing.

Harvesting: None.

Data quality: Reliable, somewhat limited. Personal communication - Quentin Luke. Site visit to Dzirihini (22/11/96).

IUCN Category of Threat: Critically Endangered; C 2a) & D.

Proportion of population within protected areas: thought to be 50% in Kenya, none in Tanzania.
Cultivated populations: At CFCU Ukunda nursery, 1 in Ann Robertson's garden (Malindi).
Management and research recommendations:

- Introduction/ translocation to a nearby comparable, protected site,
- *ex situ* conservation: nurseries, arboreta, etc.,
- research on habitat, population levels and habit (whether epiphytic, terrestrial or secondarily terrestrial).

TAXON DATA SHEET-KENYA COAST

Taxon: *Gigasiphon macrosiphon* (Harms) Brenan Family: Caesalpiniaceae
Common name: Mnyanza (Digo).
Distribution (at BRU and within national hierarchies): K7, T8.

Habit: Tree to 20 m tall - canopy species in coastal forest.
Habitat: Moist semi-deciduous/evergreen lowland forest.

Status
Distribution: Coastal forests of Kenya and Tanzania.
Range: Unknown.
Area occupied: Unknown.
Number of locations: 5 - 4 in Kenya (Mrima Forest Reserve, Marenje Forest Reserve, Kaya Muhaka National Monument and Gongoni Forest Reserve; Kwale District) and 1 in Tanzania (Rondo Plateau).

Population trends
% change in years or generations: Unknown.
% decline: Unknown.
Time/rate (year or generations): Unknown.
No. of mature individuals: Unknown (4 mature trees observed in Gongoni Forest Reserve - 21/11/96).

Threats: Ongoing destruction and degradation of coastal forests in Kenya and Tanzania. Observed high levels of seedling mortality at Gongoni Forest Reserve - Duiker damage.
Status of habitats: Forest Reserves (Gongoni, Mrima, Marenje), National Monument (Kaya Muhaka), other locations unknown.

Harvesting: Tree harvested for timber.

Data quality: Poor; populations visited at Gongoni Forest Reserve and Kaya Muhaka on 21/11/96.

IUCN Category of Threat: Endangered; B 1 & 2 a, b, c, d, e)

Proportion of population within protected areas: thought to be 100% of Kenyan populations and unknown for Tanzanian populations.
Cultivated populations: Amani, Tanzania, 1 at NMK, 1 at CFCU at Ukunda, 2 in Ann Robertson's garden (Malindi). 100 seeds in the NMK Seedbank - (from one mother tree).
Management and research recommendations:

- Field survey of Tanzanian populations required,
- Establish as priority species for Forest Department management,
- Monitoring and studies of regeneration and seedling mortalities,
- Establish *ex situ* field gene bank and investigate usage as ornamental species.

Species Survey Research for *Ficus faulkneriana, Cola usambarensis, Gigasiphon macrosiphon*

Report on Status of Tanzanian populations of *Ficus faulkneriana* led by Coastal Forest Conservation Unit, National Museums of Kenya Quentin Luke, Mohamed Pakia, Hamisi Mududu (1998)

On the 5th January 1998, the CFCU Project Executant (PE), Quentin Luke, Mohamed Pakia (Student Ethnobotanist) and Hamisi Mududu (Field Assistant), visited the East Usambara Mountains (Amani Nature Reserve) in Tanga, Tanzania. The main objective of the visit was for the PE to undertake some ground work on the selection of sites with species of interest for the Darwin course scheduled for March 1998.

Site search was delayed due to problems on the hosts' (East Usambara Project) side. However, on the 7th January, with assistance from Mr. Ahmed Mndolwa (Amani Botanical Gardens Manager) and Mr. Andrew Theophilo Mrinji (Forester, Amani Nature Reserve) sites with *Ficus faulkneriana* were identified around KwaGunda sisal estate, in Lwengela valley (that separates East and West Usambara) . The first encounter during the search was of *Ficus natalensis*, a species that closely resembles the species of interest (*Ficus faulkneriana*). Further search led to identification of four sites with *Ficus faulkneriana*. The following is a brief description of the sites identified:

Site 1

Species: *Ficus faulkneriana*
GPS Reading: S 5°09.154'
E 38°09.779'
Alt* 345M

Number of individuals: One mature plant, eight young plants (three of which were cut down, but two had started copicing).

Vegetation Type:
The epiphytic fig trees at this site are growing on the *Cinderella odorata* on a cultivated area. Some of the notable plant species around this site included:
Sterculia appendiculata, Ficus exasperata, Cussonia zimmermanii, Antiaris toxicaria, Albizia adianthifolia, Trichilia emetica, Bridelia micrantha, Milicia excelsa, Schizozygia coffaeoides.

* The GPS reading for Altitude is not reliable.

Site 2

Species: *Ficus faulkneriana*
GPS Reading: S 05°09.625'
E 38°32.931'
Alt. 250M

Number of individuals: Four mature trees, and seven young plants. All noted to be terrestrial, and one of the mature trees was propagating through self layering.

Vegetation type:

The *Ficus* plants on this site are growing in a bush on a cleared area, mainly with regrowing shrubs. Some of the plant species noted on this site include:
Antiaris toxicaria, Grewia forbesii, Lantana camara, Solanum incanum, Keetia zanzibarica, Senna singueana, Harrisonia abyssinica, Ficus exasperata, Triumfetta rhomboidea, Dichrostachys cinerea, Antidesma venosum, Annona senegalensis, Brackenridgea zanguebarica, Lonchocarpus bussei, Erythrina abyssinica.

Site 3

Species: *Ficus faulkneriana*
GPS reading: S 05°09.540'
E 38°32.660'
Alt. 240M

Number of individuals: One mature plant, on *Hyphaene compressa.*

Vegetation type:

The *Ficus* tree is on epiphytic *Hyphaene compressa*, in cleared area. Some of the plant species identified at the site include:
Flueggea virosa, Antidesma venosum, Triumfetta rhomboidea, Lantana camara, Annona senegalensis, Keetia zanzibarica, Maytenus senegalensis.

Site 4

Species: *Ficus faulkneriana*
GPS reading: S 05°09.526'
E 38°32.676'
Alti. 198M

Number of individuals: One mature tree, on *Hyphaene compressa.*

Vegetation type:

The *Ficus* plant is epiphytic on *Hyphaene compressa,* in a cleared area. Some of the species identified at the site:
Triumfetta rhomboidea, Panicum sp., Antidesma venosum, Annona senegalensis.

Site 5

Species: *Ficus faulkneriana*
GPS Reading: S 05°09.534'
E 38°32.728'
Alt. 460M

Number of individuals: One mature tree, on *Hyphaene compressa.*

Vegetation type:
The *Ficus* tree is epiphytic on *Hyphaene compressa*, in a cleared area. Some of the plant species identified at this site include:
Lantana camara, Solanum incanum, Grewia forbesii, Triumfetta rhomboidea, Waltheria indica, Flueggea virosa.

The point to note here is that, all the sites identified are outside the East Usambara mountains, at the Lwengela valley. A private land, utilised for sisal growing.

Later in the day, the selected site with *Cephalosphaera usambarensis* in the Amani Botanic Gardens was visited. The site carries a big number of the species, such that it appears like a plantation of *Cephalosphaera usambarensis* . Although the claim is that, the species is growing as a result of natural regeneration, there could be a mistake in the claim. A more convincing site, that does not raise suspicion on the natural regeneration of *Cephalosphaera usambarensis* was identified the following day (8th January) during a walk along the mountain trail followed by a deviation to the left.

The proposed site(s) with *Gigasiphon macrosiphon* (only read from the literature) could not be visited due to inaccessibility as the roads were in poor condition following the heavy rains (El Nino). However, there was assurance from Mr. Shadrack Mwashauri of a follow up on *Gigasiphon macrosiphon.*

The CFCU personnel left Amani Nature Reserve, via Tanga for Ukunda, at about mid-day on the 8th January 1998.

REPORT COMPILED BY : Mohamed Pakia (Student Ethnobotanist, CFCU Ukunda)

East Usambara Catchment Forest Project

ASSESSMENT OF CATEGORIES OF THREAT

OF

THREE ENDEMIC

TIMBER TREE SPECIE OF EAST USAMBARA

BY,
SHEDRACK M.MASHAURI

A THESIS SUBMITTED IN PARTIAL FULLFILMENT FOR THE DARWIN INTERNATIONAL CERTIFICATE IN PLANT CONSERVATION TECHNIQUES FOR EASTAFRICA.

30th April 1997

Department of International Development Co-operation, Finland

Metsähallitus - Forest and Park Service

Ministry of Natural Resources and Tourism, Tanzania

Forestry and Beekeeping Division

SUMMARY.

East Usambara forests is unique biodiversity hot spot center in the whole East Africa; The flora value and endemism signify the area as the most important one in the Eastern Arc forest.Eastern Arc forest are the most important forest area (in terms of biological diversity and endemics) in Africa.

The conservation effort to restore and maintaining the area has been done since German reign. The Amani Botanic Garden (ABG) which was initially second biggest one in the World is located in East Usambara,at Amani. However its management was not effective, at present rehabilitation and management restructuring of ABG is needed.

East Usambara Catchment Forest Projest started in 1991 with the major objective of conserving East Usambara biodiversity and catchment value, establishing Amani Nature Reserve (ANR) and rehabilitation of ABG.

The "fine filter" approach of conservation to East Usambara is not developed; but enough information have been collected from different studies which can be used to develop "fine filter" approach of conservation;

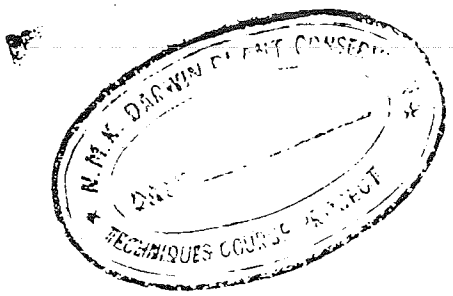
This work however have made use of the available information to assess some endemic specie of East Usambara, and were sufficient to qualify specie to their proper categories of threat.

Greenwayodedron suaveolens was assessed and qualified ***Vulnerable***, though some information on its status in Uganda is unknown ; *Cola Usambarensis* assessment has qualified the species ***Critically Endangered*** and endemic East usambara while *Cynometra engleri* qualified ***endangered*** and endemic.

East Usambara Catchment Forest Project can adhere to Agenda 21 about Convention on Biological Diversity, Article 8, and 9, on specie's maintenance, habitat and ecosystem restoration through "fine filter" approach of conservation, by which recovery programmes for threatened specie, habitat and ecosystem can be developed.

4.2 (ii) TAXON DATA SHEET.

Taxon: *Cola usambarensis*.



Family: Sterculiaceae.

Common name: Muungu.(Sambaa).

Distribution: Endemic East Usambara.

Habit: Small tree.

Habitat requirement: submontane forest dependent sp: found in growing with *Pachystela msolo,Cola scheffleri, Grewia guetzeana etc.*

Status

Historical distribution; Only known from East Usambara,

Current distribution; East Usambara Mountains, In proposed Amani Nature Reserve, Kambai Forest Reserve, Bamba Forest Reserve, and Mtai Forest Reserve ,

Range; Less than 500km^2

Area Occupied; Less than 100km^2

Number of locations; Less than 10,

Population trends:
%changes in years or generations about 50,
%decline
Time/rate(years or generations) 25 yrs,
No. of mature individuals Less than 100,
Threats: G. H. Hc, L, Lf.
Status of Habitat Protected area, (Forest Reserves and Nature Reserve),

Harvesting Yes for community & local bussiness with local people,

Data quality: . General field study;
. Indirect information (trade, figures, habitat availability etc),

IUCN Category of Threat See Result 5.2

Proportion of population within protected areas 100%,

Cultivated populations Nil,
Management and Reseach Recommendations.

The covery plan for sp should be prepared,
Genetic study and ecology of sp to be studied etc,
Cm, Gm, Hp, Hm, Lr & E. M.

5.2 Cola usambarensis:

A small tree endemic East Usambara submontane forest; at altitude about 800 m.a.s.l.

It is found rarely in very few localities, as sprout, or mature but debarked for use (rope)
The species is still used by local community though in protected areas.

No available literature on its ecology or its quantity in the forest.

A. Declining population; Few remaining plants were found in recent botanic work declining is due to local commercial harvesting, deforestation, and community use i.e construction poles and ropes.

This indicates a rapid decline of more than 50% over the past 10years and will most likely continue into the future. Therefore the species qualifies as Endangered: A1c; A2c.

B. Small Distribution; Confined in very few locality in East Usambara Mountains, the area of occurrence is less than 100km^2. Taking into account the specie is known to exist in East Usambara Mountains only (sub criteria B1) and the quality and extent of habitat is declining continuosly (subcriteria B 2c), the species qualifies as Critically Endangered: B1 + 2c.

C. Small Population size and Decline; In AFIMP 1987 a species was recorded confined in few localities at Amani, hence Frontier survey 1995 recorded few from Bamba and Kambai forest reserves, but the number of mature individual seems to be less than 250.

Taking into account the rapid decline rate (subcriteria C1) as well as continuing decline combined with all individual being in a single subpopulation (subcriteria C2b), the species qualified as Critically Endangered: C1 and C2b.

D. Very small population; The number of mature individual seems to be less than 250. Thefore the species qualifies as Endangered: D1.

E. Quantitative analysis; A quantitative analyses has not been done but rapid population estimates, and extent of occurance - indicate the specie been rare.

Conclusion: This species qualify be listed endangered; A1c and D1 But it strongly qualify to be listed as **Critically Endangered:** B1 + 2c; C1; C2b.

Cola usambarensis is ***Critically Endangered*** endemic.

RECOMMENDATIONS

The rapid assessment of category of threat to three (3) specie of East Usambara, has been a blue print to focus to more areas of research to make conservation activities more effective, however general observation from whole study following recommendation are worth, to be considered by PCP. and EUCFP.

East Usambara Catchment Forest Project, should initiate the work to up date information regards to endemism; the information on endemism should be collected from different areas and updated scientic paper about East Usambara endemism to be published.

- Scientist who are permited to do either botanical or zoological work in this area should be connected with project interest in up dating some information, also their work report or findings should be known to the project; This will reduce unknown random distribution of scientic findings from the area to other areas (nations).

- The EUCFP should collaborate with PCP, on the technical aspects to come up with proposals on how EUCFP can develop a " finefilter" conservation approach, at species level.

  The endemic specie of East Usambara been easily known through identification can be used for further assessment of threat to endemics and define categories of threat of endemic specie; This will support botanic research for other areas of rare plants and management of conservation priorities.

- The ABG, rehabilitation plan should consider endemic sp. of Tanzania endangered specie and specie under CITES which can be cultivated in Amani.

- The EUCFP -should develop this proposal (vision) so as to formulate a National Conservation Plan of endangered plant species or rare endemics.

- The EUCFP should point out specific areas that needs botanical research, and the proposal related to conservation through research, eg. genetic study of *Cola usambarensis* to be formulated and forwarded to FORST. The EUCFP should hold the role to convince FORST to play a role on conservation of endemics in East Usambara and other Eastern - Arc forest.

  The Conservation Projects Development Unit of Royal Botanic Gardens, Kew, should consider areas of collaboration through Darwin initiative for plant conservation in East Africa to East Usambara as starting point of Eastern Arc forest. (The value of Eastern Arc interms of flora could be managed effectively if collaborative effort in research and management is organized, much interms of flora is yet to be explored in this area) , That should be Darwin vision to this biodiversity hot spot center.
  The PCP - through Plant Conservation Techniques Course's participants should be Pioneer group to start categorizing the threat of plants in East Usambara to set a base information for further assessment. (This can be done during the CAMP workshop 1998 at Amani.)In future Darwin Eastern Arc mission can develop further research oppotunities in this area.

The ABG - rehabilitation plan should seek technical formalities and assistance on new techniques in plant conservation through experienced body eg. Conservation projects development unit, Royal Botanic Gardens Kew.

CONCLUSIONS

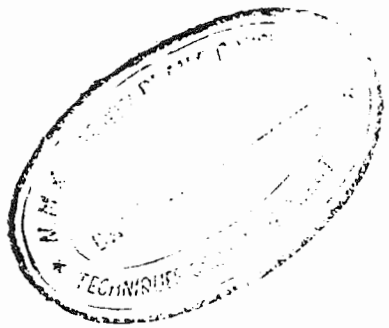
The endemic plants of East Usambara are under threat; rapid assessment done to some specie has shown the need to have species conservation programme in this area.

The efforts of EUCFP to conserve the East Usambara forests, should consider that "fine filter" conservation effort by establishing a mechanism by which rare and threatened, plants in East Usambara are conserved.

The "finefilter" conservation approach, is the only means to ensure the survival at species level.

East Usambara forest is biodiversity hot spot area all over East Africa; what ever effort to restore the degraded habitat in this area should be supported. The species conservation programme, derived from assessment of status of some specie can be developed to other areas as well and later to have a National Programme for endangered or threatened Plant species.

The EUCFP - role in spear-heading this vision will help the National conservation efforts to adhere to the Convention on Biological Diversity Article 8 and 9 about In-situ and Ex- situ conservation respectively.



Survey for the conservation of *Gigasiphon macrosiphon* (Harms) Brenan (Caesalpinaceae) at Muhaka, Gongoni and Buda Mafisini forests.

By

Mbinda J. Munge

Coastal Forest Conservation Unit

National Museums Of Kenya,

P.O. Box 86,

UKUNDA-KENYA.

Report submitted for the Darwin International Certificate in Plant Conservation Techniques

April, 1996.

2 Abstract

Coastal forests of East Africa are rich in endemic species of plants which are under threat as a result of population pressure and forest fragmentation. Survey for the conservation of *Gigasiphon macrosiphon* (Harms) Brenan was conducted in three Coastal forest patches of south coast, Kenya. These are Kaya Muhaka (one of the about 60 Mijikenda's sacred forests), Gongoni and Buda Mafisini forests. They are part of the remains of the once extensive and deversified Zanzibar-Inhambane lowland forest of eastern Africa.

The gradual disappearance of unknown number of plant and animal species has been compared to the burning down of genetic library (Reichholf 1990a), which must be designated not merely as death, but as the end of birth (Riede 1990). The final consequenses of this process of large scale extinction cannot be foretold (Prance and Elias 1977; Myers 1980; Bazzaz 1986), neither can the economic loss be calculated (Schmidt 1991).

Species such as *Gigasiphon macrosiphon* (Caesalpinaceae) are almost extinct because charcoal production for limestone industries in Kwale District are supplied from the moist forest (Luke, per. comm 1991). Henk Bentje (1994), categorised *Gigasiphon macrosiphon* as endangered. It is only known from five localities which are under a lot of Human population pressure as the demand of natural resources increases; yet very little is known about the local uses, seedling regenaration, population structure and its associated species.

3. Introduction

Coastal forests in Kenya are generally distributed north and south of Mombasa. North Mombasa is constituted by five administrative districts namely Mombasa, Malindi, Kilifi, Lower Tana River and Lamu, while South Mombasa constitutes one district, Kwale. All these districts are forested with Kwale being the most forested and containing most of the gazetted forest reserves (Burgess, et al . ,in prep). The current total area of true closed canopy coastal forest in Kenya is estimated as 550 kilometres square (Burgess, et al . , in prep).

Coastal forests support around 50 species of mammals, 200 species of birds, 1000-1,500 species of higher plants, and an unknown number of invertebrates species (estimated as several tens of thousands) (Burgess, et al ., in Litt). At least 6 species of mammals, 8 species of birds, 6 species of amphibians, 12 species of reptiles, at least 500 species of plants and unknown number of invertebrates are dependent on the survival of coastal forest if they are not to become globally extinct (Burgess, et al . , in Litt).

8.5 Propagation and *ex-situ* conservation

Like most other tropical trees, *Gigasiphon macrosiphon*, was easily propagated from both seed and vegetatively. 72 (90%) out of 80 seeds sown in the nursery germinated. 50% germinated within the second week and the rest within the third. By the 7th week, the average growth rate per seedling per week was 7.8 cm.

The entire process of root formation in cuttings has been found to be detemined by many factors including physiological and environmental factors (Leakey, 1995). 15 out of the total 22 cutting placed in the propagator rooted after two weeks and were transferred into polythene tubes. The rest had rooted by the end of the third week.

8.6 Category of threat

Gigasiphon macrosiphon could be classified as Endangered in Kenya. It is facing an extreemely high risk of extinction in the near future. The population is severely fragmented and extent of occurrence is estimated to be less than 5000 kilometres square. It is known to exist at only five locations in Kenya: Muhaka, Gongoni, Buda Mafisini, Marenje and Mrima forests. Continuing decline is projected as a result of habitat degradation by man's activities.

9 Conclusion and recommendations

Gigasiphon macrosiphon is in danger of disappearing in the near future. Its future lies the conservation of these forest fragments. However, it seems that by the middle of the next century, these forest fragments will be reduced to smaller patches, leading to severe management problems presented by small populations of species: genetic; demographic; ecological; and accidental (Whitmore and Sayer, 1992).

The FRs, though heavily exploited for timber and fuelwood (unlike the Kayas), recorded much higher populations of the species. Therefore, the FD and other conservation bodies need to face up to the challenges possed by habitat loss, and design, promote and implement a massive programme of conservation action, involving both *ex-situ* and *in-situ* methods as appropriate.

The local community needs to be educated on the conservation status of *Gigasiphon Macrosiphon*. Resource substitution can be a solution to over exploitation of the species.Other medicinal plants known to the local people can be used as alternatives. For fuelwood, building, and bows and arrows, other plants could also be used instead of *Gigasiphon macrosiphon*.

The social-economic environment is an important element when justifying sustainable exploitation of natural resources. The well being of the local people is an ultimate goal towards protection of biological diversity. Programmes aimed at improving the economic

status of the local people such as income-generating projects to uplift the standards of living goes along way in conservation of biological diversity. Encouraging the locals to establish woodlots of fast growing indigenous and exotic plant species will reduce the pressure on the gazetted forests. These would provide the much needed building poles and fuelwood, which they could even sell to the middlemen.

The other populations in Marenje and Mrima FRs should also be surveyed. The survey should be extended to cover the populations said to be found in Tanzania (FTEA).Other elements connected to consevation of a species like pollination agents and predation should also form part of the research. This will assist in coming up with an appropriate management plan.

The large and beautifull flowers (with one partly yellow petal) of the species, and the reddish colour of young leaves would make it a worthwhile introduction for ornament in other parts of the tropics.

Acronymes used:

CFCU	Coastal Forest Conservation Unit
FD	Forest Department
FR	Forest Reserve
PE	Project Executant
TMP	Traditional Medical Practitioner

Illustrations

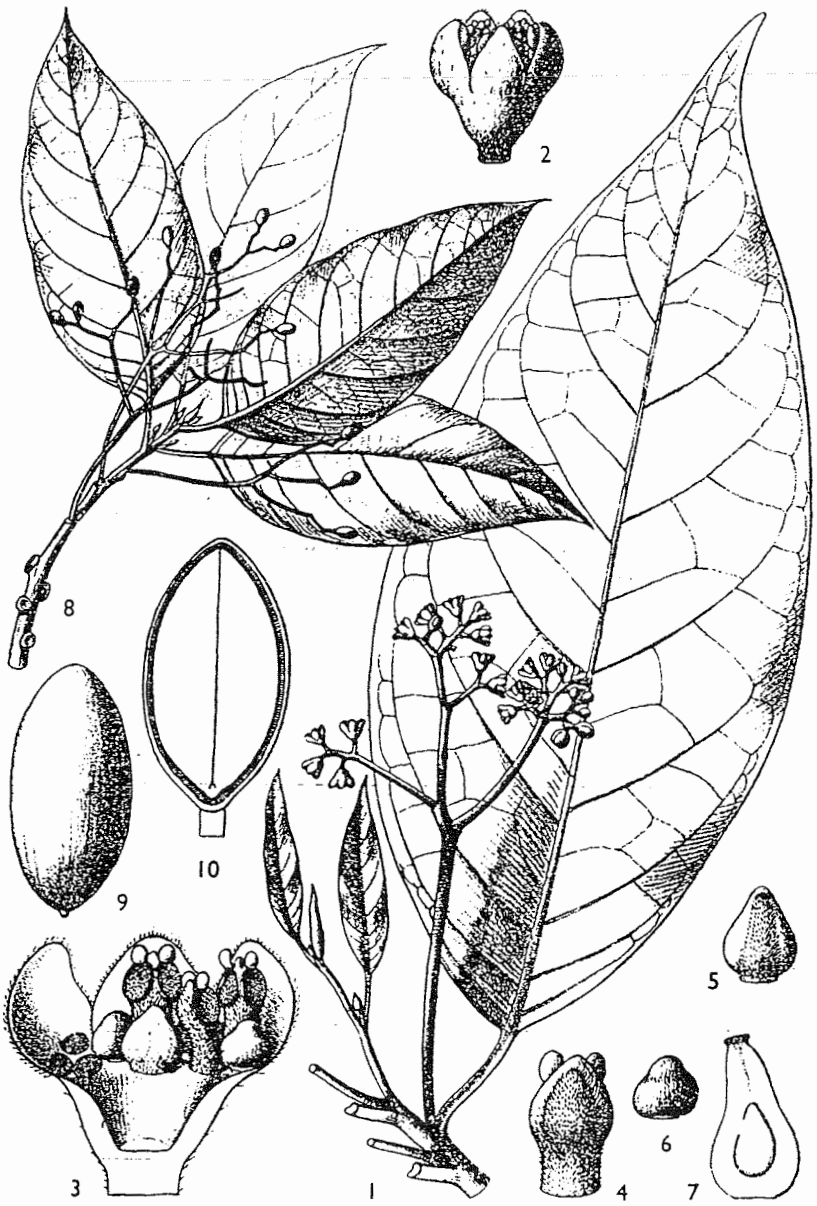
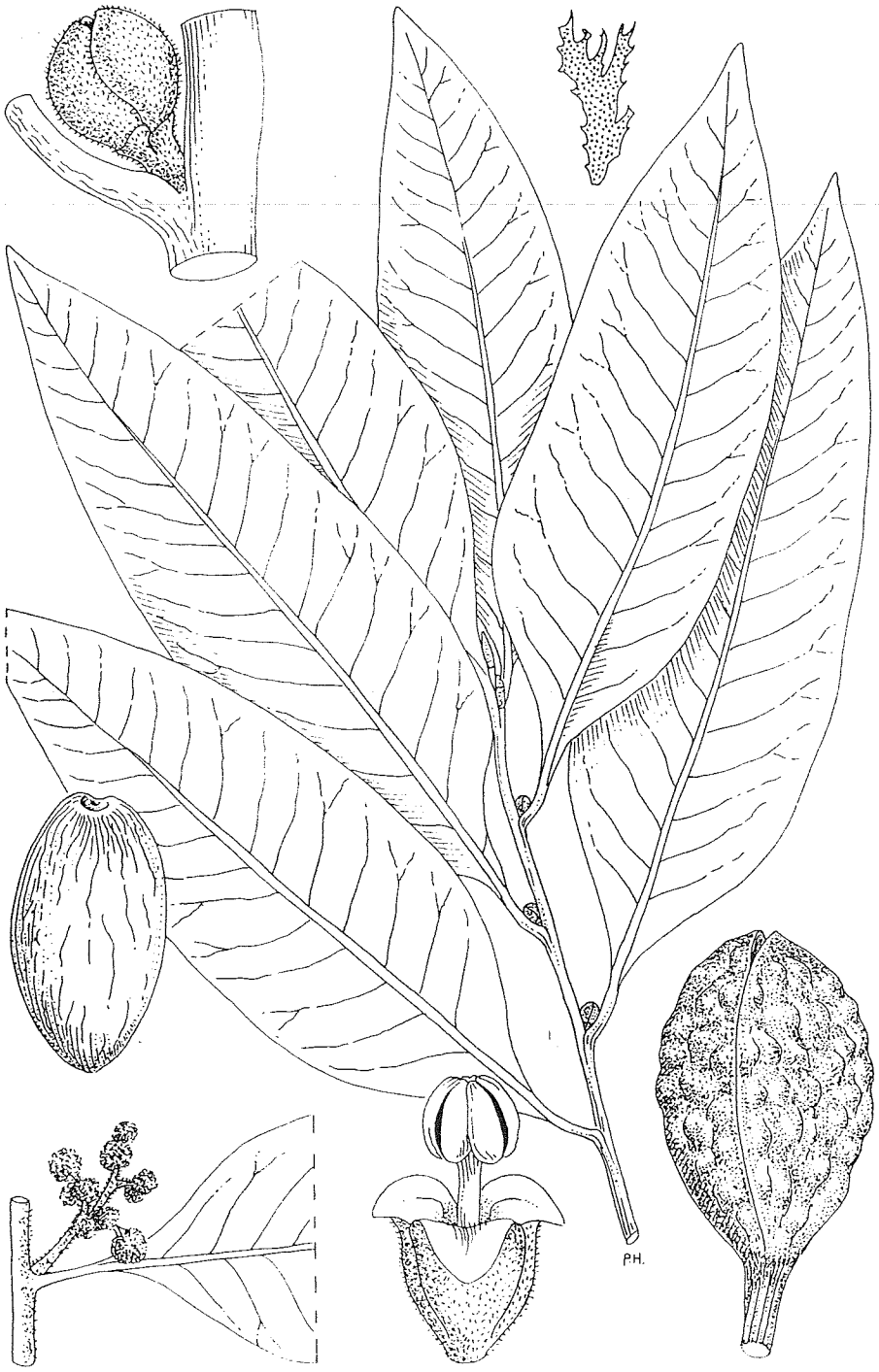


FIG. 1. *BEILSCHMIEDIA KWEO* — 1, flowering branch, × 1; 2, flower, × 7; 3, longitudinal section of flower, × 12; 4, stamen of outer whorl, × 16; 5, staminode, × 16; 6, gland at base of third whorl of stamens, × 16; 7, longitudinal section of ovary, × 12; 8, branch with young fruit, × ½; 9, fruit, × 1; 10, longitudinal section of fruit, × 1. Reproduced from N.B.G.B. 6: 74 (1914).

Beilschmiedia kweo (Mildbr.) Robyns & Wilczek Lauraceae
From: *Notizblatt Bot. Gart. Mus. Berlin-Dahlem* 6:74 (1914).



Cephalosphaera usambarensis (Warb.) Warb. Myristicaceae
Artist: Pat Halliday
From: (1988) Myristicaceae, Flora of Tropical East Africa

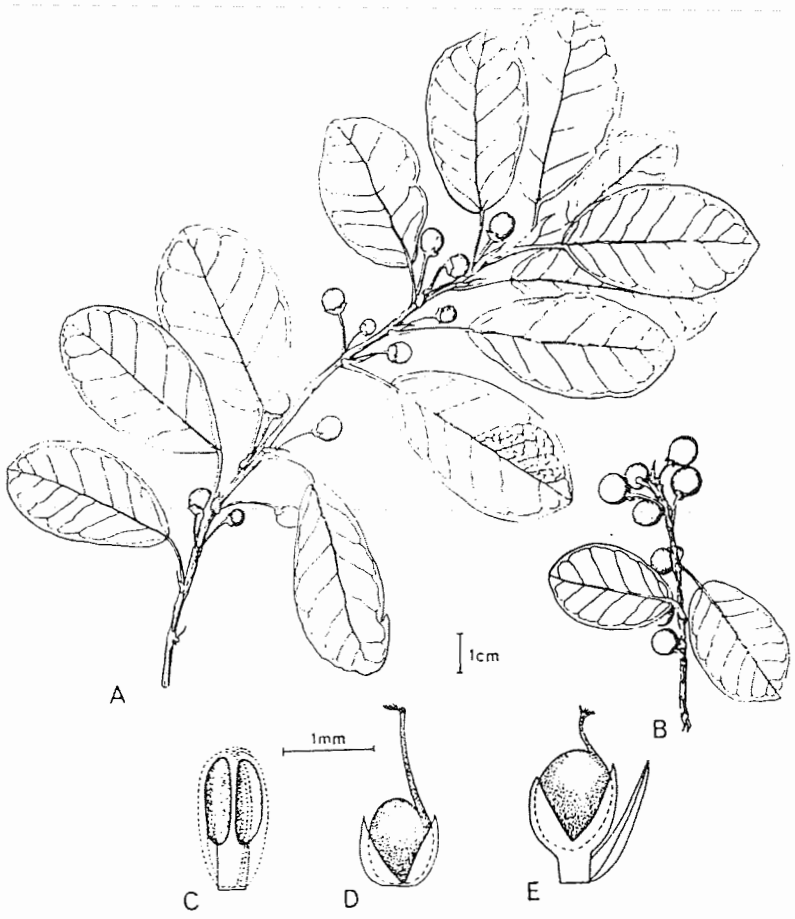


FIG. 2. *Ficus faulkneriana*. **A** leafy twig with figs (from *Magogo & Glover* 10); **B** leafy twig with figs, **C** staminate flower; **D** seed flower; **E** gall flower (from *Faulkner* 1168). Drawn by Miss E. M. Hupkens van der Elst & Mr T. Schipper.

sessile, style (including stigma) c. 0·5–1 mm long; fruits ellipsoid to ovoid or subovoid, 1–1·2 mm long; "gall fruits" subglobose to ellipsoid to ± ovoid, c. 1–1·2 mm long. Interfloral bracts up to 2 mm long. Fig. 2.

KENYA. Kwale District: Shimba Hills, Lango ya Mwagandi, 10 Feb. 1968, *Magogo & Glover* 10 (K).

TANZANIA. Lushoto District: Korogwe, Kwedikwazu, 6 May 1966, *Semsa* 4018 (K). Tanga District: Magunga Estate, Vigai, 16 Dec. 1953, *Faulkner* 1309 & 1310 (B, K, SRGH). Pangani District: Mwera, 29 March 1957, *Tanner* 3666 (K); Mkwaja, 10 Oct. 1957, *Tanner* 3715 (K).

The collections are from coastal bushland and wooded grassland, at altitudes up to 450 m.

Ficus faulkneriana C.C. Berg Moraceae
Artist: Miss E M Hupkens van der Elst and Mr T Schipper
From: Berg, C.C.(1988) New Ficus (Moraceae) of Africa. *Kew Bulletin* **43**:84.

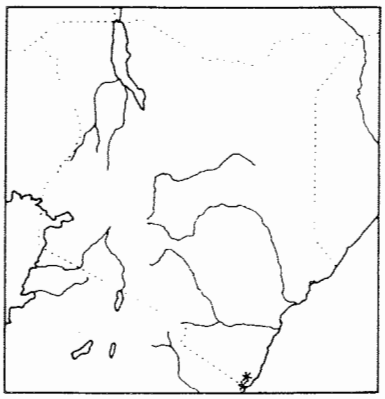
Gigasiphon macrosiphon (Harms) Brenan — *Caesalpiniaceae*

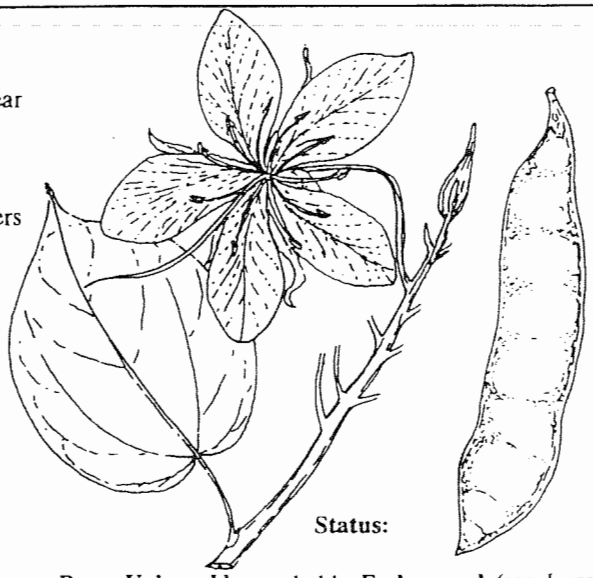
Local Names & Uses: none known.

Distribution: coastal Tanzania (Rondo plateau and near Tanga) and Kenya (Mrima and Marenje forests).

Habitat: moist lowland forest; alt. 100-810 m.

Description: tree 12-20 m tall. Leaves simple. Flowers large, white.

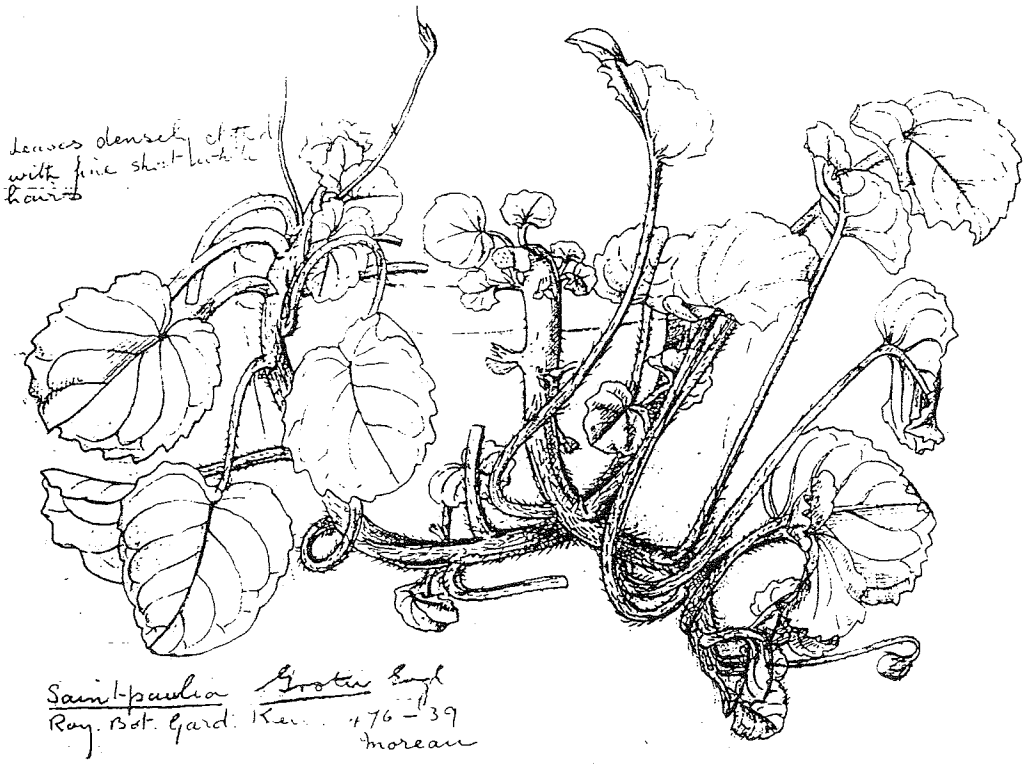




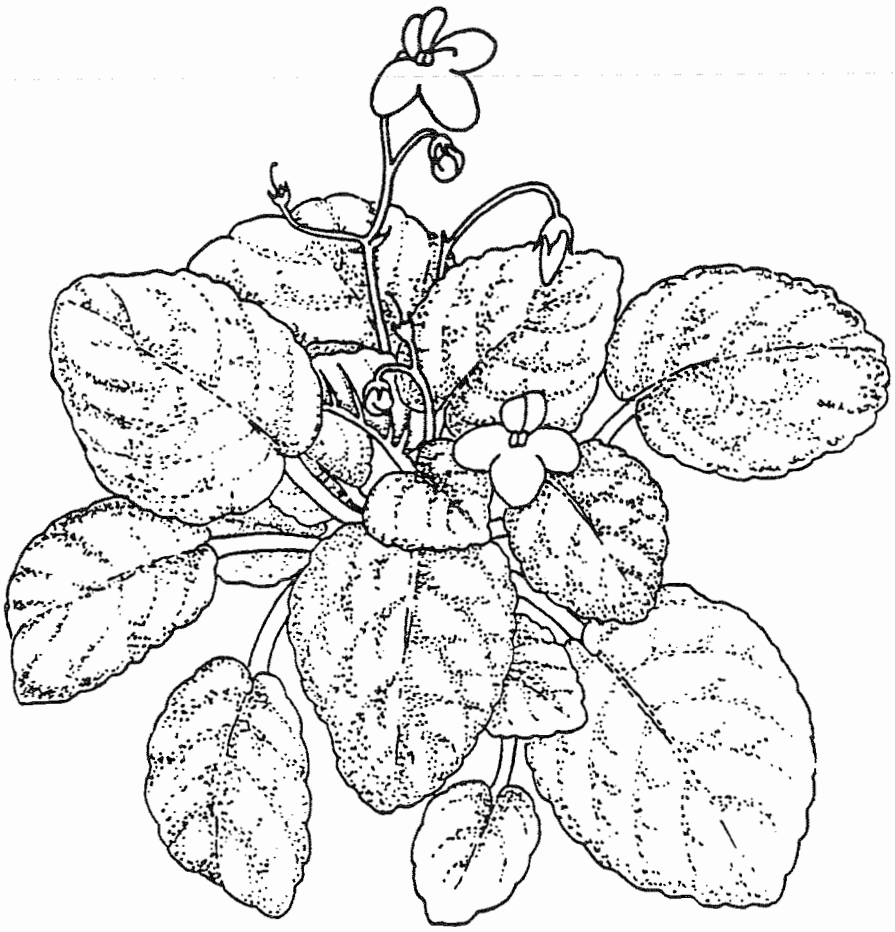
Status:

Rare, Vulnerable, probably **Endangered** (see Lucas & Synge 1978). In Kenya both sites are under threat, and Mrima has been partially destroyed; this species was last collected there in 1964. There is a specimen in cultivation at Waimea Botanical Garden, Hawaii.

Gigasiphon macrosiphon (Harms) Brenan Caesalpiniaceae
Artist: Henk Beentje (After: Flora of Tropical East Africa)
From: Beentje, H.J. (1988) Atlas of the Rare Trees of Kenya. *Utafiti* 1(3):71-123.



Saintpaulia grotei Engl. Gesneriaceae
Artist: S. Ross-Craig
From: Royal Botanic Gardens, Kew, archives

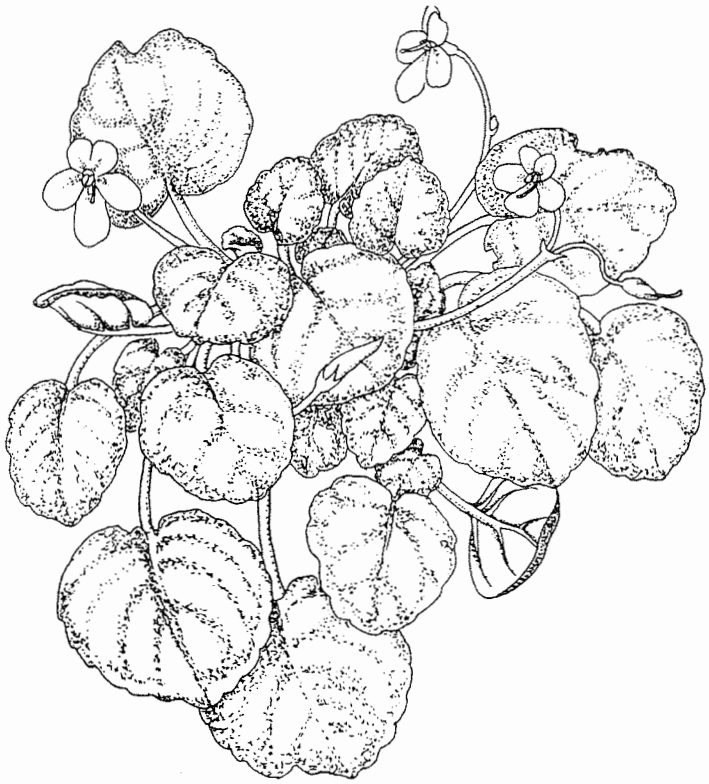


Saintpaulia confusa

Illustration reproduced with kind permission of the artist: Reinhild Raistrick

Saintpaulia difficilis

Illustration reproduced with kind permission of the artist: Reinhild Raistrick



Sp grotei

Saintpaulia grotei

Illustration reproduced with kind permission of the artist: Reinhild Raistrick

Species Profiles

LITERATURE REVIEW ON COLA USAMBARENSIS

TAXONOMIC CLASSIFICATION:

Class: Angiospermae
Order: Malvales
Family: Sterculiaceae
Genus: Cola
Species: C. usambarensis
Local (vernacular) Name: Muungu (shambaa).

Description

Cola usambarensis is a small branched tree up to 15m height. The young shoots are shortly stellate, hairy, leaves papery, oblong, elliptical up to 25 x 13 cm, cuneately narrowed to an obtuse or subacute base, primary lateral nerves (other than basal) 4 - 7 each side of midribs, petioles mostly long up to 19cm, male flowers about 0.6 - 0.8 cm.

Habitat

Cola usambarensis is restricted to the East Usambara mountains, Northern parts of Tanzania. It has been found growing in association with *Pachystella msolo, Cola scheffleri, Grewia goetzeneana* and other evergreen mountainous forest species of the east usambara mountains. *Cola usambarensis* is a forest dependent tree species . In many cases it is found in primary forest and in normal circumstances it can not be found in forest edge. C.*usambarensis* occurs in the altitude of more than 850 metres above sea level.

Distribution:

In East Usambara Mountains, *C.usambarensis* is found in Amani Nature Forest Reserve (ANFR), Kambai , Bamba, Mtai and Kwamarimba Forest Reserves

Biology and Reproduction;

There is no much information concerning biology and reproduction for the species *Cola usambarensis*. The trees of the genus *Cola* are dioecious with no petals, sepals (perianth) with a short tube and 4-8 lobes. Anthers on an androsphere in a dense head. Fruits of one to several free carpels.

Uses:

The outer layer (bark) of *Cola usambarensis* is used for ropes production for local houses construction.

Conservation status:

Cola usambarensis is endemic to East Usambara mountains. There is no any information available concerning its occurence in any other parts of the world.

References:

1 Bentje Henk (1994). Kenya Tree , Shrubs and Lianas

2 Brenan J.P.M & Greenway F.S.L. (1949). Check list of forest trees and shrubs of the British Empire No. 5 Tanganyika Territory .

3 Cunneyworth P. (1996) East Usambara Catchment Forest, Kwamarimba Forest Reserve Biodiversity Survey.

4 Mashauri S. M. (1997) Assessment of Categories of threat of three endemic timber tree species of East Usambara.

Compiled by Raymond Kilenga

SPECIES PROFILE

Cola usambarensis

Class : Angiospermae
Order : Malvales
Family : Sterculiaceae
Genus : *Cola*
Species: *Cusambarensis*
Local : Muungu (Samba)
Kiswahili :

Description

Family:
The plants under this family have stellate hairs on leaves and/or twigs and/or inflorescences. The leaves alternate and are stipulate. The flowers are unsexual or bisexual, 3-6 merous. Petals may be absent or present iand fruits are various.

Genus: *Cola*

The petioles are usually thickened near its apex, the petioles on single branches often vary in length, leaves with normal venation, cunate or rounded at base. The plants of the genus Cola are dioecious (except *Cola porphyrantha* which has male and female on the same plant. The petals are absent, sepals (perianth) with short tube and 4-8 lobes. Anthers are on androphore usually in a dense head. They have fruits of one to several free carpels.

Cola usambarensis:

The tree is branched, is upto 15m with young shoots, shortly stellate hairy, soon glabresent; its papery or subcoriaceous, oblong, elliptic, its upto 25x13 cm, cuneatly narrowed to an obtuse or subacute base, primary lateral nerves which are 4-7 each side of midrib. Petiole mostly long upto 19cm and usually distinctly swollen and bent, usually cream or brownish cream, produced on young and old branches. Female flowers are abbout 0.6-0.8cm.

Habitat

The species is common in evergreen rain forest, about 1000metres altitude near Amani in East Usambara. In AIMF 1987 a species was recorded confined in few localities at Amani, Also a survey done in 1995 recorded a few from Bamba and Kambai forest reserves but the number of mature plants seems to be less than 250 trees.

C.usambarensis is a forest dependent species (defined as a primary forest only. It does not include forest edges or secondary forest).

Distribution: (Declining)

Few remaining plants were found in recent botanic work. Declining is due to local commercial harvesting deforestation and community use that is construction of poles and ropes. This indicates a rapid decline of more than 50% in the past 10 years, and will most likely continue to decline in future.

Conservation status:

The species qualifies as endangered ; A1c; A2c. Quantitave analysis has not been done but rapid population estimates and extent of occurance indicate the species beinfg rare. The species is critically endangered endemic. (Mashauri, 1996)

Biology and Reproduction

Not known.

Reference

1. Beentje, H.J. (1994) NMK. Kenya trees and shrubs and Lianas.

2. Brenan, J.P.M. & Greenway,F.L.S. ( ) Check-List of the Forest trees and shrubs of the British Empire. No.5 Tanganyika Territory Part II

3. Cunneyworth, P. (1996). Kwamarimba Forest Reserve.

4. Mashauri, M.S. (1996). Assessment of categories of threats of three endemic Timber tree species of E.Usambara.

Compiled by

Lucy M. Mwaura

SPECIES PROFILE

Cynometra brachyrrhachis

Taxonomic classification:

Class	:	Angiospermae
Order	:	Fabales
Family	:	Leguminosae
Sub Family	:	Caesalpinosae
Genus	:	*Cynometra*
Species	:	*C.brachyrrhachis*

Description:

Tree; young branchlets shortly pubescent.
Leavea: petiole 2-3mm. Long; rachis with petiole 0.8-1.5cm long, pubescent or puberulous; leaflets 4, opposite, or ssometimes, oblanceolate, ovate-lanceolate, or ovate, falcate- curved, 1-5cm long, 0.5-2cm wide, usually gradually acuminate and acute at apex, rarely shortly narrowed and obtuse, glabrous or subglabrous.

Racemes terminal, short,axis 4-10mm. long, puberulous, pedicels 4-7mm. long (including hypanthium), sparsely puberulous to subglabrous. Sepals 4. Petals unknown. Pods unknown.

Note: This species may well not be correctly placed generally. It might well, for instance, be a Scorodophloeus.

Habitat:

Uncertain, but presumably lowland rain-forest.

Distribution:

T3, not known else where.
Tanzania- Lusoto District: Amani, Bomle Road. By Zimmerman, Mar.1912, Grote 3583.

Biology and Reproduction:

Not known.

Uses:

Timber from mature trees.

Conservation status:

[Rare, endangered.]

References

1. Milne-Redhead, E. & Polhill, R.M.(Eds) (1967). FTEA; Leguminosae Sub family Caesalpinioideae.

2. Brenan, J.P.M. & Greenway, P.J. (1949) Check-list of the forest trees and shrubs of the British Empire. No. 5 Part 11. Imperial Forestry Institute Oxford 1949.

Compiled by

Jane F. Nyafuono

PLANT CONSERVATION TECHNIQUES COURSE - Darwin Course 1998:

SPECIES PROFILE FOR CAMP 1998

TAXON: CYNOMETRA BRACHYRRHACHIS

LITERATURE REVIEW

FAMILY: CAESALPINIACEAE

GENUS: CYNOMETRA

SPECIES: BRACHYRRHACHIS

LOCAL [VERNACULAR] NAME UKWE [SAMBAA]

DESCRIPTION

This species is a tree .It produces branches and branchlets. The young branchlets are shortly pubescent. The leaves have leaf petioles, 2-3 mm. Long. The rhachis with petiole is 0.8-1.5cm.long, pubescent or puberulous. It has four [4] leaflets. This can be arranged either opposite, or sometimes sub-opposite, or alternate., sessile, obliquely lanceolate, oblong-lanceolate, oblanceolate, ovate-lanceolate, or ovate,-/+ falcate- curved, 1-5cm. long,0.5-2cm wide, usually gradually accuminate and accute at apex. Rarely shortly narrowed and obtuse, glabrous or subglabrous.

HABITAT

No adequate research that has been done on this species, and as a result the exact habitat is uncertain, but recent research shows that the species can be found on both Lowland Rain Forest and submountaineous forests.

DISTRIBUTION

The species is not widely distributed. In East Africa the species was recorded in Tanzania. This is the Tanga Region[T3] It was located in Lushoto District; Amani, Bomole road in 1909 by Zimmermann in his collection No2564 and in Mar.1912 by Grote in collection No. 3583.

BIOLOGY AND REPRODUCTION

Racemes are terminal, short , axis -/+ 4-10mm. Long puberulous. Pedicels are 4-7mm. Long, sparsely puberulous to subglabrous. Has four [4] sepals. Petals unknown for this species. Pods also unknown.

USES

No specific use which has been identified for the species but it is good for timber charcoal and firewood.

CONSERVATION STATUS

It is Endemic to T3 and can be classified as RARE.

REFERENCES

Forest Trees &Shrubs of the British Empire No. 5; Tanganyika Territory Part II. By J. P. M .Bream M. A. in collaboration with P. J. Greenway F> C. S.

Flora of Tropical East Africa.

Technical Paper No. 33 Kwamarimba Forest Reserve (A biodiversity Survey)

Compiled by Mududu H. J.

CFCU

SPECIES PROFILE

The African Violet (*Saintpaulia difficilis* B.L. Burtt)

Taxonomic Classification

Class: Angiospermae
Order: Scrophulariales
Family: Gesneriaceae
Genus: *Saintpaulia*
Species: *S.difficilis*
Local Name: Unknown

Description

It is a small, perennial, pubescent herb commonly growing on rocks above the stream bed in Tanga region, Muheza District, E.Usambara Mountains, Amani Forest Reserve and in Kwamkoro-Kiganga Forest Reserve adjoining Mnusi Scarp Forest Reserve at the S.W escarpment of E.Usambara Mts near the *Maesopsis* plantations and remnants of the intermediate rain forest (Borhidi *et al.* 1987).

It has two to four flowers which are violet in colour with bright yellow stamens. The corolla tube is always short. The anthers diverge widely so that the lines of dehiscence are more or less parallel to the filament and to one another. Measurements of one corolla - lobes was as follows: Middle lobe 15 mm long by 11 mm wide, Side lobes 12 mm long by 9 mm wide, Lower pair 9 mm long by 7 mm wide.

The calyx is small, deeply 5 lobed, the lobes are 5 mm long, hairy, reddish brown. The corolla is wide, the lobes are unequal, with a deep violet blue colour. The peduncle is 3-6 cm long (Burtt, 1960).

The species has several leaves which are petioled and rosulate at the apex of a short thick fleshy stem. The petiole (which is red when young but becomes pale green with age), is hairy about 6-10 cms long. The leaf surfaces bear scattered short-stalked subsessile glands. The leaf blade is also densely hairy, on the upper side, with very short hairs on the underside. It is not yet possible to categorise whether the species has long erect hairs or short appressed hairs. But it has eglandular hairs on the upper leaf surface. The leaves are either ovate or dentate. The leaf veins are opposite with a dull green (almost olive) on the upper side while the underside is paler. The leaves are moderately thick in texture. Measurements of leaf blades are: 90 mm long by 60 mm wide, 70 mm long by 50 mm wide, 75 mm long by 54 mm wide.

Habitat

The species occurs on rocks besides streams in the evergreen *Parinari, Piptadenia, Cynometra* rainforest of Usambara Mts on steep mountain slopes or vertical cliffs near rivers or rivulets

(e.g. Sigi River). It prefers shade by canopy species such as *Maesopsis* and *Allanblackia*, ferns and *Impatiens*. It has been recorded at an altitudinal range of 930-975m.

Distribution

The species has been recorded in Tanga region, Muheza District, E.Usambara Mountains and in Amani Forest Reserve Kwamkoro-Kiganga Forest Reserve adjoining Mnusi Scarp Forest Reserve at the S.W escarpment of E.Usambara Mts. It is also available on some Mountains in Kenya. Plants usually healthy in the dry season (January) though not with many flowers. This is in T3.

Biology and Reproduction

Not yet documented

Uses

Ornamental house plants (Cronquist, 1981, Heywood, 1978).

Conservation status

Endemic to northern Tanzania. Highly endangered through removal of forest cover, quarrying and overcollection from natural habitats by professionals and amateur horticulturalists (Macharia *et al.* 1994). However on 24 January 1991, about 100 plants of *S.difficilis* were found growing on a rock above a stream bed (Raistrick,

References

BORHIDI, A., IVERSEN, S.T., MZIRAY, W.R., PERSSON, E., PETTERSSON, B. and POCS, T. 1987. No. 87363.

BURT, B.L. 1960. Studies in the Gesneriaceae of the Old World XV: The genus *Santpaulia*. *African Violet Magazine* **13**(3):547-568.

CONQUIST, A. 1981. *An integrated system of classification of flowering plants*. Columbia University Press, New York.

HEYWOOD, V.H. (1978). *Flowering Plants of the world*. Oxford University Press, Oxford.

MACHRIA, S., T.R. PEARCE, B.TEIBER and R. AMAN. Molecular taxonomy of *Saintpaulia rupicola* and the genus *Saintpaulia*. In: L.J.G. VAN DER MAESEN, X.M.VAN DER BURGT and J.M. VAN MEDENBACH DE ROY (eds.). *The Biodiversity of African Plants*. Proceedings of the XIVth AETFAT Congress, 22-27 August, Wageningen, The Netherlands. Kluwer Academic Publishers, Dordrecht.

Compiled by: Christopher Bakuneeta

A CONSERVATION ASSESSMENT AND MANAGEMENT REPORT ON *SAINTPAULIA DIFFICILIS* B.L. BURTT FAMILY: GESNERIACHEAE

By

David N. Okebiro

E.A. Herbarium

Introduction

For the conservation and management of *Saintpaulia difficulis* to be effective, the whole species range of the genus *saintpaulia* H. Wendl. Must be taken into account. This is important because the genus is endemic to the lowland coastal and Eastern Arc mountain forests of East Africa (Tanzania and Kenya). Presently there is insufficient data about their actual field populations though they are under threat due to the depletion of their forest habitat. Most of the species are closely allied, difficult to separate and lack taxonomic clarity which explains possible hybridization in the field. In more recent years new populations of *Saintpaulia* showing distinct morphological features from those already described in Burtt's classification have been found. Eastwood et al (1998). There has been much discussion surrounding these discoveries, with suggestions that they represent undescribed taxa.

The Genus *Saintpaulia*

Saintpaulias commonly known as the African violet in horticultural trade were discovered in East Africa in Usambara mountains by Baron Walter von Saint Paul in 1892. They are members of the Gesneriaceae, a family which embraces well over 2,000 species in about 125 genera. Though the family is distributed throughout the world, most of them are tropical plants. Saintpaulias are now the most popular house plants and cultivated commercially on a vast scale at room temperature of about 65°F (19°C). The retail trade of the commercial varieties that have been developed is well over $30 million and is based on two species of *Saintpaulia ionantha* and *Saintpaulia confusa*. However there exists high potential to develop other varieties from the wild genepool that have not been utilized in the horticultural market.

The earliest specimen of *Saintpaulia* was collected in 1884 by Sir John Kirki "opposite Zanzibar" and the second specimen was collected by Rev. W.E. Taylor in Giryama and Shimba mountains South West Kenya between Taita Hills and the Coast in 1887.

Affinities of the genus

No species of *Saintpaulia* has ever been described under another genus though Rodigas (1895) wanted to unite *Saintpaulia* with *Petecosme*. Only one plant *Linnaeopsis alba* (E.A. Bruce) R.E. Burtt has been wrongly included in *Saintpaulia*. These two facts argue that the genus must be very well marked, but they derive more from it's having a very characteristic facies than from a clear technical definition, Burt (1958).

Geographical distribution and ecology of the genus *Saintpaulia*

Saintpaulia is endemic to the coastal lowlands and Eastern Arc remnant forests in East Africa. Individual species are restricted in their distribution and, many are endemic to one mountain or particular region, Eastwood et al (1998). However their restricted distribution may be a reflection of insufficient field surveys to establish actual populations. Of the 21 known species 11 of them (about 50%) including *Saintpaulia difficilis* occur in Usambara mountains.

They grow in well shaded forest areas, usually on sloppy rocky areas or steep cliffs adjacent to forest streams or rivers. They have also been observed to grow on leaf litter, tree trunks and rock crevices. Lowland species in coastal forests occur on limestone outcrops or limestone gorges alongside rivers under shade.

Saintpaulia difficilis B.L. Burtt

Description

Perennial hairy herb. Leaves in a rosette, elliptic ovate, ,petiole up to 18 (-20)cm. long, leaf blade 5-7.5 (-9.0)cm long by 3-6.0 (-7.0)cm wide, apex obtuse, base cuneate, rounded to subcordate, margin crenate serrate, lateral nerves 4-5. Inflorescence a cyme, peduncle 5-12cm long, pilose, bracts linear, to 7mm long, pilose. Calyx divided into 5 equal lobes upto the base, lobes lanceolate, 4mm long, pilose. Corolla violet-purple, tube short, 2mm long, companulate, limp 2.5 x 2.5cm, upper lobe 8mm long by 5mm wide. Filaments 4mm long, attached on the corolla, anthers 1.75 - 3.0mm long, yellow.

exerted. Ovary conical, 2mm long, villose, style upto 8mm long, base pubescent slowly changing to glabrous towards the tip, stigma oblique. Fruit 2.5cm long 3mm wide, pubescent

Specimens cited

Greenway & Verdcourt 8454. East Usambaras, head waters of the Sigi river, Ubiri-Monga, 3500ft. 24-5-1950; Greenway 7551. Head waters of the Sigi river, 24-10-1945; Greenway 5974. Headwaters of the Sigi river, 3500ft., 22-7-1940

Geographical distribution and ecology

Saintpaulia difficilis is endemic to East Usambara mountains, Tanzania. It occurs between 900 - 1080m above sea level. From herbarium records and field notes, the species appears to be locally abundant in remnant rainforest patches adjacent to the Sigi river and around Amani. It occurs on leaf moulds on rocks and logs, rock crevices and on rocks by the river side. The present number of remaining sub-populations and their distribution is unknown.

R. Rainstrick in her collection of the species in 1991 notes that the specimen was found in the Amani Forest Reserve, Kinganga under a canopy of *Maesopsis* sp. In 1994, Benny Bytebier (Personal Communication) of Plant Conservation and Propagation Unit (National Museums of Kenya) observed the species in a small population of approximately 100 plants situated in Kwamkoro Tea Estate, near Amani, East Usambaras. The population is in a patch of natural forest surrounded by tree plantations.. The forest is currently looked after by the East Usambara Usambara Catchment Forest Project. The population may be under threat from over collection as it is used as a tourist attraction by Forestry Department. In 1950s, Greenway collected the species from the upper waters of the Sigi river. By then it was abundant.

Kew Living collection of *Saintpaulia difficilis*

There are three accessions:

(1) 1974-2878 is of direct natural source donated by Cunningham and Van Someren as a plant collected from Amani.

(2) 1987-1364 (Mather-2) donated by Silva Mather. The exact location of the original material is unknown.

(3) 1995-500 (Mather -2) donated by Mrs Mather's family. It is assumed to be a replica of accession 1987-1364.

Status

Endemic to Tanzania

Data in respect of present wild population(s) is deficient

Old IUCN Category of Threat - Indeterminate

New IUCN Category of Threat - Data deficient / Threatened

Discussion

Like other Tanzanian Saintpaulia taxa, there is no enough field information in respect of *S. difficilis*. The greatest threat to the genus as a whole is that of habitat loss through deforestation. An inventory of the East Usambara Mts which has the highest *Saintpaulia* spp. diversity (11 species) revealed that 231km^2 or 58% of original tropical forest remain above 600m, Newmark, (1993). Though the position of *S. difficilis* is improving due to the gazettement of Amani Nature Reserve, the site is currently used as a tourist attraction and the population can be depleted due to over illegal collection. Many plants from Amani also have characteristics tending towards *S. confusa* This therefore requires a detailed field survey.

Recommendations

1. Detailed field surveys are required to determine the distribution and wild status of the species.
2. A taxonomic and molecular review of the genus as a whole is required in order to delimit actual species.
3. The prevailing threats and trends be identified and possible remedies implemented e.g. gazettment of remaining forest reserves.
4. Both *in-situ* and *ex-situ* should be addressed.
5. There should also be public awareness, education and sensitization of the communities around the forest reserves so that they can understand the value of the

genus and more important on how they can participate in the commercial exploitation of the taxa sustainably.

References

Burt B.L. (1958) Studies in the Gesneriaceae of the Old World XV, The genus Saintpaulia. Notes from the Royal Botanic Garden, Edinburgh 22: 547-568. Great Britain.

Bytebier, B. (1998). Personal Communication.

Clements, T. (1988). African violets. Redwood Press Ltd. Great Britain.

Eastwood, A. *et al* (1998). The conservation status of *Saintpaulia*. Curtis's Botanical Magazine, Volume 15 Part 1. Great Britain.

Eastwood, A. and Maunder, M. (?). A conservation assessment of *Saintpaulia* Taxa Conservation Projects Development Unit, Royal Botanic Gardens, Kew - England.

Mather, S. (?). Growing Saintpaulias (African violets) in Kenya. Kenya Horticultural Society, Nairobi.

Newmark, W.D. (1993). The role and design of wildlife corridors with examples from Tanzania. Ambio 22:500-504.

Wall, B. (1990). The African Violets and related plants. The Royal Horticultural Society, Great Britain.

Literature review on *Beilschmiedia kweo*

(Tylostemon kweo - mildbr, in N. B. G. B. 6)

Taxonomic classification

Division: Lignosae

Order: Laurales

Family: Lauraceae

Genus: Beilschmiedia (formerly Tylostemon)

Species: Kweo (mildbr - 1793)

Local (vernacular) Name: mfimbo (Kisambaa)

Kiswahili Name: Mfimbo

Description:

It is an evergreen tree growing to 30 metres high with lightly branched crown and is not buttressed. Branching starts from 18 to 24 metres above ground. The bark is grey, flakes off irregularly, leaving liver - coloured patches (Greenway 1949). Leaves are leathery, glabrous, oblong, ovate or elliptic i.e. 11.5 - 18 cm long, 4 - 9cm wide, narrowly accuminate at the apex, broadly cuneate to round at the base, said to be waxy above; petiole 1.7 - 2cm long with some pubescence when young but soon glabrous. The tree has small dark red flowers in axillary panicles 4 - 6cm long; peduncles +- 5cm long; secondary axes up to 3cm long; pedicles 2mm long. Perianth turbinate - campanulate, up to 3mm tall and wide; tube 1.3 - 1.5mm long; lobes ovate,1.3 - 1.5mm long. Introrse anthers of both outer whorls of stamens broadly ovate, with broad short filaments; those of third whorl dehiscing laterally, sub rectangular with depressed subglobose or ellipsoid glands at base of filaments; 3 staminodes of the inner whorl cordate, acuminate, scarcely stalked. Ovary and style flask shaped,2mm. Long. Fruits ellipsoid, olive like 3.5-5cm long,1.5-2.5cm wide. Cotyledons pale violate-brown, semicircular, very thick and solid. B.kweo produces hard wood with greenish brown or chestnut heartwood - Greenway(1949) SEE FIG.1

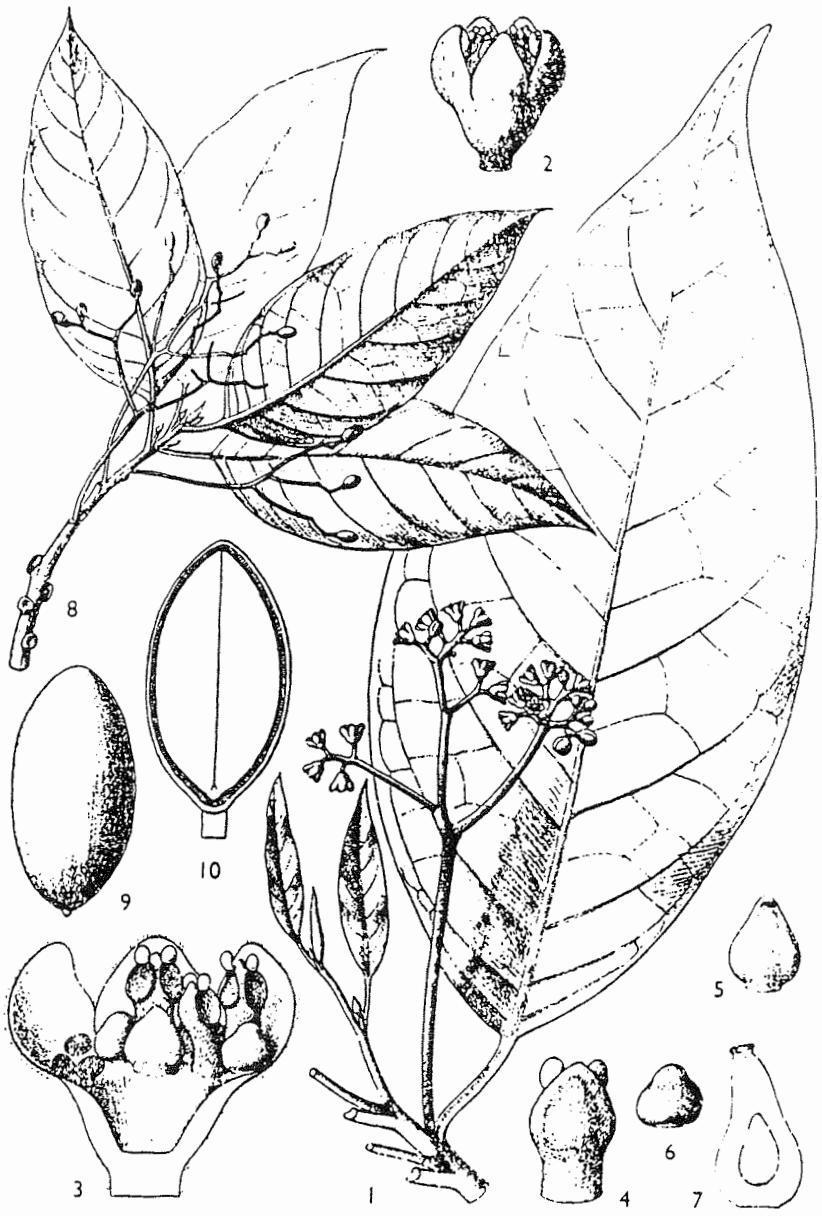


FIG. 1. *BEILSCHMIEDIA KWEO* — **1**, flowering branch, × 1; **2**, flower, × 7; **3**, longitudinal section of flower, × 12; **4**, stamen of outer whorl, × 16; **5**, staminode, × 16; **6**, gland at base of third whorl of stamens, × 16; **7**, longitudinal section of ovary, × 12; **8**, branch with young fruit, × ½; **9**, fruit, × 1; **10**, longitudinal section of fruit, × 1. Reproduced from *N.B.G. B.* 6 74 (1914).

HABITAT:

Locally common in evergreen rain forest in East Usambaras and as outlier on east side of West Usambaras (Greenway 1949) Mismahl s.n(T)G.1793!; at altitude 800-1800mts above sea level .

DISTRIBUTION

In East Africa, *B.kweo* is restricted to T3, T6, ?7. Past records indicate that *B. kweo* used to exist in the following locations; Lushoto District: E.Usambara mts., Kwamkoro, 24th Oct 1929 Greenway 1723! And Kwamkoro Forest Reserve,23rd Feb 1960,Bryce129! And Amani 15th Nov1928 Greenway 990!.Morogoro District; S. Nguru Forest Reserve, Kombola Enclave,27th Oct

1938, Sefu in F.H.1528!and Mbembule,11 Nov 1938, Markham in F.H.1529.

Note: Two specimens has been referred to as *B.kweo* elsewhere in Tanzania. However, the specimen from Mwanihana Forest Reserve in Iringa District may have been incorrectly named. The correct specimen may have been the one from Ruaha valley in Iringa described on 26th Aug 1958 by ede6

BIOLOGY AND REPRODUCTION

Flowers are hermaphrodites and dark red in lax few -flowered inflorescence, more campanulate ;glands inserted at the base of the filaments of the third row of stamens, ovoid. Fruit naked at the base, the Perianth tube-deciduous.

USES

According to "check-lists of the forest trees and shrubs of the British empire No.5"B.kweo used to be an economic timber before 1914 when it used to be exported to Germany where it was used for wagon and ship building and luxury panelling. The supply got exhausted then. However, FTEA says the supply got exhausted in 1945.

Conservation status:

Since 1945, the supply of this timber is said to be scarce. B kweo is endemic and restricted to T3, T6, ?7 zones in Tanzania. The first collections of it was made by the East African Museum in 1928 as per specimen number 990. This species was threatened by human exploitation and habitat loss due to deforestation. I have not come across any document that talks about the current conservation status of this species.

References:

Check lists of the forest trees and shrubs of the British Empire No.5. Tanganyika Territory Part II compiled by J. P. M. Brenan, M. A. in collaboration with P.J. Greenway FLS. Imperial Forestry Institute Oxford 1949

Hamilton & Bensted - Smith (1989). Usambara Integrated Rainforests Project (1989), Hedberg & Hedberg 1990

Flora of Tropical East Africa - Bernard Verdcourt Royal Botanic Garden, Kew with assistance from East African Herbarium

The Families of Flowering Plants by J. Hutchinson 3rd Edition. Oxford at the Clarendon Press 1973.

East African Museum, Nairobi

East Usambara Catchment Forest Project. Tech. Paper 35

Mr. Mudolwa - Personal communication.

Compiled by: Joel John Asega

Literature Review on *Cephalosphaera usambarensis*

Taxonomic classification:

Class : Magnoliales
Order : Magnollidea
Family : Myristicaceae
Genus : *Cephalosphaera (Brochoneura)*
Species: *C.usambarensis* (Warb)
Local (Vernacular) Name: Mtambaa (Usambara)
Kiswahili Name: Mtambaa.

Description:

Cephalosphaera usambarensis is generally a tall evergreen tree up to 50 metres high. It has a white clean and straight trunk to approximately 15 metres above the ground. The bark is smooth and with sometimes slightly buttressed trunk at the base. The crown is dominant and sometimes reported to be one of the emergent in the East Usambara forests (Ruffo, Hamilton et al 1987). Branching habit is quite horizontal or in whorled at an interval formation.

Leaves oblong, alternate and acute at both ends. One midrib vein is very distinct bearing opposite arranged veinules. The leaf texture is smooth with glacious beneath. The leaf size is approximately 10-29 cm by 4-7.3 cm (Brenan, Greenway 1949). The flowers are either in cymes or racemes and display a yellowish appearance(Mabberly, 1989). The mature fruits large, approximately 10cm by 5cm, yellow-green with fleshy pericarp, splitting longitudinally into 2 spoon like lobes and liberating a large hard oval seed of approximately 9cm by 4cm.

Habitat:

The tree is recorded as restricted to wet evergreen afromontane forests in East Africa with associations of *Maranthes, Parinari, Strombosia* and *Allanblackia* (Hamilton and Smith, 1987). It has also been found growing in tree association of *Croton,Hirtella, Afzellia, Cynometra, Hymneae, Parkia* and *Milicia* (Monday G, Compilation Darwin Course 1996). It has also been recorded growing well in plantations in the East Usambara mountains Tanzania (TAFORI- TIP- Experiment No.3 Amani).

Distribution:

In East Africa *C.usambarensis* is restricted to floristic regions of K7 and T3 only. In Kenya it has been recorded in Kwale district, Shimba Hills on Buffalo Ridge (3926 E, 0413 S) at an altitude of 240 metres above sea level. In Tanzania it is mostly dominate in the East Usambara forests in the range of 400-1200 metres above sea level with a very high natural

regeneration (Brenan and Greenway, 1949). But according to Ruffo and Mugasha (1980) only few numbers of the tree have been recorded in the Eastern side of West Usambara mountains. And according to Iversen (1991), C.usambarensis has a restricted range and is near endemic to Usambara mountains of Tanzania. This might be considered as one of the indicators on the rarity this tree species.

Biology and Reproduction:

Cephalosphaera usambarensis belongs to a small family with 16 genera and about 389 species of trees mainly confined to the lowland tropical rain forest of the Old and New World (Purseglove W,1984).

Trees of this family are evergreen, aromatic with watery pink or red sap in the bark. Leaves are alternate, exstipulate, entire, pinnately nerved often with pellucid dots. Inflorescence axillary, flowers small, regular and usually dioecious. Calyx usually 3-lobbed, cup shaped, petals absent, stamens 2-40, filaments united into a column, anthers 2-locular, ovary superior and 1-locular.

Fruits fleshy drupe, usually splitting into 2 valves and exposing single seed surrounded by undivided pulp. Seeds with copious endosperm, usually ruminate and small embryo.

According to the field experience in the East Usambara mountains (Amani), C.usambarensis has been found regenerating naturally in the valleys than on hill slopes.

Uses:

Timber is extracted from the mature trees while the bark is usually stripped off the felled tree trunks to yield sheets. the sheets of the bark are used in the manufacture of plywood and their derivatives products.

Conservation status:

There is limited literature about the conservation status of this species and from the available information there is clear indication that this tree species seem to be endemic to East Africa. It is restricted to K7 and T3 zones in Kenya and Tanzania respectively (East African Herbarium Records,).

C.usambarensis appear to be threatened by human exploitation, competition for suitable habitats by the introduced *Maesopsis sp.* in East Usambara hills as well as habitat loss due to deforestation.

Literature cited:

Brenan J and Greenway P.J (1949). Checklists of the Forest Trees and Shrubs of the British Empire (No.5),Tanganyika Territory part Two, Imperial Forestry Institute, Oxford.

East African Herbarium Database Records (1996).

Gillette J.B.& McDonald P.G.(1970). A numbered checklist of the Trees, Shrubs and Noteworthy Lianes Indigenous to Kenya, Government Printer, Nairobi, Kenya.

Hamilton & Smith B (1989). Forest Conservation in the East Usambara mountains- Tanzania IUCN, WWF- GlandSwiss.

Iversen S.T.(1991). The Usambara mountains Phytogeography of the Vascular Plants Flora, Doctoral Dissertation at Uppsala University, Sweden.

Mondey G.B.(1996). Darwin Plant Conservation Course Compilation paper for Conservation Assessment and Management Workshop for selected species of Kenya Coastal Forest.

Ruffo & Mugasha (1980). Natural Forest Research Section, Lushoto ,Tanzania.

Purseglove J.W.(1984). Tropical Crops Dicotyledons, Longman Group Limited,England.

Compiled by Aggrey Rwetsiba and Ahmed Mndolwa

Shadrack K. San'gangyi

LITERATURE REVIEW ON Cynometra longipedicellata(Harms)

Taxonomic Classification:

Family: Leguminoseae

Sub-Family: Caesapiniodeae

Tribe: Cynometra

Description: Much branched evrgreen treeup to 18m. high, with broad rounded crown.

Biology: Leaves: Petiole with ranchis 2-5cm long, Stripules persistent, foliaceas obliquely ovate to ovate-oblong, 0.7-1.5cm long, petiole 3-10mm long, l eaflets 2-4 sessile, elliptic to ovate-elliptic or obovate-elliptic 3-12cm long 2-7cm wide, mostly obtuse at apex not e marginate. Panicles compact, axes pubescent upto 1-2.5cm long, pedicles unusually long 1.5-3.5cm glabrous,jointed about 5mm below the hypanthium. Flowers white,sepals 4, 4-7mm long. Petals 7-8mm but damaged ones only examined.

Distribution: Tanzania: Loshoto District in evergreen rainforest, East Usambara.

District: T3 not known elsewhere.

Conservation status: Protected.

REF: Flora of East Africa by **J.P.M.BRENAN**

SPECIES PROFILE *Ficus faulkneriana*

TAXONOMIC CLASSIFICATION

Class:

Order:

Family: MORACEAE

Genus: *Ficus*

Species: *faulkneriana*

Vernacular name: MKUYU (swahili)

MVUNO.(swahili)

DISTRIBUTION

This plant species is known to be endemic in East Africa. In East Africa, it is only found in Kenya and Tanzania .In Tanzania , it is found in Tanga and Pangani districts (East of Tanzania).

In Kenya it is found in Mwagandi and kware areas Northern kenya.

HABITAT

Coastal Bushland, and Wooded grassland, between 0-450m. sea level

PLANT DESCRIPTION

Height: A tree up to 30m. tall or above.

Leaves: Spirally,sometimes tending to sub opposite

Lamina: Corriaceous,ob ovate to elliptic or sometimes oblong

Appex: Rounded to obtuse,sometimes very shortly and bluntly acuminate or emarginate.

Base;Rounded to Cordulate or obtuse

Margins; Entire,both surfaces glabrous.

Veins;Lateraly,midrib not reaching the appex,Tertiary venation reticullate or parallel to the latteral veins

Petiole; 0.2-1cm long, thick and glabrous

Stipules; 0.2-0.6cm long,sparsely puberulous or ciliolate often sub persistent

Figs; in pairs in the leaf axils or below the leaves

Peduncle; 0.3-1.5cm long sparsely minutely, puberculous,basal braccts 1.5-2cm long, persistent.

Receptacle;sub globose,to ob void,0.4-1.2cm long,when dry almost glabrous,reddish or yellowish at maturity.

ECOLOGY AND REPRODUCTION

The species looks like *Ficus natalensis* and *Ficus thorningii*.

In wet forests the species associates with other plants, such as *Cynometra, Drypetes, Parkia, Garcinia, Manilkara*, and *Mangroove forests*..

No information is available,on it's reproduction.Furthermore,the species looks like *Ficus natalensis* and *F.thorningii*.

CONSERVATION STATUS

This plant species, at the moment is only known to occur in in East Africa (Kenya and Tanzania0.

ECONOMIC USE

No information is available on the economic importance of this plant.

REFFERENCES

Berg.C.C.(1989) Flora of Tropical East Africa

Iversen S.T (1991) The Usambara Mountains Phyogeography of the vascular Plant Flora, New York.

BY: BAYONA D.G..

Literature Review on Gigasiphon microsiphon

Species Name Gigasiphon microsiphon (Harms) Brenan

Synonyms: Bauhinia microsiphon Harms
Cigasiphon humblotianum sensu KTS

Taxonomy

Family : Ceasalpinaceae

Genus : Gigasiphon

Species : Gigasiphon microsiphon

Distribution: Kenya k7(Mrima, Marenje forests)
Tanzania T7(Rondo plateau and near Tanga)

Conservation status:
Endangered (KTSL,P243), Rare vulnerable, probably endangered (Utafiti occasional papers of the National Museums of Kenya Vol. No 3 Nov 1988 P 80)

Local use : None known

Habitat : Moist lowland forests, altitude 100-810m(Utafiti occasional papers of the NMK Vol 1)
Lowland rain forests altitude 120-910m(FTEA1967)
Moist evergreen forest altitude 100-250m(KTSL)

Description of the Genus (According to FTEA 1967)

Small to large evergreen trees without tendrils leaves simple +/- accuminate and not all bilobed at apex .Flowers large to very large hermaphrodite in short terminal or auxillary recemes sometimes aggregated into pinacles. Hypanthium elongate narrowly cylindric comprising most of the apparent pedical Sepals 5, rather narrow, free or sometimes irregularly jointed above Petals 5, Stamens 10 usually all fertile ,filaments flabrous or pubescent below. Ovary long stipitate, style elongate, Stigma small, pods large irregularly eliptic-oblong, upto +/- seeded woody dehiscent or indehiscent. Seeds large with narrowly U-shaped line extending most of their circumference ,endosperm absent. Six species have been placed in the genus (two from Tropical Africa ,one from Madagascar and one each from Timor ,the Philippines and New Guinea)

Description of the species (According to FTEA 1967)

Tree 6-20m high. Bark whitish or pinkish grey, branchlets rusty ,puberous soon grabescent. Leaves papery, broadly ovate to suborbicular-ovate or +/- 8-17 cm wide +/- cordate or subcordate at base subglobrous. Racemes erect short terminal 4-10cm long . Hypanthium 8-13cm long rusty-pubescent outside sepals +/- 5-8 cm long. Petals magnolia like pure white except for yellow splash within one petal or white creamy pink obovate elliptic 9-13 cm long 4-6 cm wide. Stamens are all fertile, filaments slightly pubescent. Pods upto +/- 6 seeded, flattened indehiscent, breaking regularly +/-30 cm long and 6-6.8cm wide .Seeds suborbicular-compressed, +/-1.8-3 cm in diameter, 1-1.6 cm thick dull, purplish-brown

References:

1. C.C Berg and Mrs. Marie E.E Hijman, Flora of Tropical East Africa.

2. Henk Bantje, Kenya Trees, Shrubs and Lianas.

3. Nduma Immaculate (1996) in Conservation Assessment and Management Planning Workshop for Selected Species of the Kenya Coastal Forests.

By Alsen Oduwo
C-MAD

Literature Review on *Saintpaulia grotei* Engl.

Taxonomic Classification

Common name: African Violet
Family name: *Gesneriaceae*
Genus *Saintpaulia*
Species *Saintpaulia grotei*

Description

Saintpaulia grotei Engl. commonly known as African Violet is perennial creeping herbaceous plant with fresh green, short hairy , rounded crenate leaves on long flexible brown petioles (Byrd 1963). The flowers are small, pale violet-blue with darker edge in axillary clusters , excellent for hanging baskets.

Distribution and Habitat

The taxa grows naturally on T3 (NMK 1997 data base). It is endemic to East Usambara Mountains in Tanzania. Herbarium records from Royal Botanic Garden Kew indicate that the taxa is distributed between 1020 to 1080 m a.s.l. It is found in areas such as Kwamkoro Forest Reserve (Eastwood and Maunder 1995 Report No2, pp10). Around Amani in Sub-montane rain forest and Kihuhwi in E. Usambara Mountains.

Specimens also have been collected at Mt. Mlinga by (R. Raistric specimen No 2 from Kew). The taxa grows well on big rocks and in soils below well shaded undisturbed evergreen rain forest which comprises *Cephalosphaera* and *Cynometra*.

Conservation Status

According to new IUCN category of threat (Eastwood and Maunder 1995 Report No 2, pp 10), the taxa is categorised as data deficient. Royal Botanic Garden at Kew holds 4 specimens from Ambangula in West usambara.

References

African Violet Magazine (1960). Studies in the *Gesneriaceae* of Old World XV Vol. 13 No 3.

Byrd, A (1963). Exotica. Pictorial Cyclopidia of Exotic Plants. Guide to care of Plants Indoors. Roettrs Publishers Company, Rutherford, USA.

Eastwood, A and Maunder, M. (1995) A conservation Assessment of *Saintpaulia* taxa. Cultivated within the living collections. Royal Botanic garden, Kew. Conservation Projects development Unit. Kew Species Assessment Report No 2 pp 10

COMPILED BY W. H. NTUNDU

DARWIN INTIATIVE PLANT CONSERVATION TECHNIQUES COURSE 1998:

SPECIES PROFILE

Taxa: *Coffea sp.A.* of FTEA.

LITERATURE REVIEW

Class : Magnoliopsida
Subclass : Asteridae
Order : Rubiales
Family : Rubiaceae
Tribe : Coffeeae
Genus : *Coffea*
Species : *sp. A*

Description:

Shrub 3m tall; young stems glabrous covered with brown bark. Leaf blades broadly elliptic 7.5-13.5cm long; 3.5-6.5cm wide; subcuminate at the apex acute at base, moderately shiny on both faces, with lateral and and tertiary nerves apparent on both faces: domatia sparsly hair; petiole 0.6-1cm long; stipules triangular obtuse. Flowers 1-2 per axil;; not on the common peduncle, bracteoles 2, not lobed. Corolla and calyx not known. Fruits orange; up to 1.5 cm long,; 1cm wide, not prominent at apex; scarcely tapered towards base; inflorescence stalks lengthening to 1.3-1.5cm; the portion above the upper bracteoles being the longest.

Habitat:

This species grows on limestone, in a lowland evergreen forest in the coastal forest of E.Africa. Associated plant taxa were not mentioned.

Distribution

The Family Rubiaceae contain about 450 genera and 6500species, the vast majority of the taxa occur in the tropical and subtropical regions. *Coffea sp.A* is found in T6 zone in East Africa and known only in Tanzania. It has been collected only from Morogoro District, Kimboza forest reserve (C. 3748E, 700S) at an elevation of 300-350m above sea level (Mwasumbi, Rodgers and Hall specimen numbers 12393 and Rodgers et.al.specimen 2511). Generally it is a rare plant taxa over this range and no more information on herbarium collection showing it is wide distribution. This might be considered as an indicator on the rarity of representative taxa within its genus.

Biology and Reproduction

No enough information about this species available (Mr. Pearce T. Per. Comm. - E.African Herbarium database. Magogo F.C. on the herbarium vouchers). The Rubiaceae are Asteridae with opposite leaves and interpetiolar stipules, or with whorled leaves and no stipules. The flowers have an inferior ovary and a regular corolla with isomerous, stamens attached to the tube. These features distinguish the bulk of the Rubiaceae from all other families.

The occasional exceptions to some of them need not becloud our recognition of the basic pattern. As additional characters it may be noted that the stipules commonly bears colleters, that the vast majority of the species have well developed endosperm, and that the endosperm nearly always follows the nuclear pattern of development.

Uses:

None is known.

Conservation status:

There is no much information about this species. However, scanty information indicated that it might be endemic to the coastal forest of E.Africa. It is found in T6 zone, and unknown elsewhere in Tanzania. The first collection was made by the University of Dar es Salaam herbarium (Mwasumbi, Rodgers & Hall, specimen number 12393) and (Rodgers,et al. specimen number 2511) on March 1983 and July 1983 respectively by the same group. This shrub appears to be rare and it has no information of its uses to justify that it is endangered. None is known about biological and reproduction aspect, that brings a future challenge to conservationists.

References:

1. Bridson, D.& Cerdcourt, B. (1988). FTEA Rubiaceae (Part II).

2. Polhill, D. (1988). FYTEA Index of collecting localities.

3. Mabberley, D. G. (1998). The Plant Book; A portable dictionary of higher plants. Cambridge University Press, Cambridge, UK.

4. Cronquist, A. (1981). An intergrated system of classification flowering plants. The NewYork Botanic Garden, Columbia Univ. Press.

5. Pearce. T, Magogo, F.C. & Mwangangi, O.M. (Personal Communication on the EAH Data base and vouchers).

Compiled by **Daniel K. Sitoni**

ENVIRONMENTAL/BIODIVERSITY ISSUES IN THE EAST USAMBARAS

MANAGEMENT RECOMMENDATIONS MADE BY THE GROUPS

GROUP 1 - REPORT

HABITAT LOSS:(100,000 hectares historically; currently 45,000 hectares)
The forest is historically important for fuelwood, building poles, foods, medicines, etc.
Exploited heavily in the past for timber, tea plantations, etc.

Educational Issues

a) **for the community**

- Current programmes are working, but are not adequately addressing endangered species issues i.e. are currently focused on habitat level issues such as ecosystem services. There is a need to:
  - highlight value of forest species by including endangered species concerns/issues in existing community meetings;
  - provide information on endangered species e.g. leaflets etc.;

b) **for forest officers**

- Current focus is on forest conservation in a general sense. There is need to:
  - encourage farm forestry programme to include information on rare/endemic species.
  - highlight the importance of endangered species;
  - provide information on endangered species (types, range, localities etc.);
  - form an 'endangered species focus group' to provide input into regular forest meetings.

Economic issues

- Want decrease in demand for species within the reserve

a) **Sustainable Utilisation**

- Extend current seedling project by providing seedlings of endangered tree species free to the local community - in the long term must provide capacity to maintain seedling production on farm
- Develop demonstration plots for endangered species
- Develop alternative sources/crops
- Incentives - e.g. extend current vegetable seed supply to women's groups beyond current pilot group.

b) **Trade/Commercialisation**

- Consider other non-tree species e.g. of potential horticultural interest like *Saintpaulia* - development of botanic garden - potential income generation by involving local community.

Legislative Issues

- Project could try to initiate legal protection for endangered species e.g. CITES, ESA. Increase number of species put through IUCN categories of Threat - support for protection.

GROUP 2 - REPORT

Topic 1. The future of protected forest areas:

a) potential threats.

- Encroachment - Agricultural
  - Tea estates
  - Small scale farmers.
  - -Exotic Species
- Harvesting
  - Commercial (illegal poaching)
  - Subsistence (household use)
- Change in legal status
- Funding sources
  - Heavy dependence on external sources
- Human Resources
  - Inadequate use of **local** competent experts

b) Impacts of threats on biodiversity.

- Habitat decline /deterioration
  - -soil, climate, micro-climate
- Reduction in population of spp.
- Decrease in species diversity
  - selective harvesting - (habitat loss)
- Increase in species diversity
  - (low levels of disturbance) introduced exotic species spreading
- Habitat fragmentation
- Poor / inadequate understanding/support for biodiversity conservation strategies, re-enforcing all the above factors.

c) Current conservation strategies in East Usambaras

- Legislation
  - Amani gazetted as Nature Reserve
  - Ban on logging in East Usambaras through forest ordinance
- Other Measures / Activities
  - Farm forestry / women group tree nurseries
  - replanting
  - Conservation education - elders
  - Joint management with identified stakeholders (e.g., EU Tea Co, TAFORI, EUCFP), Community)
- Research / Surveys
  (bio-inventory, biological surveys).
  perimeter surveys - boundary surveys

d) Areas / Issues of Concern

- Inadequate community participation in decision making ? implementation
  - representation in management meetings

- use of ITK in research and management
  ILK
  ELK

- sustainable utilisation of forest / products. Not clearly addressed - what else apart from firewood? Survey on forest resources

- Poor Institutional Linkages i.e. across / along ministries, NGO's, Research groups etc.
- Lack of Research Guidelines
  - collecting procedures
- Over reliance on External Funding
- Main office not located in project area
  - huge transport costs
  - management implications

e) Management Recommendation
community participation

- Practical involvement of community in applied research, planning, decision making and implementation. [Forests should be managed with the people and not for the people]

* Institutional Linkages

- Review and strengthen existing institutional arrangements (memorandum of understanding) by identifying and involving all relevant institutions (stake holders).

* Research

- Develop research guidelines / protocols.
- Encourage applied research - relevant for management problems
- Resource surveys for sustainable utilisation
  - species specific research on endemics, endangered, rare. (Further categorisation of endemics)

* Funding

Develop income generating activities as a source of self-funding. Possible sources are:

- research fees
- Camping fees, guide fees
- gate collections
- user fees
- T. shirts, post cards

equitable
Share with local people

⇒ For Local People

- sale of handicrafts
- seedlings
- hotels and rest houses tourist orientated
- income generating farm products (horticulture / dairy)
- beekeeping, rabbit keeping, poultry.

* Office

- Relocate main office to project area, preferably Amani

* Human Resources

- Capacity Building - skills improvement for community project staff, front-line and national level staff.
- Maximise use of local experts
  * Awareness Campaigns
- Mass media
- Electronic media
  - Radio
  - Video
  - TV
- PET (Participating Education Theatres)
  - Drama groups
  - Cultural Groups
  - Choirs

  * Monitoring and Evaluation

  Need for participating monitoring all the above proposed interventions

Remarks by the Participants at the Second Darwin Initiative Plant Conservation Techniques Course Closure on 10 March 1998

Delivered by Dr.Christopher Bakuneeta

Our Guest of Honour

The Regional Director, East and Central Africa of the British Council

The Director, NMK

The Course Organisers, Facilitators and Sponsors

Invited Guests, Ladies and Gentleman

On behalf of the participants to the PCTC and on my own behalf, I take this opportunity to thank all of you for coming to witness our successful completion of this second course. Many issues became clearer to us during the course. There was accumulative evidence throughout the course that plants have not yet received the attention they deserve in conservation. Wild animals have continued to enjoy a Lion's share in biodiversity conservation. Why are plants being sidelined when we know that animals depend on them for food, clothing and shelter and that they do not only provide us with air to breathe, but also to clean it up for us?

We are however proud to inform you that we have been prepared to go out and save the plants. We need your moral and financial support. During the course, our conservation skills have been practically re-awakened and strengthened. Our management capabilities have been updated and now we have the abilities. We still lack the tools and require support from the local, national and international communities so as to be able to do a good job.

Equally important was the regional co-operation that has been reactivated. We now know who is where and doing what within East Africa and we would like this bondage to be kept alive so that more plant species can be prevented from going extinct if possible. There are many threatened species outside Protected Areas and since we are not going to gazette National Parks for plants, we need to work with the land owners in order to save those threatened plant species in the wild. This is a challenge that we need to address before those plants disappear under social, political and economic human uses.

Our highest thanks go to the funders of this course. Without your financial support, presumably we would not be here. We would like you to realise that since plants feed the animals, let project proposals that address plant conservation receive a fair attention in your research/ conservation priorities. Let the BIG FIVE not continue marginalising the plants as they have been in the past. We encourage you to continue supporting this course and related courses in the field of plants so that we multiply and hopefully advocate for PLANT RIGHTS just as the animals have in some areas.

We cannot forget the organisers and facilitators of this course. More especially the NMK Management which hosted us, the Resource Personnel from within and without. We would like to extend our appreciation to the Management of the East Usambara Catchment Forest Project (Tanzania) for accepting to host us during our practicals and the support given to us there. Equally appreciated are the services of Suncourt Inn Ltd for keeping us safe. Please extend our appreciation to them. We recommend to the organisers to keep accommodating more participants in that Inn.

More appreciation goes to the non-teaching staff of NMK for the assistance given during the course. We apologise for any inconveniences that we might have caused during the course, more especially in the Computer Room at the Plant Conservation Programme (PCP). Admittedly, we cannot claim expertise, so we request to be pardoned.

We look forward to the time when more funds will flow in the Conservation of Plants so that we can meet again in Population and Habitat Viability Assessment workshops for the threatened plant species in the region where sufficient data will have been collected to enable us to take firm decisions on the status of the species.

As we prepare to go back to our Institutions of work, we appeal to all of you here to join us in advocating for plant conservation the world over. Let the marginilisation of plants not enter the 21st century. Our support for the introduction and conservation of exotic plant species at the expense of the indigenous species should be based on sound scientific and beneficial reasons since exotics are more likely to become invasive than native species. If both *in -situ* and *ex-situ* conservation could receive more attention than they have received in the past, if all the stakeholders are sensitised with greater emphasis on the local communities who live and interact with plants all the time, we are optimistic that we shall win the battle. But we need the tools, your moral, financial support and your active participation in this noble cause of conserving plants.

We wish everybody a good time and a safe journey back to your homes and places of work.

Thanks.

Plant Conservation Techniques Course Alumni

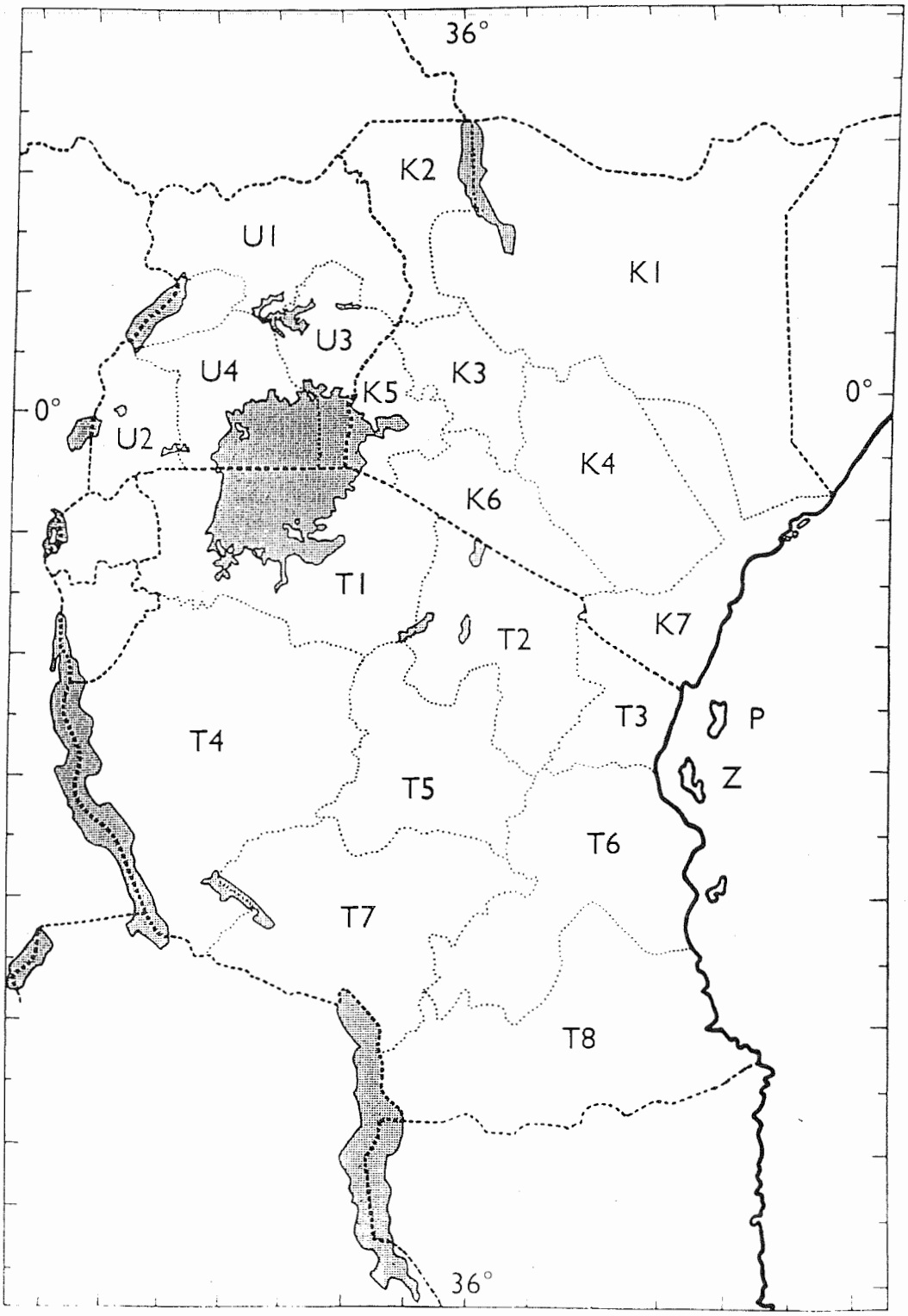
Name	*Course*	*Country*	*Institution*
Joel John Asega	*1998*	Uganda	Agriculturalist, Entebbe Botanical Gardens, National Agricultural Research Organisation
Monday Guard Barya	*1996*	Uganda	Scientific Officer/Ecologist, Uganda Wildlife Authority, Kampala
Donatus Bayona	*1998*	Tanzania	Ecologist, Ruaha National Park, Tanzania National Parks
Salome Kago	*1996*	Kenya	Forester, Forest Department, Nairobi
Raymond Roman Killenga	*1998*	Tanzania	Co-ordinator of Surveys, East Usambara Catchment Forest Project, Tanga
Stanley Kone	*1996*	Kenya	Field Ethnobotanist, Loita Ethnobotany Project, Narok
Simon M Macharia	*1996*	Kenya	Research Scientist, Department of Molecular Genetics, National Museums of Kenya, Nairobi
Shedrack M Mashauri	*1996*	Tanzania	Forest Officer, Amani Nature Reserve, East Usambara Forest Catchment Project, Tanga
Ahmed Selemani Mndolwa	*1998*	Tanzania	Forester in Charge, Amani Botanic Garden, Tanzania Forestry Research Institute, Tanga
Joshua Muasya	*1996*	Kenya	Herbarium Technician, East African Herbarium, National Museums of Kenya, Nairobi
Hamisi Juma Mududu	*1998*	Kenya	Agriculturalist, Coastal Forest Conservation Unit, National Museums of Kenya
Mbinda Jeremiah Munge	*1996*	Kenya	Nursery Manager, Coastal Forest Conservation Unit, Ukunda
Joshua Makovu Muturi	*1996*	Kenya	Herbarium Technician, East African Herbarium, National Museums of Kenya, Nairobi
Lucy Muthoni Mwaura	*1998*	Kenya	Technician, Seed Centre, Kenya Forestry Research Institute
Berna Nakityo	*1996*	Uganda	Taxonomist, National Herbarium. Makere University, Department of Botany, Kampala
Immaculate Nduma	*1996*	Kenya	Conservation Officer, Nairobi Arboretum, Nairobi
Wazael Hillary Ntundu	*1998*	Tanzania	Scientific Officer, Genebank, Tropical Pesticide Research Institute, Arusha
Jane Frances Nyafuno	*1998*	Uganda	Curator, Herbarium, Forest Department

Name	*Course*	*Country*	*Institution*
Sylvester P Odunga	*1996*	Kenya	Forestry Seed Technician, Kenya Forestry Research Institute, Nairobi
Alsen Otieno Oduwo	*1998*	Kenya	Co-ordinator, Community Mobilisation Against Desertification (C-MAD)
David Nyakundi Okebiro	*1998*	Kenya	Senior Technologist, East African Herbarium, National Museums of Kenya
Moses M Omurambi	*1996*	Kenya	Research Technologist, Kenya Wildlife Services, Nairobi
Aggrey Rwetsiba	*1998*	Uganda	Warden, Kibale National Park, Uganda Wildlife Authority
Shadrack Kengere Sanganyi	*1998*	Kenya	Technician, Genebank, Kenya Agricultural Research Institute
Shilla N A Shilla	*1996*	Tanzania	Genebank Technician, Tropical Pesticides Research Institute, Arusha
Daniel Kambei Sitoni	*1998*	Tanzania	Technician, National Herbarium, Tropical Pesticide Research Institute, Arusha
Salim Zubairi	*1996*	Uganda	Landscape, Design and Seed Collection, Entebbe Botanic Garden, Entebbe

Appendix I Maps

From: Flora of Tropical East Africa

GEOGRAPHICAL DIVISIONS OF THE FLORA



Eastern Arc Mountains (From International Conference on the Eastern Arc Mountains, Morogoro, Tanzania 1997)

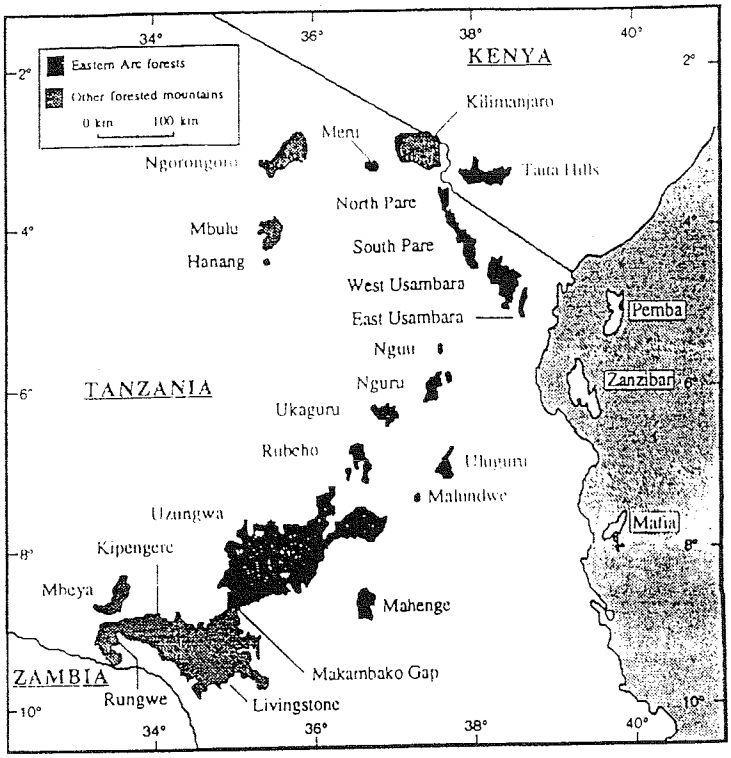
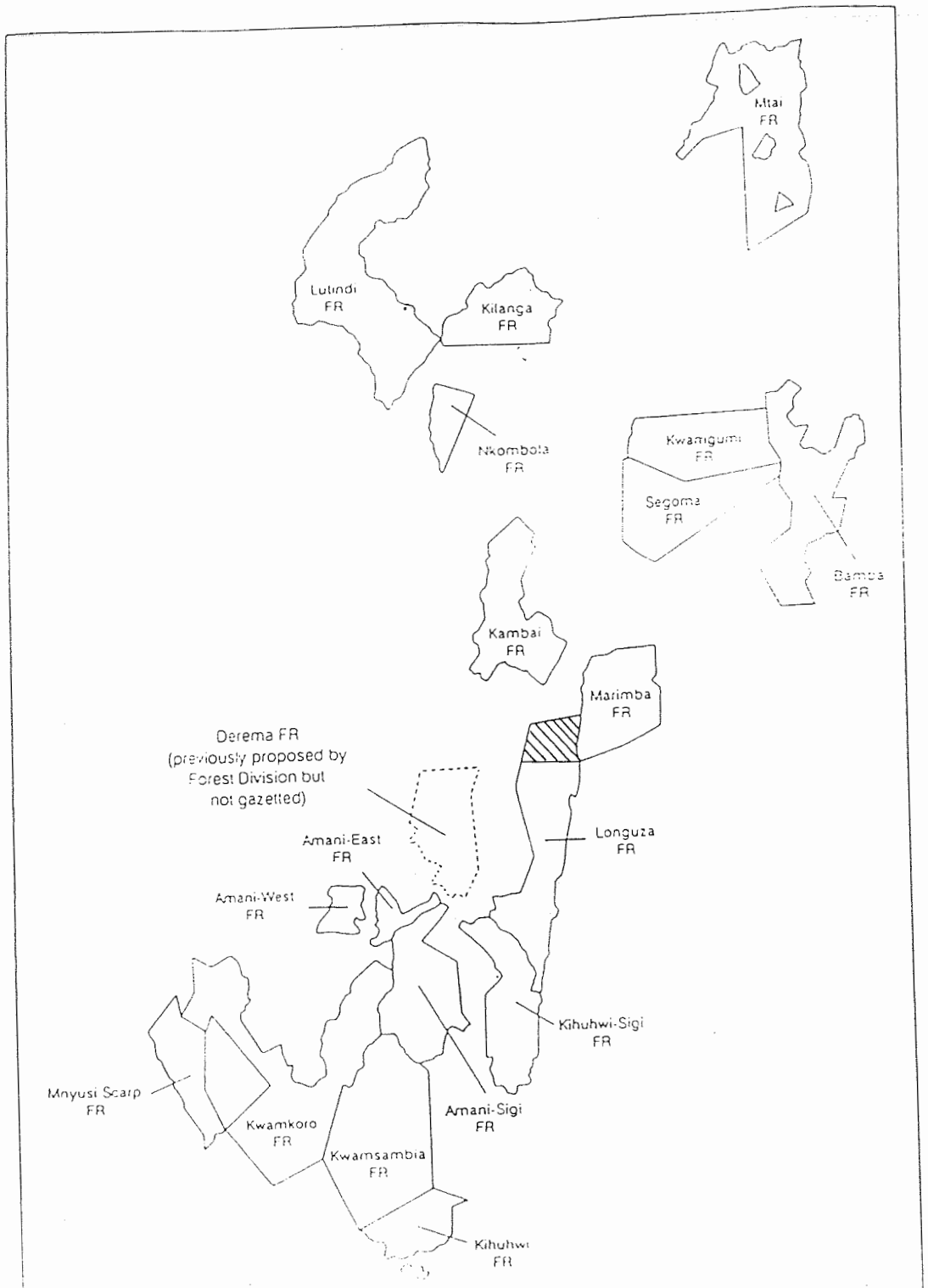
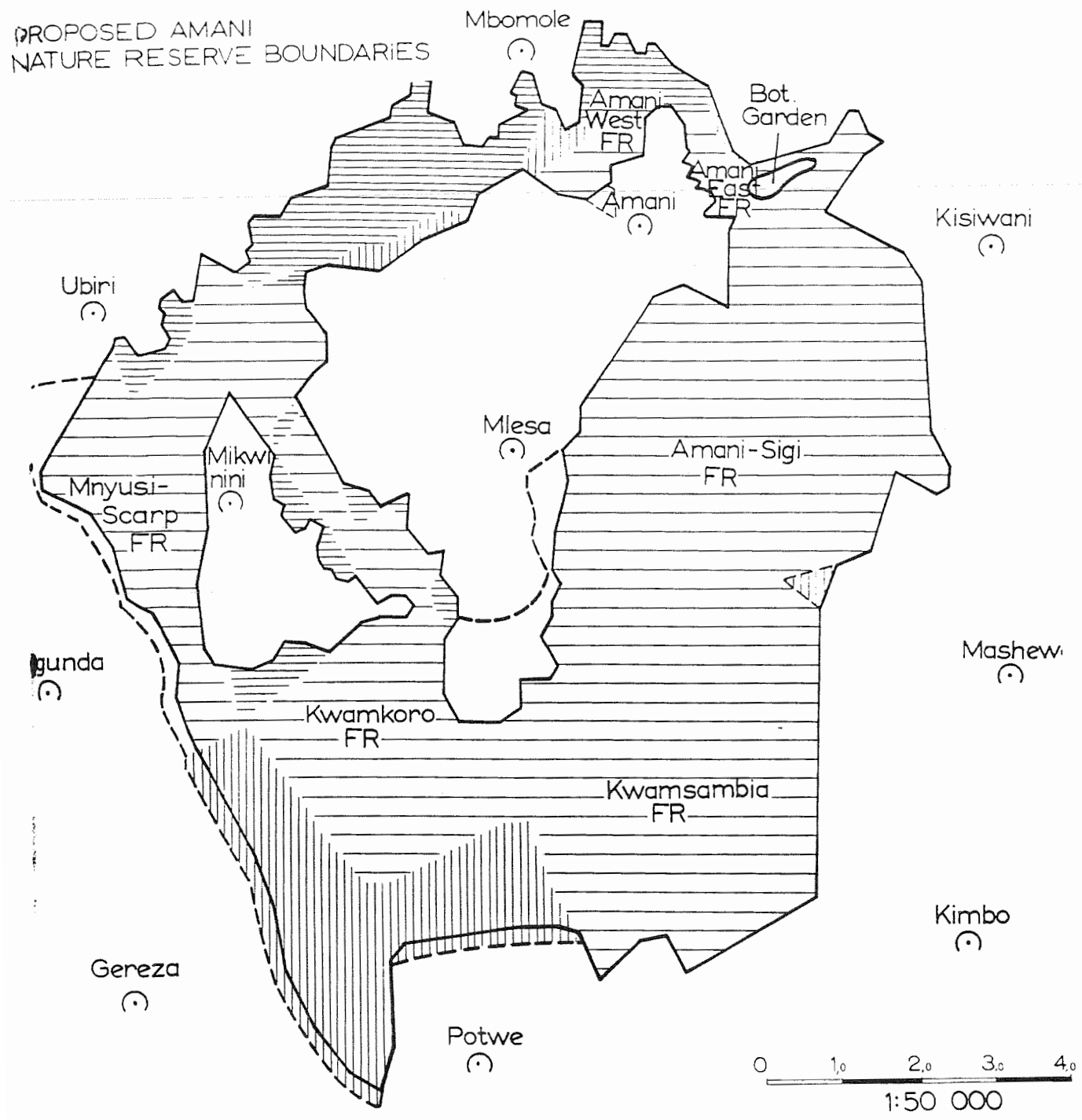


Figure 1.1. Mountains of eastern Tanzania and southeastern Kenya supporting moist forest. Eastern Arc mountain forests are shown in black.

Forest Reserves in the East Usambara Mountains




PROPOSED AMANI
NATURE RESERVE BOUNDARIES
Mbomole
Amani West FR
Bot. Garden
Amani East FR
Amani
Kisiwani
Ubiri
Mlesa
Mikwi nini
Amani-Sigi FR
Mnyusi-Scarp FR
gunda
Mashew
Kwamkoro FR
Kwamsambia FR
Kimbo
Gereza
Potwe
0 1.0 2.0 3.0 4.0
1:50 000
Nature Reserve boundary
Forest Reserve boundary
Village
Forest Reserve area inside Nature Reserve
Enlargement areas:
tea estate land
public land

Appendix II About Conservation Assessment and Management Plans

CBSG Workshop Processes

Introduction

There is a lack of generally accepted tools to evaluate and integrate the interaction of biological, physical, and social factors on the population dynamics of the broad range of threatened species. There is a need for tools and processes to characterize the risk of species and habitat extinction, on the possible effects of future events, on the effects of management interventions, and on how to develop and sustain learning-based cross-institutional management programs.

The Conservation Breeding Specialist Group (CBSG) of IUCN's Species Survival Commission (SSC) has 10 years experience in developing, testing, and applying a series of scientifically-based tools and processes to assist risk characterization and species management decision making. These tools, based on small population and conservation biology (biological and physical factors), human demography, and the dynamics of social learning are used in intensive, problem-solving workshops to produce realistic and achievable recommendations for both *in situ* and *ex situ* population management.

Our Workshop processes provide an objective environment, expert knowledge, and a neutral facilitation process that supports sharing of available information across institutions and stakeholder groups, reaching agreement on the issues and available information, and then making useful and practical management recommendations for the taxon and habitat system under consideration. These processes have been remarkably successful in unearthing and integrating previously unpublished significant information for the decision-making process. Their proven heuristic value and constant refinement and expansion have made the PHVA process one of the most imaginative and productive organizing forces for species conservation today (Conway, 1995).

Integration of Science, Management, and Stakeholders

The CBSG PHVA Workshop process is based upon biological and sociological science. Effective conservation action is best built upon a synthesis of available biological information, but is dependent on actions of people living within the range of the threatened species as well as established national and international interests. There are characteristic patterns of human behavior that are cross-disciplinary and cross-cultural which affect the processes of communication, problem solving, and collaboration: 1) in the acquisition, sharing, and analysis of information; 2) in the perception and characterization of risk; 3) in the development of trust among individuals; and, 4) in 'territoriality' (personal, professional, institutional, local, national). Each of these has strong emotional components that shape our interactions.

Recognition of these patterns has been essential in the development of processes to assist people in working groups to reach agreement on needed conservation actions, collaboration needed, and to establish new working relationships.

Frequently, management actions have been identified by local management agencies, external consultants, and local experts. However, an isolated narrow professional approach which focuses primarily on the perceived biological problem seems to have little effect on the needed political and social changes (social learning) for collaboration, effective management, and conservation of habitat fragments or protected areas and their species components. CBSG workshops are organized to bring together the full range of groups with a strong interest in conserving and managing the species in its habitat or the consequences of such management. One goal in all workshops is to reach a common understanding of the state of scientific knowledge available and its possible application to the decision-making process and needed management actions.. We have found that the decision-making driven workshop processes with risk characterization tools, stochastic simulation modeling, scenario testing, and deliberation among stakeholders are powerful tools for extracting, assembling, and exploring information. This process encourages developing a shared understanding across wide boundaries of training and expertise. These tools also support building of working agreements and instill local ownership of the problems, the decisions required, and their management during the workshop processes. As participants appreciate the complexity of the problems as a group, they take more ownership of the process as well as the ultimate recommendations made to achieve workable solutions. This is essential if the management recommendations generated by the workshops are to succeed.

CBSG participants have learned a host of lessons in more than 100 workshop experiences in 40 countries. Traditional approaches to endangered species problems have tended to emphasize our lack of information and the need for additional research. This has been coupled with a hesitancy to make explicit risk assessments of species and habitat status and a reluctance to make immediate or non-traditional management recommendations. The result has been long delays in preparing action plans, loss of momentum, dependency on crisis-driven actions or broad recommendations that do not provide useful guidance to the managers.

CBSG's interactive and participatory workshop approach produces positive effects on management decision-making and in generating political and social support for conservation actions by local people. Modeling is an important tool as part of the process and provides a continuing test of assumptions, data consistency, and of scenarios. CBSG participants recognize that the present science is imperfect and that management policies and actions need to be designed as part of a biological and social learning process. The Workshop process essentially provides a means for designing management decisions and programs on the basis of sound science while allowing new information and unexpected events to be used for learning and to adjust management practices.

Workshop Processes and Multiple Stakeholders

Experience: The Chairman and 3 Program Officers of CBSG have conducted and facilitated more than 100 species and ecosystem Workshops in 40 countries including the USA during the past 6 years. *Reports from these workshops are available from the CBSG Office.* We have worked on a continuing basis with agencies on some taxa (e.g., Florida panther, Sumatran tiger) and have assisted in the development of national conservation strategies for other taxa (e.g., Sumatran elephant, Sumatran tiger, Indonesia). Our *Population Biology Program Officer (Dr. P. Miller)* received his doctoral training with Dr. P. Hedrick and is familiar with the genetic and demographic aspects of a range of vertebrate species. He has worked extensively with VORTEX and other population models.

Facilitator's Training and Manual: A manual has been prepared to assist CBSG workshop conveners, collaborators, and facilitators in the process of organizing, conducting, and completing a CBSG workshop. It was developed with the assistance of two management science professionals and 30 people from 11 countries with experience in CBSG workshops. These facilitator's training workshops have proven very popular with 2 per year planned for 1996 and 1997 in several countries including the USA. *Copies of the facilitator's manual are available from the CBSG Office.*

Scientific Studies of Workshop Process: The effectiveness of these workshops as tools for eliciting information, assisting the development of sustained networking among stakeholders, impact on attitudes of participants, and in achieving consensus on needed management actions and research has been extensively debated. We initiated a scientific study of the process and its long term aftermath three years ago in collaboration with an independent team of researchers (Vredenburg and Westley, 1995). A survey questionnaire is administered at the beginning and end of each workshop. They also have conducted extensive interviews with workshop participants in workshops in five countries. *Three manuscripts on CBSG Workshop processes and their effects are available from the team and the CBSG office.* The study also is undertaking follow up interviews about two years after each workshop to assess longer term effects. To the best of our knowledge there is no comparable systematic scientific study of conservation management processes. *We apply the same scientific study tools to all of the workshops in our programs and provide an analysis of the results after each workshop.*

CBSG Workshop Toolkit

Our basic set of tools for workshops include small group dynamics skills, explicit use in small groups of problem restatement, divergent thinking sessions, identification of the history and chronology of the problem, causal flow diagraming (elementary systems analysis), matrix methods for qualitative data and expert judgements, paired and weighted ranking for making comparisons between sites, criteria, and options, utility analysis, stochastic simulation modeling for single populations and meta-population and deterministic and stochastic modeling of local human populations. Several computer packages are used to assist collection and

analysis of information with these tools. We provide training in several of these tools in each workshop as well as intensive special training workshops for people wishing to organize their own workshops.

Stochastic Simulation Modeling

Integration of Biological, Physical and Social Factors: The Workshop process, as developed by CBSG, generates population and habitat viability assessments based upon in-depth analysis of information on the life history, population dynamics, ecology, and population history of the populations. Information on demography, genetics, and environmental factors pertinent to assessing population status and risk of extinction under current management scenarios and perceived threats are assembled in preparation for and during the workshops. Modeling and simulations provide a neutral externalization focus for assembly of information, identifying assumptions, projecting possible outcomes (risks), and examining the data for internal consistency. Timely reports from the workshop are necessary to have an impact on stakeholders and decision makers. Draft reports are distributed within 3 weeks of the workshop and final reports within 60 days.

Human Dimension: We have collaborated with human demographers in 4 CBSG workshops on endangered species and habitats. They have utilized computer models incorporating human population characteristics and events at the local village level in order to provide projections of the likely course of population growth and the utilization of local resources. This information was then incorporated into projections of the likely viability of the habitat of the threatened species and used as part of the population projections and risk assessments. We have prepared a draft manual on the human dimension of population and habitat viability assessment. It is our intention to further develop these tools and to utilize them as part of the scenario assessment process.

Risk Assessment and Scenario Evaluation: A stochastic population simulation model is a kind of model that attempts to incorporate the uncertainty, randomness or unpredictability of life-history and environmental events into the modeling process. Events whose occurrence is uncertain, unpredictable, and random are called stochastic. Most events in an animal's life have some level of uncertainty. Similarly, environmental factors, and their effect on the population process, are stochastic - they are not completely random, but their effects are only predictable within certain limits. Simulation solutions are usually needed for complex models including several stochastic parameters.

There are a host of reasons why simulation modeling is valuable for the workshop process and development of management tools. The primary advantage is to simulate scenarios and the impact of numerous variables on the population dynamics and potential for population extinction. Interestingly, not all advantages are related to generating useful management recommendations. The side-benefits are substantial.

- Population modeling supports consensus and instills ownership and pride during the workshop process. As groups begin to appreciate the complexity of the problems, they have a tendency to take more ownership of the process and the ultimate recommendations to achieve workable solutions.
- Population modeling forces discussion on biological and physical aspects of the problem and specification of assumptions, data, and goals. The lack of sufficient data of useable quality rapidly becomes apparent and identifies critical factors for further study (driving research and decision making), management, and monitoring. This not only influences assumptions, but also the group's goals.
- Population modeling generates credibility by using technology that non-biologically oriented groups can use to relate to population biology and the "real" problems. The acceptance of the computer as a tool for performing repetitive tasks has led to a common ground for persons of diverse backgrounds.
- Population modeling explicitly incorporates what we know about dynamics by allowing the simultaneous examination of multiple factors and interactions - more than can be considered in analytical models. The ability to alter these parameters in a systematic fashion allows testing a multitude of scenarios that can guide adaptive management strategies.
- Population modeling can be a neutral computer "game" that focuses attention while providing persons of diverse agendas the opportunity to reach agreements on difficult issues.
- Population modeling results can be of political value for people in governmental agencies by providing support for perceived population trends and the need for action. It helps managers to justify resource allocation for a program to their superiors and budgetary agencies as well as identify areas for intensifying program efforts.

Modeling Tools: At the present time, our preferred model for use in the population simulation modeling process is VORTEX. This model, developed by Lacy et al., is designed specifically for use in the stochastic simulation of the small population/extinction process. It has been developed in collaboration and cooperation with the CBSG PHVA process. The model simulates deterministic forces as well as demographic, environmental, and genetic events in relation to their probabilities. It includes modules for catastrophes, density dependence, metapopulation dynamics, and inbreeding effects. The VORTEX model analyzes a population in a stochastic and probabilistic fashion. It also makes predictions that are testable in a scientific manner, lending more credibility to the process of using population modeling tools.

There are other commercial population models, but presently they have some limitations such as failing to measure genetic effects, being difficult to use, expensive and so not readily available to all users, or failing to model individuals. VORTEX has been successfully used in more than 90 CBSG PHVA workshops in guiding management decisions. VORTEX is general enough for use when dealing with a broad range of species, but specific enough to incorporate most of the important processes. It is continually evolving in

conjunction with the PHVA process. VORTEX has, as do all models, its limitations which may restrict its utility. The VORTEX model analyzes a population in a stochastic and probabilistic fashion. It is now at Version 7.2 through the cooperative contributions of dozens of biologists. It has been the subject of a series of both published and in press validation studies and comparisons with other modeling tools. More than 2000 copies of VORTEX are in circulation and it is being used as a teaching tool in university courses.

We use this model and the experience we have with it as a central tool for the population dynamic aspects of our workshops. Additional modules, building on other simulation modeling tools for local human population dynamics (which we have used in 3 countries) with potential impacts on water usage, harvesting effects, and physical factors such as hydrology and water diversion need further development to provide input into the population and habitat models which can then be used to evaluate possible effects of different management scenarios. No such composite models are available.

CBSG Resources as Unique Asset

Expertise and Costs: The problems and threats to endangered species everywhere are complex and interactive with a need for information from diverse specialists. No agency or country encompasses all of the useful expert knowledge. Thus, there is a need to include a wide range of people as resources and analysts. It is important that the invited experts have reputations for expertise, objectivity, initial lack of a local stake, and for active transfer of needed skills. CBSG has a volunteer network of more than 700 experts with about 250 in the USA. More than 3,000 people from 400 organizations have assisted CBSG on projects and participated in workshops on a volunteer basis contributing tens of thousands of hours of time. We call upon individual experts to assist in all phases of each project.

Indirect cost contributions to support: Use of CBSG resources and the contribution of participating experts provide a matching contribution more than equaling proposed budget requests for projects.

Manuals and Reports: We have manuals available which provide guidance on the goals, objectives, and preparations needed for CBSG workshops. These help reduce startup time and costs and allow us to begin work on organizing a project immediately with proposed participants and stockholders. We have a process manual for use by local organizers which goes into detail on all aspects of organizing, conducting, and preparing reports from the workshops. Draft reports are prepared during the workshop so that there is agreement by participants on its content and recommendations. Reports are also prepared on the mini-workshops (working groups) that are conducted in information gathering and diagnostic exercises with small groups of experts and stakeholders. We can print reports within 24-48 hours of preparation of final copy. We have CD-ROM preparation facilities and experience.

Conservation Assessment and Management Plan (CAMP)

Introduction

Reduction and fragmentation of wildlife populations and habitats are occurring at a rapid and accelerating rate. The results for an increasing number of taxa are small and isolated populations that are at risk of extinction. For such populations, more intensive management becomes necessary for their survival and recovery. To an ever increasing extent, this intensive management will include, but not be limited to, habitat management and restoration, intensified information gathering, and possibly captive breeding.

The problems for wildlife are so enormous that it is vital to apply the limited resources available for intensive management as efficiently and effectively as possible. Conservation Assessment and Management Plans (or CAMPs) are being developed to respond to this need.

CONSERVATION ASSESSMENT AND MANAGEMENT PLANS (CAMPS)

CAMPs are intended to provide strategic guidance for application of intensive management and information collection techniques to threatened taxa. CAMPs provide a rational and comprehensive means of assessing priorities for intensive management within the context of the broader conservation needs of threatened taxa.

Within the Species Survival Commission (SSC) of IUCN, the primary goal of the Conservation Breeding Specialist Group (CBSG) is to contribute to the development of holistic (i.e., integrating *in situ* and *ex situ)* and viable conservation strategies and action plans. The CAMP process assembles a broad spectrum of expertise on wild and captive management of the taxa under review. CAMPs are conducted as collaborative ventures of CBSG with the taxon-based Specialist Groups of the IUCN/SSC and BirdLife International, or with regional wildlife agencies or non-governmental organizations. Generally, representatives of the organized regional captive breeding programs of the zoo/aquarium world also are included.

A CAMP process brings together 10-40 experts (e.g., wildlife managers, Specialist Group members, scientists from the academic community and/or the private sector, land owners, and captive managers) to evaluate the threat status of all taxa in a broad group (e.g., an order or family), country, or geographic region to set conservation action and information-gathering priorities. The CAMP process also provides an opportunity to test the applicability of the New IUCN Red List Categories.

The New IUCN Red List Categories

The threatened species categories now used in Red Data Books and Red Lists have been in place, with some modification, for almost 30 years (Mace et al., 1994). The Mace-Lande criteria (Mace & Lande, 1991) were one developmental step in an attempt to make those categories more explicit, and were tested extensively in early CAMPs. These criteria subsequently have been revised and formulated into the New IUCN Red List Categories, which also are being tested in the CAMP process.

The New IUCN Red List Categories provide a system that facilitates comparisons across widely different taxa, and is based both on population and distribution criteria. These criteria can be applied to any taxonomic unit at or below the species level, with sufficient range among the different criteria to enable the appropriate listing of taxa from the complete spectrum of taxa, with the exception of micro-organisms (Mace et al., 1994).

The New IUCN Red List Categories are: Extinct (EX); Extinct in the Wild (EW); Critically Endangered (CR); Endangered (EN); Vulnerable (VU); Conservation Dependent (CD); Lower Risk (LR); Data Deficient (DD); Not Evaluated (NE).

The CAMP Process

The CAMP process itself is intensive and interactive and is unique in its ability to facilitate objective and systematic prioritization of research and management actions needed for species conservation, both *in* and *ex situ*. Participants develop the assessments of risks and formulate recommendations for action using a Taxon Data Sheet that allow recording of detailed information about each taxon under review, including data on the status of populations and habitat in the wild as well as recommendations for intensive conservation action. The Taxon Data Sheet is augmented by a spreadsheet that summarizes data written on the Taxon Data Sheet and provides for rapid review or comparison of taxa.

During a CAMP process, the wild and captive status for each taxon under consideration are reviewed, on a taxon-by-taxon basis (usually at the subspecies level). For each taxon, there is an attempt to estimate the total population. It is often very difficult, even agonizing, to be numerate because so little quantitative data on population sizes and distribution exists. However, it is frequently possible to provide order-of-magnitude estimates, especially whether the total population is greater or less than the numerical thresholds for the population data used in determining categories of threat. CAMP spreadsheets include a "data quality" column so that "guesstimates" can be distinguished from population estimates based on solid documentation. The CAMP process attempts to be as quantitative or numerate as possible for two major reasons:

- Action plans ultimately must establish numerical objectives for population sizes and distribution if they are to be viable.

- Numbers provide for more objectivity, less ambiguity, more comparability, better communication and hence cooperation.

Information about population fragmentation and trends, distribution, as well as habitat changes and environmental stochasticity also are considered.

The CAMP process utilizes information from SSC Action Plans that may already have been formulated by the taxon-based Specialist Groups as well as additional data, published and unpublished, from experts on the taxa. CAMPs have been endorsed by the SSC and by BirdLife International as the logical first step toward the development of taxonomic Action Plans where they do not yet exist.

For each taxon reviewed, three kinds of assessments/recommendations are made:

1) assigning taxa to New IUCN Red List Category of Threat;

2) making recommendations for research and management activities to contribute to the taxon's conservation. These recommendations aim to more fully integrate recommended research and management actions and known threats. Research management can be defined as an interactive management program including a strong feedback loop between management activities, evaluation of their effectiveness, and the response of the species;

3) making recommendations for captive programs if they can contribute to the conservation of the taxon. These form the foundation for development of Global Captive Action Recommendations (GCARs) and regional strategic captive collection plans for the zoo and aquarium community.

The CAMP process generally uses a conservative taxonomic approach. In most cases, initial risk assessment and management recommendations are made in terms of the maximal distinction among possible "subspecies" until taxonomic relationships are better elucidated. Splitting rather than lumping maximizes preservation of options. Taxa can always be merged ("lumped") later if further information invalidates the distinctions or if biological or logistic realities of sustaining viable populations precludes maintaining taxa as separate units for conservation.

THE REVIEW PROCESS FOR CAMPs

The results of the initial CAMP process are reviewed: 1) by distribution of a preliminary draft to a small cohort of process participants agreeing to serve as voluntary editors; 2) by distribution to a broader audience which includes CAMP participants, wildlife managers and regional captive programs worldwide; 3) at regional review sessions at various CBSG meetings and processes, taking advantage of local expertise with the taxonomic group in question. Thus CAMPs are not single events although sometimes they are singular events. Instead, they are part of a continuing and evolving process of developing conservation and recovery plans for the taxa

involved. The CAMP review process allows extraction of information from experts worldwide and prioritization of actions based on levels of threat. In nearly all cases, follow-up meetings are required to consider particular issues in greater depth or on a regional basis. Moreover, some form of follow-up will always be necessary to monitor the implementation and effectiveness of the recommendations resulting from the process. In many cases a range of Population and Habitat Viability Assessment (PHVA) process result from the CAMPs.

Over the past five years, CAMPs have been carried out for a wide spectrum of the vertebrates: boid and pythonid snakes; varanid and iguanid lizards; penguins; waterfowl; Falconiformes; megapodes; quail, partridges and francolins; pheasants; cracids; pigeons and doves; cranes; parrots; hornbills; marsupials; primates; canids and hyenas; procyonids; mustelids; viverrids; Felids; cervids; antelope; and Caprinae. Several regional CAMPs have also been conducted: Hawaiian forest birds; endemic Mexican lagomorphs; Costa Rican endemics; endemic bird and mammal species of Panama; South American felids; primate and carnivore species endemic to Mexico; and St. Helena Island endemic plants, invertebrates and vertebrates.

CAMPs are "living" documents that will be continually reassessed and revised as new information becomes available and as global and regional situations and priorities shift. The current CAMP process will continue both by its application to new groups of taxa and regions and the refinement of the ones already under way. Within the next five years CAMP processes will be initiated for all terrestrial vertebrate groups (the so-called tetrapods) and for selected fish, invertebrate, and plant groups. As more and more of the tetrapods are assessed by the CAMP process, the CAMP program is shifting to a regional approach, focusing on particular countries or regions.

The CAMP process is unique in its ability to prioritize intensive management action for species conservation, providing a framework for intensive management in the wild and in captivity. CAMP documents can be used as guidelines by national and regional wildlife agencies as well as regional captive breeding programs as they develop their own action plans. The long-term impact of the CAMP process on global priority setting has the potential to be profound. Within the near future, wildlife and zoo animal managers will have a set of comprehensive documents at their disposal, collaboratively and scientifically developed by the experts on the taxon or region, establishing priorities for global and regional species management and conservation. It is the intent that the CAMP process will ultimately contribute to the wise worldwide use of limited resources for species conservation.

The CAMP Process

A CAMP process brings together 10-40 experts (e.g., wildlife managers, Specialist Group members, scientists from the academic community and/or the private sector, land owners, and captive managers) to evaluate the threat status of all taxa in a broad group, country or region. CAMPs can be initiated by wildlife agencies, non-governmental organizations, or Specialist Groups; CAMPs are organized in collaboration with and facilitated by the IUCN/SSC Conservation Breeding Specialist Group. The list of invitees to a CAMP is generated by the host/organizer in collaboration with the appropriate SSC or BirdLife International Specialist Group and CBSG. CBSG may suggest additional participants, but the primary responsibility for generating a list of invitees lies with the host/organizer.

The CAMP process is intensive and interactive, generally taking place over a full three- or three-and-one-half day period, including evenings. Participants arrive the day before the CAMP begins and depart on the fourth day. CAMPs generally are held at a location that minimizes outside disturbance, with meals brought in to minimize distractions.

The meeting agenda is compiled by the host/organizer, with input from the CBSG office and/or the appropriate Specialist Group Chair. Usually, there are several overview presentations on the first morning which discuss the general status of the taxonomic group or region (e.g., conservation status and general threats), as well as a specific presentation on the CAMP process by CBSG. After preliminary presentations Working Groups are organized to review the taxonomic groups or taxa within the region coinciding with their expertise. Working Groups report back to the other participants in plenary sessions several times during the course of the process. Participants work to reach consensus on assessments and recommendations prior to the process' end. It is the aim to complete a draft CAMP document by the end of the third day.

There are several ground rules made explicit at the beginning of a CAMP process:

* Every idea or plan or belief about the Taxon or Region can be examined and discussed.
* Everyone participates in discussions and no one dominates.
* Set aside (temporarily) all special agendas except conserving the Taxon or Region in question.
* Assume good intent of all participants. Treat other participants with respect.
* Stick to the schedule .. begin and end promptly.

* The primary work will be conducted in sub-groups
* Facilitators of plenary sessions or working groups can call 'time out' when discussions reach an impasse or stray too far off the topic at hand.
* Agreements or recommendations are reached by consensus.
* Plan to complete and review a draft report by the end of the meeting.
* Flexibility is key. We will adjust our process and schedule as needed to achieve our goals.

Working Group Tasks: the CAMP Spreadsheet and Taxon Data Sheets

In each working group, two people are key: 1) the facilitator; and 2) the Taxon Data Sheet recorder. Working group facilitators are designated by the CAMP facilitators and organizers. It also is essential that in each working group one person keep master Taxon Data Sheets for each taxon. S/he generally enters them into a computer as they are discussed. **Taxon Data Sheet information should be checked as each is completed to be sure that all data have been recorded.**

Each participant is given a spreadsheet at the beginning of the process. An important step for each working group is to examine the taxonomic list on the spreadsheet to make sure that it is complete. After the list is checked for taxonomic correctness, working group participants begin to systematically work through the taxa, making assessments and making recommendations on the Taxon Data Sheets. A Taxon Data Sheet category explanation sheet, such as the one that follows, is provided to explain the various data categories. A sample Taxon Data Sheet typically used for mammals is included as Appendix I in this section; sample Taxon Data Sheets for Birds and for Plants are included as Appendices II and III. Sample spreadsheets for vertebrates are included as Appendix IV in this section. Blank taxon data sheets for mammals, birds and plants are included as Appendices IV - VI. Blank spreadsheets for vertebrates and plants are included as Appendices VII and VIII, respectively.

INTERACTIVE MANAGEMENT FOR CONSERVATION OF PLANT POPULATIONS HOW IT WORKS

GARDEN (Captive propagation --nursery, garden, tissue culture) <=====> **WILD** (Free growing wild plants)

I.U.C.N., S.S.C. B.G.C.I. & C.B.S.G. <=====> I.U.C.N. , S.S.C. Plant Specialist Groups
Cactus & Succulents
Bamboo
Carnivorous
Indian Subcontinent
etc/

IUCN

GLOBAL (CAPTIVE) ACTION PLANS <=====> GLOBAL P.A. ACTION PLANS ?

REGIONAL (CAPTIVE) ACTION PLANS <=====> REGIONAL P.A. ACTION PLANS

CONSERVATION ASSESSMENT& MANAGEMENT PLAN (C.A.M.P.)
POPULATION AND HABITAT VIABILITY ASSESSMENT (P.H.V.A.)

INDIVIDUAL SPECIES ACTION PLANS

EX SITU BREEDING PROGRAMMES <=====> WILD PLANTS POPULATION (Protection, Management, Recovery)

Academic Interest | Commercial Interest | Personal Interest <=====> WILDLIFE & BOTANIC Institutions GO & NGO

INDIVIDUAL PLANT MASTERPLANS <=====> NATIONAL CONSERVATION STRATEGY / LEGISLATION

CUTTING BY CUTTING RECOMMENDATIONS <=====> INDIVIDUAL PROTECTED AREA RECOMMENDATIONS

Appendix III Briefing Papers

Anon (1997) Major East African centre of plant diversity protected. *Plant Talk* (**July**) p39.

Eastwood, A., Bytebier, B., Tye, H., Maunder, M., Tye, A. and Robertson, A. (1998) The conservation status of *Saintpaulia*. *Curtis's Botanical Magazine* **15**(1):49-62.

Davis, S.D., Heywood, V.H. and Hamilton, A.C.(eds) (1994) *Centres of Plant Diversity: A guide and Strategy for their Conservation* Vol.**1**, *Europe, Africa, South West Asia and the Middle East*. Oxford: WWF and IUCN, IUCN Publications Unit.

Katigula, M.I.L and Johansson, S. (1997) Legal gazettement of the Amani Nature Reserve, East Usambara Mountains, Tanzania (9th May 1997). (Unpublished Report)

Ruffo, C.K. (1989) Some useful plants of the East Usambaras. In *Forest Conservation in the East Usambara Mountains Tanzania* (Hamilton, A.C. and Bensted-Smith, R., eds), pp. 185-94. The IUCN Tropical Forest Programme and the Forest Division, Ministry of Lands, Natural Resources and Tourism, United Republic of Tanzania. IUCN, Gland.

Ruffo, C.K., Mwasha, I.V. and Mmari, C. (1989) The use of medicinal plants in the East Usambaras. In *Forest Conservation in the East Usambara MountainsTanzania* (Hamilton, A.C. and Bensted-Smith, R., eds), pp. 195-206. The IUCN Tropical Forest Programme and the Forest Division, Ministry of Lands, Natural Resources and Tourism, United Republic of Tanzania. IUCN, Gland.

Rogers, A. Robertson, A. and Sayer, J. (1992) East Africa. In *The Conservation Atlas of Tropical Forests: Africa* (Sayer, J.A., Harcourt, C.S. and Collins, N.M., eds), pp. 143-60. Macmillan, U.K.

Amani Nature Reserve Gazetted

1. Amani Nature Reserve

The Government of Tanzania has legally gazetted the Amani Nature Reserve in the East Usambara Mountains, Tanzania on 9 May 1997 for the Protection of the Biodiversity and Endemic Plants and Animals of these sub-montane rain forests.

The legal establishment was published in the special supplement to the Gazette of the United Republic of Tanzania no. 19, vol. 78 dated 9 May 1997 as Government Notice no. 151 (Rules) and 152 (Declaration Order).

Introduction

The East Usambara rain forests are one of the most valuable conservation areas in Africa and one of the biodiversity hot spots and centres of plant diversity of the world. Their biological significance has been compared to the Galapagos Islands. The East Usambara mountains are known world wide for the diversity of flora and fauna, and for the exceptionally high degree of endemic plants and animals found in the forests. These rain forests also secure the water supply for 200,000 people in Tanga, and local people in the mountains depend on the forests for many of their daily needs.

The East Usambara Catchment Forest Project (EUCFP) has worked in the East Usambaras mountains since 1990 with the mission to protect these natural forests. The project aims at establishing the Amani Nature Reserve (ANR); protecting water sources; establishing and protecting forest reserves; sustaining villager's benefits from the forest; and rehabilitating the Amani Botanical Garden. The project is implemented by the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism (MNRT) with financial support from the Government of Finland, and implementation support from the Finnish Forest and Park Service (FPS). The total financial support for the two first phases 1991-98 amounts to a total of 6.1 million USD or about 3.6 billion Tshs.

The Amani Nature Reserve

The establishment of a nature reserve in Amani, the area with most endemic plants, was officially proposed in 1988 by the Finnish supported Amani Forest Inventory and Management Plan Project. In 1992 the EUCFP prepared a frame plan for the establishment and management of the ANR, and in collaboration with the IUCN Law Centre the legal aspects of the establishment of nature reserves were studied. The survey and mapping of the ANR was completed in 1994. The total area of the ANR will be 8,380 ha, which includes 1,065 ha of forests owned by private tea companies under the management of the East Usambara Tea Company. It also includes the Amani Botanical Garden, which was established in 1902 and still is one of the largest botanical gardens in Africa. The official and legal establishment of the ANR was completed with the publication of the Amani Nature Reserve Declaration Order (Government Notice no. 152) and the accompanying Rules (Government Notice no. 151) in the Government Gazette 78 (19) of 9 May 1997.

The objective with the Amani Nature Reserve is as stated in the Rules is:
1. to protect the unique, biologically important sub-montane rain forest ecosystem of the East Usambara mountains,
2. to maintain biodiversity, genetic resources, natural processes and cultural values in an undisturbed, dynamic and evolutionary state in order to have an ecologically representative example of the Eastern Arc forest ecosystem available for present and future generations, scientific study, environmental monitoring, education, and sustainable and controlled local and recreational use.

Presently Tanga Region lacks major tourist attractions although it is neighbouring the well known northern circuit in Tanzania with spectacular assets such as Kilimanjaro, Ngorongoro and Serengeti. The Amani Nature Reserve has all the potential to become an equally important attraction. If well planned, this can on the long-term bring considerable benefits both to the local communities in the East Usambara mountains and the Tanga Region. The project has since 1994 developed visitors and tourists services partly in collaboration with private companies. This includes the development of forest trails, trail guides, and signboards to direct visitors. Recently the rehabilitation of an old German Station master's house, which was built between 1905 and 1910, was completed and converted into the Amani Nature Reserve Information Centre. This includes a small six-room resthouse. A tourist map and a guidebook for Amani Nature Reserve and the East Usambaras is among the new information material being developed.

One of the major tasks of the EUCFP in 1997 is to prepare a management plan for the ANR. The planning exercise will involve the local people and other land owners and stake holders in the East Usambara area. The international status of the ANR will be upgraded; a Man and Biosphere Reserve or Global Heritage Site status will be considered. The Amani Nature Reserve may soon be part of the image that Tanzania presents to the world, and we hope that in the near future people abroad will associate the Amani Nature Reserve with Tanzania just as they do with Kilimanjaro, Ngorongoro or Serengeti.

Conservation of the East Usambara forests
The forest cover in the East Usambara area is about 45,000 ha or about 50% of the land area. Some of these forests have been protected in forest reserves since the turn of the century and many go back to the 1930's and 1950's. The project has worked to consolidate these protected forests and presently about 33,000 ha is within the forest reserves. Commercial harvesting and pitsawying has been banned and the project has been successful in containing encroachment and other illegalities in the area. Since 1992 EUCFP has surveyed more than 12,000 ha of natural forests which will be legally protected. A resent update of the land use information shows that at present the protected area is about 74% of the total forest area; 65% in sub-montane rain forest, and 78% in the lowland forest. This means that 11-12,000 ha of forest remain outside formal, legal protection.

People and forest conservation

People in the East Usambaras depend on the forests. The major challenge for the EUCFP is participatory management of these forests. Management means mainly discussing and agreeing with the local communities on their needs and how these needs should be met, whether from the public land forests or from the forest reserves. The EUCFP has made efforts to strengthen villagers rights to manage their own forests. Farm forestry activities have been started in a number of pilot villages in an effort to develop a strategy to improve local land husbandry. The EUCFP has also started to work with environmental education in primary schools by involving elders and "forest specialists" in the villages. More emphasis has been given to farm forestry and extension activities since 1995.

Conclusion

The main mission of the East Usambara Catchment Forest Project, in collaboration with the local communities and other stake holders, is to protect the natural forests in the East Usambara mountains. This can only be done by harmonising the needs of the local people with the conservation objectives. Successful conservation of these valuable forests can only be achieved with local support, and through sustainable financial arrangements and benefits. Presently there is light in the tunnel and the project has made a substantial contribution to the protection of this globally important asset. However, there are still many issues that may require continued external support. Through the support to the conservation of the East Usambara forests the Government of Tanzania together with the Government of Finland have taken concrete action in line with the Biodiversity Convention and the commitments made at the Conference of Environment and Development in Rio.

M.I.L. Katigula
Project Manager

Stig Johansson
Chief Technical Adviser

For more information:

East Usambara Catchment Forest Project
P.O. Box 5869, Tanga, Tanzania
Phone: 255-53-43820
Fax: 255-53-43820
E-mail: usambara@twiga.com

Forestry and Beekeeping Division
P.O. Box 426, Dar es Salaam, Tanzania
Phone: 255-51-111 061/2/3/4
Fax: 255-51-114 659
Tlx: 41853 misitu tz

Tanga Region Catchment Forest Office
P.O. Box 1449, Tanga, Tanzania
Phone: 255-53-43453 / 46907
Fax: 255-53-43820
Tlx: 45161 safari tz

Finnish Forest and Park Service
P.O. Box 94, FIN-01301, Vantaa, Finland
Phone: 358-9-857 841
Fax: 358-9-8578 4401
E-mail: knowhow@metsa.fi

Embassy of Finland
P.O. Box 2455, Dar es Salaam, Tanzania
Phone: 255-51-119 170/1/2
Fax: 255-51-119 173
Tlx: 41066 finemb tz

Dept of Development Co-Operation
Katajanokanlaituri, FIN-00160 Helsinki, Finland
Phone: 358-9-134 161
Fax: 358-9-1341 6293