



**Ministry of Natural Resources and Tourism  
Forestry and Beekeeping Division**

**Eastern Arc Mountains Forest (EAMF) Strategy**

Version December 1, 2006

Forestry and Beekeeping Division  
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Web Eastern Arc: [www.easternarc.or.tz](http://www.easternarc.or.tz)  
Web FBD: [www.nfp.co.tz/html/](http://www.nfp.co.tz/html/)

**DECEMBER, 2006.**





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## Acknowledgements

The preparation of this Eastern Arc Mountains Strategy and Action Plan for the conservation of the Eastern Arc Mountains was commissioned by the Forestry and Beekeeping Division (FBD) through the Conservation and Management of Eastern Arc Mountains Forests (CMEAMF) and financed by the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP).

We thank the managers of the land within the Eastern Arc Mountains: In particular the foresters of the four Regional Catchment Forests Programme Offices, the communities and the local government staff of the 14 Districts and five Regions within the Eastern Arc. This work is also based on the research undertaken in the Eastern Arc Mountains by many hundreds of researchers over several decades.

Finally the Ministry of Natural Resources and Tourism highly appreciates the financial support that was received from GEF through UNDP. This enabled this invaluable work to be completed and will significantly contribute to achieving sustainable conservation of the Eastern Arc Mountain Forests.

### Suggested citation:

Forestry and Beekeeping Division (2006). *Eastern Arc Mountains Strategy: Main Strategy Document*. Compiled by Conservation and Management of the Eastern Arc Mountain Forests, Forestry and Beekeeping Division, Morogoro.

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## SUMMARY

Conservation and Management of the Eastern Arc Mountain Forests (CMEAMF) is a project of the Ministry of Natural Resource and Tourism, Forestry and Beekeeping Division. The project will last for 5 years (2004-2008) and one of the outputs is the development of a holistic conservation strategy – to be produced and agreed and to be under implementation within three years (by the end of 2006).

This document summarises the results of the strategy development process and presents the main strategies, objectives, activities and ways to monitor implementation. It also outlines how the strategy links to the work of the Eastern Arc Mountains Conservation Endowment Fund (EAMCEF) and the Catchment and Mangroves Forest Management Programme of the Forestry and Beekeeping Division. However, the strategy is certainly not only for their use, it aims to present a holistic conservation framework, outlining what needs to be done to ensure sustainable conservation, and as such is a strategy for all players interested in the conservation of the high biodiversity forests of the Eastern Arc, and the ecosystem services that they provide to ensure the economic development of the Tanzanian nation.

The Eastern Arc Strategy has been developed by many stakeholders using three main approaches:

- 1) A series of stakeholder workshops undertaken across the entire Eastern Arc region
- 2) A series of consultancies aiming to assess the current situation on the ground (the baseline) and to develop thematic strategies to address issues of particular concern in the Eastern Arc region
- 3) A series of strategy development and ratification workshops.

### Stakeholders process

To gather stakeholder inputs Forestry and Beekeeping Division (CMEAMF) undertook 14 District meetings and four Regional meetings, and worked with experts from technical agencies, to define the major problems that need to be tackled in order to improve the conservation situation across the Eastern Arc. Thousands of people, including representatives of villages and Ward leaders from across the Eastern Arc were involved with this process. Key conservation issues identified during these consultation processes were:

- a) The prevalence of destructive wild fires
- b) Widespread poverty at all levels and the lack of management resources
- c) A lack of understanding and appreciation of the values and importance of the Eastern Arc
- d) Poor availability and understanding of policies and laws
- e) Unsustainable tree harvesting despite long term harvesting bans
- f) Illegal mining for gold and other minerals
- g) Poor agriculture, charcoal production and livestock husbandry practices

## Consultancy process

To further inform the development of the strategy CMEAMF also commissioned a number of studies to provide data on the status of critical aspects of the Eastern Arc Mountains. These studies aimed to cover issues that were considered important to measure the impact of implementation, and inform strategy development. The baselines studies commissioned were as follows:

- a) Forest biodiversity values
- b) Forest area and changes over time
- c) Forest condition, forest threats, and reserve management effectiveness scores
- d) Staffing, equipment and funds available for management
- e) Knowledge, attitude and practices
- f) Water flows and water quality

For the most critical issues identified during the local stakeholder process and within the various baseline studies, specific consultancies were also established to provide precise answers on that Tanzania needs to do to address the threats. These consultancies developed specific strategies to tackle the following key issues:

- a) Fire reduction
- b) Sustainable forest use
- c) Payment for water environmental services (Water PES)
- d) Payment for carbon sequestration (deforestation avoided – Carbon PES).
- e) The development of a comprehensive protected area network for the Eastern Arc Mountains
- f) Biodiversity conservation – focusing on threatened species and preventing extinction.

## Strategy development

The results of these consultancies were used to identify the critical conservation targets (habitats, species, and ecological services) derived from the Eastern Arc Mountains. For each of these conservation targets a detailed process was undertaken to priorities the key threats<sup>1</sup>

For each of these threats, a series of strategies has been developed to try and mitigate that threat, together with key objectives, activities and an outline of monitoring needs.

The principal strategies that are proposed are as follows:

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<sup>1</sup> Lying below many of identified threats are ‘root causes’ which are deeper seated and more problematic issues that will require greater efforts to solve – these include poverty, poor governance and corruption, and lack of training and human capacity.

- Strategies to Address Fire
- Strategies to Address Illegal Logging
- Strategies to Address Collection of Firewood and Building Materials
- Strategies to Address Mining
- Strategies to Address Hunting and Poaching
- Strategies to Address Invasive Species
- Strategies to Address Unsustainable Collection for the Pet Trade

There are also a number of cross cutting issues that are addressed in separated sections at the end of the document, as follows:

- Water supply strategies
- Information, Education and Awareness Strategies
- Sustainable Financing Strategies
- Climate change strategies

Some elements of the strategy have already been initiated on the ground – in particular that involved with the enhancement of the protected area network and improving the level of awareness on forest conservation issues.

Finally, a mechanism for the coordination and management of the implementation of the Eastern Arc Mountains Strategy is proposed – that of a multisectoral committee operating at national level and coordinating the implementation of the various elements of the projects work. The key stakeholders in this committee would be the Forestry and Beekeeping division of the Ministry of Natural Resources and Tourism, the Ministry of Water and Livestock, the Ministry of Agriculture, the Vice Presidents Office (Environment), and the Prime Ministers Office- Regional and Local Government.

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## I. Background

The Eastern Arc Mountain are of global importance for their biological values and of national importance to Tanzania for their role in providing water to millions of Tanzanians in major cities and for the hydropower stations that generate more than 50% of the electricity in the country.

The Tanzanian government has recognized this importance and has facilitated the development a holistic strategy for the conservation of biodiversity, water supply and soils in the Eastern Arc Mountains of Tanzania.

Coordinated by the Forestry and Beekeeping Division of the Ministry of Natural Resource and Tourism, the project that has addressed this tasks is called ‘Conservation and Management of the Eastern Arc Mountain Forests (CMEAMF)’ – with funding provided by the Global Environment Facility through the United Nations Development Programme.

To further support the conservation in the Eastern Arc, the Government of Tanzania has assisted the creation of a conservation ‘Trust Fund’ that will provide ling term finance for conservation efforts in the area. This independent body is called the ‘Eastern Arc Mountains Conservation Endowment Fund’ – see [www.easternarc.or.tz](http://www.easternarc.or.tz) .

### Developing the background materials.

The CMEAMF project developed detailed baselines on a number of issues that were considered important to measure the impact of the conservation strategy. Baseline data is available on :

- a) Forest biodiversity values
- b) Forest area
- c) Forest condition, management effectiveness and forest threats
- d) Staffing, equipment and funds available for management
- e) Knowledge, attitudes and practices
- f) Water flows and water quality

For the most critical issues identified during the local stakeholder process, specific consultancies were also established to provide precise answers on what Tanzania needs to do to address the threats, These consultancies have provided data on the following key issues;

- a) Fire reduction
- b) Sustainable forest use
- c) Payments for water environmental services (Water PES)
- d) Payments for carbon sequestration (deforestation avoided - Carbon PES),
- e) Joint Forest Management
- f) A comprehensive protected area network
- g) Biodiversity conservation strategy

### Bringing the materials together

A three step process was used to finalize the strategy.

First, an initial planning meeting was held on the 21-23 June 2006 in Morogoro to define the conservation vision, assess the threats and outline the main strategies to be developed. The

workshop was attended by 33 people that included a range of stakeholders, including representatives from central government, local government, NGOs and parastatals.

Second, a facilitated meeting (with the support of WWF and the Foundations of Success organisation from the USA) was held on the 15-20<sup>th</sup> October in Kibaha that further developed the strategic thinking and outlined the bulk of the materials presented in this plan. Again this meeting included a variety of stakeholders, with 25 people attending during the 5 day period.

Finally a meeting was held on the XX 2007 to discuss the details of the strategic plan and to refine the indicators for the monitoring matrix.

## 2. Description of the Strategy Area

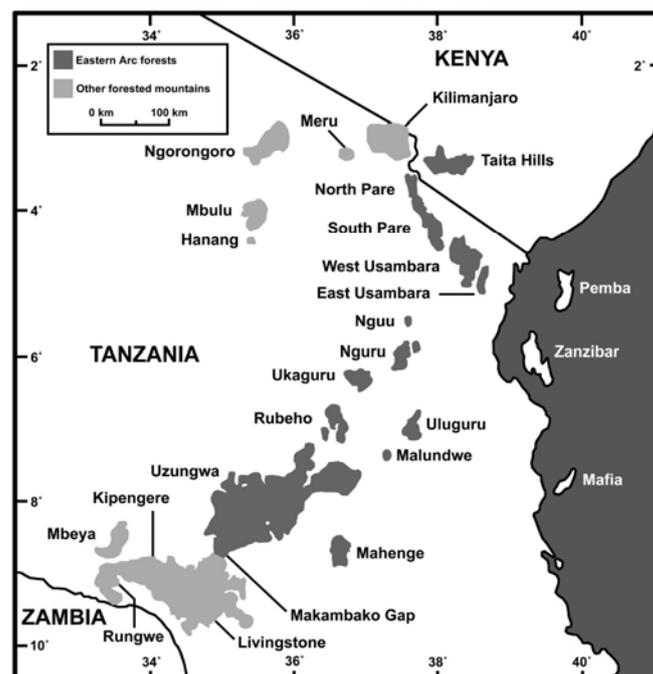
### *What is the Eastern Arc?*

The Eastern Arc is a chain of ancient mountains covered by rain forests and grasslands in Tanzania and Kenya. There are 12 Mountain blocks in Tanzania and one in Kenya that comprise these mountains – scattered across 14 administrative Districts in Tanzania. Scientists believe that forest has survived on the Eastern Arc Mountains for over 30 million years, and there are ancient connections to the forests of the Congo Basin and West Africa, and even to Madagascar. In this document we focus on the Eastern Arc Mountain blocks in Tanzania

The 12 Eastern Arc Mountain blocks in Tanzania stretch across 14 districts

<b>Mountain Blocks</b>	<b>District</b>
North Pare	Mwanga
South Pare	Same
West Usambara	Lushoto, Korogwe,
East Usambara	Korogwe, Muheza
Nguu	Kilindi
Nguru	Mvomero
Uluguru	Morogoro and Mvomero
Ukaguru	Kilosa
Rubeho	Mpwapwa and Kilosa
Malundwe	Mvomero
Udzungwa	Kilombero, Kilolo and Mufindi
Mahenge	Ulanga

**Figure 1. Location map of the Eastern Arc Mountains**



## ***What are the biodiversity values?***

The biological values of the Eastern Arc Mountains are truly exceptional in global terms as has been recognized by many organizations, for example by Conservation International, World Wide Fund for Nature (WWF), Birdlife International and the World Conservation Union (IUCN).

Current knowledge shows that 97 species of vertebrate animal are endemic to the Eastern Arc Mountains, split as follows: 10 mammal, 20 bird, 29 reptile and 38 amphibian species; more than 10 additional new species are in the process of being described. In addition to this, another 71 species are only found in the Eastern Arc and other nearby forest habitats. These are termed near- endemic species. Seventy two of the endemic or near- endemic vertebrates are threatened by extinction (8 Critical, 27 Endangered, 36 Vulnerable), with an additional seven wide ranging threatened species. This is one of the highest concentrations of threatened species in the world and shows that the Eastern Arc is one of the places where species could disappear from the face of the earth in coming years. Indeed one species, the Kihansi spray toad, seems to be on the edge of extinction in the wild.

It is more difficult to provide a precise estimate for the number of endemic plants in the Eastern Arc. However, botanical experts have identified at least 68 endemic tree species and hundreds of species of endemic shrubs and herbs, with the total number of endemics likely to reach 1,500 species. The Uluguru mountains alone has more than 135 plant species that are confined to that single mountain block, and 100 or more endemic species are also known on the East and West Usambara, and Udzungwa ranges. The number of threatened plant species in the Eastern Arc is similarly difficult to calculate precisely, but a recent estimate was that around 1,000 plants are threatened with extinction.

### **Importance of different Eastern Arc blocks**

By adding up of the number of endemic and near- endemic species in each mountain block, it is possible to obtain simple estimation of biological value and priority for conservation investment (Table 1). Based on current knowledge three blocks are of the highest importance: Uluguru, East Usambara and Udzungwa. The Nguru and Rubeho come close behind in this ranking. These five blocks are the most important for conservation attention, although every part of the Eastern Arc has high value in global terms, and the lack of study in some areas means that rankings may change in the future.

### **More still to discover**

To illustrate that we do not have complete knowledge of these mountains, a new species of large monkey- a mangabey (*Lophocebus kipunji*) was described in 2005 from the Udzungwa Mountains and the Southern Highlands further south. In addition, a new species of shrew (*Congosorex phillipsorum*) was described during 2005 from the same Udzungwa mountain forest: and three new bird species have been named from various mountains in the past couple of years, along with five new species of amphibian. At least another 10 new species of vertebrates will be described in the next few years. It seems that detailed study of each mountain block will continue to discover additional species that are unknown to science.

Major gaps in biological knowledge remain in the Eastern Arc, with several mountain blocks being almost unknown for anything other than birds. Current investment aims to fill these knowledge gaps, and work will focus on the poorly known North Pare, Nguu, Nguru, Rubeho, Mahenge and Ukaguru blocks.

**Table 1. Numbers of endemic and near-endemic vertebrates and trees in different Eastern Arc Mountain blocks (November 2005)**

<b>Mountain block</b>	<b>Approximate forest area remaining (hectares)</b>	<b>Single block endemic (One to 13 blocks)</b>	<b>Near endemic (also coastal forest, Southern Highlands, or Kilimanjaro area)</b>	<b>Number of Eastern Arc endemic trees</b>
Taita (Kenya)	300	6	11	8
North Pare	2,500	0	12	0
South Pare	13,540	2	19	1
West Usambara	26,500	5	48	27
East Usambara	25,800	4	78	40
Nguu	24,900	0	27	6
Nguru	34,000	0	52	25
Uluguru	27,000	14	82	26
Ukaguru	17,400	1	27	4
Rubeho	47,400	2	35	0
Malundwe	450	0	2	4
Mahenge	1,940	0	11	5
Udzungwa	102,400	17	96	37

## II. Our Vision for the EAMFE

The June 2006 strategic planning workshop developed a vision for the conservation of the Eastern Arc mountains. Meeting participants were divided into four groups according to the type of institution they represented – NGOs, local government, central government and parastatals. Each group developed a vision of how they would like to see the Eastern Arc mountains in 50 years' time. Having examined each vision, the main elements were extracted in plenary and developed into the overall vision. The final vision for the Eastern Arc mountains is:

### **EASTERN ARC CONSERVATION VISION**

**We envisage that the unique biodiversity values of the Eastern Arc Mountain forest ecosystems of Tanzania are conserved, sustainably managed and providing equitably shared benefits and services for local, national and international stakeholders**

It is hoped that this vision will provide guidance for the work that is undertaken in the Eastern Arc Mountains over the coming decades.

### *The Eastern Arc Mountains Conceptual Model*

The conservation planning meeting in October 2006 developed a detailed conceptual model for the Eastern Arc Mountains. This model identifies the main conservation targets, the direct threats that they face, and the various indirect threats and opportunities that contribute to the manifestation of the threat impacting on the conservation targets.

Conservation targets. The group defined the following as the main conservation targets in the Eastern Arc Mountains:

- Forest (divided up as upper montane, montane and sub-montane forest types as these face some different threats.
- Montane grasslands
- Montane wetlands
- Water resources
- Endemic species
- Wide ranging species

Threat ranking. A reassessment of the previous threat ranking exercises undertaken by Forestry and Beekeeping Division, agreed upon the following main threats to the conservation targets:

Threats Ranked High (red on conceptual diagram)

- Uncontrolled fire
- Conversion of natural habitats to agriculture

Threats ranked medium (orange on conceptual diagram)

- Unsustainable collection of firewood and building materials

- Illegal logging

Threats ranked low (green on conceptual diagram)

- Unsustainable hunting/poaching
- Inappropriate mining practices
- Illegal grazing

### **Drivers**

Lying behind the indirect threats and opportunities are a number of drivers or root causes of the problems that result in the threats on the conservation targets in the Eastern Arc. The drivers identified at the October 2006 planning meeting were:

- Corruption
- Lack of transparency
- Weak law enforcement
- Weak management capacity
- Lack of awareness
- High international and national demands
- Population growth
- High price of electricity

These are most difficult issues to address, but which have a fundamental bearing on whether the conservation vision for the Eastern Arc Mountains might be achieved.



### **III. Goals for the EAMFE**

#### **Target: Upper Montane Forest (above 2,000 m)**

*Goal: by 2017, 100% of remaining \*upper montane forest is effectively conserved*

\*Based on baseline data from 1999 – 2003 the total amount of forest is around 230,858 ha

#### **Target : Montane Forest (from 1,500 to 1,900 m)**

*Goal: by 2017, 100% of remaining \*montane forest are effectively\*\*conserved and connectivity among major forest patches\*\*\*is created*

\*Based on baseline data from 1999 -2003 the total is around 2,000,529 ha

\*\*Intact tree canopy with full set of species including representative endemic species; decreasing levels of disturbance

\*\*\*Ulugurus (Bunduki, Kitumbaku Hills), East Usambaras (Derema, Nilo-Kambai/Segoma), Uzungwa Scarp to Matundu/Iyonde)

#### **Target: Sub-Montane Forest (from 800 to 1,400m)**

*Goal: by 2017, at least 80% of remaining sub-montane forest\* is effectively \*\* conserved*

\*Based on baseline data from 1999 – 2003 the total forest is around 1,026,683 ha

\*\*Intact tree canopy with full set of species including representative endemic species; decreasing levels of disturbance

#### **Target: Montane Grasslands**

*Goal: By 2017, representative samples\* of the Montane Grassland in the Eastern Arc mountains are effectively \*\*conserved.*

\*Baseline data on the montane grasslands of the Eastern Arc are not compiled, but they occupy extensive areas on the southern Eastern Arc mountains. Example montane grasslands are conserved in the Uluguru (Uluguru South) and Udzungwa (e.g. Mufindi reserves and West Kilombero Scarp) ranges. Unprotected grasslands exist mainly in the Udzungwa mountains, but also in the Rubeho mountains.

\*\*Full set of species, total biomass, ground cover

#### **Target: Montane wetlands**

*Goal: By 2017, representative samples\* of the Montane Wetlands in the Eastern Arc mountains are effectively \*\*conserved.*

\*Baseline data on the montane wetlands of the Eastern Arc are not compiled, but they do not occupy large areas on most mountains. Examples of montane wetlands are conserved in the Uluguru (Uluguru South), Udzungwa (Kisinga Lugaru and West Kilombero Scarp in particular). Unprotected wetlands exist mainly in the Udzungwa mountains.

\*\*Full set of species, water quality, vegetation cover

**Target: Water Resources (streams, rivers, catchments areas)**

*Goal: By 2017, the streams, rivers and wetland of the East Arc Mountain have stable hydrology (within its natural range) and water quality is within acceptable standards*

**Target: Endemic species**

*Goal: By 2017, all endemic species\* are effectively conserved.*

\*Endemic species of vertebrates and plants and listed in Appendix 1 and Appendix 2

**Target: Wide-ranging species**

*Goal: By 2017, wide ranging species\* populations are either increasing or fluctuating within normal variation within the Eastern Arc region.*

\*these species include elephant and leopard

**Target: Species under trade**

*Goal: By 2017, the trade in Eastern Arc species \* is effectively controlled*

Trade includes chameleons, African violets, Livingstone's Turaco, large beetles, cycads, African Sandalwood, African cherry (*Prunus africana*)

## Monitoring Plans for each of the Goals

These outline plans indicate what would need to be done to measure the achievement of the targets identified in the plan

<b>Goal for Upper Montane Forest:</b> By 2017, 100% of remaining upper montane forest is effectively conserved					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Forest cover above 2,000m altitude	Remote sensing and altitudinal analysis	Every 5 years	Depending on funds For 2008 CEPF and FBD should have funds	Sokoine University GIS lab or Institute of Resource Assessment in Dar es Salaam	A technically demanding and potentially expensive task
<b>Goal for Montane Forest:</b> By 2017, 100% of remaining upper montane forest is effectively** conserved and connectivity among major forest patches***is created.					
<i>WHAT (Indicators)</i>	<i>HOW(Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Forest cover above 1,500 and 1,900m altitude	Remote sensing and altitudinal analysis	Every 5 years	Depending on funds For 2008 CEPF and FBD should have funds	Sokoine University GIS lab or Institute of Resource Assessment in Dar es Salaam	A technically demanding and potentially expensive task
<b>Goal for Sub Montane Forest:</b> By 2017, 80%* of remaining sub-montane forest is effectively **conserved					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Forest cover above 800m and 1,400m altitude	Remote sensing and altitudinal analysis	Every 5 years	Depending on funds For 2008 CEPF and FBD should have funds	Sokoine University GIS lab or Institute of Resource Assessment in Dar es Salaam	A technically demanding and potentially expensive task

<b>Goal for Montane Grasslands:</b> By 2017, representative samples* of the Montane Grassland in the Eastern Arc mountains are effectively** conserved					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Area of grassland above 2000m altitude	Remote sensing	Every 5 years	Depending on funds For 2008 CEPF and FBD should have funds	Sokoine University GIS lab or Institute of Resource Assessment in Dar es Salaam	A technically demanding and potentially expensive task

<b>Goal for Montane Wetlands:</b> By 2017, representative samples * of Montane Wetlands in the Eastern Arc mountains are effectively **conserved					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Area of wetlands above 2000 m altitude	Remote sensing	Every 5 years	Depending on funds For 2008 CEPF and FBD should have funds	Sokoine University GIS lab or Institute of Resource Assessment in Dar es Salaam	A technically demanding and potentially expensive task

<b>Goal for Water Resources:</b> By 2017, the streams, rivers and wetlands of the Eastern Arc Mountains have stable hydrology (within the natural range) and water quality is within acceptable standards.					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Rivers flows	Gauging stations within the Eastern Arc Mountains	Daily readings	River Basin Authorities and the Ministry of Livestock and Water	Rivers flowing from the Eastern Arc Mountains	Baselines have been identified in the report by Department of Hydrology – University of Dar es Salaam – show declines in many rivers

Water quality (sediments, nitrates, phosphates, pollutants)	Water sampling points within the Eastern Arc	Periodic readings	River Basin Authorities and the Ministry of Livestock and Water	Rivers flowing from the Eastern Arc Mountains	Baselines have been identified in the report by Department of Hydrology – University of Dar es Salaam
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<b>Goal for Endemic species:</b> By 2017, all endemic species*are effectively conserved					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Alliance for Zero Extinction species (highly threatened species found in only a single locality) 16 species, but increasing as more species are described from small areas)	Special studies depending on each species	Every 5 years	Researchers	At the locations where these species are found	Data on the status and distribution of these species is stored in the CEPF ‘outcomes’ Database and at the BirdLife partners in the region (WCST in Tanzania). Shared with FBD database.
Other endemic species (96 vertebrate animals and 800-1,000 plants)	Special studies depending on resources available	Every 5 years	Researchers	In each of the forests of the Eastern Arc Mountains	Data gathered and stored at the national Biodiversity database (University of Dar es Salaam) and in CEPF outcomes database. Shared with FBD database

<b>Goal for Wide-ranging Species:</b> By 2017, wide ranging species * populations are either increasing or that fluctuating within normal variation within the Eastern Arc region					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Elephant	Population range assessment (sites) Population census in Udzungwa Mountains NP	When resources are available	Udzungwa NP ecologist. Other researchers as are available	Udzungwa, Rubeho, Mahenge blocks (not present elsewhere)	Elephant populations are increasing the Udzungwa NP. Trends elsewhere are not known
Leopard	Camera trapping within sites	Under existing Museo Trento and TFCG project	Museo Trento and TFCG projects	Eastern Arc Forest Reserves	Camera trap data provides one of the only ways to assess the presence of this species which is very secretive

<b>Goal for species under trade:</b> By 2017, the trade in Eastern Arc species * is effectively controlled					
<i>WHAT (Indicators)</i>	<i>HOW (Methods &amp; Tasks)</i>	<i>WHEN</i>	<i>WHO</i>	<i>WHERE</i>	<i>Comments</i>
Chameleon exports	Trade (export) data against quotas	Annually	Wildlife Department/CITES/TR AFFIC	Dar es Salaam	It is not known how accurate the export data are
Amphibian exports	Trade (export) data against quotas	Annually	Wildlife Department/CITES/TR AFFIC	Dar es Salaam	It is not known how accurate the export data are
Bird export data	Trade (export) data against quotas	Annually	Wildlife Department/CITES/TR AFFIC	Dar es Salaam	It is not known how accurate the export data are

## IV. Prioritization of Threats and Selection of Strategies

### 4.1 Threat Prioritization

#### 4.1 Threat Prioritization.

The purpose of this exercise is to prioritize the threats identified in the conceptual model.

The following criteria are used for the prioritization of threats:

- **Area.** How wide an area does the threat affect? Is it going to affect the entire area or just a small part of it?
- **Intensity.** How strong is the impact of the threat on a given piece of habitat, ecosystem service or wildlife population? Will it destroy it completely? Or will it cause only minor damage?
- **Urgency.** How urgent is the action to deal with the threat? Is the threat occurring now? Or is it only likely to be important in future years?

#### Procedure

Based upon the conceptual model we undertook the following activities.

- 1) Choose the direct threat that influenced the biodiversity targets.
- 2) Prioritized the threat using the criteria outlined above.
- 3) Created a table with threat in the left column and criteria in the right columns.
- 4) For each threat in turn, assign a relative threat value in comparison to other threats. The highest score that any threat can get for each criterion is equal to the total number of the threats in the matrix (in the example, it is 5, as there are five threats).
- 5) Repeat the process for each criterion.
- 6) Finally, add up to the threat scores and add the total to the last column.
- 7) Based on the totals, assign each threat to one of three categories: “high” priority, “medium” priority or “low” priority.
- 8) Transfer your results to a computer file.

This procedure was undertaken for the Eastern Arc Mountains in the October 2006 planning meeting. Initial consideration was also made of the various threat prioritizations that had been made during earlier phases of this work. The ranked threats from the Eastern Arc Mountains are:

Threat	Area	Severity	Urgency	Total
Uncontrolled fire	10	9	10	29
Conversion of natural habitats to agriculture	9	10	9	28
Illegal logging	7	7	6	20
Unsustainable collection of firewood and building materials	8	6	7	21
Inappropriate mining practices	1	8	8	17
Illegal grazing	4	4	5	13
Unsustainable hunting/poaching	6	5	4	15
Unsustainable collection for the pet trade	3	1	3	7
Unsustainable collection for medicinal plant	5	3	2	10

Invasive species.	2	2	1	5
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The participants felt that there was not enough information available to them to evaluate the potential impact of climate change in the EAMF. Thus, it was not included in the threat ranking, although it is known that it has a potential overriding effect on the habitats and species of the Eastern Arc.

## 4.2 Strategy Selection Process

The selection of those strategies to be developed within the Eastern Arc strategic plan was undertaken using a standardized methodology that has been applied to other similar planning exercises globally. The approach is as follows:

- 1) Select a priority threat.
- 2) Using the conceptual model, identify all the main factors that contribute to that threat (e.g. market factors, social organization, people's general level of knowledge of appropriate practices, politics, law enforcement, etc) and extract them from the model .
- 3) If there are only a few factors in the conceptual model that contribute to this threat, or if the conceptual model fails to capture the most important factors, then identify more factors.
- 4) Of these main factors, eliminate those you cannot change and highlight the ones you believe you have to change to reduce the threat – these are the **key factors**.
- 5) Brainstorm in a small group the potential strategies to influence these key factors.
- 6) Choose your final strategies, based on the following criteria:
  - The strategy is essential to reduce the threat.
  - The strategy is not already being fully addressed by others.
  - The skills and experience exists to undertake the strategy.

Subsequent chapters of this document focus on describing each of the main strategies identified to mitigate the key threats.

- Each chapter begins with mini conceptual model that was produced to help identify the root causes of that threat.
- The chapter then proceeds to outline the 'results chain' for the strategy that was regarded by the group as the most likely to be able to mitigate that threat.
- Finally a number of major objectives are identified and a list of activities that are required to be implemented are proposed.

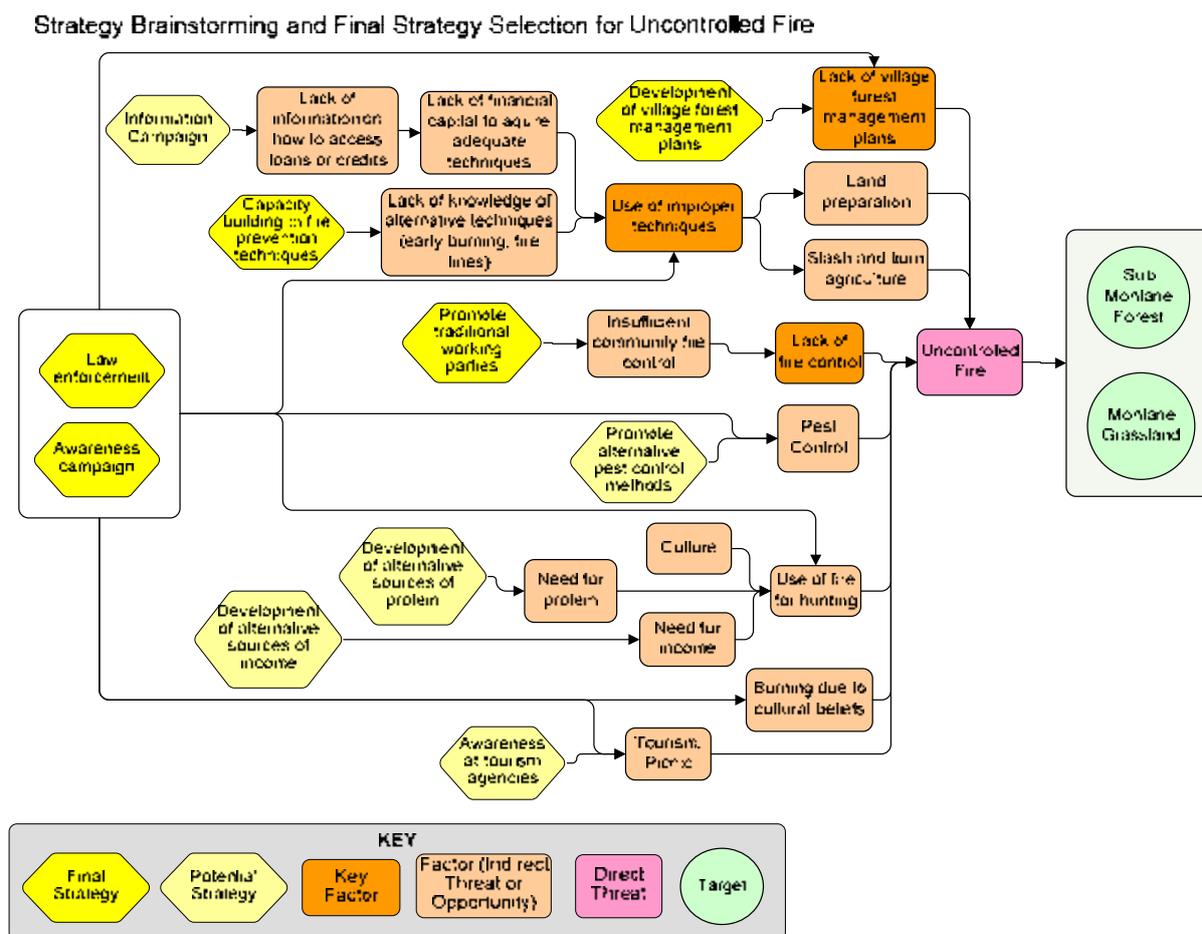
## V. Strategies to Address Fire

### 5.1 Analysis of the Root Causes of this Threat

Uncontrolled fire was regarded as a major threat to the montane grasslands and the sub-montane forests. The key factors that were selected as resulting in the high rates of fire were the lack of village forest management plans, the use of improper fire techniques, and the general lack of fire control. Consideration of the factors and the various strategies proposed to identify them resulted in the selection of five ‘final strategies’

- 1) The development of village forest management plans
- 2) Capacity building in fire prevention techniques
- 3) Promote traditional working parties
- 4) Law enforcement
- 5) Awareness campaigns

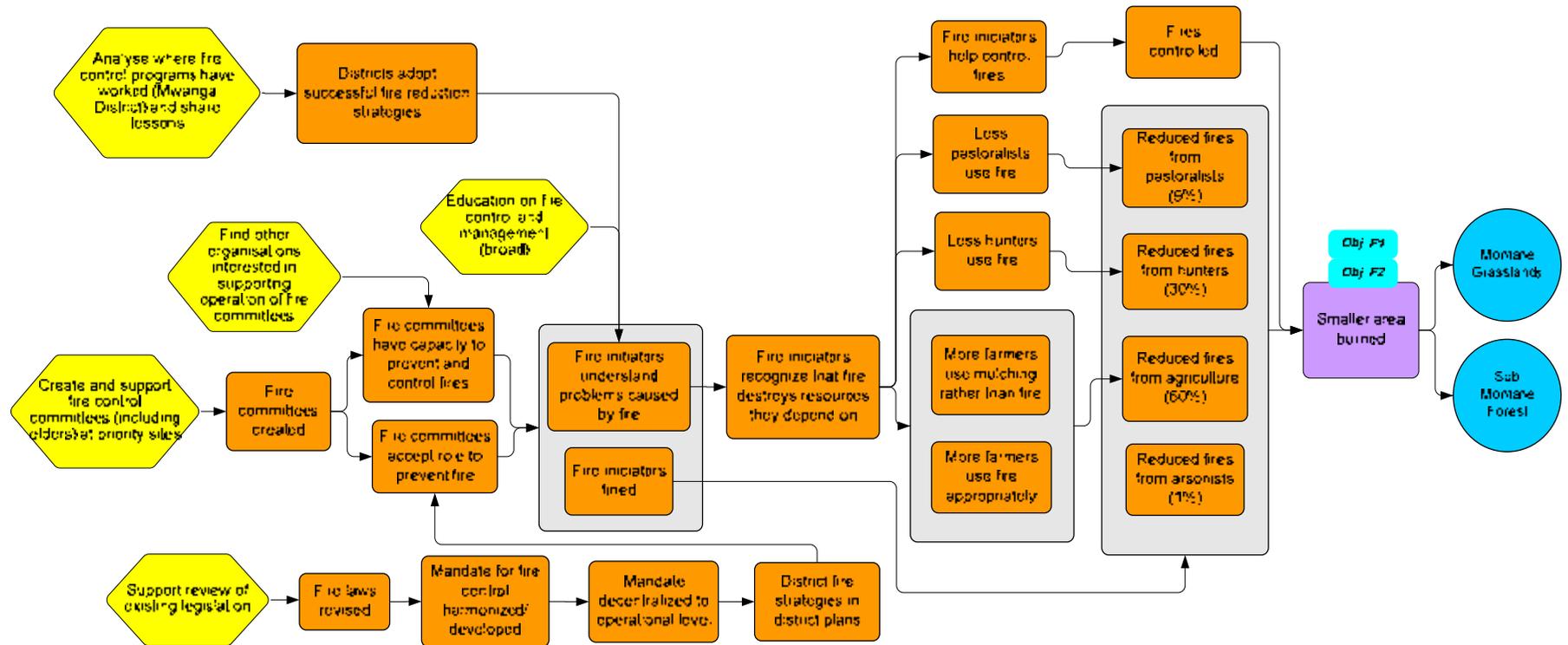
A pictorial representation of the mini conceptual model is outlined below:



## 5.2 Strategy to Raise Awareness of Fire Control

### Results Chain

Strategy to Prevent and Control Fire



## Objectives, Activities, and Monitoring

Objective Fire 1: By 2017, the number of fires across the Eastern Arc are reduced from the 1,643 fire points per annum in 2003 to less than 1,000 fire points.

Objective Fire 2: By 2017, total area burnt in fire prone areas\* of the Eastern Arc is reduced by about 30%.

Objective Fire 3: By 2012, fire control plans are developed and implemented in 80% of the c.300 villages in fire prone areas of the Eastern Arc\*

Objective Fire 4: By 2010, key community members are actively involved in fire protection activities in the most fire prone areas of the Eastern Arc\*.

\* The most fire prone areas are Chome in South Pare, Uluguru, Mahenge and Udzungwa

### Activities

- Compile MODIS fire points data from the University of Maryland to assess if the number of fires in Tanzania have declined since 2003
- Compile MODIS fire points data from the University of Maryland to assess if the area of fires in Tanzania have declined since 2003
- Instigate a programme to develop control committees and activities in the key villages in fire prone areas of the Eastern Arc
- Produce and disseminate fire control and prevention information materials
- Disseminate messages at national, district and village levels on fire prevention using appropriate media
- Establish fire prevention committees/fire fighting brigades in the most fire prone villages across the Eastern Arc
- Provide copies of policies, laws, regulations and by-laws to districts and communities across the Eastern Arc

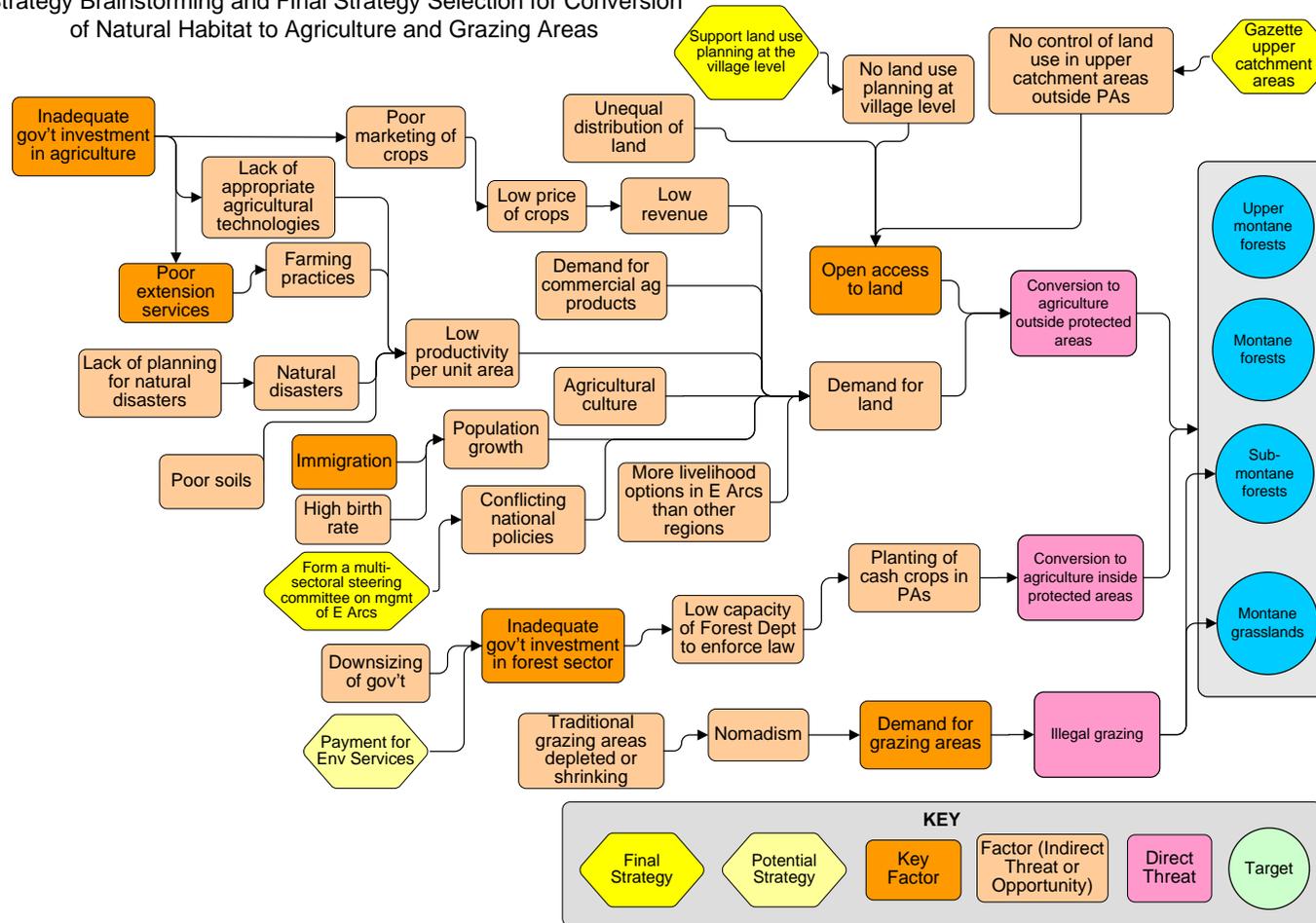
### Monitoring

- In 2008 obtain MODIS data from University of Maryland and repeat fire points analysis from 2004 (CMEAMF)
- Count the number of villages implementing fire protection activities in the Eastern Arc (catchment forest programme)
- Record the types and volumes of educational materials produced and disseminated (TFCG, FBD, WWF)
- Count the number of fire prevention committees established across the Eastern Arc (catchment forest programme)

# VI. Strategies to Address Agriculture and Illegal Grazing

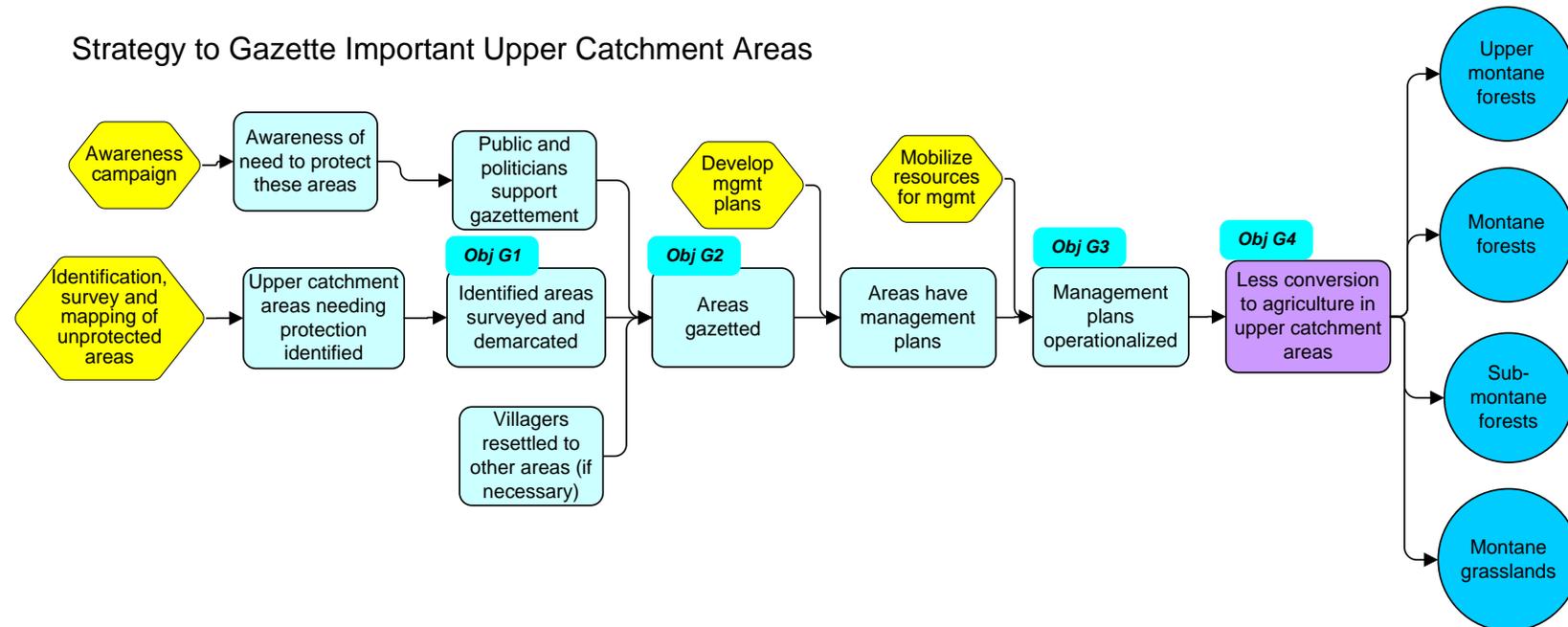
## 6.1 Analysis of the Root Causes of these Threats

Strategy Brainstorming and Final Strategy Selection for Conversion of Natural Habitat to Agriculture and Grazing Areas



## 6.2 Strategy to Gazette Important Upper Catchment Areas

### Results Chain



## **Objectives, Activities and Monitoring**

Objective G1. By 2017, all unprotected forest patches are identified and gazettement processes are underway, including the forest corridors of Derema and Nilo- Kambai (East Usambara), Bunduki (Uluguru) and Iyondo-Uzungwa Scarp (Udzungwa).

Objective G2. By 2012, ten proposed Forest Reserves covering over 60,000 ha are gazetted as national Forest Reserves, at least three Nature Forest Reserves (Nilo, Uluguru, West Kilombero) are established from within the current network of protected forest reserves, and the area of village forests is increased from 1,270 ha to at least 3,480ha.

Objective G3. By 2016, a standardized format for management plans agreed for catchment reserves and at least 30 plans have been completed and are under implementation.

Objective G4. By 2017, the rate of loss of forest in the Eastern Arc due to agriculture and grazing declines from 1,900 ha per decade (1990 – 2000) to less than 1,000 ha per decade, with forest area increasing in some blocks.

### **Activities**

- Identify all unprotected forest patches (see protected areas thematic strategy document)
- Gazette the 10 proposed reserves across the Eastern Arc Mountains
- Gazette at least 6 new village forest reserves across the Eastern Arc Mountains
- Create functional forest corridors in East Usambara, Uluguru and Udzungwa Mountains
- Develop and agree standardized format for simple and operational management plans
- Write and implement at least 30 simple management plans for Eastern Arc forests
- Remove villages and illegal farmers from within boundaries of Eastern Arc Forest Reserves

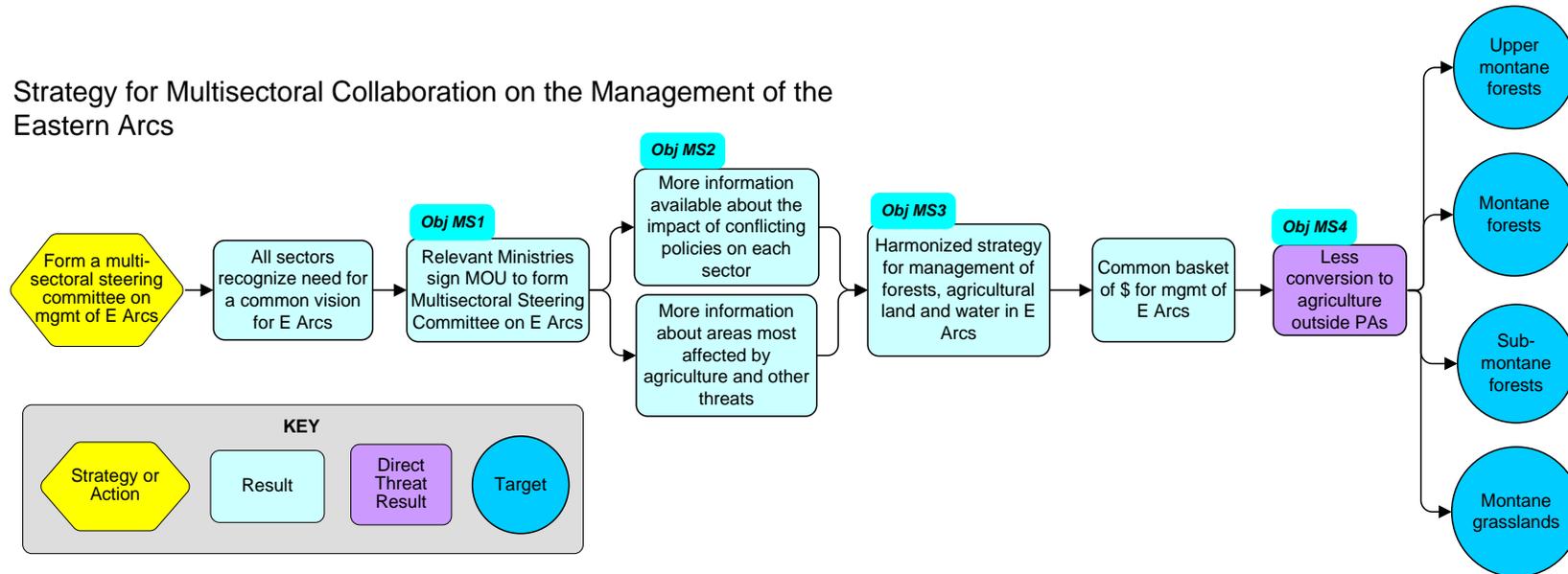
### **Monitoring**

- An accurate and updated forest list and GIS shape files for the Eastern Arc Mountains (updating that produce in 2004)
- Gazettement records of new Forest Reserves and Nature Reserves
- Copies of the management plan guidelines/format
- Copies of the management plans produced for the Eastern Arc forests
- Forest change analysis repeated in 2008 to measure rates of change

### 6.3 Strategy for Multisectoral Collaboration on the Management of the Eastern Arcs

#### Results Chain

Strategy for Multisectoral Collaboration on the Management of the Eastern Arcs



## **Objective, Activities and Monitoring**

Objective MSI. By 2008, a multisectoral steering committee on the management of Eastern Arc Mountains is formed, meeting at least three times per year, and has developed and is implementing a workplan.

Objective MS2. By 2010, a fully harmonized second version strategy document is in place for the environment and management of natural resources (forests, agricultural land and water) in the Eastern Arc Mountains.

Objective MS3. By 2011, an MOU on collective conservation of Eastern Arc Mountains is signed by the relevant Ministries.

Objective MS4. By 2012, all Ministries in the MOU contribute to and access funds from the Eastern Arc Mountains Conservation Endowment Fund.

### **Activities**

- Develop Terms of Reference for the multisectoral committee
- Seek inputs from the various Ministries to the Eastern Arc Mountain strategy
- Produce a revised version of the strategy that is endorsed by all stakeholders
- Develop an MOU for management of Eastern Arc between sectoral ministries
- Agree on financial inputs into the Eastern Arc Mountains Conservation Endowment Fund

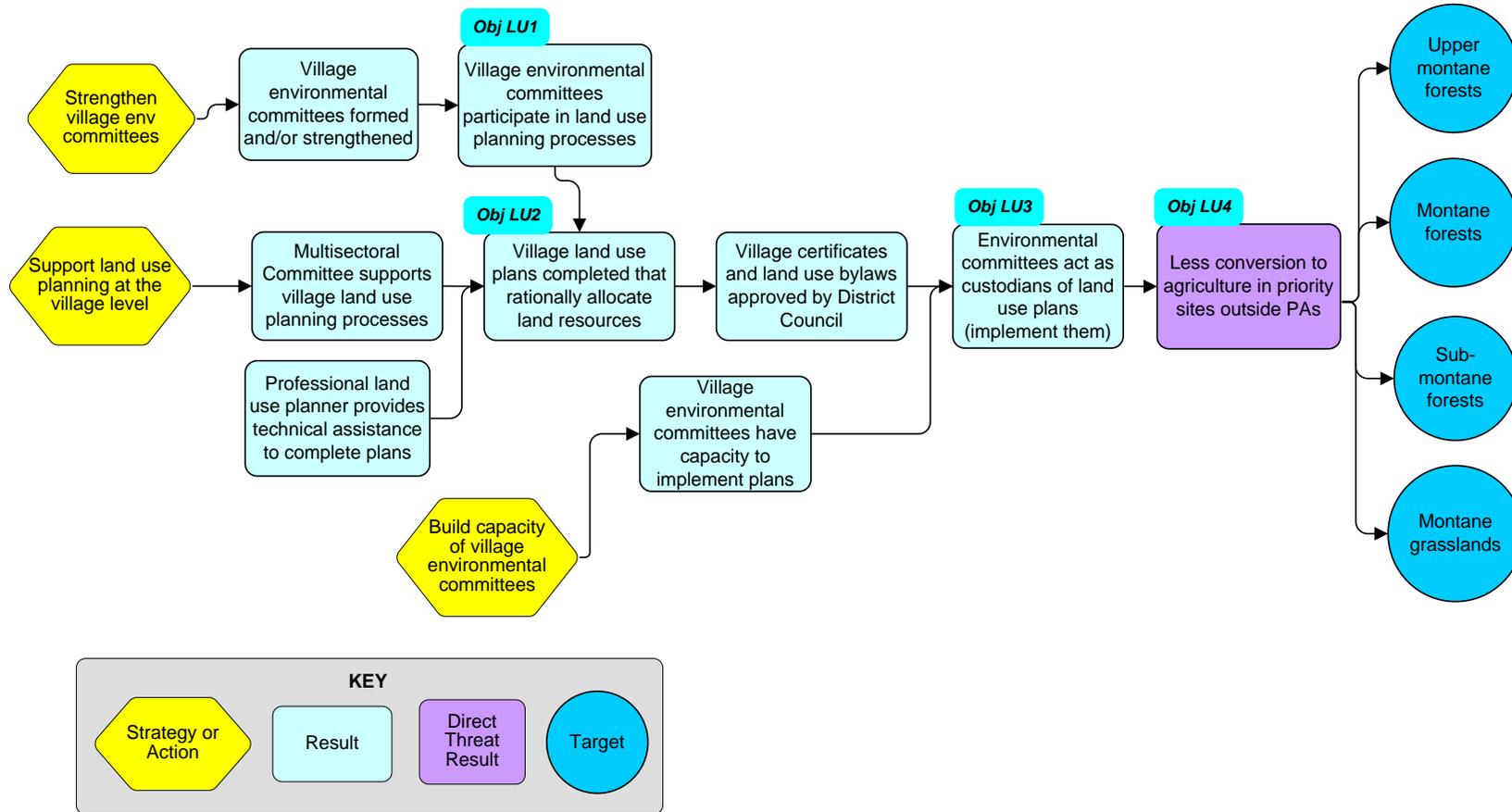
### **Monitoring**

- Copies of terms of reference for multisectoral committee
- Minutes from the meetings of the multisectoral committee
- Amounts of money flowing from Ministries to EAMCEF and from their to projects on the ground.

## 6.4 Strategy to Support Land Use Planning at the Village Level

### Results Chain

Strategy to Support Land Use Planning at the Village Level



## **Objectives, Activities and Monitoring**

Objective LU1. By 2010, 100% of the village environment committees in the five targeted mountain blocks (Uluguru, Nguru, and East and West Usambara, Udzungwa) are actively participating in land use planning processes.

Objective LU2. By 2015, at least 70% of the villages in five targeted mountain blocks (Uluguru, Nguru, East and West Usambara, Udzungwa) have land use plans in place.

Objective LU3. By 2017, villagers adhere to the land use plans and bylaws in 70% of the villages in the five targeted mountain blocks (Uluguru, Nguru, East and West Usambara, Udzungwa).

Objective LU4. By 2017, the rate of forest loss to agriculture has been reduced from 1,900 ha per decade (1990-2000) to under 1,000 ha per decade (with forest increase in some areas), and the rate of loss of woodland has been reduced from 38,000 ha per decade (1990 – 2000) to under 10,000 ha per decade.

### **Activities**

- Establish environment committees in villages where they do not exist
- Instigate programmes of land use planning where these are required
- Assist the ratification and implementation of these plans
- Undertake repeat of the land cover change analysis of 2005

### **Monitoring**

- Lists of villages in each block and the existence of village environment committees
- Copies of land use plans for each village
- Copies of bylaws for each village land use plans
- Land cover change data sets and GIS files

## **VII. Strategies to Address Illegal Logging**

### ***7.1 Analysis of the Root Causes of this Threat***

Logging of timber within the Eastern Arc Mountains catchment (central government) Forest Reserves has been banned since 1986. However, there is still a significant amount of illegal logging going on in some reserves areas, especially from the Chome FR in the South Pare Mountains and the Nguru and Kanga FRs in the Nguru Mountains.

Elsewhere there is pitsawing, in all reserves, but at a lower level. The local demand for quality timber for doors, window frames and furniture fuels this exploitation, with the wood being taken from the forest in planked form and then onto traders to sell on into the market. There is believed to be significant corruption involved in this illegal trade in timber from the Eastern Arc, although there is little to substantiate these rumours.

The group developed a mini-conceptual model for the issue of illegal logging, which is presented below. This model indicated that the major drivers of the logging in the Eastern Arc are:

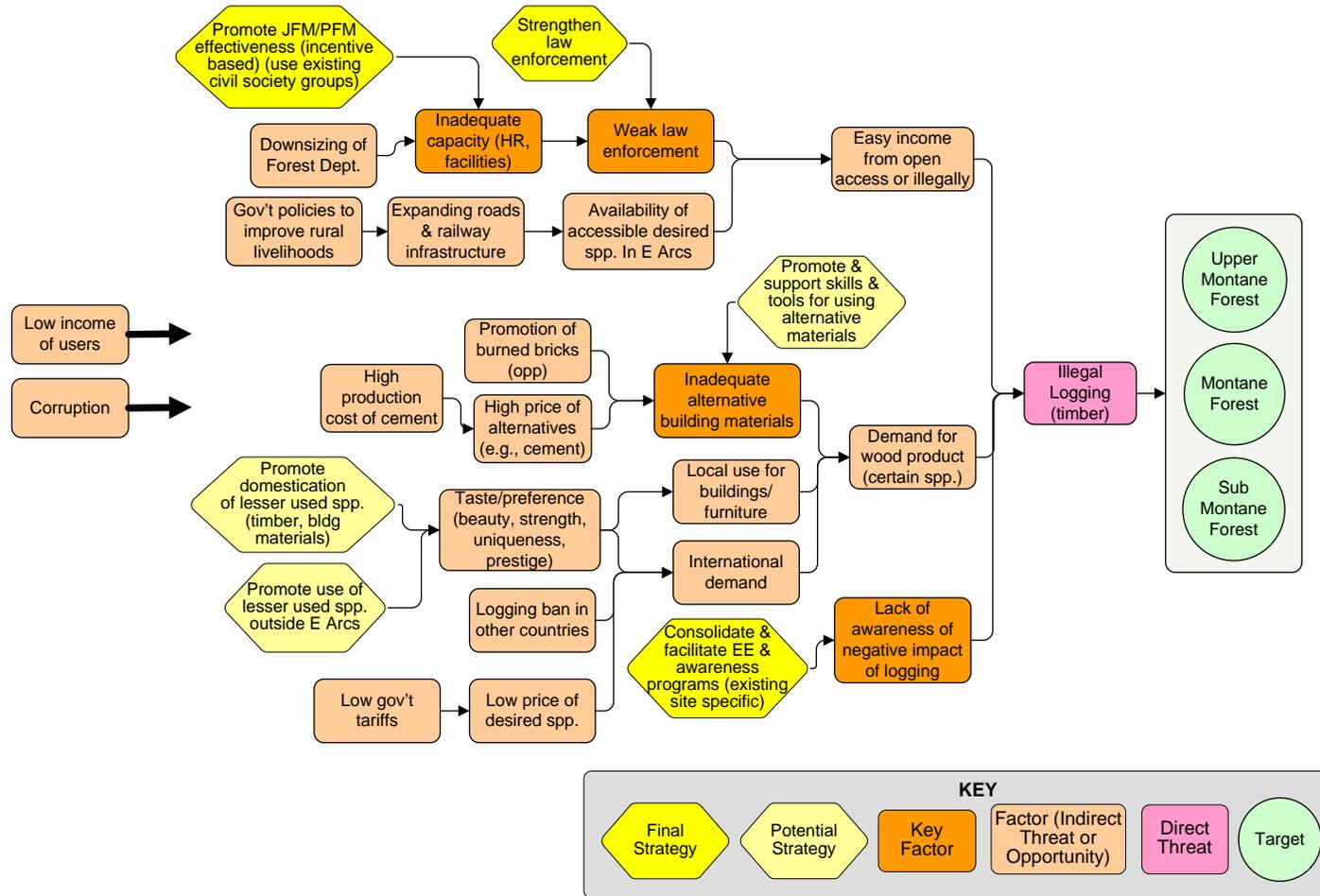
- Weak law enforcement
- Inadequate capacity (human resource and equipment)
- Inadequate alternative building materials
- Lack of awareness of the negative impacts of logging

Lying behind these issues are matters of low household income (and thus the need to illegally log) and corruption within the system that is supposed to regulate or control this logging. These are important root causes of the problem that are hard to address without high level political support. The strategies that are proposed to address these drivers are as follows:

- Promote the effectiveness of JFM/PFM schemes by improving the incentives for those participating.
- Strengthen law enforcement
- Consolidate and expand environmental education programmes

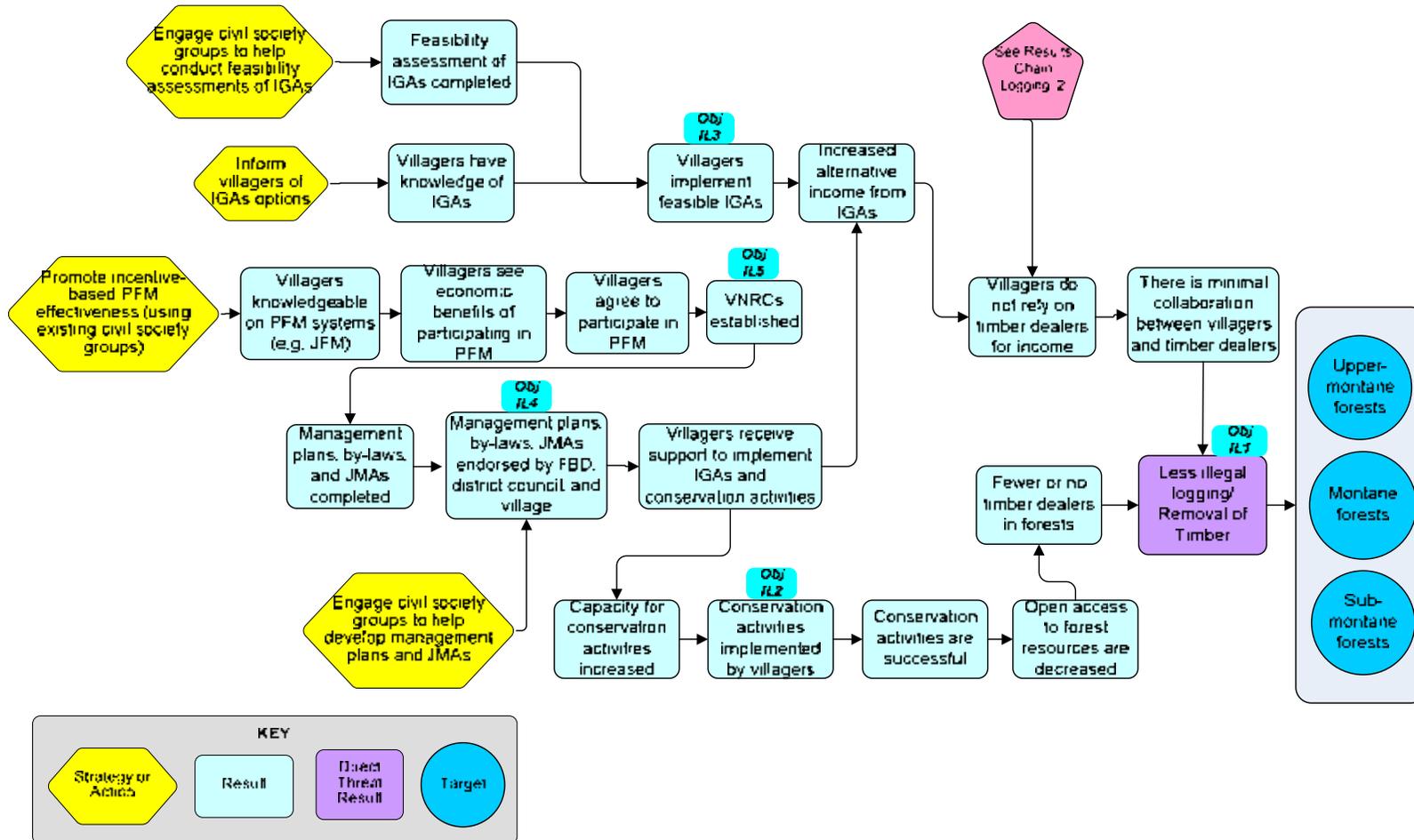
These strategies are elaborated below.

### Strategy Brainstorming and Final Strategy Selection for Illegal Logging



## 7.2 Strategy to Promote PFM Effectiveness to Address Illegal Logging

### Results Chain



## **Objectives, Activities and Monitoring**

Objective IL1: By 2017 the rates of cutting declines from around 42 old cut and 2.5 new trees/hectare (baseline in 2004) to under 20 old cut and less than 1 new cut tree/ha within the forests under JMA agreements.

Objective IL2: By 2010, weekly patrolling by villagers is taking place in all villages with JMAs, and records are being submitted to the national forestry and beekeeping database through the districts or catchment forest officers.

Objective IL3: By 2017, each village with a signed JMA would have implemented at least 3 IGAs, including utilization of the existing plantations of exotic species within the following Eastern Arc Forest Reserves (Kimboza, Bunduki, Shikurufumi), and the establishment of suitable SACCOS schemes.

Objective IL4: By 2017, the area of Eastern Arc Mountain Forest that is managed according to signed Joint Forest Management Agreements has increased from c. 200,000 to around 400,000 ha, and these agreements reflect the sharing of benefits and management responsibilities as outlined in the FBD Joint Forest Management guidelines (2006).

Objective IL5: By 2010, all forest-adjacent villages without existing VNRCs have established them in the four focal Eastern Arc Mountains (Nguru, Uluguru, Udzungwa and W. and E. Usambara)

### **Activities**

- Establish village natural resources committees in village adjacent to the Eastern Arc Mountain Forest.
- Develop further JMAs in Eastern Arc Forests where benefits and responsibilities are clearly stated and agreed.
- Implement income generating programmes around Eastern Arc Mountain Forests
- Implement timber harvesting as a component of JMAs around smaller Eastern Arc Reserves containing mature or overmature exotic plantation species.
- Establish SACCOS schemes providing relevant credit to farmers and villagers.
- Repeat baseline study on forest disturbance to assess changes.

### **Monitoring**

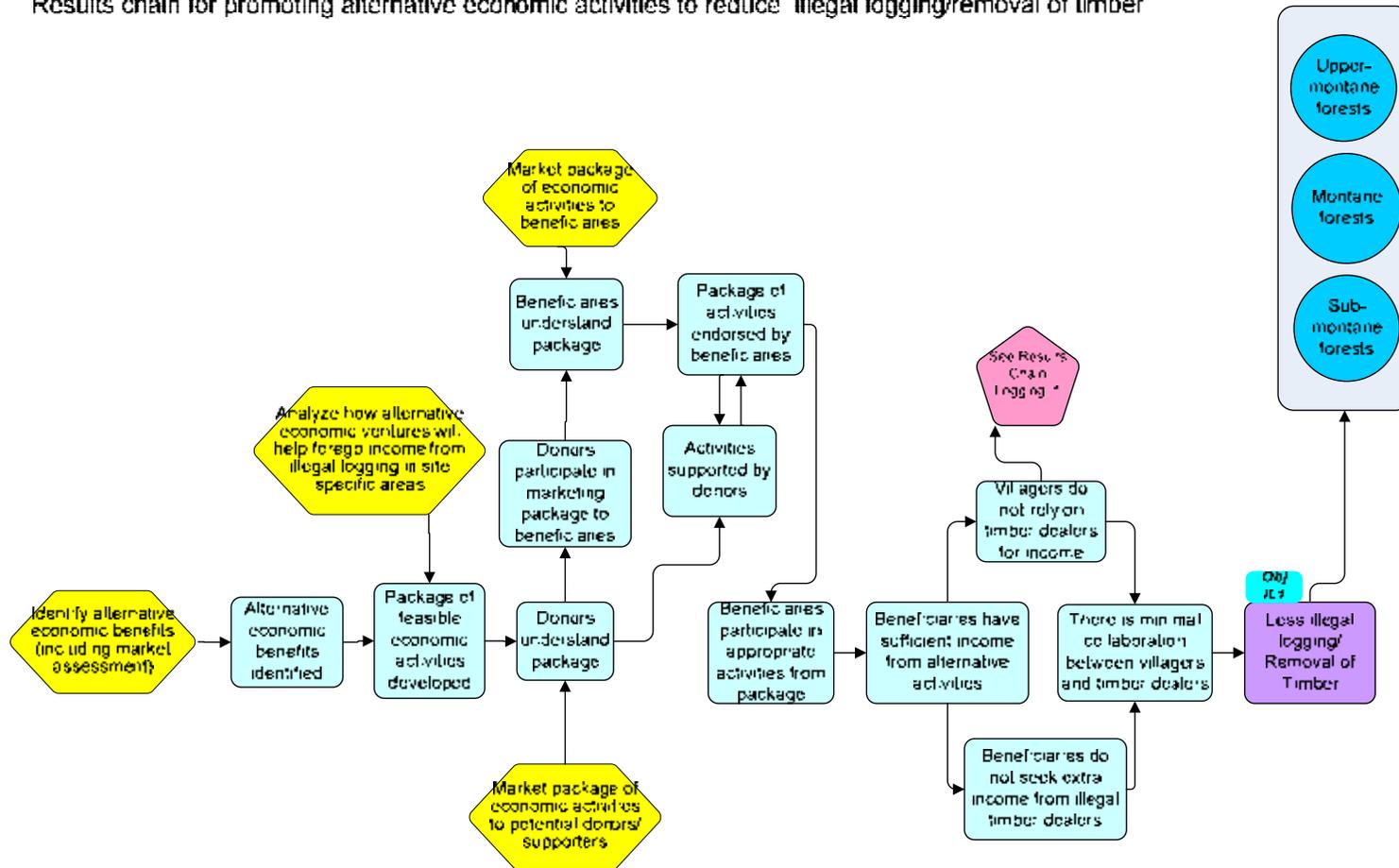
- Compiled list of Eastern Arc villages with presence or absence of VNRC

- Number of income generating activities per village and across the Eastern Arc region
- Number and scope of SACCOS schemes in the Eastern Arc Mountains
- Area of Eastern Arc under of JMAs
- Number of villages with signed JMAs
- Patrol records and assessment of the condition of the forest within and outside JMAs.
- Forest disturbance (including number of cut trees) data.

### 7.3 Strategy to Promote Alternative Economic Activities to Reduce Illegal Logging/Removal of Timber

#### Results Chain

Results chain for promoting alternative economic activities to reduce illegal logging/removal of timber



## **Objectives, Activities and Monitoring**

Objective IL1: By 2017 the rates of cutting decline from 42 old cut and 2.5 new trees/hectare (baseline in 2004) and 48.5 old cut pole sand 3.5 new cut poles/ha (baseline in 2005) to under 20 old cut and less than 1 new cut pole/ha within the forests under JMA agreements.

Objective IL2: By 2010, a review of the existing IGAs and other opportunities indicates the best way to develop alternative economic activities that assist the conservation of the natural forests of the Eastern Arc Mountains.

Objective IL3: By 2017 a package of alternative economic activities is developed that is economically preferable to logging of timber trees within the natural forest, including the development of SACCOS schemes.

Objective IL4: By 2017 the package of preferred economic alternatives to logging is being heavily promoted by the government and donors.

### **Activities**

- Review existing IGAs and assess which provide the greatest benefits (economic and ecological)
- Develop and promote package of the best IGAs in terms of supporting forest conservation
- Promote package of most suitable IGAs to donors, investors and others across the Eastern Arc mountains
- Repeat baseline study on forest disturbance to assess changes

### **Monitoring**

- Number of IGAs and the amount of funds they realize
- Number of JMAs that include IGAs
- Number of donors and others supporting the package of IGAs identified for the Eastern Arc
- Transect data on numbers of trees cut within these forests

## **VIII. Strategies to Address Collection of Firewood and Building Materials**

### ***8.1 Analysis of the Root Causes of this Threat***

One of the major threats to maintaining the quality of the forest is the extensive use by forest adjacent communities as a source of woody materials that are used as firewood and for building purposes (poles). In some places the collection of firewood is intensive and results in the removal (or near removal) of larger woody trees leaving a tangle of scramblers and smaller shrubs. Such high impacts are concentrated close to regions of high human population density, and on the margins of the reserves.

Although illegal the collection of firewood and building poles is tolerated by almost all foresters as it provides a tangible benefit from the forests. Even in the national parks, for example in the Udzungwa National Park, the extraction of dead wood for fire wood is permitted. The collection of poles for building homes is also an issues that is hard to regulate as people need to construct their homes using straight and resilient poles and these are not available in the farmlands.

The October workshop identified the following key factors in the cutting of woody materials for fuel wood and building poles:

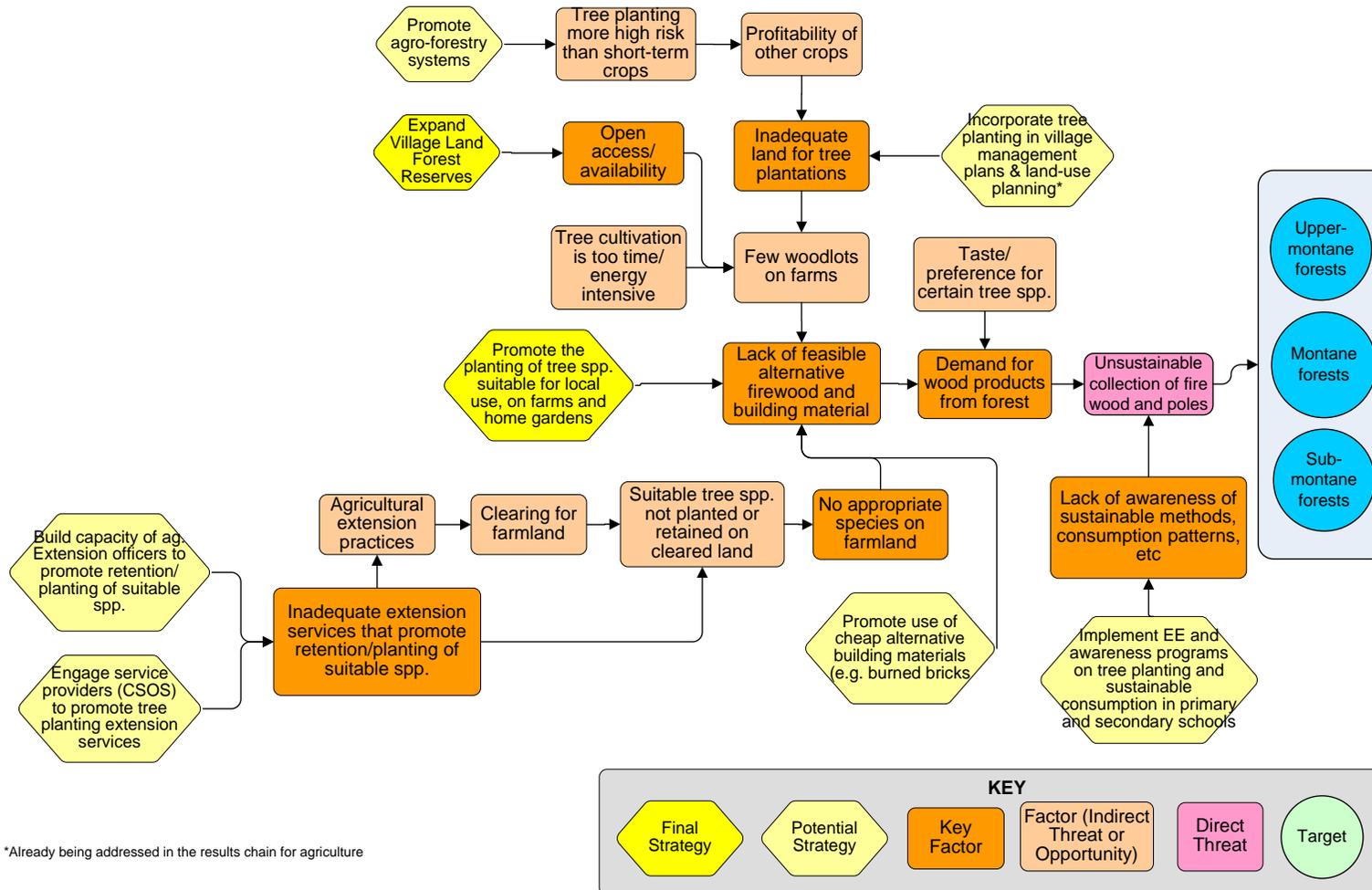
- Open access/availability
- Inadequate land for tree plantations
- Lack of feasible alternative firewood and building materials
- Demand for wood products from forest
- Inadequate extension services that promote the plantation/retention of suitable species
- No appropriate species available on farmland
- Lack of awareness of sustainable methods, consumption patterns, etc

These key factors were then used to identify the most important strategies to be implemented across the Eastern Arc. These are as follows:

- Expand village land forest reserves
- Promote the planting of tree species suitable for local use, on farms and in home gardens

Details of these strategies are outlined below.

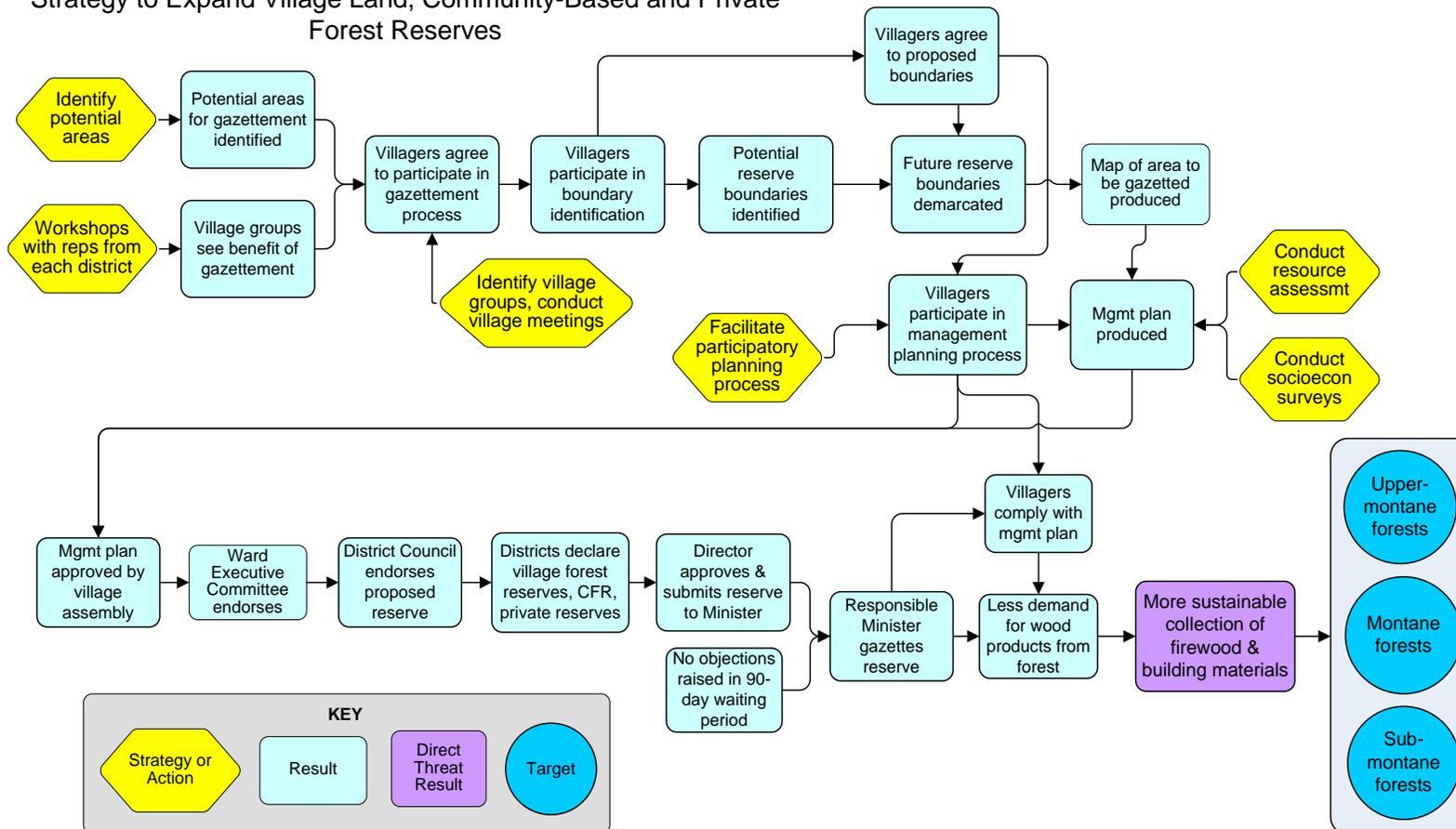
## Strategy Brainstorming and Final Strategy Selection for Unsustainable Wood Collection



## 8.2 Strategy to Expand Village Land, Community Based and Private Forest Reserves

### Results Chain

Strategy to Expand Village Land, Community-Based and Private Forest Reserves



## **Objectives, activities and monitoring.**

Objective VFR1: By 2017, at least 10 village land forest reserves have been identified and gazetted expanding coverage from 1,270 (2005) to over 3,500 ha.

Objective VFR2: By 2017, each of the existing village land forest reserves will have an accepted and operational management plan that has been agreed at District level.

Objective VFR3: By 2017, at least 3 private forest reserves have been created in Kwamtili estate (East Usambara), Mufindi (Udzungwa) and Ambangulu (West Usambara), expanding the coverage of these reserves from noting to at least 1,000 ha.

Objective VFR4: By 2017, rates of fire wood collection from the existing government forest reserves declines in those areas where village land forest reserves provide an alternative source of these materials (no baseline)

### **Activities**

- Identify potentially suitable village land forest reserve sites across the Eastern Arc.
- Hold workshop with district representatives on location and need for village land forest reserves.
- Identify village groups and conduct village meetings.
- Conduct resource assessment in the potential village land forest reserves.
- Complete management plan for the village land forest reserve
- Facilitate district council to endorse and declare village land forest reserve
- Assess rates of firewood extraction in the forests adjacent to a sample of Eastern Arc village sites.

### **Monitoring**

- Maintain detailed list of the reserves (including village land and private) across the Eastern Arc Mountains
- Copies of the management plans for the various village land forest reserves
- Copies of declarations from the relevant districts that have declared the village land forest reserves
- Gazettement notices for private forest reserves
- Fire wood collection data for a sample of forest sites.

## **IX. Strategy to Address Mining**

### ***9.1 Analysis of the Root Causes of this Threat***

The Eastern Arc Mountains contain a number of valuable mineral resources, in particular gold, rubies, tourmaline and rhodolite garnet. There is also marble and some deposits of bauxite as well. The gold and semi-precious gem stones form the basis of an artisanal industry – which is generally illegal or close to illegal in the way that it operates. The mining for gold became a major issue in 2004 when it promoted the intervention by the then president Benjamin Mkapa- who noted that ‘water is more precious than gold’

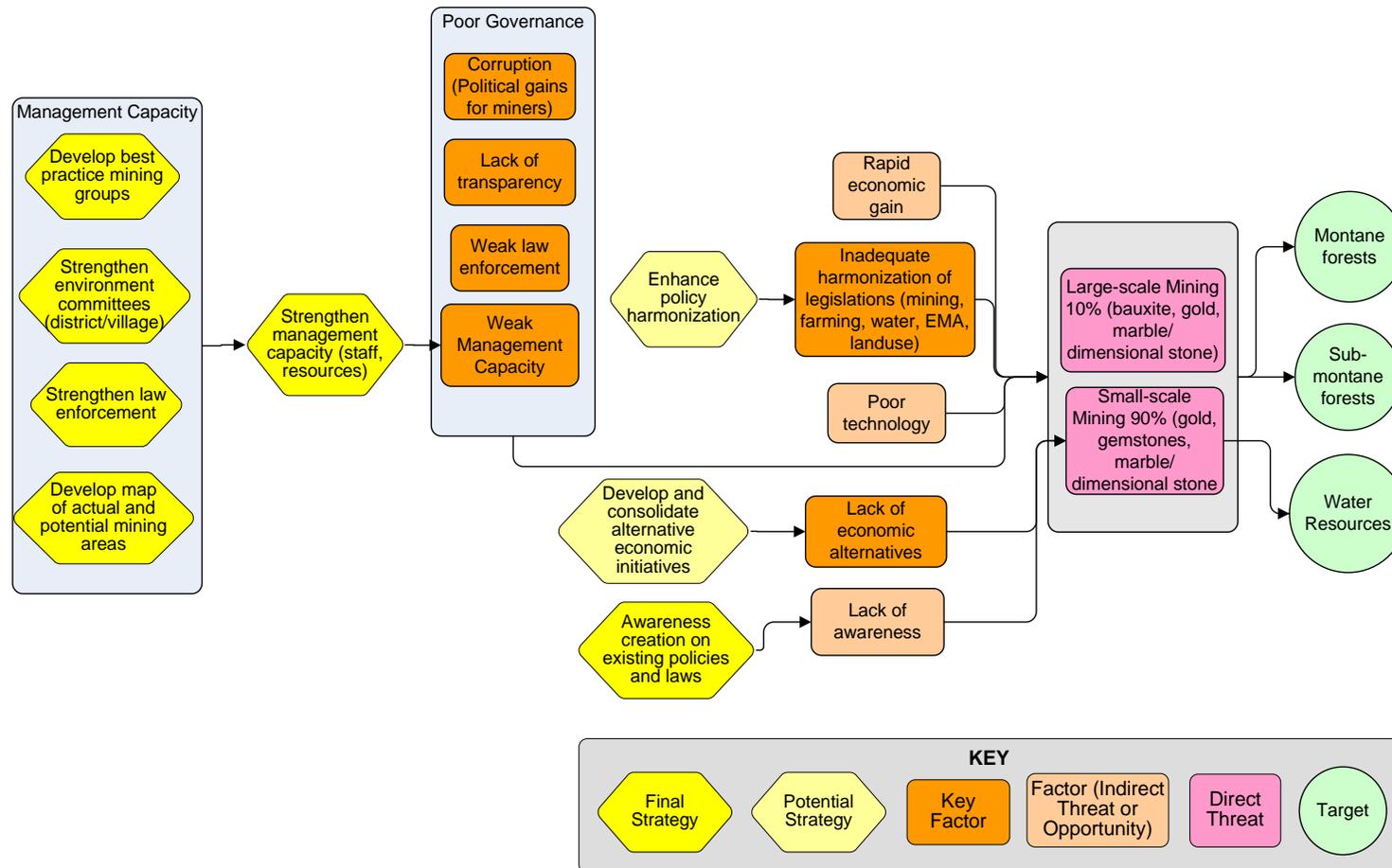
Many thousands of miners operate across the Eastern Arc. When they learn of a new find of gold, for example, they can descend into an area in thousands. They typically mine in wetland areas and in streams, hence causing considerable damage to the aquatic systems and seriously polluting downstream water sources. The Amani Nature Reserve in the East Usambaras, among other protected areas, has experienced significant problems with these illegal miners. During the October 2006 meeting the following key factors were identified as being important to the mining issue:

- Overall poor governance which is reflected in the following
  - a. Lack of transparency, especially related to issuing licenses.
  - b. Corruption related to the miners and the money that they can make in a short period
  - c. Weak law enforcement
  - d. Weak management capacity.
- Inadequate harmonization of legislation (especially mining, water, forestry, land use)
- Lack of economic alternatives.

These key factors were then used to identify the following strategies

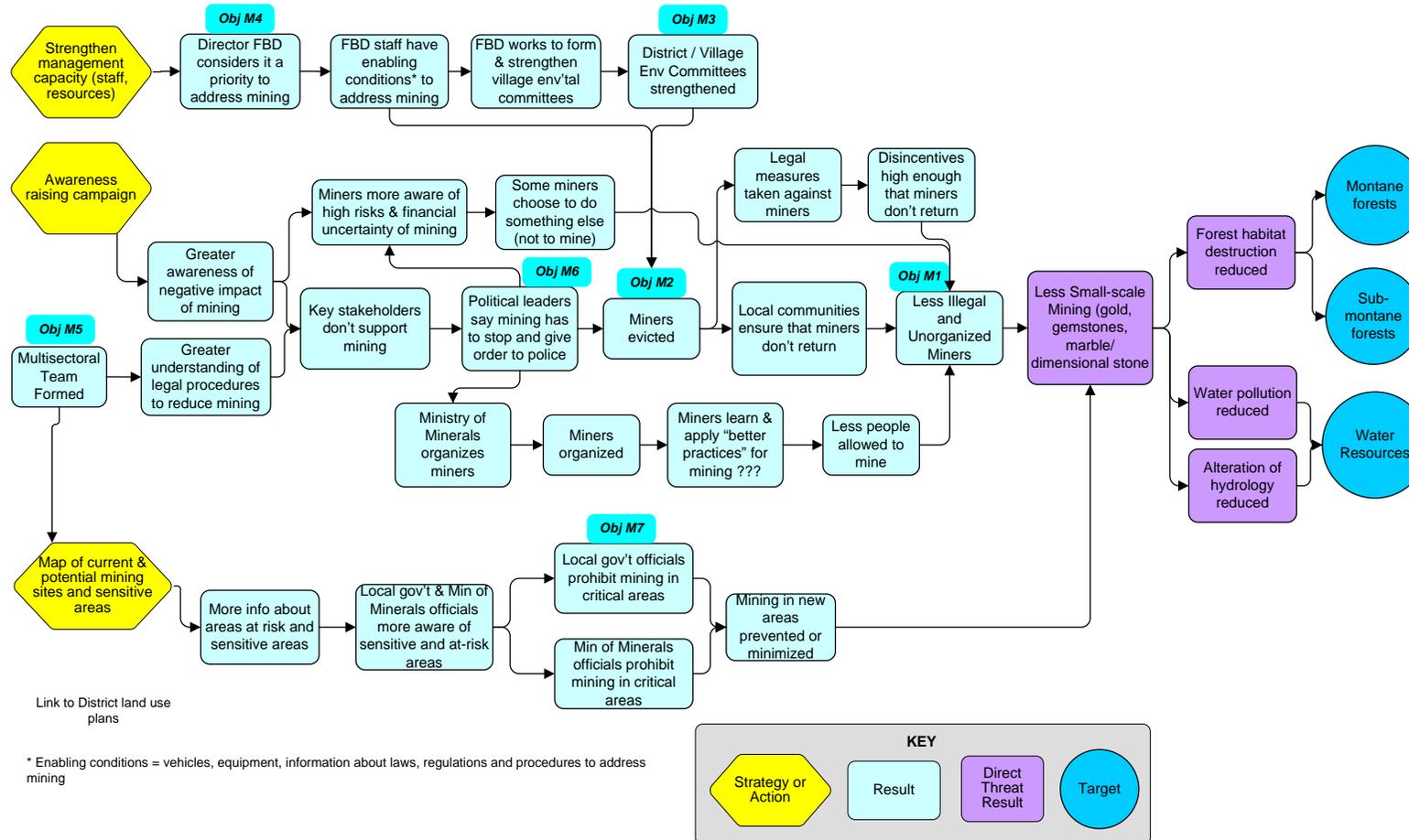
- Strengthening management capacity (best practice mining groups, environment committees, law enforcement, map of mining areas)
- Awareness campaign of the existing policies and laws.

## Strategy Brainstorming and Final Strategy Selection for Mining



## 9.2 Strategy to Strengthen Management Capacity and Raise Awareness to Address Small-Scale Mining

### Results Chain



## **Objectives, Activities and Monitoring**

Objective M1: By 2017, number of illegal and unorganized miners in Eastern Arcs Mountains declines from around 20,000 in 2005 (max over 40,000 in 2003) to under 5,000

Objective M2: By 2010, all illegal miners are evicted from forest reserves in the Eastern Arcs Mountains.

Objective M3: By 2010, village Natural Resources Committees created in all critical mining areas\* and actively assist to control miners.

\* East Usambara, West Usambara, Nguu, eastern slopes of Uluguru)

Objective M4: By 2008, the Director of Forestry allocates staff and resources to address mining issues in Eastern Arc Mountains.

Objective M5: By 2008, multisectoral teams are formed in 4 regions (Iringa, Morogoro, Dodoma and Tanga) to deal with mining issues in the Eastern Arc Mountains.

Objective M6: By 2012, the Vice-President Office classifies forest reserves of Eastern Arcs Mountains as fragile areas where no mining is allowed.

Objective M7: By 2010, District and Regional Commissioners and Ministry officials use habitat sensitivity map to prohibit mining in critical areas.

### **Activities**

- Increase number and strengthen capacity of village environment committees
- Work with police to evict miners from Forest Reserves
- Form multisectoral teams to address mining issue
- Work with VPO Environment to classify Eastern Arc Reserves as fragile areas where mining is not allowed
- Develop sensitivity map for mining in the Eastern Arc Mountains

**Monitoring**

- Number of village environment committees in critical mining areas
- Number of miners present in an area
- Number of miners arrested and evicted from Forest Reserves
- Notice from VPO classifying Eastern Arc Forest Reserves as fragile areas

## **X. Strategy to Address Hunting and Poaching**

### ***10.1 Analysis of the Root Causes of this Threat***

The hunting of wild animals for food is widespread across the Eastern Arc Mountains. This includes common and widespread species, such as bushpigs and blue and red duiker, but also species that are narrow ranging and endemic, such as Abbots duiker, red colobus and the Sanje mangabey.

The rates of hunting are hard to reliably establish, but in all forests studied that are close to human habitation there is evidence of various forms of hunting, typically involving snares, various forms of traps, and hunting with dogs. In the more remote areas of the Eastern Arc there are still large mammals present in the forests, but these are typically hunted out in areas that have a higher density of people. There is a general progression in the hunting from the large mammals in the remote areas, through medium sized species and finally to rodents and other smaller species when the larger ones have all been hunted out.

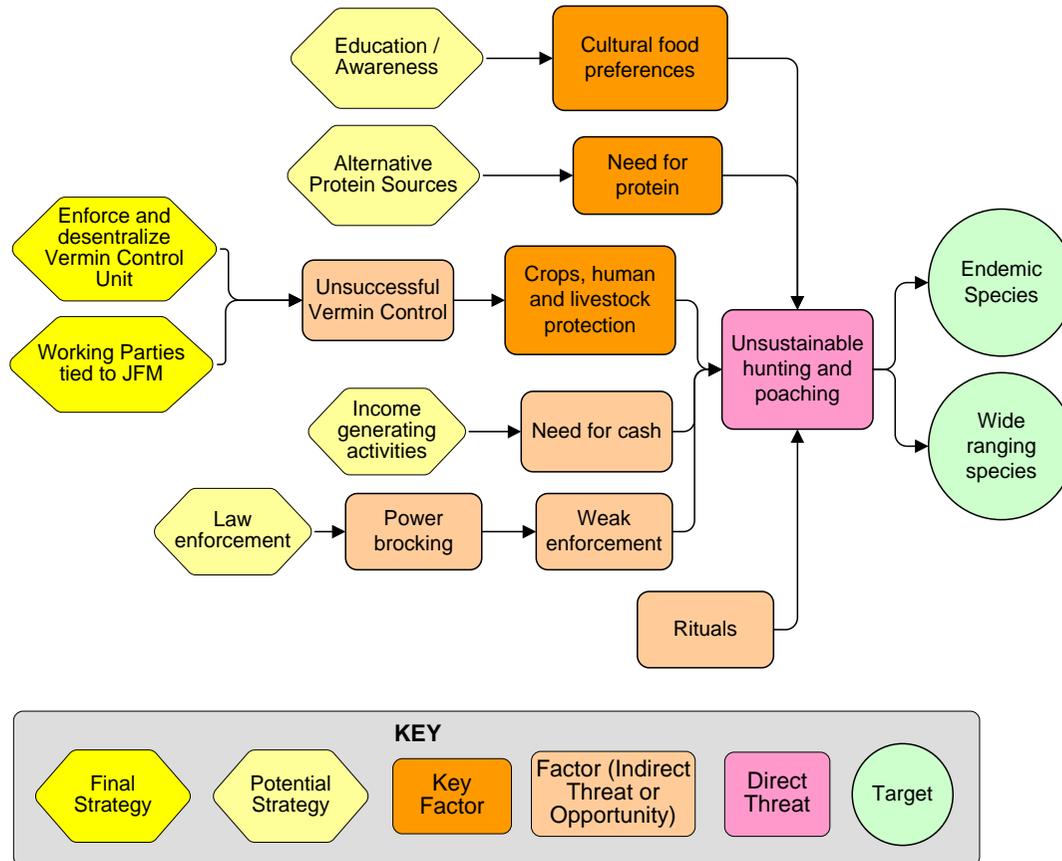
In the October 2006 planning meeting the following were identified as key factors driving hunting:

- Cultural factors
- Need for protein
- Crops, human and livestock protection

By considering these key factors the following strategies were developed:

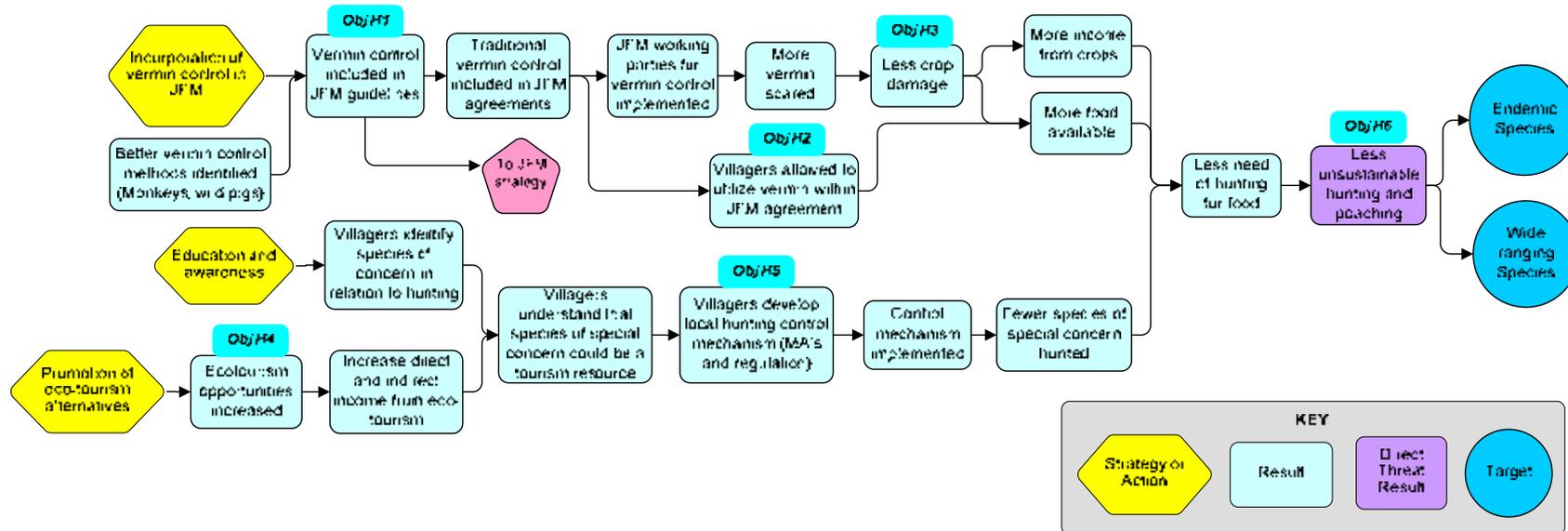
- Enforce and decentralize vermin control units
- Develop working parties tied to FJM agreements
- Education and awareness
- Alternative protein sources
- Income generating activities
- Law enforcement

## Strategy Brainstorming and Final Strategy Selection for Hunting and Poaching



## 10.2 Strategy to Decrease Unsustainable Hunting and Poaching

### Results Chain



## Objectives, Activities and Monitoring

Objective H1: By 2017, at least five signed Joint Management Agreements prevent hunting of species of special concern\*.

Objective H2: By 2010, at least five JMAs allow vermin control as a benefit to the local community.

Objective H3: By 2010, crop damage by vermin in JFM areas where vermin control is allowed is reduced by 80%.

Objective H4: By 2012, the number of opportunities for ecotourism in the EAMF increases from around 4,000 per annum (2005 estimate) to over 8,000 per annum.

Objective H5: By 2008, JFM guidelines incorporate vermin control as potential benefit to the local communities.

Objective H6: By 2017, evidence of hunting decreased significantly in those forests with functioning JMAs and where the hunting baseline exists (Mtae in East Usambara, New Dabaga in the Udzungwas, West Kilombero Scarp in the Udzungwas)\*\*

\*Eastern Arc endemics most threatened by hunting are : Abbots duiker, Red colobus monkey, Sanje mangabey. Elephant is also threatened in some areas by hunting.

\*\* These are the only sites where there is reasonable baseline for rates of hunting in terms of numbers of traps/snares etc per unit area of forest

### Activities

- Ensure that JMA arrangements prevent the hunting of endemic and threatened Eastern Arc species
- JMA agreements allow hunting of crop raiding vermin species on a trial basis
- Ecotourism numbers monitored in the main tourism centers of Amani, Udzungwa, Uluguru
- Undertake detailed assessments of the rates of hunting in different Eastern Arc Forest Reserves

### Monitoring

- Annual compiled lists of ecotourists
- Copies of JMA agreements
- Spreadsheet on the rates of hunting in different forests across the Eastern Arc



## **XI. Strategy to Address Invasive Species**

### ***11.1 Analysis of the Root Causes of this Threat***

Invasive species pose an increasing threat to biodiversity globally. In the Eastern Arc Mountains it is increasingly being appreciated that invasive alien species of trees, shrubs, lianas and herbs are invading the area – including entering the natural forest and outcompeting the natural vegetation that is found there, often replacing the area with a pure stand of alien invasive species.

The past problems with the invasive tree *Maesopsis eminii* in the East Usambara Mountains are well known, but it is becoming increasingly clear that there are also invasive species issues in the North and South Pare Mountains, the Ulugurus, and the Udzungwas. Indeed, these problems may be increasing in every mountain block. At this time there are no control measures in place to halt the spread of these species, indeed people in management positions are often not aware of this issue. Consequently, although this strategy was prioritized as one of the lowest threats at the present time, its potential to become a much more significant problem over the next few years is large.

The key factor that was identified for the invasive species was:

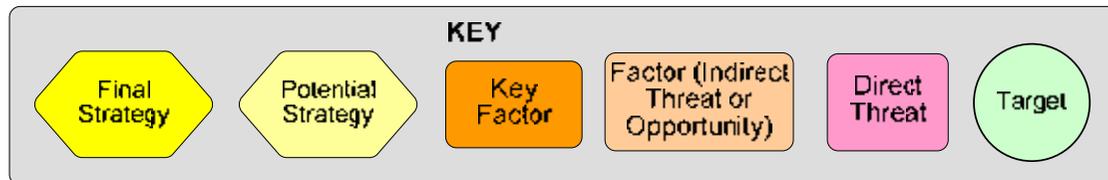
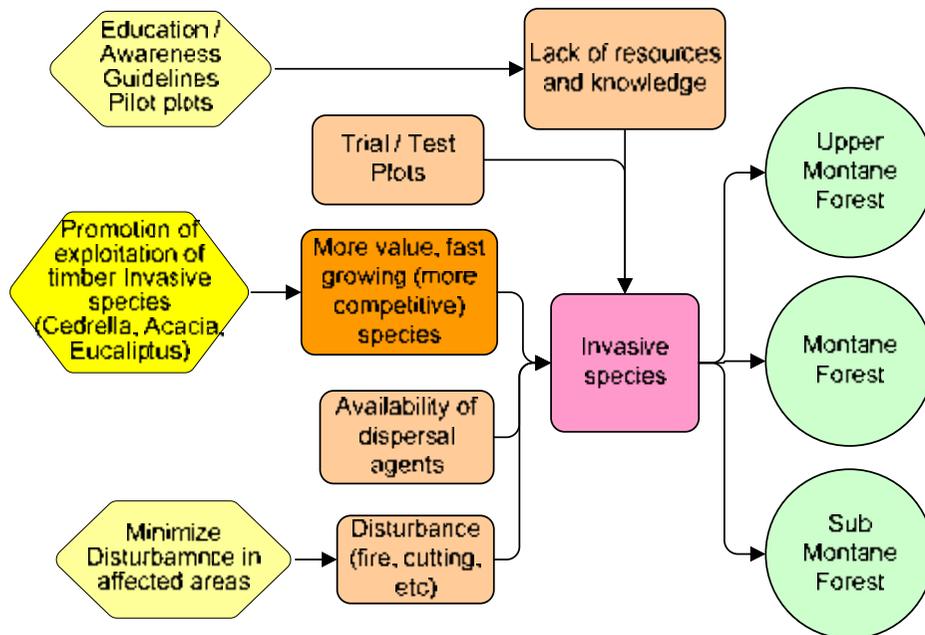
- Higher value and faster growing (more competitive species)

The strategies proposed to address this factor were:

- Education and awareness guidelines
- Promote the exploitation (local harvesting) of invasive timber species
- Minimise disturbance in affected areas

This conceptual model was then used as the basis of the results chain on invasive species, outlined below:

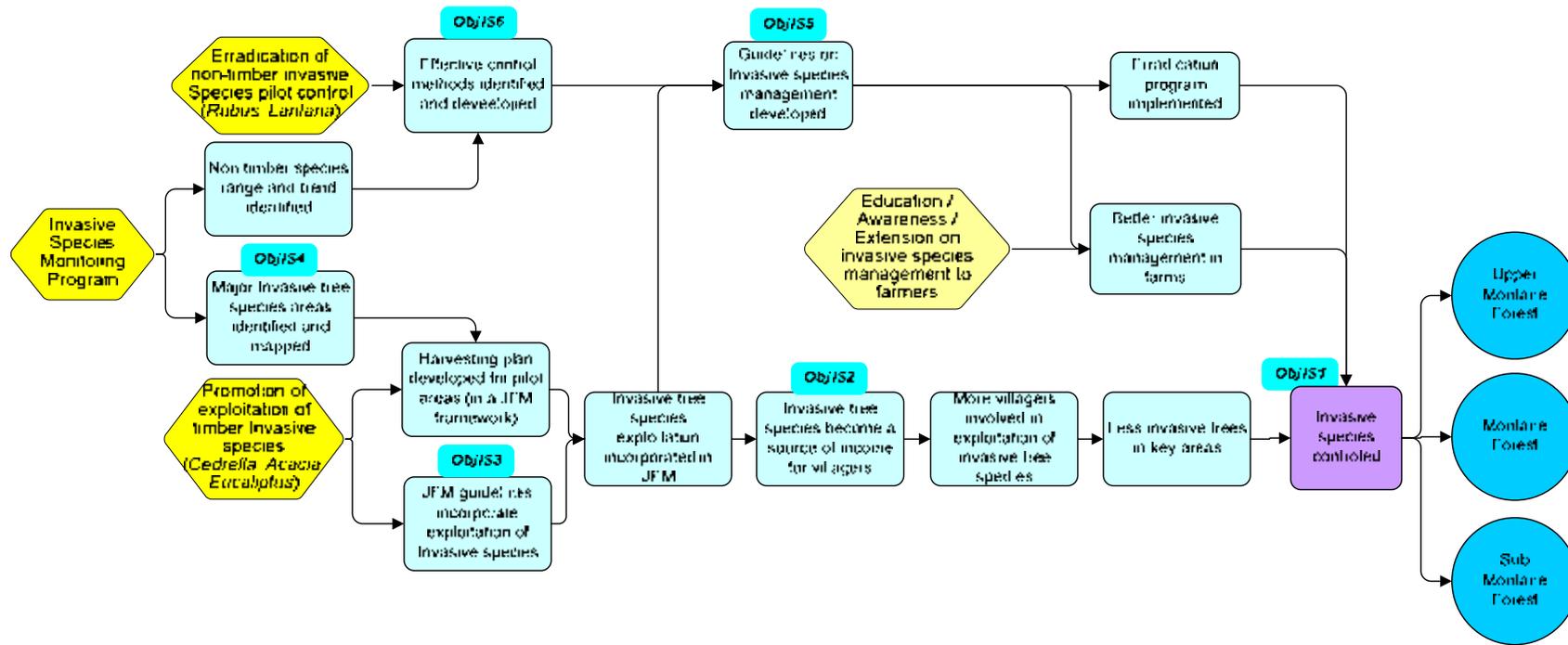
## Strategy Brainstorming and Final Strategy Selection for Invasive Species



## 11.2 Strategy to Reduce the Expansion of Invasive Species

### Results Chain

Strategy to Reduce the expansion of Invasive Species



## Objectives, Activities and Monitoring

Objective IS1: By 2017, area and scale of invasive species problems (especially involving *Eucalyptus*, *Acacia*, *Cedrela mexicana* and *Lantana camara*) reduced significantly in worst affected areas across the Eastern Arc (East Usambara, North and South Pare Mountains).

Objective IS2: By 2010, at least 10 villages under JMF are benefiting\* from the utilization of invasive woody species.  
\*level of benefits to be determined by management plans.

Objective IS3: By 2008, JFM guidelines allow exploitation of invasive species by participating communities.

Objective IS4: By 2009, the severity of damage to habitats by invasive tree species is mapped across the EAMF.

Objective IS5: By 2015, Guidelines on management of invasive species are developed and ratified by FBD.

Objective IS6: By 2015, effective control methodology of *Rubus* and *Lantana* is developed.

### Activities

- Complete JFM guidelines and ensure that they allow the exploitation of invasive species
- Include the exploitation of invasive species within JFM agreements
- Investigate methodologies for the control of *Rubus* and *Lantana*
- Map the extent of distribution and severity of invasion of natural habitats by invasive species

### Monitoring

- Number of JFM agreements which allow the harvesting of exotics
- GIS mapping of the extent and severity of invasion of natural habitats across the Eastern Arc

## **XII. Strategies to Address Unsustainable Collection for the Pet Trade**

### ***12.1 Analysis of the Root Causes of this Threat***

There is a thriving trade in animals (and to a lesser extent plants) from the Eastern Arc Mountains forests to foreign pet owners. The preferred species are those which are endemic to the Eastern Arc Mountains region and which are small enough in size to keep in a cage or a tank in a normal western house. This includes several species of chameleons (especially those with horns), amphibians (especially tree frogs) and some of the larger types of insects (beetles and millipedes). A few types of birds are also collected for the pet trade, but these tend to be for specialist collectors who have facilities to cater for the larger birds and their demands for space, warmth and specialized foods.

Tanzania sets quotas for the export of these various types of animals, and these quotas are enforced by the Wildlife Division in Dar es Salaam. The animals being exported are inspected prior to being allowed out of the country. The scientific basis for some of the quotas is not especially clear as some are species of chameleons that are only known from one or two mountain blocks where the populations, and hence the levels of sustainable offtake, are unknown.

The October 2006 planning meeting defined the key factors that impact on the unsustainable collection of Eastern Arc endemic and near-endemic animals and plants for the pet trade. The key factor at that time was said to be:

- Insufficient knowledge

Due to the fact that the main problem was insufficient knowledge no strategies or results chains were developed. However, the main actions that are required would be to undertake a series of research projects on the key traded species in the Eastern Arc Mountains, to determine whether the trade is sustainable or not. It is also important to assess whether it is adequately controlled by the existing rules and regulations within the Wildlife Division and the exporting agents. A number of targeted projects are therefore needed in the field or order to address these issues and to know how to further address this problem in the future.



## Cross cutting issues

During the course of the strategy development process a number of issues were identified that did not fit neatly into a strategy to address a key threat. However, several of these issues are regarded as so important that they deserve their own short section within this Eastern Arc conservation plan.

### *Water supply*

One of the important attributes of the Eastern Arc Mountains is their provision of clean water all year round. This is particularly important because the mountains are the source of water for large urban areas, such as Dar es Salaam, Tanga and Morogoro, but also because they are also the sources of the majority of the water that flows to the main hydroelectrical power generation plants at Kihansi, Kidatu and Mtera. As such, the maintenance of these values is of critical importance. An outline of how these should be addressed is presented below, derived from the results of the June 2006 strategic planning meeting for the Eastern Arc.

<b>Desired State</b>	<b>Activities</b>	<b>Indicators</b>
Water quality/quantity improved in rivers flowing from Eastern Arc	To keep updated existing baseline data on river flows from the Eastern Arc mountains	Number of rivers which are measured and data compiled on a regular basis increased from 19 (2005) to 30 by year 2016
	To improve conservation and management of water sources in the EAM	Number of critical water sources which are not disturbed by human activities within 60m from water sources (no baseline)
	To improve river bank protection along rivers flowing from the EAM	Number of kilometers of river bank originating from the EAM forests with no human activities likely to compromise conservation within 60m of river (no baseline)
	To raise awareness of stakeholders on issues of water source protection	90% of EAM community representatives (increased from 2004 baseline of 79%) mention water as a forest value by 2016

### *Education and Awareness*

A strategy for Information, Education and Awareness for the Eastern Arc Mountains has already been developed by the Tanzania Forest Conservation Group and is already under implementation (see document on [www.easternarc.or.tz](http://www.easternarc.or.tz)). Implementing this strategy is a clear priority for the coming years, as is measuring the progress to achieve the goal of enhanced awareness, leading to better management decisions within the Eastern Arc. The IEC document also provides a baseline on the levels of knowledge of the Eastern Arc Mountains within various villages and districts. A summary of what needs to be done across the Eastern Arc is outlined below:

<b>Desired State</b>	<b>Activities</b>	<b>Indicators</b>
Awareness of forest conservation values and benefits increased	To identify direct and indirect conservation values and benefits from EAM	Direct and indirect conservation values and benefits identified from sample of EAM villages by 2010
	To promote forest conservation values and benefits to different EAM stakeholders	90% of all communities adjacent to EAM are aware of forest conservation values and benefits by 2016 (Check IEC baseline)
		70% of District EAM stakeholders are aware of forest conservation values and benefits by 2016 (check IEC baseline)

### *Sustainable Finance*

Another critical issue within the context of the Eastern Arc Mountains is the development of one (or a set of) sustainable financing mechanisms that will provide a greater level of funds for management and for community actions than are currently available. A number of different existing and potential mechanisms exist to enhance the sustainable finances available within this ecoregion. The various ways to generate sustainable finance that are regarded as feasible in the Eastern Arc are as outlined below.

<b>Desired State</b>	<b>Activities</b>	<b>Indicators</b>
Sustainable funding mechanisms for forest conservation established through payments for environmental services schemes (water, carbon and biodiversity)	To develop and implement transparent mechanisms for water and electricity payments to support management of catchment forests and local community development	System agreed and established for water revenue sharing by 2010
		Percentage of revenue paid by water and power generation users to water basin authorities returned to catchment forest managers and local communities to support forest conservation activities by 2010
	To identify and operationalise 'afforestation' and 'deforestation-avoided' carbon payments for the benefit of local communities and catchment forest managers	Percentage of revenue generated from carbon payments returned to catchment forest management and local communities by 2010
	To expand and scale up the activities of the existing EAMCEF	Conservation endowment fund capital base increases from \$7 million to \$14 million by 2016
		Annual disbursement to field projects increased in line with increase in capitalisation

### *Climate change*

The issue of climate change is one that might have dramatic consequences for the Eastern Arc Mountains – particularly as it may render the mountains unsuitable climatically for some of the endemic species that are currently found there. However, at this time, the existing climate models seem imprecise for the Eastern Arc region and further work is required in order to make them more useful and relevant for the area. Hence, at this time, the main activity that is proposed on climate change in the Eastern Arc Mountains is further research and the development of locally relevant models. However, there is one practical issue that can be done to address the potential impacts of climate change, which is to work to enhance the connectivity of the forests in the Eastern Arc as that will allow species a better chance to move along climatic gradients as the climate changes.

<b>Desired State</b>	<b>Activities</b>	<b>Indicators</b>
Climate change mitigation measures in place	To model the predicted effects of climate change on the forest habitats	Monitoring model in place and providing predictions on the effects of climate change on EAM in place by 2008
	To increase forest connectivity to enhance the natural resilience of remaining forests to the predicted effects of climate change	Reduction in forest fragmentation statistics (as calculated by GIS methods) by 2016.

## **Management and Implementation**

It is proposed that the implementation of this strategy is coordinated by an inter-Ministerial committee made up of representatives of the key stakeholders managing the Eastern Arc and who rely upon the ecological services it delivers. Proposed members are as follows:

Vice Presidents Office (Environment)  
Ministry of Natural Resources and Tourism  
Ministry of Lands  
Ministry of Livestock and Water  
TANESCO  
Ministry of Agriculture  
Ministry of Mines  
Prime Ministers Office – Local and Regional Government

The group should be convened to assist with the smooth implementation of the strategy, and to monitor the achievement of its established indicators over time. It is suggested that an annual meeting, convened by the Vice Presidents Office (Environment) would provide the relevant forum to achieve the goal of overall coordination.

### **Strategy implementation**

The implementation of this strategy is the responsibility of all those who helped in its development, this includes various Ministries, Departments within Ministries, and a number of local and international NGOs. Each agency has a role to play, but there are several issues that form pre-requisites for successful implementation:

- District Councils need to incorporate elements of the strategy into the District Development Plans for each of the 15 Eastern Arc Districts.
- Forestry and Beekeeping Division – especially the ‘Catchment and Mangroves Management Programme’ also needs to take up the various forestry challenges raised here, and in particular needs to implement the elements relating to PFM (JFM and CBFM) and the development of a comprehensive protected area network.
- The Eastern Arc Mountains Conservation Endowment Fund should be encouraged to adopt the basic elements of this strategy and align its grant making capacity to help implement Eastern Arc strategy elements
- The various NGOs and private sector actors that support the work of the Forestry and Beekeeping Division and the local government authorities are encouraged to help take on elements of the strategy to assist in its implementation (and monitoring).

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## **Key documents produced by Conservation and Management of the Eastern Arc Mountain Forests (CMEAMF)**

### **Baseline reports**

FBD 2005a. *Hydrological Values*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2005b. *Education and Awareness*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2005c. *Biodiversity*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2005d. *Forest Area*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2005e. *Forest Condition, Threats and Management Effectiveness*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

### **Thematic strategies**

FBD 2005. *Information, Education and Awareness*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2006a. *Biodiversity Conservation*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2006b. *Monitoring*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2006c. *Protected Area Network*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2007a. *Sustainable Forest Use*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2007b. *Fire Reduction*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2007c. *Water Ecological Services*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

FBD 2007d. *Carbon Ecological Services*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. [www.easternarc.or.tz](http://www.easternarc.or.tz)

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The “Conservation and Management of the Eastern Arc 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 (\$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 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.org](http://www.cepf.org)) and with environmental NGOs and projects operating in the area.

### **Conservation and Management of the Eastern Arc Mountain Forests (CMEAMF)**

The CMEAMF project aims to improve the prospects for long term sustainable conservation of the globally important forests of the Eastern Arc. 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.