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# **Vulnerability to climate stress – local and regional perspectives**

Proceedings of two workshops  
January 27-28, 2005, World Agroforestry Centre, Gigiri, Nairobi  
And February 14, 2005, KEFRI Research Centre, Kitui

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December 2005

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**Tittel:** Vulnerability to climate stress – local and regional perspectives

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**Sammendrag:** Denne rapporten beskriver to relaterte møter som fant sted i januar/februar 2005 i forbindelse med prosjektet "Adaptation as a livelihood struggle: conflict and vulnerability among dryland populations in Kenya". Prosjektet undersøker hvordan konflikt påvirker tilpasning og sårbarhet overfor klimahendelser som tørke. Et av prosjektmålene er å bidra til nasjonale (kenyanske) og regionale (øst-Afrikanske) policy prosesser ved å påpeke hvordan tilpasningstiltak overfor klimaendringer kan nå de som er mest sårbare. De to møtene var direkte rettet mot dette prosjektmålet. Det første møtet fant sted i Nairobi. Her ble foreløpige forskningsresultater fra Kitui og Turkana (prosjektets case study områder) diskutert med representanter for nasjonale og regionale myndigheter og prosjekter, samt forskere. Møtet var et fellesarrangement med prosjektet "Capacity building in Least developed countries regarding Adaptation to Climate Change (CLACC)" og presenterte også forskning angående klimaendringer og tilpasnings-policy i regionen. Det andre møtet fant sted i Kitui Town. Her ble forskningsresultater fra Kitui diskutert med lokalbefolkningen samt distrikts- og lokalmyndighetene.

Presentasjonene fra workshopene kan lastes ned fra <http://www.cicero.uio.no/workshops/Vulnerability-2005/>

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**Abstract:** This report presents the proceedings of two related workshops, taking place in January/February 2005, that presented findings of the project "Adaptation as a livelihood struggle: conflict and vulnerability among dryland populations in Kenya". The research investigates how conflicts shape adaptation and contribute to vulnerability in the face of climate stress such as drought. One of the aims of the project is to contribute to national (Kenyan) and regional (East African) climate adaptation policy processes with regard to how the most vulnerable can be targeted. The two meetings were intended to address this particular project aim. The first workshop, taking place in Nairobi, was a forum for discussion of preliminary research findings from the Kitui and Turkana case study sites with national and regional policy makers, practitioners and researchers. This workshop, conducted jointly with the "Capacity building in Least developed countries regarding Adaptation to Climate Change (CLACC)" project, also included presentations regarding climate change adaptation research and policy development in the region. In the second workshop, taking place in Kitui Town, the Kitui case study findings were discussed with villagers as well as district and local administration and leaders.

Presentations from the workshops can be downloaded from <http://www.cicero.uio.no/workshops/Vulnerability-2005/>

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# Contents

- 1 Introduction ..... 1
- 2 The Nairobi Workshop: Vulnerability to climate stress – local and regional perspectives..... 3
  - 2.1 WORKSHOP PROGRAMME ..... 3
  - 2.2 WELCOMING REMARKS ..... 5
  - 2.3 DAY 1, LOCAL PERSPECTIVES: OVERVIEW (09.00-13.00) ..... 5
  - 2.4 THE IMPACTS OF CONFLICT ON HOUSEHOLD VULNERABILITY TO CLIMATE STRESS: EVIDENCE FROM TURKANA AND KITUI DISTRICTS IN KENYA, BY SIRI ERIKSEN AND JEREMY LIND ..... 7
  - 2.5 THE HISTORICAL CONTEXT OF ENDAU HILL, BY BERNARD OWUOR..... 34
  - 2.6 GROUP DISCUSSIONS (14.00-16.30) ..... 40
    - 2.6.1 *Presentations by the groups* ..... 40
    - 2.6.2 *Discussion* ..... 43
  - 2.7 DAY 2, REGIONAL PERSPECTIVES: OVERVIEW..... 44
    - 2.7.1 *Overview of climate change adaptation*..... 44
    - 2.7.2 *Capacity Strengthening in the Least Developed Countries on Adaptation to Climate Change (CLACC)* ..... 45
    - 2.7.3 *Presentations on National Adaptation Plans of Action*..... 45
    - 2.7.4 *Discussion* ..... 48
    - 2.7.5 *European Capacity Building Initiative: A Matter of Equity, Capacity, and Trust*..... 49
    - 2.7.6 *Assessment of Impacts and Adaptation to Climate Change (AIACC) – Research Results and Challenges*..... 50
  - 2.8 LIST OF PARTICIPANTS ..... 54
- 3 Kitui Workshop: Endau Hilltop Forest Research Dissemination ..... 60
  - 3.1 WORKSHOP PROGRAMME ..... 60
  - 3.2 OVERVIEW AND BACKGROUND..... 61
    - 3.2.1 *Opening remarks, by James Kimondo, Centre Director, KEFRI – Kitui Regional Centre* ..... 61
    - 3.2.2 *Introduction of the workshop, by Bernard Owuor* ..... 61
    - 3.2.3 *Overview of Endau Hilltop research project, by Siri Eriksen*..... 61
  - 3.3 RESULTS OF SOCIO-ECONOMIC SURVEYS - COMMUNITIES LIVING AROUND ENDAU HILLTOP FOREST: CLIMATE CHANGE, CONFLICT AND COPING STRATEGIES, BY SIRI ERIKSEN, BERNARD OWUOR AND WYCLIFFE MAUTA 62
  - 3.4 THE EFFECTS OF CONFLICT AND EXCLUSION ON HOUSEHOLD ADAPTATION TO CLIMATE STRESS: THE CASE OF ENDAU, KENYA, BY BERNARD OWUOR, SIRI ERIKSEN AND WYCLIFFE MAUTA ..... 66
  - 3.5 VEGETATION SURVEY OF ENDAU HILLTOP FOREST – ENDAU HILLTOP FORESTS: ITS CONTRIBUTIONS TO THE LOCAL COMMUNITIES, BY FRANCIS N. GACHATHI AND JARED AMWATTA MULLAH ..... 79
  - 3.6 A VITAL HABITAT TO LOCAL LIVELIHOOD AND DROUGHT COPING STRATEGIES IN THE DRYLANDS: THE CASE OF ENDAU HILLTOP FOREST, KITUI DISTRICT, KENYA, FRANCIS N. GACHATHI AND JARED AMWATTA MULLAH..... 81
  - 3.7 PLENARY DISCUSSION AND FEEDBACK ..... 95
  - 3.8 THE WAY FORWARD ..... 96
  - 3.9 RECOMMENDATIONS ..... 97
  - 3.10 CLOSING REMARKS ..... 98
  - 3.11 LIST OF PARTICIPANTS..... 100

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## 1 Introduction

Two workshops were held in Kenya in 2005 in conjunction with the Department of Sociology and Human Geography/the Center for International Climate and Environmental Research – Oslo (CICERO) led research project “Adaptation as a livelihood struggle: conflict and vulnerability among dryland populations in Kenya”. This report presents the proceedings from those two workshops.

The study, running from January 1 2004 – October 31 2006, investigates how conflicts shape adaptation and contribute to vulnerability. The main aim is to identify the mechanisms through which livelihood struggles in the face of climate stress lead to differentiated vulnerability and marginalization. In particular, the research addresses the following questions in order to identify how climate change and adaptation among the poor sectors of society can be effectively confronted:

- What factors determine who emerges as winners and who emerges as losers from localized insecurity and resource conflicts?
- How do local conflicts influence and constrain local adaptation strategies to climatic stress and contribute to differentiated vulnerability?
- How can government climate change adaptation policies target those with few options, and who are most vulnerable in a community?

One of the aims of the project is to contribute to national (Kenyan) and regional (East African) climate adaptation policy processes with regard to how the most vulnerable can be targeted. The project provides input to adaptation policies by highlighting vulnerable groups and the forms of support that may increase their capacity to adapt to climate stress. The research includes two empirical case studies in dryland Kenya, in Turkana and Kitui, where conflicts and drought stress are both prevalent. The project is a collaboration between the Department of Sociology and Human Geography, CICERO and the Ethnographic Museum (all University of Oslo), King’s College (London), the African Centre for Technology Studies (ACTS, Nairobi) and the Kenya Forestry Research Institute.

The first workshop, entitled “Vulnerability to climate stress – local and regional perspectives” was held on January 27-28, 2005 at World Agroforestry Centre Complex in Nairobi, Kenya with national and regional participation. The workshop was organized by the African Centre for Technology Studies (ACTS) in conjunction with CICERO and IIED. The objective of the workshop was to provide experience of local adaptation and identify linkages between different policy areas that are critical to adaptation to climate variability and change in the Eastern Africa region. In addition to presenting results from the Department of Sociology and Human Geography/CICERO led research project, the workshop also had a regional component through the IIED-led “Capacity building in Least-developed Countries regarding Adaptation to Climate Change (CLACC)” project, focusing on Civil Society Organizations in Sudan, Uganda and Tanzania. The workshop provided an opportunity to engage in consultation with policy makers regarding study findings and identify how such research can best contribute to ongoing policy processes. The workshop also represented an arena for bringing together and facilitating discussion between policy makers in the areas of climate change, disaster response, conflict, dryland development, planning and economic development and forest/biodiversity conservation, all critical to adaptation in the region. Kenya is a signatory to treaties and conventions on environmental management and conservation, including the UN Framework Convention on Climate Change and the Convention on Biological Diversity. The case of Kenya, presented during the first day of the workshop, provided a starting point for examining the implications of adaptation

commitments to the climate change convention of countries in the eastern African region, forming the focus of discussions during the second day.

The second workshop, entitled “Endau Hilltop Forest Research Project Dissemination” was held on February 14, 2005 at the Kenya Forestry Research Institute Kitui Regional Research Centre, with participation from villagers and leaders from the Endau Hill area as well as NGOs and government and district administration. The workshop was held to, first, present preliminary findings from social and vegetation data collection carried out in February 2005 and, second, to bring together key stakeholders to share experiences and knowledge on the management of drought and conflict as well as utilization of natural resources of Endau hilltop forest. One of the preliminary findings of this study was that the local communities are not actively involved in the decision making processes relating to the hill, presenting challenges both to management of conflict, drought and the future conservation of this hill. The Kitui workshop provided a small contribution to addressing this challenge.

Papers describing the empirical work of the project were written in the aftermath of the two workshops. The preliminary Turkana and Kitui results presented in the Nairobi workshop were written up as a joint manuscript for an international workshop regarding Human Security and Climate Change, Holmen Fjord Hotel, Asker, near Oslo, 21–23 June 2005, organized by Centre for the Study of Civil War; International Peace Research Institute, Oslo (PRIO); and CICERO for the Global Environmental Change and Human Security Program (GECHS). A review of archival data regarding conflicts and drought in Kitui was written up as a project report. Lastly, the project presented two papers at the International Human Dimensions Programme on Global Environmental Change taking place in Bonn, October 2005. These papers are included in the proceedings in addition to summaries the presentations given at the Nairobi and Kitui workshops. All of the slide presentations from the workshops are available for viewing and downloading at <http://www.cicero.uio.no/workshops/Vulnerability-2005/>.

A documentary produced by BizLight Communications, Kenya, for the project captures both the workshops and data collection in Kitui District and is available from the Department of Sociology and Human Geography (Siri Eriksen), CICERO (the Information Department) and KEFRI (Bernard Owuor).

## 2 The Nairobi Workshop: Vulnerability to climate stress – local and regional perspectives

### 2.1 Workshop programme

#### VULNERABILITY TO CLIMATE STRESS-LOCAL AND REGIONAL PERSPECTIVES

An ACTS/CICERO/IIED policy workshop

Nairobi, 27-28 January, 2005  
World Agroforestry Centre Campus  
United Nations Gigiri Avenue

| DAY ONE (Thursday, 27 January 2005)   |  |   |  |
|---|--|---|--|
| Time  | Agenda Item  | Responsible person  | Notes  |
| 0830-0900   | Registration   | ACTS  | Registration of Participants                   |
| <i>Opening Session: Welcome, Introductions, Official Opening and Agenda Setting</i><br><i>Chair Person: Dr Deborah Potts (King's College, London)</i> |  |   |  |
| 0900-0915   | Welcoming Remarks  | Anna Ogalo, on behalf of Prof. Judi Wakhungu<br>ACTS' Executive Director  | Welcoming remarks and introductions            |
| 0915-0930   | Overview of the workshop: Purpose and objectives   | Dr. Siri Eriksen<br>(University of Oslo)  | Climate setting and management of expectations |
| 0930-1005   | Conflict, vulnerability and adaptation around Endau Hilltop, Kitui District              | Dr. Siri Eriksen<br>(University of Oslo),<br>Bernard Owuor, Wycliffe Mauta, Francis Gachathi & Jared Mullah (KEFRI) | An analysis of the Kitui case study            |
| 1005-1040   | Endau case: Historical context<br>Endau hilltop forest vegetation: Kitui District, Kenya | Bernard Owuor and Francis Gachathi<br>(KEFRI)   | An analysis of the Kitui case study            |
| 1040-1100   | Discussions  |   |  |
| 11.00-1130  | Tea/Coffee Break   |   |  |

|  |  |   |   |
|--|--|---|---|
| <b>Chairperson: Dr Deborah Potts (King's College, London)</b>                                  |  |   |   |
| 11.30-12.15  | Coping in an environment of violence: Reflections and evidence from south Turkana, Kenya                               | Jeremy Lind (King's College, London)  | An analysis of the Turkana case study         |
| 12.15-13.00  | Commentary & Discussions   | A policy analyst  | Comment on the most important issues          |
| <b>13.00-14.00</b>   | <b>Lunch Break</b>   |   |   |
| <b>Chairperson: Dr. Evans Kituyi (University of Nairobi/ GEF-RETAP Biomass Energy Project)</b> |  |   |   |
| 14.00-15.30  | Break out sessions: Identification of linkages between climate change adaptation and key policy themes                 |   | Break away into 3-4 groups.                   |
| 1530-1630  | Reporting and listing of critical policy Linkages  |   | Outcome from the group discussions.           |
| 16.30-17.00  | <i>Cocktail</i>  |   |   |
| <b>Second Day Friday 28<sup>th</sup> January, 2005</b>   |  |   |   |
| <b>Chairperson : Mr Okoth James Oduor (Aridlands Resource Management Project)</b>              |  |   |   |
| 0900-0920  | Overview of climate change & negotiations  | Dr. Saleemul Huq (IIED)   | Insights into climate change and negotiations |
| 0920-0940  | Overview of the Capacity building in Least developed countries regarding Adaptation to Climate Change (CLACC) project. | Mr. Victor Orindi (ACTS)  | Project overview                              |
| 0940-1000  | National Adaptation Programme of Action (NAPA) in Tanzania   | Richard Muyungi (Ass. Director of Environment Vice President's Office-Tanzania) | Overview of policy process                    |
| 1000 - 1020  | NAPA in Sudan  | Dr. Nadir Awad (Higher Council for Environment & Natural Resources Sudan)       | Overview of policy process                    |
| 1020-1040  | Questions and Discussions  |   |   |
| 1040 - 1100-   | <b>Tea/coffee</b>  |   |   |

| <b>Chairperson: Dr. Saleemul Huq (IIED)</b> |  |                                       |  |
|---|--|---------------------------------------|--|
| 1100 -<br>1130                              | European Capacity Building Initiative: A Matter of Equity, Capacity, and Trust               | Dr Benito Müller (OIES, Oxford)       |  |
| 1130<br>1200                                | Assesments of impacts & Adaptations to Climate Change (AIACC)-Research Results & challenges. | Dr. Daniel Olago (University of Oslo) |  |
| 1200-<br>1230                               | The way forward  |                                       |  |
| 1300  | Lunch  |                                       |  |

## **2.2 Welcoming remarks**

The conference opened with welcoming remarks by Anna Ogalo on behalf of the Executive Director of the African Centre for Technology Studies (ACTS). Anna started by welcoming participants to ACTS. She then noted that conflicts from climate related stress are becoming more common. She emphasised that the workshop came at an opportune time when certain areas in the country were affected by conflicts over water and grazing areas.

## **2.3 Day 1, local perspectives: Overview (09.00-13.00)**

Dr. Siri Eriksen gave an overview of the workshop objectives and next presented findings from the Endau case study. Bernard Owuor and Francis Gachathi presented findings regarding the historical context to management of Endau hilltop and the vegetation and biodiversity on the hill. Jeremy Lind presented preliminary findings from the Turkana case study. For a written up presentation of these findings, see the papers in sections 2.4 and 2.5. The slide presentations are also in the annex of this report.

During the discussion, Dr Deborah Potts wanted to know the definition of famine as used in the study? She gave the example of southern Africa where in extreme cases, people may die from famine. But it is important to differentiate this with seasonal hunger that may not necessarily result in death. Dr Siri Eriksen replied that the definition used in the study is based on what local people perceive as famine.

Dr Debby Nightingale stressed the importance of land tenure systems in the dryland areas. She mentioned the fact that big droughts and rinderpest epidemic affected these areas. She also emphasized the importance of the conflict between Christianity and traditional systems. Christianity has in many cases interfered with traditional systems of natural resource management hence the need to evaluate the environmental impacts of Christianity.

Dr Benito Müller said that it was important to differentiate between adaptation to conflict and to climate variability. One participant wondered why ecologists and development planners give conflicting messages to the dry land communities regarding sustainable development. On one hand, developments often focus on formal education, better health services. To access

most of the basic services requires people to settle in a given place. This marginalizes migratory groups who have to move during certain times of the year. Nomadic pastoralists are therefore sidelined and confusion exists as to what is the best way to develop (retain their traditional nomadic lifestyles or settle in order to access the services). Some participants lamented the tendency of maintaining certain areas (especially the dry lands) as laboratories for experiment.

Dr Sumaya Zakieldeem emphasized the importance of separating stages/time during the dry seasons (ie *beginning*, *middle* and *end* of the dry season) as coping strategies tend to differ during the different stages of the dry season. It is also important to come up with criteria concerning the strategies used during the dry season.

Mr Jeremy Lind presented research regarding the impact of conflict on household livelihood strategies in Turkana. In the discussion that followed, participants agreed that there is need to separate internal and external strategies. How some of the internal strategies like cattle raids evolved are not being highlighted adequately in studies. How did Ngorokos become violent against their own people with the *custom* becoming *cattle rustling*? Some external interventions, such as the introduction of irrigation schemes by NORAD, failed due to inadequate understanding of the dry land communities. They were too mechanized and inappropriate for such areas.

Dr Serigne Kandji explained the need to differentiate between conflicts resulting from climate change/variability and those resulting from other factors. Solving conflicts arising from climate related factors could promote adaptation to climate change. Mr Bernard Owuor asked whether raiders are considered heroes or thieves in their communities. Participants felt that it was important to identify role of clan based institutions in cattle rustling. *Ngorokos* initially served the community but with commercialization, they answer to those who buy the animals.

Mr Richard Muyungi stressed the importance of using the lessons learnt, including: what communities at the margin of resilience can do and the way forward in light of climate change; and the role of institutions and policies in case vulnerability becomes severe. He said that current policies work in the current situation but what happens in future when conditions become worse for example? Institutional approaches need to be changed to accommodate such changes.

## **2.4 *The impacts of conflict on household vulnerability to climate stress: evidence from Turkana and Kitui Districts in Kenya, by Siri Eriksen and Jeremy Lind***

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Improved maps of the case studies have been added to the original manuscript

### **Abstract**

While resource conflicts and violence are evident in many dryland areas of East Africa, there is a lack of systematic knowledge of how they affect household livelihoods and in particular capacities and ways of coping with drought and other climate stresses. With few exceptions, analytic frameworks for assessing vulnerability in drylands do not provide insights into the impacts of conflict on livelihood activities, household assets, food sources, social relations and access to resources. Analysts commonly take it for granted that household livelihoods are assembled in peaceful and stable settings. Conflict and violence are treated as epiphenomenal, if they are considered at all. In this paper, we discuss the need to examine the impacts of conflict on livelihoods and household vulnerability to climate stress. We present preliminary results from data collection carried out in 2004 in two case study sites, Turkana and Kitui Districts in Kenya. The study shows that conflict is having major impacts on coping strategies and the social distribution of vulnerability in the two communities. We conclude that conflict forms part of structural processes to gain control over resources or strengthen livelihoods and coping strategies and thus they represent a manifestation of political processes driving vulnerability. The research demonstrates some of the important linkages between climate change and human security.

### **Introduction**

In this paper, we investigate the impact of conflict and violence on household vulnerability to climate stress in two sites in Kenya. Conflict and climate stress are two critical challenges faced by many African populations. While resource conflicts and violence are evident in many dryland areas of East Africa, there is a lack of systematic knowledge of how they affect household livelihoods and in particular capacities and ways of coping with drought and other climate stresses. Climate stress is prevalent in much of sub-Saharan Africa. In the drylands of East Africa, climate stress is exemplified in present year-to-year variability, seasonality, uncertainty and patchiness of rainfall and extreme events such as droughts and flash flooding. It does not necessarily include observed or projected long-term changes in climate conditions, although such changes may lead to an increase in extreme events such as drought (McCarthy et al. 2001). A large body of literature is devoted to understanding the assorted adjustments and their corresponding techniques for living with such variability and uncertainty. Within the climate change literature, there is an expanding interest in vulnerability and capacities to

adapt to changes. However, analysts commonly take it for granted that household livelihoods are assembled in peaceful and stable settings. Acknowledgment that vulnerability is shaped by multiple stressors, including conflict, rather than climate change as a single stressor is fairly recent (O'Brien and Leichenko 2000). As a consequence of a single stressor focus, climate change adaptation has mainly been viewed as a series of technical adjustments that occur automatically provided there is sufficient 'adaptive capacity'. Such 'adaptive capacity' is commonly measured in terms of national indicators of technology, economic and institutional resources (Cohen et al. 1998; Yohe and Tol 2002; Eriksen and Kelly, 2005). There is an implicit assumption that 'appropriate' adaptation to climate change will occur automatically given transfers of technology and accompanying economic resources (Smith and Hitz 2003; O'Brien et al 2004). Too often, the local social and political context is missing from such analyses. While there is growing comprehension of the social and political dimensions of adaptation, little is known about how conflict and violence shape local level vulnerability and the techniques and processes through which households adapt to climate constraints.

We present preliminary results from data collection carried out in 2004 and 2005 in two case study sites in Turkana and Kitui Districts in Kenya. These sites exemplify how conflict affects household coping and adaptive strategies. The two are dryland sites where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustain rural production systems. They were selected to demonstrate the range of conflict types experienced in drylands, as well as mixed farming and pastoralist population groups, representing the two main agricultural production systems in drylands. The impacts of conflict and violence on livelihoods are evident in much of northern Kenya, which is inhabited by predominately pastoralist peoples. Across this vast region, livelihoods are compromised by threats attributed to large-scale livestock raids and smaller-scale opportunistic attacks by armed bandits. Pastoralists inhabiting such areas must, for example, adjust grazing and farming methods in relation to the likelihood of conflict at specific times and to locations of recent insecurity. Conflict centered on access to and utilisation of forest resources, hills and wetlands affect the options available for generating livelihood in the vast drylands of Kitui in Eastern Province, as well. Kitui is inhabited by Akamba peoples who combine livestock-keeping with small-holder farming as well as Oroma and Somali pastoral groups who visit the area seasonally. In particular, the hills are important for coping with drought. They have permanent sources of water and forests that provide food and income during drought. Conflict between local households and authorities, who want to constrain access to the hilltop forests, limit drought coping options. In addition, conflict between different agro-pastoralist groups as well as between agro-pastoralists and nomadic pastoralists over use of water and grazing leads to loss of crops and livestock as well as, occasionally, lives, which are all key livelihood assets used in drought coping.

People's ability to cope with and recover from climate related and other stresses is taken as an entry-point to understand adaptation. Livelihood and coping strategies refer to the ways that people manage climatic variability among other types of change. Adjustments in these strategies are what is meant by adaptation in a local context. Coping strategies are methods used by households to survive when confronted with unanticipated shocks and stressors whereas adaptation involves adjustments over the longer-term to enhance longer term livelihood security. Adaptation in the context of this study refers to adjustments in the use of resources in relation to climate stress (events such as drought and flooding, uncertainty and patchiness of rainfall). Adaptation is neither unproblematic nor automatic. It takes place in a dynamic and multi-stressor environment, may exacerbate existing resource conflicts as well as exclude some groups from resource access and contribute to the marginalization of the poor. Adaptation measures may thus change the distribution of resources and have implications for equity.

The main research question that this study addresses is how does conflict and violence influence and constrain ways of managing and adapting to climate stress? A related question is how does conflict and violence affect patterns of vulnerability? First, we examine the nature of the insecurity in the two sites. What are its broad impacts on people's lives? Second, we examine how insecurity and conflict have shaped adjustments in livelihoods over time, and specifically current strategies to cope with climate stress. Individual and household options to secure livelihoods during a 2004 drought incidence in both sites are studied. Third, we investigate how insecurity affects social differentiation of vulnerability. Which individuals and groups are particularly vulnerable to conflict and violence and which individuals and groups are particularly vulnerable to drought? Which groups gain, or seek to gain, material wealth, livelihood security or power from conflict? Finally, we consider the implications of the research findings for how adaptation policies can best target those with few options and are most vulnerable in a community. The study shows that conflict is having major impacts on coping strategies and contributes to increased social differentiation in terms of vulnerability to drought among the population at the two sites. We argue that conflict forms part of structural processes to gain control over resources or strengthen livelihoods and coping strategies and thus they represent a manifestation of political processes driving vulnerability.

## **Methods**

### *Comparative case study analysis*

The research questions are investigated through comparative analysis of two dryland areas in Kenya that are exposed to drought stress and are affected by conflict and violence. Three to four villages were visited in Kitui and Turkana Districts in Kenya (see Fig 1). The study areas are described in more detail below. There are differences between the study areas in the type of insecurity as well as production systems. While drought coping strategies may vary between the sites, the selected study areas allows for investigation of commonalities in political processes driving vulnerability and social manifestations of vulnerability that may exist across contexts.

The case-study approach (George 1979; Yin 1994; Fotheringham 1997) provides an appropriate means of exploring coping and vulnerability. Case studies are a useful tool when contextual conditions pertinent to the phenomenon are to be investigated as well as the phenomenon. Comparative case study analysis can be particularly informative when investigating factors that lead to variation in a phenomenon. In this study, two cases differing in production types (pastoral and agro-pastoral) and types of conflicts are compared in order to investigate whether the way that conflicts affects adaptation to climate stress displays some common patterns across contexts. In particular, we want to investigate the particular ways that conflict affects adjustments to livelihoods over time as well as coping options during a particular drought event. We also examine how conflict and insecurity affects the social differentiation of vulnerability, in terms of whether specific groups can be identified that are particularly vulnerable or which gain, or seek to gain, material wealth, livelihood security or power from conflict.

Endau is one of several hilltops in Kitui District. It lies between the central highlands of Kenya and the coastal forests. From the dry plains lying at 500 masl, the hill rises to several peaks, the highest at 1400 masl. Practically all the forest from the foot of the hill to the peak has been gazetted government forest. The hill is critical to people's strategies to manage drought in the area. It serves as a water catchment and has permanent sources of water, the relatively favourable microclimatic conditions on and around the hill compared to the dry plains allow cultivation of crops, and the forest itself provides dry season fodder for livestock as well as forest products. The four villages investigated around Endau hill in Kitui District included Ikisaya to the west of the hill, Malalani to the north of the hill, Twambui to the northeast of the hill and Ndetani to the southwest of the hill.

This geographic spread of the sample was designed to capture the different conflict situations on different sides of the hill. In particular, government restrictions on farming on the hill and drought access to forest resources had played an important role in the history of conflicts in the agro-pastoral communities in Ndetani and Ikisaya, and contributed to out-migration and landlessness from the more pastoral Malalani. Raiding had occurred on all sides of the hill, but conflicts between population groups related to drought access to water and pasture were most pronounced in the mainly pastoral Malalani and Twambui.

Field research was conducted in three areas of Turkana District. The main considerations in selecting Kalokol, Kakuma and Katilu as study areas in Turkana site were the intensity and nature of insecurity, which vary between the different sites, as well as the livelihood activity that is most widely practiced in each site. There are important differences between the study areas in their ecology and local livelihoods, relief and development inputs, and their history of displacement, migration and settlement. Another factor that influenced the choice of the study sites was an interest to follow up a field study on coping strategies and food sources in Turkana that was done in 1991 by a team from the Institute for Development Studies (IDS) in Sussex. The IDS team worked in three study sites: Kalorukongole, a fishing village outside of Kalokol, Lopur, a pastoralist community outside of Kakuma, and Kaputir, an agro-pastoralist community on the Turkwel River in southern Turkana. There was an interest to work in comparable sites in fieldwork undertaken for this study in order to develop a rudimentary time series on coping strategies.

#### *Data collection*

Data collection for the two areas was carried out in 2004 and 2005. A four person team carried out a social survey in four villages situated around the Endau hilltop forest in Kitui District, Ikisaya, Ndetani, Malalani and Twambui. Complementary data were provided by an ethnobotanical survey of Endau forest carried out by a three person team. Thirty seven semi-structured interviews and ten key informant and focus group interviews were carried out in the Kitui site in 2004 and a total of 24 household, focus group and key informant interviews were carried out in 2005. During the 2005 data collection, a minimum of four interviews were carried out in each village, totaling 24. Households that displayed particular histories to be followed up in greater depth were selected from those interviewed in 2004, such as landlessness, bereavement due to conflict, eviction from the forest, or role in local institutions, groups or political positions. Both male headed and female headed households, interviewees of different ages and of different relative wealth status were included in the selection. Particular care was taken to include members of different clans, an important factor determining social, economic and political stratification. Focus group discussions were carried out with women's groups, groups of elders (men), and a youth group. In order to collect the information required to answer the research questions, particular themes were covered in interviews. These themes included people's identity and how it affected their perceived rights to resources; clans, customary institutions and power relations; changes in coping strategies since 2004 and in particular how conflict had affected differential coping strategies between households; which households had been most vulnerable during the drought; use and marketing of forest products; changes over time in migration, economic activities, the conflict situation and environmental conditions; and rights to land and water sources and how such rights are gained or lost. During interviews, a list of questions pertaining to these general themes was used as a point of departure, each interview covering the two or three themes on which the interviewees life history could reveal particular insights. Informal discussions through interaction with people such as during meals or in the market place, observations of activities and invitation to homes were also important sources of data regarding power relations, conflicts and access to resources.

In Turkana, comparative data were drawn from forty five household interviews carried out early in 2005. Qualitative interview data was gathered in order to investigate particular issues in more depth

with selected households and in order to identify changes in livelihoods and coping strategies over time. A four person team carried out research in three areas of Turkana District: villages near to Kalokol in proximity of Lake Turkana, villages near to Kakuma in the northern part of the District bordering Uganda, and in Katilu, site of an irrigation scheme along the Turkwel River in southern Turkana. A more detailed description of the study sites is in the following sections.

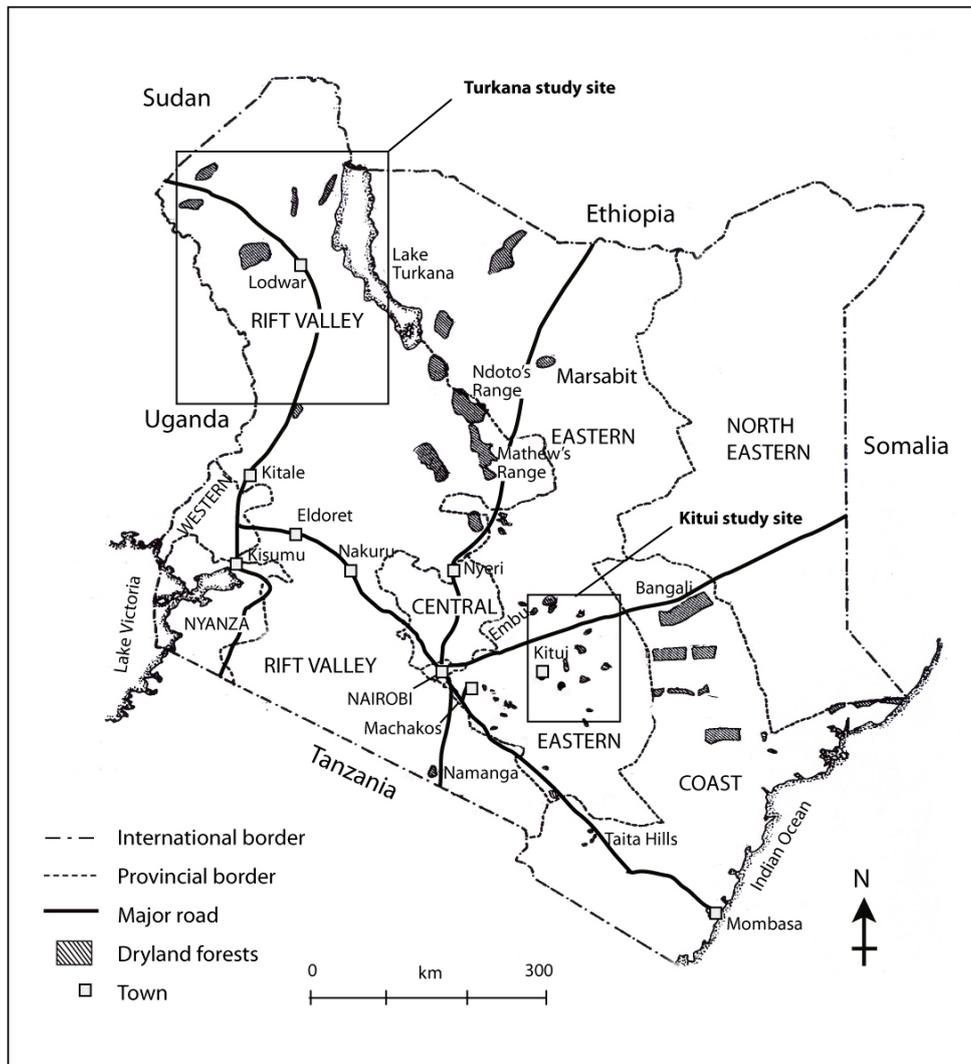
Fieldwork consisted of a household survey, interviews and discussions with key informants, and focus group discussions. The focus group discussions covered a checklist of questions. Group discussions with women focused in particular on vulnerability and food shortages while group discussions with men focused on droughts and coping strategies. However, research assistants were flexible to focus on issues they felt to be important and to follow up issues raised by participants in the groups. A feedback session was held after the focus groups to discuss issues that came up during the groups and to identify key issues to follow up in the household survey and discussions with key informants.

A household survey covering forty-five households was carried out. The questionnaire-interview technique was used, with specific questions divided into sections on livelihoods and markets, food sources, insecurity, droughts and coping strategies. Open-ended questions were used to encourage people to respond in narrative, in other words to share stories and personal experiences as a way of illustrating important local events, and trends in insecurity and coping with droughts.

Discussions and interviews were carried out with key informants including an area councillor, kraal leaders, administrative officials, elders, women's groups, church leaders, cooperative leaders and individual herdsmen and farmers. The aim of these was to explore in some detail anything notable coming out of the household survey and focus groups. Discussions with key informants also covered pre-determined question-exercises, including drought and conflict trendlines, and ranking exercises on vulnerability to food shortages and coping strategies.

This paper focuses on the preliminary findings from the data collection. The policy implications of the research are gleaned with the help of a project policy consultation workshop with climate change focal points and national level policy makers held in Nairobi in January 2005. In addition, a consultation workshop was held in February 2005 with district level departmental heads and members of the communities in Kitui where research was carried out.

**Figure 1.** Map of Kenya and the location of the case study sites



**Figure 2.** The Kitui case study site

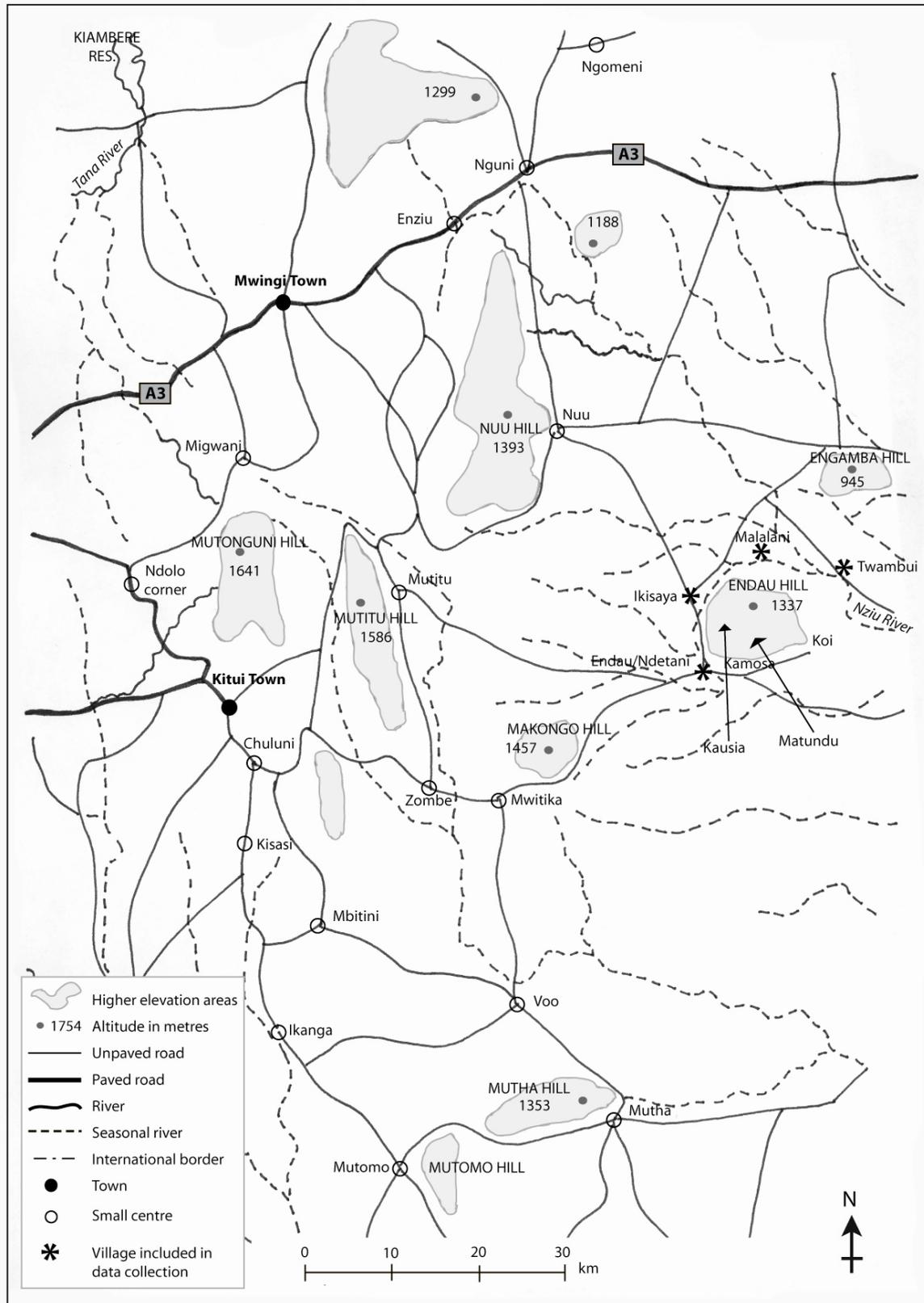
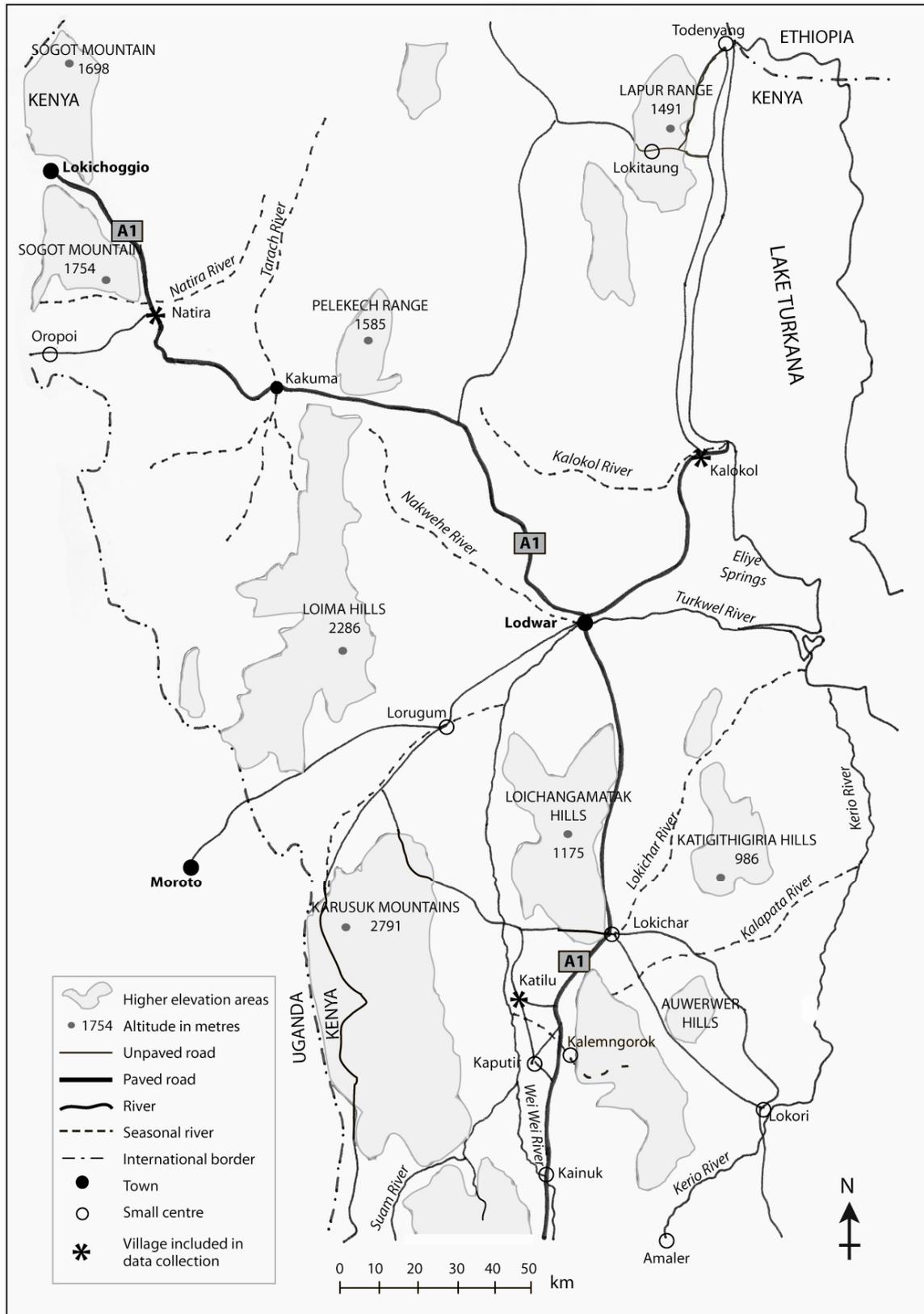


Figure 3. The Turkana case study site



## Results

### *The Kitui case*

#### The nature of insecurity

The settled agro-pastoralists around Endau Hilltop (Endau and Malalani Locations) originate from various areas within Kitui District and neighbouring Mwingi and Machakos Districts, including Mutha, Mwingi, Nuu, Mutitu, Ukasi, Machakos, Mui, Nguni, Voo. Settlement began 130 years ago when herders from the Akamba ethnic group came to search for pasture and water. The first group of settlers arrived from the area around the neighbouring hill, Nuu. They mainly settled around the water sources and grazing areas as they kept livestock. The Akavi, an ethnic group related to the Masai, were also herding cattle in the area but were fought and repelled by the Akamba groups. Later Akamba immigrants followed their clan members who had settled near the hill, leading to different areas around the hill being dominated by particular Akamba clans. This history still shapes patterns of land ownership, resource access and socio-economic differentiation as the land on which different clans settled varies in its suitability for grazing as well as cultivation.

There are several types of conflicts in Endau. First, there are conflicts over access to the forest on the hilltop. Some people started settling on the hill in the 1930s and started cultivating crops that thrived in the slightly cooler and moister climate than that of the lowlands. The colonial government, however, decided that the forest should be protected, and evicted all people from the forest in 1948. While the local population and chiefs were unhappy about the eviction, they had little power to protest or voice their concerns against the colonial District Commissioner. People started settling on the hill again in 1966, soon after independence. Access to land had been a critical issue in the Kenyan fight for independence, and the local administration allowed settlement on the hill. Formally, however, the forest was gazetted and owned by the government, to be managed by the Forest Department. In the 1990s, there was increasing concern within the government department that the forest was being cleared, threatening water catchments, the reliable supply of water downhill and leading to erosion. In early 1996, the government gave those living on the hill two weeks in which to leave, after which any person remaining on the hill would be arrested. This created massive discontent among people who regarded the land they had cultivated for decades as theirs and who felt that the government had taken away their land, crops and livelihoods. Forcible eviction mainly took place on the Malalani side of the hill. On the Ikisaya and Ndetani side of the hill, most people had moved to the lowlands when water was piped in the 1980s. Some of the people who had moved to the hill on the Malalani side came from poor families and clans with little land or came from distant areas and had no land at the foot of the hill. Others had effectively lost land that they had originally had because other members of their clan or family, and in some cases their neighbours, were now cultivating parts or all of that land. Disputes and court cases over land ownership ensued – others decided to move to other sides of the hill and try to access land there. Several people remain landless as a result of the eviction. The eviction also reduced the diversity and reliability of harvests in Endau as several crops that thrived on the hill, including sweet potatoes, sugar, bananas, avocado, mangos and other fruit trees cannot easily be grown in the lowlands while maize is less reliable. The rules prohibit anyone entering the forest without a permit, preventing access to forest products or to permanent water sources.

The second type of conflict is violence related to raiding. In the 1970s, raiding of cattle started in the wet season grazing lands to the east and northeast of Endau. In addition to Akamba herders, pastoralist groups including Oroma and (Kenyan) Somali related groups use

graze their cattle in these areas. Raiding peaked in the early 1990s, when pastoralist groups raided cattle in settlements close to the hill and even villages on the southwestern side of the hill away from the grazing lands, including Ikisaya and Ndetani. Armed with guns, households were attacked, the men often taken prisoners and used to carry the loot and help drive the cattle, then killed. The school and police station were also attacked in armed battle. The school closed, people fled, hiding in the forest, and cultivation was disrupted, people losing entire harvests. During this period of insecurity, people settled around Endau hill lost hundreds of cattle, some of them all their cattle, in addition to other possessions. Several lost family members, and many moved, in particularly from the least safe areas of Twambui and Malalani in the north and east to the relatively safer areas to the southwest of the hill, including Ndetani. Some of the migrants were given land by relatives or clan members, while others essentially had to start as landless, building up their asset base afresh and buy new land. Businesses were robbed, burnt down and had to close, some of which have still not reopened due to the trauma experienced by its owners.

The interviews revealed local speculations that the raiding was instigated and sponsored by a powerful individual in the army with Somali background. They relayed accounts of raided cattle being driven into army trucks and sold in distant markets. The raiding also coincided with that individual's period of tenure, the violent raiding ceasing suddenly in 1993 when he was sacked from his post. On the other hand, there was also accounts of powerful Akamba individuals in the army, as a retaliation for having cattle raided, ordering the massacre of an entire pastoralist group, claimed to be Somali, including women, children and cattle 'to get rid of the problem once and for all' in the neighbouring district, Mwingi. Some smaller scale raiding of cattle continued in the easternmost areas of Endau until 1999, but no lives were lost. Akamba herders also stole cattle from Somali and Oroma related groups, though in smaller numbers. There was the feeling that if an Akamba herder stole cattle, the local administrator would apprehend the individual immediately and return the cattle to its Oroma or Somali owner, but that the administration in the neighbouring district, Tana River, never returned cattle stolen from Akamba herders. At the time of data collection, there was a great deal of suspicion among agro-pastoralists settled in Endau towards Oroma and Somali related groups, exemplified by allegations that pastoralists would poison their livestock when selling these to Akamba to prevent Akamba from gaining powerful herds. Kitui District administration were accused of being lax towards pastoralists by allowing them into Kitui District, which some Akamba felt 'belong to Akamba', and that no pastoralist should be allowed into the district without a permit. This was a sentiment shared by some administrators, although other administrators pointed out that there is freedom of movement according to the Kenyan constitution.

The third type of conflict centres on access to dry season water sources in the lowlands. The main sources of dry season water are shallow wells in Malalani and Twambui, while water has been piped from the hill to a few points in the southwest side of the hill, such as Ikisaya and Ndetani. Most of the shallow wells in Malalani and Twambui and Malalani are owned by a few families, typically those with land near the riverbed. Others who own no wells have to access water from these same wells, usually for free, but only after the owner has fulfilled his own water needs (wells, like land and livestock, are almost exclusively owned by men). Water access is important not only for domestic uses, but also for watering cattle during the dry season when water sources in the plains, as well as seasonal streams from Endau hill, dry up. In addition to the settled population using the shallow wells during dry seasons and droughts, Akamba herders come from other areas, such as the neighbouring district Mwingi, during dry spells, in order to water their cattle. These herders pay the well owners for access; in addition, they need to rent grazing land in order to feed their cattle while they are present in the area. The communities settled near the hill have shared wet season grazing areas with other pastoralist groups for generations; a new development in 2000, however, was the

coming of pastoralist groups of Oroma and Somali origin to villages close to the hill during the dry season to rent access to shallow wells. The reason for this recent development may have a number of reasons. Other dry season water sources in Tana River District may have become unavailable either due to decrease in streamflow or increase in livestock numbers and uses. Water, which had been relatively plentiful after the heavy El Nino rains in 1998, may have dried up by 2000. The particular groups coming to Endau may have been squeezed out of their original areas after conflicts with other pastoralist groups and lost access to critical dry season water sources that way.

The arrival of pastoralist groups has caused internal divisions among the settled population, especially in Twambui. Practically all families who own wells rent these out to pastoralists, at a much more profitable rate than the rate which herders from Mwingi pay. Mwingi herders, as well as the local population who depend on free access to the wells, are critical of other pastoralist groups who are allowed to pay a fee in order to use the wells. This is partly due to their own access being threatened and in part due to the history of raiding and killing by pastoralist groups less than a decade ago. There have been disagreements when Somali and Oroma cattle or camels have grazed in other areas than those rented, or groups have arrived with more livestock than for which they have rented well access and grazing land. There have also been disputes when the local population have stolen or killed pastoralist livestock; however, these are sporadic incidences that are normally settled through negotiation between elders and do not reach the court system. Meetings have been arranged among the settled Akamba population in order to prevent wells or grazing lands are to be rented out to Oroma or Somali pastoralists, however, no such agreement has ever been reached. In addition to renting out use of wells and grazing land, trade is profitable with the Oroma and Somali, who sell livestock and buy food and domestic goods. Those who profit from these transactions welcome the pastoralist groups.

There are also conflicts over the management of water piped from the hill. There has been very little investment in piped water provision, despite there being several permanent water sources on the hill within only a few kilometers distance from most villages. There are currently three functional or partly functional water pipelines, supplying villages to the west and south of the hill. Several other water projects failed due to corruption among the organizations carrying out the project, poor quality of pipes and poor engineering, as well as lack of maintenance. Notably, the drier areas to the east and north of the hill, including Malalani, have been unable to complete water projects that were started. Important contributing reasons for the failure of these projects have been the lack of commitment by the villagers and the failure to form functional water committees. It is possible that the provision of piped water has been perceived as less important by the powerful individuals in areas where shallow wells provide water during dry spells, especially since the powerful individuals in these villages often are the same who own these shallow wells. Ikisaya and Ndetani have no shallow well water sources and depend directly on water from the hill. Water was collected from the water sources on the hill itself in the past and was one of the motivations for living on the hill. After water was piped from these sources and brought to the lowlands, cattle no longer had to be brought to water on the hill and water for domestic purposes could also be collected in the lowlands. Control over water pipelines are a source of local disputes between clans in a village as well as between villages sharing pipelines. Clans battle for control over water committees which decide prices as well as, to some extent, the distribution of water. The water committees also arrange for the maintenance of water pipelines. Villages have been known to sabotage each others pipelines or their maintenance in order to control where water is brought. Increasing local democratization appears to enhance participation and management of some of these committees, however.

### The effect of insecurity on coping and adaptation

Conflict and insecurity affected adjustments in livelihoods over time in very diverse ways on different sides of the hill. This also affected the options available when coping or securing livelihoods during the 2004 drought. The hill is important in securing livelihoods, and critical to adaptation to frequent droughts. It is a source of dry season grazing, a source of permanent springs as well as a catchment for seasonal rivers and their shallow wells. The enhanced microclimate and groundwater enables cultivation at the foot of the hill and in the past, cultivation of diverse crops on the hill itself as well. Honey, fruit and handicraft are important forest products and game meat (partly dependent on the water from the hill) a major food source during the dry season. Making bricks for sale is a dry season source of income dependent on water from the hill. In addition, the hill is critical as the home of the spirits that control rainfall and as sites for rituals to predict and ensure good rains. Many sources of livelihoods when harvests fail are therefore related to the hill. Social networks, especially in terms of clans, are important in managing drought and other crises. Richer clan members assist poorer clan members; however, only limited assistance can be provided during drought by clans that are generally poor. In addition, casual labour on farms with better harvests, sometimes in distant areas, is an important source of survival for some households. Migration to cities by one or more family members in order to provide remittances has been an important source of spreading risk, diversifying incomes and surviving crises for many households.

In Malalani, eviction from the forest had led to destitution among some households, who no longer had land and could not keep cattle. These destitute households often borrowed a small piece of land from a clan member or social relation in order to cultivate. The land was often borrowed for free or for minor favours such as sharing labour or a small part of the harvest; however, tenure was not secure. A good harvest could allow these households to sell crops and invest in building up a herd, the sale of which could then finance the buying of land. While some households succeeded, many households were not able to build up assets this way because the plot of land was too small to yield large crops. Many were dependent on doing casual labour or on assistance from other clan members. At the time of the eviction, many households who had lived on the hill migrated to Ndetani, hoping to be able to buy land there. Eviction from the hill also made it more difficult to find dry season grazing. As the hill is protected as a water catchment, no permits for grazing are supposed to be granted. Recently, the Forest Department had nevertheless started managing controlled dry season grazing on the hill through a permit system because the hill is critical for livestock survival during drought. This permit system means that livestock have to be driven up and down the hill every day rather than remaining on the hill for the entire drought period, although this creates extra work as well as stress for the cattle. Some herders tried to keep cattle on the hill illegally while others who did not want any conflict with the Forest Department abstained from herding on the hill and reduced cattle numbers as a result. Most respondents reported that they had fewer cattle than they used to, affecting the viability of selling livestock as a source of income during a crisis such as drought.

While some households in Twambui had had farms on the hill, livestock keeping had always been the main source of livelihoods and there was less resentment regarding the eviction in this area. Here, the raiding by pastoralist groups had had huge impacts on livelihoods. Some had lost their entire herds, others had had their business burnt down, others had lost a family member, often the husband and main breadwinner. Some households moved to 'safer areas' such as Ndetani, with or without livestock or land, increasingly turning from livestock keeping to cultivation as the area is more suitable for cultivation while grazing lands are less extensive than in Twambui. Wet season grazing areas were also considered unsafe by some due to the historical raiding, and many grazed their cattle in areas closer to the hill, which

could support fewer livestock. Raiding had therefore resulted in long term destitution, migration, landlessness and reduction in livestock numbers, in a similar manner to that of eviction from the forest in Malalani. At the same time, the recent renting out of wells and grazing land as well as trading with pastoralist groups had provided a profitable source of income during drought. Respondents explained that these transactions funded childrens' education as well as weddings and some younger people now preferred starting up local businesses to migrating to cities to look for work which is increasingly difficult to find. Various forms of business and trade had therefore increased in importance as a way of managing drought compared to labour migration and remittances.

People in Ikisaya had lost cattle and people during the raiding and killing, but there were fewer signs of destitution or migration here. Social networks appeared relatively strong. Conflict with a neighbouring village over the maintenance of the pipeline had led to leaks in the waterpipe, although the pipe appeared fairly functional. The conflict hindered further expansion of the pipeline to other areas, however. Conflicts among clans over control over the water committee could slow down further water development. The provision of water had enabled people to leave the hill, where many explained that life had been harsh. Respondents said that cattle had contracted diseases, the weather was cold and transportation very difficult as steep paths had to be climbed in order to get to water sources or to roads, markets, schools or medical services in the lowlands. Herding livestock was made easier by water provision in the lowlands, therefore. Poorer members of the community felt that their survival might be easier if they were allowed to farm on the hill, however. Both Ikisaya and Ndetani communities had lost diversity of crops. It is worth noting that during the 1996 severe region-wide drought, households had been able to sell agricultural produce cultivated on the hill to other drought-stricken areas. 2004, which was meteorologically a less severe drought, had more severe effects on households because they no longer cultivated crops on the hill. The eviction from the forest and conflict with the government over access, had increased famine as no other similar sources of drought food existed. Respondents in Ikisaya as well as Ndetani and Malalani lamented that they no longer had access to fruit trees that had provided important nutrition during drought: "Why should monkeys eat the fruit while we starve?".

Eviction from the forest had a larger impact on Ndetani than Ikisaya. The forest boundary was set lower in this area, sometimes cutting through people's farms. Some people lost farmland and had had to reduce both farming and livestock keeping. In addition, the area had received migrants from the Malalani side evicted from the hilltop as well as victims of raiding and there were several landless and destitute families. Many families were unable to harvest enough to feed them through the dry season or droughts and there was increased reliance on casual labour as a source of livelihoods.

#### Winners and losers in the context of conflict and adaptation

Conflict had contributed to increased social differentiation and vulnerability to drought in Endau. There were no new or alternative sources livelihoods in the villages that had relied on farming on the hill, and the eviction essentially reduced livelihood options. Significantly, conflict contributed to the creation of destitute groups. The eviction had led to landlessness, especially in Malalani and Ndetani. The landless were particularly vulnerable as they could seldom harvest enough food from borrowed land to last them through dry seasons; in addition, they could seldom keep many livestock, the sale of which is an important source of drought coping. It is likely that the pre-existing social inequality in Malalani contributed to the landlessness. Poor clans are more likely to have start farming farmland belonging to clan members living on the hill, and the evicted people would rather migrate elsewhere than try to force poor clan members off their land, knowing that these clan members had little land to cultivate.

Women were particularly vulnerable to insecurity and conflict. As a women's group in Twambui explained, women were responsible for their children and could not flee during periods of raiding. Husbands and men could flee to other safer areas to find jobs, but women often stayed to look after the children and the farm. Raiding and killing had also led to several women losing their husbands. Women headed households are particularly vulnerable because women have poor customary rights to land, wells and livestock, which may be inherited by a brother of the deceased husband if the family had no sons. Secure access to land, wells and livestock is critical livelihood and drought coping strategies. A woman, once married, belongs to the husband's clan, but in some cases found that the clan was less forthcoming with assistance to her than to her deceased husband. Women had traditionally had power in the community through 'Mwambaa', groups of older women who performed customary rituals on the hill. Due to their contact with the spirits, these groups command respect in the community and can order people to pay fines if they do not obey customs, for example in relation to timing of planting and ensuring good rains. They also commanded power in development projects by being able to institute similar fines on households that did not contribute to community goals such as building of a school or of water pipelines. This power was strong where the local administrator recognised and collaborated with this customary institution, such as in Ikisaya. However, the spread of Christianity was reducing membership and authority of this institution. At the same time, women were seldom members of or had any influence on the newer and formal development and water committees. Some men actively sought to undermine the power of Mwambaa.

The increased trade and renting out of wells and grazing land to pastoralists were the main 'new' or strengthened source of livelihoods. This source benefited a few individuals who owned wells or businesses, while those who did not own wells found their access to water less secure. A few individuals therefore benefited from negotiation, rather than conflict, with pastoralists, although this resulted in greater inequality and conflicts within the village. Access to grazing and wells for the most vulnerable was threatened. This development contributed to increased social differentiation although not necessarily to destitution, therefore.

It is worth noting that the conflict with pastoralists, in terms of the raiding, may have been economically motivated, possibly instigated by a powerful individual in the army as a way of amassing wealth. Those households among the settled population for whom raiding had led to destitution were particularly vulnerable during drought. At the same time, the pastoralists themselves may have been losers in the long run, as illustrated by their present precarious rights to natural resources around Endau, expensive access to wells, and distrust from parts of the settled population. They may also have been targets of raiding and conflict from other pastoralist groups, excluding them from other dry season water sources and forcing them into areas such as those close to Endau.

Both inequality and conflict were also actively used by local politicians to gain power. Some politicians promised that if elected, they would allow poor people to farm on the hill. Others promised that if elected, they would make sure that no Oroma or Somali pastoralists would be allowed to access water or grazing. These could be powerful arguments among poor people depending on continued free access to shallow wells owned by others. The lack of piped water made poor households particularly dependent on the wells owned by a few rich individuals. It is likely that the current power base commanded by those owning shallow wells in a situation where these were the only dry season sources of water would be changed and weakened by the provision of piped water, especially if the pipes were controlled by other individuals in the community. Similarly, directing attention to the government eviction of people from the forest could be preferable in terms of maintaining current power relations to

addressing a situation of unequal land distribution and landlessness. When faced with landlessness and eviction from the forest, those in small or poor clans and thus few sources of assistance became particularly vulnerable. Unequal access to land, grazing and water; exacerbated by the lack of development and investment in basic services such as water provision, and struggle for political power and control over wealth were underlying causes of conflict in the Endau area.

#### *The Turkana case*

##### The nature of insecurity

Livestock theft is the centre of current insecurity in south Turkana. One 1985 assessment found that 47% of the District had a moderate or serious raiding risk (Ecosystems, 1985). No comparable assessment has been done in recent years. However, the problem of insecurity has not improved since the 1980s and many argue that it has worsened. There is enormous variation in the size and impacts of livestock raids in Turkana that is reflected in local perceptions of the problem. At one extreme is the large inter-tribal raids across the boundary between Turkana District and neighbouring areas within Kenya and in Uganda. Up to several hundred armed men from one side execute a coordinated attack on neighbouring villages lying across the border in the largest attacks. Large raids result in many human casualties (typically less than one hundred in any given attack), the destruction of homesteads over a wide area and the loss of several thousand livestock. The devastation of the largest raids is so complete that they are memorialised by recalling the season and year in which a raid has occurred after the name of the area where it took place.

At the other extreme is smaller-scale theft of animals and household goods by organised bands of up to ten *ngoroko*, or bandits. *Ngoroko* are often of the same ethnic origin of those they attack, although usually of a different sectional affiliation. Many *ngoroko* are believed to originate in northwest Turkana. They move southwards along the western flank of the District abutting the escarpment on their way to raid in West Pokot, Baringo and Samburu Districts to the south and east of Turkanaland. *Ngoroko* opportunistically attack vulnerable homesteads or small cluster of homes lying in remote bush areas, as well as vehicles travelling along isolated stretches of road. They typically take a small number of milking livestock kept at homesteads, as well as grain reserves, fuelwood, kitchen utensils and other household goods. Although attacks by *ngoroko* are less severe in terms of loss of life and livestock and destruction of property, they are more frequent and their longer-term impacts are felt to be equally or more pernicious than the occasional raids staged at a larger scale.

Violence centred on livestock theft has led to depletion of livelihood assets for individuals, households and communities, displacement of people from insecure areas, destabilisation of the setting for generating livelihood, and destruction of the means for making a living. In particular, the depletion of the household herd features centrally in individual recollections of violence and insecurity. While the severity of loss understandably varies between households, it must be emphasized that the loss of animals in raids and other violent incidents is a near universally shared experience for many Turkana people.

Before considering in more detail the impacts of chronic violence and insecurity on coping and adaptation, it is instructive to consider the broader livelihood context in Kalokol, Kakuma and Katilu, the three areas in Turkana District visited for this study. There are important differences between the study areas in their ecology and local livelihoods, relief and development inputs, and their history of displacement, migration and settlement.

Kalokol was the centre of the former fishing industry that was at one time the mainstay of the local economy in this part of Turkana District. Natole is a small village outside of Kalokol and is situated near to the lakeshore. In common with many of the villages in the Kalokol area, Natole has its origin as a distribution centre for relief assistance. A combination of conflict and drought has displaced many people from different parts of Turkana District, leading to the establishment of destitute camps around Kalokol. This history dates back to the 1930s in colonial Turkana District when the administration created a ‘*maskini*’ camp at Fergusons Gulf for people who had lost their herds. The camp inhabitants were given nets and taught how to fish. They were also given food aid as a supplement to their catch.

According to local sources, modern Kalokol town was created around the time of *Uhuru*. Many people were moved out of the camps around Kalokol to satellite centres up and down the western shore of Lake Turkana. Natole was one of the villages created. There was a large influx of displaced people to the area from northern Turkana in 1980, when drought combined with livestock disease precipitated a major humanitarian crisis in Turkana District. Destitute people were settled by the Kenyan government and aid agencies in many of the villages around Kalokol. Since then, there has been spontaneous resettlement of people displaced by drought and armed violence. Many inhabitants of Natole came during the 1990s from Lowarengak and Todoyeng, fishing communities on the upper shores of the Lake bordering Ethiopia, after being attacked by neighbouring Merille raiders.

The history of resettlement and in-migration means that Turkana from many different kinship sections inhabit the Kalokol area. Relations are mostly peaceful between the original inhabitants, earlier resettlers and more recent newcomers. The Ngimataperi, the kinship group that is native to Kalokol, welcomed the resettlers, gave them fishing gear and instructed them in fishing. Levels of insecurity are low. Raiding is non-existent in this part of Turkana. Local people report that *ngoroko* are also not known. Boran and Merille raiders are the only source of insecurity. They attack Turkana fishing parties that navigate far out on the Lake. But they do not venture near to the lakeshore at Kalokol. However, Merille attackers regularly raid the fishing communities to the north of Kalokol that are located nearer to the border with Ethiopia.

Many of the resettlers in Kalokol come from Lukumong-land, an area inhabited by people of the Ngilukumong kinship section of the Turkana. It is located north of Kakuma town and stretches up the escarpment to the border with Uganda. It is a second area that was visited for this study. Cross-border raiding has long been a fixture of life in the area and is the main type of insecurity recalled by local people visited for this study. Like Kalokol, many of the settlements in this region originated as distribution centres for relief assistance in the early 1980s. Kakuma town itself experienced significant growth in 1980 when first the Diocese of Lodwar and later the Turkana Rehabilitation Project (TRP) established feeding camps in the town to provide assistance to thousands of people who had lost their herds to drought and animal disease. A ‘camp crisis’ ensued, culminating in a cholera outbreak in Kakuma and the deaths of many people.

Following the crisis, TRP resettled the Kakuma camp population in settlements scattered over a wide area of northern Turkana, including centres and encampments in Lukumong-land. One such centre was Kalobeyei, heart of the ancestral land of the Ngilukumong people. In the early 1980s TRP assisted resettlers to take up millet and sorghum gardening along the seasonal river that cuts across the northern edge of Kalobeyei. Although there is a tradition of cultivating ephemeral plots of sorghum in many areas of Turkana, farming was less familiar to the Ngilukumong. Customarily, they focus almost entirely on keeping livestock, in addition to gathering wild foods. They acquired grains, gourds and honey through trade with Dodoth people in Uganda and the Teuso, a small tribe straddling the Kenya-Uganda border.

The third study area is Katilu in southern Turkana. The Katilu Irrigation Scheme was established in the 1960s with substantial support from FAO and UNDP. The Scheme expanded in the 1970s and in the early 1980s to support people from northern Turkana, as well as destitute people from Kalokol. Thus, Turkana from many different kinship sections inhabit the area. Katilu is considered the ancestral land of the Ngisonyoka, the kinship section that is dominant in southern Turkana. Traditionally, the Ngisonyoka do flood retreat gardening of sorghum along seasonal rivers. However, few were settled on the Katilu Irrigation Scheme, although the native Ngisonyoka welcomed the original Turkana inhabitants of the Scheme, according to local sources. Since the establishment of the Scheme, many Ngisonyoka have taken up farming of small rain-fed plots. Farmers with rain-fed plots are far more numerous than those with a scheme plot, who number around 600 households.

Another Turkana section that is native to the Katilu area is the Ngikebotok. They inhabit the area immediately along the Turkwel River. Customarily, they are farmers in addition to keeping small herds. Some are hunter-gatherers. Uniquely for southern Turkana sections, they maintain close links with the neighbouring Pokot people. Although this raises suspicion among some Turkana from other sections, a tradition of intermarriage and trade bonds members belonging to different communities and underpins (mostly) peaceful inter-section relations. The Ngisonyoka privilege exchange relations with the Ngikebotok, from whom they get sorghum and gazelle skins, both of which hold cultural importance for the Ngisonyoka.

#### The impacts of chronic insecurity and violence on coping and adaptation

Changes in how the Turkana manage and adapt, and more specifically survive periods of food scarcity, must be considered in view of a long running shift away from having herds. Other important trends are the halting commodification of herds and the re-emerging importance of migration and access to regional markets. An external support system has become more important since the late 1970s, notably relief assistance but also remittances from relatives working in large Turkana towns and further afield as farm labourers in the highland agricultural areas or as watchmen in the major Kenyan cities. The significant structural changes in Turkana pastoralism predate the proliferation of weapons and began after *Uhuru* in the 1960s and 1970s when large-scale relief operations were first initiated and many Turkana were resettled in fishing and farming communities as part of development programmes. Alternatives to livestock keeping have increased in importance as customary pastoralism has become less reliable and adequate to cover a household's nutrition and food security needs. Insecurity has not initiated diversification and the shift away from having herds but it has hastened these trends. Livestock keeping has become less reliable over time. As a matter of course, Turkana people have sought alternative economic activities. For this reason, it is misleading to do a simple comparison between current and past coping strategies since the structural context for pastoralism has undergone such significant change.

The Turkana have a rich experience living with drought and other climate stress. People interviewed for this study report doing a number of tasks-for-cash to survive from one hungry season to the next, such as burning charcoal, fetching water, collecting and selling wild foods, fuelwood, seeds from trees, and construction poles, and participation on public workfare schemes. Women do many of the newly important work activities. Sequencing of activities is also evident, with more extreme survival strategies taken up at the end of a long sequence of activities undertaken over the course of a long dry season or during drought. Examples include bleeding animals, migrations of whole families to distant border grazing, temporarily leaving pastoralism to seek other opportunities to survive, drawing down grain stores, slaughter or sale of animals, and feeding on dead animals. It is noteworthy that many coping

and crisis strategies have become more regular in the calendar of work activities (See Table 1).

**Table 1. Commonly practiced coping strategies in Turkana District, March 2005 (based on small group discussions with men in three study sites).**

|  | All the time | Late dry season only | Early dry season only | Only during severe drought |
|--|--------------|----------------------|-----------------------|----------------------------|
| <i>2.4.1.1.1 KALO KOL</i>                  |              |                      |                       |                            |
| Fishing                                    | X            |                      |                       |                            |
| Rely on food aid                           |              | X                    |                       |                            |
| Basketry                                   | X            |                      |                       |                            |
| Burn charcoal and sell fuelwood            | X            |                      |                       |                            |
| Gather wild foods                          |              |                      | X                     |                            |
| Gather traditional salt and black powder   |              |                      |                       | X                          |
| Collect fish bones for sale                | X            |                      |                       |                            |
| Feed on dead animals                       |              |                      |                       | X                          |
| Depend on gifts of food and animals        | X            |                      |                       |                            |
| Blacksmithing                              | X            |                      |                       |                            |
| <b>KAKUMA</b>                              |              |                      |                       |                            |
| Sale of livestock                          | X            |                      |                       |                            |
| Gather wild foods                          |              |                      | X                     |                            |
| Split herd in dry season                   |              | X                    |                       |                            |
| Depend on gifts of food and animals        |              |                      |                       | X                          |
| Rely on food aid                           | X            |                      |                       |                            |
| Rely on cereal stock from rainfed cropping |              |                      | X                     |                            |
| Animal exchanges                           |              | X                    |                       |                            |
| Negotiate peace                            |              | X                    |                       |                            |
| <b>KATILU</b>                              |              |                      |                       |                            |
| Farming                                    |              | X                    |                       |                            |
| Sell animals                               |              |                      | X                     |                            |
| Slaughter animals                          |              | X                    |                       |                            |
| Split the herd                             |              | X                    |                       |                            |
| Gather wild foods                          |              |                      | X                     |                            |
| Depend on gifts of food and animals        |              |                      |                       | X                          |
| Bleed animals                              | X            |                      |                       |                            |
| Chase old claims                           | X            |                      |                       |                            |
| Bridewealth                                | X            |                      |                       |                            |
| Reduce consumption                         | X            |                      |                       |                            |
| Migration                                  |              |                      |                       | X                          |

An important observation is that the high prevalence of diversification as a livelihood strategy signals efforts by the Turkana to actively manage vulnerability by increasing the reliability of livelihood assets. But peoples' involvement in so many coping and survival strategies is also a sign of distress in Turkana livelihood systems. There is a risk of misinterpreting diversification and market activity for a thriving local economy and robust community and household livelihoods. For example, high levels of livestock sales is an indicator of distress. The overriding interest of most Turkana to preserve assets and increase the chances of recovering from drought was summed up by one herd owner questioned for this study: 'the more I sell the more I lose.'

The life histories and current situations of Turkana households that were visited for this study illustrate these general points and observations. In Kalokol the establishment and eventual collapse of the fishing industry features centrally in local explanations of the decline in wellbeing. Colonial administrators gave nascent support to the establishment of a small fishing industry at Kalokol as a way of supporting victims of famine. But their attempts were frustrated by difficulties in procuring fishing gear, treacherous conditions on the lake, and a lack of interest in fishing by inhabitants of the famine camps at Kalokol. The Norwegian development agency (NORAD) supported the construction of a fish factory at Kalokol town and the establishment of the Turkana Fisherman's Co-operative Society. Natole fishermen sold their catch to the factory, which opened in 1982. Women were trained in cleaning, weighing and packing the fish for export. Nile perch fish fillets were exported to Nigeria. Dried fish was exported to Congo-Brazzaville and Zaire. The factory served as a guaranteed source of income for many people in Natole. Infamously, the Kenyan government severed diplomatic ties with Norway in 1990, leading to the immediate withdrawal of funds. The factory closed shortly thereafter and the Co-operative became inactive after the leaders embezzled the funds.

Today most people rely on subsistence fishing and the collection of fruits from *Eengol*, the doum palm. Women gather and sell the seeds of the *Eengol* to traders in Kalokol, who make oil from the seeds for frying fish. Women also gather building materials from the *Eengol* and make a porridge by grinding a powder from the hard fruit. Basket making is another important activity undertaken by women. However, markets are undeveloped. Most women sell their baskets at very low prices to Turkana traders from Lodwar, the administrative and commercial centre of Turkana District. Men complain of similar market problems, in particular the 'exploitative' prices paid by middlemen who buy directly from fishermen at the lakeshore.

Levels of poverty are very high, even by Turkana standards. Wealth ranking with local elders showed that a wealthy household has 20 or more goats, which would be considered poor in other parts of the District. Most households in Natole have diversified livelihoods but earn meagre amounts of income. There are few development inputs. A Turkana NGO is helping women to develop markets for products made from the *Eengol*. The fish factory remains closed.

Relief assistance is more common and has been provided in 2005 as part of a WFP led emergency operation (EMOP) in food insecure districts. Households that were interviewed report significant problems with relief distributions. Local leaders that were interviewed claim that five people died of starvation in November and December 2004 before food aid was distributed in sufficient quantities. The area councillor confirmed the starvation cases. The victims were both men and women and from different age groups. Only one was a long term resident of Natole. Four had resettled in Natole in the early 1990s from Lowarengak.

Experiences of violence feature centrally in the livelihood trajectories of many pastoralist households near to and outside of Kakuma. Natira is a large encampment of displaced pastoralists along the tarmac road linking Kakuma town to Lokichoggio, a large town one hundred kilometres to the north that serves as the base for humanitarian operations in southern Sudan. Natira has absorbed several hundred survivors of the Kaabong incident, a humanitarian crisis that unfolded over March and April 2004. Kaabong is the name of a water point in Dodoth-land, across the escarpment in neighbouring Uganda. In 2003, NGOs facilitated a peace dialogue between the Ngilukumong (the Turkana kinship section that inhabits this part of Turkana District) and the Dodoth. Senior leaders and high level officials from both sides participated in the talks, which led to an agreement. Assured by the agreement, Ngilukumong migrated to Kaabong late in the dry season in March 2004 to water their animals. Dodoth raiders attacked them as they approached the water point. People escaped back to Lukumong-land, an arduous journey that lasted four days and nights, over difficult terrain and without water. Up to thirty Turkana were killed or kidnapped in the melee at the time of the attack. Many others died of thirst on the journey back to Kenya. Several hundred animals died after becoming stuck in a muddy water pan on the Kenya side of the border. For this study, other survivors of the crisis were visited in Nakoyo, a village on the northern outskirts of Kakuma that was formed in the months after the attack at Kaabong.

The Kaabong incident was a turning point for many Ngilukumong, and a focus for discussions on the impacts of armed violence on coping strategies. People were asked to recall their experiences. Many households have a small residual herd, mostly composed of lactating animals that had been left behind at the time of the migration to Kaabong. The animals remained behind to provide milk for members of households who do not migrate, including infants, youngest children, children in school, pregnant women, the elderly and the destitute with no herds to look after. Many people focus on natural reproduction of the remaining herd. Goats are highly valued since they reproduce quickly, require little labour, and can graze within the dry rangelands that are safe to access. Customarily, exchange of animals between stock associates plays an important role in the efforts of the herd owner to make adjustments to the herd structure after incurring significant losses. Household specific herding strategies over the long term inform the participation of herd owners in such exchanges. However, few people that were visited for this study in the Kakuma area currently exchange animals since their herds have been depleted. There is a threshold for participating in animal exchanges and thus being able to use exchanges as a means to recover from loss. Many are too poor to participate in animal exchanges.

Other coping strategies include collecting wild foods (although people complain that areas where wild foods are gathered are not safe), burning charcoal, receiving relief assistance, and participating in the cash for work bush clearance along the Kakuma-Lokichoggio road. However, the line between coping and survival is fine and calls into question the labels we use to describe household efforts to make ends meet.

An important outlet for significant numbers of Kaabong survivors, as well as other Ngilukumong who were not involved in the attack, is to provide cheap labour in Kakuma town. Kakuma is the location of a large refugee camp run by the UNHCR. Since the first refugee camp was established in the early 1990s, Kakuma has become a destination for people seeking to provide services to the camp population, such as washing clothes, collecting fuelwood and thorn-fencing for sale, burning charcoal, and carrying goods. However, relations between the camp population and the Turkana are uneasy at the best of times, and violence in 2004 between Dinka refugees and Turkana labourers forced many Dinka to seek refuge at the Chief's camp in Kakuma. Turkana were also prohibited from entering the camp for a time until tensions subsided. Many Turkana resent the presence of refugees and the international assistance they receive. Yet, many Turkana depend on the existence of a large

refugee population as a market for their goods and services. They also benefit from the free secondary education and vocational training, as well as free health facilities, made available to the local Turkana population under host community programmes run by the UNHCR and various aid agencies.

In Katilu, the demise of the irrigation scheme featured centrally in discussions held for this study. The story is remarkably similar to that told by fisherfolk in Kalokol: a catastrophic decline of a local economy and way of life leading to problems with food security and nutrition. NORAD picked up funding of the Katilu Irrigation Scheme in the early 1980s after FAO withdrew, and continued its support until 1990. Notably, NORAD changed the system of irrigation from furrow to basin irrigation, which local farmers blame for lower yields in later years after NORAD departed. It also created a Management Committee for the Scheme that was separate from the Katilu Farmer's Cooperative Society. The Scheme has experienced a precipitous decline since 1990. The Cooperative collapsed due to mismanagement and embezzlement of funds by the Co-op leaders. The infrastructure of the Scheme has fallen into disrepair and ruin. Farmers have had limited access to improved varieties of seeds, fertiliser and insecticide, and markets for their products. For example, a bag of maize sells for 900Ksh in Lodwar, which is the nearest sizeable market, located some 120KM from Katilu. It costs 150Ksh to transport a bag to Lodwar using public transport, 200Ksh each way for the seller, in addition to any expenses incurred staying overnight in Lodwar. Thus, at least half the cost of a bag of maize is lost through trying to get it to market. The Management Committee has continued after the collapse of the Coop. Since 1990 and up until recently, the Kenyan government and NGOs have provided little or no assistance to the Scheme or to farmers. Farmers have found their own ways of coping, such as shifting from cash to subsistence crops, and relying on locally available seeds.

Chronic insecurity is another factor that features strongly in local explanations in Katilu of how livelihood security has declined. Cross-border raids between Turkana and neighbouring Pokot people occur with some regularity in Katilu. However, according to local opinion, attacks by groups of armed *ngoroko* are a more significant problem. This view was especially strong among women and relates to the nature of violence that involves *ngoroko*, who engage in systematic rape of young girls and women. *Ngoroko* also enter homes, demand grains and cooked food, threaten children and take away girls as wives. Cross-border raiders rarely cross the Turkwel River and enter Lopur, Katilu and other Turkana villages lying to the east of the river. In most cases, attacks by raiders are confined to grazing sites on the western side of the river where large herds are found. Thus, *ngoroko* violence disproportionately affects women. It has created an atmosphere of intimidation and fear and has clear detrimental impacts on livelihoods.

Coping strategies have become routinised in Katilu. Private transfers of small amounts of money and grains, and gifts of one or two animals, within extended families are common and possibly more important than receipts of food aid in this part of Turkana District. Interestingly, a women's group in Lopur ranked (better off) households with many dependents to be among the first to be vulnerable to food shortages.

#### Winners and losers in a context of chronic violence and livelihood change

The key to living with uncertainty and insecurity is to constantly seek to enlarge the reliability of assets, in other words to reduce vulnerability. For many Turkana, the key to reducing vulnerability is to manage the probability of violence affecting one's livelihood. It is mistaken to view the Turkana as victims who react passively to incidences of violence, market

fluctuations and changing economic fortunes. Violence is embedded in livelihood strategies. The discussion here focuses on four aspects of Turkana livelihoods in which this can be observed: the structure of household herds, sources of food, indigenous defense mechanisms and recovery strategies. These are discussed in turn.

There are two ways in which the structure of household herds can be used to indicate efforts to manage the threat of violence. One way relates to restrictions on mobility and access to key resources due to insecurity. The threat of raiding and banditry has forced most people away from borderlands that are ecologically fecund compared to the interior areas of Turkana District that are drier, squeezing herders lower down the ecological gradient. Shifting to drought tolerant animal species is one way that herders can accommodate this change and avoid having to move to insecure border areas in search of pasture and water. Camels and goats are the more drought tolerant animals in mixed Turkana herds. A second way is that certain characteristics of particular animals are perceived to be advantageous in situations of violence. Insecurity is among the considerations of Turkana herders in discussing the comparative advantages and disadvantages of different animals. For example, conventional wisdom in Turkana is that a cow knows its home kraal and may return if it is stolen. It is also thought that goats are useful for warning of an unfamiliar presence near to the homestead by making a purring noise. An advantage of donkeys in relation to this discussion is that they can help to quickly and easily transport household goods when under attack.

Goats are the most valued animal species in mixed Turkana herds and have many advantages seen from the perspective of violence. One is that they reproduce quickly. Many herd owners pursue a shoats (sheep and goats) strategy after a catastrophe as a way of reconstituting the herd (Dahl and Hjort, 1979). A second is that goats have a short gestation period compared to other animals and so they produce milk quickly. The biophysical consequences of frequent or unplanned movements associated with violence include worsening household food security and nutrition (Pike, 2004). Although lactating goats will produce milk over a shorter period, the fact that they can produce milk quickly means they are attractive to households who have seen sudden and unpredictable declines in nutrition and food security of household members linked to violence and displacement. A third advantage is that goats are easily zero grazed in the homestead implying that herd owners do not need to risk taking their goats to insecure grazing areas. The recent emergence of a market in Katilu for acacia pods, which are sold in large maize sacks by women gatherers, is linked to a continuing threat of violence and the interest of herd owners to adopt zero grazing techniques. Another advantage is that goats are easily bartered and acquired. There is a long and precipitous decline in per capita tropical livestock units (TLUs) in Turkana due to a combination of losses to drought, theft and disease and because of population growth. Many Turkana report the centrality of violence in the decline of their own household's herds. Goats have become more important as a way of covering acute needs for food, medicine and school fees as poverty levels have deepened.

The shift away from having herds and the growing unreliability of pastoralism linked to chronic violence is reflected in changing sources of food. Most Turkana used to rely primarily on animal products from their herds but now purchase grains from income earned through various tasks-for-cash and other survival work (see Table 2). The decline of the herd and the adoption of new work activities have meant that people look for different sources of food. Shifting food sources is a longer-term adjustment to the changed circumstances surrounding pastoralism and the diversification of Turkana livelihood systems away from a high dependence on livestock keeping. Limited contact between groups because of insecurity has damaged exchange relations and cross border trade through which Turkana formerly accessed millet, pulses, sugar and other commodities. Turkana rely more on itinerant traders that operate within the District, as well as shop keepers and relief distributions for such commodities. Affordability and convenience are among the advantages of maize meal most

commonly reported. Several people who were interviewed point out that maize meal goes well with vegetables, wild foods and fish, as well.

**Table 2. Primary food sources in select Turkana villages, March 2005 (out of sample size of fifteen households per study site; some households report more than one primary source of food).**

| Study site         | Kalokol | Kakuma   | Katilu   |
|--------------------|---------|----------|----------|
| <b>Food source</b> |         |          |          |
| Goats and sheep    | 7 (47%) | -        | 1 (7%)   |
| Cattle             | 2 (13%) | -        | -        |
| Camels             | 1 (7%)  | -        | -        |
| Maize              | 3 (20%) | 12 (80%) | 13 (87%) |
| Sorghum            | -       | -        | 7 (47%)  |
| Fish               | 4 (27%) | -        | -        |
| Wild foods         | 8 (53%) | 3 (20%)  | -        |
| Other              | 1 (7%)  | 1 (7%)   | 1 (7%)   |

Another aspect of Turkana livelihoods in which people can be seen to manage the probability of violence is in indigenous mechanisms for protection and defense. The Turkana have a variety of ways of minimising the threat of insecurity. Mechanisms that were mentioned by people visited for this study include fencing homesteads, reporting to Chiefs and other administrative officials, settling in permanent centres, negotiating with enemies (peace meetings), organising security patrols to defend animals, acquiring illegal guns, zero grazing animals in homesteads or on farms, traveling in groups and/or with an armed escort, conducting rituals for seers, kraaling animals, taking animals out later and returning them earlier to the kraal, and holding nightly security meetings between sharpshooters, young men and kraal leaders.

In addition, Turkana communities manage the probability of violence by digging trenches near to gate passes, a point (usually a mountain pass) through which people from neighbouring communities pass through on their way into or out of the Turkana plains. A notable indigenous defense mechanism has been the formation of *arumrum*. These are large residential units and grazing associations that comprise up to several hundred families. The obvious advantage of *arumrum* from the perspective of reducing vulnerability is that they offer safety in numbers. These have multiplied across insecure parts of southern and northwestern Turkana since the early 1980s in response to the continuing threat of armed violence (Buchanan-Smith and Lind, 2005).

The indigenous defense mechanisms described here are coupled with livelihood activities. Insecurity has challenged many drought coping strategies such as movement to key resource areas (use of distant border grazing), exchange relations with neighbouring groups that inhabit a different grade of the ecological gradient, collecting wild foods, accessing market information and markets to sell animals to purchase grains. However, the Turkana have devised a number of mechanisms to minimize the threat of violence, which are too easily overlooked in discussions of the impacts of conflict.

Turkana herders also reduce future vulnerability to the threat of violence through recovery strategies following a catastrophe. It is already observed that many herders pursue a 'shoats strategy' as a way of building up the herd after catastrophe and that goats have certain advantages in respect to living with the threat of violence. However, insecurity also exerts a

downward pressure on pathways to recover and expand the herd after catastrophe. Community-wide losses mean that it is much harder to rebuild through customary social networks (Lind, 2005). The experience of Turkana pastoralists who survived the Kaabong emergency is an example of how widely shared asset losses can frustrate later recovery and rehabilitation options. Redistribution through bridewealth is also less of an option since most people are poor and unable to pay out a large number of animals. Instead, people increase their engagement in arduous survival activities such as burning charcoal and collecting and selling wild foods and fuelwood as a way of making very small amounts of income to build up and purchase animals. People also use savings from work activities to buy food as a way of protecting existing animal assets, or rely on relief assistance in order to prevent having to slaughter or sell. The widespread lack of cash underlines the difficulty of recovering for most people. Some households who lost animals in the Kaabong emergency had split their herds before the attack and thus had some remaining animals to care for and use as seed stock to reconstitute the herd. Some households who have lost animals in violent attacks do receive gifts of food and animals from other community members. However, the number of animals given is very few and not enough to reconstitute a viable herd. Another observation relevant to this discussion is that there is little vertical movement of animals between people belonging to different socio-economic groups. In part this relates to increasing destitution and the shrinking number of people who can be considered as better off.

Very few people can be considered ‘winners’ in the context of chronic violence and insecurity in Turkana District. Instead, there are gradations among those who are considered to be ‘losers’. There is a need to better understand the different categories of the poor in order to inform possible inputs and interventions that can reduce vulnerability and enhance livelihood security for the very poor and destitute.

### *Synthesis*

It is noteworthy that violence is more chronic and severe in Turkana and that levels of destitution are greater compared to Kitui. In other ways, there are important similarities between the two cases. Conflict and violence form part of the structural processes to gain control over resources or (in Kitui) to strengthen livelihoods and coping strategies. Thus they represent a manifestation of political processes driving vulnerability. In both Turkana and Kitui, raiding can be viewed as a strategy to violently acquire wealth in livestock. In Kitui, raids were apparently instigated by a powerful individual, although livestock theft continues between Akamba, Oroma and Somali both as a way of acquiring cattle and as retribution. Some Akamba farmers steal livestock belonging to pastoralists who have invaded their land as a way to protest the presence of pastoralists belonging to different ethnic groups. Conflict between the government and the community is rooted in the eviction of people from Endau hilltop, a strategy by the Kenyan government to regain control over the forest. In the Kitui case, conflict is also used to gain political control and redirect attention to the perceived injustice of past evictions from the hilltop and away from the current state of unequal ownership and access to resources and the lack of basic services. In Turkana, insecurity centres on the violent theft of livestock. A point related to this is that insecurity in south Turkana should not be seen as the desperate action of impoverished herders who attempt violently to claim scarce resources in an increasingly degraded environment. Most violence appears to be exclusionary, implying that there are few ‘winners’ from raiding and banditry. Although ‘theft’ is mentioned as a survival strategy, what is often being referred to is theft of small amounts of milk and grain by very poor people within villages. There are clear methodological challenges to investigating raiding and *ngoroko* attacks. Further work is needed on the sociology of violence in Turkana and neighbouring areas.

In both cases, conflict and violence have contributed to growing numbers of destitute people. In Kitui, eviction from the forest and raiding had led to landlessness, migration and loss of livestock. In Turkana, violence features centrally in peoples' recollections of a long process of livelihood decline and deepening poverty. Many households have become 'assetless' due to raiding. It is also difficult to reconstitute a herd through customary social networks since livestock losses are broad based across communities. Large scale humanitarian operations and an increasing number of those judged to be in need of food aid is the outcome of chronic violence and the lack of rehabilitation and recovery options.

The destitute are particularly vulnerable during drought because they lack productive assets and have limited options to cope and survive. Significantly, this state of destitution rather than meteorological conditions may be the main reason that necessitated the declaration of a national drought emergency in Kenya in July 2004. Many officials in aid and donor agencies believe that emergency food aid is an inappropriate response to chronic food insecurity and that the creation of other social protection measures is needed (Lind, 2005). The chronically food insecure are unable to meet their annual food needs even in 'normal' years (Sharp et al, 2003).

In both Turkana and Kitui, the loss of productive assets is so extensive for the destitute that they are unable to recover without a redistribution of wealth. Many destitute survive on casual labour and assistance from social networks and clans in Kitui. In Turkana, destitute people similarly rely on tasks-for-cash, as well as food aid or simply reduce consumption. In this situation of extending and deepening poverty, it is difficult to discuss adaptation when many people are trying to survive.

#### **4 Conclusions**

The two cases reveal critical lessons for adaptation. There is no one-size-fits all solution to adaptation – people adjust their livelihoods to many stressors at the same time. Any government measures aimed at enhancing local adaptation to climate stress clearly have to take account of such other stressors, including any presence of conflict. For example, many technical type measures, such as the introduction of improved breeds, are unlikely to be effective in a situation of raiding. Measures aimed at supporting local adaptation, such as the provision of water, need to consider the context of conflicts over water access and control over water sources. The Kitui case also illustrates that reducing land degradation in the narrow environmental sense of enhancing hilltop vegetation and catchment properties may in fact increase vulnerability. Instead, improving local access, social equity, and livelihood security are critical to enhancing climate change adaptation.

The study shows that the main challenge to achieving adaptation is destitution and loss of productive assets. If the most vulnerable are to be enabled to adapt their livelihood strategies, destitution has to be addressed. Targeted measures to lift people out of destitution may be an important component of any national climate change adaptation strategy. The most vulnerable can be targeted through measures to strengthen their existing livelihood strategies. Flexibility is critical to managing dryland livelihoods under climate change, such as through: mobility of people and livestock (access to grazing); diversity of crops; diversity of livelihoods; and flexible access to forest areas. Investing in dryland development, so obviously lacking in the two case study areas, is one way of addressing destitution. Fees and taxes currently collected from the local population can be invested in development activities such as water and roads. Drylands have a lot of resources – lack of development of these resources and access to these resources is the problem, not resource scarcity. In Kitui, tapping water sources and availing to different areas and groups in the lowlands (including pastoral areas) would enhance

livelihood options. Similarly, potentially high value dryland niche products such as gum Arabica could provide new economic opportunities.

In order to effectively address vulnerability, the actual drivers of inequality and destitution also have to be addressed, however.. Conflict is an important stressor contributing to destitution. Addressing the causes of conflict, in particular the political processes to gain power and wealth of which such conflicts form part, is important if local adaptation is to be strengthened. Adaptation and reduction of vulnerability are essentially political and need to address political issues such as the representation of vulnerable groups (the poor, landless, small clans) in local powerful institutions, and the rights of the same groups to land, grazing and water.

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## **2.5 The historical context of Endau hill, by Bernard Owuor**

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A preliminary report describing an examination of historical data undertaken as part of the research project

### **Introduction**

This report gives a historical account of the Endau hilltop forest from the 1800s to about 1963 and slightly after. The information for preparing this report was gathered mainly from the Kenya National Archives. It was supplemented by literature searches on the Internet and also from reports, journal articles, books, and papers that provided historical information about the Endau hilltop forest and the communities living around the forest. The report provides historical information on a wide range of topics including boundaries, conflicts, climate, drought, forest management, governance and political organization, migration and human settlements, economic history, geology.

### *Boundaries and Boundary Changes*

Consider the maps of the administrative divisions of Kitui District taken in 1984 (in the bundle marked Ref. 307.73.OLE Page: 12) and 1986 (in the front page of bundle marked Ref. 307.73. ID5B). Though these two maps were drawn in a space of just two years, they confirm that the district administrative boundaries remained uninterferred with, at least in the 1980s. Our area of focus – Endau – remains at the far Eastern borders of the district. Despite the fact that earlier administrative maps could not be obtained at the national archives and other government agencies, the literature obtained indicates that the position of the Endau location in particular has remained as depicted in the recent maps (see the boundary description provided in the bundle marked DC /KTT/4/1 In 1931.

Most recently, however, the Kenyan government effected changes that saw Kitui District divided and a new district – Mwingi District – created. Because the Mwingi Division of the initial Kitui District (Map in 307.72.OLE) was to the far western side of the district, it is obvious that this development didn't affect the Endau location and it remains on the far eastern side of the new (and smaller) Kitui District. It can therefore be said that these earlier maps will suffice for purposes of locating the ENDAU area within Kitui district.

### *Climatic Conditions*

In the wider Kitui district, there are two rain seasons annually: the March/ April rains which fall from February to May, and the November/December rains which occur in September to January.

According to the findings of Michael O'Leary in 1984 (see page 14 bundle marked Ref.30.7.72.OLE), more rainfall was received during the November/December season compared to the March/April season over the period 1942-1960. This was true for both the highlands and the lowlands. It is also observed that the highland receives comparatively

higher amounts of rain than the other parts of the district. Figures compiled by the Ministry of Agriculture in 1971 and 1972 (See page 5 of the bundle marked Ref. 307.73.IDA A), Indicate that of the 23 stations, Endau was fourth in rainfall figures in the respective years.

Drought: A major feature of the climate in Kitui District is the regular occurrence of drought, which can lead to famine. Famines are the principal contingencies featured in the event calendars of the Kitui Akamba. Not all famines were spread throughout the district. Some famines were confined to certain localities, and usually the central highlands escaped the ravages of long and severe droughts more frequency than localities of the lowlands. Again, this means that Endau is among the areas that have escaped severe droughts in the past owing to its high attitudes. Between 1940 and 1962, droughts and famine occurred in the district on average once every six years (page 14 of Ref 307.72.OLE)

*Geology of the Endau Area - (See the map marked Ref.K556.BAK)*

Other Notable features: Principally the Nziu River and its right bank tributary the Munyoni. Another river is Matia passing North of Engamba.

#### *Springs on Endau Hills*

*Report by C.Tomkinson (Mr.), District Commissioner. Date 7/11/1936*

1. KAUSA SPRING - 3500ft up on west Endau Hill – Permanent, SUO DAM-Semi-Permanent water hole, MWALIKANTHI-Site for earth Dam, NGAMBA-Permanent Hill Springs on boundary reserve: Settlement not recommended

#### **Gazettement and status change of the forest**

The literature shows that the forest in the pre-independence era was protected in one of the following two ways: (1) the decision by the Local Native Council (L.N.C) to set aside certain forests as reserves, or (2) the practice of protection by the local leaders through the organ known as the L.N.C. In the later case, colonial administrators used their own power and discretion to declare forest reserve.

Page 17 in the bundle marked PC/SP.1/4.1A gives an account of a visit by the divisional forest officer and the Forester Machakos and their tour of the entire Kitui district in September, 1948 After this tour, the two officers decided to ask the L.N.C to declare certain hills and ranges as reserves by March 1949. The list of these hills and ranges is given as Mutonguni, Mutito, Matha and Ndhoani. The Endau hills are not on this list. This means that up to 1948, the Endau hills remained unprotected under any administrative or legislative orders. The 1949 Kitui District Report (marked as bundle PC/SP.1/141 1B) gives the list of hills set aside as reserves by the L.N.C. In fact, out of the four hills and ranges recommended for reservation by the forest offices the previous year, only the Mutha hill was actually reserved. The other six hills reserved by the L.N.C in 1949 were not on the recommendation of the forest officers, at least not during their September 1948 visit. This suggests a great deal of independence and autonomy of the L.N.C from officers of the colonial administration. The second last paragraph on page 17 of the report states “It (the L.N.C) refused to set aside Endau, the remainder of Kabonge hill, Mutito...”

*Administrative Order:* On the same page of the report, it is indicated that Nda hills had been protected by administrative order. This decision by the local administrative officer is likely to have been reached as a result of concerns over the destruction of the forest by the natives. The report says in part “...the devastated area [was] making a good recovery”. Bundle DC/KTI/4/1/4 contains several correspondences between the Kitui District Commissioners office and various individuals/ groups of people regarding access to the Endau hills. For

example, the letter labelled L1 written in July 1962 shows that an individual had made a request to be granted permission to enter the Endau hills.

*After Independence:* Upon Kenya's independence from British rule in 1963, things changed and the local communities once again gained access to the Endau hills – the legal protection of the forest did not take effect. Michael O'Leary points out on page 50 of the bundle marked Ref.30.7.72.OLE that the post-colonial government did not seriously focus on problems relating to soil erosion and water development until the 1974-1978 development plan, and by then much damage had been done – particularly by the clearing of hill forests.

### **Economic history of the District**

From the earliest oral and recorded history, it is evident the people of the District have experienced cycles of droughts and consequent famines arising from acute shortages of water and food for both human and livestock consumption (Akong'a 1981). This cycle has transformed famine into an avoidable, naturally caused condition, which has become an institutionalized cultural phenomenon, since some people's names, ages, and other major historical events are marked by reference to unforgettable past famines.

#### *Drought.*

In the past, the droughts and famines were followed by human and livestock diseases such as smallpox and rinderpest, respectively, which decimated the already emaciated human and livestock populations. The people of the District are therefore appreciative of the fact that during the colonial and post-colonial administration, they have been able to receive relief food supplies and other assistance from sources external to the District.

In order to cope with the deleterious effects of drought and famine, the people of Kitui have in the past responded in various desperate ways. Some families have migrated permanently to the neighbouring districts of Meru, Embu or to the coast province, mainly in the area of Mariakani and Shimba hills. In very severe famines such as those experienced in 1989, 1918, 1935 and 1961, some household heads pawned their wives or unmarried daughters to families willing to offer immediate means of survival such as livestock or grains. Hunting wild game and birds, collecting fruits and leaves, and digging up roots were also common survival techniques. This is not frequently done today as the resources are already depleted. As a last resort, the people of the district are hard-pressed to part with their livestock either by selling them to buy food and other household necessities or by slaughtering them for food. In this practice, the Kamba or Kitui are not alone; all pastoral ethnic groups behave the same way in similar circumstances. Famine also sets into motion a chain of adaptive responses, some of which may be repugnant to the norms and values of the Kamba society and the laws of the land – urban and village prostitution for example.

From 1898, the time a colonial post was first established at Kitui boma, now Kitui town, the colonial administration began to assist the people in coping with drought and famine conditions. It provided the people with famine relief supplies in the form of food and seeds; paid people engaged in public works, such as road construction, with food in lieu of the wages; and arranged for public auctions of livestock. Indirect assistance to the people coping with drought and drought and famine conditions came through construction of access roads to increase the mobility of the people and the administration and increasing water sources by the construction of sub-surface dams, weirs and rock catchment tanks. The construction of health facilities and schools, tax exemption and the provision of improved grazing facilities in Yatta furrow have also been instrumental, but indirectly, in coping with the deleterious effects of drought and famine. In recent times, the people of the district have received assistance from

the government and non-governmental organizations such as nation Christian Council of Kenya (NCCCK); the catholic relief services; USAID, DANIDA and other individual church and educational institutions.

### **Conflicts, migration and settlements**

#### *Migration*

The 2 maps on pages 18 and 20 of the bundle marked Ref.30.7.72.OLE illustrate clearly the manner in which movements took place in the district. Migration into Kitui came eastwards from Machakos. Some people in central Kitui believed migrations took place from Mwala (Machakos) across the Yatta to central Kitui. It appears that both traditions are true but, that the migrations from Machakos came later when land pressure there precipitated movement eastwards. Other scholars also mention an oral tradition about a stock-keeping people who lived in Kitui before Akamba colonisation.

The principal reason they give for migrating is population increase. Invariably the reason is described as *mengiva matyannisye*; they increase in numbers and split. The Akamba then only needed to occupy the hill niches and increases in the population were not met by expanding into the nearby plains but by fresh migrations to new areas of high ground.

From Miusyani the Akamba moved to the hill complexes of Ikuitha, Kanziko, Mutha and Inyuu until eventually they reached the central block of mountains located in central Kitui. From there migrations went south eastwards towards Mutha and Kanziko where there were Akamba settlements already. Another migratory route went from the central block of mountains northwards through Mutonguni and Migwani hill ranges, reaching as far as the hills which surround Mwingi Range; the other followed the Enziu River eastwards. At Ngugi this migratory path split. One route moved northwards towards the Nthunguthu complex of hills – Mai, Ngomeni and Tolotwa outcrops; the other route turned southwards towards the hill complexes of Imba and Ukasi.

#### *The Akamba, Orma and Maasai (Settlements).*

In the earlier days of the Akamba occupation of Kitui, the pastoral Orma herded their livestock as far east as Mutito hill. In the Nuu location it is said that the Orma once watered their livestock at Mwola water spring at the foothills of the Nuu Range, and there are stones in the vicinity of the chief's camp, which are said to have once been the cooking stones of Orma women. When the Akamba moved eastward from Central Kitui they confronted the Orma and small-scale livestock raiding, usually initiated by the Akamba. The Akamba armoury of bows and poisoned arrows were, if anything, superior to the spears, swords and shields of the Orma. The Akamba military position was strengthened once they had established sizeable communities on the hill complexes of Eastern Kitui. The Orma settlements were scattered and moved frequently as they sought suitable grazing and water for their livestock.

Scholars have distinguished two cultural or ethnic groupings of Maa-speaking tribes: the IIMAasai and Iioikop. The former are the purely pastoral Maasai, and the Iioikop are the Wakwavi or Wakuafi referred to by the earliest explorers. The pastoral Maasai did not engage their 'agriculturally dependent mainly Bantu-speaking neighbours' in a large-scale war but carried out small-scale retaliatory cattle raids during which they burnt down houses. It is believed that the Maasai had a sincere desire to avoid incidents or episodes of human attrition that lead to bloodshed. During the 19<sup>th</sup> century, three major battles were waged by the pastoral

Maasai against tribes of the Iioikop groupings, all ended in success for the former. By 1875, the pastoral Maasai were the undisputed masters of the Rift Valley lowland plains.

Although the Kitui Akamba refer to all Maasai groups as Akavi, they nevertheless distinguish those associated with Mt. Kilimanjaro from those coming from Ngong and Kajiado. When the Orma withdrew from Eastern Kitui their place was taken by the Akavi from Mt Kilimanjaro, who raided Akamba settlements. They came from the south through Kanziko, Enyali, Nguaniwa and Kandolongwe moving in bands of warriors (Moran). The settlements in Eastern Kitui were more scattered and less populated than those of central Kitui, and consequently were the easier targets for raiding parties. The attacks came from the east, and the routes followed by the raiders prevented them from being detected until the last moment. In the more isolated areas around the Engamba hill and Tolotwa outcrop, and around the occasional settlements built on the plains near some rock close to Kaluyu Rock, stockades (mbenge) were built to minimise the effects of surprise attack. Stockades had outer fences of thorns in which broken gourds were hung to warn the settlers of prowlers. Within the stockade there was high ground to which the settler ran when raided.

### *Conflicts*

Whereas the Akamba settlements of Eastern Kitui were the targets of Akavi warriors, in other parts of Kitui the Akavi were more on the defensive. Those of them who frequented central and Northern Kitui came from Ngong and Kajiado with their livestock in search of suitable grazing. They established temporary encampments at places such as Mwakini, Nzalae, and Thitani and as far east as the Nthunguthu River. Usually inter-tribal skirmishes occurred as a result of raids initiated by the Akamba.

The Akamba also fought amongst themselves. Disputes took place between clans and people living in different hill settlements for which a variety of reasons are given: competition over girls, interference with the women and children of other clans, livestock theft, access to dry season wells, etc.

Correspondences contained in the bundle marked Ref. DC/KTI/3/1/4 show various letters written by the local administration barring certain individuals and /or groups of people from entering the Kitui District. In many cases, the reason given for such a restriction is that it would be in the interest of peace in the area. The Somalis, Orma and Wagalla were the most common victims of such restriction. These communities are known to be pastoralists, and the fear seems to have been that they would move in and pose competition for land with the Akamba, who always grew crops on the farms as opposed to grazing.

### **Governance and political organisation**

Political organizations in Kenya in the pre-colonial period took two basic forms. On the one hand, there were the organized jurisdictions of political administration that had clear government structures and recognized administrative institutions. While on the other hand, there were the unorganized societies without any clear political jurisdictions and authorities. Evans-Pritchard (1940) called the former group the state societies and referred to the latter group as the stateless societies. Political organization in Kambaland was under the framework of state societies.

#### *Structures of Governance.*

The Homestead: This was the lowest territorial unit of governance. Its constituent population was the family, and the male head occupied the position of the ultimate decision maker.

However, depending on the issues, other members of the family (extended) could also be involved in decision-making.

**The Chiefs and Village Councils:** This was the highest level of local governance in the pre-colonial period. The Village Councils were constituted of elders who had authority over a number of villages or defined territories. Generally, elders were male members of society who had outstanding leadership qualities or descendants of certain family lineages considered to have legendary leadership abilities.

The major responsibilities of the Village Councils were:

- Protection of territorial boundaries.
- Conflict resolution.
- Making crucial decisions.
- Listening and determining cases.
- Determining community representatives in interactive activities with other communities – a particular example is the frequent decision by the village councils to send out experienced warriors to represent the community in trade activities with maasai and Arab communities.

**Laws:** Generally, laws were the uncodified socio-cultural norms. These provided the framework for individual behaviour. A breach of these laws fetched various forms of punishment usually decided upon by the council of elders under an institution known as *Nzama* (a form of court which decided all cases in the open; there was no superior court). Cases considered very serious were left for the determination of a select group of elders in secrecy. Their decisions were always accepted and endorsed by the *Nzama*.

**Punishment:** For crimes that led to death, offenders were fined in terms of cows and bulls, the number of which depended on the nature of the offence. Those who stole cattle or agricultural produce were actually lynched. In all cases, suspects and witnesses had to swear an oath in public before giving evidence or answering to charges.

## **2.6 Group Discussions (14.00-16.30)**

In the afternoon, participants split into three groups.

### **Instructions for breakout group session on policy linkages**

We break out into groups to discuss the following questions:

How does your policy area relate to adaptation in a case similar to Kitui or Turkana? Share experiences and knowledge.

1. List the relevant policy areas represented in the group
2. Can you identify critical policy lessons?
3. How do these policy areas or policy lessons affect adaptation?
4. How could research results such as those presented in this workshop inform policy processes?

Each group will have a facilitator who guides discussion to ensure that all the above questions are discussed in the group. The group selects a rapporteur who takes notes during the discussions. The rapporteur writes these notes on a flipchart or overhead transparency either as the group discussion proceeds or while the group has a 10-15 minute break directly before the reporting (final session). These group findings are presented in plenary during the final session. The different group findings will be described and synthesized in the workshop report and circulated to all participants for comment within a few weeks of the workshop.

Each group was composed of a mixture of policy makers and researchers.

### **2.6.1 Presentations by the groups**

#### **Group A**

Q1 How does your area of work relate to adaptation as we heard this morning?/ What are the relevant policy areas represented in the group?

- Forest products- how to use local plant and plant products more sustainably
- Natural resource management especially related to land use conflict in Sudan, developing land use maps
- Strengthening local level coping strategies to cope in extreme climate events, especially drylands and drought recovery strategies, access to seeds
- Policy processes, sustainable development/poverty and adaptation to climate change
- Energy and development, causes of climate change , charcoal supply chain in Narok-tenure systems, land use change, diversification away from charcoal to agriculture can result in increased vulnerability to climate
- Environmental policy and especially conflict over resources land in Great Lakes region understanding sources and history of conflicts
- Forests- Forest policy- forest management regimes- government policies denies local communities their livelihoods- need to look at free hold systems where local population involved in planning and forest management and conservation practices in pro-people would like to reform government policy
- Land reform, political ecology, migration, urban livelihoods and links to rural livelihoods

Q2 What important identify important policy lessons can be identified?

- Know what your objective is and what the gaps are and how to meet your objective
- Need to work on policy reform not just implementation
- Can you separate out coping strategies in general to those for climate change-do we need to separate out coping strategies for climate vulnerability to climate change
- Good to understand current and past coping strategies to climate vulnerability in order to apply it elsewhere
- Important to broaden community beyond climate change
- Be aware of cumulative and multiple stress lessons on a community which undermine their coping capacity
- Need to identify the causes for this vulnerability and steer policies towards addressing those
- Can policies be designed to reduce tension over lack of access to vital resources (water) in order to avoid conflicts- water policies or forest policies need to alleviate tensions
- Drylands, because of extreme environment, require different types of policies and should not be viewed as non-productive areas
- Rights to resources in that is forest policy in Kenya rarely devolved to communities
- Who has rights over resources? Based on geography? History, affiliations? On who needs it most/most vulnerable?
- How to scale up policies and reconcile different levels of decision making
- Need for local ownership of policies and plans
- Need to consider all the actors in a land issue i.e agriculturalists pushing out the maasai into smaller areas in fragile ecosystems (who is involved in this government) development partners, private sector
- Lack of recognition of local institutions in resolving conflicts over land
- All relevant stakeholders need to be involved; marginalized groups, women and need to look at effectiveness of their participation, what role do they play and weight do they carry? Need info from the field/ ground flow upwards into higher level decision making
- Policies need to address root causes rather than band aids- i.e food aid dependency.

### Group B

Q1 How does your area of work relate to adaptation as we heard this morning?/ What are the relevant policy areas represented in the group?

- Disaster management and increasing adaptation and coping mechanisms
- ASAL Policy
- Forest Policy
- Local government Policy
- Environmental policy
- Agriculture and livestock policy
- Land policy
- Human settlement policy
- Poverty reduction strategy

Q2 What important identify important policy lessons can be identified?

- Good policies but lack of implementation: No institutional capacity, lack of political will, unclear institutional arrangements
- Disconnection between research and policy

- Only environmental policies talk about climate change
- No thorough research for solving climate change problems
- Lack human and financial capital
- No intersectoral consultation
- Outdated policies
- Lack of participation of stakeholders

#### Q3 Further policy lessons for integrating adaptation

- Adaptation is accidentally integrated in policies
- No planned integration of impacts of climate change
- Adaptation looked at on short-term basis
- Current adaptation policies do not provide opportunities for diversification
- Adaptation to climate change is poorly researched

#### Q4 Linking research to policy

- Research must be relevant and appropriate
- Packaging and dissemination to be improved-policy briefs
- Research needs to add value to peoples lives
- Need to recognize role of communities
- Where does policy enter decision making processes (entry points)

### Group C

Q1 How does your area of work relate to adaptation as we heard this morning?/ What are the relevant policy areas represented in the group?

- Disaster relief systems and climate change
- Water resources and climate change
- Land use change and climate change
- Drought vulnerability and livelihood
- Environment and development
- Vulnerability to climate change and climate variability (Local adaptation)
- Environment and culture
- Interface: climate change and development 9few knowledge of existing capacities into negotiations

#### Q2 and 3 Policy lessons/adaptation

- Need to get this information about coping and resilience to policy makers globally and locally
- We need long-term planning and focus instead of rapid responses
- Plan for mobility instead of controlling mobility
- We must create opportunities around mobility and invest in the environment (water , grazing, services) in a way that facilitates mobility needed for adaptation to climate variability
- Land tenure- recognize different kinds of land tenure systems-property rights
- Improvement in infrastructure
- Get policy makers to accept climate research results
- Target technical people in the ministries

- Scientists learn to communicate at the popular level?
- Donor should require government agencies to use existing expertise and wide scientific base plus consultation as a condition for funding
- Give better incentives to researchers to policies and target policy makers
- Integrate policies and sectors relevant to vulnerability
- Ensure state function of security effectively assists vulnerable people in insecure areas
- Policy briefs summarizing research findings for policy maker
- Community briefs—for comments to push leaders- written/ oral/local languages
- Short conferences- disseminate
- Pilot project and activities
- Target research to inform policy
- Practitioners and researcher to link up on the ground and apply results before policy change

### **2.6.2 Discussion**

In the discussion of group presentations, a number of points were raised by the participants: There was agreement that work done in other areas could make useful contribution to adaptation to climate change in the study areas. Consensus is developing and people are accepting that climate change is taking place. Knowledge generation for adaptation must start from the communities and institutions in the south if it is to be relevant and appropriate.

Mr. Richard Muyungi said that there is a global consensus that the climate is changing. The problem faced is reaching the policy and decision makers with this understanding. Communication to policy makers is important (ie education, awareness and training) hence the need to translate the information collected to forms that decision makers can better understand. Awareness raising should even be carried out in primary schools. In this regard, it would be easier to focus on the effects of climate change/variability ( ie what people experience) as causes might be theoretical and difficult to understand.

Dr Daniel Olago of the University of Nairobi underscored the need for policies that may support growing of indigenous crops (e.g. millet in Ukambani that was used for brewing) and the need to translate research into policy language. With regard to making the results reach end-users, acceptability by the farmers is important.

Dr Siri Eriksen wanted to know the entry point for researchers in influencing policies. Mr Muyungi responded that it is better to target the highest levels possible e.g. parliamentarians. He gave the case of Tanzania as an example where MPs after being sensitized demanded to know what the Ministry of Environment was doing on climate change. The biggest challenge is translating policy statements and research findings into legislation and actions that may bring some change on the ground ie implementation on the ground.

## **2.7 Day 2, Regional perspectives: Overview**

The second day focused on adaptation to climate change initiatives at different levels.

### **2.7.1 Overview of climate change adaptation**

The first to present was Dr Saleemul Huq of IIED on climate change negotiations and funding mechanisms. He started by talking about the evolution of climate change issue in 3 inter-linked domains: in terms of the science and the UN Intergovernmental Panel on Climate Change (IPCC); in terms of intergovernmental negotiations and the United Nations Framework Convention in Climate Change (UNFCCC); and in terms of international public awareness and politics-such as the recent G8 meeting in Davos.

UNEP (United Nations Environment Program) and WMO (World Meteorological Organisation) took the initiative to the first IPCC assessment. The first assessment came out in 1990 and showed the importance of climate change, leading to the 1992 UN Framework Convention on Climate Change. The second assessment came out in 1995 and the Kyoto Protocol for emissions reduction was agreed in 1997. The third assessment came out in 2001, observing that climate change is attributed to human activities. The Fourth Assessment is currently ongoing and is coming out in 2007.

Climate change is important to local communities in climate risk areas. Not every local community is vulnerable to climate change (e.g some urban areas may not be very vulnerable). Only in climate – risk areas does climate change need to be considered initially (such as flood prone or drought prone areas). Priority (as defined by UNFCCC etc) are the Least Developed Countries (LDCs). These are the 49 poorest countries, mostly in Africa but not including Kenya, and the Small Island Development States (SIDS, totaling 42 countries – some overlapping with LDCs, such as Fiji and the Maldives).

Climate change adaptation funding:

There are three funds for climate change adaptation activities. First, the LDC fund encompasses LDCs only, to fund the development of National Adaptation Plans of Action (NAPAS).

Second, the special climate change fund includes all developing countries; but is not yet operative. It may include \$ 100million/yr

Third, the GEF adaptation fund includes \$ 50 million over 3 years of which \$ 5 million to shape fund (already operational in Kenya).

There are also bilateral and multilateral funds, for example GDA- by India and Vietnam. UK aid, DFID, will fund research in climate change and development from 2006 (3 year cycle)

Conclusions:

Communities already at risk to climatic impacts are also at risk to climate change. Research, practice and policy communities who already deal with or work with the LDC countries and issues need to take notice of climate change issues. The challenge is the need to learn about new issues. The good news related to the process is the potential new sources of funding (for actions and policies).

## **2.7.2 Capacity Strengthening in the Least Developed Countries on Adaptation to Climate Change (CLACC)**

Victor Orindi of ACTS gave an overview on CLACC (Capacity strengthening in the Least developed countries on Adaptation to Climate change). He explained how the project is being administered in phases. The first round included four fellows from four southern organizations (ACTS, BCAS, ENDA and ZERO) visiting four northern institutions (CICERO, IIED, SEI-Oxford and PIK-POSTDAM respectively) for a period of two months. The outputs from the visits are regional and country reviews on mainstreaming adaptation to climate change. The reports will come out before end of February, 2005.

In the second round, the regional coordinating partners (ACTS, BCAS, ENDA and ZERO) will be hosting three fellows each from three LDCs in their regions for a period of six weeks. CLACC aims at contributing to the NAPA Process and other climate change initiatives in the Least Developed Countries.

## **2.7.3 Presentations on National Adaptation Plans of Action**

Mr Muyungi and Nadir Awad presented on the NAPA process in Tanzania and Sudan respectively. In both cases, they have held workshops and now consulting with other stakeholders. Muyungi said that most of the national communications emphasize mitigation of greenhouse gas emissions rather than adaptation. NAPAs are therefore aimed at identifying urgent adaptation needs of the LDCs. Muyungi's slide presentation is available at <http://www.cicero.uio.no/workshops/Vulnerability-2005/> and outlined below in section 2.7.3.1.

The presentations noted a number of challenges faced by the NAPA processes. Challenges include getting the necessary documents, as well as awareness creation. Agricultural research institutes are still not clear on the likely impacts of climate change. Health personnel still view climate change as something not directly linked to their sector making it difficult to carry out any assessment. There is need for these assessments to synchronize the information from the Poverty Reduction Strategy Papers (PRSPs) as well. Policies that are specifically geared towards climate change are lacking in a number of countries except for in national environmental legislation. The legal and regulatory framework for implementing the policies is still lacking.

### **2.7.3.1 Outline of Mr. Muyungi's presentation: NAPA in Tanzania**

What is at stake for LDCs and many African countries in the climate change arena?

- Minimum contribution to mitigation
- Inevitable victims of adverse impacts as they unfold
- Potential for significant interruption of development process
- Already poor adaptive capacity makes them highly vulnerable- less resources, less participation in decision processes (Floods in Mozambique; melting of mount Kilimanjaro)
- NCs address some adaptation needs, but emphasizes on greenhouse gas accounting

Mozambique floods in 1999-2000 and 2000-2001 wet seasons highlighted the need for urgent action, and the need for a mechanism for communicating those needs.

### **NAPA: Goals and Objectives**

- The goal of NAPA is to lay out a plan of action about how to build capacity to adapt to climate change and how to enhance coping strategies to adverse impacts of climate and climate change
- An important characteristic of NAPAs is the emphasis on **rural communities**, and the **use of traditional knowledge** about **coping strategies**, and the need for the process to be **bottom-up** so it can capture most important vulnerabilities of stakeholders
- Given the existing emphasis on reducing poverty as a major development strategy, NAPAs would contribute to poverty reduction as a means for building up communities to advance socially, economically and in the face of a changed climate
- Critical for NAPAs to including major stakeholder groups, and to be coupled to national development plans and activities

### **Why NAPA**

- Low adaptive capacity of LDCs to adverse impacts, renders them in need of immediate and urgent support to start adapting to current and projected adverse impacts of cc
- Activities proposed through NAPA would be those of which further delay would increase vulnerability and worsen impacts, or lead to increased costs at a later stage
- NAPA document need to communicate their urgent and immediate needs relating to adaptation to climate change
- Desirable for this document to be brief, easy to produce, and concise and also to highlight critical needs for immediate action

### **Process of NAPA: Principles**

- The NAPA would be guided by the following:
- Participatory approach, Complementary approach (building upon existing plans and programs), Sustainable development, Gender equity, Country-driven approach, Environmental protection, Simplicity

### **Structure of NAPA**

- To be a brief document with the following elements
  - Introduction and Setting
  - Framework for Adaptation Programme (nature of climate change pressures, adaptation processes and limitations)
  - Identification of Key Adaptation Activities
  - List of Potential Projects (long list)
  - Selection of Priority Activities (short list)
- Brief Project Profiles showing:
  - Title; Justification; Brief Project Description; and Implementation

### **The Challenge: Selection of Priority Activities**

- Priorities should be those that:
  - Avoid **loss of Life** and livelihoods
  - Avoid deterioration of Human health
  - Ensure Food security and agriculture activities
  - Safeguard Water availability, quality and accessibility
  - Protect Essential infrastructure

- Protect Cultural heritage
- Conserve unique biological diversity
- Do not adversely impact Land management
- Ensure other environmental amenities
- Contribute to social-economic factors, especially poverty alleviation and sustainable development

#### **TANZANIA: Approach**

- NAPAs will communicate priority activities addressing the urgent and immediate needs and concerns of Tanzania relating to adaptation to the adverse effects of climate change in the priority Sectors
- Sectors: Health, industrial, coastal and marine, fresh water bodies including dams, forestry and landuse, wetlands, agriculture and livestock, wildlife, infrastructure and settlements
- The rationale for the approach is justified by the vulnerability of the selected sectors and the implications to economic growth and human survival which renders them in need of immediate and urgent support to start adapting to current and projected adverse effects of climate change.
- The intention is to avoid further delays that could increase vulnerability or lead to increased costs at a later stage.

#### **NAPA in Tanzania**

The Team has a total of 18 members who are divided into different sectors with team leaders of each Sector

They are in five clusters:

- Agriculture, Forestry, wildlife and livestock Sector.
- Transport, human settlements, tourism and lands sector.
- Coastal and marine, freshwater bodies including wetlands sector.
- Energy sector
- Health and industrial sector.

The second step which covers the synthesis of available impacts assessments, coping strategies, past consultations, trends and existing development frameworks was done within these clusters.

#### **The process**

The steps included:

- synthesis of available information through NAPs, NBSAP and pre WSSD consultations
- Available related policies, strategies, such as NEP 1997, Nat. Land Policy, 1995, Human Settlement Policy 2000, National Transport Policy, 2003, Land Act and Village land Act 1999, Rural Devpt Strategies, Agricultural Sector Development Strategy, Vision 2025 and the Draft EMA,
- Production of synthesis sectoral reports
- Consultations with key stakeholders within the sectors

#### **Synthesis of available information: Challenges**

- Availability of important references and documents from the various sectors
- Inadequate awareness amongst the people being consulted
- Availability of Consultees/experts

- Synchronizing Information from sectors with ongoing processes which have impacts on NAPA e.g PRS process. The finalization of such process will impact on the final outcome. NAPA priorities must be consistent with PRSP priorities
- Lack of specific policy statement focusing on the adaptation to climate change except for the NEP
- Many of the reviewed policies are yet to have legal and regulatory framework in place for supporting their implementation, were the NAPAs could be aligned at the later stage

### **Conclusions**

- The programs and plans reviewed provide details and a good basis for the next steps
- The sectoral synthesis reports consistent with prior work on V&A and a good basis for project identification
- Available information is adequate but there is a lot of ongoing studies and process which might warrant the reconsideration of some of the findings and conclusions in these key sectors as we go along

### **2.7.4 Discussion**

Dr Benito Müller reiterated the fact that climate change is not an environmental problem but that of the whole economy. Government economic and finance departments need to realize that climate change will affect countries' economies and not the environment alone. Dr Siri Eriksen wanted to know the steps in the NAPA Process where research teams could contribute most while Dr Kandji Serigne wondered whether there is funding to implement the NAPAs once they are done.

Dr. Sumaya Zaki-Eldeen wanted to know why CLACC started late considering that NAPAs are almost bring finalized. She alluded to the fact using CO<sub>2</sub> emissions when comparing capability and responsibility with regard to climate change is confusing. Dr Müller responded that finding more precise indicators is still going on. But assigning responsibilities to climate change is the main problem. Dr Huq responded that contribution in the NAPA process was just one of the objectives of CLACC but since impacts of climate change will be felt for a long time, the project still has a role to play in strengthening adaptation to climate change initiatives for example in the implementation of the NAPAs.

Mr Muyungi said that research institutions are key members of the NAPA team to provide understanding of the work done. Their involvement in the various stages make analysis and synthesis of the work easier. The research networks are important especially when it comes to the consultation stage. Research done at the national level need to be added to the NAPA process.

Regarding funding, he said there is a feeling that activities meant to address land degradation should be considered by the GEF. Getting funds for the implementation of the NAPAs is still being sought and negotiators are currently working on this. He was of the opinion that money for implementation of the NAPAs should not be used for mainstreaming as suggested currently by the GEF. Research institutes are also currently represented in the technical teams. Paul Ogungo pointed out that it was important to link seed money with internal sources of funding for implementation of the NAPAs and not just rely on external funding.

Another question was raised regarding the relationship between climate change and Millennium Development Goals (MDGs). Climate change and MDGs how are these being mainstreamed in the LDCs?

Muyungi said that NAPA originated from the recognition by the international community of the low capacity of LDCs to cope with impacts of climate change. Funding for LDC to deal with vulnerabilities should therefore be guaranteed. On MDGs, he said that they do not factor in the disruptions of climate and setbacks that may come from climate change. NAPAs will address immediate and urgent needs hence contributing to the achievement of MDGs.

External funding for NAPAs exists because it is an intergovernmental process bringing governments/parties together. The intergovernmental process guides the process. Funding being sought are those under these commitments. LDCs are doing measures regarding adaptation but need additional support to implement these. Both MDG and NAPAs aim at achieving sustainable developments. In terms of negotiations at the international level, it was agreed that LDCs do not have prior proper consultation at the national level. Most developing and least developing countries usually do not have positions before big climate change meetings or negotiations. Countries should be assisted to develop their positions before negotiations.

### **2.7.5 European Capacity Building Initiative: A Matter of Equity, Capacity, and Trust**

Dr Benito Müller of OIES, Oxford presented on equity, capacity and trust in the climate change issue. The slide presentation is available at <http://www.cicero.uio.no/workshops/Vulnerability-2005/> and outlined below.

#### **2.7.5.1 Outline of Dr. Müller's presentation**

##### **A Matter of Trust and Equity**

*The Issue of Developing Country 'Participation'*

Kyoto's entry into force will trigger a flow of aid to help the developing world tackle its emissions problems, U.N. officials say.

And the example of legal obligations on richer countries could also make it easier to bring big developing-world polluters India and China into the fold, [UNEP head Klaus] Toepfer said.

'We specifically and clearly refuse to open at this time any dialogue or process or indeed any wording that could be in any way interpreted as accepting to open discussions on new commitments on non-Annex I countries'

Venezuela on behalf of G77+China, COP8

*The Principle of Common but Differentiated Responsibilities*

*Acknowledging* that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions,

##### **A Matter of Capacity**

Negotiation Capacity: Average COP-Participation

Negotiation Capacity: Aggregate LDC Delegations

Negotiation Capacity: Institutional Memory.

Analytic Capacity: The ETSAP MARKAL Example

Analytic Capacity: FCCC Accredited NGOs

Analytic Capacity: CAN Membership

Based on material available from: [www.OxfordClimatePolicy.org](http://www.OxfordClimatePolicy.org)

## Outline of the ECBI

### *Two Main Aims*

- To move forward the international climate change negotiations by supporting delegates and other stakeholders from targeted developing countries to enhance their capacity for participating effectively in the FCCC negotiations.
- To generate trust by bringing together developing country stakeholders with their European counterparts in the context of these capacity building activities to foster better mutual understanding of each others' positions and constraints.

### *Three Key Target Groups*

- Regional G77+China leaders: Brazil, China, India, and South Africa.
- Advanced Developing Countries ADCs: in particular Korea, Mexico, and Turkey.
- Group of Least Developed Countries LDCs: in particular, but not restricted to, Bangladesh, Comoros, The Gambia, Senegal, Uganda Tanzania and Yemen.

### *Programmes and Activities*

The activities of the ECBI are divided into three programmes

The Senior Fellowship Programme: Senior Fellowships will be awarded to policy makers, negotiators and other stakeholders (from the participating developing countries), who are directly involved in the UNFCCC negotiations. By organising personal interaction with the participating European government partners, the SFP is intended to be a key **trust-building** element of the initiative. The training element of the SFP will, in particular, involve non-technical quantitative assessments.

The Workshop Programme carries out **capacity building for groups** of the targeted stakeholders (initially focusing on the Group of Least Developed Countries LDCs). This will be achieved mainly through workshops that will among other things serve as platforms for informal exchange of views between DC participants.

The Policy Analysis Programme: The purpose of the Policy Analysis Programme is to build in-country **analytic capacity** through collaboration between ECBI experts from across Europe and their developing country colleagues. The initial focus is on two Policy Analysis Projects on Building Technical Quantitative Capacity (particularly in Advanced Developing Countries and on Least Developed Countries, respectively). Apart from building analytic capacity, the projects are designed to **inform and be guided by domestic policy makers**. As such, they also have an integrated role in the Senior Fellowship training.

## 2.7.6 Assessment of Impacts and Adaptation to Climate Change (AIACC) – Research Results and Challenges

Dr Daniel Olago of University of Nairobi presented findings on Climate change, Malaria and Cholera in the Lake Victoria Basin, a study that forms part of the AIACC project. The AIACC research found occurrence of Malaria in the highland areas (e.g. Kericho) where it previously did not exist. This is a confirmation that climate may be changing. The slide presentation is available at <http://www.cicero.uio.no/workshops/Vulnerability-2005/> and outlined in section 2.7.6.1.

In reaction to the presentation, Dr Mahendra Kumar of UNEP felt that a lot more needs to be done in terms of identifying adaptation strategies. He wondered whether there are strategies that may prevent large scale-onset of malaria and the possibility of re-introducing DDT which is effective in controlling malaria but is currently banned?

Dr Daniel Olago responded that the strategy of dealing with malaria is largely reactive since this is a new disease in the highland areas, therefore there is no adaptation. There are no

strategies for destroying breeding grounds especially cattle foot tracks which are almost everywhere. Mosquito causing malaria usually bite at night (between 9pm and 4am mostly) - a reason why some groups staying indoors for most of the time (e.g women and children) are more affected than men. He also said that DDT has been found to degrade fairly fast in the tropical areas hence debate still going on as to whether it may be reintroduced for purposes of controlling malaria. Regionally a 1°C temperature increase is being seen; but in Kericho, they are seeing a 3°C increase an indication of changing climate. This may be partly attributed to land use change as well.

Dr Kandji Serigne felt that children need to be given priority over the use of nets as this is the age group that lacks immunity to malaria, not the old people who often use the nets. Some households also lack beds where the nets can be used. Family planning should be encouraged to ensure that households have only the number of children they can provide for. Another option (default scenario) is to expose the people so that they may develop immunity.

The workshop was concluded with a thank you note from Victor Orindi and Dr Siri Eriksen.

### **2.7.6.1 Outline of Dr. Olago's presentation**

#### **Climate Change, Malaria and Cholera in Lake Victoria Basin Capacity Building to Evaluate and Adapt to Climate Change-Induced Vulnerability to Malaria and Cholera in the Lake Victoria Region**

##### **AIACC - PROJECT AF91**

##### **Lake Victoria Basin sites**

Kenya: Kericho (malaria) and Kisumu (cholera).

Tanzania: Bugarama village, Muleba District (malaria) and Chato Village, Biharamulo District (cholera).

Uganda: Kasese, southwest Uganda (Malaria) and Gaba, Kampala (cholera).

##### **Objectives**

- To analyse climate variability in temperature and rainfall extremes in relation to reported and documented malaria and cholera outbreaks in order to establish the coupling sensitivities and critical climate thresholds.
- To determine socio-economic profiles and activity patterns of the target groups as factors that influence their vulnerability, and adaptations strategies.
- To build capacity of institutions and scientists in the region to conduct climate variability and change, vulnerability and adaptation research.

##### **Background on malaria**

- Transmission of most vector and water borne disease has seasonality and is associated with variation with rainfall and temperature.
- The intensity of transmission is regulated by the weather and the climate
- Rainfall in general affects the availability and suitability of disease habitats
- Temperature affects the rate of vector and pathogen development and also the vector blood-feeding rates.
- Temperature also affects the suitability of habitats for disease reservoirs

##### **Temperature changes**

- Both lowland and highland sites show increases in Tmax and Tmin over the various period lengths of the temperature datasets.

- Of note is the marked increase in Tmax (3.6°C) in Kericho
- The results concur with previous studies that determined an increasing trend in Tmin and Tmax over the majority of East Africa, with a few stations along Lake Victoria shoreline showing decreasing Tmin or “no trend” characteristics

#### **Rainfall patterns - local**

- High Tmax years within the Lake Victoria region as a whole are associated with El Niño occurrences, strongly suggesting that positive excursions in maximum temperature are significantly linked to El Niño Southern Oscillation (ENSO)/Indian Ocean dipole reversals.
- The Kericho site appears to have its own peculiar microclimate whose influence sometimes overrides the more regional temperature enhancing or cooling effects of El Niño and La Niña
- The observed heterogeneity in the rainfall patterns around Lake Victoria may be partly accounted for, to varying degrees, by a combination of factors such as differences in topography and aspect, changes in land use, the influence of Lake Victoria, and land-ocean interaction

#### **Hydrology - Kericho**

- For the Kericho area, Kenya, highest flows in Sondu-Miriu River occur in the six months from April to September.
- Peak river discharge lags two of the three observed rainfall peaks (April and August) by one month, but is coincident with the rainfall peak in November.

#### **Temperature, rainfall and malaria**

- The most significant anomalies in temperature and rainfall were observed during the El Niño period of 1997/98 following which there were severe malaria outbreaks.
- In all cases seasonal malaria outbreaks were associated with anomalies in temperature.
- For example, anomalies at Kericho in the mean monthly maximum of 2.2-4.5°C were observed between January and March 1997 and 1.8-3.0°C in February –April 1998.

#### **Relationships: Climate, Hydrology and Malaria**

- The observed increase in temperatures has probably enabled malaria vector mosquitoes to find new habitats in the highlands.
- Malaria epidemics often occur from the months of July to September
- There is a one month lag between the peak rainfall and the peak river flow - since peak rainfall occurs in April, there is a minimum two-month lag between the peak rainfall and the epidemics
- The two-month lag between peak rainfall and the onset of the epidemics can largely be accounted for by the one month lag in peak streamflow, and the physiological factors related to the development of the malaria larvae into full grown adults (which require 2 to 3 weeks)

#### **Vulnerable communities**

- Communities living at altitudes above 1,100m asl have added risks of malaria disease due to climate variability and change, lack of immunity, and poverty.
- The observed climate and hydrologic patterns show a higher disposition to malaria epidemics in the highland communities of East Africa.

- The use of ITNs is not very widespread due to high poverty levels - often children had no protective nets
- The proportion of household members sleeping under a bed net increases with increase in average income
- Additionally, the poor are further disadvantaged by their inability to access medical treatment and lack of health care facilities during such epidemics.
- Due to poverty and inadequate, or lack of, early warning mechanisms, the communities lack effective strategies for coping with climate-induced shocks such as disease and weather extremes.

#### **Adaptation mechanisms – I**

- The strategies aimed at rolling back malaria need to be specifically tailored to suit the varying requirements of the affected communities – not many use nets

#### **Adaptation mechanisms – II**

- The respondents indicate that in the likely event that a malaria epidemic does occur then in order to cover the cost of treatment, the majority (75.5 per cent) sell their food crops.
- Other ways of coping include borrowing or relying on remittances from relatives.
- In Kabale a number of people have resorted to selling land in order to cope with cost of malaria treatment.
- The stated coping mechanisms deplete respondents' resources and may lead to increased food shortage, debts and poverty.
- It is therefore not surprising that more than half of the respondents indicate that they find the cost of treating malaria to be high.

#### **Adaptation mechanisms – III**

- One of the objectives of the “Roll Back Malaria” program requires early disease diagnosis and treatment. This presupposes the availability and accessibility of properly equipped and functioning health facilities.
- Most visited hospitals that are the best equipped and best manned.
- respondents report that they sometimes prefer private clinics because they provide a quicker service, unlike public health facilities that are often over-crowded.
- The medical and support staff in public health facilities are also considered generally unfriendly

#### **Adaptation mechanisms – IV**

- Long distances to public hospitals, poor infrastructure and high transport costs results in their limited usage by rural based communities.
- Many people resort to self-treatment or to traditional medicines.
- Public hospitals are also perceived as providing low quality health care and it is believed that traditional remedies are effective in treating malaria.
- Thus, among the adaptations to highland malaria has been the use of traditional curative measures (using local herbs as insect repellents or antimalarials).
- Most of these anti-malarial herbs could as well treat other diseases.

#### **Conclusion**

- climate change has altered the climates of the highland areas of East Africa, and this has resulted in malaria epidemics in the highland communities of East Africa.
- These communities are vulnerable due to climate variability and change, lack of immunity, and poverty.

- The abilities of these communities to cope are strongly challenged by these factors.
- Since the effect and intensity of the disease is very closely associated with poverty, its eradication is essentially linked to poverty alleviation and thus in our view it deserves the unique title of a “political disease” despite the fact that it is at the same time a medical challenge.
- It has been proposed that private expenditures for treatment and prevention, increased urbanization, and increased funding for government control can reduce malaria transmission
- It is clear that under the current economic environment, the three east African countries are ill placed to react in such a manner.
- In the face of recurrent climate disasters, the East African governments have been unprepared and are consequently reactive, slow and late in their response. Such strategies exacerbate the impact of climate-induced diseases such as malaria.
- There is an urgent need to develop sustainable adaptive strategies and early warning systems that will address future climate changes challenges.
- Combined efforts that improve adaptation to climate change, early warning systems, knowledge of disease, medical health infrastructures and services provision, and household socio-economics would reduce the existing malaria situation in East Africa.

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### **3 Kitui Workshop: Endau Hilltop Forest Research Dissemination**

#### **3.1 Workshop programme**

**Endau Hilltop Forest Research Dissemination:  
Climate adaptation as a livelihood struggle: Conflict and vulnerability among dryland populations in Kenya**

**Held at Kenya Forestry Research Center, Kitui Regional Centre, 14 February, 2005.**

|                     |   |
|---------------------|---|
| SESSION 1:          | OPENING   |
| 8.00 – 8.30 AM:     | Arrival and Registration  |
| 8.30 – 9.00 AM:     | Welcome<br>Opening remarks by Centre Director, James Kimondo KEFRI – Kitui<br>Overview of the workshop, by Bernard Owuor  |
| SESSION II:         | PRESENTATIONS   |
| Chair:              | District Development Officer  |
| Rapporteur:         | District Forest Officer/District Culture and Social Services Officer  |
| 9.00 – 9.20 AM:     | Overview of Endau Hilltop research project, by Siri Eriksen   |
| 9.20-10.00 AM:      | Results of Socio-economic Surveys - Communities living around Endau Hilltop Forest: Climate change, conflict and coping strategies, by Siri Eriksen, Bernard Owuor and Wycliffe Mauta |
| 10.00 – 10.30 AM:   | Results of Ecological Surveys - Endau Hilltop Forests: Its Contributions to the Local Communities by Francis Gachathi and Jared Amwatta Mullah  |
| 10.30 – 11.00 AM:   | QUESTIONS/ANSWERS   |
| 11.00 – 11.20 AM    | TEA BREAK   |
| SESSION III:        | PLENARY DISCUSSIONS AND FEEDBACK  |
| Chair:              | District Agriculture Officer  |
| Rapporteur:         | DO – Mwitika/District Environment Officer   |
| 11.25 AM– 12.55 PM: | Plenary discussion  |
| 1.00 PM – 1.30 PM:  | Recommendations and way forward   |
| SESSION IV:         | CLOSING   |
| Chair:              | Centre Director, KEFRI – KITUI  |
| Rapporteur:         | Wycliffe Mauta  |
| 1.35 – 1.40 PM:     | Closing Remarks by Project Leader   |
| 1.40 – 1.45 PM:     | Closing Remarks by Chief Endau Location   |
| 1.45 – 1.50 PM:     | Closing Remarks by DO, Mwitika Division   |
| 1.50 – 2.00 PM:     | Closing Remarks by DC, Kitui District   |

## **3.2 Overview and background**

### **3.2.1 Opening remarks, by James Kimondo, Centre Director, KEFRI – Kitui Regional Centre**

He started by saying the Endau hill is very important for the people of Endau and is an highland on its own, surrounded by dryland on the plains. He said when people of Endau are in problems, even people Kitui town will be also in problems. He welcomed all who are here to contribute their ideas and opinions in this workshop for the betterment of Endau people.

### **3.2.2 Introduction of the workshop, by Bernard Owuor**

Bernard Owuor introduced the Endau hilltop research project, briefly mentioning that it started January 2004, the first and the second phase of the project taking place in August 2004 and February 2005. He said that two teams who are involved in the research, one team conducting socio-economics survey on the areas surrounding the hill (Siri Eriksen, Bernard Owuor and Wycliffe Mauta) and the other doing the vegetation survey at the hill (Francis Gachathi and Wycliffe Amwatta). Siri Eriksen is from the University of Oslo and Jared Amwatta comes from the Kenya Forestry Research Institute (KEFRI) - Kitui Regional Centre, while the rest are from KEFRI Headquarters, Muguga.

Bernard Owuor talked about the hill and how the participants can interact in this workshop and bring up our contributions in form of ideas and opinions, form discussion groups and bring up points that can assist in development of Endau people as a community and how the Endau people can utilize Endau hilltop resources sustainably. At the end of the workshop the participants are expected to provide recommendations on the way forward how the hill can be used and sustainably be utilized by the local community in way that will benefit them in a proper way.

### **3.2.3 Overview of Endau Hilltop research project, by Siri Eriksen**

Siri Eriksen gave an overview of the project entitled “Climate Adaptations as a Livelihood Struggle: Conflicts and Vulnerability among Drylands Populations in Kenya”. The slide version of this presentation is found at <http://www.cicero.uio.no/workshops/Vulnerability-2005/>.

The research was conducted in last year 2004 in August and also this year 2005, in February. Data analysis and reporting are now the main tasks. The project is funded by the Research Council of Norway. The research project is ending October 2006, with a final research meeting planned for that time.

Those who are participating in the project are: Department of Sociology and Human Geography (leading project), the Center for International Climate and Environmental Research - Oslo (CICERO), and The Ethnographic Museum (University of Oslo) all of University of Oslo, King’s College London, Kenya Forestry Research Institute (KEFRI), and the African Centre for Technology Studies, Nairobi (ACTS).

Climate research suggests that global temperatures are rising and will continue to rise. The experience we gathered from Endau people is that the temperature are going up and also rains have decreased with time and also rivers are drying up, areas where they used to have springs

have dried up. The objective of the project is to see how people are coping and adapting to these climate changes and how the resources found in Endau hill can be utilised sustainably by the community and we are also looking at how conflicts are affecting the way that people adapt to climatic changes as well as the way that people are using the resources of the hill.

The results from this project will be used to help the locals especially when policy are made to have these results in their minds and incorporated in the policy when they are being formulated.

We want to thank the administrators and the people of Endau and especially our assistants David Kakee Mutava, Nzuki Mwaka, Mutie Mang'ethwa for facilitating and contributing to the research.

We also thank KEFRI very much for facilitating the research and hosting the workshop.

### **3.3 Results of Socio-Economic Surveys - Communities living around Endau Hilltop Forest: Climate change, conflict and coping strategies, by Siri Eriksen, Bernard Owuor and Wycliffe Mauta**

This section summarises the presentation, the slide version of which is found at <http://www.cicero.uio.no/workshops/Vulnerability-2005/>. The findings are also written up in a paper, found in section 3.4.

#### *Historical perspectives*

The people of Endau migrated from Machakos, Mutha, Nguni, Mui, Nuu and Voo. Those who came first came in 1895 and those who came later followed their relatives and clansmen. The main thing that made them to move were water and pasture for their domestic animals. They started going up the hill in 1930's and in 1948 they were evicted from the hill by the colonial District Commissioner, Mr. Kelly. They were allowed to return in 1966, after independence. In 1960, the hilltop Forest was gazetted and in 1984, the forest boundaries were reviewed. In 1996 the people were evicted again from the hill. Some of those who were evicted got their land back and others never got back their former land. Many of those who never got their land back are landless upto date.

#### *Activities of the people of Endau:*

The hill is very important for the people of Endau especially during dry season. The microclimate is enhanced and people get water from the springs originating from the hill. They get wild fruits from the hill and sometimes they hunt wild animals from the hill as one of the coping strategies. They also take animals to graze in the hill during the dry season.

#### *In wet season:*

Animals are moved to Ngwaniwa where water and pasture is available. People cultivate and plant crops.

#### *During dry season:*

- People do casual labour
- They dig shallow wells in the dry river beds.
- They make bricks and sell.

- They gather forest products, such as honey, fruits and do weaving as one of adaptive strategies of coping with extreme dry seasons.
- They hunt wild animals
- They rely on remittances from relatives and friends.

The Endau hilltop creates a micro-climate that allows for farming in the areas surrounding the hill which are more productive than the areas which are far from the hill. There are more rains around the hill than in the surrounding plains due to the orographic advantage of the hill. There are water sources in the hill example Itiani, Kausya and others. The activities that are carried out in areas around the hill include the following:

- Grazing
- Harvesting of forest products eg fruits, poles, herbs etc.
- Hunting of wild animals for meat
- People cultivate near the foot of the hill.
- The hill has cultural values such as being sites for sacrifices.

In summary the hill is important for the people of Endau.

#### *Conflicts*

We identified various types of conflicts as outlined below:

- There is conflict between the community and forest department over the use of the hill.
  - o When people were evicted from the hilltop they were not happy.
  - o Lack of access to the forest products
- There were several raids by Somalis between 1970-1999.
- Recently there were conflicts between Akamba's, Somali's and Oroma's over water and grazing land. There are also conflicts between the Akamba themselves over land boundaries and water sources.
  - o Those who went uphill when they came back never got their land back and there is a lot of conflicts and some of them are even landless.
  - o There is conflict over water pipes and maintenance equipment (diestock), between Ikisaya and Kathua people.
  - o Conflicts between those who support Somali's and those who do not want them.
  - o There are conflicts between Christians and those in the community who value cultural values eg. Sacrifices on the hill for the Gods of the hill. Several pictures were shown covering the watering shallow wells at Twambui phase and pictures showing Somalis watering their camels in those wells.

#### *Conflicts on eviction from the hill and its effects*

- Increased famine
- People become landless and a lot of migration during dry season (grazing and accessing forest products).
- No access to clean drinking water from the hill.
- Raiding by neighbouring communities led to loss of life and increased fear.
- Loss of properties, long term destitution and reduction of livestock.
- Some people left their land and found themselves without land and homes.
- Other people have fear of going back.

#### *Conflicts of people of Endau themselves and the effects*

- Unequal land accessibility, big clans have more land than small clans.
- Leadership and decision-making in water projects, e.g. one clan dominating in the representation on the water project committee.

- Access to grazing and water wells for the most vulnerable threatened by renting out of these resources to Kamba and Oroma/Somali pastoralists with big purchasing power.
- Increased economic differences within the community – some people benefiting other losing.

*The vulnerability of the landless*

- Those who lose their land get very small plots to cultivate which they are lent/given by other neighbors on sympathy grounds.
- The poor are most vulnerable
- Others who are most vulnerable are the women – they cannot own land, wells, and even livestock and sometimes they are neglected by their clan members. They are the most affected by raiding and insecurity because when raiders strike men run away leaving them with young children and to take care of the household.
- Customary management institutions are weakening in many cases (within the community), such as the women's traditional ritual groups, *Mwamba*

*Main source of conflicts*

- Unequal access to land, grazing and water
- Lack of development and investment in basic services in the area.
- Struggle for political powers and control over wealth.
- Political instigation – used as campaign platform to get more votes.

*Lesson for adaptations*

- Flexibility in managing dry land livelihoods under climate change
- Flexible access to forest products
- Diverse crops (dryland crops) eg. millet, sorghum, cowpeas, green grams
- Dryland have a lot of resources, including valuable tree species and drought resistant crops, but management, access and development of them is poor.
- The hill has valuable resources such as water. Water committees should be strengthened and officials should be elected democratically not one clan dominating – each clan and social groups in the village should be represented.

*Recommendations*

1. Enhanced development
  - a. Tapping of water from the hill and to be availed in the grazing areas so that people especially the Somalis, Oromas and Kambas can graze together at Ngwaniwa and Kaniki or other alternative sources of water like borehole dug on the plains.
  - b. Our research has revealed that those who are near the foot of the hill and have water do not bother going uphill.
  - c. Let roads be improved as well as schools and hospitals. Improved transport network can be important in this area.
  - d. Improve the management of water committees
2. Creating economic opportunities
  - a. awareness of usage of forest products – especially those plants that have useful products – Gum arabica harvesting e.g. King'olola (Kikamba)
  - b. Technical advice on farming to be provided to the community to regarding farming and forestry
  - c. Participation of community on the forest management and allow them flexible access to fruits and any other forest products on the hill top.
  - d. The money got through charging fees for grazing uphill to be channeled to community development.

- e. Invest fees and taxes in local development activities.
- 3. Targeting the vulnerable
  - a. Representation of women and other vulnerable groups in in development committees.
  - b. Poor to be assisted to get farms and water.

### **3.4 *The effects of conflict and exclusion on household adaptation to climate stress: the case of Endau, Kenya, by Bernard Owuor, Siri Eriksen and Wycliffe Mauta***

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#### **ABSTRACT**

Conflict and climate stress are two critical challenges faced by many African populations. In this paper, we examine adaptation among dryland populations, focusing on the case of Endau in Eastern Kenya. We analyse household and key informant data collected during the 2004 drought and slight respite early 2005 in order to identify how conflicts have affected adaptation to climate stress among population groups living around the hill. Rising above the dry plains, Endau hilltop has an upland microclimate, thick forests, and permanent water sources. Its resources are critical to household adaptation strategies to climate stress; for example, during drought, settled Akamba agro-pastoralists as well as Somali and Oroma pastoralist groups all depend on water sources and grazing land in and around the Endau hilltop forest. In addition, forest products form alternative sources of livelihoods. We find that three main types of conflict exclude people from accessing critical adaptation resources: first, government gazettement of the forest severely restrict local access; second, power struggles within the settled Akamba community affect control of key resources; and third, conflict with pastoralist groups over access to water and grazing resources. These processes of exclusion have led to landlessness, loss of livestock, destitution, and extreme vulnerability to drought among some families. This study underscores the importance local conflicts in understanding adaptation and vulnerability, illustrating in particular the critical role of conflict in creating exclusion, inequality and vulnerable groups. We conclude that ensuring access to key resources is critical both to resolving conflict and to strengthening adaptation.

Key words: conflict, adaptation, vulnerability

## Introduction

Global warming is likely to lead to diverse changes in local climatic conditions, including potential increases in the frequency and intensity of extreme climatic events, such as droughts, floods and storms (Joubert and Hewitson, 1997; McCarthy, et al., 2001; Schär et al., 2004). Present capacity to respond to and manage climatic variability, including extreme events, forms an important component of adjustments to climatic changes (Burton et al. 2002). In particular, identifying and addressing constraints to local adaptation mechanisms, whether these constraints be political, economic or social in nature, is critical to develop effective adaptation policies (Eriksen and Kelly 2005). An implicit assumption has often been evident in the climate change literature that ‘appropriate’ adaptation to climate change will occur automatically given transfers of technology and accompanying economic resources (Smith and Hitz 2003; O’Brien et al 2004). While there is growing comprehension of the social and political dimensions of adaptation, little is known about how conflict and violence shape local level vulnerability and the techniques and processes through which households adapt to climate constraints. In this paper, we focus in particular the impact of conflict and violence on household vulnerability to climate stress.. While resource conflicts and violence are evident in many dryland areas of East Africa, there is a lack of systematic knowledge of how they affect household livelihoods and in particular capacities and ways of coping with drought and other climate stresses.

The experience of households in the drylands of Kenya can provide useful lessons for adaptation as these areas are characterized by low, erratic and unreliable rainfall and face frequent episodes of floods and drought. The natural resources found on hilltops located on the vast plains of the drylands play a particularly important role in supporting local adaptation mechanisms in these areas (Gachathi 1996; Eriksen et al. 2005). If of sufficient height, the hills trap and hold clouds or force moisture-laden winds into high altitude where cooling causes condensation. In addition to holding unique islands of forest, they function as water catchments for springs and streams. In this paper, we examine the role that one particular hilltop, Endau in Kitui District, eastern Kenya, plays in local adaptation processes to climatic variability and drought. We investigate how conflict and exclusion from key hilltop resources constrain adaptation among the population groups living around the hilltop. We first examine the role that hilltop resources play in coping strategies with drought in the area and how access to coping strategies by different groups have been negotiated through local institutions and resource rights. The way in which conflicts have affected access to resources that are critical to adaptation to climate stress is then identified. We argue that conflicts have accentuated local inequalities and contributed to creating vulnerable groups. The implementation of policies restricting forest access, historical raiding and recent economic exchanges between agro-pastoral and pastoralist groups have reinforced existing tensions between population groups, clans and social groups. These developments have contributed to excluding some from accessing important adaptation strategies while creating opportunities for others, as well as pushing some people into destitution. This has restricted the diversification of agricultural, livestock and forest-based activities and pushed more people into diversifying into business, employment and other economic activities

## Methods

The case-study approach (George 1979; Yin 1994; Fotheringham 1997) provides an appropriate means of exploring coping and vulnerability. Case studies are a useful tool when contextual conditions pertinent to the phenomenon are to be investigated as well as the phenomenon. The case selected here, Endau, is one of several hilltops in Kitui District (see Figure 1). It lies between the central highlands of Kenya and the coastal forests. From the dry plains lying at 500 masl, the hill

rises to several peaks, the highest at 1400 masl. Practically all the forest from the foot of the hill to the peak has been gazetted government forest. The hill is critical to people's strategies to manage drought in the area. It serves as a water catchment and has permanent sources of water, the relatively favourable microclimatic conditions on and around the hill compared to the dry plains allow cultivation of crops, and the forest itself provides dry season fodder for livestock as well as forest products. The four villages investigated around Endau hill included Ikisaya to the west of the hill, Malalani to the north of the hill, Twambui to the northeast of the hill and Ndetani to the southwest of the hill. This geographic spread of the sample was designed to capture the different conflict situations on different sides of the hill. In particular, government restrictions on farming on the hill and drought access to forest resources had played an important role in the history of conflicts in the agro-pastoral communities in Ndetani and Ikisaya, and contributed to out-migration and landlessness from the more pastoral Malalani. Raiding had occurred on all sides of the hill, but conflicts between population groups related to drought access to water and pasture were most pronounced in the mainly pastoral Malalani and Twambui.

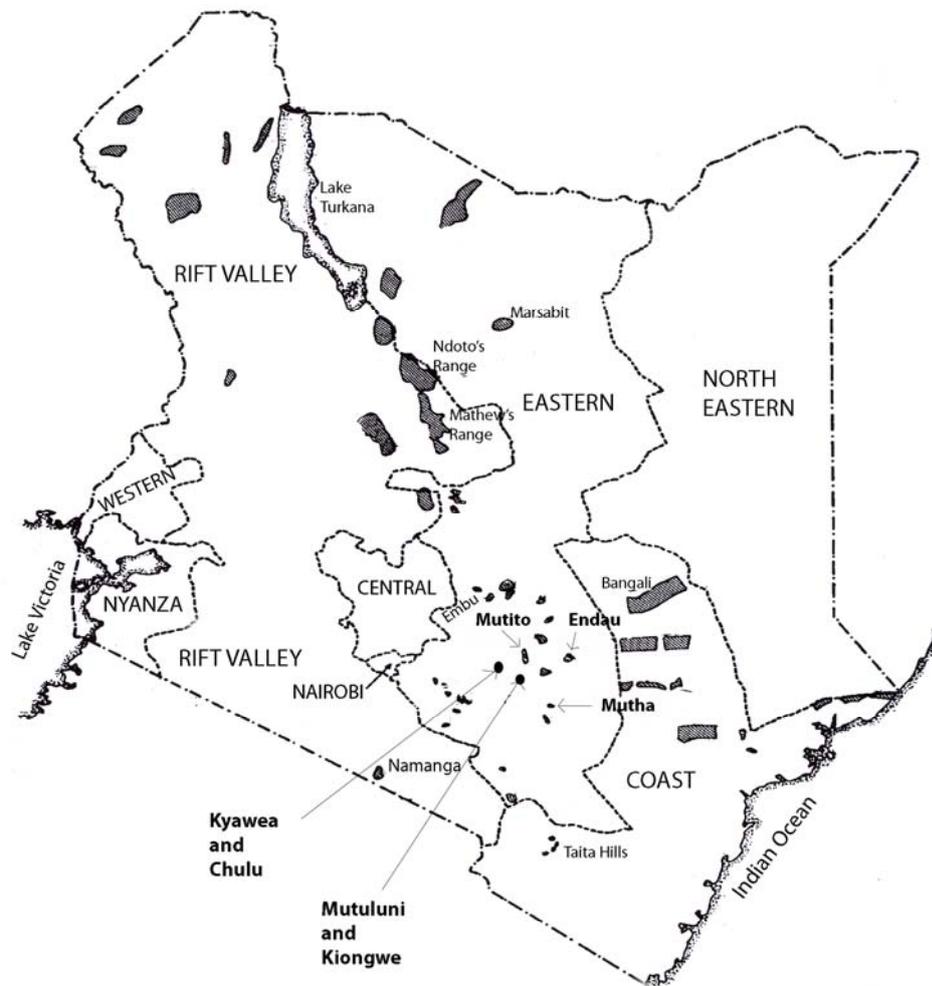


Figure 1: The location of Endau and other hilltops in Kitui District

A four person team carried out a social survey in Ikisaya, Ndetani, Malalani and Twambui. Complementary data were provided by an ethnobotanical survey of Endau forest carried out by a three person team. These results are reported in a separate paper. Thirty seven semi-structured interviews and ten key informant and group interviews were carried out as part of the social survey in 2004 and a total of 24 household, focus group and key informant interviews were carried out in 2005. Themes that were followed up in more depth in 2005 included clans, customary institutions and power relations; changes in coping strategies since 2004, landlessness, bereavement due to conflict, eviction from the forest, and role in local institutions, groups or political positions. Both male headed and female headed households, interviewees of different ages and of different relative wealth status were included in the selection. Particular care was taken to include members of different clans, an important factor determining social, economic and political stratification. Group interviews were carried out with women's groups, groups of elders (men), and a youth group. Informal discussions through interaction with people such as during meals or in the market place, observations of activities and invitation to homes were also important sources of data regarding power relations, conflicts and access to resources. A consultative stakeholders and collaborators' meeting also formed part of the data collection.

### **The role of Endau hill in coping with drought and adaptation to climate change**

The dryland hilltop/mountain forests provide resources that enable the surrounding populations survive drought and conditions of climate stress. Wood and non-wood products, water; alternative pastures during drought, herbal medicine are some of the critical products sourced from the mountain. Drought foods include wild fruits/foods such as tubers and also wildlife that are hunted for meat. Due to the scarcity of food during drought, some people gather these fruits for domestic consumption and for sale in the local markets to raise money for purchase of other basic household goods.

The hill also provides improved microclimate in terms of rainfall levels and lower temperatures. The areas of immediate proximity to the hill receive slightly more rainfall than the lowerlying plains. These areas support agriculture and produce foods that are shared with communities further downhill through complex social exchange arrangements among the communities. These are also alternative grazing sites especially during drought when there is no pasture in the lowlands due to the dry conditions that prevail around these times. Herders take their livestock up the mountain for grazing and water where they are kept until when the droughts are over and the lowlands receive enough rains.

Endau hill provides a critical service as a water catchment, hosting several permanent water sources in addition to supplying water to seasonal rivers in the plains. Piped water from the hilltop supplies some of the villages in the plains, notably on the southern and western sides. The hilltop ensures continuous recharge of underground aquifers which flow as rivers and streams that flow further downstream to supply water to human and animal populations. The hilltops/mountains are therefore water catchments and water provided from the hill support livelihood systems downstream and also farming activities.

Many of the observed coping strategies during the dry season and drought in the four villages investigated (listed in Table 1) are based on indigenous plant resources or resources found on the hill (marked in bold). It should be noted that not all indigenous plant resources are accessed on the hill, some of these resources are also accessed on the plains. It should also be noted that some activities may be indirectly dependent on hilltop resources; for example, the sale of milk or sale of livestock may be dependent on accessing hilltop grazing and the sale of farm produce may be dependent on cultivation using slightly moister conditions at the foot of the hill. Finally, the hill also plays a critical role in people's management of drought: the hill

is the home of the spirits that control rainfall and rituals to predict and ensure good rains are performed on sacred sites.

Table 1: Dry season and drought coping strategies

| Activity  |
|---|
| <ul style="list-style-type: none"><li>• Casual labour</li><li>• Seasonal migration to find work</li><li>• Rely on food aid</li><li>• Sale of livestock</li><li>• Loan and help from neighbours/clan</li><li>• Hiring out of wells and grazing</li><li>• <b>Gather wild fruits for food and sale</b></li><li>• <b>Illegal gathering of cassava, sweet potato and fruits from the hill</b></li><li>• <b>Hunt wild meat for food and sale</b></li><li>• <b>Collect honey</b></li><li>• <b>Rituals on hill</b></li><li>• <b>Sale of handicrafts</b></li><li>• <b>Sale of poles</b></li><li>• <b>Sale of herbs</b></li><li>• <b>Sale of vegetables</b></li><li>• <b>Sale of water</b></li><li>• <b>Graze cattle on the hill</b></li><li>• Rent grazing lands</li><li>• Sale of milk</li><li>• Business</li><li>• Remittances/permanent migration</li><li>• Employment</li><li>• Sale of farm produce</li></ul> |

The pattern of coping reflects large socioeconomic differences within and between villages. Farming diverse crops and maintaining large herds through seasonal grazing have been critical to surviving droughts in the area. Those households unable to secure a harvest during drought or unable to keep herds, or who do not have employment or reliable remittances, diversify into a multitude of other activities, some of which may be quite marginal.

Access to coping strategies by different groups have been negotiated through local institutions and resource rights, of which the history of clan ownership of land plays an important part. Settlement began 130 years ago when herders from the Akamba ethnic group came to search for pasture and water. The settled agro-pastoralists around Endau Hilltop (Endau and Malalani Locations) originate from various areas within Kitui District and neighbouring Mwingi and Machakos Districts, including Mutha, Mwingi, Nuu, Mutitu, Ukasi, Machakos, Mui, Nguni, Voo. Land ownership today is still to a great extent determined by which areas a clan occupied when they first arrived at the hill. The first group of settlers mainly settled around the water sources and grazing areas as they kept livestock. Later Akamba immigrants followed their clan members who had settled near the hill, leading to different areas around the hill being dominated by particular Akamba clans. This history still shapes patterns of land ownership, resource access and socio-economic differentiation as the land on which different clans settled varies in its suitability for grazing as well as cultivation.

### **Conflicts and the social distribution of vulnerability**

Conflicts have accentuated local inequalities and contributed to creating vulnerable groups. First, conflicts have served to exclude some from accessing important adaptation strategies, in particular reliance on dry season crops and diverse grazing, critical to coping with variability in the past. While local exclusion processes in the past may have been informal, based on access to the required labour, capital or customary resource rights, recent conflicts have had implications for a much larger part of the local population. Implementation of conservation policies, for example, has served as a formal exclusion process. This form of exclusion takes the form of conflicts between the settled Kamba agro-pastoralists and the government regarding access to the hilltop forest. Kamba agro-pastoralists first settled on the hill in the early twentieth century. The farming population on the hill was evicted from the forest by the colonial government in 1948 and also by the post-independence government in 1996, under the threat of military intervention. The forest is gazetted as government land and no one is allowed to enter the forest without a permit from the Forest Department. The government therefore set the rules that govern the access and use of resources from the hilltop forest. Exclusion of people from the protected area of the hilltop has led to loss of farmland, drought reserve grazing and access to other forest products that are critical to drought coping. Fees paid to the Forest Department are not ploughed back into the community for development purposes. There is therefore no equitable sharing of benefits. The eviction reduced the diversity and reliability of harvests in Endau as several crops that thrived on the hill, including sweet potatoes, sugar, bananas, avocado, mangos and other fruit trees cannot easily be grown in the lowlands while maize is less reliable. As a consequence of no longer being able to cultivate crops on the hill, the 1996 drought hit Endau particularly severely. In comparison, households had been able to sell agricultural produce cultivated on the hill to other drought-stricken areas the 1984 severe region-wide drought.

Eviction from the hill also made it more difficult to find dry season grazing. As the hill is protected as a water catchment, no permits for grazing are supposed to be granted. Recently, the Forest Department had nevertheless started managing controlled dry season grazing on the hill through a permit system because the hill is critical for livestock survival during drought. This permit system means that livestock have to be driven up and down the hill every day rather than remaining on the hill for the entire drought period, although this creates extra work as well as stress for the cattle. Some herders tried to keep cattle on the hill illegally while others who did not want any conflict with the Forest Department abstained from herding on the hill and reduced cattle numbers as a result. Most respondents reported that they had fewer cattle than they used to, affecting the viability of selling livestock as a source of income during a crisis such as drought.

Access to grazing areas have been further restricted by violent raiding, a second form of conflict which took place between the 1970s and the late 1990s. Wet season grazing areas also considered unsafe by some due to the historical raiding, and many grazed their cattle in areas closer to the hill, which could support fewer livestock.

**Table 2: Effects of conflict**

| Village  | Most important conflicts  | Main effects   |
|----------|---|--|
| Ndetani  | Eviction from hill<br><br>(Violent raids)   | Landlessness and in-migration<br>Restricted dry season grazing<br>Loss of fruit trees and drought crops<br>In-migration of people exposed to violent raids in Twambui and Malalani   |
| Ikisaya  | Violent raids<br><br>Conflict over pipeline   | Loss of livestock and lives<br>Closure of school<br>Disrupted farming<br>Restricted wet season grazing<br>Sabotage to pipes and disrupted maintenance  |
| Malalani | Violent raiding<br><br>Eviction from hill<br><br>Access to shallow wells and dry season grazing | Loss of livestock and lives<br>Outmigration<br>Restricted wet season grazing<br>Landlessness and outmigration<br>Restricted dry season grazing<br>Loss of fruit trees and drought crops<br>High fees to rent water, free access to water difficult<br>Livestock theft<br>Local tension between groups in the village, with pastoralist groups and with administration<br>Increased trade |
| Twambui  | Violent raiding<br><br>Access to shallow wells and dry season grazing                           | Loss of livestock and lives<br>Outmigration<br>Restricted wet season grazing<br>High fees to rent water, free access to water difficult<br>Livestock theft<br>Local tension between groups in the village, with pastoralist groups and with administration<br>Increased trade  |

Second, conflicts had led to destitution among some groups living around the hill. In Malalani, eviction from the forest had led to destitution among some households, who no longer had land and could not keep cattle. These destitute households often borrowed a small piece of land from a clan member or social relation in order to cultivate. The land was often borrowed for free or for minor favours such as sharing labour or a small part of the harvest; however, tenure was not secure. A good harvest could allow these households to sell crops and invest in building up a herd, the sale of which could then finance the buying of land. While some households succeeded, many households were not able to build up assets this way because the plot of land was too small to yield large crops. Many were dependent on doing casual labour or on assistance from other clan members. At the time of the eviction, many households who had lived on the hill migrated to Ndetani, hoping to be able to buy land there (see box 1). In Twambui in particular, the raiding by pastoralist groups had also caused landlessness and destitution.. Some had lost their entire herds, others had had their business burnt down, others had lost a family member, often the husband and main breadwinner. Some households moved to ‘safer areas’ such as Ndetani, with or without livestock or land,

increasingly turning from livestock keeping to cultivation as the area is more suitable for cultivation while grazing lands are less extensive than in Twambui.

Third, unequal access to critical drought resources led to some people profiting from drought, while others finding their access to important adaptation strategies undermined. There were internal conflicts over ownership, access and control of key resources such as land, water and pastures. These conflicts were compounded by the fact that the key resources are gradually moving into private hands. Private property rights allow individuals to appropriate and dispose of property without consulting to the rest of the community. The main sources of dry season water are shallow wells in Malalani and Twambui, while water has been piped from the hill to a few points in the southwest side of the hill, such as Ikisaya and Ndetani. Most of the shallow wells in Malalani and Twambui and Malalani are owned by a few families, typically those with land near the riverbed. Others who own no wells have to access water from these same wells, usually for free, but only after the owner has fulfilled his own water needs (wells, like land and livestock, are almost exclusively owned by men). Water access is important not only for domestic uses, but also for watering cattle during the dry season when water sources in the plains, as well as seasonal streams from Endau hill, dry up. In addition to the settled population using the shallow wells during dry seasons and droughts, Akamba herders come from other areas, such as the neighbouring district Mwingi, during dry spells, in order to water their cattle. These herders pay the well owners for access; in addition, they need to rent grazing land in order to feed their cattle while they are present in the area. Fee-paying herders may threaten the free access to wells by local herders. The arrival of further pastoralist groups has caused internal divisions among the settled population, especially in Twambui. Oroma and Kenyan Somali groups, contacts with which had previously been restricted to the sharing of wet season grazing lands (and the raiding), started coming to Twambui and Malalani during the dry season to rent access to shallow wells. The reason for this recent development may have a number of reasons. Other dry season water sources in Tana River District may have become unavailable either due to decrease in streamflow or increase in livestock numbers and uses. Water, which had been relatively plentiful after the heavy El Nino rains in 1998, may have dried up by 2000. The particular groups coming to Endau may have been squeezed out of their original areas after conflicts with other pastoralist groups and lost access to critical dry season water sources that way.

Practically all families who own wells rent these out to pastoralists, at a much more profitable rate than the rate which herders from Mwingi pay. Mwingi herders, as well as the local population who depend on free access to the wells, are critical of other pastoralist groups who are allowed to pay a fee in order to use the wells. In addition to feeling their own access being threatened, many still fear that the same groups may resume the raiding and killing experienced less than a decade ago. There have been disagreements when Somali and Oroma cattle or camels have grazed in other areas than those rented, or groups have arrived with more livestock than for which they have rented well access and grazing land. There have also been disputes when the local population have stolen or killed pastoralist livestock; however, these are sporadic incidences that are normally settled through negotiation between elders and do not reach the court system. Meetings have been arranged among the settled Akamba population in order to prevent wells or grazing lands are to be rented out to Oroma or Somali pastoralists, however, no such agreement has ever been reached. In addition to renting out use of wells and grazing land, trade is profitable with the Oroma and Somali, who sell livestock and buy food and domestic goods. Those who profit from these transactions welcome the pastoralist groups. Households that rent out access to wells and grazing land, as well as traders who do business with pastoralist groups, have seen their income levels increase during drought, especially in Twambui. Local trade in food and household goods has boomed between villagers who are mostly Akamba and visiting herders. Respondents explained that these transactions fund childrens' education as well as weddings. Some younger people prefer

to start up local businesses to migrating to cities to look for work that is increasingly hard to find (see box 2).

**Box 1, Landless in Ndetani**

One of the interviewees and his family are landless living in the Ndetani-Kamusa village on the southern side of the hill. Their family lived on the hill from the 1960s. When evicted in 1996, they found their original land at the foot of the hill had been taken over by other people while their clan was unable to allocate them new land. They are too poor to buy another plot of land. They emigrated from the northern side of the hill in Malalani and are now cultivating a small plot borrowed from relatives in Ndetani-Kamusa. This piece of land is so small that they cannot get enough harvest to sustain them; they therefore have to rely on casual labour, producing charcoal, cutting posts, making bows and arrows and walking sticks from the forest and for sale in the market as sources of income to buy food. Gathering of forest products is therefore important in their survival strategies. However, the restrictions to forest access, requiring the paying of levies to the forest department makes forest access unaffordable to the poor such as the informant, exacerbating their precarious predicament. He also has to rely on friends and relatives for assistance as the land can not provide for his family needs.

**Box 2. Youth Trader in Twambui**

A young trader living in the Twambui phase of Endau hill illustrates the differential outcomes from tension and conflict. He resorted to business to support his family following the death of his father and is now the bread winner for the family. His family lost livestock during the cattle raids of 1970s and since then the family has not been able to build their herd due to fear and low financial capacity. The informant sells household goods in a kiosk, which earns him income for paying school fees for his siblings, for buying goats which he rears for later sale, and to help his mother with household expenses. He invested part of the revenue from the business in another business opened by one of his sisters another business. His business depends largely on trade with pastoralist Kenyan Somalis and Oroma people. During the dry season, these groups camp in the area for a few months for water and pasture for their cattle. He enjoys booming trade, while other people in the village fear their presence due to their historical raids and violence as well as their purchasing power and preferential access to local wells. Economic exchanges with pastoralist groups is a major source of tension among settled Kamba agro-pastoralists. During the wet seasons, the trader follows pastoralists into the wet season grazing areas on the plains in order to continue trading with them.

**Box 3. Vulnerable woman**

The predicament of one of the informants, a poor woman living 1km from the hill in Malalani, illustrates vulnerability among women. She has a small farm which cannot support her family. She does not own the plot she uses, continued access to the land is insecure, and she is therefore perceived locally as landless. She was evicted from the hill in 1996 by the government. When she came back to her earlier ancestral land at the foot of the hill, she could not regain access to this land as it was being used by relatives. The situation of the woman was complicated by the death of her husband when she came back from the hill. As a woman, she is not allowed to own important resources including land, wells or livestock, and therefore cannot make important decisions regarding their management. The woman only has limited user rights to a small piece of land given to her by relatives. This greatly limits how many livestock she can keep and also the crops she can grow on the farm. The land is not very productive as it is on the leeward side of the hill. In order to survive, the woman has to rely on casual employment and relief supplies to meet her domestic needs. Her social networks are limited as she comes from a small and poor clan that is not able to provide the necessary safety net. The woman is therefore highly vulnerable during drought periods, her food stocks running out quickly and alternative income sources being very few.

Conflict has contributed to creating some very vulnerable groups, therefore, as well as benefiting a few individuals increasing local social differentiation. Significantly, conflict contributed to the creation of destitute groups. The eviction had led to landlessness, especially in Malalani and Ndetani. The landless were particularly vulnerable as they could seldom harvest enough food from borrowed land to last them through dry seasons; in addition, they could seldom keep many livestock, the sale of which is an important source of drought coping. It is likely that the pre-existing social inequality in Malalani contributed to the landlessness. Poor clans are more likely to have started farming farmland belonging to clan members living on the hill, and the evicted people would rather migrate elsewhere than try to force poor clan members off their land, knowing that these clan members had little land to cultivate. In addition to many forest uses now being illegal, restrictions on accessing other hilltop resources especially affects the poor and vulnerable who can not afford the charges now having to be paid to access these resources. For example, the villages are far from the medical facilities and collect herbal medicine from the hilltop forest. However, they can not collect these easily from the forest.

Women were particularly vulnerable to insecurity and conflict. As a women's group in Twambui explained, women were responsible for their children and could not flee during periods of raiding. Husbands and men could flee to other safer areas to find jobs, but women often stayed to look after the children and the farm. Raiding and killing had also led to several women losing their husbands. Women headed households are particularly vulnerable because women have poor customary rights to land, wells and livestock, which may be inherited by a brother of the deceased husband if the family had no sons. Secure access to land, wells and livestock is critical livelihood and drought coping strategies. A woman, once married, belongs to the husband's clan, but in some cases found that the clan was less forthcoming with assistance to her than to her deceased husband (see box 3). Women's power in local fora is also weak as formal committees are dominated by men and the power of traditional women's fora is waning. A committee of old women are still in some of the areas used in mobilizing the rural communities for development though their powers connected to the spirits of the hill, but membership in the committees is now reduced by changes in society, in particular the spread of Christianity.

### **Addressing barriers to adaptation**

The study identified three main constraints to adaptation in the area. First, access to the forest is limited leading to tension and conflict between the inhabitants and the government (forest department). Following evictions from the hill in 1948 by the colonial government and in 1996 by the District Commissioner (see fig 5), the local communities feel that access to grazing, water and forest resources has been unlawfully taken from them. Second, there is a lack of development in basic services and infrastructure. The marketing facilities are poorly developed, roads are impassable during rain season, there is a lack of telephone networks, and significantly, there has been little development of piped water from the hill to the villages, provision of which is critical both for domestic use, survival during drought and economic activities. Third, several families have lost their means of production, including land, livestock, and businesses due to eviction from the forest as well as raids and insecurity occurring between 1970s and 1990s. Such destitution is a major barrier to enhancing longer term livelihood security in the face of frequent droughts.

An important aim of the project, in addition to enhancing scientific understanding of local adaptation, was to generate useful information on the basis of which practical interventions can be crafted and to strengthen links with and between policy makers and practitioners. An additional aim was to create a platform and forum for discussion of adaptation constraints,

which would include different stakeholder perceptions of the problem, including the most vulnerable, local administration and government institutions. The project held two workshops, one at the national/regional level and one at the district level, to discuss the preliminary findings as well as solicit suggestions regarding practical measures to enhance local adaptation to drought. The workshop represented one of very few efforts so far to link the local level adaptation experiences with national policy processes. As Saleemul Huq, coordinator of CLACC, pointed out at the workshop, unless such links are strengthened, there is a danger of developing climate change adaptation policies that promote large-scale technical measures that are far removed from local livelihood security needs and which may actually aggravate vulnerability.

The district level workshop generated increased dialogue among different stakeholders and research findings brought to the fore concerns of vulnerable groups not normally heard (see fig 8). Empirical information can empower the most vulnerable groups and dispel myths regarding the main challenges during drought. Especially important in this regard was the emphasis of opportunities, and unequal benefits, brought by pastoralist contribution to the local economy and the deconstruction of causes of conflicts.

#### **Box 4. Investing in dryland resources**

Creating economic opportunities includes the enhancing of dryland products, including trees such as *Acacia Senegal*. This tree, which is plentiful in the area, provides Gum arabica which has a high, but currently unexploited, market value. Dryland products can be enhanced through the collection of germplasm of the trees and crops and accessing them to the community for wider planting; seed banking; ex-situ conservation of the high value trees and crops; and intensification of the planting of high value trees and crops on the farms. In addition, building local capacities to start and manage businesses, provision of credits to start businesses, and processing for value adding of local farm and forest products, strengthening technical advice on farming and forestry; participation by the community in forest management are practical measures that would facilitate adaptation. Importantly, in order to target the most vulnerable, adaptation measures would need to improve representation of vulnerable groups (the poor, landless, small clans) in development related committees; enhance representation of women in development related committees; and ensure rights of the poor to land, grazing and water in management systems and tenure reforms. In particular, economic opportunities need to be created that are accessible to the landless and destitute, or people be lifted out of destitution through assistance and redistribution of resources.

Through discussion fora, very specific and targeted measures were identified, that could enhance adaptive capacity. While issues of resource access and livelihood security generated open discussion and practical suggestions, other issues of social and economic inequity and power struggles can only indirectly be touched upon in a workshop fora. Informal institutions like mwamba and clans are very sensitive. As a result, discussion centred on enhancing flexibility critical to managing dryland livelihoods under climate change was at the heart of many of these measures. Mobility of people and livestock (access to grazing), diversification of crops and income sources, flexible access to forest were all identified as important. It was emphasized that contrary to popular perception of poverty being due to scarcity of resources, drylands have a lot of resources. Lack of development of these resources and access to these resources is the problem, not resource scarcity. Investing in dryland resources also entails exploring economic opportunities inherent in local products and niches (see box 4), improving the position of dryland in the political economy. Investing in dryland development would entail tapping water sources and availing to different areas and groups in the lowlands (including pastoral areas). In the case of Endau, people would then not want to settle on the hill, nor would pastoralist groups need to access water near the hill, thus easing some

tensions. Improving the organization of water and other development related committees, including their democratic election and representation of weaker clans and vulnerable groups was identified as important to improve access to water. In general, improving roads and communication infrastructure as well as improving social infrastructure (schools, hospitals etc) is a way of supporting the generation of income opportunities in general and reducing domestic costs in specific.

### **Conclusions**

Conflicts have disruptive and destabilizing tendencies that can restrict access and constrain mobility (people and livestock) both of which are important to maintain a household's flexibility in everyday management of livelihood assets. Conflict is an important yet comparatively un-explored constraint on household adaptation to climate stress. It is therefore necessary to fully understand why conflicts occur. Reasons why certain individuals and social groups are vulnerable and therefore challenged in their capacity to adapt to climate stress should be studied comprehensively for lasting solutions to be realized. Each situation is unique and has to be clearly understood on its own merit before making any recommendations or interventions on how people can adapt to climate stress in the drylands. This will greatly depend on the complexities and particularities of options and capacities to cope and adapt. It is also very crucial to consider the nature and substance of these conflicts. Conflicts should also be looked at more broadly and not only a technical problem but rather a social and political one. There are patterns of exploitation of natural resources that have evolved over the years as the communities adjust to changing situations and at times very extreme changes in climate. The authorities at times come up with interventions that are disruptive to this rhythm of life without proper consultations with all stakeholders leading to further conflict therefore aggravating the situation. There is therefore need for a pluralistic approach and exercise flexibility by all parties and should be well coordinated and all inclusive. Traditional coping strategies of the communities have to be appreciated and taken into consideration when designing adaptation strategies for them to be effective. One of the major implications is that there is need to actively involve the local population in the management of the forest as this will lead to minimal degradation of the resources. The fact that the communities are not involved greatly limits their access and ability to cope with climatic variability and change.

Local power struggles and unequal resource access within the Kamba agropastoralists community was one of the main current source of conflict and vulnerability. Improving local access, social equity, and livelihood security are critical to enhancing climate change adaptation. It is important to understand the underlying causes of vulnerability, social differentiation and conflicting interests between different groups in order to be able to target measures at the most vulnerable. The identification of local mechanisms creating destitute groups is particularly important in this regard. Access to the forest, distribution of land, and the ownership and access rights to shallow wells are critical issues that need to be addressed in order to enhance adaptation in Endau.

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### **3.5 Vegetation survey of Endau Hilltop forest – Endau Hilltop Forests: Its Contributions to the Local Communities, by Francis N. Gachathi and Jared Amwatta Mullah**

This section summarises the presentation, the slide version of which is found at <http://www.cicero.uio.no/workshops/Vulnerability-2005/>. The findings are also written up in a paper, found in section 3.6.

#### **The hilltop forest and its contributions to the local community:**

The hill assists in improving the microclimate and is also a source of water to the community surrounding the hill. The forest has a diversity of plant species.

The geographic location of Endau is 38°E 1° 16' S. The forest is intermediate between highland and coastal forest. The height is about 1490m above sea level. The surrounding plains are about 500m above sea level. There is ever green type of forest in upper valleys and peaks above the mistline. The hill is managed by the forest department under District forest officer at Mwitika division.

#### *The services that Endau people get from the hill*

- Water catchments – vital for the pastoralists.
- Grazing area for livestock during dry season.
- Sacred site for traditional ceremonies and sacrifices e.g *Kwasyusili* and *Kwamutiya*.
- The hill enhances microclimate e.g. temperature and soil moisture.

#### *Water catchments*

- Over 20 streams originate from the hill
- 8 of the streams are saline.
- 6 streams have been tapped (3 operational). Water is for domestic use, livestock and to grow vegetable in the plains.

#### *Vegetation found on the plains*

Trees include Itula, Ikuu, Muuku, Mutoo/Kitoo, Kyuasi, Lannea, Muua, Musemei, Mwamba, and Muange. Shrubs include Isivu, Kitithi, Mulawa, Muvu, and Itiliku

#### *Trees found on dry rocky hillside:*

Muteta, Kisaya, Mutuiyu, Itula, Kikomoa, Kitheu,

#### *Upper hillsides below mistline:*

Kyaakyosi, Mukongoo, Kinguuthe, Mutandi, Mukame

#### *Hilltop above mistline:*

Podo, Olea, Albizia, Maesa, Calodendrum, Chionanthus, Rapanea, Trichocladus, Cussonia, Croton

#### **Uses of the trees**

House construction: Kitoo, Muuku, Mukokola and Kitithi

Firewood and charcoal: Mua, Muswi, Mwaa, Mukame Mukokola

Traditional medicines: Kyalandathe, Muteta, Musemei, Muthulu, Moa, Mwaittha, Mukenea, Kivuthi

Fruits: Kimuu, Muamba, Kitungu, Kisaya, Kithumula, Mukukuma, Kivuu, Kisiu, Kithiya, Kitotoo, Kikomoa

For beehives and troughs: Itula, Ikunguu, Muuku, Kisiu, Kutithi.

For mortar and pestle: Muuku, Mutala, Kitoo, Kisiu.

For fibers (threads): Kyuusya, Kithaalwa, Mwamba.

For the other services eg. Settling beehives: Mwamba, Mwaa, Kithumula, Mwange.

Used for timber: Mukau, Mukame, Mutala, Itula.

For wood carving: Mvingo, Kyaasyosi, Itula, Kyuasi.

For other uses:

Gum Arabic – King’olola

Frankincense – Kinondo

Awareness needed to be created concerning the usage of these plants.

*Way forward*

1. Create community awareness, community should be involved in the planning and management of the Endau hilltop forest.
2. All conservation initiatives for the Endau hilltop forest should be people-focused.
3. Community participation in forest management.
4. The planting of trees outside the forest especially indigenous trees.

### **3.6 A vital habitat to local livelihood and drought coping strategies in the drylands: the case of Endau Hilltop Forest, Kitui District, Kenya, Francis N. Gachathi and Jared Amwatta Mullah**

This manuscript was presented at the International Human Dimensions Programme on Environmental Change (IHDP) Open Meeting in Bonn in October 2005.

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#### **Introduction**

The dry lands of Kenya have small outlier forests often a few hectares which are mainly found on hill tops. The estimated area of closed canopy forests within the dry lands is 163 000 ha (Waas, 1995). A further 47 000 ha is classified as 'other forest associations. The gazetted areas of these forests contain a substantial proportion of transition forest zones and other woody vegetations. The closed forests are mainly confined to the wetter and less accessible hilltops, often surrounded by *Acacia-Commiphora* bush land.

Kitui district is dotted with several hilltop forests such as Endau, Mutha, Nthoani and Makongo. These hilltop forests have high plant diversity and animal species. They support unique islands of forests, support flora and fauna not found in the drier lowlands and on cultivated lands. These hilltop forests are also crucial in enhancing watershed functions of the hills thereby providing water sources, food and income to the local populations during droughts (Karanja *et.al.* 2002).

Despite the vital role of these hilltop forests biodiversity, information on the ecological status and species composition is lacking (Beentje, 1990). Due to expansion of agricultural land and changes in customary land tenure systems, such forests are increasingly facing threat of destruction and source of conflict over resource use. Endau hilltop forests which borders different pastoralist and agro pastoralist communities is a good case study for evaluating the importance of such hills to the local communities. This study mapped the different vegetation types ranging from the surrounding plains up to the hilltop indicating clearly the altitudinal variation in tree species composition. Of special interest was how the study would contribute to existing data on ethno botany of Endau hilltop forest resources and livelihood securities in the area.

## Objectives

- To map out the tree distribution along the altitude and different phases of the hill,
- To document indigenous knowledge systems on the uses of plants, and
- To draw up a list of the plants that are of use/and or value to the local communities.

## Methodologies

An ethno-botanical survey was conducted for 14 days in February 2005 through various participatory methods including: group discussions, transect walks in the forest, demonstrations, observations and excursions to selected areas. Target groups included livestock herders, traditional medical practitioners, community elders, forest personnel and the provincial administration. Discussions were held in Kiswahili or through a Kamba interpreter at the sites where the plants concerned were found and confirmed by the informants. Plants were scientifically identified using the current literature (Beentje, 1994).

Fifteen farmers were interviewed on each aspect of the hill. The interviews and group discussions mainly focused on access and right of use, plant uses, plant distribution, species diversity.

### *Study Area*

The Endau Hill is located at 38° 38' East, 1° 16' South. From the general altitude of 500 m above sea level on the plains, the hill rises to several peaks with summit at Matundu (1400 m). Endau Hilltop forest is a gazetted forest which has been surveyed and demarcated on the ground. It is legally owned by the Government and managed directly by the Forest Department (FD) on behalf of the State. It falls under the administration of the District Forest Office (DFO), Kitui. The day to day management of the forest is the responsibility of the Forester at Mwitika with one Forest Guard and one Patrol Man, both stationed at Endau Centre. The forest has an area of 6700 ha (DFO, 2004). Currently there are no plantations and the purpose of management is purely protection, particularly for water catchments and the local community has no role in management of the forest.

### *Vegetation Survey*

Systematic sampling of parallel 10 m wide transects spaced 100m apart were made starting from the villages at the foot of the hill, crossing the farmlands, *Acacia - Commiphora* bush land (500 m), home sites (500-800 m), and up the hill along established footpaths, water lines crossing woodland (700-1000 m) and evergreen mist forest (>1200 m). The routes proposed were the best representatives of the vegetation of the drier, wet and moderate sides of the hill. The first transect was from Ikisaya along the pipelines through Kausia, Ngunga-Imwe springs to Matundu (1200 m). This is the wet side of the hill. The second transect was taken from Malalani through Kaudia and Changala springs to the Kauwaa peak (1386 m). This is the dry side of the hill. The third transect was taken from Masusia along Kamusa water course to the hilltop at height of 932 m. Short excursions were also made at the foothill and plains mainly to confirm a specific plant or observe a demonstration on harvesting medicinal herbs.

Sampling plots were stratified across these settings to capture the diversity of vegetation resources along the altitudinal gradient which were determined by Geographical Positioning System (GPS). In the highly modified landscapes, homes or farmlands were selected randomly and all trees left were recorded. In the bush land, woodland and in the forest, plot

sizes of 20m by 20m were taken and all the trees more than 10cm diameter recorded. Five plots were established at Ikisaya, seven at Malalani side and four at Kamusa side

#### *Plant Uses*

The key guides for the vegetation survey were Nzuki Mwaka, the forest patrolman, 51 years old, who was born at Ikisaya and has worked as a patrolman for Endau hill forest for 26 years and Peter Kitili, 45 years old forest guard for Endau hill. These two were also instrumental in confirming plant local names in the field as we walked along the transect lines. The plants concerned were scientifically identified at the site where found and where doubtful, a sample was collected, pressed and later identified at the East African Herbarium in Nairobi.

A preliminary checklist developed during the reconnaissance survey (Gachathi and Amwatta, 2003) which was constantly enriched proved useful during the interviews. The herbalists and local artisans were interviewed separately and individually at Ikisaya trading centre. The herdsman who were mainly from Malalani were interviewed in the field on the hill as they herded their animals.

### **Results**

#### *Species Diversity*

A total of 149 species were recorded representing 96 genera in 37 families (Appendix II). The altitudinal distribution of the species is discussed in the following sub-sections;

#### Plains surrounding Endau Hill

The vegetation surrounding Endau hill is dominated by thorny trees and shrubs with very little ground cover. The predominant vegetation type is that of *Acacia - Commiphora* wooded bush land (White, 1983). It is in drought-dormant condition for much of the year but leaves and ground cover herbs sprout immediately after the onset of the rains. The wet, dry and moderate phases of the hill had different plant diversity as shown in Table 1.0.

**Table 1.0. Dominant plant on the plains at different phases of the hill**

| Plant Forms   | Hill Phase  |   |  |
|---------------|---|---|--|
|               | Ikisaya   | Kamusa  | Malalani   |
| <b>Tree</b>   | <i>Commiphora baluensis</i><br><i>Commiphora africana</i><br><i>Commiphora campestris</i><br><i>Terminalia .brownii</i><br><i>Terminalia spinosa</i><br><i>Lannea triphylla</i><br><i>Delonix elata</i> | <i>Hyphaene.compressa</i><br><i>Adansonia. digitata</i><br><i>Balanitesaegyptica</i><br><i>Boswellia.neglecta</i><br><i>Terminalia .pruinoides</i><br><i>Sclerocarya.birrea</i><br><i>Acacia .seyal</i> | <i>Commiphora.baluensis</i><br><i>Lannea .elata</i><br><i>Acacia .senegal</i>    |
| <b>Shrubs</b> | <i>Boscia .coriacea,</i><br><i>Combretum exaltum</i><br><i>Grewia bicolar</i><br><i>Entda. leptostachys</i>   | -   | <i>Senna abbreviata</i><br><i>Grewia. villosa</i><br><i>Entada. leptostachys</i> |
| <b>Herbs</b>  | <i>Cassia hildebrandtii</i><br><i>Heliotropium undulatifolium.</i>  | <i>Cassia hildebrandtii</i><br><i>Solanum incanum</i>   | <i>Barleria acanthoides</i><br><i>Pupalia lappacea</i>                           |

The farmers in the study area judiciously spared some tree species on their farm and pasture lands to provide specific products and services. Some of the most dominant trees left in the homestead and farmlands varied as shown in Table 2.0.

**Table 2.0 Common tree species on farm and pasture lands**

| Hill Phase       |   |  |   |
|------------------|---|--|---|
| Niche            | Ikisaya (600 m a.s.l)   | Kamusa (561 m a.s.l)   | Malalani (526 m a.s.l)  |
| <b>Homestead</b> | <i>Tamarindus indica</i><br><i>Berchemia discolor</i><br><i>Terminalia prunioides</i><br><i>Grewia villosa</i>                              | <i>Sterculia africana</i><br><i>Terminalia brownie</i><br><i>Terminalia prunioides</i><br><i>Adensonia digitata</i><br><i>Dobera glabra</i><br><i>Sclerocarya birrea</i> | <i>Delonix elata</i><br><i>Berchemia discolor</i><br><i>Commiphora baluensis</i><br><i>Commiphora africana</i><br><i>Lannea alata</i>       |
| <b>Farm</b>      | <i>Tamarindus indica</i><br><i>Berchemia discolor</i><br><i>Albizia anthelmintica</i><br><i>Melea volkensi</i><br><i>Sterculia africana</i> | <i>Berchemia discolor</i><br><i>Terminalia prunioides</i><br><i>Adensonia digitata</i><br><i>Sclerocarya birrea</i><br><i>Dalbergia melonoxylon</i>                      | <i>Delonix elata</i><br><i>Commiphora baluensis</i><br><i>Hyphaene compressa</i><br><i>Adensonia digitata</i><br><i>Balanites aegyptica</i> |

#### Foothill Woodlands

The common species on the Ikisaya phase included, *Strychnos henningsii*, *Teclea simplicifolia*, *Maytenus putterlickioides*, *Ochna ovata*, *Rhus natalensis*, *Vangueria apiculata*, *Psydrax schimperiana* and *Obetia radula*. Kamusa phase was dominated by *Newtonia hildebrandtii*, *Terminalia brownii*, *Diospyros mesifiliformis*, *Kigelia africana*, *Commiphora edulis*, and *Trema orientalis*. The woodlands on the Malalani phase was mainly dominated by extensive stands of *Commiphora baluensis*, *Acacia senegal*, *Boswellia neglecta* and *Euphorbia quinquescostata* on the steep rocky hillsides. From the foothill woodlands, the species density increases with altitude. Most of the species found in this zone are less deciduous. This offers better opportunity for grazing during droughts. Subsistence farming also occurs around the foothills.

Unlike in the plains surrounding the hill, this zone is rich in climbers. The climbers include *Landolphia buchananii*, *Adenia gummifera*, *Helinus mystacinus*, *Grewia similis*, *Dregea schimperii*, and *Rhoicissus tridentata* on the Ikisaya and Kamusa phases. On Malalani phase, *Acacia brevispica* was dominant.

#### Forest Below Mist line

This is a transition zone between the foothill woodlands and the mist forest. The plant species here are evergreen, broader-leaved and denser. The trees are bigger than in the foothill woodlands. Such trees offer suitable sizes for larger items of material culture such as beehives, water troughs and mortar. The zone is also rich in medicinal plants, most of which could not be found in the other zones, e.g. *Strychnos henningsii* and *Caesalpinia volkensii*. Indigenous fruits such *Vitex doniana* (Kimuu), *Vangueria madagascariensis* (Kikomoa) and *Uvaria scheffleri* (Mukukuma) are found in this zone.

On the three phases of the hill in this zone, evergreen vegetation types were restricted to the upper valleys. Dense stands of the tree species were mainly confined along the water drainage lines. The dominant tree species in this zone are, *Newtonia hildebrandtii*, *Cassipourea celastroides*, *Diospyros mespiliformis*, *Diospyros abyssinica*, *Rawsonia lucida*, *Acacia robusta*, *Drypetes natalensis*, *Craibia brownii*, *Lecaniodiscus fraxinifolius*, *Rothmannia urcelliformis*, *Teclea simplicifolia*, *Steganotaenia araliacea*, *Hunteria zeylanica*, *Croton megalocarpus*, and *Ficus sycomorus*.

### Mist Forest

The mist forests are mainly confined to the main peaks of the hill. These are at Kauaa, Mbuuni, Iyaani, Kaikoe, Muka-Mwaza, Matundu and Ngusyini. Most of our respondents were not familiar with the species in this zone and had no local names for them. This is because the zone is rarely used by the local people due to distance, rugged topography and cold weather. The tree species found in this zone were bigger and more evergreen than those below mist line. The forests in this zone trap and hold low clouds enhancing precipitation hence the name ‘mist forests’. This is the main water catchment zone. The dominant tree species are *Podocarpus falcatus*, *Olea europaea* subsp. *africana*, *Albizia gummifera*, *Calodendrum capense*, *Newtonia buchananii*, *Ilex mitis*, *Chionanthus battiscombei*, *Olea capensis*, *Erythroxylum emerginatum*, *Maesa lanceolata*, *Cussonia holstii*, *Rapanea melanophloeos* and *Trichocladus ellipticus*. These tree species are usually associated with upland forests between 1250-2800m.

### Tree species distribution on the three phases of the hill

About thirty two tree species were more frequently found in transects on the different phases of the hill. However, their distribution varied from one phase to the other. For instance, *A. senegal* and *L. alata* were only found in Malalani phase. *Diospyros mespiliformis* was recorded at Ikisaya and Kamusa but not in Malalani (Appendix III).

### *Plant Resource Use*

The main use of plants in Endau is communal grazing by the Kamba ethnic community who also grow subsistence crops such as maize, beans, pigeon peas, cassava, green grams, millet, sorghum etc. The kambas keep cattle, goats, sheep and donkeys. Other uses include building materials, fuel wood, medicinal herbs, wild fruits, bee forage, carvings, and items of material culture like mortars, bows, beehives etc. (Appendix I).

Poles are mainly used for house construction and fencing around the homesteads and cattle enclosures. Julius Wathe, a farmer from Kamusa explained that, for house construction, the criteria for quality poles are durability and resistance to termite attack. Some *Acacia* and *Terminalia* species and *Cassia abbreviata* are chosen for this purpose. A two metre piece goes for between Ksh 20-30. The rafters used for tying the sides are those that bend without breaking. These are mostly chosen from *Combretum exalatum* and are sold about Ksh 15 each. The recommended fencing posts are those that continue growing and therefore form a live fence. Under this category are most Commiphoras. House construction and fencing is a man’s work.

The species preferred for firewood and charcoal are those with dense and heavy wood that produce a lot of heat, good charcoal and keep fire burning slowly for a long time. The Acacias, particularly *A. tortilis* and *A. ancistroclada* are highly preferred for this purpose. Firewood collection is done by women for both domestic and sale. A piece about 3m with diameter of about 5cm is sold at one shilling.

The plant use in medicine is common, very popular and held with a lot of esteem by the Kamba community. They put into use quite a large number of species ranging from annual herbs, climbers, shrubs and trees (Appendix 1). The parts used vary from one species to another. For trees and shrubs, the parts commonly used are the bark and roots. For herbs, it is usually the whole plant. Plants recorded as medicinal herbs include: *Cassia abbreviata* (by far the most commonly used species to treat a variety of diseases), *Acacia reficiens*, *Capparis tomentosa*, *Strychnos henningsii*, *Caesalpinia volkensii*, *Maerua denhardtiorum*, *Entanda leptostachya*, *Albizia anthelmintica*, *Croton megalocarpus*, *Acacia nilotica*, *Aloe* spp., *Croton*

*dichogamus*, , *Salvadora persica*, and *Zanthoxylum chalybeum* among others. Most of these species are common in the plains surrounding the hill. However Grace Kambua, a renowned herbalist at Ikisaya, pointed out that a few of the medicinal plants can only be found on the hill, e.g. *S. henningsii*, *C. volkensii*, and *C. megalocarpus*. Medicinal herbs are collected by herbalists who could be either men or women.

Wild fruits are popular particularly with herdsmen, women and children. Common popular fruits include: *Adansonia digitata*, *Grewia villosa*, *Vitex doniana*, *Lannea alata*, *Uvaria schefleri*, *Berchemia discolor*, *Azanza garckeana*, *Tamarindus indica* and *Cordia monoica*. *A. digitata* is particularly useful during famine. Most of these fruits are sold in the local markets for extra household income and others like *A. digitata* and *T. indica* are bought by dealers from Mombasa and Garissa. The fruits of *V. doniana* are gathered from the hilltop forest and are highly valued, selling at Ksh. 5 per glass.

There are a number of items made from wood in the Kamba culture at Endau. These include beehives, mortar, troughs for watering animals, bows, and yokes for oxen plough, tool handles and various baskets. Beehives and water troughs are usually made from *Commiphora baluensis*, *Commiphora edulis*, *Terminalia brownii* and *Erythrina melanacantha*. These items are made from big tree trunks and are sold in the local markets. Beehives, mortar and water troughs are made by men while baskets are done by women. Durability is the key word when choosing these items and a beehive from *Terminalia brownii* is highly recommended and sells at Ksh. 300.

Mortar and pestle are useful for pounding grains. The trees usually selected for the mortar are those with dense and hard wood and includes: *Terminalia brownii*, *Dobera grabra* and *Sterculia africana*. The pestle is usually made from *Cassia abbreviata* and *Terminalia spinosa* among others. These are also sold in local markets.

Bows and arrows are used for protection and hunting. The bows are mainly made from *Dombeya kirkii* while arrow shafts are from various species. This is a preserve for men. These are readily available from the local markets.

Fibres for weaving baskets are obtained from various species including the *Adansonia digitata* and *Sterculia africana*. The *A. digitata* fibre is strong and hence valued highly. The fibres for baskets of the *kiondo* type are usually decorated with dyes from various plants including *Lannea schweinfurthii*, *Terminalia brownii* and *Commiphora africana*. This is a woman's work but men also make ropes.

Ploughing the shambas is done by pairs of oxen and yokes are essential so that the pair can be worked as a team. These yokes, known as 'Isoki, are made from trees with tough wood including *Kigelia africana*, *Terminalia brownii* and *Balanites glabra*. The yokes are made by men for both home use and for sale in local the markets.

Some trees also offer services. For example the *A. digitata* is specially suited for setting beehives as wild animals that eat honey find it difficult to climb. Other trees suitable for setting beehives include *Balanites aegyptiaca*, *Acacia tortilis*, *Kigelia africana* and *Tamarindus indica*. Forking structure of the tree determines the position and the number of the beehives to be set on each tree. Honey is part of source of cash income to the local communities. The survey revealed that there is great potential for honey production in Endau. The indigenous knowledge attached to honey production is tremendous and the collectors usually grade their honey according to qualities which are mostly guided by source of nectar (plant species), colour and season. Honey from *Acacia mellifera* and *A. senegal* in particular

was highly prized. This is a man's work. *Delonix elata* is used to find direction or locate animals when hunting in the plains.

#### *Services of Endau Hilltop Forest to the local communities*

According to the local community living next to Endau hill, the most important commodity derived from the hill is water. The hill is a source of about twenty permanent water springs. Six of these springs have been tapped and piped down into huge tanks at the foot of the hill and to the market centres for use by the local community and their livestock. Some of such permanent springs are Ngunya-imwe and Kausya which supply Ikisaya, Wazalani and Kathua markets. The Ikituku and Yongoni springs supply Manjunja area, Kangera and Kaundua supply Mutalani, Kibau spring supply Koi primary School and Twamboi markets while at Malalani there is a shallow well. This water is piped with the help of various NGOs particularly the ASAL Programme and AMREF. Water is managed by local communities through water committees. More than anything else, availability of water determines human settlement distribution around the hill. This has also changed the local community mode of life from nomadic to sedentary.

The next important use of Endau Hill to the local community is dry season grazing. During the dry season when all grass and palatable herbs are dry, livestock, mainly cows are moved to the hilltop where pastures are available. The dry side of the mountain is Malalani while the area between Walazani and Endau is the wettest. There are more animals on the dry side of the forest than the wet side. Animals are allowed into the forest only after paying mandatory government grazing fee of Ksh. 20 per cow per month and Ksh. 10 per sheep per month. However, most of the respondents were reluctant to pay leading to conflict with the Government Goats and donkeys are not allowed in the forest as they are said to debark and destroy trees yet they are herded together and therefore practically not easy to separate.

A number of plant species found on Endau hill are also of interest for socio-cultural activities. These forests have become central to the culture of the local communities and have been associated with various traditional ceremonies and sacrifices with great cultural and spiritual value. For example, every year before planting takes place, a traditional ceremony is performed at one site on the hilltop where people take their seeds for blessings by their ancestors. These sacred sites are at Kwa Sio Sili and Kwa Muteyia.

The hilltop forest also supports a variety of animals, birds and reptiles. The local community largely depend on game meat and rarely slaughter their livestock as they are mainly for sale.

Interestingly, all young people and even several elders believe that there is a kind of mineral which they call red mercury at one site on the hilltop called Kwa Kitoleko. Nobody seems to have seen it though. They say the area is guarded by a huge reptile. We came across limestone at the Matungu peak.

The forest is rarely ever used above the mist-line. This is partly because of the distance involved and the fact that it is illegal to cut trees in the forest. Also a lot of plant needs are obtained from the dry plains below and at the foot of the hill. For instance, *Acacia senegal* (Kingolola) and *Boswellia neglecta* (Kinondo) which produce commercial non-timber products are found in these zones. The species produce gum Arabic and frankincense respectively, which are sold to local industries and also for export. However, the local people were not aware of the commercial value of these two species.

#### *The Importance of Endau Hilltop Forests at Global Level and Science*

Endau hill is intermediate between the eastern edge of the Kenya highland forests and the coastal forests and this could be a "meeting point for species". The micro-climate effect

provide a much wider range of environments than under other vegetation cover, supporting a wider range of species. Because of isolation, the species of plants and animals in them have evolved with mutual adaptation in an intimate interdependence. There are local populations of animals that remain on Endau hill since it has become difficult for them to move across the dry land plains to similar habitats on other hilltop forest like Makongo, only twenty km. away. These forests are of special interest to biologists, for in them we can witness the process of survival and adaptation of species.

### *Discussion*

The local community seemed to realize that the hill top forests are important, as water catchments areas, dry season pasture and source of medicines, wild food plants and various craft products. The vegetation of Endau hill is diverse and varies with the altitude. This is due to the fact that Endau hill forms the first barrier to moisture-laden clouds which blow in from the coast. Kamba names were consistently provided for all the trees measured in the plots, on the farms and on the plains. At higher elevations local familiarity with the tree species dropped by 10 per cent of the trees known. The tree species like *Podocarpus falcatus*, *Olea europaea ssp africana* and *Trichocladus ellipticus* could not be given local names.

### **Way Forward**

- The local communities should be involved in the planning and management of the Endau hilltop forests
- All conservation initiatives for the Endau hilltop forests should be people-focused and community –driven guided by their socio-cultural conditions
- Greater community participation should be recognized as a major contributor successful for forests management in the dry lands
- The planting of trees outside the forest especially when indigenous trees are used as an excellent method of reducing the threat to the hilltop forest
- The hilltop forests should be designated as sites of special interest and eco-tourism because of diversity and rare plants and birds.
- The local community should be made aware of the commercial value and market for both gum arabica and frankincense

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**Appendix I : Some plants of use and/ or value to the communities around the Hill**

| <i>Botanical Name</i>                         | <b>Kamba Name</b> | <b>Uses</b>                      |
|---|-------------------|----------------------------------|
| <i>Acacia ancistoclada</i>                    | Muswi             | firewood, building, bee forage   |
| <i>Acacia brevispica</i>                      | Mukuswi           | firewood, building medicinal     |
| <i>Acacia gerrardii</i>                       | Munina            | bee forage, medicinal, beehive   |
| <i>Acacia mellifera</i>                       | Muthiia           | bee forage, fencing, firewood    |
| <i>Acacia nilotica</i>                        | Musemei           | medicinal, fodder, tea, fencing  |
| <i>Acacia reficiens</i>                       | Kituu             | medicinal, bee forage, fencing   |
| <i>Acacia senegal</i> var.<br><i>kerensis</i> | King'olola        | bee forage, edible gum           |
| <i>Acacia seyal</i>                           | Kyunga            | fence, gum, mineral indicator    |
| <i>Acacia tortilis</i>                        | Mwaa              | fodder, charcoal, set beehives   |
| <i>Acalypha fruticosa</i>                     | Mukulua           | fodder, arrow shaft              |
| <i>Adansonia digitata</i>                     | Muamba            | fibre, fruits, set beehives      |
| <i>Albizia anthelmintica</i>                  | Moakyumanai       | medicinal, set beehives          |
| <i>Albizia gummifer</i>                       | Musewa            | Timber                           |
| <i>Aloe sp</i>                                | Kiluma            | Medicinal                        |
| <i>Aspilia pluriseta</i>                      | Muuti             | medicinal, insecticide           |
| <i>Azanza garckeana</i>                       | Kitotoo           | fruits edible, sold in markets   |
| <i>Balanites aegyptiaca</i>                   | Kiluluwi          | set beehives,                    |
| <i>Berchemia discolor</i>                     | Kisaya            | fruits, set beehives             |
| <i>Boscia coriacea</i>                        | Isivu             | fruits, smoking utensils         |
| <i>Boswellia neglecta</i>                     | Kinodo            | medicinal, fragrant resin        |
| <i>Bridelia taitensis</i>                     | Yathia            | firewood, toothbrush, medicinal  |
| <i>Cadaba farinosa</i>                        | Karui             | building, shade                  |
| <i>Capparis tomentosa</i>                     | Kitaandambo       | Medicinal                        |
| <i>Carphalea glaucescens</i>                  | Muthakame         | medicinal, building              |
| <i>Carsalpinia volkensii</i>                  | Kivuthi           | Medicinal                        |
| <i>Cassia abbreviata</i>                      | Mwalandathe       | medicinal, firewood, building    |
| <i>Cissus aphylla</i>                         | Mwelengwa         | Medicinal                        |
| <i>Combretum collinum</i>                     | Kitithi           | building, firewood, fodder       |
| <i>Combretum constrictum</i>                  | Mukokola          | building, firewood, fodder       |
| <i>Combretum schumannii</i>                   | Kyakyosi          | Carvings, building               |
| <i>Commiphora africana</i>                    | Ikuu              | water trough, fencing            |
| <i>Commiphora baluensis</i>                   | Itula             | beehive, medicinal, tea          |
| <i>Commiphora campestris</i>                  | Yulu              | beehive, water trough, fencing   |
| <i>Commiphora habessinica</i>                 | Kitungati         | medicinal, treats wounds         |
| <i>Commiphora rostrata</i>                    | Inywamanzi        | Medicinal                        |
| <i>Cordia monoica</i>                         | Muthiia           | Fruits                           |
| <i>Cordia sinensis</i>                        | Muthia            | fodder, fruits, arrows, building |
| <i>Craibia brownii</i>                        | Mukubu            | axe handles, seeds poisonous     |
| <i>Croton dichogamus</i>                      | Mwalula           | medicinal, soup flavour          |
| <i>Croton megalocarpus</i>                    | Muthulu           | medicinal, bee forage            |
| <i>Cussonia holstii</i>                       | Malende           | water trough for cattle          |
| <i>Dalbergia melanoxylon</i>                  | Muingo            | Carvings                         |
| <i>Delonix elata</i>                          | Muange            | medicinal, set beehives          |
| <i>Dichrostachyus cinerea</i>                 | Munoa-mathoka     | firewood, building, medicinal    |

|                                    |               |                                   |
|------------------------------------|---------------|-----------------------------------|
| <i>Diospyros mespiliformis</i>     | Mukongoo      | Timber                            |
| <i>Dobera glabra</i>               | Kisiu         | making ndii, stools               |
| <i>Dombeya kirkii</i>              | Muvau         | make bows. bee forage             |
| <i>Entada leptostachya</i>         | Mwaitha       | medicinal                         |
| <i>Erythrina melanacantha</i>      | Ikunguu       | stools. water trough, beehives    |
| <i>Euclea divinorum</i>            | Mukinyai      | medicinal, building               |
| <i>Ficus sp.</i>                   | Muumbu        | water indicator                   |
| <i>Ficus sycomorus</i>             | Mukuyu        | water troughs, indicator, fruits  |
| <i>Fluegea virosa</i>              | Mukuluu       | water indicator, building         |
| <i>Grewia bicolor</i>              | Mulawa        | herding sticks, fruits, beds      |
| <i>Grewia villosa</i>              | Muvu          | Fruits                            |
| <i>Haplocoelum foliolosum</i>      | Mukumu        | Firewood                          |
| <i>Harrisonia abyssinica</i>       | Mkiliulu      | Medicinal                         |
| <i>Hypoestes verticillata</i>      | Mukala        | insecticide for chicken fleas     |
| <i>Kigelia africana</i>            | Kiatine       | beer, stools, yoke, beehive       |
| <i>Lannea alata</i>                | Kitungu       | fruits, wool                      |
| <i>Lannea schweinfurthii</i>       | Muasi/Kyuasi  | stools, timber, medicinal, fire   |
| <i>Lannea triphylla</i>            | Kithaala      | fibre, yoke, fruits               |
| <i>Lawsonia inermis</i>            | Itiliku       | chairs, water indicator, dye      |
| <i>Lonchocarpus bussei</i>         | Kinguuthe     | charcoal, medicinal               |
| <i>Maerua crassifolia</i>          | Kaluli        | Shade                             |
| <i>Maerua decumbens</i>            | Kinatha       | water purifier                    |
| <i>Maerua denhardtiorum</i>        | Itembokambola | Medicinal                         |
| <i>Melia volkensii</i>             | Mukau         | timber, mortar, medicinal         |
| <i>Newtonia hildebrandtii</i>      | Mukame        | firewood, beehive, building       |
| <i>Obetia radula</i>               |               | fibre to make rope                |
| <i>Ochna ovata</i>                 | Mutandi       | building, pestle, firewood        |
| <i>Olea capensis</i>               | -             | fodder, tool handles, clubs       |
| <i>Olea europaea ssp. africana</i> | Muthata       | carvings, firewood,               |
| <i>Opilia campestris</i>           | Kiburuburu    | Medicinal                         |
| <i>Ormocarpum kirkii</i>           | Muthingii     | Firewood                          |
| <i>Pappea capensis</i>             | Kyuua         | medicinal, fruits, mortar, stool  |
| <i>Pavetta gardenifolia</i>        | Mutuiyu       | Medicinal                         |
| <i>Phyllanthus sepialis</i>        | Mwalanganga   | indicator of flooding area        |
| <i>Rhus natalensis</i>             | Mutheu/Kitheu | fruits, fodder, medicinal         |
| <i>Rothmannia urcelliformis</i>    | Mutendeluka   | Fruits                            |
| <i>Salvadora persica</i>           | Mukayau       | medicinal, toothbrush             |
| <i>Sansevieria sp.</i>             | Ngwau         | fibre for tying                   |
| <i>Senna singueana</i>             | Mukengeeka    | medicinal, firewood               |
| <i>Sphaeranthus ukambensis</i>     | Zonzoia       | Medicinal                         |
| <i>Steganotaenia araliacea</i>     | Muvuavui      | Medicinal                         |
| <i>Sterculia africana</i>          | Kyuusia       | fibre for rope, fire drill        |
| <i>Strychnos henningsii</i>        | Muteta        | medicinal, fodder, spearshaft     |
| <i>Synadenium compactum</i>        | Kyatha        | insecticide, poisonous            |
| <i>Tamarindus indica</i>           | Kithumula     | fruits, bee forage, beehives      |
| <i>Teclea simplicifolia</i>        | Mutuiyu       | walking sticks, medicinal         |
| <i>Terminalia brownii</i>          | Muuku         | mortar, beehive, pestle, carvings |

|                                   |             |                                |
|-----------------------------------|-------------|--------------------------------|
| <i>Terminalia prunioides</i>      | Mutoo       | building, firewood, charcoal   |
| <i>Terminalia spinosa</i>         | Mutala      | medicinal, building            |
| <i>Thunbergia guekeana</i>        | Ithunzu     | fodder during drought          |
| <i>Uvaria scheffleri</i>          | Mukukuma    | fruits, building               |
| <i>Vangueria madagascariensis</i> | Kikomoa     | fruits edible, sold in markets |
| <i>Vitex doniana</i>              | Kimuu       | fruits edible, sold in market  |
| <i>Wrightia demartiniana</i>      | Muvoia      | medicinal, fire drill          |
| <i>Ximenia americana</i>          | Lamai       | fruits, medicinal              |
| <i>Zanthoxylum chalybeum</i>      | Mukenea     | medicinal, carvings, tea       |
| <i>Ziziphus mucronata</i>         | Kitola-usuu | fruits, building, firewood     |

**Appendix II: Checklist of plant species found in the study area**

| BOTANICAL NAME                      | KAMBA NAME  | FAMILY          |
|-------------------------------------|-------------|-----------------|
| <i>Acacia ancistoclada</i>          | Muswi       | Mimosaceae      |
| <i>Acacia brevispica</i>            | Mukuswi     | Mimosaceae      |
| <i>Acacia gerrardii</i>             | Munina      | Mimosaceae      |
| <i>Acacia mellifera</i>             | Muthiia     | Mimosaceae      |
| <i>Acacia nilotica</i>              | Musemei     | Mimosaceae      |
| <i>Acacia elatior</i>               | Muswiswi    | Mimosaceae      |
| <i>Acacia reficiens</i>             | Kituu       | Mimosaceae      |
| <i>Acacia robusta</i>               | -           | Mimosaceae      |
| <i>Acacia senegal var. kerensis</i> | King'olola  | Mimosaceae      |
| <i>Acacia seyal</i>                 | Kyunga      | Mimosaceae      |
| <i>Acacia tortilis</i>              | Mwaa        | Mimosaceae      |
| <i>Acalypha fruticosa</i>           | Mukulua     | Euphorbiaceae   |
| <i>Acyranthes aspera</i>            | Uthekethe   | Amaranthaceae   |
| <i>Acokanthera shimperi</i>         | Kivai       | Apocynaceae     |
| <i>Adansonia digitata</i>           | Muamba      | Bombacaceae     |
| <i>Albizia anthelmintica</i>        | Moakyumanai | Mimosaceae      |
| <i>Albizia gummifera</i>            | Musewa      | Mimosaceae      |
| <i>Allophylus rubifolius</i>        | -           | Sapindaceae     |
| <i>Aloe sp</i>                      | Kiluma      | Aloaceae        |
| <i>Aspilia pluriseta</i>            | Muuti       | Compositae      |
| <i>Azanza garckeana</i>             | Kitotoo     | Malvaceae       |
| <i>Balanites aegyptiaca</i>         | Kiluluwi    | Balanitaceae    |
| <i>Bauhinia taitensis</i>           | Mululuwi    | Caesalpiniaceae |
| <i>Berchemia discolor</i>           | Kisaya      | Rhamnaceae      |
| <i>Boscia coriacea</i>              | Isivu       | Capparaceae     |
| <i>Boscia angustifolia</i>          | Mululi      | Capparaceae     |
| <i>Boswellia neglecta</i>           | Kinodo      | Burseraceae     |
| <i>Bridelia taitensis</i>           | Yathia      | Euphorbiaceae   |
| <i>Cadaba farinose</i>              | Karui       | Capparaceae     |
| <i>Capparis tomentosa</i>           | Kitaandambo | Capparaceae     |
| <i>Carphalea glaucescens</i>        | Muthakame   | Rubiaceae       |
| <i>Caesalpinia trothae</i>          | -           | Caesalpiniaceae |
| <i>Caesalpinia volkensii</i>        | Kivuthi     | Caesalpiniaceae |
| <i>Carrisa edulis</i>               | Mutote      | Apocynaceae     |
| <i>Cassia abbreviate</i>            | Mwalandathe | Caesalpiniaceae |

|                                  |               |                |
|----------------------------------|---------------|----------------|
| <i>Cissus aphylla</i>            | Mwelengwa     | Vitaceae       |
| <i>Clausena anisata</i>          | -             | Rutaceae       |
| <i>Clerodendrum eriophyllum</i>  | Muumba        | Verbenaceae    |
| <i>Combretum collinum</i>        | Kitithi       | Combretaceae   |
| <i>Combretum constrictum</i>     | Mukokola      | Combretaceae   |
| <i>Combretum schumannii</i>      | Kyakyosi      | Combretaceae   |
| <i>Commiphora africana</i>       | Ikuu          | Burseraceae    |
| <i>Commiphora baluensis</i>      | Itula         | Burseraceae    |
| <i>Commiphora campestris</i>     | Yulu          | Burseraceae    |
| <i>Commiphora confusa</i>        | Kakuu ka tui  | Burseraceae    |
| <i>Commiphora edulis</i>         | -             | Burseraceae    |
| <i>Commiphora habessinica</i>    | Kitungati     | Burseraceae    |
| <i>Commiphora rostrata</i>       | Inywamanzi    | Burseraceae    |
| <i>Cordia monoica</i>            | Muthiia       | Boraginaceae   |
| <i>Cordia sinensis</i>           | Muthia        | Boraginaceae   |
| <i>Craibia brownie</i>           | Mukubu        | Papilionaceae  |
| <i>Croton dichogamus</i>         | Mwalula       | Euphorbiaceae  |
| <i>Croton megalocarpus</i>       | Muthulu       | Euphorbiaceae  |
| <i>Croton scheffleri</i>         | -             | Euphorbiaceae  |
| <i>Cussonia holstii</i>          | Malende       | Araliaceae     |
| <i>Dalbergia melanoxylon</i>     | Muvingo       | Papilionaceae  |
| <i>Delonix elata</i>             | Muange        | Caesalpinaceae |
| <i>Dichrostachyus cinerea</i>    | Munoa-mathoka | Mimosaceae     |
| <i>Diospyros mespiliformis</i>   | Mukongoo      | Ebenaceae      |
| <i>Dobera glabra</i>             | Kisiu         | Salvadoraceae  |
| <i>Dombeya kirkii</i>            | Muvau         | Steculiaceae   |
| <i>Drypetes natalensis</i>       | -             | Euphorbiaceae  |
| <i>Ehretia cymosa</i>            | -             | Boraginaceae   |
| <i>Entada leptostachya</i>       | Mwaitha       | Mimosaceae     |
| <i>Erythrina abyssinica</i>      | Kivuti        | Papilionaceae  |
| <i>Erythrina melanacantha</i>    | Ikunguu       | Papilionaceae  |
| <i>Euclea divinorum</i>          | Mukinyai      | Ebenaceae      |
| <i>Euphorbia candelabrum</i>     | Kyaa          | Euphorbiaceae  |
| <i>Euphorbia quinquecostata</i>  | -             | Euphorbiaceae  |
| <i>Euphorbia robecchii</i>       | -             | Euphorbiaceae  |
| <i>Ficus sp.</i>                 | Muumbu        | Moraceae       |
| <i>Ficus sycomorus</i>           | Mukuyu        | Moraceae       |
| <i>Fluegea virosa</i>            | Mukuluu       | Euphorbiaceae  |
| <i>Gardenia ternifolia</i>       | -             | Rubiaceae      |
| <i>Grewia bicolor</i>            | Mulawa        | Tiliaceae      |
| <i>Grewia tenax</i>              | -             | Tiliaceae      |
| <i>Grewia villosa</i>            | Muvu          | Tiliaceae      |
| <i>Haplocoelum foliolosum</i>    | Mukumu        | Sapindaceae    |
| <i>Harrisonia abyssinica</i>     | Mkiliulu      | Simaroubaceae  |
| <i>Hermannia oiveri</i>          | Ughuundu      | Sterculiaceae  |
| <i>Heteromorpha trifoliata</i>   | -             | Araliaceae     |
| <i>Hibiscus micranthus</i>       | Mulalambila   | Malvaceae      |
| <i>Hymenodictyon parvifolium</i> | -             | Rubiaceae      |
| <i>Hypoestes verticillaris</i>   | Mukala        | Acanthaceae    |
| <i>Indigofera spp.</i>           | Musuusuu      | Papilionaceae  |

|                                    |               |                 |
|------------------------------------|---------------|-----------------|
| <i>Kigelia africana</i>            | Kiatine       | Bignoniaceae    |
| <i>Lannea alata</i>                | Kitungu       | Anacardiaceae   |
| <i>Lannea schweinfurthii</i>       | Muasi/Kyuasi  | Anacardiaceae   |
| <i>Lannea triphylla</i>            | Kithaala      | Anacardiaceae   |
| <i>Lawsonia inermis</i>            | Itiliku       | Lythraceae      |
| <i>Lippia javanica</i>             | Muthiethi     | Verbenaceae     |
| <i>Lonchocarpus bussei</i>         | Kinguuthe     | Papilionaceae   |
| <i>Maerua crassifolia</i>          | Kaluli        | Capparaceae     |
| <i>Maerua decumbens</i>            | Kinatha       | Capparaceae     |
| <i>Maytenus putterlickioides</i>   | Muthunzi      | Celastraceae    |
| <i>Maerua denhardtiorum</i>        | Itembokambola | Capparaceae     |
| <i>Maesa lanceolata</i>            | -             | Myrsinaceae     |
| <i>Manilkara mochisia</i>          | Kinako        | Sapotaceae      |
| <i>Melia volkensii</i>             | Mukau         | Meliaceae       |
| <i>Millettia leucantha</i>         | Mutwa         | Papilionaceae   |
| <i>Newtonia buchanannii</i>        | -             | Mimosaceae      |
| <i>Newtonia hildebrandtii</i>      | Mukame        | Mimosaceae      |
| <i>Obetia radula</i>               | -             | Urticaceae      |
| <i>Ochna ovata</i>                 | Mutandi       | Ochnaceae       |
| <i>Ocimum basilicum</i>            | Mutaa         | Labiatae        |
| <i>Ocimum suave</i>                | Mukandu       | Labiatae        |
| <i>Olea capensis</i>               | -             | Oleaceae        |
| <i>Olea europaea ssp. africana</i> | Muthata       | Oleaceae        |
| <i>Opilia campestris</i>           | Kiburuburu    | Opiliaceae      |
| <i>Ormocarpum kirkii</i>           | Muthingii     | Papilionaceae   |
| <i>Osyris lanceolata</i>           | -             | Santalaceae     |
| <i>Pappea capensis</i>             | Kyuua         | Sapindaceae     |
| <i>Pavetta gardenifolia</i>        | Mutuiyu       | Rubiaceae       |
| <i>Phyllanthus sepialis</i>        | Mwalanganga   | Euphorbiaceae   |
| <i>Piliostigma thonningii</i>      | Mukolokolo    | Caesalpiniaceae |
| <i>Rhus natalensis</i>             | Mutheu/Kitheu | Anacardiaceae   |
| <i>Rhus quartiniana</i>            | Mutheu        | Anacardiaceae   |
| <i>Rothmannia urcelliformis</i>    | Mutendeluka   | Rubiaceae       |
| <i>Salvadora persica</i>           | Mukayau       | Salvadoraceae   |
| <i>Sansevieria sp.</i>             | Ngwau         | Agavaceae       |
| <i>Sclerocarya birrea</i>          | Muua          | Anacardiaceae   |
| <i>Scutia myrtina</i>              | Mtanda mboo   | Rhamaceae       |
| <i>Solanecio mannii</i>            | -             | Compositae      |
| <i>Solanum incanum</i>             | Mutongu       | Solanaceae      |
| <i>Solanum renschii</i>            | Mutongatongu  | Solanaceae      |
| <i>Sphaeranthus ukambensis</i>     | Nzou-ya-iiia  | Compositae      |
| <i>Sterculia Africana</i>          | Kyuusya       | Sterculiaceae   |
| <i>Sterculia stenocarpa</i>        | Kyuusya       | Sterculiaceae   |
| <i>Strychnos henningsii</i>        | Muteta        | Loganiaceae     |
| <i>Suregada procera</i>            | -             | Euphorbiaceae   |
| <i>Tamarindus indica</i>           | Muthumula     | Caesalpiniaceae |
| <i>Teclea simplicifolia</i>        | -             | Rutaceae        |
| <i>Terminalia brownie</i>          | Muuku         | Combretaceae    |
| <i>Terminalia orbiculalis</i>      | Mutula        | Combretaceae    |
| <i>Terminalia parvula</i>          | Mutula        | Combretaceae    |

|                                   |             |               |
|-----------------------------------|-------------|---------------|
| <i>Terminalia prunioides</i>      | Mutoo       | Combretaceae  |
| <i>Terminalia spinosa</i>         | Mutala      | Combretaceae  |
| <i>Thylachium thomasii</i>        | -           | Capparadaeae  |
| <i>Trema orientalis</i>           | -           | Ulmaceae      |
| <i>Tridax procumbens</i>          | Kaningu     | Compositae    |
| <i>Turraea robusta</i>            | -           | Meliaceae     |
| <i>Uvaria scheffleri</i>          | Mukukuma    | Annonaceae    |
| <i>Vangueria infausta</i>         | Kikomoa     | Rubiaceae     |
| <i>Vangueria madagascariensis</i> | Kikomoa     | Rubiaceae     |
| <i>Vitex doniana</i>              | Kimuu       | Verbenaceae   |
| <i>Waltheria indica</i>           | -           | Sterculiaceae |
| <i>Ximenia Americana</i>          | Mutula      | Olacaceae     |
| <i>Zanthoxylum chalybeum</i>      | Muenea      | Rutaceae      |
| <i>Ziziphus mucronata</i>         | Kitola-usuu | Rhamnaceae    |

### Appendix III: Common trees (> 10 cm dbh) found in the transects

| Transect                            | Ikisaya | Malalani | Kamusa | All |
|-------------------------------------|---------|----------|--------|-----|
| <b>Total number of trees</b>        |         |          |        |     |
| <i>Acacia senegal var. kerensis</i> | -       | 20       | -      |     |
| <i>Adansonia digitata</i>           | 2       | -        | 6      |     |
| <i>Albizia anthelmintica</i>        | 5       | 2        | 8      |     |
| <i>Berchemia discolor</i>           | 8       | 3        | 6      |     |
| <i>Boswellia neglecta</i>           | 2       | 16       | -      |     |
| <i>Bridelia taitensis</i>           | 6       | -        | 9      |     |
| <i>Cassia abbreviata</i>            | 10      | 14       | 5      |     |
| <i>Combretum collinum</i>           | 6       | 3        | 5      |     |
| <i>Commiphora baluensis</i>         | 11      | 44       | -      |     |
| <i>Craibia brownii</i>              | 25      | 5        | 17     |     |
| <i>Dalbergia melanoxylon</i>        | 5       | 2        | 12     |     |
| <i>Delonix elata</i>                | 2       | -        | 4      |     |
| <i>Diospyros mespiliformis</i>      | 15      | 1        | 12     |     |
| <i>Haplocoelum foliolosum</i>       | 8       | 6        | -      |     |
| <i>Ficus sp.</i>                    | 3       | -        | 9      |     |
| <i>Lannea alata</i>                 | -       | 25       | -      |     |
| <i>Kigelia africana</i>             | 1       | 6        | 4      |     |
| <i>Newtonia hildebrandtii</i>       | 19      | -        | 6      |     |
| <i>Obetia radula</i>                | 3       | 1        | 1      |     |
| <i>Ochna ovata</i>                  | 11      | 4        | 2      |     |
| <i>Rothmannia urcelliformis</i>     | 10      | -        | 4      |     |
| <i>Sterculia africana</i>           | 8       | 2        | 15     |     |
| <i>Tamarindus indica</i>            | 5       | -        | 6      |     |
| <i>Teclea simplicifolia</i>         | 4       | 1        | 3      |     |
| <i>Terminalia brownii</i>           | 8       | -        | 18     |     |
| <i>Terminalia prunioides</i>        | 6       | 1        | 10     |     |
| <i>Zanthoxylum chalybeum</i>        | 2       | -        | 2      |     |
| <i>Cassipourea celastroides</i>     | 5       | 1        | 6      |     |
| <i>Combretum schumannii</i>         | 14      | -        | 4      |     |
| <i>Drypetes gerrardii</i>           | 4       | -        | -      |     |
| <i>Celtis mildbraedii</i>           | 2       | -        | 1      |     |
| <i>Psydrax schimperiana</i>         | 3       | 1        |        |     |

### **3.7 Plenary discussion and feedback**

Questions for Siri Eriksen: Can you explain what you meant by creating economic opportunities and to invest fees and taxes in local development activities?

Answer - For example, the fees taxed from the community such as grazing fees at the hill top, paid by individual to graze his/her animal at the hilltop, could be channeled back to the community to be used in development activities (water pipelines, social and physical infrastructure etc) as well as enhancing dryland products (processing and marketing).

Questions for District forester – Endau hill is gazetted forest or can it be grazed?

Answer - If there is agreement with the local community during dry seasons, animals can be taken uphill for grazing with controlled supervision by the forest patrol man and forest guard. Animals are allowed to graze with payment of small fee per animal, currently 40.00 KSh per animal. Not all the area in the hill can be grazed but particular area have been selected for grazing and other areas left for the purpose of water catchments. This system is based on an understanding of the problems the community faces of inadequate water and pastures especially during the dry season.

Question for Francis Gachathi – There are other tree species that can produce gum arabica, how can people of Endau be assisted to identify such species for use?

Answer - Already we have identified those species and we will follow up to see how more can be identified and awareness created. There is a project that is doing this and very soon we are going to inform the project to come and look into that, but this will depend on the quality of gum to be harvested from the species. The species we have already identified (Acacia Senegal) can have the best gum arabica and I am very sure the one currently found in Turkana, northern Kenya, may not be enough to meet the world market demand. Therefore this one of Endau can have good potential in future.

Education and awareness on harvesting is needed to ensure that the gum is harvested sustainably, however.

Question for policy makers - The people of Endau believe the Endau hill belongs to them. Why can't the government get the people involved in the management of the hill? We know initially the people of Endau were managing the hill why can't the government show them how to manage and use the hill sustainably? We know water is very important resource from the hill why should the government not tap this water for the people?

Answer - The hill was gazetted in 1960 and according to the existing forest act and policy people are not allowed in the gazetted forest and they cannot be involved in the management of the hill. However, the old forest act is going to be reviewed and I am sure it is going to favor people and it will be flexible and not anti-people. The community will be involved in the management of forest. Already, the Forest Department is involving communities in other parts of the country and even in Kitui through establishing local forest management committees.

Question for Chief Endau – There are streams from the hill that are functioning and we have permanent water flowing from them and there have been project going on to tap water for the people in the plains. Why have some of the projects have phased out or stopped with no more water flowing through the pipes?

Answer - The water committees in the community are not well organized and once pipes break no repair takes place. The pipes that were brought were plastic pipes and due to much water pressure they are unable to hold water any more therefore they burst easily. Let the administrations assist the community to have functional water committees.

Question for Francis N. Gachathi – The hilltop vegetation research team have not mentioned anything on the grass and wildlife species found in the hilltop, why?

Answer - This has been mentioned although not in the presentation because of the time but already it has been documented both in written form of data and well covered in the slides.

It was recommended that his report should be availed in the district for further dissemination. The report for phase I research work at Endau hill is to be send to the District Administration Headquarters for dissemination.

The grazing at Endau hill has been legalized during dry season but it should be done in a sustainable way and conserve the catchments forests.

A participant asked who will teach the people of Endau how to elect water committee officials democratically. It was suggested that this will be the work of local administrations at the community levels. The women have to be included in the committees. Let all the stakeholders be involved in the management and conservation of Endau hill.

### **3.8 The way forward**

Mr. Mwea Muindi – Kitui Agricultural officer chaired the discussion session.

The importance of involving the community in the management and conservation of the Endau hill top forest. Sustainability has to be enhanced on forest resources, women should be involved and youths.

It was emphasised that water development is costly and takes a lot of money from the government; therefore people in the community should be involved in any project on water. Committees should be trained to manage and maintain the water pipe lines (they should have basic training).

From June next year there will be water board but not ministry of water, to look at issues of water and management.

A question was posed as to how we can use herbal plant in the hill top and how the Ministry of Culture and Social Services can make sure that the knowledge on herbal medicine is properly in use after inventory of the plants.

The herbal experts will be involved in the herbal committees to advance and guide people on the area of herbal medicine. For those who claim to have knowledge on herbal medicine

there names will be enlisted in the Ministry of Culture and Social Services at Kitui District Headquarters and their herbs taken to Nairobi to an expert to be analyzed and tested. If the herbs work, the herbalist will be given licenses to practice and assist people.

The farmers should be advised to leave the herbal plants on their farms. The herbal plants that are on the hill should also be planted on the plains to be utilized by the community.

The community should forward the list of plants that they need to be supplied with by the forest department and KEFRI Research Regional Centre in Kitui town.

The registration of herbal medicine men/women: People should forward their names to the office of culture and social services and they should pay 500/- for registration.

There will be seminar on herbal medicinal plants on 4/03/05 organized by Ministry of Culture and Social Services at Kitui town.

The Chief of Malalani Location emphasised that the community in his area of administration should be involved in development because they are the ones that rent shallow wells to Somali's and then the issue of conflict will be solved. Those who continue renting wells and pasture land to Somalis and Oromas will be listed down by the Chief Malalani and their names forwarded to the District Commissioner for Kitui for further action.

It was suggested that excluding pastoralists from local resources will not solve any conflicts, instead resources should be developed for everyone and in particular, water and other services be provided to different pastoralist groups.

### **3.9 Recommendations**

1. Create awareness on the importance of conservation of the hill. The local community should form conservation and management committees
2. Identify other stakeholders, especially government departments and involve them.
3. Build capacity of the local on proper management and utilization of local resources.
4. Mainstreaming culture into development to ensure that development is culturally relevant and sustainable.
5. Sharing and disseminating available information among all stakeholders to be encouraged for better and well informed decision making in the management and conservation of hilltop natural resources.
6. On- farm planting highly valuable trees to be promoted to reduce pressure on hilltop forest resources.
7. Creating alternative economic opportunities for the communities.
8. Conflicts to be managed through the following:
  - Improve water supplies to reduce conflict eg. (develop boreholes near to the Somalis and Oromas)
  - Locals to control access to water by Somalis and Oromas
  - Control of livestock diseases.
  - Intertribal peace committees to be established

- Negotiations among the affected communities
- Enziu Ranch to be developed by the government – 72,000 Ha (as it is the conflict stadium)

### **3.10 Closing remarks**

#### **Centre Director, KEFRI- Kitui, James Kimondo**

The Director thanked the participants and expressed how he has been educated because he now clearly understands the challenges the people are facing. He hoped that participants have gone home with something from the workshop. He welcomed the project leader to give her final remarks.

#### **The project leader, Siri Eriksen**

The workshop has covered many issues. The workshop proceedings will be compiled and sent to all participants through Kitui Regional Centre. We should put great emphasis on the issues discussed during the workshop and the recommendations made for our future success in natural resources management and conservation in Endau and Malalani locations.

The researchers have enjoyed the field research and visiting Endau. She said that the workshop gave her the opportunity to share findings and the discussion has helped her improve the research. Exciting issues were raised, such as conflict resolutions and its now upon various participants to address some of these issues and the researchers also have got challenging issues to work on. She thanked every body for their contributions to the success of the workshop and the research work at Endau hill on climate change. She thanked all who participated.

#### **Chief Endau Location**

Samuel Kimanthi extended his thanks to Norway Government , Kenya Government, KEFRI and all who made the day a success. The phase ending today has been beneficial and the recommendations will bear fruit especially for the Endau and Malalani people. He wished all participants success in days to come.

#### **Mr. Benedict Musyoka, District Drought Management Officer (on behalf of District Commissioner, Kitui District)**

The District Commissioner has other engagements and Mr. Musyoka gave the final speech. God created man, animals and plants and man was to take charge. The size of land remains constant although people, animals are increasing. This has created these conflicts that we see and which has made Somalis, Oromas come to Endau. This has created problems for the people and the government. The climate is changing and it comes with its own problems and that is a fact that cannot be put aside.

He explained the example of elephants and fodder how they oscillate, that is, they each increases as the other increases and decreases as the other decrease. He posed the question of why the people migrated to Endau in the first place, suggesting that it must have been out of reduction of grazing area. He claimed that unless we become wise, man has become an enemy of himself and if human activities are not checked, man will destroy himself. It emerged from the Nairobi workshop on climatic change that the climate is actually changing. The situation is worsening and we can only deal with it by creating awareness on economical sustainability of resources.

He emphasised that as we eat today and utilize our resources we must remember that the future generation will need to utilize the same. The utilization, conservation and preservation

should now be the responsibility of the community. They should take charge so that they are not faced with extinction. Culture should be mainstreamed into development for the good of the community. It is important to let the people of Endau rely on the natural water that is coming from the Endau hill and make sure that the water is conserved for the future generations. The community should be able to tap the little they have, have their own initiatives and push these forward.

He thanked the participants for coming, participating and contributing to the workshop. He wished the participants to go well and find ways of living peacefully with their neighbours and that the administration will be behind them. They will work with other bordering districts to find a solution, as they have been doing when visiting all those places. They are quite aware of the conflict. He promised to talk to DC to see whether the issue of conflict between the Somalis, Oromas and Kambas over the water and pasture can be settled.

Finally, he thanked the project leader and the the project team for the work that they have done in the community as this will go a long way in promoting development in Endau as no development can be achieved without proper and efficient management of the environment . The way forward is to rely on what we have recommended in this workshop. He emphasised that we should follow up what the researchers have found instead of ignoring facts. He asked all those who attended the workshop to work together for the purpose of steering development in this area of Endau and Malalani Locations. He said that we have to start our own development so that we can move forward.

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