

**WORKING PAPER 47**  
**Environmental Education Programme**  
**Environmental Activities within Local Communities**  
**East Usambara Mountains**

**Frontier Tanzania**  
**2002**

# **East Usambara Conservation Area Management Programme**

## **Working Paper 47**

### **Environmental Education Programme** **Environmental Activities within Local Communities** **East Usambara Mountains**

**Oliver, S.A., Bracebridge, C.E., Fanning, E. & Muruke, M.**  
**(eds.)**

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

**Department of International  
Development Co-operation, Finland  
Metsähallitus Consulting**

**Frontier-Tanzania  
University of Dar es Salaam  
Society for Environmental Exploration**

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**East Usambara Conservation Area Management Programme (EUCAMP)**

The East Usambara rain forests are one of the most valuable conservation areas in Africa. Several plant and animal species are found only in the East Usambara mountains. The rain forests secure the water supply of 200,000 people and the local people in the mountains depend on these forests. The East Usambara Conservation Area Management Programme has established the Amani Nature Reserve and aims; at protecting water sources; establishing and protecting forest reserves while sustaining villager's benefits from the forest. The programme is implemented by the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism with financial support from the Government of Finland, and implementation support from Indufor / Metsähallitus Group. To monitor the impact of the project, both baseline biodiversity assessments and development of a monitoring system are needed. The present activity is aimed at establishing baseline information on biological diversity in selected East Usambara forests.

**The University of Dar es Salaam (UDSM)**

The University of Dar es Salaam was established in July 1970 as a centre for learning and research in the arts and the physical, natural, earth, marine, medical and human sciences. The University is surveying and mapping the flora and fauna of Tanzania and is conducting research into the maintenance and improvement of the environment and the sustainable exploitation of Tanzania's natural resources.

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**Frontier Tanzania Forest Research Programme (FT FRP)**

The Society for Environmental Exploration and the University of Dar es Salaam have been conducting collaborative research into environmental issues since July 1989 under the title of Frontier Tanzania, of which one component is the Frontier Tanzania Forest Research Programme (FT FRP). Since July 1994, the FT FRP has been working in the forests of the East Usambara mountains in collaboration with the East Usambara Conservation Area Management Programme (EUCAMP). This survey of selected forests collects baseline biodiversity data and assists the EUCAMP in the management of the East Usambara forests.

**FOR MORE INFORMATION:**

Forestry and Beekeeping Division  
P.O. Box 426, Dar es Salaam, Tanzania  
Tel: 255-22-2111 062/3/4  
Fax: 255-22-2114 659  
E-mail: [misitu@twiga.com](mailto:misitu@twiga.com)

Department for Development Co-operation  
Ministry for Foreign Affairs  
Katajanokanlaituri 3  
FIN-00160 Helsinki, Finland  
Tel: 358-9-134 161 Fax: 358-9-1341 6293

East Usambara Conservation Area Management  
Programme  
P.O. Box 5869, Tanga, Tanzania  
Tel: 255-27-2643453, 2646907, 2643820  
Fax: 255-27-2643820  
E-mail: [usambara@twiga.com](mailto:usambara@twiga.com)  
Internet: [www.usambara.com](http://www.usambara.com)

Indufor / Metsähallitus Group  
Töölönkatu 15, FIN-00100 Helsinki, Finland  
Tel: 358-9-6840 1122  
Fax: 359-9-135 2552  
E-mail: [indufor@indufor.fi](mailto:indufor@indufor.fi)

Dept. of Zoology & Marine Biology  
University of Dar es Salaam  
P.O.Box 35064, Dar es Salaam, Tanzania  
Tel: 255-22-2410462  
E-mail: [zoology@udsm.ac.tz](mailto:zoology@udsm.ac.tz)

Society for Environmental Exploration  
50-52 Rivington Street, London, U.K.  
Tel: +44 20 76132422  
Fax: +44 20 76132992  
E-mail: [info@frontier.ac.uk](mailto:info@frontier.ac.uk)  
Internet: [www.frontier.ac.uk](http://www.frontier.ac.uk)

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## EXECUTIVE SUMMARY

During previous East Usambara Biodiversity Survey (EUBS) work, it was clear that local communities showed a great interest to be involved with, and to learn more about the biodiversity of their forest reserves and the work that Frontier-Tanzania in conjunction with the Catchment Department is carrying out in them. An additional objective was added to the Terms of Reference signed between Frontier-Tanzania and EUCAMP to tackle this issue.

The objective of the Environmental Education Programme was to provide small scale feedback with regard to the survey findings through environmental education activities within school and village committee networks, in co-operation with the EUCAMP Village Forestry Programme.

The aims of the Environmental Education Programme is:

- to translate biodiversity survey science and its results into a language that is both accessible and of interest to local communities.
- to increase knowledge on the importance of biodiversity in the East Usambara mountains within local communities.
- to increase local awareness of national environmental issues and to promote a concept of responsibility and pride for Forest Reserves.
- to build the capacity of local communities to understand the importance of biodiversity in their local forests, in the hope of helping effective future management of forest resources.

This paper combines Environmental Education activities from work carried out in three areas, Mlinga, Bombo East I and II and Mgambo forest reserves, which took place between October 2001 and June 2002. The paper documents these activities and discusses drawbacks and suggestions to assist future projects.

In general, adults targeted for the Environmental Education programme were environmental committees, village chairmen and teachers. These groups were invited to the research basecamp for meetings or workshops. Children targeted were predominantly primary school groups. These groups were taught by EUCAMP and Frontier-Tanzania staff, with the help of their teachers, during school hours. Additional activities such as an Environment Day, a women's group meeting and a secondary school visit to basecamp are also discussed within this document.

We hope that this working paper can be used as a resource for future biodiversity surveys and monitoring studies, and referred to during the implementation of future forest management such as Joint Forest Management, an initiative strongly encouraged by government policies and legislation (Forest Policy, 1998 and Forest Act, 2002).

## ACKNOWLEDGEMENTS

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Chief Technical Advisor:	Dr. Veli. Pohjonen
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Biodiversity Co-ordinator and Botanical Collector:	Mr. Albert Ntemi Sallu
Foresters:	Mr. Selemani Hamadi, Mr. Johari Mtango, Mr. Juma Ndege, Mama Asia Ezekiel, Mr. Frank Mahenge, Mr. Josephat Maingu, Mr. Francis Tunguli and Mr. Peter Juma Ntogolela.

### SOCIETY FOR ENVIRONMENTAL EXPLORATION

Managing Director of SEE:	Ms. Eibleis Fanning
Development Programme Manager:	Ms. Elizabeth Humphreys
Director of Research:	Dr. D. Stanwell Smith
Operations Manager:	Mr. Matthew Willson

### UDSM

Co-ordinators:	Prof. K. M. Howell and Dr M. Muruke
----------------	-------------------------------------

### FRONTIER-TANZANIA

Project Co-ordinator:	Ms. Nicola Beharrell
Research Co-ordinator:	Ms. Susannah Hall and Ms. Samantha Staddon
Assistant Research Co-ordinators:	Ms. Sophie Oliver, Ms. Claire Bracebridge, Ms. Jillian Smith, Mr. Adam Murphy, Ms. Nadine Svoboda, and Ms. Rosalind Salter
Logistics Manager:	Ms. Claire Latham
Field Assistants:	Mr. Hassani Abedi, Mr. Ramathan Rajabu, Mr. Ashraf Omari, Mr. Godfrey Mathew, Mr. Francis Kiondo, Mr. Iddi Selemani, Mr. Amiri Saidi, Mr. Lawrence Balua and Ms. Zahara Rashidi.
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# 1. DEVELOPMENT OF THE ENVIRONMENTAL EDUCATION PROGRAMME

Authors: Oliver, S.A. & Bracebridge, C.E. Pp. 1-4

## 1.1 Background

Since July 1995 Frontier-Tanzania (a collaboration between the University of Dar es Salaam and the Society for Environmental Exploration) has worked with the East Usambara Conservation Area Management Programme (EUCAMP) to survey the biodiversity of all East Usambara Mountain Forest Reserves. The East Usambara Biodiversity Surveys Project (EUBS) is implemented by the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism (MNRT) with financial support from the Government of Finland, and technical support from Metsähallitus Consulting.

Local community involvement in forest management and conservation is presently being encouraged by the Tanzanian Government through the implementation of the Forest Policy (1998). Within the 'Ecosystem Conservation and Management' section, this policy document discusses various 'visions for the future', three of which include a greater appreciation and awareness of biodiversity values, the involvement of private sector and local communities in biodiversity conservation, and to deliver extension education to local communities. Additionally, the new Forest Act (2002) states, as one of its main objectives, the aim of "*delegating responsibility for management of forest resources to the lowest possible level of local management consistent with national policies*". The idea of apportioning such responsibility to the main stakeholders (villagers and village governments), via participatory joint forest agreements, is fundamental but crucial to the future sustainable protection of natural resources. Although there are no reliable data on deforestation rates, it is predicted to be between 130,000-500,000 per annum (Forest Policy 1998). Of the 33.5 million hectares of Tanzanian forest and woodland, only 13 million ha has been gazetted as forest reserves. Despite most of the exploitation and depletion of natural resources occurring within the remaining areas of public land, deforestation is also extending into the protected reserve areas. The main reasons for this have been inadequate management and resources.

During previous (EUBS) work, it was clear that local communities were very interested to be involved with, and learn more about the biodiversity of their forest reserves. Throughout Tanzania and the rest of the developing world, knowledge gained from such scientific research has often not been made accessible to local villagers and schools.

In October 2001 a new Terms of Reference was signed by Frontier-Tanzania and EUCAMP to complete biodiversity surveys of the remaining five Forest Reserves, Mlinga, Bombo East I and II, Mgambo and Derema (proposed). An additional objective was added to the Terms of Reference that would tackle this issue. The objective stated that the EUBS team would 'provide small scale feedback with regard to the survey findings through environmental education activities within school and village committee networks, in co-operation with the EUCAMP Village Forestry Programme'. Despite limited funds, it was felt that environmental education could be provided on a small budget using locally available resources.

This objective was first implemented within Mlinga Forest Reserve, followed by Bombo East I and II, and then Mgambo. The experiences gained in these three areas have been documented within this EUCAMP working paper, in the hope that they will assist planning for future implementation of environmental education programmes.

## 1.2 Objective

- To provide small-scale feedback with regard to the survey findings through environmental education activities within school and village committee networks, in co-operation with the EUCAMP Village Forestry Programme.

## 1.3 Aims

- To translate biodiversity survey science and its results into a language that is both accessible and of interest to local communities.
- To increase knowledge on the importance of biodiversity in the East Usambara mountains within local communities.
- To increase local awareness of national environmental issues and to promote a concept of responsibility and pride for Forest Reserves.
- To build the capacity of local communities to understand the importance of biodiversity in their local forests, in the hope of helping effective future management of forest resources.

## 1.4 Planning process

For effective implementation of any environmental education programme, time is required to plan and carry out activities. The following steps were followed to ensure limited time could be used effectively:

1. **Assess the environmental situation** (identify the main environmental issues in the local area, identify work already carried out by EUCAMP within this area, by assessing consequential actions and technical solutions that EUCAMP have installed).
2. **Identify the audience or 'target groups'** (identify who will benefit and receive most)
3. **Identify the message** (identify how best to feedback information about biodiversity surveys – i.e. whether to incorporate local environmental issues, national and global conservation issues).
4. **Select a strategy** (what resources, forms of communication will be required to get your message across most effectively).
5. **Evaluation** (involving staff and target groups through further communication, both during phase and after to adapt and improve ideas and practices).

## 1.5 Target groups

Target groups were identified during and after preliminary meetings with local village committees.

Potential target groups were thought to be, extension workers (e.g. forest managers), resource managers, local leaders, village committees, school children and teachers, environmental committees, youth groups, women's groups and the general public. These groups were considered for the following reasons:

### *Extension workers/resource managers*

The involvement of extension workers (e.g. EUCAMP forest officers) in education efforts can maximise education impact since these workers can influence many people, and are they used to communicating with the local community. The translation of recent biodiversity research and science to foresters and other resource managers is therefore particularly worthwhile. This involvement is generally accomplished whilst training EUCAMP staff during the biodiversity surveys in the field.

### *Local leaders and village committees*

It is essential that local village leaders and committees are aware of EUBS work and have an understanding of the principles and reasons behind the research. Local leaders and other influential members of the community are generally an effective target group, firstly, as they are likely to help identify other target groups and secondly because they usually lead community members by example.

### *General public*

The general public are an obvious target, although a great deal of preparation is required when targeting this group to make impacts effective and to ensure concepts are thoroughly understood.

### *School children*

School children might be targeted in the hope of creating environmentally responsible adults, investing in the country's future. Other groups (e.g. those presently negatively affecting the environment, such as hunters) may however require more urgent attention. With reference to biodiversity survey feedback however, school children are a particularly important target group. Environmental education of school children can also indirectly or directly involve adults.

### *Environmental Committees*

Environmental committees are an obvious target for biodiversity survey feedback. It is likely that they will provide an interested and motivated audience. As active members of an organisation that is helping manage the forest reserves in the East Usambara mountains, they are an essential target group for biodiversity survey feedback.

### *Women's groups*

Women's groups are also an influential target group within the community and many extension activities and resource use issues (run by management organisations such as EUCAMP) are

directed at women as the main resource collectors or users. Women's groups are familiar with working together to discuss environmental issues (e.g. new stove technology) and are likely to be an interested and motivated audience. They are also likely to pass on these learnt skills and good-practice to their children.

## 1.6 Potential Strategies

The following strategies were considered as preliminary ideas for activity options.

- On camp demonstrations of biodiversity research to regional/village committees/women's groups.
- 'Activity afternoon' for younger school children, poster competition.
- More structured lessons for older school children with visual aids, essay writing competition.
- Presentation to local extension workers, environmental committees or women's groups about biodiversity survey and monitoring techniques and the value of Eastern Arc and East Usambara mountains for biodiversity.

Discussion topics might include:

- What is biodiversity? Endemism/environmental 'hotspots'
- Biodiversity value of Eastern Arc and East Usambara mountains
- Establishment of Forest and Nature Reserves
- Forest management and responsibilities of individuals, e.g. Forest Policy
- Ecology, e.g. balance of nature, food webs etc.
- Importance of forests, including conservation problems, solutions etc.

Available resources include:

- Maps – The world, Africa, Tanzania, Eastern Arc mountains, East Usambara mountains
- Toy Globes.
- Visual aids - field identification keys of animals and plants produced by Frontier Tanzania, environmental issues posters and pamphlets (WWF, WCST)
- Printed material produced by Frontier-Tanzania
- Stationary – colouring pens and pencils, paper, card

## 1.7 Evaluation

It is essential that an evaluation of the successes and failures of any environmental education programme be documented, so that experiences are learnt from and communicated widely. This report therefore documents the experiences from the environmental education activities that took place between October 2001 and June 2002 within the Environmental Education Programme.

## **2. ACTIVITIES IN MLINGA FOREST RESERVE**

Authors: Hall, S., Oliver, S.A. & Ntemi A. S. Pp. 5-20

### **2.1 Introduction**

Mlinga Forest Reserve, located to the east of the main East Usambara Mountain range of northeast Tanzania, covers an area of 8.9 km<sup>2</sup> (890ha), situated in Muheza District, Tanga Region. Its steep rocky slopes and peak area distinguish the Reserve. Altitudes range from 220m to 1069m above sea level. The Forest Reserve contains submontane, lowland forest and open wooded grassland. Mlinga Forest Reserve was gazetted as a Catchment Forest Reserve in 1994 primarily to protect the headwaters of Mruka (a tributary of the Sigi) and Mkulumzi Rivers and to conserve the interesting forest and rocky summit surrounding Mlinga peak (Hamilton, 1989). Mlinga Forest Reserve is surrounded by Misozwe, Magula and Mwembeni villages.

The greatest threat to forest quality and biodiversity within Mlinga Forest Reserve is the extensive nature of fire disturbance. Annual fires have been common place, with large areas of forest being lost. The East Usambara Biodiversity Survey of Mlinga found that approximately 77% of the forest reserve has been damaged by fire (Frontier Tanzania 2002a).

The East Usambara Biodiversity Survey (EUBS) took place in Mlinga Forest Reserve from 8<sup>th</sup> October to the 12<sup>th</sup> December 2001. Environmental education activities were incorporated into this period.

Environmental education activities within Mlinga Forest Reserve were co-ordinated by Ms. Susannah Hall (Frontier-Tanzania) and Mr. Albert Ntemi (EUCAMP), with the assistance of Mr. M. Wambura (EUCAMP), all Frontier-Tanzania and EUCAMP staff, Field Assistants and Research Assistants participating in the EUBS project. Ms. Sophie Oliver and Ms. Jane Wheeler (Frontier-Tanzania) took lead roles in organising school visits.

### **2.2 Environmental situation**

The environmental situation was assessed during the EUBS reconnaissance visit on 27<sup>th</sup> September, 2001 and during casual discussions in the first week of the fieldwork (13<sup>th</sup> to 21<sup>st</sup> October) between Mr. Albert Ntemi, Mr. Selemani Hamadi (Catchment Officer, Misozwe Sub-station) and Ms. Susannah Hall. From these discussions, the main environmental issues that were affecting Mlinga Forest Reserve were as follows, fire disturbance, animal hunting, illegal timber and pole extraction. These issues were to be addressed within the education programme.

The adjacent villages benefiting from the Forest Reserve are: Misozwe (and sub-villages, particularly Antakai), Magula and Mwembeni.

### 2.3 Target groups

Target groups were selected during a working group meeting held on 22<sup>nd</sup> October 2001, at which Mr. Albert Ntemi, Mr. Selemani Hamadi and Ms. Susannah Hall were present.

- **Adults**

The short-term nature of EUBS work within Mlinga Forest Reserve meant that previously established groups, environmental committees and women's groups, were selected as the most suitable target groups that would represent the adult community. These groups were already familiar with working together to discuss environmental issues. It was hoped that the members of these groups would represent their villages and feed information back to other members of the community.

Representatives from all three villages (Misozwe, Magula and Mwembeni) were invited to participate. It was noted that these three villages had not previously worked collaboratively in the past on environmental issues. Collaboration in the form of a meeting or workshop for each of these groups seemed to be a productive step towards the encouragement of collaborative conservation and protection of the Forest Reserve.

Positive preliminary suggestions and feedback regarding workshop strategy and structure were gained from members of both environmental committees and women's groups at a village committee meeting held 29<sup>th</sup> October 2001. The aim of this meeting was to introduce the EUBS team and work to village committee members.

- **Children**

There are three schools surrounding Mlinga Forest Reserve, namely Misozwe, Magula and Mwembene Primary Schools. Both Magula and Mwembene are very inaccessible and, as a result of limited time and resources, it was decided unfeasible to visit these children during this field phase. Therefore, the primary school in Misozwe was the centre for all of the children's activities. Misozwe Primary School is a large school, and it was decided that two visits would be made, each day targeting a different age bracket.

### 2.4 Activities & Timetable

Target Group	Activities	Villages involved	Dates & Times	Location
Environmental committees	Meeting	Misozwe, Magula and Mwembeni	9 <sup>th</sup> November 2001 9 am - 4.00 pm	EUBS Basecamp
Women's group	Meeting	Misozwe and sub-villages	8 <sup>th</sup> December 2001 9 am – 1.00 pm	EUBS Basecamp
Primary school (visit 1)	Years 1-3 education morning	Misozwe and sub-villages	3 <sup>rd</sup> December 2001 8 am - 10 am	Misozwe Primary School
Primary school (visit 2)	Years 4-6 education morning	Misozwe and sub-villages	4 <sup>th</sup> December 2001 8 am – 10 am	Misozwe Primary School

## 2.5 Adult Environmental Education Activities

### 2.5.1 Environmental Committees Meeting

#### 2.5.1.1 Methodology

Environmental committees from Misozwe, Magula and Mwembeni villages were invited, by letter, to the Biodiversity Survey basecamp on 9<sup>th</sup> November 2001. The aim of the meeting was to increase awareness of the importance of Eastern Arc mountains with reference to East Usambara mountain forests and, in particular, Mlinga Forest Reserve.

The meeting took the form of a presentation (Appendix 1) with discussion opportunities throughout. A question session at the end of the meeting led towards a more detailed discussion period of local issues within Mlinga Forest Reserve.

The meeting was chaired by Mr. Albert Ntemi. Technical assistance was provided by Mr. Matiko Wambura (EUCAMP Head Office, Tanga), Ms. Susannah Hall, Mr. Adam Murphy (both EUBS researchers) and Mr. Selemani Hamadi (EUCAMP). Additional presentation participants included Mr. Frank Mahenge (EUCAMP, Amani Nature Reserve) and Mr. Francis Kiondo (Field Assistant, Frontier Tanzania Forest Project-EUBS).

#### 2.5.1.2 Results

In total, 23 representatives from 3 villages attended the meeting. Presentation notes and handouts can be found in Appendix 1. Minutes from the meeting in Kiswahili are in Appendix 2. Main discussion points stemmed from the set of ten questions asked by EUBS to the villagers towards the end of the meeting. These questions and the committee members' answers are summarized below:

*Q1. What are the causes for the decline in forest surrounding their villages?*

**A1.** Fires, illegal hunting and pit-sawing, lack of environmental education, increasing population.

*Q2. Who caused/causes this disturbance?*

**A2.** Villagers themselves i.e. fire when preparing farms, pitsawing is mainly done by the people from the mainland who came here many years ago for jobs when harvesting was allowed.

*Q3. What are the effects that have happened as a result of the deforestation?*

**A3.** Lack of rains, lack of big animals which were found in the forest before, lack of water.

*Q4. What kind of animals have decreased or disappeared as a result of the illegal hunting and felling?*

**A4.** Lions, leopards and colobus monkeys.

*Q5. What advise do you think will help to protect the forest from disturbance?*

**A5.** To give environmental education to those people with farms near to the forest after their names have been listed. Clear forest borders more regularly so that fire will not enter the forest reserve.

*Q6. What problems discourage the planting of trees?*

**A6.** The seeds sold are not easily affordable by all. We advise to supply the seeds free. Education for conservation and environment is not enough, education in agroforestry is needed. Also people do not all have enough land for trees.

*Q7. What do you think will happen if all the forests are destroyed and damaged?*

**A7.** Desert, soil erosion, strong wind and bad weather.

*Q8. Do you believe the following saying "trees can live without people, but people cannot live without trees?"*

**A8.** Unsure yes. (Mr. Matiko explained more that humans need oxygen which is a waste product of trees and trees need carbon dioxide which is the waste product of humans, and therefore even if humans were not present the trees can get that carbon dioxide from other animals, but without trees, humans will be in trouble because of harvesting for firewood, timber for furniture and poles for houses).

*Q9. What efforts do you make for environmental conservation in your areas?*

**A9.** Misozwe: Everybody should plant at least three trees in his or her area, and they have a plan to plant trees both sides along the road from Mabungu village to Mkwajuni village. Mwembene: Everybody is encouraged to plant fruit trees.

Magula: they have a plan to plant trees along the path from Magula to Misozwe villages for shade.

*Q10. What do you think you could do to get what you need from the forests without disturbing them?*

**A10.** There should be special days for collecting firewood and medicines etc. Also, those who need to go to the forest should report to the village environment group leaders and forest officer before harvesting.

After a long discussion about the questions, Environmental Committee members asked several questions:

*Q1. Would it be possible to employ more people from the other villages?*

**A1.** We only had one training opportunity for a field assistant this phase because it is essential to have highly experienced staff to ensure safety of all project participants and to ensure animals and plants are collected to a high standard. We employed a young man from the closest village to camp for convenience and because he was highly suitable. It would be nice to employ one representative from every village surrounding the forest reserve so that training can be spread across the reserve borders. However, this is impractical because there are often

many villages surrounding the reserve. To ensure thorough and safe training it is necessary to only have a small number of participants training at one time.

*Q2. Will it be possible to have another meeting before the end of the survey work?*

**Q2.** That is a wonderful idea, but it is not feasible in the short time frame we are working with. Also we would like to involve Women in a similar meeting and visit the local school, our time and resources are limited and therefore a formal meeting such as this will not be possible.

#### 2.5.1.3 Discussion

As this was the first time for environmental committees from the three villages to collaborate together to discuss environmental issues, this was seen as a positive step. Secondly, it provided an opportunity for environmental committee members to voice their issues about conservation within Mlinga Forest Reserve to EUCAMP management. The meeting was good at rejuvenating conservation awareness and enthusiasm within the participants. Such a meeting could provide an important foundation towards Joint Forest Management (JFM) awareness and planning.

The format of the presentation worked well and the ten questions essential for the generation of effective and informative discussions.

The meeting ran significantly over-time, although this was more of a positive outcome of a long question session. A second meeting was requested by participants although, unfortunately, time and resources for this were not available.

Mr. Matiko played a prominent role during the meeting, and helped make the day a great success. It is essential that many experienced EUCAMP staff are involved in meetings such as this, to ensure effective answers to questions and the correct transfer of knowledge. Local catchment officers should also be involved at all stages of the planning and execution.

A whole day is required, particularly if there is an enthusiastic group of participants. Regular meetings between environmental committees and local catchment officers would be an effective means of sustaining enthusiasm and promoting conservation activities within the forest reserve. Subsequent meetings should be structured, with aims, objectives and group outputs.

### 2.5.2 Women's Group Meeting

#### 2.5.2.1 Methodology

The Women's Group from Misozwe village were invited, by letter, to the EUBS basecamp on 8<sup>th</sup> December 2001. The female teachers from Misozwe Primary School were also invited, after they made known their wish to learn more about our research. The aim of the meeting was to increase awareness of the importance of forest reserves within the East Usambara mountains, and in particular Mlinga Forest Reserve. There was to be discussion on the implementation of the new stove technology within the village, as the women had been training previously through EUCAMP on the construction and use of new brick and mud stoves.

The women's group meeting took the same form as the environmental committee meeting (refer to Appendix 1), although there was less emphasis on the Eastern Arc and East Usambara mountains as a whole, rather, more local issues were concentrated upon. The ten 'discussion promoting' questions were omitted and replaced by questions regarding new improved stove technology, for which the women's group has previously received training. The timetable of events is summarised in Appendix 3.

#### 2.5.2.2 Results

A total of 25 female participants, and one male attended the meeting. Most of the women were from Misozwe village. The male participant was a representative of the new improved stove training support group. The women put many questions to the EUBS team, particularly concerning animals such as snakes. Questions asked by the women included the following:

*Q1. How can you differentiate between poisonous and non-poisonous snakes?*

**A1.** You need to be able to identify the snake. The position of teeth determines the sort of bite and the type of snake determines the type of poison. Many snakes are not poisonous, but it is important that you are careful and leave them well alone. To kill snakes upsets the animal balance of the forest – for example snakes eat rodents etc.

*Q2. Is the venom of a snake in the spit juice or teeth?*

**A2.** Both, it depends on the snake and its defense strategy. Spitting snakes generally do not bite and vice versa.

*Q3. How do you catch snakes?*

**A3.** We use buckets to collect reptiles and amphibians, and also catch snakes casually, usually using sticks and gloves (if suitable) to handle carefully. Only experienced herpetologists or EUBS field staff handle snakes. Large poisonous snakes are usually easy to identify by sight and not handled. Such snakes are documented as a sighting. If we require a specimen, the snake is killed using a large stick.

*Q4. What does 'Endemic' mean?*

**A4.** An endemic frog is one that is found no-where else in the world. So a frog endemic to Mlinga Forest Reserve means that this is the only location in the world that it has been recorded.

*Q5. What is the importance of other animals which are not eaten by human beings?*

**A5.** Discussion about food-chain

*Q6. How do you know medicinal plants?*

**A6.** Medicinal plant knowledge is usually passed down from elder family members. To know whether a plant has medicinal properties you need first to be able to identify it. This usually requires specimen collection and identification in a herbarium. Chemical analysis can determine the chemical and hence medicinal properties of plants. Local knowledge can be used to produce literature on medicinal properties of plants.

Main discussion points concerning new improved stoves stemmed from the four questions asked by Albert Ntemi to the women, towards the end of the meeting. These questions directed discussion towards new stove technology and their progress since training. Answers from the women to these questions are summarized below:

*Q1. How have the improved stoves assisted you in forest conservation?*

**A1.** They have reduced walking distances to the forest to collect firewood, they also reduce smoke coming from the fire as the smoke in the new improved stoves is directed up a chimney. We now use less firewood, and save time cooking. It is possible to use debris if there is no firewood. It is said that one person can use five trees per year using new improved stoves, instead of fifteen trees using three stone stoves.

*Q2. To what extent has the improved stove knowledge/training spread amongst other women in the past year?*

**A2.** We haven't started to teach the other women because they haven't prepared the materials, also they are supposed to pay us 1,000TSh for one stove. Materials that they need to prepare include:

For the brick-type stove; ash (one tin), sand (one tin), clay soil (three tins), bricks (26 pieces).

For the mud stove; ash (one tin), sand (one tin), clay soil (eight tins).

*Q3. Which is the best new improved stove? Why?*

**A3.** All the new improved stoves are good, but the mud stoves need a longer time to dry after construction before you can use them.

*Q4. Is there any other environmental conservation measures you are planning to start apart from the improved stove?*

**A4.** We have started tree nurseries for the next planting season.

Catchment staff suggested that the women's group collaboratively work harder to encourage other villagers to prepare materials to build new improved stoves. Charges for their services of training should be reduced or the service should be free, just as it was for them.

#### 2.5.2.3 Discussion

Many women showed an interest in the biodiversity surveys and in receiving further environmental education. The meeting also provided a good opportunity to feedback developments since new improved stove technology training. The women were particularly interested in the animals found in Mlinga Forest Reserve.

The women's group and teachers seemed to enjoy the meeting, although they were not as interested in conservation issues as the environmental committee members had been previously. It is possible that the women of Misozwe are not as reliant on Mlinga Forest Reserve as anticipated. The EUBS research found limited fuel and pole-cutting disturbance within Mlinga Forest Reserve, and the large areas of public land surrounding the village suggest that this form of pressure on the reserve is not great. It is predicted that women in Magula and Mwembeni villages would be more dependent on Mlinga Forest Reserve, being

more isolated and living much closer to the forest. Perhaps a meeting with these women would have been advantageous.

The meeting would have greatly benefited from female catchment officer participation. In future great efforts should be made for an experienced female catchment officer to be present at meetings of this nature.

## 2.6 Children's Environmental Education Activities

### 2.6.1 Misozwe Primary School Visits

#### 2.6.1.1 Methodology

The main goal of the school Environmental Education project was determined and the following mission statement was created:

*“To increase interest, respect and the sense of responsibility for local Forest Reserves in both children and teachers.”*

The aims of the project were determined, as follows:

- To promote self-responsibility for protecting and utilising Forest Reserves.
- To encourage respect and interest for the natural forest habitat.
- To increase awareness of the role of a Catchment Officer.

A ‘brainstorming’ session involving Frontier staff, volunteers and EUCAMP representatives resulted in the production of a list of educational activity ideas that would be appropriate to carry out at Misozwe Primary School. These ideas were prioritised and the most feasible and relevant ones were used. The activities that would be used were, a catchment officer talk, ‘what’s in the bag’ game, an environmental trail, a poster-drawing session and a story-writing lesson. For each chosen activity, a Lesson Plan was created (see Appendix 4). Each lesson was designed to take 30 minutes and approximate times were allocated to different aspects of the lesson.

The date and duration of the school visits had been jointly decided after three meetings that took place at the school. The confirmed dates for visits were 3<sup>rd</sup> and 4<sup>th</sup> December (08.00 to 10.00). These dates were chosen as they did not interfere with the school exam timetable, and they fitted into the Frontier fieldwork schedule. It was decided that we should arrive at the start of the school day, as some of the children were participating in Ramadan, and would tire more readily around midday. Certain questions were asked at these initial meetings, such as:

1. Would class teachers be willing to assist with the smooth running of the visits?
2. What is the usual duration/number of lessons?
3. What is the size/age of classes?
4. How are classes normally run? Any resources available?
5. Could we take sound-recordings/photographs?
6. Would teachers fill out feedback forms afterwards?

There were over 400 students in attendance at Misozwe Primary School. It seemed most sensible to split classes into year groups. There were approximately 100 Standard One (6 year old) pupils, 60 Standard Two, and 50 Standard Three, Four, Five and Six (13 year olds), although attendance could vary. On the 3<sup>rd</sup> December, we took lessons for Standards One, Two and Three, and on the 4<sup>th</sup> we took Standards Four, Five and Six.

English speaking catchment officers were pivotal to the success of the visits. Visual aids and other sensory learning techniques were used as much as possible to reduce language comprehension issues.

#### 2.6.1.2 Summary of Visits

On Day 1, all the school teachers made themselves available to assist with the morning's activities. There were around 85 Standard One pupils and 80 pupils in Standard Two and Three combined. It was decided to teach Standards Two and Three together - making two groups of around the same size.

Most of the activities were conducted outside in the school grounds (see below table). This was essential for the environmental trail, but was also preferable for the catchment talk and 'what's in the bag?' for more space and to create a more relaxed study environment.

##### *Day 1 Schedule:*

<b>Standard One</b>	<b>Standard Two and Three</b>	<b>Location</b>	<b>Lesson Length</b>
Catchment Officer Talk	Catchment Officer Talk	School grounds	30 min
Environmental Trail	'What's in the Bag?'	School grounds	30 min
'What's in the Bag'	Environmental Trail	School grounds	30 min
Poster Drawing	Poster Drawing	Classroom	30 min

On Day 2, there were 89 pupils in Standards Four, Five and Six combined, therefore, it was decided that we would teach all years together. There was only one teacher present to assist on Day 2 and the three youngest years were occupied for most of the time in classes by the remaining teachers.

##### *Day 2 Schedule:*

<b>Standard Four, Five and Six</b>	<b>Location</b>	<b>Lesson Length</b>
Catchment Officer Talk	School grounds	45 min
Environmental Trail	School grounds	30 min
Group Story Writing	Classroom	45 min

The only intended variation to the schedule on Day 2 was to exchange 'what's in the bag' for the group story-writing lesson. However, once at the school, it seemed appropriate to continue the catchment talk longer for the older children and to remove the poster-drawing activity from the day to fit in better with the time available.

### 2.6.1.3 Discussion of Activities

#### ***Catchment Officer Talk***

Positive points:

- The main emphasis of the catchment talks was that the forest reserves belonged to the local communities and that it was up to local people to utilise and protect them (see Appendix 4 for talk content). Self-sufficiency was also talked about and encouraged, to alleviate pressure on the reserves. The children were already aware of these concepts and their knowledge was encouraged further through questions posed by the catchment officers.
- A colourful poster of endemic East Usambara species and a simple map of the East Usambara Forest Reserves were visual aids to the talk (see photo gallery, Appendix 6). The posters were held up by Frontier volunteers (but may have caused unnecessary distraction to some of the talks, as the posters were not always introduced adequately by the speaker). The posters were given to the school after the visit and the Usambara species poster was up in the staff room when we returned to the school on the day following the visits.
- Combining Standards Two and Three on Day 1 meant that there were two catchment officers co-presenting a talk. This seemed to work very well and kept the attention of the children better than having one speaker. We decided to combine Standards Four, Five and Six on the Day 2 to repeat the joint speaker effect.

Difficulties:

- Catchment officers performing this talk were not given much preparation time prior to visits, because individuals available were not confirmed until a couple of days before the visit. The assumption was made that all officers would be familiar with talking to school groups but, naturally, some officers were more comfortable with presenting to children than others.
- Suggested material was given and discussed with the officers the day before the visit to be used as guidance for talk content. On one occasion, these sheets were closely followed as prompting notes, which made the talk a little flat as this was not the original intention of having the notes. If practice talks could be performed to the Frontier camp before a school visit, this might improve techniques.
- As the talks were conducted in Kiswahili, it was difficult for Frontier-Tanzania to evaluate their success extensively, however, it was fair to say that children were attentive and enthusiastic towards the catchment officers throughout their talks. A talk from each day was recorded for further analysis and pupil questions were recorded.
- The officers were requested to style their talks in a casual question/answer format to encourage student participation. As expected, this style worked better on Day 2 with the older children, where there were a number of children offering answers. On Day 1 the group was not so interactive with the officers. This is an inevitable result of using unfamiliar 'teachers' and the natural shyness of the younger children.

#### ***Environmental Trail***

Positive points:

- All ages seemed to enjoy the trail and were very good at writing lists of natural things that they found in the grounds. Many drew pictures to illustrate what they found.

- The older year-groups were given an activity extension of noting ‘where’ the particular natural thing was found as well as ‘what’ it was.
- A number of sets of binoculars were brought along for the Trail. These were enjoyed by many of the pupils (and teachers). They were good to encourage looking at the environment in a novel, more detailed way. Pupils were eager to test them out, although tended to require instruction for use.
- On Day 2, a poster with animal footprints was used in the Trail introduction by the Catchment Officer. The footprint signs could be ‘flipped up’ to reveal the picture and name of the animal that would make them (see photo gallery, Appendix 6). This proved to be great fun and successfully involved all the children. The catchment officer encouraged children to make noises of the animals concerned etc.
- At the end of Day 1, one of the pupils brought up a large flap-necked chameleon from a nearby tree to show us. This was seen as a positive reflection of boosting the child’s enthusiasm for the local fauna in his desire to ‘show it off’ to us.

#### Difficulties:

- Footprints on the poster were not drawn to scale and would have been easier to envisage had they been.
- Many children appeared to invent natural things that they were unlikely to have come across on the morning of the Trail. It was not determined whether they may have seen these items previously in the grounds or not. Although this was not the intention of the exercise, the ‘inventions’ were plausible items within the environment and so still involved thought as to what could be there. Perhaps a way of getting round this problem could be to divide the page into what was there and what might be there (although this could get confusing).
- The Frontier-Tanzania volunteers helped well in this activity and it was often a good time for relaxed interaction, as volunteers loosely joined to pupil groups. A sheet of Kiswahili translations for likely items found would assist these English-speakers.
- Some of the younger children may have been uncomfortable or unable to write the names of their findings on paper. This had been considered and was why drawings were also encouraged. Perhaps the younger children would have found it simpler just to look rather than to record as well.

#### ***‘What’s in the Bag’***

##### Positive Points:

- This was a fun activity, which was enjoyed by the majority of the younger pupils.
- A few were not very keen on putting their hands in the bags (which was understandable!) but generally there was a teacher or catchment officer on hand to encourage.
- The Frontier-Tanzania volunteers were able to assist passing bags around the children. They benefited from having a list of the Kiswahili word for items.

##### Difficulties:

- The main drawback was the small number of Kiswahili speakers. Some groups were increased in size to ensure that there was a school teacher (or ‘controller’) per group. This was a good idea and worked well although the extent of teacher-participation varied considerably.

- In future, smaller groups would be preferable (although not always possible). Alternatives such as ‘touch tables’ etc. might be a more manageable way of conducting a similar activity, although would have less impact.
- Some of the younger children were shy with the close proximity of the Frontier-Tanzania staff at this point and needed encouragement to bravely put their hands into bags.
- Some of the teachers who took control of the bag-passing did not actually show the children the contents of the bag after everyone touched inside the bag. The difficulty was that the activity was both new to pupils as well as to teachers, perhaps more thorough explanation of the exercise was necessary.
- Most groups did not get the concept of describing how the object felt before passing the bag on and some blurted out what was in the bag before passing it on.

### ***Poster***

#### Positive Points:

- All the children on Day 1 were gathered up together and introduced to the poster idea outside, before going into classrooms to carry out the activity. This seemed easiest as the catchment officers could work together to introduce the concept.
- As time became short, the task was introduced and then the children were taken back to their classrooms to draw the posters. This was planned as a ‘quiet’ activity to make it easy for the teachers to resume lessons afterwards. It turned out that this was not necessary as the children were well-behaved throughout the morning and not requiring a ‘cool down’ time.
- On returning for Day 2, we were presented with a stack of posters that the children had drawn after we had left on Day 1. Many of the posters incorporated issues such as hunting and tree cutting as well as acknowledging forest reserves as a water catchment areas.
- The introduction to the poster-drawing activity by the catchment officers served as a reminder of points discussed at the start of the day and the poster served as a summarising task for the pupils.

#### Difficulties:

- As time was short, the decision was made to leave the children with the task of the poster to complete after our departure. Paper and drawing pencils were left with the school. Although the teachers voiced no issues with this, it would have been courteous for permission to have been obtained beforehand in the event of going over time.
- Drawing a poster was possibly a novel concept for the children and the results were pleasing. However, some of the posters appeared to be more like pictorial lists of things found in forests and many had a similar theme.

### ***Story Writing***

#### Positive Points:

- The story-writing exercise was a flexible task and, like the poster-drawing, was introduced and then left with the school to complete. It acted as a summarising activity for the day and made a good activity to finish up with.
- It is also a task that could be developed or continued at a later date by the teachers if they wished to do so. We left two extra books for them to write more stories in the future.

- Writing a joint story was a novel concept for pupils, teachers, catchment officers and Frontier staff alike. On our return the following day, we were given individual stories from all of the students. This was not quite how we planned the activity to occur but we were pleased that all children had participated in the task and most of the stories were detailed and contained a ‘forest message’ (see examples of Misozwe School work, Appendix 7).

#### Difficulties:

- As the story-writing was a new concept to all concerned, there was some confusion when the catchment officer introduced the activity. At first the story took shape as a list of things found in a forest reserve and the catchment officer had to be reinstructed. Basically, it was difficult to design this activity for someone else to carry out in exactly the way intended.
- Ideally, an ‘example’ story should be read out before the class attempts their own story.
- The teacher that was attending assisted with interpretation of the activity, although a briefing of the concept beforehand would have been helpful.
- The story-writing was the most ambitious of the activities but was felt it could be the most effective.
- A class book was prepared within which to scribe the story. Wide-spaced lines were drawn on plain card pages and space at the bottom of each page left for illustration at a later date. During the activity, a Tanzanian field staff member was given the task of copying the story from the blackboard into the book. However, it was written out in small ‘adult’ writing and all squashed onto the first page. This was a minor issue, but it highlights how it is often difficult to get instructions across with language difficulties; it also highlights that certain ideas common to UK schools are often unfamiliar to Tanzanian schools.

#### 2.6.1.4 Further Discussion

##### ***Teacher participation***

##### *Positive points:*

- All of Misozwe’s teachers were present to assist with the activities on Day 1. They were very useful to help organise such a large number of young children. The ‘what’s in the bag’ exercise would have been less of a success without their assistance.
- There was a feedback discussion session with the teachers after the visits, which was attended by all eight teachers as well as the head-teacher. All teachers completed individual feedback forms (see Appendix 5) and (unprompted) produced a summary sheet of their comments.
- Most of the teachers were very enthusiastic and helpful during the course of our visits. Their two main roles were assisting with organising the classes and helping to maintain enthusiasm levels. Their assistance was very valuable to the smooth running of the two days.
- Feedback from teachers was very positive and they were keen to find out how they could continue teaching about conservation and environmental issues. They were very keen to be given further resources and expressed great interest in wishing go to Amani Nature Reserve (they had approached the local catchment office previously to try to arrange such a visit, for students and/or teachers, but to no avail). Due to this enthusiasm, the female teachers from the school were invited to the women’s group meeting held at the Frontier camp at Mlinga Forest Reserve (see women’s group section of chapter).

- When we left the school, the teachers insisted on giving us a food gift as a thank you for our visits.

#### *Difficulties:*

- With only a limited working knowledge of the school and of the Tanzanian education system, it was difficult to plan the activities and to ‘pitch’ them correctly for the situation. Questions asked at meetings prior to the visits that (from an UK perspective) would have been straightforward to answer, proved not so simple and so there were several unknown variables to accommodate on arrival.
- Having all the teachers present on Day 1 meant that the older year-groups were not being taught at all during this visit, so they were leaning out of classrooms watching the goings on. This did not appear to be an issue for the school but it had not been our intention to cause quite such a distraction to the rest of the school.
- On Day 2 there was only one teacher assisting us. This was not a problem as we were instructing the three older years together, but it would have been difficult if there were a larger number of students. We were most grateful for this teacher’s assistance, especially his participation with the story-writing activity.
- It was wrongly assumed that the teachers would all have English-language skills.
- Some teachers were very helpful with the ‘what’s in the bag’ activity on Day 1, whereas others were less forthright to participate. The success of this activity required at least one Kiswahili speaker per group, and so some groups were more successful than others.
- Half of the feedback forms from the teachers were kept by the school ‘for their files’, so we were unable to see them all. Many of the feedback questions were not interpreted in the way that they were intended. It is not clear if the interpretation was lost in the translation or whether unfamiliarity with the feedback-form approach was the cause of this loss. Subsequently, the feedback forms have been amended to reduce future confusion (see Teacher Evaluation Forms, Appendix 5).
- Certain school practices as found in the UK, were wrongly assumed to occur at Misozwe school (for example, that certain teachers would teach specific year groups). This made ‘straight-forward’ questions (e.g. the ones put forward to teachers, as listed in the Methodology) hard to obtain clear answers to.

#### *Class sizes*

We were given approximate class sizes before the visits, but it was only on the day that we were able to visualise how the children could best be organised. Spot decisions were made during visits on how to group certain years together for various activities and to decide whether to hold lessons in the classroom or in the grounds. These decisions depended on how the teachers naturally grouped children, whether they were manageable in larger groups and the relative abilities of catchment officers, Frontier staff and teachers present. In fact, the children were used to being taught in large groups and were very disciplined.

### *Activities*

The activities were flexible enough to allow combinations of year-groups where necessary. It was possible to extend or shorten them if required. As a whole, 30 minutes was about right for lesson lengths, and two hours seemed to work well for the duration of the visits.

A contingency plan, had there been rain, was for the environmental trail to be abandoned and the ‘what’s in the bag’ to be conducted indoors and given to the older years to do on Day 2. In these visits, however, this was not necessary.

### *Competition Prizes*

The concept of conducting a competition was discussed prior to the visit and the topic was brought up again by a catchment officer during one of the visits. There were 15 colourful ‘Frontier’ T-shirts, which could have been given as prizes for best stories or posters etc. The decision was made not to do this, as we did not want to create a competitive atmosphere. In the end, the T-shirts were given to the headmaster to be distributed as he chose fit – perhaps to the school football team or choir. At the time, the teachers said they would like to wear them when they taught the children about the forest, so there is a chance the shirts may not end up where intended.

The idea of distributing sweets or putting sweets into a ‘what’s in the bag’ bag at the end of that activity was considered but, again, it was decided this might lead to avoidable disruption or squabbles and possibly issues concerning Ramadan fasting.

In the UK, teaching methods are tending away from competitive activities in preference for more co-operative activities. Further investigation is needed to determine whether a competition would be a valuable addition to a school visit.

#### 2.6.1.5 Recommendations

Continuity is the main factor that would significantly improve future school visits by Frontier. Although dealt with professionally, it was difficult for catchment officers to introduce activities to children when the activities were new to them too. Some officers were clearly more comfortable in presenting to children than others, and it would be very valuable to utilise these officers skills again. Sadly it is often difficult to request the assistance of specific catchment officers in advance and they may well have other commitments.

Locally stationed catchment officers should be involved wherever possible. Prior to these activity days, the Misozwe Catchment Officer had had the intention of visiting the school but had never arranged a visit.

Teacher involvement was essential (especially for the younger year-groups) and desirable to education and promote conservation topics for future lessons.

Lesson plans in Kiswahili could be given to teachers before the school visits and more detailed information/instruction on lesson content given at this point.

The school visits will often be difficult as the EUBS team generally ask the school if they can visit, rather than being requested by the school themselves. It may be more effective if a visit could fit around a school already looking at 'conservation' as a topic. Perhaps factsheets or a resource pack could be given to the school prior to a visit to encourage class discussions beforehand.

It would be advisable to schedule the school visit early to mid-way through a 'phase' so that contact with the school can be maintained during the remainder of the 'phase', if appropriate and time allows. Ideally a teacher-training session after the school visits should be incorporated to empower teachers to continue environmental education in the schools and to avoid the 'flash in the pan' feeling.

- A resource pack would be ideal to give to a school with ideas for continuation lessons etc. that can be performed at a later stage. Such a document has been produced as a separate working paper (Frontier Tanzania 2002c) and the distribution of such a document is being investigated.

### 3. ACTIVITIES IN BOMBO EAST I AND II FOREST RESERVES

Authors: Staddon, S., Svoboda, N., Salter, R. & Ntemi, A.S. Pp. 21-26

#### 3.1 Introduction

Bombo East I and II Forest Reserves are located in the north of the East Usambara Mountain range of north-eastern Tanzania, and cover an area of 4 (404 ha) and 4.5 km<sup>2</sup> (448 ha) respectively, situated in Korogwe and Muheza District, Tanga Region. Altitude ranges from 220 m to 840 m above sea level (asl). The Forest Reserve contains lowland forest and open wooded grassland. Bombo East I and II Forest Reserves were gazetted as forest reserves in 1993. A small part in the south-east was de-gazetted in 2000. Bombo East I and II are surrounded by Makorokoro, Mnazi Moja and Bombo Maji Moto villages.

The Environmental Education activities carried out during the Bombo East I and II phase followed a very similar pattern to those initiated in Mlinga Forest Reserve. This decision was taken due to the positive reaction to the initial methodology and based on the feedback received.

Initial permission to carry out environmental education activities with the local community was sought from the village chairman (*mwenyekiti*) of Bombo Maji Moto; the largest nearby village. This occurred during a general meeting with the *mwenyekiti* of the main village and all its sub-villages in which the aim and work of the EUBS team was discussed. The other villages invited to participate in the education activities were Magungamzia and Kwekuyu. These villages were chosen based on knowledge provided by the Kwemkole Catchment Officer, Mr. Peter Juma Ntogolela.

Environmental education activities within Bombo East I and II Forest Reserves were co-ordinated by Ms. Samantha Staddon (Frontier-Tanzania) and Mr. Albert Ntemi (EUCAMP), with the assistance of all Frontier-Tanzania and EUCAMP staff, Field Assistants and Research Assistants participating in the Bombos EUBS project (January to March 2002).

#### 3.2 Environmental Situation

The environmental situation was assessed during the EUBS reconnaissance visit on 10<sup>th</sup> December 2001 and during casual discussions between Mr. Albert Ntemi, Mr. Peter Juma Ntogolela and Ms. Samantha Staddon. It was evident from these discussions that the major environmental threat to Bombo East I and II was fire; with other issues, such as wood extraction, hunting and grazing, also affecting the reserves.

#### 3.3 Target groups

Target groups were selected using the same criteria as for Mlinga Forest Reserve. However, there were no women's groups in the area and so adult education was centred around local environmental committee groups.

### 3.4 Activities & Timetable

Target Group	Activities	Villages involved	Dates	Location
Environmental committees	Meeting	Bombo Maji Moto, Magungamzia, Kwekuyu	16 <sup>th</sup> March, 2002	EUBS Basecamp
Primary school children	Educational visit	Bombo Maji Moto	11 <sup>th</sup> March, 2002	Bombo Maji Moto Primary School

### 3.5 Adult Environmental Education Activities

#### 3.5.1 Environmental Committees Meeting

##### 3.5.1.1 Methodology

The environmental committees of Bombo Maji Moto, Magungamzia and Kwekuyu were invited to a meeting at the EUBS basecamp on 16<sup>th</sup> March 2002. The main aim of the meeting was to raise the awareness of local forest conservation issues, whilst also providing the opportunity to explain the work of EUBS. The programme for the day closely followed that employed in Mlinga Forest Reserve. However, slightly more emphasis was given to showing participants the sort of science techniques employed by EUBS. Participants were given the opportunity to see a sample of both plant and animal specimens, the chance to see trapping/recording techniques in the field (Sherman traps, bucket-pitfall traps, butterfly canopy traps and binoculars) and the chance to read through environmentally-based literature (such as WCST and TFCG publications).

##### 3.5.1.2 Results

A total of 47 people attended the meeting, including seven EUBS and EUCAMP staff. The meeting involved talks and discussion on Frontier-Tanzania and the work of EUBS, the East Usambaras and the Eastern Arc, problems facing Bombo East I and II Forest Reserves and a question and answer session based on forest conservation (Appendix 7.9: Programme for the Meeting with Environmental Committees - in English). Minutes were taken (Appendix 7.10: Meeting Minutes - in English) and the question and answer session was recorded on tape.

A copy of the meeting proceedings was sent to the *mwenyekiti* from villages and environmental committees after the event (Appendix 7.11: Proceedings of the Meeting with Environmental Committees - in Kiswahili). These copies included the meeting minutes, a transcript of the talks given and the questions asked (in Kiswahili). It was hoped these proceedings might serve to reiterate the important issues raised during the meeting and to stimulate further discussion, and action, towards forest conservation.

##### 3.5.1.3 Discussion

All of the talks given by EUBS and EUCAMP staff appeared to be well received, with most people taking notes throughout. The majority of talks were interactive and involved some post-talk discussion. The session in which committee members were able to learn about EUBS

techniques proved very popular. Participants offered local names for many of the specimen species collected, demonstrating a good local knowledge of flora and fauna. One interesting point was that a White-bellied African hedgehog (*Atelerix albiventris*) had recently been taken as a specimen and it became apparent that no one had ever seen one before. This example served to highlight the importance of the work of EUBS in recording different species. The other thing that worked well was setting up Sherman traps, bucket-pitfall traps and canopy traps around camp, which allowed people to get a better idea of how the techniques are used in the field.

There were more people who wished to attend the meeting than it was possible to accommodate with transport and camp limitations. The ratio of men to women in attendance was predictably biased, with only six women present. However, the women that did choose to attend allowed for a short discussion on alternative stove-technology - an issue relating specifically to women.

It was unfortunate that some people who wished to attend the meeting were unable to, due to logistical restrictions. Unless increased resources are available in the future, it would be a good idea to limit invitations to ten committee members from each village, to maintain a feasible number of attendants.

Not all *mwenyekiti* from each village were present at the meeting. Due to their high standing within local communities, it is suggested that they be specifically invited, along with the environmental committees.

## **3.6 Children's Environmental Education Activities**

### **3.6.1 Bombo Maji Moto Primary School Visits**

#### **3.6.1.1 Methodology**

One school was visited for environmental education activities, namely Bombo Maji Moto Primary School. This school is the largest in the vicinity of Bombo East I and II Forest Reserves and takes students from a wide area and from many sub-villages.

An initial meeting with teachers from the school was held in order to discuss the main aims and ideas involved in the environmental education and to ascertain the number of students in the school, class sizes, timings of lessons etc. It also proved helpful in establishing that the teachers were very interested in the idea as a whole and that they were keen to help on the day. A preliminary programme for the day was given to the teachers at this stage and this allowed them to become familiar with the activities before they happened.

The structure of the visits was to take a similar style to that used in at Misozwe Primary School, near Mlinga Forest Reserve. One change to the programme from Misozwe was to introduce a poster lesson themed 'animals and their habitats'. This consisted of two posters depicting the forest reserve and bordering farms and the children were asked to position cut-outs of animals in suitable habitats into either the 'day' scene or the 'night' scene, reflecting when the animals were most active (see Appendix 7.4.6 for lesson plan). The other change was

that there was no concluding activity such as a story-writing or a poster-drawing session as there had been for Misozwe.

### 3.6.1.2 Summary of School Visits

The School was split into two groups so that the younger children would be taught in the morning and the older children in the afternoon. The morning session involved students from Standards 1 and 2; a total of around 160 children. The afternoon session involved approximately 80 children from Standards 3 to 7.

Both the morning and afternoon sessions lasted for 2 hours and involved four main activities in roughly 30 minute ‘lesson’ lengths:

<b>Activities</b>	<b>Location</b>	<b>Lesson Length</b>
Catchment Officer Talk	Classroom	30 min
Poster – ‘animals and their habitats’	Classroom	30 min
Environmental Trail	School grounds	30 min
Conclusion of visit	School grounds	30 min

After both the morning and afternoon sessions were completed, the teachers were asked for feedback and encouraged to provide ideas for future improvements. Environmental education literature, posters, maps, pencils and a globe were left for the school with the teachers.

### 3.6.1.3 Discussion of Activities

#### ***Catchment Officer Talk***

The catchment officer talk was given chiefly by Mr. Peter Juma Ntogoela (based at the EUCAMP sub-station in Kilanga Ngua). It followed the same structure as for Mlinga Forest Reserve (see Appendix 7.4.1). The students already knew him through his work in the school’s tree nursery and so the talk was well received. The older students (during the afternoon session) were actually shyer when it came to answering his questions during the talk, than the younger students had been during the morning session. It appeared that the children learnt a lot from this talk and it should be considered a very important part of the environmental education programme.

#### ***Poster – ‘animals and their habitats’***

The poster - ‘animals and their habitats’ - activity was led by Mr. Albert Ntemi, Mr. Amiri Saidi and Mr. Kenneth Danga (see Appendix 7.4.6). It was found that the younger students were more forthcoming with answers and ideas than the older students in this activity, although the level of discussion was similar for both. The students knew about animals living in and around the *shambas* and the forest edge, but were less familiar with forest-dependent species and their tracks. Although the pupils knowledge of such species may not have greatly increased as a result of this activity, they are likely to have been made more aware of the concept that animals have their own specific place in the environment.

#### ***Environmental Trail***

The outline for the trail was the same as for the school visits made in Mlinga Forest Reserve (see Appendix 7.4.2). Groups of approximately 20 pupils in the morning and 10 in the afternoon joined with a Kiswahili speaking EUBS or EUCAMP staff member and one or two English speaking EUBS staff and volunteers. This resulted in 8 to 10 groups during each session. The smaller group size in the afternoon made the activity slightly easier and more manageable. Pupils in the afternoon groups took out pens and paper to record what they saw. The morning session involved little discussion of what was being seen, whereas, the afternoon session involved a more observational approach. The lack of Kiswahili language skills on the part of the English volunteers made discussions with students about what they were finding on the trail more difficult. In general, the students appeared to grasp the idea well and activities based within the immediate environment can be an important learning technique.

### ***'Conclusion of visit'***

The 'conclusion of visit' activity that ended each session served to reiterate the important points raised during the day. With the younger students this involved a short talk by Albert Ntemi outside in the school grounds. At this point in the session it seemed appropriate to keep the talk short. The students listened well and appeared to take everything in, answering questions asked of them relating to forest conservation correctly.

With the older students, the activity lasted longer and involved returning to the classroom. To start with, the children called out animals and other environmental features that they had seen and listed on the trail. There was some repetition during this and it is suggested that in future a list be written on the black-board as children are calling out animals etc. so that once a name has been called out, it won't be again. A poster was then used on which animal prints had been drawn on a piece of paper covering up the animal's name. Going through this poster worked well and revealed how much the students knew. The session ended with a conclusion of the importance of forest reserves and a chance for the students to ask questions. There was only one question, relating to the cultivation of seedlings.

#### **3.6.1.4 Further Discussion**

Teachers who had sat in on both the morning and afternoon sessions suggested that mixing the age groups would have been beneficial to the sessions, so that different ages could help each other. During the planning of the activities it was assumed that the level of comprehension and discussion between the younger and older groups would be too different for this to be effective however, in reality, this was not the case. Reflecting on the fact that the older students were shyer than the younger ones, the idea to mix age groups could have worked well.

The teachers also suggested bringing in specimens or more 'props'. This had been discussed during planning but the decision was made that the activities should be kept 'low-tech,' to concentrate on the importance of forest reserves and the work of catchment officers as opposed to the work of EUBS. One suggestion for the future could be to lengthen the sessions and include a description of EUBS work with the chance to see some trapping techniques and specimens, as in the meeting with the environmental committees. This could be done in the afternoon with the morning session left as it is. This would likely require two days for school visits. Overall, the teachers said they liked the education activities very much and thought that

the students were able to get a lot from them. They were pleased with the materials left for the school.

## **4. ACTIVITIES IN MGAMBO FOREST RESERVE**

Authors: Hall, S, Oliver S.A., Bracebridge C.E. & Ntemi, A.S. Pp. 27-38

### **4.1 Introduction**

Mgambo Forest Reserve is located to the north-east of the main East Usambara Mountain range, adjacent to the savanna plateau that reaches to Kenya. Mgambo Forest Reserve covers an area of 13.46 km<sup>2</sup> (1,346 ha). It lies in the district of Muheza, Maramba Division, Tanga Region, covering land approximately 10 km north from Maramba town, located on latitude 4°46'00" and longitude 38°45'15". Mgambo was gazetted July 1998 as delineated and described on Forest and Bee Keeping Division Map No. Jb. 2291. It was gazetted primarily to protect the catchment areas supplying Bwiti, Mavovo, Mgambo and Daluni village areas. Average annual rainfall of the area is between 1000 and 1500 mm per year falling principally from March to June, although in recent years rain has been unpredictable and low. Vegetation cover within Mgambo Forest Reserve has previously been recorded as containing 1295 ha of poorly stocked lowland forest and 51 ha of cultivation under lowland forest (Johansson, 1996). However the EUBS survey found extensive open woodland areas with evidence of much illegal grazing disturbance (Frontier 2002b).

Environmental education activities within Mgambo Forest Reserve were co-ordinated by Ms. Susannah Hall and Ms. Sophie Oliver (Frontier-Tanzania) and Mr. Albert Ntemi (EUCAMP), all Frontier-Tanzania and EUCAMP staff, Field Assistants and Research Assistants participating in the EUBS project (April to June 2002).

### **4.2 Environmental Situation**

The environmental situation was assessed during the EUBS reconnaissance visit in March 2002 and during casual discussions between Mr. Albert Ntemi (EUCAMP) and Mr. Josephat Maingu (Catchment Officer, Bwiti station). It was evident from these discussions that the major environmental threat was illegal grazing and forest fires.

### **4.3 Target groups**

Target groups were selected using the same criteria as for Mlinga Forest Reserve. However, there were no women's groups in the Bwiti area and so adult education centred on work with members of local environmental committees.

#### 4.4 Activities & Timetable

Target Group	Activities	Villages involved	Dates	Location
Environmental committees	Meeting	Mgambo, Kwajanja and Bwiti	18 <sup>th</sup> May, 2002	EUBS Basecamp
Secondary school children	Camp visit	Maramba	4 <sup>th</sup> May, 2002	EUBS Basecamp
Primary school children	Educational visit	Bwiti and sub-villages	14 <sup>th</sup> May, 2002	Bwiti Primary School
General public	'Environment Day'	Bwiti and sub-villages, Maramba	8 <sup>th</sup> June, 2002	Bwiti football pitch

#### 4.5 Adult Environmental Education Activities

##### 4.5.1 Environmental Committees Meeting

###### 4.5.1.1 Methodology

Environmental committee members, *mwenyekiti* and villagers from Bwiti Mavovo, Mgambo, and Vuga villages were invited to attend an Environmental Conservation Workshop at EUBS base camp, situated close to Bwiti village, on 18<sup>th</sup> May 2002. The aim of the workshop was to discuss relevant environmental conservation issues concerning Mgambo forest reserve and to provide an open forum to address some of the problems and possible solutions that the villagers may be able to practically apply in the future in a sustainable manner. In conjunction with and, crucial to, this was a clear explanation of the 1998 Forest Policy highlighting the objectives for joint forest management. Additionally, the biological importance of the East Usambaras was emphasised, with an explanation and introduction to the scientific research conducted by EUBS team, including techniques and equipment used, and some demonstrations of recent specimens collected.

The workshop was initially a series of introductory presentations covering the topics already mentioned, and presented by Mr Gerald Otieno, Mr Albert Ntemi and Mr Johari Mtango (all EUCAMP officers), and Ms Susannah Hall (EUBS Research Co-ordinator). Additional assistance was given by Ms Claire Bracebridge (EUBS Assistant Research Co-ordinator) for the practical demonstrations.

The presentations were designed to stimulate ideas for the second half of the workshop. Participants divided into three groups to discuss and find possible solutions for conservation issues within Mgambo forest reserve. The groups reassembled to feedback as a whole and discuss the findings, with the hope that some of the solutions may be put to future practice.

Further the workshop members were informed of the plan for an Environment day to be held on 8<sup>th</sup> June at Bwiti village. They were invited to contribute any ideas or opinions and to advertise the day to villagers to encourage participation.

## 4.5.1.2 Results

In total, representatives from the 3 villages attended the workshop. The minutes, in both English and Kiswahili, can be found in Appendix 7.12 and 7.13 respectively. The main result of the workshop was the production of a list of problems and their causes as well as solutions to some of the main conservation issues concerning Mgambo and, by extension, many other forest reserves. These issues are summarised in the table below.

The villagers thought that environmental protection was important for local people surrounding Mgambo forest. They felt widespread education was needed to make the people feel that the forest belonged to them and that it was to be their responsibility to protect it. They admitted that, to date, performance was poor from the environmental committees, with little law enforcement regarding prohibitions of resource use in the reserve.

## Summary of Discussion Groups.

<b>Problem</b>	<b>Reason / Cause</b>	<b>Solution</b>
Fire	Shamba Grazing Hunting Unkept borders Honey Charcoal	Good shamba preparation will help to control fires. Zero grazing or provide alternatives, such as herd reduction, planting grass or improved land use in the village. Clear borders and create fire breaks. Introduce bee keeping in shambas Use kerosene and other fuel alternative to charcoal. General law enforcement. General education on effects of fire.
Tree Harvesting and Forest Produce	Poverty No trees suitable outside of the forest. Population increase Development – housing, etc.	Income generating activities (government) – group action / interest. Plant trees in the shambas. Population control – condoms. Buy timber. Law enforcement (by local <i>mwenyekiti</i> ).
Grazing	No area set aside for grazing outside of the reserve.	Improved land use in village (Muheza) – collective action. Grow grass. Reduce livestock. Have chickens / duck not cows or goats. Law enforcement – village government and environmental committees.
Hunting	Lack of meat - poverty	Keep chickens / ducks to reduce the dependence on forest meat.
Lack of education and understanding about conservation issues concerning the forest	Lack of money – government. Lack of personnel – government.	Government search for external funding and/ or utilise NGOs. Collective action i.e. from villagers to local and district levels of government, as well as more centralised action. Involve stakeholders in education and subsequent joint forestry management.

#### 4.5.1.3 Discussion

It was apparent that the local communities, represented by the participants of the workshop, were aware of the central conservation issues and problems concerning close associations of villages near the forest reserve. The importance of protecting natural resources was strongly felt and the workshop readily suggested practical positive future aims and objectives. It seems that although there is an awareness of the unsustainable nature of illegal practices in and around the reserve, there is a lack of momentum to take responsibility for actually implementing some of the suggested changes. It is possible the local communities have been unaware of the content of the Forest Policy (1998) and, hence, the legal backing and encouragement for joint forest management whereby the local communities are the main enforcers of forest protection and sustainable management. It is hoped that the workshop not only informed, but also stimulated some enthusiasm for future action.

The format of the workshop itself worked well, enabling the chance to disseminate and exchange ideas on environmental conservation issues. The idea of an ‘environment day’ was well received and subsequent help, especially from Bwiti village who were to host the event, was readily given, thus enabling EUBS researchers to merely instigate and facilitate a day that was essentially the villagers’.

The involvement of the EUCAMP officers was crucial and central to the day. Without their language skills, knowledge of the forest policy and familiarity with local issues and culture, the day could not have been executed in such a successful manner. All in all, it was a stimulating and enjoyable day, not least for the fact that it was good to bring four villages together to try to address problems of a shared natural resource.

#### 4.5.1.4 Further Discussion

As a result of the environmental conservation workshop, Ms Susannah Hall and Mr Albert Ntemi were invited to attend two external meetings. The first was the Bwiti village meeting, held on 5<sup>th</sup> May 2002. Ms Hall and Mr Ntemi were consulted regarding options for cattle grazing, as Bwiti once used a water tank, now in disrepair, and a grazing area, now shamba, for the cattle. The aim of the meeting was to discuss ways to relieve the pressure that had been exerted on the forest reserve. It was decided to try to repair the tank and to reclaim the grazing area. There were concerns, however, regarding possible compensation entitled to farmers who would lose crops.

The second meeting attended, held on 9<sup>th</sup> May 2002, concerned dairy farming and forestry extension. Maramba Dairy Farming Co-operation (MADAFCO), based in Maramba, have set up a project educating people in ‘zero grazing’. The aim is to train people in an income generating activity that relieves poverty locally and does not involve illegal and unsustainable use of the forest reserve, such as charcoal production and timber sales. People are encouraged to own milking cows that are kept on their properties and fed with grass produced from shambas. The milk is then bought by MADAFCO and sold in Tanga. Thus, those involved with the project have a daily stable income without encroaching on the forest. MADAFCO are looking to expand the project and breed cattle that they can supply to those interested in participating in the scheme. They primarily wanted Ms Hall and Mr Ntemi’s advice on how

best to proceed with this idea in terms of gaining international funding. Ms Hall agreed to look in to this matter.

Both meetings proved to be interesting and informative, particularly the latter meeting which is extremely encouraging in terms of proactive measures taken to provide alternatives for income generation within rural communities surrounding the forest reserves.

## **4.6 Children's Environmental Education Activities**

The Environmental Education activities for children in Mgambo Forest Reserve differed from that conducted in Mlinga and the Bombos in a number of ways. Firstly, EUBS worked with a secondary school, Maramba Secondary School, in addition to the local primary school. Secondly, it was decided to involve these two schools in organising an Environment Day in Bwiti village, which occurred towards the end of the Mgambo field phase.

### **4.6.1 Bwiti Primary School Visits**

#### **4.6.1.1 Methodology**

The methodology for the Bwiti Primary School visits, near Mgambo Forest Reserve, utilised a core structure as used for Mlinga Forest Reserve, and a school visit was organised involving a catchment officer talk and environmental trail. Because an Environment Day was also planned, however, it was decided that the school visits would not involve as many staff members and would serve as more of an introduction to EUBS and EUCAMP work and to promote and develop the idea of holding an Environment Day in the village.

A meeting was arranged with the teachers of Bwiti Primary School and certain staff members from Frontier-Tanzania and catchment officers on 30<sup>th</sup> April, 2002. The proposal of a school visit was discussed as well as an Environment Day in Bwiti. The teachers and EUBS staff in attendance were the following, Mr. Bakari Zitto, Mr. Albert Ntemi, Mr. Odillo Mjata, Ms. Sophie Oliver, Ms. Josephine Sembe, Ms. Susannah Hall, Ms. Mary Saidi, Mr. Hawa Mdoe and Ms. Mary Nathaniel. Following this meeting, a group of teachers from Bwiti and a neighbouring school came to visit the EUBS base-camp on 10<sup>th</sup> May. This was a teacher-initiated visit and it was pleasing to see how keen the teachers were to find out what our work entailed. The date of 14<sup>th</sup> May was confirmed as the day for the proposed school visit.

#### **4.6.1.2 Summary of Visits**

The timetable for the visits were as follows (number of pupils in brackets):

8.30a.m. to 10a.m. Std. 1 (100) and Std. 2 (104)

10.30a.m. to 12 p.m. Std. 3 (82), Std. 4 (58), Std. 5 (25), Std. 6 (38) and Std. 7 (34).

For both groups the schedule was as follows:

1. Introduction to staff from Frontier-Tanzania/EUCAMP.
2. Brief introduction to the work carried out by EUBS within the context of Mgambo Forest Reserve (by Mr. Albert Ntemi).
3. Talk by Mr. Albert Ntemi and Mr. Josephat Maingu on role of catchment officers, the importance of forest reserves and how to protect/utilise them (see Appendix 4).

4. Environmental trail introduced by Mr. Johari Mtango (see Appendix 4). The children were instructed to take a look around the school grounds (“school environment”) to look for natural signs (trees, animals, signs of animals, flowers, stream etc) but, more specifically, to look for man’s impact on the environment (litter, trampled livestock paths, crops, teak plantation, water tap, brick kiln etc.). The trail was to be used to start children thinking about the local environment, its importance and how it is affected by us.
5. After the trail and back in the classroom, the findings from the trail were put on the board in the form of ‘issues’ one side, ‘solutions’ the other. Then the children were asked to think of other environmental issues relevant to Mgambo and the East Usambara area.  
Some of the ideas for the board were as follows:

**Problems**

Overgrazing  
 Water pollution  
 Litter  
 Tree/pole cutting  
 Charcoal burning  
 Hunting  
 Illegal cultivation  
 Soil run-off  
 Fires

**Possible solutions**

Designated grazing areas outside Mgambo forest reserve  
 Wash clothes away from stream/cattle etc. downstream  
 Keep village tidy  
 Plant tree nurseries  
 More efficient stoves etc.  
 Fish farming  
 More efficient shamba use  
 Thoughtful shamba construction  
 Controlling shamba fires etc.

6. The planned Environment Day, 8<sup>th</sup> June was then discussed. The theme for the day was how each individual can make a positive difference to the environment. Ideas included songs, dancing, poster competitions (with small prizes for top posters). Other ideas were also to be discussed with teachers and pupils.

#### 4.6.1.3 Discussion of Activities

The catchment officers Mr. Albert Ntemi and Mr. Johari Mtango involved with the school visit had both had previous experience in teaching these activities. This made the Bwiti school visits run very smoothly and professionally.

The environmental focus of the trail was particularly good. This was due to good teacher input and the varied nature of the school surroundings.

#### 4.6.1.4 Further Discussion

The EUBS basecamp was situated very close to Bwiti Primary School. This meant that it was important for us to visit the school early on so that the school were aware what we were doing. The visits worked well to prepare children for the Environment Day. It was fantastic that the teachers arranged to come and learn more about our research on basecamp. This made the links with the school stronger and gave them a better understanding of our work.

We found the teachers of Bwiti School to be very helpful and receptive to the concept of an Environment Day in Bwiti. The teachers agreed to encourage the children to draw

environmental posters for a competition. We also suggested they might work with the children on an environmental song for the Environment Day and it transpired that they had already won the regional final for such a song! The school had also been the first in the region to plant an extensive teak plantation in the school grounds and they had a cultivated area for children to learn how to tend.

#### 4.6.2 Maramba Secondary School Visits

##### 4.6.2.1 Methodology

Maramba Secondary School had indicated to Maramba Catchment Office that they had a strong desire to visit the Frontier base-camp during our phase in Mgambo. It was decided that such a meeting would be beneficial to Maramba pupils and teachers as well as to the EUBS team. Initially, a meeting was arranged between Frontier staff and a teacher, Mr. Sheshangali, who represented Maramba Secondary School on 1<sup>st</sup> May, 2002 at the EUBS base-camp near to Bwiti village, Muheza District. This meeting was to discuss how best to proceed with a visit.

Maramba Secondary School has 250 pupils in years 1 to 4 of the National Certificate (equivalent to GCSEs in the UK). Students' ages range from 15 to 20 years. Each year-group has two streams, depending on skill. All students of Maramba School are required to study at least one science subject (taking around 11 subjects in the 1<sup>st</sup> and 2<sup>nd</sup> year and then reducing to 8 or 9 subjects in the 3<sup>rd</sup> and 4<sup>th</sup> year).

With Mr. Sheshangali's recommendations, 12 students and 3 teachers were chosen to visit the camp on 4<sup>th</sup> May. The enthusiasm of the students to come to camp was enormous and the ones that were chosen were the most keen and intelligent students, three from each year-group. The number of visitors was dependent on safe numbers that could travel in a vehicle and logistics of having the group on camp.

It was arranged that the students chosen were to be instructed by their teachers to ask questions, take notes and present what they had learnt during the visit to all the students in their year on their return. This would take place the following week at the school, when a weekly session is timetabled for discussion in environmental or social topics.

##### 4.6.2.2 Summary of Visit

- 9 a.m.            Forest Reserve/Conservation Talk:  
                       -Importance of East Usambaras within Eastern Arc/world  
                       -Concept/reasons for Nature and Forest Reserves  
                       -Forest threats and conservation issues
- 11 a.m.            Frontier/Biodiversity Talk/Activities  
                       -East Usambara plant/animal diversity  
                       -EUBS Sampling techniques and specimens  
                       -Riverine Forest walk  
                       (observe animals/plants/discuss issues/demonstrate capture techniques).
- 1.30 p.m.        'Environment Day' Plans

- World Environment Week and proposed Environment Day Ideas for Maramba School's involvement.  
Theme for the Day is 'how individuals can make a positive difference to the environment'.

A more detailed plan of the visit can be found in Appendix 7.14.

#### 4.6.2.3 Discussion of Activities

After the introduction to camp, the Ms. Susannah Hall talked to students about the importance of the East Usambaras within the context of the Eastern Arc, Tanzania and the world, using a map as a visual aid. Also discussed was the geological history of the East Usambaras and the biological importance of the area. Then, Mr. Albert Ntemi talked about the benefits of establishing forest reserves in forested areas of the East Usambaras, along with the collaboration with local villages and EUCAMP necessary in the formation of forest reserves and the concept of 'Joint Forest Management' which is in the early stages of development.

Students were asked what problems they thought affected forested areas. Their answers, in chronological order were as follows:

1. Fire - caused by hunters flushing out animals and preparing meat in the forest. Also caused by shambas (although this was mentioned after prompting).
2. Deforestation - chopping trees for construction/furniture/charcoal.
3. Grazing - Problem with cows and goats eating saplings and compacting soil. (also of farmers burning land to promote grasses).
4. Advisors - (this was a reference to lack of guidance/education for local communities as to how best to protect their forest).
5. Diseases - (this was a reference to diseases that affect trees that then die after a fire). Mr. Albert Ntemi went on to discuss how sometimes trees are debarked for medicines or roots taken which then allow bacteria to enter a tree and kill it.
6. Soil/topography - looking at soil erosion issues of cultivating on slopes or with fewer trees then the soil washing away.
7. Carved ornaments - especially of black woods.

The issue of encroachment was discussed when people alter the location of the border markers or place shambas inside the reserve. Mining (for example, of greenstone in Mtai) and honey-collectors setting fires was also discussed.

A student asked what happens if the forests are destroyed. The question was put to the floor and answers were as follows:

1. Less rain
2. Temperatures change
3. Everyone believes forests are the source of water.

These answers were talked about and a diagram of rain formation over mountains was drawn on the board.

A student then asked, why are forests where they are. Discussions of seed banks, dispersal mechanisms and epiphytes followed.

After a break, the students were shown round the science area and told about biodiversity and endemism. They were shown photo identification sheets for some of the animals and plants found in the East Usambaras and some of Frontier's specimens were brought out and discussed. Some live frog and insect specimens were shown. The students asked many questions about diversity, how animals live/behave, food chains and taxonomy. This was the first outing of its kind for the school and most of the curriculum learning is done without any visual aids. The teachers and students were very grateful to have the practical experience of seeing specimens close up.

We then went as a group into the riverine forest next to basecamp and walked along to where a small trapsite had been established with a couple of lowered buckets in the ground and a butterfly canopy trap. The butterflies in the trap were observed and talked about. Trees and conservation issues were discussed.

After lunch the concept of World Environment Day was introduced by Ms. Sophie Oliver and the suggestion of an Environment Day at Bwiti. The issues that had been talked about during the day (and some others) were written onto the white board (e.g. water pollution, over-grazing, population increase, litter, soil pollution, logging etc.) Ways to represent these issues to the village of Bwiti were considered, such as posters, poems, stories, singing and plays. It was emphasised that material should concentrate on changing habits of individuals, so that people could identify with and act on the topics highlighted from the day.

#### 4.6.2.4 Further Discussion

This school visit was one of the most rewarding activities conducted. All the students were very excited to see live and dead specimens, walk in the forest and be taught about field techniques and conservation matters. Their understanding of English also made it easier for the Frontier-Tanzania staff to communicate.

There is very little practical emphasis for science subjects within the Tanzanian curriculum and subsequently, it was of great benefit for students to see 'in the flesh' many aspects of their studies. It seemed clear that they learnt so much in a short space of time and we were encouraged by the many interesting questions put to us from students and teachers throughout the day.

Both students and teachers were happy to help us in putting together an Environment Day in Bwiti. The teachers agreed to encourage their students to submit environmental posters for a competition and to prepare a group of students to perform an environmental play. This made for a good reciprocal arrangement and the partnership was an appropriate way to continue the momentum of environmental topics that had been introduced during the visit.

### 4.6.3 Bwiti Environment Day

#### 4.6.3.1 Methodology

An Environment Day was organised within the village of Bwiti. This was to encourage the village and, in particular, the school children of Bwiti and Maramba, to promote environmental good-practice within the community. The day was to coincide with World Environment Week at the start of June. When the idea was discussed at our initial meeting with Bwiti Primary School teachers, it was well received and the teachers were keen to be actively involved in the preparations. Subsequently, a number of further meetings were arranged prior to the event involving teachers and Bwiti's *mwenyekiti*. Letters were written inviting the Division secretary, and other special guests from Catchment and the community. Posters were put up a week before the event although village networks had already spread the news about the day.

A friendly football competition involving the villages surrounding Mgambo Forest Reserve had been organised to coincide with Environment Week with the final to be played on Bwiti's Environment Day. A goat was to be awarded to the winning team, with smaller prizes for second and third teams. Six letters were distributed to the local teams and an organiser was appointed within Bwiti. It was clear from the early stages that this competition was of great importance to the local teams. The pitch was carefully tended to and there was much talk about playing techniques and tactics and pride within Bwiti to be hosting the competition. However, the competition was abandoned mid-way through the week due to increased tension between teams. As a consequence, a more casual match was organised involving mixed teams from Bwiti and EUBS staff and volunteers, to be held as a fun conclusion to the Day.

#### 4.6.3.2 Summary of Events

The day before Environment Day, holes were dug to plant a number of saplings, donated by Catchment, in and around the school grounds at Bwiti. On the morning of the 8<sup>th</sup> June, Frontier-Tanzania volunteers and school children helped to plant the trees. Meanwhile *makuti* screens were erected, a large banner strung up, Frontier display boards and children's posters were stuck up around the football pitch area.

Maramba Secondary School teachers and other special guests were collected at noon and driven back to camp using the EUBS vehicle. Maramba students, involved in the Day's activities, were driven to Bwiti using their school vehicle.

After providing lunch for the guests, Frontier-Tanzania volunteers and Bwiti's school children led a procession through the village singing environmental songs and holding up banners. The day continued as shown (Kiswahili version in Appendix 7.15):

#### **Environment Day, Bwiti, 8<sup>th</sup> June, 2002**

- |           |   |
|-----------|---|
| 1.30 p.m. | Procession through Bwiti by Bwiti Primary School and Frontier volunteers  |
| 2 p.m.    | Opening address by Village Chairman.<br>Introduction to special guests. Short welcome/introduction by Frontier and Catchment staff. |
| 2.15 p.m. | Bwiti Primary School Choir to sing environmental songs and poetry reading.  |
| 3 p.m.    | Maramba Secondary School acting out environmental play.   |
| 4 p.m.    | Division Secretary to read environmental speech and present prizes to winning students for poster competitions.                     |

- 4.30 p.m. Bwiti village and Frontier to play friendly football match.  
5.45 p.m. Close of day.

#### 4.6.3.3 Discussion of Activities

It was assumed that villagers would join in the procession through Bwiti prior to the start of the Day. This did not seem to happen and, initially, it was just the school children present. Fortunately, it did not take long for villagers to arrive.

The Day ran very smoothly and the children had obviously put a lot of effort into producing such polished performances. Bwiti school's environmental song was adapted from a song that they had performed regionally and won them first prize. It was pleasing that the school now had the opportunity to sing the song to their own village. Maramba school's play had also been adapted from a previous play to fit the theme of the Day. This made it easier for the students involved who had just completed examinations. The play was very well received and succeeded in portraying a serious message in an entertaining way for the audience.

There was an impressive number of posters drawn from Bwiti and Maramba schools. This was particularly pleasing because some of the children were very shy about drawing. The speech by the Division Secretary was well received and there were about one thousand people who attended the afternoon as well as stayed to watch the football afterwards.

#### 4.6.3.4 Further Discussion

The main difficulty was actually unrelated to environmental matters but involved the decision to hold a football tournament in the week leading up to the Environment Day. The plan was for a final to be played on Environment Day. Unfortunately, despite ample enthusiasm and support for the competition, the competitiveness between sub-villages was far more than had been anticipated and the competition was abandoned due to aggressive behaviour in one of the early matches. Something else that had not been foreseen, was that the regional Football Association should have been contacted prior to us organising the event. This would have seemed superfluous to us as the competition was supposed to be friendly but with the outcome of events it became clear why we should have been aware of this protocol. It was very unfortunate that the competition could not continue, as there was great enthusiasm for it, and no such event had been held there before. Fortunately the competition's outcome did not taint us or the preparations for the Environment Day and village enthusiasm for the day remained high. The only way that a competition might have worked is with substantially more security. However, such an event would have overshadowed the Environment Day itself and so perhaps it was better in the long run to have a friendly non-competitive game to round up the day.

Another aspect of the day which did not go entirely to plan was that of giving out balloons with environmental messages written on them to children during the day. The desire for children to obtain these balloons was more than the humble balloon-blowers could deal with. The solution was for the task of 'balloon-giver' to be passed on to Mr. Odillo Mjata, one of the teachers at Bwiti school, as he was better able to control the large group of eager children.

There was much discussion as to what time to hold the event. In Tanzania, it is more common to start events in the mornings. This would have caused difficulties regarding lunch and playing the football match. The afternoon time seemed to be the most convenient logistically and, as it happened, avoided the rain which fell during the morning.

Apart from this issue, the actual Environment Day was a huge success and great fun. The best part of it was that after initiating the idea, Frontier-Tanzania really took a back-seat whilst the schools of Bwiti and Maramba organised most of the entertainment for the day. The songs, poems and play were of excellent quality and many of the posters had thought-provoking 'take-home' messages.

## 5. CONCLUSIONS

Authors: Oliver, S.A. & Bracebridge, C.E. Pp. 39

Although some activities had been carried out in EUBS expeditions in previous years, the Environmental Education programme described in this working paper created a more organised structure for chosen environmental activities. This improved the clarity of environmental information exchanged and in turn the impact of the environmental messages put across to the community.

It is essential for communities living close to the forest reserves of the East Usambaras to be aware of the forests' biological and conservation importance. The Tanzanian Government has emphasised this importance by encouraging community involvement in forest management and conservation within the Forest Policy (1998) and new Forest Act (2002) via joint participatory management. The villagers, as the main stakeholders, are encouraged to implement the required changes. However, at a local level, although the villagers seem to be aware of the issues faced, they lack the knowledge and skill of how to proactively make these long-term strategic changes. The role of environmental education and awareness is integral to this and for the success of all government policies relating to wildlife and forestry. This is particularly salient in situations such as those experienced by working in the East Usambaras. Villages and shambas lie in such close proximity to the forest reserves that even the few patches of remaining good forest are being rapidly encroached upon and diminishing. With the legislative backing firmly in place, the villagers perhaps need some initial encouragement and help to get started in protecting their forests *now*.

The work documented in this paper was intended to highlight conservation issues relevant to the local communities surrounding forest reserves. It was hoped that these groups would dispatch this information further within the community. A wide range of people of all ages were involved with the activities and, in the case of the Environment Day organised, any interested members of the public were invited. This was an important aspect of the programme and allowed different groups of people to be targeted in a relatively short space of time.

It is very important for the community to be aware of both Catchment and EUBS work within the East Usambaras. It was felt that the activities described in this paper went some way to enhance this awareness and lead to greater understanding of environmental issues.

On the whole, the team of people involved with this programme were very proud of their achievements and hope that this paper may be of use to future developments in community Environmental Education within the East Usambara Mountain region.

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## 7. APPENDICES

### 7.1: Mlinga Environmental Committees and Women's Group Meeting Presentation (Kiswahili)

#### 1. UTANGULIZI : *Susannah Hall (Kiongozi wa Utafiti, Frontier-Tanzania)*

- Karibuni katika kambi ya utafiti Usambara Mashiriki. Jina langu ni Susannah Hall. Mimi ni kiongozi wa utafiti. Nina fanya kazi na Frontier-Tanzania. Frontier-Tanzania ni ushirikiano baina ya umoja wa utafitiwa wa mazingira na chuo kikuu cha Dar-es-Salaam. Frontier-Tanzania wamepewa mkataba na Programu ya vendelezaji wa misitu ya Usambara mashariki (EUCAMP) kutafiti viumbe adimu katika misitu yote ya hifadhi.
- Kikundi cha watafiti katika msitu wa hifadhi Mlinga kina jumuisha wafanyakazi wa wili wa misitu Albert Ntemi na bwana miti Selemani. Mtalam moja wa mimea kutoka TAFORI, viongozi wa tano wa Frontier, wasaidizi watanzania msituni na kambini kuna kundi dogo la wazungu saba kutoka Ulaya. Tuta fanyakazi katika msitu hifadhi Mlinga kwa wiki kumi zijazo.
- Leo, tume wakaribisha hapa kubadilishana mawazo kuhusu bionuwai (mimea na wanyama) na utunzaji wa misitu katika milima ya Usambara Mashiriki hasa msitu hifadhi Mlinga.
- Kikundi hiki kimekuwa kikifanya kazi katika milima ya Usambara mashiriki tangu mwaka elfu moja mia tisa tisini na nne hadi sasa. Kimefanya kazi katika misitu ifwatayo: Kambai, Kwamngumi, Semdoe, Longuza, Mlungui, Kwamarimba, Mtai, Bamba, Magoroto, Manga, Amani, Segoma, Nilo
- Lengo la utafiti wa viumbe adimu katika milima ya Usambara Mashariki.
  - 1) Kutoa taarifa mbalimbali zinazo husu thamani ya viumbe adimu ndani ya misitu katika kuboresha mpango wa utunzaji misitu na ufuatiliaji wa muda mrefu.
  - 2) Kutoa mafunzo ya njia za utafiti wa viumbe kwa wafanya kazi wa hifadhi misitu.
  - 3) Kutoa matokeo ya utafiti kwa jamii kwa kutumia njia ya elimu ya mazingira.

#### 1. SAFU YA MILIMA YA UKANDA WA MASHARIKI : *Susannah Hall & Albert Ntemi*

- ***Je unaifahamu safu ya Milima ya Ukanda wa Mashiriki?***  
Safu ya Milima hii imeishia mwambao wa Pwani ya Kaskazini-Mashiriki, kutokea Kusini-Magharibi mwa Tanzania, ineumbwa na milima tisa iliyotengana kuanzia Kusini mwa nchi ya Kenya kupitia Tanzania ikifanya umbo kama la mwezi mchanga uliochomoza na ndiyo maana ya jina la “Safu Ya Milima Ya Ukanda wa Mashiriki” (The Eastern Arc Mountains).
- ***Safu ya Milima ya Ukanda wa Mashiriki ni ipi?***  
Angalia ramani: Taita Hills (Kenya), Pare Kaskazini na Kusini, Usambara Mashiriki na Magharibi, Nguu, Nguru, Ukaguru, Robeho, Uluguru, Udzungwa, Mahenge.

- ***Kipi kilisababisha milima hii ionekane kama ilivyo sasa?***  
Inasemekana kwamba misitu mikubwa ya mvua nyingi ya Afrika Magharibi ilikuwa imesambaa bara zima la Afrika. Kutokana na mabadiliko ya hali ya hewa, miaka milioni knmi iliyopita, misitu hii ya Mashiriki ilijitenga kutoka misitu ya Afrika Magharibi. Kutokana na ukame na shughuli za maendeleo za binadamu kuongezeka milima hii imekuwa ikitengana kutoka safu moja baada ya nyingine na kuonekan kama visiwa (vilivyozungukwa na mbuga za majani, vichaka, mashamba, makazi ya watu nk.).
- ***Nini umuhimu wa misitu iliyopo katika milima hii?***
  1. kuwa inahifadhi vyanzo vya maji
  2. watu wanaoishi maeneo haya wanapata mahitaji yao kutoka katika misitu hii kama vile: maji, kuni, mkaa, dawa, nguzo, za kujengea na mbao kwa ajili ya matumizi mbalimbali
  3. Pia misitu hii inatengeneza mandhari katika maeneo husika na imekuwa kivutio kikubwa kwa watalii.
  4. Zaidi ya hayo, misitu hii ina umuhimu katika kuhifadhi ardhi na kurekebisha hali ya hewa na pia ina mchango mkubwa sana, katika kuwepo kwa mvua zinazonyesha katika maeneo hayo. Kwa hiyo, milima hii ni uti wa mgongo wa Taifa letu na urithi wa vizazi vijavyo. Na kiulimwengu ni ya 24 kuwa na Bioanuwai nyingi (aina mbalimbali ya viumbe hai).
- ***Je unafahamu kwamba misitu hii inakabiliwa na hatari ya kutoweka?***  
Cha ajabu ni kwamba misitu iliyoko katika milima hii hukatwa sana kwa ajili ya mbao na matumizi mengine pamoja na kuchomwa moto ovyo. Ingawa kuna udhibiti lakini uvunaji haramu wa mbao bado ni tatizo sugu.
- ***Nini athari (madhara) za kuharibu misitu hii?***  
Baadhi ya madhara ya uharibifu wa miti, hutokea baada ya muda mfupi na mengine huchukua muda mrefu kujitokeza. Athari hizo ni pamoja na:
  1. Mmomonyoko wa udongo na maporomoko ya ardhi
  2. Ukame
  3. Kutokea kwa mafuriko
  4. Kukauka kwa vyanzo vya maji
  5. Kutoweka kwa aina fulani ya miti
  6. Kutoweka kwa aina fulani za viumbe hai kwa mfano wanyama, wadudu, ndege, mimea, nk.
  7. Mabadiliko ya hali ya hewa, mfano kuongezeka kwa joto duniani, gesi ya hatari kwa bindadamu mfano CO, CO<sub>2</sub>.
- ***Kuna juhudi zozote zinazofanyika katika kuhifadhi misitu iliyoko kwenye Milima ya Ukanda wa Mashiriki?***  
Kwa vile umuhimu wa Safu ya Milima ya Ukanda wa Mashariki unaeleweka vema kwa wanabiolojia na watafiti tu. Tumeona kuna haja kubwa ya kuelewisha jamii nzima ya Tanzania ifahamu kinachoendelea kuhusu Bioanawai (Biodiversity- Maisha ni Kuwiana Baina ya Viumbe, Binadamu na Mazingira yao) iliyo hazina kubwa kwetu. Elimu ya mazingira imeanza kutolewa kwa wananchi wanaoishi katika milima hii, kuhusu madhara

ya kuharibu mazingira. Serikali na mashariki yasiyo ya kiserikali yameanzisha juhudi za kuishirikisha jamii inayoishi au kupakana na maeneo ya misitu katika kuhifadhi misitu. Juhudi hizo ni pamoja na kuwahamasisha wananchi kupanda miti katika mashamba yao kwa ajili ya matumizi yao. Pia juhudi zinafanywa kuwaelimisha wakulima juu ya kilimo misitu (kilimo mseto).

### **3. MISITU YA USAMBARA MASHARIKI:** *Albert Ntemi (Kiongozi wa Bioanuwai EUCAMP)*

- Misitu ya Usambara Mashariki ni Miongoni mwa Misitu ya mvua ya ukanda wa mashariki (Eastern Arc Mountains) na ni kati ya Misitu ya hifadhi yenye thamani katika bara la Africa. Kuna baadhi ya mimea na wanyama ambao wanapalikana tu katika misitu ya Usambara Mashariki. Misitu hii ni muhimu katika utoaji wa maji kwa wananchi wa Tanga mjini na watu wote wanaoishi kando kando ya Milima hii.
- Mpango wa utunzaji wa Misitu ya Usambara Mashariki umefanikiwa Kuanzisha Hifadhi ya Mazingira Asili ya Amani yenye malengo ya.
  - Kuhifadhi Vyanzo vya maji,
  - kuanzisha na kutakunza misitu ya hifadhi
  - Kuendeleza faida za misitu kwa wanavijiji.
- Utafiti katika Misitu ya Usambara Mashariki ulianza Miaka ya 1890 hasa katika ukusanyaji wa Mimea. 1928 utafitiwa vyura ulifanyika na kati ya 1930 kazi ya utafiti wa ndege ilianza. Tangu utafiti huo wa awali, utafiti wa bailojia katika milima hii umezidi kuongezeka.
- Wananchi wa waeneo haya wanategemea misitu hii kwa mahitaji yao mengi ya kilasiku kwa mfano; Kuni, Maji, Mboga, Matunda, Dawa, Majengo, Mvua, Uyoga, hewa nzuri, n.k. Ingawa umuhimu huu wa Misitu hii unafahamika kwa wananchi wa milima hii ambaoni ndio watumiaji wakuu, bado uharibifu wa misitu unatokea mara kwa mara ambao unahatarisha misitu. Uharibifu kama, uchomaji moto, uvunaji haramu wa mbao, uwindiaji, ukatiji, majengo na fito, ulimaji ndani ya misitu na mwingine mwingi ni hatari kwa misitu hii kwa hapo baadae kama hautakomeshwa mapema.
- Wananchi wanatakiwa kujivunia na utajiri walio nao wa misitu hii na waitunze kwa manufaa ya sasa na vizazi vijavyo kwa matumizi endelevu. Maeneo mangi hapa Tanzania hayana Milima na misitu minene na mizuri kama hii. Ukame ni tatizo katika maeneo hayo hivyo isingekuwa vizuri kutoweka yote. Tushirikiane kuitunza misitu ya Usambara Mashariki kwa nguvu zote. MISITU NI UHAI.

### **4. UMHIMU WA UTAFITI KATIKA MISITU YA USAMBARA MASHARIKI** *(Albert Ntemi)*

Utafi huu ulianza mwaka 1994 na umekuwa na matokeo mazuri sana kwa kufanikiwa kupata mimea na wanyama ambao walikuwa hawajulikani na pia kuongeza orodha ya mimea na wanyama. Misitu 13 imeshafanyiwa utafiti kama huu katik misitu ya Usambara Mashariki.

**Madhumuni ya utafiti:**

1. Kutafiti mimea na wanyama adimu ndani ya misitu ya hifadhi.
2. Kusaidia mpango wa utunzaji wa baadaye wa misitu.
3. Kutoa mafunzo ya utafiti kwa Mabwana na mabibi miti.
4. Kutoa ripoti ya kila msitu ikionyesha matokeo ya utafiti na ushauri wa utunzaji wa msitu kwa matumizi endelevu.
5. Kuchunguza uharibifu wa misitu.

**Mafanikio ya Utafiti:**

1. Umefanikiwa kutafiti misitu 12 na huu ni wa 13.
2. Mimea mingi imeweza kujulikana kwa wanamimea ambayo ilikuwa haifahamiki hapo nyuma.
3. Wanyama wadogo wadogo wengi wamejulikana kutoka na utafiti huu.
4. Utafiti huu umeweza kuelimisha njia mbali mbali ya utafiti kwa karibu mabwana na mabibi miti katika Mradi wa hifadhi Misitu Usambara Mashariki.
5. Watafiti mbali mbali wame vutiwa na kufaidika na utafiti huu.
6. Kujulikana zaidi ulimwenguni umhimu wa misitu hii ya Usambara Mashariki kupitia utafiti huu.

**5. VITU TUVYOTAFITI NDANI YA MISITU YA HIFADHI** (*Francis Kiondo - Msaidizi wa utafiti*)

Katika misitu ya hifadhi ya Usambara Mashariki, tunatafiti viumbe hai ndani ya maeneo yote ya misitu ya asili. Kwa mfano:

**Wanyama**

- wanyama wadogowadogo kama panya, popo, vyura, nyoka, mijusi, ndege, wadudu kama vipepeo, konokono, jongoo.

**Mimea**

- Kutambua majina ya miti ya kitaalamu na ya kienyeji
- kukusanya mimea na kuipeleka sehemu mbalimbali ulimwenguni kwa ajili ya kutambulika zaidi na kuhifadhiwa kwa matumizi ya baadaye.

**Kuchunguza uharibifu wa Misitu**

Hapa tuna pita sehemu zote za misitu na kuangalia uharibifu uliofanywa na watu.

- Uharibifu kama ukataji miti, fito, na nguzo.
- Uchanaji mbao
- Uwindaji haramu wa wanyama
- Uchomaji moto ovyo

Sampuli zilizokusanywa za mimea na wanyama kwa kutumia njia za kitaalamu. Sampuli hupelekwa kwa wataalama Dar-es-Salaam, Uingereza, Zimbabwe, Marekani na Ujerumani kwa utambuzi zaidi.

**6. MATATIZO YANAYO ONEKANA MSITU WA MLINGA** (*Selemani Hamadi - Bwana Miti*)

1. Mito ya mara kwa mara.
2. Uvunaji haramu - ukiambatana na ukataji nguzo.
3. Uwindaji wanyama.

**Athiari za Matatizo Hayo**

- a) Moto
 

Uwoto wa asili hutoweka matokeo yake huota miti ambayo haina maana kama Mlinga maeneo yaliyo unguwa yana miti aina ya mishinga.
- b) Unauwa wanyama wadogo wadogo ambao hawana uwezo wa kukimbia.
- c) Kuharibu vyanzo vyamaji.
- d) Kuota mimea aina tofauti.
- e) Kuharibu rutuba aridhini.
- f) Kuongezeka kwa panya mashambani.
- g) Kuongezeka kwa wanyama waharibifu mashambani kama nyani, kima, nguruwe sababu yakukosa chakula msituni.
- h) Kuhama kwa viumbe kutoka sehemu moja hadi nyingine.

**Uvunaji Haramu**

- a) Kupotea kwa aina muhimu za miti mfano hapa-mvule.
- b) Kuharibu uoto wa asili na kuuwa mimea iliyo jirani na sehemu ulipo angushwa mti.
- c) Kuwepo kwa maeneo ya wazi ndani ya msitu.

**Uwindaji**

- a) Hatari ya moto msituni, wawindaji huwa wanachoma moto na kusababisha wayama kuhamia upande mwingine ili wawapate kwa urahisi - au kuchoma nyama msituni.
- b) Ukataji wa miti aina ya nguzo kufanyia mitego.
- c) Kuuwa wanyama.
- d) Mitego ni hatari kwa watu.

**Tufanye nini ili tuepukane na matatizo haya?**

- a) Kufanya mikutano ya mara kwa mara na vitongoji vinavyo pakana na misitu ya hifadhi.
- b) Doria za mara kwa mara kushirikiana na wana kamati.
- c) Kuhamasisha upandaji miti ya matunda, mbao, na kuni - pia kuhamasisha wananchi kulima kilimo cha kuchanganya mazao ya chakula na miti - kilimo mseto au kilimo msitu.

## 7. TUJARIBU KUJIULIZA MASWALI MACHACHE

1. Ni sababu zipi zinazosababisha kupungua au kutoweka kwa misitu katika eneo ualoishi?  
*What are the factors causing the forest to decrease or disappear in the area you are living?*
2. Ni akina nani ambao hufanya uharibifu huo?  
*Who causes those effects?*
3. Ni athari zipi ambazo zimetokea baada ya uharibifu wa miti kufanyika kwa muda mrefu?  
*What are the long term affects of the destruction that has happened?*
4. Wanyama wa aina gani wamepungua au kutoweka kwa sababu za uwindaji haramu na ukataji wa miti ovyo?  
*What kind of animals have decreased or disappeared because of illegal hunting or tree cutting?*
5. Unatoa ushauri gani ili kuzuia uharibifu huo usiendelee?  
*What advice do you give to stop these effects?*
6. Juhudi gani unazofanya katika kuhifadhi mazingira katika makazi unayoishi?  
*What action have you taken to protect the area in which you live?*
7. Ni sababu zipi zinazo kwamisha juhudi za upandaji miti kwenye makazi yako?  
*Are there any reasons or problems that stop you planting trees?*
8. Wewe unadhani ni kitu gani kitatokea misitu yote ikiharibiwa?  
*What do you think will happen when all the forests are finished?*
9. Je unaamini usemi huu, miti inaweza kuishi bila binadamu lakini mwanadamu hawezi kuisha bila miti? Wewe una mtazamo upi?  
*Do you believe this saying "trees can live without people, but people cannot live without trees"?*
10. Unadhani ni njia zipi zitumike ilikupata mahitaji kutoka misituni bila kuiharibu?  
*What measures do you think could be used to get forest products without destroying forests?*

## SAFU YA MILIMA YA UKANDA WA MASHARIKI – direct translation of Eastern Arc mountains information based on the text from Eastern Arc Map

### 1. *Do you know the Eastern Arc Mountains?*

The Eastern Arc mountains are located parallel to the south east coast from south-west Tanzania, a combination of nine separate mountains from South Kenya to Tanzania, making a shape of a small moon/half circle – hence the name Eastern Arc. It is believed that these mountains formed one million years ago, through natural earth formation. A good place for rainforest which have existed on African continent for a long time. SEE MAP.

### 2. *Can you identify which mountains are in the Eastern Arc?*

The Eastern Arc mountains include the following mountains from the north east: Taita Hills Kenya, N and S Pare, E and W Usambara etc. In total this area is 2% of the total land of Tanzania – about 50,000km<sup>2</sup>, but it is forest habitat for many plants and animals. This area is the second most important place in the African continent for birds. The volcanic mountains

Mt. Elgon, Mt. Kenya and Mt. Kilimanjaro are not old enough to be considered within the Eastern Arc.

### **3. *What caused the mountains to form?***

It is known that the big rainforest in West Africa was widespread throughout the whole of Africa. Because of differences in climatic conditions about 10 million years ago, the East African forest was separated from West African forest. As a result of drought and the development activities of people, these forests have been separating and becoming isolated, surrounded by dry scrub/woodland areas, estates and residential areas. These mountains have also been called the 'Galapagos Islands' of Africa due to their isolation and the presence of different living organisms that are only found here and nowhere else in the world, e.g. there are 16 genera of plants and 20 of 21 species of house flowers (African violets) that are found only in the Eastern Arc mountains.

### **4. *What are the importance of Eastern Arc mountain forests?***

Geographically these mountains have forests which are very important in Tanzania for conserving water sources (rivers), for providing a resource to people living in big cities such as DSM, Tanga, Morogoro etc. and for hydroelectric power for generating electricity e.g. Pangani, Kihansi. There are big dams (Mtera, Mindu) important for fishing, irrigation and home uses. People living in these areas have daily needs from these forests – water, charcoal, firewood, drugs, poles and timber. Also these forests have been important for the conservation of the environment and regulation of air, contributing a lot to rainfall. So these forests are the spinal chord of the country and heritage of future generations. In the world they are the 24<sup>th</sup> biodiversity hotspot.

### **5. *Do you know that these forests are in danger of disappearing?***

The sad/worrying thing about these mountains' forests are that they have been intensively cut for timber and other uses together with bushfires. Although there is protection, illegal harvesting of timber is a big problem. Also, many areas have been cleared for cash crops or cultivation such as tea or coffee. These areas have fertile soil. Other development activities affecting these forests include overgrazing, mining, road constructions, railways, illegal hunting etc. Population increase is growing simultaneously with the demand for forest products and resources and endangering the sustainability of forests.

### **6. *What are the factors affecting the forests?***

Among the forms of forest destruction (some happening for short and some for long periods of time) are the following:

- i. soil and land degradation
- ii. drought
- iii. floods
- iv. destruction of water sources (drying out)
- v. invasion of foreign/invasive species
- vi. invasion of other living organisms e.g. animals, insects, birds, plants etc.
- vii. Climate change e.g. temperature increases, ozone gases

***7. Are there any conservation measures being practised in the Eastern Arc mountains?***

At present the Eastern Arc mountains are known clearly by biologists and researchers, but we have seen there is a big need to educate Tanzanian people to know what is going on concerning their own biodiversity. Environmental education has been given to people near to these mountains aiming to improve environmental degradation. The government and NGOs have started conservation efforts by collaboration with local people living adjacent to forest areas. These efforts will increase awareness to plant trees in their shambas for the purpose of their daily needs. Also these efforts have started to educate peasants about farm forestry and agroforestry.

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## 7.2: Minutes of Mlinga Environmental Committees Meeting (Kiswahili)

*Katibu wa kikao - Frank S. Mahenge*

### MAFUNZO YA ELIMU YA MAZINGIRA 9/11/2001

Wajumbe waliohudhulia

No.	JINA	CHEO	ATOKAKO
1	Mr. Thabiano	M/kiti	Magula
2	Alphonse Msenga	Mjumbe	Misozwe
3	Albert Ntemi	B/miti (EUCAMP)	Maramba
4	Ernest Michael	Mjumbe	Kanyalika
5	Dismas Mhando	Mjumbe	Misozwe
6	William J. Kumwaga	Mjumbe	Misozwe
7	Peter Semgodo	Mjumbe	Magula
8	James Mlima	Mjumbe	Misozwe
9	Jullius Usingu	Mjumbe	Mwembeni
10	Sylvester Mukanda	M/kiti	Magula
11	Sturt Bakari	Mjumbe	Mwembeni
12	Sylvester Juma	Mjumbe	Mwembeni
13	Andrew D. Kalage	M/Mazingira	Mwembeni
14	Matoe Charles Hiza	Katibu/mz.	Mwembeni
15	Luka H. Y. Kingazi	Katibu/Mz	Magula
16	Edmund Challenge	Mjumbe	Misozwe
17	Rashid M. Mtulu	Mjumbe	Mwembeni
18	Francis M. Mdachi	Katibu/Mz	Misozwe
19	Joyce Tupa	Mjumbe	Misozwe
20	Beatrice Mlenga	Mjumbe	Misozwe
21	Jestina Ernest	Mjumbe	Magula
22	Grace Raphael	Mjumbe	Magula
23	A. B. Mbio	M/Kiti	Misozwe
24	Matiko Wambura	APM-eucamp	Tanga
25	Selemani Hamadi	B/Miti-eucamp	Misozwe
26	Francis Kiondo	Frontier-Tz	Tanga
27	Frank S. Mahenge	Frontier-Tz	Amani
28	Adam Murphy	Frontier-Tz	Uingereza
29	Susannah Hall	Frontier-Tz	Uingereza

### MPANGO WA ELIMU KWA KAMATI ZA MAZINGIRA NOVEMBA 9, 2001

#### Utafiti wa viumbe adimu katika msitu wa Hifadhi Mlinga (East Usambara Biodiversity Surveys).

Mkutano wa mafunzo uliojumuishia kamati za mazingira za vijiji vitatu Misozwe, Magula na Magoroto-Mwambene ulioandaliwa na watafiti ulifunguliwa mnamo saa 3:30 na Bwanamiti wa eneo hilo. Lengo kuu la mkutano ilikuwa ni kutoa matokeo ya utafiti kwa jamii inayozunguka hifadhi hii kwa kutumia njia ya elimu ya mazingira. Mkutano ulifanyika kwenye kambi ya utafiti eneo la Mpakani, Misozwe.

*Agenda za mkutano zilikuwa kama ifuatavyo:*

1. Historia ya kazi za utafiti
2. Mgawanyiko wa safu ya milima ya ukanda wa Mashariki.

3. Hifadhi ya misitu ya Usambara Mashariki
4. Umuhimu wa utafiti katika misitu ya Usambara Mashariki
5. Vitu vinavyofanyiwa utafiti ndani ya misitu ya hifadhi.
6. Matatizo yaliyoonekana katika misitu wa Mlinga na jinsi ya kuyaepuka na kuyatatua.
7. Maswali ya kujiuliza ili kuuokoa misitu Mlinga (Kama tathmini ya ulewaji wa wajumbe).

Mada ya kwanza ilitolewa na Susannah Hall, ambaye ni kiongozi wa utafiti Frontier-Tanzania. Mtoa mada alianza kwa kuwakaribisha wageni, pamoja na kujitambulisha yeye mwenyewe na shughuli anazosimamia, pamoja na taasisi anazoshirikiana nazo katika kazi ya utafiti wa bioanuai (mfano: TAFORI, Chuo Kikuu Dar es Salaam, EUCAMP).

Pia alieleza sehemu ambazo kazi hii ya utafiti imekwishafanyika kuwa ni Misitu ya Kambai, Longuza, Kwamarimba, Bamba, Manga Segoma, Semdoe, Kwamgumi, Mlungui, Mtai, Amani, Nilo na sasa wapo hapa Mlinga.

Mwisho alieleza lengo la utafiti wa viumbe adimu katika milima ya Usambara Mashariki kwamba ni kutoa taarifa mbalimbali zinazohusu thamani ya viumbe adimu ndani ya misitu, kutoa mafunzo ya utafitikwa wafanyakazi wa hifadhi na kutoa matokeo ya utafiti kwa jamii kwa kutumia njia ya elimu ya mazingira.

Baada ya mada kutolewa wajumbe walieleza jinsi walivyovutiwa na kazi hizo za utafiti na jinsi walivyokumbukwa kwamba wao pia ni wshika dau. Aidha walishukuru kwa kukutanishwa kwa kamati za mazingira katika vijiji vitatu, kwani walikiri hawajawahi kukutana wala kutambulishana, ukizingatia kwamba hifadhi ya mazingira haina mpaka. Hii ilibainika wakati kijiji cha Misozwe kilipowaomba watu wa Magula kuendelea kuhifadhi chanzo cha maji ambacho ni pekee kwa matumizi yao.

Mada ya pili ilitolewa na Ndugu Albert Ntemi, ambaye ndio kiongozi wa kazi ya utafiti kwa upande wa Mradi wa Misitu Usambara Mashariki. Ilihusu maelezo au ufafanuzi wa safu ya milima ya Usambara Mashariki (the Eastern Arc Mountains).

Alianza kwa kuwafahamisha wajumbe mahali ukanda wa milima hii unapopatikana kwa kutumia ramani. Alitaja majina kama ifuatavyo: Taita Hills (Kenya), Pare Kasikazini, na Kusini, Usambara Mashariki na Magharibi, Ngunguru, Ukaguru, Udzungwa, na Mahenge.

Aidha alifafanua kitu kilichosababisha milima hiyo ionekane kama ilivyo sasa-kwamba ni kutokana na mabadiliko ya hali ya hewa, ukame pamoja na shughuli za maendeleo ya binadamu. Zamani miaka milioni kumi iliyopita misitu hii iliunganika na kuwa mikubwa yenye mvua nyingi sana iliyosambaa kutoka Afrika Magharibi na kuenea Afrika nzima (Tropical Forest).

Mtaalamu huyu aliendelea kueleza umuhimu wa misitu iliyopo katika safu ya milima hiyo kwamba ni kuhifadhi vyanzo vya maji, jamii inaypizunguka hupata mahitaji yake ya kila siku kama maji, kuni, mkaa, dawa, nguzo za kujengea na mbao kwa ajili ya matumizi mbalimbali. Pia kutengeneza mandari asilia ambayo ni kivutio kikubwa kwa watalii na kwamba huhifadhi ardhi na kurekebisha hali ya hewa. Aliongeza kwamba milima hii ni muhimu sana kiulimwengu; ni ya 24 kuwa na bionuwai nyingi (aina mbalimbali za viumbe hai).

Pia alifahamisha wanamazingira hao kuwa milima hii inakabiliwa na hatari ya kutoweka kutokana na shughuli za binadamu kama upasuaji wa mbao, kilimo, kuchoma moto hovyoy, na matumizi mengine ya ardhi; japo kuna udhibiti lakini uvunaji haramu wa mbao bado ni tatizo sugu.

Mtaalamu alifafanua kwamba baadhi ya madhara ya uharibifu wa miti hutokea baada ya muda mfupi na mengine huchukua muda mrefu kujitokeza. Alizitaja athari hizo kuwa ni pamoja na mmomonyoko wa udongo na maporomoko ya ardhi, kutoweka kwa mimea au viumbe fulani fulani, pamoja na mabadiliko ya hali ya hewa.

Mwisho mtaalamu alifahamisha juhudi zinazofanyika katika kuhifadhi misitu iliyoko kwenye milima ya ukanda wa Mashariki kutokana na umhimu wake kwa watafiti, wanabiolojia na jamii zinazozunguka milima hiyo. Kwamba "...tumeona na kunahaja kubwa ya kuielimisha jamii nzima ya Tanzania ifahamu kinachoendelea kuhusu bionuwai iliyo hadhina kubwa kwetu," na kwamba wameanzisha mpango kamambe wa Elimu ya Mazingira ambayo imeanza kutolewa kwa wananchi wanaoishi katika milima hii, kuhusu madhara ya kuharibu mazingira asilia. Serikali na Mashirika yasiyokuwa ya Kiserikali (NGOs) yameanzisha juhudi za kuishirikisha inayoishi au kupakana na maeneo ya misitu katika kuhifadhi misitu. Mfano kuweka mikakati ya pamoja ya kuwahamasisha wananchi kupanda miti katika mashamba yao kwa ajili ya matumizi yao wenyewe.

Mada ya tatu iliyohusu milima ya Usambara Mashariki ilitolewa na ndugu Albert Ntemi (kiongozi wa bioanuwai EUCAMP). Alieleza kuwa misitu hii ni miongoni mwa misitu ya mvua ya ukanda wa Milima ya Mashariki na ina mimea na wanyama ambao baadhi yao hupatikana hapa tu, na kuwa ni mkati ya misitu yenye thamani katika bara la Afrika. Pia misitu hii ni muhimu katika utoaji wa maji kwa wananchi wa Tanga mjini na baadhi ya wilaya za mkoa huu.

Aidha alieleza mafanikio ya mpango wa utunzaji wa misitu ya Usambara Mashariki kuwa umefanikiwa kuanzisha Hifadhi ya Mazingira Asilia ya Amani, utafiti wa kibiolojia umeongezeka, na kwamba watu wanaendelea kupata kupata mahitaji ya mazao ya misitu ndani ya misitu hiyo.

Mwisho aliwaeleza wanamazingira hao kuwa wajivunie na utajiri walionao wa misitu hii na waitunze kwa manufaa ya vizazi vya sasa na vijavyo kwa kuzingatia matumizi endelevu.

Mada ya nne iliyohusu umhimu wa utafiti katika milima ya Usambara Mashariki ilitolewa na kiongozi wa bioanuwai EUCAMP Ndugu Albert Ntemi.

Alianza kwa kueleza historia fupi ya kazi ya utafiti katika misitu hii kwamba umeanza tangu mwaka 1995 na kuwa umekuwa na matokeo mazuri kwa kufanikiwa kupata mimea na wanyama adimu. Misitu 13 imeshafanyiwa utafiti kama huu katika misitu ya Usambara Mashariki

Madhumuni ya Utafiti yalikuwa kama ifuatavyo:

- Kutafiti mimea na wanyama ndani ya misitu ya hifadhi.

- kusaidia katika mpango wa baadae wa utunzaji wa misitu
- kutoa mafunzo ya utafiti kwa mabwana- na mabibimiti
- kutoa taarifa ya matokeo ya utafiti na mapendekezo kwa ajiri ya matumizi endelevu.
- kuchunguza uharibifu wa misitu na madhara yake.

Mwisho alifafanua mafanikio ya utafiti kwamba ni pamoja na:

- Mimea na wanyama imeweza kujulikana ambayo ilikuwa haijulikani mwanzo.
- umetoa elimu ya utafiti kwa mabwana- na mabibimiti katika mradi wa Hifadhi Misitu Usambara Mashariki.
- watafiti mbalimbali wamevutiwa na kufaidika na utafiti huu.
- kujulikana zaidi ulimwenguni umhimu wa misitu hii ya Usambara Mashariki kupitia utafiti huu.

Mada ya tano ilihusu vitu ambavyo vinafanyiwa utafiti ndani ya misitu ya Hifadhi. Vitu hivyo vimegawanyika katika makundi makuu mawili ya viumbe hai; Mimea na Wanyama. Mada hii ilitolewa na wataalamu wawili ikianza na mambo ya mimea ambayo ilitolewa na Ndugu Francis S. Mahenge (Afisa Misitu ya Hifadhi).

Alianza kwa kueleza hatua ya kwanza ambayo ni kuugawa msitu kwa mstari maalumu (transect line), na baadaye kufuatia mistari ya katikati yenye urefu wa mita 450 ambapo 'plot' za mimea hupimwa. Baada ya hapo kando ya mistari hiitathmini ya uharibifu hufanyika. Pia miti mikubwa zaidi ya sentimita 10 na baadaye viploti vyenye ukubwa wa mita moja ya ukubwa kwenye kona mimea hupimwa na kutambuliwa na mtaalamu wa mimea . Ambayo haijulikani hutumwa katika vyombo vingine vya utafiti wa miti huko Dar es Salaam, Uingereza, Zimbabwe, Marekani na Ujerumani. Katika kuchunguza uharibifu wa misitu na wanyama, watafiti hupita sehemu zote za misitu na kuangalia uharibifu uliofanya na watu. Mfano: ukataji miti, fito na nguzo, uchanaji mbao, uwindaji haramu wa wanyama na nyuki, na uchomaji moto ovyo.

Sehemu ya pili ya mada ya tano upande wa wanyama iliandaliwa na Ndugu Francis Kiondo (Mtafiti Msaidizi). Aliwataja wanyama wanaofanyiwa utafiti kuwa ni Panya, popo, vyura, nyoka, mujusi, ndege, konokono, na wadudu kama vile vipepeo na jongoo.

Alieleza jinsi ya kutafuti wanyama wakubwa kama Digidigi, nyani, mbega, nguruwe, pelepele na ndege, kwamba hutumia sauti zao, kuona kwa darubini, vinyesi vyao, alama za miguu pamoja na njia wanazopita. Halafu wajumbe walitembeza kuona na kujifunza kwa vitendo juu ya utafiti.

Mada ya sita ambayo iliandaliwa na Ndugu Selemani Hamadi (Bwana Miti wa Eneo) ilihusu matatizo yanayoonekana katika msitu wa Mlinga. Alianza kwa kuyataja matatizo makuu matatu ambayo ni sugu ndani ya msitu huu nayo ni: mioto ya mara kwa mara, uvunaji haramu na uwindaji wanyama.

Baada ya kuyataja matatizo aliendelea kueleza athari za matatizo hayo, kwamba moto husababisha uoto wa asili kutoweka na kuota mimea isiyo na manufaa, mfano mishigi. Pia moto huua wanyama wadogo wadogo. Moto huharibu rutuba ardhini, kuongezeka kwa panya

shambani na nyumbani, kuongezeka wanyama waharibifu mashambani kama nyani, na kusababisha viumbe kuhama kutoka sehemu moja mpaka nyingine.

Aliendelea kueleza madhara ya uvunaji haramu wa mbao kwamba miti muhimu hupotea au kutoweka, huharibu uoto wa asili na pia huua mimea iliyo jirani na pia husababisha maeneo wazi ndani ya msitu.

Uwindaji haramu ni hatari kwa kusababisha moto msituni, kuua wanyama, ukataji wa miti aina ya nguzo kufanyia mitego pia hiyo mitego huwa hatari kwa watu.

Mwisho mtaalamu huyo alipendekeza mambo ya kufanya ili kuepukana na matatizo haya. Alipendekeza kufanyike mikutano ya mara kwa mara na vitongoji vinavyopakana na misitu ya hifadhi hasa wakati na kabla ya kipindi cha hatari ya moto. Pia kuwe na doria za mara kwa mara kushirikiana na wanakamati, na kuhamasisha upandaji miti ya matunda, mbao, na kuni, pamoja na kuhamasisha kujishughulisha na kilimo misitu ili waweze kupata mahitaji yao karibu na makazi yao.

Baada ya mada ya mwisho, wajumbe walikaribishwa kuchangia hoja, maswali na kutoa mapendekezo yao juu ya somo hilo.

Wajumbe walikubaliana kwa kauli moja kwamba matatizo ya uharibifu wa mazingira ni makubwa na yanazidi kuongezeka kwa kasi ukilinganisha na hali ya hewa ya zamani. Walitaja sababu kuwa ni moto, shughuli za maendeleo, na uwindaji ndani ya msitu, pamoja na madhara ya kuzaana ambayo yanapelekea ongezeko kubwa la watu. Pia walikiri kutoweka kwa baadhi ya viumbe ndani ya msitu wa Mlinga kutokana na matumizi mabaya au yasiyoendeleu ya maliasili.

Hata hivyo wajumbe walikuwa na maswali kadhaa juu ya mada ya utafiti na wataalamu kwa ufasaha waliyajibu kama ifuatavyo:-

Swali la kwanza lilihusu maeneo muhimu duniani ya bioanuwai mengine ukizingatia kwamba wataalamu wamesema hapa Usambara Mashariki ni la 24 kuwa na bioanuwai nyingi. Kwa kutumia ramani ya Dunia ambayo imeainishwa maeneo hayo mtaalamu Susannah Hall aliwaelimisha wajumbe na wakaelewa kwani eneo lao ni la 24 kidunia.

Swali la pili: Mjumbe alipenda kuelewa kwa nini utafiti unafanyika kwa has kwa wanyama na wadudu kama vile chura. Swali hili lilijibiwa na meneja mradi EUCAMP. Alianza kwa kueleza historia ya uumbaji wa mwanzo wa mimea na wanyama pamoja na kuwiana kwao. Aliongeza kwamba kiumbe kimoja kinamaana yake na huwa na uhusiano na kingine, na mara nyingi kuwepo kwa kiumbe fulani huashiria kuwepo kwa kingine. Na mara kimoja kikitoweka basi mfumo mzima hugeuka na mara nyingine huleta madhara makubwa kwa viumbe vingine. Mfano kama wanyama wakitoweka msituni basi wanyama kama simba, chui, fisi hula hata watu ambacho si kitendo cha kawaida. Mwisho alisema kama kungekuwa na upigaji kura kati ya binadamu na viumbe vingine kwamba yupi ni kero na hasitahiri kuwepo, basi binadamu kura ya kumuangamiza ingemuangukia kwa sababu ya vitendo vyake vya uharibifu.

Swali jingine: Mjumbe aliuliza: kutokana na kutokuwepo mawasiliano kati ya wanyama pori na wakulima, je watafiti hawawezi kugundua njia ya kuwasiliana nao ili wasiharibu mazao

yetu (wakulima)? Wataalamu Albert, Matiko, na Susannah walijibu kwa undani kama ifuatavyo:-

- Binadamu tumepewa akili na utashi wa kuvitawala viumbe, kwa hiyo tujitahidi kutumia uwezo huo kuwashinda wanyama bila kuleta madhara kwao.
- Mtaalamu wa pili alifurahishwa sana na swali hilo kuwa mjumbe ameweza kusema wanyama wa porini na sio waharibifu. Mwisho alipendekeza kwamba wananchi wapange matumizi bora ya ardhi kwa kujenga makazi kati ya mashamba na misitu.
- Mtaalamu wa tatu aliwaambia wajumbe kuwa kuwepo kwa wanyama waharibifu ni kutokana na matendo yetu mabaya ambayo yanaharibu mazingira na chakula kwa cha wanyama. Nao wakikosa mahitaji huja mashambani kwetu. Alimaliza kwa kupendekeza tuache vitendo vinavyosababisha moto msituni.

Swali la mwisho toka kwa wakulima lilikuwa ni hofu kuwa wanahisi kufichwa juu ya utafiti. Hisia ni kwamba watafiti wanatafuta madini na rupia ndani ya msitu Mlinga.

Jibu lilikuwa wao ni watafiti wa mimea na wanyama tu, na hawana utaalamu waowote juu ya madini. Waliwaomba wajumbe kuwa kama kuna madini basi serikali hutoa idhini ya kutafiti na endapo ikidhihirika kwamba madini yanafaida zaidi ya hifadhi ya misitu basi huo msitu hubadilishwa na kuitwa hifadhi ya madini. Baadae madini huchimbwa kwa manufaa ya nchi, kama ilivyotokea kwenye misitu ya huko Morogoro.

Kabla ya kufunga mafunzo kulikuwa na maswali dodoso yaliyoandaliwa na watafiti kama kipimo cha mafunzo yaliyotolewa.

*1) Ni sababu zipi zinazosababisha kupungua au kutoweka kwa misitu katika eneo unaloishi?*

Wajumbe walijibu nkupendekeza kama ifuatavyo:

Walijibu kwa kauli moja kwamba sababu kuu ni moto, kukosekana kwa elimu ya mazingira, uvunaji holela wa mbao na nguzo, uwindaji haramu na ongezeko la watu. Walipendekeza suluhisho la tatizo ni bwanamiti ashirikiane na kamati za mazingira, mipaka ya misitu na ya mashamba isafishwe, kuandaa mikakati ya kuielimisha jamii juu ya madhara ya uharibifu huo. Na mwisho walipendekeza mbiu zipingwe mara moto utokeapo na tahadhari zitolewe kipindi cha hatari ya mioto.

*2) Ni akina nani ambao hufanya uharibifu huo?*

Waharibifu wakuu wa misitu ni wananchi na zaidi ni wageni toka bara waliokuja kupasua mbao, pamoja na wawindaji haramu ndani ya misitu.

*3) Ni athari zipi ambazo zimetokea baada ya uharibifu wa miti kufanyika kwa muda mrefu?*

Walitaja athari kama ifuatavyo:

- kukosekana kwa mvua ya kutosha na kubadilika kwa misitu, mfano mvua za vuli hazitabiriki tena.
- wanyama na mimea muhimu wametoweka.
- vyanzo vya maji vimepungua au kukauka na kusababisha mito ya msimu badala ya ile ya kudumu.
- mila na desturi za hifadhi ya mazingira imepotea, mfano miiko mingi sasa haifuatwi.

4) *Wanyama wa aina gani wamepungua au kutoweka kwa sababu za uwindaji haramu na ukataji miti ovyo?*

Wafuatao ni wanyama ambao wanamazingira kwa kauli moja walikili kwamba wamepotea: simba, Chui, nyati, na waliopungua ni swala, digidigi, na ndege kama kanga.

5) *Unatoa ushauri gani ili kuzuia uharibifu huo usiendelee?*

-Walipendekeza kwamba wawindaji wote waorodheshwe, watambuliwe na hatimaye wapewe elimu ya mazingira ya wanyama na mimea.

-Njia mbadala ni kufuga wanyama kama vile kuku, mbuzi, pimbi, ng'ombe, n.k. Elimu na ushauri utolewe.

6) *Juhudi gani unazofanya katika kuhifadhi mazingira katika makazi unayoishi?*

Kila kijiji mjumbe alisimama na kueleza juhudi zinazofanyika na wote waliunga mkono kama ifuatavyo:

Misozwe:

- Wameandaa mikakati ya kuelimisha watu binafsi kuanzisha vitalu vya miti na kupanda miti.
- Wameandaa utaratibu wa kupanda miti ya asili kandokando ya mto upitao katika kijiji chao.
- Wiki ya Upandaji Miti kitaifa watapanda miti pembeni mwa barabara kuu iendayo Muheza kwa miti aina ya mijohoro.
- Kushirikiana na watu wa Magula kuhifadhi chanzo chao cha maji.

Magula:

- Wameweka mikakati ya kuhifadhi vyanzo vya maji ambavyo ndoyo uhai wa vijiji vya ukanda wa chini.
- Wameweka marufuku ya kukata miti au kulima kandokando ya mito au katika vyanzo vya maji.
- Wanaelimisha watu wasichome moto.

Magoroto-Mwembeni:

- Wamewahamasisha watu kuanzisha vitalu vya miti na kupanda miti mashambani pamoja na kwenye vyanzo vya maji na kandokando ya mito.

(NB. Hiki ni miongoni mwa vijiji anzilishi [pilot villages] katika shughuli za hifadhi misitu). Katika kuchangia juhudi za kuhifadhi misitu kujiji cha Misozwe na Magula waliazimia kuanzisha hifadhi ya misitu kwa kushirikiana kuhifadhi vyanzo vya maji na kuhifadhi kandokando ya mto.

7) *Ni sababu gani zinazokwamisha juhudi za upandaji miti kwenye makazi yako?*

Walitaja, upungufu wa miche, na iliyopo huuzwa kwa wengi wasio na vitalu. Walipendekeza mbegu zitolewe kwa watu wote, pia waelimisha kutafuta au kukusanya mbegu zao wenyewe.

Upungufu wa elimu na uhamasishaji juu ya upandaji miti na dhana nzima ya kilimo mseto (agroforestry).

8) *Unadhani ni kitu gani kitatokea misitu yote ikiharibiwa?*

Wajumbe walibashiri na kutaja kama ifuatavyo:

- kutatokea mmomonyoko wa ardhi na makorongo ya kutisha.
- kutatokea jangwa na ukosefu wa mvua.
- utoweka kwa malisho ya wanyama.
- upepo mkali na vimbunga vitatokea.
- kutaharibika majira na hali ya hewa itabadilika na kuwa mbaya.

9) *Je unaamini usemi huu: 'miti inaweza kuishi bila binadamu lakini mwanadamu hawezi kuishi bila miti'? Wewe unamtazamo gani?*

Wajumbe wate walikubali kwa kauli moja kwani kama binadamu hatakuwepo basi uharubifu utapungua na kubakia kama ilivyokuwa asili ya uoto na wanyama.

10) *Unadhani ni njia zipi zitumike ili kupata mahitaji kutoka msituni bila uharibifu?*

- Kamati za mazingira zitumike na zishirikishwe ili kulinda na kuelimisha jamii juu ya matumizi endelevu.
- Vibali vya mazao ya maliasili vianzie vijijini kwa kutumia kamati za mazingira.
- Kuwe na utaratibu maalum wa kuvuna mazao ya misitu.
- Kuanzisha na kuzilinda hifadhi za misitu za vijiji na kutumia katika matumizi endelevu.
- Kushirikishwa kwa wanakijiji katika kazi za utafiti pamoja na kupewa taarifa za mwisho za utafiti.
- Yote hayo yalipendekezwa na kupitishwa kwa kauli moja.

## **KUFUNGA**

Mgeni Rasmi Ndugu Matiko wambura (Meneja Mradi, EUCAMP) aliombwa kusema machache juu ya mafunzo na mwisho aliombwa kufunga mafunzo ya elimu ya mazingira.

Alianza kwa kutoa shukurani zake za dhati kwa watafiti (Frontier-Tanzania) kwa kuandaa na kutekeleza mpango wake wa elimu ya Mazingira kwa jamii inayozunguka msitu unaotafitiwa, pamoja na kuwajulisha matokeo ya utafiti. Pia alitoa shukurani zake kwa wanakamati za mazingira wa Misozwe, Magula na Miembeni, pamoja na viongozi wao kwa kuhudhuria mafunzo hayo.

Alikiri kwamba mafunzo yamewafikia walengwa kutokana na michango yao katika mada zote na madhumuni yake pia yamedhihirika. Mfano:

- Wameweza kukutana na kufahamiana wanakamati za mazingira.
- Kueleweshwa juu ya mbinu za utafiti kwa vitendo na kuona matokeo yake.
- Pia wameweza kujua vyanzo vya uharibifu wa mazingira, madhara yake na mbinu za kukabiliana na matatizo hayo.

Alisisitiza kwamba matokeo ya utafiti ni muhimu sana katika kupanga na kutekeleza sera za ushirikishwaji wa jamii katika misitu ya hifadhi za taifa na za vijiji (Joint Forest Management programme, JFM). Hii ndio sera ya taifa na idara ya misitu ndio itasimamia katika kuwezesha wanavijiji kumiliki misitu yao, kuanzia ngazi ya mtu binafsi, familia hadi kijiji. Pia miti ya asili iliyopo ndani ya mashamba kumilikiwa na wakulima na kuitumia katika matumizi endelevu chini ya usimamizimwa wataalamu wa misitu.

Alikiri kwamba chanzo kikubwa cha uharibifu wa misitu ni elimu duni ya mazingira ambayo ni muhimu sana katika kuhifadhi misitu. Lakini aliwafariji kwa kuwaeleza kuwa msitu huo wa Mlinga upo ndani ya mpango kabambe wa kuishirikisha jamii katika kuhifadhi misitu ya taifa (JFM). Na aliwaomba wajumbe wawe mabalozi katika kufikisha ujumbe huu. Pia aliwaomba kwamba wayatumie madaraka waliyopewa bila woga wala unafiki kama vile kuwaficha waharifu wa mazingira.

Aliwaambia wajumbe kwamba mtazamo wa ofisi ya Hifadhi Mkoa “tutashirikiana katika kuhifadhi maeneo yaliyopo ndani ya vijiji, kama vile vyanzo vya maji, misitu ya vijiji, n.k. Pamoja na kusaidia vijiji katika kuweka mipango ya utekelezaji wa hifadhiya mazingira.

Mwisho alishukuru tena watafiti kwa kuweka na kutekeleza mpango wa elimu ya mazingira. Aliomba taasisi nyingine za kiserikali na zisizo za kiserikali kuiga mfano mzuri huo. Kikao kilifungwa mnamo saa 9:45 jioni.

Photograph of Misozwe Environmental Committee with Frontier and EUCAMP staff.



### 7.3: Mlinga Womens Group Meeting Agenda (Kiswahili & English)

Wajumbe waliohudhulia

No.	JINA	CHEO
1	Susannah Hall	Kiongozi wa utafiti, Frontier-Tanzania
2	Albert Ntemi	Kiongozi wa utafiti Hifadhi Mimitu, EUCAMP
3	Hanifa Juma	Mwalimu, Misozwe Primary School
4	Bibie Selemani	Mwalimu, Misozwe Primary School
5	Mwanaidi Shabani	Mwalimu, Misozwe Primary School
6	Flora Mbwana	Mwalimu, Misozwe Primary School
7	Monica Sekimweri	Mwalimu, Misozwe Primary School
8	Ester Majama	Mwana kikundi
9	Zaina Ali	Mwana kikundi
10	Zaina Salimu	Mwana kikundi
11	Pili Hamza	Mwana kikundi
12	Mary Msumi	Mwana kikundi
13	Rhoda Makuo	Mwana kikundi
14	Mariam Mngazija	Mwana kikundi
15	Salima Mohamed	Mwana kikundi
16	Pili Amiri	Mwana kikundi
17	Mary Mhina	Mwana kikundi
18	Fatuma Mgallawe	Mwana kikundi
19	Agatha Selevesta	Mwana kikundi
20	Tarendane Aseri	Mwana kikundi
21	Joyce Tupa	Mwana kikundi
22	Monika Endward	Mwana kikundi
23	Joyce Nyangue	Mwana kikundi
24	Rhoda Lumuliko	Mwana kikundi
25	Mary Mathayo	Mwana kikundi
26	Gces Yakobo	Mwana kikundi
27	Stera Wares	Mwana kikundi
28	Joyce Semakome	Katibu kikundi
29	Selemani Hamadi	Bwana Miti, Misozwe

#### Kamati za wanawake – Ratiba (Kiswahili)

- 9.00 am** Kukaribisha wageni na chai (Selemani Hamadi)
- 9.30 am** Utangulizi na kujitambulisha (Susannah Hall)
- 9.45 am** Mimitu ya Usambara Mashariki (Albert Ntemi)
- 10.00 am** Umuhimu wa utafiti (Albert Ntemi)
- 10.15 am** Vitu tunanyotafiti (Albert Ntemi)
- 10.30 am** Mapumziko mafupi na chai
- 11.00 am** Matatizo ya mimitu wa Hifadhi wa Mlinga (Selemani Hamadi)
- 11.30 am** Majadiliano / Majiko sanifu
- 12.00 pm** Maswali machache kukota Frontier-Tanzania
- 12.30 pm** Kuona 'specimens' (Frontier Tanzania)
- 1.00 pm** Chakula na kufunga kikao

**Women's Group Meeting – Timetable (English)**

- 9.00 am** Welcome, tea and registration (sign visitors book & complete form) (Local Catchment Officer)
- 9.30 am** Introduction (Susannah Hall)
- 9.45 am** East Usambara mountains Forests (Albert Ntemi)
- 10.00 am** Importance of biodiversity research (Albert Ntemi)
- 10.15 am** What are we doing in the forest? (Albert Ntemi)
- 10.30 am** Tea break
- 11.00 am** Problems of Mlinga FR (Local Catchment Officer)
- 11.30 am** Discussion about new improved stoves
- 12.00 pm** Questions to Frontier-Tz and EUBS
- 12.30 pm** Specimen viewing (Frontier Tanzania)
- 1.00 pm** Lunch and closing

**Makiko sanifu**

1. Je majiko sanifu yamewasaidiaje katika uhifadhi wa misitu na mazingira?  
*How have the improved stoves assisted you in forest conservation?*
2. Elimu hii ya Majiko sanifu, je mmeienezaje kwa waki na mama wengine katika kijiji chenu?  
*To what extent has the improved stove knowledge/training spread amongst other women?*
3. Aina ipi ya majiko ni bora zaidi?  
*Which is the best new improved stove? Why?*
4. Je mnamalengo yapi mengine ya kuhifadhi misitu zaidi ya huo wa majiko sanifu?  
*Is there any other environmental conservation measures you are planning to start apart from the improved stove?*

## **7.4: Lesson Plans for School visits**

### **7.4.1: Catchment Officer Talk**

#### **(a) Suggested Content (English)**

##### **Goal**

To increase the children's interest, respect and sense of responsibility for local Forest Reserves.

##### **Key questions to address during visits:**

- What is a Forest Reserve?
- Why are they important?
- Who do they belong to?
- Who looks after them?
- Where would we be without them?

##### **Catchment Officer (CO) Talk:**

###### **What is a CO?**

I work with local village people to help them make use of Forest Reserves in a way that doesn't damage them. There are people like me in charge of all of the Forest Reserves in the E. Usambaras (see map). The Government has created these jobs because they know how important the forests are to the local people.

###### **What is a Forest Reserve?**

These are important areas of land because they contain

- the water source for the surrounding low-lying villages
- a fuelwood source

The Government knows how important these areas are for the local villages and so it has protected them.

###### **What does a CO do?**

I encourage villagers who live close to Forest Reserves to look after them properly. I talk to village Environmental Committees and other groups to improve the way we use our forests.

The FRs are a 'resource' - which means that they are ours to use, but we must use them carefully if we are to enjoy them for years to come.

###### **Some of the things I am involved with are:**

1. **Creating tree nurseries**, like the one in the school. These are important to stop people illegally cutting down trees in the FRs to use for building materials. Tree nurseries are also good as they teach us how to grow and care for our trees which we can use or sell to raise money for the school.
2. **Creating wild vegetable nurseries** in villages. This is to stop people illegally harvesting wild plants from the forests and so that they have nice things to eat and to sell in town.
3. **Teaching people how to light safe fires** that do not burn down the forest by mistake. People must tell the village Environmental Committee before they light fires, otherwise they will be fined. I teach them how to clear vegetation around their shambas and keep watch on fires so that they do not spread beyond their fields and into the FR.

4. **Trying to stop illegal hunting.** Any form of hunting or harvesting (except for collecting dead wood) is against the law in Tanzania in FRs. People caught hunting are punished by the Government. Hunters often start fires by mistake that burn off large areas of forest. It is a real problem as the forest burns very quickly in the dry weather. Lots of plants and animals die in the fires and it destroys the reserve.
5. **Improving cooking stoves.** We all use a lot of firewood to cook our food. I am helping to promote a new clay stove that uses much less firewood than an open fire. This is great as it means less wood needs to be gathered each day and it means less damage to our FRs. It is a stove that we can make in our villages. Do you have one at home?
6. **Encouraging beekeeping groups** in villages. Kwatango, for example, have over 40 beehives and the village shares the honey and sells any they have left over. This is good because everyone likes honey and it stops people going into the FR and illegally harvesting wild honey.
7. **Encouraging fishkeeping** in pools to help stop people illegally hunting in the forest. This has been possible in Magoroto where there is more rain.

### **What are the Frontier people doing?**

They have come to look for all the special plants and animals that we have in our Forest Reserves. They are writing down all of the plants and animal types that they find in a list. There are many unusual types of animals, trees and plants here that aren't found anywhere else in the world. That makes these reserves very special (see endemics poster).

### **(b) Hifadhi ya Misitu, Siku Ufundishaji Shule ya Msingi (Kiswahili)**

#### **Lengo**

Kuongeza kiwango cha hisia kwa wapafunzi kupenda, kuheshimu na hisia za wajibikaji wa wanafunzi juu ya mazingira hasa misitu ya hifadhi iliyo karibu nao.

#### **Maswali ya msingi**

(Wakati wa kufundisha)

Msitu wa hifadhi ni nini?

Umulu mu wake ni nini?

Msitu wa hifadhi ni uali ya nani?

Nani anawajibika kwatunazi?

Bila ya misitu tungekuwa wapi?

#### **Nukuu kutoka kwa afisa misitu afisa misitu ni nani?**

“Ninafanya kazi na wananchi ili kuwawezesha kutumia/kunufaika na misitu ya hifadhi kwa njia ambazo hazitaleta uharibifu”

“Wapo watendaji wengine kama yeye katika misitu yote ya Usambara mashariki (angalia ramane). Serikali iliamzisha usima mizi huu kwa vile inafahamu umuhimu wa misitu kwa wanachi wake.

#### **Misitu ya hifadhi ni nini?**

Haya ni maeneo muhimu kwa sababu.

(i) Ni maeneo ya vyanao vya maji kwa maeneo yaliya karibu.

(ii) Kuni kwa ajili ya nishati hupapti kana humo. Serikali inafahamu umuhimu wa maeneo haya kwa wali wakew nelio maana imeamaa kuyatenga na kuyali nza.

**Kazi ya afisa misitu ni nini?**

Kuwahamasisha wananchi waishio karibu na misitu tu ya hifadhi (mfano msitu wa Mlinga) kuulinda na kuutunza kwa dhati, husaidiana na kamati za mazizigira za vijiji na vikundi vingine kuwaelimisha wananchi juu ya matumizi mazuri ya misitu yetu.

Misitu ya hifadhi ni “maliya asili” tui tumiayo, lakini hatuna budi kuitumia kwa uangalifu mkubwa ili tuweze kuifaidi kwa miaka mingi.

**Kazi nyingine ambazo afisa misitu anazifa nya**

1. Uanzishaji wa vitalu vya miti, kama kitalu chenu cha miti. Hii ni moja ya njia muhimu ya kupunguza ukatati miti ovyo katika misitu ya hifadhi kwa ajili ya ujenzi. Vitalu vya miti ni muhimu kwa sababu tunajifunza jinsi ya kuotesha mbegi, za miti, utunzaji wa miti ambayo baa daye tunaitumia, pamoja na kuuza ili kupata fedha kwa ajili ya shule yetu.
2. Uanzishaji wa bustani za mboga, katika vijiji. Ulimaji wa mboga moboa ni ili kupunguza kutegemea uvunaji wa majani ya mboga kutoka msituni. Badala yake mboga mboga hizo tunatu mia na nyingine kuuza.
3. Kuelekeza matumizi mazuri ya moto, ambago hauwezi kuleta madhara kwenye misitu pale inapotumika. Wananchi wanao wajibu wa kutoa taarifa kwa kamati za mazingira za vijiji kabla ya kuchoma moto katika mash a yao, vinginevyo hatua za kisheria zitachuku liwa dhida yao. Vilevile afisa misitu anaelekeza narina ya kusafisha shamba kabla ya kucho ma moto na jinsi ya kuchunga moto usieriee katika misitio ya hifadhi moto unapotumika mashambani.
4. Kuzuia uwindaji haramu. Aina yoyote ya uwindaji (ou uvunaji wa mali asili (isipokuwa kuokota kuni kavu) ni kinyume na sheria za misitu za Tanzania. Mtu yeyote anayekamatwa kwa mako sa hayo anahukumiwa kulingana na sheria za nchi. Wawindaji mana nyingi wamekuwa ndio charizo cha moto misituni kwa vile huchoma moto kwa nia ya kuwaua wanyama, ambapo baadaye hua cha moto huo kuendelea kuwa na kuchoma msitu. Msitu unaungua kwa kwa mfano kij haraka sana hasa nyakati za ukame (kiangazi) na kusababisha mali hai nyingi hasa wanyama na mimea adimu kuungua moto.
5. Utengenezaji na utumiaji majiko sanifu. Sisi wote lazima tukubali kwamba tunatumia kuni nyingi sana kupikia vyakula vyetu. Afisa misitu husaidai wananchi kutumia majiko yana yotengenezwa kwa udongo wa mfnyanzi yanayo tumia kuni kidogo sana kulinganisha na jiko la mafiga matatu. Hii ni hatua kubwa sana ya kuokoa misitu yetu. Ni majiko ambayo kila mtu anaweza kutengenezea. Je kila mmoja wenu wanalo nyumbani kwenu?
6. Kuhimiza ufugaji wa nyuki ki vikundi katika vijiji, kwa mfano kijiji cha kwatango wana zaidi ya mizinga ya nyuki 40, wanavikundi hugawana asali na ziada huuza na kujipatia fedha. Huu ni mfano mzuri wa kuigwa kwa vile utasaidia kuondoa tatizo la uwindaji asali kutoka msituni isivyo halali.
7. Kuhimiza ufugaji wa samaki kwa kuchimba mabwawa madogo madogo ya kifamilia, hii itasa iolia kuondoa tatizo la uwindaji haramu kwa ajili ya kitoweo. Ufugaji wa samaki umeanza kuenea sana katika eneo la Magoroto ambago hupatikana maji kwa urahisi.
8. Watafiti kutoka (Frontier) wamekuja kufanya nini? Watafiti hawa wamekuja kutafiti na kuchunguza aina mbali mbali aalum za wanyama na mimea zipatikanazo kwenye msitu

wa Mlinga. Wamekuwa wakiorodhesha wanyama na mimea ya pekee ipatikanayo katika misitu ya hifadhi ya Usambara mashariki. Baadhi ya aina za mimea na wanyama wana patikana hapa tu na hawapatikani sehemu nyingine duniani (angalia bango la viumbe adimu). Hii inafanya viumbe hivi viwe ni viumbe vya pekee duniani.

#### 7.4.2: Environmental Trail

##### **(a) Environmental Trail Lesson (English)**

- Emphasis:** 1. Science  
2. Geography (Extension/follow-up lesson)
- Age group:** 6+ **Lesson length:** 30 min
- Aim :** To increase awareness of the “immediate” environment.
- Objectives:** 1. To explore biodiversity in school grounds, e.g. (signs of) animals, plants, trees, insects/butterflies, through observation of the grounds.  
2. To be able to geographically represent features of the environment.
- Resources:** Plain paper  
Wax crayons  
Writing pencils  
*Binoculars, butterfly sweepnets, magnifying glasses, specimen pots, compasses, sound-recording/playing equipment\**  
(\*non-essential, suitable for lesson extension ideas. May be safety issue with magnifying glasses in dry grass)

##### **Methodology:**

1. Choose a location in the school grounds and ask the children what they understand the word “environment” to mean (this can be done as an introduction or as a reminder at the end of the lesson if children are already familiar with the word). (5 min)
2. After establishing that it is “the world around us” (or other similar definition), say that we are looking for living things within the school environment and/or signs of things that have been there. Will need to consider how to go about this without damaging grounds etc. (5 min)
3. Distribute drawing apparatus and show any other resources.
4. Split into smaller groups to look for signs, such as bird nests, bark/leaf rubbings, flowers, birds/butterflies/insects. Find as much as possible within 20 min.
5. Reassemble to discuss what was found. Look at good examples. Comment on findings.

##### **Lesson Extension:**

6. After returning to classroom, draw a map of the school and where living things were found. This can be extended further for more able/older children by increasing the area to include village, rivers, Forest Reserve, catchment areas.
7. A sound environmental trail, listening for evidence, recording and identifying sounds.
8. Use more technical equipment. Measuring trees, collecting insects etc.
9. Introduce more technical scientific terms to the environmental trail, e.g. invertebrates/vertebrates.
10. Change the emphasis of the trail from natural signs to looking for signs of man’s uses of/impacts on the environment. Examples of impact may include: burning, cultivation,

water taps, brick furnaces, grazing, medicinal uses of trees. This could lead onto discussions on environmental concerns back in the classroom.

**Evaluation:**

Evaluate how the lesson went by using feedback from children, general comprehension of the term “environment” and the interpretation of children’s work sheets.

**(b) Uchunguzi wa Mazingira (Kiswahili)**

**Mkazo:** 1. Sayansi/Jiografia

2. Jiografia (Upanuzi wa somo)

**Umri drs:** 6+

**Muda dk:** 30

**Kusudi:** Kuongeza ufahamu wa mazingira ya karibu sana na wanafunzi wanamoishi.

**Lengo:** 1. Kuchunguza bioanuwai katika maeneo ya shule mf (alama za) wanyama, mimea, miti, wadudu, vipepeo kwa kuangalia adhini.

2. Kuwa na uwezo wa kuviwakilisha kijiografia vitu vilivyo kwenye mazingira.

**Vifaa:** Karatasi isiyo na mistari

‘Wax crayons’

Penseli

Kionambali, chandarua za vipepeo, vioo/miwani ya kukuzia, chombo chenye vitu vya mazingira, compasses, vinasauti\*

(\*si lazima, vyafaa kwa mwendelezo/upanuzi wa somo)

**Njia:**

1. Baada ya kuchagua enco katika mazingira ya shule wanafunzi wataulizwa wanaelewa nini maana ya neno ‘mazingira’. (Yaweza kufanyika kama utangulizi wasono au mwisho kuona kama wanafunzi wameielewa maana) dk 5.

2. Baada ya kueleweka kuwa ni “eneo linalotuzunguka” (au ufafanuzi unaofanaua na huo), sema kuwa tunatafuta viumbe hai katika mazingira ya shule na/au alama ya vitu vilivyokuwepo. Ni muhimu kuangalia ufanikishaji wa zoezi hili pasipo kuharibu mazingira. dk 5.

3. Gawa vifaa vya kuchorea na onyesha nyenzo nyingine yoyote.

4. Wagawe wanafunzi katika makundi madogomadogo, katika kuangalia alama, kama viota vya ndege, majani/magome ya miti, maua ndege, vipepeo, wadudu. Tafuta vingi iwezekauavyo kwa dk 20.

5. Kusanyikeni tena kujadili vilivyopatikana. Toa maoni juu ya matokeo.

**Nyongeza/upanuzi wa somo:**

6. Darasani, chora ramaniya shule, na wapi viumbe hai vimepatikana. Kwa wanafunzi wakubwa panua hadi kuonyesha kijiji, mito, na msitu wa hifadhi.

7. Sikiliza sauti, rekodi na tambua sauti.

8. Tumia vifaa vya kitaalamu zaidi. Kupima miti, kukusanya wadudu n.k.

9. Ingiza maneno ya kitaalamu zaidi katika uchunguzi wa Mazingira mf. Viumbe wasio na uti wa mgongo/wenye uti wa mgongo.

10. Badili msisitizo wa uchunguzi toka alama za vitu asilia kuangalia alama za matumizi ya binadamu/madhara katika mazingira. Mifano ya madhara inaweza kujumuisha uhomaji moto, ulimaji, mabomba ya maji, matanulu ya matofali, ulishaji mifugo, matumizi ya miti kwa dawa. Hii inaweza kupelekea mjadala juu ya uwajibikaji katika mazingira mrudipo darasani.

**Tathmini:**

Kutoka katika mawazo ya wanafunzi na uelewa wa neno ‘mazingira’ na kutokana na kazi za wanafunzi. Pia maoni ya walimu na yako binafsi.

**7.4.3: What’s in the bag?**

**(a) What’s in the Bag Lesson (English)**

**Emphasis:** 1. Science  
2. Language

**Age group:** 6+

**Lesson length:** 30 min

**Aim:** To increase awareness of the variety of living things found in the Forest Reserve.

**Objectives:** 1. To aid recognition of living things.  
2. To increase use of descriptive language.

**Resources:** Cloth drawstring bags (at least 2 per group of 10 children).  
Assorted objects found in forest, for example:  
Shells, seeds/seedpods, feathers, birds’ nests, fur, bark, dry grass/fresh grass (reference to fire risk), teak leaves (reference to border marker trees)  
Cassette player and blackboard\*  
(\*Required for lesson extension idea)

**Methodology:**

1. Sit the children down into groups of approximately 10 in a circle with one teacher/Kiswahili speaker per group and other helpers.
2. Explain that there are natural things from the Forest Reserve inside the bag.
3. Pass the bag around and, without them looking inside, ask the children to put a hand into the bag to carefully feel what’s inside and for them to use one word to describe how it feels. Each must be a different word from the previous one. They must not say what is in the bag at this stage.
4. After the last child has had a go, ask each child in turn what they think it might be. Reveal the object to show if they were right and pass it round again if required.
5. Repeat this process until the end of the session (about 5 objects). Exchange bags with other groups as required.

**Lesson extension:**

6. Play sounds on a tape so the children draw what animals they can hear within a 5 min (or given) period. Then go through the tape again commenting when sounds are heard (writing/drawing on board to illustrate).

**Evaluation:**

The children's ability to guess the objects correctly and skill improvement.

**(b) Kuhisi Kuna Nini Ndani ya Mfuko? (Kiswahili)**

**Mkazo:** Sayansi/Lugha

**Umri drs:** 6+

**Muda dk:** 30

**Shabaha:** Kuongeza ufahamu wa kujua aina mbalimbali za viumbe hai waliomo ndani ya hifadhi ya msitu.

- Malengo:**
1. Kusaidia utambuzi wa viumbehai
  2. Kuongeza matumizi ya lugha ya kujieleza.

**Vifaa:** Mifuko/makapu yenye vitu; mawili katika kundi la watu 10 kama inawezekana. Vitu/maliasili zilizopatikana msituni, manyoya ya ndege, matunda yenye mbegu ndani, mbegu, viota vya ndege, manyoya/nywele sufi, majani ya miwato.

**Njia/Mbinu:**

1. Itaelezwa kuwa kuna vitu ndani ya mifuko/makapu kutoka msituni. Wanafunzi watakaa katika makundi yenye wasani wa watu 10 katika mduara na mfuko/kapu litapitishwa kuzunguka.
2. Pasipo kuchungulia kilichopo ndani watahisi na kusema neno moja kuelezea kuna vitu gani kila mara lazima liwe neno tofauti na la kwanza.
3. Kisha baada ya mwanafunzi wa mwisho kwenda kuhisi wataulizwa ni vitu gani wanafikiri vitakuwemo.
4. Kisha vitu vitafunuliwa polepole kuonyesha kama walikuwa sahihi. Hii itarudiwa mpaka mwisho wa somo (Kama vitu vitano).

**Upanuzi/Nyongeza:**

Sauti zinaweza kupigwa katika radio na kisha watoto/wanafunzi wakachora aina ya wanyama watakaoweza kusikia kwa. dk 5. Baadae sauti zitapigwa tena na kutoa maelezo kila sauti ikisikika (kwa kuandika/kuchora ubaoni ili kufafanua).

**Tathmini:**

Katika uwezo wa wanafunzi kuotea sawa na kuongezeka kwa ujuzi.

#### 7.4.4: Writing a Group Story

##### **(a) Writing a Group Story Lesson (English)**

“One day I went to the forest and I saw...”

**Emphasis:** 1. Environment Awareness  
2. Language  
3. Drawing\*

**Age group:** 7+

**Lesson length:** 30 min

**Aims:** To highlight the diversity of life in the Forest Reserve and to emphasise its importance and the need for local people to help conserve it.

**Objectives:** 1. To discuss problems affecting forests.  
2. To discuss how to conserve them.  
3. To think of a well-constructed story with distinct beginning/middle/end.  
4. To use descriptive vocabulary and punctuation.

**Resources:** Blackboard and chalk  
A4 book made of white card and pen (at least 8 pages)  
Forest Reserve endemic species poster/map of East Usambaras (optional)  
Wax crayons/colour pencils\*  
(\*For illustrating the story, as a lesson extension)

##### **Methodology:**

1. Ask the children what animals they might expect to see in the Forest Reserve, how people might use the forest and what might harm the forest. List ideas on the blackboard.
2. Explain that they are going to write a joint story. Start the story off by writing on the board: “One day I went to the forest and I saw...” and ask a child to suggest the next line, using an animal, for example. Suggest scenarios (where necessary) to make the story flow.
3. Write the sentences on the blackboard (and a scribe should record the story as it is constructed into a class book). Ideally, after the start, there should be a couple of descriptive sentences to set the scene. Then, as the ‘walk’ goes further, activities in the middle of the story will be resolved (for good or bad) at the end.
4. For older children, the middle part of the story should be about 10 sentences and finishing at least a couple of these with a ‘message’.

##### **Lesson extension:**

5. This concept could be also used with younger children. An example story should be read out in class to illustrate what is required.
6. Individual stories made up by the children.
7. Illustrating the class book..

**Evaluation:**

This activity can act as a summarising exercise to consolidate what has been learnt during the school visit. This activity (or the Poster Drawing activity) should be used as a concluding lesson to a session. Evaluation can be made from quality of story content etc.

**(b) Kitabu cha Kundi Kuandika Hadithi (Kiswahili)**

“Siku Moja Nilikwenda Msituni na Niliona...”

**Mkazo:**

1. Ufahamu wa Mazingira
2. Lugha
- 3 Uchoraji

**Madhumuni:**

Kusisitiza umuhimu wa msitu katika maisha ya kila siku katika eneo husika, na Umuhimu wa wenyeji katika utunzaji wa mazingira. Kuonyesha uwiano wa maisha wa viumbe hai katika msitu.

**Makusudi:**

1. Kufikiria hadithi iliyotengenezwa vizuri yenye mwanzo, ukati na mwisho unaoeleweka.
2. Kwa kutumia misamiati na misemo inayotambulika.
3. Kujadili matatizo yanayoathiri misitu.
4. Kujadili jinsi ya kutunza misitu.

**Vifaa:**

Matangazo/mabango anayotumia Bwana miti yanaweza kutumika kama kikumbushio. Ubaa na chaki, (ubaa mweupe), kipande cha karatasi chenye matangazo.

**Mbinu/Njia:**

1. Watoto wataulizwa ni wanyama gani wanategemea kuwaona msituni, watu wanaweza kuutumia vipi msitu na nini kinaweza kuudhuru msitu. Mawazo yao yataandikwa/yataorodheshwa ubaoni.
2. Baadae itaelezwa kuwa wataandika hadithi ya pamoja. Mwalimu atanzisha hadithi kwa kuandika ubaoni “siku moja, nilikwenda msituni na niliona...” na kuuliza mtoto mmoja kuchangia mstari unaofuata, kwa mfano kwa kutumia mnyama. Mapendekezo jinsi ya kuelezea kilichoonekana yataombwa kuifanya hadithi iendelee.
3. Sentensi zitaandikwa ubaoni (na mwandishi ataandika hadithi jinsi inavyoombwa katika kitabu cha darasa). Kimantiki baada ya kuanza, kutakuwa na maelezo ya kujenga mandhari. Baadaye, jinsi hadithi inavyoendelea kuombwa shughuli za kati za hadithi zitamalizika (kwa uzuri au ubaya) mwishoni mwa hadithi.
4. Kwa watoto wakubwa (madarasa ya juu). Ukati wa hadithi utakuwa kama sentensi 10 na kumalizika kwa ‘ujumbe’.

**Mwendelezo wa Somo:**

5. Inawezekana mtindo huu kutumika na watoto wadogo pia. Hadithi ya mfano itasomwa darasani kuonyesha nini kinatakiwa.
6. Hadithi za mtu mmoja mmoja za watoto.
7. Kuelezea kitabu cha darasa.

**Tathmini:**

Shughuli hii yaweza kuwa kama zoezi la kukamilisha muunganiko wa kila kilichofundishwa wakati wa ziara. Shughuli hii (au shughuli ya Uchoraji wa Mabango) itumike kama somo la kuhitimisha shughuli. Tathmini inaweza kufanyika kutokana na uzuri wa hadithi, n.k.

#### 7.4.5: Design a Poster

##### **(a) Design a Poster Lesson (English)**

**Emphasis:** 1. Environmental Awareness  
2. Drawing/Design

**Age group:** 5+

**Lesson length:** 30min

**Aim:** To demonstrate an understanding that the Forest Reserves belong to all of us and we need to work together to conserve them for the future.

**Objectives:** 1. To concisely plan a message on how to look after the Forest Reserve.  
2. To be able to illustrate the message in a relevant way.

**Resources:** A4 paper for each child  
Assorted drawing and colouring pencils/crayons  
Poster of East Usambara endemic species\*  
Map of East Usambaras\*  
(\*optional)

##### **Methodology:**

1. In a question/answer session, ask the children why the Forest Reserves are important and what might harm them (e.g. hunting, water pollution, timber-felling). Then, discuss with them ways of looking after the forest. Write ideas on the blackboard.
2. Ask the children to design a poster that will persuade people to conserve their Forest for the future.

##### **Lesson extension:**

3. For older children (8 yrs+), poster content and drawing detail can be more complicated, and posters could contain more text.

##### **Evaluation:**

This activity can act as a summarising exercise to consolidate what has been learnt from previous lessons.. The posters can be used as evidence of the level of comprehension the children have on the importance of the Forest Reserves and they can be displayed in the classroom.

##### **(b) Kusanifu Tangazo, Bango (Kiswahili)**

**Mkazo:** 1. Ufahamu wa mazingira  
2. Kuchora/kusanifu

**Lengo:** Kuonyesha ufahamu kuwa wote tunamiliki misitu na tunahitaji kufanya kazi pamoja ili kuhifadhi kwa ajili ya siku zijazo.

**Umri drs:** 5+

**Muda dk:** 30

**Kusudi:** 1. Kupanga kwa ufupi ujumbe juu ya jinsi ya kutunza msitu wa hifadhi.  
2. Kuweza kuchora ujumbe kwa njia husika.

**Zana:** Angalau karatasi aina ya A4  
Michoro mbalimbabli na kalamu za kuchorea.

**Mbinu/Njia:**

1. Katika kipindi cha Maswali na Majibu, wanafunzi wataulizwa kwa nini msitu ni muhimu na nini chaweza kudhuru msitu (m.f. uwindaji, uchafuzi wa maji, upasuaji mbao). Njia za kutunza msitu zitajadiliwa wakati huu. Maoni yataandikwa ubaoni.
2. Watoto watatakiwa kuchora/kusanifu bango la kushawishi watu kutunza msitu kwa matumizi ya baadae.

**Mwedelezo wa Somo:**

Kwa watoto wakubwa (miaka 8+) mawazo na vitu vya kuchora vyaweza kufanya vigumu zaidi, na bango laweza kuwa na maelezo mengi zaidi.

**Tathmini:**

Shughuli hii yaweza kuwa kama zoezi la kukamilisha muunganiko wa kila kilichofundishwa wakati wa ziara. Shughuli hii (au shughuli ya Kitabu cha Darasa) itumike kama somo la kuhitimisha shughuli. Ni vizuri baadhi ya mabango yakatunzwa kama kielelezo au yakachukuliwa kutoka shuleni baadaye.

**7.4.6: Animals and their Habitats**

**(a) Animals and their Habitats Lesson (English)**

**Aims:** To increase awareness of animals and their natural requirements.

**Resources:** Cut-out pictures of animals  
Sellotape®  
Black board and chalk

**Methodology:**

- Explain the term ‘habitat’. Discuss where we live and what we eat.
- Then ask the children to think of an animal that needs the forest to live in.
- Take a cut-out of that animal and show it to the class. Ask them to determine whether this animal is awake in the daytime or whether it is awake at night time (diurnal or nocturnal).
- Divide the blackboard into two halves with a sun drawn on one half and a moon on the other. For each animal discussed, fix the cut-out on either side of the board using Sellotape® depending on whether the animal is diurnal or nocturnal.

**Extension:**

- Repeat exercise, but place animals according to habitat, e.g. in forest habitat or shamba habitat but writing these headings on the board.
- Teach children about food chains by asking the children what an animal might eat and what might eat it. Arrange the cut-outs on the board in the form of a food web.
- Encourage the children to imitate the noise of an animal or mimic the way that it moves etc. Ask the children to arrange the cut-outs themselves.
- 

**(b) Wanyama na Makazi yao (Kiswahili)**

**Madhumuni:** Kuongeza ufahamu wa wanyama na mahitaji yao.

Vifaa: Vipande vya karatasi vyenye picha za wanyama, ubao na chaki.

**Njia/Mbinu:** Elezea neno ‘Makazi’. Jadili wapi tunaishi na nini tunakula. Baadae waambie watoto kufikiria wanyama wanaohitaji msitu kwa makazi. Chukua kipande cha karatasi chenye picha ya mnyama na lioneshe darasa. Waulize wanadhani mnyama huyo huwa macho wakati wa mchana au kama hutembea usiku. Ugawe ubao katika sehemu mbili kukiwa na ‘jua’ upande mmoja na ‘mwezi’ upande mwingine. Kwa kila mnyama aliyejadiliwa mbandike kwenye upande wa ubao kwa kutumia ‘selotape’ kutegemea kama hutembea mchana (diurnal) au usiku (nocturnal).

**Mwendelezo wa Somo:** Rudia zoezi sasa kwa kuwaweka kila mnyama kwenye makazi yake, mf. Makazi ya msituni, shambani, nk. kwa kuandika makazi haya ubaoni. Fundisha juu ya ‘Mikufu ya Chakula’ (Food Chains) kwa kuwauliza watoto nini mnyama anaweza kula na nini kinaweza kumla yeye. Panga picha za wanyama ubaoni katika mtindo wa ‘Mtandao wa Chakula’ (Food web).

**7.5: Evaluation Forms for Teachers (English and Kiswahili version)**

1. Were there any activities that you think went particularly well? Why?

2. Would you make any changes to the activities? Why?

3. Do you think the activities were appropriate for the age groups?  
Yes  No

4. How do you think you may be able to follow up these activities in school?

5. Was the time allowed appropriate for the activities?  
Yes  No

6. Would you like any more information on environmental education from Frontier Tanzania? Give details.

7. Any further comments?

**Tathmini ya Frontier (Kiswahili)**

1. Je unafikiri kulikuwa na shughuli yoyote iliyokwenda sawa sawa katika masomo ya mazingira? Kwa nini?

2. Je kuna mabadiliko yoyote mnafikiri mngyafanya katika shughuli hizo? Kwa nini?

3. Je unafikiri shughuli zilizopangwa zilikuwa sawa sawa kwa umri wa makundi ya wanafunzi?

Ndiyo

Hapana

4. Je unafikiri mtafuatiliaje shughuli hizi katika shule yenu?

5. Je muda uliokuwa umepangwa kwa kila shughuli ulikuwa sahihi?

Ndiyo

Hapana

6. Mngependa habari gani zaidi kuzifahamu kuhusu elimu ya mazingira kutoka Frontier Tanzania?

7. Je mna ushauri gani zaidi?

## 7.6: Feedback from Misozwe School Teachers Summarised Evaluation Sheet from Misozwe Teachers

1. Ndiyo.  
Kwa sababu kwanza wanafunzi walielewa faida za kutunza mazingira na hasara za kutotunza mazingira.  
*(Yes. Because students understood the importance of environmental conservation and the problems associated with not conserving the environment.)*
2. Ndiyo. Mabadiliko ambayo tungeweza kuyafanya ni kutoharibu mazingira kwa kuchoma moto, kukata miti, kupanda miti kwenye vyanzo vya, mito, kupanda miti kwenye mazingira.  
*(Yes. Changes we can make include not degrading the environment through discouraging bush-fires, tree-cutting and encouraging tree-planting along river-sources and also general tree-planting.)*
3. Ndiyo  
*(Yes)*
4. Tutaendeleza shughuli za mazingira kwa kupanda miti, nyasi kuzuia mmomonyoko, kupanda mazao kwa kutumia kontua kwenye mashamba yaliyoko milimani (kwenye mitelemko).  
*(We will continue with environmental activities through tree-planting, grass-growing – to check soil-erosion, and also planting crops in contours in fields which are on slopes).*
5. Hapana  
*(No)*
6. Tungependa kufahamu zaidi juu: Kuhifadhi mazingira, Utunzaji wa misitu na elimu ya viumbe hai.  
*(We'd like to have more knowledge on environmental conservation, forest conservation and biodiversity education).*
7. Tunashauri kuwa mara kwa mara walimu na wanafunzi wapatiwe elimu ya mazingira hususani walimu kwa sababu wao ndiyo wawezeshaji wakuu. Kwa kufanya hivyo, elimu ya mazingira itakuwa imesambaa zaidi katika jamii.  
*(We recommend that environmental education be given frequently to teachers and students, and especially to teachers for they are the sole role-players. This would make environmental education more widely disseminated)*

**Further suggestions from the teachers**

- Swali 1: Kutokana na elimu ya mazingira iliyotolewa na Frontier-Tanzania wanafunzi na walimu wamepata changamoto zaidi ya hifadhi. Je, Frontier-Tanzania wana mipango gani zaidi ya mbeleni katika suala la mazingira katika shule ya Msingi Misozwe?  
*(Question 1: The environmental education given by Frontier-Tanzania to teachers for students has been very effective in raising the spirit of conserving. What does Frontier plan for future on the environmental issue for Misozwe Primary School?)*
- Jibu: Waalimu wafanye mawasiliano zaidi na ofisi ya misitu ya Usambara kwa kuwa ndiyo wahusika wakubwa. Ila Frontier-Tanzania inaendelea kuandaa vifaa vja kusaidia kufundishia (Resource Pack) na watavitume mara vitakapokuwa tayari.  
*(Answer 1: Teachers should make more contacts with Forestry Office in Usambaras for they are the key-players in this issue. However, Frontier-TZ continues preparing a Resource Pack and will send this to Misozwe School when completed.)*
- Swali 2: Je, kuna uwezekano wa kufanya safari ya mazingira kwenda Amani Nature Reserve?  
*(Question 2: Is there any possibility to make a study-tour to Amani Nature Reserve?)*
- Jibu: Uwezekano wakuwepo ama kutokawepo ungejulikana siku inayofuata 6/12/01 baada ya kumuona Research Coordinator.  
*(Answer 2: The possibility will be decided upon consultation with the Research Coordinator and outcome given the following day (6/12/01).*
- Swali 3: Je, shule inaweza kupata picha zilizopigwa wakati wa shughuli za elimu ya mazingira iliyofanyika tarhe 3 na 4/12/01.  
*(Question 3: Can the school get the photographs taken during the Environmental Education activities on the 3<sup>rd</sup> and 4<sup>th</sup> December 2001?)*
- Jibu: Ndiyo, na zitatumwa pamoja na Resource Pack  
*(Answer 3: Yes, they will be sent together with the Resource Pack.)*

**7.7: Photo Gallery**

Misozwe Primary School Environmental Education Visits



Catchment Officer Talk



Children listening to Talk



Environmental Trail (using binoculars)



Environmental Trail



Animal Tracks Poster



Usambara Posters



Children in Classroom



Catchment Officer Talking



Misozwe School teachers



Misozwe School students

## 7.8: Environmental Stories written by Misozwe Primary School

### **Group Story written by Standards Four, Five and Six.**

Siku moja nilikwenda msituni, na niliona wanyama, mimea wadudu na mabonde. Niliona nyuki akila asali ya maua. Huku ndege wazuri wakitoka katika viota vyao. Msituni pia niliona wawindaji. Niliona hali ya hewa ikiwa tofauti na ya nyumbani. Hali ya hewa ya msituni ni nzuri kwa sababu msituni kumetulia, kuna vivuli vingi vya miti. Pia miti mirefu na minene inayofaa kwa kupasua mbao.

Kwenye mabonde yaliyopo kwenye msitu huu yapo maji yanayotiririka kuelekea bondeni. Kando kando yake walikuwepo wanyama, ndege na wadudu wakinywa maji hayo matamu. Miti iliyopo kando kando ilistawi vizuri na kuhifadhi unyevu na pia kuzuia joto na mwanga wa jua kukausha chemchemu za maji. Ndege waliimba na kuruka huko na huko, juu ya miti.

Mchana niliamua kurudi nyumbani, na nilipokuwa njiani, nilisikia watu wakizungumza huko msituni, nilipata wasi wasi, niliwafuata, kumbe walikuwa wanakata miti ya kujengea. Niliwaasa waache kukata miti ovyo bila utaratibu. Waliyasikia maneno yangu nao wakaacha kukata miti. Tulirudi nyumbani. Tulipokuwa njiani niliwaeleza faida za misitu kwa viumbe hai. Walifurahi na walishukuru kwa kupata maoni yenye maana, nao walisema misitu ni mali na ina faida kubwa kwetu.

### **Summarised English translation of Group story:**

*As I went to the forest I saw animals, plants, insects, and valleys. Bees were sucking nectar from flowers, while birds were flying out of their nests. There were hunters. The forest had a good atmosphere - cool and shady. Trees for lumbering were plenty. Water was flowing down the valley. On the way back I saw people felling down trees for building purposes. I asked them not to cut down trees for the sake of cutting. They agreed with me. They were very delighted to get sensible advice, and they appreciated the benefits of forests.*

### **Individual Stories written by students (Stds 4, 5 and 6)**

#### **1. By Neema Abdallah Kivugo**

Siku moja milikwenda msituni, na niliona wanyama, mimea, wadudu na mabonde. Huko niliona nyuki wakila asali ya maua. Huku ndege mazuri wakirukaruka kutoku katika viota vyao.

Msituni pia niliona wawindaji. Niliona haliyahewa ikiwa tofauti naya nyumbani. Hali ya hewa yahuko ni nzuri kwa sababu kumetulia na kuna kivuli, kwakweli unatamani usirudi nyumbani ualio kuwa makikuta kuni, makima mama hao unalikata ku kwa mpangilio malinifuraisha sana, kwasababu mali chukua zile zilizoku ma zimeanguka napia zilizo kumu imefikia wakati makukatwa.

Huko msituni tulizungu ka sana na kuwaona manyama nzuri makiwa mana kula nyasi moja mapo akima gi digi. Mnyama huyuni mzuri sana anafanana na mbusi kuni anaishi msituni. Misitu inafaida kwelusisi nadamu na manyama. Kwa bina, dumu tunapatafaidu nyingi furai sana kikini sisi matuma misozwe pia tunafaidi msitu metu ma Mlinga tunapata kuni, mbao, madao a kienyejina miti ya kujengea. Kwa manyama manapata chakula chao msituni na ne manaishi hukohuko. Ndugu zangu naomba tushirihianeni ili tutuze misitu ili tusikose maji navitu vingine. Tuki choma misitu ukaribisha ukame kushirikiana ni muhimu.

**Summaried English translation:**

*Forests are very beneficial both to humans and to animals. Humans get firewood, timber, local herbs, and building materials; and also attract tourists. Animals get food and habitat. Everyone must co-operate to conserve the forests.*

**2. By Francis Mngano:**

Siku moja ni likwenda msituni, nanilionya wanyama, mimea wadudu na mabonde. Huko niliona vyuki wakila asali ya mana. Hukundege wazuri wakiruka kutoka kwenye viota vyao. Msituni pia niliona wawindaji. Niliona haliya hewa ikiwa tofauti naya nyumbani nilikoto ka. Nilipo kuwa msituni niliona maji yakitiririka kutoka juu kuelekea bondeni. Pia niliona ndege nawanyama kando ya maji huku wakinywa maji nilifurahisana kuona vitu kama hivyo. Basi nilizidi kutembea katika msitu huo.

Nilepofika huko niliona miti mizuri ya kujengea nameni ne minene ya mbabo. Katika kutembea nikaona moto unawani wawi ndaji basi hali ya hewa ile nzuri ili badilika na kuambayo. Basi motouli endelea nikaona afadhalinito ke katika msituule ili nisije kuambwa nawanainchi kwamba niwewe ulie chomea moto ule. Basi nilifika hadji kwa bwana miti ilikutoa taarifa basi tulienda hadi msituule pamoja nawanainchi. Loo! Kufika kule usituulikwawa ume teketea hikyo tuli zunguuko moto na tukazimamotoule. Basi kijiji kile kilikuwa nankame maji yalikwawa ya shida. Bwana miti ali toa onyo kwawa atakae. Chomka moto atapelekwa vyombo vya dola.

**Summarised English translation:**

*On his tour he found that someone has set fire in the forest. He informed the Forest Officer. Together, with the villagers, they succeeded to put out the fire. The officer warned against bush fires.*

**3. By George Dernes**

Siku moja nilikwenda msituni na niliona wanya ma, mnomeci wadudu mabonde. Huko niliona nyanki wakila asali yamama. Huku ndege wazuri wakipuka kutoka kwenge inota vyao. Msituni pia mliona wawindaji, Niliona hali ya newa ikawa tofauti na ya nyumbani onlikoto pia mlipo kwawa msituni mliona haliyahewa mzuri kwliko nyumbani. Unlipo kwepomsituni nilimwonanyoka aki aka katika shimolake, naliona maji ya katinipika mtokamlimasi kwenda bondermis. Msituni pia mli wasia ndege wengi wakimukaru kwenye mitisu.

**Summaried English translation:**

*In the forest there is good atmosphere. He saw hunters in the forest, also snakes, and water flowing down valley. He also saw a flock of birds flying from tree to tree.*

**4. By Tina Tonge**

Siku moja nilikwenda msituni, na niliona wanyama, mimea, wadudu na mabonde. Huko niliona nyuki wakila asal, ya mame. Huku ndege wazuri wakiruka kutoka kwenye viatu vyao. Msituni pia niliona nawindaji. Niliona hali ya hewa ikiwa toramti naya nyumbani. Pia niliona panya wengi wakipitipiti, na niliona mayi ya kitiririka kutoka kwenye mlima. Na niliona nyoko, wadudu, mama. Pia nilionmbi mingi na nyasi nzuri na milima na mabonde. Na sikunyo tena niliona panzi akitua kwenye majani. Nanilionya ndege wa zuri wengi. Nanilionya mimea mingi. Na nikaona vinyonga wakitembea kwenya miti. Nanikaona wadudu wengi wazuri wazuri ambao nyumba sija waona ateai siku moja.

**Summarised English translation:**

*In forests there are animals, plants, insects and valleys. She saw rats, flowing water, snakes, and flowers. Also she saw a lot of trees and beautiful grass. She also saw chameleons.*

**5. By Pili Ramadhani**

Siku moja nilikwenda msituni, na niliona wanyama, mimea, wadudu na nabonde. Huko niliona nyuki wakilo asali ya maua. Huku ndege wazuri wakiruko kutoka kwenye viota vyao. Msituni pia niliona wawindaji. Niliona hali ya hewa ikiwa to auti na yanyumbani niliko toka. Pia nilipokuwa kule msituni nili yundua kwambo misitu ni muhimu kwa viumbehai. Pia niliona maji yakitirika kutoka mlimani kuelekea bondeni. Napia niliona wanya ma wakiwa kando kando yamfereji wakiwa wanakunywa maji. Na niliona miti mizuri ya kudumu. Nilifurahi kuona miti hiyo kwa kuwa nimiti mizuri ya hifadhi ya misitu. Niliona wanyama, ndege, na wadudu wa aina mbali inbalo wakiwa katika msitu huo. Nili furahi ....wona viumbe hao katika msitu huo.

**Summarised English translation:**

*In forests there are animals, plants, insects and valleys. She saw bees and birds. She also discovered that forests are important to living things.*

## 7.9: Bombo Environmental Committee Meeting Programme

**Date:** 16 March 2002  
**Location:** Basecamp of the East Usambara Biodiversity Surveys (EUBS), Bombo East I and II Forest Reserves  
**Participants:** Representatives from the environmental committees of Bombo Maji Moto, Magungamzia and Kwekuyu

### Timetable:

9.00am	Environmental committee members arrive and sign in
9.30am	Meeting Opens <i>Peter Juma Ntogolela, Catchment Officer, EUCAMP</i>
10.00am	Introduction to Frontier and the East Usambara Biodiversity Surveys (EUBS) <i>Sam Staddon, Research Co-ordinator, EUBS</i>
10.15am	Introduction to the Eastern Arc <i>Albert Ntemi Sallu, Biodiversity Officer, EUCAMP</i>
10.45am	Break
11.00am	Introduction to the East Usambaras <i>Albert Ntemi Sallu</i>
11.15am	The Work of EUBS (including a chance to see specimens and collection techniques) <i>Amiri Saidi, Field Assistant, EUBS and Albert Ntemi Sallu</i>
12.00pm	Lunch
12.30pm	Conservation Issues Surrounding Bombo East I and II Forest Reserves <i>Peter Juma Ntogolela</i>
1.00pm	Question and Answer Session <i>Albert Ntemi Sallu</i>
2.30pm	Meeting Closes <i>Peter Juma Ntogolela</i>

## **7.10: Bombo Environmental Committee Meeting Minutes**

*By: Amiri Saidi, Field Assitant, EUBS*

### **1.0 Introduction**

The meeting started at 9.50am. Mr. Juma Ntogoleta was the meeting chairman. He is also the Catchment Officer of Bombo I and Bombo II Forest Reserves. He started by introducing the main aims of the meeting and all the members introduced themselves from three villages; Bombo Maji Moto, Kwekuyu and Magungamzia.

After the introductions, a short speech by Miss Sam Staddon (Research Co-ordinator, Frontier) followed. She explained about Frontier and the East Usambara Biodiversity Surveys (EUBS). The research in the Usambaras started in 1994 up to this time. Miss Staddon also explained the objectives of the research for the rare species found in the East Usambara Mountains.

### **2.0 Introduction to the Eastern Arc Mountains**

Albert Ntemi as Biodiversity officer of EUCAMP, explained about Eastern Arc Mountains. He first explained about the Eastern Arc Mountains by using a world map and introduced it in the context of the World's Biodiversity Hotspots. He also used a map of Tanzania to show the exact location of the Mountains.

The formation of this mountain range is a result of weather conditions and plate tectonics over the past 20 million years, and human activities. An example of human activity in the area are the Sisal plantations in Magoma area.

He explained the importance of the Eastern and the East Usambara Forests as follows:

- Important water catchment areas.
- Tourist attraction, e.g., Amani.
- They sustain favourable weather conditions.
- Important for the collection of firewood, charcoal, medicinal plants and construction material.

He then discussed the effect of fire on this area, which has led to the destruction of the forest. Effects of this destruction on the surrounding environment are as follows:

- Soil erosion.
- Aridity.
- Reduction in rare and endemic plant and animal species.

At the end of this topic, the members of the Environmental committee contributed by discussing different ideas for the conservation of the forests found in the Eastern Arc Mountains. These were as follows:

- Those people living near to the forest should plant trees.
- Border trees should be planted.
- Law and enforcements are needed when harvesting trees.
- Local people should be involved in forest conservation.

- Local knowledge from indigenous people should be used in forest conservation.

### 3.0 Introduction to the East Usambaras forest

After a short break, Albert Ntemi explained about the east Usambara forest. He explained the importance of this forest, such as the availability of endemic plant and animal species, e.g., *Saintpaulia sp.* He also talked about the importance of the forests such as; a source for rainfall, firewood, timber and other plants such as mushrooms.

### 4.0 The work of EUBS

This topic started by first explaining the meaning of environment, as all things surrounding people are mostly comprised of plant and animals as Mr. Amiri said in the meeting. In the forest reserves we conduct research on those living organisms. He explained the different ways of getting the plants and animals from the forest for more study:

Animals:

- Rats are caught using Sherman traps.
- Frogs, snakes and lizards are caught using drift fencing and bucket traps.
- Millipedes and Molluscs are sampled using quadrats.
- For butterflies sweep nets and canopy net traps are used.

Plants:

- Plants are classified by the use of botanical names and local names
- Specimens are collected.
- Forest disturbance is assessed.

### 5.0 Conservation Issues Surrounding Bombo East I and II Forest Reserves

The main problems facing these forest reserves as explained by Mr Juma Ntoglela are as follows:

- Fire.
- Illegal harvesting of animals and plants.

The members of the environmental committee contributed the effects of fire to reserves as follows:

- Trees and animals are killed.
- Land becomes dry and drought and starvation occur.
- Animals such as baboons lose their food supply and therefore shift to the shambas in search of food.

At the end of the topics the environmental committee contributed to the solutions for these problems:

- Increase the number of meetings.
- To emphasize the use of law and enforcement in the use of the forest products.
- To have more emphasize on trees planting for resource use.
- To involve local people in the conservation of forests.

Suzie Hall as Acting Project Co-ordinator, asked about the solutions for illegal harvesting of animals in the reserve. The environmental committee answered as follows:

- To hold meetings.
- To reduce the illegal harvesting of honey.

## 6.0 Question and Answer Session

Questions, answers and discussions were as follows:

*Q1) What are the causes for the reduction or exhaustion of the forest resources in your living area?*

- Population increase, expansion of families searching for human needs.
- Charcoal burning, firewood cutting.
- Fire.
- Sisal plantations take up large areas so reduce area that can be used by local people.
- Poor law enforcement in governing the use of forest products.
- Low emphasis in the conservation/protection of the forest.

*Q2) Who did this?*

- The members said that it was themselves.

*Q3) What are the effects occurring after the destruction of the forest?*

- Reduction in rainfall, e.g., rain is later nowadays.
- Soil erosion.
- Reduction in soil fertility and productivity.

*Q4) What types of animals have you seen in this area in the past that are not here now?*

- Elephant, buffalo, lion, leopard and big snakes.

*Q5) What is your advice to reduce or stop illegal hunting activities?*

- Regular meeting followed by village meetings at least once a month.
- Good relations between the environmental committees and the District Municipals.
- Regular seminars. One member said that some of the seminars activate forest destruction e.g., the introduction of cinema around villages in 1998 led to more forest fires.

*Q 6) What are your ideas for the conservation of the environment in your area?*

- No destruction in the catchment area, e.g., *Kigelia senegalensis*.
- More emphasis on planting different tree species in shambas.
- Introduction of tree nurseries, e.g., Kwekuyu.
- Improve stoves to reduce the pressure on extracting firewood from the forest.

*Q 7) Which factors reduce the ability to plant trees in your area?*

- Low amount of tree seeds.
- Poor emphasis.
- Poor follow ups.

- Lack of baskets for carrying trees.

*Q 8) Which ways can be used to make the extraction of forest products sustainable?*

- More law enforcement.
- Increase patrols around the forests.
- Involve local people in the management of forest products.

At the end of the meeting, the members of the committees from the three villages finished by giving thanks to all members who conducted the meeting. They said that they were very happy with the way the meeting went and they enjoyed and understood what was discussed. They suggested having more meetings like this and they said they will pass on what they had learnt to other villagers.

At 2.25 pm the meeting ended. Mr. Juma Ntogoleta, as the chairman of the meeting, gave thanks to the members of the committee for their contributions.

## 7.11: Proceedings of the meeting with environmental committees (in Kiswahili)

### Mfuatano wa Matukio ya Kikao cha Mazingira na Kikundi cha Watafiti Bayoanuai Usambara Mashariki (EUBS)

Tarehe: 16/03/2002  
 Mahali: Kambi kubwa ya EUBS, Misitu ya Hifadhi ya Bombo Mashariki 1 na 2 (Kilimandege na Kilimamwarabu).  
 Washiriki: Wawakilishi kutoka Bombo Maji Moto, Magungamzia na Kwekuyu, Wafanyakazi wa EUCAMP (Bwana na Bibi Miti), Wafanyakazi wa EUBS.

#### **Ratiba:**

3.00 Asubuhi Kuwasili na kusaini kwa Wanachama wa kamati za mazingira  
 3.30 Asubuhi Kufunguliwa kwa Mkutano, (Peter Juma Ntogoleta, Bwana Miti, EUCAMP)  
 4.00 Asubuhi Utangulizi kwa Frontier na Watafiti Bayoanuai wa Usambara Mashariki (EUBS), (Sam Staddon, Kiongozi wa Utafiti, Frontier)  
 4.15 Asubuhi Utangulizi kuhusu Safu za Milima ya Ukanda Mashariki, (Albert Ntemi Sallu, Mwanabayoanuai, EUCAMP)  
 4.45 Asubuhi Mapumziko  
 5.00 Asubuhi Utangulizi kuhusu Misitu ya Usambara Mashariki, (Albert Ntemi Sallu)  
 5.15 Asubuhi Kazi za EUBS, ikiambatana na nafasi za kuangalia baadhi ya sampuli pamoja na njia za kukusanyia sampuli  
 6.00 Adhuhuri Chakula cha mchana  
 6.30 Adhuhuri Mambo yanayozunguka Misitu ya Hifadhi ya Bombo Mashariki 1 na 2 (Kilimandege na Kilimamwarabu), (Peter Juma Ntogoleta)  
 7.00 Mchana Maswali na majadiliano, (Albert Ntemi Sallu)  
 8.30 Mchana Kufungwa kwa Mkutano, (Peter Juma Ntogoleta)

#### **Washiriki:**

<b>Jina</b>	<b>Kijiji</b>	<b>Nafasi kikasi</b>
M.S. Kanju	Bombo Maji Moto	Mtendaji kijiji
Edward Mkhintu	Magungamzia	K/iawi
Omari Hasani	Magungamzia	Mjumbe wa kamati za mazingira
Dunstan	Magungamzia	Mjumbe wa kamati za mazingira
Ramadhani Hasani	Bombo Maji Moto	Mwenyekiti Kitongozi
Rajabu Hasani	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Martini John	Magungamzia	Katibu S/kijiji
Maamuou	Magungamzia	Mjumbe wa kamati za mazingira
Mjimbe	Namiti	Mjumbe wa kamati za mazingira
Jumia	Kwekuyu	Mjumbe wa kamati za mazingira
Sylvester	Kwekuyu	Mwenyekiti ya kamati za mazingira
Joyce	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Asha	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Hadija	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Suphiani Mbmguu	Kwekuyu	Mjumbe wa kamati za mazingira

Simoni Nkupe	Kwekuyu	Mjumbe wa kamati za mazingira
Juma Bakari	Kwekuyu	Mjumbe wa kamati za mazingira
Charles M. Sheshe	Bombo Maji Moto	Mwenyekiti ya kamati za mazingira
Rashich B. Kiondo	Kwekuyu	Mwenyekiti Kijiji
Peter Mlargos	Magungamzia	Mwenyekiti S/kijiji
Ahy Mandadi	Magungamzia	Mjumbe wa kamati za mazingira
Raphael Mjoka	Kwekuyu	Mjumbe wa kamati za mazingira
Salehe Shahara	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Tatu Subati	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Rukia Sheshe	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Adam Shemtuhu	Kwekuyu	Mjumbe wa kamati za mazingira
Issa Chauganga	Kwekuyu	Mjumbe wa kamati za mazingira
Dunstan Mlanswi	Mziya	Mjumbe wa kamati za mazingira
Zainasu Liomo	B/Makorokoro	Mjumbe wa kamati za mazingira
Mahamudu Saidi	Bombo Maji Moto	Mjumbe wa kamati za mazingira
A. Mahamude		Mjumbe wa kamati za mazingira
Juma Shuehul	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Ayubu Ramadhani		Mjumbe wa kamati za mazingira
Alfani Chambo		Mjumbe wa kamati za mazingira
Peter Ntogozelela	Bombo Maji Moto	Mjumbe wa kamati za mazingira
Athumanilukindo		Mjumbe wa kamati za mazingira
Hassani	Kwekuyu	Mjumbe wa kamati za mazingira
Thomas Tem	B/Mwangalien	Mwalimu
Said Senkume	Kigongoi	
Willy Shulamuh	B/Mwangalien	Mjumbe wa kamati za mazingira
Albert Ntemi Sallu	Maramba	EUCAMP
Peter Juma Ntogozelela	Kilanga Ngua	EUCAMP
Sam Staddon	Kambi kubwa ya EUBS	Frontier
Claire Latham	Kambi kubwa ya EUBS	Frontier
Amiri Saidi	Kambi kubwa ya EUBS	Frontier
Nadine Svoboda	Kambi kubwa ya EUBS	Frontier
Susannah Hall	Kambi kubwa ya EUBS	Frontier

## Muhstasari:

(Amiri Saidi, Msaidizi wa Utafiti, Frontier)

### 1.0 Kuingiza

Kikao kilifunguliwa saa 3.50 na ndugu Juma Ntogozelela kama mwenyekiti wa kikao ambaye pia ni bwana miti wa Bombo I and II. Alianza kwa kuwaomba wajumbe wa kikao wajitambulisho, ambao ni kutokea vijiji vitatu, Bombo Maji Moto, Kwekuyu and Magungamzia.

Baada ya utambulisho alimkaribisha mwanakamati ndugu Sam Staddon kama kiongozi wa utafiti Frontier. Aliwakaribisha wanakamati katika kambi ya utafiti ya Usambara Mashariki na alitoa maelezo mafupi kuhusu Frontier –Tanzania. Ndugu Sam Staddon aliendelea kuelezea kuhusu wafanyakazi wa kikundi cha utafiti na kazi walizofanya katika misitu ya Usambara tangu mwaka 1994 mpaka sasa. Alielezea malengo ya utafiti wa viumbe adimu katika milima ya Usambara mashariki.

### 2.0 Safu ya Milima ya Ukanda wa Mashariki

Mada ilitolewa na Albert Ntemi kama kiongozi wa utafiti upande wa EUCAMP. Alianza kuelezea safu ya milima ya ukanda wa mashariki kwa kutumia ramani ya dunia ikionyesha mgawanyiko wa Bayoanuwai Duniani. Alitumia ramani ya Tanzania kuelezea Safu za Milima ya Ukanda Mashariki.

Aliendelea kueleza sababu zilizosababisha mgawanyiko wa Milima Ukanda wa Mashariki, Shughuli za kila siku za binadamu, mabadiliko ya hali ya hewa pamoja na ukame zikiwa ndio sababu kuu za mgawanyiko wa safu hizi. Mfano wa Shughuli za binadamu ni kilimo cha mkonge.

Umuhimu wa safu hizi za milima ni misitu iliyomo ndani ya misitu hiyo ambayo husaidia katika:

- Kuhifadhi vyanzo vya maji.
- Vivutio kwa watalii mfano Amani and Udzungwa.
- Hali ya hewa nzuri.
- Kuni, mkaa, dawa na nguzo.

Mtoa maada pia aligusia hatari za kutoweka kwa misitu ndani ya milima hiyo kwa ajili ya moto pamoja na uvunaji haramu. Alimalizia kwa kuelezea athari za kuharibu misitu hiyo kama zifuatazo:

- Mmomonyoko wa udongo na mafuriko.
- Ukame na kukauka kwa vyanzo vya maji.
- Kutoweka kwa viumbe hai.

Mwisho wa mada hii wanakamati walitoa mawazo kwa kuelezea juhudi mbalimbali walizofanya kuhifadhi misitu iliyoko kwenye mlima ya ukanda wa mashariki:

- Watu wenye maeneo karibu na misitu wanapanda miti ya kudumu.
- Mtu hawezi kukata miti bila ulinzi.
- Watu wa idara za misitu wamekaa na kamati za mazingira kutenga maeneo, wanakijiji wameshirikishwa.
- Upandaji wa miti ya mipaka.

Na mwisho walishauri ushirikishaji wa wananchi katika uhifadhi misitu.

### 3.0 Utangulizi kuhusu misitu ya Usambara Mashariki

Baada ya mapumziko mafupi kikao kiliendelea, ndugu Albert Ntemi aliendelea na mada kuhusu misitu ya Usambara mashariki. Alieleza umuhimu wa misitu hiyo kama upatikinaji wa mimea na wanyama ambao ni pekee katika misitu hiyo. Mfano mimea ya dugurushi. Alieleza historia fupi ya utafiti katika misitu hiyo.

Ilifuatiwa na mahitaji yanayopatikana katika misitu hiyo kama mvua, mbao, kuni na uyoga.

### 4.0 Kazi za utafiti wa EUBS

Mtoa maada Amiri Saidi alianza kwa kueleza nini maana ya mazingira. Mazingira ni vitu vinavyotuzunguka sisi kwa ujumla ambayo sehemu kubwa ikiwa imuchukuliwa na wanyama na mimea katika misitu ya hifadhi ya misitu ya asili. Mtoa mada alielezea kwa nadharia njia za kukamatia wanyama mbalimbali msituni kwa ajili ya utafiti:

- Wanyama kama panya hukamatwa kwa mitego maalum ambayo huwekewa ehambo kuvutia panya.
- Wanyama kama vyura, nyoka, mijusi, hukamatwa kwa kutumia ndoo ambazo huchimbiwa ardhini kwa kulinga niji na mazingira wanayopatikana wanyama hao.
- Jongoo na konokono ni kwa kuchimba ardhini.
- Vipepeo ni kwa kutumia mitego ya aina mbili kulingana na umbali tofauti wa vipepeo hao aina ya kwanza ambayo huwekwa juu zaidi hutengenezwa kwa chandarua na sahani kubwa ya kuwekea chambo ambacho mara nyingi ni ndizi, na aina ya pili ni chandarua iliyounganishwa na fimbo ya chuma ambayo hutumia mkono.

Upande wa mimea iliongelewa kuhusu:

- Kutumia majina ya kitaalam na kienyeji.
- Ukusanyaji wa mimea.
- Kuchunguza uharibifu wa misitu.

### 5.0 Matatizo yanayoonekana Misitu ya Hifadhi ya Bombo Mashariki 1 na 2 (Kilimandege na Kilimamwarabu)

Hii ilielezewa na Bwana miti Juma Ntoglela. Matatizo haya ni kama:

- Mito ya mara kwa mara.
- Uvunaji haramu.
- Uwindaji wanyama.

Wanakamati walichangia kuhusu madhara ya moto katika misitu hii:

- Kuua miti ambayo inahifadhi wanyama.
- Ukame na njaa.
- Wanyama kama nyani wanakosa chakula kwa hiyo wanahamia shambani. Matatizo mengine ni kama:
  - Uvunaji haramu
  - Uwindaji haramu

Mwisho wanakamati walichangia njia mbalimbali kutatua matatizo:

- Mikutano ya mara kwa mara.
- Kutilia mkazo sheria za misitu.
- Kuhamasisha upandaji miti kwa matumizi mbalimbali.

Susie Hall kama kaimu meneja wa mradi aliuliza swali kwa wanakamati kuhusu utatuzi wa uwindaji haramu, nao walijibu kama ifuatavyo:

- Vikao ndani ya vitongoji.
- Kupunguza urinaji haramu wa asali.

### 6.0 Maswali na majibu

Maada ya mwisho ilikuwa ni kuuliza maswali kwa wanakamati ambayo ilifanywa na ndugu Albert Ntemi.

1) Ni sababu zipi zinazosababisha kupungua au kutoweka kwa misitu katika eneo unaloishi?

Wajumbe walichangia fuatavyo:

- Upanukaji wa vijiji – kukua kwa familia katika kujitafutia mahitaji.
- Uchomaji mikaa, ukataji kuni.
- Mito ya mara kwa mara.
- Mashirika ya serikali mfano mashamba ya mikonge yanamega maeneo makubwa kuliko maeneo ya wanavijili.
- Kupungua kwa sheria.
- Hakuna/upungufu wa uhamasishaji.
- Wawindaji na wachonga vinyago.

2) Ni nani ambao hufanya uharibifu?

- Wajumbe walikubali kwamba ni sisi wenyewe wananchi.

3) Ni Athari zipi ambazo zimetokea baada ya uharibifu wa miti kufanyika muda mrefu?

- Upungufu wa mvua na maji. Walitoa mfano wa mabadiliko ya hali ya hewa; mjumbe mmoja alichangia na kusema hapo zamani ilikuwa ni lazima zianze tarehe 15/3 lakini sasa ni tofauti.
- Mmomonyoko wa udongo.
- Upungufu wa uzalishaji wa mazao katika udongo.

4) Wanyama wa aina gani wamepungua au kutoweka kwa sababu za uwindaji haramu na ukataji wa miti hovyoy?

- Wanakamati walisema hapo zamani palikuwepo na mbogo, ndovu, simba, chui na nyoka wakubwa wengi lakini sasa wamepungua.

5) Unatoa ushauri gani ili kuzuia uharibifu huo usiendelee? Mjumbe alisimama na kulezea kwamba kamati za mazingira zikutane kwa mwezi zikifuatiwa na mkutano wa kijiji kuweka sheria na kanuni zitakazolinda misitu.

- Ushirikiano mzuri kati ya kamati za mazingira na halmashauri za vijiji.
- Ni vizuri kamati hizi zikathaminiwa na halmashauri za wilaya.
- Semina za mara kwa mara, ingawa mjumbe mmoja alitoa madhara ya semina hizo kwa mfano utumiaji wa sinema za mazingira zilisababisha ongezeko la mioto mwaka 1998.

6) Juhudi gani ulizofanya katika kuhifadhi mazingira ya sehemu unayoishi? Wanakamati walichangia kwa kusema:

- Baadhi ya sehemu zenye vyanzo vya maji imepitishwa sheria ya kukataza ukataji wa mikuyu.
- Uhimizaji upandaji miti katika mashamba, mfano Bombo Maji Moto.
- Kutengeneza bustani, kwa mfano Kwekuyu.
- Majiko sanifu, kwa mfano Kwekuyu.

7) Ni sababu zipi zinazokwamisha juhudi za upandaji miti katika makazi yako?

Swali hii lilijibwa wa wajumbe wa Bombo mbuyuni na Kwekuyu kama ifuatavyo:

- Upungufu wa mbegu za miti.
- Uhamasishaji.
- Ufuatiliaji mbovu.
- Upungufu wa vikapu vya kubebea miti.

8) Ni njia zipi zitumike ilikupata mahitaji kutoka misituni bila kuharibu?

- Hili kama swali la mwisho wanakamati walichangia kama ifuatavyo.
- Ushirikishaji wananachi.
- Kuwa na wataalam kabla ya kutumia miti.
- Mikakati ya kwana kwa utalam.
- Panda miti kata miti.
- Kuimarisha doria ndogondogo.
- Doria za mara kwa mara.

Mwisho wanakamati walihitimisha mkutano kwa kutoa shukrani na kuelezea mambo mazuri waliyojifunza kuhusu mazingira. Shukrani kwa watoa maada na waliomba semina hizi ziwe mara kwa mara na kuahidi kwa dhati kwamba watakwenda kuyafanyia kazi huko waendako.

Saa 8.25 ilikuwa ndio mwisho wa kikao. Mwenyekiti wa kikao alitoa nasaa zake na kuwashukuru wanakamati kwa mwitikio wao wa kikao.

## MAELEZO YA MAJADILIANO

### UTANGULIZI KWA FRONTIER NA WATAFITI WA BAYOANUWAI WA USAMBARA MASHARIKI (EUBS)

*Sam Staddon (Kiongozi wa Utafiti, Frontier-Tanzania)*

Karibuni katika kambi ya utafiti Usambara Mashariki. Jina langu ni Sam Staddon. Mimi ni kiongozi wa utafiti. Ninafanya kazi na Frontier-Tanzania. Frontier-Tanzania ni ushirikiano baina ya umoja wa utafiti wa mazingira na chuo kikuu cha Dar-es-Salaam. Frontier-Tanzania wamepewa mkataba na Programu ya uendelezaji wa misitu ya Usambara Mashariki (EUCAMP) kutafiti viumbe adimu katika misitu yote ya hifadhi.

Kikundi cha watafiti katika msitu wa hifadhi Bombo Mashariki 1 na 2 (Kilimandege na Kilimamwarabu) kinajumuisha wafanyakazi wawili wa misitu; Albert Ntemi na bwanamiti Ntogolela. Tuna viongozi watano wa Frontier, wasaidizi watananzania watano na wasaidizi wazungu kumi na tatu (kutoka Ulaya). Tunafanya kazi hapa kwa wiki kumi.

Leo, tumewakaribisha hapa kubadilishana mawazo kuhusu bayoanuwai (mimea na wanyama) na utunzaji wa misitu katika milima ya Usambara Mashariki hasa misitu ya hifadhi Bombo Mashariki 1 na 2 (Kilimandege na Kilimamwarabu). Utafiti huu ulianza mwaka 1994 na umekuwa na matokeo mazuri sana kwa kufanikiwa kupata mimea na wanyama ambao walikuwa hawajulikani na pia kuongeza orodha ya mimea na wanyama. Misitu 14 imeshafanyiwa utafiti kama huu katika misitu ya Usambara Mashariki:

Kambai	Kwamngumi (Kwamtili)
Longuza	Mlungui (karibu na Bamba)
Kwamarimba	Mtai (karibu na Maramba)
Bamba	Magoroto
Manga (Lanzoni)	Amani
Segoma	Nilo (karibu na Kwemkole, Kizara na Kilanga Ngua)
Semdoe	Mlinga (karibu na Mesozwe)

Lengo la utafiti wa viumbe adimu katika milima ya Usambara Mashariki:

- Kutoa taarifa mbalimbali zinazohusu thamani ya viumbe adimu ndani ya misitu katika kuboresha mpango wa utunzaji misitu na ufuatiliaji wa muda mrefu.
- Kutafiti mimea na wanyama adimu ndani ya misitu ya hifadhi.
- Kusaidia mpango wa utunzaji wa baadaye wa misitu.
- Kutoa mafunzo ya utafiti kwa Mabwana na mabibi miti.
- Kutoa ripoti ya kila msitu ikionyesha matokeo ya utafiti na ushauri wa utunzaji wa misitu kwa matumizi endelevu.
- Kuchunguza uharibifi wa misitu.

Mafanikio ya Utafiti:

- Umefanikiwa kutafiti misitu 12 na huu ni wa 13.
- Mimea mingi imeweza kujulikana kwa wanamimea ambayo ilikuwa haifahamiki hapo nyuma.
- Wanyama wadogo wadogo wengi wamejulikana kutoka na utafiti huu.
- Utafiti huu umeweza kuelimisha njia mbali mbali za utafiti kwa mabwana na mabibi miti katika Mradi wa hifadhi Misitu Usambara Mashariki.
- Watafiti mbali mbali wamevutiwa na kufaidika na utafiti huu.
- Kujulikana zaidi ulimwenguni umhimu wa misitu hii ya Usambara Mashariki kupitia utafiti huu.

## UTANGULIZI KUHUSU SAFU YA MILIMA YA UKANDA WA MASHIRIKI

Albert Ntemi Sallu, Mwanabayoanuwai, EUCAMP

### Je unaifahamu safu ya Milima ya Ukanda wa Mashiriki?

Safu ya Milima hii imeishia mwambao wa Pwani ya Kaskazini-Mashiriki, kutokea Kusini Magharibi mwa Tanzania, imeumbwa na milima tisa iliyotengana kuanzia Kusini mwa nchi ya Kenya kupitia Tanzania ikifanya umbo kama la mwezi mchanga uliochomoza na ndiyo maana ya jina la “Safu Ya Milima Ya Ukanda wa Mashiriki” (The Eastern Arc Mountains).

### Safu ya Milima ya Ukanda wa Mashiriki ni ipi?

Angalia ramani: Taita Hills (Kenya), Pare Kaskazini na Kusini, Usambara Mashiriki na Magharibi, Nguu, Nguru, Ukaguru, Robeho, Uluguru, Udzungwa, Mahenge

### Kipi kilisababisha milima hii ionekane kama ilivyo sasa?

Inasemekana kwamba misitu mikubwa ya mvua nyingi ya Afrika Magharibi ilikuwa imesambaa bara zima la Afrika. Kutokana na mabadiliko ya hali ya hewa, miaka milioni kumi iliyopita, misitu hii ya Mashariki ilijitenga kutoka misitu ya Afrika Magharibi. Kutokana na ukame na shughuli za maendeleo za binadamu kuongezeka milima hii imekuwa ikitengana kutoka safu moja baada ya nyingine na kuonekana kama visiwa (vilivyozungukwa na mbuga za majani, vichaka, mashamba, makazi ya watu nk.).

### Nini umuhimu wa misitu iliyopo katika milima hii?

1. Kuwa inahifadhi vyanzo vya maji
2. Watu wanaoshi maeneo haya wanapata mahitaji yao kutoka katika misitu hii kama vile maji, kuni, mkaa, dawa, nguzo, za kujengea na mbao kwa ajili ya matumizi mbalimbali
3. Pia misitu hii inatengeneza mandhari katika maeneo husika na imekuwa kivutio kikubwa kwa watalii.
4. Zaidi ya hayo, misitu hii ina umuhimu katika kuhifadhi ardhi na kurekebisha hali ya hewa na pia ina mchango mkubwa sana katika kuwepo kwa mvua zinazonyesha katika maeneo hayo. Kwa hiyo milima hii ni uti wa mgongo wa Taifa letu na urithi wa vizazi vijavyo. Na kiulimwengu ni ya 24 kuwa na Bayoanuwai nyingi (aina mbalimbali ya viumbe hai).

### Je unafahamu kwamba misitu hii inakabiliwa na hatari ya kutoweka?

Cha ajabu ni kwamba misitu iliyoko katika milima hii hukatwa sana kwa ajili ya mbao na matumizi mengine pamoja na kuchomwa moto ovyo. Ingawa kuna udhibiti lakini uvunaji haramu wa mbao bado ni tatizo sugu.

### Nini athari (madhara) za kuharibu misitu hii?

Baadhi ya madhara ya uharibifu wa miti, hutokea baada ya muda mfupi na mengine huchukua muda mrefu kujitokeza. Athari hizo ni pamoja na:

1. Mmomonyoko wa udongo na maporomoko ya ardhi
2. Ukame
3. Kutokea kwa mafuriko
4. Kukauka kwa vyanzo vya maji
5. Kutoweka kwa aina fulani ya miti
6. Kutoweka kwa aina fulani za viumbe hai kwa mfano wanyama, wadudu, ndege, mimea, nk.

7. Mabadiliko ya hali ya hewa, mfano kuongezeka kwa joto duniani, gesi ya hatari kwa binadamu mfano CO, CO<sub>2</sub>.

Kuna juhudi zozote zinazofanyika katika kuhifadhi misitu iliyoko kwenye Milima ya Ukanda wa Mashariki?

Kwa vile umuhimu wa Safu ya Milima ya Ukanda wa Mashariki unaeleweka vema kwa wanabiolojia na watafiti tu, tumeona kuna haja kubwa ya kueleemisha jamii nzima ya Tanzania ifahamu kinachoendelea kuhusu Bayoanuwai (Biodiversity- Maisha ni Kuwiana Baina ya Viumbe, Binadamu na Mazingira yao) iliyo hazina kubwa kwetu. Elimu ya mazingira imeanza kutolewa kwa wananchi wanaoishi katika milima hii, kuhusu madhara ya kuharibu mazingira. Serikali na mashrika yasiyo ya kiserikali yameanzisha juhudi za kuishirikisha jamii inayoishi au kupakana na maeneo ya misitu katika kuhifadhi misitu. Juhudi hizo ni pamoja na kuwahamasisha wananchi kupanda miti katika mashamba yao kwa ajili ya matumizi yao. Pia juhudi zinafanywa kuwaelimisha wakulima juu ya kilimo misitu (kilimo mseto).

## **UTANGULIZI KUHUSU MISITU YA USAMBARA MASHARIKI**

Albert Ntemi Sallu, *Mwanabayoanuwai*, EUCAMP

Misitu ya Usambara Mashariki ni Miongoni mwa Misitu ya mvua ya ukanda wa mashariki (Eastern Arc Mountains) na ni kati ya Misitu ya hifadhi yenye thamani katika bara la Africa. Kuna baadhi ya mimea na wanyama ambao wanapatikana tu katika misitu ya Usambara Mashariki. Misitu hii ni muhimu katika utoaji wa maji kwa wananchi wa Tanga mjini na watu wote wanaoishi kando kando ya Milima hii.

*Mpango wa utunzaji wa Misitu ya Usambara Mashariki umefanikiwa Kuanzisha Hifadhi ya Mazingira Asili ya Amani yenye malengo ya:*

- Kuhifadhi Vyanzo vya maji,
- Kuanzisha na kutunza misitu ya hifadhi.

Kuendeleza faida za misitu kwa wanavijiji.

Utafiti katika Misitu ya Usambara Mashariki ulianza Miaka ya 1890 hasa katika ukusanyaji wa Mimea. 1928 utafiti wa vyura ulifanyika, na kati ya 1930 kazi ya utafiti wa ndege ilianza. Tangu utafiti huo wa awali, utafiti wa bayolojia katika milima hii umezidi kuongezeka.

Wananchi wa waeneo haya wanategemea misitu hii kwa mahitaji yao mengi ya kila siku, kwa mfano; Kuni, Maji, Mboga, Matunda, Dawa, Majengo, Mvua, Uyoga, hewa nzuri, n.k. Ingawa umuhimu huu wa Misitu hii unafahamika kwa wananchi wa milima hii ambao ndio watumiaji wakuu, bado uharibifu wa misitu unatokea mara kwa mara ambao unahatarisha misitu. Uharibifu kama, uchomaji moto, uvunaji haramu wa mbao, uwindaji, ukataji, majengo na fito, ulimaji ndani ya misitu na mwingine mwingi, ni hatari kwa misitu hii kwa hapo baadae kama hautakomeshwa mapema.

Wananchi wanatakiwa kujivunia na utajiri walio nao wa misitu hii na waitunze kwa manufaa ya sasa na vizazi vijavyo kwa matumizi endelevu. Maeneo mangi hapa Tanzania hayana Milima na misitu minene na mizuri kama hii. Ukame ni tatizo katika maeneo hayo hivyo

isingekuwa vizuri kutoweka yote. Tushirikiane kuitunza misitu ya Usambara Mashariki kwa nguvu zote.

## **MISITU NI UHAI!**

### **VITU TUVYOTAFITI NDANI YA MISITU YA HIFADHI**

Amiri Saidi, Msaidizi wa Utafiti na Albert Ntemi Sallu

Katika misitu ya hifadhi ya Usambara Mashariki, tunatafiti viumbe hai ndani ya maeneo yote ya misitu ya asili, kwa mfano:

#### *Wanyama:*

- wanyama wadogowadogo kama panya, popo, vyura, nyoka, mijusi, ndege, wadudu kama vipepeo, konokono, jongoo

#### *Mimea:*

- Kutambua majina ya miti ya kitaalamu na ya kienyeji
- kukusanya mimea na kuipeleka sehemu mbalimbali ulimwenguni kwa ajili ya kutambulika zaidi na kuhifadhiwa kwa matumizi ya baadaye.

#### **Kuchunguza uharibifu wa Misitu:**

Hapa tunapita sehemu zote za msitu na kuangalia uharibifu uliofanywa na watu.

- Uharibifu kama ukataji miti, fito, na nguzo.
- Uchanaji mbao
- Uwindaji haramu wa wanyama
- Uchomaji moto ovyo

Sampuli zilizokusanywa za mimea na wanyama kwa kutumia njia za kitaalamu. Sampuli hupelekwa kwa wataalama Dar-es-Salaam, Uingereza, Zimbabwe, Marekani na Ujerumani kwa utambuzi zaidi.

**MATATIZO YANAYONEKANA MSITU WA BOMBO MASHARIKI 1 NA 2***Peter Juma Ntoglela, Bwana Miti, EUCAMP*

1. Mito ya mara kwa mara.
2. Uvunaji haramu - ukiambatana na ukataji nguzo.
3. Uwindaji wanyama.

**Athari za Matatizo Hayo****Moto**

- a) Uwoto wa asili hutoweka matokeo yake huota miti ambayo haina maana kama Bombo Mashariki 1 na 2 maeneo yaliyoungua yana miti aina ya mishinga.
- b) Unauwa wanyama wadogo wadogo ambao hawana uwezo wa kukimbia.
- c) Kuharibu vyanzo vya maji.
- d) Kuota mimea aina tofauti.
- e) Kuharibu rutuba ardhini.
- f) Kuongezeka kwa panya mashambani.
- g) Kuongezeka kwa wanyama waharibifu mashambani kama nyani, kima, nguruwe sababu yakukosa chakula msituni.
- h) Kuhama kwa viumbe kutoka sehemu moja hadi nyingine.

**Uvunaji Haramu**

- a) Kupotea kwa aina muhimu za miti mfano hapa-mvule.
- b) Kuharibu uoto wa asili na kuuwa mimea iliyojirani na sehemu ulipoangushwa mti.
- c) Kuwepo kwa maeneo ya wazi ndani ya msitu.

**Uwindaji**

- a) Hatari ya moto msituni, wawindaji huwa wanachoma moto na kusababisha wayama kuhamia upande mwingine ili wawapate kwa urahisi - au kuchoma nyama msituni.
- b) Ukataji wa miti aina ya nguzo kufanyia mitego.
- c) Kuuwa wanyama.
- d) Mitego ni hatari kwa watu.

**Tufanye nini ili tuepukane na matatizo haya?**

- Kufanya mikutano ya mara kwa mara na vitongoji vinavyopakana na misitu ya hifadhi.
- Doria za mara kwa mara kushirikiana na wanakamati.
- Kuhamasisha upandaji miti ya matunda, mbao, na kuni - pia kuhamasisha wananchi kulima kilimo cha kuchanganya mazao ya chakula na miti - kilimo mseto au kilimo msitu.

## 7.12: Mgambo Environmental Conservation Workshop Minutes

By Claire Bracebridge, Susannah Hall, Albert Ntemi, Johari Mtango & Amiri Saidi

<b>Date:</b>	18 <sup>th</sup> May 2002
<b>Location:</b>	East Usambara Biodiversity Survey (EUBS) Main camp, Mgambo Catchment Forest Reserve (Bogoro - Bwiti village).
<b>Faciliatators:</b>	Albert Ntemi - EUCAMP Susannah Hall – EUBS Research Co-ordinator
<b>Participants:</b>	EUCAMP Forestry Officers (East Usambara Conservation Area Management Program). EUCAMP Agricultural Extension Officer. EUBS Scientists and Research Assistants. Village <i>mwyenekiti</i> and women from Bwiti Mavovo. Environmental committee members from Bwiti Mavovo and Vuga villages. Villagers of Bwiti Mavovo, Mgambo and Vuga.
<b>Timetable:</b>	
09:00 – 09:15	Opening <i>Gerald Otieno, Forest Officer, EUCAMP</i>
09:15 - 09:20	Welcome to EUBS basecamp <i>Susannah Hall, Research Co-ordinator, EUBS</i>
09:20 - 09:45	Introduction : Eastern Arc & East Usambara forests and importance of reserve areas <i>Albert Ntemi, Biodiversity Officer, EUCAMP</i>
09:45 - 10:45	Current Forest Policy <i>Gerald Otieno</i>
10:45 - 11:00	Break
11:00 - 11:30	Importance of biological research and research methodology of biodiversity surveys <i>Albert Ntemi and Johari Mtango, Agricultural Extension Officer, EUCAMP</i>
11:30 - 12:00	Botanical and zoological specimen viewing <i>Albert Ntemi Susannah Hall and Claire Bracebridge, Assistant Research Co-ordinator, EUBS</i>
12:00 - 12:30	Questions
12:30 - 13:15	Break
13:15 - 14:15	Small group work - conservation issues in Mgambo forest reserve: problem causes, reasons and solutions.
14:15 - 14:45	Group feedback to whole group
14:45 - 15:30	Discussion
15:30 - 15:45	Close <i>Gerald Otieno &amp; Mwenyekiti, Bwiti Mavovo Village</i>

## **1.0 Introduction**

The workshop was opened at 9.30am by Maramba Catchment Forest Officer, Mr Gerald Otieno and the participants were welcomed to the EUBS basecamp by Ms Susannah Hall.

Mr Otieno emphasised to the participants the importance of conserving their environment and the consequences that human daily activities have in influencing environmental destruction.

He stressed that having EUBS main camp located here was a good opportunity to discuss and teach each other, as well as find solutions for environmental problems faced here. He added that co-operation was a vital component in saving our environment.

Mr Otieno thanked the participants for coming to the workshop and invited each to introduce themselves to the workshop, which was carried out before moving on to the introductory speech by Mr Albert Ntemi.

## **2.0 The Eastern Arc**

A map and a short briefing was given to introduce the location and importance of the Eastern Arc mountains. It was explained that the “Eastern Arc” is a chain of mountains that runs from the Taita Hills in Kenya south to the Udzungwa mountains in Iringa, Tanzania. The East Usambaras forests are found in the “Eastern Arc” chain.

Ten million years ago Africa’s forests were a continuous green belt from east to west and north to south. Human activities contributed to the disintegration and fragmentation of these forests. To date agricultural activities are the major cause of forest destruction, creating what are effectively forest “islands”. Daily human activities are still connected to and influence these forest pockets, including the East Usambaras. Therefore, as a group, the importance of the forest and the resulting problems it faced was discussed and the major issues listed for the East Usambaras and particularly locally with respect to Mgambo forest reserve.

### **2.1 The Importance of the East Usambara forests:**

- Employment for timber industries.
- Water catchment areas.
- Shelter for living organisms.
- Weather regulations.
- Medicinal plants.
- Reduction of soil erosion.
- Tourism attractions.
- Source of non timber products.

### **2.2 Problems facing East Usambara Forests:**

Daily human activities which contribute to forest reduction are tree cutting for house building, forest fires and burning, cultivation, timber extraction, grazing and illegal hunting.

### **2.3 Effect of Forest Encroachment:**

- Less trees providing local ecosystem for floral and fauna.
- Reduction of living organisms
- Unreliable rainfall
- Long dry spells.
- Global warming.
- Water pollution.
- Reduction of worship areas.

#### **2.4 Measures taken to save the East Usambara Forests:**

- Introduction of Environmental Conservation to the communities surrounding the forests.
- Conducting forest research and disseminating the findings to the local communities.
- Cooperation between Tanzanian government and NGOs in forest conservation.

### **3.0 Forest Policy**

The forest policy was introduced by the government in 1953 with amendments made in 1963 and 1998 involving all stakeholders. The main reason for involving stakeholders is to increase community participation in forest conservation and sustainable utilisation of natural resources, as they are the main implementors of the forest policy. In order for communities, governmental institutions, international institutions and private organisations to know what to resources to use, they must first know what to conserve.

#### **3.1 Main and Long Term Objectives of the Forest Policy:**

- Strengthen and implement sustainable and equitable use of forest produce for the present and future generations.
- Conserve and monitor forest produce, thereby producing sustainable availability of it.
- Create employment via sustainable forest produce.
- Stabilisation of ecology and forest biodiversity wetlands and soil fertility.
- Increase national monitoring and to develop the national forest sector by involving stakeholders.

#### **3.2 Problems facing the effective implementation of the Forest Policy:**

- Desertation of about 50,000ha per annum.
- Tree harvesting.
- Hunting.
- Animal grazing in the forests.
- Forest encroachment by agricultural activities.
- Stakeholder's rights are not open.
- Poor involvement of stakeholders.
- Poor forest resource monitoring due to inability of government to employ forest technicians.
- Undefined forest borders.

### 3.3 Community Responsibilities:

- To know the forest borders.
- To monitor forest use.
- Provide manpower.

### 3.4 Forest Management

#### Aims:

- The sustainable harvesting of the forest produce.
- To divide the forest into: Government forest
- Local government forest.
- Village forest.
- To conserve biodiversity of the forest.
- To conserve water sources.

#### Strategy:

To make the contracts with the local people and to involve them in the management of the natural resources

### 4.0 Importance of EUBS Biological Research

To look for and identify flora and fauna for the purpose of learning and gaining new knowledge within that topic. To look at cause and effect and provide problem-solving solutions.

Frontier's research is to search for plants and animals such as reptiles, amphibians, rodents and other small animals, and to look at the environment in general within the East Usambaras.

#### 4.1. Objectives:

- To Provide information which will help in planning for the conservation of the forest.
- Training people, including EUCAMP field officers, local villagers and overseas volunteers in field techniques and environmental awareness.
- Provide direction for follow up (i.e. monitoring) research within the forest reserves.

#### 4.2 Advantages:

- To understand the life cycles and ecology of different living organisms in the forest.
- To store information and provide results of the research.
- To publicise the Mgambo forest reserve internationally.
- To provide environmental education to local communities at school and village level.

The East Usambara forests are particularly important because of the living organisms it contains and conserves, especially endemic species, e.g. snakes.

The research helps in understanding rare species obtained in the East Usambaras.

#### 4.3 Methods used for the Research:

- Walking.
- Searching for signs (tracks and dung) of animals.
- Traps.

Before doing anything the forest should be divided into plots of 900 m x 450 m in order to ensure systematic unbiased work, to provide trails to repeatedly use in the forest and to become familiar with the area.

The participants of the environmental workshop were shown some of the equipment used during trapping animals:

Buckets for shrews, snakes, frogs and lizards.

Bat nets for trapping bats.

Sherman traps for rodents e.g. rats, which is baited with coconut and peanut butter.

Butterfly canopy traps, baited with fermented banana.

## **5.0 Problems within Mgambo Forest Reserve: discussion of the environmental workshop:**

Members of the meeting listed problems involved in Mgambo forest reserve:

- Fire.
- Illegal harvesting of forest products.
- Grazing.
- Illegal hunting of animals.
- Lack of widespread environmental education to local communities in general.

### **5.1 Group work:**

The participants divided themselves into three groups for the purpose of discussing the different problems mentioned above and to suggest solutions for them.

### **5.2 Results of discussion groups:**

#### **Group 1**

<b>Problem</b>	<b>Reason/Cause</b>	<b>Solutions</b>
Fire	Hunters Grazers	Restrictions of the illegal hunting activities
Illegal harvesting of forest products	Poor understanding of the meaning of forest reserves	To educate people about the advantage of forest reserves
Grazing	Lack of education	The environmental committees will educate the hunters
Lack of education in understanding the forest	Insufficient training	To get education from the environmental committees

**Group 2**

<b>Problem</b>	<b>Source/ Causes</b>	<b>Solutions</b>	<b>Persons responsible to implement solutions</b>	<b>Tools/ Equipment needed</b>
Fire	Hunters Honey Hunters	Fire breaks Road construction Mass education on effects of fire	Villagers	Tools to construct a road and dig fire breaks.
Illegal Harvesting of Forest Products	The desire to acquire money	Take them to the village office	Chair person	Small laws and law enforcement
Grazing	Lack of grazing areas outside of the reserves	Village government to allocate areas	Village to government	Environmental committees
Hunting	Desire / need for meat / food	Take them to the village office	Villagers	Patrols
Lack of Education in the understanding of the forest reserve.	Poor participation of local people	To involve the stakeholders	Villagers and the village government	Education

**Group 3**

<b>Problem</b>	<b>Reason / Cause</b>	<b>Solution</b>
Fire	Shamba Grazing Hunting Unkept borders Honey Charcoal	Good shamba preparation will help to control fires. Zero grazing or provide alternatives, such as herd reduction, planting grass or improved land use in the village. Clear borders Introduce bee keeping in shambas Use kerosene and other fuel alternative to charcoal. General law enforcement.
Tree Harvesting and Forest Produce	Poverty No trees suitable outside of the forest. Population increase Development – housing, etc.	Income generating activities (government) – group action / interest. Plant trees in the shambas. Population control – condoms. Buy timber. Law enforcement.
Grazing	No area set aside for	Improved land use in village (Muheza) –

	grazing.	collective action. Grow grass. Reduce livestock. Have chickens / duck not cows or goats. Law enforcement.
Hunting	Lack of meat / poverty	Keep chickens / ducks to reduce the dependence on forest meat.
Lack of Education about the Forest	Lack of money – government. Lack of personnel – government.	Government search for external funding and/ or utilise NGOs. Collective action i.e. from villagers to local and district levels of government, as well as more centralised action.

## 6.0 Discussion

One of the villagers tried to explain the past procedures used, such as different pasture areas and different areas for watering the animals. There are areas reserved as pasture but the problem is the way / access to the area. Some of these areas are no longer accessible due to shambas.

Environmental protection is important for the local people surrounding the Mgambo forest. The villagers felt strongly about the need to conserve their natural resources in the forest.

### 6.1. Suggestions for future positive action / aims:

- They want to prohibit the grazing of animals in the reserve and drinking from the streams in the forest.
- Any illegal activities should be reported to the leaders. Such reports should not be hidden.
- Mass education to people is required in order to feel that the forest belongs to them and that it is their responsibility to ensure no destruction occurs. If it does, it is up to them to solve the problems and produce a positive outcome.
- The laws governing the forest are important to be used as required and enforced by all leaders.
- There is poor performance for those environmental committees to date. It would be better if the committees have more power over daily activities.

All participants of the workshop were finally informed that on 8<sup>th</sup> June 2002 there would be a World Environmental Day event. Frontier will participate in this in Bwiti village. Members of this workshop are requested to advertise this to the villagers to encourage participation in this day at Bwiti Primary school.

Any villagers with any ideas or opinions for environmental conservation are welcome to the office with an opportunity to discuss their ideas and contribute to the day.

### **7.0. Closing Speech**

Bwiti *mwenyekiti* closed the workshop at 4.12 pm by thanking the participants and Frontier staff for their good contribution to the days discussions. Moreover he emphasised the worth of researchers exchanging their ideas with locals for environmental conservation issues.

### 7.13 Warsha ya uhifadhi wa mazingira msitu wa hifadhi Mgambo Usambara Mashariki

*Na Claire Bracebridge, Susannah Hall, Albert Ntemi,, Johari Mtango & Amiri Saidi*

<b>Tarehe:</b>	18 Mei 2002
<b>Mahali:</b>	Kambi Kuu ya EUBS – Msitu wa Hifadhi Mgambo (Bogoro – Kijiji cha Bwiti)
<b>Wawezeshaji:</b>	<i>Albert Ntemi - EUCAMP</i> <i>Susannah Hall – Frontier-Tanzania</i>
<b>Washiriki:</b>	Ofisi ya hifadhi misitu – Mabwanamiti , Bwanakilimo Wataalamu kutoka EUBS Wenyeviti wa vijiji – Bwiti Mavovo Wajumbe wa kamati za Mazingira – Bwiti Mavovo Wanavijiji toka Bwiti Mavovo na Vuga
<b>Ratiba:</b>	
3:00 – 3:15	Kufungua Washa – Mkuu wa Kituo cha Misitu Maramba- <i>Gerald. Otieno</i>
3:15 – 3:20	Makaribisho <i>Susannah Hall</i>
3:20 – 3:45	Utangulizi:- Milima ya Ukanda wa Mashariki na Misitu ya Usambara Mashariki <i>Albert Ntemi.</i>
3:45 – 4:15	Sera mpya ya misitu <i>Gerald Otieno</i>
4:15 – 5:00	Chai
5:00 – 5:30	Umuhimu wa Utafiti wa Viumbe Adimu na Mbinu zitumikazo katika utafiti <i>Albert Ntemi na Johari Mtango</i>
5:30 – 6:00	Kuona sampuli za wanyama na mimea <i>Albert Ntemi, Susannah Hall na Claire Bracebridge</i>
6:00 – 6:30	Maswali
6:30 – 7:15	Chakula
7:15 – 8:15	Kazi za Vikundi – Masuala ya Uhifadhi katika Msitu wa Hifadhi Mgambo – Chanzo cha matatizo, sababu, na hatua za kuchukua.
8:15 – 8:45	Matokeo kutoka kila kikundi
8:45 – 9:30	Majadiliano – Wote
9:30 – 9:45	Kufunga <i>Gerald Otieno &amp; Mwenyekiti wa Kijiji, Bwiti</i>

### **1.0 Utangulizi, Makaribisho:**

Kikao kilifunguliwa na Afisa Misitu wa Maramba, Bwana Otieno, saa 3:20 Asubuhi. Alianza kwa kuwataarifu wajumbe namna ya uhifadhi misitu. Mazingira na Shughuli za binadamu zimesababisha kuharibu mazingira kwa kiasi kikubwa.

‘Leo tumefika katika Kambi ya Utafiti hivyo ni wakati mzuri wa kukutana na kujadiliana mambo mengi. Tushirikiane katika kufundisha.’ Alimaliza kwa kuwashukuru wajumbe kwa kufika.

Bwana Mtango aliwataka washiriki wajitambulishe, jambo lililofanyika kabla ya ndugu Albert Ntemi kutoa hotuba ya utangulizi.

### **2.0 Milima ya Ukanda wa Mashariki:**

Alianza kwa kuonyesha wanawarsha ramani ya Milima ya Safu ya Mashariki, kuanzia milima ya Taita-Kenya, hadi milima ya Udzungwa-Iringa, Tanzania. Ndani ya ukanda huo wa safu ya Milima ya Ukanda wa Mashariki ndimo ilimo milima ya Usambara Mashariki.

Miaka milioni kumi iliyopita misitu ya Afrika ilikuwa imeungana. Shughuli za kila siku za binadamuzimechangia sana kuitenganisha misitu hii, na kuifanya iwe inaonekana kama visiwa. Misitu ya Usambara Mashariki ni misitu ambayo inahusishwa na Shughuli za kila siku za binadamu.

#### **2.1 Umuhimu wa Misitu Hii:**

- Ajira katika viwanda vya mbao
- Kuhifadhi vyanzo vya maji
- Makazi ya viumbe hai
- Kurekebisha hali ya hewa
- Dawa za Asili
- Kupunguza mmomonyoko wa udongo
- Kivutio kwa watalii
- Chanzo cha bidhaa zitokanazo na mbao

#### **2.2 Matatizo yanayoikabili Misitu ya Usambara Mashariki:**

Shughuli za kila siku za binadamu zimechangia kuhatarisha kutoweka kwa misitu hii. Mf. Ukataji kuni, uchomaji moto, n.k.

#### **2.3 Athari Zake:**

- Miti michache yenye kutupatia ikolojia kwa mimea na wanyama
- Kupungua kwa viumbe hai
- Mvua isiyotegemewa
- Ukame wa mara kwa mara
- Ongezeko la joto duniani
- Uchafuzi wa maji
- Kupungua kwa maeneo ya kuabudia

#### **2.4 Nini Kifanyike Kuokoa Misitu ya Usambara Mashariki:**

- Elimu ya Mazingira kwa umma.
- Utafiti na kutoa ushauri kwa umma.

- Serikali pamoja na Mashirika yasiyo ya Kiserikali kushirikiana katika utunzaji wa misitu.

### **3.0 Sera Mpya ya Misitu:**

Sera ya Misitu ilianzisha na serikali 1953 na kurekebishwa 1963 na 1998 kwa kuwahusisha washikadau. Sababu kubwa ya kuwahusisha washikadau ni kuongeza ushirikishwaji wa jamii katika uhifadhi wa misitu kwa matumizi endelevu ya maliasili, kwani wao ndio watekelezaji wakubwa wa sera hii. Ili jamii, taasisi za serikali, taasisi za kimataifa, na mashirika binafsi kujua ni raslimali kiasi gani kutumia, lazima yajue ni kiasi gani kuhifadhi.

### **3.1 Malengo Makuu na ya Muda Mrefu ya Sera ya Misitu:**

- Kuimarisha na kutekeleza matumizi endelevu na linganifu ya mazao ya msitu kwa kizazi cha sasa na vijavyo.
- Kutunza na kulinda mazao ya msitu, ili kuhakikisha uwepo wake.
- Kupanua ajira kwa kuendeleza uwepo wa mazao ya msitu
- Kuimarisha mfumo wa ikolojia, biyoanuwai ya misitu na vilindimaji, na rutuba ya udongo.
- Kukuza uwezo wa taifa katika usimamiaji na kuendeleza sekta ya misitu ya taifa kwakushirikiana na washikadau.

### **3.2 Matatizo ya Utekelezaji wa Sera ya Misitu:**

- Ukuaji wa jangwa kwa kasi ya hekta 50,000 kwa mwaka
- Uvunaji wa miti
- Uwindaji
- Ulishaji mifungo misituni
- Uvamizi wa misitu ufanywao na wakulima
- Haki za washikadau haziko wazi
- Ushirikishwaji mdogo wa washikadau
- Udhhibiti duni wa raslimali za misitu utokanao na serikali kukosa uwezo wa kuajiri wataalamu wa misitu.
- Mipaka ya misitu haijabainishwa vizuri.

### **3.3 Majukumu ya Jamii:**

- Kujua mipaka ya msitu
- Kusimamia matumizi ya msitu
- Kutoa nguvukazi

### **3.4 Usimamizi wa Misitu, Madhumuni:**

- Upatikanaji na uvunaji endelevu wa mazao ya msitu.
- Kugawa misitu katika: Misitu ya Serikali Kuu  
Misitu ya serikali za mitaa  
Misitu ya vijiji
- Kuhifadhi bayoanuwai ya msitu.
- Kuhifadhi vyanzo vya maji

### **Mikakati:**

Kuweka makubaliano na wenyeji na kuwahusisha katika udhibiti wa maliasili.

#### 4.0 Umuhimu wa Utafiti wa Kibayolojia wa Frontier Tanzania

Maana ya Utafiti: Ni kuchunguza, kufuatilia ili kujua mambo Fulani (mf. Matatizo, sababu, matokeo, n.k.) na kutoa ushauri wa kuondoa matatizo hayo.

Utafiti wa kikundi cha Frontier kwenye misitu ya Usambara zaidi ni utafiti wa mimea na viumbe, mf. Wadudu, wanyama, ngege, mimea, hali ya mazingira, n.k.

#### 4.1 Malengo:

- Kutoa taarifa zitakazosaidia kuendeleza kupanga mipango ya uhifadhi bora wa misitu
- Kutoa mafunzo kwa wataalamu mbalimbali wa misitu, wananchi, n.k.
- Kutoa mwelekeo wa ufuatiliaji wa shughuli za misitu

#### 4.2 Faida:

- Kufahamu aina ya viumbe hai vilivyomo ndani ya maeneo ya misitu.
- Kuweka kumbukumbu za matokeo.
- Kutangaza msitu wa Mgambo katika ngazi ya kimataifa.
- Kutoa elimu katika ngazi ya shule na vijiji.

Umuhimu wa misitu ya Usambara Mashariki ni kwa jinsi misitu hii inavyoweza kuhifadhi viumbe wa pekee ambao hawapatikani mahali pengine duniani, mf. Nyoka, vinyonga, n.k. Utafiti huu umetuwezesha kufahamu viumbe adimu vilivyomo Usambara Mashariki.

#### 4.3 Mbinu Zinazotumika katika Utafiti:

- Kutembea
- Kutafuta ishara (nyayo na vinyesi) vya wanyama
- Mitego

Kabla ya kufanya chochote msitu hugawanywa katika vieneo vya m 900 x m 450 ili kuhakikisha kazi inafanyika kwa utaratibu na bila upendeleo, na pia kuweka njia za kutumia mara kwa mara msituni kuujuu vizuri msitu.

Washiriki wa warsha walionyeshwa baadhi ya vitu vitumikavyo katika kutega wanyama:

- nazi na karanga kwa ajili ya panya
- ndizi kwa ajili ya vipepeo
- ndoo – kupata panya, nyoka, chura, mijusi, n.k.
- Neti - kupata popo

#### 5.0 Matatizo ndani ya Msitu wa Hifadhi Mgambo:

Washiriki walitaja matatizo yaliyomo Msitu wa Hifadhi Mgambo.

- Moto
- Uvunaji haramu wa mazao ya msitu
- Ulishaji mifugo
- Uwindaji haramu
- Ukosefu wa elimu pana ya mazingira kwa jamii enyeji kwa ujumla.

### 5.1 Kazi za Vikundi:

Washiriki walijigawa wenyewe katika makundi matatu kwa nia ya kujadili matatizo mbalimbali yaliyotajwa hapo juu na kutoa ushauri wa nini kifanyike kupata suluhisho.

### 5.2 Matokeo ya Majadiliano:

#### Kikundi 1

Tatizo	Sababu	Suluhisho
Moto	Wawindaji Wachungaji	Wasiwinda eneo la hifadhi
Uvunaji haramu wa mazao ya msitu	Kutoelewa maana ya kuhifadhi misitu	Kuwaelimisha wananchi juu ya faida ya kuhifadhi misitu
Ulishaji mifugo	Ukosefu wa elimu	Ni kuwadhibiti wenye mifugo kwani tunawafahamu
Uwindaji	Ukosefu wa elimu	Kamati ya mazingira itachukua jukumu la kuwaelimisha wawindaji
Ukosefu wa elimu katika kuelewa misitu	Kukosa mafunzo wataalamu	Kuelimishwa na kamati ya mazingira

#### Kikundi 2

Tatizo	Chanzo/ Sababu	Kutatua Tatizo	Mhusika	Nyenzo inayohitajika
<b>Moto</b>	Wawindaji Walina asali	Kulima barabara. Kuelimisha watu kuhusu adhali za moto	Mwanakijiji Mwenyewe	Kulima njia
Uvunaji wa mazao ya msitu ovyo	Tamaa ya pesa	Apelekwe kwenye ofisi ya kijiji	Mhusika wa kijiji ambaye ni mwenyekiti	Sheria ndogo
Kuchunga Mifugo	Kukosa maeneo	Kijiji kiwapatie maeneo	Serikali ya kijiji	Kamati ya mazingira ya kijiji
Uwindaji	Uchu wa nyama	Apelekwe ofisini	Mwananchi	Doria
Ukosefu wa elimu ya Ufahamu kuhusu Msitu wa Hifadhi	Kutoshirikishwa	Wadau na wataalamu washirikiane	Mwananchi na serikali ya kijiji	Elimu

**Kikundi 3**

<b>Tatizo</b>	<b>Sababu</b>	<b>Suluhisho</b>
Moto	Shamba –mkaa Ulishaji mifugo Uwindaji -kulina asali Mipaka isiyotuzwa	Uandaaji mzuri wa mashamba utasaidia kuzuia mioto. Ufugaji wa ndani au upunguzaji mifugo, upandaji majani au kuboresha matumizi ya ardhi kijijini. Kusafisha mipaka Kuanzisha ufugaji wa nyuki mashambani Kutumia mafuta ya taa au nishati nyingine mbadala Kutilia mkazo sheria kwa ujumla
Uvunaji miti na mazao ya msitu	Umasikini Hakuna miti ifaayo nje ya msitu Ongezeko la watu Maendeleo-ujenzi, n.k.	Shughuli za kuongeza kipato (serikali) Kupanda miti mashambani Kudhibiti ongezeko la watu—kondomu Kununua mbao Kutilia mkazo sheria
Kuchunga Mifugo	Hakuna maeneo yaliyotengwa kwa malisho	Kuboresha matumizi ya ardhi vijijini (Muheza) – juhudi za pamoja. Kuotesha majani Kupunguza mifugo Kufuga kuku/bata badala ya ng'ombe au mbuzi Kutilia mkazo sheria
Uwindaji	Uhaba wa nyama/ umasikini	Kufuga kuku/bata kupunguza utegemezi wa nyama ya porini.
Ukosefu wa mwamko juu ya misitu	Ukosefu wa fedha (serikali) Ukosefu wa wataalamu (serikali)	Serikali itafute fedha nje na/au iimarisha NGOs. Juhudi za pamoja k.v. kutoka kwa wanakijiji kwenda serikali ya mtaa na wilaya.

**6.0 Majadiliano:**

Mwanawarsha mmoja alijaribu kuelezea utaratibu uliokuwepo zamani. Maeneo ya kuchungia mifugo yalitengwa, maeneo ya kunyweshea mifugo na hata njia maalum za kupitishia mifugo zilikuwapo. Hivyo ni vyema viongozi pamoja na wananchi wakae pamoja ili kurudisha utaratibu uliokuwepo zamani.

Vilevile wajumbe walieleza kwamba maeneo ya kulishia mifugo yapo na yametengwa tangu siku nyingi. Tatizo ni njia ya kupitisha mifugo. Elimu ya mazingira ni muhimu kwa wanajamii wanaozunguka Msitu wa Mgambo. Wajumbe waliombwa kuwa na uchungu na msitu wao. Washirikiane na serikali za vijiji pamoja na wataalamu wa misitu waliopo.

**6.1 Mapendekezo kwa mafanikio ya baadae:**

- Wanahitaji kuzuia uchungaji mifugo ndani ya eneo la hifadhi na kunywesha mifugo kwenye vijito msituni.
- Shughuli haramu yoyote iripotiwe kwa viongozi. Taarifa hizo zisifichwe.

- Elimu kwa jamii inahitajika ili kuifanya ijihisi msitu ni wake na inawajibu wa kuhakikisha hauharibiwi. Ukiharibiwa basi ni jukumu lao kuurudisha katika hali yake ya kawaida.
- Sheria zinazohusu misitu ni muhimu kutumika na kutiliwa msisitizo na viongozi wote.
- Kunautendaji kazi duni wa kamati za mazingira kwa sasa. Ingekuwa vizuri kama kamati zingekuwa na mamlaka zaidi katika Shughuli za kila siku.

Washiriki wote wa warsha hii mwishoni walijulishwa kuwa tarehe 8 juni 2002 kutakuwa ni Siku ya Mazingira Duniani. Frontier itashiriki katika tukio hili katika kijiji cha Bwiti. Wajumbe wa warsha hii wanatakiwa kulitangaza tukio hili kwa wanavijiji kuwahamasisha washiriki siku hiyo hapo Shule ya Msingi Bwiti.

Kila mwanakijiji mwenye mawazo au maoni juu ya uhifadhi wa mazingira anakaribishwa ofisini kwa nafasi ya kuyajadili mawazo yake na kuchangia katika siku hiyo.

### **7.0 Kufunga:**

Mwenyekiti wa Kijiji cha Bwiti alifunga warsha saa 10.12 jioni kwa kuwashukuru washiriki na wafanyakazi wa Frontier kwa michango yao mizuri katika majadiliano. Zaidi ya hapo alisisitiza umuhimu wa watafiti kubadilishana mawazo na wenyeji katika masuala ya uhifadhi wa mazingira.

### **7.14: Maramba Secondary School, Visit to Mgambo Forest Reserve Frontier Basecamp, 4<sup>th</sup> May 2002**

- 8.30 a.m. Welcome to camp.  
Group shown round tents, eating area, science banda etc.
- 9 a.m. Forest Reserve/Conservation Talk:  
-Importance of East Usambaras within Eastern Arc/world  
-Concept/reasons for Nature and Forest Reserves/Buffer Zones  
-Threats to the forests and conservation issues
- 10.30a.m. - 11 a.m. Tea break**
- 11 a.m. - 12.30p.m. Frontier/Biodiversity Talk/Activities  
-Discuss plant/animal diversity within the East Usambaras  
-Introduce some sampling techniques and specimens  
-Walk through Riverine Forest looking for monkeys/frogs/birds, discussing issues, plants etc. as go. Walk to 'set-up' of trapsite to demonstrate capture techniques (take binoculars for students).
- 12.30p.m. - 1.30 p.m. Lunch**
- 1.30 p.m. - 2.15p.m. 'Environment Day' Plans  
-Discuss concept of World Environment Week and proposed Environment Day (Bwiti, 8<sup>th</sup> June). Ideas for Maramba School's involvement (posters, poems, plays, songs). Theme for the Day is to be 'how each individual can make a positive difference to the environment'. Write suggested topics/issues on white board.
- 2.15p.m. - 2.30p.m. Photos, 'Thank yous' etc.
- 2.30 p.m. Close

**7.15: Ratiba ya siku ya Mazingira Bwiti****8<sup>th</sup> June, 2002**

Muda	Shughuli	Mhusika
8.00	Ufunguzi wa Siku ya Mazingira na kutambulisha wengi	Mwenyekiti wa kijiji Bwiti
8.15	Nyimbo, ngonjera na mashairi kutoka shule ya msingi Bwiti (ngoma)	Shule ya msingi Bwiti
9.00	Kwaya na shairi kutoka shule ya sekondari Maramba	Shule ya sekondari Maramba
10.00	Hotuba ya mgenirasmu Zawaidi kwa mshindi wa michoro ya mabango	Katibu tarafu Katibu tarafu
10.30	Mchezo wa kirafiki (Frontier na Bwiti)	
11.45	Kufunga Siku ya Mazingira	Katibu tarafu