CRITICAL ECOSYSTEM PARTNERSHIP FUND

Proceedings of a Workshop to document lessons learnt from the Critical Ecosystem Partnership Fund's investment in research, monitoring and awareness raising in the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania

Dar es Salaam
27th – 28th June 2006

BirdLife INTERNATIONAL
Together for birds and people

icipe

Tanzania Forest Conservation Group

WWF

NatureKenya
The East Africa Natural History Society

Executive Summary

This report describes the proceedings of a workshop which brought together grantees receiving support from the Critical Ecosystem Partnership Fund (CEPF) for research, monitoring and awareness raising projects in the Eastern Arc and Coastal Forests of Kenya and Tanzania and other relevant stakeholders. The aim of the workshop was to share experiences and document lessons learned during the implementation of these projects.

The workshop was held in Dar es Salaam between 27th – 28th June 2006. Thirty-three people participated in the workshop including representatives of: the civil society organisations implementing the research, monitoring and awareness raising projects financed by CEPF; relevant government departments including the Forestry and Beekeeping Division, the Department of Commercial Crops Fruits and Forests, Zanzibar and the Vice-President's office; CEPF and Conservation International; the Commission for Science and Technology and the media.

The Critical Ecosystem Partnership Fund is currently investing US$ 7 million in the Eastern Arc and Coastal Forests of Kenya and Tanzania. This investment is guided by five strategic funding directions. The third strategic funding direction is 'to improve biological knowledge in the hotspot'. The workshop focused specifically on CEPF's investment in improved biological knowledge. There are 24 projects being supported under this strategic direction representing an investment of US$ 1.9 million.

The workshop was organised by the Tanzania Forest Conservation Group on behalf of the Coordination Unit for CEPF's investment in the Eastern Arc Mountains and Coastal Forests. The workshop contributed to CEPF's commitment to share information about its investment in the region.

During the workshop 16 presentations were made about projects being financed by CEPF and one presentation was made by the related 'Conservation and Management of the Eastern Arc Mountain Forests project'. Each presentation was followed by discussions. The participants then separated into a series of working groups to brain storm on some of the key lessons learnt on research, awareness raising and biological monitoring and to identify recommendations. Summaries of each of the project and working group presentations are included in this report.

For more information about CEPF's investment in the Eastern Arc Mountain and Coastal forests, please visit www.cepf.net or cepf.tfcg.org or contact the Tanzania Forest Conservation Group, PO Box 23410, Dar es Salaam, Tanzania (tfcg@tfcg.or.tz)

Acknowledgements

We wish to thank all those individuals and institutions who contributed their time and effort to ensuring the success of the workshop.

In particular, we are grateful to CEPF for financing the workshop and in particular to John Watkin for taking the time to travel to Dar es Salaam to open and close the meeting and for his valuable insights on linkages with CEPF.

We thank James Mwang'ombe for chairing the meeting; Giulia Wegener for recording the proceedings of the workshop and Chrispin Kapinga for time-keeping.

We would also like to thank all those who prepared and gave presentations including John Watkin (CEPF), Paul Ndang'ang'a (BirdLife International), Will Crosse (Conservation International), David Knox (CABS / Conservation International), Professor Kim Howell (UDSM), Dr. Neil Burgess (CMEAMF / WWF-US), James Mwangombe (East African WildLife Society) and Dr Seif Madoffe (Sokoine University of Agriculture), Jaclyn Hall (University of Florida), Nisha Owen and Giulia Wegener (Frontier-Tanzania), Steve Collins (ABRI), Nike Doggart (TFCG), William Kindeketa (TBRCP), Joy Juma (FFI) and Guy Norton (ABRU). We also thank Roy Gereau (Missouri Botanical Gardens) and Dr. G. Hertel for their input in the design of the presentations.

The proprietors and management of the Courtyard also deserve thanks for providing the facilities and sustenance to keep the meeting going.

This workshop report was prepared by Nike Doggart (TFCG) and Giulia Wegener.

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List of acronyms

ABRI	African Butterfly Research Institute
ABRU	Animal Behaviour Research Unit - Mikumi
AZE	Alliance for Zero Extinction
CABS	Centre for Applied Biodiversity Science
CEPF	Critical Ecosystem Partnership Fund
CI	Conservation International
CMEAMF	Conservation and Management of the Eastern Arc Mountain Forests
CR	Critically Endangered
EACF	Eastern Arc and Coastal Forests
EAWLS	East African WildLife Society
EN	Endangered
FBD	Forestry and Beekeeping Division
FFI	Flora and Fauna International
FHM	Forest Health Monitoring
GEF	Global Environment Facility
IBA	Important Bird Area
ICIPE	International Centre for Insect Physiology and Ecology
IUCN	World Conservation Union
KBA	Key Biodiveristy Area
MBG	Missouri Botanical Gardens
METT	Management Effectiveness Tracking Tool
MM	Msitu Mkuu
MoU	Memorandum of Understanding
NGO	Non-Governmental Organisation
NV	Ngezi-Vumamawimbi
SUA	Sokoine University of Agriculture
TBRCP	Tanzania Botanical Research Programme
TFCG	Tanzania Forest Conservation Group
UDSM	University of Dar es Salaam
UNDP	United Nations Development Programe
VU	Vulnerable
WCS	Wildlife Conservation Society
WCST	Wildlife Conservation Society of Tanzania
WWF	World Wide Fund for Nature

1) Background to the workshop

1.1 Introduction

This report describes a workshop which brought together grantees receiving support from the Critical Ecosystem Partnership Fund for research, monitoring and awareness raising projects in the Eastern Arc and Coastal Forests of Kenya and Tanzania. The aim of the workshop was to share experiences and document lessons learned during the implementation of these projects.

The Critical Ecosystem Partnership Fund (CEPF) is a joint initiative of Conservation International, the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank. Conservation International administers the fund. CEPF provides strategic assistance to nongovernmental organizations, community groups and other civil society partners to help safeguard Earth's biodiversity hotspots. A fundamental goal is to ensure civil society is engaged in biodiversity conservation. The partnership invests in biodiversity hotspots, Earth's biologically richest and most threatened areas. CEPF focuses on hotspots in the developing world and strategically targets priority areas in the hotspots for maximum impact.

CEPF provides funding and technical assistance to civil society groups. It acts as a catalyst to create strategic working alliances among diverse groups, combining unique capacities and eliminating duplication of efforts for a comprehensive, coordinated approach.

The Critical Ecosystem Partnership Fund is currently investing US$ 7 million in the Eastern Arc and Coastal Forests of Kenya and Tanzania. This investment is guided by five strategic funding directions:

1. Increase the ability of local populations to benefit from and contribute to biodiversity conservation, especially in and around Lower Tana River Forests; Taita Hills; East Usambaras / Tanga; Udzungwas; and Jozani Forest.
2. Restore and increase connectivity among fragmented forest patches in the hotspot, especially in Lower Tana River Forests; Taita Hills; East Usambaras / Tanga and Udzungwas.
3. Improve biological knowledge in the hotspot (all 160 sites eligible).
4. Establish a small grants program in the hotspot (all 160 sites eligible) that focuses on critically endangered species and small-scale efforts to increase connectivity of biologically important habitat patches.
5. Develop and support efforts for further fundraising for the hotspot.

Within East Africa, CEPF's investment has been coordinated by four organizations and their partners. These organizations are working together to achieve CEPF's desired outcomes in the region. The four organizations are: BirdLife International - Africa Secretariat (in Kenya the Birdlife Partner is Nature Kenya. In Tanzania the Birdlife Partner is the Wildlife Conservation Society of Tanzania (WCST)); International Centre for Insect Physiology and Ecology (ICIPE), Tanzania Forest Conservation Group and WWF - East Africa Regional Programme Office. The job of the CEPF coordination unit is to ensure that an effective, efficient and coordinated approach is applied amongst stakeholders to achieve the CEPF conservation outcomes for the Eastern Arc and Coastal Forests. To achieve this goal, the unit aims to meet four objectives. Each organisation is responsible for taking a lead on one of these objectives.

The objectives are as follows:

Objective 1: 'An Eastern Arc Coastal Forest coordination unit exists with appropriate mechanisms to facilitate achievement of the investment priorities identified in the CEPF ecosystem profile'. (Led by ICIPE)

Objective 2: 'Stakeholders within civil society and government are aware of the CEPF process, goals and achievements and are sharing experiences'. (Led by TFCG)

Objective 3: 'Civil society stakeholders are supported to design effective conservation projects in line with the CEPF Ecosystem Profile and submit proposals to CEPF'. (Led by WWF)

Objective 4: 'A comprehensive and complementary suite of CEPF projects (within budget) is in place to fully address the strategic directions / investment priorities identified in the ecosystem profile'. (Led by BirdLife)

The workshop described in this report relates to an activity that contributes to objective 2 of the Coordination Unit's work. As part of the work under this objective, the Tanzania Forest Conservation Group (TFCG) developed a communication strategy to guide awareness raising and information sharing activities related to CEPF's investment. Stakeholder meetings were one of the activities identified in this strategy as providing a useful mechanism for communicating results and lessons learned. The meeting described in this report is the first of a series of lessons learned workshops which will focus on each of the strategic funding directions supported by CEPF.

1.2 Workshop aim

The aim of the workshop was to bring together CEPF grantees involved in projects under CEPF Strategic Funding Direction 3 to share experiences on biodiversity research, monitoring and awareness raising and document lessons learnt.

1.3 Expected outputs

- Grantees have an opportunity to share experiences and to learn about other projects being supported by CEPF.
- Grantees have an opportunity to identify areas of potential synergy between projects.
- Relevant stakeholders including government departments and national research institutions can learn about the projects financed by CEPF.
- Participants will identify some of the key lessons that have been learned through the implementation of the CEPF projects.
- CEPF representatives and grantees have an opportunity to meet and discuss the progress of their projects.
- A report documenting the progress and lessons learned from projects supported by CEPF under Strategic Funding Direction 3.
- Recommendations on ways of strengthening research, monitoring and awareness raising in the hotspot.

1.4 Participants

The lead contacts under all projects supported through CEPF's strategic funding direction 3 were invited to the workshop. Of the 24 research and monitoring projects supported by CEPF, representatives of 15 projects were able to attend. In addition, we had participation from the Monitoring Department of the Forestry and Beekeeping Division, the Department for Commercial Crops, Fruits and Forests, the Tanzania Commission for Science and Technology, the UNDP/GEF Conservation and Management of the Eastern Arc Mountain Forests Project, the National Environmental Management Council in the Vice President's Office and two journalists. A total of 33 people participated in the workshop. The full list of participants is included as Appendix 3.

1.5 Workshop structure and organisation

The workshop continued over two days from 27th – 28th June 2006 at the Courtyard Hotel in Dar es Salaam. The workshop was organised by the Tanzania Forest Conservation Group on behalf of the CEPF Coordination Unit for the Eastern Arc Mountain and Coastal Forests. During the first day, grantees gave presentations on their projects. The presentations focused on the aims, methods, results and lessons learned from the projects. In addition the Conservation and Management of the Eastern Arc Mountain Forests project (CMEAMF) gave an overview of the institutional context of the Eastern Arc and the achievements of CMEAMF. After each presentation, participants had an opportunity to ask questions and discuss the results. On Day 2, participants formed working groups to identify specific lessons learned on research, monitoring and awareness raising based on guidelines provided by the workshop organisers (Appendix 1). Each group had a Chair and Rapporteur. The rapporteurs presented the findings of their group to the plenary as power point presentations. The presentations were followed by discussions.

1.6 Report structure

This report includes summaries of each of the presentations made during the workshop. The text for each presentation is based on the power point files prepared by the presenters. Additional information outlined verbally by the presenter is documented as foot notes. At the end of each section, there is a summary of the discussions that took place after each presentation. The project presentations are followed by a summary of the findings of the four working groups. The workshop timetable, instructions for the working groups and a list of participants are provided as appendices.

Many of the presentations included attractive and illustrative photographs and graphics however many of these have had to be removed in order to keep the size of the PDF file small enough to be able to share this document electronically.

2) Presentations

2.1 Opening remarks and participant introductions

The workshop was officially opened by John Watkin who began by welcoming participants and explaining that the aim of the workshop was to provide participants with an opportunity to find out what each of the projects have been working on as well as to identify lessons learned that can strengthen CEPF's investment here and elsewhere.

Participants then introduced themselves and it was agreed that we should elect a Chair for the meeting. James Mwangombe was elected and agreed to Chair the meeting.

2.2 Presentation 1: Critical Ecosystem Partnership Fund (CEPF) Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya

Presented by John Watkin

A Partnership Approach [1]

Timeline

- Ecosystem Profile developed in early 2003
- Donor Council approval in November 2003
- Investment launched in 2004

Conservation Outcomes

- Extinctions avoided: 333 Threatened species
- Areas Protected: 160 sites – 5 "priority" sites
- Landscape: Increasing connectivity, 4 priority sites

Priority Sites

- Lower Tana Forests
- Taita Hills
- East Usambara Mountains
- Jozani Forest, Zanzibar
- Udzungwa Mountains

Background

- Significant conservation history in East Africa
- Extensive civil society sector
- Established Government and Parastatal sector
- Many qualified and competent national scientists and conservationists
- History of competition between non government organisations

[1] CEPF works through a partnership approach. CEPF has received a massive number of applications. Funds have been allocated according to the strategic funding directions and investment priorities identified in the Ecosystem Profile. CEPF has promoted partnership between stakeholders.

The selection of projects started in 2004. CEPF aimed to encourage projects to adopt complementary methods and to contribute data to the Tanzania national databases at UDSM and to the databases held by the National Museums of Kenya as well as to the CEPF Conservation Outcome Database. CEPF are now evaluating the flow of collected data.

The biodiversity hotspot concept is an idea that was developed in 1988 by Norman Myers and later adopted by Conservation International as a basis for prioritising conservation investment. The Eastern Arc and Coastal Forests are estimated to have lost 70% of its original habitat. After a re-evaluation of the hotspots, a number of changes were made to the original analysis. This has resulted in the EACF hotspot being split into two separate components to align with WWF's ecoregion approach, including the Eastern Afromontane hotspot and the Eastern African Coastal Forest hotspot, which spans from Somalia to Mozambique.

The ecosystem profile represents the conceptual basis for CEPF's interventions. It is a tool to refine decision making for investment. It acknowledges the presence of a history of conservation in Eastern Africa, and it consequently adopted a partnership approach in order to be more effective.

CEPF's Niche

- Conserving global species and site imperatives for biodiversity conservation
- Monitoring the survival of these species in the long-term
- Increase community involvement in conservation

Five Strategic Directions

- 326 applications total

Strategic Direction	Funds allocated	Funds remaining	Number of projects
1: Community Livelihoods	$ 2,831,484	$181,016	Total number = 24 Mean = $ 118,000 Median = $ 20,000
2: Increase connectivity	$2,500,000	$ 409,233	Total Number = 15 Mean = $ 46,000 Median = $ 20,000
3: Improve Biological Knowledge	$1,959,709	$ -34,709	Total Number = 24 Mean = $ 82,000 Median = $ 47,000
4: Small Grants Program	$164,377	$ 375,623	Total number = 8 Mean = $ 20,000 Median = $ 20,000
5: Long-term financing	0	$425,000	Total Number = 0 Mean = $ 0 Median = $ 0
Totals	**$ 5,643,837**	**$ 1,356,163**	**71 projects supported thus far. 25 projects in development totalling US $1,062,562**

Approach to Grant Making

Succession of Strategic Directions:

Biological knowledge =>
=>Increasing connectivity =>
=>Community Livelihoods =>
=>Small Grants =>
=>Long-term Financing=>

Investment planning workshops

Udzungwa Mountains – summary published in Oryx
Taita Hills Stakeholders Workshop [2]

Layering of projects

Pilot projects => Scientific input => Community action => Community Micro Grants [3].

Highlights of FY 06

SD 1: Community Livelihoods

- Coordination Unit
- Hotspot Wide Monitoring Program (BirdLife and CABS)
- Alternative Nature-based Livelihoods
- Environmental Awareness (including 2 BBC "Earth Report" Films with an audience of 550 million) [4]
- Community Micro Grants

[2] The results of this workshop were published in Oryx,

[3] The aim of this pilot project is to explore the potential for achieving conservation and development using a combination of improved scientific and socio-economic knowledge. The micorgrants are managed by WWF in Kenya and Tanzania in partnership with TFCG, WCST, Nature Kenya and CFCU and include alternative fuel, better marketing of crops, eco-guides/rangers, and participatory forest management.

[4] These documentaries will be produced by TFCG for broadcast on BBC World.

SD 2: Increasing Connectivity

- Taita Hills model including community involvement5
- Tana Delta Irrigation Project Environmental Assessment
- East Usambara Mountains Derema Corridor: Global Conservation Fund grant leveraging Finnish Government and World Bank contributions to the compensation scheme6
- Udzungwa Mountains: Assessment of opportunities to increase connectivity that resulted in 3 keystone projects

SD 3: Improving Biological knowledge

- Surveys of lesser known sites
- Red Listing of Plants workshop
- Journal of East African Natural History7
- National Biodiversity Database (Tanzania)
- Forest Health
- Insect Diversity

SD 4: Small Grants

- Several key small grants that fill site and species gaps in the overall portfolio8
- eg. Survey of Microchiropteran Bats complementing a grant from CI Madagascar and builds on the BP Conservation Programme Award studying Seychelles Sheath-tailed bat

SD 5: Long term financing

- Terms of Reference for the consultancy developed in conjunction with CI
- Priority for FY 07

Coordination Unit

International Centre for Insect Physiology and Ecology
Overall management, administration and accounting of the Unit

Tanzania Forest Conservation Group
Establish a network of raising awareness of CEPF goals and objectives

World Wide Fund for Nature EARPO and TPO
Interface with civil society especially CBOs

BirdLife International in conjunction with their national partner organizations NatureKenya and Wildlife Conservation Society of Tanzania Coordinating the review process and ensuring a complementary suite of projects

Co-opted members of the CU are Tom Butynski and Neil Burgess

Success through Partnerships

GEF-UNDP Eastern Arc Mountain Forests Conservation and Management Project
GEF Medium Sized Project for the Kwale District
USAID Arabuko Sokoke project and Visitors Centre at Fort Jesus, Mombasa
Signing the Memorandum of Understanding between Conservation International and the Government of Tanzania

Conservation Outcomes

- The Ecosystem Profile and Conservation Outcomes have guided the investment.
- 49 of the 160 sites identified in the Ecosystem Profile have CEPF projects
- 310 of the 333 species outcomes have been encompassed in the portfolio
- Site and species gaps to be filled as best as possible in FY 07

Up coming years activities

Community Livelihoods

[5] The Taita Hills are one of the most threatened and fragmented sites in the region.
[6] The World Bank will give a presentation on the way forward for the Derema investment on 29th June.
[7] The support given to the Journal of East African Natural History is also meant to enable grantees to publish their findings. All papers published since 1910 are available on the East African Natural History Society's website.

TRAFFIC: Forest Product Extraction and Rural Livelihoods
WCS: Aerial mapping of the forests

Increasing Connectivity
WWF TPO: Conserving of the Forests of Matumbi Hills and
Improving the Conservation of Magombera Forest

Biological knowledge
Meeting of grantees

Small Grants Program
Small Grants Programme for Building Research Capacity among Tanzanian and Kenyan Students.

Long-term financing
Review of applications for a consultancy on opportunities for long-term financing
Building upon the recommendations from the consultancy to secure funding opportunities including payments for ecosystem services, carbon sequestration and trust funds

Concluding remarks
The CEPF EACF portfolio has demonstrated how - by playing to the respective strengths of civil society, engaging all stakeholders in the Ecosystem Profile process and implementation of the full investment - significant strides can be made to achieving conservation outcomes.

By emphasizing partnerships and using CI's expertise where it was deficient locally, CI has gained significant credibility in the region.

Discussion

Q: It would be interesting to know what other external and international organisations think of CEPF in Tanzania

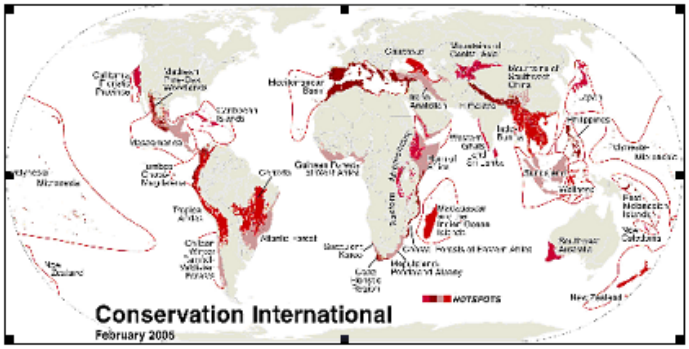
A: The investment in the Eatsern Arc and Coastal Forests of Kenya and Tanzania has been heralded as a success, particularly given the variety of civil society organisations that have been involved.

Q: What were the criteria used to select priority sites for conservation within the hotspot?
A: The selection was based on the number of threatened and endemic species present at a site and levels of threat.

2.3 Presentation 2: Conservation outcomes in East Africa

Presented by David Knox, Center for Applied Biodiversity Science, Conservation International

Global priorities



Global priorities are important for organizations with globally flexible conservation resources,
But they don't inform conservation actions on the ground & in the water [9]

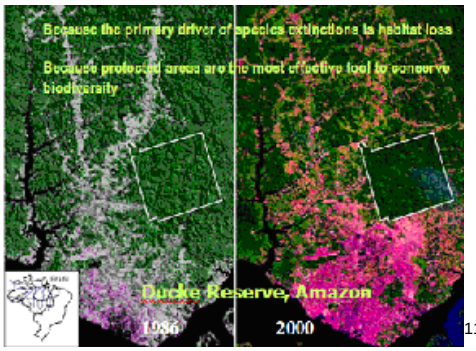
Necessity for targets in biodiversity conservation
* Justifying the relevance and efficiency of conservation strategies
* Establishing a baseline for monitoring changing biodiversity and, ultimately, conservation success

Conservation Outcomes[10]

The global standard for the status of threatened species

[9] The hotspot approach is helpful to guide international organisations like CI in orienting globally flexible resources. However this approach does not indicate where within a hotspot we should focus our efforts or resources, it does not reflect what scientific knowledge and conservation action is already available on the ground and what are the gaps.

[10] Biodiversity functions along an ecological continuum rather than through discrete units. For pragmatic reasons three discrete units were chosen: the species, their habitat and the landscape's connectivity.



[11]

Key Biodiversity Areas[12]

Sites of global significance for biodiversity conservation identified using globally standard criteria and thresholds, based on the needs of biodiversity requiring safeguard at the site scale (Eken, et al. 2004. Key biodiversity areas as site conservation targets. *BioScience*, **54,** 1110-1118)

KBA criteria

- Quantitative, objective, transparent
- Based on framework of vulnerability and irreplaceability [13], widely used
- in systematic conservation planning
- Species that need and benefit from site-level conservation

KBA criterion 1: Globally threatened species (according to the IUCN Red List)
Vulnerability based on presence of populations of species with high probability of extinction in short- to medium-term future. Sites with regular occurrence of one or more CR, EN, or VU species.

KBA criterion 2: Restricted-range species
Irreplaceability: representation of geographically concentrated species: depend on network of irreplaceable sites within at least part of range or life cycle

Sites regularly holding one or more restricted-range species (as defined as species having a global range size of <50,000km^2

KBA criterion 3: Globally significant congregations
Irreplaceability: sites holding large proportions of the global population of a species at a given time (e.g. breeding colonies, foraging and roosting sites, bottleneck sites)

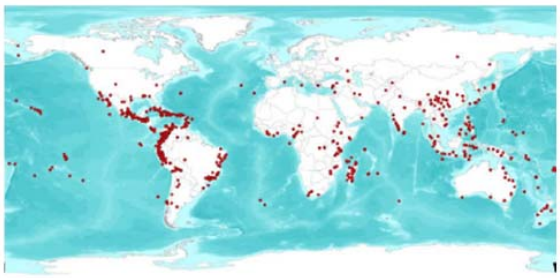
KBA criterion 4: Bioregionally-restricted species assemblages

Irreplaceability: sites holding a significant proportion of the group of species whose distributions are restricted to a biome or subdivision of it

[11] It is not possible to conserve species one by one, fortunately we don't have to as habitat is the key factor causing species to become threatened and eventually extinct. Therefore preventing species extinctions and ensuring the persistence of biodiversity over the long term requires that key areas of habitat are conserved. What is the best means to do this? CI believes that protected areas are the most effective mechanism to conserve species and their habitats. This belief is based on research and analyses such as that shown here of the region surrounding the Ducke Reserve. The purple and pink colors represent areas of forest that have been converted to other land uses. The area surrounding the reserve underwent significant conversion during the period 1986 to 2000, while the reserve itself remained largely intact.
[12] It is not feasible to conserve all species through a direct approach. Some species are protected from extinction through species specific projects. Many (90% according to the IUCN Red List) are better preserved through some form of habitat protection. The Key Biodiversity Areas serve this scope. They provide protection to species that can survive at the site level and that do not generally require large home range areas.
[13] Irreplaceability is a measure of the spatial options available. It refers to species that have limited spatial options for their conservation

Alliance for Zero Extinction sites (the highest priority subset of KBAs globally)

CR/EN single-site endemics - if we fail to conserve these sites then the species found in these sites will certainly face extinction



How are KBAs identified?

Bottom-up, typically driven from national level
Builds on previous attempts to identify site priorities
Identified using best possible existing data
Based on known occurrence of species at site
Data underpinning KBAs consolidated in a database and made available
Subjected to expert review
Iterative

KBAs in East Africa

IBAs for Kenya and Tanzania

- Extended to identify 160 KBAs in 2002 with Ecosystem Profile
- Ensure this information is updated and iterative

Additional Data

- Initial work was with 2002 Red List, now we have 2006 Red List
- Excellent field work from CEPF and other projects
- New sites being identified and key to update these data [14]

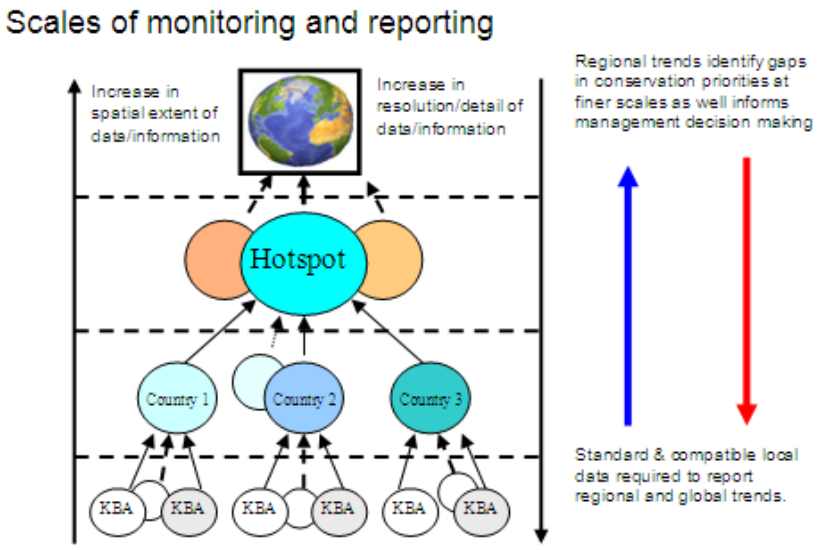
Discussion
See below after Will Crosse's presentation.

[14] New threatened species were included in the IUCN Red List 2006, including various fish and reptile species. New sites need to be identified for these species.

2.4 Presentation 3: Establishing standardised regional monitoring systems – lessons learned from other hotspots.

Presented by Will Crosse, Conservation International

Strengthening the relationship between local data collection and large-scale data representation through standardized regional biodiversity monitoring
'from disparate data to coordinated reporting'



Different types of monitoring

- Different scales and objectives of monitoring and what decisions the data can inform.
- There is a strong relationship between data collection at the site level and information reporting at the regional level.

What process must be put in place for standardized data to flow and contribute to regional reporting of biodiversity trends?

- Baseline monitoring (inventory/assessment) is used to characterize existing conditions, and to establish a database for planning a future comparison.
- Intervention monitoring is used to evaluate whether specified activities had the intended effect.

↓

- Regional/National monitoring assesses results towards achieving a desired change in a system.
- Global Monitoring – feeding information for global reporting requirements.

Collection of status & trend data improves our effectiveness to:

- Track and assess trends in the status of biodiversity
- Assist in demonstrating impact of actions and investments on biodiversity
- Justify and direct future conservation, policy and investment decision making
- Communicate successes and failures of conservation strategies to government agencies, investment bodies, industry and society as a whole.
- Better understand the dynamics of biodiversity components and threats and adapt accordingly.
- Contribute to international biodiversity status reporting, e.g. Convention on Biological Diversity and the Millennium Ecosystem Assessment

Indicators, defined regionally, are globally applicable measures that contribute to Convention of Biological Diversity recommendations.

Core Indicators: [15]

- Red List Index: Change in Red List status of species
- Protected status of Key Biodiversity Areas
- Change in habitat cover of Key Biodiversity Areas
- Fragmentation of habitat in corridors

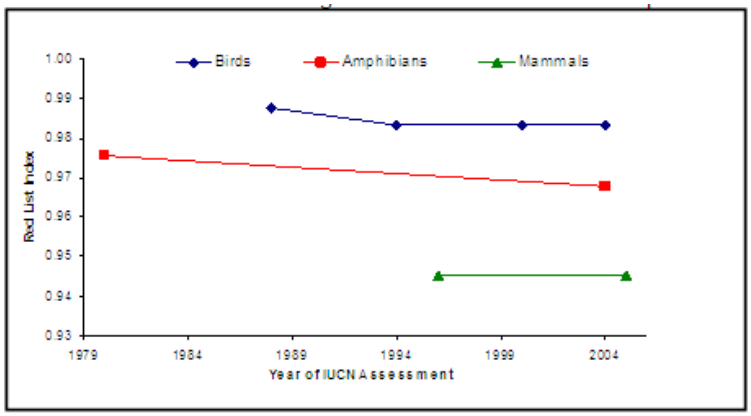
Additional intervention measures*:*

- Number of safeguarded Key Biodiversity Areas with governance structures & management plans16
- Percentage of globally threatened species that have ongoing studies that focus on ecology, population, or distribution & monitoring in place

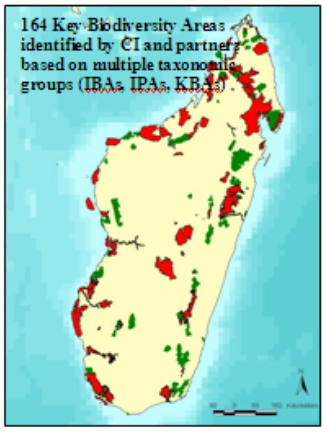
Lessons in data collection, analysis and dissemination from Madagascar:

- Leveraging and diversifying biodiversity information for multiple actors at multiple scales

Red List Index: Change in IUCN Red List status of species



RLI : Measure the relative rate at which the number of sp in each IUCN Redlist category change by tracking genuine change in sp extinction risk between Red List assessment B & A: the RLI reveals deterioration in the conservation status over the last two decades



Protected status of KBAs

GREEN = Protected KBAs (n=50)

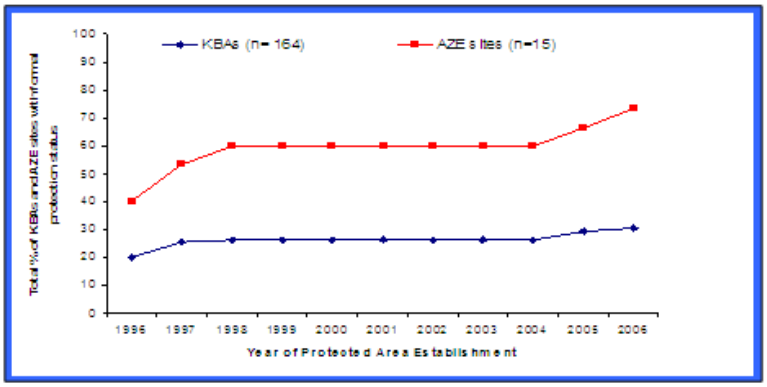
RED = Unprotected KBAs (n=114)

Outcomes data, represented spatially, provides detailed information that can direct in-depth analysis and appropriate conservation decision making particularly when complemented with other variables, notably management and governance information and change in habitat cover.

[15] These indicators were developed to incorporate three levels (species, habitat and landscape) in order to promote their global applicability and long-term vision.

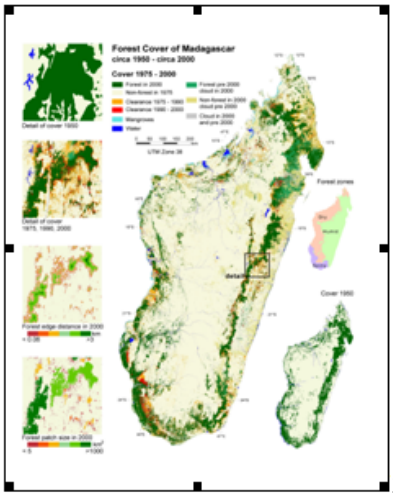
[16] In addition to evaluating whether protection status exists or not for Key biodiversity Areas, higher resolution management and governance information is also currently being collected for analysis purposes. While appropriate management activities vary widely depending on context, it is valuable to measure standard, quantitative & measurable indicators and create data layers to present change in management and governance levels both spatially and over time. Examples include, staffing in place, enforcement strategies, education & awareness programs and research & monitoring in place.

Change in Protection Status of Conservation Priority Areas [17]: Key Biodiversity Areas, including Alliance for Zero Extinction Sites



Time period 1996 – 2006. In Madagascar, 50 of 164 KBAs (30.4%) including 11 of 15 AZE sites (73%), benefit from official safeguard status

AZE sites: highly irreplaceable and highly threatened sites that contain the last remaining population of one or more Critically Endangered or Endangered species.

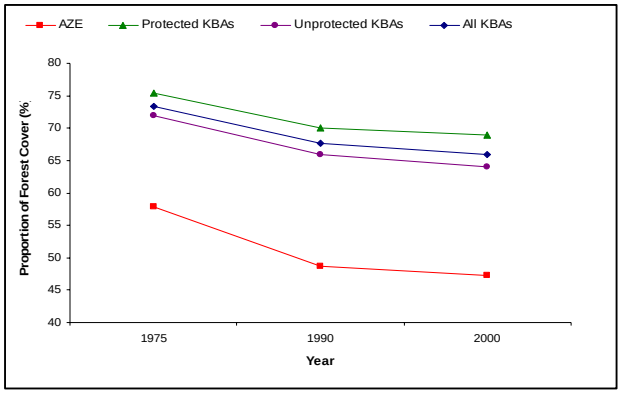


[18]

Change in Forest Cover of Madagascar:

- Habitat loss over the period of time :1975, 1990, 2000 that can cause species to be threatened with extinction

Change in Habitat Extent in Key Biodiversity Areas, including Alliance for Zero Extinction sites

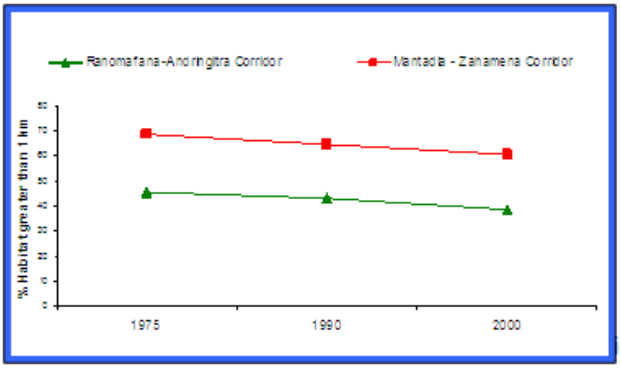


AZE sites had the highest rate of decline in the proportion of habitat cover during 1975 to 1990. During 1990 to 2000 the rate of decline slowed for all KBAs

[17] The analysis of change in protected status of conservation priority areas serves as a tool to inform where, how and why future protected area networks should be shaped. In 2006 30.5% of all 164 KBAs of Madagascar, including 11 of 15 AZE sites (73%), benefit from official safeguard status

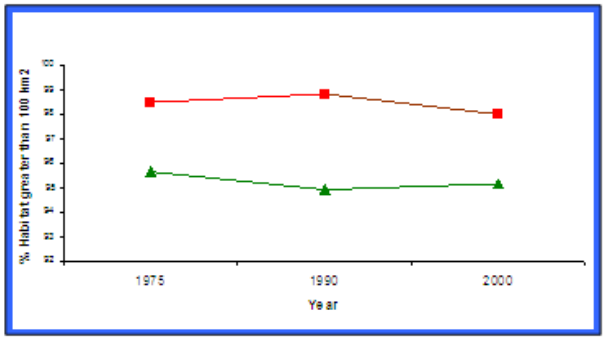
[18] This map provides spatial representation of the forest cover and the biodiversity sites (which are overlain on top). Sokoine University of Agriculture & WCS are planning to develop similar maps for the Eastern Arc Mountains and Coastal Forests.

Change in fragmentation in biodiversity conservation corridors [19]: edge indicator



a) proportion of habitat not within 1 km from a non-habitat edge

Change in fragmentation in biodiversity conservation corridors [20]:



b) proportion of habitat not in isolated patches <100 km2

Reporting:
Can a subset of selected CBD indicators recommended for measuring the 2010 target be adopted to track & report progress at national and regional scales?

Decision-making:
How can biodiversity information be best utilized by government and investment decision makers to guide strategic conservation & sustainable development planning?
What scale of conservation decision making (site, regional & national) and by whom?

Establishing National/Regional Monitoring networks to ensure sustainability and consistency in data collection and reporting

Monitoring systems held together by five components:

- Key stakeholders with defined technical roles & responsibilities
- Complementary indicators with standardized measurement protocols
- Centralized & compatible data housing and analysis infrastructures
- Collaborative dissemination efforts (workshops, publications)
- Fundraising strategy driven by multiple partners

Partnerships to strengthen the sustainability of regional biodiversity monitoring [21]

Stakeholders participation in steering committees
E.g. establishment of Eco-partnership (SW China Hotspot).
Standardizing monitoring methodologies

[19] The analysis of change in habitat coverage in conservation priority areas enables governments, donors and the conservation community to evaluate rates of habitat change in relation to their investment and conservation activities.
[20] The analysis of changes in habitat fragmentation, isolation of habitat in small patches, and proportion of edge habitat bordering non-natural habitat is important because these have negative implications on species needing sufficiently large and continuous habitat patches for their life requirements, including movement across landscapes.
[21] The partnership approach to monitoring is very strong in Tanzania and has potential to make the data available for sustainable long-term monitoring.

E.g. Development of the National Biodiversity Monitoring Manual (Philippines)
Conducting components of outcomes definition and monitoring.
E.g. CI & Wildlife Conservation Society partnership on change detection analysis for Sumatra, Indonesia
Participation in fundraising strategies.
E.g. The Biodiversity Monitoring Alliance (Philippines)

Discussion

Q: CI's conservation approach seems to be very much based on species richness and species threat in its identification of conservation priorities. However, national governments make decisions at the habitat level.

A1: CI's approach uses the concept of irrepleacability and focuses on the endemism of the species more than on their richness. In this way the approach is intrinsically underpinned by a habitat level component. We do work at the habitat level but on the basis of the type of species these habitats can harbour. The policy and intervention approach adopted is based on the target species found in a habitat.

A2: CI does not want to give a generalised set of management recommendations to local governments. Policies should be developed on a case by case basis. CI only aims at providing baseline biodiversity information which governments and civil society can use to inform where their conservation interventions would likely have the greatest impact on biodiversity conservation.

Q: Are there any lessons from Madagascar that can be extended to other countries in the region?

A1: In Madagascar seven areas were previously unprotected. They were selected for conservation through boundary demarcation and community based management because they contain highly threatened endemic species. There is a high level of commitment on behalf of the new president because only 8% of forest cover is remaining. By looking at past rates of habitat loss there is high risk of further loss. This loss in forest habitat leads to economic losses itself, including loss of water sources. It is for these economic reasons that the new president is trying to develop Madagascar as a biodiversity-based economy.

A2: It is important to ensure that gathered data is contributed to the global network of IUCN categorization. This network is highly comprehensive (an example is CABS' vast database) and has the potential of securing further areas to conservation.

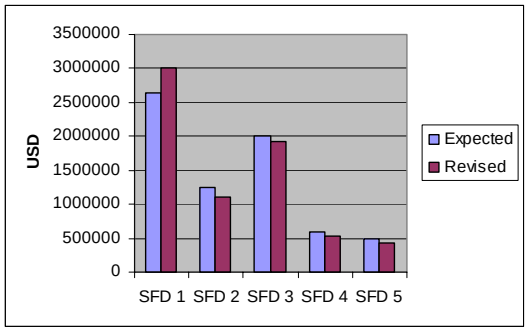
2.5 Presentation 4: Overview of CEPF's investment in the Eastern Arc Mountain and Coastal Forests [22]

Presented by: Paul K. Ndang'ang'a, BirdLife International

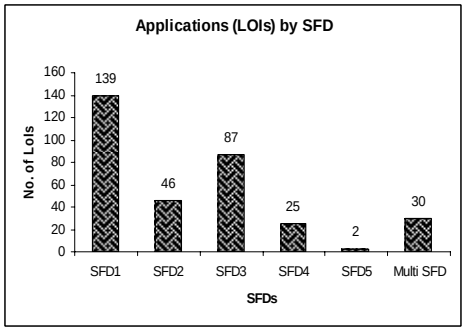
Strategic Funding Directions (SFDs) in the EACF

- Increase ability of local populations to benefit from and contribute to biodiversity conservation
- Restore & increase connectivity among fragmented forest patches
- Improve biological knowledge
- Establish small grants program focussing on CR species and small-scale efforts to increase connectivity
- Develop and support efforts for further fundraising

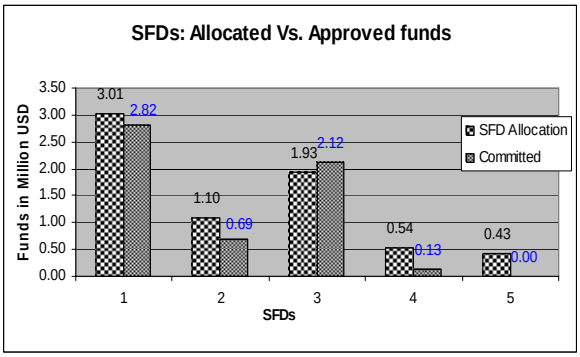
Fund allocation in EACF = USD 7,000,000 [23]



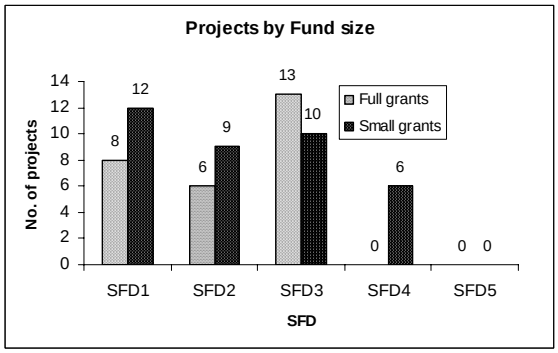
Analysis of the Project Portfolio (Feb'06)



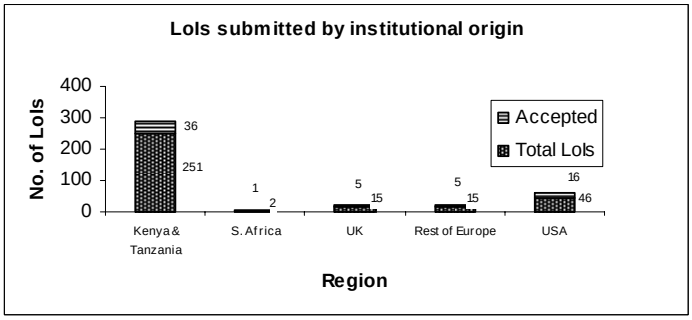
Committed funds per SFD



Nature of funded projects



Origin of Submissions



Site coverage

Eastern Arc & Coastal Forests region hosts 333 species outcomes at 161 sites
Interest expressed by applicants for work at 84 outcome sites

[22] The annual analysis of the project portfolio for 2005 is available on the website.
[23] The number of applications to CEPF was very high, indicating a high level of interest toward the conservation of the EACF hotspot. The size of the grants varied. A large proportion has been allocated to civil society through small grants.

Funds committed at 49 sites where activities may benefit 311 of the 333 outcome species [24]

Sites & no. of projects in place [25]

- Udzungwas (7), Tana River forests (6)
- Arabuko Sokoke Forests, Uluguru Mts, Entire Hotspot, Tz (5)
- North Pare Mts, Rubeho Mts (4)
- Boni forest, Coastal Forests, Tanzania, Dodori forests, Jozani Forest Reserve, Lindi District Coastal Forests, Mt. Kasigau, Nguru Mts, Tanga (3)
- Nguu Mts, Pemba Island, Rufiji District Coastal Forests, Udzungwa Mountains, Ukaguru Mts (2)
- Chale Island, Chuna forest, Kaya Gonja, Kaya Kinondo, Kaya Miungoni, Kaya Muhaka, Kaya Rabai, Kaya Sega, Kilombero Valley, Kilwa District Coastal Forests, Kisarawe District C Forests (Pugu Hills), Lindi, Lunghi, Mafia slands, Mahenge, Mikumi Park, Mrima Hill, Mtwara coastal forests, Tana River Delta, Tumbatu Island, Uvidunda Mts, West Usambara, Witu, Zanzibar (Kituani), Zanzibar (Muyuni), Zanzibar Island-East Coast, Zanzibar Island-South Coast (1)

Gaps in site Coverage

- South Pare Mts (33 outcomes species) among critical sites yet to be captured
- 77 sites have no ongoing projects

Species coverage

- Mammals: primates, small mammals
- Insects: butterflies, army ants, ground-dwelling ants/beetles
- Birds: Threatened birds (E. Usambara)
- Amphibians: Assessment of amphibians in Taitas, frogs (chytrid distribution & pathogenicity)
- Plants: Plant conservation assessment
- Reptiles: Three biodiversity survey projects
- Reptiles: ???? [26]

Discussion

Q: Investment in small target research projects at the student level has been low.

A: Although CEPF has closed applications for funds under the five strategic funding directions, there are still funds available through the small grants programme and the micro-grants programme. The small grants programme offers funding for Kenyan and Tanzanian students to conduct research projects in the hotspot with a particular focus on threatened and endemic species.

Q: There has been substantial funding in the South Pare Mountains through the GEF Cross Border project. The main threat to the forests in these mountains is illegal logging. There has been no monitoring of the success of the investment in these mountains, and whether there have been any positive achievements (e.g. in the development of successful forest management programs and in curtailing governance problems).

[24] Funded initiatives tackle the conservation of outcome species through an indirect approach, i.e. by protecting their habitat sites.
[25] Some projects cover the whole hotspot. Some sites are benefited by one or two projects.
[26] There have been no projects that have focused on fish in the hotspot.

2.6 Presentation 5: Instituting a standardised sustainable biodiversity monitoring system in the Eastern Arc and Coastal Forests

Presented by: Paul K. Ndang'ang'a, BirdLife International

Purpose

- Sustainable monitoring system involving all key stakeholders in the EACF
- Information is made widely available and accessible.

Objectives/Outcomes

- Standardised protocols for monitoring agreed with all stakeholders and instituted [27]
- The status of key taxa, key sites and the ecosystem processes maintaining biodiversity are monitored
- Co-ordinated storage, handling and sharing of conservation data

Achievements against outputs: ……

Output 1: A baseline of monitoring knowledge, data and practitioners in the EACF and the current main gaps and needs established.

- Comprehensive review of approaches used for biodiversity monitoring, actors, methods, coverage (sites/species) in the EACF done, report availed
- Main actors implementing biodiversity monitoring in the EACF identified, database initiated and continually updated
- Gaps in monitoring data discussed (workshop), baseline review report availed

Output 2: Protocols for biodiversity monitoring developed, agreed, standardized and implemented by all key stakeholders across the EACF hotspot.

- Workshop: 30 May -1 June 2005, 85 participants - Task Force to develop monitoring approaches
- Agreed common indicators and methodologies for species, sites and habitat monitoring
- Two communications to stakeholders on agreed indicators and tools, how to contribute monitoring information
- Templates for Memorandum of Understanding (MoU) among the key partners agreed upon
- Case-by-case analysis of MOU needs for sharing data

Output 3: The trends in conservation status and threats to selected species, sites and habitats in the EACF hotspot after four years of CEPF investment assessed and documented

- Model demonstration sites/species selected (at least Arabuko Sokoke; Dakatcha; Uluguru; Lindi/ Sokoke Scops-owl; Clarke's Weaver; Uluguru Bush-shrike;Spotted Ground Thrush) [28]
- Equipment need assessment etc, systematic data collection
- Dissemination of information of biodiversity status – annual biod. trend & status report; feedback to stakeholders

Output 4: A comprehensive database developed and maintained where information on the Conservation Outcomes of EACF hotspot is stored and from where such information is readily available and regularly distributed

- Outcomes database continues to be populated – in process to be uploaded on TFCG CEPF website
- Consultation ongoing with CABs to make database useful for monitoring
- Monitoring data being captured in simple spreadsheet [29]

Output 5: A forest cover and change detection map (1990-2000) for the coastal forest areas of the Eastern Arc Mountains is produced and distributed widely within the region

- CI - CABS

[27] Initially BirdLife decided to have a protocol for the flow of data from the start. However, an ongoing consultative approach was eventually selected as being more effective.
[28] These sites represent a minimum set for which commitment has been made for systematic data collection.
[29] At the moment this is a simple spreadsheet that captures the information received from various organisations. It indicates what indicators were recorded and when they were last assessed. We have also developed a spreadsheet where people can advise how to improve the gathering of information.

Some lessons

- Need to set aside enough time for stakeholder consultations (share expertise, reduce duplication) – otherwise major delays may occur.
- Coming up with agreeable method of aggregating different forms of information for monitoring purposes can be challenging.
- Two-way benefits necessary for successful data sharing.
- Though necessary, agreements on information sharing may not always be based on MoUs.
- Keep it simple!

Discussion

Q: This project has been running for 1 and ½ year. However, your presentation does not present any achieved results in terms of analysis and resolutions.

A: The consultation stage has taken longer than anticipated and has delayed the actual implementation of the project. But these consultations have now provided us with a clear way of obtaining information from stakeholders. Data is currently being collected. Indicators are being chosen. We are still perfecting the system, the process of data collection and aggregation will be easier afterwards.

Q: Between whom are the MoUs mentioned in your presentations stipulated?

A: Mainly with in-country key repository institutions, such as WCST.

I: MoUs are required at different levels, including the site level. However, organizations often need other MoUs in place before they can engage in the data collection activity e.g. Permission from COSTECH.

Q: Are there any agreed analysis measures for the gathered data? Is there an established steering committee and has a set of responsibilities been agreed upon?

A: A task force has been formed during the 30 May -1 June 2005 workshop. However there is need for more refinement of the resolutions that were agreed upon. Maybe we need to rethink the structure of this task force and its responsibilities.

I: The BirdLife monitoring project is behind schedule. CEPF's current strategy to tackle this problem is to provide additional technical support through Will Crosse and David Knox. This is done in recognition of the fact that the collection and analysis of data by BirdLife is a long-term process that should extend beyond the life-span of the CEPF investment.

2.7 Presentation 6: Making data available on the species and sites of the Eastern Arc and Coastal Forest hotspot in Tanzania.

Presented by: Kim M. Howell, Department of Zoology and Wildlife Conservation, University of Dar es Salaam

UDSM BIODIVERSITY DATABASE DEPARTMENT OF ZOOLOGY & WILDLIFE CONSERVATION

- Established under GEF project
- Continued support from ENRECA
- Most focus is on specimen data from terrestrial vertebrates collected during various research projects, EIAs, theses, etc.
- In 2006, a non-specimen database was added

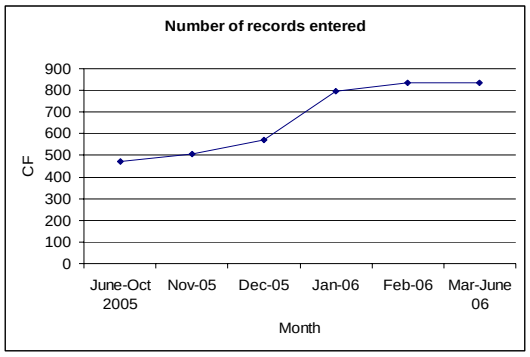
UDSM DATABASE

- 16,000+ records entered using MS Access [30]
- Many pending
- Many difficult issues related to identifying specimens to the species level[31]

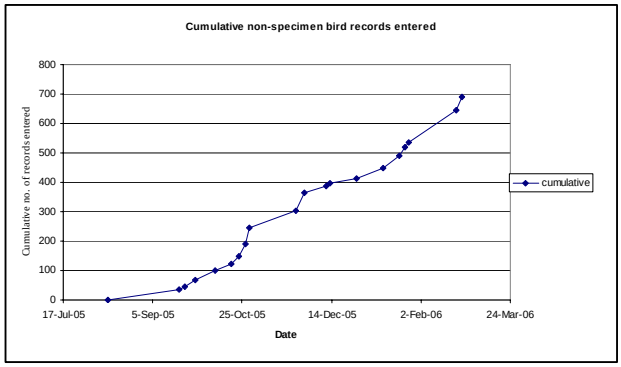
CEPF PROJECT

The project consists of 3 major components: 1) Data entry and management for specimen data (entering data resulting from specimens collected during fieldwork in Tanzania; 2) Physically identifying, sorting and labeling specimens 3) Entering data from non-specimen sources ("data mining" of historical records such as field notes, older writings, etc)[32].

SPECIMEN DATA ENTRY



NON-SPECIMEN DATA ENTRY



Data sent in excel to partners, WCST-Birdlife for inclusion in broader database

CEPF-problems encountered (human)

- One staff member injured in automobile accident unable to return to teaching, hence Database manager was required to teach two courses completely new to him
- Another staff member also heavily loaded with teaching experienced some health problems reducing efficiency in entering data

CEPF-non-human problems

- Electric power cuts greatly affected ability of data enterers to function, both in office and at home
- Little feedback received from partners as to whether or not data format and content was suitable and/or useful

[30] A new Anura sp. has been recorded in Jozani FR.

[31] For example: 1. some EIA projects require that data is not made available before the approval of reports. 2. we are often given photographs which can aid in the identification process, but for some taxa physical specimens are necessary for identification purposes. 3. The identification of some taxa at the species level can be demanding, and this often delays the analysis of data for reporting purposes.

[32] Data mining for this project involves mainly information on birds from personal (i.e. belonging to KMH) note-books.

- Large amount of time spent attempting to meet reporting budget and progress on –line but have not been able to use on-line grant-writer software, only getting “file truncated” messages

CEPF

- Project very helpful in assisting support for handling of specimens, and data entry
- We have not been able to assess whether or not, or how, data entered have been used in the wider database, although it may be too soon to do so.

Discussion

I: There is need to train a member of staff in UDSM in data management for export of data through WCST to BirdLife.

Q: Are plants included in the UDSM database?

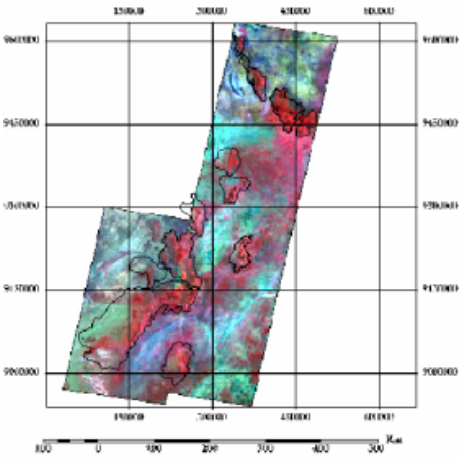
A: A separate plants database was started in 1994 through the Botany Department.

2.8 Presentation 7: Conservation and management of the Eastern Arc Mountain Forests: Forest Monitoring in the Eastern Arc Mountains and Coastal Forests through the Forestry and Beekeeping Division, Tanzania

Presented by: Neil Burgess, CMEAMF/FBD

Eastern Arc Mountains

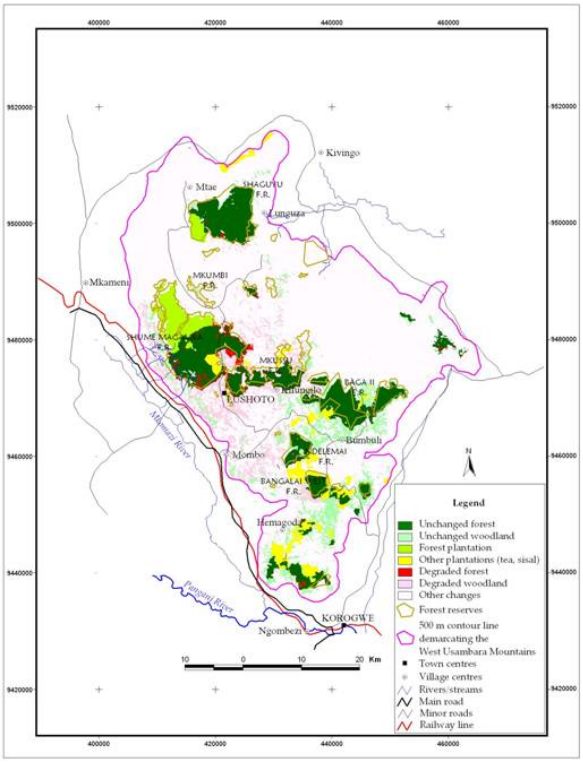
- Forest Area Assessment
- Protected Area Assessment
- Forest Condition assessment
- Forest threats assessment
- Forest biodiversity assessment



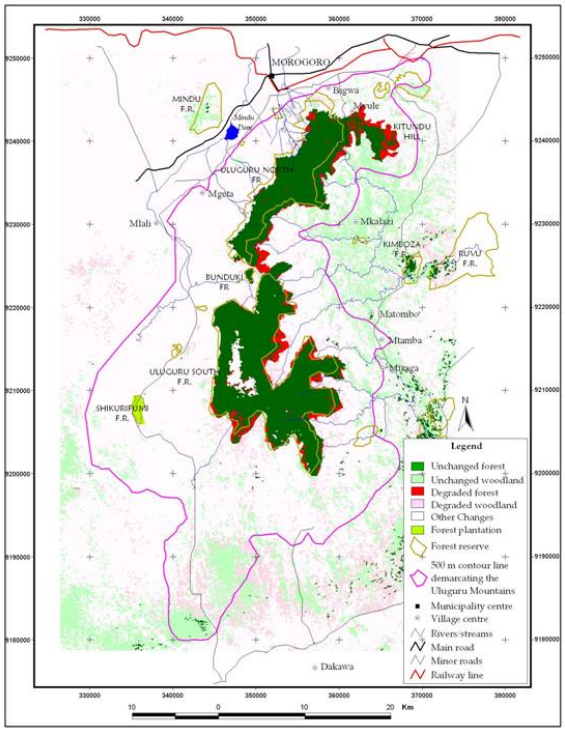
Forest Area

Mosaic of satellite images

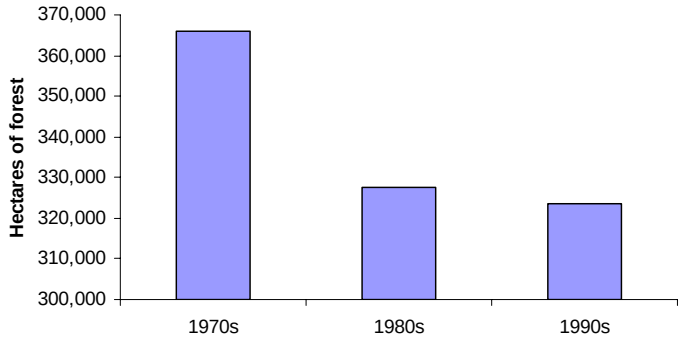
Forest area and forest loss



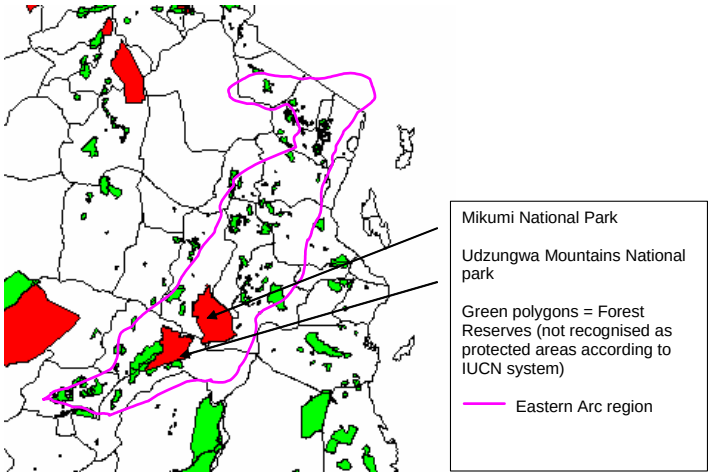
West Usambara Mountains: red areas are those where forest has been lost over time



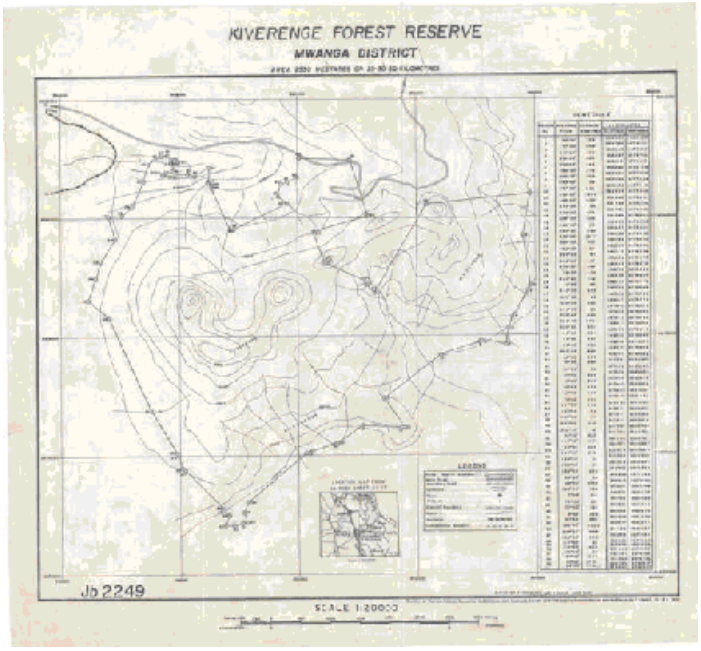
Uluguru Mountains: the red areas are where forest has been lost since 1975



Forest Loss Across the Eastern Arc: 1970s to 1990s/2000s

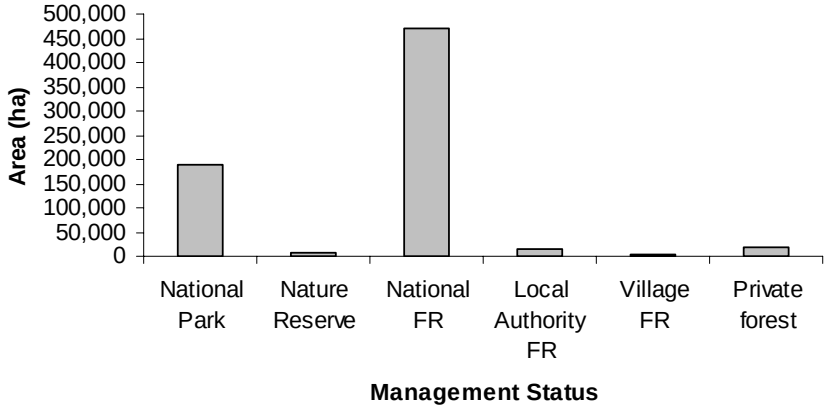


Reserve network



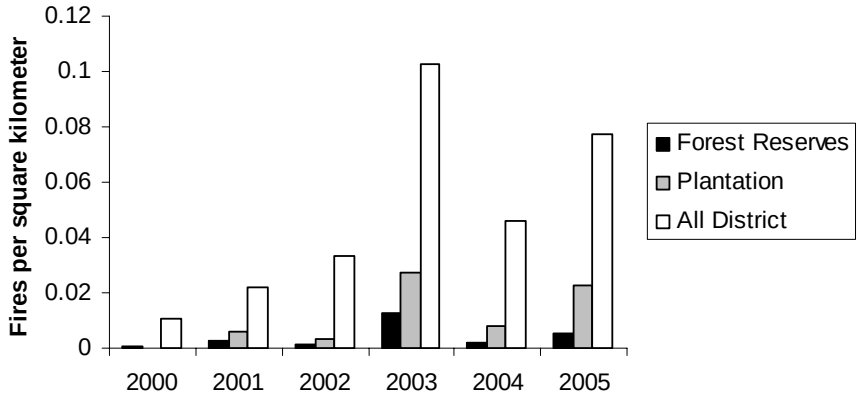
Boundary Map for the Kiverenge proposed FR, Mwanga District (more than 200 scanned from E Arc and CF sites)

Network of reserves across the Eastern Arc

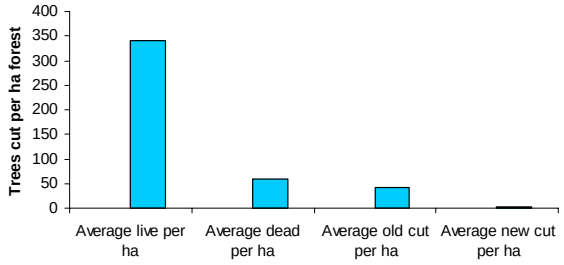


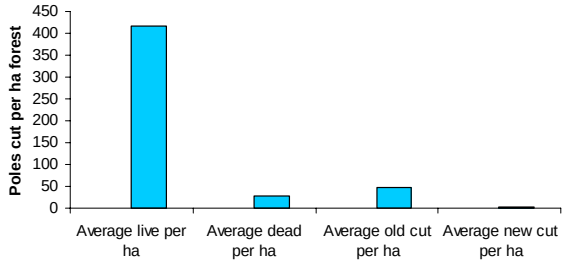
Forest Condition

Fires: using MODIS remote sensing data

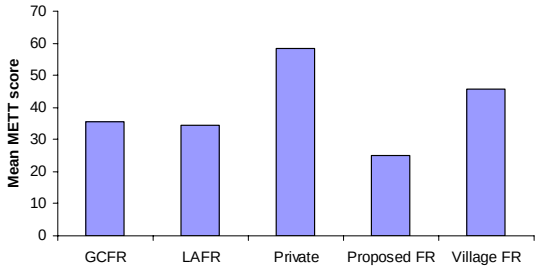


Tree and Pole Cutting across a sample of 26 forests



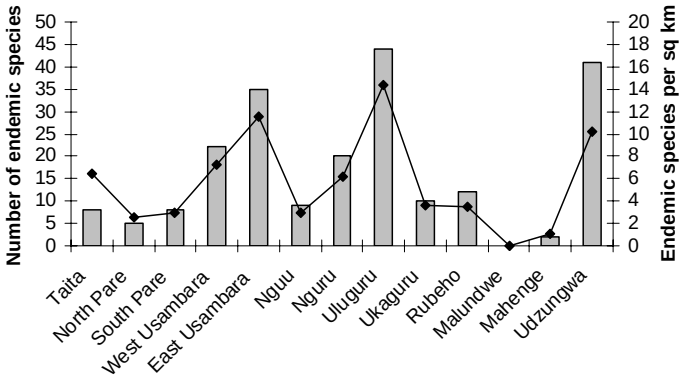


Forest Management Effectiveness (sample of 127 sites in the Eastern Arc)

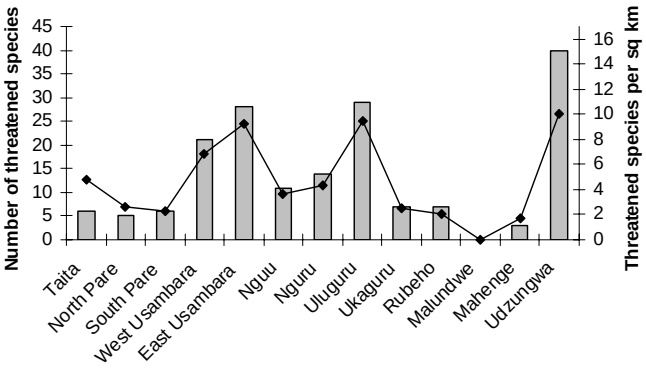


Biodiversity Values

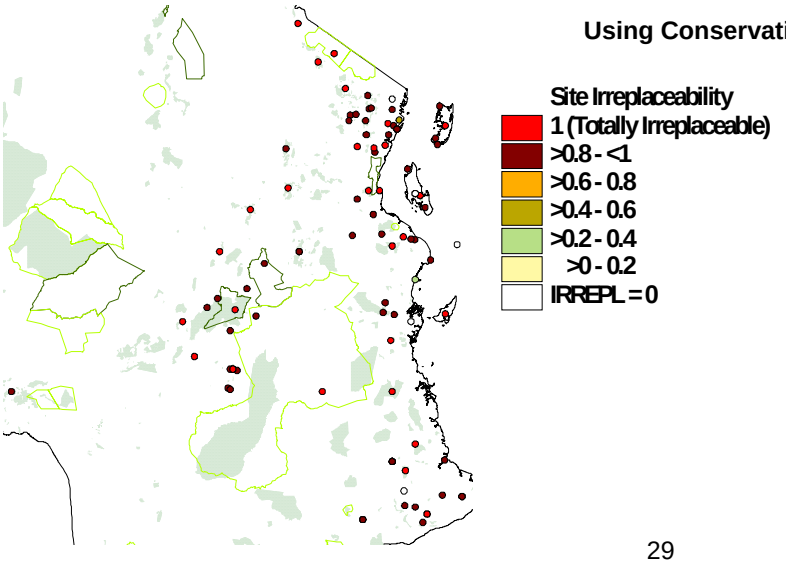
Eastern Arc Endemic Vertebrates



Eastern Arc threatened species



Using Conservation Planning Software to define key sites



2.9 Presentation 8: Forest health monitoring in the Eastern Arc Mountains and Coastal Forests

Presented by: Dr Seif Madoffe, Faculty of Forestry and Nature Conservation, Sokoine University of Agriculture and James Mwang'ombe, East Africa Wild Life Society

Partners: USDA Forest Service/West Chester University of Pennsylvania / FBD, Tanzania

History of Forest Health Monitoring

- Implemented in USA in 1990 – in response to a need for more information on forest health and acid rain[33]
- Morogoro Meeting in 1997 - Outcomes[34]
- TZ/KN/USDA Forest Service Team Formed
- Funded in 1998 - 2002
- Landsat image analysis – 1999 (Imagery in KN and TZ)
- Eastern arc Web site – 1999-2001 (Transition to TZ in 2005) http://www.easternarc.or.tz/ea.htm
- FHM plots established in the Taita Hills, East Usambaras, Ulugurus and Zanzibar – 2000-2002
- Training of foresters on FHM techniques and technologies – 2001-2002

FHM Plots

2000 – Initial Plot Establishment
2001 – Training, Certification, Plot Establishment Completed
2002 – Data Management, Analysis
2003 – Report Completed-see Downloads-Eastern Arc Mountains-General http://www.easternarc.or.tz/dl.htm

Objective – FHM Plots

- Baseline Plots – What is there in terms of species, condition, factors for changes etc
- Establish a network of experts/stakeholders and website
- Train & Certify 15 Crew Members (9 Kenyans and 6 Tanzanian)
- Plan for 5-year Re-measure Cycle of installed permanent plots, to detect change over time – that's why we are here!

Location of study areas

Baseline Plots
46 plots Established

- Taita Hills – 17 plots in Ngangao and Chawia forests
- E. Usambaras – 20 plots in Amani Nature Preserve
- Ulugurus – 6 plots in Teachers College Riverine and Kimboza forests
- Zanzibar – 3 plots in Jozani forest

Methods – plot setup[35]

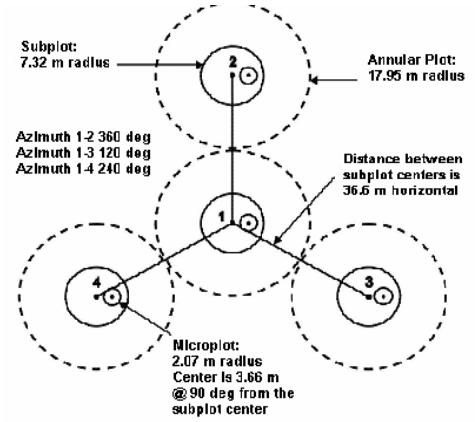
[33] Forest Health Monitoring Program started in the USA in 1990 in response to a need to have more information on the health of the forests (in addition to the historical standard measurements such as species and volume). The issue at that time was the effects of Acid Rain on forests.

[33] 1997 Eastern Arc Meeting in Morogoro – monitoring was identified as an important need so a team was formed (the lead scientist in Kenya was Dr Joe Mwangi (deceased). Funding was obtained from USDA Forest Service and USAID

[35] The plot design is a cluster of 4 subplots. The center subplot is subplot 1, and subplots 2,3,4 radiate from subplot 1 at azimuths of 360, 120, and 240 degrees, respectively.

The field plot consists of four subplots approximately 0.017 ha in size with a radius of 7.32 m. The center subplot is subplot 1. Subplots 2, 3, and 4 are located 36.6 m horizontal at azimuths of 360, 120, and 240 degrees, respectively, from the center of subplot 1 (see Figure 1). In the subplots, data are collected on trees with a diameter at breast height (DBH) of 12.7 cm or greater.

Each subplot contains a microplot of approximately 0.0013 ha in size with a radius of 2.07 m. The center of the microplot is offset 90 degrees and 3.66 m horizontal from each subplot center. Microplots are used to select and collect data on saplings (DBH of 2.54 cm to less than 12.7) and seedlings (DBH less than 2.54 cm in diameter and greater than 15 cm in length [conifers] or greater than 30 cm in length [hardwoods]).



Methods

Forest Health Indicators

- Mensuration- summarizes forest condition –growth, reg, etc
- Visual Crown Ratings – condition of crown
- Damage – human or natural – limited to 2 most severe, stem and crown

Mensuration[36]

- Growth- dbh, height
- Regeneration – no of seedlings
- Mortality no of dying trees and saplings

Visual Crown Rating[37]

- Live Crown Ratio- live crown to total ht
- Crown Density
- Crown Dieback
- Foliage Transparency
- Sapling Vigor – amount/condition of live crown

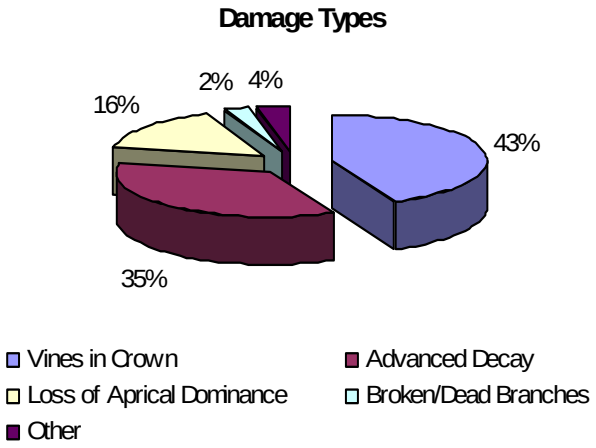
Tree Damage[38]

[36] Mensuration is the measurement of tree and sampling to summarize forest conditions. The mensuration indicator is an important descriptor of the forest condition in regard to growth, regeneration, and mortality. Detailed measures of each tree, such as its position on the plot relative to plot center, species identification, DBH, tree height, and relative crown position within the forest canopy were recorded for all trees and saplings on the subplots and microplots, respectively. Microplot seedling numbers were tallied by species.

[37] One of the primary indicators of tree health is the condition of the tree crown. The crown indicator takes into account the amount, condition, and distribution of tree foliage, branches, and reproductive structures, and quantitatively describes the visual appearance of the tree crown. All live trees with 12.7 cm DBH or greater are assessed for live crown ratio, crown density, crown dieback, and foliage transparency. All crown measurements are recorded in 5 percent unit classes, from 0 to 100 percent. Anderson *et al.* (1992) used the following ratings guidelines to determine the health of trees in US forests.
Live Crown Ratio is defined as the proportion of the live tree crown in relation to the total height of the tree. Pruning studies have shown that removal of live branches up to two thirds of tree height will not adversely affect tree growth. Thus, trees with a live crown ratio of at least 35% are considered to be in good health.
Crown Density is the amount of crown foliage, branches, and reproductive structures that block visible light. It is used to assess the expected growth in the near future. Generally, greater density means a healthier tree.
Crown Dieback is the recent mortality of branches with fine twigs, which begins at the outer, upper portions of the tree crown and proceeds toward the tree trunk. Most trees have at least a few dead twigs due to normal environmental stressors. Trees with 5% dieback or less are considered to be in good health.
Foliage Transparency is the amount of light that is visible through the live, normally foliated portion of the crown. "Normal" foliage transparency ratings are relative and vary somewhat between species. Some tree species will exhibit a higher foliage transparency due to their inherent leaf design and branch structure. Without more information on the relative foliage transparency between species, it is generally accepted that trees in good health have a transparency rating of 45% or less.
For saplings with DBH at least 2.54 cm and less than 12.7 cm, the relative health is assessed by crown vigor. Crown vigor is divided into three classes: high, moderate, and low vigor. Sapling vigor class is determined through the combined measures of live crown ratio, percent of normal foliage, and dieback. Ratings in the moderate and high categories indicate more foliage area available for photosynthesis.

- Location – stem, crown
- Type – canker, decay, broken tops, vines
- Severity – acuteness, class

Trees>12.7cm DBH Spp distribution

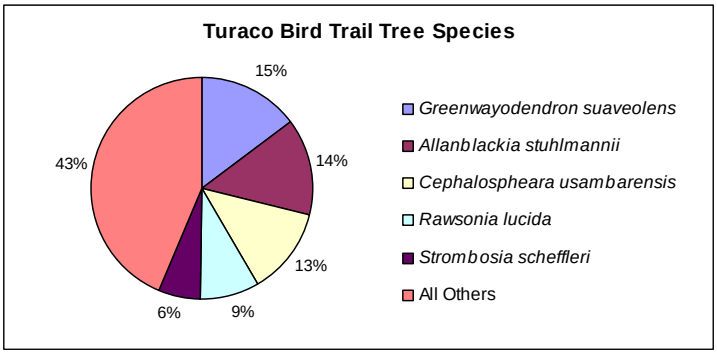


[38] The tree damage indicator assesses the location, type, and severity of natural- and human-caused injury on trees with at least 12.7 cm DBH. Up to two damages are recorded per tree, and only those that are most significant are recorded when multiple damages occur on one tree. Generally, damages that occur in the lower parts of the tree are more significant, so damage location assessment begins at the roots and proceeds up the tree bole to the branch shoots. Damage type describes the form of the injury, and is also recorded in a hierarchal manner when two damages occur in the same location. Damage severity describes the acuteness of the damage, and provides a threshold at which a particular damage should be recorded. In cases of particularly threatening damage types, no threshold is required and the damage is noted (e.g., conks). The objective of the prioritized listing of damage type, location, and severity threshold is to limit the damage recordings to only those stressors that may severely impact the tree health. In this way, small imperfections that do little to affect tree health, such as small wounds on the bole or dead branches below the live crown are not recorded as damage.
The following lists the damages from most to least significant, and the severity threshold for each type:

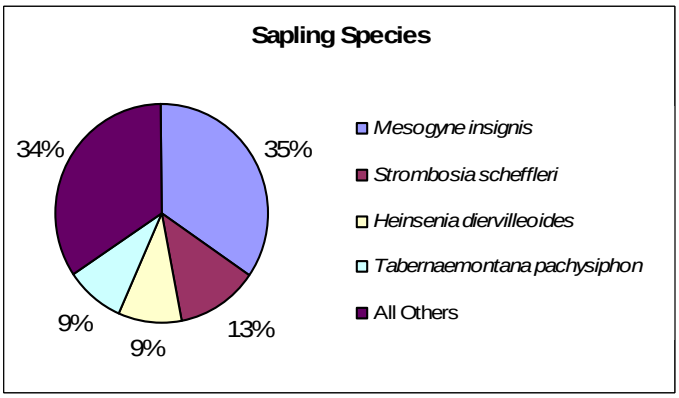
Damage Type - Severity
Canker, Gall 20% of bole circumference
Conks, fruiting bodies, and advanced decay no threshold, all occurrences recorded
Open wounds 20% of bole circumference
Resinosis or gummosis 20% of bole circumference
Cracks and seams 1.5 m in length
Broken bole or roots less than 1 m from the bole - no threshold, all occurrences recorded
Brooms on roots or bole - no threshold, all occurrences recorded
Broken or dead roots beyond 1 m from the bole - 20% of bole circumference
Vines in the crown - 20% of live crown area
Loss of apical dominance, dead terminal - no threshold, all occurrences recorded
Broken or dead branches - 20% of branches within the live crown
Excessive branching or brooms within the live crown - 20% of branches within the live crown
Damaged buds, foliage or shoots - 30% of buds
Discoloration of foliage - 30% of foliage
Other damages not described above - no threshold

What we call serious damage is often part of the ecological-aging processes in these natural forests. However, if advanced decay is very serious and affects large trees, it raises concerns regarding the sustainability of these forests.

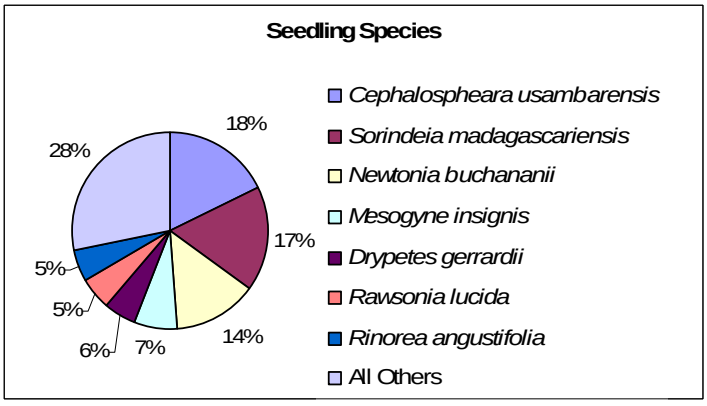
Trees > 12.7 cm DBH [39]



Saplings DBH >2.54 <12.7cm40



Seedlings <2.54 cm DBH, >0.3m height41



[39] Example of reporting and looking at the data - damage types for trees: no damage was observed on 82 trees, while 51 had one damage and 16 had two damages. Of the 83 damages noted, the most common damages were vines in crown, advanced decay, and loss of apical dominance.

[40] There were 32 saplings and 13 species measured in Turaco Bird Trail Forest. Of those, 66% were species *Mesogyne insignis* Engl., *S. scheffleri*, *Heinsenia diervilleoides* K. Schum., and *Tabernaemontana pachysiphon* Stapf. Ninety-four percent of the saplings had average to good vigor.

[41] There sere 392 seedlings and 38 species measured in Turaco Bird Trail. Of those, 61% were species *C. usambarensis*, *S. madagascariensis*, *N. buchananii*, *M. insignis*, *D. gerrardii*, *R. lucida*, and *Rinorea angustifolia* (Thouars) Baill.

Plan for 5-year Remeasure Cycle

- CEPF Funding – 2005
- Field work begins Aug 2006

Other Funding sources

- USDA Forest Service
- West Chester University of Pennsylvania
- Philadelphia Zoo
- Alabama Wire

Objective[42]

Develop recommendations for the management and conservation of forest ecosystems in the Eastern Arc Mountains and coastal forests.

Methods[43]

August - September 2006
Ulugurus
East Usambaras
Taita Hills
Same Variables
Change Analysis
New Report
Data Sharing- make it available and share with others

Lessons Learned[44]

- Forests are Different!
- Visual Crown Estimates - difficult and may not be repeatable
- Damage – what is significant?- eg case of native vines
- Plots are Expensive
- Good Botanist is Essential

Cooperators

- Forest & Beekeeping
- Kenya Forest Service

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[42] The objective can be achieved through the analysis of tree and forest health data. Understanding the trends in mortality, growth, and damages of tree species will improve management recommendations made for these forests. Any significant negative trends detected will identify more intensive studies to determine cause and effect relationships. Positive trends will indicate that current protection/management guidelines are working, while negative trends will call for modification in current guidelines.

[43] The CEPF project will be carried out in September 2006 in these areas. We will re-locate the established plots and use the same protocols as were used in 2000 and 2001 (FHM indicators – mensuration, visual crown ratings, damage). Data will be compiled into a database and analyzed. We will make the data available and contribute towards a standardized sustainable biodiversity monitoring database as directed by BirdLife International.
Contribution to Red Listing process in partnership with Missouri Botanical Garden and IUCN SSC.
Publication on forest health trends and management implications.
Dissemination of these data and conclusions to relevant audiences.

[44] We have already learned from the first phase of the project that it is not a simple matter to take a monitoring system from one country (US), and apply it to the forests of another. Some examples of this are the forest type, physiographic class (e.g. in USA there are no buttress trees), stand age, disturbance, and treatment codes. The codes used for the US measures did not always translate neatly into East African conditions.
We realized that the visual crown ratings were more difficult in the Eastern Arc forests, because the crowns are not easily viewed (dense and tall canopy; visibility often obstructed by vines and lianas). In the upcoming remeasure, we will assess how repeatable and reliable this measure is for these forests.
Assessing damage data is difficult – vines in crown and decay were the most frequent – but how significant is that for these forests? Unless there are introduced invasive vines or plant pathogens we would say these are just part of the ecosystem. Removing them could cause other problems. Forest fragmentation could enhance their impacts.
Plots are expensive to install and maintain – in addition to travel, plot work involves training and certification to insure the quality of the data. We will also find out how hard it is to re-locate the established plots – plot markings (stakes in the ground, tags on witness trees, and DBH marks) may have disappeared in the interim.
A good botanist is a must for species identification – we relied heavily on their expertise (this also increases the cost of the plots).

Discussion

Q: How do you decide the location of the plot? Did you take into account altitudinal stratification when locating your plots?

A: First we established a zonation of a selected area, identifying healthy, disturbed and very disturbed habitats within it. Then we establish natural or artificial trails and we walk a reasonable distance e.g. 200m from such trails in a direction perpendicular to the trail. The starting point on the trail is chosen randomly. Altitudinal stratification was not considered in the zonation, only disturbance is used. Altitude was however imbedded within the zones.

Q: You mentioned that acid rain was the main issue when this method was developed in the USA. What has been found about this form of disturbance in Tanzania and Kenya?

A: Acid rain was the initial stimulus for the development of this method. However, in Tanzania and Kenya acid rain has not been recorded as a problem instead, human disturbance has more impact. Vines are also a major form of disturbance because they can strangle trees or obstruct sunlight. Insects were not found to have a very high impact on trees.

Q: Is there any plan to intervene to extirpate the vines?

A: There are various possible forms of intervention: they can be chopped down or use ecological tools of extirpation. One has to be careful because some of these vines are associates of some trees/species. At the moment we have a starting point for future intervention, because after repetition of data collection data is now sufficient to conduct statistical analysis.

Q: Have you ever thought of using the system developed in Helsinki to evaluate the health of the forest?

A No, but we are sharing data with the University of Helsinki.

Q: Have you recorded the presence of any pests or invasive species?

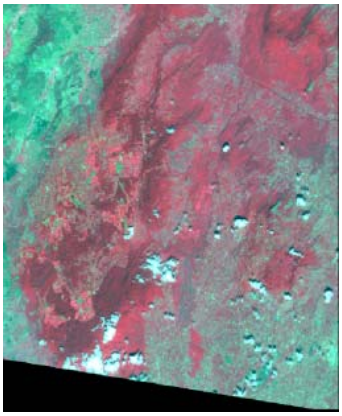
A: The only pest species recorded are the first colonizers of a cleared area. There are also some invasive exotic species including *Lantana camara*, *Maesopsis eminii* and *Cedrela mexicana*.

2.10 Presentation 9: Satellite analysis of within-forest heterogeneity: ecological change in the East Usambaras

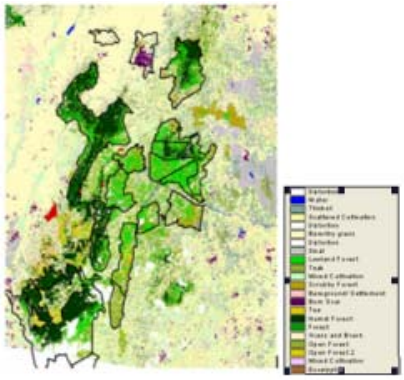
Presented by: Jaclyn Hall, University of Florida

Dissertation Committee
Jane Southworth – Remote Sensing and Land Cover Change – Chair
Mike Binford - - Landscape Ecology and Remote Sensing
Tim Fik – Statistics
Walter Judd – Botany
Tom Gillespie – Biogeography – Tropical Ecology, Geography UCLA, Tanzania's Mountains

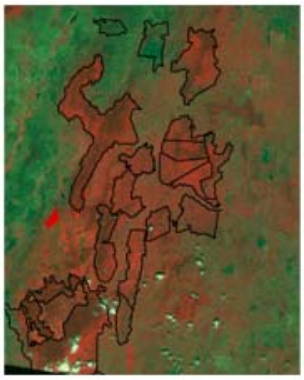
East Usambaras [45] [46]



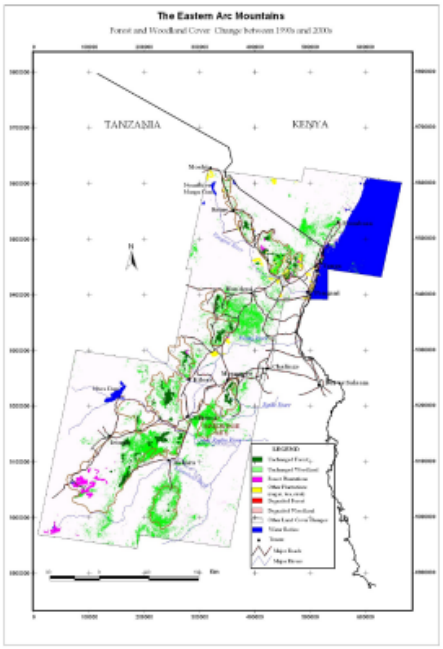
Land Cover



2000 SPOT[47]

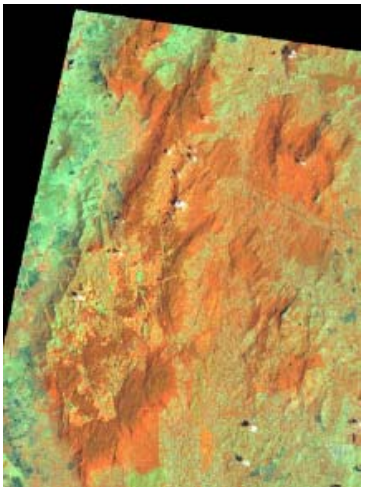


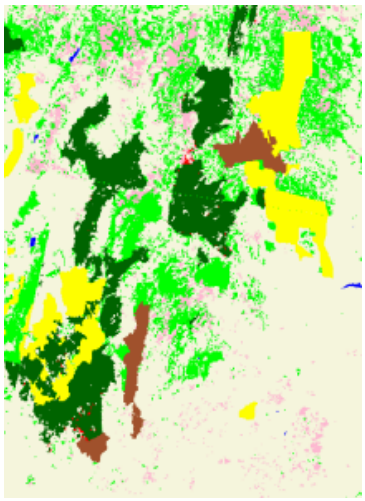
[45] General goal: how to use the information contained in satellite images to help aid in conservation. What at the ground level can be identified from the satellite image. The more specific goal of my research changed with time. It was initially the relationship between satellite imagery and biodiversity. However, it became evident that satellite images provide an indication of forest structure and cover rather than biodiversity. The researcher would like to develop a system that enables the study of a forest through satellite imagery without further need for field verification. In this way change could be monitored directly from satellite imagery.
[46] This research project explores the meso-scale level (the forest structure), which is the intermediate level between the species level (the tree) and the landscape level (the forest patches).
[47] What can be seen in each pixel (30x30m) is the light spectrum reflected by the tree species present within that pixel. The spectrum band varies with the structure of the canopy. The spectrum band is therefore an indication of how different tree species affects the canopy structure.



Land cover change ~1990-2000[48]

Red = forest loss





Yellow- Plantation
Brown- Plantation forest

Threats to the Eastern Arc Forests

Indirect

- Unclear forest boundaries and lack of resources
- Poverty
- Lack of participation by communities
- Increase of human population/development
- Poor farming methods / Shifting cultivation
- Lack of resources for forest management
- Poor relationship / communication / cooperation

[48] In the first map in this page the legend states that this is a map showing degraded forest. But this is a misuse, because the methods of analysis used to create this map were concerned with land cover conversion – or deforestation. This is why the third map on this page shows less disturbance and degradation than we know actually occurs in these forests: because in reality the map was created to show only complete deforestation. This points out that satellite maps can only help identify something if the right question is asked and the right analysis of images is carried out (Forest Cover change map commissioned by the Eastern Arc Conservation project, created at Sokoine University of Agriculture using methods from Conservation International).

- Unsustainable harvesting of medicines
- Lack of awareness of benefits of forests

Threats to the Eastern Arc Forests

Direct

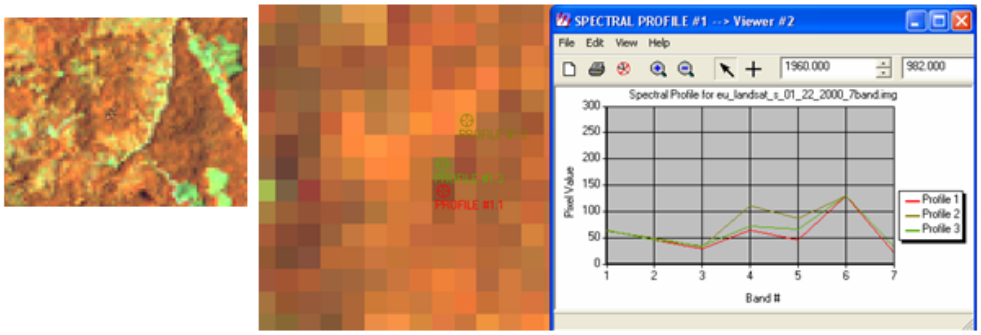
- Fire
- Mining
- Shifting cultivation/encroachment
- Illegal honey hunters
- Charcoal burning
- Uncontrolled logging
- Grazing
- Lack of law enforcement

Many of these degrade the forest, but only a few cause complete deforestation.

Method of analysis

- Ask the right questions!
- How much deforestation has occurred in the East Usambaras?
- What is the extent of forest degradation in the East Usambaras?
- Use the right method of analysis!

The disturbed forest



Overarching Research Question

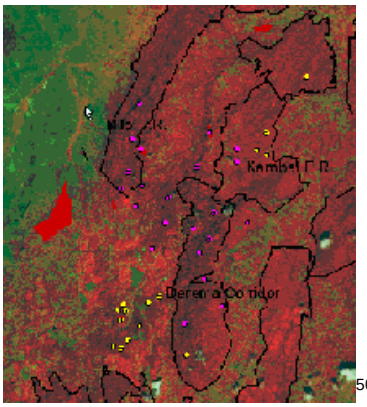
1. How has the forested landscape of the East Usambaras been altered over the past 30 years?

Research Questions

1. How has the forested landscape of the East Usambaras been altered over the past 30 years?
2. What is the relationship between spectral reflectance as measured by satellites and species level biophysical characteristics of a landscape?
3. Are biophysical characteristics of humid and semi-humid forests correlated more strongly with mid-infrared and thermal signals than to red and near-infrared signals?[49]
4. What is the relation between classes of species richness and landscape characteristics in the Eastern Arc Mountains of Tanzania?

[49] Ground-truthed data is needed to verify the inferred relationship between spectrum band and forest structure and levels of deforestation. In order to use field data for this purpose, good GPS data should always accompany such data.

Part 1- Floristic Surveys
Floristic Surveys



[50]

Data collected will include:
Richness categories:[51]

- Total richness – total number of species at each plot.
- Obligates – number of species obligate to forests.
- Endemic – number of species endemic to the EACF.
- Rarity - number of species rare in EU.
- Widespread – number of species widespread throughout East or Southern Africa.
- Disturbance categories:
  Selective logging category 1 – # of stumps > 30 cm dbh
  Selective logging category 2 – # of stumps >= 30 cm dbh
  Pole cutting category 1 – # of stumps < 30 cm dbh
  Pole cutting category 2 – # of stumps < 30 cm dbh
- Landscape metric categories:
  Forest patch size
  Concentric Isolation Measure
  Surrounding forest elevation
  Concentric anthropogenic measure
  Distance from patch edge
  Distance from closest settlement
  Distance from road

Topographical categories:
Elevation
Slope
Aspect
Latitude

Structural Categories:
Percent canopy coverage
Percent herbaceous ground cover
Number of stems
Basal area
Canopy height

Part 2 – Forest Parameter Index
What is the relationship between spectral reflectance as measured by satellites and species level biophysical characteristics of a landscape?

[50] Yellow=completed sites. Pink=sites that the researcher would like to study.
[51] Our thoughts about diversity can differ when looking at different richness categories

Methods

- Index development
- Logistic Regression
- For each forest parameter of interest
- Richness categories
- Canopy closure
- Basal area
- Stem density
- Ordination Axis

Analysis

- Correlation
- Principle Components Analysis
- Ordination
- Regression
- Polynomial
- Multiple
- Logistic
- Neural Networks
- Correlation Matrix52
- Determine which landscape features correlate with richness categories
- Reduction of redundancy
- Principle Components Analysis and ordination
- Determine how richness categories are associated with multiple landscape features
- Determine which combination of spectral bands are associated with each forest parameter

Model Development – Understanding the spectral signatures

- Series of PCA's
- Single band data
- SRTM DEM
- Slope
- Aspect
- Elevation
- Common indices
- NDVI, NDMI, TCAg, MIRI, and others
- Ordination – finding hidden patterns
- Logistic Regression - 75% of sites used for model development, 25% for testing
- Variables chosen from PCA
- Interactive terms
- Dummy Variables53
- 800m elevation, Nilo, South Eastern slope

Goal of Regression

- Intensity Map
- Probability response variable being high

PART 3- CHANGE DETECTION

2006	2000	1987	1975
ASTER	Landsat 7	Landsat 5	MSS

- Rerun regression for each sensor
- Standardize the range of index values across sensors
- Subtract images to identify change
- Examine degree and pattern of change with landscape variables

[52] With this method, highly correlated variables are eliminated, while the one with a higher correlation with the dependent variable is retained.
[53] These are important because elevation is a main determinant of forest type.

- Household level socio-economic surveys

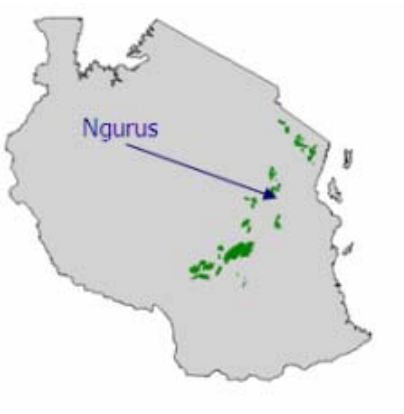
Dissertation will be a series of papers.
Paper I - Biodiversity, endemism, and conservation implications in the secondary forests of East Usambaras.
Journal of East African Natural History

Paper II - Spectral signatures of biophysical characteristics of humid forests.
Ecological Applications or Journal of Photogrammetric Engineering and Remote Sensing

Paper III - Within-class change detection: shade crop expansion in humid forests.
International Journal of Remote Sensing

Paper IV - Within-class change: a neglected piece of the carbon puzzle
Global Change Biology

Results Testing – the Ngurus.



Lessons learned

This research
- Neighboring patches of forest regrowth have different compositions
- Land cover classifications and change trajectories should NOT be conducted without adequate ground truthing
- Different ecosystems should not be analyzed together

General
- All data – GPS'ed All data collected, social or biological, should be spatially explicit
- Quality GPS's

Acknowledgements
Fulbright – Data collection and results testing
CEPF – Data collection
NSF Working Forests in the Tropics – Preliminary data collection
Tanzanian Forest Conservation Group – Logistical Support

2.11 Presentation 10: Mtwara Coastal Forests Reconnaissance Project and Biodiversity Research and Awareness in the lesser-known Eastern Arc Mountains (BREAM)

Presented by: Giulia Wegner and Nisha Owen, Frontier-Tanzania

Frontier-Tanzania

- A collaboration between the University of Dar es Salaam & the Society for Environmental Exploration
- Established in 1989
- To advance field research into environmental issues, and implement practical projects contributing to the conservation of natural resources
- Forest, savannah & marine research projects
- Eastern Arc & Coastal Forests: East Usambaras, Udzungwas, Mahenge, Ulugurus, Mpanga / Kipengere, Coast, Lindi, Tanga, Chumbe Island-Zanzibar and Mtwara regions
- BREAM: partnership with WWF – TPO & Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism in conjunction with F. Rovero & M. Menegon of the Museo Tridentino di Scienze Naturali, Trento, italy and A. Perkin of the Nocturnal Primate Research Group, Oxford Brookes University, UK.

MTWARA COASTAL FORESTS PROJECT (April-December 2005)

LOCATION

Forest reserve	District	Management	Protection	Size (ha)
Mtiniko	Mtwara Rural	Central government	Proposed	1,736
Mtuli Hinju	Mtwara Rural	Central government	Proposed	296.0
Kambona	Masasi	Central government	Gazetted	29.9
Ndechela	Masasi	Central government	Gazetted	6,216
Makonde Scarp I	Masasi	Central government	Proposed	1,748.3
Makonde Scarp II	Newala	Central government	Proposed	1,554
Mkunya River	Newala	Central government	Proposed	4,797.3
Makonde Scarp III	Tandahimba	Central government	Proposed	1,434.7

AIMS AND OBJECTIVES

- Biodiversity survey in the lesser known Coastal Forests;
- Compilation of indigenous knowledge;
- Prioritisation and management recommendations for conservation;
- Raise local awareness through a Layman's Report in Kiswahili;
- Raise national and international awareness by contributing data to the CEPF Conservation Outcomes, TROPICOS (MBG) and UDSM Biodiversity databases, and by sharing information with GOs and NGOs.

VEGETATION TYPES

Coastal Forest Mosaic:

- Forest types and species unique to the Swahilian regional centre of endemism, along with woodland, thicket, grassland and farmland.

Main forest types

- Brachystegia forest
- Legume-dominated dry forest
- Mixed not legume-dominated dry forest
- Mixed scrub forest
- Riverine forest

DISTURBANCE

- The reserves have been extensively exploited.
- Agriculture is the most destructive use.
- Timber extraction is intensive, with cutting for poles being above the upper value of 16% reported from other Coastal Forest regions.

ENDEMISM – FAUNA and FLORA

- Endemic species found

Cynometra gillmanii	E, CR
Gardenia transvenulosa	E, VU
Vitex zanzabarensis	E, VU
Reichenow's batis (Batis reichenowi)	E
Mertensophryne micranotis	E
Silver striped charaxes (*Charaxes lasti lasti*)	E
East coast akalat (*Sheppardia gunningi*)	NE, VU
Spotted flat lizard (*Platysaurus maculatus*)	NE
Lesser pouched rat (*Beamys hindei*)	NE
Small-eared galago (*Otolemur garnettii*)	NE

Only 12% of the flora recorded is endemic to the Swahilian region sensu lato, against 33% in other regions.

Less than 2% of the fauna is endemic or near endemic to the Coastal Forests, against 26% in other regions.

RANGE EXTENSIONS

Grey-crested helmet-shrike (*Prionops poliolophus*)	Both species were previously recorded in restricted areas of Kenya and northern Tanzania
Red-headed bluebill (*Spermophaga ruficapilla*)	
Savanna vine snake (*Thelotornis capensis oatesi*)	Previously recorded at Mbala, Zambia.

CONSERVATION VALUE OF MTWARA COASTAL FORESTS

- Modest biological importance within the EACF hotspot;
- Extremely important to local inhabitants;
- Forest along the Makonde escarpment protects from soil erosion, floods and landslides;
- Rivers and springs provide a water supply to the towns of Newala and Mahuta and a range of villages;
- 92% of the population of the Mtwara Region live in rural areas and depends on the long-term availability of forest resources and services;
- Efforts should be made to restore and increase connectivity among as many fragmented forest patches as possible (e.g. by combining Ndechela FR and the contiguous Lukwika-Lumesule GameReserve, and the whole of the Makonde Scarp into one reserve).

LESSONS LEARNT

- The objectives of a biodiversity survey need to be pre-defined with precision;

- Intensive and systematic surveys in areas of low biodiversity value may dissipate scarce resources. On the other hand;
- Insufficient data collection may limit the use of the data as a baseline for future monitoring;
- Gazettement of reserves and enforcement of law alone may not be sufficient to achieve conservation, but they constitute the first necessary step toward it.

BREAM PROJECT

- Globally recognised for rich biodiversity and endemic species but highly endangered

- Mahenge (Sali, Mselezi), South Ngurus (Kanga, Nguru South), Ukagurus (Mamboto, Ikwamba, Mamiwa Kisara North & South), Rubehos (Pala Ulanga)

AIM

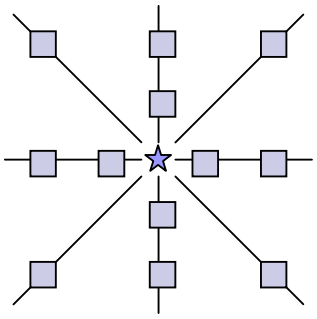
- Knowledge of the biodiversity of a number of catchment forest reserves in the Morogoro Region is increased through systematic and intensive biodiversity surveys and human resource-use assessments; and preserved through increased environmental awareness within communities in proximity to the reserves in the study area. Sensitisation to the regulations pertaining to catchment forest reserves combined with income generation initiatives will assist in the prevention of further degradation of biodiversity within the selected areas of the hotspot.

OBJECTIVES

- Rapid biodiversity surveys of flora & fauna: mammals, butterflies, herpetofauna, birds, plants
- Human resource use assessment & forest disturbance surveys
- Community days & environmental education activities, document indigenous knowledge & forest awareness, record issues of concern to local peoples
- Training of forest officers in systematic survey methodologies & species identification.
- Collate & disseminate baseline biodiversity & forest disturbance information through the production of reports
- Capacity building & initiation of sustainable community forest projects in conjunction with WWF-TPO

METHODOLOGIES

- Systematic & easily replicated
- Regularly used in the Eastern Arc Mountains
- Compiled into standardised work unit (2km x 2km grid), replicated throughout FR
- 1 zoological site
- 3 zoosite vegetation & regeneration plots
- 12 standard vegetation & regeneration plots
- 4 disturbance transects
- 4 large mammal transects



FAUNA

mammals

- sherman traps
- bat mist netting
- direct & indirect diurnal transects
- nocturnal transects
- acoustic recordings
- camera-traps
- opportunistic live-trapping

birds

- mist netting
- randomised walks

herpetofauna

- bucket pitfalls & drift fences
- visual encounter survey quadrats & transects
- acoustic recordings

butterflies

- canopy traps
- sweep netting
- opportunistic observations & collections

FLORA

vegetation plots

- trees >10cm dbh
- standard
- zoosite

regeneration plots

- grasses, forbs, mosses/lichens, ferns, trees < 10cm dbh
- standard
- zoosite

opportunistic observations & collections

HUMAN RESOURCE-USE

disturbance transects

- pole & timber extraction
- location & nature of other disturbance
- cultivation, pit-sawing, burning, hunting, mining, paths & settlements

opportunistic observations

COMMUNITY DAYS

- structured interviews
- environmental education
- games
- presentation
- community pack
- discussion
- Swahili report

MAHENGE MOUNTAINS

Sali & Mselezi FRs

increased knowledge of biodiversity of the Mahenge mtns (compiled on preliminary taxonomic identifications and therefore subject to change).

- 339 faunal species in 81 families
- 238 vertebrate species in 75 families: 47 mammals, 131 birds, 29 amphibians, 31 reptiles; & 101 butterfly species in 6 families
- 22 (9.2%) threatened species & 49 (20.6%) strictly forest-dependent
- 210 floral species
- 163 trees, 20 herbaceous, 12 shrubs, 10 grasses, 5 lianas

ENDEMICS	VERTEBRATES			FLORA
	Mahenge Mtn endemics	Eastern Arc endemics	Near endemics	Eastern Arc & Near endemics
Previous Records	0	2	8	5
BREAM survey	6 (6)	8 (6)	17 (9)	12 (10)
New Total % of species	6 2.5%	8 3.4%	19 7.1%	15 7.1%

MAHENGE

Eight potential new species

- Nectophrynoides sp. 1 & 2
- Callulina
- Probreviceps
- Hoplophryne
- Afrixalus
- Hyperolius
- Cnemapsis

New vocalisations of hyrax
(*D. validus* or potential new variant)

Range extensions & new records

- Usambara eagle owl Bubo vosseleri
- cf. Lycodonomorphus whytei
- cf. Xyelodentophis uluguruensis
- Afrixalus uluguruensis
- Probreviceps rungwensis
- Bicyclus danckelmani
- (Thymeleaceae) Peddiea lanceolata
- (Euphorbiaceae) Sibangea pleioneura

Human resource-use & community concerns

- illegal logging, hunting & burning, shamba clearance
- low levels of knowledge concerning FR & benefits of conservation
- lack of support & resources to the community, inability to contribute to Participatory Forest Management scheme

Management priorities

- boundary demarcation
- management plans & budget
- personnel & law enforcement
- provision of alternative resources for sustainable use
- environmental education & awareness raising
- support to Village Environmental Committee

SOUTH NGURU MOUNTAINS

Kanga FR surveys completed

Faunal highlights

- Lowe's servaline genet *G. servalina lowei*
- leopard *P. pardus*
- fossorial skinks
- *Rhampholeon sp. nov*

Disturbance

- discovered 162 planks & active pit-sawing sites at Dafinga, Kwabeko & in the north of the FR
- hunting

Nguru South FR ongoing

Faunal highlights

- high diversity of Nectophrynoides & Callulina
- endemics: Mrs Moreau's warbler B. winifredae, Werneri's chameleon C. werneri

Disturbance

- discovered ~1600 planks at Maskati, led to FBD setting example
- active pit-sawing sites at Mhonda
- cultivation including marijuana, hunting, burning, gold mining

LESSONS LEARNED

- logistical requirements
- mobile expedition
- large forest reserves
- range of methods

- development of relationship with FBD
- sharing information on illegal activities

- community work expansion
- community packs
- Swahili short report

Discussion

Q: Have you linked and compared your findings with previous work?
A: Yes. For example Frontier conducted previous work in the Mahenge Scarp, Nambiga and Newenge. The results from these surveys have been compared with the ones from this current study. Some species that were found the first time round were not re-recorded, including one bird, two trees and one caecilian.

Q: How confident are you in the species identifications?
A: Small mammal, herpetofauna, bat, butterfly and plant specimens are sent to taxonomists in-country. Specimens are also sent to international authorities when further identification is needed (e.g. plants are sent to Missouri Botanical gardens). Bird identifications are carried out by a contracted ornithologist. When necessary skins and blood specimens are collected and sent to relevant authorities abroad.
The identifications presented in this presentation are provisional. We are awaiting final verifications from taxonomists.

Q: Reports are useful, but publications in peer reviewed journals are more effective for sharing knowledge and findings. Do you have plans to publish your results in the scientific literature?
A: Yes we have plans to publish our results on the scientific literature.

Q: How do you ensure that the results from your research projects are utilised to promote practical conservation efforts?
A: The Swahili Layman Report we produced and distributed was very well received by district officers and community groups, and this indicates the importance of feeding biological knowledge back into the communities. The district officers and communities also expressed a desire to see some government and non-government conservation interventions in the areas studied. Donors and conservation groups should start thinking about what action should be taken after the completion of these research projects.

2.12 Presentation 11: An overview of the butterfly faunas of the Eastern Arc Mountain and Coastal Forests: biodiversity, endemism and conservation.

Presented by: Steve Collins, African Butterfly Research Institute

History: Established 1997, founded on the Collins collection, to which was added the Kielland collection in 1996 (*Butterflies of Tanzania*). With more recent additions the whole exceeds 1 million specimens of sub-Saharan butterflies. It is a recognised world base reference collection of African butterflies, and has been used in the preparation of a number of monographs on Afrotropical butterflies, including the *Butterflies of Tanzania* (*Supplement*), Congdon and Collins 1998.

Mission Statement: The African Butterfly Research Institute will continue to expand its position as a centre of excellence, using butterflies to promote our understanding of biodiversity, biogeography and conservation issues by using butterflies as a flagship group for the invertebrates.

Who are we? The Project Leader, **Steve Collins**, is a Kenya citizen who has collected butterflies all his life. The Principal Researchers, **Colin Congdon** and **Ivan Bampton** (both British), have between them well over 100 years' experience of working in Africa, mainly East Africa. Both have been Research Associates of ABRI since its inception. Co-researches **Peter Walwanda** (Kenyan) and **Martin Hassan** (Tanzanian) have many years of field experience.

Project Theme
The provision of base-line data on distribution and habitat preferences of endemic butterflies.

Project Objectives
- Enable overview of zonal butterfly biodiversity
- Provide a baseline study of butterfly distributions
- Develop conservation priorities
- Compile annotated checklist of endemic/near endemic butterflies

And in order to achieve these objectives:
- Obtain comprehensive reference collections of butterflies for each locality, identify specimens, compile checklists.

Project Localities
Eastern Arc Mountains:
- Taita Hills
- Pare Mountains
- West Usambara
- East Usambara
- Nguru
- Uluguru
- Udzungwa

Northern Zanzibar-Inhambane Coastal Forest Mosaic:
- Arabuku-Sokoke
- Kimboza
- Pugu Hills
- Rondo Plateau/Lindi Coastal
- Jozani

Results
Two new species to science

Locality	Butterflies	Threatened	Site
Teita Hills K	248	6	1
Pare T	257	15	1
W Usambara T	306	43	8
E Usambara T	307	43	4

Locality	Butterflies	Threatened	Site
Nguru T	383	54	7
Uluguru T	349	40	6
Udzungwa T	540	75	9
Arabuko K	292	32	-
Kimboza T	224	27	1
Pugu Hills T	257	20	-
Rondo / Lindi T	278	22	5
Jozani Z	100	13	1
Zone	709	157	103

Methods
On site investigations, using

- Nets
- Traps
- Breeding from early stages
- Examination of the ABRI collection - (1m specimens)
- Records from the literature

Lessons learned

- For this kind of project, as far as possible use in-country research resources.
- This reduces establishment costs and takes advantage of local experience.
- Capacity Building Local Scientist
- Training TAWIRI Scientist in Butterfly Monitoring (KIHANSI GORGE (1 year) 115 species; We sent TZ ABRI Researcher 3W; added 70 species; 185 species)
- No replacement for field knowledge e.g. Kihansi (even with well trained personnel)
- Verification vouchers specimens – Frontier Tanzania working in Udzungwa
- Good linkage with Botanical Udzungwa Project on likelihood of species occurrence
- Report illegal activities such as woodcutting to Authorities : Additional surveillance

Finances

- Total cost of Project ca. (1 year) $ 40 000. Of this amount, half was provided by ABRI in the form of Counterpart Funding. Other half provided by CEPF.
- Total data entries on Spreadsheet 3 540
- Cost per entry: $ 11.30 or $5.65 (each for CEPF and ABRI)

We would suggest that CEPF evaluate the cost effectiveness of their investments on data gathering (?current monitoring)

Since the termination of this project 3/2006 ABRI has been analysing their data on Madagascan Butterflies and an internal photographic guide has been developed for all 324 species 15/06/06
- New species to science discovered

Publications
Currently working on a Field Guide Book to Living Butterflies of East Africa to fit in with Struik Series.
ABRI publishes either directly or in association - 1 Book per annum on African Butterflies
2005 Butterflies of West Africa
2005 Revision of Genus Ornipholidotos Lycaenidae
2005 Revision of Genus Telipna Lycaenidae

ABRI is willing to partner with other like minded organisations in carrying out Butterfly Analysis in the Afrotropical Region. We have worked in over 40 African countries

Discussion
Q: Why have you chosen to use butterflies as indicators of habitat change rather than other insect species?
A: Butterflies are an effective taxon for the study of biodiversity as they can be used to generalize results and findings to other taxa (e.g. Papillionidae spp. and large mammals) and are very effective for genetic studies.

2.13 Presentation 12: Filling the knowledge Gap: surveys of poorly known sites and species in the Eastern Arc Mountain and Coastal Forests

Presented by: Nike Doggart, Tanzania Forest Conservation Group

Partnership
Partnership project between the Tanzania Forest Conservation Group and the Museo Tridentino di Scienze Naturali.

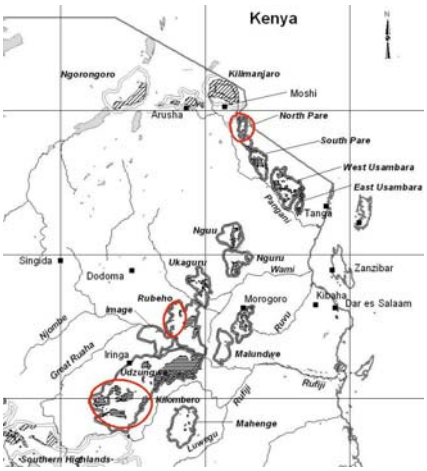
Team members
Andrew Perkin, TFCG / Oxford Brookes University.
Charles Leonard, Tanzania Forest Conservation Group
Francesco Rovero, Museo Tridentino di Scienze Naturali
Michele Menegon, Museo Tridentino di Scienze Naturali
Nike Doggart, Tanzania Forest Conservation Group

Project purpose

Protected area authorities, conservation organisations and other stakeholders within the EACF Hotspot are planning and implementing conservation activities using current, relevant and accurate information on the status of selected sites and species.

Output 1.

Vertebrate biodiversity and habitat condition is documented for selected forests in the North Pare, Udzungwa and Rubeho Mountains.



Output 2.

Field data on the status of sengi, galago, duiker, diurnal primate, hyrax and selected amphibian and reptile species gathered and contributing to redlist re-assessments by relevant IUCN-SSC specialist groups and hotspot monitoring processes.

Output 3.

The capacity of civil society organisation and protected area authorities to conserve and monitor the unique species and forests of the Eastern Arc and Coastal Forest hotspot is enhanced.

Methods[54]

Mammals

- Camera traps
- Bucket pitfalls
- Sherman, Chardonneret and Tomahawk traps
- Recording vocalisations (hyrax and galago)
- Indigenous knowledge interviews
- Transect walks (duiker and primates)

Reptiles and amphibians

- Bucket pitfalls
- Transect walks

[54] Alignment of research methods with Frontier-Tanzania in order to avoid duplication of effort and to enable standardisation. Indigenous knowledge was also utilised to collect biological information. Indigenous knowledge was sourced from an heterogeneous group of people (e.g. different genders, different ages, people who lived in ana area for a long time), in order to understand the patterns of knowledge in the area.

Birds

- Mist netting and observations

Forest condition

- Disturbance transects

Results Output 1: North Pares

- Recorded: 21 mammal, 11 reptile and 5 amphibian species.
- Two new species from the N. Pare (one Callulina, one Rhampholeon) await description.
- No records of either the Taita galago or the Mountain dwarf galago. Only small-eared galago recorded.
- No records of *Colobus angolensis* in the highlands but *Colobus guereza* present in the lowland Kileo Forest.
- No records of Lowe's servaline genet or Abbott's duiker.
- Generally lower diversity than other E. Arc Mountains. Could this reflect extreme volcanic events (from neighbouring Mt Kilimanjaro) and/or periods of low rainfall?

Results Output 1: Mufindi

- Recorded: 15 amphibians, 11 reptiles.
- Mammal and bird data still being collected.
- Iringa akalat present in tea estate forests.
- Possible new species of chameleon.
- Mountain dwarf galago present in Kigogo Forest Reserve.
- No records of Abbott's duiker or Lowe's servaline genet.
- High levels of disturbance and problems with invasive Rubus sp.

Results Output 2: Sengi

- Surveys completed in North Pare, Udzungwa (Mwanihana and Ndundulu) and Tanga Coastal Forests.
- Chair of IUCN Afrotheria SSC Specialist Group participated in surveys.
- Golden-rumped sengi not recorded from Tanga Coastal forests.

Results Output 2: Hyrax

- Surveys completed in North Pare, Ndundulu, Tanga Coastal Forests.
- No tree hyrax recorded from N. Pare or Tanga coastal forests.
- Tree hyrax recorded from only one village-managed forest in Mufindi that had lower levels of disturbance than other areas.

Results Output 2: Duikers

- Abbott's duiker common in Mwanihana. Not recorded in Mufindi or North Pare.
- No records of Ader's duiker in Tanga coastal forests.

Results Output 2: Galagos

- Surveys completed in North Pare, Mufindi, Ndundulu and Tanga Coastal Forests.
- No records of dwarf galagos in North Pare nor in several Mufindi forests.
- Cocos dwarf galago present in northern Tanga coastal forests.
- Small-eared galago present in North Pare Mountains but not recorded from Mufindi forests.

Results Output 3:

- Training provided to protected area staff in Mwanga, Mufindi, Pangani and Handeni.
- Training to TFCG staff in GIS and biodiversity survey methods.

Planned activities

- Report on North Pare forests completed and circulated in August 06.
- Report on Mufindi forests completed and circulated in September 06
- Presentations to stakeholders in Mufindi and North Pare in August 06.
- Surveys in Rubeho Mountains between September – December 06.
- Surveys in Coastal Forests (Lindi: Rondo F.R., Chitoa F.R., Litipo F.R., Ruawa F.R. and Ndmiba F.R.; Rufiji: Ngumburuni and Namakutwa) in 2007.

Lessons learned

- Defining the Eastern Arc. Some areas such as the North Pare have few 'Eastern Arc species'.55
- Forest reserve boundaries unclear in many areas.
- Indigenous knowledge provides valuable information, particularly in terms of historical records.
- Local species extinctions appear to be occurring in some Eastern Arc forests e.g. tree hyrax from several Mufindi forests.
- Information about the biological values of the forests is frequently absent with the protected area authorities and effort is needed to ensure that data is provided at village, district and central government level.
- Training needs to extend to how to use data as well as how to collect it.

Acknowledgements

- Financed by the Critical Ecosystem Partnership Fund
- Data collected by Andrew Perkin, Charles Leonard, Michele Menegon and Francesco Rovero
- Photographs by Michele Menegon, Andrew Perkin, David Ribble and Galen Rathbun
- Forest change maps provided by CMEAMF

[55] It is also important to gain further understanding of the geographical and biological relationship with the Southern Highlands and Coastal Forests. Further research is also needed to understand the disjointed patterns of occurrence of some species throughout the hotspot.

2.14 Presentation 13: TALK

Presented by: Nike Doggart, Tanzania Forest Conservation Group

TALK is about:

- Training
- Awareness
- Learning and
- Knowledge

Project purpose
The values of the Eastern Arc and Coastal forests of Kenya and Tanzania are brought to the attention of millions of people.

Started February 2006

Output 1

- Two television documentary programmes are broadcast on BBC World and on Tanzanian and Kenyan television stations and four radio programmes are broadcast on Kenyan and Tanzanian radio stations with information about the importance of the Eastern Arc and Coastal forests.
- Progress so far: initial filming started in East Usambaras in March. Filming to be finalised during July 2006. Broadcast November 2006 on BBC World as part of a series called 'Villages on the Frontline' as well as on Tanzanian and Kenyan stations.

Output 2

- A series of printed materials with information about the Eastern Arc and coastal forests are distributed to primary schools, nature clubs, village environmental committees and other stakeholders.
- Progress so far: booklet on natural resource policies and acts revised and due to be printed in July 2006.

Output 3

- A drama and a music competition with themes relating to the conservation of the Eastern Arc and Coastal forests are held [56].
- Progress so far: To be implemented in 2007.

Output 4

- An Eastern African coastal forest web site is developed and launched.
- Progress so far: website designed and due to go online in July 2006 at coastalforests.tfcg.org.

[56] This communication approach was developed on the basis of communication studies conducted together with the CMEAMF. From these studies it transpired that dance and drama are well received means of communication and awareness promotion among communities.

2.15 Presentation 14: Plant conservation assessment project in the Eastern Arc and Coastal Forests Hotspot of Tanzania and Kenya

Presented by: Mr. William J. Kindeketa, GIS Specialist and TBRCP Projects Manager

General Introduction

- The Plant Conservation Assessment in the Eastern Arc Mountains and Coastal Forests Biodiversity Hotspot of Tanzania and Kenya Project is being conducted by the Missouri Botanical Garden (MBG) and IUCN—the World Conservation Union.
- The MBG component of the project is being implemented by the Tanzania Botanical Research and Conservation Programme (TBRCP), which is a collaborative enterprise of the National Herbarium of Tanzania at TPRI and MBG.
- The project is funded by the Critical Ecosystem Partnership Fund (CEPF).

Project Staff

MBG Component
Mr. Roy E. Gereau – Project Supervisor and MBG Tanzania Programme Director
Mr. W.R. Quentin Luke – Project Coordinator
Mr. William J. Kindeketa – GIS Specialist and TBRCP Projects Manager
Ms. Sharon Bodine – Data Specialist
Mr. Canisius Kayombo – Senior Field Botanist
Mr. Lenin Festo – Field Botanist
Mr. Gabriel Laizer – Field Botanist

IUCN Component
Dr. George E. Schatz – IUCN Project Liaison (MBG staff member seconded to IUCN for this project)
Dr. Craig Hilton-Taylor, Red List Officer
Dr. Geoffrey Howard, IUCN East Africa Regional Office, Nairobi
Dr. Abdulrahaman Issa, Head, IUCN Tanzania Country Office

Project Objectives

To train East African experts in botanical field surveys, data capture and analysis, and plant diversity monitoring and assessment to participate in all phases of the project and integrate them into a strengthened network of regional experts to assure continuity of application of project results.

To produce the first comprehensive evaluation of the conservation status of a large number of targeted taxa in the Hotspot using IUCN Red List criteria and procedures.

To disseminate this information so that governments, donors, and NGOs will adapt their conservation planning and policy development in light of the information generated through this project.

Project Activities

Collation of plant specimen label data for targeted species from East African and international herbaria including the National Herbarium of Tanzania (NHT), Tanzania Forest Department (TFD), University of Dar es Salaam Herbarium (DSM), East African Herbarium (EA), Missouri Botanical Garden Herbarium (MO), and the Royal Botanic Gardens, Kew (K).

Example of herbarium plant specimen label data: Apiaceae label data for target taxa evaluated at First Red Listing Workshop.

Collection of plant data from various literature sources such as monographs, floras, revisions, taxonomic articles describing individual new species, etc.

Identification of underexplored areas based on existing herbarium specimens by using Geographical Information Systems (GIS).[57]

Visiting and collecting additional herbarium specimens and data from identified localities such as Rubeho Mountains, Udzungwa Mountains, Mahenge Escarpment and coastal forests in Lindi Rural and Kilwa Districts.

We collect herbarium specimens with the following information: General locality description including country, political subdivisions, name of Forest Reserve or other protected area, etc.; habitat description including vegetation type, disturbance, land uses, etc.; geographic coordinates (latitude and longitude); elevation in metres above sea level; description of collected plant including height, abundance, flower color, and other characteristics that will not be apparent in the dried specimen.

Determination and re-identification of plant voucher specimens, by using keys, herbarium reference material and literature, including monograph revisions.

Uploading of all electronic plant data to the MBG database, TROPICOS.[58]

Mapping the distribution of target species using GIS tools.

Assessment of Red List threat status of target species based on IUCN Criteria

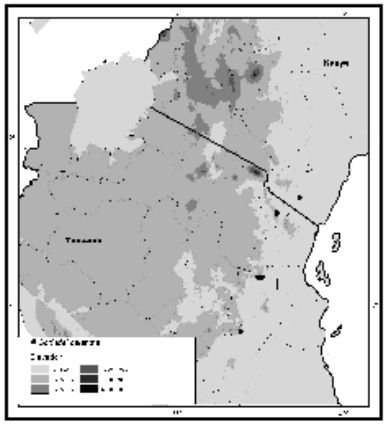
Take pictures of species and publish important findings.

Project Achievements

The project has electronically captured and uploaded to TROPICOS about 4,350 voucher specimens of target taxa from herbaria and the taxonomic and floristic literature.

Also about 4,000 plant voucher specimens have been collected from various areas in Eastern Arc and Coastal Forests Hotspot. See image of *Lettowianthus stellatus* (Annonaceae; photo C. Davidson) collected in forest near the Mahenge Scarp.

In the week of 27 February – 3 March, the project conducted its First Plant Red Listing Workshop in Dar es Salaam. In five working days, the Workshop evaluated the conservation status of 180 target taxa, with results as follows:



Least Concern (LC): 44
Near Threatened (NT): 12
Vulnerable (VU): 39
Endangered (EN): 54
Critically Endangered (CR): 30
Extinct (EX): 1

Representative distribution map of *Sorindeia calantha* (Anacardiaceae), evaluated as EN

This is the first time in history that plant Red List assessments have been systematically performed based on primary data from herbarium collections,

[57] GIS data is very useful to identify gaps in the areas where data has not been collected.

demonstrating a powerful tool for the application of museum data to the evaluation of practical conservation problems.

Work Remaining

In the Second and Third Red Listing Workshops and in consultation with colleagues between workshops, we expect to evaluate the conservation status of about 1,800 more target taxa of plants during the three-year life of the project and to publish the resulting Red List evaluations in both hard and soft copy. Close collaboration with governments, donors, and NGOs will be needed to ensure incorporation of this information into national and regional conservation planning and policy development.

DISCUSSION

Q: Does your project provide management recommendations for the conservation of threatened taxa? For example, do you try to why some species are more threatened than others and to offer advice for their conservation?
A: Our aim is to identify patterns in species distribution and the condition of forests.

Q: Is a list of the species assessed available on the web? The CMEAMF project is developing a biodiversity strategy. This strategy is currently relatively weak on plants. It would be useful if your findings could be shared with our project and other stakeholders.
A: The TROPICOS database is available on the web. Moreover a spreadsheet with the results from the First Plant Red Listing Workshop was distributed.
I: Ok. But it would be helpful to receive a full report on the workshop.
I: In your TROPICOS database you could include a column that facilitates the quick selection of threatened species and protected areas.
I: I agree with this suggestion. It is better to have a separate column to highlight important species and sites as sometimes GPS coordinates can be inaccurate.

Q: What were the lessons learnt from the First Plant Red Listing Workshop and have you identified a way to 'speed up' the process?
A: We still need to verify the results from the workshop through further meetings with experts. The first of these meetings will be held at the Kew Gardens in July.

Q: How do you assess the habitat of important plant species?
A: we use IUCN criteria.

Q: What do you do when specimens cannot be identified.
A: For each specimen we collect six duplicates: one for the UDSM Herbarium, one for Arusha National Herbarium, one for the Herbarium of Tropical E Africa (Nairobi), one for MBG, one for Kew Gardens, and one for taxa specialists.

2.16 Presentation 15: Conservation of indigenous forests and endemic species on Pemba Island

Presented by: Joy Juma (FFI) and Salim Khamisi (DCCFF)

INTRODUCTION

The project is being implemented by the Department of Commercial Crops, Fruits and Forestry (DCCFF) of Zanzibar in partnership with FFI

Program Funding: Critical Ecosystem Project Fund (CEPF)

Program Area: Ngezi Vumamawimbi (NV) and Msitu Mkuu (MM) Forest Reserves. These are recently gazetted forests.

GEOGRAPHICAL LOCATION

The Ngezi and Msitu Mkuu Forests are located on Pemba Island, which is one of the Islands of Zanzibar, Tanzania.

Ngezi-Vuma Wimbi Forest Reserve (2,990ha) is located to the Northwest

Msitu Kuu Forest Reserve (180ha) is to the North East of Pemba.

PROJECT OBJECTIVES

To protect the critical remnants of the Coastal Forest Mosaic on Pemba Island and their resident endemic and endangered species through the following:

- Identify and popularize biodiversity values
- To establish management plans and monitoring systems e.g Pemba flying fox monitoring tool.
- To establish strategic linkages between different stakeholders for biodiversity conservation.

METHODS USED

- Forests transects for biodiversity inventories-nested quadrant method
- Sample plots-monitoring *Maesopsis eminii*
- Direct counts and patch counts of Pemba flying fox
- Opportunistic observations
- Mechanical removal methods-eradication of *Maesopsis eminii* in Ngezi-Vumawimbi
- Stakeholder Involvement- participatory involvement
- Other monitoring tools
- Secondary Data- review of previous records

KEY OUTPUTS

- The Pemba forests and biodiversity are well conserved.
- Greater understanding of biodiversity and conservation priorities among communities neighboring the forest
- Guidelines for tourism investors produced[59]
- Forest Management Plans
- Biodiversity inventories for NV and MM- IUCN redlist
- Beneficial participation of neighbouring communities in forest conservation and eco-tourism activities
- Eradication of Maesopsis eminii in Ngezi Vuma Wimbi
- Enhanced capacity built to enable good management of the Ngezi Vuma Wimbi and Msitu Mkuu Forest Reserves

[59] Many tourism investors have shown interest in the area.

- Enhanced capacity built to enable good mgt. of the Ngezi Vuma Wimbi and Msitu Mkuu Forest Reserves
- Increased population of the Pemba Flying Fox (11% annual increase)

ACHIEVEMENTS SO FAR

Management Plans for Ngezi Vumawimbi and Msitu Mkuu Nature Reserves are in the final stages (MM funded by CEPF)

Draft Guidelines for Tourism Investors in the region produced

Monitoring tools for species produced and used for data collection e.g Pemba flying fox monitoring, *Maesopsis eminii* monitoring tool, plant species, Pemba blue duiker, Tree Hyrax, Pemba Scops Owl, illegal activities

Biodiversity Inventories of NV, MM, Ras Kiuyu and Kangagani Forests undertaken

Training – computer use, fire mgt, M&E, tourguiding and communication activities.

Eradication of *Maesopsis emnii* underway

LESSONS LEARNT

- Successful implementation needs committed institutional capacity building;
- Instilling confidence and adequate supervision of staff was rewarding - interest and level of commitment increased;
- Communities were willing to participate when they were fully involved and if they could benefit from the programme;
- Strategic partnerships were important especially for the biodiversity inventories- Uni. of Dar;
- Noted that in the high-moist disturbed forest the *Maesopsis eminii* seedlings are more concentrated.60
- Pemba Flying Fox can survive in any surrounding as long as there is no disturbance

Discussion

Q: 12 live individuals of Pemba Flying Fox were sent to USA. What is their current condition? Is your project involved with the management of these animals.
A: We have been told that these animals are not alive any more.

Q: Are the Ngezi and Msitu Mkuu Forests in the process of being converted into Nature Reserves to account for their importance to the Pemba Flying Fox? Would this make a difference in the management objectives for these forests?
A: These forests were declared forest nature reserves just last year. One of the reasons that underpinned this declaration is the fact that the Msitu Mkuu forest is the only area where the Blue Duiker is still found on Pemba.

Q: Has any butterfly study been conducted during your project? A study was carried out on Pemba Island in the 80s. Further studies on butterflies could be useful as they constitute a potential tourism attraction.
A: We are interested in receiving information on previous butterfly studies on the island as we don't have much information on butterflies at the moment.

Q: Is the Pemba Flying Fox eaten?
A: Yes, but we are discouraging this practice by raising awareness of the importance of this species.

Q: Can you tell us something more about your education activities?
A: We conduct various campaigns in the schools, especially on the importance of the forests. We also hold meetings with tourist hotels and we helped in the formation of forest committees that help the project in awareness promotion. We are also conduct training with the communities in gathering biological data and we would like to be

[60] However no correlation could be identified between an increase in ME seedlings and disturbance. Further research is needed.

able to use this data for an annual census. It was from these data that we noticed the 11% annual increase in the population of this species.

Q: How do you motivate people toward the conservation of the reserves?
A: In 1979 clearing of the forest was started by the Zanzibar government to make space for the cultivation of rubber. Initially an attempt was made to restore the forest by using *Maesopsis*. This is a fast colonizer and competitive species, and as such it threatened to out-compete other plant species, leading to a change in forest structure. We have started using tree-barking rather than felling to kill the species slowly, in order to avoid damage to neighboring tree species. We are trying to evaluate what method is most efficient: in one plot we extract seedlings, in another we use tree barking, and in a third plot we use a combination of both methods.
I: The use of chemicals to eradicate Maesopsis may be cheaper.
I: However chemicals are an external input and therefore may increase expenditures.
I: WCST has two books, on the flora and fauna of Pemba, published in 1978. They are on sale.

2.17 Presentation 16: Malundwe Mountain: exploring a little known Eastern Arc forest

Presented by: Guy W. Norton, Anglia Ruskin University – Cambridge / Animal Behaviour Research Unit, Mikumi National Park, Tanzania

Acknowledgements

- Dawn Hawkins, Neil Burgess, Nick McWilliams, Franc Hughes, Bill Stanley
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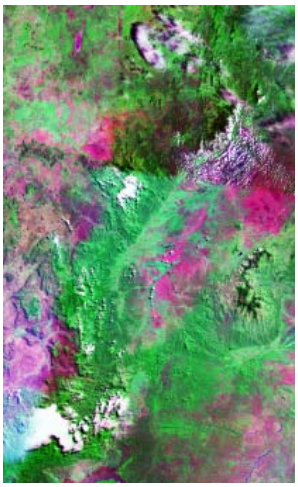
- Research Associates: Jody Gunn, Kate McQuaid, Leah Collett, Abi Bunker, Chrissie Dodkin
- Collaborative Researchers
- Families
- Tanzanian Colleagues
- Funding & Supporting Institutions: CEPF, Darwin Initiative, WCS, British Airways, COSTECH, TANAPA, TAWIRI, TAFORI, MINAPA, SUA, UDSM

Eastern Arc Mountain Forests

- Biogeographical Islands
- Occurs in Disjunct Small Patches
- Endemism
- High heterogeny and biodiversity
- Diversity both within & between forest 'islands'
- Paleoendemics and Neoendemics
- Complex Geologic and Evolutionary History
- Ancient separation from larger forests
- Variations in Climate led to multiple expansion & contraction
- Important water catchment systems



Malundwe Forest

- Small Forest equidistant from 2 of the largest - Uzungwa & Uluguru.[61]
- Located within the Mikumi National Park. The smallest of forests in the eastern Arc.
- Unmapped and undescribed; the least known.
- Important to multiple water catchments
- Protected and undisturbed for over 50 years
- Lower elevations undisturbed (except by fire) and contiguous with forest[62]

Current Malundwe Project

- Assessment of species diversity and heterogeny
- Establish extent and stratification
- Examine continuity with woodland, riverine systems
- Assess patterns of water flow
- Establish affinities with other forests and habitats
- Establish management plans and capacity with MINAPA

'Recent' Malundwe Surveys

Circa 1975? Kielland Butterfly Collection Survey
Mid 1982 Hall & Johnson 1 day visit – qualitative assessment of floral pattern
August 1982 Norton et al ABRU Survey aborted[63]
August 1983 Norton & Lovett Floral and general assessment, using radius vegetation plots. It was established that the mountain is comprised of East African Montane Forest.
1984 – 1996?
1997 Beale and Mabula ABRU survey reestablished vegetation plots

[61] Malundwe is about 40 km distance which may not be a barrier for some species. Potentially connected to both these forests via riverine forest in catchment systems.
[62] Lovett described it as lowland and upland forest botanically distinguishable from other Eastern Arc forests. Brachystegia (on the lower slopes) and Riverine forest also occur.
[63] The survey was not completed due to the presence of poachers in areas below the forest. Qualitative (visual) assessments of forest boundaries were made.

2004 Gunn & Stanley – Joint ABRU, Small mammal project survey
2005 July ABRU CEPF surveys begin

Survey Progress to date

- 6 Reconnoitre Trips
- Survey and map access routes
- Assess Flow patterns
- Assess Water Resources
- 3 species survey and mapping trips
- Small Mammals (with Stanley et al)
- Herps
- Invertebrates
- Birds
- Botany[64]

Most plant species are Eastern Arc indigenous species

No new species have been found yet. We are still awaiting the identification of various specimens, among which there may be some endemic species.

Methods

- GPS tracking, georeferencing
- Small Mammal Traplines (Stanley et al)
- Pit fall Trap Lines
- Invertebrate Traps
- Bird Call recognition
- Mist Nets?
- Camera Traps
- Vegetation Assessment transects
- Point assessment at 100m (within specific habitats)
- Transects Placed consistent with gradients and catena[65]

Problems and Issues[66]

- Lack/Loss of field lore – No available local knowledge
- Terrain and access routes difficult[67]
- Water sources limited and unreliable[68]
- Logistical management and scheduling
- Isolation and communication
- Safety[69]
- Part time project

[64] No comprehensive study of the understorey has been conducted yet. It would be interesting to describe patterns of regeneration in areas not affected by disturbance. It would also be interesting to see the effect of buffalo and elephants browsing now that disturbance from poachers has decreased.

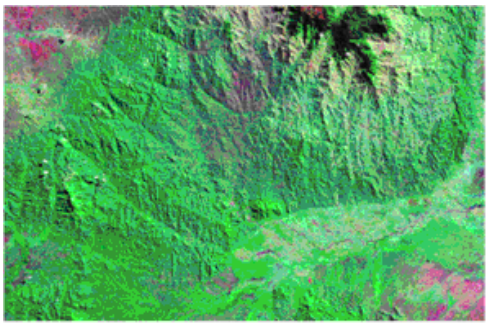
[65] On the eastern slopes the catena ranges from Eastern arc forest at the higher elevations grading into heavy woodland and occasionally open woodland and grassland on the lower slopes. Watercourses extend forest and riverine vegetation into lower elevations. Forest on the steeper western slopes ends abruptly at a grassland boundary but seems to have increased (extends further down the slope) since 1983. This increase may be due to changes in fire patterns due to changes in park fire management policy and to a reduced level of poaching related fires.

[66] The project is addressing some of the challenges of designing an appropriate sampling strategy which is an issue for all CEPF projects. The problems are both easier to see and understand on Malundwe because it is so much smaller and the topography is much less complex. The general issues are: how many transects, how many samples (points) along transects and transect as well as plot placement. The larger and more heterogenous the terrain and habitat of a forest the more this becomes an issue. There is a real risk as Stanley pointed out in his Tawiri paper last December that if samples are taken from too few areas or without proper regard to terrain and access bias the forest biodiverstiy will be misrepresented. This is a problem we are addressing explicitly on Malundwe but the issue has a wider application to other projects

[67] The dense structure of the woodland means that it is very difficult to access the forest during the wet season. It is also difficult to reach areas away from contour related game trails. However, the project is aware of this potential for bias and is making every effort to access points throughout the forest and to reach the forest during the wet season as well as the dry season.

[68] This logistic problem has not been solved yet. The only solutions currently available are to walk very long distances from camp or to carry water.

[69] Significant populations of buffalo and elephant contribute to safety difficulties.



Malundwe is a water catchment for the Ruaha, Wami and Ruvu rivers.

Discussion

Q: How do you know that the forest is expanding?

A: From my personal visual estimation. The edges of the forest are moving down the slopes. It is difficult to evaluate the position of the forest edges from the satellite imagery.

3) Overview of lessons learned by CEPF research projects

3.1 Lessons learned about biodiversity monitoring

This section summarises the findings of the working group that focused on monitoring based on the guidelines outlined in Appendix 1.

Members of this group included: Paul K. Ndang'ang'a, Seif Madoffe, Amina Akida, John Watkin, Giulia Wegener and Will Crosse.

Different types of monitoring

- Need to understand different scales and objectives of monitoring and what decisions the data can inform.
- **Baseline monitoring (inventory/assessment)** is used to characterize existing conditions, and to establish a database for planning a future comparison.
- **Intervention monitoring** is used to evaluate whether specified activities had the intended effect.
- **Regional/National monitoring** assesses results towards achieving a desired change in a system.
- **Global Monitoring** – feeding information for global reporting requirements.

What is the INFORMATION relationship between different scales of monitoring and what process must be put in place for data to flow?

Strengths in Monitoring

- Considerable willingness to contribute to regional monitoring process
- Defines conservation priorities
- Informs decision makers to guide conservation, policy and investment planning
- Raises awareness among various actors
- Broad institutional involvement established

Current threats in Monitoring

- Dealing with ownership and data sharing issues, including acknowledgement.
- Monitoring is an expensive process thus limits sustainability of monitoring system.
- Monitoring data could report on illegal activities.
- Loss of valuable data that contributes to long term monitoring.
- Unscrupulous use of data

Current opportunities to strengthen Monitoring

- Providing baseline data and establishing a cross-institutional monitoring culture.
- There are mechanisms to aggregate biodiversity data for analysis and reporting at the hotspot level.
- Cross regional exchange.
- National/Regional level monitoring serves as powerful information for government level decision making.

Lessons Learned

- Ecosystem Profile in 2003 acts as conservation outcomes baseline data.
- Breakdown in communication among stakeholders.
- Virtual taskforce has lost momentum.
- Uncoupled stages of information flow.
- Comparison in 2008 to look at trends in conservation outcomes on four core measures.

Recommendations

- Indicators agreed need to be re-prioritized, both core and supplementary measures (BL).
- Identify better ways to access and consolidate socio-economic data to complement biological data.
- Re-define participants and roles of taskforce.
- Better processes to maintain communication of taskforce network.
- Identify how to sustain network of data providers to ensure sustainability.
- Better articulation of process and objectives of regional monitoring to stakeholders (Dissemination of meeting outputs and Madagascar products).
- Clarify what and how Birdlife and CABS are meant to compile for analysis.
- Clarify roles and responsibilities of other organizations contributing to the process.
- Back up data
- Paul Ndanganga as point of contact in regional monitoring process

3.2 Lessons learned about biodiversity research

This section summarises the findings of the working group that focused on research based on the guidelines outlined in Appendix 1.

Members of this group included: Issa Abdulrahman, Abi Bunker, Steve Collins, Guy Norton, Jaclyn Hall, Catherine Mndeme and Lauren Persha.

Capacity Building

- Even though millions have been invested? Has capacity been built?
- The country needs to be able to retain the talented people that have been produced
- Every project should have a capacity building/ technical training aspect
- How can we allow others to know that trained Tanzanians are available
- Need to get students involved in the projects
- Need to share information about Tanzanians who have certain skills

Retaining Capacity

- Government agencies are hesitant to *over-train* junior staff.

Legislation and Permits

- In country legislation to get things going
- Processes and procedures are long and costly
- 6 months timeline for doing research in Kenya which impacts on work that is season dependent – this is a big issue
- Lack of clarity of forest research – What permits are needed based on the reserves that you are working in?
- This is an important aspect to expats doing research, especially those doing research in the entire Eastern Arc, Kenya and Tanzania.

Is there a way to facilitate the process?

- Can we have an in-country person/organization/partner to do the processing for researchers?
- Institutional differences depending on where you work, various permit confusions - need to organize and plan for this.
- Know who you are going to be working with, send copies of research and permits even when it is not completely necessary.
- CEPF and CI should give guides on the web to this process

Creating Linkages

- Forestry and Bee Keeping and other incountry stakeholders should be here at this workshop
- 5 year plans do exist in the government bodies, we should identify them, and then know what to build on while building linkages.
- Can COSTECH have a role in integrating different bodies e.g. TAWIRI TAFIRI, Forestry and Bee Keeping, TANAPA, etc.
- Can we match these Tanzanian institute agendas with donor perspectives?

Weakness

- Donor perspectives drive research questions

Partnership Weakness

- Competitiveness
- Territoriality
- We should be more willing to share

Role of Civil Society

- Providing good linkages in capacity building in partnerships
- Greater flexibility and responsiveness
- Driven by current ‘fashions’ and may be in conflict depending on differing agendas
- Need to be facilitator and not provider
- Role in proposal review process
- Linking with local/nation/international processes
- COSTECH – should require that researchers present findings at TAWIRI, Ministries, Divisions

- Strong interest from national and local level institutions but not robust research agenda
- Links between international & ground level weak
- Individuals very important – strength & weakness

Funding

- Lack of future funding plans
- Use current data/research to secure future funding
- Acountability for achieving outcomes – directly linked to funding

Lessons learned

- Electronically available research
- Sharing data and networking
- Results oriented and linked to funding
- Need to ask the right questions
- Built-in commitment to and equality of in-country capacity building
- Civil society involved in proposal review process
- Recognise and plan for the limitations in process
- Think and plan beyond short-term - balance between static & dynamic goals
- Link between research results & influencing Govt.

3.3 Lessons learned about awareness raising and capacity building

This section summarises the findings of the working group that focused on awareness raising and capacity building based on the guidelines outlined in Appendix 1.

Members of this group included: William Kindeketa, Nisha Owen, Joy Juma, Nike Doggart, Paul Nyiti, Wilfred Gwaleme, Chrispin Kapinga and Chrissie Dodkin.

STRENGTHS	**WEAKNESSES**
Monitoring awareness **Difficult to measure the impact of awareness raising: but in some cases projects are seeing results e.g. FFI and the Pemba Flying Fox, also activities generally well received at a local, national and international level.**	Difficult to measure conservation impact of awareness raising
Partnerships **Through productive partnerships sharing complementary information, data, specimens, avoiding duplication of efforts, and documenting biodiversity values and indigenous knowledge, CEPF investment in awareness raising & capacity building has been enhanced. But, not enough involvement of Community Based Organisations, difficult to get funding through CEPF through lack of capacity.**	Should be more involvement of CBOs on the ground. Difficult for CBOs to get access to funds through CEPF, not strengthened by this investment – more experience and success in Kenya, need more training and capacity building on local fund-raising; local resources and local funds in Tz still very low, shift from GOs to NGOs and CBOs but slow and mostly in response to external funding, expertise not always there
Capacity Building **CEPF projects have a wealth of information, technical expertise and participant commitment which has already begun building capacity at a local and institional level, backed by P. Kikwete's emphasis on conservation. But, need to invest further at a District Level in encouraging participation, supporting FBD with implementation of PFM, and targeting the private sector.**	Lack of suitably trained/qualified staff – particularly botanists Need at District Level to engage in capacity building – needs to be investment Survey methods hard work – discouraging Not enough staff, money or even interest in Govt or staff for training – may change in future with Govt reshuffling and money allocations Projects should allocate more money for capacity building as an incentive Awareness raising in Tz has not focused enough on private sector organisations and their responsibilities CEPF need to provide enough support to FBD in terms of AW and CB in the context of PFM
Civil Society Organisation achievements **CEPF focus on CSOs has benefited from accountability, flexibility, innovative approaches resulting in tangible results for AR and CB, although need to be aware of limitations of expertise.** **Rigorous review process meant that funding went to productive NGOs.**	Some NGOs don't have expertise
Long-term approach **AR and CB part of a long-term solution to conservation, many projects already take a long-term view as well as investing in physical assets, but there is a lack of adequate funding and this may not continue once investment is over.**	Lack of adequate funding for long-term approach

Communications **CEPF projects utilise a range of methods to communicate findings and raise awareness through websites, meetings, Swahili reports, on a local national and international level. But, knowledge of the EA and projects limited in general public, insufficient media linkages, and information not always available for decision making.**	EA forests & projects known to limited number of people/institutions, mostly because of the World Bank rather than CEPF – possibly because World Bank deals with Govt, and CEPF with NGOs Many projects not well known Insufficient linkages with local media, limited accessibility to media Need to make data and information available – many people/institutions unaware, particularly for decision making etc Awareness of websites and resources therein low – should be improved Sometimes scientific findings / reports unsuitable at local level Difficulties of defining and focusing on "awareness", particularly levels of awareness and knowledge – EA mountains – forests – species – water etc etc, Ecosystem functions not well known
Alternative Livelihoods **Currently CEPF projects have small-scale attempts to provide alternative resources to reduce illegal activities, but this is not always the case and is vital to alleviate poverty and provide financial incentives for conservation.**	Do not always provide alternatives/incentives to cease exploitation and illegal activities

OPPORTUNITIES

- Chance to document indigenous knowledge before lost
- Sharing of experience between Kenyan CSOs and Tanzanian CSOs to learn from Kenyan success in strengthening CBOs
- Way to make data and info available for decision making and other processes & improve communication – reports, Technical Reports, Layman's Reports, Swahili Reports, capitalise on use of photos
- Interest of local communities in finding out more about the forests, and desire for assistance in PFM, and in possibilities for alternative resource use – demand for information
- CEPF E-news
- Linking with local media
- President Kikwete has placed emphasis on environment and conservation: strategy for conservation of land circulated in all levels
- Journal East Africa Natural History – publication of results in targeted volume
- Link with Ministry of Education and District Education Officers for schools

THREATS

- Culture and gender constraints and divides mean that women often do not get sufficient access to awareness and capacity building
- Takes time to change behaviour and see results, particularly in terms of conservation impact
- Often AR & CB cease once projects end and CEPF investment ends
- Little interest in Kenya from media on environmental issues, perhaps more in Tanzania
- Poverty level – survival biggest issue, incentive from illegal activities greater than from using sustainable resources
- Adequate funding
- Weak governance: accountability and responsibility undermining credibility of awareness raising
- Communication issues: Swahili and translating material/resources
- Inadequate/lack of alternative resources/incentives to cease illegal activities

RECOMMENDATIONS

- Support more sharing of information and experiences between Kenyan and Tanzanian CSOs
- Target minority groups particularly women
- Focus on the provision of alternative resources and incomes

- Make information available to a wide range of stakeholders from local communities to government to international institutions. Use different methods depending on the target group. Provide more materials in Swahili.
- Make use of the media: local, national and international
- Target the private sector to address corporate social responsibility
- Invest more in institutional capacity building to combat weak governance
- Intensify co-operation with Government to implement and advise directives on conservation and alternative resource use, including education
- Take a long-term approach

3.4 Mapping group

This section summarises the findings of the working group that focused on addressing issues related to the mapping of the Eastern Arc Mountain and Coastal Forests region of Kenya and Tanzania based on the guidelines outlined in Appendix 1.

Members of this group included: David Knox, Babu Matunda, James Mwangombe, Salum Khamisi Haji and Neil Burgess.

Naming of Reserves

- Add the additional reserves on the map from WDPA
- Workshop with key stakeholders e.g. forest officers, other gov't officials and NGOs to update/correct these names
- Produce an additional map at the end of this process with the corrected names/polygons

Coastal Forests

- All coastal forests being digitised by WWF in Kenya and Tanzania and will be ready towards the end of the year
- These data will be fed into an updated map for the region

Polygon Data for TZ forest reserves and national parks

- Start with WDPA and will be adjusted and refined with the workshop previously mentioned to update the names

Additional KBAs in the hotspot

- Data needs to be fed into this from WCST/Nature Kenya and through the recommendations with the monitoring group
- Regeneration of some of the degraded coastal forest reserves
- Don't only map deforestation but instead include afforested areas at a local level

4) Conclusions

Participants to the workshop found the event extremely informative and helpful because it increased their understanding of the following:

1. How individual activities and projects are part of a larger conservation framework that operates at the species, habitat and landscape level, and at the national, regional and global scale.

2. How the activities of each project contribute to the development and refinement of an effective international conservation framework, which is based on the IUCN Red List of threatened species and the Key Biodiversity Areas (KBA) network.

3. How the CEPF partnership approach functions and what are the achievements of funded projects in Kenya and Tanzania.

4. How data and information flow into the CEPF Outcome Database and how this database is utilised to monitor biodiversity at the species, habitat and landscape level.

5. That there are still important discoveries taking place in the Eastern Arc Mountains in terms of endemic and threatened species. This confirms once again the biological richness and importance of this hotspot.

6. That there is need to further improve the way the CEPF Outcome Database is managed and to gain a clearer understanding of the way the database will be used to monitor biodiversity.

7. That a vast amount of data and information is being gathered by the various CEPF-funded projects and that the exchange of experiences and information can be of extreme value to each individual project. There should be more exchange and communication between different projects.

Appendix 1. Guidelines for working groups

GROUP 1: LESSONS LEARNED GROUP (MONITORING)
Throughout the course of the workshop we have had some discussions and presentations about conservation monitoring in the hotspot.

Your task is to write down some of the key lessons that have been learnt based on your experiences and on the discussions that have come up during the workshop and document some recommendations.

A first step to identifying some lessons learned and recommendations would be to conduct a 'SWOT' analysis. As a group, think through some of the strengths and weaknesses / opportunities and threats. The strengths and weaknesses can guide you in formulating 'lessons learned'. While the opportunities and threats can help in formulating recommendations on a way forward to improve and strengthen conservation monitoring in the Eastern Arc and Coastal Forests of Kenya and Tanzania.

This group should focus on thinking through some ways to strengthen data sharing through the Tanzania National Database / TROPICOS / NMK databases and the BirdLife-led monitoring programme.

Please prepare your findings as a power point presentation and select someone from your group to present the findings to the other participants. The presentation should include a list of the strengths / weaknesses / opportunities and threats that helped in guiding you to formulate the lessons learnt and recommendations. It should also include the lessons learnt and recommendations that you have formulated. The lessons learnt can be written as paragraphs while the recommendations should aim at a 'bullet point' style.

Some themes to think about:
Partnership
Capacity building
Role of civil society organisations
Linkages with local, national and international processes
Funding
Conservation impact
Sustainability

With particular reference to:
Information sharing
Access to technical expertise, in particular linkages with CABS.
Protocols for data sharing including format, ownership, basis for open data access
How to make it available on the internet (suggestions on how it should be presented through local websites).
Data quality control
Managing data versions over time to ensure that time series data is recorded

Please also list any other more general lessons learnt and recommendations regarding CEPF's investment and conservation monitoring.

GROUP 2: LESSONS LEARNED GROUP (RESEARCH)
Throughout the course of the workshop we have had some discussions and presentations about biological research in the region.

Your task is to write down some of the key lessons that have been learnt based on your experiences and on the discussions that have come up during the workshop and to document some recommendations.

A first step to identifying some lessons learned and recommendations would be to conduct a 'SWOT' analysis. As a group, think through some of the strengths and weaknesses / opportunities and threats. The strengths and weaknesses can guide you in formulating 'lessons learned'. While the opportunities and threats can help in formulating recommendations on a way forward to improve and strengthen conservation research in the Eastern Arc and Coastal Forests of Kenya and Tanzania.

Please prepare your findings as a power point presentation and select someone from your group to present the findings to the other participants. The presentation should include a list of the strengths / weaknesses / opportunities and threats that helped in guiding you to formulate the lessons learnt and recommendations. It should also include the lessons learnt and recommendations that you have formulated. The lessons learnt can be written as paragraphs while the recommendations should aim at a 'bullet point' style.

Some themes to think about:
Partnership
Capacity building
Role of civil society organisations
Linkages with local, national and international processes
Funding
Conservation impact
Sustainability

Please also list any other more general lessons learnt and recommendations regarding CEPF's investment and conservation monitoring.

GROUP 3: LESSONS LEARNED GROUP (AWARENESS RAISING AND CAPACITY BUILDING)

Throughout the course of the workshop we have had some discussions and presentations about awareness raising and capacity building in the hotspot.

Your task is to write down some of the key lessons that have been learnt based on your experiences and on the discussions that have come up during the workshop and document some recommendations.

A first step to identifying some lessons learned and recommendations would be to conduct a 'SWOT' analysis. As a group, think through some of the strengths and weaknesses / opportunities and threats. The strengths and weaknesses can guide you in formulating 'lessons learned'. While the opportunities and threats can help in formulating recommendations on a way forward to improve and strengthen awareness raising and capacity building in the Eastern Arc and Coastal Forests of Kenya and Tanzania.

Please prepare your findings as a power point presentation and select someone from your group to present the findings to the other participants. The presentation should include a list of the strengths / weaknesses / opportunities and threats that helped in guiding you to formulate the lessons learnt and recommendations. It should also include the lessons learnt and recommendations that you have formulated. The lessons learnt can be written as paragraphs while the recommendations should aim at a 'bullet point' style.

Some themes to think about:
Partnership
Capacity building
Role of civil society organisations
Linkages with local, national and international processes
Funding
Conservation impact
Sustainability

Please also list any other more general lessons learnt and recommendations regarding CEPF's investment and conservation monitoring.

GROUP 4: MAPPING GROUP
The CEPF ecosystem profile for the Eastern Arc and Coastal Forests included a map indicating 161 sites in the region. Your task is to review this map and make corrections based on your field experience. The aim is to create a map that will be useful to conservation practitioners within the region.

Please also list any other more general lessons learnt and recommendations regarding CEPF's investment and conservation monitoring.

Appendix 2: Timetable for the CEPF Strategic Funding Direction 3 Meeting

Dates: 27th – 28th June 2006 Venue: Courtyard Hotel, Dar es Salaam

Time	Event	Organisation	Presenter
27th June			
08:00	Registration		
08:30	Opening remarks and participant introductions	CEPF	John Watkin
08:45	Overview of CEPF's investment in the Eastern Arc and Coastal Forests	BirdLife International	Paul Ndanganga
09:00	CEPF's conservation outcomes definition, monitoring and data networks	CEPF	Will Cross and David Knox
09:40	Project description: Instituting a Standardized Sustainable Biodiversity Monitoring System in the Eastern Arc / Coastal Forests of Tanzania and Kenya	BirdLife International / WCST / Nature Kenya	Paul Ndanganga
10:20	MORNING COFFEE		
10:40	Project description: Making Data Available on the Species and Sites of the Eastern Arc and Coastal Forest Hotspot in Tanzania	University of Dar es Salaam	Professor K.M. Howell
11:20	Forest Monitoring in the Eastern Arc Mountains and Coastal Forests through the Forestry and Beekeeping Division, Tanzania	CMEAMF/FBD	Neil Burgess
11:40	Project description: Trends in the Health of Selected Forests in the Eastern Arc and Coastal Forest	West Chester University, Pennsylvania, Sokoine University of Agriculture and East African Wildlife Society	James Mwangombe / Dr S. Madoffe
12:20	Project description: Biodiversity of a Landscape: Examining Forest Heterogeneity and Ecological Change in the East Usambaras Since 1975	University of Florida	Jaclyn Hall
13:00	LUNCH		
14:00	Project description: Biodiversity Research and Awareness in the Lesser Known Eastern Arc Mountains: Mahenge, Rubeho, Ukaguru, and Nguru. AND The Forgotten Coastal Forests of Mtwara: A Reconnaissance to Prioritize Biological Knowledge for Community Conservation Initiatives	Frontier Tanzania	Nisha Owen
14:40	Project description: Overview of Butterfly Faunas of Eastern Arc Mountains and Coastal Forests: Biodiversity, Endemism, Conservation	ABRI	Steve Collins
15:20	Project description: Filling the Knowledge Gap: Surveys of Poorly Known Sites and Species in the Eastern Arc and Coastal Forests	TFCG / MTSN	Nike Doggart
16:00	Project description: Plant Conservation Assessment in the Eastern Arc Mountains and Coastal Forests Mosaic of Kenya and Tanzania	Missouri / IUCN / TBRP	William Kindeketa
16:40	TEA		
28th June			
09:00	Project description: Conservation of Indigenous Forest and Endemic Species on Pemba Island	FFI / DCCFF	Joy Juma
09:40	Project description: Malundwe's Afromontane forest and river catchments: Discovery and capacity building.	ABRU	Guy Norton
10:20	MORNING COFEE		
11:00	Group work to reflect on lessons learnt.	ALL	
13:00	LUNCH		
14:00	Finalising presentations by groups	ALL	

15:00	Presentations by groups and discussion	ALL	
16:30	Closing remarks	ALL	
17:00	TEA		

Appendix 3. List of participants

Name	Organisation	Postal Address	e-mail address	Phone
Akida, Amina	FBD	PO Box 426, Dar es Salaam	amakida@hotmail.com or akida@tfs.go.tz	022 2861657 or 0713 356782
Bunker, Abigail	ABRU - Mikumi	PO Box 75, Mikumi	abru@raha.com or acb123@hotmail.co.uk	023 2620420 or 0787 050662
Burgess, Neil	UNDP, CMEAMF	PO Box 289, Morogoro, Tanzania	neil.burgess@wwfus.org	0744 924257
Collins, Steve	African Butterfly Research Institute - ABRI	PO Box 14308, 0800 Nairobi, Kenya	scollins@iconnect.co.ke	+254 722 701021
Crosse, Will	Conservation International	1919 MST, NW, Suite 600, Washington DC, 20036	wcrosse@conservation.org	+1 202 9121447
Dodkin, Chrissie	ABRU - Mikumi	PO Box 75, Mikumi	abru@raha.com	023 2620420 or 0787 050662
Doggart, Nike	Tanzania Forest Conservation Group	PO Box 23410, Dar es Salaam	ndoggart@tfcg.or.tz	022 2669007 or 0744 380609
Gwalema, Wilfred	NEMC (VPO)	PO Box 3063, Dar es Salaam	ruralres2005@yahoo.com	0744 086638
Haji, Salim Khamis	DCCFF (Zanzibar)	PO Box 283, Wete, Pemba	cnrpemba@redcolobus.org	0787 273583 or 0777 430890
Hall, Jaclyn	University of Florida	PO Box 57, Amani, Tanga	jhall@geog.ufl.edu	0784 934909
Howell, Kim	UDSM	PO Box 35064, Department of Zoology and Wildlife Conservation	kmhowell@udsm.ac.tz	0744 580456
Issa, Abdulrahman S.	The World Conservation Union (IUCN)	Tanzania Country Office, PO Box 13513, Dar es Salaam	issa@iucn.or.tz	0744 570234
Juma, Joy	Fauna and Flora International	PO Box 20110, 00200, Nairobi	joy@eawildlife.org	+254 20 3878016
Kapinga, Chrispin	TFCG	PO Box 23410, Dar es Salaam	chr23juve@yahoo.com	0744 254446

Kilemo, Dominic B.	NEMC (VPO)	PO Box 63154, Dar es Salaam	dbkilemo@yahoo.com	0713 249720
Kindeketa, William	Tanzania Botanical Research & Conservation Programme	PO Box 10656, Arusha	tbrcp@yahoo.com or william.kindeketa@yahoo.com	0784 499266 or 0744 499266
Kisembo, Patrick	The Guardian	PO Box 31042, Dar es Salaam	patrickisembo@yahoo.com	0746 317920
Knox, David	Conservation International	1919 MST, NW, Suite 600, Washington DC, 20036	dknox@conservation.org	+1 202 912 1728 or +1 202 470 6883
Komba, Benedict	Radio Tanzania	PO Box 9191, Dar es Salaam	benkomba@yahoo.com	0746 317920
Madoffe, Seif	Sokoine University of Agriculture	PO Box 3010, Morogoro	madoffe@suanet.ac.tz or madoffe@yahoo.co.uk	0744 302337 or 023 2604648
Magin, Chris	RSPB	The Lodge, Sandy, Beds, UK	chris.magin@rspb.org.uk	+44 1223 290972
Matunda, Babu	WWF - Tanzania Programme Office	PO Box 63117, Plot 350, Regent Estate, Mikocheni, Dar es Salaam		022 2775346
Melamari, Lota	WCST	PO Box 70919, Dar es Salaam	melamarilota@yahoo.co.uk or wcst@africaonline.co.tz	022 2112518 or 0784 461122
Mndeme, Catherine	COSTECH	PO Box 4302, Dar es Salaam	cmndeme@yahoo.com or cmndeme@costech.or.tz	0744 748929
Mwangombe, James	East African Wildlife Society	PO Box 1043 80304, Wundanyi, Kenya	crossborder@wananchi.com or mwangombejames@yahoo.com	+254 43 42403 or +254 733 849103
Ndanganga, Paul Kariuki	BirdLife International	PO Box 3502 - 00100, Nairobi	paul.ndanganga@birdlife.or.ke	+254 8562246/ 856 2490
Nnyiti, Paul	WCST	Box 70919, Dar es Salaam	wcst@africaonline.co.tz	022 2112518 or 0744 434354
Norton, Guy	ABRU - Mikumi National Park, Anglia Ruskin University	PO Box 75, Mikumi	g.norton@anglia.ac.uk	+44 8451460590
Owen, Nisha	Frontier-Tanzania	PO Box 9473, Dar es Salaam	frontier@africaonline.co.tz or nisha-r-owen@hotmail.com	022 2780063

Persha, Lauren	Indiana University	PO Box 4302, Sokoine University of Agriculture, Morogoro	lpersha@indiana.edu	0746 774450
van Andel, Alexander	University of Utrecht	Janter Gouwweg 50, 1412 HC, Naarden, Netherlands	A.C.vanAndel@students.uu.nl	
Watkin, John	CEPF	1919 MST, NW, Suite 600, Washington DC, 20036	j.watkin@conservation.org	+1 202 912 1767
Wegener, Giulia	Frontier-Tanzania	PO Box 9473, Dar es Salaam	frontier@africaonline.co.tz or nisha-r-owen@hotmail.com or giulia_wegener@yahoo.com	022 2780063