THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF NATURAL RESOURCES AND TOURISM

FORESTRY AND BEEKEEPING DIVISION

MANAGEMENT PLAN FOR DEREMA FOREST RESERVE

MUHEZA DISTRICT, TANGA REGION

FIVE YEARS PLAN 2010/2011 -2014/15

DECEMBER 2009

MANAGEMENT PLAN FOR DEREMA FOREST RESERVE

MUHEZA DISTRICT, TANGA REGION

PREPARED BY: REGIONAL CATCHMENT FOREST OFFICE, TANGA

APPROVED BY…….

DIRECTOR OF FORESTRY AND BEEKEEPING DIVISION

MINISTRY OF NATURAL RESOURCES AND TOURISM

DATE…….....

EXECUTIVE SUMMARY

Derema Forest Reserve located in the North-east corner of Tanzania within Tanga region in Muheza district, Amani division lies between Latitude 5^{0} 00' S and 5^{0} 02' S and Longitude 38^{0} 45'E and 38^{0} 47'E. The forest has an area of 956 ha and boundary length of 27.2 km. Five villages of Kisiwani, Msasa IBC, Kwezitu, Kwemdimu and Kambai with a total population of 7,878 people boarders the forest. The reserve is managed by District Catchment Forest Manager who reports to Regional Catchment Forest Manager, then to the Director of Forestry and Beekeeping of the Ministry of Natural Resources and Tourism.

Derema Forest Reserve (DFR) provides a critical biodiversity link between Amani Nature Reserve (ANR) and the largely intact forest reserves in the northern part of the East Usambaras. Being located within the East Usambara Mountains which are part of the Eastern Arc Mountain chain, the forest is rich in plant species diversity. Most of species are both lowland sub-montane (3.8%) and sole lowland species (36.2%) that outnumber the sub-montane ones. About 60% are found in both habitats. In the submontane habitat, two species *Morinda asteroscepa* and *Oxyanthus speciosus* are found in forest gaps whereas in the both lowland and sub-montane, the forest gap species are *Trema orientalis, Cussonia zimmermannii* and *Markhamia lutea*.

The forest has the alien species constituting 2%, the nearly endemic species 6% and endemic species 1% of the identified 1,435 species. All of the endemic species are forest dwelling and 83% of them are forest dependent. The vegetation of DFR is of four types namely forest, open or disturbed forest, bush or thicket and woodland mostly influenced by human activities. The major forest disturbance caused by human beings in DFR is pole cutting, followed by previous agricultural activities, cutting withies and stacks, debarking, fodder, timber extraction and fire.

In terms of fauna the percentages of endemic species among amphibians, reptiles and invertebrates are high. The East Usambaras are included as a "Threatened Community" in the IUCN Invertebrate Red Data Book. Some mammal species of the DFR are classified as globally threatened. International Council for Bird Preservation (ICBP) has classified both the submontane and lowland forests of the East Usambara as Endemic Bird Areas (EBA).

Thirteen globally endangered species of birds are found there, of which most are endemic to either the East Usambaras or one or few other Eastern Arc forests or the East African coastal forests. The Eastern Arc Mountains have been identified as one of the three most important sites in Africa for endemic birds and the most important site in Africa for globally threatened bird species.

DFR is also an important watershed area with its rivers feeding into the Zigi river which is sole reliable water source to both domestic and industrial use in Tanga City and its neighborhood sisal estates.

Preparation of Derema plan came as a pre requisite in management of forest resource as provided in National Forest Policy and Forest Act.. Like other forest, Derema is managed without having a Management plan.

The management plan for DFR is for a period of 5 years from year 2009/10 has main objective of protecting and managing the aforementioned values. The main activities include office establishment, improvement of transport facilities, staff recruitment and training. Field operations will entail establishment tree nurseries capable of raising 347,200 seedlings, maintenance of 27.2 km of reserve boundary, rehabilitation of 192 ha formally occupied by farm plots, conduction biological studies as well as resource assessment. All these activities will be done in collaboration with adjacent communities from the five villages. In order to ensure community participation extension services will be extended to these communities with appropriate incentives. Village Natural Resources Committees will be established in each of the five villages that will be guided by appropriate by-laws.

During the plan period possibilities will be explored to initiate the REDD mechanism as a way generating income to communities. Other Income Generation opportunities like those practiced around ANR will be extended to the surrounding villages. The total budget for the plan period is TShs 679,086,000., money assumed to come through the Government of Tanzania.

ACKNOWLEDGEMENT

The management of Catchment Forests in Tanga Region is responsible among others to safeguerd forest ecosystems. The management feels priviledged to have this plan in place as one of the important document in conservation of East Usambara Forests.

The assignment to prepare Derema management plan was commissioned by WWF-Tanzania Country Office, through Tanga Catchment Forestry Office. Facilitation Team for Muheza District comprised of Madiga, J.S. (FOR: DED –Muheza), Paul E. Moshi ... (DAS –Team leader), Mialla, Y.S. (RCFM), Kijazi, A.S. (RAP-Derema), Luciana E. Mshana (Economist – TCFO), Omari Mrisho (For:DFO-Muheza), Jackson Saria (For:DCFM-Muheza), Vije Mfaume(CDO-Muheza), John Kabamba (DNRO), Salehe Kamnge(DLNRE-Muheza), Mdoe, Y. (Councilor-Kisiwani), Kambaiko, S. (Councilor-Zirai); was formed to oversee the implementation of planned activities and produce a management plan. From the Facilitation Team, a Planning Team comprised of Yonas S. Mialla, Kijazi, A.S., Luciana E. Mshana, Msumari Issa, Mbuya, L. and Rashid Shekivunge was formed to take a leading role to ensure compilation, writing and submitting the management plan.

The Planning Team feels that this work would not have been completed without the assistance and support of many people including the District Facilitation Team, Survey Team (Kimweri, M. and Mahiku), village representatives from all of the five villages, Dr. Makonda and Mr. Killenga for availing biological and socio-data.

The team is specifically thankful to Mr. Peter Sumbi who with much inspiration, provided constructive comments to completion of the plan. The administrative support provided by WWF-Tanzania Office is sincerely apppreciated.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENICES

ACRONYMS/ABBREVIATIONS

APO	-	Annual Plan of Operation
CBD	-	Convention on Biological Diversity
CBFM	-	Community Based Forest Management
CBO	-	Community Based Organizations
DFR	-	Derema Forest Reserve
DCFM	-	District Catchment Forest Manager
DFO	-	District Forest Officer
EAMCEF	-	Eastern Arc Mountains Conservation Endowment Fund
EBA	-	Endemic Bird Area
EIA	-	Environmental Impact Assessment
FINNIDA	-	Finnish International Development Agency
FR	-	Forest Reserve
HQ	-	Head Quarter
ICBP	-	International Council for Bird Preservation
IUCN	-	International Union for Conservation of Nature
JFM	-	Joint Forest Management
JMA	-	Joint Management Agreement
MAB	-	Man and Biosphere Reserve
MJUMITA	-	Mtandao wa Jamii wa Usimamizi wa Misitu ya Asilii Tanzania
MNRT	-	Ministry of Natural Resources and Tourism
MOU	-	Memorandum of Understanding
NGO	-	Non- Government Organization
NFP	-	National Forest Programme
NDTL	-	Novella Development Tanzania Ltd
PBWO	-	Pangani Basing Water Office
PES	-	Payment for Ecosystem Services
PME	-	Participatory Monitoring and Evaluation
PRA	-	Participatory Rural Appraisal
REDD	-	Reduced Emission from Deforestation and Forest Degradation
SFM	-	Sustainable Forest Management

Tanga UWASA-		Tanga Urban Water and Sewage Authority
TFCG	-	Tanzania Forest Conservation Group
UNCCD	-	United National Convention and Combating Desertification
UNESCO	-	Unite Nations Education Science and Culture Organization
UNFCCC	-	United Nations Frame work Convention on Climate Change
UNFF	-	United Nation Forum on Forests
VFR	-	Village Forest Reserve
VNRC	-	Village Natural Resources Committee
WWF	-	World Wide Fund for Nature

PART I

1.0 GENERAL DESCRIPTION

1.1 Legal status, ownership and administration

1.1.1 Legal status and history

Derema forest is currently not a gazetted forest reserve but is due for gazettement **(Figure 1).** Efforts to reconfirm forest boundaries and compensate crops were made to rescue the forest. All gazettement procedures are completed and sooner the forest will be gazetted as State Forest Reserve. Currently, the commitment to conservation has been focused in adding Derema forest being a critical link to northern and southern major blocks of forests already protected in the East Usambaras; in order to upgrade the scientific management of biodiversity resources within the forests.

1.1.2 Ownership and administration

Derema Forest Reserve will be under the ownership of the central government under the Forestry and Beekeeping Division, Ministry of Natural resources and Tourism after its official gazettement. The Tanga Regional Catchment Forest Manager (RCFM) is the immediate incharge of the Derema gazettement process. The RCFM reports to the Director of Forestry and Beekeeping Division. The administrative and managerial structure will finally decided by the Director of Forestry and Beekeeping Division, whether to fall under Amani Nature Reserve or Tanga Regional Catchment Forest Office.

1.2 Location

Derema Forest Reserve is located in the North-east corner of Tanzania within Tanga region in Muheza district, Amani division; between Latitude 5^{0} 00’ S and 5^{0} 02’ S and Longitude 38^{0} 40’E and 38^{0} 45’E (WWF, 2009). The forest is boarded by five villages namely Kisiwani (Southern part), Msasa IBC (Western part), Kwezitu (North-West), Kwemdimu (South-East) and Kambai which lies to the North of the forest (**Figure 1**)

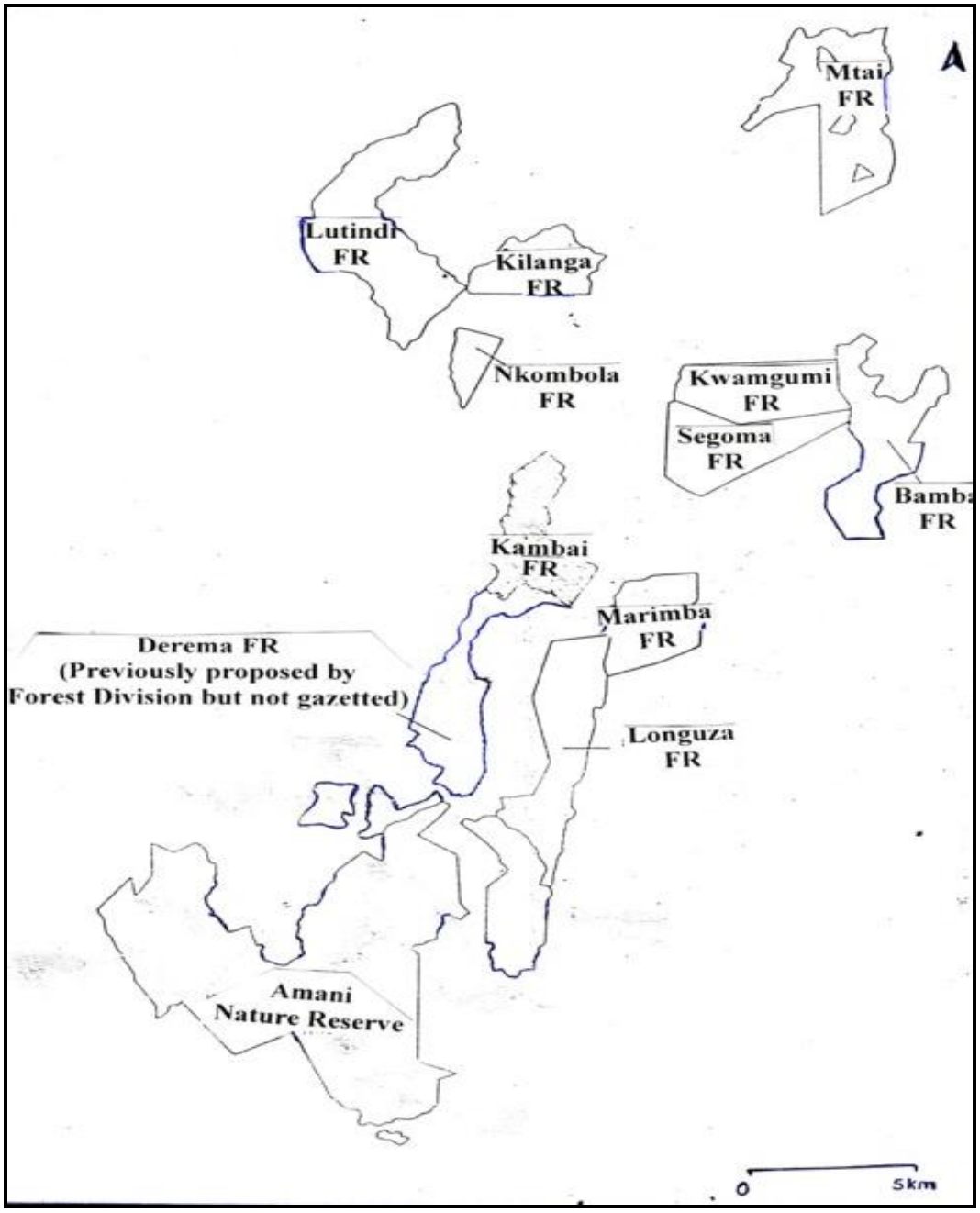

Figure 1: Location map of Derema Forest Reserve in relation to other forests in the East Usambara

DFR lies within East Usambara Mountains that form part of the Eastern Arc Mountain chain. DFR wildlife corridor provides a critical link between Amani Nature Reserve (ANR) and the largely intact forest reserves in the northern part of the East Usambaras. The gazetted forest area therefore would facilitate gene flow between the southern and northern forest blocks and enhance biological diversity in the East Usambaras (Jambia and Sosovele, 2000). The main access to the Derema Forest Reserve is via Muheza town. The distance from Tanga to Derema along Kisiwani village is about 54 km and from Kisiwani Village to ANR HQ, via Zigi information Centre in Amani is 11 km.

1.3 Size and Boundary

Derema Forest Reserve has the total area of 966 ha as verified on boundary Map **(Fig.2).** The surveyed boundary was 27.2 km (URT, 2006) that goes through the villages of Kisiwani, Msasa IBC, Kwezitu, Kwemdimu and Kambai. The boundary is demarcated by beacons.

1.4 Physical features

1.4.1 Topography and Hydrology

Derema Forest Reserve ranges approximately between 190 m and 1130 m. above sea level. The highest point is in the South-west part at Makanya peak (1120 m.a.s.l). The average altitude is 650 m.a.s.l in its central part. The Southern side rises from the lowland at 860-1120 m.a.s.l. DFR is amongst the important water catchments areas in the East Usambara Mountains that are drained by Zigi River with its tributaries of….and…… The Zigi River provides domestic water to Tanga town, industries, estates and adjacent local communities.

1.4.2 Geology and soils

Derema is composed of old ancient crystalline rocks. These rocks belong to Precambrian Usagaran system predominated by gneiss and to some extent granulites and amphibolites. It is believed that the age of the block-faulting rock uplift was certainly earlier than 25 million years ago.

Derema soils are mostly clay and clay-loams to about 5 meters deep. The soils are generally red and well drained. Soils in higher altitudes are acidic and highly leaching, although

undisturbed natural forest cover prevents leaching. Average organic matter content under forest cover is about 4% in the upper soil (about 10 cm), but is very low at greater depth. Most of the soil nutrients are associated with presence of organic matter. Soils at lower altitudes are less leached and much less acidic. Soil pH ranges from about pH 7 at 300 m.a.s.l to about pH 6.5 at 850 m.a.s.l and then diminishes rapidly below pH 5 at 900 m.a.s.l and to about pH 4 at 1050 m.a.s.l.

1.5 Climate

Derema area is characterized by relatively cool weather throughout the year. The area experiences two distinct rain seasons. Long rains peak from March to May whereby short rains are experienced from October to December. The mean annual rainfall is 1910 mm and the mean minimum and maximum temperature is 16.3°C and 24.1°C respectively. Rainfall is lower during the dry seasons, in January-February and September-October. However, during the past fifteen years there have been some climatic changes in the area with increase of temperature and inconsistent rains. The global warming might have influenced these changes. Generally, the Western part of the forest receives higher precipitation, whereby the leeward Northern side of the reserve is relatively drier compared to other parts.

1.6 Special sites and features

Currently there are no existing special sites or features in Derema except for the old story about a river known as "*pacha"* that was situated at Msasa IBC village and a tree with breasts. It was strictly prohibited for a person to catch varieties of aquatic species from that river more than what he/she intended. Violation would normally lead to one getting lost through the forest. The breast tree has died away for quite long now because of violating traditional norms and values (Personal communication with Mzee Athumani Hella of Kisiwani village on 16.10. 2009). Outside Derema forest, there are attractive features like Monga and Derema tea estates and tea processing industries.

1.7 Historical events

The history of the East Usambara reveals that people have been living in the East Usambara

Mountains for more than 2000 years. Earliest settlements date back to early Iron Age in the 3rd century AD. People of the Usambaras have been strongly conditioned by policy decisions made outside the local lives of the villages. Generally, village families have been subject to a history of changing fundamental conditions for their making a living. Similarly, the history of Derema in particular had been affected by dynamic policy decisions during colonial era and there after. The name Derema originated from the wild vegetable known as ***Ndelema*** in Shambaa vernacular. Back in 1896, during the German regime most of Derema area was densely forested and intact.

Commercial logging of timber began during the German colonial era in late 1890s. Major tree species extracted include *Ocotea usambarensis*, *Milicia excelsa* and *Newtonia buchananii*. A railway line and a Station Master's house were constructed at Zigi to facilitate logging between 1904 and 1910. A railway from Tanga to the Usambaras provided the means to evacuate the timber, and clear-cutting led to fragmentation of the remaining forests. Most other forest land was cleared for coffee and tea plantations. During 1933 -1935 communities in the East Usambaras experienced locust break and hunger termed as *"Kijankingo*" meaning eating animals' skin. People were forced to boil animal skins and wild roots as food (Personal communication with Mdoe, Y.S. and Chamungwana, M. from Msasa IBC and Kwezitu villages respectively, on 12.10.2009).

In 1934 the British regime proposed reservation of Derema forest due to alarming destructive situation but could not materialize; instead commercial logging continued at Msasa IBC areas. Timber industries increased and part of the forest was grown tea. This resulted into significant destruction of natural forests. The conversion of timber and coffee areas to tea provided hundreds of labor opportunities in the mountains, though the Shambaa were apparently never very keen to take up these low-paying jobs. Both timber trade and the later attempts to save the forest remnants led to displacement of villagers or restrictions on access to the forest, for which there was rarely any compensation. By 1942, more forest reserves were established and the reserved area had doubled. The history further noted that after the Arusha declaration in 1967, community adjacent Derema forest were said to have been allocated forest land where they raised cardamom.

In 1970 the idea of conserving Derema forest was once more revived due to mass destruction of natural habitats as a result of commercial logging under FINNIDA. Despite the mass destruction of forests there was notable extinction of large animals like lion and leopards (Personal communication with Mdoe, Y.S. and Chamungwana, M. on 12.10.2009). On other hand the consequence of the environmental degradation and draught led to a serious hunger between 1974 -1976. By 1980s, to government encouraged high-value spices and were rapidly spread into the forests. Cardamom, the most valuable crop grows well under the moist and shaded conditions of the forest.

As environmental conservation issues grew more important during the 1990s; forests and villages were again subject to policy shift, as regeneration of indigenous forest biodiversity became the watchword of government commitments in the area. In 2000, therefore, through East Usambara Conservation Area Management Project (EUCAMP) under the support of FINNIDA (FPS) and the government of Tanzania; gazettement process for Derema forest reserve started. These initiatives were preceded by series of awareness meetings with communities living adjacent to Derema forest who agreed to conserve the forest under a condition of being compensated their crops grown inside the forest and within the boundary. A total of 1128 affected farmers were finally compensated in three phases between 2006 and 2008. Boundary resurvey to confirm the boundary and beacon installation were completed on August, 2009.

1.8 Socio-cultural rights and privileges

Derema Forest Reserve possesses ethno botanical values to adjacent local people. Medicinal plants are of major significance, because most of them can not be domesticated outside the forest. Wild plant species and non-timber products such as vegetables, mushrooms, fruits, bush meat and honey have been important to the traditional tribal life of the shambaa and were collected without major contradiction to the conservation objectives. Woody products such as fuelwood, building poles, withies, ropes have been obtained from Derema forest. Nevertheless, proper control is required to ensure that utilization does not jeopardize the environmental conservation goals.

1.9 Biological aspects (Flora and Fauna)

Extensive research work has been done in DFR that revealed an overview of the biological knowledge of the forest. There exists a well documented biological /biodiversity base line data that support biodiversity conservation.

1.9.1 Natural forest cover (Flora)

DFR is rich in plant species diversity. Most of species are both lowland sub-montane and sole lowland species outnumber the sub-montane ones. The forest has the alien species constituting 2%, the nearly endemic species 6% and endemic species 1% of the identified 1,435 species. All of the endemic species are forest dwelling and 83% of them are forest dependent.

The vegetation of DFR is of four types mostly influenced by human activities: forest, open or disturbed forest, bush or thicket and woodland. The major forest disturbance caused by human beings in DFR is pole cutting, followed by previous agricultural activities, cutting withies and stacks, debarking, fodder and timber extraction. However the life form of DFR can be summarized as follows:

Table 1: Derema FR species composition

Species' life form	Number of species encountere	Percentage composition of l form to the forest
Tree	524	36.5
Shrubs	325	22.6
Herbs	395	27.5
Lianas	4	0.3
Climbers	173	12.1
Palms	8	0.6
Epiphytes	3	0.2
Orchids	3	0.2

It is evident that the largest composition of forest form is trees, followed by shrubs and herbs. The following is a summary of ecological types for plant species of DFR

Table 2: Derema FR Ecological types of plant species

Ecological type	Number of species	% of total species
F-Forest Dependant Species	130	9.1
f-Forest Non-Dependant Species	235	16.4
O-Non-Forest Species	98	6.8
Unknown	971	67.7
Total	1435	100.0

It is also evident that the majority of plant species of DFR are forest non-dependant species (16.4%) and forest dependent species (9.1%). The recent biodiversity survey of DFR indicates the habitant for plant species of the area as follows:

Table 3: Number of habitats for plant species

Habitant	Number of species	% of total species
L-Lowland Forest Species	104	36.2
S-Submontane Forest Species	11	3.8
L & S	172	59.9
Total	287	100.0

It is evident that most of species of DFR (36.2%) are lowland and only 11 (3.8%) are entirely sub-montane however, about 60% are found in both habitats.

In the submontane habitat, two species *Morinda asteroscepa* and *Oxyanthus speciosus* are found in forest gaps whereas in the both lowland and sub-montane, the forest gap species are *Trema orientalis, Cussonia zimmermannii* and *Markhamia lutea***.**

1.9.1.2 Areas of protection forest

DFR was used for agricultural activities (cardamom farming) including other human activities such pole and withies cutting, timber extraction and fodder cutting. Conservation of biodiversity and water catchments values were not the concern of the local communities

surrounding the area, although the area has great potential for biodiversity and water catchments values that needs protection. After declaring the area as forest corridor it is important to demarcate areas/zones as protected areas.

1.9.1.3 Other natural vegetation types

There are few glades/gaps and heathland in DFR as a result of vegetation disturbance caused by wild fires (though occasional) that accommodate a different biological life than the dense forest. Some fauna that are not forest are usually found in these areas.

1.9.2 Fauna

Characteristically, most of the fauna species are strictly forest dependent. Furthermore, the East Usambara forests are rich in endemic animal species. The DFR and the East Usambara mountains in general are well known for their diverse avifauna with a high degree of endemism. Greater part of the birds are strictly forest dependent and the most threatened species only live in the understoreys of the least disturbed forests. However most of fauna species found in DFR are forest dwelling, and about most of them being forest dependent. The area is also endowed with a good number of either endemic or near endemic species of which 13 and 24 species are in extinction respectively, it is also evident that endemic long-billed tailorbird (*Orthotomus moreaui*) is critically endangered facing extinction. Likewise number of other endangered, near threatened and vulnerable species is also alarming.

1.9.3 Plant and animal species of special concern

The DFR, as part of the Eastern Arc Mountains, has been identified as an area of global conservation concern. The Eastern Arc has been classified as one of the 25 “Hot spots” of the world characterized by high concentrations of endemic species. These areas are threatened by rapid rates of habitat modification or loss. Of the flora, 3.1 % are strictly endemic in the East Usambara Mountains and when taking into account the near-endemic species the rate is as high as 22 %. The endemic forest plant taxa in the East Usambara are predominantly found within the submontane forests (50 taxa) and only 14 endemic taxa are occurring in the lowland forest remnants. Notably, all the East Usambara endemic plants are forest taxa.

The percentages of endemic species among amphibians, reptiles and invertebrates are high.

The East Usambaras are included as a "Threatened Community" in the IUCN Invertebrate Red Data Book. Some mammal species of the DFR are classified as globally threatened. International Council for Bird Preservation (ICBP) has classified both the submontane and lowland forests of the East Usambara as Endemic Bird Areas (EBA). Thirteen globally endangered species of birds are found there, of which most are endemic to either the East Usambaras or one or few other Eastern Arc forests or the East African coastal forests. The Eastern Arc Mountains have been identified as one of the three most important sites in Africa for endemic birds and the most important site in Africa for globally threatened bird species.

1.9.4 Species posing management challenges

Exotic and invasive species may have negative effects on the ecological balance of the DFR and certainly contradict with the general objectives of the DFR of conserving indigenous flora and fauna of the East Usambara forests. Therefore, no more exotic plant or animal species are allowed to be introduced in the DFR. The exotic species already existing in the DFR have to be controlled and monitored carefully for their possible negative effects on the indigenous species. It has been observed that some of the introduced species are invasive, colonizing the area. These include *Maesopsis eminnii, Cedrella odorata, Lantana camara, Clidemia hirta, Psidium cattleianum, Landolphia owariensis, Elaeis guineense, Arenga pinnata* and *Bamboo vulgaris.*

1.10 Buffer zones and corridor

1.10.1 Buffer zones

Buffer zones around DFR promote sustainable land and natural resources use practices through implementation of the Village Natural Resources Management Plans, farm forestry activities and tree planting. The objective of the buffer zones is to decrease the dependency of the local communities on the natural resources of DFR and contribute to the social and economic development of the communities. The buffer zone area of the reserve is 40.5 ha including Kambai Village Forest Reserve (32.5ha), Kwezitu Village Forest Reserve (8.5ha), IBC Msasa Village Forest Reserve and Nguingui Forest Reserve.

1.10.2 Corridors

Two corridors namely Derema Forest Reserve-Amani Nature Reserve and Kambai Village Forest Reserve-Derema Forest Reserve do exist. They connect the important Eastern Arc Mountains of the East Usambaras block.

1.11 Socio-economic status of adjacent communities

1.11.1 Communities adjacent to the forest

The Derema forest reserve is surrounded by five (5) villages with a dense population. The villages are located in two administrative Wards of Zirai and Kisiwani. Zirai has villages of Kwezitu and Kambai while Kisiwani Ward has Kisiwani, Kwemdimu and Msasa IBC villages. The total population is estimated at around 7880 people in 2006 with an average household size of 7.8 persons. The majority of the people in the villages are the locals of Wasambaa and Wabondei tribes. The minority is from immigrants of the Wangoni, Wahehe, Wakinga, Wamakonde, Waha and Wasukuma who initially came into the area for employment in sisal and tea estates as well as Sikh Sawmills.

Table 4: Village population, affected farmers and Plots taken around DFR

Village	Male	Female	Total	No.hh
Kisiwani	759	773	1532	315
Kwemdimu	908	751	1659	296
Msasa IBC	1095	1192	2287	412
Kwezitu	1503	1517	3020	?
Kambai	686	653	1339	?
Total	4951	4886	9837	

The communities collect forest products such as fuelwood, building poles, medicinal plants, timber and ropes. Others include wild food (vegetables, fruits, nuts, mushrooms, spices and hunt for bush meat) in the DFR. The pressure towards utilizing forest products from the DFR is considerable and that is why the government in collaboration with conservation community moved in to conserve it. For decades villagers surrounding Derema forest reserve

had plots and cultivating inside the forest. The main crops were cardamom which is one of the superior cash crops in the area, although has for a long time threatened the forests. Cultivation involves clearing the forest undergrowth and smaller trees, with the establishment of cardamom under a canopy formed by the remaining large trees. Due to such demand of this cash crop and others the conservation efforts included payment of compensation amounting to about TShs 2.2 billion for crops that were being cultivated inside the forest and availing alternative farm plots in the low land for interested farmers. There is also a high risk of extinction of the big wild animals within the DFR just Amani Nature Reserve due to increase of illegal hunting. Together with strictness and awareness conducted to local community hunting for mammals for food is increasing greatly. On the other hand there is great loss of fauna due to Vermin hunting and illegal pet trade of Animals. (Resource Assessment Report, 2007).

1.11.2 Local economy

The main roads connecting to villages surrounding DFR include the public road from Muheza - Amani road (35.km) that falls under Tanzania Roads Agency (TANROADS). The road continues to Msasa IBC and Kwezitu village for about 10 kms. Other villags like Kwedimu is connectd by 6 km road from Zigi station, while Kamabi village is connected by 25 km from Lunguza plantation office. The road conditions are of key importance for transportation and marketing agricultural crops from the villages, however most of them are in bad condition especially during the rain season. It is very difficulty to reach Kambai village during such seasons. A close cooperation is very important between surrounding villages and Road Agency as well as Muheza district council which has other programmes like Tanzania Social Action Fund (TASAF) and Village Travel and Transport Programme (VTTP).

Farming, both food and cash crops, is the main livelihood of most local people in the surroundings of the DFR. Farm sizes range from 0.8 to 1.6 ha including plots both inside and outside the forests. Survey report of 2000 revealed that about 37% of farmers own their farms by inheritance, 40% through own effort in unclaimed lands, by purchase (about 20%), and 3% by allocation under the Ujamaa villagization schemes after 1967. The study also

revealed that 5% of the population earns supplementary income from wage labor, about 15 % engage in petty trading, and a few individuals have shops or local beer shebeens. For cash, most of the farmers claim to have one of the four major cash crops (cardamom, cloves, black pepper and cinnamon). Farmers claimed very high incomes from these crops, while there was strong variation among the five villages, on average each farmer claimed to be earning 1.4 million TSH from cardamom, 165,000 TSH from cinnamon, 84,000 from black pepper and 21,000 from cloves. Other commercial crops are sugarcane, tea, cashew nuts, citrus and *Allanblackia* seed. Food crops grown in the area include maize, banana, cassava, yams, beans, cow peas and vegetables. Dairy farming and butterfly farming as well as tree planting are among the economic activities in the villages surrounding Derema forest reserve.

Tea estates are major employers in the upper plateau of Amani, with some 15 % of the permanent tea estate workforce and 46 % of the temporary workers are from nearby villages including those surrounding Derema forest. The Government and the village administration employ about 2 % of the people. In addition to agricultural crops additional income is mainly from self employment such as dairy farming, sale of the fire wood from planted Eucalyptus species and butterfly farming. The growing beekeeping and fish farming might contribute to the income of local communities in future.

1.11.3 Local land-use

The area of the village communities surrounding the DFR is mainly agricultural or residential land with no or only little forest. The land use patterns during 1960s-1990s were almost the same without big changes. However during 1990s to 2000 there was drastic change in land use particularly in lowland buffer zone villages where by most of sisal estates were abandoned and some of them are converted to peasant agriculture. At the upper plateau particularly in Amani Division, the degraded tea estates were restored under the private sector initiatives. The tea out grower scheme started to be introduced, and some more areas formally used for peasant agriculture was turned to protected forest reserves. Scattered woodlots are common but main belong to adjacent Tea Estates for tea curing. Most of the valley bottoms around Derema are used for cultivation of horticultural crops, banana, yams, sugarcane, beans, maize and vegetables; while the sloping ground is planted with cloves,

cinnamon, black pepper and cardamom. However, several daily household products, such as fuelwood, building poles, wild vegetables, fruit, are collected from the forests.

1.12 Other activities that could have impact on the forest reserve management

There are several stakeholders working within the buffer zone of Derema forest reserve might affect the management of DFR in one way or another. In this aspect the Management of DFR should take into account all types of land use within the area for the betterment of management. The following Institutions/ organizations and their activities are of great concern to DFR.

The East Usambara Tea Company (EUTCO) with more than 12,000 ha of leased land and out of it more than 30% is planted with tea adjacent to DFR in the external boundary. About 30% of the EUTCO land is covered by natural forest of great biological and hydrological values. About 20% of the EUTCO leased land is wetland and water sources while the rest of land is occupied by infrastructure and settlements.

Villagers depend on subsistence farming of food or cash crops for their living. The farming methods practiced is still poor, soil conservation activities such as terracing as well as manuring and other soil improvement practices are not commonly used. This leads within a few years to soil infertility and hence to low crop production. Once the soil is exhausted the area is abandoned, which creates further pressure on forest land in search for more fertile land. Fire is often used in the farmlands for land preparation, and it sometimes causes forest fires in the DFR. More effective farming methods are required to ensure efficient use of land. Furthermore, the farmers gave out their farm plots to be included in DFR an action that has been done though voluntary but creates a high demand for cultivation of cash crop that has been generating cash income. This calls for intensifying other alternatives IGAs such butterfly farming, dairy rearing, poultry projects, beekeeping, basketry and others. Availing alternative farm land in the lowland that will be used to plant horticultural, arable and commercial crops will easy the pressure in the mountains.

PART 11

2.0 REVIEW OF EXISTING MANAGEMENT PLAN

2.1 Review of previous plan

Derema forest has been managed as a general land Forest, governed by village land Act and Land Regulations Like other Forest in General land; there was no management plan these forests apart from harvesting plan in some forests. Derema forest was proposed to be gazetted as a forest reserve since 1970s. It was just recent that the gazettement process is on final stages. Thus, preparation of this management Plan marks the first Management Plan for Derema Forest.

2.2 Survey of Existing Forest Resources

Derema forest is within the East Usambara Mountain block, an area classified as one of the global centre of plant diversity by the IUCN plant conservation Program Further more the East Usambara Mountains are recognized as the second area in diversity of Fauna in Africa, In general the diversity of species, whether it is measured in species richness or as endemism is very high. Ecologically, Derema forest shares some similarities with Amani Nature Reserve. The Forest forms a corridor that connects Amani Nature Reserve in the South and Kambai Forest Reserve in the North. Recent study by Dr Makonda and Mr Killenga on biological and socio-economic studies provides the following existing forest resources.

2.2.1 Vegetation diversity

The status of the tree species diversity is summarized figure 2 below. The figures shows that 30 (2%) have been introduced (alien), almost 80 (6%) are nearly endemic with limited ranges in the Eastern Arc Mountains and /or the East African lowlands between Somalia and Mozambique and 12 (1%) are endemic. Figure 3 shows that, of the endemic species, 4 (5%) species are endemic to the East Usambaras namely; *Saintpaulia grotei*, *Psychotria triclada, Cola usambarensis* and *Rinorea scheffeleri* in which the former is also endangered. Eight species (10%) namely; *Saintpaulia magungensis, Chassalia albiflora, Englerodendron usambarense,*

Greenwayyodendron suaveolens, Rinorea angustifolia, Rytigynia longicaudata, Sericanthe odoratissima and *Uvariodendron oligocarpum* are endemic in both East and West Usambaras.

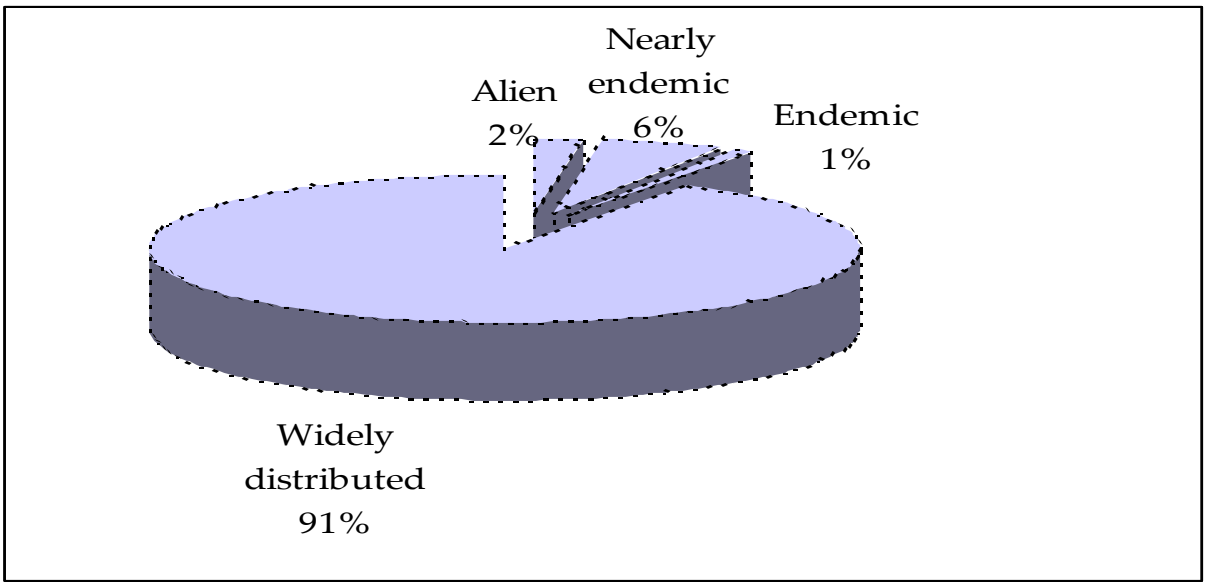

Figure 2: Summary of endemic status for plant species of Derema Forest Corridor

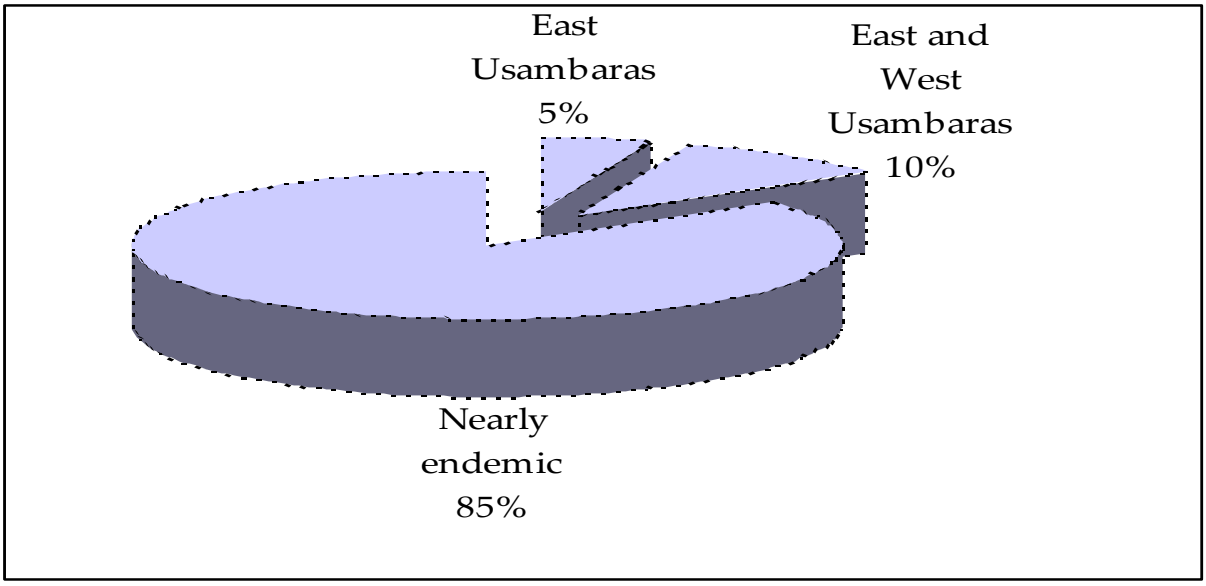

Figure 3: Proportions of endemic plant species of Derema Forest Corridor

It should be noted here that, out of all the endemic species, three are shrubs (*Psychotria triclada, Chassalia albiflora* and *Englerodendron usambarense*), two are herbs (*Saintpaulia grotei* and *S. magungensis*) and seven are trees (*Greenwayyodendron suaveolens, Rinorea angustifolia, R. scheffeleri, Rytigynia longicaudata, Sericanthe odoratissima, Uvariodendron oligocarpum* and *Cola usambarensis*). And that all are forest dwelling species in which two (17%) namely; *Saintpaulia magungensis* and *Saintpaulia grotei* are non-forest dependent and the remaining 10 (83%) are forest dependent.

2.2.2 Fauna diversity

2.2.2.1 Mammals

Several mammals have been identified in Derema FR (Appendix 5). The table below shows the status of the mammals in forest.

Table 5: Summary of status of identified mammals in Derema Forest Corridor

Serial number		Status	Number observed	% of total
1	F	Forest dependent species	8	27.6
2	f	Forest dwelling but not forest dependent	10	34.5
3	O	Non-forest species	1	3.4
4	E	Endemic to the Usambara Mountains	0	0.0
6	N	Near-Endemic	2	6.9
7	W	Widespread	15	51.7
8	V	Vulnerable	2	6.9
9	NT	Near threatened	1	3.4
10	EN	Endangered	1	3.4
10.	Unknown		23	79.3

Whereas 10 species of mammals (34.5%) were forest dwelling but not forest dependent, 8 species (27.6%) were forest dependent and only one species namely, *Rattus rattus* (common mice) was a non-forest. Two species were found to be vulnerable (*Dendrohyrax validus* and *Beamys hindei*) and one species near threatened (*Galago zanzibaricus*). Zanj elephant shrew

(*Rhynchocyon petersi*) was found both near endemic in the Usambaras and globally endangered whereas lesser pouched rat (*Beamys hindei*) had a near endemic and vulnerable status. Vervet monkey (*Cercopithecus aethiops*) locally known as "ndrue", blue monkey (*Cercopithecus mitis*) and bush pig (*Potamochoerus lavatus*), cane rat (*Thryonomys swinderianus*), giant rat (*Paraxerus ochraceus*) are hunted for protein.

2.2.2.2 Birds

Stuart (1989) estimated that at least 110 species of birds are found in the East Usambaras, during this study however, 41 species were identified. Table 6 below gives a summary of the status of the identified bird species in the study area.

Table 6. Summary of status of identified birds in Derema Forest Corridor

Serial number		Status	Number observed	% of total
1.	F	Forest dependent species	8	19.5
2.	f	Forest dwelling but not forest dependent	12	29.3
3.	O	Non-forest species	9	22.0
4.	E	Endemic to the Usambara Mountains	5	12.2
5.	N	Near-Endemic	4	9.8
6.	W	Widespread	23	56.1
7.	V	Vulnerable	5	12.2
8.	NT	Near threatened	4	9.8
9.	CE	Critically endangered	1	2.4
10.	Lc	Least concern	7	17.1
11	Un	Unknown	3	7.3

Analysis in Table 6 shows that most of the bird species are forest dwelling and while 56.1% is widespread, 12.2% is endemic to the Usambara Mountains and 9.8% is near endemic to the area. The endemic species are southern banded snake-eagle (*Circaetus fasciolatus*), Amani sunbird (*Hedydipna pallidigaster*), long-billed tailorbird (*Orthotomus moreaui*), Usambara eagle-owl (*Bubo vosseleri*) and Usambara hyliota (*Hyliota usambarae*). The near endemic

species are Banded green sunbird (*Anthreptes rubritorques*), Swynnerton's Robin (*Swynnertonia swynnertoni*), Sokoke scops owl (*Otus ireneae*) and East coast akalat (*Sheppardia gunningi*).

Whereas five species namely; dappled mountain robin (*Modulatrix orostruthus*), banded green sunbird (*Anthreptes rubritorques*), Usambara thrush (*Turdus olivaceus roehli*), Usambara eagle-owl (*Sheppardia gunningi*) and East coast akalat (*Bubo vosseleri*) are vulnerable, four species are near threatened. The near threatened species are Southern banded snake-eagle (*Circaetus fasciolatus*), Fischer's turaco (*Tauraco fischeri*), Banded green sunbird (*Anthreptes reichenowi*) and Swynnerton's Robin (*Swynnertonia swynnertoni*). Further analysis shows that one species of the birds namely *Orthotomus moreaui* (long-billed tailorbird) is critically endangered. Details of birds are presented in appendix 6.

2.2.2.3 Reptiles

Table 7. Summary of status of identified reptiles in Derema Forest Corridor

Serial number		Status	Number observed	% of total
1.	F	Forest dependent species	12	34.3
2.	f	Forest dwelling but not forest dependent	11	31.4
3.	O	Non-forest species	3	8.6
4.	E	Endemic to the Usambara Mountains	1	2.9
5.	N	Near-Endemic	9	25.7
6.	W	Widespread	15	42.9
7.	V	Vulnerable	7	20.0
9.	EN	Endangered	3	8.6
11.	Lc	Least concern	2	5.7
12.	Un	Unknown	7	20.0
13.	DD	Data Deficient	1	2.9

Thirty five (35) species of reptiles were identified. These were 8 species of chameleons, 2 geckos, 1 agama, 4 skinks, 1 lizard and 20 snakes all represented 9 in families. As shown in the summary in Table 6, most of the species are forest dependent with only three which are non-forest. Whereas one species of chameleon (*Bradypodion spinosum*) was found to be endemic in the area, nine species

were near endemic as shown in Table 7. The endemic *Bradypodion spinosum* and the near endemic *Lygodactylus kimhowelli* and *Chamaeleo deremensis* are also endangered. The survey indicated that *Chamaeleo deremensis* and *Bradypodion spinosum* are common in Derema in undisturbed forest areas. Among the listed snakes, Usambara Gabon viper (*Bitis gabonica*), Forest cobra (*Naja melanoleuca*) and Eastern green snake (*Philothamnus punctatus*) are common in Derema in undisturbed forest particularly Shamba Ngeda areas. Appendix 7 details of reptiles are presented.

2.2.2.4 Amphibians

Table 8 below shows that all of the identified amphibians in the area are forest dwelling in which 66.7% is forest dependent. Two of the species namely *Boulengerula boulengeri* and *Hoplophryne rogersi* are endemic to the Usambara Mountains and six are near endemic.Whereas six species are vulnerable, one species namely *Leptopelis vermiculatus* and *Mertensophryne micranotis* are near threatened and endangered, respectively. Appendix 8 details the amphibians of Derema FR.

Table 8: Summary of status of identified amphibians in Derema Forest Corridor

S/N		Status	No. observed	% of total
1.	F	Forest dependent species	10	66.7
2.	f	Forest dwelling but not forest dependent	5	33.3
3.	O	Non-forest species	0	0.0
4.	E	Endemic to the Usambara Mountains	2	13.3
5.	N	Near-Endemic	6	40.0
6.	W	Widespread	7	46.7
7.	V	Vulnerable	6	40.0
8.	NT	Near threatened	1	6.7
9.	EN	Endangered	1	6.7

2.2.2.5 Butterflies

There are more than 460 species of butterflies in the Usambara Mountains and in the study only 62 species could be scientifically identified, distributed within 16 families. The summarized results in Table 10 shows that out of this list, five species are endemic namely; *Charaxes usambarae, Cymothoe amaniensis, Hypolimnas antevorta*, *Euthecta* sp. and

Hypolimnas usambara in which the former two are also endangered. Also, three species namely, *Charaxes contralius, Charaxes lasti* and *Astictopterus tura* are near endemic.

Table 9: Summary of status of identified butterflies in Derema Forest Corridor

Serial number	Status		Number observed	% of total
1.	F	Forest dependent species	15	23.1
2.	f	Forest dwelling but not forest dependent	37	56.9
3.	O	Non-forest species	4	6.2
4.	E	Endemic to the Usambara Mountains	5	7.9
5.	N	Near-Endemic	3	4.6
6.	W	Widespread	60	92.3

Further observations in Table 9 indicate that most of the butterfly species are forest dwelling and therefore their existence depend on plants. Appendix 9 details the different species of butterflies found in Derema FR.

2.3 Forest Management Activities

2.3.1 Boundary consolidation

Derema forest boundary was clearly demarcated and visible on the ground. The boundary was marked by numbered beacons, scouped directional trenches and few areas planted with trees. The boundary was recently maintained through slashing and ground screefing. In total the forest is aligned with 166 numbered beacons. In 2008/09 boundary resurvey was done for a length of 27.2 km and boundary map produced. Boundary maintenance which is done annually involves cleaning and maintaining boundary marks.

2.3.2 Forest Protection

Being in general land, the forest received general protection and in most cases ad hock patrols to address specific problem such as tree cutting was carried out. However, some illegal activities such as trafficking of live animals and plants were done unnoticed. The

Regional Catchment Forest Office through Muheza District Office was responsible in the protection of the forest. Amani Nature Reserve, Muheza District Council, Longuza Teak Plantation both supported protection of the forest. Local communities played a great role in forest protection. Traditionally they valued the forest and maintained sacred forests around Derema. In each of the five villages, Village Natural Resource committees were established and participated in mobilizing the community in various environmental issues. Through this committee, law enforcement and fire management were effected. Most of these villages were sandwiched between Amani and Derema. Villagers participated in joint patrols in ANR.

2.3.3: Restocking and Natural Regeneration

About 1547 farm plot within Derema Forest were left unattended following crop compensation to 1128 farmers. Uprooting of the plants and restocking the area has not been done. Natural regeneration has been promoted through general forest protection to minimize forest disturbances.

2. 3.4 Nurseries

Regional Catchment Forest Office was running a nursery located at Longuza Teak Plantation. The capacity of the nursery was to raise 200,000 seedlings per year. Teak and *Cedrella* seedlings were raised. At village level individual tree nurseries were promoted with institution support in brackets: Kwezitu (TF CG), Kisiwani (ANR), IBC Msasa (ANR) and Kambai (TFCG). Tree species raised include; *Allablankia stchumanii, Gravellea robusta, Newtonia buchananii, Fruit tree.* Support provided includes watering cans, sieve wire, soil ingredients and potting materials.

2.4 Management of buffer zones and corridors

The primary objective of Derema Forest Reserve is to safeguard its biodiversity and catchment values. The forest consists of important natural forest patches found within the permanent villages surrounding Derema forest. Furthermore, there are two major corridors of which their connectivity to other forest blocks will provide direct link to other protected forests in the East Usambara.

2.4.1 Natural forest patches

Four natural forest patches earmarked are situated in Kwezitu, Msasa IBC and Kambai villages. Kwezitu village consists of two forest patches one being Kwezitu village forest reserve with an area of about 8.5 ha. This is already established village forest with a well established Forest Committee. Nguingui is another forest patch found in Kwezitu village. This is a conspicuous forest patch with a rock outcrop and a dense forest on top. Kambai village forest reserve which bears the name of the village is the third forest patch with an area of about 32 ha. This forest is currently owned by the village thus providing an important buffer area between Derema forest and adjacent communities. The fourth forest patch is found in Msasa IBC. It occupies an area of …….ha. This forest patch is among the most important buffer zone because Msasa IBC village is partly an island being surrounded by protected forests on one hand and tea plantations on the other hand.

2.4.2 Corridors

Derema -Amani Nature Reserve and Derema –Kambai corridors are currently considered as the corridors of main concern to the East Usambaras. Derema –Amani Nature Reserve with approximately provides an important link to the Southern famous biological conservation area, the Amani Nature Reserve. Derema –Kambai corridor which has about links the southern block to the major protected northern blocks of the East Usambaras.

2.4.3 Agroforestry and tree planting

Agroforestry practices and tree planting serve as sources of woody and fodder requirements in buffer zone areas. Agroforestry/on farm trees are practiced in all five villages adjacent to Derema forest. Few individual woodlots are found in Kwezitu for supplying firewood to EUTCO (Tea Company); and for domestic purposes as well. There are individual teak woodlots in Kambai village raised for commercial purposes. Longuza Teak Project also serves as firewood source to the surrounding villages. There is need to put more emphasis to the on- farm -tree planting (multi-purpose trees) practices to sustain woody requirements in the area.

2.5 Watershed areas management and soil conservation

Sustainable supply of water is pertinent and primary issue in the protection of catchment areas and water sources such as rivers, streams and wetlands. Derema Forest Reserve harbors water source points where intakes for domestic purposes have been constructed. These include……Streams like……and……..are tributaries feeding the large river Sigi which supplies water to Tanga city and the surrounding mountainous dwellers.

Some initiatives done to conserve the watersheds include general protection of forests and monitoring of water intakes by water user groups in collaboration with Water Department, Hydrology section at regional level. Water gauging station at Kisiwani in Amani is a hydro-station constructed by the then East Usambara Catchment Forest Project (EUCFP) in collaboration with Water Department to monitor impact of forest on hydrological cycle. Currently this hydro-station is under Water Department and may continue to serve the purpose. Furthermore, establishment of Zigi conservation programme under Pangani Basin Water Office (PBWO) is a step towards sustainable and equitable supply water to relevant users.

Soil conservation initiatives in the area include introduction of sustainable agriculture which included construction of contour bands and fodder banks taking into account the physical terrain of the area. Spices farming like cloves and cinnamon; and agricultural fruit trees like avocado, jack fruit and citrus were among the tree crops that enriched the soil.

2.6 Physical resources

2.6.1 Buildings

There are two field staff quarters at Kwezitu and Kambai villages as shown below:

Table 10: Field staff quarters adjacent Derema FR

Village	Capacity	Year built	Condition/Remarks
Kwezitu	2 rooms, 1 kitchen, 1 toilet	1992???	Fair. Renovation required
Kambai	2 rooms, 1 kitchen, 1 toilet	1992????	Bad. Urgent renovation required

District Catchment Forest Manager (DCFM)s Office in Muheza. The DCFM for Muheza is accommodated at the District Commissioner's office building. The office lacks basic office facilities.

2.6.2 Equipment and vehicles

There is no motor vehicle directly allocated for Derema forest activities; except for the five motorcycles allocated to facilitate Derema Resettlement Action Plan (RAP). These may as well cater for other Derema forest activities to begin with. Distribution was done as follows: DCFM Office, Livestock Office–Muheza, Lands Office-Muheza, Agricultural Office–Kisiwani and Agricultural office-Zirai. Other vehicle support to facilitate Derema activities were provided by ANR, RCFM and DNRO's offices.

2.6.3 Roads

There are no forest roads; however the forest is accessible through Muheza –Amani road served by TANROAD and feeders roads joining at Makanya (sub-village of Msasa IBC) with about 4 km and Kwemdimu village with about 6 km to Derema forest. These roads include those used by forest adjacent communities, visitors interested in ecotourism and various institutions/organizations residing Amani area. Due to terrain forest roads may not be required rather emphasis should be put on forest boundary that will cater as fire line.

2.6.4 Communications

Communication means form an important link and source of information which is vital for effective and efficient management of forest resources. The office consists of electricity; nevertheless, no internet services or land line telephone at the DCFMs office; except personal mobile phones. Office supporting equipment required includes computer and accessories and office furniture.

2.7 Human resources

2.7.1 Staff

Sustainable management of forest reserve requires adequate and skilled staff. Derema Forest

Reserve has inadequate human resources. The number of existing staff is four. The current staffing at field and district level is therefore not enough for proper management of the forest as they also serve other catchment forests as well. The current staff disposition is as shown below (Table 7):

Table 11: Human resource staffing

Working Station	Designation	Number	Training level
Muheza District	DCFM	1	BSc. Forestry
Muheza District	Asst. DCFM	1	Diploma
Kwezitu	Forest Attendant	1	Standard VI
Kambai	Forest Attendant	1	Standard VI

2.7.2 Training

2.7.2.1 Staff

Table xxx above shows that the District forest office is comprised of two Forest Attendants, one Diploma holder and one staff with Bsc. in Forestry. Training which were offered for all level were refresher course, study tours, seminars, awareness meetings and workshops. These were organized and conducted during EUCFP and EUCAMP which phased in 2002. More capacity building in terms of refresher courses, and other various trainings are required for effective management of forest resources.

2.7.2.2 Communities adjacent to the forest

Derema forest is surrounded by the communities who pose great challenge in the management of forest resources. A number of trainings were offered as part of community involvement and awareness creation. These include; study tours, meetings, seminars and workshops. The trainings were conducted under the support of ANR, EUCFP and EUCAMP. Similar trainings are required to capacitate communities in all matters related with conservation and management of the forest.

2.7.3 Supporting institutions

Supporting institutions which interact in the management and conservation of forests include: TFCG, ANR, WWF, CARE, Catchment Forest Office, EAMCEF, CMEAMF & NDTL. They work on supporting activities that are part of the management and conservation of the forest.

2.7.4 Community organizations

There are various village organizations around Derema forest that play part in the conservation and management issues. These include: WEAM in two villages, VNRCs in five villages, MJUMITA, UWAMA and VCDC.

2.8 Extension services and socio-economic studies

In order to achieve sustainable management of the DFR, communication between the communities and extension agents is very necessary. For management of the reserve some extension services have be carried out to the surrounding communities. These include workshops, meetings and seminars held to sensitize the communities on the importance of conserving the forest. Also leaflets, calendars and booklets were provided to communities. For communities learn from others who had already experience in participatory forest management exchange visits were also conducted. Most of these activities were facilitated by Amani Nature Reserve management.

Apart from carrying out extension services, two socio-economic studies were done around DFR. The first one was done in 2000 on Socio-economic Impact Assessment on the proposed Derema forests reserve and Wildlife corridor which resulted in the formulation of Derema Resettlement Action Plan (RAP) of 2006. The second one was carried out on late 2009 which combined Biodiversity Survey and Socio-economic study on Derema forest reserve. The findings from this study were used as inputs in preparation of the management plan for Derema Forest Reserve. Despite these studies continuous communication between the communities and management of DFR is very crucial for efficient and adequate management of the reserve. Hence, conservation and environmental education should be done through more extension services and social economic studies.

2.9 Marketing and initiatives for revenue generation

Derema Forest Reserve being adjacent to Amani Nature Reserve has the potential of generating revenues to the communities as well as the government. These include marketing of Non-Timber Forest Products (NTFPs), eco-tourism, beekeeping, collection and sale of *Alanblakia stuhmanii* seeds, collection and sale edible wild fruits. Also outside the DFR there is high potential promoting spice farming and intensifying butterfly farming to adjacent communities. The presence of rivers and water sources from DFR offer possibility of initiating Payment for Ecosystem Services (PES) by linking the water users and conservation values. Also intensive management of the reserve may lead to consideration on the newly initiated Carbon Trade.

2.10 Potential values of the forest

Biodiversity value, amelioration of climate, water for irrigation and drinking including Payment for Ecosystem Service (PES) are potential values of DFR. Eco-tourism provisions, local employment for casual labour and social values form important potentials to the local communities. Research and training together with the eco-tourism and carbon sequencing are potential for national and international communities. Being a natural forest of higher biodiversity values, DFR has a great chance to qualify for Carbon Credit.

2.11 Inter-sectoral linkages and co-operation

Different sectors have collectively participated in the process of acquisition of DFR as it is important in environmental conservation to local, national and international communities. Such sectors include Forestry, agriculture, livestock, tourism, energy and minerals, land development, water, wildlife, environment and local government authorities especially Muheza District Council. Organization that in one way or the other contributed/ interested to the successful acquisition of the reserve include Amani Nature Reserve (ANR), Lunguza Forest Plantation, East Usambara Tea Company (EUTCO), Tanzania Forest Conservation Group (TFCG), World Wild Fund for Nature (WWF), CARE International (Tanzania Office), Eastern Arc Mountains Conservation Endowment Fund (EAMCEF), Novella

Development Tanzania Ltd (NDTL), Pangani Basing Water Office (PBWO), Tanga Urban Water and Sewage Authority (Tanga UWASA). This cooperation will be sustained and strengthened by establishing a Coordinating Body because currently the only function body is Village Conservation and Development Committee (VCDC) which coordinates ANR and its surrounding villages.

2.12 Financial resources

Derema Forest Reserve had opportunity of receiving funds from different sources since being proposed to as a conservation corridor. The table below shows the contributions from the different agencies since 2005 to the time writing this plan.

Table 12: Source of funds and areas of expenditure

Year	Source of fund	Total Tshs received	Activity targeted	Achievement
2005/06	MNRT	600,000,000	Compensation payment to affected communities	paid
2006/07	CPEF	300,000,000	Compensation payment to affected communities	paid
2007/08	World Bar Finnida	1,629,000,000	Compensation payment to affected communities	Payment completed on time
2008/09	TFCMP/W	235,000,000	Implementation of Resettlement Action Plan (RAP)	Implemented
2008/09	WWF	20,000,000	Boundary consolidation and map production	27.2 of Boundary length resurveyed, 166 beacons installed and directional trenches scooped. Map produced and used
2009	WWF	12,000,000	Biological and socio economic survey	Completed and report submitted
Total		2,796,000,000		

2.13 Management challenges

Challenges that emerged during acquisition of DFR were delays of obtaining legal ownership, which was complicated by presence of villager's cash crops and scattered planted trees inside the forest. Others that have not been solved up to time of preparing the management plan include unavailability of alternative land for affected but interested farmers from Derema villages. Though adjacent communities earn money through selling of *Allanblackia stulhumanii* seeds, little is known on how seed collection affects natural regeneration in the reserve. It was revealed by local communities that the daily collection of *Allanblackia stulhumanii* seeds ranges between 50 to 100kg per person. Research is needed to establish the effect of collection of the seeds on natural regeneration. Invasive species such as *Meosops eminii, Cedrela odorata,* and *Lantana camara* are also posing some management challenges. There is also labour competition among different stakeholders posing management challenges. Limited communication networking and poor infrastructures posses challenges to the management of DFR. Roads are difficult to drive through during the rain season. DFR also suffers from lack of buildings to cater for field staff. The present houses are small two rooms houses in Kwezitu and Kambai villages that need maintenance. Being close to the ANR, Derema Forrest Reserve also faces the problem illegal trafficking of live fauna mainly Chameleon, snakes, lizards, tortoise and birds.

PART III

3.0 MANAGEMENT DIRECTIVES

3.1 Global initiatives, Policy statements and directives

Management of Derema Forest Reserve (DFR) will involve translating relevant international conventions and agreements into on-ground actions through National Policies and Programmes. The management plan responds to wider global, national and local societal trends and needs which advocate and promote for Sustainable Forest Management practices. In principle, instruments for achieving sustainable forestry practices are being developed through various international and national processes and initiatives. Tanzania is among signatories of various international conventions related to forest conservation and management commitments. In global context Tanzania is obliged to commitments of the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol; Convention on Biological Diversity (CBD), the UN Convention on Combating Desertification and Drought (UNCCD) and its protocol and the United Nations Forum on Forests (UNFF). Other conventions include Convention on International Trade in Endangered Species of the wild fauna and flora (CITES) (2003) and Ramsar convention.

The United Nations Framework Convention on Climate Change (UNFCCC), usually referred to as "Convention on Climate Change" was adopted in May 1992. In response to the effect of global warming and climate change, Tanzania ratified the Convention in 1996. The United Nations Framework Convention on Climate Change (UNFCCC) recently agreed to study and consider a new initiative, led by forest-rich developing countries, that calls for economic incentives to help facilitate *'Reduced Emissions from Deforestation and Degradation'* (REDD) in developing countries. These emissions reductions could simultaneously combat climate change, conserve biodiversity and protect other ecosystem goods and services. Tanzania is obliged to implementing programmes and projects that reduce emission units (emission permitted them but not used) and sell this excess capacity to countries that are over their targets.

Tanzania has already taken the advantage of this global opportunity in carbon trading although the MNRT has not yet initiated any carbon trading projects. Given the available forest resources in the country (Derema Forest Reserve included), which represent a huge net carbon sink, there is urgent need for the MNRT to initiate carbon trading projects in Tanzania. This new gazettement of Derema Forest Corridor Reserve, being a natural forest of higher biodiversity values has a potential to qualify for not only enhancing ecosystem connectivity to important protected Areas (Amani Nature Reserve and Kambai Forest Reserve) but also shall enhance Reduced Emission from Deforestation and forest degradation (REDD). Therefore, successful implementation of the Derema Management Plan will not only ensure constant gene flow within the East Usambara but also stabilization of greenhouse gas concentrations in the atmosphere and spare the excess capacity (carbon marketing to industrial countries).

It has been recognized by International community that desertification is a major economic, social and environmental problem of concern to many countries in all regions of the World. In 2006, Tanzania embarked on the development of Strategy for Urgent Actions on Land Degradation and Water catchments which seek to halt land degradation and conserve water catchments areas. The implementation of Derema proposed Forest Reserve Plan aimed to combat desertification and mitigate the effects of drought and/or desertification, particularly in the East Usambara Mountain Forests Landscape.

The plan puts forward some workable strategies to ensure reduction of environmental degradation arising from illegal human activities related to agricultural farming, harvesting of forest products, Stone and sand mining, collection of live animals (snakes, birds and chameleons) and game meat hunting. The plan has been developed to integrate various and complimentary strategies that focus on forest gazettement and management, rehabilitation of degraded forest land, conservation and sustainable management of forest and water resources, leading to improved living conditions of adjacent communities, in particular at the community level in adjacent five villages. The plan promotes awareness of planned interventions and is geared towards facilitating implementation of viable selected income generating activities and PES initiatives which are usually environmentally friendly. The participation of local communities with the support of non-governmental organizations and government institutions, in efforts to minimize and eventually combat forest deforestation and degradation is highly stressed thro. Mitigation measures to degraded ecosystem within Derema forest are proposed for implementation are here by suggested for implementation.

The United Nations Convention on Biological Diversity was set up to conserve biodiversity and to promote the sustainable use of biodiversity. The Convention supports national efforts in the documentation and monitoring of biodiversity and the restoration of degraded ecosystems. In implementing Convention on Biological Diversity, Tanzania has agreed to

promote conservation of biological diversity as well as develop programmes/projects for biodiversity conservation. A sound implementation of DFR management plan contributes to a sustainable use of biological diversity components as well as fair and equitable sharing arising out of the utilization of genetic resources.

Tanzania recognizes the multiple environmental values and benefits of forests, for local, national and international interests. This is in line with the implementation of the United Nations Forum on Forestry (UNFF). The DFR contributes considerably to both national and global biodiversity conservation objectives as it protects diverse tropical rain forest ecosystem. Thus, the proper and effective implementation of management plan for DFR will ensure that Tanzania meets the requirements for these International obligations and commitments.

In principle, the management plan for DFR has been prepared based on requirements of international obligations and commitments as translated in the National Forestry Policy (1998), National forestry Programme (2001), Forest Act (2002), National Land Policy (1999) and Environmental Policy (1997) and takes into account macro economic policies and other sectoral strategies. Each instrument mentioned above has supporting statements for the management of DFR.

3.1.1 National Forest Policy

National Forest Policy was consulted during preparation of this management plan as it remarks important policy directives to be considered during preparation stage. The Policy states that there must be an approved management plan. Furthermore the policy states that areas categorized as protected forests are of economic, scientific and aesthetic value as well as for non-wood products such as eco-tourism, bee products, genetic resources (MNRT, 2007); to mention just few. Three major aspects under the National Forest Policy are biodiversity conservation, water and soil conservation and involvement of the local people. Policy statement (16) states: "Biodiversity conservation and management will be included in the management plans for all protection forests. Involvement of local communities in conservation and management will be encouraged through joint management agreements".

Forest policy statement (No. 17) also stipulates that: “Biodiversity research and information dissemination will be strengthened in order to improve biodiversity conservation and management.” Forest policy statement (No. 20) and (No 21) direct the inclusion of watershed management and soil conservation in the management plans as well as strengthening research and information dissemination to improve watershed management and soil conservation. Forest policy statement (No. 39) directs participation of local communities in forestry activities.

3.1.2 Forest Act

The Forest Act (2002) was also referred in the preparation of this plan. The contents elaborated in the Forest Act which relate with the formulation of working instruments relevant to the implementation of this management plan were taken into consideration. In order for the stakeholders to participate in the management and conservation of the forest reserve and in the implementation of the plan strategies, the following issues as stipulated in the Forest Act will be consulted:

- Cost and benefit sharing among stakeholders
- Local government responsibility in the vicinity of the forest
- Roles of individuals and organizations as may be prescribed
- Responsibilities of relevant government officials as Director may direct
- Users and organization of the forest from the private sector.

3.1.3 National Forest Programme

The NFP (2001) provided the strategic guides to be used for the preparation and implementation of this management plan. To mention few the following were identified useful during the planning process.

Protective buffer zones around gazetted forest reserves with biodiversity and other amenity values will be demarcated and managed in collaboration with adjacent communities through JFM and CBFM. The purpose of the zones is to protect the respective forest reserves and provide benefits for adjacent communities and they will be managed in accordance with the

forest management plans.

3.1.4 National Land Policy of 1999

The National Land Policy aims at protecting sensitive areas, which include water catchments areas, mountains, forests and seasonal migration routes of wildlife (MNRT, 2007). The Policy clearly states that these areas shall not be allocated to individuals. Such statements will be referred during zonation of the forest and implementation of the management plan.

3.1.5 National Environmental Policy of 1997

This Policy was also consulted during preparation of Derema Forest Reserve management plan as it intends to satisfy basic needs of the poor but at the same time protect the environment. It also promotes eco-tourism which is believed to be environmentally friendly. These are one of basics for the nature reserve management plan.

3.1.6 Other Sector Policies and strategies

Among other things, the current government reforms emphasize decentralization of the authority to the local level and promotion of community involvement in the provision and management of social services through increased cost sharing. These reforms are in line with the Village Act and Land Act of 1999 that require a village to be registered and mandated to manage the resource in its area of jurisdiction. On other hands, this management plan is in line with the Government of Tanzania Vision 2025 which is concretized in two strategy papers; the Poverty Reduction Strategy Paper (PRSP) and the Tanzania Assistance Strategy (TAS). In these two papers, the importance of the Government to work with the local communities and empower them to participate in designing and implementing poverty reduction programmes is underlined.

3.2 Management objectives and their management tools

Derema Forest Reserve being a sub-mountane forest with continuous stand of trees, which attain a height of about 45 m or more in association with epiphytic plants, climbers and lianas rich in plant and animal diversity, has various known and potential values including: provision of corridor amelioration of climate, wild animals, lumbering, medicines, wild fruits, mushrooms, vegetables and insects, firewood, cultural places, building poles and

rafters, thatching materials (grass), source of water supply and drain off to Sigi River which contributes to down stream communities and Tanga Municipal Council domestic and industrial water use, fishing activities and potential for irrigation downstream.

3.2.1 Statement of objectives.

The goal of the management of Derema Corridor Forest Reserve is to enhance effective management and protection of this unique habitat in order to provide a viable linkage between major Forest blocks – Northern and Southern, for biodiversity conservation and livelihood of adjacent communities.

Objective:

Enhanced ecosystem stability through both deliberate in-situ and ex-situ conservation measures in order to enhance forest connectivity and continuous livelihood improvement achieved

Specific Objectives:

- To link major forest blocks (Amani Nature Reserve and Kambai Forest Reserve), which is a critical and contiguous habitat for hundreds of bird, reptile, insect, and plant species movement (gene flow).

- To improve natural vegetation cover in the Derema corridor for biodiversity conservation.

- To maintain and promote all identified critical micro habitats (cultural, peaks, attractive scenery points) as well as ecosystem services valuation to enhance sustainable funding and livelihoods support.

- To support community based conservation and Income Generation Activities within community buffer zone and in alternative farming landing.

Targets/Outputs:

- Derema forest corridor officially gazetted as National Forest Reserve.
- Forest management operations intensified by key stakeholders.
- Initiatives to get rid of invasive species and introduction of native species in gaps implemented.
- Monitoring data show increased vegetation cover and improved migration of important species.
- Mechanism/Framework for ecotourism and PES interventions initiated and promoted.
- Number of viable IGAs and farming systems introduced and supported to adjacent communities.

3.2.1.1 Forest management zones

The forest management zones for Derema are identified and categorized into three:- protection, amenity and community buffer zones. These have been identified to be established and managed according to prescribed management practices in this forest management plan.

Protection / hydrological zone

This zone includes water catchment and biodiversity sites. The zone will be solely for forest protection and water catchment values, preventing any destructive human activities and in-situ conservation of biodiversity resources. Enrichment planting of the rightly selected plant species will be promoted. Elimination of invasive species and removal of exotics will systematically be implemented.

Amenity Zone

The forest area occupying the Makanya hill peak, cultural attractive sites, water falls, and historical sites which offer a possibility for use as amenity /attractive sites and hence promoting ecological tourism in the forest – as environmental friendly economic ventures to forest managers including adjacent communities.

Community buffer zone

The community buffer zone consists of Village Land adjacent to the Derema forest corridor. The Village land in five villages – Kisiwani, Kambai, Kwezitu, Kwemdimu and Msasa IBC can further be zoned into farmland, Village Land Forest Reserves, Residential areas, and other local interests. Improved farming systems and tree planting in individual farms around adjacent villages in order to ease pressure on the reserve forest will be promoted. The management of existing Village Land Forest Reserves will be supported to buffer the Derema forest corridor. Commercial tree planting for timber and fuelwood for tea and soap factories will be promoted. Ecotourism in VLFRs and other cultural sites within Community buffer zone will also be promoted.

3.2.1.2 Forest Management Units

With supervision of the Tanga regional Catchment Forest Project, five village forest management areas have been demarcated in the forest. Each village will manage its unit/area within earmarked forest boundary beacons according to village location, forest map and management plan which have already been prepared by FBD forest surveyors, Catchment Forest Officers, NGOs and the five adjacent village authorities.

3.2.1.3 Management map

A complete management map showing all major futures for DFR has not been prepared. The map below (Fig.2) shows management zones The map will be updated from time to time to monitor changes.

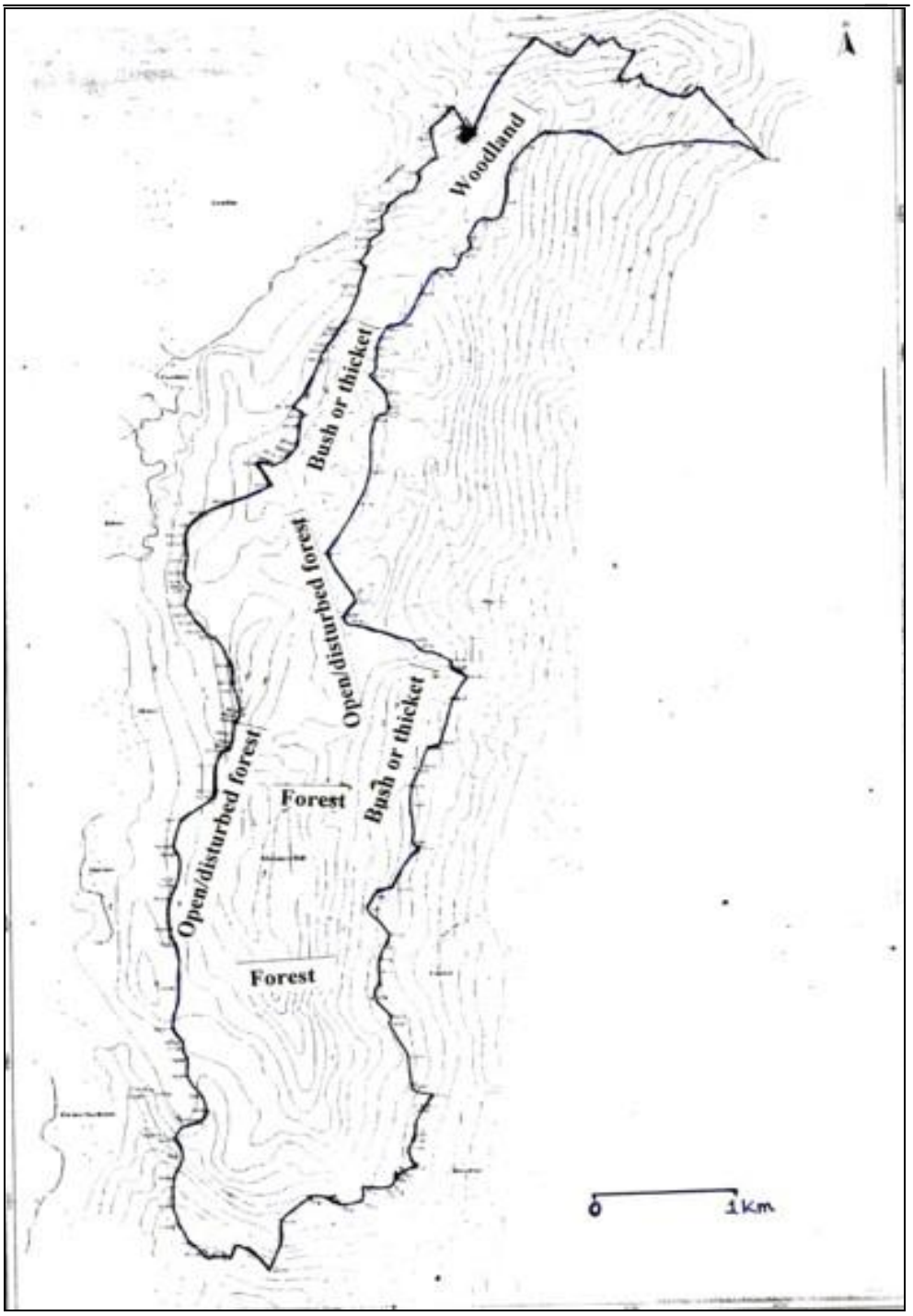

Figure 4: Major vegetation types of Derema Forest Corridor:

PART 1V

4.0 MANAGEMENT PRESCRIPTION

This chapter prescribes main activities to be carried out in DFR, treatment schedule, timing, methods and conditions which will manipulate the forest and other resources to achieve planned outputs.

4.1 Forest Management Operations

4.1.1 Forest Resources assessment and monitoring.

During this plan period, no biological survey will be carried out, rather monitoring of biodiversity will continually be conducted. To determine growing stock, forest inventory will be carried out. Inventory results among others will form a baseline data for carbon trading through calculation of forest biomass. A consultant will be contracted to carry out the inventory and assess forest disturbances. By engaging a consultant, mapping and zoning of the forest will be done. Through zoning, areas of high biodiversity and Catchment and cultural values will be determined. Farm plots and areas planted with trees will also be zoned, to determine its extent and work out harvesting plan.

4.1.2 Harvesting Plan

There are few plots of planted trees within Derema forest which need to be considered for removing. The plots will be determined with respect to one occupied the area, size of the plot, tree species, and age. Solitary trees will be removed in consultation with the former occupier of the area. Removal of trees in plots/woodlots inside the forest will be determined by commercial harvestable age, thus immature tree will be retained to attain harvesting age. Removed tree will be replaced by indigenous tree species. A survey will be carried out to among others determine the growing of planted tree species. And recommend harvesting regime.

4.1.4 Boundary consolidation

Forest boundary of 27.2 km long will be maintained annually. Slashing and ground screefing

using slashes, pangas and hand holes will be used to clear boundary line at a width of 3 km. Forest adjacent villages will provide paid labour force at a rate of 30 mandays per km. Boundary clearing will be followed by tree planting at a space of 2.5 m by 2.5m for boundary length of 25 km, recommended tree species for boundary planting include but not limited to: *Makhamia lutea* and *Tectona grandis.*

4.1.5. Forest Protection

Derema Forest will be protected against illegal activities such as tree cutting, encroachment through agricultural activities. Hunting and forest fires. Clearly maintained forest boundary will partly serve as a fire break and discourage agriculture expansion inside the forest. Routine boundary checking will be done by forest staff in respective stations. Patrol by local community will be done via the established VNRCs to check for illegal activities inside the forest. Minor cases will be brought before Village council to impinge the law against trespasser. 20 joint patrols will be organized per year, 6 villagers and 2 militia men.

4.1.6 Forest restocking and Natural regeneration

Farm plot areas inside Derema forest will be rehabilitated by replacing farm crops with indigineous tree species preferably *Ficus circomorus, Mitrygyna robrostipulata, Brideria micrantha, Syzygium guinensis and Newtonia buchananii* as water catchment tree species. Other species include *Albizia schemperiana. Allablankia scthumanii, Chlorophora excelsa.* About - 192 ha will be planted at a space of 3m x 3m by employing casual labour at a rate of 30 mandays per hectare.

4.1.7. Nurseries

Five nursery sites will be established one from each of the five villages. Identified individuals will be supported with nursery equipment and tools. For each nursery a support of 2 watering cans, one wheelbarrow, collection of nursery soil ingredients and sieve wire will be provided. The Five year target is 350,000 seedlings.

4.2 Management of Buffer zones and corridors

The community buffer zone consists of Village Land adjacent to the Derema forest corridor. The Village land in five villages – Kisiwani, Kambai, Kwezitu, Kwemdimu and Msasa IBC

can further be zoned into farmland, Village Land Forest Reserves, Residential areas, and other local interests. Improved farming systems and tree planting in individual farms around adjacent villages in order to ease pressure on the Forest Reserve will be promoted. The management of existing two Village Land Forest Reserves of Kambai (32 ha) and Kwezitu (8.5ha) will be supported by training two VNRCs and Village PFRA Teams of fourteen members will work on buffer the Derema forest corridor for six days by three staff and one driver. Commercial tree planting for timber and fuelwood for tea and soap factories will be supported by provision of seeds and other nursery materials and equipment. Ecotourism in VLFRs and other cultural sites within community buffer zones will also be promoted and supported by training five Village Ecotourism Committees.

Private (individual and group) nurseries will be established in all five villages surrounding the Derema Forest Reserve. Preferable exotic tree species are those suitable for fire wood such as *Acacia mangium, Senna siamea, Senna spectabilis,* etc. Other species in the lowland include the above plus *Tectona grandis and Albizia spp.* These species will be planted on communal and private woodlots, on their farms and water sources within their villages. Seeds will be purchased but mostly seeds will be locally collected. Wild seedlings and suckers will be collected and nursed in the nursery to gain vigour for restoration work. NGOs such as WWF and TFCG together with Catchments project, Amani Nature Reserve and Muheza District Council will provide technical and necessary materials support to these five villages to engage in tree planting scheme, sustainable management of Village Land Forest Reserves and Income Generating Activities. The purpose of supporting such community based conservation and economic interventions are to minimize pressure on surrounding Derema forest corridor and maintain its ecosystem integrity and continued corridor value.

A number of viable Income Generating Activities have been studied and recommended (Ngaga, 2007) ranging from nature based – butterfly farming, fish pond farms, beekeeping, medicinal farming *(Ocimum sp),* tree planting, horticulture, and improved farming systems; non-nature based – savings and credit schemes, village banks, efficient cooking stoves, commercial seeds collection and modern housing scheme.

4.3 Watershed areas management and soil conservation

Watershed areas as identified by hydrological survey and steep slopes will remain undisturbed to encourage natural regeneration. Adjacent communities will be facilitated to develop and enforce by-laws that ensure sustainable protection of River banks and steep slopes. Communities in five villages will be supported to rehabilitate the river valleys with suitable plant species.

4.4 Physical resources

Derema Forest reserve is a newly established reserve with limited physical resources. Few existing resources or facilities require some renovation but also a need for procurement of the new ones. These include funds for procurement and installation of telephone, fax, internet facilities, stationeries /services for equipment and tools and purchase of one photocopy machine.

4.4.1 Buildings

Existing buildings located in Kambai and Kwezitu villages urgently need to be renovated. Two new field houses will be constructed/ renovated. The existing field quarter at Kisiwani will be renovated and another constructed one at Msasa IBC. The newly field proposed buildings will be under category of class B that will accommodate one field staff in each building. Forest Manager for Muheza district is accommodated at the District Commissioner's office building. Office requirements include wall painting, replacement of electricity cable, replacement of ceiling boards and floor, roof painting and furniture(tables-2 , chairs-4, 1 file cabinet, 1 book shelf) and installation of one land line telephone.

4.4.2 Tools, Equipment and vehicles

Improvement of working condition will encourage and motivate staff in the management and conservation of forest resources. Provision of adequate working tools and equipment is thus a prerequisite. Two motorbikes will be procured for the field staff located at Kisiwani and Kwezitu villages. The motorbikes will be used for coordinating field activities for the five villages. One vehicle for DCFM office will be purchased to facilitate conservation and management operations of the Derema Forest Reserve.

4.4.3 Roads

The existing road from Muheza to Amani and feeder roads will be used to link Derema Forest Reserve with the surrounding communities, hence facilitating conservation and forest management activities. The roads will still be maintained by related institutions. For instance villagers will continue serving feeder roads under-self help arrangements.

4.4.4 Communications

Communication facilities will be procured to improve communications among key stakeholders (e.g. communities, Government Agencies and institutions). Procurements will include one land line telephone, one Fax machine, two computers (1 desktop and 1 laptop) with accessories, one photocopy and binding machines to be centered at DCFMs Office.

4.5 Human resources

4.5.1 Staff

The existing staff in Catchments Forest Office at District and field levels together with staff working with ANR will continue serving the conservation and management of the Derema Forest Reserve. However, recruitment of more qualified staff is required for proper implementation of conservation issues. Two staff with Diploma and Certificate in forestry will be recruited / enrolled and located at Kisiwani and Msasa IBC villages. Both staff will be carrying responsibilities on forest development activities, forest protection, and ecotourism, training activities for the surrounding communities, extension services and administrative issues.

4.5.2 Training

Training will be conducted in order to increase effectiveness and capabilities for the staff and communities on conserving and managing Derema forest. The training plan will be designed to cover needs and opportunities. Short courses for both district and field level officers including DFO, refresher courses for field staff, workshops , seminars, study tours for staff

in all level will be organized centrally from time to time according to the needs during implementation of this plan. Various short course trainings will be designed and conducted twice a year.

These include the introduction to computer literacy (2 weeks at VETA Tanga) including 3 staff at the district level, communication skills (2 weeks at IRDP Dodoma) including 3 staff at the district level, monitoring of biodiversity (2 weeks at IRA Dar es salaam) including 3 staff at the district level, training on REDD concept and measurement of carbon stock (TOT) (3 weeks at SUA Morogoro) including 3 staff at the district level.

Training for the communities will be conducted through meetings/seminars and exchange visits. The training for the communities will cover soil and water conservation approaches, formulation of by-laws, tree planting techniques, beekeeping activities and nursery establishments.

Training local communities TOT on soil and water conservation will take 4 days per village in five villages facilitated by three technical staff and one driver including five members in each village. Facilitation of formulation of By-laws in five villages facilitated by 3 technical staff and one driver including seven members in each village.

Training local communities on nurseries establishment and tree planting techniques will include fifteen members per village in five villages facilitated by 3 technical staff and one driver that will take three days in each village.

Beekeeping training will be conducted to ten members in each village by 4 days in five villages facilitated by 3 technical staff one driver with a provision of modern beekeeping gears and equipment.

Two local communities exchange visits on REDD concept and Carbon Stock Measurement and beekeeping practices for six members from each village will be conducted at Mgambo village in Amani, Muheza District and Suwa village in Handeni District, facilitated by two technical staff and two drivers respectively.

4.5.3 Enhancement of Community Participation (JFM)

4.5.3.1 Community Organizations and institutions

Essentially, Joint Forest Management (JFM) approach is currently not being practiced. However a need to formulate 5 Village Environmental Committees (VEC) or Village Natural Resources Committee (VNRC) is inevitable. Facilitation team will be comprised of 2 persons. These committees are anticipated to act as a bridge between Derema Forest Reserve authority and local communities in 5 villages. Through VEC/VNRC the community will be easily mobilized in carrying out protection activities in the Forest Reserve. Cost benefit sharing from non-off take mechanism such as PES and ecotourism will be taken into consideration during implementation of activities. Joint Forest Agreement consultation process in five villages in form of workshops and meetings are envisaged.

Formulation of Derema Forest Reserve Local Conservation and Development Committee (LCDC) that will comprise 15members (One Representative from each VNRC, One Representative from each village government and One Representative from local communities in each village).

4.5.3.2 Instruments to facilitate community participation

Village Assembly meetings will be used as a tool to formulate or approve (existing) Village Environmental Committees. Training involving Village Environmental Committee members will be organized to about 50 members in all 5 Villages (ten members from each village). Training will cover two days in each village with a total of 6 facilitators. By-laws will be formulated by VEC/VNRC and village governments with a total of 20 villagers under the facilitation of Forest Reserve management and District Lawyer. Final draft will be forwarded to the District Council for approval before sending back the village for implementation. Management Agreements for Derema Forest Reserve will be prepared between Village government and the Director of Forestry and Beekeeping in 5 Villages. The Agreement will cover aspects on forest management activities, rules regarding access and use of reserve, right holder and resolution of disputes.

4.6 Extension services and Socio-economic studies.

4.6.1 Extension services

Extension services will be provided to local communities in all 5 villages according to specific needs. Tourism and Information Officer of ANR will be responsible for all extension activities. Extension services will include two meetings in each village, 4 radio programmes per year, 10 home visits in each village and two ngoma troupes for outdoor campaigns in each village, four video and film shows in each village per year, through engaging 2 personnel from Publicity Northern Zone and 2 personnel from DCFM Office at Muheza, one ANR tourism and information officer and one driver. These will be used to demonstrate concepts that will sensitize local communities in nature conservation and thus operationalization of this plan for two days in each village. Extension materials like 4,000 leaflets, 2,000 brochures, 500 calendars, 1,000posters, 10 sign boards and 100 booklets will be produced and supplied to 5 Villages in order to send conservation messages that are anticipated to promote participatory management of the reserve.

A programme on environmental conservation education will be developed for primary and secondary schools found in two wards and all 5 Villages. Fourteen teachers from seven schools (2 secondary and 5 primary schools) will be trained on environmental conservation issues at a training of trainers course (TOTs) for 4 days at Muheza facilitated by three technical staff.

Five villages will be trained on ecotourism activities by 4 staff whereby each village will compose 10 members. The training will take two days.

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Through one PFRA the information will be collected, and will cover cultural, division of labor, access to resources, role and responsibility and economic status of local communities in all five villages. One socio-economic study will be done to determine existing and potential IGAs, their ownership and beneficiaries. Derema Forest Reserve will provide support to some of the viable IGAs which fall under its mandate. Financial support from Derema Forest Reserve will be granted to initiate village IGAs which will aim on promoting

sustainable use of the natural resources. A participatory resource assessment on JFM in 5 Villages will be carried out for 7 days by engaging a team of 3 technical staff and one driver and 10 villagers per village.

4.7 Initiative for Revenue Generation and sharing

During stakeholders' consultative meetings and socio-economic surveys carried out by Dr. Makonda and consultative meetings from each village out in 5 Villages, it was learnt that there was a number of existing and potential sources of revenues including ecotourism, commercial tree nurseries, tree woodlots, beekeeping and fees for use of the forest. Tourist industry needs to be developed to accommodate the growing number of tourists visiting East Usambara Mountain forests.

Other opportunity is the establishment of commercial tree nurseries. Villagers will be sensitized to form working groups that can be facilitated and supported to raise tree seedlings. Seeds, polythene tubes, watering canes and knives will be purchased and distributed to the groups. Forest Management Agreements (JMA) or MoU to be prepared and signed between Forest and Beekeeping Division and individual villages will guide cost-benefit sharing ratio. Other potential source of income is Payment for Environmental Service for larger water users whom mechanism has not been clearly developed.

Other priority income generating activities include dairy cattle farming, black pepper farming, butterfly farming, fish farming, horticultural farming and spices farming. Training on these priority income generating activities will be conducted in all five villages by including ten members facilitated by three technical staff and one driver for three days in each aspect.

Training on construction of improved and efficient cooking stoves will be conducted by a team of 3 technical staff and one driver to 10 villagers in each of 5 Villages for three days. Training will be conducted to encourage use of pressed mud bricks. This will be promoted in all 5 Villages involving a team of 3 facilitators and one driver and 10 villagers from each village for three days. Procurement of 5 compressed machine one for each village will be

done to facilitate training on the use of improved pressed mud bricks.

4.8 Inter-sectoral linkages and co-operation

Inter-sectoral linkages and co-operation between DFR management and other related sectors and supporting organizations will be strengthened. The related sectors include agriculture, livestock, tourism, energy and minerals, land development, water, wildlife, environment, and supporting organization such as local government authorities, central government, NGOs (WWF, NDTL, CARE International, TFCG, and Frontier Tanzania), ANR, EUTCO, EAMCEF, CMEAMF, PBWO, Regional Catchments Forest Office, Longuza Forest Plantation and research institutions such as TAFORI, TAWIRI, ARI and NIMR.

Further research and other related issues such as Environmental Impact Assessment (EIA) and Socio-economic Impact Assessment (SIA) will be conducted when necessary. Annual work plans will be discussed with other related sectors and supporting organization for harmonization. Promotion of an integrated extension services for the management of Derema Forest Reserve and adjacent communities will be enhanced.

PART V

5.0 FINANCES, BUDGET, MONITORING AND REVISION

5.1Financial implications

DFR planned activities will be carried out in five year plan period (2010/11- 2014/2015). Estimated budget for the five years is Tanzanian shillings 679,086,000. Source of funds to support implementation of the planned activities will originate from the Government of Tanzania and other interested parties inside and outside the country, through the Ministry of Natural Resources and Tourism. Detailed budget is presented in Appendix 3 and Schedule of Activity in Appendix 4. Pie chart below presents areas of expenditure

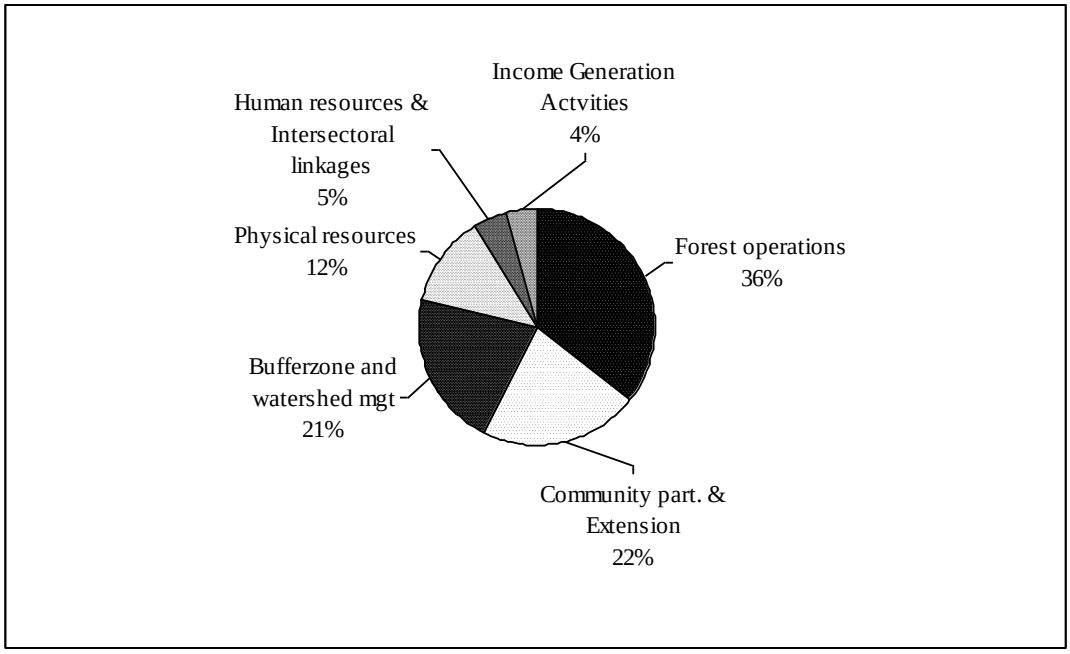

Figure 4: Budget distribution as per major planned activities

5.2 Annual Plan of Operation

Implementation of activities will be executed annually through developing an Annual Plan of Operation (APO) based on the Five years management plan (Appendix 5). The Activity schedule for 2010/11 -2014/15 (Appendix 4) will guide implementation of DFR activities.

5.3 Monitoring and evaluation

Monitoring and evaluation of activities under this management plan is presented in Appendix2. This will be done through field visits, progressive reports to be presented monthly, quarterly and annually. Field check ups on regeneration and boundary status; and adoption of income generation activities will closely be followed up. Management Effectiveness Tracking Tool (METT) will be annually employed as amongst the relevant tools for monitoring and evaluation. Final evaluation will be carried out towards the end of fifth year.

5.4 Constraints/Assumptions

The anticipated factors that may constrain implementation of DRF management plan are as follows:

- Willingness of the participating community and other stakeholders to effectively manage the forest.
- Improved capacity among stakeholders to manage the forest (financially, human and physical resource).
- Clear Policy on Cost and benefit sharing mechanisms need to be developed and put into actions in order to maintain the morale of the participating community
- Reliable markets for carbon trading

5.5 Planning period, amendments and revision

Derema Forest Reserve management plan is of five year period 2010/11- 2014/15; out of which an Annual Plan of Operation will be developed on yearly basis. Developed and evaluated monitoring indicators will dictate the needs for amendments of the plan. Revision of the plan will be done by year 2014/15.

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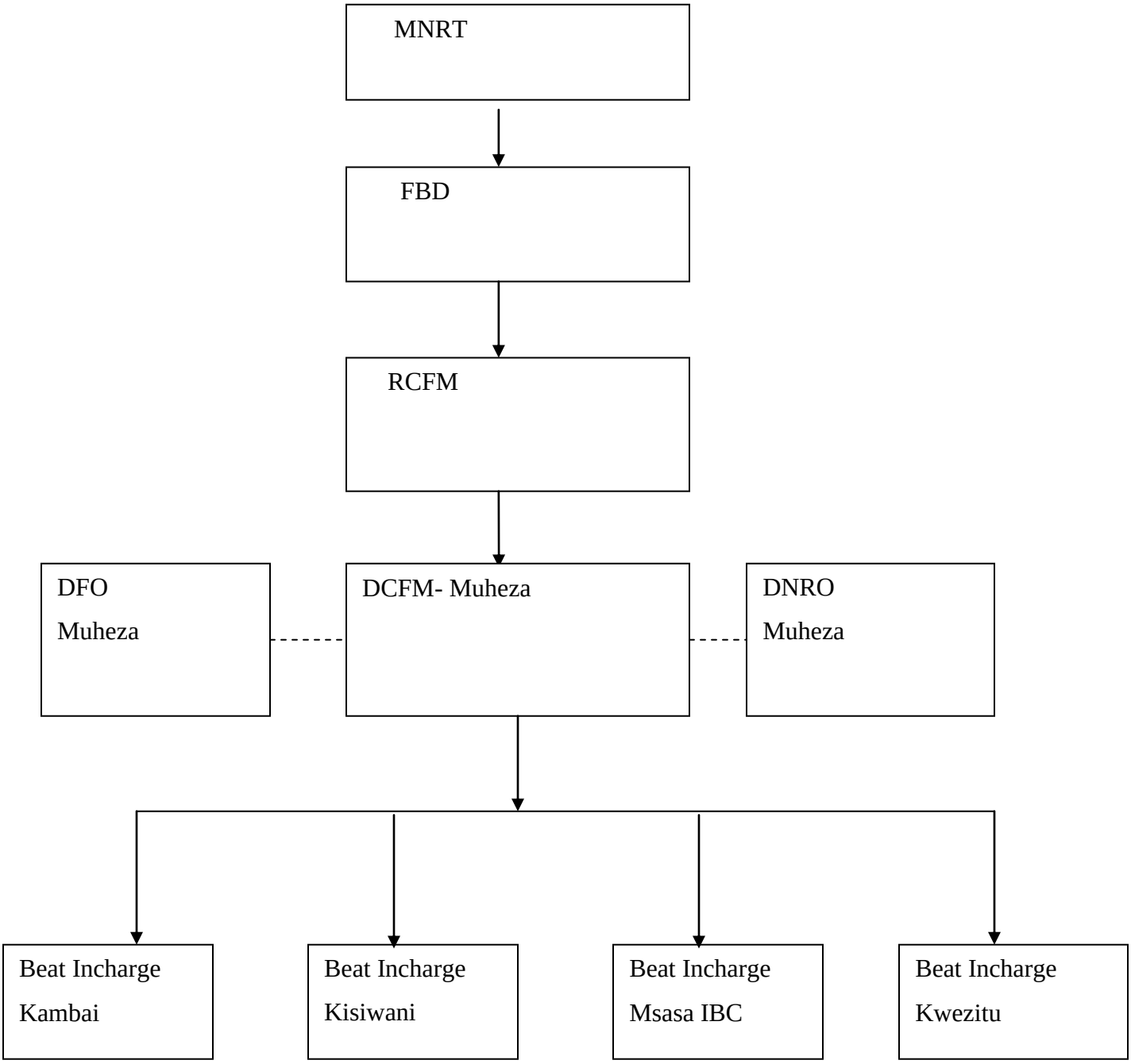
WWF 2007, Lessons learnt from the Eastern Arc Project Consultancy Report. THREAT Monitoring work relevant to the East Usambara Forest Landscape Restoration.pp 20

APPENDICES

Appendix 1: Organization chart for DFR



Appendix 2: Matrix for Monitoring and Evaluation for DFR 2010/11-2014/15

Activity code	Activity/Output	Indicator	Means of Verification	Risks and Assumption
5.1	Forest Management Operations			
5.1.1	Forest Resources assessment	Engage a consultant on biodiversity status of the forest for 25 days by 2010/11	Survey report, Checklist of flora and fauna	
			Thematic map	Conservation of high value spp
		Engage one consultant to conduct forest inventory by 2010/11	PFRA report	
			Village profile report	
			Resource map	
5.1.2	Harvesting Plan	Commission a consultant to develop harvesting plan by 2010/11	Consultancy Report	
5.1.4	Boundary Consolidation			
		Annual boundary maintenance of 27.2 km at a rate of 30 m/day per km	field report	
		Boundary tree planting of 27.2 km at a rate of 20 m/days per km. in two rows by 2011/12	Field report	
5.1.5	Forest Protection	Conduct 20 patrols per year by involving 6 villagers, 2 militiamen and 2 forest staff annually	Patrol report	

5.1.6	Forest restocking and Natural Regeneration			
5.1.6.1		Forest restocking by planting 192 ha of degraded area at 30 mdays per ha (about 1100s/ha) total 211200 seedlings by 2011/12	Tree planting ledger Reports Gap filing thematic map	Conducive weather condition prevails
5.1.6.2		Weeding planted area 192 ha by 2012/13	Reports	
5.1.7	Nursery			
5.1.7.1		Support establishment of 5 tree Nurseries to raise 350000 seedlings		
5.1.7.2		Purchase of 231200 seedlings for gap and boundary planting	Nursery register Store ledger	
5.2	Management of buffer zones and corridors			
5.2.1		Demarcate and survey 5 Village Forest Reserves by engaging 2 surveyors and 1 field staff for 15 days per forest	survey report	Villagers willingness to participate
5.2.2		Awareness raising to formulate and strengthen 10 members from each of the 5 VNRCs facilitated by a team 4 staff for 3 days	Field report	

5.2.3		Engage 4 staff to train 10 members from each of the 5 VNRCs on PFRA principles and techniques for 3 days per village	Training manual and Reports	
5.2.4		4 staff to facilitate 20 Villagers from Kwezitu and Kambai to carry out PFRA exercise for 6 days in each VLFRs	Reports	
5.3	Watershed management areas and soil conservation			
4.3.1		Enrichment planting of 100 ha of the forest by year 2012/13	Planting ledger	Conducive weather co prevailed and planting available
		Provide technical support in domestication of indigenous tree species.	Nursery register	
5.4	Physical resources			
5.4.1	Buildings			
5.4.1.1		One office building maintained by year 2010/11	Tender document Completion report	
5.4.1.2		Other buildings (7) maintained by year 2011/12		
5.4.3	Transport Facilities			
5.4.3.1		One Land cruiser station wagon and one Hard top purchased by year 2010/11	Store ledger	
5.4.3.2				
5.4.4.3		One Toyota Pick up and 4 motorcycles purchased by year 2010/11.	Store ledger	
5.4.4		Various field equipment, tools and uniforms purchased by year 2010/11	Store ledger	
5.4.4.1				
5.4.5	Roads and Tracks			

4.4.5.1		Roads of 20 km maintained annually.	Casual labour attendance register	
5.5	Human Resources			
5.5.1	Staff			
5.5.1.1		Recruitment of 3 certificates, two Diploma, 4 Bsc /Msc staff and one PhD/MSc.		
		Orientation of new staff		
5.5.2	Training			
5.5.2.1		2 Staff, one Diploma receive further training		
5.5.3	Enhancement of community participation (JFM)			
5.5.3.1		Formulation/approval of 17 VNRCs done by year 2010/11	Village minutes	
5.5.3.2		Training of 18 VNRCS done by year 2010/11	Training manual and Reports	
5.5.3.3		Formulation of Village by laws by year 2010/11	Signed bylaws availed	
5.6	Extension services and Socio-economic Studies			
5.6.1	Extension services			
5.6.1.1		Prepare and distribute publicity materials to 18 villages and 0ther stakeholders by on annual basis	Store ledger	
5.6.1.2		Interactive video shows carried out annually during the plan period.	Reports	
5.6.1.3		Conduct school children conservation programme in 16 Villages annually	Teaching materials	
5.6.1.4		Radio programme developed and aired annually.		

5.6.1.5		Develop a web site by year 2011/12		
5.6.1.6	Ecotourism			
		5 trails, one campsite, one picnic site renovated annually and one trail established by year 2010;/11	Field reports	
5.6.2	Socio-Economic studies			
5.6.2.1		Conduct PFRA in 18 villages by year 2010/11		
5.7	Initiative for Revenue generation and sharing.			
5.7.1		Engage a consultant to carry out study on existing and potential IGA for 60 days in 18 villages by year 2010/11	Reports on IGAs	
5.7.2		Engage consultant to develop tourism management plan by year2011/12		
5.7.9		To facilitate District legal person to develop MoU to be signed by respective stakeholders by the use of terms of reference		
5.8	Inter-sectoral linkages and co-operation		Signed MoU	
5.8,2		Consultative meetings to enhance cooperation carried out annually.	Minutes from the meetings	
5.8.3		Advisory board meeting carried out annually	Resolutions from the meetings.	

Appendix 3: Five years Workplan and budget for DFR 2010/11-2014/15

	ACTIVITY	Unit	Target	CPU	TOTAL					
CODE	**DESCRIPTION**	**measure**		**000'**	**000'**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**
5.1	**FOREST MANAGEMENT OPERATIONS**									
5.1.1	**Forest Resources Assessment**									
5.1.1.1	Engage a consultant biodiversity status of the forest for 25 days.	Consultant	1	20,000	20000	20000				
		Person days	20	65	1300	1300				
5.1.1.2	Engage one consultant to conduct forest inventory	Consultant	1	40,000	40000	40000				
		Perdiem	90	65	5850	5850				
5.1.2	**Harvesting Plan**									
5.1.2.1	Commission a consultant to develop harvesting plan	Consultant	1	20,000	20000	20000				
		Perdiem	30	65	1950	1950				
	Subtotal				**89100**	**89100**				
5.1.4	**Boundary consolidation**									
5.1.4.1	Annual boundary maintenance of 27.2 km at a rate of 30 m/day per km.	Cas. Labours	4080	3.8	15504	3100.8	3100.8	3100.8	3100.8	3100.8
		Perdiem	100	35	3500	700	700	700	700	700
		Fuel	1000	1.5	1500	300	300	300	300	300
5.1.4.2	Boundary tree planting of 27.2 km at a rate of 20 m/days per km. two rows at	Cas. Labours	816	3.8	3100.8		3100.8			
		Perdiem	20	35	700		700			
		Fuel	200	1.4	280		280			
	Subtotal				**24584.8**	**4100.8**	**8181.6**	**4100.8**	**4100.8**	**4100.8**

5.1.5	**Forest Protection**									
5.1.3.1	Conduct 20 patrols per year by involving 6 villagers, 2 militiamen and 2 forest staff.	Perdiem	200	35	7,000	1,400	1,400	1,400	1,400	1,400
		Fuel	15000	1.5	22,500	4,500	4,500	4,500	4,500	4,500
		Refreshments	100	3	300	60	60	60	60	60
	Subtotal				**29,800**	**5,960**	**5,960**	**5,960**	**5,960**	**5,960**
5.1.6	**Forest Restocking and Natural Regeneration**									
5.1.4.1	Forest restocking by planting 192 ha of degraded area at 30 mdays per ha (about 1100s/ha) total 211200 seedlings	Cas. Labours	5760	3.8	21,888		21,888			
		Perdiem	40	35	1,400		1,400			
		Fuel	100	1.5	150		150			
5.1.4.2	Weeding planted area 192 ha	C.L	192	3.8	730			730		
		Perdiem	40	35	1,400			1,400		
	Subtotal				**25,568**	**-**	**23,438**	**2,130**	**-**	**-**
5.1.7	**Nurseries**									
5.1.5.1	To support establishment of 5 tree Nurseries to raise 350000 seedlings	10 watering cane	10	10	100	100				
		5 wheel barrows	5	60	300	300				
		10 m sieve wire	10	4	40	40				
		Polythene tubes	500	6	3,000	3,000				

		10 spades	10	5	50	50				
5.1.5.2	Purchase of 231200 seedlings for gap and boundary planting	Seedlings	231200	0.5	115,600		115,600			
		Fuel	200	1.4	280		280			
	Subtotal				**119,370**	**3,490**	**115,880**	**-**	**-**	**-**
5.2	**Mangement of Buffer zones**									
5.2.1	Demarcate and survey 5 Village Forest Reserves by engaging 2 surveryors and 1 field staff for 15 days per forest	Perdiem	90	45	4,050				4,050	
		Fuel	200	1.5	300				300	
		Refreshments	200	4	800				800	
5.2.2	Awareness raising to formulate and strengthen 10 members from each of the 5 VNRCs facilitated by a team of 4 staff for 3 days	Perdiem	60	45	2,700		2,700			
		Fuel	200	1.5	300		300			
		Stationeries	1	300	300		300			
		Refreshments	150	3	450		450			
5.2.3	To engage 4 staff to train 10 members from each of the 5 VNRCs on PFRA principles and techniques for 3 days per village	Perdiem	60	35	2,100		2,100			
		Fuel	200	1.5	300		300			
		Stationeries	2	150	300		300			
		Refreshments	150	3	450		450			

5.2.4	4 staff to facilitate 20 Villagers from Kwezitu and Kambai to carry out PFRA exercise for 6 days in each VLFRs	Perdiem	48	35	1,680					1,680
		Fuel	200	1.5	300					300
		Refreshments	120	3	360					360
		Stationeries	2	50	100					100
	Subtotal				**14,490**	**-**	**6,900**	**-**	**5,150**	**2,440**
5.3	**Watershed Management**									
5.3.1	3 staff work with 4 villagers from each of 5 villages for 1 day per village to identify critical watershed areas vulnerable to erosion/landslides.	Perdiem	15	35	525		525			
		Fuel	150	1.5	225		225			
		Refreshment	20	3	60		60			
					-		-			
5.3.2	3staff to conduct on farm training to interest farmers for 3 days in each village to conserve critical watershed and vulnerable areas to erosion	Perdiem	45	35	1,575		1,575			
		Fuel	150	1.4	210		210			
	Subtotal				**2,595**	**-**	**2,595**	**-**	**-**	**-**
5.4	**Physical Resources**									
5.4.1	Construct one field staff house at Msasa IBC by engaging a contractor	Lumpsum	1	15000	15,000			15,000		
					-			-		

5.4.2	Engage a contractor to renovate 3 field staff houses at Kambai, Kwezitu & Kisiwani	Lumpsum	3	8	24			24		
					-		-			
5.4.3	Contract to renovate DCFM office at Muheza	Lumpsum	1	3000	3,000		3,000			
					-		-			
5.4.4	Procurement of DCFM Office furniture	Lumpsum	1	3000	3,000		3,000			
5.4.5.	Installation of landline telephone/fax	pc	1	2000	2,000		2,000			
5.4.6	Electrification of the office replaced cables	Lumpsum	1	500	500		500			
5.4.7	Purchase of Laptop computer	pc	1	3000	3,000		3,000			
5.4.8	Purchase of Desktop computer and accessories	Set	1	2000	2,000		2,000			
5.4.9	Purchase of Photocopier machine	pc	1	1500	1,500		1,500			
5.4.10	Purchase of 2 motorcycles	pc	2	5000	10,000		10,000			
5.4.11	Purchase of one Vehicle	pc	2	60000	120,000		120,000			
	Subtotal				**160,024**		**145,000**	**15,024**		
5.5	**Human Resources**									
5.5.1	**Staff**									
5.5.2	**Training**									
5.5.2.1	Train 3 staff on computer for two weeks at VETA Tanga	Perdiem	42	65	2,730		2,730			
		Tuition fees	3	400	1,200		1,200			

5.5.2.2	Two weeks training of 3 staff on communication skills at IRDP Dodoma	Perdiem	42	65	2,730		2,730			
		Tuition fees	3	400	1,200		1,200			
5.5.2.3	Train 3 staff on monitoring of biodiversity for two weeks at IRA Dar es salaam	Perdiem	42	65	2,730		2,730			
		Tuition fees	3	400	1,200		1,200			
5.5.2.4	Trainig of 3 staff on REDD concept and Carbon Stock Measurement	Perdiem	42	65	2,730		2,730			
		Tuition fees	3	400	1,200		1,200			
5.5.2.5	4 staff to train 5 local communities TOTs on soil and water conservation for 4 days in each of five villages	Perdiem	20	35	700		700			
		Fuel	150	1.5	225		225			
		Refreshments	25	3	75		75			
5.5.2.6	4 staff to facilitate 7 villagers to formulate bylaws in each of the five villages	Perdiem	20	35	700		700			
		Fuel	150	1.5	225		225			
		Refreshments	35	3	105		105			
		Stationeries	5	40	200		200			
5.5.2.7	4 staff to train 15 villagers on nursery establishment and trees planting practices for 3 days in each of the five villages	Perdiem	20	35	700		700			
		Fuel	150	1.5	225		225			
		Refreshments	75	3	225		225			

		Stationeries	5	40	200		200			
5.5.2.8	4 staff to train 10 villagers on modern beekeeping practices for 3 days in each of the five villages	Perdiem	20	35	700		700			
		Fuel	150	1.5	225		225			
		Refreshments	50	3	150		150			
		Stationeries	5	40	200		200			
5.5.2.9	4 staff to supervise one exchange visit to 6 villagers from each of five villages on REDD concept and Carbon Stock Measurements for 5 days at Mgambo village in Amani	Perdiem	20	35	700		700			
		Fuel	300	1.5	450		450			
		Allowances	30	15	450		450			
		Stationeries	1	200	200		200			
							-			
5.5.2.10	4 staff to supervise one exchange visit to 6 villagers from each of five villages on modern beekeeping practices for 5 days at Suwa village in Handeni District	Perdiem	20	45	900		900			
		Fuel	400	1.5	600		600			
		Allowances	30	25	750		750			
		Stationeries	1	200	200		200			
							-			
	Subtotal				**24,825**	**-**	**24,825**	**-**	**-**	**-**
5.5.3	**Enhancement of Community participation**									
5.5.3.1	4 staff to conduct PFRA exercise for the preparation, compilation and endorsement of	Perdiem	175	35	6,125		6,125			

	Joint Forests Management Agreements of DFR btn the 5 villages and the Director of FBD by involving 10 villagers for 7 days for each village	Fuel (30lt /trip)	1050	1.5	1,575		1,575			
		Refreshments	350	3	1,050		1,050			
		Stationeries	1	300	300		300			
							-			
							-			
5.5.3.2	Facilitating a one day meeting of 15 members of DFR Local Communities Conservation and Development Committee 4 times per year	Allowances	150	15	2,250			2,250		
		Refreshments	150	3	450			450		
		Stationeries	5	100	500			500		
		Venue	5	50	250			250		
									-	-
	Subtotal				**62,150**	**-**	**58,700**	**3,450**		
5.6	**Extension**									
5.6.1	6 staff to conduct two outdoors forestry extension meetings per year by two days in each of the 5 villages	Perdiem	300	35	10,500	2,100	2,100	2,100	2,100	2,100
		Fuel (50 trips)	2500	1.5	3,750	750	750	750	750	750
		Stationery	1	1000	1,000	200	200	200	200	200
						-	-	-	-	-
5.6.2	4 radio programmers to prepare 4 radio programmes per year for broadcasting DFR by 2 days in each of the 5 villages	Perdiem	160	35	5,600	1,120	1,120	1,120	1,120	1,120
		Fuel (40 trips)	200	1.5	300	60	60	60	60	60
		Stationery	1	500	500	100	100	100	100	100

						-	-	-	-	-
5.6.3	4 staff to conduct 10 home visits per year for two days to extend information on DFR in each of the 5 villages	Perdiem	400	35	14,000	2,800	2,800	2,800	2,800	2,800
		Fuel (100 trips)	5000	1.5	7,500	1,500	1,500	1,500	1,500	1,500
						-	-	-	-	-
5.6.4	Hiring two traditional ngoma troupes for two outdoors forestry extensions meetings per year in each of the five villages	Ngoma troupes	1000	30	30,000	6,000	6,000	6,000	6,000	6,000
		Perdiem	150	35	5,250	1,050	1,050	1,050	1,050	1,050
		Fuel (50 trips)	2500	1.5	3,750	750	750	750	750	750
5.6.5	Ordering 4000 DFR leaflets as an extension materials for five villages	Leaflets	4000	1	4,000		2,000		2,000	
		Fuel (5 Trips)	250	1.5	375		188		188	
5.6.6	Ordering 2000 DFR brochures as an extension materials for five villages	brochures	2000	2	4,000		2,000		2,000	
		Fuel (Trips)					-		-	
5.6.7	Ordering 1000 DFR Calendars as an extension materials for five villages	calendars	1000	2	2,000	400	400	400	400	400
5.6.8	Ordering 1000 DFR posters as an extension materials for five villages	posters	5000	1.5	1,500			750		750
5.6.9	Ordering 10 DFR sign boards as an extension materials for five villages	sign boards	10	300	3,000			3,000		
								-		
5.6.10	Ordering 200 DFR booklets as an extension materials for five villages	booklets	200	3	600			600		
								-		

5.6.11	4 staff to sensitize 7 school teachers located in two wards of Zirai and Kisiwani by two days on environmental conservation education and develop a programme	Perdiem	8	35	280			280		
		Fuel	150	1.5	225			225		
		Stationeries	1	40	40			40		
		Teachers	14	30	420			420		
5.6.12	4 staff to train 14 teachers as TOTs on school environmental conservation education programme by 3 days at Muheza	Perdiem	12	35	420			420		
		Allowances	42	50	2,100			2,100		
		Stationeries	1	50	50			50		
5.6.13	4 staff to train 5 Village Ecotourism Committees of 10 villagers on ecotourism issues by 2 days in each of the 5 villages	Perdiem	40	35	1,400			1,400		
		Fuel	200	1.5	300			300		
		Stationeries	1	200	200			200		
		Refreshments	100	3	300			300		
	Subtotal				**103,360**	**16,830**	**21,018**	**26,915**	**21,018**	**17,580**
5.7	**Initiatives for Revenue Generation and employment**							-		
5.7.1	Hold ecotourism forum meeting to 15 villagers twice a year by engaging 3 facilitators	Perdiem (staff)	40	45	1,800	360	360	360	360	360
		Perdiem (Villagers)	150	35	5,250	1,050	1,050	1,050	1,050	1,050
		Fuel (10 trips)	500	1.5	750	150	150	150	150	150
		Stationeries	10	50	500	100	100	100	100	100

5.7.1	4 staff to train 10 villagers on modern dairy cattle farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		
5.7.2	4 staff to train 10 villagers on modern black pepper farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		
5.7.3	4 staff to train 10 villagers on modern butterfly farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		
5.7.4	4 staff to train 10 villagers on modern fish farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		

5.7.5	4 staff to train 10 villagers on modern spices farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		
5.7.6	4 staff to train 10 villagers as TOTs on making and use of modern, improved and efficient cooking stoves for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		
5.7.7	4 staff to train 10 villagers as TOTs on making and use of modern and improved pressed mud bricks with litle cement for 3 days in each of the 5 villages	Perdiem	60	35	2,100			2,100		
		Fuel	200	1.5	300			300		
		Stationeries	1	300	300			300		
		Refreshments	150	3	450			450		
		Bags of cement	5	14	70			70		
5.7.8	Procurement of 5 mud bricks compressed machines from KAMECO at Korogwe	machines	5	700	3,500			3,500		
		transport	1	100	100			100		
								-		

5.7.9	Procurement of equipment for training of compressed mud brick making in all 5 villages	drums	5	50	250			250		
		spades	5	5	25			25		
		wheel barrows	5	100	500			500		
	Subtotal				**34,795**	**1,660**	**1,660**	**28,155**	**1,660**	**1,660**
5.8	**Intersectoral linkages**									
5.8.1	Facilitating a one day meeting of 15 members of DFR Advisory Board twice per year	Perdiem	150	45	6,750	1,350	1,350	1,350	1,350	1,350
		Fuel	3000	1.5	4,500	900	900	900	900	900
		Stationeries	2	500	1,000	200	200	200	200	200
		Refreshments	150	5	750	150	150	150	150	150
		Venue	5	50	250	50	50	50	50	50
	Subtotal				**13,250**	**2,650**	**2,650**	**2,650**	**2,650**	**2,650**
	GRAND TOTAL				**679,086**	**123,791**	**391,982**	**88,384**	**40,538**	**34,391**

Appendix 4:Five years activity schedule for DFR

ACTIVITY		Implementation period				
CODE	**DESCRIPTION**	2010/11	2011/12	2012/13	2013/14	2014/15
5.1	**FOREST MANAGEMENT OPERATIONS**					
5.1.1	Forest Resources Assessment					
5.1.2.1	Annual boundary maintenance of 27.2 km at a rate of 30 m/day per km.					
5.1.2.2	Boundary tree planting of 27.2 km at a rate of 20 m/days per km.					
5.1.3	Forest Protection					
5.1.4	Forest Restocking and Natural Regeneration					
5.1.4.2	Weeding planted area 192 ha					
5.1.5	Nurseries					
5.1.5.2	Purchase of 231200 seedlings for gap and boundary planting					
5.2	**Management of Buffer zones**					
5.2.1	Demarcate and survey 5 Village Forest Reserves					
5.2.2	Awareness raising to formulate and strengthen 5 VNRCs of 10 villagers facilitated by a team of 4 staff by 3 days in each of the 5 villages					
5.2.3	To engage 4 staff to train 5 VNRCs of 10 villagers on PFRA principles and techniques for 3 days per village					
5.2.4	4 staff to facilitate 20 Villagers from Kwezitu and Kambai to carry out PFRA exercise for 3 days in each VLFRs					
5.3	**Watershed Management**					
4.3.1	3 staff work with 4 villagers from each of 5 villages for 1 day					

	per village to identify critical watershed areas vulnerable to erosion/landslides.	
4.3.2	3staff to conduct on farm training to interest farmers for 3 days in each village to conserve critical watershed and vulnerable areas to erosion	
5.4	**Physical Resources**	
5.4.1	Construct one field staff house at Msasa IBC by engaging a contractor	
5.4.2	Engage a contractor to renovate 3 field staff houses at Kambai, Kwezitu & Kisiwani	
5.4.3	Contract to renovate DCFM office at Muheza	
5.4.4	Procurement of DCFM Office furniture	
5.4.5.	Installation of landline telephone/fax	
5.4.6	Electrification of the office replaced cables	
5.4.7	Purchase of Laptop computer	
5.4.8	Purchase of Desktop computer	
5.4.9	Purchase of Photocopier machine	
5.4.10	Purchase of 2 motorcycles	
5.4.11	Purchase of one Vehicle	
5.5	**Human Resources**	
5.5.1	Train 3 staff on computer for two weeks at VETA Tanga	
5.5.2	Two weeks training of 3 staff on communication skills at IRDP Dodoma	
5.5.3	Train 3 staff on monitoring of biodiversity for two weeks at IRA Dar es salaam	
5.5.4	Training of 3 staff on REDD concept and Carbon Stock Measurement	
5.5.5	4 staff to train 5 local communities TOTs on soil and water conservation for 4 days in each of five villages	

5.5.6	4 staff to facilitate 7 villagers to formulate bylaws in each of the five villages
5.5.7	4 staff to train 15 villagers on nursery establishment and trees planting practices for 3 days in each of the five villages
5.5.8	4 staff to train 10 villagers on modern beekeeping practices for 3 days in each of the five villages
5.5.9	4 staff to supervise one exchange visit to 6 villagers from each of five villages on REDD concept and Carbon Stock Measurements for 5 days at Mgambo village in Amani
5.5.10	4 staff to supervise one exchange visit to 6 villagers from each of five villages on modern beekeeping practices for 5 days at Suwa village in Handeni District
5.5.3	Enhancement of Community participation
5.5.12	Facilitating a one day meeting of 15 members of DFR Local Communities Conservation and Development Committee 4 times per year
5.6	**Extension**
5.6.5	Ordering 4000 DFR leaflets as an extension materials for five villages
5.6.7	Ordering 1000 DFR calendars as an extension materials for five villages
5.6.8	Ordering 1000 DFR posters as an extension materials for five villages
5.6.9	Ordering 10 DFR sign boards as an extension materials for five villages
5.6.10	Ordering 200 DFR booklets as an extension materials for five villages
5.6.11	4 staff to sensitize 7 school teachers located in two wards of Zirai and Kisiwani by two days on environmental conservation education and develop a programme
5.6.12	4 staff to train 14 teachers as TOTs on school environmental

	conservation education programme by 3 days at Muheza				
5.6.13	4 staff to train 5 Village Ecotourism Committees of 10 villagers on ecotourism issues by 2 days in each of the 5 villages				
5.7	**Initiatives for Revenue Generation and employment**				
5.7.1	Hold ecotourism forum meeting to 15 villagers twice a year by engaging 3 facilitators				
5.7.1	4 staff to train 10 villagers on modern dairy cattle farming practices for 3 days in each of the 5 villages				
5.7.2	4 staff to train 10 villagers on modern black pepper farming practices for 3 days in each of the 5 villages				
5.7.3	4 staff to train 10 villagers on modern butterfly farming practices for 3 days in each of the 5 villages				
5.7.4	4 staff to train 10 villagers on modern fish farming practices for 3 days in each of the 5 villages				
5.7.5	4 staff to train 10 villagers on modern spices farming practices for 3 days in each of the 5 villages				
5.7.6	4 staff to train 10 villagers as TOTs on making and use of modern, improved and efficient cooking stoves for 3 days in each of the 5 villages				
5.7.7	4 staff to train 10 villagers as TOTs on making and use of modern and improved pressed mud bricks with litle cement for 3 days in each of the 5 villages				
5.7.8	Procurement of 5 mud bricks compressed machines from KAMECO at Korogwe				
5.7.9	Procurement of equipment for training of compressed mud brick making in all 5 villages				
5.8	**Intersectoral linkages**				

Appendix 5: Annual Plan of Operation for DFR 2010/2011

		FINACIAL BUDGET				
	ACTIVITY	**Unit**	**Target**	**CPU**	**TOTAL**	
CODE	**DESCRIPTION**	**measure**		**000'**	**000'**	**2010/11**
5.1	**FOREST MANAGEMENT OPERATIONS**					
5.1.1	**Forest Resources Assessment**					
5.1.1.1	Engage a consultant biodiversity status of the forest for 25 days.	Consultant	1	20,000	20,000	20,000
		Person days	20	65	1,300	1,300
5.1.1.2	Engage one consultant to conduct forest inventory	Consultant	1	40,000	40,000	40,000
		Perdiem	90	65	5,850	5,850
5.1.2	Commission a consultant to develop harvesting plan	Consultant	1	20,000	20,000	20,000
		Perdiem	30	65	1,950	1,950
	Subtotal				**89,100**	**89,100**
5.1.2	**Boundary consolidation**					
5.1.2.1	Annual boundary maintenance of 27.2 km at a rate of 30 m/daya per km.	Cas. Labours	4080	3.8	15,504	3,101
		Perdiem	100	35	3,500	700
		Fuel	1000	1.5	1,500	300
5.1.2.2	Boundary tree planting of 27.2 km at a rate of 20 m/days per km. two rows at	Cas. Labours	816	3.8	3,101	
		Perdiem	20	35	700	
		Fuel	200	1.4	280	
	Subtotal				**24,585**	**4,101**
5.1.3	**Forest Protection**					
5.1.3.1	Conduct 20 patrols per year by involving 6 villagers, 2 militiamen and 2 forest staff.	Perdiem	200	35	7,000	1,400
		Fuel	15000	1.5	22,500	4,500

		Refreshments	100	3	300	60
	Subtotal				**29,800**	**5,960**
5.1.4	**Forest Restocking and Natural Regeneration**					
5.1.4.1	Forest restocking by planting 192 ha of degraded area at 30 mdays per ha (about 1100s/ha) total 211200 seedlings	Cas. Labours	5760	3.8	21,888	
		Perdiem	40	35	1,400	
		Fuel	100	1.5	150	
5.1.4.2	Weeding planted area 192 ha	C.L	192	3.8	730	
		Perdiem	40	35	1,400	
	Subtotal				**25,568**	**-**
5.1.5	**Nurseries**					
5.1.5.1	To support establishment of 5 tree Nurseries to raise 350000 seedlings	10 watering cane	10	10	100	100
		5 wheel barrows	5	60	300	300
		10 m sieve wire	10	4	40	40
		Polythene tubes	500	6	3,000	3,000
		10 spades	10	5	50	50
5.1.5.2	Purchase of 231200 seedlings for gap and boundary planting	Seedlings	231200	0.5	115,600	
		Fuel	200	1.5	300	
	Subtotal				**119,390**	**3,490**
5.2	**Management of Buffer zones**					
5.2.1	Demarcate and survey 5 Village Forest Reserves by engaging 2 surveryors and 1 field staff for 15 days per forest	Perdiem	90	45	4,050	
		Fuel	200	1.5	300	
		C.L	200	3.8	760	

5.2.2	Awareness raising to formulate and strengthen 5 VNRCs of 10 villagers facilitated by a team of 4 staff by 3 days in each of the 5 villages	Perdiem	60	45	2,700	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
5.2.3	To engage 4 staff to train 5 VNRCs of 10 villagers on PFRA principles and techniques for 3 days per village	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	2	150	300	
		Refreshments	150	3	450	
5.2.4	4 staff to facilitate 20 Villagers from Kwezitu and Kambai to carry out PFRA exercise for 3 days in each VLFRs	Perdiem	48	35	1,680	
		Fuel	200	1.5	300	
		Refreshments	120	3	360	
		Stationeries	2	50	100	
5.2.5	Rehabilitation of Forest Corridors					
	Subtotal				**14,450**	**-**
5.3	**Watershed Mangement**					
5.3.1	3 staff work with 4 villagers from each of 5 villages for 1 day per village to identify critical watershed areas vulnerable to erosion/landslides.	Perdiem	15	35	525	
		Fuel	150	1.5	225	
		Refreshment	20	3	60	
					-	
5.3.2	3staff to conduct on farm training to interest farmers for 3 days in each village to conserve critical watershed and vunerable areas to erosion	Perdiem	45	35	1,575	
		Fuel	150	1.4	210	

	Subtotal				**2,595**	**-**
5.4	**Physical Resources**					
5.4.1	Construct one field staff house at Msasa IBC by engaging a contractor	Lumpsum	1	15000	15,000	
					-	
5.4.2	Engage a contractor to renovate 3 field staff houses at Kambai, Kwezitu & Kisiwani	Lumpsum	3	8	24	
					-	
5.4.3	Contract to renovate DCFM office at Muheza	Lumpsum	1	3000	3,000	
					-	
5.4.4	Procurement of DCFM Office furniture	set	1	3000	3,000	
5.4.5.	Installationof landline telephone/fax	pc	1	2000	2,000	
5.4.6	Electrification of the office and replace cables	Lumpsum	1	500	500	
5.4.7	Purchase of Laptop computer	pc	1	3000	3,000	
5.4.8	Purchase of Desktop computer and accessories	Set	1	2000	2,000	
5.4.9	Purchase of Photocopier machine	pc	1	1500	1,500	
5.4.10	Purchase of 2 motorcycles	pc	2	5000	10,000	
5.4.11	Purchase of one Vehicle	pc	2	60000	120,000	
	Subtotal				**160,024**	**-**
5.5	**Human Resources**					
5.5.1	**Staff**	0		**0**	-	
5.5.2	**Training**					
5.5.2.1	Train 3 staff on computer for two weeks at VETA Tanga	Perdiem	42	65	2,730	
		Tuition fees	3	400	1,200	
5.5.2.2	Two weeks training of 3 staff on communication skills at IRDP Dodoma	Perdiem	42	65	2,730	

		Tuition fees	3	400	1,200	
5.5.2.3	Train 3 staff on monitoring of biodiversity for two weeks at IRA Dar es salaam	Perdiem	42	65	2,730	
		Tuition fees	3	400	1,200	
5.5.2.4	Trainig of 3 staff on REDD concept and Carbon Stock Measurement	Perdiem	42	65	2,730	
		Tuition fees	3	400	1,200	
5.5.3.5	4 staff to train 5 local communities TOTs on soil and water conservation for 4 days in each of five villages	Perdiem	20	35	700	
		Fuel	150	1.5	225	
		Refreshments	25	3	75	
5.5.4.6	4 staff to facilitate 7 villagers to formulate bylaws in each of the five villages	Perdiem	20	35	700	
		Fuel	150	1.5	225	
		Refreshments	35	3	105	
		Stationeries	5	40	200	
5.5.5.7	4 staff to train 15 villagers on nursery establishment and trees planting practices for 3 days in each of the five villages	Perdiem	20	35	700	
		Fuel	150	1.5	225	
		Refreshments	75	3	225	
		Stationeries	5	40	200	
5.5.2.8	4 staff to train 10 villagers on modern beekeeping practices for 3 days in each of the five villages	Perdiem	20	35	700	
		Fuel	150	1.5	225	
		Refreshments	50	3	150	
		Stationeries	5	40	200	

5.5.2.9	4 staff to supervise one exchange visit to 6 villagers from each of five villages on REDD concept and Carbon Stock Measurements for 5 days at Mgambo village in Amani	Perdiem	20	35	700	
		Fuel	300	1.5	450	
		Allowances	30	15	450	
		Stationeries	1	200	200	
5.5.2.10	4 staff to supervise one exchange visit to 6 villagers from each of five villages on modern beekeeping practices for 5 days at Suwa village in Handeni District	Perdiem	20	45	900	
		Fuel	400	1.5	600	
		Allowances	30	25	750	
		Stationeries	1	200	200	
	Subtotal				**24,825**	**-**
5.5.3	**Enhancement of Community participation**					
5.5.3.1	4 staff to conduct PFRA exrcise for the preparation, compilation and endorsement of Joint Forests Management Agreements of DFR btn the 5 villages and the Director of FBD by involving 10 villagers for 7 days for each village	Perdiem	175	35	6,125	
		Fuel (30lt /trip)	1050	1.5	1,575	
		Refreshments	350	3	1,050	
		Stationeries	1	300	300	
5.5.3.2	Facilitating a one day meeting of 15 members of DFR Local Communities Conservation and Development Committee 4 times per year	Allowances	150	15	2,250	
		Refreshments	150	3	450	
		Stationeries	5	100	500	
		Venue	5	50	250	
	Subtotal				**62,150**	**-**

5.6	**Extension**					
5.6.1	6 staff to conduct two outdoors forestry extension meetings per year by two days in each of the 5 villages	Perdiem	300	35	10,500	2,100
		Fuel (50 trips)	2500	1.5	3,750	750
		Stationery	1	1000	1,000	200
						-
5.6.2	4 radio programmers to prepare 4 radio programmes per year for broadcasting DFR by 2 days in each of the 5 villages	Perdiem	160	35	5,600	1,120
		Fuel (40 trips)	200	1.5	300	60
		Stationery	1	500	500	100
						-
5.6.3	4 staff to conduct 10 home visits per year for two days to extend information on DFR in each of the 5 villages	Perdiem	400	35	14,000	2,800
		Fuel (100 trips)	5000	1.5	7,500	1,500
						-
5.6.4	Hiring two traditional ngoma troupes for two outdoors forestry extensions meetings per year in each of the five villages	Ngoma troupes	1000	30	30,000	6,000
		Perdiem	150	35	5,250	1,050
		Fuel (50 trips)	2500	1.5	3,750	750
5.6.5	Ordering 4000 DFR leaflets as an extension materials for five villages	Leaflets	4000	1	4,000	
		Fuel (5 Trips)	250	1.5	375	
5.6.6	Ordering 2000 DFR brochures as an extension materials for five villages	brochures	2000	2	4,000	
		Fuel (Trips)				
5.6.7	Ordering 1000 DFR calenders as an extension materials for five villages	calenders	1000	2	2,000	400

5.6.8	Ordering 1000 DFR posters as an extension materials for five villages	posters	5000	1.5	1,500	
5.6.9	Ordering 10 DFR sign boards as an extension materials for five villages	sign boards	10	300	3,000	
5.6.10	Ordering 200 DFR booklets as an extension materials for five villages	booklets	200	3	600	
5.6.11	4 staff to sensitize 7 school teachers located in two wards of Zirai and Kisiwani by two days on environmental conservation education and develop a programme	Perdiem	8	35	280	
		Fuel	150	1.5	225	
		Stationeris	1	40	40	
		Teachers	14	30	420	
5.6.12	4 staff to train 14 teachers as TOTs on school environmental conservation education programme by 3 days at Muheza	Perdiem	12	35	420	
		Allowances	42	50	2,100	
		Stationeries	1	50	50	
5.6.13	4 staff to train 5 Village Ecotourism Committees of 10 villagers on ecotourism issues by 2 days in each of the 5 villages	Perdiem	40	35	1,400	
		Fuel	200	1.5	300	
		Stationeries	1	200	200	
		Refreshments	100	3	300	
	Subtotal				**103,360**	**16,830**
5.7	**Initiatives for Revenue Generation and employment**					
5.7.1	Hold ecotourism forum meeting to 15 villagers twice a year by engaging 3 facilitators	Perdiem (staff)	40	45	1,800	360
		Perdiem (Villagers)	150	35	5,250	1,050
		Fuel (10 trips)	500	1.5	750	150
		Stationeries	10	50	500	100

5.7.1	4 staff to train 10 villagers on modern dairy cattle farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
5.7.2	4 staff to train 10 villagers on modern black pepper farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
5.7.3	4 staff to train 10 villagers on modern butterfly farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
5.7.4	4 staff to train 10 villagers on modern fish farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
5.7.5	4 staff to train 10 villagers on modern spices farming practices for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	

5.7.6	4 staff to train 10 villagers as TOTs on making and use of modern, improved and efficient cooking stoves for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
5.7.7	4 staff to train 10 villagers as TOTs on making and use of modern and improved pressed mud bricks with litle cement for 3 days in each of the 5 villages	Perdiem	60	35	2,100	
		Fuel	200	1.5	300	
		Stationeries	1	300	300	
		Refreshments	150	3	450	
		Bags of cement	5	14	70	
5.7.8	Procurement of 5 mud bricks compressed machines from KAMECO at Korogwe	machines	5	700	3,500	
		transport	1	100	100	
5.7.9	Procurement of equipment for training of compressed mud brick making in all 5 villages	drums	5	50	250	
		spades	5	5	25	
		wheel barrows	5	100	500	
	Subtotal				**34,795**	**1,660**
5.8	**Intersectoral linkages**					
5.8.1	Facilitating a one day meeting of 15 members of DFR Advisory Board twice per year	Perdiem	150	45	6,750	1,350
		Fuel	3000	1.5	4,500	900
		Stationeries	2	500	1,000	200
		Refreshments	150	5	750	150
		Venue	5	50	250	50
	Subtotal				**13,250**	**2,650**
	GRAND TOTAL				**679,066**	**123,791**

Appendix 6: Summary of identified mammals in DFR

Family name	Common name	Species name	Ecol. type	Endem status	IUCN Status
Galagonidae	Bush baby	*Galago zanzibaricus*	f	W	NT
	Small-eared galago	*Otolemur garnetti*	f	W	
Colobidae	Angola pied colobus	*Colobus angolensis*	F	W	
Herpestidae	Slender mangoose	*Herpestes sanguineus*	f	W	
Cercopithecidae	Yellow baboon	*Papio cynocephalus*	f	W	
	Vervet monkey	*Cercopithecus aethiops*	f	W	
	Blue monkey	*Cercopithecus mitis*	f	W	
Macroscelididae	Zanj elephant shrew	*Rhynchocyon petersi*	F	N	EN
Thryonomyidae	Cane rat	*Thryonomys swinderianus*			
	Giant rat	*Paraxerus ochraceus*			
	Soft-furred rat	*Praomys* sp.			
	Spiny mice	*Acomys* sp.			
	Woodland mice	*Hylomyscus denniae*	F	W	
	Common mice	*Rattus rattus*	O	W	
Cricetidae	Lesser pouched rat	*Beamys hindei*	f	N	V
	Flying squirrel	*Anomalurus fraseri*	F		
Bovidae	Ader's duiker	*Cephalophus adersi*			
	Black-fronted duiker	*Cephalophus nigrifrons*			
	Blue duiker	*Cephalophus monticola*	F	W	
Suidae	Bush pig	*Potamochoerus larvatus*	f	W	
	Giant forest hog	*Hylochoerus meinertzhageni*	F	W	
	Porcupine	*Hystrix galeata*			
	Warthog	*Phacochoerus aethiopicus*			
Procaviidae	Eastern tree hyrax	*Dendrohyrax validus*	f	W	V
	Rock hyrax	*Heterohyrax brucei*			
Viverridae	Neumann's genet	*Genetta genetta*			
Pteropodidae	Fruit bat	*Lissonycteris angolensis*	F	W	
	Fruit bat	*Epomorphorus* spp.	F	W	
Vespertilionidae	Yellow-bellied bat	*Scotophilus nucella*	f	W	

Appendix 7:Summary of identified birds in DFR

Family name	Common name	Scientific name	Ecol type	End. statu	IUCN status
Accipitiridae	Southern banded snake-eagle	*Circaetus fasciolatus*	F	E	NT
Accipitridae	Tawny eagle	*Aquila rapax*	O	W	Lc
Accipitiridae	Long-crested eagle	*Lophaetus occipitalis*	f	W	Lc
Accipitiridae	Augur buzzard	*Buteo augur*	O	W	Lc
Coliidae	Speckled mousebird	*Colius striatus*	O	W	
Columbidae	Red-eyed dove	*Streptopelia semitorquata*	O	W	
Corvidae	Pied crow	*Corvus albus*	O	W	
Corvidae	White-naped raven	*Corvus albicollis*	O	W	
Cuculidae	White-browed coucal	*Centropus superciliosus*	O	W	
Dicruridae	Square-tailed drongo	*Dicrurus adsimilis*	f	W	
Estrildidae	Common waxbill	*Estrilda astrild*	O	W	
Muscicapidae	White-chested alethe	*Alethe fuellerborni*			Un
Muscicapidae	Spot-throat	*Modulatrix stictigula*			Lc
Muscicapidae	Dappled mountain robin	*Modulatrix orostruthus*			V
Musophagidae	Fischer's turaco	*Tauraco fischeri*	f	W	NT
Nectariniidae	Banded green sunbird	*Anthreptes rubritorques*	F	N	V
Nectariniidae	Olive sunbird	*Nectarinia olivacea*	f	W	
Nectariniidae	Amani sunbird	*Hedydipna pallidigaster*		E	EN
Nectariniidae	Uluguru violet-backed sunbird	*Anthreptes neglectus*			Lc
Nectariniidae	Collared sunbird	*Anthreptes collaris*	f	W	
Nectariniidae	Banded green sunbird	*Anthreptes reichenowi*	F	W	NT
Nectariniidae	Scarlet-chested sunbird	*Nectarinia senegalensis*	f	W	
Nectariniidae	Variable sunbird	*Nectarinia venusta*	f	W	
Sylviidae	Long-billed tailorbird	*Orthotomus moreaui*		E	CE
Turdidae	Usambara thrush	*Turdus (olivaceus) roehli*			V
Oriolidae	African golden oriole	*Oriolus auratus*	f	W	

Ploceidae	Usambara Mountain weaver	*Ploceus nicolli*			EN
Ploceidae	Dark-backed weaver	*Ploceus bicolor*	f	W	
Strigidae	Usambara eagle-owl	*Bubo vosseleri*	F	E	V
Strigidae	Sokoke scops owl	*Otus ireneae*	F	N	EN
Sturnidae	Red-winged starling	*Onychognathus morio*	O	W	
Sturnidae	Black-bellied starling	*Lamprotornis corruscus*	f	W	
Sturnidae	Black-bellied starling	*Lamprotornis corruscus*	f	W	
Sylviidae	Usambara hyliota	*Hyliota usambarae*		E	EN
Sylviidae	Red-capped forest warbler	*Orthotomus metopias*			Lc
Timaliidae	Pale-breasted illadopsis	*Illadopsis rufipennis*	F	W	Un
Turdidae	Red-tailed ant-thrush	*Neocossyphus rufus*			Lc
Turdidae	Sharpe's akalat	*Sheppardia sharpie*			Un
Turdidae	East coast akalat	*Sheppardia gunningi*	F	N	V
Turdidae	Swynnerton's Robin	*Swynnertonia swynnertoni*	F	N	NT
Picidae	Mombasa woodpecker	*Campethera mombassica*	f	W	Un

Appendix 8: Summary of identified reptiles in DFR

Family nam	Common name	Scientific name	Ecol type	End. status	IUCN status
Chamaeleo-nidae	Two horn chameleon	*Bradypodion fischeri fischeri*	F	N	V
	Three horn chameleon	*Chamaeleo deremensis*	F	N	EN
	One horn chameleon	*Bradypodion tenue*	F	N	V
	Flap chameleon	*Chamaeleo dilepsis*	f	W	
	Pygmy chameleon	*Rhampholeon temporalis*	F	N	V
	Two horn chameleon	*Bradypodion matschiei*			
	Soft horn chameleon	*Bradypodion spinosum*	F	E	EN
	Giant chameleon	*Chamaeleo melleri*			
Gekkonidae	Tropical house gecko	*Hemidactylus mabouia*	f	W	

	Tropical house gecko	*Lygodactylus kimhowelli*	F	N	EN
Agamidae	Montane rock agama	*Agama montana*	F	N	V
Scincidae	Long-tailed limbless skink	*Melanoseps longicauda*	f	N	DD
	Boulenger's skink	*Mabuya boulengeri*	O	W	
	Speckle-lipped skink	*Mabuya maculilabris*	f	W	V
	Savanna snake-eyed skink	*Panaspis wahlbergii*	O	W	
Cordylidae	E.A. spiny-tailed lizard	*Cordylus tropidosternum*	f	W	
Leptotyph-lopidae	Peter's black worm snake	*Leptotyphlops scutifrons*	f	W	Lc
	Worm-snake	*Leptotyphlops macrops*	F	N	
	Meker's worm-snake	*Leptotyphlops scutifrons merke*	f	W	Lc
Viperidae	Usambara Gabon viper	*Bitis gabonica*	F	W	
	Horned adder	*Bitis caudalis*			
	Puff adder	*Bitis arietans arietans*	O	W	
	Bibron's burrowing adder	*Atractaspis bibronii*			
Elapidae	Half-banded garter snake	*Elapsoidea semiannulata*			
	Günter's garter snake	*Elapsoidea guentheri*			
	Sundevall's garter snake	*Elapsoidea sundevallii*			
	Forest cobra	*Naja melanoleuca*	f	W	
	Mozambique spitting cobr	*Naja mossambica*			
Colubridae	Savanna vipe snake	*Thelotornis capensis mossambi*	f	W	
	Herald snake	*Crotaphopeltis tornieri*	F	W	V
	Brown house snake	*Lamprophis capensis*	f	W	
	Common house snake	*Boaedon fuliginosus*			
	Eastern green snake	*Philothamnus punctatus*	f	W	
	Usambara centipede-eater	*Aparallactus werneri*	F	N	V
Pythonidae	African python	*Python sebae*	F		

Appendix 9: Summary of identified amphibians in DFR

Family name	Scientific name	Ecologica type	Endemic status	IUCN statu
Bufonidae	*Bufo brownie*	F	N	V
	Bufo gutturalis	f	W	
	Mertensophryne micranotis	F	N	EN
Arthroleptidae	*Arthroleptis stenodactylus*	f	W	
	Arthroleptis xenodactyloides	f	W	
Hyperoliidae	*Hyperolius argus*	f	W	
	Hyperolius mitchelli	F	W	
	Leptopelis vermiculatus	F	N	NT
	Leptopelis uluguruensis	F	N	V
	Leptopelis flavomaculatus	F	W	
	Leptopelis barbouri	F	N	V
Microhylidae	*Hoplophryne rogersi*	F	E	V
Ranidae	*Arthroleptides martiensseni*	F	N	V
Caeciliidae	*Boulengerula boulengeri*	F	E	V
Hemicidae	*Hemisus marmoratus* sp. *marmoratus*	f	W	

Appendix 10: Summary of identified butterflies in DFR

Species family name	Species scientific name	Species host plant	Ecologica type	Endemi status
Acraeidae	*Acraea engina*			W
	Acraea satis			W
	Acraea aganice			W
Nymphalidae	*Amauris albimaculata*	*Tylophora, Dregea, Cynanchum* spp	f	W

	Amauris niavius	*Tylophora, Dregea, Secamone, Cynanchu* spp	f	W
	Amauris ochlea	*Tylophora, Dregea, Cynanchum* spp	f	W
Arctiidae	Forest moth	*Brucea* spp.	F	W
	Tiger moth	*Clotalaria* spp.	f	W
Nymphalidae	*Aterica galene*		F	W
Pieridae	*Belenois thysa*		f	W
	Catopsilia florella	*Senna* spp.	O	W
Papilionidae	*Catuna sikorana*			W
Nymphalidae	*Charaxes acuminatus*	*Allophylus* spp.	F	W
	Charaxes brutus	*Allophylus* spp.	f	W
	Charaxes candiope	*Eucalyptus*, *Aloe* spp.	f	W
	Charaxes cithaeron	*Allophylus* spp.	f	W
	Charaxes contralius	*Allophylus* spp.	f	N
	Charaxes etecipe	*Allophylus* spp.	F	W
	Charaxes lasti	*Allophylus* spp.	F	N
	Charaxes macclounii	*Allophylus* spp.	f	W
	Charaxes pollox	*Allophylus* spp.	F	W
	Charaxes protoclea	*Allophylus* spp.	F	W
	Charaxes usambarae	*Allophylus* spp.	F	E
	Charaxes varanes	*Allophylus* spp.	f	W
	Charaxes violetta	*Allophylus* spp.	f	W
	Charaxes xiphares	*Allophylus* spp.	F	W
	Cymothoe amaniensis		F	E
Hesperidae	*Astictopterus tura*		f	N
	Coeliades chalybe		f	W
Nymphalidae	*Cymothoe amaniensis*		F	W

Danaidae	*Danaus chrysippus*	*Calotropis procera*	f	W
Nymphalidae	*Tirumala petiverana*	*Dregea, Tylophora* spp.	f	W
	Euphaedra neophron	*Blighia unijugata, Deinbollia* sp.	f	W
	Euphaedra orientalis	*Phoenix* spp.	f	W
	Euxanthe tiberius	*Deinbollia* spp.	F	W
	Euxanthe wakefieldi	*Deinbollia* spp.	f	W
Papilionidae	*Graphium angolanus*	*Uvaria, Annona* spp.	O	W
	Graphium leonides	*Uvaria, Annona* spp.		W
	Graphium policenes	*Uvaria, Annona* spp.	O	W
Nymphalidae	*Hypolimnas daedalus*	*Urera sansibarica, Urera trinervis*		W
	Hypolimnas antevorta	*Urera sansibarica, Urera trinervis*	F	E
	Hypolimnas anthedon	*Laportea, Urera trinervis*	f	W
	Hypolimnas deceptor	*Laportea, Urtica* spp.	f	W
	Hypolimnas misippus	*Justica, Asystasia* spp.	f	W
	Hypolimnas usambara	*Urera sansibarica*	f	E
	Junonia oenone		O	W
	Junonia terea			W
	Junonia natalica		f	W
	Junonia heirta cebrene		f	W
Papilionidae	*Papilio constantinus*	*Toddalia, Vepris, Citrus* spp.	f	W
	Papilio dardanus	*Toddalia, Vepris, Clausina, Citrus* spp.	f	W
	Papilio demodocus	*Toddalia, Vepris, Citrus* spp.	f	W
	Papilio desmondi	*Toddalia, Vepris, Citrus* spp.	f	W
	Papilio echeriodes	*Toddalia, Vepris, Citrus* spp.	F	W
	Papilio hornimani	*Vepris, Zanthoxylum, Citrus* spp.	f	W
	Papilio nireus	*Toddalia, Vepris, Citrus* spp.		W
	Papilio ophidicephalus	*Vepris, Citrus, Zanthoxylum* spp.	f	W

	Papilio pelodurus	*Cryptocarya liebertiana*	f	W
	Papilio phorcas	*Vepris, Zanthoxylum* spp.	F	W
Nymphalidae	*Précis octavia*	*Calliandra, Delonyx*, and *Senna* spp.	f	W
	Pseudacraea boisduvali	*Mimusops, Chrysophyllum* spp.	f	W
	Pseudacraea lucretia	*Mimusops, Chrysophyllum* spp	F	W
	Salamis anacardii	*Asystasia* sp.	f	W
	Salamis cacta	*Asystasia* sp.		W
	Salamis parhassus	*Asystasia, Justica* spp.	f	W
Lycaenidae	*Euthecta* sp.	*Calliandra, Delonyx*, and *Senna* spp.	f	E