

## TFCG Technical Report 49

### Climate Change, Agriculture and Poverty Alleviation Project

# Identification of unsustainable land-use practices that threaten water sources and other ecosystem services in Kilosa District

Dr. W. A. Mugasha and Dr. J. Z. Katani  
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<sup>1</sup>Tanzania Forest Research Institute, Morogoro

<sup>2</sup>Faculty of Forestry and Nature Conservation, Sokoine University of Agriculture, Morogoro

### **About the Tanzania Forest Conservation Group**

**TFCG Mission:** To conserve and restore the biodiversity of globally important forests in Tanzania for the benefit of the present and future generations. This is achieved through capacity building, advocacy, research, community development and protected area management, in ways that are sustainable and foster participation, co-operation and partnership

The Tanzania Forest Conservation Group (TFCG) is a Tanzanian NGO, registered in 1985. TFCG has 30 years of experience in working with issues relating to forest conservation in Tanzania. Through TFCG's five programmes: advocacy, participatory forest management, environmental education, community development and research, TFCG has succeeded in rolling out innovative and high-impact solutions to the challenges facing Tanzania's forests and the people that depend on them. In particular, TFCG has been active in advocating for improved forest management and reduced deforestation throughout this period.

### **About the Climate Change, Agriculture and Poverty Alleviation Project**

**Goal:** Poverty has been reduced amongst small-scale farmers in Tanzania and greenhouse gas emissions from agriculture have been reduced through the widespread adoption of climate resilient, low emission agricultural practices.

**Intermediate outcome 1:** Tanzania has developed and is implementing policies and strategies that prioritise support to small-scale farmers to enable them to improve their livelihoods through the adoption of climate smart agriculture and sustainable land and natural resources management.

**Immediate outcome 1:** Small-scale farmers and other stakeholders are demanding the integration of climate smart, small-scale agriculture and sustainable land and natural resources management in national policy and policy implementation.

The CCAP project was active between October 2012 – December 2015. The project was financed by UK AID through the Accountability in Tanzania Programme. The project partners in 2015 were the Tanzania Forest Conservation Group, the Agricultural Non-State Actors Forum, the Community Forestry Network of Tanzania (MJUMITA) and the Tanzania Organic Agriculture Movement. The project worked with communities in Kilosa and Chamwino Districts and with stakeholders at national level.

For more information, please visit: <http://www.tfcg.org/CCAP.html>

## Executive Summary

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### Background information

The climate change, agriculture and poverty alleviation project (CCAP) is implemented under a partnership arrangement that involves four organizations: the Tanzania Forest Conservation Group (TFCG), the Community Forestry Network of Tanzania (MJUMITA), the Tanzania Organic Agriculture Movement (TOAM) and the Agricultural Non State Actors Forum (ANSAF).

The intermediate objective of the CCAP initiative is that Tanzania has developed and is implementing policies and strategies that prioritize support for small-scale farmers to enable them to improve their livelihood through adoption of climate smart agriculture and sustainable land and natural resources management options/practices. The immediate objectives of the CCAP initiatives are that small-scale farmers and other stakeholders are demanding the integration of climate-friendly agriculture in national policy and policy implementation. Moreover, government, private sector and civil society are cooperating to support small-scale farmers to benefit from low GHG emission agriculture that is more resilient to climate variability.

However, before embarking to accomplish project objectives, it is imperative that current land use practices, how they are carried out, their impact to environment and people's lives, and their corresponding drivers are known and documented. It is against this background that TFCG engaged a team of two consultants to identify unsustainable land use practices commonly practiced by small-scale farmers and pastoralists in Kilosa with a particular focus on those threatening key water sources; causing deforestation and forest degradation; threatening pollinators; and /or causing water pollution. Specific objectives of the consultancy were to:

- ✓ Identify and characterizes unsustainable agricultural, mining, livestock management, logging and/or charcoal production practices that threaten ecosystem values including the quality and flow of water, soil, biodiversity including pollinators and forests/woodlands in a sample of the 14 villages that the project is working with.
- ✓ Provide practical recommendations on how the identified unsustainable practices can be addressed. The recommendations include what needs to be done and by whom in order to address both the direct and indirect causes of the problem; and / or action needed to mitigate the damage.

### Methodology

The study was carried out in four sample villages of Kisongwe, Mfuluni, Nyali and Msimba out of 14 project villages. Situation and problem analyses were used in this assignment. Situation analysis was carried out to give an account of what is currently happening by characterizing different unsustainable land use practices in the selected villages by describing what is being done, including specific examples accompanied by photographs. This was followed by assessment of environmental impact of the identified practices focusing on evidence of the damage caused; an identification of the scale of the problem, identification and documentation of who was involved.

Problem analysis was used to identify and prioritize the causes and effects of the identified unsustainable land use practices and included data describing levels of awareness amongst small-scale farmers in the selected villages on the risks of the different land use practices under consideration. Analysis of the causes and effects helped to identify the repercussions of the practices and segments of the community who are most affected and key actors needed to be involved in planning interventions aimed at providing long-lasting remedial measures to address the unsustainable land use practices. Data collection for both analyses involved focus group discussions, group interviews, key informant interview, field observations and review of various documents.

### Results

*Review of relevant policies and legal framework related to land uses*

The policies, laws, bylaws and other plans governing land uses in different sectors are in place. The relevant policies and legal framework reviewed include agriculture and livestock, wildlife, land, forestry, water and environment sectors. Also the review included bylaws, forest management and land use plans. The control of unsustainable land uses practices depends very much on how these policies are implemented and laws are enforced.

#### *Land use and land use practices*

The common land uses identified in the selected villages included agriculture, forest for charcoal production, settlement, forest for water catchment and biodiversity conservation, forest for timber harvesting, area for grazing and areas for social services e.g. dispensary, schools, market, graveyards, grounds for sports, worshipping, shops etc.

#### *Unsustainable land use practices*

Unsustainable land use practices identified were charcoal and timber production involving improper techniques and technology, traditional farming practices which do not use soil and water conservation techniques, overgrazing, mining in natural forests, hunting using fire and fishing using poison.

#### *Impact of unsustainable land uses to environment*

Impact of unsustainable land use practices to environment were identified to be reduction of water quantity and quality, soil degradation, decrease of forest cover, climate variability (drought), siltation, disappearance of valuable timber tree species and aquatic organisms.

#### *Impact of unsustainable land uses to people's lives*

Unsustainable land use practices have the following impact to people lives: increased poverty (low income generation), hazards such as floods, conflicts among different users, hunger and diseases.

#### *Drivers of unsustainable land uses*

The main identified drivers of unsustainable land use practices were poverty, inadequate extension services, climate variability (unreliable rain and drought), poor law enforcement, corruption and low financial and human resources at district level.

### **Conclusion**

- 1) All the study villages were found to have land use plans which were established between 2010 and 2012. The defined land uses depended on landscape characteristics i.e. water sources, forest cover, economic activities, priorities, geographical location and demands.
- 2) Although common unsustainable land use practices were identified i.e. charcoal and timber production, traditional agriculture which do not follow soil and water conservation techniques, overgrazing, mining, hunting, and unsustainable fishing, some few vary with geographical location. The following are examples:
  - ✓ Charcoal making is more prominent in villages close to town centres since the transport costs are significantly lower. The same would be expected for timber, however due to scarcity of timber tree species close to town centres the pressure has shifted to highlands.
  - ✓ Agriculture in hilly or slope areas is common in villages situated in the highlands.
  - ✓ Overgrazing is more common in lowland areas than in the highlands
- 3) Some of the environmental impacts caused by land use practises were found to vary from one location to another while others cut across the landscape. For example:
  - ✓ Siltation is taking place in villages located in the lowlands more than in the highlands.
  - ✓ Soil degradation due to soil erosion is more common in highland and hilly villages situated than in lowland villages.
  - ✓ Decrease in water flow, water quality and drought cut across the landscape.
  - ✓ Forest cover is decreasing more in villages close to town centres than those situated far away due to high charcoal demand and the fact that charcoal does not require strict tree selection like

timber. Although timber are harvested from highlands (away from town centres), they do not cause as significant damage as charcoal.

- ✓ Climate variability was directly linked to drought and unreliable rainfall. This was common to all visited villages.
- 4) The identified impacts of unsustainable land use practices to people's lives cut across the landscape except flood hazard which is specific to some vulnerable villages in the lowland i.e. Dodoma Isanga, Nyali, Kisanga and Ibingu.
- ✓ Increased poverty due to low crop production as a result of unsustainable farming practices and drought were apparent in all villages. This also aggravates the food shortage problem (hunger).
  - ✓ Diseases were also reported as a consequence of poor water quality and quantity and this was common to all selected villages.
  - ✓ Furthermore, conflict between farmers and herders were found to be common in villages situated in the lowland as a result of overgrazing.
- 5) Identified drivers of unsustainable land use practices include the following:
- ✓ Poverty: poverty is both a driver and an effect. A good example is related to agriculture. Due to poverty, people fail to access infrastructure required to implement soil and water conservation agriculture (poverty as a driver). Failure to carry out sustainable agriculture intensifies poverty due to low income generated from unsustainable agriculture (poverty as an effect). For livestock, building water reservoirs which serve during dry season and decrease the migration of herders in search of water require capitals which majority do not have.
  - ✓ Drought forces people to cultivate close to water sources/ivers. Drought also limits the growth of pastures which result in herder migration to other areas. Drought also intensifies poverty due to low crop production.
  - ✓ Poor law enforcement and corruption aggravate forest cover reduction due to illegal charcoal making and timber harvesting. In addition, it intensifies agriculture on the river banks as a result water quality and quantity is reduced.
  - ✓ Low financial and human resources at district level which limit the extension services
- 6) Policies and legal framework which govern land uses are in place. However, their enforcement and implementation of plans by district officials have been minimal due to inadequate human and financial resources to implement their routine activities and to support initiatives introduced by development partners e.g. TFCG.
- 7) Although past interventions to address unsustainable land use practices were relevant, most of them failed due to: inadequate on farm demonstrations, short lived projects (2 years), inappropriate technologies; for example, introducing exotic poultry breed that is vulnerable to diseases; and importation of finished product instead of transfer of appropriate technologies.

## **Recommendations**

- 1) Government at different levels and other development partners such as TFCG should ensure that introduction of sustainable farming practices follows all necessary phases of namely, basic on-station research, on-farm adaptive research and dissemination.
- 2) Future project to promote sustainable land use practices must harness indigenous knowledge and perspectives of the local people; and build on thorough analysis of the underlying causes of the problem
- 3) The few available extension workers should be encouraged to operate through farmer field schools or groups, instead of working with individual farmers, in order to reach a large number of people with little resources
- 4) Policies, development and conservation interventions should focus on sustainable income generating activities building from existing activities especially those which are affordable to the poor such as chicken production. In addition, preference should be given to development to low cost technologies and building local capacity instead of importing finished products; for example instead of ordering

beehives from town for establishment of beekeeping projects, means must be thought to develop local capacity for manufacturing beehives.

- 5) To enhance adoption of technologies, the core infrastructures/materials involved should be those locally readily available to community. For example, local carpenter may be trained to construct beehives using timber available in the village and sell to people at reasonable price instead of importing beehives from Morogoro.
- 6) In order to alleviate negative repercussions of unregulated livestock migration from one village to another, government at different levels and other development partners such as TFCG should acknowledge positive contribution of pastoralism to the national economy and adopt participatory landscape natural resource management systems that integrate pastoralism at the landscape level; instead of the current village based land use planning that fail to capture the need of pastoralists within a given landscape.
- 7) Promotion of sustainable farming practices should go hand in hand with establishment of mechanisms to enhance farmers bargaining power. This can be achieved through establishment of practical system to ensure farmers' access to market information such as mobile phone based that takes advantage of high coverage of mobile phones network in Tanzanian villages.
- 8) In order to ensure practicability of natural resources management by-laws, their formulation should be facilitated and building on indigenous knowledge and harnessing technological, social and political realities.
- 9) Government at different levels and other development partners such as TFCG should work together with extension officers to develop a practical incentive mechanism to sustain introduced interventions. Besides, the use of paraprofessionals should be considered to resolve the widespread inadequate number agricultural extension officers observed in the study area.
- 10) Improvement of district human and financial capacity by employing more extension officers at village levels and providing working facilities to enable them implement and enforce policies and laws.

## Acronyms

AGRA	Growing Africa's Agriculture
ANSAF	Agricultural Non State Actors Forum
CCAP	Climate Change, Agriculture and Poverty alleviation Project
FGD	Focus Group Discussion
GHG	Greenhouse Gases
MJUMITA	Mtandao wa Jamii wa Usimamizi wa Mimitu Tanzania (Tanzanian Community Forest Conservation Network)
REDD	Reducing Emission from Deforestation and forest Degradation
SECAP	Soil Erosion Control and Agroforestry Program
TFCG	Tanzania Forest Conservation Group
TFS	Tanzania Forest Service Agency
TOAM	Tanzania Organic Agriculture Movement
VNRC	Village Natural Resources Committee

## **Acknowledgements**

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Furthermore, special thanks are extended to Village leaders and villagers of Mfuluni, Nyali, Msimba and Kisongwe who participated actively in the group discussions during our visits to their villages.



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## 1. Introduction

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### 1.1. Background Information

The climate change, agriculture and poverty alleviation project (CCAP) is implemented under a partnership arrangement that involves four organizations: The Tanzania Forest Conservation Group (TFCG), the Community Forestry Network of Tanzania (MJUMITA), the Tanzania Organic Agriculture Movement (TOAM) and the Agricultural Non State Actors Forum (ANSAF). The initiative aims to steer Tanzania towards an agricultural development pathway that achieves the dual goals of poverty reduction and lower greenhouse gas emissions. The project started in October 2012 and is financed by UK AID through the Accountability in Tanzania programme.

The goal of the CCAP initiative is that poverty has been reduced amongst small-scale farmers in Tanzania and greenhouse gas emissions from agriculture have been reduced through the widespread adoption of climate resilient, low emission agricultural practices.

The intermediate objective of the CCAP initiatives is that Tanzania has developed and is implementing policies and strategies that prioritize support for small-scale farmers to enable them to improve their livelihood through adoption of climate smart agriculture and sustainable land and natural resources management options/practices. The immediate objectives of the CCAP initiatives are that small-scale farmers and other stakeholders are demanding the integration of climate-friendly agriculture in national policy and policy implementation. Moreover, government, private sector and civil society are cooperating to support small-scale farmers to benefit from low GHG emission agriculture that is more resilient to climate variability.

### 1.2. Objectives of the consultancy

The overall objective of this consultancy was to identify unsustainable land use practices commonly practiced by small-scale farmers and pastoralists in Kilosa with a particular focus on those threatening key water sources; causing deforestation and forest degradation; threatening pollinators; and /or causing water pollution.

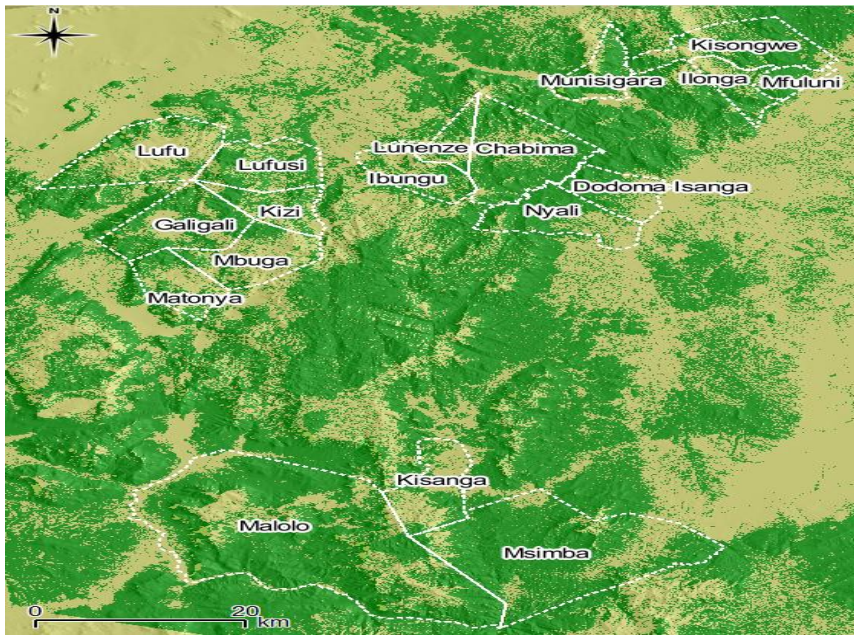
Specific objectives of the consultancy were:

1. Identify and characterize unsustainable agricultural, mining, livestock management, logging and/or charcoal production practices that threaten ecosystem values including the quality and flow of water, soil, biodiversity including pollinators and forests/woodlands in a sample of the 14 villages that the project is working with. This included a detailed analysis of at least 5 different practices. The practices analysed in detail were selected in consultation with community and project representatives. For each practice, the following was provided:
  - A description of the practice i.e. what is being done, including specific examples from the project villages accompanied by photographs;
  - An assessment of the environmental impact of the practices including evidence of the damage caused and an indication of the scale of the problem and associated risks;
  - A description of who is involved in the practice;
  - An outline of the underlying causes behind people practicing these techniques. This includes data describing levels of awareness amongst small-scale farmers in the project villages on the risks of the land use practice under consideration;
  - A description of any measures taken already to address these practices and lessons learned from initiatives to address the problem;
  - An analysis of whether the practice was already governed by national laws or by local by-laws.
2. Provide practical recommendations on how the identified unsustainable practices can be addressed. The recommendations include what needs to be done and by whom in order to address both the direct and indirect causes of the problem; and / or action needed to mitigate the damage.

## 2. Methodology

### 2.1. Study design

The study was carried out in four villages in Kilosa District: Kisongwe, Mfuluni, Nyali and Msimba. These villages were selected in consultation with CCAP Project Coordinator Mr. Eliakim Enos based on prior knowledge on the land use practices so as to represent the main land use practices in Kilosa including: agriculture, livestock management, timber and charcoal harvesting, mining and settlement development. All selected four villages are implementing community based forest management. In addition, factors such as climate and geographical features i.e. presence of rivers, wetlands, highlands and lowlands and catchment forests were considered. These features have implications on the land use practices/economic activities. The four villages were selected from 14 villages in Kilosa District where TFCG and MJUMITA have been promoting climate change mitigation and adaptation activities (Figure 1).



**Figure 1.** Distribution of project villages in Kilosa district

### 2.2. Data collection and analysis

Situation and problem analyses were used in this assignment. Situation analysis was carried out to give an account of what is currently happening by characterizing different unsustainable land use practices in the selected villages by describing what is being done, including specific examples accompanied by photographs. This was followed by an assessment of the environmental impacts of the identified practices focusing on evidence of the damage caused; an indication of the scale of the problem, identified who was involved in the practices and documented. Situation analysis culminated by describing measures in place to curb unsustainable land use practices and lessons learned from initiatives to address the problem. Source of data/information and methodological approach to analyse the situation described above are described in Table 1.

Problem analysis was used to identify and prioritize the causes and effects of the identified unsustainable land use practices and included data describing levels of awareness amongst small-scale farmers in the selected villages on the risks of the different land use practices under consideration. Analysis of the causes and effects helped to identify the repercussions of the practices and segments of the community who are most affected and key actors needed to be involved in planning interventions aimed at providing long-lasting remedial measures to address the unsustainable land use practices.

Situation and problem analyses were carried out in two stages. First, consultation of the project field officers, district staff, and other stakeholders was conducted at Kilosa in order to assess clearly the perspectives of the project stakeholders about the main natural resource management problems and their

causes. Second, the same was carried out at community level with representatives from small-scale farmers and livestock keepers, village leaders and village natural resource committee (VNRC) members to solicit the perspective at the community level. Appendix 1 shows the list of people who were consulted during interviews and focus group discussion (FGD) for this assignment. Further analysis, was done to assess commonalities and differences between perspectives on unsustainable land use practices at the levels of the community and other key stakeholders at the higher level. After this analysis the consultant developed a comprehensive matrix of unsustainable land use practices with their causes and effects to environment and human lives. This is due to the fact that quite often the difference in perspectives between communities and development actors constitutes one of the main obstacles towards the successful achievement of the proposed solutions to address the unsustainable land use practices.

The matrix relating information collected for each sub-objective of this assignment, tasks and methodological approach is presented in Table 1. Data collection tools/checklists are presented in Appendix 2.

**Table 1.** Methods, source of information and type of data collected to identify and analyse unsustainable land use practices in Kilosa District

Objective	Tasks	Methodological approach
1. Description of practices i.e. what is being done with specific examples	<ul style="list-style-type: none"> <li>✓ Acquisition of data on land use practices carried out in project area</li> <li>✓ Seek people's opinions on the existence of unsustainable land uses by identifying and characterizing them by focusing on agricultural, mining, livestock management, logging and / or charcoal production practices</li> <li>✓ Review of land use change analyses generated by MJUMITA for Kilosa</li> <li>✓ Consult project field officers, district staff, client and other stakeholders in Kilosa</li> </ul>	<ul style="list-style-type: none"> <li>✓ Situation analysis through FGD with stakeholders at district and village levels</li> <li>✓ Secondary data (Review of reports and other scientific works carried out in project villages on land use practices)</li> <li>✓ Key informant interviews with selected district staff and community members</li> </ul>
2. Assessment of environmental impact of the identified practices including evidence of the damage caused, indication of the scale of the problem and associated risks	<ul style="list-style-type: none"> <li>✓ Data acquisition on environmental hazards taking place to the selected villages and others i.e. floods, landslides etc.</li> <li>✓ Acquisition of data on presence of debris, siltation to the water streams</li> <li>✓ Acquisition of data on water quantity trends (debris, siltation of water streams, etc.) and disappearance of some aquatic organisms</li> <li>✓ Consulting key staff from Kilosa district council and Wami-Ruvu Water Basin Office</li> </ul>	<ul style="list-style-type: none"> <li>✓ Field observations/visits</li> <li>✓ Situation and problem analyses through FGD with stakeholders at district and village levels</li> <li>✓ Key informant interview</li> <li>✓ Literature review from documented publications and reports on possible repercussion of the identified unsustainable natural resource management practices</li> <li>✓ Review reports on water quality from Wami-Ruvu Water Basin Office</li> </ul>
3. An outline of the underlying causes behind people practicing these techniques.	<ul style="list-style-type: none"> <li>✓ Identify the causes and effects for at least 5 unsustainable land uses</li> <li>✓ Consult project field officers, district staff, client and other stakeholders in Kilosa</li> <li>✓ Review of land use change analyses generated by MJUMITA for Kilosa</li> </ul>	<ul style="list-style-type: none"> <li>✓ Problem analysis through FGD with stakeholders at district and village levels</li> <li>✓ Key informant interviews</li> </ul>
4. To describe measures taken already to address unsustainable practices and lessons learned from initiatives to address the problem	<ul style="list-style-type: none"> <li>✓ Identify past measures implemented to address unsustainable land use practices and draw lessons learned from the initiatives</li> <li>✓ Review of land use change analyses generated by MJUMITA for Kilosa</li> <li>✓ Consult key stakeholders at community level and key stakeholders at different levels</li> </ul>	<ul style="list-style-type: none"> <li>✓ Secondary data (Review relevant documentation e.g. Village land use plans, village forest reserve management plans and by-laws)</li> <li>✓ Field observations</li> <li>✓ Situation Analyses through FGD with stakeholders at district and village levels</li> </ul>
5. To analyse whether the practices are already governed by national laws or by local by-laws	<ul style="list-style-type: none"> <li>✓ Undertake sectoral policy review and analysis for land, water, wildlife, forestry, agriculture and livestock sectors</li> <li>✓ Undertake analysis of different institutions, laws and regulation (both formal and informal) involved in issues related to the identified</li> </ul>	<ul style="list-style-type: none"> <li>✓ Secondary data (Review of village land use plans and by-laws, the village forest reserve management plans and by-laws, policy and Act for the Environment, Forest, Water, agriculture, livestock, wildlife and land.</li> </ul>

Objective	Tasks	Methodological approach
	unsustainable natural resource management practices from community, district and national levels, and assess horizontal and vertical coordination processes ✓ Assess congruency and antagonism between initiatives on the ground	✓ Key informant interviews

### 3. Results and discussion

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The results and discussion section consists of two main parts. The first part provides a review of policies and legal framework related to land uses. The second part presents the results of current land use and land use practices, impact of unsustainable land use practices to the environment and people's lives, drivers/cause of unsustainable land use practices.

#### 3.1. Review of relevant policies and legal framework related to land uses

The integration of conservation and utilization is imperative for sustainable management of natural resources. However, the implementation of sustainable natural resources management depends on the existing policy and legal frameworks. This means the existing ones can be sufficient or some revisions might be required to address some challenges arising in integrating conservation and utilization of natural resources. To determine whether the existing policy and legal framework are sufficient or not, reviews of all related policies and legislations and linking them with practices on the ground are crucial. This study focuses on unsustainable land use practices commonly practiced by small-scale farmers and pastoralists in Kilosa with a particular focus on those threatening key water sources; causing deforestation and forest degradation; threatening pollinators; and /or causing water pollution. Therefore to address these issues, this analysis focuses on policies and legislations related to the following sectors: forestry, land, water, agriculture, wildlife, livestock and environment. Also it addresses issues at district and village levels such bylaws, forest management and land use plans.

##### 3.1.1. Forestry sector

Management and utilization of forest resources are governed by the National Forest Policy of 1997 and the Forest Act No. 14 of 2002. The goal of the National Forest Policy is to enhance the contribution of the forest sector to the sustainable development of the nation through conservation and management of natural resources. To achieve this goal the policy focuses on four main areas: land management, forest-based industries and products, ecosystem conservation and management, and institutional and human resources. The national forest policy has a total of 41 policy statements and there are 19 key policy statements that pertain to the direct control of unsustainable land use practices in forests:

- ✓ *Policy statement (1):* To ensure sustainable supply of forest products and services and environmental conservation, all types of forest reserves will be managed for production and/or protection based on sustainable management objectives defined for each forest reserve. The management of all types of forest reserves will be based on forest management plans.
- ✓ *Policy statement (3):* To enable participation of all stakeholders in forest management and conservation, joint management agreements, with appropriate user rights and benefits, will be established. The agreement will be between the central government, specialized executive agencies, private sector or local government, as appropriate in each case, and organized local communities or other organizations of people living adjacent to the forest
- ✓ *Policy statement (5):* To enable sustainable management of forests on public lands, clear ownership for all forests and trees on those lands will be defined. Forests and the responsibility for their management will be allocated to villages, private individuals, or to government. Central, local and village governments may demarcate and establish new forest reserves.
- ✓ *Policy statement (6):* Village forest reserves will be managed by the village governments or other entities designated by village governments for this purpose. They will be managed for production and/or protection based on sustainable management objectives defined for each forest reserve. The management will be based on forest management plans.
- ✓ *Policy statement (14):* Internal trade and exports of forest produce, excluding those regulated by international agreements of which Tanzania is a party, will be promoted. To prevent forest destruction and degradation through commercial exploitation, trade of certain forest products may be regulated.
- ✓ *Policy statement (15):* New forest reserves for biodiversity conservation will be established in areas of high biodiversity value. Forest reserves with protection objectives of a national strategic importance

may be declared as nature reserves. This statement allows for local governments to enforce protection on locally determined areas of importance for conservation or production.

- ✓ *Policy statement (16)*: Biodiversity conservation and management will be included in the management plans for all protection forests. Involvement of local communities and other stakeholders in conservation and management will be encouraged through joint management agreements.
- ✓ *Policy statement (17)*: Biodiversity research and information dissemination will be strengthened in order to improve biodiversity conservation and management.
- ✓ *Policy statement (18)*: Biodiversity conservation will be incorporated in the management regimes of natural production forests and plantations. Biodiversity conservation and management guidelines will be incorporated in the management plans. The replacement of natural forests by exotic plantations will be minimised.
- ✓ *Policy statement (19)*: New catchment forest reserves for watershed management and soil conservation will be established in critical watershed areas
- ✓ *Policy statement (20)*: Watershed management and soil conservation will be included in the management plans for all protection and production forests. Involvement of local communities and other stakeholders in watershed management and soil conservation will be encouraged through joint management agreements.
- ✓ *Policy statement (22)*: Management of forest reserves will incorporate wildlife conservation. Wildlife resource assessment will be intensified.
- ✓ *Policy statement (21)*: Research and information dissemination will be strengthened in order to improve watershed management and soil conservation.
- ✓ *Policy statement (22)*: Management of forest reserves will incorporate wildlife conservation. Wildlife resource assessment will be intensified.
- ✓ *Policy statement (23)*: Environmental impact assessment will be required for the investments which convert forest land to other land use or may cause potential damage to the forest environment.
- ✓ *Policy statement (26)*: National criteria and indicators for sustainable forest management will be developed. Management guidelines for different forest types will be established on the basis of these criteria and indicators, and management plans for all types of forest reserves prepared accordingly.
- ✓ *Policy statement (30)*: The capacity of the local governments to administer and manage forest resources will be strengthened and a coordination mechanism between the local and central governments established
- ✓ *Policy statement (35)*: To ensure increased awareness and skills amongst the people on sustainable management of forest resources, the forestry extension services will be strengthened.
- ✓ *Policy statement (36)*: Forestry related extension messages delivered by different natural resources management sectors and other related sectors will be harmonised through integrated planning, research and training.
- ✓ *Policy statement (39)*: Local communities will be encouraged to participate in forestry activities. Clearly defined forest land and tree tenure rights will be instituted for local communities, including both men and women.

The achievement of these policy statements are supported by the Forest Act. The Forest Act has assigned the forests into four different types to allow easy monitoring and management of forest resources in Tanzania (URT, 2002a). The first is national forests which consist of forest reserves and forest on general lands. The natural forest reserves are for protection on steep slopes, water catchments areas and diverse biological ecosystems or for the production of forest products including timber, fuel wood, gums, resins and bark. Forests on general lands are non-demarcated public lands and their administrations and managements are supposed to be under the Commissioner of Land but because of lack of administration by the government, forests on general lands are considered as open access and highly affected by unsustainable land use practices. Secondly, forests under local authority, these consist of forest reserves and forest on general lands. Forest reserves in this category are mainly natural forests for productions and protections. These forests are owned and managed by local authorities. Thirdly, village forests which consist of village land forest reserves; community forest reserves created out of village forests; and forests,



which are not reserved but are on village land and their management, are vested in the village council. Finally, private forests which consists of forests on village land held by one or more individuals under customary rule and forests on general or village land of which the rights of occupancy or lease have been granted to individuals, groups, corporate bodies or any other organization.

The Forest Act No. 14 of 2002 is very crucial in controlling unsustainable land uses because it provides guidance and directives on the following issues:

- ✓ Preparation and implementation of Forest Management Plans
- ✓ Declaration and management of forest reserves
- ✓ Procedures for issuing permits and licenses for activities carried in national and local authority forest reserves.
- ✓ Trade of forest produce and their restrictions
- ✓ Conservation of trees, wild plants and wild animals. This includes reserved trees and protected wild animals
- ✓ Restriction on burning of vegetation and procedures for managing wild fire.
- ✓ Offences and penalties related to forest activities

The forest policy and Act provide the bases for controlling unsustainable land use practices. However, the enforcement of the forest Act requires adequate human, financial, and infrastructure resources.

### **3.1.2. Land sector**

The management of land in Tanzania is governed by the National land Policy of 1995 and Land Act No. 4 of 1999 and Village Land Act No. 5 of 1999. The overall aim of the National Land Policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment. The policy has several specific objectives but the following are very pertinent to this assignment:

- ✓ Promote an equitable distribution of and access to land by all citizens
- ✓ Ensure that existing rights in land especially customary rights of small holders (i.e. peasant and herdsmen who are the majority of the population in the country) are recognized, clarified and secured in law
- ✓ Set ceilings on land ownership which will later be translated into statutory, ceilings to prevent or avoid the phenomenon of land concentration (i.e. land grabbing)
- ✓ Ensure that land is put to its most productive use to promote rapid social and economic development of the country
- ✓ Protect land resources from degradation for sustainable development

The achievement of these policy objectives are supported by the Land Act No. 4 of 1999 and Village Land Act No. 5 of 1999. According to URT (1999a) and URT (1999b), the public land has been categorized as:

(a) General land referring to all public land, which is not reserved land or village land and includes unoccupied or unused village land. (b) Village land referring to land which is within the boundaries and jurisdiction of a registered village (c) Reserved land referring to land put under special uses including forest reserves, national parks, marine parks, wildlife conservation, road reserves, etc. In most cases general lands have suffered from unsustainable land uses through deforestation and forest degradation since are considered as open access due to lack of administration by the government.

The village land is further divided into: (a) communal village land (b) individual, family or clan land when it is occupied and used under customary law; and (c) unoccupied or unused land that may be made available for communal or individual purposes through allocation by the village council. The two Acts do address land issues but at different levels and in different contexts as follows: the Land Act No. 4 of 1999 provides for the basic law in relation to land other than the village land, the management of land, settlement of disputes and related matters, while the Village Land Act No. 5 of 1999 provides for the management and administration of land in villages and for related matters. Despite the specialization of these two Acts, there have been some mis-understanding by some actors on the term general land due to the difference in definitions. Both Acts have defined the term 'general land' in almost the same way (i.e. referring to "all public land, which is

not reserved land or village land”) except that the Land Act has added: “includes unoccupied or unused village land” which is not appearing in the Village Land Act. This has caused some actors to consider the presence of general land within the village and hence contributing to unsustainable land use practices such as unsustainable charcoal productions because general land is supposed to be administered by the Commissioner for Lands and not village government.

The National land Policy of 1995, Land Act No. 4 of 1999 and Village Land Act No. 5 of 1999 are very important in this assignment because they put the foundation for controlling unsustainable land use practices. This includes the provisions for:

- ✓ Declaration of hazardous land such as land within 60 m of river banks, wetlands, land on slopes
- ✓ Declaration of reserved land
- ✓ Dispute settlement
- ✓ Rights to occupy land

### **3.1.3. Water sector**

Management and utilization of water resources are guided by a National Water Policy of 2002 and Water Resource Management Act of 2009. The national water policy recognizes water resources as one of the most important agents to enable Tanzania achieve its Development Vision objectives (both social and economic), such as eradicating poverty, attaining water and food security, sustaining biodiversity and sensitive ecosystems. Also water is fundamental for other various social – economic development activities such as industrial production, irrigated agriculture, livestock keeping, mineral processing, hydropower production, navigation and recreation and tourism. As a result the policy has identified three sub-sectors including water resource management, rural water supply, and urban water supply and sewerage (URT, 2002b). The reason for the establishment of three sub-sectors is to ensure that water is managed sustainably and used equitably by taking into consideration the concerns of all water users. This is based on the fact that there is depletion of water resources and rising demand on limited water supplies resulting in putting at risk some of the water related investments, thereby creating conflicts among different water users. On the other hand it is challenging to strike a balance among these three sectors because some tend to be given more priority than others. For example, water for irrigation and urban supply tends to be given more attention than rural water supply because investment in the former is expected to give more returns (Boelens *et al.*, 2007). Further, the policy promotes an integrated water resources management to ensure that water does not become a constraint to national development. The approach addresses participatory, multi-sectoral, multidisciplinary river basin management, which, recognizes that water is a scarce resource and integrates the linkage between land use and water use and recognizes the important role water ecosystems play in the national economy.

The National Water Policy of 2002 is supported by Water Resource Management Act No. 11 of 2009. The main objective of the Act is to ensure that the national’s water resources are protected, used, developed, conserved, managed and controlled. The Act provide for establishment of protected zones which include among others catchment, swamp and wetlands (URT, 2009).

The National Water Policy of 2002 and Water Resource Management Act No. 11 of 2009 are very relevant for controlling unsustainable land uses because they address water resources in landscape approach by creating nine hydrological zones or river basins which are not based on administrative boundaries like region and district. The landscape approach recognizes the fact that unsustainable land use practices at local level have implications on a wider landscape. Also they recognize the fact that forests offer habitat for wildlife, bee keeping, unique natural ecosystem and genetic resources, and have an important effect on the conservation of water resources.

### **3.1.4. Wildlife sector**

Conservation and utilization of wildlife resources are guided by the Wildlife Policy of Tanzania of 1998 and Wildlife Conservation Act No. 5 of 2009. The policy of 1998 has identified a number of problems and challenges facing wildlife sector (URT, 1998). In order to address these problems and challenges, the policy aims at involving a broader section of the society in wildlife conservation particularly the rural

communities and the private sector. The role of the public sector will be to stimulate and guide the local communities and the private sector by administering, regulating and promoting the management of the wildlife resource. Also the policy recognizes the need to integrate wildlife conservation and rural development, share benefits, protect biological diversity, raise conservation awareness amongst Tanzanian people and involve all stakeholders in wildlife conservation and sustainable utilization.

The implementation of the wildlife policy of Tanzania is supported by Wildlife Conservation Act No. 5 of 2009. The Act provides for protection of wildlife corridors, dispersal areas, buffer zones and migratory routes and establishment of wildlife protected areas. Also the Act provide for establishment of wildlife management areas for purposes of effecting community based wildlife conservation in areas: (a) outside of core protected areas; (b) which are used by local community members; and (c) within the village land and stipulates the mechanisms of equitable distribution of costs and benefits targeted at promoting wildlife conservation, enhancing economic development and poverty reduction.

The Wildlife Policy of Tanzania of 1998 and Wildlife Conservation Act No. 5 of 2009 are very relevant for controlling unsustainable land uses practices because they address both issues of wildlife conservation and human development.

### **3.1.5. Environment sector**

Management of the environment is guided by National Environmental Policy of 1997 and Environmental Management Act No. 20 of 2004. The policy has identified six major problems for urgent attention which include land degradation; lack of accessible, good quality water for both urban and rural inhabitants; environmental pollution; loss of wildlife habitats and biodiversity; deterioration of aquatic system; and deforestation. The mentioned problems have implications on the economic well-being of the country and the health of the people. To address these problems, the policy has the following objectives: to ensure sustainability, security and equitable use of resources for meeting the basic needs of the present and future generation without degrading the environment or risking health or safety; to prevent and control degradation of land, water, vegetation, and air which constitute our life support systems; to conserve and enhance our natural and man-made heritage, including the biological diversity of unique ecosystems of Tanzania; to improve the condition and productivity of degraded areas including rural and urban settlements in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surrounding; to raise public awareness and understanding of the essential linkages between environment and development, and to promote individual and community participation in environmental action; and to promote international cooperation on the environment agenda, and expand our participation and contribution to relevant bilateral, sub-regional, regional, and global organizations and programmes, including implementation of treaties.

The achievements of the policy objectives are supported by the Environment Management Act No. 20 of 2004. The Act considers the environmental issues are cross cutting and it requires each Ministry to establish a sector environment section for: ensuring compliance by the sector Ministry with the requirements of this Act; ensuring all environmental matters contained in other written law falling under sector ministry are implemented and report of their implementation is submitted to the director of environment; and liaison with the director of Environment and the Council on matters involving environment and all matters with respect to which cooperation or shared responsibility is desirable or required under this Act. The Act recognizes that the management and utilization of land shall be in accordance with the prevailing land laws provided that where there is any conflict on environmental aspect of land management, the provisions of this Act shall prevail. As such the Act provides for declaration of ecologically fragile or sensitive areas to be Environmental Protected Areas under this Act. For example the Act prohibits human activities within sixty metres of a permanent water course or which may, by their nature, likely to compromise or adversely affect conservation and, or the protection of ocean or natural lake shorelines, riverbank, water dam or reservoir. Also the Act requires an Environmental Impact Assessment to be carried out prior to the commencement or financing of a project or undertaking.

The National Environmental Policy of 1997 and Environmental Management Act No. 20 of 2004 are very important in controlling unsustainable land use practices because it touches several environmental issues happening in different sectors but they are interrelated.

### 3.1.6. Agriculture sector

The agriculture sector in Tanzania is guided by the National Agriculture Policy of 2013. The policy has the following objectives:

- ✓ Strengthen agricultural support and technical services (research, mechanization, irrigation, extension and training);
- ✓ Increase production, productivity and profitability from utilization of the factors of production (land, labour and capital);
- ✓ Enhance national food and nutrition security and production of surplus for export;
- ✓ Improve agricultural processing with a view to add value to agricultural produce and create jobs;
- ✓ Enhance production of quality products in order to improve competitiveness of agricultural products in the domestic, regional and international markets;
- ✓ Increase foreign exchange earnings from exportation of agricultural products;
- ✓ Provide enabling environment to attract private sector investment to take advantage of existing comparative and competitive advantages;
- ✓ Strengthen inter-sectoral coordination and linkages to increase efficiency and effectiveness;
- ✓ Protect and promote integrated and sustainable utilization of agricultural lands; and
- ✓ Promote implementation of cross cutting issues in agricultural undertakings.

The implementation of these policy objectives are supported by different strategies but for this assignment more focus is given to Kilimo Kwanza and Mkukuta. *Kilimo Kwanza* – “agriculture first” was adopted in 2009 as a recognition that agriculture can do much more than it has in the recent past when is done in the right conditions and with the right support. The strategy is built around ten pillars:

- ✓ A national vision
- ✓ A mobilization of financial resources – including a Rural Development Bank
- ✓ Institutional reorganization - good governance, good co-ordination
- ✓ “Paradigm shift” - production of the right crops
- ✓ Land titles, and use of land “to promote harmonious exploitation”
- ✓ Better incentives, including removal of market barriers
- ✓ Industrialization – processing (forward linkages), fertilizers, seeds, machinery and tools (backward linkages)
- ✓ Science, technology and human resource development – using an increased % of government income
- ✓ Infrastructure – irrigation, storage, ports, airports, roads, markets, etc.
- ✓ Mobilization of all Tanzanians

However, many people have understood that *Kilimo Kwanza* as giving a green light to large scale and expansion of farm size by clear felling forests.

Mkukuta is a Swahili word referring to the National Strategy for Growth and Reduction of Poverty (NSGRP) for putting the focus on poverty reduction high on the country’s development agenda. The strategy recognizes the fact that the constraints to rural growth are largely related to those in the agricultural sector which include low productivity of land, labour and production inputs; limited capital and access to financial services; underdeveloped irrigation potential; poor rural infrastructure hindering effective rural - urban linkages; inadequate agricultural technical support services; infestations and outbreaks of crop; animal pests and diseases; erosion of natural resource base and environmental degradation.

The formulation of the National Agriculture Policy of 2013 also takes into account the existence of huge potential and opportunities for development of the agricultural sector. Whereas 44 million hectares of land are suitable for agricultural production, only 10.8 million hectares (24 percent) are cultivated mostly under subsistence agriculture. The latter consists of smallholder farmers cultivating between 0.2 and 2.0 hectares,

a production scale that is too low to generate significant income streams to farmers for effective poverty reduction and agricultural development. The potential exists for expansion of agricultural area under cultivation for small, medium and large-scale farming in areas with available land for expansion while intensive farming shall be applied in densely populated areas with the aim of commercializing agriculture in Tanzania (URT, 2013).

Therefore, the implementation of all these strategies to achieve the objectives of the National Agriculture policy needs to be well coordinated and controlled otherwise they can result into unsustainable land use practices.

### **3.1.7. Livestock sector**

The livestock industry is guided by the National Livestock Policy of 2006. The policy points out that the livestock industry has maintained a steady annual growth rate of over 2.7 percent during the last decade. This is lower than the rate of human population growth of 2.9 percent. The livestock industry is expected to grow at 9% by year 2010. The specific objectives of the National Livestock Policy are to:-

- ✓ Contribute towards national food security through increased production, processing and marketing of livestock products to meet national nutritional requirements.
- ✓ Improve standards of living of people engaged in the livestock industry through increased income generation from livestock.
- ✓ Increase the quantity and quality of livestock and livestock products as raw materials for local industry and export.
- ✓ Promote integrated and sustainable use and management of natural resources related to livestock production in order to achieve environmental sustainability.
- ✓ Strengthen technical support services, develop and disseminate new technologies.
- ✓ Develop human resources including livestock farmers.
- ✓ Promote production of safe and quality foods of animal origin in order to safeguard consumers.
- ✓ Promote the use of draught animal power and biogas utilization.
- ✓ Mainstream cross-cutting and cross-sectoral issues such as gender, HIV/AIDS, land and environment.

The formulation of this policy has taken into consideration of the following:-

- ✓ The Tanzania Development Vision (TDV) 2025;
- ✓ National Strategy for Growth and Reduction of Poverty (NSGRP) of 2004;
- ✓ Millennium Development Goals (MDGs);
- ✓ The Rural Development Strategy (RDS) of 2001;
- ✓ Rural Development Policy of 2003;
- ✓ National Trade Policy of 2003;
- ✓ Livestock Stakeholders Resolutions of 2001;
- ✓ The Agricultural Sector Development Strategy (ASDS) of 2001;
- ✓ The Agricultural Sector Development Programme (ASDP) of 2003;
- ✓ Presidential Circular No. 1 of 2002;
- ✓ The National Empowerment Policy of 2004;
- ✓ The Investment Policy 1997
- ✓ The National Land Policy of 1995;
- ✓ The Environment Management Policy of 1997;
- ✓ The Agriculture and Livestock Policy of 1997;
- ✓ International and Regional integration initiatives
  - World Trade Organization's Agreement on Sanitary and Phytosanitary
  - WHO/FAO's Codex Alimentarius
  - NEPAD's Comprehensive Agricultural Development Programme
  - SADC's Regional Indicative Strategic Development Plan (RISDP)
  - East African Community (EAC) – Agricultural and Rural Development Policy

The formulation of this policy has not taken the National Forestry Policy into consideration which has implication on the initiatives taken by livestock sector to reduce degradation caused by livestock keeping. For example the NAFORMA report (URT, 2015) states that about one third (32.5%) of the country's area is protected either as protection forests or wildlife areas which actually is not allowed to be used for grazing but at the same time the National Livestock Policy acknowledges that rangeland resource is estimated at 60 million hectares that comprise 40 million hectares devoted to grazing and 20 million hectares of fallow and forestland. Proper range management and tsetse control would open up more grazing land and could support over 20 million livestock units (URT, 2006). The implementation of this policy if not well interpreted by actors in considerations of other land uses could result into unsustainable land use practices.

### **3.1.8. Bylaws, Forest management plans and Land use plans**

#### *Bylaws*

The Local Government (District Authorities) Act No. 7 of 1982 gives power to the District and Village councils to make bylaws to promote and secure the good rule and orderly government of its area of jurisdiction; to foster and maintain the health, safety and well-being of the inhabitants of its area of jurisdiction; and for carrying into effect and for the purposes of any of the functions conferred by or under this Act or any other written law. This provision is very important in controlling unsustainable land use practices in villages where people are involved in different economic activities. However, formulation of these bylaws by itself is not enough if they are not enforced.

#### *Forest management plan*

The Forest Act No. 14 of 2002 provides for preparation and implementation of Forest Management Plans. The Act requires that no forest reserve for production will be harvested without having a forest management and harvesting plans. The reviews of some VLFR Management plans of Mfuluni, Nyali, Msimba and Kisongwe villages revealed that Forest management plan included also bylaws to implement the plan. These plans were prepared according to the national guidelines for preparing forest management plans. The key chapters included in the plan are:

- ✓ Introduction
- ✓ Description of the forest and community
- ✓ Goal and objectives of the forest
- ✓ Forest resources assessment
- ✓ Forest manager
- ✓ Information communication and record keeping
- ✓ Strategies for forest management and development
- ✓ Forest control and protection
- ✓ Stakeholders and their roles and responsibilities
- ✓ Regulations and rules for utilizations of forest products
- ✓ Collection of revenues and their uses
- ✓ Monitoring and evaluation of the plan

The Forest management plans are useful only if they are implemented and the bylaws therein are enforced. However, this requires concerted efforts of all key stakeholders including villagers, village government, VNRC, district council and forest based business community.

#### *Land use plan*

Development of Land Use Plans is guided by National Land Policy of 1997, Land Act No. 4 of 1999, Village Land Act No. 5 of 1999 and Land Use Planning Act No. 6 of 2007. The objectives of land use planning include to:

- ✓ facilitate efficient and orderly management of land use;
- ✓ empower landholders and users to make better and more productive use of their land;
- ✓ promote sustainable land use practices;
- ✓ ensure security and equity in access to land resources;

- ✓ facilitate the establishment of a framework for the prevention of land use conflicts;
- ✓ facilitate overall macro-level planning while taking into account regional and sectoral considerations;
- ✓ provide for inter-sectoral co-ordination at all levels;
- ✓ ensure the use of political and administrative structures and resources available at national, regional, district and village levels; and
- ✓ Provide a framework for the incorporation of such relevant principles contained in national and structural development policies as may be defined by the Government.

### **3.2. Land use and land use practices**

The term *land use* throughout this report infer to the land area which has been set for specific use as described by land use plan and the *land use practices* describe how specified land use area is actually used.

The Kilosa district has a total of 169 villages and 42 have land use plans. The land use plans differ between the villages depending on their economic activities, priorities, geographical location and demands. It was found that in most villages the common land uses include agriculture, forest for charcoal production, settlement, forest for water catchment and biodiversity conservation, forest for timber harvesting, area for grazing and areas for social services e.g. dispensary, schools, market, grave yard, grounds for sports, worshipping, shops etc. Land use plan are very important for ensuring sustainable land use practices because it defines what is to be done and where. When the land use plan is well implemented, it reduces the possibility for unsustainable land use practices and conflicts among the resource users.

The identified land use practices taking place to specified land use types are as follows: 1) in forest (both reserved and utilization) include charcoal/timber production and hunting; 2) agriculture include people shifting their settlement to agricultural land areas, cultivating in slope areas and close to rivers, use of fire for land preparation, and the use of pesticides/fungicides 3) livestock keeping include grazing in non-livestock zones 4) mining in forest area and 5) fishing.

### **3.3. Identified unsustainable land use practices**

#### **3.3.1. Charcoal and timber production**

Charcoal and timber production are among the dominant land use practices in project villages. It is regarded as unsustainable land use practices due to the following:

- ✓ When the rate of extraction of charcoal and timber exceed the rate of forest growth (regenerations and tree diameter growth).
- ✓ Illegal harvesting of timber and charcoal
- ✓ Use of poor harvesting techniques and harvesting in fragile areas i.e. steep slopes or catchment areas. For example cutting trees too low which may hinder coppicing and soil erosion exacerbated by opening up of forest cover that hinder regrowth.
- ✓ When fires escape to the forest during charcoal burning and timber harvesting (e.g. cooking).
- ✓ When charcoal production uses high value timber tree species e.g. Mninga, Mvule, Mpingo, medicinal trees, trees with bee colonies and bird nests.
- ✓ When charcoal and timber production involve clear felling
- ✓ When charcoal and timber is produced using traditional charcoal kiln and chainsaw machine, respectively (e.g. low recovery rate) which require large volume of trees to produce a given volume of charcoal or timber.
- ✓ When fuelwood extraction involves cutting of live trees.

The intensity of charcoal and timber extraction varies from one area to another. For example, results from FGD revealed that the magnitude of charcoal production is high for the villages located close to town centres e.g. Nyali and Msimba villages (Appendix 3, plate 1). For timber production, the opposite is true. Most preferred tree species e.g. Mkola (*Azelia quenzensis*), Mninga (*Pterocarpus angolensis*), Msani

(*Brachystegia microphylla*) and Mtondolo (*Brachystegia speciformis*) are found in forests located in high altitude (e.g. Kisongwe and Mfuluni). Although, there have been the shift to lesser known trees species for timber e.g. Miombo (other *Brachystegia spp.*), quite few larger trees of the same species are available in the vicinity of town centres. However, forests of such trees composition are found away from town centre. This may further be explained by the fact that forests close to towns are degraded to the extent that suitable trees for timber are not available. This is different for charcoal production which does not require strict selection of trees in term of species or size. In addition, field observation and FGD revealed that charcoal production in villages located away from town centre is not very common due to economical reason associated with poor road infrastructure and the magnitude of the work involved to carry charcoal to the road side (Appendix 3). This situation has been reported elsewhere (e.g. Malimbwi, *et al.*, 2005).

Plate 1 to 4 shows example of unsustainable wood fuel (charcoal and firewood) and timber harvesting.



Plate 1: Pile of charcoal bags Msimba village along Mikumi-Iringa highway



Plate 2: Bare hills due to clear felling



Plate 3: Harvesting of live trees for fuelwood



Plate 4: Caught illegally harvested timber stacked in village executive officer's office

Through group discussions, consensus across villages was that charcoal and timber production practices were the most unsustainable practices. This include illegal harvesting from reserved forest. On the other hand, field observation revealed that legal harvesting taking place in production forest sometimes do not adhere to acceptable tree cutting techniques by cutting too low which may hinder coppicing and encourage fungal infection because of moisture from the ground or decay of the stump (Appendix 3; Luoga *et al.*, 2004). In addition, all vegetation around the kiln area is normally cleared instead of carrying out tree selection. It was also revealed that for timber production, harvesting of one tree may cause mortality of many other trees. For example the local pit sawing technique which is often used require large number of poles collected from other trees close by to support logs under the process. Furthermore, not only that lives of wild animals are endangered by unfilled pits left after lumber production but also the act is not environmentally friendly.



### 3.3.2. Agriculture

Based on discussions with district agriculture staff, about 90% of the population in Kilosa district depends on agriculture for subsistence and for income generation. Field observations showed that in the highlands, majority of agriculture areas are located in hilly/sloped area and few in valley bottoms. FGD revealed the following unsustainable agricultural practices:

- Continuous cultivation without any external inputs or without implementing soil and water conservation techniques a case reported in all visited village,
- farming close to water sources/streams/rivers reported to be carried out in all visited villages (Plate 6),
- cutting small trees for tomato plant stakes (*fito*) and the use of pesticides commonly in highland villages i.e. Mfuluni and Kisongwe (Plate 7 and 8), and
- shifting cultivation common to all visited villages (Appendix 3).

Continuous cultivation is more detrimental in highlands which are vulnerable to soil erosion and run-off due to steep slopes (e.g. Mfuluni and Kisongwe villages, Appendix 3). This is normally associated with other unsustainable practices such as use of fire for farm preparation and cultivating on steep slopes without using contours or terraces (Plate 5). Use of fire for farm preparation is frequently cited as one of the major causes of wild forest fires and soil exhaustion in general. On the other hand, farming close to water sources/streams/rivers (Plate 6) decreases water quantity and quality as a result of siltation and drying of rivers due to elevated evaporation. Cutting small trees for tomato plant stakes (*fito*) impairs forest regeneration potential whereas use of pesticides (Plate 7 and 8) decreases water quality. In addition, there is shifting cultivation with short fallows that leads to soil exhaustion (Appendix 3). Examples of shifting cultivation can be found in Kisongwe village whereby some people abandon their old farms and encroach areas set aside for future settlement and agriculture expansion (as prescribed in land use plan) to establish new farms (Appendix 3).



Plate 5: Terrace/contour free agriculture on hilly or sloped areas in Kisongwe village



Plate 6: Cultivation at prohibited area close to the Kisunguzi river bordering Ludewa and Kisongwe villages



Plate 7: Stack of poles for tomatoes along the road side



Plate 8: Stack of poles ready to be used in tomato garden

### 3.3.3. Livestock keeping

In Kilosa there are villages whose livelihoods predominantly depend on livestock mainly cattle, goats and sheep. During FGD in selected villages, it was revealed that in some villages, the area set for livestock keeping is inadequate. For example, Nyali village with about 400 cattle has 59 hectare set for livestock keeping, which is equivalent to about 0.15 hectare per cattle. This area per cattle is less than the recommended 2 hectare per cattle in Dry sub-humid and semi-arid areas as recommended by FAO (El-Nahrawy, 2011). However, the problem of overgrazing is extended to areas with no cattle such as Mfuluni village due to the influx of herders from outside the village who intrude the village during dry season in search for good pasture. This is associated with other destruction in forests and raiding of agricultural crops. Tribes of herders causing problem were mentioned to be Masai, Mang'ati and Sukuma (Appendix 3). Villages identified to be predominantly livestock keepers include Gongoni, Ngaite, Kidui, Miombo, Mateteni and Kivungu villages, which are located in the lowland. However, all these villages have no land use plan and are not enrolled into sustainable charcoal production or REDD project. During dry season their livestock are often grazed to their neighbour village's agricultural fields and forests as their pastures are exhausted. This causes soil erosion and compaction in agricultural lands and mortality of tree regenerants to mention a few (e.g. Plate 9).



Plate 9: Severely impaired forest regeneration as a result of overgrazing

### 3.3.4. Others unsustainable practices

There are other unsustainable practices which are not common to all villages. These include hunting, fishing and mining.

#### ***Hunting***

Hunting is one of alternative activities to farming carried out during the dry season when most farming activities cease. The negative impacts of hunting to forest resources result from use of fire as a hunting tool. Results from FGD revealed that male youth and elders are the ones involved in hunting. Youth tend to use fire to clear bushes so that animals can be spotted easily or run into burrows which afterward are excavated (Appendix 3). On the other hand, elders use snares to catch animals. The former is more detrimental to the forest and water resources due to forest fires happening during dry season. In addition to that, communities perceived that hunting has caused population decrease, and/or extinct of some wild animal species. Animals hunted includes rodents, rabbits, wild-pig and dik dik. Animals which have been reported to be decreased include wild-pigs, rabbits and dik dik. In Nyali and Mfuluni villages elder reported that over ten years back, leopard, hyena and buffalos which are no more in these days were constantly seen in the adjacent forests.

## **Mining**

Areas where mining is taking place are normally at small scale or artisanal level. The villages reported to have mining activities include Kisongwe, Udete, Mfuluni, Udingu and Malolo A. Mineral mentioned to be mined include rhodolite (garnet), gold and mica. Mining is carried out by villagers using inferior equipment such as hoe, spades and mattock. People from outside the villages and Kilosa district are attracted when they receive signals of success stories about mineral availability. For example in year 2011 a big flux of people to Idete village took place due to information spread on availability of gold, which resulted in the degradation of large part of the forests. The major market for the mined minerals were reported to be vendors from Dar es salaam and other towns. Field observation revealed medium scale mining in Kisongwe village which was reported to be carried out by Chinese (Plate 10). It was not clear to villagers what type of mineral were mined since they were not involved. In all project villages, no land area was set for mining in their land use plans. Mining is unsustainable practice because it involves haphazard clearing of production/reserved forests including areas near or into water streams/rivers. Therefore, this jeopardizes the integrity of forest ecosystems and water resource. Such impact of mining to the forests has been reported in Amani Nature Reserve (Burgess et al., 2015).



Plate 10: Medium scale mining operated by Chines at Kisongwe village

## **Fishing**

Fishing is common in villages with permanent rivers and dams (Plate 11). Typical examples are Msimba, Kisongwe and Mfuluni villages. Fishing become unsustainable practice due to predominant poison fishing using botanicals such as *Tephrosia vogelii*, the fish-poison bean extract or chemicals such as flea and tick dip that kills small to larger fish. Although the community did not mention any negative impact of the fishing poison, records have revealed that these chemicals are carcinogenic (e.g. Sandhu et al., 2013). Another problem with fishing is the use of small size fishing nets that catch small and larger fish all together. People perceived that in comparison to the past five years, the number of fish have decreased significantly as a result of overfishing and use of unsustainable fishing practices.



Plate 11: Zombo dam in Zombo village adjacent to Nyali village

### 3.4. Impacts of unsustainable practices to the environment

#### 3.4.1. Soil erosion and siltation

Soil erosion is prominent in the villages situated in the highlands. Causes of soil erosion cut across to a number of unsustainable practices (Table 2). Common practices identified in study area (Appendix 3) such as cultivation in steep slopes without using soil conservation techniques such as terraces and contours; cultivating close to water streams/rivers during dry season which expose soils to direct rain splash and water run-off during rainy season; mining where large volume of excavated soils become loose and therefore turn out to be susceptible to erosion by water; overgrazing which expose soils to rain and soil structure breakdown due to frequent livestock hooves trample (Plate 12) making soils susceptible to erosion by water have been reported elsewhere (Taddese, 2001; Zalidis et al., 2002; Maqsood et al., 2013).



Plate 12: Soil erosion taking place on livestock pathways

Siltation and soil erosion are closely related processes. Whenever there is soil erosion, soil siltation will take place somewhere else (Mabit et al., 2014). Field observations revealed that siltation is not common in the highland. Quite few areas in the highland are susceptible to siltation e.g. valley bottom and rivers e.g. Ibingu village. Siltation is very common in lowland areas (Plate 13). Consequently, river depth has significantly decreased making settlements close to river basins susceptible to floods e.g. Nyali village as a result of siltation in Zombo valley and Malolo A village as a result of siltation in Malolo river (Malolo valley).



Plate 13: Siltation as observed in river Mkondoa

### 3.4.2. Water pollution and decrease in water quantity

Evidence to water quality deterioration is not straight forward because this assignment did not involve laboratory water quality assessment. However, evidence can be drawn from disappearance of some aquatic organisms pointed out by villagers as a result of pesticides application in vegetable garden near water sources, fishing by chemicals (*Tephrosia vogelii* extract or chemicals such as flea and tick dip) and decrease in water flow due to siltation. For example, during the FGD in Nyali it was revealed that *Anguilla* sp (Eel fish, “Mkunga”) have disappeared whereas *Synodontis* sp (“Gongo”), *Labeo* sp (Carp fish, “Ningu”), *Clarias* sp (African catfish, “Kambare”), *Clarias* sp (Elephant fish, “Surusuru”), *Urolepsis* sp (Tilapia “Pelege”) and crabs have decreased significantly in Zombo dam and other rivers in Nyali village (Appendix 3). Furthermore, Schaefer and Dietrich (2015) reported concentrations of total suspended solids, and ammonia nitrogen (NH<sub>3</sub>-N) in river Mkondoa exceeding the allowed standards. Ammonia in its unionized form (NH<sub>3</sub>) is known to be toxic to fish. Most likely explanation for high concentration maybe due to improper uses of inorganic fertilizers. However, it was revealed to all visited village that the use of fertilizers is not common. According to Wami-Ruvu Water Basin Board staff the observed NH<sub>3</sub>-N observed maybe explained by the fact that the upper and middle parts of river Mkondoa passes to several wards, example Kidete that are famous for production of vegetables such as onions that involve high inputs of fertilizers and pesticides. In addition, due to soil erosion especially during rainy season water tend to flow with suspended sediments (Plate 13).

Decrease in water flow (water quantity) has also been reported. This is explained by decrease of forest cover due to charcoal, timber extraction and shifting cultivation which consequently decrease water infiltration to soils leading to increased run-off and water loss due evaporation. Decrease of water flow were reported in all visited villages e.g. Nyali village (Zombo river), Kisongwe village (Kisongwe river), Mfuluni village (several streams were reported dry), and Msimba village (past few years back, river Msimba was permanent but it is now a seasonal river, Plate 14).



Plate 14: Dried up river Msimba in Msimba village

### 3.4.3. Forest degradation, deforestation and climate variability

All visited villages agreed that forest cover has decreased over time, which correspond to preliminary result of land change analysis undertaken by MJUMITA as shared through email by Technical Advisor. Based on preliminary results, between year 2014 and 2015 in three villages i.e. Kisanga, Msimba and Ihombwe, 43% of forest clearing is due to charcoal production, and 40% farming practices and 17% both charcoal and farming practices. However, in comparison to the past 6 years, there is a dramatic change of what key driver contributed significantly to deforestation. Kibuga and Samweli (2010) reported that farming practices contribute over 90% of the deforestation in Kilosa district. In addition, forest degradation has also been hastened mainly by tree cutting for fuelwood, timber and wildfires. Field observations revealed fresh stumps in the forest (e.g. Plate 3) suggesting that these are ongoing practices in spite of land use plans being in place in some villages.

Climate variability and frequent droughts has also been perceived by both communities and professionals as a result of forest degradation and deforestation (Appendix 3). Two common rain fall seasons were mentioned i.e. between March and June; and between October and December. Although the study did not involve rain data analysis, villagers pointed out that the latter has become unreliable than the former compared to the past 10 years.

### **3.5. Impact of unsustainable practices to people's lives**

The identified impact of unsustainable practices to people's lives in the selected villages are shown in Table 2. These include:

- ✓ Hunger due to low crop yields as a result of loss in soil fertility.
- ✓ Low income due to low agriculture produce since majority of people in project villages depends on agriculture
- ✓ Jeopardised people's health due to water borne diseases as a result of decreased water quantity and quality for domestic uses
- ✓ The conflicts between farmers and pastoralists especially during the dry seasons
- ✓ Increased ignorance due to the fact that majority of parents cannot pay school fees for their children
- ✓ Destructions of settlements and other infrastructures due to floods i.e. Dodoma isanga, Nyali, Kisanga and Ibingu.

**Table 2.** Drivers, impact to environment and people's lives of unsustainable land use practices

Land use	Practices	Drivers	Environmental impact	Impact to people's lives
Agriculture	Cultivation on sloped agricultural land without using soil and water conservation techniques	<ul style="list-style-type: none"> <li>• Inadequate capital to implement sustainable agriculture</li> <li>• Inadequate knowledge on sustainable agriculture</li> <li>• Labour intensive soil and water conservation measures</li> <li>• Inadequate extension services</li> <li>• Inadequate law enforcement</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion</li> <li>• Soil infertility</li> <li>• Siltation in rivers</li> <li>• Water pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Hunger as a result of low crop production</li> </ul>
	Cultivation at water source or close to streams/rivers	<ul style="list-style-type: none"> <li>• Soil infertility</li> <li>• Drought</li> <li>• Inadequate and inefficient irrigation infrastructure</li> <li>• Inadequate knowledge on sustainable agriculture</li> <li>• Inadequate extension services</li> <li>• Inadequate law enforcement</li> <li>• Inadequate cooperation among sectors and stakeholders with interest in water resource management</li> </ul>	<ul style="list-style-type: none"> <li>• Decrease in water quantity</li> <li>• Water pollution</li> <li>• Erosion of river bank</li> <li>• Siltation</li> </ul>	<ul style="list-style-type: none"> <li>• Water for domestic use become scarce</li> <li>• Waterborne diseases</li> </ul>
	Unsustainable land preparation i.e. the use of fire, use of pesticides, fungicides	<ul style="list-style-type: none"> <li>• Lack of education</li> <li>• Negligence</li> <li>• Poverty and simplification i.e. tilling the land is demanding and costly</li> <li>• Inadequate extension services</li> <li>• Inadequate law enforcement</li> </ul>	<ul style="list-style-type: none"> <li>• Soil infertility</li> <li>• Forest degradation when fire escape to forests</li> <li>• Water pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in crop production</li> <li>• Scarcity of water in terms of quantity and quality due deterioration of watershed and pollution, respectively</li> </ul>
Production and reserved forests	Charcoal and timber production using unsustainable techniques	<ul style="list-style-type: none"> <li>• Poverty i.e. lack of other alternative income generating activities</li> <li>• Lack of education</li> <li>• Soil infertility</li> <li>• Inadequate opportunities for income generating activities</li> <li>• Inadequate law enforcement</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced forest cover</li> <li>• Forest degradation</li> <li>• Reduced quantity of water</li> <li>• Disruption of wild animals habitats</li> <li>• Disappearance of valuable timber species</li> </ul>	<ul style="list-style-type: none"> <li>• Water for domestic use become scarce</li> <li>• Floods</li> <li>• Climate variability</li> </ul>
	Hunting	<ul style="list-style-type: none"> <li>• Poverty</li> <li>• Inadequate opportunities for income generating activities</li> </ul>	<ul style="list-style-type: none"> <li>• Forest degradation</li> <li>• Disappearance of small animals</li> </ul>	<ul style="list-style-type: none"> <li>• Water for domestic use become scarce</li> <li>• Floods</li> <li>• Climate variability</li> </ul>
	Mining	<ul style="list-style-type: none"> <li>• Poverty</li> <li>• Inadequate opportunities for income generating activities</li> </ul>	<ul style="list-style-type: none"> <li>• Deforestation and forest degradation</li> <li>• Soil erosion</li> <li>• Water pollution caused by</li> </ul>	<ul style="list-style-type: none"> <li>• Disease</li> <li>• Floods</li> </ul>

Land use	Practices	Drivers	Environmental impact	Impact to people's lives
			chemicals used to extract minerals such as gold, mica and rod light	
Livestock	Overgrazing	<ul style="list-style-type: none"> <li>• Drought</li> <li>• Low level of education</li> <li>• Inadequate land use plans to other villages</li> <li>• Inadequate land use/natural resource management planning process.</li> <li>• Livestock population increase</li> <li>• Inadequate cooperation between farmers and pastoralists</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion</li> <li>• Forest degradation</li> </ul>	<ul style="list-style-type: none"> <li>• Conflicts</li> <li>• Water for domestic use become scarce</li> </ul>



### **3.6. Drivers of unsustainable land uses**

Table 2 illustrates the key drivers of the observed unsustainable land use practices in selected project villages. The main key drivers were identified to be poverty, inadequate knowledge, climate variability and population increase.

#### **3.6.1. Poverty**

Poverty is both a cause and effect of inadequate adoption of soil and water conservation measures. First, the link between poverty and unsustainable agriculture can be explained by the fact that poor farmers may not be able to implement suitable farming practices e.g. the use of terraces, contours and agroforestry due to inadequate resources (Jones, 2002; Ojiem *et al.*, 2006). For example, during FGD, the majority of farmers recounted that they do not have adequate financial resources and man power to implement sustainable farming practices (Appendix 3). Second, as the poor fail to adopt sustainable farming practices, they experience the continuous decline in crop yields which in turn aggravate their poverty. In such scenario, people are forced to engage themselves in other unsustainable practices such as charcoal and timber production to meet their immediate needs. In that case the resulting land degradation is not purposely done but is an inescapable outcome of resource utilization (e.g. see. Luoga *et al.*, 2000). These facts represent vicious cycle of poverty-natural resources degradation that must be dismantled to enhance both soil and water conservation and poverty alleviation.

#### **3.6.2. Inadequate knowledge**

To many others, non-adoption of introduced new sustainable land use practices is due to inadequate knowledge. For farmers to adopt any technology they need to have a clear analytical understanding on how the technology works and compares to other technologies available (introduced versus indigenous). For example, during FGD participants were sceptical as to why they should plant trees in their farms while there are still plenty trees in the nearby forests. This implies that adoption of new conservation practices requires adequate participatory practical training (Young 1997; Carswell 2006). Although, this study did not go further to investigate how many people in the villages have a primary school education, but it was revealed that majority do not have primary school education. In such a situation, conventional extension communication material such as brochure and leaflets cannot work out because majority will not be able to understand the message. This proposition is supported by results from FGD (Appendix 3) where farmers expressed their reluctance to replace technologies inherited from their grandparents with modern technologies as they have never seen where such technologies worked properly. For example, one focus discussion participant in Kisongwe village reported:

*“I am aware of several generations of grandparents who raised us through traditional farming, I do not understand the origin of the new farming practices that we hear whenever in meetings like this one”*

Similarly, pastoralists expressed their reluctance to reduce the number of livestock per unit area to correspond with the available pasture because they have no practical experience as to what could be the effect on the overall livestock productivity. One pastoralist in Nyali village reported:

*“Since time in memorial, cattle is a well-known sign of wealth and is our natural bank; we have never heard problems in the past; now afraid to lose our wealth when told to reduce the number of cattle”*

Basing on these facts, any intervention to reverse the situation should capitalise on understanding the existing indigenous knowledge and work out appropriate ways to instil new natural resource conservation knowledge. This will require series of necessary steps as suggested by Ngambeki and UNECA (2003).

#### **3.6.3. Ineffective natural resource management planning**

Although most villages which were visited had village land use plan, natural resource degradation was still happening. The major driver behind this experience is inefficient natural resource management planning process. For example, this study has noted that facilitation of land use plan do not taking into account indigenous knowledge and perspectives of the local people. This proposition is supported by FGD results

from Nyali village where land use plan allocated an area of 59 hectare for grazing of 400 cattle (Appendix 3). Similarly, villages which are considered to be non-pastoralists has historical influx of cattle herders during dry season (e.g. Kisongwe). However, their land use plan fail to acknowledge this fact. As a result, cattle herder movement during dry season continue to distract natural resources in villages already having land use plans. It is important that land use planning process acknowledge existence of cattle herders where applicable and adopt holistic landscape natural resource management system as opposed to the current village based natural resource management systems.

#### **3.6.4. Climate variability**

Similar to poverty, climate variability is both cause and effect of unsustainable land use practices. Unsustainable land use practices especially those escalating decrease of forest cover are responsible for current climate variability in the perspective of farmers. On the other hand, measures employed to cope with climate variability especially drought are perceived to be among the main cause of unsustainable land use practices. Unsustainable measures used to cope with drought were mentioned to be the following:

- ✓ Agriculture activities close to water sources i.e. streams and rivers.
- ✓ Engaging to other alternative income generating activities such as charcoal and timber production to cope with crop failure due to drought.
- ✓ Migration of large herds of livestock to few localized areas with green pasture.

As a result of frequent drought, river banks are the only places with moisture to grow crops. Consequently, in attempt to earn their livelihood, people are forced to cultivate within the riverbanks (refer Plate 6). On the other hand, river banks are preferred because they contain silted soils which are relatively fertile compared to other sites of the landscape. In addition, due to low crop production as a result of drought people are engaged into other fast income generating activities such as charcoal and timber production.

As stated earlier, livestock available in most of the project villages are not damaging to environment due to small/none number of livestock they have. The problem however, is the livestock coming from neighbouring villages. An interview with extension officer in Nyali village revealed that due to large number of livestock in neighbouring villages, the available pastures and water become inadequate to support them. This has been aggravated by drought. Therefore, the shepherds where the majority were identified to be Masai and Mang'ati tribes are compelled to herd their livestock in project village's agricultural and forest areas causing considerable amount of damage. Furthermore, basing on the farmers-herder conflict study in Kilosa district carried out by Benjaminsen et al. (2009), the problem emanate from the government where livestock keeper are confined to 'pastoral villages' which lack sufficient pastures and water supplies, leading herders to search for such resources elsewhere to ensure survival of their cattle.

#### **3.6.5. Population increase**

The increase in human population means an increase in demand of resources to support the population. Under the traditional way of living (business as usual), population increase intensify problems mentioned in previous sections. However, this was not mentioned by villagers as a serious driver of identified unsustainable land use practices. This implies that people perceive that the available resources are still plentiful.

#### **3.6.6. Inadequate extension services**

Adoption of farming technologies requires three phases, namely, basic on-station research, on-farm adaptive research for evaluation/testing to enhance initial selection of adaptable technologies and the dissemination phase (Ngambeki and UNECA, 2003). However, as noted in Appendix 3, extension workers do not follow these important phases and they tend to focus on the individual farmers that reduces their effectiveness. For example one extension officer in Nyali village reported:

*"I am only one extension officer for the entire village with 740 farming households therefore I cannot reach each of them given the meagre budget provided"*

Similarly, extension workers are constrained by budget as reported by district agricultural staff. This is further intensified by uncoordinated extension services offered by district council and other private sectors as pointed out by agricultural extension officer in Nyali village (e.g. Dubé and Schmithüsen, 2003).

### 3.6.7. Other drivers

Other indirect drivers which compel people to practise unsustainable land use practices include (Appendix 3):

- ✓ Market failure/unfair market relations: it was revealed that buyers dictate farm gate prices for agricultural crops which tend to be lower compared to prices offered in town centres. This is caused by inadequate market information reaching farmers that hinders their bargaining power. As a result profitability of farming activities is severely constrained. This acts as a disincentive for adoption of improved farming practices because financial returns remain far lower than production costs forcing people to carry out other unsustainable land use practices such as charcoal and timber extraction
- ✓ Limited financial resources and inadequate human resources at district level which halt support of initiated interventions or even implementing the routine activities as pointed out by district agriculture staff.
- ✓ Inadequate law enforcement e.g. the penalty or fines for outlaws are insufficient to constrain people from breaking the laws. For example if you are caught doing illegal charcoal production you will be required to pay 50,000 Tshs. This is relatively low compared to the value of charcoal produced. This is further aggravated by corruption where people who are convicted they are not dealt with properly as they give bribe at higher levels along the chain of law enforcement hierarch. This discourages law enforcement support at the grassroots (Appendix 3).
- ✓ Escalating demand for forest products i.e. timber and charcoal

### 3.7. Past interventions to address unsustainable land use practices

Several past and ongoing efforts were carried out to cope with unsustainable land use practices were identified. This includes the following:

- 1) Enacting and enforcing by-laws which govern management of water, land and forests resources including forest patrols, these were implemented through government institutions.
- 2) Efforts made by NGO's such as Growing Africa's Agriculture (AGRA), TFCG, National Network of Community Groups Involved in Participatory Forest Management (MJUMITA), Soil Erosion Control and Agroforestry Project (SECAP) and Swisscontact in collaboration with district council where each deal with at least one of the following:
  - Sustainable forest management,
  - Water and soil conservation farming practices, and
  - Alternative income generation activities.

#### 3.7.1. Formulation and enforcement of natural resource management by-laws

All visited villages have approved by-laws to govern management of water, land and forest resources. However, to a large extent the by-laws are not legitimate within the perspective of the communities (Appendix 3). Consequently, communities including village leaders are not willing to support enforcement of the by-laws. For example, all the village visited had approved water resource management by-laws which prohibit farming within 30 m and 60 m from small rivers/streams and big rivers, respectively. However, in practice the communities had approved informal but legitimate arrangement that prohibit farming within 4 m from streams or rivers but allow farming within 30 m and 60 m from streams/rivers. Farmers were concerned that prohibiting farming within 30 m or 60 m from the streams/rivers is impossible given the available technologies and the nature of the landscape. For example village chairman of Mfuluni village stated:

*"In most cases, basing on the topography, farming 60 m away from the rivers, you will be farming on steep slopes of the valley away from the productive land"*

Another respondent from Kisongwe village stated:

*“Irrigation farming is important venture for our life in this area that we cannot leave without. It is impossible to cultivate 30 m or 60 m from the streams/rivers proposed by the government because there is no appropriate technology to divert water that far; if we accept what government proposes that will be a burden to us; we will have to carry water on our head to irrigate farms 60 m away, and that is too much work”*

These narratives imply that when such by-laws were being enacted, communities were used as rubber stamp to approve by-laws that they did not agree with. This may suggest some inherent weaknesses of the processes involved to facilitate communities to enact natural resources management by-laws.

Furthermore, our results suggest that situation continue to be worse even when the by-laws are accepted by the community due to corruption and other governance issues. Findings show that all visited villages have appointed VNRCs that among others, they were given responsibility to exclude illegal forest uses. Although exclusion of illegal forest uses is considered a responsibility of each resident, in practice, VNRC are left to do all patrols with no or little support from the community. This proposition is supported by testimonies from FGDs across all visited villages (Appendix 3). On average, VNRC is comprised of 12 members, who are not adequate to control illegal forest uses without the support of the community. As a result, patrols are ineffective given the vast areas and sometimes difficult terrain. In addition, some members of the VNRC collude with illegal harvesters due to corruption (Appendix 3) which discourages support from the community. Similar results on illegitimacy of local forest governance structure has been reported in Tanzania by Rantala and German (2013). In order to ensure practicability of natural resources management by-laws, their formulation should be facilitated and building on indigenous knowledge and harnessing technological, social and political realities.

### **3.7.2. Interventions led by Non-Governmental Organisations**

Several organisations have been involved in different interventions to alleviate the problem of unsustainable land use practices. These include Alliance for Green Revolution in Africa (AGRA), SwissContact, Soil Erosion Control and Agroforestry Program (SECAP), TFCG and MJUMITA (Appendix 3). AGRA promoted legume based intercropping practices (combination of maize and peas) to enhance soil fertility; SwissContact worked with youth to promote aquaculture, vegetable gardening and poultry production; SECAP promote conservation agriculture in the highland areas; TFCG and MJUMITA have been piloting Reducing Emission from Forest Degradation and Deforestation (REDD) through forest management, land use planning, sustainable charcoal production, sustainable land use practices, saving and loan scheme and alternative income generating activities.

With exception of intervention led by TFCG and MJUMITA, most of the previous intervention failed due to defective design. Factors which contributed to failure of the previous interventions include (Appendix 3):

- ✓ Emphasis on theoretical underpinnings of the various practices without any effort to establish demonstration sites.
- ✓ Short term projects (2 years) that did not provide ample time for communities to evaluate and adopt the technologies
- ✓ Inappropriate technologies; for example, introducing exotic poultry breed that is vulnerable to diseases

TFCG and MJUMITA have succeeded in most aspects of their interventions. The major reason for their success is their robustness in project design based on the thorough analysis of the underlying causes of the problem. For example instead of abolishing charcoal burning completely, the project promoted sustainable technology for charcoal production. This was necessary because although the charcoal burning is the threat to forest conservation its contribution to livelihood of the people is significant. It is worth noting that despite success in most aspects, there were few weaknesses regarding TFCG and MJUMITA interventions. In some cases there was overemphasis on delivering products at the expense of required technologies. For example, beekeeping has been promoted through importation of improved beehives from Morogoro town instead of importing the technology of production of beehives. As a result, the number of beehives have remained constant in all visited villages due to limited availability and high price when ordered from Morogoro town.

Based on this analysis, two things are recommended to ensure success of similar interventions in the future:

- ✓ Project design must be informed by thorough analysis of the underlying causes of the problem
- ✓ More emphasis should be given on transfer of appropriate technologies rather than importation of finished products.

## 4. Conclusion and recommendations

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### 4.1. Conclusion

- 1) All the study villages were found to have land use plan which were established in year between 2010 and 2012. Among others, the defined land uses depended on village landscape characteristics i.e. water sources, forest cover, economic activities, priorities, geographical location and demands.
- 2) Although common unsustainable land use practices were identified i.e. charcoal and timber production, traditional agriculture which do not follow soil and water conservation techniques, overgrazing, mining, hunting, and unsustainable fishing, some few vary with geographical location. The following are examples:
  - ✓ Charcoal making is more prominent in villages close to town centres since the production cost is significantly low e.g. transport. The same would be expected for timber, however due to scarcity of timber tree species close to town centres the pressure has shifted to highlands.
  - ✓ Agriculture in hilly or slope areas is common in villages situated in the highlands.
  - ✓ Overgrazing is common in lowland areas than highlands
- 3) Some of environmental impacts caused by land use practises were found to vary from one location to another while others cut across the landscape. For example:
  - ✓ Siltation is predominantly taking place in the villages located in lowland than in the highlands.
  - ✓ Soil degradation due to soil erosion is common in villages situated in the hilly or sloped areas than those in the lowlands.
  - ✓ Decrease in water flow, water quality and drought cut across the landscape.
  - ✓ Forest cover is decreasing more in villages close to town centres than those situated far away due to high charcoal demand and the fact that charcoal do not require strict tree selection like timber. Although timber are harvested from highland (away from town centres), they do not cause significant damage as charcoal.
  - ✓ Climate variability were directly linked to drought and unreliable rainfall. This was common to all visited villages.
- 4) The identified impacts of unsustainable land use practices to people's lives cut across the landscape except flood hazard which is specific to some vulnerable villages in the lowland i.e. Dodoma isanga, Nyali, Kisanga and Ibingu.
  - ✓ Increased poverty due to low crop production as a result of unsustainable agriculture and drought were apparent in all villages. On the other hand, this also aggravate the food shortage problem (hunger).
  - ✓ Diseases were also reported as a consequence of poor water quality and quantity and this was common to all selected villages.
  - ✓ Furthermore, conflict between farmers and herders were found to be common in villages situated in the lowland as a result of overgrazing.
- 5) Identified drivers of unsustainable land use practices include the following:
  - ✓ Poverty: poverty is both a driver and effect. A good example is related to agriculture. Due to poverty, people fail to access infrastructure required to implement soil and water conservation agriculture (poverty as a driver). Failure to carry out sustainable agriculture intensify poverty due to low income generated from unsustainable agriculture (poverty as an effect). For livestock, building water reservoir which serve during dry season and decrease the migration of herders in search of water require capitals which majority do not have.
  - ✓ Drought which force people to cultivate close to water sources/rivers. Drought also limit the growth of pastures which result to herder migration to other areas. Drought also intensify poverty due to low crop production.

- ✓ Poor law enforcement and corruption aggravate forest cover reduction due to illegal charcoal making and timber harvesting. In addition, it intensify agriculture on the river banks as a result water quality and quantity is reduced.
- ✓ Low financial and human resources at district level which limit the extension services

6) Policies and legal framework which govern land uses are in place. However, their enforcement and implementation of plans have been very minimal due to inadequate human and financial resources for the district council to implement their routine activities and to support initiatives introduced by development partners e.g. TFCG.

7) Although past interventions to address unsustainable land use practices were relevant, most of them failed due to: inadequate on farm demonstrations, short lived projects (2 years), inappropriate technologies; for example, introducing exotic poultry breed that is vulnerable to diseases; and importation of finished product instead of transfer of appropriate technologies.

## 4.2. Recommendations

1) Government at different levels and other development partners such as TFCG should ensure that introduction of sustainable farming practices follows all necessary phases of namely, basic on-station research, on-farm adaptive research and dissemination.

2) Future project to promote sustainable land use practices must harness indigenous knowledge and perspectives of the local people; and build on thorough analysis of the underlying causes of the problem

3) The few available extension workers should be encouraged to operate through farmer field schools or groups, instead of working with individual farmers, in order to reach a large number of people with little resources

4) Policies, development and conservation interventions should focus on sustainable income generating activities building from existing activities especially those which are affordable to the poor such as chicken production. In addition, preference should be given to development of low cost technologies and building local capacity instead of importing finished products; for example instead of ordering beehives from town for establishment of beekeeping projects, means must be thought to develop local capacity for manufacturing beehives.

5) To enhance adoption of technologies, the core infrastructures/materials involved should be those locally readily available to community. For example, local carpenter may be trained to construct beehives using timber available in the village and sell to people at reasonable price instead of importing beehives from Morogoro.

6) In order to alleviate negative repercussions of unregulated livestock migration from one village to another, government at different levels and other development partners such as TFCG should acknowledge positive contribution of pastoralism to the national economy and adopt participatory landscape natural resource management systems that integrate pastoralism at the landscape level; instead of the current village based land use planning that fail to capture the need of pastoralists within a given landscape.

7) Promotion of sustainable farming practices should go hand in hand with establishment of mechanisms to enhance farmers bargaining power. This can be achieved through establishment of practical system to ensure farmers' access to market information such as mobile phone based that takes advantage of high coverage of mobile phones network in Tanzanian villages.

8) In order to ensure practicability of natural resources management by-laws, their formulation should be facilitated and building on indigenous knowledge and local experience and harnessing technological, social and political realities.

9) Government at different levels and other development partners such as TFCG should work together with extension officers to develop a practical incentive mechanism to sustain introduced interventions. Besides, the use of paraprofessionals should be considered to resolve the widespread inadequate number agricultural extension officers observed in the study area.

10) Improvement of district human and financial capacity by employing more extension officers at village levels and providing working facilities to enable them implement and enforce policies and laws respectively.



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## APPENDICES

Appendix 1: List of consulted people

### Kilosa District

S/N	Name	Position
1	Mr. Ibrahimu Ndembo	DLNRO, Kilosa District Council
2	Mr. Sebastian Marisa	Forest Officer, Kilosa District Council
3	Mr. Eliakim Enos	Project Coordinator, CCAP Project
4	Mr. Charles Leonard	Project Manager, TFGC, Kilosa
5	Mr. John S. Olomi	TFS District Forest Manager, Kilosa
6	Mr. Dionis Mboya	Agricultural Officer, Kilosa District Council

### Wami/Ruvu water basin offices

S/N	Name	Position
1	Miss. Nickbar Mwanana	Community Development Officer

### Kisongwe village

S/N	Name	Position
1	Mr. Lauliani Mkuchu	Village Chairperson
2	Mr. Fanuel Mgangu	Village Executive Officer
3	Mr. Thomasi Piusi Sehoya	Member of VNRC
4	Ms. Tasiana F. Msemwa	Member of Village Council
5	Mr. Nicodemus Victor	Member of VNRC
6	Mr. Octavia Joseph	Member of VILUM
7	Mr. Julius T. Sehoya	Secretary VILUM
8	Mr. Nestory Lusiani	Member of VILUM
9	Mr. Keneth Mikaeli	Member of VNRC

### Mfuluni village

S/N	Name	Position
1	Mr. Gelati P. Lui	Village Chairperson
2	Mr. Ciani Ima	Member of VILUM
3	Mr. Isa Hasani	Member of VNRC
4	Mr. Telesphor Mousi	Member of VNRC
5	Ms. Vemia Petitis	Member of VILUM
6	Ms. BibiAnna Mathias	Village member
7	Monica M. Senyagwa	Village member

### Nyali village

S/N	Name	Position
1	Mr. Damas Mahanza	Village Chairperson
2	Mr. Kuzenzemala D.L.	Acting Village Executive Officer
3	Mr. Ramadhani Amiri	Village Member
4	Mr. Shabani Kangamoto	Chairperson VNRC
5	Ms Tausi Hasani	Member of VILUM
6	Ms. Aziza Amili	Member of Village Council
7	Mr. Joseph M. Pius	Secretary VILUM
8	Fauster	Member of VILUM
9	Sara Robert	Treasurer VNRC
10	Kessy Mwino	Secretary VNRC
11	Clistofa Magundula	Member of Village Council
12	Emmanuel D. Maroda	Member of Village Council

<b>S/N</b>	<b>Name</b>	<b>Position</b>
13	Mr Yoram S. Maliwa	Secretary Charcoal makers association

**Msimba village**

<b>S/N</b>	<b>Name</b>	<b>Position</b>
1	Mr. Bakari A. Mbongwa	Village Chairperson
2	Mr. William O. Mlelwa	Village Executive Officer
3	Mr. Abdallah S. Dege	Chairperson, Sub village
4	Ms. Yustina Timbangya	Treasurer VNRC
5	Mr. Wilson Addu	Member of VNRC
6	Ms. Emiliana Petro	Member of VNRC
7	Mr. Mlochela Tengeneza	Chairperson VILUM
8	Ms. Imelda Ernest	Chairperson, Sub village
9	Mr. Winfred Charles	Secretary VILUM
10	Ms. Leoteria Henry	Member of VILUM

## **District Level**

### **Situation Analysis**

1. What are the existing land uses practices in this district
2. Among the mentioned land use practices, what are the key 5 unsustainable land use practices?
3. For each of the identified unsustainable land use practices, which villages use the corresponding dominantly?
4. Describe how the mentioned unsustainable practices are carried out?
5. For each unsustainable practice, explain whether there are social group(s) that practice it more than others?
6. What are the negative environmental outcomes/damages of the mentioned unsustainable practices?
  - a. Has the water volume decreased compared to 5 years back?
  - b. Has the river depth decreased compared to past five years back?
  - c. Are there any fish/aquatic organisms which have disappeared?
  - d. Has water quality decreased?
  - e. Has the quality/cover of forest decreased?
  - f. Is there evidence that some tree species have disappeared?
  - g. Has the incidence of floods decreased or increased compared to past 10 years?
7. For each unsustainable practice, explain whether there are social group(s) that are more affected and to what extend?
8. What efforts/initiative has been done to address unsustainable practices?
9. Among those, which ones have been successful and why?
10. Which ones failed and why?
11. Are there by-laws governing land use practices?
12. To what extent are the bylaws followed?
13. Why the by-laws not followed?
14. Briefly describe the key aspects of the by-laws related to the identified unsustainable land use practices?
15. What does law states regarding identified unsustainable practices?

### **Problem Tree Analysis**

1. What are the main reasons which drive people toward practicing identified unsustainable land use practices in bullet 6
  - a. Reduced agriculture productivity
  - b. Alternative income generating activities
  - c. Population pressure
  - d. Ignorance on the impact of different unsustainable practices
2. For the immediate effect identified above in bullet 6, describe corresponding effects on people's lives
3. What do you think can be done to address the problem of unsustainable land use practices?
4. What stakeholders should be involved?

## **Village Level**

### **Situation Analysis**

1. What are the existing land uses practices in this Village
2. Among the mentioned land use practices, what are the key 5 unsustainable land use practices?
3. For each of the identified unsustainable land use practices, which other villages use the corresponding dominantly?

4. Describe how the mentioned unsustainable practices are carried out?
5. For each unsustainable practice, explain whether there are social group(s) that practice it more than others?
6. What are the negative environmental outcomes/damages of the mentioned unsustainable practices?
  - a. Has the water volume decreased compared to 5 years back?
  - b. Has the river depth decreased compared to past five years back?
  - c. Are there any fish/aquatic organisms which have disappeared?
  - d. Has water quality decreased?
  - e. Has the quality/cover of forest decreased?
  - f. Is there evidence that some tree species have disappeared?
  - g. Has the incidence of floods decreased or increased compared to past 10 years?
7. For each unsustainable practice, explain whether there are social group(s) that are more affected and to what extent?
8. What efforts/initiative has been done to address unsustainable practices?
9. Among those, which ones have been successful and why?
10. Which ones failed and why?
11. Are there by-laws governing land use practices?
12. To what extent are the bylaws followed?
13. Why the by-laws not followed?
14. Briefly describe the key aspects of the by-laws related to the identified unsustainable land use practices?
15. What does law states regarding identified unsustainable practices?

### **Problem Tree Analysis**

1. What are the main reasons which drive people toward practicing identified unsustainable land use practices in bullet 6
  - a. Reduced agriculture productivity
  - b. Alternative income generating activities
  - c. Population pressure
  - d. Ignorance on the impact of different unsustainable practices
2. For the immediate effect identified above in bullet 6, describe corresponding effects on people's lives
3. What do you think can be done to address the problem of unsustainable land use practices?
4. What stakeholders should be involved?

Appendix 3: Perceptions from communities and professionals on identification and analysis of land use issues in Kilosa district

Group	Land uses identified in the existing land use plans	Prevailing unsustainable land use practices	Impacts of unsustainable land use practices on the environment and natural resources	Impacts of unsustainable land use practices to people's lives	Underlying causes of unsustainable land use practices	Past interventions and local coping strategies to address unsustainable land use practices	What should be done to halt unsustainable land use practices
Highland villagers (represented by Kisongwe and Mfuluni villages)	<ul style="list-style-type: none"> <li>✓ Area reserved for village forests</li> <li>✓ Area reserved for farming</li> <li>✓ Area reserved for both farming and settlements</li> <li>✓ Area reserved for settlements</li> <li>✓ Area reserved for burials</li> <li>✓ Area reserved for livestock; observed in Kisongwe but not in Mfuluni</li> <li>✓ Others (market place, roads, schools, mosques and churches etc.)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Unsustainable farming practices: <ul style="list-style-type: none"> <li>✓ Farming close to water sources. Although their bylaws prohibit farming within 60 m from river/stream, they have agreed informally to farm up to 4 m</li> </ul> </li> <li>✓ Use of fire for farm preparation, honey harvesting and hunting. In hunting youth normally use fire and dogs to scare animals which force them to hide in burrows which are then excavated. Fire is also used to clear bush so that animals can be spotted easily. Elders use snares to catch animals. Hunted animals include wild-pigs, rabbits, rodents and dik-dik</li> <li>✓ Cutting small trees for tomato plant stakes</li> <li>✓ Farming in steep slopes</li> <li>✓ Shifting cultivation noted in Mfuluni village</li> <li>✓ Mining noted in Kisongwe, Udetu, Mfuluni, Udingu and Malolo villages. Minerals include rod</li> </ul>	<ul style="list-style-type: none"> <li>✓ Decrease of water volume</li> <li>✓ Soil erosion and deterioration of water quality</li> <li>✓ Forest degradation and deforestation</li> <li>✓ Unreliable rainfall (extended drought)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Decline in household income (Poverty)</li> <li>✓ Food insecurity due to low crop produce</li> <li>✓ Scarcity of water for domestic and irrigation purposes</li> <li>✓ Tension between farmers and pastoralists but never caused bloodshed</li> <li>✓ Conflict between villages over boundaries especially in area which villages are separated by forests</li> <li>✓ Climate variability. Of the two rainy seasons i.e. short season from October to December; and long rainy season from March to June, the former has become unreliable compared to the latter</li> </ul>	<ul style="list-style-type: none"> <li>✓ Low income which limits villagers to adopt/invest in sustainable agricultural practices. This also explains why the majority of villagers do not use fertilizers</li> <li>✓ Low agricultural crop prices compared to prices offered in town which force people to carry out other unsustainable land use practices e.g. charcoal and timber extraction</li> <li>✓ Inadequate knowledge on practicability of alternative sustainable farming practices</li> <li>✓ Reluctance to detach from traditional practices e.g. traditional agriculture</li> <li>✓ Drought which aggravates low crop produce. This forces villagers to engage in other income generating activities which are not sustainable e.g. agriculture close to water source, hunting, charcoal making etc.</li> <li>✓ Increased demand for timber for construction of modern houses which aggravates forest degradation</li> <li>✓ Inadequate extension services due to few extension officers and ineffective approaches</li> <li>✓ Inadequate fines for offenders which does not discourage them from illegal activities e.g. charcoal and timber extraction</li> <li>✓ Corruption, people who are convicted are not dealt with properly as they give bribes at higher levels along the chain of law enforcement hierarchy.</li> <li>✓ Inadequate community support for enforcement of natural resource management by-laws</li> <li>✓ Illegitimacy of VNRCs within their communities</li> </ul>	<ol style="list-style-type: none"> <li>1. Enacting and enforcing by-laws which govern management of water, land and forest resources. Problem related to the by-laws: <ul style="list-style-type: none"> <li>✓ Illegitimacy of by-laws: some by-laws have no majority acceptance</li> <li>✓ Poor by-law enforcement due to corruption</li> </ul> </li> <li>2. Patrols to the forests. But it fails due to the following reasons: <ul style="list-style-type: none"> <li>✓ Topographic nature (undulating) and few members of persons involved limit the patrol effectiveness</li> <li>✓ Forest patrol is the task of VNRC</li> <li>✓ Some members of the village environment committee collude with illegal harvesters due to corruption</li> </ul> </li> <li>3. Efforts from NGO <ul style="list-style-type: none"> <li>✓ Growing Africa's Agriculture (AGRA): Introduced legume-based intercropping practices (combination of maize and peas). However, villagers commented that it was more theoretical than practical which hinders the adoption of the technology.</li> <li>✓ TFCG &amp; MJUMITA: promoting climate change mitigation and adaptation activities. It includes REDD, sustainable charcoal production, conservation agriculture, beekeeping, poultry, energy saving stoves, village savings and loans associations.</li> <li>✓ Swisscontact: Villagers reported that they introduced aquaculture in combination with vegetable gardens and poultry production. Aquaculture did not progress (ended on excavation of fish ponds, no further progress took place); the introduced poultry (exotic breed) which were not able</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Training farmers on soil and water conservation agriculture</li> <li>2. More extension officers are required so that a larger number of farmers can be reached</li> <li>3. Farming subsidies should be made available and on time to farmers i.e. fertilizers, seeds etc.</li> <li>4. Money from REDD project should be paid</li> <li>5. Education of good farming practices should be provided sustainably and completely</li> <li>6. Fees for agricultural produce should be reduced to maximize farmer profit for that little they get from fields</li> <li>7. Road infrastructure should be improved so that farmers' produce is reached easily by buyers</li> <li>8. Facilitation in terms of loans on agricultural equipment such as water pumps to enhance irrigation</li> <li>9. Government should intervene on village boundary conflicts</li> </ol>

Group	Land uses identified in the existing land use plans	Prevailing unsustainable land use practices	Impacts of unsustainable land use practices on the environment and natural resources	Impacts of unsustainable land use practices to people's lives	Underlying causes of unsustainable land use practices	Past interventions and local coping strategies to address unsustainable land use practices	What should be done to halt unsustainable land use practices
		<p>light, mica and gold. Extraction is carried out using hoes, mattock, spades, axes and bush knives. Major market are vendors from Dar es salaam</p> <ul style="list-style-type: none"> <li>✓ Overgrazing exacerbated by influx of Masai, Sukuma and Mang'ati and allocating small or no area for grazing in land use plan</li> <li>✓ Timber extraction (charcoal not common due to poor road infrastructure and the long distance to the market)</li> <li>✓ Fish poisoning using <i>Tephrosia vogeliin</i> extract or other chemicals such as flea and tick dip</li> </ul>			<ul style="list-style-type: none"> <li>✓ Population increase which increase the demand of more land and pressure to the forest resources leading to forest degradation and deforestation</li> </ul>	<p>to survive the new environment i.e. diseases. Vegetable cultivation is progressing well although the major problem is that they are carried out close to water source (rivers and streams)</p>	

Group	Land uses identified in the existing land use plan	Prevailing unsustainable land use practices	Impacts of unsustainable land use practices on the environment and natural resources	Impacts of unsustainable land use practices to people's lives	Underlying causes of unsustainable land use practices	Past interventions and local coping strategies to address unsustainable land use practices	What should be done to halt unsustainable land use practices
Lowland villagers (represented by Nyali and Msimba villages)	<ul style="list-style-type: none"> <li>✓ Area reserved for village forests</li> <li>✓ Area reserved for farming</li> <li>✓ Area reserved for both farming and settlements</li> <li>✓ Area reserved for settlements</li> <li>✓ Area reserved for burials</li> <li>✓ Area reserved for</li> </ul>	<p>✓ Unsustainable farming practices:</p> <ul style="list-style-type: none"> <li>✓ Farming close to water sources</li> <li>✓ Shifting cultivation noted in Nyali village</li> <li>✓ Use of fire for farm preparation, honey harvesting and hunting. In hunting youth normally use fire and dogs to</li> </ul>	<ul style="list-style-type: none"> <li>✓ Decrease of water flow</li> <li>✓ Soil erosion and deterioration of water quality</li> <li>✓ Forest degradation and deforestation</li> <li>✓ Unreliable rainfall (extended drought)</li> <li>✓ Decrease/disappearance of fish (e.g. in river Lukulu) and</li> </ul>	<ul style="list-style-type: none"> <li>✓ Decline in household income (Poverty)</li> <li>✓ Food insecurity due low crop produce</li> <li>✓ Scarcity of water for domestic and irrigation purposes</li> <li>✓ Conflict between farmers and pastoralists, sometimes resulting into bloodshed</li> </ul>	<ul style="list-style-type: none"> <li>✓ Low income which limit villagers to adopt/invest in sustainable farming practices. This also explain why majority of villager do not use fertilizers</li> <li>✓ Low agricultural crop prices compared to prices offered in town which force people carry out other unsustainable land use practices e.g. charcoal and timber extraction</li> <li>✓ Inadequate knowledge on</li> </ul>	<ol style="list-style-type: none"> <li>1. Enacting and enforcing by-laws which govern management of water, land and forest resources. <ul style="list-style-type: none"> <li>✓ Illegitimacy of by-laws: some by-laws are have no majority acceptance</li> <li>✓ Poor by-laws enforcement due to corruption</li> </ul> </li> <li>2. Patrols to the forests. But it fails due to the following reasons: <ul style="list-style-type: none"> <li>✓ Topographic nature</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>✓ Training farmers on soil and water conservation agriculture</li> <li>✓ More extension officers are required so that larger number of farmers can be reached</li> <li>✓ Farming subsidies should be made available and on time to farmers i.e. fertilizers, seeds etc.</li> <li>✓ Money from REDD</li> </ul>



Group	Land uses identified in the existing land use plan	Prevailing unsustainable land use practices	Impacts of unsustainable land use practices on the environment and natural resources	Impacts of unsustainable land use practices to people's lives	Underlying causes of unsustainable land use practices	Past interventions and local coping strategies to address unsustainable land use practices	What should be done to halt unsustainable land use practices
	<p>livestock; observed in both villages</p> <p>✓ Others (market place, roads, schools, mosques and churches etc.)</p>	<p>scare animals which force them to hide in burrows which are then excavated. Fire is also used to clear bushes so that animals can be spotted easily. On the other hand, elders uses snares to catch animals. Hunted animals includes wild-pig, rabbit, rodents and dik-dik</p> <p>✓ Charcoal and timber extraction</p> <p>✓ Overgrazing exacerbated by influx of Masai, Sukuma and Mang'ati and allocating small or no area for grazing in land use plan</p>	<p>crabs spread</p>	<p>✓ Climate variability. Of the two rainy seasons i.e. short season from October to December; and long rainy season from March to June, the former has become unreliable compared to the latter</p>	<p>practicability of alternative sustainable farming practices</p> <p>✓ Drought which aggravate low crop production in the arable land. This force villagers to engage into other income generating activities which are not sustainable e.g. farming close to water source, hunting, charcoal making etc.</p> <p>✓ Inadequate extension services due to few extension officers and ineffective approaches</p> <p>✓ Migration of herders i.e. sukuma, masai and mang'ati people</p> <p>✓ Inadequate area set for livestock; 59 hectare were set in Nyali village that has more than 400 cattle (Nyali village)</p> <p>✓ Inadequate fines for offenders which does not discourage them from illegal activities e.g. charcoal and timber extraction</p> <p>✓ Corruption, people who are convicted they are not dealt with properly as they give bribe at higher levels along the chain of law enforcement hierarch.</p> <p>✓ Inadequate community support for enforcement of natural resource management by-laws</p> <p>✓ Illegitimacy of VNRCs within their communities</p> <p>✓ Population increase which increase the demand of more land and pressure to the forest resources leading to forest degradation and deforestation</p> <p>✓</p>	<p>(undulating) and few number of persons involved limit the patrol effectiveness</p> <p>✓ Forest patrol is the task of VNRC</p> <p>✓ Some member of the village environment committee collude illegal harvesters due to corruption</p> <p>3. Efforts from NGO</p> <p>✓ Growing Africa's Agriculture (AGRA): Introduced legume-based intercropping practices (combination of maize and peas). However, villagers commented that it was more theoretical than practical which hinder the adoption of the technology.</p> <p>✓ TFCG &amp; MJUMITA: promoting climate change mitigation and adaptation activities. It include REDD, sustainable charcoal production, conservation agriculture, beekeeping, poultry, energy saving stoves, village savings and loans associations.</p> <p>✓ Swisscontact: Villagers reported that they introduced aquaculture in combination with vegetable gardens and poultry production. Aquaculture did not progress (ended on excavation of fish ponds, no further progress took place); the introduced poultry (exotic breed) which were not able to survive the new environment i.e. diseases. Vegetable cultivation is progressing well although the major problem is that they are carried out close to water source (rivers and streams)</p>	<p>project should be paid on time</p> <p>✓ Education of good farming practices should be provided sustainably and complete</p> <p>✓ Fees for agricultural produce should be reduced to maximize farmers profit for that little they get from fields</p> <p>✓ Road infrastructure should be improved so that farmers produce are reached easily by buyers</p> <p>✓ Facilitation in term of loans on agricultural equipment such as water pumps to enhance irrigation</p> <p>✓ Government should intervene on the village boundaries conflicts</p>

Group	Land uses identified in the existing land use plan	Prevailing unsustainable land use practices	Impacts of unsustainable land use practices on the environment and natural resources	Impacts of unsustainable land use practices to people's lives	Underlying causes of unsustainable land use practices	Past interventions and local coping strategies to address unsustainable land use practices	What should be done to halt unsustainable land use practices
District, Wami-Ruvu Water basin office and TFCG staff	<ul style="list-style-type: none"> <li>✓ Of 211 villages in Kilosa district, only 42 villages (20%) have land use plan.</li> <li>✓ For villages with land use plan, the land has been set for the following: <ul style="list-style-type: none"> <li>✓ Area reserved for village forests</li> <li>✓ Area reserved for farming</li> <li>✓ Area reserved for both farming and settlements</li> <li>✓ Area reserved for settlements</li> <li>✓ Area reserved for burials</li> <li>✓ Area reserved for livestock; observed in both villages</li> <li>✓ Others (market place, roads, schools, mosques and churches etc.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>✓ Charcoal extraction (villages close to town centres or road infrastructure e.g. Nyali village)</li> <li>✓ Timber (from forested highland villages)</li> <li>✓ Unsustainable agriculture practices <ul style="list-style-type: none"> <li>✓ Agriculture practices close to water sources.</li> <li>✓ Shifting cultivation (commonly in Chabimba, Ibingu and mfuluni villages)</li> <li>✓ Application of fertilizers e.g. urea</li> <li>✓ The use of agrochemicals e.g. pesticides</li> <li>✓ The use of fire as tool to prepare farms</li> </ul> </li> <li>✓ Overgrazing (dominantly in lowland villages) where majority of livestock are coming from other places e.g. Ihombwe and Kisanga village</li> <li>✓ Destruction of water sources by livestock</li> <li>✓ Extraction of bamboo and wild palm for basket and mat making, respectively</li> <li>✓ Mining (very small scale in Kisongwe, Udete, Mfuluni, Udingu and Malolo villages)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Loss water shed resulting to decrease in water volume. For example river Mduku, Iyovi, Mkondoa.</li> <li>✓ Siltation (e.g. Zombo and Kigunga dam, Mkondoa and Msowelo river) due to soil erosion exacerbated by loosening of soils (tilling) close to rivers and streams</li> <li>✓ Water quality deterioration due to the use of pesticides and fertilizers.</li> <li>✓ Forest degradation and deforestation especially those villages which do not have land use plan. Floods in Kitete and Dumila is common as a result.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Decline in household income (Poverty)</li> <li>✓ Food insecurity due low crop produce</li> <li>✓ Conflict between farmers and pastoralists, sometimes resulting into bloodshed</li> <li>✓ Loss of food crops such as maize, sorghum potatoes, and cassava due to livestock raiding</li> <li>✓ Climate variability, disappearance of short (<i>vuli</i>) rain season</li> </ul>	<ul style="list-style-type: none"> <li>✓ Inadequate human and financial resources at district level. For example for each village there is at most two extension officers. Also the focus is to individual farmers rather than group of farmers.</li> <li>✓ Inadequate alternative income generating activities other than farming which increases pressure to the natural forests</li> <li>✓ Inadequate financial and physical resources at district level e.g. there is no transport facilities for district agriculture and forest officers that limit their routine services to villages.</li> <li>✓ Low income which limit villagers to adopt/invest to sustainable agricultural practices.</li> <li>✓ Inadequate knowledge on practicability of alternative sustainable farming practices</li> <li>✓ Population increase which increase the demand of more land and pressure to the forest resources leading to forest degradation and deforestation</li> <li>✓ Escalating demand of forest products i.e. charcoal and timber inside and outside Kilosa district</li> </ul>	<ol style="list-style-type: none"> <li>1. Taking opportunities of collaborating with NGO's on promotion of modern agricultural practices. E.g. WOPATA and JAICA</li> <li>2. Support from NGOs (TFCG and MJUMITA) to introduce the following: <ul style="list-style-type: none"> <li>✓ Improved agriculture techniques i.e. conservation agriculture (contour and terraces)</li> <li>✓ Land use planning of about 49 villages</li> <li>✓ Sustainable charcoal production to enable villages to have financial base to manage their forests and improve their livelihood</li> <li>✓ Beekeeping project as alternative income generating activity</li> </ul> </li> <li>3. Establishment of water user associations to manage water use and reduce water use conflicts in different sub-catchments</li> <li>4. SECAP in collaboration with district agriculture offices introduced sustainable farming practices i.e. minimum tillage, crop rotation, contour bands, as means of conserving soils and increase productivity.</li> <li>5. JICA: Operated in Kilangali, Ludewa and Ulaya madizini. Training were conducted on: <ul style="list-style-type: none"> <li>✓ sustainable farming practices</li> <li>✓ Tree planting programme</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>✓ Working facilities to professional staff such as transport</li> <li>✓ Regular provision of financial resources to support extension services</li> <li>✓ Number of extension officers should be increased to be able to reach majority of farmers</li> <li>✓ Regular refresh training to extension officers</li> <li>✓ Farmers/villagers should follow bylaws and advices given by professionals</li> </ul>

**Project: Climate Change, Agriculture and Poverty Alleviation Project (CCAP)**

**Title: A rapid study to identify unsustainable land use practices that threaten water sources and other ecosystem services in Kilosa District.**

## **1. Project Summary**

### **1.1 Project partners and duration**

The climate change, agriculture and poverty alleviation project (CCAP) is a partnership project being implemented by four organizations: the Tanzania Forest Conservation Group (TFCG), the Community Forestry Network of Tanzania (MJUMITA), the Tanzania Organic Agriculture Movement (TOAM) and the Agricultural Non State Actors Forum (ANSAF).

The initiative aims to steer Tanzania towards an agricultural development pathway that achieves the dual goals of poverty reduction and lower greenhouse gas emissions. The project started in October 2012 and is financed by the Accountability in Tanzania programme.

### **1.2 Project Goal, Objectives and Outputs**

**The Goal of the CCAP Initiative is that:**

Poverty has been reduced amongst small-scale farmers in Tanzania and greenhouse gas emissions from agriculture have been reduced through the widespread adoption of climate resilient, low emission agricultural practices.

**The Intermediate objective of the CCAP initiative is that:**

Tanzania has developed and is implementing policies and strategies that prioritise support to small-scale farmers to enable them to improve their livelihoods through the adoption of climate smart agriculture and sustainable land and natural resources management.

**The immediate objectives of the CCAP initiatives are:**

Small-scale farmers and other stakeholders are demanding the integration of climate-friendly agriculture in national policy and policy implementation.

Government, private sector and civil society are cooperating to support small-scale farmers to benefit from low GHG emission agriculture that is more climate resilient.

## **2.0 Scope of Work**

### **2.1 Overall Objectives and Approach this consultancy**

During Phase 1 of the project, many farmers expressed concern about land use practices damaging water sources and other sensitive areas. TFCG is seeking a consultant to identify unsustainable land use practices commonly practiced by small-scale farmers and pastoralists in Kilosa with a particular focus on those threatening key water sources; causing deforestation and forest degradation; threatening pollinators; and / or causing water pollution. The findings from this study will provide an evidence-based for stakeholders to meet and agree on action to address these unsustainable practices.

The **overall objective** of this assignment is to identify and describe unsustainable land use practices commonly practiced in Kilosa with a particular focus on those threatening key water sources; causing deforestation and pollution.

Specifically the consultant will:

1. Identify and characterise unsustainable agricultural, mining, livestock management, logging and / or charcoal production practices that threaten ecosystem values including the quality and flow of water, soil, biodiversity including pollinators and forests / woodlands in a sample of the 14 villages that the

project is working with. The assessment should include a detailed analysis of at least 5 different practices. The practices analysed in detail should be selected in consultation with community and project representatives. For each practice, the consultant shall provide:

- a description of the practice i.e. what is being done, including specific examples from the project villages accompanied by photographs;
  - an assessment of the environmental impact of the practice including evidence of the damage caused and an indication of the scale of the problem and associated risks;
  - a description of who is involved in the practice;
  - an outline of the underlying causes behind people practicing these techniques. This should include data describing levels of awareness amongst small-scale farmers in the project villages on the risks of the land use practice under consideration.
  - a description of any measures taken already to address these practices and lessons learned from initiatives to address the problem.
  - an analysis of whether the practice is already governed by national laws or by local by-laws.
2. Provide practical recommendations on how the identified unsustainable practices can be addressed. The recommendations should be clear in terms of what needs to be done and by whom in order to address both the direct and indirect causes of the problems; and / or action needed to mitigate the damage.

### **3. Methodology and output**

#### **3.1 Methodology**

The consultant shall propose a relevant, efficient and cost-effective methodology for executing the assignment. At a minimum the consultant shall undertake the following activities in order to achieve the objectives of the consultancy:

- (i) Review relevant documentation including but not limited to the village land use plans and by-laws, the village forest reserve management plans and by-laws, the Environment Act and the Forest Act.
- (ii) Consult land use change analyses generated by MJUMITA for Kilosa.
- (iii) Collect and synthesize inputs by consulting small-scale farmers, village leaders, VNRC members, project field officers and district staff.
- (iv) Visit sites affected by the unsustainable land use practices.
- (v) Prepare a draft report and share with the CCAP project team for review. Upon receipt of comments, these will be integrated into a revised report.
- (vi) Share the final report and make a presentation of the main findings to a stakeholders meeting that will be organized by TFCG in Morogoro/Kilosa.

#### **3.2 Outputs of this consultancy**

##### **3.2.1 Report**

An inception report detailing the proposed methods and with a detailed activity plan and timetable shall be submitted within 5 days of signing the contract.

The consultancy report will include sections on:

- (i) Executive summary
- (ii) Acronyms
- (iii) Acknowledgements
- (iv) Introduction and background including an outline of the study objectives and context;
- (V) Methodology including detailed descriptions of those consulted and with references for all documents consulted.

(vi) Results including detailed descriptions of at least five different land use practices including, at a minimum, the aspects described in Section 2.1 of this document

(vii) Conclusion and recommendations

viii) Annex (TOR, itinerary, persons interviewed)

ix) Reference list

x) Photographs

The report should be delivered in English and submitted by e-mail to [tfcg@tfcg.or.tz](mailto:tfcg@tfcg.or.tz).

#### **4. Location**

Data collection will take place in a sample of 14 villages in Kilosa District. The villages' land use plans were supported by REDD - TFCG and MJUMITA project which came to an end last year.

#### **5. Timing**

The draft report shall be submitted by 30<sup>th</sup> November. The consultant shall submit a revised report within 5 working days of receiving comments from TFCG on the draft report.