

**EAST USAMBARA FOREST LANDSCAPE RESTORATION PROJECT**



**FINAL REPORT**  
**COMMUNITY-BASED FIRE MANAGEMENT PLAN AND**  
**BY-LAWS IN THE EAST USAMBARAS**



**A Consultancy Report Submitted to WWF Tanzania Programme Office**

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## **Executive Summary**

The forests of the East Usambaras have suffered a considerable loss in the past because of human activities despite of its exceptional importance for biodiversity catchments and livelihoods. The World Wide Fund for Nature – Tanzania Programme Office (WWF-TPO) in collaboration with Tanzania Forest Conservation Group (TFCG) have initiated a partnership project known as East Usambara Forest Landscape Restoration Project (EUFLRP) whose aim is to prevent the loss of the globally important biodiversity values of these forests; enhance connectivity between remaining forest blocks, improve the livelihood of local people and restore and maintain the multiple functions of the forests in the East Usambara Mountains. The project commissioned this study to review some experiences / lessons learnt from various projects within Tanzania, region and world wide on forest fire issues and develop / design community-based fire management programme including by-laws for the project target villages in Lowland - East Usambaras.

The main objective was to design and develop practical and field based community-based forest/bush fires management plan and by-laws for the targeted area, that will govern and spell out roles and responsibilities of each key player (Village Government, Environmental Committee (VEC), District Council, Regional Authority, Forest and Beekeeping Division (FBD) and other relevant stakeholders in combating fire incidences in the landscape.. This assignment involved also designing an implementation/action plan for the community based fire management, mode of operation, fire by-laws, rules and regulations regarding the use of fires in the target villages as a tool for their day-to-day environment and economic ventures.

The study was conducted in ten villages where the project operates namely Boshia, Kizerui, Kuze-Kibago, Segoma, Kambai, Mgambo, Misalai, Kiwanda, Kwetango, and Zirai in Muheza District, Tanga region. The study involved review of documents, fieldwork and data analysis. Fieldwork involved site

visits, interviews, focused group discussions, and interviews with key informants.

### **Forest and Bush Fires in the East Usambaras**

Findings have shown that bush and / forest fires have been everlasting problem in the East Usambara landscape for long time. Generally bush fires are the most common and widespread in the lowlands especially during the dry season (July to November) when people are clearing the land for cultivation. Fire has been and is still used because is one of the least expensive methods to clear and prepare land for agriculture and other land uses in the area. It started long time ago (before 1930) during shifting cultivation and the system has been maintained until now where people have established permanent settlements. This has become their tradition attributed to poverty, inadequate knowledge, skills and awareness on the appropriate agronomic practices and sustainable environmental management.

Despite the fact that, comparatively, there has been less forest fire incidences than bush fires in the area; several cases of uncontrolled fires have been reported resulting into destruction of forests, farmlands, crops, livestock, houses and other properties. In Segoma village for example uncontrolled fire, which occurred in 2005, destroyed two houses and about 8 hectares of farms out of which 2 hectares were planted with coconuts and cassava. It also killed 2 cows and 3 goats. Five hectares also planted with coconut, cassava, oranges and teak were also destroyed with fire in 2004 at Kiwanda village. Portion of the village forest reserve of Kizerui and Kambai was destroyed by fire during the dry seasons in 2004 and 2005. In 2006 about 6 hectares of farm land was destroyed by fire in Segoma, 9 hectares in Kwatango, 6 hectares in Kambai, 8 hectares in Bosha and 7 hectares Kiwanda.

Forest fires in East Usambaras are also caused by illegal timber dealers, hunters, by people clearing land for cultivation, by children playing with fire, and cigarettes. Others causes are people smoking out beehives during honey harvesting, making charcoal and cooking.

The situations in East Usambaras can be considered as failures in forest and bush fire management and are generally symptomatic of the breakdown of local control over natural resources. Normally there is an Environmental Committee in every village of which including others is responsible for fire management in the area. On the contrary little has been done in regard to fire management and control. The committees have completely failed to undertake their responsibilities of supervision and monitoring of fire management activities in the area. This was also revealed during focused group discussions when the majority of participants failed to tell whether they were aware of some by-laws, rules and regulation and penalties in regard to fire management and control. On average, only few participants (20%) especially the village chairpersons and executive officers were aware of that. Even the village environmental committee members themselves were not aware implying that there is inadequate knowledge and awareness of their responsibilities of which also contributes to poor community participation as a result.

Experiences from elsewhere have shown that for successful forest and bush fire management, frequent training and awareness raising to communities is a prerequisite. However, not much was done in regard to that in this particular area. There was no any fire management program taking place in any of the study villages implying that they are lacking training and awareness campaign on fire management. Some villages however had rules and regulations, and by laws for fire management although not well known to the communities. These includes; Written permission from the village government (sub village chair person/ chair person); to inform at least one member of the village environmental committee and all his or her neighbours about the intention of using fire to clear land for cultivation; and to create firebreaks- five meters wide around the farm before setting fire. This aimed at enabling village government and the neighbours become aware and provide immediate assistance for fire suppression in case of uncontrolled fires.

Further observations have shown that the problem of unsustainable fire management is also attributed to poverty. The fact is that forests adjacent

communities are poor, own small farm sizes ranging between 1ha to 2.5 ha with yielding capacity of 3 to 4 bags of maize, insufficient to cater for their annual livelihood demands. Such situation has resulted into some communities becoming involved into other alternative economic activities, which are the causes of, some of the on going forest, and bush fires in the area. Such activities include illegal timber harvesting, traditional beekeeping activities, hunting in search for alternative sources of protein and free range grazing.

Majorities (97%) of the respondents agreed on the immediate need and support for fire management programme in the area. As a result basing on the study findings and suggestions from the respondents, there has been designed and developed a Community Based Fire Management Plan and By-Laws for the East Usambaras (Appendix 1) as well as its implementation action plan (Appendix 2). By having such a plan that can be implemented and monitored, it is anticipated that bush and forest fires will be significantly controlled in view of the fact that the methods and strategies to achieve such goals have been suggested by the communities themselves in line with their surrounding environment.

## **Conclusion and Recommendations**

### **Conclusion**

The problem of forest and bush fires in the East Usambaras is a result of failure of the existing fire management system in the area. There is poor involvement of the communities thus lack control of it. There is no agreed community based approaches for fire management like strategies, regulations, by-laws and the associated penalties, distribution of roles and responsibilities, decision-making power and availability of necessary resources. As a result local communities that are key and first beneficiaries to the proposed community based fire management plan are yet empowered enough to have more control of it.

## Recommendations

- *For fire management to be successful local communities need to be empowered through awareness raising, environmental education, and where necessary to support them in terms of fire fighting gears and through legal enforcement by respective authorities.*
- *Successful fire management requires the introduction more promising and acceptable alternative economic activities, which are environmentally sound like modern beekeeping, zero grazing for dairy cattle and goats, fish farming, butterfly farming etc. These would act as incentives for the community to effectively participate in implementing the proposed sustainable forest fire management plan.*
- *There should be proper enforcement and monitoring in respect of the agreed community based by-laws, fines and penalties for the uncontrolled forest and bush fires. In some cases where the offenders are not members of the communities, culprits should be referred to the courts of law??*
- *All the prerequisites for successful controlled burning should be thoroughly followed up as per the agreed Community-Based Fire Management Plan.*
- *The responsibility for fire management should be given to the Village Environmental Committee in order to avoid unnecessary clashes in the course of executing their responsibilities.*
- *The committees need to be supported in terms of fire management plan and by-laws development and enforcement, awareness raising of the problems, damages of uncontrolled fires and training on sustainable fire management approaches.*

## **Acknowledgements**

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## List of Abbreviations

|           |  |
|-----------|--|
| ANR       | Amani Nature Reserve   |
| CACA      | Caprivi Arts and Cultural Association                                      |
| CBFMP     | Community Based Fire Management Plan.                                      |
| CBFM      | Community-based Forest Fire Management                                     |
| CMEAMFP   | Conservation and Management of the Eastern Arc Mountains<br>Forest Project |
| DBC       | Development Brigade Corporation  |
| EUCAMP    | East Usambara Catchments Forest Management Programme                       |
| EUFLRP    | East Usambara Forest Landscape Restoration Project                         |
| FBD       | Forest and Beekeeping Division   |
| JFM       | Joint Forest Management  |
| SHUWIMU   | “Shirika la Uchumi la Wilaya ya Muheza”                                    |
| SPSS      | Statistical Package for Social Sciences                                    |
| TFCG      | Tanzania Forest Conservation Group   |
| VEC       | Village Environmental Committee  |
| WWF       | World Wide Fund for Nature   |
| WWF - TPO | World Wide Fund for Nature - Tanzania Programme Office                     |

## **1.0 INTRODUCTION**

### **1.1 Background Information about the Project**

The forests of the East Usambaras are among the most important for biodiversity conservation in Africa. They are also home to communities of poor people who need to utilise natural resources to survive. Research on the distribution of forests in the East Usambaras indicates that if the forests become too fragmented and isolated then a number of the species only known to exist from this area will become globally extinct. Forest loss will also disrupt the ecological services currently provided by the forests to the villages and towns in the vicinity of the East Usambaras. Policy and legal changes in Tanzania over the past ten years have provided an enabling framework for engaging local communities in forest protection, sustainable management and restoration. Projects in Tanzania are now exploring how to use these legal changes to improve the prospects both for the conservation of globally important forest resources, but also to increase the livelihood opportunities for people living in the same areas. Since 2004, with support from the Ministry of Foreign Affairs of the Government of Finland, WWF-Finland has been leading a partnership project that aims to reduce the loss of globally important biodiversity, improve livelihoods and restore a multi-functional landscape in the area. Considerable progress has been made towards achieving those goals. The current project aims to build on the success of the first phase of the project and will continue to work at a landscape scale working in 3 divisions including 28 villages with a total population of 135,000. The current phase also includes the development of a strategy to sustain forest conservation activities in the landscape beyond the lifespan of this project.

WWF-Finland has been leading a partnership project with WWF Tanzanian Programme office and Tanzanian Forest Conservation Group (TFCG) that aims to reduce the loss of globally important biodiversity, improve livelihoods and restore a multi-functional landscape in the area. Considerable progress has been

made towards achieving those goals. This includes the establishment and management of village forest reserves; diversification of income generating activities; conservation knowledge and skills development both at village and district levels; enhanced partnerships with the private sector including the tea estates and with Government including Muheza District Council, Amani Nature Reserve and the Catchment Forestry office. The project has also established links with the gazettement and compensation process for the proposed Derema Forest Reserve.

**Threats:**

Forest cover in the Usambara Mountains, and the former lowland forests has been massively reduced, fragmentation is high and the ability of the remaining forests to sustain people and biodiversity is greatly diminished. There are only around 692 sq km of coastal forests remaining in Tanzania mostly as fragmented patches, all of which are threatened and increasingly confined to reserves and sacred forest patches.

Pressure on land is high in the East Usambaras from growing populations in the adjacent agriculturally dependent communities who suffer from a high level of poverty. As a result a significant part of the forest loss has been due to clearance for local farms, but there have also been significant losses to commercial plantations of tea and cardamom in the highlands, and sisal and cocoa in the lowlands.

Fire is a major threat to the forests in the lowlands of the East Usambaras and on the drier western faces of the main mountain block. Clearance of forest up to the boundaries of the forest reserves has meant that forests inside the reserves are frequently affected by fire from the burning of adjacent fields. Hunting and wild honey collection activities are also common sources of uncontrolled forest fires.

Since 2003, mining has also been a significant threat to the forests and water sources of the East Usambara Mountains. Although small-scale mining had taken place periodically over many years in the lowland East Usambaras, it was not until 2004 that large numbers of people established artisanal mining operations in the area. The project will continue to monitor the situation and to work with stakeholders to find more permanent solutions to this issue.

Growing industrial demand for fuel wood is another direct threat in East Usambara. This comes from factories in Tanga, in particular a soap factory as well as from the East Usambara Tea Company. In the case of the tea company, they do not have sufficient Eucalyptus to run the driers. They have therefore been cutting *Maesopsis* from the forest on their land. *Maesopsis* is an invasive species with a low calorific value. The project will work with the tea company and the communities to develop a strategy to resolve this issue.

There is a need for improved management of natural vegetation along river banks. Riverine forest can be an ideal wildlife corridor. At the same time, the conservation of natural vegetation along streams and rivers can ensure improved water quality for communities down stream. The project intends to support efforts to protect natural vegetation along water courses as well as encouraging forest regeneration in these areas using appropriate species.

Other threats come from the low capacity of the District authorities to fully implement their work programmes due to the lack of funding and capacity. This low capacity also flows to other levels of the Tanzanian government system, such as Divisions, Wards and finally Villages.

The Tanzania Forest Conservation Group (TFCG) is leading implementation of field based activities in this partnership project with WWF Tanzania Programme Office assuming an overall coordination role between TFCG, WWF- International,

WWF Finland, Muheza District Council and other interested partners. The project is known as East Usambara Forest Landscape Restoration Project (EUFLRP) designed after the forests of the East Usambaras suffered a considerable loss and fragmentation in the past because of human activities. Therefore the project aims to prevent the loss of the globally important biodiversity values of these forests; enhance connectivity between remaining forest blocks, improve the livelihood of local people and restore and maintain the multiple functions of the forests in the East Usambara Mountains. It is also following the provisions of the Policy reforms in Tanzania of involving various stakeholders' particularly local communities in establishing and managing forests through Participatory Forest Management arrangement including new opportunity of creating Village Land Forest Reserves outside previous protected areas.

## **1.2 The Study**

- ❑ The project engaged a consultant to conduct some assessments on Forest/Bush fire problems in the project area, fire danger indices, and main cause of fire in the area, existing land use practices and economic ventures that fuel fire occurrences.
- ❑ Suggest possible/practical solutions to alleviate or minimize fire occurrences in the project areas. Work with communities in target 10 villages to design a practical community-based fire management plan and by-laws that will govern the implementation of the proposed fire management plan.
- ❑ Describe roles and responsibilities of different key players in the project areas regarding combating fire problems in the area.
- ❑ Provide indicators for monitoring progress in implementation of the proposed fire management plan.

### **1.3 Main Objective of the Study**

Review experiences / lessons learnt from various projects within Tanzania, region and world wide on forest fire issues and develop / design community-based fire management programme including by-laws for 10 project target villages in Lowland - East Usambara

### **1.4 Specific Tasks**

- Conduct literature review on previous and ongoing project interventions in the area through various reports, project documents and publications that are available in Regional Forest Catchments Office – Tanga, Amani Nature Reserve, Tanzania Forest Conservation Group (TFCG), WWF, Muheza District Council, Forestry and Beekeeping Division, Mlingano Agricultural Research Station, Private companies, and any other relevant sources within and outside Tanzania.
- Through the internet review issues of forest/bush fires and possible community – based forest/bush fire management plans and by-laws that have been successfully designed and implemented under similar circumstances in other places.
- Carry out some interviews with personnel from the above named organizations to document their recommendations on possible cause of actions to be included in the community – based forest/bush fire management plans or initiatives and to identify any relevant fire related initiatives ongoing in the District/region with which the project could link.
- Conduct field study interviews and meeting discussions in 10 villages – Kizerui, Kuze-Kibago, Segoma, Kambai, Mgambo, Bosha, Kwetango, Zirai, Misalai and Kiwanda to document recommendations from communities regarding fire problems, causes, possible solutions involving communities themselves for stopping or minimizing forest/bush fires in the

area whilst improving their economic activities and conserving the forest resources.

## **1.5 Expected outputs**

- Through Village meetings, design and develop community based forest/bush fires management plan and by-laws for the targeted area. The plan should spell out roles and responsibilities of each key player (Village government, Environmental committee, District Council, Regional Authority, FBD, other relevant stakeholders etc)
- Design an implementation/action plan for the community based fire management, mode of operation, fire by-laws, rules and regulations regarding the use of fires in the villages as a tool for their day-to-day economic ventures.
- To document the prerequisites and guidelines agreed by each of the project village and spell out the don'ts and dos regarding the use of fire and how to fight against fires in the village land as well as in Forest Reserves. This considered capacity of the local community, access to tools and gears for fighting fires, environmental impact, potential livelihood impact, gender, youth and feasibility.

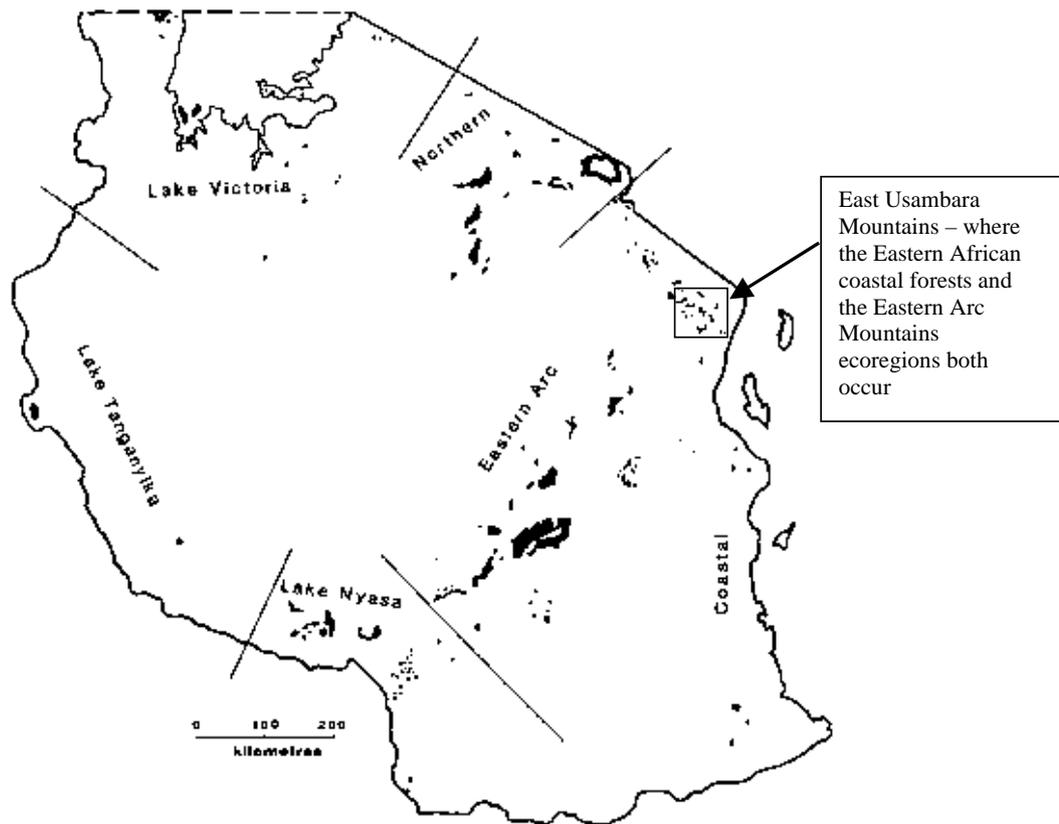
## **2.0 METHODOLOGY**

### **2.1 Description of the study area**

#### **2.1.1 Usambara Mountains**

The Usambara Mountains situated in Tanga region North-East of Tanzania are part of the series of the eastern arc Mountains in Africa. The eastern arc chain of mountains was formed about million years ago. The chain begins in the north with the Taita hills in Kenya and continues south with the Pare, Usambara, Nguu, Nguru, Uluguru, Ukaguru, Malundwe, Rubeho, Udzungwa and Mahenge in

Map 1: Location of the East Usambaras in relation to the Eastern Arc mountain forests.



Tanzania. The mountain forests of Malawi and northern Mozambique are included in the arc by some authorities. It is thought that they have been isolated from each other for the last 20 million years, maintaining uniform climatic regimes during this time, resulting in their high rates of endemism (Sayer, 1991).

Traditionally the mountains are divided into two main blocks, West and East Usambaras, which are separated by the North-South running Lwengera Valley. The East Usambara Mountains are among the areas in Tanzania where a concern for environmental hardship is slightly more intensive compared to the west. East Usambara Mountains form part of the chain of isolated mountains stretched in an arc around eastern Tanzania. The arc comprises the Pare, Kilimanjaro, East and West Usambara series of mountains. According to Hamilton and Smith (1989), the East Usambara alone covers about 1300km<sup>2</sup> by area, and it is located between two administrative districts of Muheza and Korogwe.

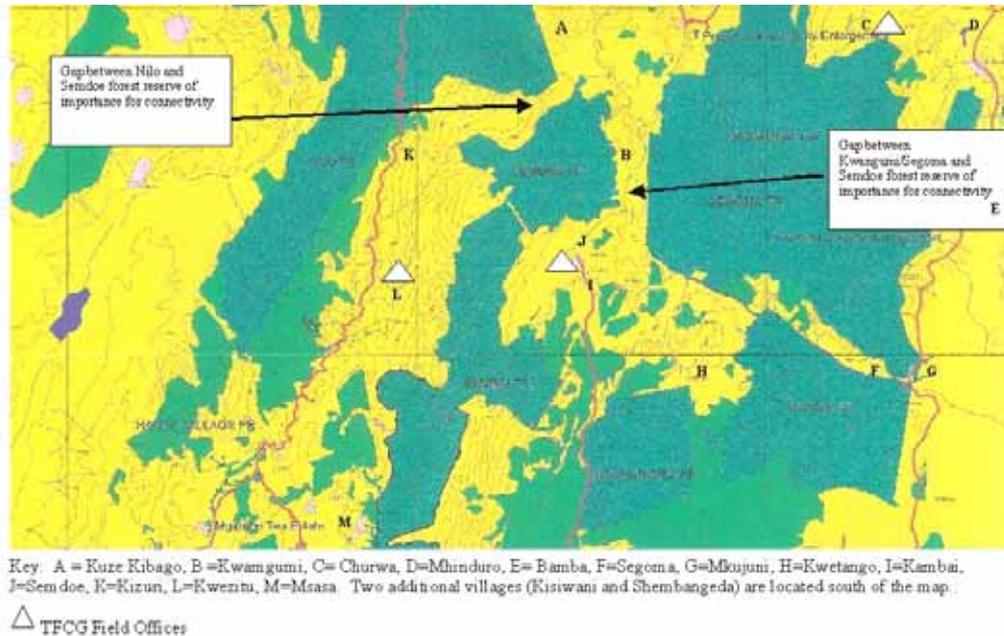
### **2.1.2 Climate and Relief**

The East Usambara Mountains rise sharply to over 1000m and peak at 1500m above sea level and have unusual high rainfall and low temperatures at higher altitudes, possibly due to their proximity to the sea (Hamilton and Smith, 1989). Rainfall is monsoonal, with a wetter south-easterly monsoon from April to October and a drier north-easterly monsoon from November to March. Rainfall peaks correspond to the movement of the Inter Tropical Convergence Zone. Annual mean rainfall increases with altitude from 1200mm in the foothills to over 2200 mm in the highest areas annually. Temperatures drop with altitude. The lowland mean temperatures are typical for their altitude, in contrast to the abnormally cool climate of the uplands.

### **2.1.3 Biodiversity Value**

In terms of biodiversity, the area is generally ranked among the top 5 forest regions on the African continent. More than 100 species of plants and animals are confined to the forests of the East Usambaras, and many of these are threatened with extinction. These rare endemic species which are found throughout the forests, from the lowland forests at around 150 m to sub-montane and the montane forests up to the peaks at over 1,500 m altitude. The project is

therefore putting efforts towards preventing loss of these important species and also improving forest connectivity through restoration and maintaining corridors which link these lowland forests to the sub-montane and montane forests (Map 2).



#### 2.1.4 Hydrology

The East Usambara Mountains serves several important ecological functions, which include water catchments. These forests secure water for Tanga city for more than 200,000 inhabitants, (Schut, 1996). Likewise, the forests contribute water to Pangani River, which is also useful for hydroelectricity generation. The forests are vital for the long-term sustainability of smallholder agriculture and industrial plantations, such as sisal, cocoa and tea estates.

#### 2.1.5 Livelihoods

In terms of livelihoods, the forests of the East Usambaras play a crucial role in supporting the local population, the majority of which live close to and are dependent on the forests for many of the goods and services they provide. These include medicinal plants, fuelwood, building materials, mushrooms, fruits and

vegetables and a regular supply of water. At the same time, the forests house a number of important economic activities such as beekeeping, butterfly farming and eco-tourism, all of which are potentially important sources of income for local communities.

## **2.2 Main Aim of the Project**

Since its implementation, the project has been working to address the following issues:

- ❑ To restore and maintain forests and their multiple functions across the landscape for the benefit of people and biodiversity.
- ❑ To decrease the pressure on natural forests by providing alternatives e.g. tree planting, agroforestry, improved wood stoves and building houses using mud bricks, which requires less timber and poles.
- ❑ To improve the connectivity between selected East Usambara forests to enhance the chances for globally rare and endemic species to survive in the long term (*Map 2*).
- ❑ To work with communities, and the private sector in critical areas between the existing government forest reserves to plan the management of their village or private lands to include village and community forest reserves or private reserves and enhanced tree cover which help to improve connectivity and forest functions as part of a negotiated and agreed strategy for the whole landscape.
- ❑ To assist the target villages to improve their livelihoods through undertaking proven income generating activities where possible focused on the sustainable use of natural resources, especially with regard to deriving enhanced benefits from forest through for example, farming native butterflies, beekeeping and moth farming, collection and sell of *Alanblackia stuhlmanii* nuts, fish farming and developing ways to benefit from ecotourism.

- To work with the District authorities in Muheza to enhance their capacity especially in management of natural resources both in the village lands and the government forest reserves as a strategy towards building long term sustainability into conservation interventions.
- To work with the Tanga Catchments Forest Office to help build on their achievements under EUCAMP with regard to enhancing the forest management in the East Usambaras, in particular through utilizing their accumulated skills and knowledge on ways to improve forest connectivity in these mountains, including the use of JFM and CBFM.

### **2.3 Population and Land use practices in relation to fire incidences**

The study was conducted in ten villages of which seven (Kizerui, Kuze-Kibago, Segoma, Kambai, Bosha, Kiwanda and Kwetango) are found in the lowlands while the rest three (Zirai, Mgambo and Misalai) are in the highlands. The lowland areas are more drier characterized by open bush and farm lands with tall grass which go dry during dry seasons. Due to that communities use fire to clear the land for cultivation and thus accelerate the risk of bush and forest fires in these areas. Comparatively there are rare cases of forest and bush fires in the uplands due to the fact that the area receives more rainfall and majorities of people practice agroforestry systems (*Home gardens and Agrosilvicultural systems*).

#### **2.3.1 Kuzekibago village**

Kuzekibago is a lowland village, which was registered in 1976 following the villagilization operation of 1975 in the country. It borders Bosha village to the north, Kwamtili estate and Semdoe forest to the east, Kambai and Kizerui village to the south and south east and Nilo forest reserve to the west. The village has ten hamlets which are Kibago (A), Kibago (B), Mabanda, Seluka, Kwamtili, Kwesangazi, Magati, Antakai, Miongwe and Feza. It forms part of the Semdoe - Segoma forest gap. There are 595 households with a population of 3,256 people, 1202, 1056 and 998 being men, women and children respectively.

It has one village forest reserve (36ha). Land ownership is traditional and is controlled by clan. There are some few people who own up to 70 acres leaving majority with 1 to 2.5 hectares. Crops cultivation mainly using hand hoe is the dominant land use occupying 80% of the village land. It is a mixed intercropping practice of maize, beans, bananas, cassava, green gram, and cow pea and tree crops mostly planted close to homesteads like mango, cashew nuts and coconuts. Yield levels of maize ranges from 3 to 5 bags of 100Kg per acre. Slash and burn is more less a traditional way of land preparation and this is attributed to forest fire incidences in the area. Another source is fire connected with illegal logging, hunting of small animals such as digdig, and traditional honey harvesting. Some of the bottlenecks to optimal crops production are poverty, poor soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, vermin, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

### **2.3.2 Segoma village**

Segoma village was registered in 1975 during the popular villagilization operation in Tanzania. It is in the lowland located in a narrow ridge surrounded by an abandoned “Shirika la Uchumi la Wilaya ya Muheza” (SHUWIMU) estates in the lowland East Usambara Mountains. It also forms an important part of the Sigi river watershed and an important corridor for forest restoration. It borders SHUWIMU estate and Manga Forest Reserve in the south, sisal estate in the east, Segoma forest reserve in the northeast and Kwamngumi in the north. Currently it doesn't have a forest reserve but was in a process of negotiation for an area for their village forest reserve. There are 120 households with a population of 573 people; 193, 201 and 179 being men, women and children respectively. The household size ranges from 6 to 7 persons majority being from the abandoned Lanzoni sisal estate

The main economic activities are agriculture and petty business. Majority owns between 1.5 to 3 hectares of land growing food crops like maize, cassava, bananas, beans, cowpea, yams, groundnut and green gram. Land preparation is mostly slash and burn and cultivation is seasonally using hand hoe. Cash crop is mainly coconut. Yield levels for maize ranges between 0.8t/ha to 1.2t/ha while most of the listed legumes yields are less than 1t/ha. However, discussion have shown that, optimal levels for maize could range from 4.5t/ha to 8t/ha depending on varieties and other inputs used signifying that those farmer's yields levels are far too low.

Constraints to crop production have been inadequate extension services, presence of vermin, shortage of land, poor yielding cultivars, relaying on hand hoe and traditional cultivation methods. In regard to fire occurrence, it was reported that accidental fires that break out during land clearing, careless use of fires and smoking were some of causes of forest/bush fires in Segoma village.

### **2.3.3 Churwa village**

Churwa village was registered in 1976. It borders Bosha village in the north, Kwamtili estate and Semdoe forest reserve to the south, Muze village to the east and Kauzeni sisal estate to the north and west. Currently it doesn't have a village forest reserve. There are 593 households with a population of 2,532 people.

Land ownership is traditional and is controlled by clan where majority owns about 1 to 2 hectares. Crops cultivation is mainly by using hand hoe. They practice a mixed intercropping of maize, beans, bananas, cassava, green gram, cow pea and tree crops like mango, cashew nuts, coconuts and oranges. Yield levels of maize ranges from 3 to 6 bags of 100Kg per acre. Slash and burn is a traditional way of land preparation of which is attributed to forest fire incidences in the area. Other causes of fires are lack of fire management plan, encroachment and other illegal activities in forest reserve particularly traditional honey harvesting and logging.

Some of the bottlenecks to optimal crops production have been poor agricultural extension services and soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, vermin, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

#### **2.3.4 Kizerui village**

Kizerui village was registered in 2000 after detaching from Zirai. It is located nearly on the top of a ridge lying northeast close to the boundary between Muheza and Korogwe district. The top of the ridge is the highest point, which divides the two watershed areas pouring water into Sigi River in the East and Pangani River in the west. It borders Kuzekibago village and Nilo forest reserve in the north through west, Zirai village to the south and Semdoe forest reserve and Kambai village to the east. It forms part of the Nilo – Semdoe forest gap. It has a village forest reserve (34ha) called “Mzungui”. There are 426 households with a population of 2059 people, 1052 and 1007 being men and women respectively. The household size ranges from 5 to 7 persons majority being Wasambaa who shifted into this area from Lushoto due to the problem of landlessness.

Traditional laws of passing land from one generation to another are controlling land ownership in the area. Majority owns between 3 to 7 acres of land and landless people are directed by the village government to open land at the general land, which is in the gap between Nilo and Semdoe forest reserves. Farming is the main economic activity mainly using hand hoes. They practice mixed intercropping of maize, beans, bananas, cassava, green gram, cow pea and tree crops like mango, papaya, guava, cashew, cloves, cinnamon and *Allanblackia*. Yield levels range between 0.6t/ha to 0.9t/ha for maize while other leguminous crops are lower than 0.7t/ha. Slash and burn is traditional land preparation mostly practiced in the lowland thus attributed to forest fire incidences in the area.

During the field visit, the following were mentioned to be constraints to optimum crop production. Poor soil fertility, low crop prices, accelerated soil erosion, poor cultivars that have low productivity, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets. The causes of forest /bush fires were connected with illegal logging, hunting of small animals and traditional beekeeping.

### **2.3.5 Kambai village**

Kambai village was registered in 1969. It borders Kwetango village to the east, Lunguza forest plantation to the south, Kwezitu village to the west and Kuzekibago village and Semdoe forest reserve to the north. It has a village forest reserve (8.5ha) also called “Kambai”. There are 251 households with a total population of 1061 people dominated by the Sambaa tribe.

Land is traditionally owned majority with 1to 2 hectares main source of livelihood is farming dominated by crops cultivation mainly using hand hoe. It is also a mixed intercropping practice of maize, beans, bananas, cassava, green gram, cow pea, black pepper, mango, cashew nuts and coconuts. Yield levels of maize ranges from 3 to 4 bags of 100Kg per acre. Slash and burn is more less a traditional way of land preparation and this is attributed to forest fire incidences in the area. Other fire incidences in the area accrue from charcoal burners, illegal loggers and hunters

Optimal crops production have been constrained by poverty, poor soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, vermin, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

### **2.3.6 Mgambo village**

Mgambo village was registered in 1978. It borders Misalai village to the north, Shambangeda village and Tea estate to the south and east, and Kazita village to the west. It has a village forest reserve (156ha) called Handei. There are 424 households with a population of 1,872 people.

Land ownership is traditional and is controlled by clan where majority owns about 1 to 3 hectares. Crops cultivation is mainly by using hand hoe. It is a mixed intercropping practice of maize, beans, bananas, vegetables, cassava, green gram, tea, mango, cloves, Allanblackia and oranges. Yield levels of maize ranges from 3 to 6 bags of 100Kg per acre.

There has been a problem of poor agricultural extension services and soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, vermin, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets in the village. These therefore have been contributing to poor crops yields in the area. Careless use of fires was reported to be one of the causes of bush fires.

### **2.3.7 Misalai village**

Misalai village was registered in 1970. It borders Zirai village to the north, Tea plantation and Mgambo village to the south, Kwezitu village to the east and Kazita village to the west. It has a village forest reserve (30ha) called Kwevumo. There are 370 households with a population of 1870 people.

Land ownership is traditional and majority owns about 1 to 2 hectares. Crops cultivation is mainly by using hand hoe. It is a mixed intercropping practice of maize, beans, bananas, cassava, yams, cardamom, cinnamon, black pepper,

sugarcanes, and vegetables like cabbages, tomatoes, carrots, Allanblackia, tea and cloves. Yield levels of maize ranges from 2 to 3 bags of 100Kg per acre.

Optimal crops production have been constrained by poor agricultural extension services and soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets

### **2.3.8 Zirai village**

Zirai village was registered in 1976. It borders Kizerui village to the north, Misalai village to the south, Kwezitu village to the east and Kazita village to the west. It has a village forest reserve (33ha) called “Kizingata”. There are 212 households with a population of 1020 people.

Land ownership is traditional and majority owns about 1 to 5 hectares. Crops cultivation is mainly by using hand hoe. It is a mixed intercropping practice of maize, beans, bananas, cassava, yams, cardamom, cinnamon, black pepper, sugarcanes, and vegetables like cabbages, tomatoes, carrots, Allanblackia, tea and cloves. Yield levels of maize ranges from 2 to 3.5 bags of 100Kg per acre.

Optimal crops production have been constrained by poor agricultural extension services and soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

### **2.3.9 Bosha village**

Bosha village was registered in 1975. It borders Michungwani village to the east, Muze village to the south, Kuzekibago village to the west and Michungwani village to the north. It doesn't have a village forest reserve. There are 600

households with a total population of 2521 people dominated by the Sambiaa tribe.

Land is traditionally owned majority with 1 to 2.5 hectares. The main source of livelihood is farming dominated by crops cultivation mainly using hand hoe. It is also a mixed intercropping practice of maize, beans, bananas, cassava, green gram, cow pea, black pepper, mango, cashew nuts and coconuts. Yield levels of maize ranges from 3 to 4 bags of 100Kg per acre. Slash and burn is more less a traditional way of land preparation and this is attributed to forest and bush fires in the area. The village lack a strong committee responsible for environment to effectively enforce village bylaws against bush fires.

Optimal crops production have been constrained by poverty, poor soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, vermin, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

### **2.3.10 Kiwanda village**

Kiwanda is the only village, which has been registered in the East Usambaras. It was registered in 1978. It borders Kwatango to the north, Bombani village to the south and Lunguza forest plantation and Kambai village to the west. It has two-community forest reserves called “Nkanyarika” and “Bomani”. There are 524 households with a population of 2038 people. The household size ranges from 4 to 5 persons majority being Wasambiaa.

Traditional laws of passing land from one generation to another are controlling land ownership in the area. Majority owns between 1.5 to 2 hectares of land. Farming is the main economic activity of this area mainly using hand hoes. They practice mixed intercropping of maize, beans, bananas, cassava, green gram, cow pea and tree crops like mango, papaya, guava, cashew, cloves and cinnamon. Yield levels ranges between 2 to 4.2 bags for maize. Slash and burn

is traditional land preparation, which attributes to forest and bush fires in the area.

During the field visit, the following were mentioned to be constraints to optimum crop production. Poor soil fertility, low crop prices, accelerated soil erosion, poor cultivars that have low productivity, inadequate capital for supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

### **2.3.11 Kwatango village**

Kwatango village was registered in 1975. It borders Misozwe village to the east, Kiwanda village to the south, Kambai village to the west and Segoma village and Manga forest reserve to the north. It has a one village forest reserve (26ha) also called "Kwatango". There are 187 households with a total population of 964 people.

Land is traditionally owned majority with 1.5 to 2.5 hectares. The main source of livelihood is farming dominated by crops cultivation mainly using hand hoe. It is also a mixed intercropping practice of maize, beans, bananas, cassava, green gram, cow pea, black pepper, mango, cashew nuts and coconuts. Yield levels of maize ranges from 3 to 4 bags of 100Kg per acre. Slash and burn is more less a traditional way of land preparation and this is attributed to forest and bush fires in the area. There is a village environmental committee and some persons who are responsible with overseeing forest activities within the nearby forest reserve. The groups have no definite defined roles about who should deal with issues of forest/bush fires such there is careless use of fires in the village and lack of willingness to monitor and deal with encroachment and other illegal activities in forest areas.

Optimal crops production have been constrained by poverty, poor soil fertility, land scarcity, low crop prices, poor soil conservation measures, poor cultivars that have low productivity, unreliability of seasons, vermin, inadequate capital for

supplying necessary agricultural inputs, poor infrastructure and accessibility of the markets.

### **3.0 Review of documents**

A survey of literature was conducted covering previous intervention reports in the areas e.g. Tanga Catchments Project, Amani Nature Reserve (ANR), Tanga Mangrove Project, Tanzania Forest Conservation Group (TFCG), WWF-project progress reports, FBD and the project document. Other documents consulted include internal project audit report and baseline information on the villages involved in the East Usambara Restoration Project.

In addition, different national and sectoral policies and strategies were reviewed to see opportunities and support to fire management in the area. The policies include National Forest Policy, National Wildlife Policy, National Environmental Policy, National Tourism Policy, National Beekeeping Policy and National Agriculture and Livestock Policy.

Through the Internet, literature review was also consulted to tap experiences knowledge and skills from other countries with similar vegetations where sustainable forest fire activities have been successfully promoted. The aim of this review was to learn from that success as a basis towards developing community based fire management in the East Usambaras.

### **3.1 Vice President's Strategy to Combat Deforestation and Land Degradation (Government Notice of April, 2006)**

About wildfires the strategy states that;”*Matukio ya uchomaji wa moto misitu na nyika ni marufuku nchini na wahalifu wote wa agizo hilo wachukuliwe hatua za kisheria. Uongozi wa eneo linalohusika uwajibike kwa usimamizi wa agizo hili.*”

The directive from Vice Presidents office emphasizes the need of observation of the law with regard to bush and forest fires and culprits not to be spared. Thus

the community fire management plan proposed fall in line with government's recent directive over control of wildfires.

### **3.2 National Forest Policy (URT 1998)**

The overall priority of the forest is the management of the county's forest resources at various levels for sustainable and progressive development. Unfortunately estimates by 1998 indicated that about 130,000 to 500,000 ha of forested land were being lost per annum. Among major causes of such losses was wildfire and still is. Therefore management and control of bush and forest fires will enhance the restoration of forests and was in support of the National Forest policy.

#### **3.2.1 Forest Act No.14 of 2002**

Development of fire management plan at village level, fulfils some objectives of this Act and its administration. Such objectives as outlined under Forest Act (2002), Section 3, are:

- To encourage and facilitate the active participation of the citizen in sustainable planning, management, use and conservation of forest resources through the development of individual and community rights, whether derived from customary law or under this Act, to use and manage forest resources,
- To delegate the responsibility for management of forest resources to the lowest possible of local management.

The administration of any legislation spells out restrictions, offences and fines concerning the Act. Section 70 (1-5) spells out restriction on burning of vegetation, Section 71 (1-5) talks about power to require persons to assist in extinguishing fire.

### **Restriction on burning**

- Burning of any vegetation on any land outside the cartilage of own house or compound
- Wilful or negligent kindle or cause to be kindled any fire which one has reasonable cause to believe may spread so as to destroy or damage any property of any other person or the sate.
- Any person who intends to burn vegetation should posses a written permission from the person having control of land or from forestry or other officer with the authority to grant such permission . Upon receipt of such permission the person should inform

-the occupiers of all land which is situated within half a kilometre of the place where the burning is to take place

-the officer who has authorized the burning of vegetation on any land or where the burning is to take place on the burner's own land, and officer responsible for such matters from a local authority having jurisdiction over the place where the burning is to take place.

- The notice referred above shall be in writing and delivered by hand or given orally , be deemed to take effect from the time it is given, and shall state as near as may be the time at which the burning will take place.
- Where a fire lawfully kindled after notice given in terms of above, the fact that such notice was given shall

- be sufficient defence to any person who kindled or was responsible for the fire to any charge contravening the terms unless it is proved that such a person wilfully or by the negligence of himself, his employees or agents caused or permitted such fire to spread across the boundaries of the land on which the burning took place to such other land

- but not affect the right of any person aggrieved to sue for and receive damages in respect of any loss sustained by him as a result of such fire.

Section 71 stipulate power to require any person to assist in extinguishing fire in the open air believed to become dangerous to life or property.

## **Offences and fines**

Section 91 (1) Any person who, without lawful authority or excuse the proof of which shall lie upon him-

(a) lights or assists, rekindles or adds fuel to any fire or causes any of the above of these activities to take place;

(b) leaves unattended a fire which he, with or without authority has lighted or assisted in lighting or used or rekindled or to which he has added fuel before such fire is thoroughly extinguished;

(c) fails to comply with any lawful order issued to him under and in connection with any of Part IX of this Act , shall be guilty of an offence and upon conviction, shall be liable to a fine of not less than fifty thousand shillings and not exceeding one year or to both such fine and imprisonment.

(2) Any person who wilfully and unlawfully and unlawfully sets fire to any forest reserve, forest plantation, standing trees, sapling or shrubs, whether indigenous or not , commits an offence and upon conviction shall be liable in accordance with the provisions of section 321 of the Penal Code.

### **3.3 National Environmental Policy (URT1997)**

The National Environment Policy relevant objectives to prevention and control of wildfires are:

- To prevent and control degradation of land, water, vegetation and air which constitute our life systems
- To raise public awareness and understanding of essential linkages between environment and development and promote individual and community participation in environmental action

Control of fires prevents forest and land degradation whereas community based fire management supports public awareness to maintain sustainable environment management.

### **3.4 National Wildlife Policy (URT 1988)**

The National Wildlife Policy identifies wildfires together with encroachment, illegal logging and poaching as major contributors to the deterioration of the wildlife population. Thus control and management of wildlife fires is relevant to wildlife development as the E. Usambara Arc Mountains forests host several animal species.

### **3.5 National Tourism Policy (URT 1999)**

Among the policy strategies for Eco-tourism to enhance the conservation of nature, creating sustainable environmental awareness among tourists, the local population, and sensitising them on the need to respect nature and conserve environment. With the creation of Amani Nature Reserve, obviously prevention of bush and forest fires observes respect of the environment.

### **3.6 National Beekeeping Policy (URT1998)**

Beekeeping activities particularly honey harvesting has been mentioned several times as among causes of bush and forest fires in many parts of the country including the East Usambara. However the National Beekeeping policy seems to

be silent on forest fires. It just puts more emphasis on the use of bee smokers which are also reported to be in scarce supply.

### **3.7 National Agricultural and Livestock policy (1997)**

Use of fire in land clearing for agriculture and burning of pasture land for new palatable pasture for livestock are reported to be major causes of wild fires. The communities in the Usambara were reported to rely on the make use of of fire for land clearing for agriculture. Generally however the agriculture and livestock policy does not explicitly criticize the practice nor provide some policy guidance about the long standing practice of fire use.

### **4.0 Field Visits / Observations**

Activities during field visits included physical observations, administering household questionnaires to individuals and focused discussions with village governments, village environmental committees and disadvantaged groups of women and youths. Among the issues discussed include fire problems, causes, community involvement and further possible solutions for stopping or minimizing forest/bush fires. Consultative meetings were conducted with the staff of Muheza District Council especially the District Planning Officer, District Agricultural Officer, District Community Development Officer, District Forest Officer and District Forest Catchment Officer. Other offices consulted include Regional Forest Catchment Office – Tanga, Amani Nature Reserve, Tanzania Forest Conservation Group (TFCG), WWF, Forestry and Beekeeping Division and the Mlingano Agricultural Research Station. The purpose of the consultative meetings was to identify whether there is any ongoing plans for sustainable fire management in the areas and also to learn and build on the previous interventions in the areas as far as fire management is concerned.

Limited household survey was conducted for some villagers to give a brief picture of the livelihood status and possibly identify existing opportunities. The information sought included household characteristics, land ownership,

household production, farming methods, livestock and the effects of fire on farm production, properties and environment at large.

## **5.0 Data analysis and reporting**

### **5.1 Data analysis**

All field data and interviews were summarized and analyzed using appropriate programmes. The qualitative data for example were analyzed by using Content and Structural-Functional methods while Descriptive and Inferential statistics methods (Statistical Package for Social Sciences, SPSS) were applied to analyze the quantitative data. The results were summarized and used as a basis for designing and developing the community based forest/bush fires management plans and by laws in the area. The plan also took into consideration the issue of gender and youth involvement, capacity of the local community and access to tools and gears for fire fighting. However, following the first draft, a final report will be written incorporating all the comments and suggestions.

### **5.2 Study Limitations**

Generally the time allocated to accomplish this work was too short (14 days) and also it was scheduled during rain season such that most of the roads were not passable. As a result more time was spent in the field and thus increased the costs. In addition all villages which were visited none was keeping data on fire incidences/ frequencies and even the size of land area that was been burnt/ destroyed by bush and/ or forest fires per annum. Therefore there is need for baseline data collection just before starting implementation of the proposed community based fire management plan in the East Usambaras. This would help to measure the achievement in terms of fire management in future.

## **6.0 Findings**

The findings being presented in this section are based on analysis of the information obtained during questionnaire administering and discussions with communities and various stakeholders in ten villages of the study area. The stakeholders include the Tanzania Forest Conservation Group (TFCG), Muheza District Officials, Tanga Catchment Office, and World Wide Fund for Nature, Tanzania Programme Office (WWF-TPO).

The findings presented in this chapter include the discussion on socio-economic characteristics of the participants and about forest and bush fires in the East Usambaras. Others include the proposed Community Based Fire Management Plan and by laws governing its implementation and a detailed Action plan showing monitoring plan and indicators to be tracked over time during the entire period of its implementation.

### **6.1 Socio-economic characteristics of the respondents**

The findings have shown that 55.1% of the respondents were males and 44.9% females. Eight five percent were married, 6.7% divorced, 3.7% widowed and 3.7% separated. Age distribution varied from 22 – 70 years with an average of 45 years. Majority (79.1%) was in the age's group 31 – 64 years, whereas 12.7% were above 64 years and 8.2% bellow 30 years. Mean household size was 5.6 persons, 95% being smallholder farmers with an average farm size of 3.4h acres. Majority (71.6%) had primary education, 14.2% secondary, 8.2% adult education, 3.7% no formal education while 2.2% diploma. The main source of fuel is firewood mostly collected from their farm fields.

### **6.2 Forest and Bush Fires in the East Usambaras**

Findings have shown that bush and / forest fires have been a problem in the East Usambara landscape for long time. Generally bush fires are the most common

and widespread in the lowlands especially during the dry season (November to March) when people are clearing the land for cultivation. Fire has been and is still used because is one of the least expensive methods to clear and prepare land for agriculture and other land uses in the area. It started long time ago (before 1930) during shifting cultivation and the system has been maintained until now where people have established permanent settlements. This has become their tradition attributed to poverty, inadequate knowledge, skills and awareness on the appropriate agronomic practices and sustainable environmental management.



Picture 1: Bush Fire during Dry season in East Usambaras.



Picture 2: Regeneration of burnt bushland just after the first rains in East Usambaras

Inadequate knowledge and skills on fire management have resulted into failure to control it especially when clearing land for cultivation and thus destroy large areas of forest, farmlands, crops, livestock, houses and other properties. In Segoma village for example uncontrolled fire, which occurred in 2005, destroyed

two houses and about 8 hectares of farms out of which 2 hectares were planted with coconuts and cassava. It also killed 2 cows and 3 goats. Five hectares also planted with coconut, cassava, oranges and teak was also destroyed with fire in 2004 at Kiwanda village. Portion of the village forest reserve of Kizerui and Kambai was destroyed by fire during the dry seasons in 2004 and 2005. During the dry season 2006 about 6 hectares of farm land was destroyed by fire in Segoma, 9 hectares in Kwatango, 6 hectares in Kambai, 8 hectares in Bosha and 7 hectares Kiwanda. This implies that if such a situation is not well addressed then, it is likely to affect sustainability of the on going forest landscape restoration initiatives in the area.

Experience from Mongolia have shown that on average, 50-60 forest fires and 80-100 steppe fires occur annually and about 95 percent of such fires are caused by human activities and currently they have put in place a system to ensure sustainable fire management (Wingard and Erdenesaikhan, 1998; Wingard and Moody, 2000). However, according to group discussions in East Usambaras, little attempt has been made to control the bush fires. Although they were not able to tell exactly the size of bush land, which is destroyed, and the fire incidences per year as they don't keep records; observation have shown that large areas of bushes and /or farmlands are destroyed every year. The truth is that some farmers commonly use fire every during long dry season for clearing the land for cultivation and this is the main cause of the uncontrolled bush and farm fires in the area.

It was also observed that, comparatively we have less incidences of forest than bush fires in the East Usambaras. This is also in line with data collected by the Conservation and Management of the Eastern Arc Mountains Forest Project (CMEAMFP) (Figure 1). However, this might have been contributed by some efforts that have been taken some few years ago. Observation has shown that, during late 1990s the East Usambara Catchments Forest Management Programme (EUCAMP) organized training on fire management which was

campaigned by video show to some of the villages. This probably might have contributed to such a situation. The only constrain is that the training was conducted only once and there was no follow up of which could do away completely with the problem of forest fires. Comparatively it also shows that the fire incidence in other districts (Korogwe and Lushoto) is higher than in East Usambaras (Figure 2&3). In Muheza for example (Figure 1) forest fires incidences occurred once only in 2003 since year 2000 compared to Korogwe and Lushoto where they have been experiencing fires every year. This implies that with adequate campaign, training, wide public awareness raising, sustainable fire management could be achieved.

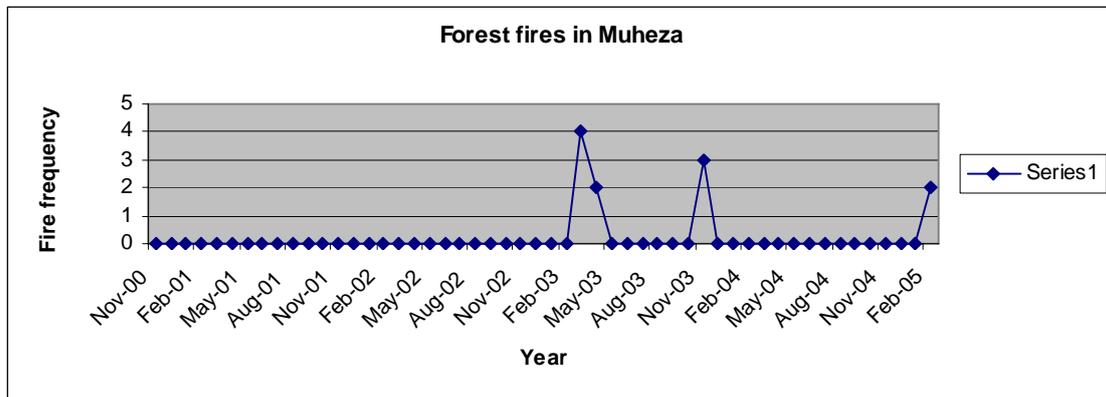


Figure 1: Forest fire incidences in Muheza District from November 2000 to February 2005. Source: CMEAMF, Project Forest Fire database.

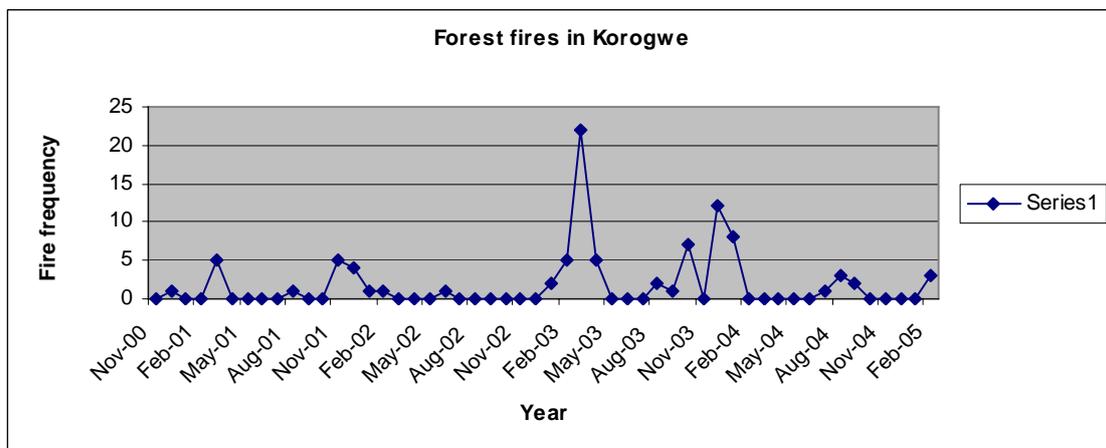


Figure 2: Forest fire incidences in Korogwe District from November 2000 to February 2005. Source: CMEAMF, Project Forest Fire database.

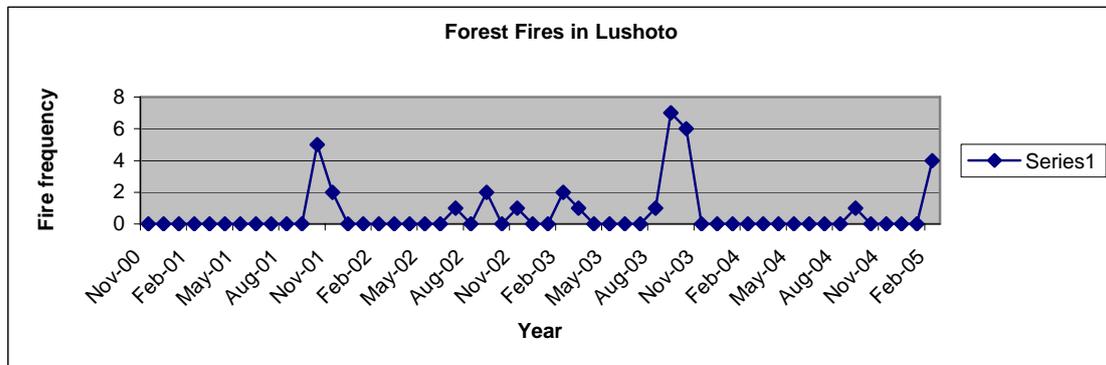


Figure 3: Forest fire incidences in Lushoto District from November 2000 to November 2004. Source: CMEAMF Project, Forest Fire database.

Forest fires in East Usambaras are also caused by illegal timber dealers, hunters, by people clearing land for cultivation, by children playing with fire, and cigarettes. Others causes are people smoking out beehives, making charcoal and cooking.

These causes are more or less the same to those reported in rangelands, woodlands and forests in Zambia. Where some fires are started deliberately by livestock owners seeking to promote a green flush for their animals, by rodent hunters clearing vegetation to catch their prey more easily, by people creating firebreaks around their homesteads or seeking to improve visibility, or by individuals playing with fire, smoking out beehives, making charcoal, cooking or trying to keep warm and timber extraction (Frost, 1992a). These fires have been killing the more fire-sensitive trees, suppress the re-growth of more resistant species, and prevent the re-establishment of the woodland canopy, which would suppress herbaceous production and reduce fuel loads, fire frequency and intensity (Gambiza *et al.*, 2000).

The situations in East Usambaras can be considered as failures in forest and bush fire management and are generally symptomatic of the breakdown of local control over natural resources. Normally there is an Environmental Committee in every village of which including others is responsible for fire management in the area. On contrary very little have been done in regard to this. They have failed to fully undertake their responsibilities of supervision and monitoring fire management activities in the area. This was also revealed when participants failed to tell whether there were aware of some by-laws, rules and regulation and penalties in regard to fire management. On average, only few participants (20%) especially the village chairpersons and executive officers were aware of that. Even the village environmental committee members themselves were not aware implying that there is inadequate knowledge and awareness of their responsibilities.

Community participation in fire management in East Usambaras is poor. Few people had participated into fire suppression in the area. It was also informed that, there is a tradition of people to mobilize themselves and call for forest fire suppression work in case of uncontrolled fire outbreak in the area. However, always there has been poor turn up. Experience from other countries have shown that, for successful forest and/ or bush fire management, according to Goldammer (2000), there was a need of sufficient awareness raising, environmental education, community enthusiasm and goodwill and where necessary legal enforcement by authorities.

There was no any fire management program taking place in any of the study villages implying that they are lacking training and awareness campaign on fire management. For successful forest and bush fire management there was a need to conduct frequent training and awareness rising to communities. Experience from Namibia has shown that, involvement of communities in fire management has resulted into 54 percent reduction of burned areas annually and also a decrease of fire incidences by 70 percent (Table 4). Communities

were involved through various training, mobilization and organization of fire awareness and public education campaign through schools and local organizations. This included also the production and use of written materials, posters (Figure 1, 2, 3 & 4), billboards, drama, radio programmes and videos (FAO, 1999; Goldammer and de Ronde, 2001).

This has resulted into improved condition of plants and trees; more forest products (e.g. fruits, nuts) as food supplements; increased numbers of wildlife; increased availability of grasses, thatch and other building materials; more fodder for livestock; less diseases among livestock; absence of livestock or crops destroyed by fire in the pilot villages; and increased income from sales of grasses, animals, and other products (Virtanen, 1998).

*Table 1: Performance indicators of activities in East Caprivi Namibia between 1995 and 1998\**

| Output areas                                       | Conventional government-run forest fire control | Implementation of IFFM |         |         |
|--|---|------------------------|---------|---------|
|  | 1995  | 1996                   | 1997    | 1998    |
| Total area burned (ha)                             | 838,000   | 790,000                | 558,000 | 390,000 |
| Area burned (%)                                    | 99  | 91                     | 67      | 47      |
| Reduction in burned area (%)                       | 0.2   | 6.0                    | 24.0    | 54.0    |
| Area under forest fire management (ha)             | 10,000  | 115,000                | 396,000 | 636,000 |
| Area covered by fire management (%)                | 2   | 14                     | 48      | 76      |
| Area protected from fire by DoF (ha)               | 2,000   | -                      | -       | -       |
| Area protected from fire by local communities (ha) | 0   | 50,000                 | 202,000 | 450,000 |
| Effectiveness of fire prevention                   | 20  | 44                     | 51      | 71      |

|  |             |                        |                    |                           |
|--|-------------|------------------------|--------------------|---------------------------|
| in managed areas (%)   |             |                        |                    |                           |
| Number of communities/<br>stakeholders   | 0           | 7 + 2<br>DBC** +<br>13 | 23 + 6<br>DBC + 42 | 28 + 2 DBC +<br>24 +64*** |
| Fire lines or fuel breaks built (cut<br>line) (km)                                     | 150         | 487                    | 1,217              | 1,812                     |
| Number of people involved in<br>fire control activities                                | 30          | 300                    | 525                | 1,000                     |
| Number of fires observed   | >10,000     | 6,000-<br>8,000        | 4,000-<br>6,000    | 3,000-4,000               |
| Number of people trained in<br>forest fire control                                     | 0           | 7,500                  | 13,000             | 33,500                    |
| Total area burned in Namibia<br>including prescribed burning in<br>national parks (ha) | 3-5 million | 3-5 million            | 2.1 million        | 2.0 million<br>(estimate) |

\* The programme began only in April 1996.

\*\* DBC = Development Brigade Corporation

\*\*\* Number of stakeholders involved in assisting the DoF in forest fire prevention activities during 1998 was: 28 local communities (16 contracted), 2 DBC camps with ex-combatants of the independence movement, 24 handicraft producer villages (under the Caprivi Arts and Cultural Association (CACA) and 64 schools.



Figure 4

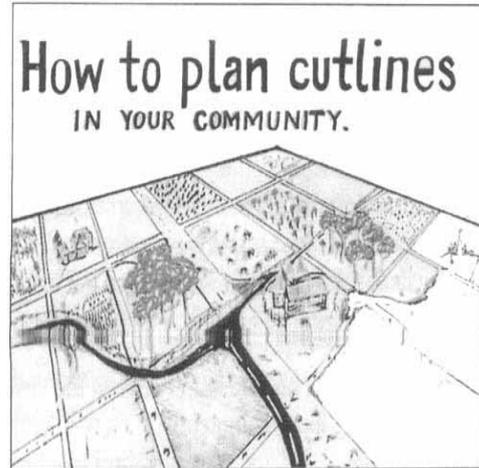


Figure 5

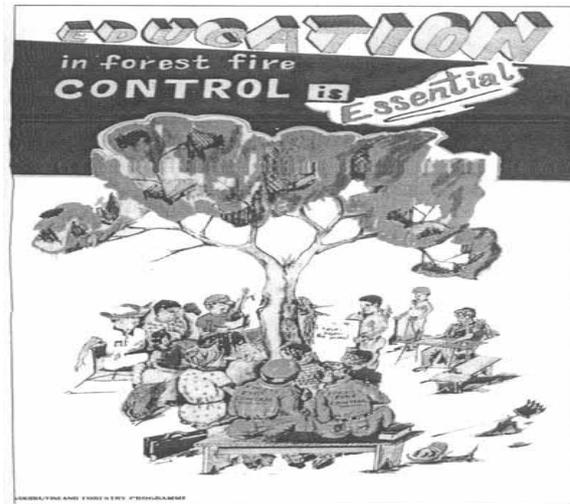


Figure 6



Figure 7

*Figures 4, 5, 6, & 7: Examples of fire prevention posters in Namibia*

According to some of the village chairpersons and executive officers in East Usambaras, some of the village rules and regulations, and by laws for fire management were less known to majorities: These included written permission from the village government (sub village chair person/ chair person); information notice to at least one member of the village environmental committee and all his or her neighbours about the intention of using fire to clear land for cultivation; and firebreaks preparation around the farm before setting fire. This was meant make village government and the neighbours aware and as a way for immediate support in fire suppression in case of emergence of uncontrolled fires. However, this approach falls short of many things as compared to fire management programs elsewhere.

Successful controlled or prescribed fire use in Cambodia has shown that many communities have rules for fire use, techniques for preventing the spread of fires and arrangements for fire suppression. Some rules include prohibiting fire when there is a drought and permitting the burning of dried slash only just before the onset of the rainy season. Various techniques such as protecting valuable trees, burning against the wind, back burning, and constructing firebreaks are also employed. When fires start to spread, every effort is made to suppress them and advance warning is given to others who are likely to be affected (Baird et al., 1996; Baird, 2000). In South Africa for example people living on fire prone areas have accepted responsibility and eventually successfully managed to protect their immediate surroundings from fire through firebreaks construction and jointly participating into fire suppression work (Murphree, 1991; Kruger, 2001).

Experience from Amani Nature Reserve has shown that fire was of great concern in the Joint Forest Management (JFM) approach. Forest fires were a big problem in some of the lowland forests particularly prior to JFM process. To arrest such a situation the Amani Nature Reserve was engaged into fire management campaign every year just before the dry seasons. It involved massive public awareness raising and various training to the village environmental committees,

local communities and schools. This has resulted into decrease in forest fires by more than 80%.

Response from Mlingano Agricultural Research Institute have shown that use of fire in clearing land for cultivation in East Usambaras was contributing into environmental degradation and led to accelerated poor soil fertility. It destroys the humus, reduces level of organic matters and kills the useful micro organisms for organic matter decomposition. Some nutrient elements (volatile and others) get lost through evaporation and run off as ash. Degradation of water catchments areas resulting in loss of water, loss of biodiversity and extinction of plants and animals; natural regeneration and reduction in forest cover and production; and carbon sink resource and increase in percentage of CO<sub>2</sub> in the atmosphere.

Response from the Regional Catchment Forests Office – Tanga and Muheza District has informed that the on going problem of forests and bush fires both a regional and a national issue, which required joint efforts starting from the village to national level. It is a cross-sectoral issue that requires strong coordination and cooperation at all sectors. It requires sufficient communication, massive awareness raising and capacity building at all levels. For fire management to be successful, local communities should be organized, strengthened their capacity improved to enable them work towards a common endeavour. Strengthen the political will of the community and the Local Government Units towards the conservation/protection of the forest resource against fires. Furthermore, work to incorporate forest/ bush fire management initiatives into other development efforts at all levels i.e. the community, district and regional levels should be abolished.

According to Mr. Kapinga, the acting Manager for Tanga Regional Catchments Forests, the problem of forest fires was being experienced in Muheza as well as in other districts in Tanga region. The problem was more pronounced in Korogwe, Lushoto, Handeni and Kilindi districts (Figure 2&3). In some of these areas the incidence of forest fires were almost twice compared to Muheza

district. The fact that the public was yet to realize to burn forests was tantamount to destroying their own property, communities were not readily alert to put o an end to the practice. He insisted this to be the area where more investments in terms of awareness raising and training were immediately needed. The deep rooted thinking that catchments forests were government property needed to be erased to bring up the sense of local community ownership and responsibility. He added that in implementing fire management plan a single committee should be formulated to avoid clashes likely to happen in places having several committees both dealing with environmental issues in the course of executing their responsibilities. He stressed that the existing systems could undertake all the necessary improvements starting from capacity building to training of all key stakeholders. Fire management was one of the responsibilities of the village environmental committee. What actually lacked were training, monitoring and frequently awareness raising and reminding committees of their responsibilities.

Responses from the District forest officer - Muheza have shown that the problem of unsustainable fire management in East Usambaras was also attributed to poverty. The forests adjacent communities were poor, owned small farm size averaged 3 to 5 acres with yielding capacity of 3 to 4 bags of maize, which cannot cater for their annual demands. The situation has resulted to a big number of farmers becoming involved into other alternative economic activities such as illegal timber harvesting, traditional beekeeping and hunting for alternative sources of protein as well as free-range grazing. Some of the activities, which are causes of, some of the on going forest and bush fires in the area. The discussion, which he concluded by saying that, unless we are able to introduce more promising alternative economic activities that would go hand in hand with implementation of community, based fire management plan, then, the future of fire management in East Usambaras would still be uncertain.

Discussion with the TFCG project officers Mr. Mtui and Mbagha have shown that the project has good intention of introducing suitable alternative Income

Generating Activities in the area. Some of these activities are beekeeping, fish farming, butterfly farming, moth farming and *Allanblackia* nuts collection. Currently 20 pilot farmers have been trained in beekeeping and moth farming in Kenya. In return they have also in collaboration with the project officers managed to formulate and start training to 8 groups in Segoma village, 9 groups in Kuzekibago and 16 groups in Kizerui village. All these groups in three villages have a total of 460 people and the project has supported them with 140 beehives. The project has also introduced agroforestry systems and tree planting scheme in the area. The idea is to let people have as many on farm multipurpose trees and woodlots as possible as a strategy to reduce pressure on surrounding forests in future. People in East Usambaras at one time must be able to obtain most if not all timber and non-timber products within their farms, they added. It is believed that by so doing it would act as incentives and at the same time contributions towards sustainable fire management in the area.



Picture 3



Picture 4

*Picture 3 & 4: Some of the tree nurseries established to produce seedlings for restoring the degraded land around the East Usambaras*

For any community-based fire management systems to be sustainable, incentives for fire management is necessary and must largely be related to the community's needs (Vayda, 1999). However, according to CESVI (2000),

Sometimes the communities might have shown some interest in controlling forest and bush fires due to the fact that have been threatening their lives, livelihoods and properties. In some cases could be due to the perceived value of the forests for non-monetary reasons like religion, aesthetics or simply a love of nature. Some times might be due to the more practical incentives support from governments, international organizations and NGOs to initiate and finance work by community 'volunteers' build firebreaks and fire lines; development of alternative livelihood strategies such as animal husbandry etc; fund raising activities by the community; and improving community knowledge and skills in fire management which could include training them to use simple tools for fire fighting; and offering alternative livelihood strategies. Such support can help promote inter-community co-operation and strengthen the community's technical skills for fire management.

In addition to incentives for effective fire management, sanctions for unsound management are equally important. According to Baird *et al.* (1996), generally, community-enforced fines and other penalties often work better than government legislation in discouraging people from breaking rules. However, the government has a role in preventing uncontrolled forest fires, especially when offenders are not members of the community. Therefore there is a need for community-based management plan and by laws to govern uncontrolled fires in East Usambaras.

However, it must be noted also that, allocation of resources for forest fire management requires careful planning to ensure that poor communities are not overburdened by such arrangements, especially in cases where tangible benefits are unlikely to be realized in the near future. Raising awareness of forest fires is not always a key factor for successful fire management. In some cases for example you might find that the communities are already aware of the problems and damages of uncontrolled fires like in Philippines. The case where would be required to build on that awareness to promote more actions on the ground. Sometimes you might need to introduce plans like 'No Fire Bonus scheme as a compensation for preventing forest/bush fires in that particular areas (Baird *et al.*, 1996). For example a total of 124 communities in

Philippines benefited from development projects worth US\$ 4,000 each as bonus for not incurring any forest fire during the dry season or other forest destruction, such as illegal logging and encroachment (Pogeyed, 1998).

Controlled burning if well managed could be the alternative for fire management in East Usambaras. However, according to Frost (1992a), controlled burning requires community based decisions on where, when and how to burn. Reasons on why use fire, the benefits to be gained through its use, the consequences of changing the pattern of use and co-coordinated actions on the prerequisite preparations to control the spread of the fires need to be well known. This actually is not happening in East Usambaras and thus calls for great attention especially when designing and developing the community based fire management and implementation action plan.

The underlying concept of Community-based Forest Fire Management (CBFFM) according to Goldammer (2001) is to better integrate fire and people into land-use and vegetation management systems. That means responsibility for fire management is brought closer to those who benefit both from the use of fire and from having more control. For this to be successful all stakeholders involved in fire management must agree on the approaches for CBFFM, distribution of responsibilities, decision-making power and resources. However, the process of negotiation and consensus building requires careful consideration of different perspectives and also the pluriformity of the legal context. In some cases the existing rules might be different and sometimes of contradictory origins (e.g. laws and administration rules governed by centralized legislation, traditional rules that may not be legally recognized, or weakening influence of traditional structures due to increasing cultural intermix (migration) or other impacts of globalization). To overcome possible conflicts and deadlocks, a combination of bottom-up and top-down approaches in defining the appropriate integrated fire management strategy seems to be most effective to build consensus among stakeholder groups at different levels (Bappenas, 1992; Goldammer, 1993).

Majorities (97%) of the respondents have agreed on the immediate need and support for fire management programme in the area. However, based on the study findings and suggestions from the respondents, we have managed to design and develop a Community Based Fire Management Plan and By-Laws for the East Usambaras (Appendix 1) and its implementation action plan (Appendix 2). With this plan and proper implementation and monitoring system hope probably would be able to arrest the problem in future as it based on their suggestions and local environments

**Table; 2 Causes of fire and suggested solutions**

| S/n | . Cause  | Suggested solution   |
|-----|--|--|
| 1.  | Accidental fires that break out during land clearing , cooking and smoking   | Continued awareness raising about the dangers of fire, particularly just before fire season                        |
| 2.  | Fire connected with resource extraction i.e. illegal logging, hunting, charcoal making, and traditional honey harvesting | The communities should be assisted in developing alternative economic livelihoods activities                       |
| 3.  | Careless use of fires  | Enforcement of by laws, and regulations, penalties or direct compensation payment                                  |
| 4.  | Lack of fire management plans and facilities to suppress fires   | Establish capacity building initiatives for the community to develop and implement community fire management plans |
| 5.  | Lack of willingness to monitor and deal with encroachment and other illegal activities in forest areas                   | Provide incentives to individuals, village environmental committees, village governments to control unwanted fires |
| 6.  | Fire use is the easiest and cheap method in land agricultural preparation  | The communities should adhere to supervised controlled burning   |

## **7.0 Conclusion and Recommendations**

### **7.1 Conclusion**

The problem of forest and bush fires in the East Usambaras is a result of failure of the existing fire management system in the area. There is poor involvement of the communities by Private companies, District Council, Catchment Forest Project, Amani Nature Reserve and even during previous EUCAMP support thus lacks control of it. There is no agreed community based approaches for fire management like strategies, regulations, by-laws and the associated penalties, distribution of roles and responsibilities, decision-making power and availability of necessary resources. However, despite the fact that local communities are the key and first beneficiaries from the use and not use of fires they are still not yet empowered enough to have more control of fires within the landscape..

### **7.2 Recommendations**

1. It was noted that one of the causes of the problem of forest and bush fires in the area is inadequate awareness, knowledge and skills on fire management by local communities thus failure to control fire incidences. *Therefore for fire management to be successful we need to empower the local communities especially through awareness raising, environmental education, institutionalize fire management schemes at local level and where necessary to support them in terms of fire fighting gears and legal enforcement by respective authorities.*
2. Poverty is another factor contributing to the unsustainable fire management in the area. The forests adjacent communities are quite poor and own small farm size averaged 1 to 1.5 hectares with yielding capacity of 3 to 4 bags of maize, which cannot cater for their annual demands. As a result some people have been involved into other alternative economic activities some of which are associated with the on going forest and bush fires in the area such as illegal

timber harvesting, traditional beekeeping activities, hunting in search for alternative sources of protein and free range grazing. *Therefore for successful fire management programme, there is a need to introduces more promising alternative economic activities, which are environmentally sound like modern beekeeping, zero grazing for dairy cattle and goats, fish farming, butterfly farming etc. These would act as incentives for their participation into sustainable fire management. Scaling up these IGAs in the landscape would significantly minimize fire incidences in the landscape.*

3. In addition to incentives for effective fire management, sanctions for unsound management are deemed equally important especially in discouraging people from breaking the rules for fire management. *Therefore there should be enforcement and monitoring of the agreed fines and penalties for the uncontrolled forest and bush fires. In some cases where the offenders were not members of the community assistance from the government should be sought for the law to take its own cause.*
4. It was noted that it's hardly possible to completely ban use of fire in the area since it is such a useful traditional tool to use especially in clearing farms for cultivation. Nevertheless, controlled burning as a suitable approach for sustainable forest and bush fire management in the area has been taken up by the communities as the best alternative. *It was therefore important that all the prerequisites for successful controlled burning were thoroughly followed up as per the agreed Community Based Fire Management Plan.*
5. However, careful planning is required especially in allocating resources, roles and responsibilities for forest fire management to ensure that poor communities are not overburdened by such arrangements, especially in cases where tangible benefits are unlikely to be realized immediately. In this case the responsibility for fire management should be given to the Village Environmental Committee than to several authorities within same village. In so doing

unnecessary clashes in the course of executing their responsibilities would be minimized. There is normally an Environmental Committee in every village of which fire management is one of its responsibilities. *The committees should be supported in terms of fire management plan and by-laws development and enforcement, awareness raising about problems and damages of uncontrolled fires. Regular training on sustainable fire management approaches should be enhanced.*

6. There exist no recorded data about fire incidences; area burned or type of property destroyed. *Fire baseline information need to be established at the beginning of the project in order to determine progress during different stages of the project implementation.*

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## **9.0 APPENDICES**

### **9.1 Appendix one: THE COMMUNITY BASED FIRE MANAGEMENT PLAN AND BY LAWS FOR THE EAST USAMBARAS**

This management plan was developed based on the comments, suggestions and recommendations made during the various meetings with village governments and village environmental committees, and disadvantaged groups of women and youths in East Usambaras. It includes also inputs made during the consultative meetings with District Forest Office - Muheza, Regional Catchment Forest Officer – Tanga, Amani Nature Reserve, Mlingano Agricultural Research Institute Tanzania Forest Conservation Group (TFCG) and WWF TPO. It follows thorough assessment, discussions and analysis of the fire problems in the area, causes, community involvement and further possible solutions for stopping or minimizing forest/bush fires in the area and conserving the forest resources. It shows the implementation plan, mode of operation, fire by-laws, and rules and regulations. It also documents the prerequisites and guidelines agreed by each of the project village and spell out the don'ts and dos regarding the use of fire and how to fight against fires in the village land as well as in Forest Reserves. This considered capacity of the local community, access to tools and gears for fighting fires, environmental impact, potential livelihood impact, gender and youth.

#### **9.1 The Implementation Plan**

##### **9.1.1 Supervision and Monitoring of the Implementation process**

The Village Environmental Committee will do supervisory work of this management plan. The reason behind this is that fire issues are part of the responsibilities of village environmental committee in every village. This was agreed especially in trying to avoid clashes that could be created as a result of having many committees in one area with interacting responsibilities. Also it appeared that fire has been problematic due to

inadequate capacity of the existing systems in terms of technical know how, awareness and commitment for which if tackled could result into successful fire management in the area.

## **9.2 Roles and Responsibilities**

The agreed roles and responsibilities ranges from the Village Environmental Committee, to village government, Public/ Communities, District, Regional, FBD and NGOs. It has appeared that for fire management to be successful there was needed to establish a close linkange, commitment and cooperation among different stakeholders, government institutions and the existing organizations. Every stakeholder has to play its part fully and share the experience, challenges and achievements among others.

### **9.2.1 Village Environmental Committee**

The village Environmental Committee will be responsible to the village government and some of its specific responsibilities shall be:

- To update the progress on fire management in the village every month.
- To plan and supervise execution of all fire management activities in the village
- To prepare fire management Action Plan annually which will be shared with the village government
- To discuss and agree upon the request/ intention for and participate into prescribed fires, like constructing firebreaks around the forest perimeter every year just before the start of the dry season and also around agricultural fields before setting fire to clear land for cultivation.
- To mobilize and supervise public participation into sustainable fire management initiatives in the village.
- To propose to the village government the necessary amendments to be made on the existing fire management plan and by-laws.
- To keep records of all meetings, training, workshops, transactions and collections from fines, permits etc.

- Ensure effective communication for successful and sustainable fire management in the village.

### **9.2.2 Village Government**

The village government will be required to:

- Approve the fire management plan and by-laws and later submit it to the Village Council then forward it to Ward Development Committee for further approval.
- Organize various meetings with village government, village environmental committee and village assembly to discuss issues related to sustainable fire management in the area, election of environmental committee members, approval of the fire management plan etc.
- Keep all monthly reports on fire management progress from the village environmental committee.
- Ensure that the village environmental committee is fully undertaking its responsibilities as per the management plan.
- Issue permission for prescribed fires in the village.
- Supervise enforcement of the fire by-laws and effectiveness of the associated penalties/ fines and compensation.
- See to it that the communities are fully involved into sustainable fire management activities in the village.
- Contribute (in kind and cash) into successful implementation of the fire management plan.
- Keep in custody all materials and tools that would be available for fire fighting in the village.

### **9.2.3 The Communities / villagers**

The local communities would be responsible for:

- Implementing the fire management plan
- To elect members for the Village Environmental Committee
- To inform the village government and Village Environmental Committee in a good time in case of any uncontrolled fires in the area.

- To participate into various meetings, trainings etc regarding to sustainable fire management issues in the area including approval of the fire management plan and by-laws.
- To voluntarily participate fully into all uncontrolled fire suppression work in the area.
- To voluntarily participate into firebreaks construction work around all the existing forest reserves' perimeter (village, community, private, government forest reserves) just before the on set of the dry season in every year so as to reduce the threat of fire. Each family will contribute at least one representative (labour) in this work and failure to that shall be liable to a fine as per the existing by-laws.

#### **9.2.4 Muheza District Council**

- To approve the fire management plan and by-laws
- To contribute (in kind and cash) into successful implementation of the fire management plan and enforcement of the by-laws.
- Work to incorporate fire management initiatives into other development efforts in the area.
- To participate into various meetings, trainings, workshops, etc regarding to sustainable fire management initiatives in the area.

#### **9.2.5 Forest and Beekeeping Division (FBD)**

- To approve the fire management plan and by-laws
- To contribute (in kind and cash) into successful implementation of the fire management plan.
- Work to incorporate fire management initiatives into other development efforts in the area.

#### **9.2.6 NGOs**

- To provide technical assistance especially in designing and developing the fire management plan and by-laws.

- Organize, support and conduct various meetings, seminars, workshops, and campaigns on fire awareness rising and public education through schools and local organizations.
- Oversee the implementation and monitoring progress of fire management work and give technical backups whenever necessary.
- Support training through:- fire drama, radio programmes and videos and also availability of fire suppression tools and equipments, training materials and posters.
- Support introduction of alternative environmentally positive economic activities in the area.
- To provide technical and material support towards improving and sustaining the existing farming systems in the area.

### **9.3 Mode of Operation (Rules and Regulations)**

#### **9.3.1 Prescribed burning**

Findings have shown that it would be hardly possible and unsustainable to completely ban the tradition of using fires in clearing farms for cultivation in the East Usambaras. Alternatively, the communities have agreed on prescribed burning technique following its prerequisites as shown hereunder that:

- No one is allowed to use fire to clear land for cultivation prior written permission from the village government (either from village chairperson or sub village chairperson). However permission will be granted only to those with strong supporting reasons explaining the intention and time of the day he/she wants to set fire.
- He / she should also inform the sub village chairperson (if not involved when issuing permission) and at least one member of the Village Environmental Committee.
- He / she should also inform all his / her neighbours around the area where fire would be set. This would help in drawing up joint suppression of uncontrolled fires and also provide advance warning in a good time to those who are likely to be affected.

- Must observe various techniques to be involved like protecting valuable trees, houses, animal stalls, burning against the wind, back burning, and constructing firebreaks around farm land perimeter.

### **9.3.2 Capacity Building**

#### **9.3.2.1 At the community level**

Training and mobilization of communities towards sustainable fire management will be needed. This should involve massive fire awareness and public education campaign through schools (primary and secondary) and local communities and organizations in the area. These include the techniques for fire fighting and firebreaks construction; formation of fire drama groups, production of posters and distribution of various written materials for learning and training. Introduction of radio and video programmes is considered important for massive public awareness rising and training.

#### **9.3.2.2 At District, Regional and National Level**

All stakeholders' and/ or institutions above should be involved particularly in strengthening communication, capacity building of the key players (training) improvement and sustenance of cooperation on fire fighting initiatives.

### **9.4 Fire By-Laws**

The following are the by-laws and the associated penalties which were thoroughly discussed and agreed upon by the communities in East Usambaras of which everyone has to comply with. Therefore based on that it is an offence for any person who;

- Wilfully and unlawfully refuses or discourages others to participate in fire management activities in the village as per instructions and/ or the existing management plan,
- In anyhow refuses or discourages people to participate into fire suppression and /or firebreaks construction work in the village,

- Fails to inform his / her neighbours, the village chairperson/ sub village chairperson, and at least one member of the village environmental committee, before he / she sets fire to clear the land for cultivation,
- Sets fire or attempts prescribed burning prior a written permission of the village government nor abiding to all prerequisites for prescribed burning,
- Wilfully and unlawfully sets or causes fire to any forest reserve and / or bush land in the area.

Therefore if anyone fails to comply with any of these by – laws shall be guilt of an offence and upon conviction, shall be liable to a fine of not less than 20,000 Tshs for the first offence and 40,000 Tshs for each of the added offences. Failure to comply with these penalties, the main Act proceedings and penalties shall be executed through the Muheza District Forest Officer. In addition to that, shall be required to plant trees and tend them until such that the area of the forest or / and bush land that has been destroyed by fire is restored. Shall be liable to pay for compensation of any damages that might have been caused starting from that of crops, houses, livestock and other properties.

**Appendix two (1) FOREST ACT NO. 14 OF 2002 AND FOREST REGULATIONS,  
2004 ON BUSH/FOREST FIRES INCLUDING OFFENCES & PENALTIES.**

**(1) The Forest Act No. 14 of 2002**

Section 70 (1-5) spells out restriction on burning of vegetation, Section 71 (1-5) talks about power to require persons to assist in extinguishing fire.

**1.1 Restriction on burning of vegetation**

*70 (1) unless otherwise exempted by an order made by the Minister and published in the Gazette, no person shall, subject to the provisions of this section, within any area of Tanzania Mainland:*

*(a) Burning of any vegetation on any land outside the cartilage of own house or compound*

*(b) Wilful or negligent kindle or cause to be kindled any fire which one has reasonable cause to believe may spread so as to destroy or damage any property of any other person or the sate.*

*(2) A very person who intends to burn vegetation outside the cartilage of his own house or compound or any other land in pursuance of any permission from the person having control of the said land or from a forestry or other officecer with the authority to grant such permission, shall, before proceeding to burn any vegetation endeavour to give such reasonable notice of his intention to burn the vegetation in such form as will enable the persons to whom it is addressed to understand it, to:*

*(a) the occupiers of all land which is situated within half a km of the place where the burning is to take place*

*(b) the officer who has authorized the burning of vegetation on any land or where the burning is to take place on the burner's own land, and officer responsible for such matters from a local authority having jurisdiction over the place where the burning is to take place.*

*(3) The notice referred above shall*

*(a) be in writing and delivered by hand or given orally ,*

*(b) be deemed to take effect from the time it is given, and*

*(c) shall state as near as may be the time at which the burning will take place.*

*(4) If for any reason the burning does not place at the time specified in the notice, a further notice in terms of subsections (2) and (3) shall be required to be given by the person intending to undertake the burning*

*(5) Where a fire lawfully kindled after notice given in terms of subsections (2) and (3) spreads to other land , the fact that such notice was given shall:*

*(a) be sufficient defence to any person who kindled or was responsible for the fire to any charge contravening the terms unless it is proved that such a person wilfully or by the negligence of himself, his employees or agents caused or permitted such fire*

*to spread across the boundaries of the land on which the burning took place to such other land*

*(b) not affect the right of any person aggrieved to sue for and receive damages in respect of any loss sustained by him as a result of such fire*

*Section 71 (1) Whenever there is good reason to believe, that any fire in the open air may become dangerous to life or property, any person acting in good faith shall:*

*(a) notify the occupier of land upon which such fire is burning is of his belief, or where the occupier is not present on the land or is not present in the vicinity of the fire*

*(b) either alone or with other persons enter upon any land for the purpose of extinguishing that fire or for preventing the extension there of*

*(2) Any owner notified of a fire on his land shall take all reasonable measures to extinguish that fire or prevent its extension and to this end he may require any person present at or in the vicinity of such fire to render assistance or do any act or perform any service as he may consider necessary or expedient to control, extinguish or prevent the spread of such fire*

*(3) Any person in the vicinity of a fire has the obligation whether called upon to do so or not, to attempt or assist in extinguishing such fire which he has reasonable cause to believe is not under control or may become dangerous to life or property but no person shall be obliged to take any action which a reasonable person or firm disposition would consider to endanger his life or cause him injury*

*(4) Any person acting in terms of paragraph (a) of subsection (1) or any occupier of land acting in terms of subsection (2)*

*(a) shall have the control of persons whom he has required to assist him and of persons who voluntarily place their services at his disposal*

*(b) may take all such measures as in the circumstances are reasonable and necessary or expedient for the protection of life and property or for extinguishing or preventing the spread of fire and may for this purpose, cause reasonable destruction of any trees, grass, crops or other vegetation by cutting , burning, ploughing or (c) may order any person whose life may be or may become endangered or whose presence at or in the vicinity of the fire may interfere with any operation in connection with the fire, to remove himself or any vehicle or other thing under his control*

*(5) Where any fire is approaching the boundary of a forest reserve, or is burning within a forest reserve, any officer present shall have the right and duty to take full control of all actions to extinguish or contain the spread of the fire and to that end shall have all the powers conferred on any person referred to under subsection (4).*

*(73) Any person is upon the land of another , whether lawfully or not upon any road or vacant land shall, carefully and properly extinguish any fire kindled or used by him and until he has done so shall not go so far from any such fire as to be unable to control it by himself or his employees*

*(75) Save in respect of any reasonable and necessary action taken under the provisions of sections 71 and 74 , nothing in this Part shall be deemed to affect the right of any person aggrieved to recover damages by civil action for any loss sustained by him.*

## **(1.2) Offences and fines**

*Section 91 (1) Any person who, without lawful authority or excuse the proof of which shall lie upon him-*

*(a) lights or assists, rekindles or adds fuel to any fire or causes any of the above of these activities to take place;*

*(b) leaves unattended a fire which he, with or without authority has lighted or assisted in lighting or used or rekindled or to which he has added fuel before such fire is thoroughly extinguished;*

*(c) fails to comply with any lawful order issued to him under and in connection with any of Part IX of this Act , shall be guilty of an offence and upon conviction, shall be liable to a fine of not less than fifty thousand shillings and not exceeding one year or to both such fine and imprisonment.*

*(2) Any person who wilfully and unlawfully and unlawfully sets fire to any forest reserve, forest plantation, standing trees, sapling or shrubs, whether indigenous or not*

*, commits an offence and upon conviction shall be liable in accordance with the provisions of section 321 of the Penal Code.*

**(2) Part XIV Regulation of forest fires and the use of inflammable materials within forest reserves and woodlands**

*Section 49 (1-8 ) of the forest regulations 2004 about restriction on use and inflammable objects states that:*

*(6) No person in a forest shall:*

- (a) light or maintain a fire or cause a fire to be lighted for purposes of cooking or preparing a meal or bottling water or for any other purposes, other than a lamp or stove having being permitted to do so within a camping site or stopping place*
- (b) leave any fire which he has lighted or which he has caused to be lighted un-extinguished*
- (c) Discarding any burning or incandescent object*
- (d) use fire in connection with charcoal making , lime making, brick making, honey harvesting, distillation or activities of a similar nature or the destruction of waste or such activities*
- (e) use fire in the open air for the purpose of or in connection with the destruction of sawmill waste, unless such fire is lit:*

*(i) in an incinerator with which the escape of sparks, incandescent or burning material is prevented*

*(ii) within a pit dug into the ground or ground enclosed with a 2 metre high fence of fire resisting materials where the top of waste to be burnt shall be not less than 60 cm below the top of the pit or the top of the edge of the fence and provided that the area within a radius of 10 metres from the edge of the pit or fence is cleared of all inflammable material.*

*(7) No person other than a forest officer or manager shall light or maintain or use to be maintained or used any fire in any forest reserve for the purposes of cleaning bush, timber scrub, trees, grass or any other material for burning any firebreak unless:*

*(a) a written permit has been applied for and be granted by a forest officer or forest manager and*

*(b) such fire is lit, maintained and used in compliance with conditions of the said permit*

*(8) The form of application and permit under sub regulation shall be as set out in the 23<sup>rd</sup> and 24<sup>th</sup> Schedules to these regulations*

*(9) Any person or body of persons conducting sawmilling, logging and other forest operations in any forest reserve shall:*

*(a) surround his working compound, building, logging and landing yards, logging camps and settlements with a fire break complete*

*ly cleaned of all inflammable material to a minimum width of 10 m and maintain such a clean condition at all times*

*(b) carry out protective early burning in the vicinity of the industry, camp or settlement from time to time as directed by a forest officer or manager and;*

*(10) Every person or body of persons carrying out logging or similar licensed or permitted forest operations shall maintain a minimum requirement of fire fighting equipment and must be ready to provide additional fire fighting equipment to combat forest fires as and when directed to do so by a forest officer or manager and shall take all reasonable precautions to avoid and prevent damage to a forest reserve by fire and to extinguish any fire arising from their operations*

*(11) In the event the forest officer deem that milling, logging or any other operations in a forest reserve may give rise to a danger of ignition or rapid spread of fire, he may require a holder of a logging license or any other forest licensed operations in any forest, to suspend milling, logging or any other activity, until instructed otherwise and in writing by the forest officer*

*(12) Any person who has knowledge of any fire outbreak shall report the same to the forest officer or any authorized officer and where possible seek assistance of neighbours to extinguish the fire swiftly*

*(13) The Director or any other authorised officer may by order close for a stated period any forest reserve or roads, tracts or paths passing*

*through such a reserve to protect the same from fire or to prevent loss of property and life where the forest reserve is already on fire.*

### 10.0 Appendix three: Implementation / action plan for the community based fire management

| No | Activity                                   | Responsibility                       | TIME FRAME  |             |             |             |             |             |             |             |             |             |             |             | Expected Output | Indicator  |  |
|----|--|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------|--|--|
|    |  |                                      | J<br>a<br>n | F<br>e<br>b | M<br>a<br>r | A<br>p<br>r | M<br>a<br>y | J<br>u<br>n | J<br>u<br>l | A<br>u<br>g | S<br>e<br>p | O<br>c<br>t | N<br>o<br>v | D<br>e<br>c |                 |  |  |
| 1  | Establish Fire baseline information        | VECs, Village government (VG) & TFCG |             |             |             |             |             |             |             |             |             |             |             |             |                 | <ul style="list-style-type: none"> <li>Fire Baseline data established by December 2007</li> </ul>  | <ul style="list-style-type: none"> <li>Good progress in changing and improving restoration area</li> </ul>   |
| 2  | Public Awareness rising on fire management | VECs, VG, & TFCG                     |             |             |             |             |             |             |             |             |             |             |             |             |                 | <ul style="list-style-type: none"> <li>Awareness meetings conducted in every project village</li> <li>Posters produced and distributed in all areas</li> <li>Drama &amp; Video shows used</li> <li>Brochure produce and distributed</li> </ul> | <ul style="list-style-type: none"> <li>Increase participation in fire management public, Village</li> <li>Good success in fire management efforts levels upward, d Regional</li> </ul> |

|   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 3 | Training to VECs, Village Government (VG), Schools and public on Fire management                | TFCG, Environmental Teachers & Muheza District Officials |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Construction of firebreaks to the Village, Community, Private, and Government forests reserves. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Approval of the fire management plan and by laws at village, ward and                           | Village Assembly meeting, Ward executiv                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|   |  |  |  |  |  |  |  |  |  |  |  |  |  |   |   |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|---|---|
|   | district levels  | e<br>officer<br>& Muheza<br>District<br>Full<br>Council<br>meeting,<br>FBD |  |  |  |  |  |  |  |  |  |  |  | area  | <ul style="list-style-type: none"> <li>▪ Good Su</li> <li>fire ma</li> <li>efforts</li> <li>levels</li> <li>ward, d</li> <li>Regiona</li> </ul>   |
| 6 | Support<br>Introduction of<br>alternative<br>economic activities   | Project/<br>TFCG   |  |  |  |  |  |  |  |  |  |  |  | <ul style="list-style-type: none"> <li>▪ Suitable IGAs<br/>identified and<br/>introduced in the<br/>area</li> <li>▪ Secured market<br/>for the<br/>introduced<br/>activities and<br/>the existing ones</li> </ul> | <ul style="list-style-type: none"> <li>▪ Number<br/>involve</li> <li>related</li> <li>generat</li> <li>activit</li> <li>▪ Impact</li> <li>alterna</li> <li>based i</li> <li>generat</li> <li>activit</li> <li>people'</li> <li>livelih</li> </ul>                       |
|   | Restoration of the<br>previously on farm<br>and forest fire<br>destroyed areas by<br>tree planting as<br>woodlots and<br>agroforestry<br>practices | VECs,<br>VG, TFCG<br>and<br>District<br>official<br>s                      |  |  |  |  |  |  |  |  |  |  |  | <ul style="list-style-type: none"> <li>▪ Woodlots<br/>established in<br/>the area</li> <li>▪ Suitable<br/>agroforestry<br/>systems in<br/>practice</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Area<br/>planted</li> <li>various</li> <li>increas</li> <li>landscap</li> <li>▪ Quality</li> <li>in</li> <li>maintain</li> <li>▪ Number</li> <li>forest</li> <li>and</li> <li>woodlot</li> <li>in ke</li> <li>areas</li> </ul> |
|   |  |  |  |  |  |  |  |  |  |  |  |  |  |   |   |



## 11.0 Appendix Four: Household questionnaire

Questionnaire No \_\_\_\_\_

Date of interview \_\_\_\_\_

Village \_\_\_\_\_ Ward \_\_\_\_\_ District \_\_\_\_\_

1. Name of the respondent \_\_\_\_\_

2. Age \_\_\_\_\_ (Years)

3. Sex \_\_\_\_\_ (i) Male (ii) Female

4. Marital status of the respondent

(i) Single

(ii) Married

(iii) Widow/Widower (iv) Divorced/Separated

5. Education level

(i) No formal education (ii) Primary education

(iii) Secondary education (iv) Post secondary education

6. Major economic activities

(i) Agriculture / Farming

(ii) Livestock keeping

(iii) Hunting

(iv) Beekeeping

(v) Pet trading

(vi) Others (Explain) \_\_\_\_\_

7. What types of crops do you grow?

| Food crops | Cash crops |
|------------|------------|
|            |            |
|            |            |
|            |            |

8. What farming methods do usually use?

(i) Mixed farming (ii) Mono cropping

(iii) Crop rotation (IV) Shifting cultivation

(v) Others (Specify)

9. Do you keep livestock?

| Type | Quantity |
|------|----------|
|      |          |
|      |          |
|      |          |
|      |          |

10. Do you get extension services?

(i) Yes (ii) No

11. How many times have extension officers visited you in the last 12 months?

(i) ( ) times (ii) Never

12. Are bush and / or forest fires a problem here?

(i) Yes (ii) No

13. If yes; what are the problems?

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14. What are causes or sources of bush/ forest fires?

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15. Is there any traditional/customary law(s) that prevent people from making/ causing bush fire?

(i) Yes      (ii) No      (iii) I don't know

16. Is there any traditional / customary law (s) that prevents/ control people from causing bush/ forest fires?

(i) Yes      (ii) No

17. If yes; what are they?

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18. Do you feel responsible for stopping uncontrolled bush and forest fires in your village?

(i) Yes      (ii) No

19. If Not why?

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20. Comparatively would you say the incidence of forest and bush fires for the past 5 – 15 years have been increasing or decreasing or no change? What are the reasons for that situation?

21. On your opinion, what do you think should be done to prevent further bush and forest fires in this are?

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22. What committee is responsible for fire management in this village? Do you think the responsible committee is doing enough?

- (i) Yes      (ii) No

23. If not, what do you think should be done to end the problem?

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24. What punishment do you consider appropriate for someone found guilty of an offence of uncontrolled fires in the area?

- (a) Pay fine of Tshs 10,000 for every offence.
- (b) Pay Tshs 10,000 for the first offence and 20,000 for every additional offence.
- (c) Pay Tshs 10,000 for the first offence and 20,000 for every additional offence. Also to pay compensate for any damage that might have been caused and furthermore plant trees and tend them until the area is well restored.

25. Have you ever received any training on managing fire outbreak?

- (i) Yes      (ii) No

26. Which months of the year do you normally experience bush and forest fire outbreak?

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Thank you very much for your cooperation



## **12.0 Appendix Five: Checklist for Focused Group Discussions**

1. What is the major economic activities/source of income in the village?
2. What type of crops and livestock do you keep in the village?
3. Is bush and / or forest fire a problem in this area?
4. When do you usually experience bush and / or forest fires in this area?  
Which months?
5. What are the causes of the bush and / or forest fires in your area?
6. What committee is responsible for fire management in this village? Do you think it is doing enough that could arrest the situation in future?
7. Is there any village by-laws governing fire management in this village?
8. What punishment do you consider appropriate for someone found guilty of an offence of uncontrolled fires in this area/ village?
9. What are your opinions regarding to establishment of community based fire management programmes in this area?
10. What approaches do you consider suitable for successful fire management in this area?
11. Have you received any training regarding to fire management in this village?
12. Comparatively, what has been the situation of forest and bush fires outbreaks in the area for the past 5 to 15 years ago? Has the situation being increasing or decreasing or no change?
13. On your opinion, what do you think needs to be done to end this problem?

**- THE END-**

**Thanks for your time and contribution**

### **13.0 Appendix Six: Questionnaire for the key informants**

1. Name of respondent \_\_\_\_\_
2. Sex: (i) Male (ii) Female
3. Designation: \_\_\_\_\_
4. Do you have any project currently dealing with fire management in the area?  
(i) Yes (ii) No
5. Using your work experience, what do you consider to be the main causes of the on going bush and / or forest fires in the area?
6. Do you know any village by-laws governing fire management in the area?
7. What punishment do you consider appropriate for someone found guilty of an offence of uncontrolled fires in the area?
8. What are your opinions regarding to establishment of community based fire management programmes in the area?
9. Comparatively, what has been the situation of forest and bush fires outbreaks in the area for the past 5 to 15 years ago? Has the situation being increasing or decreasing or no change?
10. On your opinion, what do you think needs to be done to end this problem?

**-THE END-**

**Thank you for your time and cooperation**