

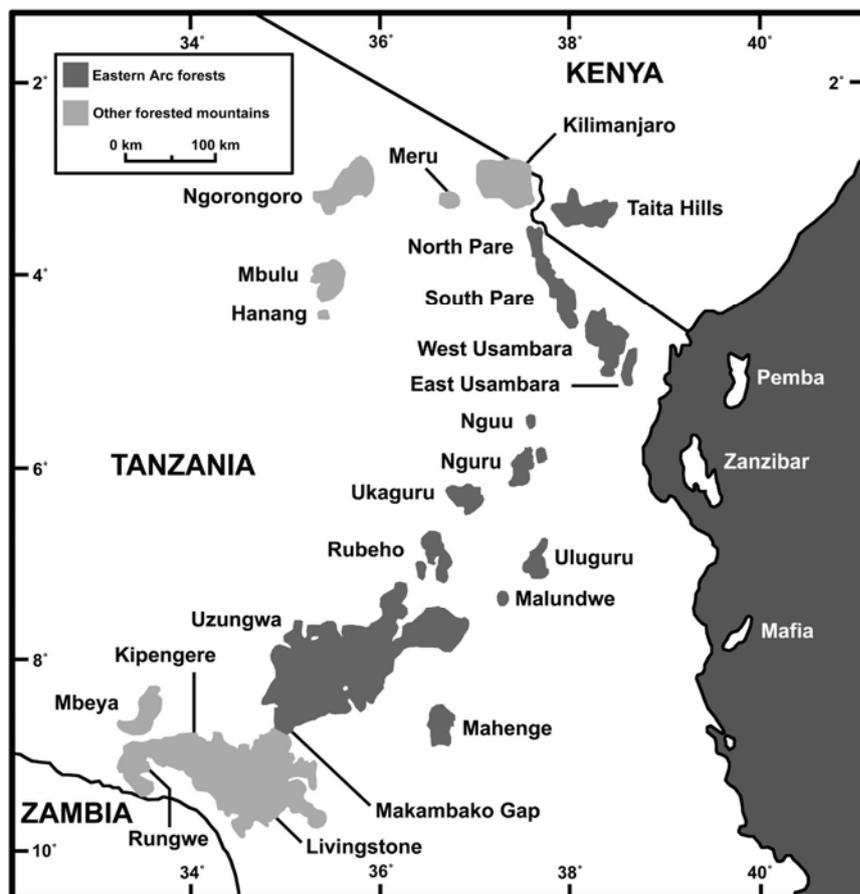


**MINISTRY OF NATURAL RESOURCES AND TOURISM**

**Conservation and Management of the Eastern Arc Mountains  
Mountain Forests, Tanzania: GEF-UNDP-URT/01/00015426**

**EASTERN ARC MOUNTAINS STRATEGY**

**THEMATIC STRATEGY: MONITORING NATURAL  
RESOURCES IN THE EASTERN ARC MOUNTAINS**



**Global  
Environment  
Facility**



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Inputs to the development of this strategy document were also made by: Amina Akida, Monica Kagya, Evarist Nashanda, Gerald Kamwenda, Mr Haule, Kekelia Kabalimu and Shedrack Mashauri.

### Contact details

#### This strategy was developed by:

**Conservation and Management of Eastern Arc Mountains Forests**, Forestry and Beekeeping Division, PO Box 289, Morogoro. Tel: 023 261 3082. Fax 023 261 3084. Email: [easternarc@easternarc.or.tz](mailto:easternarc@easternarc.or.tz)

Funded by UNDP-GEF. UNDP, P.O. Box 9182, Dar es Salaam, Tanzania.

In collaboration with:

**Eastern Arc Mountains Conservation Endowment Fund (EAMCEF)**, P.O. Box 6053, Morogoro, tel. 023 261 3660. Fax. 023 261 3113. Email: [eamcef@easternarc.or.tz](mailto:eamcef@easternarc.or.tz)

**Tanzania Forest Conservation Group (TFCG)**, P.O. Box 23410, Dar es Salaam, Tanzania. Tel. 022 266900. Fax. 022 2669007. Email. [tfcg@tfcg.or.tz](mailto:tfcg@tfcg.or.tz)

**CARE International in Tanzania (CARE)**, P.O. Box 10242, Dar es Salaam, Tanzania.

## 2. Summary

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Conservation and Management of the Eastern Arc Mountains Mountain Forests (CMEAMF) is a project of the Ministry of Natural Resources and Tourism, Forestry and Beekeeping Division. The project will last for 5 years and one of the outputs is the development of a holistic conservation strategy – to be produced and agreed and be under implementation within three years.

Component parts of this broader strategy will be developed in more detail as thematic strategies to cover particularly important issues. This 'Monitoring Strategy' is one of these thematic strategies and is specific to the situation in the Eastern Arc Mountains. The monitoring within the region that is currently going on is reviewed against the indicators of the National Forest Programme, and suggestions are made on how the monitoring effort in the Eastern Arc Mountains can be improved and also how this might be linked formally to the monitoring structures within FBD.

The monitoring thematic strategy comprises a number of parts:

- 1) *Situation analysis*. Where the current situation in terms of the monitoring within the Eastern Arc Mountains is outlined. It covers both the work being done by the Government of Tanzania and those NGO partners receiving funding through the Critical Ecosystem Partnership Fund as these two bodies have agreed to share data on the basis of a MOU signed in 2006.
- 2) *Way forward with monitoring*. These short sections outlines what needs to be done to build upon the monitoring work that is being undertaken already.
- 3) *Matrix*. This matrix includes agreed targets and timescales for the various proposed elements of the work.

### **The current situation**

Impact Monitoring. For some of the impact measurements identified in the National Forest Programme, there is reasonable baseline data on the Eastern Arc Mountains. This baseline data has mainly been collected by special projects or targeted surveys. Most of these have been undertaken by local or foreign Universities or consultancy companies. These studies cover a number of issues:

- Forest Area
- Protected Areas coverage
- Forest condition (including inventory and permanent sample plots)
- Water flows
- Endemic and threatened species
- Knowledge, attitudes and practices

Similar issues are also the focus of work by the CEPF funded monitoring efforts in the region, which are coordinated by BirdLife International.

Together the government and CEPF funded impact baselines in the area form a solid basis to measure conservation achievement. There is also some funding in place from UNDP-GEF and CEPF to repeat these baselines to measure impact of the various conservation interventions. These baselines will be repeated in 2008/09.

Performance monitoring. Some of the monitoring indicators in the National Forest Programme matrix at the output level are also being monitored in the field. Data collection is through projects of FBD, NGO projects and through the routine work of the catchment Forestry and District forest officers. Our assessment of the current situation is that:

- The available government budget only allows simple data collection to be undertaken on a regular basis. This might be designed to capture information on forest management issues (reserves status, management effectiveness, boundaries demarcation, mapping, inventory, patrol, arrests, tree planting, locally based Income Generating Activities etc).
- Various project budgets (Catchment Forest Programme (NORAD support), CMEAMF (UNDP-GEF support), PFM (DANIDA and FINNIDA support), various NGOs etc) allow the collection of more detailed performance monitoring data. These data fit the constraints of the projects and may not exactly follow the needs of the National Forest Programme – but they can contribute to it.
- In some of the existing or proposed Joint Forest Management agreements there is also a potential to include resource monitoring as a part of the management agreements. In these cases the monitoring would be undertaken by local people and fed back to the districts.

### **Way forward with monitoring in the Eastern Arc Mountains**

The way forward with monitoring and evaluation in the Eastern Arc Mountains – and the reserves there that are managed by the Forestry and Beekeeping Division is closely tied to restructuring of the Division. A clear monitoring and evaluation unit structure needs to be established. This needs to be staffed and collect the data that comes from the various component parts of FBD. For the Eastern Arc Mountains – the data should be fed into the system through the catchment and mangroves programme. Once data are collated at high level, then they might be used for decision-making. Once that happens data collection would become a central part of the culture of the Division, or its successor agency. A detailed consultancy is underway that will develop the mechanics of the FBD monitoring and evaluation database.

In the meantime, when there is no functioning database at FBD – the approach to making data available to the broader world has entailed making consultancy and other reports available on the internet. This at least allows some of the knowledge to be more broadly shared, and will also help prevent the same piece of work being done more than once (which has happened in the past).

The various NGOs operating in the area are amalgamating data on sites, species and habitats within a 'Outcomes' database that has been developed by Conservation International in the USA. The outcomes database will be linked through the internet to the system in Conservation International and the data will be made freely available at that point.

There is a signed MOU (February 2006) between FBD and Conservation International provides the potential to share data collected by government and NGOs in the Eastern Arc Mountains. Collectively these two sets of data may allow a much better assessment of changes over time. As such the Eastern Arc Mountains might become a test case where Government and Non-Governmental actors can work together to develop a workable monitoring system that provides what they both need.

At the District level some clear guidance is required on what sets of data they should be collecting and how these might either be compiled at District level or sent to the relevant line Ministry (PMO RALG or MNRT). What happens to the data at that level also needs to be clarified in terms of developing a monitoring system that has use for FBD. In terms of data sets such as those coming from the Participatory Forest Management project – data are being amalgamated by a dedicated officer within Regional and Local Government.

### **3. Background**

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#### **3.1 General**

The “Conservation and Management of the Eastern Arc Mountains Mountain Forests” (CMEAMF) Project (GEF-UNDP URT/01/32) has its roots in the 1997 International Conference on the Eastern Arc Mountains, organised by TAFORI in Morogoro.

Following the recommendations from that conference the Forest and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism (MNRT) initiated the process of developing a full project proposal for the GEF. The GEF project is for \$12 million and contains two major elements: one developed through the World Bank for an endowment trust fund and the second developed through the UNDP to assist FBD in its work to improve conservation in the Eastern Arc Mountains.

The Eastern Arc Mountains Conservation Endowment Fund (EAMCEF) contains \$7 million World Bank GEF funds. It also has \$2 million from World Bank IDA funds that will run the establishment of the secretariat for the first 5 years.

The UNDP GEF project support through FBD contains the development of a holistic conservation strategy for the Eastern Arc Mountains (\$2.14 million), and a site-based project in the Uluguru Mountains (\$2.86 million).

Both the World Bank GEF and the UNDP GEF project elements are based in the same office complex in Morogoro.

The GEF support has been fully integrated into the Tanzania Forest Conservation and Management Project (TFCMP), which is the primary financial mechanism that has been mobilized to implement the National Forest Program (NFP). TFCMP is a \$50.1 million initiative (which includes US\$ 31.1 million in IDA financing) and it supports: the processes of institutional reform for the FBD; community-based forest and woodland protection and management; improved forest governance; and increased involvement of the private sector in the management of industrial plantations. Other donors include DANIDA, FINNIDA, and GTZ.

CMEAMF has adopted a partnership approach with all Eastern Arc Mountains stakeholders to facilitate the development and implementation of the strategy. Strong partnerships are already developed with the Catchment Forestry Programme and Monitoring and Evaluation Unit of FBD, with the Eastern Arc Mountains Conservation Endowment Fund, with the Critical Ecosystem Partnership Fund ([www.cepf.web](http://www.cepf.web)) and with environmental NGOs and projects operating in the area.

<p><b>Conservation and Management of the Eastern Arc Mountains Mountain Forests (CMEAMF)</b></p>
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<p>The CMEAMF project aims to improve the prospects for long term sustainable conservation of the globally important forests of the Eastern Arc Mountains. It is coordinated by the Government of Tanzania Forest and Beekeeping Division in the Ministry of Natural Resources and Tourism, with technical inputs from two NGOs - CARE and Tanzania Forest Conservation Group. The project will run for 5 years (2004-2008) and is part of a larger funding programme to assist FBD with the better management of its forest resources. CMEAMF is funded by the Global Environment Facility through UNDP.</p>
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### 3.2 Thematic strategies

The project has an output that relates to the development of thematic strategies to enhance conservation within the Eastern Arc Mountains region: *A set of thematic strategies for biodiversity conservation are developed and implemented – through both macro frameworks and individual management plan processes.*

This document represents one of those thematic strategies. Others will be developed on a number of other themes; fire management, sustainable forest use, sustainable financing (water and carbon service payments), protected areas, biodiversity conservation. These cover the most important issues facing the sustainable conservation of the Eastern Arc Mountains Mountain forests, as defined by stakeholders from 14 separate District meetings and 4 meetings bringing groups of stakeholders together.

### 3.3 Policy Framework

The need for Forestry and Beekeeping to maintain accurate records on its forest estate, the habitats and species these areas contain, and the management work that goes on in those areas was brought strongly to attention at the 2006 joint review of the Tanzanian National Forest Programme. Consultants pointed out that they had struggled to find the relevant data that would have allowed them to know how well Tanzania had been doing to achieve the various elements of the NFP. This was despite the development of a detailed NFP monitoring matrix that should have (if kept updated) allowed anyone coming to the forestry sector to know the key facts that would allow progress to be measured and evaluated.

National Forest Policy (1998) and National Beekeeping Policy (1998). There is no mention of monitoring or evaluation in the National Forest or National Beekeeping Policy.

Forest Act no.14 (2002) and Beekeeping Act (2002). There is no mention of monitoring or evaluation in the Forest Act of 2002 or the Beekeeping Act of 2002.

National Forest Programme (2001). The NFP Document provides a comprehensive framework for managing forests sustainably by all stakeholders. A comprehensive Monitoring and Evaluation System is envisaged in the National Forest Programme to allow managers to make informed decisions on a daily basis. The issues that need to be monitored according to the National Forest programme document are as follows:

- Produce socio-economic benefits from forests
- Safeguard biological diversity
- Safeguard forest ecosystem health and vitality
- Take care of productive functions of forests
- Safeguard environmental and conservation functions of forests
- Benefit from forest resources and their contribution to global carbon cycles

However, the National Forest programme document itself does not contain a monitoring and evaluation matrix. The indicators for the National Forest programme were developed after the document was finalised. The resulting matrix forms the basis of monitoring the implementation and impact of the National Forest programme in Tanzania.

National Beekeeping Programme (2001).

The NBP Document provides a comprehensive framework for managing the bee resources of Tanzania. The sub-programmes that need to be developed are as follows:

- Land Use Planning
- Conservation of Bee Forage
- Improvement of quantity and quality of bee products
- Formulation and harmonization of Laws, Regulations and Guideline
- Development of Sector Specific Impact Assessment Guidelines
- Human resources capacity building
- Strengthening Extension services and Awareness creation in beekeeping management
- Beekeeping resources information management
- Beekeeping Research
- Beekeeping Financing

A comprehensive monitoring system is needed to make informed decisions for better beekeeping management. Currently the framework for data collection and information management does not exist and this has been a drawback in consistent planning and monitoring. This current document does not focus very much on what is needed to monitor beekeeping issues in Tanzania as the Eastern Arc Mountains and the forests they support do not contain important beekeeping values.

## 4. Situation Analysis

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This section outlines the current monitoring situation in the Eastern Arc Mountains, covering the work undertaken through government, and through NGOs and researchers.

### 4.1 Government monitoring

The National Forest Programme contains a number of Sub-programmes covering the full array of forestry issues in Tanzania. As a project – Conservation and management of the Eastern Arc Mountains Mountain Forests cannot address all the monitoring requirements, even within a restricted region such as the Eastern Arc Mountains. The primary monitoring interest is therefore within the following Sub-Programmes of the National Forest Programme:

- 1.1 Participatory Forest Management and Gender Aspects
- 1.2 Forest Biodiversity Conservation and Management
- 1.3. Forest Resources Information and Management Planning
- 2.5 Forestry Research
- 2.7 Forest Resources Valuation
- 3.1 Development of Laws and Regulations

As pointed out in the review of the National Forest Programme (March 2006) monitoring is a major weakness in the current implementation of the Programme. The report from this evaluation mission noted the following:

A number of different steps are in place to try and strengthen this reporting so that progress towards achieving the various Sub-programmes can be reported in future review missions. These steps are as follows:

- The development of a usable monitoring database has been contracted to consultants and work will start in March 2006. This will deliver a database tailored around the various Sub-programmes of the NFP within the coming 6 months.
- Programmes, Sections and Projects of FBD are encouraged to compile their own monitoring data against the format of the NFP so that the task of entering in within the system once developed will be simplified. This is being actively done in the Eastern Arc Mountains region by
  - o the Participatory Forest Management programme (Sub-Programme 1.1, 1.3, 2.5, 3.1),
  - o the Catchment and Mangroves Conservation Programme (Sub-Programme 1.1, 1.2, 1.3, 2.5, 2.7, 3.1),
  - o the project Conservation and Management of the Eastern Arc Mountains Mountain Forests (Sub-Programme 1.1, 1.2, 1.3, 2.5, 2.7, 3.1),
  - o and the component of Tanzania Forest Conservation and Management Project working on Private Sector Involvement.

### 4.2 Non-government Monitoring

Non-governmental organisations, including Universities have been collecting data from the Eastern Arc Mountains over many years. Until recently most of the monitoring systems were housed outside of the country. As examples:

- *World Database on Protected Areas*. This global database is maintained by UNEP-WCMC for the World Conservation Union (IUCN) and the United Nations.

The database is available online ([www.wdpa.org](http://www.wdpa.org)) and attempts to contain accurate data on the number, status, size and management regime of the worlds protected areas. The primary database contains only those reserves which have been coded with an IUCN protected area category (I-VI). A separate database contains 'other' reserves that do not have an IUCN protected area category. Attempts are being made to link Management Effectiveness data to the protected area database so that it is clear whether a reserve is managed or is merely a paper park with no tangible inputs to management.

- *Global 'red list' of Species Threatened with Extinction.* This database is also maintained at UNEP-WCMC for the World Conservation Union (IUCN). The database is freely available online ([www.redlist.org](http://www.redlist.org)) and attempts to contain accurate data on all species that are threatened with extinction in the world. Data are most accurate for birds, mammals, amphibians and trees. Various levels of threat are recognised, with species in the higher categories being regarded as facing more immediate danger of becoming extinct.

However in recent years databases have been developed by academics and NGOs at the national or regional level. Two examples in Tanzania are:

- *National Biodiversity database at the University of Dar es Salaam.* This database aims to hold information on the species found in different parts of the country. It is mainly based on specimens collected from various forests. A large number of these specimens are from the Forest Reserves of the Eastern Arc Mountains. The database is being added too every year as more research is carried out and the new records are added.
- *World Bird Database and Important Bird Areas Database.* These two databases have been developed by BirdLife International in Cambridge (UK). The Tanzanian versions of these databases are managed by the Wildlife Conservation Society of Tanzania. Elements of the databases aim to capture trends in threatened and otherwise endemic bird species over time, and also to measure changes in the state of Important Bird Area sites.
- *'Outcomes Database'.* The Outcomes database has been developed by Conservation International in Washington DC (USA) as a mechanism to capture data on species, sites and conservation corridors. An agreement between BirdLife International and Conservation International means that the World Bird Database, Important Bird Areas database and the 'Outcomes' databases are in the process of being amalgamated into one system. In Tanzania the outcomes database is managed by the Wildlife Conservation Society of Tanzania. At the present time the outcomes database does not allow time-series or trends data to be captured. However this is in the process of being modified and at some point during 2006 the database will be able to be used as a monitoring tool.

### **4.3 Collaboration over monitoring between Government and Non-Government Stakeholders**

Until recently there has been little or no sharing of monitoring data between the various stakeholders (government, NGO, academics, companies). However, that trend is changing as internet and computer technology allows simpler sharing of information. The internet is also providing greater and greater access to compiled sets of useful data on habitat cover, protected areas, species status etc.

In accordance with this global trend the Forestry and Beekeeping Division has initiated detailed cooperation with the Critical Ecosystem Partnership Fund – which provides

funding to civil society organisations working in biodiversity hotspots of the world – such as the Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya. This cooperation was formalised by the signing of a MOU on the 23<sup>rd</sup> February – that specifies the details of data that will be shared between the Forestry and Beekeeping Division and the projects of the Critical Ecosystem Partnership Fund – specifically the ‘sustainable biodiversity monitoring project’ that is being managed by the BirdLife International partnership – headed by the Wildlife Conservation Society of Tanzania in Tanzania.

This agreement specifies the sharing of data in the following ways:

CMEAMF will complete the following tasks:

- Complete and share the results of a forest change analysis for the Eastern Arc Mountains, in collaboration with the Sokoine University of Agriculture and the Institute of Resource Assessment at the University of Dar es Salaam. Methodology will be standardised to that used by CI/CABS and the CEPF/BirdLife project.
- Complete and share the results of an analysis of forest disturbance in a sample of 27 Forest Reserves in the Eastern Arc Mountains, in collaboration with the Sokoine University of Agriculture.
- Complete and share the results of ‘threat reduction forms’ for a sample of 25 Forest Reserves in the Eastern Arc Mountains, in collaboration with the Sokoine University of Agriculture.
- Complete and share the results of ‘management effectiveness tracking tools’ for 126 of the 150 Forest Reserves in the Eastern Arc Mountains, in collaboration with the Sokoine University of Agriculture.
- Compile, verify and share a list of the reserves (Forest Reserves and other protected areas) across the Eastern Arc Mountains, in collaboration with the Survey and Mapping unit of FBD.
- Develop and share a set of Excel spreadsheets on the endemic and near-endemic vertebrates and plants in the various forests of the Eastern Arc Mountains, in collaboration with the Eastern Arc Mountains Trust Fund and the University of Dar es Salaam.
- Update and share an existing list of publications relating to biodiversity conservation in the Eastern Arc Mountains, in collaboration with TAFORI, COSTECH and other relevant Tanzanian institutions.
- Complete and share the results of an assessment of the level of knowledge, attitudes, and practices across the Eastern Arc Mountains, in collaboration with TFCG.
- Update and share GIS map of the protected areas of the Eastern Arc Mountains, in collaboration with the Institute of Resource Assessment, University of Dar es Salaam.
- Make available any reports from past FBD project reports that contain data on species distributions, forest disturbance, threats, and management effectiveness.
- Make available any GIS data from past FBD projects relating to the hotspot area.

BirdLife International (through Nature Kenya and WCST) will complete the following tasks:

- Standardize the methodologies used to collect data in CEPF funded field projects in Tanzania.
- Collate and make available to FBD the results of biological surveys being funded by CEPF within the hotspot.
- Assist, through sub-contracting CI/CABS, in the development of a harmonized forest change map across the Eastern Arc Mountains and coastal forests in

Tanzania and Kenya. Making sure that the map is available to CMEAMF and to FBD.

- Collate and make available to FBD the results of forest disturbance and management effectiveness tracking tool sheets completed by CEPF funded projects within the hotspot
- Collate and make available to FBD any field verification data on habitats at different geographical points as are collected by CEPF funded projects within the hotspot.
- Collate and make available to FBD information on the distribution of species of conservation concern (IUCN red listed species) within the hotspot.
- Provide the staff and resources to compile and make available to FBD available data from current field projects, and from past projects that have looked at issues of forest disturbance, threats, management effectiveness.
- Provide the staff and resources to compile the updated GIS data from the coastal forests (funded through WWF) and the Tanzanian Eastern Arc Mountains (funded through UNDP-GEF) into a single compiled database and make this available to the World Database on Protected Areas through the WDPA consortium, FBD, and other relevant stakeholders including the World Bird Database.

## 5. Proposed Monitoring Framework for the Eastern Arc Mountains

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In this section of the report we outline a monitoring framework for the Eastern Arc Mountains over the coming 5 years. This is based partly on existing donor commitments to the forest sector and partly on work that will be required from within the resources of government and civil society. A coordination mechanism for the two strands of monitoring is also proposed.

### 5.1 Impact Monitoring within the Eastern Arc Mountains

This is the monitoring of long-term issues relating to the conservation of the Eastern Arc Mountains. The measurement of conservation impact has not traditionally formed a part of the monitoring regimes of the Tanzanian government or other stakeholders. The monitoring matrix that is being developed for the National Forest Programme outlines indicators at the impact and output (performance level). Here we review how data collected for the Eastern Arc Mountains, can be used to feed into the developing monitoring systems of the Forestry and Beekeeping Division. This includes data that are collected by both the government of Tanzania and various NGOs and research projects.

#### Habitats

The coverage of important habitats and their condition are well-accepted measurements that can assist defining conservation impact. Habitat cover can be measured using remote sensing or aerial photographic techniques and forest condition using field-based or form-filling techniques.

#### Habitat Area.

Relevant indicator in the National Forest programme monitoring matrix

#### **Sub-development programme 1.2**

#### **(a) Area of remaining forest cover (includes woodlands, mangroves, closed forest and thickets)**

In the context of the Eastern Arc Mountains, a baseline of forest cover, and forest loss, has been established across the years 1975-2000. The results are summarised below (Table 1). Periodic measurement of the area of forest in all (or a sample of) the Eastern Arc Mountains would provide a way to measure impact over the longer term. This only needs to be done every 5 years and the expertise is available in Tanzania to do this. Costs would most likely need to be met through special projects as this is an expensive undertaking. Tanzanian government resources will not be sufficient to cover the costs of such an exercise, and hence the Forestry and Beekeeping Division will need to convince donors to pay for such exercises on a regular (perhaps every 5 years) basis.

**Table 1. Baseline of Forest Area in the Eastern Arc Mountains (from CMEAMF 2006)**

Mountain block	Forest area in 1970s (ha)	Forest area in late 1980s/early 1990s (ha)	Forest area in 2000s (ha)	Forest area change 1970s-1980/90s (ha)	Forest area change 1980/90s-2000s (ha)	Forest area change 1970s-2000s (ha)	Proportion of forest loss 1970s-2000s (%)
North Pare	2880	2720	2720	160	0	160	6
South Pare	15220	13860	13850	1360	10	1370	9
West Usambara	35440	32110	31890	3330	220	3550	10
East Usambara	29890	26540	26270	3350	270	3620	12
North Nguru	19730	18770	18760	960	10	970	5
South Nguru	30770	29790	29680	980	110	1090	4
Ukaguru	18070	17230	17200	840	30	870	5
Uluguru	31540	28680	27810	2860	870	3730	12
Rubeho	51770	46730	46450	5040	280	5320	10
Malundwe	1335	1330	1330	0	5	5	0
Udzungwa	138370	135390	135280	2980	110	3090	2
Mahenge	2050	1940	1940	110	0	110	5
<b>Total</b>	<b>377065</b>	<b>355090</b>	<b>353180</b>	<b>21975</b>	<b>1910</b>	<b>23885</b>	<b>6</b>

*Way forward with habitat area monitoring:* The following might be considered:

- Special FBD projects, depending on the availability of funds, could be used to assess the area of forest remaining in the Eastern Arc Mountains (and elsewhere in Tanzania), on a 5-year basis. Donor funding will be required as this is an expensive undertaking.
- Links could be made with NGOs and other agencies – in particular the Critical Ecosystem Partnership Fund – to provide assistance to FBD for the forest area assessment in c.2008 (the end of the current CEPF investment).

#### Habitat Condition.

Relevant indicator in the National Forest programme monitoring matrix

#### **Sub-development programme 1.2**

**(a) All prioritised forest biodiversity sites have been surveyed and threats identified by June 2008**

**(b) Area of forest biodiversity under effective management increased by 10% by June 2008**

The condition of the Eastern Arc Mountains mountain forests, whether the various threats they face have been mitigated, and the effectiveness of their management regimes is another relevant measure of how well conservation interventions are being performed.

These metrics have also been summarised for a sample of the Eastern Arc Mountains. Some of these can be measured using simple and cheap processes (filling forms), while others require the development of special projects.

a) *Management Effectiveness Tracking Tool*. This form has been developed by WWF and the World Bank. It is a simple form system that uses a scoring system to define how well managed reserves are. Completing the form requires some training, but can be undertaken by District Forest Officers, NGOs and people working in and around forests. It is not expensive and the results are easy to analyse using widely available computer skills. One problem with this method is the potential for people to bias the results if they know what the previous scores were. Hence it is not entirely objective in its approach.

**Table 2. Baseline Management Effectiveness tracking tool scores for a sample of managed sites in the Eastern Arc Mountains (CMEAMF 2005).**

District	Central Government Forest Reserve (n=85)	Local Government Forest Reserve (n=18)	Proposed Central Government Forest Reserve (n=18)	Village Forest Reserve (n=2)	Privately owned forest (n=2)
Mwanga	44.7		33.6		
Same	39.9	37.2	31		
Lushoto	37	42.2			74
Korogwe	38.5			41.7	42.7
Muheza	36.1		17.3	50	
Kilindi	37.2				
Mvomero	35.6				
Morogoro	32.66		17.9		
Kilosa	34.1	23.3			
Kilombero	36.84	31.65			
Ulanga	30.7				
Kilolo	32		25.75		
Mufindi	31.2	38	24.9		
Mpwapwa	33.3				
<b>Mean</b>	<b>35.7</b>	<b>34.47</b>	<b>25.075</b>	<b>45.85</b>	<b>58.35</b>

b) *Threat Reduction Assessment Tool*. This form was developed by the Biodiversity Support programme in the USA. It uses a form and meetings with local managers to define a set of threats and then calculate how much those threats have been reduced (or met). Threat Reduction Assessment methods can be undertaken by District Forest Officers, NGOs and people working in and around forests. The technique is not very expensive and the results are easy to analyse using widely available computer skills. Data collected by the Conservation and Management of the Eastern Arc Mountains Mountain Forests project is summarised below (Table 3). As with the management effectiveness tracking tool, the threat reduction tracking tool also has problems due to the fact that it is subject to human bias if scores from previous years are known. It is thus not fully objective in the data it provides.

**Table 3. Threat Reduction Assessment Scores for a sample of 26 Eastern Arc Mountains Forests (CMEAMF 2005)**

Forest Name (names still need to be found)	Central Government Forest Reserve	Local Government Forest Reserve	Proposed Central Government Forest Reserve	Private Forest
1	45.9	0	0	0
2	43.1	0	0	0
3	37	0	0	0
4	32	0	0	0
5	43.4	0	0	0
6	44.4	0	0	0
7	38.3	0	0	0
8	38	0	0	0
9	36.8	0	0	0
10	30.1	0	0	0
11	39.7	0	0	0
12	28.1	0	0	0
13	28.2	0	0	0
14	28.5	0	0	0
15	35.1	0	0	0
16	27	0	0	0
17	31.4	0	0	0
18	39.1	0	0	0
19	37.8	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	30.8	0	0
25	0	41.1	38.5	66.8
26	0	31.8	26.3	71.4
<b>TOTAL</b>	<b>683.9</b>	<b>103.7</b>	<b>64.8</b>	<b>138.2</b>
<b>MEAN</b>	<b>36.0</b>	<b>34.6</b>	<b>32.4</b>	<b>69.1</b>

c) *Forest Condition Measurements.* There are various methods to measure the degree of disturbance to forests. The most commonly used methods in Tanzania are forest disturbance transects where the number of live, dead and cut trees and poles are counted on either side of a straight line transect through the forest. More than 50 forests within the Eastern Arc Mountains have been assessed in this way, and the data provides an assessment of the condition of these sites. We present sample data from 26 forests (Table 4), but there is significantly more baseline and some repeat data that might be compiled and analysed on this theme.

On average across a sample of 25 forests there are 44 cut trees and 52 cut poles per hectare of forest (where the density of uncut trees is 340 live trees and 418 live poles per hectare). Hence somewhere below 10% of the trees are cut and just over 10% of the poles are cut on average across all forests. In forests with weak management and many surrounding people who lack alternatives, rates of cutting can be higher and in a few

places (e.g. some forests managed by the District authorities) almost all larger trees have already been cut for various forms of utilisation. In other forests (remote or well managed) the levels of disturbance are lower than this average.

*Way forward with habitat condition monitoring:* The following could be considered:

- *Management Effectiveness Tracking tools.* This system could be instigated as a regular part of monitoring at the District Forest Officer (within the District) and Regional and District Catchment Forestry (Central Government) levels. Annual or even biannual scoring of the sheets would allow trends in effectiveness to be tracked at a simple level. This will be enough for most purposes. An example of the sheet is presented as Appendix 5.
- *Threat Reduction Assessment tools.* These are somewhat more difficult to apply and if they were used for regular monitoring there would probably be a tendency for the threats to be scored as declining, regardless of the actual situation. Hence it is recommended that this tool is most suitable for use on FBD projects with external funding where there are independent staff who might verify the scores that are provided. Nevertheless, it is useful for FBD to know if the major threats to its reserves are being reduced – or not. An example of the sheet is presented as Appendix 6.
- *Forest condition transects.* Collecting disturbance data using transects within the forest is being undertaken by various NGO projects, and this is likely to continue. The NGO sector is hoping to bring together all the relevant disturbance data and this will provide a useful exercise. It is recommended that FBD projects and NGO projects should be encouraged to use the same methodology (see Appendix 7). This message is also being promoted by the projects supported by the Critical Ecosystem Partnership Fund, and they are in the process of compiling the available transect data for the region.
- *Participatory forest resources assessment.* This method involves the local people being involved in the collection of data, together with the foresters. It is a stage in the development of Participatory Forest Management (PFM) within the forests of the country. The best developed examples currently are in the forests of Iringa Region where a project supported the implementation of a system for monitoring resource use by local people, linked to making detailed management decisions over the future of the forest.
- *Permanent sample plot establishment.* A number of permanent sample plots have already been established in the forests of the Eastern Arc, by researchers such as Jon Lovett, but also by institutions such as the Tanzania Forest Research Institute, Sokoine University of Agriculture and the US Forest Service. These plots measure the size and growth rates of trees, stocking status of valuable timber species, and the species composition of the reserves. They would allow changes in forest composition to be determined, as well as changes in the amount of standing timber volume over time.

**Table 4. Baseline of forest disturbance measurements in a sample of Eastern Arc Mountains forests (CMEAMF 2005)**

		Total area of transect (ha)	Total no. sampled	Average live per ha	Average dead per ha	Average old cut per ha	Average new cut per ha		Total no. sampled	Average live per ha	Average dead per ha	Average old cut per ha	Average new cut per ha
Mramba	Trees	3	1197	346.7	42.7	7	2	Poles	2362	693.3	56.7	31.7	5.7
Kiverenge	Trees	2.4	659	185	34	53	2.1	Poles	893	292	15	59	7.1
Chambogo	Trees	5.45	2476	343.3	23.5	81.7	5.9	Poles	3586	494.9	14.1	134.7	14.3
Vumari	Trees	2	937	306.5	118.5	118.5	1.5	Poles	1558	678	79.5	79.5	4.5
Mkusu	Trees	4.75	1813	311.8	18.1	47.6	4.2	Poles	2282	408.2	3.2	54.3	14.7
Mazumbai	Trees	1.3	885	580	100.8	0	0	Poles	1042	781.5	20	0	0
Bombo	Trees	3.5	1596	289.1	27.1	135.4	4.3	Poles	1497	335.1	17.7	72.9	2
West													
Ambangulu	Trees	0.8	315	362.5	20	7.5	3.8	Poles	633	707.5	10	71.3	2.5
Nilo	Trees	6.1	2579	381.8	12	26.6	2.5	Poles	1787	244.1	0.3	44.1	4.4
Mtai	Trees	3.2	1473	400	25	34	0.6	Poles	1927	554	5	40	2.5
Nguru North	Trees	11.9	3720	283.7	25.7	2.9	0.3	Poles	3484	271.4	18.2	2	1.1
Kilindi	Trees	5	2397	430.2	47	0.8	1.4	Poles	2764	528.2	22.4	1.8	0.4
Idewa	Trees	0.85	889	858.8	103.5	83.5	0	Poles	729	664.7	47.1	140	0.9
Ihang'ana	Trees	3.05	2285	570.2	77.4	91.5	10.2	Poles	2447	621.6	56.1	110.5	14.1
Kisinga	Trees	8.7	3741	322.6	94.8	11.7	0.8	Poles	3299	333.4	28	16.9	0.8
Lugala													
Kitonga	Trees	3.05	830	150.8	7.5	109.2	4.6	Poles	848	200.3	6.6	70.2	1
Mselezi	Trees	2.3	724	240	47.4	21.7	5.6	Poles	673	226.1	30.4	36.1	0
Naminga	Trees	1.05	462	304.8	109.5	25.7	0	Poles	518	407.6	70.5	15.2	0
Iyondo	Trees	9.5	4149	322.5	103.1	10.8	0.3	Poles	5167	490.1	46	7.5	0.3
Ihanga	Trees	3.5	867	134.6	11.4	95.4	6.3	Poles	1258	242	2	108.9	6.6
Mangalisa	Trees	5.05	1029	144.4	41	17.2	1.2	Poles	796	113.3	15	29.1	0.2

Mafwomero	Trees	3.3	2497	548.2	180.3	28.2	0	Poles	2312	586.1	68.5	43.3	2.7
Ukwiva	Trees	9.7	3611	307.6	57.2	7.3	0.1	Poles	2543	237.8	21.2	3.1	0
Mamiwa-Kisara	Trees	3.9	2369	433.3	146.7	27.4	0	Poles	2302	474.6	74.9	40.3	0.5
Kanga	Trees	4.25	1182	206.1	30.8	39.3	1.9	Poles	854	159.3	16.2	24.9	0.5
Nguru South	Trees	9.55	1105	87.5	5	18.7	4.4	Poles	1443	111.4	11.8	24.7	3.1
	<b>Total</b>	<b>117.15</b>	<b>45,787.00</b>	<b>8,852.00</b>	<b>1,510.00</b>	<b>1,102.60</b>	<b>64.00</b>		<b>49,004.00</b>	<b>10,856.50</b>	<b>756.40</b>	<b>1,262.00</b>	<b>89.9</b>
	Mean per forest	4.51	1,761.04	340.46	58.08	42.41	2.46		1,884.77	417.56	29.09	48.54	3.4

## Protected Sites.

The relevant indicator in the National Forest Programme monitoring matrix

**Sub-development programme 1.2. (a) Total area of forest reserved by either central or local government for conservation or sustainable utilisation purposes**

**Sub-development programme 1.3. (b) Number of declared or gazetted Village Land Forest Reserves, Bee Reserves, Local Authority and National Forest Reserves**

The total area of reserved lands is often used as the measurement of conservation impact, sometimes broken down by the types of management that are allowed. Categorisation of the management regime and hence the kinds of utilisation that will take place often follows the global schemes set up by international conservation agencies – for example the protected area coding system established by the World Conservation Union (IUCN). However, there are often national schemes that do not fit with the IUCN coding system and it is also necessary in the context of Tanzania to consider Nature Forest Reserves, national Forest Reserves, local authority Forest Reserves and village Forest Reserves as additional layers of protection of important habitats.

The current status of the network of reserves in the Eastern Arc Mountains is summarised in Table 5. A full list of the various categories of reserves is available on [www.easternarc.or.tz](http://www.easternarc.or.tz).

**Table 5. Reserve network across the Eastern Arc Mountains (Forestry and Beekeeping Division 2005).**

District	National Parks (name)	Nature Reserve (ha)	National FR area (ha)	Local Authority FR (ha)	Village Forest Reserve (ha)	Private Forests (ha)
Mpwapwa			15,465	0	0	0
Kilolo	Part Udzungwa		80,554	0	0	0
Mufindi			21,812	1,547	282	13,450
Same			19,748	7,420		0
Mwanga			7,407	0	0	0
Kilindi			30,337	0	0	0
Lushoto			34,015	1,360	2,211	500
Korogwe			11,047	0	0	3,521
Muheza		8,300	31,599	0	988	215
Kilombero	Part Udzungwa		67,337	3,467	0	0
Kilosa	Part Mikumi		80,151	0	0	0
Morogoro	Part Mikumi		35,628	20	0	0
Mvomero			31,792	0	0	0
Ulanga			4,956	0	0	0
<b>TOTAL</b>		<b>8,300</b>	<b>471,848</b>	<b>13,814</b>	<b>3,481</b>	<b>17,686</b>

*Way forward with monitoring the protected area network.* The following is suggested:

- The FBD survey and mapping division maintains the official list of reserves for the Forest Reserves in the country. This should be maintained to take consideration of gazettments, degazettments, variation orders and changes of status from e.g. Forest Reserve to National Park, or Forest Reserve to Nature Forest Reserve. There is a need to significantly update and check this list so that it is fully accurate and can be used for forest management in the country. District and Regional forest offices need to be involved in the collection, checking and production of a set of definitive maps of the Forest Reserves in the Eastern Arc Mountains region.
- FBD survey and mapping unit also has an important role to play in digitising the original boundary maps of the various Forest Reserves (JB maps). All such mps need to be scanned and then georeferenced so that they might be overlaid onto the habitat map of the region. This would allow some checking of the most obvious mistakes on the JB maps in relation to what is on the ground (in terms of forest cover) according to the satellite images. Once those maps with the greatest lack of agreement with what is on the ground are identified, then it would be possible to undertake ground survey of the problematic areas and obtain GPS points for the beacons and make a more accurate map.

Species.

The relevant indicator in the National Forest programme monitoring matrix

**Sub-development programme 1.2. IUCN Red List Status for forest dependent vertebrate species**

The Eastern Arc Mountains contain a large number of narrowly endemic species, many of which are threatened with extinction and placed upon the IUCN 'red list' [www.redlist.org](http://www.redlist.org). These species are of global value for conservation and represent one of the primary values of the forests of the Eastern Arc Mountains. A summary of the number of endemic species in each of the Eastern Arc Mountains Mountain blocks is summarised as Table 6. The number of these that are threatened species is outlined in Table 7. For only a few of these species do we know their population status and for even fewer do we know their population trends. Hence utilising species to monitoring the impact of conservation interventions in the Eastern Arc Mountains is challenging. Such an assessment relies on specialised studies undertaken by experts familiar with the methods and the species concerned.

**Table 6. Number of endemic and near endemic species by taxonomic group in the Eastern Arc Mountains (November 2005)**

Mountain block	Approximate forest area remaining (hectares)	Single block endemic (one mountain only)	Eastern Arc Mountains endemics (one to 13 blocks)	Near endemic (also coastal forest, Southern Highlands, or Kilimanjaro area)	Number of Eastern Arc Mountains endemic trees
Taita (Kenya)	300	6	8	11	8
North Pare	2,500	0	5	12	0
South Pare	13,540	2	8	19	1
West	26,500	5	22	48	27

Usambara					
East Usambara	25,800	4	35	78	40
Nguu	24,900	0	9	27	6
Nguru	34,000	0	20	52	25
Uluguru	27,000	14	45	82	26
Ukaguru	17,400	1	10	27	4
Rubeho	47,400	2	12	35	0
Malundwe	450	0	0	2	4
Mahenge	1,940	0	2	11	5
Udzungwa	102,400	17	41	96	37

**Table 7. Threatened and potentially threatened species of birds, mammals and amphibians from the Eastern Arc Mountains (November 2005)**

Threat category	Bird	Mammal	Reptile*	Amphibian	Plant*
EX	0	0	-	0	-
EW	0	0	-	0**	-
Critically Endangered	3	0	-	5	-
Endangered	8	5	-	14	-
Vulnerable	10	8	-	18	-
Data Deficient	0	5	-	3	-
Potentially threatened	4	4	Perhaps several tens of species	1	Perhaps 1,000 species (Luke and Gereau, unpublished)

\*\* the wild population of the Kihansi spray toad is dangerously low (early 2006)

*Way forward with species monitoring.* The following is suggested:

- A detailed population assessment is required for each of the threatened and endemic species in the Eastern Arc Mountains. These could only be undertaken as specific research projects. The following vertebrate species have been surveyed and might be the core of a species monitoring programme – Uluguru bush shrike (Uluguru), Loveridge’s Sunbird (Uluguru), Long-billed Tailorbird (East Usambara), Sanje Mangabey (Udzungwa), Iringa Red Colobus (Udzungwa). It is not known whether any of the plants have been surveyed in a way that would permit them to be monitored, although some of the plot data collected in various forests might form the basis for that to be done. Institutions that might be able to undertake such work include the University of Dar es Salaam, the Tanzania Forestry Research Institute, and various foreign universities (those active at present include Copenhagen in Denmark, Trento in Italy, the Field Museum in USA, and the Utah Museum in USA).
- Many of the species which are endemic or near-endemic to the Eastern Arc Mountains are not yet assessed against the IUCN criteria for threatened species. This is true for nearly all reptiles and many of the plants. Although the plants are being addressed through current CEPF investment into the region – the reptiles will still need to be tackled at a later date. This task is not suggested as one for FBD to perform because there are various specialists available for the task. However, knowing the current level of threat to the various species is important

for certain FBD management decisions – for example relating to the conservation of species like the Kihansi Spray Toad or other critically endangered species that might go extinct without management interventions.

Ecosystem services.

The relevant indicator in the National Forest Programme monitoring matrix

**There are no relevant indicators in the NFP matrix**

The Eastern Arc Mountains provide important services to people, in particular the provision of water for industry, and people. A baseline of water flows from the various Eastern Arc Mountains has been developed, showing that some rivers have declining flows and others have increasing flows.

Despite these variations, the overall trend across the entire region is for declining river flows in the long rains, long dry season and annually. Ideally the work to compile the relevant water flow data would be undertaken by the Water Basin Authorities and made freely available. However, in a number of areas the water recording stations are not functional and hence are not providing data. Moreover the capacity to analyse and make available the information on a regular basis is limited. Trends in water flow in selected rivers are outlined below.

**Table 8. Trends in seasonal mean flow rates in rivers from the Eastern Arc Mountains (significant trends are in bold)**

Basin/Sub-basin	Code	Useful records	Common period	Trend (whole period)					Trend (common period)				
				JF	MAM	JJAS	OND	Annual	JF	MAM	JJAS	OND	Annual
Sigi	1C1	1957 - 1989		0.32	-0.60	0.85	-0.08	-0.12	0.32	-0.60	0.85	-0.08	-0.12
Luengera	1DA1A	1962 - 1994	1968 – 1990	1.15	-0.25	-0.96	-0.05	-0.47	-1.00	0.06	-1.12	-1.00	-0.85
	1DA3A	1968 - 1990		-0.12	-0.12	-0.12	0.29	0.29	-0.12	-0.12	-0.12	0.29	0.29
Mkomazi	1DB2A	1962 - 1984	1962 – 1984	0.00	0.35	0.41	0.47	0.27	0.00	0.35	0.41	0.47	0.27
	1DB17	1962 - 1993*		0.37	-1.07	1.09	-0.47	1.33	0.82	1.09	-0.47	1.33	0.62
Wami	1G1	1954 - 1983	1969 – 1983	0.31	-1.47	-1.44	0.56	-0.62	1.06	0.12	0.12	1.93	1.29
	1G2	1955 - 1981		-0.46	-1.42	<b>-2.33</b>	-0.14	-1.28	-0.67	-0.22	<b>-3.19</b>	0.07	-0.37
	1G5A	1965 - 1983		-0.88	<b>-2.16</b>	<b>-2.08</b>	<b>-2.08</b>	-1.36	-1.29	-1.76	<b>-2.23</b>	-1.64	-1.06
	1GD31	1969 - 2002		-1.52	-1.05	-1.77	-1.07	-1.05	0.59	-0.47	-0.82	0.64	-0.23
Ruvu	1H5	1953 - 2004	1959 – 1987	<b>-2.18</b>	<b>-3.33</b>	<b>-3.77</b>	<b>-2.42</b>	<b>-3.32</b>	0.14	-1.27	-0.61	-0.47	-0.78
	1H8	1959 - 1999		-1.30	<b>-2.28</b>	<b>-2.34</b>	-0.80	<b>-2.48</b>	-0.63	-1.82	-0.88	-0.43	<b>-2.11</b>
	1HA9A	1954 - 1988		0.76	0.43	0.82	0.50	1.04	0.51	0.78	0.20	-0.80	0.57
	1HB2	1955 - 1987		1.47	-0.08	-0.50	0.53	0.70	<b>2.17</b>	-0.10	0.37	0.57	0.98
Kilombero	1KB8	1957 - 1985	1962 – 1983	0.47	-2.35	0.63	-0.14	-0.43	-1.80	-3.26	-1.68	<b>-2.84</b>	<b>-2.69</b>
	1KB9	1957 - 1984		<b>4.04</b>	<b>3.39</b>	<b>2.23</b>	1.23	<b>3.52</b>	<b>2.09</b>	1.14	0.44	0.00	1.14
	1KB10	1960 - 1986		0.09	-0.98	-0.83	1.10	1.10	-1.17	-0.28	-0.82	1.10	1.10
	1KB14	1958 - 1989		<b>-2.72</b>	<b>-3.88</b>	<b>-3.84</b>	<b>-3.28</b>	<b>-3.61</b>	<b>-2.59</b>	<b>-3.86</b>	<b>-4.05</b>	<b>-2.81</b>	<b>-3.79</b>
	1KB15	1958 - 1983		0.00	0.00	0.00	<b>4.81</b>	<b>4.84</b>	0.00	0.00	0.00	<b>4.84</b>	<b>4.84</b>
	1KB15A	1960 - 1990		1.70	1.79	<b>3.57</b>	<b>2.21</b>	<b>3.06</b>	0.19	<b>2.02</b>	<b>3.98</b>	1.45	<b>2.97</b>
1KB23	1962 - 1984	<b>-2.53</b>	<b>-3.21</b>	<b>-2.94</b>	-1.53	-1.64	<b>-2.47</b>	<b>-2.94</b>	<b>-2.94</b>	-1.64	-1.64		

Way forward with water monitoring in the Eastern Arc Mountains. The following is proposed:

- The various water basin authorities need to continue to collect the routine flow rate data from their existing flow stations across the rivers of the Eastern Arc Mountains. This will require the rehabilitation of a lot of gauging stations that have fallen into disrepair over the past years.

- Relevant authorities need to install new gauges at suitable sites close to, or within, the forest areas to investigate interactions between the forest cover and stream runoff. These include flow gauging stations, rainfall stations, climatic stations and observation wells for subsurface conditions.
- The Agency (or Ministry) responsible for water quality monitoring in the country needs to establish a regular monitoring network for water quality.

### Knowledge, Attitudes and Practices

The level that people at various levels know about certain issues, and then actually take action on them, is an important measure of the impact of conservation programmes. Across the Eastern Arc Mountains some basic measures of Knowledge, Attitudes and Practices (KAP) have been already undertaken, which can be used to measure progress over time to changing the way that things are done on the ground. Key results of this process are:

What do people know about the Eastern Arc Mountains?

*Have you heard of the terms Eastern Arc Mountains Mountain Forests or Mimitu ya Milima ya Tao la Mashariki'?*

- **70%** of Eastern Arc Mountains community representatives said **NO**.
- **72%** of government staff, traders and NGO representatives said **YES**.

This indicates that the phrase 'Eastern Arc Mountains Mountain Forests / Mimitu ya Milima Tao la Mashariki' is understood by many district government staff, but that communities are much less aware of it, instead relating themselves to the individual mountain block where they live.

*Why are the Eastern Arc Mountains Mountain forests important?*

### BIODIVERSITY

- **5 %** of Eastern Arc Mountains community representatives mentioned biodiversity as a **forest value**.
- **11%** of District staff mentioned biodiversity as a **forest value**.

### WATER

- **79%** of Eastern Arc Mountains community representatives mentioned water as a **forest value**.
- **63%** of District staff mentioned water as a **forest value**.

Knowledge about the unique biodiversity of the Eastern Arc Mountains forests was generally very low while there was more awareness of the role that the forests play in water catchment.

*Have you seen a copy (or summaries) of the forest policy and laws?*

- **91%** of Eastern Arc Mountains community representatives said **NO**.
- **71%** of district, ward and NGO staff **knew about** the new forest policy and laws but of those who only **46% had seen copies**.

From these results we concluded that detailed knowledge of the new forest policies and laws is low particularly within communities.

*Way forward with KAP monitoring in the Eastern Arc Mountains.* The following is proposed:

- A more comprehensive survey of knowledge, attitudes and practices (KAP) should be undertaken in a broader set of villages across the Eastern Arc Mountains.
- More awareness raising efforts need to be undertaken to raise the level of understanding of the Eastern Arc Mountains. This should entail awareness raising seminars, posters, leaflets, radio-programmes, etc.
- The KAP survey needs to be repeated after a number of years to measure whether the investment by various projects to raise awareness has resulted in any progress or not.

## **5.2 Routine Monitoring in the Eastern Arc Mountains**

There are two governmental structures that are involved with the collection of routine monitoring data from the Eastern Arc Mountains. The first structure is the central government, led by the Head of the Catchment and Mangroves Forest Conservation Programme, through the Regional and District Catchment Forest Officers and down to the level of individual sites. The second structure is the District government, through PMO RALG and to the District Executive Director and from there to the technical officers involved with Forestry and Rural Development issues. We outline the types of data that these bodies are collecting.

### *1) Central Government Monitoring through the Catchment and Mangroves Management Programme.*

The Catchment Programme has instigated a programme of monitoring through its Regional and District Officers. This monitoring aims to capture the main activities being undertaken through the various catchment offices. This monitoring scheme was originally based on the needs of the donor funded catchment forests sub-component of the Management of Natural Resource Programme in Tanzania (MNRP) programme that has been funded for many years by the Norwegian Government. This project operated in Arusha, Kilimanjaro, Tanga and Morogoro Regions. The reporting format has been expanded somewhat and is now being promoted in all the Regions under the catchment forest programme of FBD. Data are currently collected on :

- Progress with Joint Forest Management activities in the catchment Forest Reserves
- Numbers of seedlings raised and distributed
- Income generating activities that have been undertaken (beekeeping, fish farming, etc.)
- The production and dissemination of energy efficient stoves.
- Water flow rates from the catchment reserves and the associated establishment of water stations etc.
- Number of people caught undertaking illegal activities. Quantity of timber, poles, cows, bicycles, saws, sandalwood and charcoal seized. Fines imposed.
- Construction of ecotourism facilities, production of ecotourism leaflets and other promotional activities connected with tourism.
- Training, study tours, workshops and other forms of staff development.

An example of the type of monitoring data collected by the catchment and mangroves forest conservation programme is presented in Table 9, and in Appendix 3 and Appendix

4. This shows the scope of the activities which link to a number of the indicators in the NFP monitoring matrix, primarily within Sub-development programmes 1.1, 1.2 and 1.3.

**Table 9. Performance Monitoring data from the catchment forestry project - Morogoro District – 2004 (Forestry and Beekeeping Division).**

<b>CURRENT INFORMATION ON PROJECT PERFORMANCE – 2004</b>					
	<b>Achievement</b>	<b>Name of reserve</b>	<b>Villages by Name</b>	<b>Number of Villagers</b>	<b>Remarks</b>
Seedlings raised	98,000	Mkindo, Kimboza	Mwalazi, Dihombo, Kibangile, Hembeti Uponda, Mkindo, Changa, Msufini	8	
Villagers trained on tree nurseries	8 Villages	Mkindo, Kimboza	As above	120	VNRC Primary schools, and individual
By - laws prepared	8	Mkindo, Kimboza	As above	-	Approved
Fish Ponds	31	Mkindo, Kimboza	Mkindo, Kibangile, Msufini, Changa	58	
Beehives	106	Mkindo, Kimboza	Changa, Dihombo, Msufini, Kibangile, Hembeti, Uponda, Mkindo	-	
Patrols - General  - Joint				8	400 pieces of Timber confiscated in Mkindo F/R
	288	Mkindo, Kimboza	As above		1 Person jailed (5 yrs) after causing fire in Kimboza F/R
Management Agreements	8	Mkindo, Kimboza			Signed
Energy saving stores	162	Mkindo, Kimboza	Mwalazi, Dihombo, Kibangile, Msufini, Changa, Mkindo, Uponda, Hembeti	153	
VFM – Plan	8	Mkindo, Kimboza	As above	-	Prepared
Planting - gap  - boundary - village Area	5 ha (Kimboza)	Mkindo, Kimboza	-	-	
	21 (Mkindo 10, Kimboza 11)	Mkindo, Kimboza	As above	-	
	58 ha	-			
Participatory Rural Appraisal	8	Mkindo, Kimboza	Kibangile, Mkindo, Changa, Dihombo, Mwalazi, Msufini, Uponda, Hembeti	462	
Short course to	16VNRCs	Mkindo,	As above	32	2 representatives from

villagers		Kimboza			each VRNRCM 16 Villages around Mkindo and Kimboza F/E.
Village meetings	8	Mkindo, Kimboza	As above	240	
Baseline survey on Income	2 F/Rs	Mkindo, Kimboza	As above		
Baseline survey on gender				280	
Sensitization of villagers on JFM	8		As above	360	
Support villagers on Income Generating Activities,	8 Villages	Mkindo, Kimboza	As above	130	
Promote use of NTFP	-	-	-	-	

2) Local Government Monitoring through the Districts.

In some Districts the District Forest Officers under the local government are also tasked to collect some information on the forests of the Eastern Arc Mountains. This primarily relates to:

- collecting information on the number of tree seedlings being grown and planted,
- monitoring and reporting on the number of Village land forest reserves being established and the progress of CBFM and JFM agreements within the District.
- Issuing licences for harvesting and keeping records on the amount of income that is derived from that process.

**Revenue collection**

The relevant indicator in the National Forest Programme monitoring matrix =

**Sub-development programme 1.1**

**(c) Proportion of subsistence and cash based income derived from the harvesting, processing, marketing and sale of forest products**

Data for Morogoro District indicates the kind of information on revenue collected annually and submitted to the District Council to support their programmes. Revenue derived from a cess tax of 30% for timber, and 100% for charcoal totalled Tshs.46,343,714.15 over the years 1999, 2000 and 2001 (Table 10).

**Table 10. Revenue collection for 3 years in Morogoro Rural District (Forestry and Beekeeping Division)**

Year	Amount Collected Tsh.
1999	10,618,857.75
2000	17,460,661.80
2001	18,264,194.60
<b>Total</b>	<b>46,343,714.15</b>

These numbers are merely indicative, and do not necessarily reflect what might be gathered if additional efforts are made into collecting forest based revenues. In general there is more revenue available within the forestry sector – but a lot of it is ‘lost’ within the system due to poor governance and lack of transparency. These issues are fundamental to improving the revenue base that would allow District foresters to better manage the forest resources of the country.

### **Participatory Forest Management**

The relevant indicator in the National Forest Programme monitoring matrix

#### **Sub-development programme 1.1**

**Proportion of total forest area under Participatory Forest Management arrangements (including both CBFM and JFM)**

The District is also supported in its efforts to develop Participatory Forest Management. A simple monitoring matrix for PFM has been developed that tracks the implementation of the programme over time. An example for Morogoro District is presented below (Table 11).

#### *Way forward with routine monitoring*

- The regional catchment forest officers need to continue to collect data relevant to any donor projects that they might be running. However, they also need to start to collect data against the indicators of the National Forest Programme, and the monitoring system that is being developed for the NFP (under development as this document was being finalised).

- District forest officers also need to collect data and contribute it either to the local government monitoring system, or the national forestry monitoring systems of Forestry and Beekeeping Division. In some cases they may need to send the data to both places. The details are being developed into the monitoring system for the NFP.



### 5.3 Research Areas

A number of monitoring questions or issues exist in the Eastern Arc Mountains that require the input of special projects in order to answer them. The most relevant questions are outlined below:

1) Development of an FBD database:

There is no monitoring database within the Forestry and Beekeeping Division that is able to capture information from the various sections and report to the Director of Forestry or to higher authorities in the Ministry. Proposals have been made to create a dedicated forestry monitoring facility that advises the Director. This would take on board the various monitoring functions that are currently found in a number of operational units of FBD. It is expected that the monitoring database will be completed by the end of 2006. In the meantime data are being assembled to be added to it.

2) Special projects to address particular issues:

The following projects need to be undertaken within the Eastern Arc Mountains:

- What is the economic value of the Eastern Arc Mountains Mountain forests? This important question has been addressed in terms of a baseline study through a consultancy undertaken by the catchment forestry programme and a team from Norway and the Sokoine University of Agriculture.
- What has been the impact so far of the implementation of Joint Forest Management within the catchment forest reserves? Joint Forest Management is a major management intervention that has been implemented across many of the Eastern Arc Mountains reserves. The impact of JFM is being measured in terms of impact on the forest habitat, impact on livelihoods and impact on village governance structures.
- Can communities monitor changes in resource availability within Eastern Arc Mountains forests? This question focuses on the ability of communities to monitor habitat parameters to a degree of accuracy that is comparable to that of professionally trained scientists. Or at least to assess the degree of variation between scientists and community members. The ultimate goal would be to decide if communities are able to collect data that can be used to plan management interventions and make management decisions.
- What are the accurate boundaries of the Forest Reserves in the Eastern Arc Mountains? A large number of reserves exist in the Eastern Arc Mountains. Many of these were mapped many years ago and the paper maps that exist are not very accurate. Some of the paper boundary maps have been digitised into GIS, and a limited process of ground truthing has been undertaken (c.15 reserves funded by FINNIDA in the East Usambaras, 26 reserves funded by NORAD across the Eastern Arc Mountains, and 2 reserves funded by DANIDA/GEF in the Ulugurus). This indicates that some of the maps correspond to the situation on the ground, whereas others do not. A significant project intervention is required to clarify how the boundary maps relate to the situation on the ground across the Eastern Arc Mountains. Only then will fully accurate statistics on the reserve coverage of the region be available.
- What are the biodiversity values of the Eastern Arc Mountains? Special studies are required to answer these questions as they are outside the expertise of most staff employed within FBD.
- What is the population of key species within the Eastern Arc Mountains? As this area contains a large number of species threatened with extinction there is a need to monitor at least a sample of the relevant species. The expertise to

undertake such work is highly specialised and is normally undertaken by University scientists or those from within Non-Government Organisations.

- What are the water flows from the Eastern Arc Mountains? One of the major values of the Eastern Arc Mountains is their role in sourcing rivers that flow to the drier lowlands and supply agricultural systems, large urban areas, and industry. These flows are measured by the Ministry of Water by a network of gauging stations along the major rivers. These data have recently been compiled by the project Conservation and Management of the Eastern Arc Mountains Mountain Forests, and summary data are now available.
- What are the timber values of the Eastern Arc Mountains? Even though timber harvesting is banned in the Eastern Arc Mountains, there is significant illegal harvesting using pit sawing techniques.

## 6. Matrix of Actions Required

Issue	Target (From National Forest Programme matrix)	Responsible	Progress	Completion Date
<b>Impact Level</b>				
<b>Habitat area</b>	Area of forest accurately known for major Tanzanian forest types for at least 2 past periods (suggested 1975 and 1995) and currently	Special project	Area of forest calculated 1975, 1990s and 2000s. Rate of forest loss calculated.	Complete June 2006
<b>Habitat condition</b>	At least 25% of total forest area under clear ownership and effective management (PFR, CFR, VLFR, NFR, LAFR) by June 2010	Need data on forest area from special project. Need GIS of all reserves to overlay onto forest cover to make calculation	Forest area only known from 1995. GIS exists for all reserves, but has many problems.	Uncertain
	Area of forest biodiversity under effective management increased by 10% by June 2008	Effective management measured by Management Effectiveness Tracking tool forms.	Management Effectiveness Tracking Tool completed for 26 reserves.	METT forms done 2004. Can be done again at any time through forestry staff.
<b>Species</b>	Species currently assessed on IUCN 'red list' as threatened with extinction do not become assessed as facing a greater risk of extinction.	NGOs. Such as IUCN and those projects and agencies funded by CEPF	Birds, Mammals and Amphibians all assessed. Plants in progress. Reptiles will come later.	Birds, Mammals, Amphibians updated online in 2006 (www.redlist.org). Plants completed 2008. Reptiles not known when.

<b>Protected areas</b>	<p>Total area of forest reserved by either central or local government for conservation or sustainable utilisation purposes</p> <p>Number of declared or gazetted Village Land Forest Reserves, Beerreserves, Local Authority and National Forest Reserves</p> <p>Reservation gaps closed for key sites within biodiversity hotspots</p>	Forestry and Beekeeping Division. District Councils.	Basic GIS of reserves already exists. More detailed mapping of reserves in the Eastern Arc Mountains and Coastal Forests regions being coordinated through	Ongoing work. Needs major support to be completed. And checked against what is on the ground.
<b>Ecosystem services</b>	No indicators in the NFP			
<b>Attitudes and Awareness</b>	Number of people, villages and communities who are aware of their rights and responsibilities as provided in the Forest, Land and Village Land Acts to manage and conserve forests and trees	FBD and service providers such as TFCG	Partial baseline for the Eastern Arc Mountains already compiled in 2004. Covers some of these issues, but not all.	Baseline 2004. Repeat 2008.
<b>Objective Level</b>				
<b>Income Generating Activities</b>	<p>Amount of revenue generated at village level from PFM arrangements</p> <p>Proportion of subsistence and cash based income derived from the harvesting, processing, marketing and sale of forest products</p>	District Forest Officers	Some material already compiled within the PFM programme.	

<b>Participatory Forest Management</b>	20% of total unreserved forest area under CBFM arrangements and 35% of reserved forests under JFM arrangements by June 2010  45 districts and 1800 villages are actively participating in the planning and execution of PFM arrangements by June 2008	District and Catchment Forest Officers	Some data already compiled by the PFM programme	
<b>Illegal activities</b>	No indicator in NFP			
<b>Energy-efficient stoves</b>	No Indicator in NFP			
<b>Water stations</b>	No indicator in NFP			

## 7. Conclusions

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A number of conclusions have resulted from the preparation of this document:

- 1) Monitoring efforts in the Eastern Arc Mountains need to be linked to a national government process so that the data captured can be fed up and used for management decisions. At the present time the linkage to higher structures within FBD is largely missing. Monitoring data is produced by FBD projects, the catchment and mangroves management programme, and the Districts. However, the flow from these sources and into a collated data base at Ministerial or FBD level is lacking. FBD has contracted consultants to try and address this issue.
- 2) Several of the agreed NFP impact level indicators under **Development Programme 1 : Forest Resources Conservation and Management** already have data collected against them. This includes forest area, forest condition and effectiveness, and species attributes. These data can be incorporated within the FBD database when that becomes available.
- 3) NGO efforts – funded by the Critical Ecosystem Partnership Fund and undertaken by BirdLife International - have also formulated a system of indicators for natural resources in the region. At the impact level the indicators are closely similar to those of the NFP **Development Programme 1**. It is expected that the NGOs involved with the CEPF monitoring will be able to compile many additional sources of data that have not so far been managed by the FBD funded projects, or the FBD database. An MOU that has been signed between Government of Tanzania and Conservation International (the parent agency of CEPF) that will allow data sharing so that further compiled monitoring products for the region might ultimately be available for the area.
- 4) Data collected through the current project – Conservation and Management of the Eastern Arc Mountains Mountain Forests (CMEAMF) - and the existing catchment and mangroves management programme and the work of the District Forest Officers provides some information that can address some of the indicators of the National Forest Programme. We have tried to assess where there is overlap and have started to determine some of the remaining gaps

## **8. References**

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CMEAMF (2005). Baselines of Management Effectiveness, Threat Reduction Scores and forest disturbance across 26 forests of the Eastern Arc Mountains. Forestry and Beekeeping Division/Sokoine University of Agriculture, Morogoro, Tanzania.

CMEAMF (2006). A forest area baseline for the Eastern Arc Mountains. Forestry and Beekeeping Division/Sokoine University of Agriculture, Morogoro, Tanzania.

Isango, J. (2006). Bibliography of references relating to the biological diversity of the Eastern Arc Mountains, Tanzania. TAFORI and Forestry and Beekeeping Division, Tanzania.

**ANNEX 1. MONITORING MATRIX FOR THE NATIONAL FOREST PROGRAMME – INDICATING WHERE CMEAMF CAN PROVIDE AN INPUT**

**NFP Objective 1: Sustainable supply of forest and beekeeping products and services ensured to meet the needs at the local and national levels**

Selected Indicators by NFP Sub-Programme	Will CMEAMF contribute?	What data will CMEAMF contribute
<p><b>1.1. Participatory forest and bee resources management programme and gender aspects</b>  <b>Total forest area under PFM (includes JFM and CBFM)</b>                      Number and proportion of Village Natural Resource/ Environment / Forest Management Committees with women in executive positions</p>	<p>Yes</p> <p>Yes</p>	<p>Data on which FRs are under PFM based on field data collection from Districts</p> <p>For Uluguru Mountains only</p>
<p><b>1.2. Forest Biodiversity Conservation and Management</b></p> <p>Total forest area remaining</p> <p>Total forest area under reserved status</p> <p>Reservation gaps for key sites within biodiversity hotspots</p> <p>IUCN Red List Status for forest dependent vertebrate species</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	<p>CMEAMF baseline report. Satellite images and GIS datasets for Eastern Arc Mountains.</p> <p>CMEAMF baseline report. Reserve list. Scanned JB maps and GIS datasets</p> <p>CMEAMF reports and conservation strategy document. Gazettment of Derema corridor and Magombero.</p> <p>Uluguru project work on Bunduki gap. CMEAMF baseline report. Data files. Population assessment for key taxa (mainly CEPF supported)</p>
<p><b>Land Use Planning</b></p> <p>Number of villages with land use plans that incorporate areas set aside for forestry</p>	<p>Yes</p>	<p>Around the Uluguru Mountains only</p>
<p><b>Forest and Bee Resources Information Management and Planning</b></p> <p>Baseline information, management plans, resource assessment data and reports available, regularly updated and applied in forest management</p>	<p>Yes</p>	<p>1)CMEAMF baseline reports made available to FBD and placed on internet</p> <p>2) Copies of management plans located in various FBD, project and District computers compiled and made available</p> <p>3) Copies of all reports relating to forest conservation in Tanzania provided to FBD and made available through relevant web sites (<a href="http://www.easternarc.or.tz">www.easternarc.or.tz</a>)</p>

<b>Forest and Bee Resources Utilisation</b>		
Number and types of forest and beekeeping-based industries and enterprises and production	Yes	Proposed CMEAMF consultancy report for 2006
Contribution of forest and beekeeping sector to GDP	Yes	

**NFP Objective 2: Enhanced national capacity to manage and develop the forest and beekeeping sector in a collaborative manner**

Selected Indicators by NFP Sub-Programme	Will CMEAMF contribute?	What data will CMEAMF contribute
<b>Strengthening institutional set up and sectoral co-ordination and co-operation</b>		
Number of fora and mechanisms for involving stakeholders within the forest and beekeeping sector in forest management	Yes	Eastern Arc Mountains Coordination Committee
Areas and number of conflicts between stakeholders with interests in forest and beekeeping sector	No	
<b>Human Resources and capacity building</b>		
Number and qualifications of staff at different levels	Yes	CMEAMF baseline report for 2004
Number of staff and frequency of on the-job-training in line with their job descriptions	Yes	CMEAMF reports on Forest Reserves as potential IUCN coded protected areas. Nature Reserves. World Heritage Sites
<b>Forest Financing</b>		
Revenue generated from forest and beekeeping goods and services and subsequently invested back in forest and bee resources management	Yes	CMEAMF consultancy of ways to operationalise payments for <u>water</u> and <u>carbon</u> ecological services
Total financing of forest and beekeeping sector	Yes	CMEAMF Eastern Arc Mountains financing baseline
<b>Strengthening Extension services and awareness creation in forest and bee resources management.</b>		
Number of stakeholders practising sustainable forest and bee resources management	Yes	Uluguru Mountains only
Number of people aware of their rights and responsibilities in forest and bee resources management.	Yes	Mainly Uluguru Mountains

<p><b>Forestry and Beekeeping Research</b></p> <p>Number of forest and beekeeping management decisions made based on forestry and beekeeping research findings</p> <p>Number of research articles/papers produced</p>	<p>Yes</p> <p>Yes</p>	<p>CMEAMF reports used as the basis for decision making by FBD</p> <p>CMEAMF publications, publications list and material on web site (<a href="http://www.easternarc.or.tz">www.easternarc.or.tz</a>)</p>
<p><b>Policy analysis planning and monitoring</b></p> <p>Number of projects and programmes operating under NFP/NBKP that have harmonised common formats and processes for planning, monitoring and evaluation.</p>	<p>Yes</p>	<p>CMEAMF adopts indicators of NFP and reports relevant data to FBD database and to the NFP secretariat</p>
<p><b>Forest and Bee Resources Valuation</b></p> <p>Tangible and intangible values of forest and beekeeping sector is reflected in GDP contribution calculation and national accounting systems</p>	<p>Yes</p>	<p>CMEAMF economic values consultancy and subsequent lobbying</p>

**NFP Objective 3: Enabling legal and regulatory framework for the private sector in place**

Selected Indicators by NFP Sub-Programme	Will CMEAMF contribute?	What data will CMEAMF contribute
<p>Development of laws and regulations</p> <p>Application of legal instruments (rules and regulations) for protection, establishment and management of forest and bee resources and effective co-ordination of stakeholders</p>	<p>Yes</p>	<p>CMEAMF input to the revision of the Forest Policy, and the development of JFM and Nature Reserve guidelines.</p>
<p>Harmonisation of regulations</p> <p>Application of standardised regulations for harvesting, royalties, benefit sharing and tariffs on wood based products, NWFP and services</p>	<p>No</p>	
<p><b>Development of sector specific environmental impact assessment guidelines</b></p> <p>Number of EIAs conducted on investment projects taking place within forest and beekeeping management areas</p>	<p>No</p>	

**NFP Objective 4: Increased economic contribution, employment and foreign exchange earnings through sustainable forest and beekeeping-based industry development and trade**

Selected Indicators by NFP Sub-Programme	Will CMEAMF contribute?	What data will CMEAMF contribute
<p><b>Forestry and bee products and services Information Development</b></p> <p>Numbers of products with readily available information regarding raw materials, markets, supply, demand, prices, regulations on database</p>	No	
<p><b>Forestry and Bee products and markets promotion and awareness creation</b></p> <p>Types and volumes of lesser used tree species and NWFP used in forest enterprise and industries</p>	No	
<p><b>Forestry and Beekeeping Industry Technology Development</b></p> <p>Number of forest and beekeeping - based enterprises using efficient and appropriate technology</p>	No	
<p><b>Infrastructure Development</b></p> <p>Amount invested on infrastructure developments</p>	Yes	Eastern Arc Mountains Centre investment and improvements to Bunduki foresters post

**ANNEX 2. MONITORING MATRIX DEVELOPED BY BIRDLIFE INTERNATIONAL FOR THE EASTERN ARC MOUNTAINS AND COASTAL FORESTS HOTSPOT (FUNDED BY THE CRITICAL ECOSYSTEM PARTNERSHIP FUND) – OUTLINING WHERE CMEAMF CAN MAKE AN INPUT**

**CEPF Monitoring Framework**

Rank	Indicator	Main tool for obtaining information	CMEAMF input
1	Changes in forest management effectiveness	- METT (Management Effectiveness Tracking Tools) Indices	METT forms for 126 sites 2005. Annual for Uluguru reserves
2	Forest quality and forest health	- Disturbance transects - IBA monitoring framework - Remote sensing (aerial and satellite images)	Disturbance transects for 26 forests. Plus more detailed assessments in 2 Uluguru forests.
3	Area of different types of forest and degree of fragmentation	- Remote sensing (Aerial surveys; Satellite image analysis) - Habitat characterization and ground-truthing - Patch analysis	Forest Area calculation from 1970s to 1990s. detailed maps for each Eastern Arc Mountains block.
4	Presence of endemic and globally threatened species and where possible abundance for selected species (e.g. threatened, endemic or other 'flagship' species)	- Methods will vary with the taxa selected and might include vegetation plots, mist netting, patch counts etc.	Lists of all threatened species per mountain block. Fully updated and analysed to November 2005. Database of sites by species in planning.
5	Presence and use of management plan to protect the residential threatened species	- Management Plans - IBA monitoring framework	No input planned.
6	Change in species IUCN Red List Category (Vulnerable, Endangered, Critically Endangered, etc.)	- IUCN / SSC Red List - Data Analysis	Analysis planned for 2008 to assess if there are positive or negative changes in status.
7	Change in species abundance for a few key species (e.g. endemics, threatened, migratory)	- Field surveys - IBA monitoring framework	Facilitation of proposals to CEPF by WCST, Copenhagen University, and Field Museum USA to count key taxa.

8	Actions and research targeting key (threatened/endemic/migratory) species	<ul style="list-style-type: none"> <li>- IBA monitoring framework</li> <li>- Survey of research initiatives, by looking at: <ul style="list-style-type: none"> <li>▪ Number of research projects per year</li> <li>▪ Number of publications per year</li> <li>▪ Amount of funding allocated for research per year</li> </ul> </li> </ul>	Publications list for the Eastern Arc Mountains being updated through support to TAFORI
9	Forest Cover Change	<ul style="list-style-type: none"> <li>- Remote sensing</li> <li>- Aerial survey</li> <li>- Forest Health Monitoring Framework</li> </ul>	Forest cover change assessed 1970s-2000s. Work progressing on 1955 forest cover.
11	Gaps in a) national legal recognition; b) international acceptance of nationally legislated reserves; c) making biodiversity conservation an official goal of key biodiversity areas.	<ul style="list-style-type: none"> <li>- GIS</li> <li>- Evaluating gazettelement list</li> <li>- Questionnaire with site managers</li> <li>- IBA monitoring framework</li> <li>- Site surveys</li> </ul>	Forest Reserves being assessed against IUCN protected area categories. So far, 40 reserves are provisionally assigned to codes in November 2005. WCST providing technical input to this process. Review of the Tanzania forest policy planned 2006 and regulations to be developed for Nature Reserves. Would provide legal way to further recognise FRs role in biodiversity conservation.
12	Percentage area within Protected Areas	<ul style="list-style-type: none"> <li>- Maps</li> <li>- GIS</li> <li>- World Database on Protected Areas</li> </ul>	All but two boundary maps of existing Forest Reserves have been located and are scanned. Now the digital files will be geolocated and put on GIS for the Eastern Arc Mountains region. Being done by FBD with input also from UDSM. Data can also be provided to WDPA by FBD.

13	Policy development (include site, species focused issues)	<ul style="list-style-type: none"> <li>- Legal notices</li> <li>- Revised policies, laws, regulations</li> </ul>	<p>New Forest Reserves are being gazetted as follows: Mwanga District (Kamwala I – 199 ha, Kamwala II – 193 ha, Kiverenge – 2,155 ha), Same District (Mwala – 1,373 ha, Kamwenda - 583 ha), Muheza District (Derema – 968 ha), Kilolo District (Kitonga-Kimala – c.9,000 ha)</p> <p>New Nature Reserves are also proposed : Nilo, Uluguru North and West Kilombero Scarp. Review of the Tanzania forest policy planned 2006 and regulations to be developed for Nature Reserves. Would provide legal way to further recognise FRs role in biodiversity conservation.</p>
14	Change in extraction intensity of key species	<ul style="list-style-type: none"> <li>- Market survey (timber, bush meat etc)</li> <li>- Transects/forest disturbance surveys</li> <li>- CITES</li> <li>- Changes in density</li> <li>- Geographic distribution</li> <li>- Hunting levels/Cartridge frequency</li> </ul>	<p>CMEAMF will have data on rates of encounters of snares from some forests, but these have not been compiled and that would need to be done. The best data would come from Uluguru, and includes market surveys as well as transect surveys.</p>
15	Number of sites from which benefits accrue to local communities	<ul style="list-style-type: none"> <li>- Household questionnaires</li> <li>- PRA</li> <li>- RRA</li> </ul>	<p>Some of this will be done by the SEMP component of CMEAMF. There are also various PhD studies who you would need to work with.</p>
16	Changes in human population density in wards/divisions containing Eastern Arc Mountains or Coastal Forests	<ul style="list-style-type: none"> <li>- National Statistics</li> <li>- GIS</li> </ul>	<p>CMEAMF is planning to compile this when the elections are over the Ward level GIS compiled by the electoral register for Tanzania will be made available. We already have the human population data for the country.</p>
17	Fire Frequency	<ul style="list-style-type: none"> <li>- Remote sensing (MODIS fire points),</li> <li>- Direct observation</li> <li>- Disturbance transects</li> </ul>	<p>Already done for the Eastern Arc Mountains and Coastal Forests of Tanzania up to October 2005. Various excel sheets exist of fires per ecoregion, per district, per protected area.</p>

18	Environmental (ecological and economic) services from the site e.g. quality and quantity of water flowing from the site, soil erosion, non-timber forest products, pollination	<p>May include:</p> <ul style="list-style-type: none"> <li>- Hydrological surveys</li> <li>- Soil erosion measurements</li> <li>- Economic valuation and PRA</li> </ul>	<p>Hydrological data already compiled for all rivers flowing from the Eastern Arc Mountains. Water quality data, especially on sediment flows seems to be highly limited. Terms of Reference for a further economic analysis of the Eastern Arc Mountains done, building on work already completed by FBD using Norwegian economists.</p>
19	Change in policies/rules to reduce tourist practices with negative impact on threatened/endemic species	<ul style="list-style-type: none"> <li>- Surveys/assessment of tourism related policy change</li> <li>- IBA monitoring framework</li> </ul>	No work planned on this issue.
20	Increase in ecotourism projects protecting species threatened by tourism	<ul style="list-style-type: none"> <li>- Survey/assess ecotourism projects in EACF</li> </ul>	No work planned on this issue.

**ANNEX 3. EXAMPLE MONITORING SHEET FOR PROGRESS OF JOINT FOREST MANAGEMENT IN TANGA REGION**

**Northern Zone.**

District	No. of Villages Under JFM (VNRC)	No. of By laws Approved	No. of Draft By Laws	No. of Approved Management Agreements	No. of Management Plans in Place	Names of Villages	Remarks
TANGA	20	3	12	3	13		
	✓	✓	✓	-	✓	Chongoleani	
	✓	✓	✓	-	✓	Mpirani	
	✓		✓	-	✓	Ndaoya	
	✓	✓	✓		✓	Mabokweni	
	✓		✓		✓	Mafuriko	
	✓				✓	Kiomoni	
	✓					Kisosora	
	✓					Raskazoni	
	✓			✓		Sahare	Yambe Island
	✓			✓	✓	Mtambwe	management
	✓			✓		Mnyanjani	Agreement
	✓			✓		Ndumi	
	✓					Mwambani	
	✓					Mchukuuni	
	✓		✓		✓	Machui	
	✓	-	✓	✓	✓	Maere	
	✓		✓	-	✓	Tongoni	

	✓		✓	-	✓	Geza	
	✓		✓		✓	Kirare	
	✓		✓		✓	Mwarongo	

**ANNEX 4. EXAMPLE MONITORING SHEET FOR INCOME GENERATING ACTIVITIES IN TANGA REGION**

**Form No. 2**

**Income Generation Activities (IGA) as of 31 2004**

Dictriect	Types of IGAs	Name of Villages	No. of Beehives	No. of groups	No. of Individual/HH Adopted	Estimated Production (Kgs)	Remarks
PANGANI	Beekeeping	Kipumbwi	84	2	10	800kg	
		Ushongo		7		60kg	
		Mwembeni		4		30kg	
		Pangani west		30		250kg	
	Production of Door Mats	Bweni		1	4		
		Kipumbwi		1	4	-	
		Pangani Town		2	4	-	
		Pangani west		2	5	-	
		Amboni		1	5	-	
						-	
TANGA	Beekeeping	Chongoleani		55	2	55kg	Given to a group people
		Mpirani		5	1	50kg	
		Kisosora		25	1	250kg	
		Kiomoni		10	1	100kg	
		Raskazni		25	1	250kg	
MUHEZA	Beekeeping	kibiboni		10	1	50 - 70kg	
		Manza		7	1	30 - 50kg	

# APPENDIX 5. FORM FOR MANAGEMENT EFFECTIVENESS TRACKING IN THE EASTERN ARC MOUNTAINS OF TANZANIA

## Management Effectiveness assessment Form

Issue	Criteria	Score	Comments
1. Legal status	The Protected area is not gazetted	0	Note: see fourth option for private reserves
Does the protected area have legal status	The government has agreed that the protected area should be gazetted but the process has not yet begun	1	
	The protected area is in the process of being gazetted but the process is still incomplete	2	
	The protected area has been legally gazetted (or in the case of private reserves in owned by similar)	3	
<i>Context</i>			
2. Protected area regulations	There are no mechanisms for controlling inappropriate land use and activities in the protected area	0	
Are inappropriate land uses and activities(e.g poaching) controlled?	Mechanisms for controlling inappropriate land use and activities in the protected area exist but there are major problems in implementing them effectively	1	
	Mechanisms for controlling inappropriate land use and activities in the protected area exist and are being effectively implemented them	2	
	Mechanisms for controlling inappropriate land use and activities in the protected area exist and are being effectively implemented	3	
<i>Context</i>			
3. Law enforcement	The staff have no effective capacity/resources to enforce protected area exist legislation and regulations	0	Possible issue for comment: What happens if people are arrested?
Cash staff enforce protected area rules well enough?	There are major deficiencies in staff capacity/resources to enforce protected area legislation and regulations (e.g lack of skills no patrol budget)	1	
	<i>Context</i>	The staff have acceptable capacity/resources to enforce protected area legislation and regulations but some deficiencies remain	2
The staff have excellent capacity/resources to			

	enforce protected area legislation and regulations	3	
<b>Issue</b>	<b>Criteria</b>	<b>Score</b>	<b>Comments</b>
4. Protected area objectives Have objectives been agreed?  <i>Planning</i>	No firm objectives have been agreed for the protected area	0	
	The protected area has agreed objectives but is not managed according to these objectives	1	
	The protected area has agreed objectives but these are only partially implemented	2	
	The protected area has agreed objectives and is managed to meet these objectives	3	
5. Protected area design  Does the protected area need enlarging corridors etc to meet its objectives?  <i>Planning</i>	Inadequacies in design mean achieving the protected areas major management objectives of the protected area is impossible	0	Possible issue for comments: does the protected area contain different management zones and are these well maintained?  No zonation
	Inadequacies in design mean that achievement of major objectives are constrained to some extent	1	
	Design is not significantly constraining achievement of major objectives, but could be improved	2	
	Reserve design features are particularly aiding achievement of major objectives, of the protected area	3	
6. Protected area boundary demarcation  Is the boundary known and demarcated?  <i>Context</i>	The boundary of the protected area is not known by the management authority or local residents/ neighbouring land users	0	Possible issue for comments: are there tenure disagreements affecting the protected area?  No tenure disagreements
	The boundary of the protected area is known by the management authority but is not known by local residents/neighbouring land users	1	
	The boundary of the protected area is known by the management authority and local residents but is not appropriately demarcated	2	
	The boundary of the protected area in known by the management authority and local residents and is appropriately demarcated	3	

Issue	Criteria	Score	Comments
7. Management Plan Is there a management plan and is it being implemented?  <i>Planning</i>  Additional Points	There is no management plan for the protected Area	0	
	A management plan is being prepared or has been prepared but is not being implemented	1	
	An approved management plan exists but it is only being partially implemented because of funding constraints or other problems	2	
	An approved management plan exists and is being implemented	3	
	The planning process allows adequate opportunity for key stakeholders to influence the management plan	+1	
	There is an established schedule and process for periodic review and updating of the management plan	+1	
	The results of monitoring research and evaluation are routinely incorporated into planning	+1	
8. Regular work plan Is there an annual work plan  <i>Planning/Outputs</i>	No regular work plan exists	0	
	A regular work plan exists but activities are not monitored against the plan's targets	1	
	A regular work plan exists and actions are monitored against the plan's targets, but many activities are not completed	2	
	A regular work plan exists, actions are monitored against the plan's targets and most or all prescribed activities are completed	3	
9. Resource inventory  Do you have enough information to manage the area?	There is little or no information available on the critical habitats, species and cultural value of the protected area	0	
	Information on the critical habitats. Species and cultural values of the protected area is not sufficient to support planning and decision making	1	
<i>Context</i>	Information on the critical habitats, species and cultural values of the protected area is sufficient for key areas of planning/decision making but the necessary survey work is not being maintained	2	
	Information concerning on the critical habitats, species and cultural values of the protected area is sufficient to support planning and decision making and is being maintained	3	
10. Research	There is no surveyor research work taking place in the protected area	0	
Is there a programme of management-oriented survey and research work?	There is some ad hoc survey and research work	1	
	There is considerable survey and research work but it is not directed towards the needs of protected area management	2	

There is a comprehensive, integrated programme

Issue	Criteria	Score	Comments
<i>Inputs</i>	of survey and research work, which is relevant to management needs	3	
11. Resource management	Requirements for active management of critical ecosystems, species and cultural values have not been assessed	0	
	Requirements for active management of critical ecosystems, species and cultural values are known but are not being addressed	1	
	Requirements for active management of critical ecosystems, species and cultural values are only being partially addressed	2	
	Requirements for active management of critical ecosystems, species and cultural values are being substantially or fully addressed	3	
12. Staff Numbers  Are there enough people employed to manage the protected area	There are no staff	0	
	Staff numbers are inadequate or critical management activities	1	
	Staff numbers are below optimum level for critical management activities	2	
	Staff numbers are adequate for the management needs of the site	3	
<i>Inputs</i>			
	13. Personnel management		
	Problems with personnel management constrain the achievement of major management objective	0	
	Problems with personnel management partially constrain the achievement of major management Objectives	1	
Personnel management is adequate to the achievement of major management objectives but could be improved	2		
Personnel management is excellent and aids the achievement major management objectives	3		
14. Staff training  Is there enough training for staff?	Staff are untrained	0	
	Staff training and skills are low relative to the needs of the protected area	1	
	Staff training and skills are adequate, but could be further improved to fully achieve the objective of management	2	
	Staff training and skills are in tune with the management needs of the protected area and With anticipated future needs	3	
15. Current budget  Is the current budget sufficient?	There is no budget for the protected area	0	
	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1	
	The available budget is acceptable, but could be further improved to fully achieve effective	2	

Management			
<b>Issue</b>	<b>Criteria</b>	<b>Score</b>	<b>Comments</b>
<i>Inputs</i>	The available budget is sufficient and meets the full management needs of the protected area	3	
16. Security of budget	There is no secure budget for the protected area and management is wholly reliant on outside or year funding	<b>0</b>	
Is the budget secure?	There is very little secure budget and the protected area could not function adequately without outside funding	1	
<i>Inputs</i>	There is a reasonably secure core budget for the protected area but many innovations and initiatives are reliant on outside funding	2	
	There is a secure budget for the protected area and its management needs on a multi-year cycle	3	
17. Management of budget	Budget management is poor and significantly undermines effectiveness	0	
Is the budget managed to meet critical management needs?	Budget management is poor and constrains Effectiveness	1	
	Budget management is adequate but could be Improved	<b>2</b>	
<i>Process</i>	Budget management is excellent and aids Effectiveness	3	
18. Equipment	There is little or no equipment and facilities	0	
Is equipment adequately maintained?	There is some equipment and facilities but these are wholly inadequate	<b>1</b>	
	There is equipment and facilities, but still some major gaps that constrain management	2	
<i>Process</i>	There is adequate equipment and facilities	3	
19. Maintenance of equipment	There is little or no maintenance pf equipment and facilities	0	
Is equipment adequately maintained?	There is some ad hoc maintenance of equipment and facilities	<b>1</b>	
	There is maintenance of equipment and facilities but there are some important gaps in Maintenance	2	
<i>Process</i>	Equipment and facilities are well maintained	3	
<b>Issue</b>	<b>Criteria</b>	<b>Score</b>	<b>comments</b>
20. Education and awareness programme	There is no education and awareness programme	0	
Is there a planned educaiton programme?	There is a limited and ad hoc education and awareness programme, but no overall planning for this	<b>1</b>	
	There is a planned education and awareness programme but there are still serious gaps	2	

<i>Process</i>	There is a planned and effective education and awareness programme fully linked to the objectives and needs of the protected area	3	
21. State and commercial neighbours	There is no contact between managers and neighbouring official or corporate land users	0	
Is there co-operation with adjacent land users?	There is limited contact between managers and neighbouring official or corporate land users	1	
	There is regular contact between managers and neighbouring official or corporate land users but only limited co-operation	2	
<i>Process</i>	There is regular contact between managers and neighbouring official or corporate land users, and substantial co-operation on management	3	
23. Local communities	Local Communities have no input into decisions relating to the management of the protected area	0	
Do local communities resident or near the protected area have input to management decisions	Local communities have some input into discussions relating to management but no direct involvement in the resulting decisions	1	
	Local communities directly contribute to some decisions relating to management	2	
<i>Process</i>	Local communities directly participate in making decisions relating to management	3	
Additional points	There is open communication and trust between local stakeholders and protected area managers	+1	
<i>Output</i>	Programmes to enhance local community welfare, while conserving protected area resources are being implemented	+1	
24. Visitor facilities	There are no visitor facilities and services	0	Possible issue for comment: Do visitors damage the protected area?
Are visitor facilities (for tourists pilgrims etc) good enough?	Visitors facilities and services are inappropriate for current levels of visitation or are under construction	1	
	Visitors facilities and services are adequate for current levels of visitation but could be improved	2	
<i>Output</i>	Visitor facilities and services are excellent for current levels of visitation	3	
26. Fees If fees (tourism, If fees (tourism fines) are applied do they help protected area management?	although fees are theoretically applied, they are not collected	0	
	The fee is collected, but it goes straight to central government and is not returned to the protected area or its environs	1	
	The fee is collected, but is disbursed to the local	2	

	authority rather than the protected area		
	There is a fee for visiting the protected area that		
<b>Issue</b>	<b>Criteria</b>	<b>Score</b>	<b>Comments</b>
<i>Outputs</i>	helps to support this and/or other protected areas	3	
27. Condition assessment	Important biodiversity, ecological and cultural values are being severely degraded	0	Possible issue for comment: It is important to provide details of the biodiversity, ecological or cultural values being affected
Is the protected area being managed consistent to its objectives?	Some biodiversity, ecological and cultural values are being severely degraded	1	
	Some biodiversity, ecological and cultural value are being partially degraded but the most important values have not been significantly impacted	2	
Outcomes	Biodiversity, ecological and cultural values are predominantly intact	3	
Additional points	There are active programmes for restoration of degraded areas within the protected area and/or the protected area buffer zones	1	
28. Access Assessment	Protection systems (patrols, permits etc)are ineffective in controlling access or use of the reserve in accordance with designated objectives	0	
Are the available management mechanisms working to control access or use?	Protection systems are only partially effective In controlling access or use of the reserve in accordance with designated objectives	1	
	Protection systems are moderately effective in controlling access or use of the reserve in accordance with designated objectives	2	
Outcomes	Protection systems are largely or wholly effective in controlling access or use of the reserve in accordance with designated objectives	3	
29. Economic benefit assessment	The existence of the protected area has reduced the options for economic development of the local Communities	0	Possible issue for comments: how does national or regional development impact on the protected area?  Impact of protected area to the national/regional dept:  Catchment Biodiversity
Is the protected area providing economic benefits to local communities	The existence of the protected area has neither damaged nor benefited the local economy	1	
	here is some flow of economic benefits to local communities from the existence of the protected area but this is of minor significance to the regional economy	2	
	There is a significant or major flow of economic		

	benefits to local communities from activities in		Conservation
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Issue	Criteria	Score	Comments
<i>Outcomes</i>	and around the protected area (e.g. employment of locals, locally operated commercial tours etc.)	3	
30. Monitoring and evaluation  <i>Planning/Process</i>	There is no monitoring and evaluation in the protected area	0	
	There is some ad hoc monitoring and evaluation but no overall strategy and/or no regular collection of results	1	
	There is an agreed and implemented monitoring and evaluation system but results are not systematically used for management	2	
	A good monitoring and evaluation system exists, is well implemented and used in adaptive management	3	
<b>TOTAL SCORE</b>		32	32/96=33.3%

## APPENDIX 6. THREAT REDUCTION ASSESSMENT FORM

Threat assessment of 26 forest sites in the EAM forests of Tanzania  
Northern zone

**Mramba forest reserve, Mwanza district**

	Direct Threats	Area Ranking	Intensity Ranking	Urgency Ranking	Total Ranking	% Threat Met	Raw Score	TRA Index
FI1	Poles cutting	3	3	3	9	50	4.9	
FI2	Grazing	2	1	2	5	45	2.25	
FI3	Root digging (medicine)	1	2	1	4	40	1.6	
<b>Sub-Total</b>					18		8.75	48.60%
FE1	Tree/poles cutting	4	3	4	11	35	3.85	
FE2	Grazing	3	2	3	8	40	3.2	
FE3	Fire (accidental)	2	4	2	8	40	3.2	
FE4	Trailing (erosion)	1	1	1	3	50	1.5	
FE5								
<b>Sub-Total</b>					30		11.75	39.20%
<b>Total</b>					48		20.5	42.70%

**Kiverenge forest reserve, Mwanza district**

	Direct Threats	Area Ranking	Intensity Ranking	Urgency Ranking	Total Ranking	% Threat Met	Raw Score	TRA Index
FI1	Tree/poles cutting	1	1	3	5	30	1.5	
FI2	Grazing	3	3	1	7	30	2.1	
FI3	Root digging	2	2	2	6	40	2.4	
<b>Sub-Total</b>					18		6	33.30%
FE1	Tree/poles cutting	4	2	2	8	40	3.2	
FE2	Grazing	2	3	4	9	35	3.15	
FE3	Fire (accidental)	3	4	3	10	50	5	
FE4	Trailing (erosion)	1	1	1	3	40	1.2	
<b>Sub-Total</b>					30		12.5	41.70%
<b>Total</b>					48		18.5	38.50%

## APPENDIX 7. DISTURBANCE TRANSECT METHODOLOGY

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- Disturbance transects record the intensity of pole and timber cutting and incidence of other disturbance types in the forest reserve.
- GPS positions of the starting point (0m) of each transect are recorded to enable repetitions of data collection to take place in the future to assess changes of disturbance over time.
- Disturbance transects are randomly placed within the FR (**Error! Reference source not found.**). The transects are 900m long. They are located either on the edge (classified as starting from the forest edge and up to 500m inside the forest) or interior (starting 500m and beyond from the forest edge) of the FR.
- Disturbance is recorded on each 50m section along each transect. Every self-standing tree and sapling (not lianas or creepers) 5cm or above dbh is measured within 5m either side of the transect line. Each plant is recorded under one of four categories: live, old cut, new cut or naturally dead. Within these categories a distinction is made between poles and timbers.
- Poles are classified as having a dbh between 5 and 15cm with a minimum of 2m of relatively straight trunk.
- Timbers are classified as having a dbh of 15cm or above with a minimum of 3m of relatively straight trunk. These divisions are based on their differences in use.

- New cut stems are recognised by a cream coloured slash and classified as freshly cut within recent months (approximately within the past 3 months).
- Old cut stems are recognised by black coloured slash and classified as old cut (approximately more than 3 months old).
- Timber and pole cutting data are presented as an average per hectare and summarised in graphs and maps.
- The level of human disturbance in the forest can be quantified by comparing the categories of live, naturally dead, new cut and old cut within each 50m section of the transect. Other types of human disturbance are also noted within each 50m section, such as the presence of fire damage, pitsawing, charcoal production, animal traps, cultivation, settlement and mining.