



MIDDLE TANA CATCHMENT



MINISTRY OF WATER SANITATION AND IRRIGATION

STATE DEPARTMENT FOR IRRIGATION

LAND DEGRADATION ASSESSMENT REPORT

2025

Acknowledgements

On behalf of the Ministry of Water, Sanitation and Irrigation, I would like to convey the Ministry's profound gratitude to all who participated in the development of this Land degradation assessment report on Middle Tana catchment. The process of preparation of this report was highly technical, consultative, interactive and inclusive and drew from the expertise and support of several people and institutions. Special thanks go to the Cabinet Secretary, Ministry of Water, Sanitation and Irrigation, Eng. Eric Mugaa and the Principal Secretary Mr. Ephantus Kamotho for the leadership and support they provided for this exercise

Special thanks go to the County Governments through the County Executive Committee Members responsible for Environmental issues, the County commissioners and ward administrators for the various wards visited in Kitui.

Finally, I express my gratitude to members of the various Technical Task Teams from the Ministry of Water, Sanitation and Irrigation (MWSI) who undertook the field exercise.

The technical Team members included: Ms Esther Musavi, Dr. Francis Nyambariga, Dr. Elly Yaluk ,Mr. Mbathi, Eng. Milewa, Eng. Kosgey, Mr. Abwoga , Mr. Odhiambo, Ms. Lina Kiogora, Mr. Patrick Mutugi, Mr. Aineah Omondi, Ms. Mercy Ngure ,Ms. Mariam Mazera. They were ably assisted by a group of interns including Joan Terer, Bessy Kinya, Leonida Owendi and Ann Trisa.

I am also grateful to all those who contributed in one way or another in development of this Report through specialised skills such as GIS and may not have been mentioned directly. Kindly take this acknowledgement as an expression of our sincere gratitude for your contribution.

Thande Githae
Director, Land Reclamation
Ministry of Water, Sanitation and Irrigation

TABLE OF CONTENTS

Acknowledgements.....	i
1.0 INTRODUCTION	1
1.1 Land degradation and LADA objectives	1
1.2 Project background.....	3
1.3 Objectives of the exercise including scope.....	7
2.0 METHODOLOGY	8
2.1 Hot spot identification	8
2.2 Area scope	8
2.3 Physical observation	8
3.0 FINDINGS.....	9
3.1 Findings in various data categories	9
3.1.1 General introduction to the specific area.....	9
3.1.2 Data for the specific area	10
3.1.3 Analysis of the findings per area based on criteria	17
3.1.4 Summary of findings	18
3.1.5 Identification of possible interventions	18
3.1.6 Degradation Trends.....	19
4.0 CONCLUSIONS AND RECOMMENDATIONS.....	20
ANNEXES	21
Annex 1 Data capture Tool.	21
Annex 2 – Data sheets Mwingi North	22
Annex 3 Data sheets Mwingi Central	61
Annex 4 Kitui South Data Sheets.....	94

1.0 INTRODUCTION

1.1 Land degradation and LADA objectives

Land use and land cover changes associated with human activities and natural factors compromise many ecosystems, including watersheds of important rivers. Land degradation resulting from human activities has been a major global challenge since the 20th century and will remain high on the international agenda in the 21st century (Matano et al. 2015). According to Bai et al. 2008, land degradation is increasing in severity and extent in many parts of the world, with more than 20% of all cultivated areas, 30% of forests and 10% of grasslands undergoing degradation. In recent centuries, an increasing number of riparian lands have been developed and utilized for agriculture, human settlements and development of cities and towns (Jones et al. 2010). This has significantly impacted critical catchment areas.

Land degradation refers to the deterioration of land quality resulting from direct or indirect human activities, including human-induced climate change. It is characterized by the long-term decline or loss of at least one of the following: biological productivity, ecological integrity, or its value to humans (Olsson et al., 2019). This process affects the entire environment, impacting various components such as soils, water resources (both surface and groundwater), forests, grasslands, croplands (both rainfed and irrigated), and biodiversity, including animal populations, vegetation cover, and soil health (FAO, 2005).

In Kenya, land degradation is prevalent, impacting millions of people who also face poverty and recurrent natural disasters, particularly drought. Climate variability, whether naturally occurring or human-induced, further weakens the resilience of dryland ecosystems and threatens the sustainability of livelihoods in these regions. Limited understanding of the extent, severity, and frequency of land degradation, along with inadequate tools and methods for its assessment and monitoring, hinders the implementation of effective policies for integrated resource management and land rehabilitation (GOK, 2014).

Impacts of Land Degradation

Land degradation has far reaching impacts affecting not only the environment but also human livelihoods, economies, and global systems. It undermines the ability of the land to support life, threatens food security and exacerbates climate change. Key impacts of land degradation include;

- 1) Loss of Soil Fertility and Productivity:
 - Reduced Crop Yields: Degraded soil loses its ability to retain nutrients and water, leading to lower crop yields and reduced agricultural productivity. This impacts food security, especially for rural communities and smallholder farmers who rely on the land for their livelihoods.
 - Loss of Soil Nutrients: Soil erosion removes the topsoil, which is rich in nutrients essential for plant growth. This depletion of nutrients further reduces soil fertility and makes it difficult for plants to thrive.
 - Compaction and Waterlogging: Soil compaction, often caused by heavy machinery or overgrazing, reduces soil porosity, hindering water infiltration and root growth. Waterlogging can also occur, leading to anaerobic conditions that harm plant roots and reduce soil fertility.

2) Desertification and Land Loss:

- **Expansion of Arid Areas:** Desertification is a major consequence of land degradation, characterized by the expansion of arid and semi-arid areas. The loss of soil cover due to erosion and reduced vegetation leads to the formation of barren landscapes.
- **Loss of Arable Land:** as land is degraded, it becomes less suitable for agriculture, leading to a loss of arable land. This further exacerbates food security challenges and forces people to migrate to other areas. Potentially leading to further land degradation.

3) Biodiversity Loss and Ecosystem Disruption:

- **Habitat Destruction:** Land degradation destroys habitats for plants and animals, leading to a decline in biodiversity. This disrupts the delicate balance of ecosystems and can have effects on food webs and ecological processes.
- **Extinction of Species:** The loss of habitat and the disruption of ecosystems can lead to extinction of species, further reducing biodiversity and weakening ecosystem resilience.

4) Climate Change Impacts:

- **Greenhouse Gas Emissions:** Degraded land releases carbon dioxide and nitrous oxide into atmosphere, contributing to climate change. This creates a vicious cycle, as climate change further exacerbates land degradation.
- **Increased Vulnerability to Climate Change:** Degraded land is more susceptible to the impacts of climate change, such as droughts, floods, and extreme weather events which further weakens ecosystem resilience and makes it harder to adapt to climate change.

5) Socioeconomic Impacts:

- **Poverty and Food Insecurity:** Land degradation disproportionately affects poor and rural communities who rely on the land for their livelihoods. It leads to poverty, food insecurity and forced migration.
- **Economic Losses:** Land degradation has significant economic impacts, reducing agricultural productivity, increasing food prices, and leading to losses in tourism and other industries that rely on healthy ecosystems.
- **Social Instability:** The impacts of land degradation can lead to social instability, conflict, and migration as people compete for dwindling resources.

Land degradation assessment (LADA) is the process of evaluating the extent, severity, and causes of land degradation in a particular area. LADA follows a participatory, decentralized, country-driven, and integrated approach and makes ample use of participatory rural appraisals, expert assessment, field measurements, remote sensing, GIS, modelling, and other modern means of generation of data, networking, and communication technologies for sharing information at national and international levels.

LADA considers both biophysical factors and socio-economic driving forces (Kapalanga,2008). It helps understand the current state of the land, identify the factors contributing to its decline, and develop strategies for its restoration and sustainable management. The aspects that can be evaluated include land conditions, land use, land degradation trends, and the causes and effects of land degradation. Notable causes of various types of land degradation include water erosion, wind erosion, soil fertility decline,

waterlogging, salinization, lowering of the water table, deforestation, forest degradation, and rangeland degradation.

The objectives of Land Degradation Assessment include the following:

- To develop clear, achievable, and reproducible mitigation measures to restore degraded lands and promote poverty reduction, social equity, and sustainable development.
- To provide scientifically sound data to guide decision-makers in designing, prioritizing, and implementing sustainable land management and rehabilitation strategies.
- To identify drivers and project degradation severity trends through 2030 and beyond.
- To measure the current state and trends in land degradation by evaluating changes in soil quality, vegetation cover, water resources, and overall ecosystem health.
- To establish baseline data and create a reference framework that supports monitoring and evaluation of restoration and sustainable management interventions over time.
- To evaluate how degradation affects ecosystem services (e.g., productivity, biodiversity, water availability) and the livelihoods dependent on them, thereby supporting risk management and early warning systems.

1.2 Project background

The vegetation cover in the Tana Basin is mainly savanna vegetation. Land use in the Tana Basin includes forest, grassland/rangeland and agricultural use. The basin has a high population density and scattered urban and built-up areas in the upper sections of the basin with the dominant land. The vegetation cover in the Tana Basin consists primarily of savanna. Land use in the Tana Basin includes forests, grasslands/rangelands, and agricultural practices. The basin has a high population density with scattered urban and developed areas in its upper sections, where the predominant land use is rain-fed agriculture and rangeland.

As of 2019, the population of the Tana Basin was estimated to be 6.96 million, resulting in a population density of 55 persons per square kilometre. Most residents live in rural settlements, with about 22% currently located in urban areas.

This study focuses mainly on Tharaka Nithi, Embu, and Kitui counties in the central Tana Basin. The population of the Tana Basin in 2019 was estimated as 6.96 million, equivalent to a population density of 55 persons/ km². Most of the population in resides in rural settlements, with about 22% of the population currently located in urban areas.

This study concentrated mainly on Tharaka Nithi, Embu and Kitui counties in the middle Tana Basin.

The Tana Basin is a dynamic landscape that supports a wide range of land uses, including large-scale farming, irrigation, pastoralism, mining (especially sand and quarrying), fishing, forestry, hydropower generation, conservation, recreation, and water supply. However, these activities also place significant pressures on the basin's resources. Inappropriate land use practices—such as the overutilization of water, conversion of natural areas to intensive agriculture and settlements, and overstocking of livestock—coupled with the loss of catchment forests, have led to reduced water levels and increased land subdivision and fragmentation.

This complex interplay of land use and environmental pressures underscores the urgent need for integrated management strategies to ensure the sustainable development and ecological health of the Tana Basin. Land degradation in Tana Basin is primarily characterized by significant soil erosion, primarily caused by unsustainable agricultural practices like deforestation, overgrazing, and improper land cultivation, leading to reduced soil fertility, sedimentation in the Tana River, and impacting water quality downstream; this is further exacerbated by changing weather patterns and population pressure in the region.

The Middle Tana Catchment lies at an altitude below 1300 m to about 500 m. The region is semi-arid to arid. It extends over the Tharaka, Kitui, Mwingi and parts of Yatta. Because of the low rainfall and absence of permanent rivers, the region is a low potential area. It is, nevertheless, used intensively for agropastoralism (livestock & agriculture), and tree harvesting mainly for charcoal - without sustainable management of resources by way of land management, controlled grazing, managed forestry or high intensity water harvesting. In some areas water quality is an issue because of quarrying, sand harvesting and chemical wastes from farms. Towns and settlements in these zones are sources of pollution due to lack of functional sewerage systems. There are pockets in these zones with excessive fluorides, irons, manganese among others, in groundwater.

Notable issues within Middle Tana Basin region include:

- Water scarcity – rainfall ranging between 400 m to 700 m;
- Unevenly distributed groundwater and seasonal variation of shallow groundwater levels, for instance in Kitui county;
- Salinity of groundwater in several areas;
- Uncontrolled sand mining – reducing the buffering and water storage capacity of the ephemeral and seasonal streams in the area;
- Sedimentation in reservoirs and river beds;
- No protection of natural trees stands – leading to removal of trees and no regeneration;
- Poor management of grazing areas resulting in depletion of palatable grass and leading to dominance of woody plant species ;
- Invasion of alien species – especially *Prosopis juliflora*. Though the species has economic value, it tends to suffocate the area, smothering native species and the undergrowth.

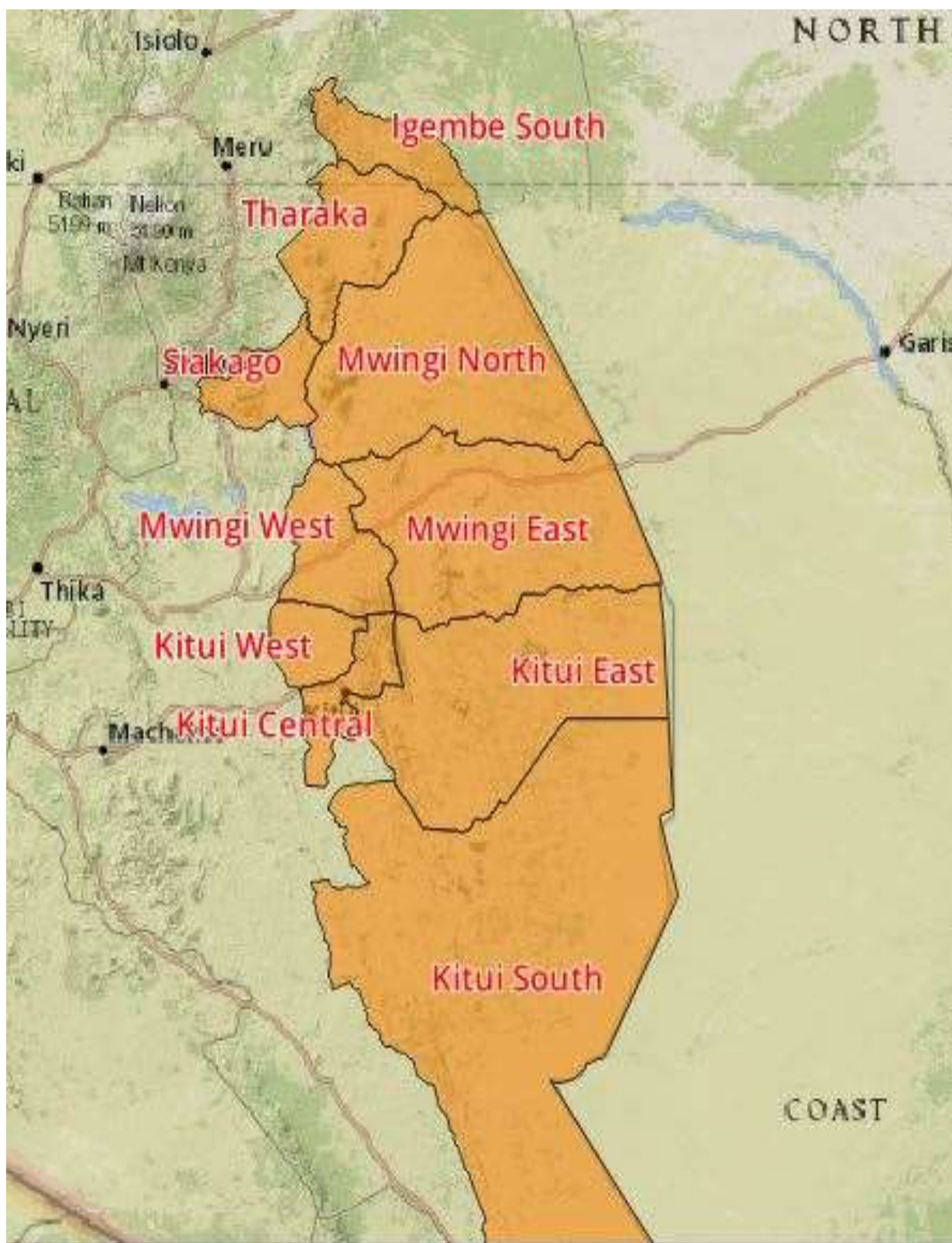


Fig 1 Middle Tana Basin administrative Map

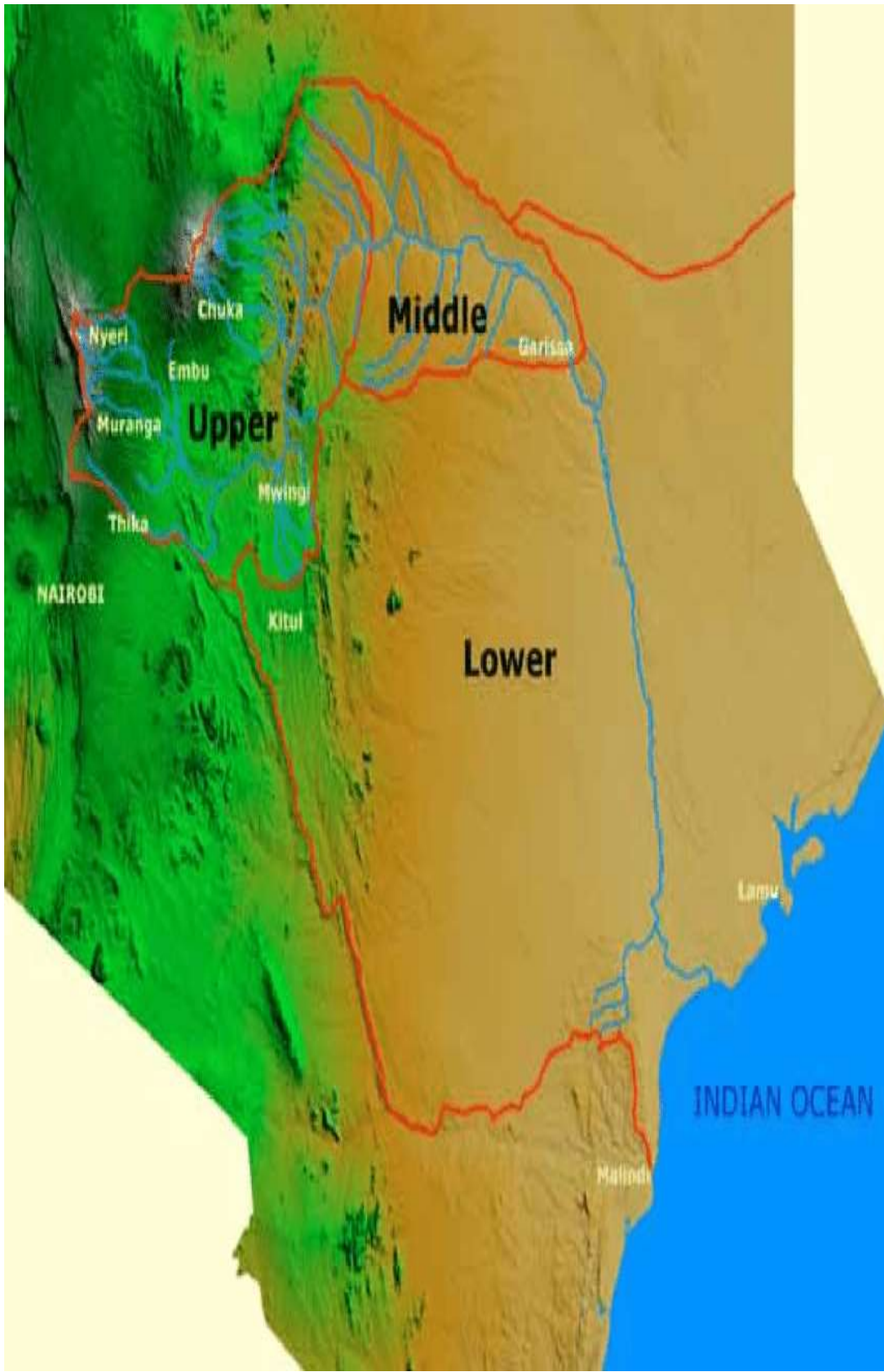


Fig 2 Middle Tana Basin Topography

1.3 Objectives of the exercise including scope

In 2014, a national Land Degradation Assessment (LADA) recommended conducting more detailed, basin-based studies to evaluate land health. In response, various teams carried out ground-truthing in key hotspots in Talek and Middle Tana Basin.

The areas of assessment in Middle Tana were mainly in Kitui, Tharaka Nithi and Embu Counties. The specific areas were in Kyuso Sub-County, Tseikuru Ward and some parts of Tharaka and Embu Counties that borders Mwingi North Constituency. Locations in Mwingi Central and Mwingi East included Waita, Nguni, Kiomo/Kyethani, Kivou, Central, Mui, and Nuu Sub-County. For purposes of this study, additional sub county of Mwingi West was brought on board and its wards are Migwani, Nguutani, Kyome/Thaana and Kiomo/Kyethani and in Kitui South, Specific locations were; Yavwia, Kivyuni, Kenze, Itumba, Mutalani, Kyanguluu and Malungu.

The primary objectives of this exercise were as follows:

- To validate and update the 2014 national LADA report through systematic field verification in the Middle Tana Catchment while identifying the primary drivers of land degradation.
- To quantify and characterize the current extent and severity of land degradation in the Middle Tana Catchment.
- To develop and recommend targeted mitigation strategies, including actionable opportunities for their implementation.

2.0 METHODOLOGY

2.1 Hot Spot Identification

The identification of hot spots in the Middle Tana was initially informed by the National Assessment of Degraded Lands (LADA, 2014), undertaken by the Ministry responsible for Land Reclamation with assistance from Regional Centre for Mapping of Resources for Development. The report revealed land degradation extent and severity, types and possible causes, specific and general hotspots predisposed to degradation in Kenya among other things. In the analyses of the report findings, the broad areas of Embu, Tharaka Nithi, Mwingi and Kitui were identified as the major hotspots amongst others.

In undertaking this study, further desktop reviews were done using satellite images to establish specific areas in the sub basin which were severely degraded. This coupled with further fields visits and guided by the degradation maps identified the following areas; Yawwia, Kivyuni, Kenze, Itumba, Mutalani, Kyanguluu and Malungu in Kitui South; outskirts of Mwingi town, Mui region, Kamuongo in Mwingi Central and Kiomo in Mwingi West; Kyuso and Tseikuru in Mwingi North; Tharaka South in Tharaka Nithi County and Mbeere South in Embu County.

2.2 Area scope

Further assessment was carried out in the Middle Tana Basin, consisting of sections of Kitui, Garissa and Tana River counties. The specific areas of interest were Kitui South (6,147km²), Kitui East (5,133km²), Kitui Central (668km²), Mwingi Central (4,109 km²), Mwingi West (1,090Km²), Mwingi North (3,881km²), Tharaka Nthi South (727.5Km²), and Mbere South (1,321Km²) constituencies where initial assessments indicated, the areas are prone to land degradation mainly associated with human activities and climate change leading to ecosystem changes and biodiversity losses.

2.3 Physical observation

Three (3) teams from the Department of Land Reclamation and Climate Resilience were constituted to conduct further Land Degradation Assessment in Middle Tana sub basin.

The assessment employed a multi-disciplinary approach such as field surveys and Participatory approaches. The participatory Approach involved various stakeholders (Farmers, local administration, County Officers) who were interviewed in order to gather information on livelihood activities and key factors causing land degradation in the proposed areas of interest.

Field Surveys, involved conducting on site observations, to assess the severity, land cover changes, identify specific drivers and agents of degradation in Middle Tana Sub Basin.

3.0 FINDINGS

3.1 Findings in various data categories

3.1.1 General introduction to the specific area

The Middle Tana Catchment is a semi-arid to arid region with altitude in the range of 500m to 1300m. The region covers Tharaka, Kitui, Mwingi and parts of Yatta. The Middle Tana Catchment consists mainly of seasonal rivers that dry up during the dry season. The region is characterized by water scarcity due to long periods of drought and short rainy seasons. The absence of permanent rivers makes the Middle Tana Catchment a low potential area. The region experiences low annual rainfall ranging from 400mm to 700mm. The region consists mainly of gently sloping and scattered low-lying hills. The dominant soil type is sandy loam. The land is mainly used for agropastoralism with livestock keeping and subsistent agriculture being the dominant economic practices. Uneven distribution of groundwater is notable with seasonal fluctuation in shallow groundwater levels. Sand harvesting is a common practice encouraged by extensive deposition of silt on seasonal river beds. Sedimentation in river channels is common reducing the average depth of rivers in some areas and thus causing flooding. In some parts of the region, groundwater is saline.

The findings at various sites are summarised in Table 1. The detailed findings are annexed to this report categorised as Kitui south, Kitui central and Kitui North, as indicated in Fig 3

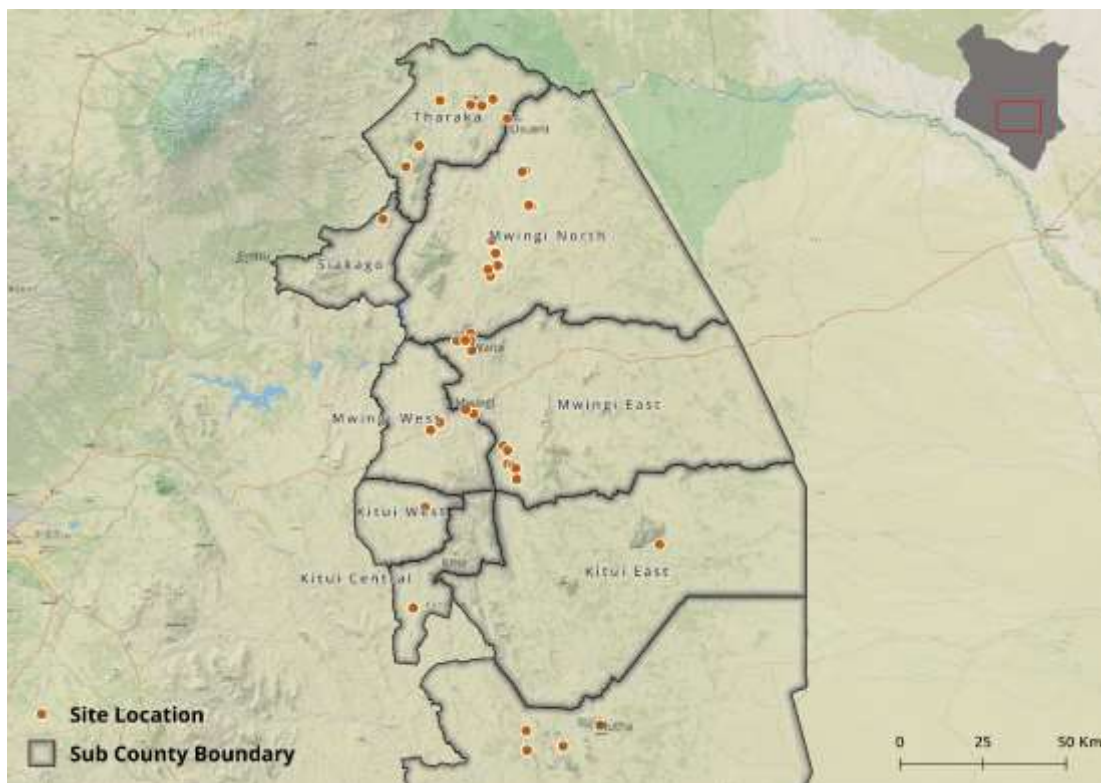


Figure 3 Middle Tana Site map

3.1.2 Data for the specific area

TABLE 1: Findings for specific areas assessed

No	Name	Location	Brief description	Main Livelihoods	Major Degradation Types and Drivers	Appropriate intervention
1	Mugoo river	Kitui County Mwingi North constituency Kyuso Sub- County	The area is inside the river and shallow well have been dug causing deterioration of water quality.	Agro pastrolism, Charcoal burning	Soil erosion, sedimentation, sand harvesting	Construction of sand dam, shallow, riverbank protection, sustainable sand harvesting practices, sustainable tree harvesting, protect the river from extended human settlement, alternative means of livelihood(beekeeping)
2	Mikwa village	Kyuso Sub- County	Bareland with scattered trees and shrubs	agropastoral	Soil erosion, overgrazing	Terracing, proper disposal of run-off water, check dams, ecosystem water retention
3	Ketwenya village	Kyuso sub county	The area is highly degraded with scattered natural vegetation.	Agropastoral	Soil erosion, overgrazing	Construction of farm ponds, sustainable land use management, selective tree harvesting
4	Maseki area Nzangathini village	Kyuso sub county	Very high levels of degradation with scattered shrubs and bare ground.	Agro pastoral, small business	Soil erosion, deforestation, poor agricultural practices, mining	Re-afforestation, sustainable agricultural practices, construction of water pans, community sand dams, household ponds, capacity building, terracing and tree planting

5	Maseki village (stream)	Kyuso sub county	Gullies were present with minimal plant litter and scattered shrubs. loss of soil cover and impassable fiddler roads	Agro pastoral	Soil erosion, Soil erosion, overgrazing, poor agriculture practice, mining and construction	Construction of sand dams, water pans and farm ponds, Riverbank protection Terracing
6	Kimo village	Kyuso sub county	Very sparse tree population Densely stoniness with disappearing grasses	Agro pastoral	overgrazing, mining and construction, poor agriculture practices	Construction of sand dams and earth dams Boreholes Tree planting Water harvesting for irrigation
7	Kaliani kwa kamakya Primary-Kaliani village	Kyuso sub county	Big gullies and sparse tree population	Agro pastoral	Soil erosion (Gullies), poor agriculture practice, overgrazing	Construction of check dams, cut off drain, gully control and sand dams
8	Manzuva area Mivukoni village	Kyuso sub county	The area has disbursed settlement, sparse tree population, and bare ground.	Agro pastoral	Soil erosion, overgrazing, runoff water	Construction of earth dams, terracing, fruit trees, boreholes and sand dams
9	Kathima area Mivukoni village	Kyuso sub county	Very sparse tree population, bare land	Agro pastoral	overgrazing, poor agriculture practices, gullies and rills	Construction of sand dams, earth dams and boreholes
10	Ngalange Village	Kitui County Mwingi North constituency Tseikuru Ward	The area is near the market and has dense prosopis julifrola (Mathenge).has Very sparse tree population and Bare land	Agro pastoral, Small business	Overgrazing, gullies and rills	Sensitization and awareness Gully control Controlled grazing. terracing
11	Itaa village (Kwamomba dam)	Nzitu sub location	Area near the dam has sparse vegetation and dense Mathenge. The water	Agro pastoral	Soil erosion, sedimentation, contamination of water	Desilting Solarization Fencing

			in the dam has high sediment level and algae.		by livestock, presence of algae	
12	Osweni (Near market)	Tharaka Nithi County Tharaka South Sub -County	Very sparse tree population, Bare land and presence of gullies	Agro pastoral	Runoff water, poor agriculture practice, overgrazing	Sustainable agriculture practices Land use management. Tree planting
13	Khangachini 1	Tharaka South Sub -County	Presence of gullies, rills, bare areas and poor vegetation condition	Agro pastoral	Runoff water, poor agriculture practice, overgrazing	Sustainable agriculture practices, tree planting
14	Khangachini 2	Tharaka South Sub -County	The area is gently sloping with normal vegetation health but there is presence of many big rocks.	Farming, pastoralism	Soil erosion , poor agricultural practices	Tree planting Sustainable land use management
15	Khangachini 3	Tharaka South Sub -County	Area if a farmland with exposed patches of bare land with rills.	Agriculture, Tree harvesting	Soil erosion, poor agricultural practices	Tree planting Sustainable agriculture practices
16	Marimanti-Gatunga	Tharaka South Sub -County	Cropped land with evidence of degradation, the surrounding area has normal vegetation health	Agriculture, Tree harvesting	Sheet erosion, run off, deforestation, poor agricultural practices	Tree planting, Sustainable land use management, Sustainable agricultural practices
17	Marimanti - Chiakariga	Tharaka South Sub -County	Cropped land with poor crops conditions.	Agriculture	Soil erosion (rills), poor agricultural practices	Tree planting, Sustainable land use management, Sustainable agriculture practices
18	Marimanti-Chiakariga	Tharaka South Sub -County	Medium levels of degradation with poor crop health and evidence of soil erosion (Reels)	Agriculture	Soil erosion (rills), poor agricultural practices	Tree planting, Sustainable land use management,

19	Kianjeru	Embu County Mbeere South	The area has evidence of degradation by water and rills are present, the cropped land is greatly affected and most of the crops have dried.	Agriculture	Soil erosion , run off water, poor agricultural practices	Terracing, Sustainable agricultural practices
20	Yavwia Area	Mutha location Ngaani sub-location Yavwia village	Bare land with extended rocky nature Shrubland	Agro pastoralism	Gulleys due to runoff water	Constructing check dams, terraces, and a water pan,
21	Kivyuni Secondary School	Mathima location Kivyuni sub location Kaangungi village	Field observations highlight bare land with rocky terrain, sparse trees, and declining soil nutrients	Farming Charcoal Burning Agro Pastoralism	Soil erosion runoff	construction of a water pan on government land, leveraging available natural
22	Kenze Area	Mutomo location Mwala sub location Kenze village	Vegetation is mainly seasonal shrubland with natural species. Land cover includes seasonal/perennial shrubland with sparse human settlements, but severe soil degradation has led to extensive bare, rocky land with poor soil nutrients	Agro pastoralism	Soil Erosion Gulleys	constructing gabions to stabilize gulleys and implementing soil conservation structures upstream
23	Itumba Area	Kibwea location Kaweru sub location Itumba village	The area is characterized by highly degraded red, sandy soil, primarily due to runoff-induced gulley erosion, with sparse human settlement and bare, rocky terrain exhibiting poor soil nutrients. The terrain consists of steep slopes with long slope lengths	Agro pastoralism	Soil Erosion Gulleys Runoff	The construction of a rock catchment is proposed

24	Mutalani Area	Endau location Katumbi sub location Mutalani village	The terrain consists of gentle, long slopes supporting sparse human settlement and seasonal shrubland with normal health and natural vegetation. Land use is primarily shrubland with scattered seasonal/perennial crops.	Agro pastoralism	Gulleys Soil Erosion Runoff Poor agriculture practices.	Construction of water harvesting pans and feedlots.
25	Kyangulu Area	Wii location Wii sub location Kyangulu village	The terrain consists of gentle, short slopes supporting moderate human settlement and seasonal shrubland with normal vegetation health. Land cover includes scattered trees, seasonal/perennial crops, and bare areas	Agro pastoralism	Soil Erosion Gulleys Runoff	Constructing gabions to stabilize gulleys
26	Malungu Area	Itoleka location Kangooni sub location Malungu village	The terrain consists of gentle, short slopes supporting sparse human settlement and seasonal shrubland with normal vegetation health. Land use comprises scattered trees and seasonal/perennial crops within a grassland environment	Agro pastoralism	Soil Erosion Poor agriculture practices Runoff.	Construction of terraces
27	Kanguu -Kitinga	Kitui County, Mwingi Sub-County, Kanguu location		Agriculture (maize farming, cattle rearing)	Gully formation Soil erosion Surface run-off	Gabbions, tree planting; cut-off drains; check dams

28	Katiliku Drift	Kitui County, Mwingi Sub-County, Ngoo location		Agriculture	Sheet erosion, loss of top soil due to river erosion.	River training; cut-off drains; check dams; underground recharge
29	Ngoo ya Kati	Kitui County, Mwingi Sub-County, Ngoo location		Agriculture	Gulleys	Catchment management, rehabilitation of river
30	Ellekya River Drift	Kitui County, Mwingi Sub-County, Ngoo location		farming (seasonal crops) and grazing livestock	Sheet erosion Flooding and encroachment of river valley Soil erosion in the upstream	Community irrigation scheme, sand dam/weir (intake)
31	Kauai Village	Kitui County, Mwingi Sub-County, Ngoo location		Agriculture	Soil erosion, deposition of sediments in the river bed	Community water pan, river training
32	Ellekya River	Kitui County, Mwingi Sub-County, Ngoo location		Agriculture	Gulley, Deposition of silt on river bed	Gabion, check dams and reseeding with grass seeds
33	Kathonzweni-Simitini	Kitui County, Mwingi Sub-County, Mui location		Agriculture (maize farming) and quarrying	Rills	Rehabilitation of quarry
34	Mwingi Town outskirts	Kitui County, Mwingi Sub-County, Mwingi Town		Agriculture (livestock keeping-cows, goats)	Gulleys, rills	Cut-off drains; gabions; check dams, terracing; river training
35	Waita market outskirts	Kitui County, Mwingi Sub-County, Waita sub-location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, rills	Check dams; planting trees
36	Kamwongo Market Outskirts	Kitui County, Mwingi Sub-county, Mwambui location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, rills	Check dams; planting trees

37	Kisole Earth Dam	Kitui County, Mwingi Sub-county, Mwambui location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, rills	Check dams; planting trees
38	Mwambui Asst. Chief's Office	Kitui County, Mwingi Sub-county, Mwambui location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, rills	Check dams; planting trees
39	Kisole market outskirts	Kitui County, Mwingi Sub-county, Mwambui location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, rills	Check dams; planting trees
40	Mbondoni	Kitui County, Mwingi Sub-county, Mbondoni location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, rills	Check dams; planting trees
41	Mbondoni GEBC Church	Kitui County, Mwingi Sub-county, Mbondoni location		Agriculture (Maize farming, cattle and goat keeping)	Gulleys, Rills	Check dams; planting trees

3.1.3 Analysis of the findings per area based on criteria

Land degradation in the middle Tana catchment has far reaching impacts affecting not only the environment but also human livelihoods, economy, and global systems. It undermines the ability of the land to support life, threatens food security, exacerbates climate change. Key findings include:

1. Water Scarcity and Water Quality Deterioration

The Middle Tana Catchment experiences rainfall ranging between 400 mm to 700 mm, which is relatively low and unevenly distributed. Increased water abstraction for irrigation, domestic use, and livestock watering has led to seasonal water shortages. Pollution from agricultural runoff, including fertilizers and pesticides from upstream farms, contributes to water quality deterioration. High evaporation rates and reduced groundwater recharge further exacerbate water scarcity in the region.

2. Uncontrolled Sand Mining

Excessive sand harvesting from riverbeds and seasonal streams is depleting sediment deposits, reducing the buffering and water storage capacity of ephemeral and seasonal streams. This practice increases riverbank erosion, altering the natural hydrology and affecting aquatic habitats. Loss of sand also disrupts groundwater recharge, leading to declining water table levels.

3. Soil Erosion

Overgrazing, deforestation, and poor land-use practices expose soils to wind and water erosion. Steep slopes and fragile soils in some areas accelerate soil loss, reducing land productivity. The removal of vegetation cover reduces infiltration, leading to more surface runoff and further land degradation.

4. Sedimentation in Reservoirs and Riverbeds

Increased soil erosion contributes to high sediment loads in the Tana River and its tributaries. Siltation in reservoirs reduces the storage capacity of critical water infrastructure, affecting hydroelectric power generation and water supply. Sedimentation in riverbeds alters water flow patterns, leading to changes in the river, seasonal flooding, and habitat degradation.

5. Poor Management of Grazing Areas and Overstocking

Overgrazing and lack of controlled grazing systems have led to the depletion of palatable grasses. This has resulted in the spread of unpalatable woody plant species, reducing the productivity of rangelands. Overstocking increases competition for resources, leading to land degradation and desertification in some areas.

6. Invasion of Alien Species – *Prosopis juliflora*

Prosopis juliflora (Mathenge), an invasive species, is rapidly spreading in the catchment area. While it has economic benefits (charcoal production, fodder, and erosion control), it outcompetes native vegetation and reduces biodiversity. Its aggressive growth reduces pasture availability, negatively impacting livestock grazing patterns.

7. Deforestation Due to Charcoal Burning and Timber Production

The demand for charcoal and firewood has led to extensive logging, reducing forest cover. Deforestation contributes to reduced rainfall infiltration, increased runoff, and higher erosion rates. Loss of trees also disrupts microclimates and threatens biodiversity.

3.1.4 Summary of findings

The Middle Tana Catchment is experiencing significant land degradation due to unsustainable resource use and poor land management practices. Addressing these issues requires integrated watershed management, enforcement of land-use policies, promotion of sustainable agricultural practices, and community-based conservation efforts.

3.1.5 Identification of possible interventions

In addressing the land degradation in the middle Tana, it requires many approaches which includes the following:

Vegetation restoration:

- Afforestation and reforestation: Planting trees in degraded areas to increase vegetation cover and stabilize soil especially areas affected by charcoal burning.
- Agroforestry: Integrating trees with crops to improve soil fertility and provide windbreaks.
- Grazing management: Controlling livestock grazing to prevent overgrazing and allow vegetation to recover.

Soil conservation:

- Contour farming: Planting crops along the contour lines to slow down water runoff and erosion.
- Terracing: Creating step-like structures on slopes to minimize erosion especially at the steep slope area.
- Mulching: Covering the soil surface with organic material to protect it from erosion and improve moisture retention.

Water management:

- Rainwater harvesting: Collecting rainwater to irrigate crops during dry periods by use of water harvesting technologies such as construction of water pans, trapezoidal bunds, rock catchment etc.
- Irrigation practices: Implementing efficient irrigation systems to minimize water waste eg drip irrigations.

Land use planning:

- Protected areas: Establishing protected areas to preserve sensitive ecosystems.
- Land zoning: Designating areas for specific land uses based on their environmental capacity.

Community engagement:

- Participatory decision-making: Involving local communities in land management planning.
- Capacity building: Providing training and education on sustainable land practices to the affected community.

3.1.6 Degradation in Tana Basin

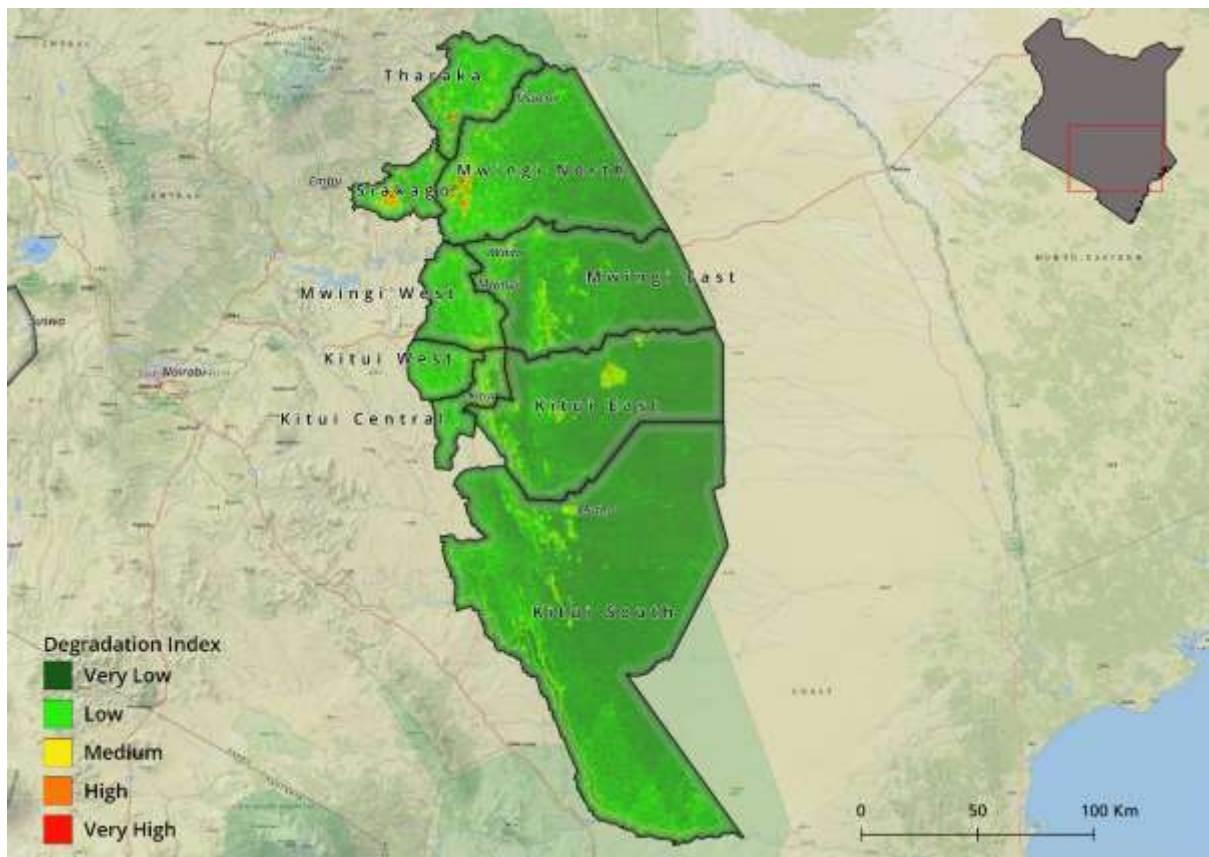


Fig Degradation Map

4.0 CONCLUSIONS AND RECOMMENDATIONS

From the field observation, Mwingi central area has been degraded over extensive tracts by anthropogenic activities such as overexploitation of local wood stands, uncontrolled livestock grazing, and farming 'on the slope'. This has caused serious soil erosion problems which is prominent in the hills, the high-altitude area with huge deposition of silt and sand downstream in low lying area. This has led to flooding phenomena of rivers with some of them changing their main course as noted with Katiliku, Ileyka and Enziu in Mui basin. It even aggravated further by quarrying operations – in particular sand and gravel mining from riverbeds. In addition, water pollution is generated from the urban centers and livestock farmyards. The use of agrochemicals on cultivated farmland may also be generating diffuse water pollution in some parts of the sub basin. The sub catchment presents a considerable challenge on water availability, land productivity, terrestrial and riparian ecosystems in general.

The team hold several opportunities that need to be explored. The main strategies are:

- Small-scale improvements in groundwater recharge and retention along all alluvial tracts and in river beds, through sand dams, subsurface dams and regulated sand and gravel harvesting coupled with the use of shallow wells for livestock watering and small patches of irrigated cultivation.
- Taking every opportunity for soil treatment to improve moisture retention in cultivated soils and secure better rainy-season crops, the use of compost and different types of mulching on the land, and the widespread application of sustainable land management (SLM) such as terracing and bunding, especially on sandy-loamy soils.
- Developing opportunities for small-scale surface water storage in the arid landscape, ranging from roof top water harvesting to rock outcrops and systematic water harvesting from roads.
- Making use of the short-duration floods running down the hill side through flood water spreading and spate irrigation for farming, range land improvement, soil regeneration, and local recharge to enhance food security.
- Improved management of grazing areas – for instance through controlled holistic grazing, whereby livestock is moved around from area to area, allowing each area to be utilized briefly and intensely. Holistic grazing stimulates the regeneration of all biomass and enables better infiltration of water as the soil crusts are broken by the hooves of grazing livestock.
- Working on protecting and developing useful wood stands suitable for arid conditions, so as to cater for the enormous market for charcoal amongst others. This would also help to build a better ecosystem and improve soil fertility. This strategy includes the control and manage conversion of invasive species – especially *Prosopis juliflora*.

ANNEXES

Annex 1 Data capture Tool.

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	
Location: Geographic (Lat/Long, Altitude)	
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	
Suggested mitigation measures and their viability	
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

Annex 2 – Data sheets Mwingi North

In Mwingi north the study covered Kyuso Sub-County, Tseikuru ward, Tharaka south subcounty and Mbeere south sub county. The Sub counties have the following characteristics;

Kyuso is a town and a Sub-County located in Mwingi North Constituency. It is situated in the semi-arid region of Kitui County, with a landscape characterized by plains and scattered hills. The town is strategically positioned near the confluence of several rivers, including the Nziu river which flows through the area. The population of Kyuso is 76,867 and its area is 2,525 square kilometres.

Tseikuru Ward is one of the five administrative wards within Mwingi North Constituency a significant town and ward located in the northern most part of the Ukambani region. It holds a prominent position within the constituency, encompassing a range of aspects. Its distinct geographical features and diverse demographics contribute to its character and challenges. It is characterized by undulating plains and hills. The population of Tseikuru is approximately 40,871, it covers an area of 1356 square kilometres, with 8579 households according to 2019 census.

Tharaka South sub-county is one of the six administrative sub-counties in Tharaka Nithi County, Kenya. It is located in the southern part of the county, bordering Kitui and Meru counties. It covers an area of 727.5 square kilometres. The river Tana, flowing through the Sub-County forms a significant boundary between Tharaka Nithi and Kitui counties. The population of Tharaka South is estimated to be 75,250.

Mbeere South is located in the southern part of Embu County, bordering Kitui County. The area is characterized by a mix of rolling hills, valleys and rocky terrain. The river Tana forms a boundary between Mbeere South and Kitui County. It has a semi-arid climate, characterized by distinct wet and dry seasons. It has a population of 149,151.

Table 1 Field observation notes for site 1

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Jane Wayua (Field extension officer)
Site Number: Photo numbers:	1 3
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mikwa Area Mugoo river (river bed)

Location: Geographic (Lat/Long, Altitude)	Lat -0.5462 Long 38.16934 Altitude 862m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Very high Sand Gulley Loss of organic matter(high on river bed)
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle flat
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Seasonal/perennial Wetland, bare areas Shallow wells, charcoal burning on the river bank
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion, Sedimentation, Physical structural disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, mining and construction
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature

Suggested mitigation measures and their viability	Construction of sand dams and shallow wells River bank protection
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Water resources to be protected and developed Sustainable sand harvesting practices Sustainable tree harvesting Protect the river from extended human settlement.



Figure 1 Photos from Mugoo River field observation

Table 2 Field observation notes for site 2

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Jane Wayua (Field extension officer)
Site Number: Photo numbers:	2 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mikwa area Mikwa Village
Location: Geographic (Lat/Long, Altitude)	Lat -0.54532 Long 38.16287 Altitude 878m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High Clay Gulley Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Very poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Dispersed settlement Goats, cows, donkeys Agro pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, seasonal/perennial Shrub land bare areas

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population
Suggested mitigation measures and their viability	Water retention terraces Proper disposal of runoff water Check dams and water harvesting
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Sustainable water harvesting methods Sustainable tree harvesting



Figure 2 Photo from Mikwa Village field observation

Table 3 Field observation notes for site 3

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Jane Wayua (Field extension officer)
Site Number: Photo numbers:	3 2
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Ketwenye Village
Location: Geographic (Lat/Long, Altitude)	Lat -0.51218 Long 38.15738 Altitude 851m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Very high Clay Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2m
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial/ seasonal woodland bare land Very poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Scattered population with 10 homesteads Cows, goats Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management	Scattered, seasonal perennial Shrub land

Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion Physical structural disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, over grazing
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population
Suggested mitigation measures and their viability	Construction of farm ponds, terracing, selective tree harvesting
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Farm pond construction Sustainable agriculture practices Sustainable land use management



Figure 3 Photos from Kitwenye Village field Observation

Table 4 Field observation notes for site 4

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Catherine Kilonzi (Chief)
Site Number: Photo numbers:	4 2
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Maseki area Nzangathini village
Location: Geographic (Lat/Long, Altitude)	Lat -0.47992 Long 38.14141 Altitude 771m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Very high Clay Gulley, reel Loss of organic(severe)
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Steep slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Very long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland Very poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparse population 10 homesteads 2-5 cows 10-20 goats 1 donkey per household Agro-pastoral Farming/small business

Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, seasonal/perennial Shrub land, bare areas Loss of ground cover
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water Deforestation Overgrazing Poor agriculture practices Mining and construction
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population Densely stoniness with disappearing grasses
Suggested mitigation measures and their viability	Water pans Tree planting Terracing in private land Capacity building
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Water pans for water harvesting Re-afforestation Sustainable agriculture practices Household farm pans/ponds Community sand dams



Figure 4 Photos from Nzangathini Village- Maseki Area filed observation

Table 5 Field observation notes for site 5

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Catherine Kilonzi (Chief
Site Number: Photo numbers:	5 3
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Maseki area Maseki village (stream)
Location: Geographic (Lat/Long, Altitude)	Lat -0.47688 Long 38.14683 Altitude 793m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Very high Clay Gulley, reel Loss of organic layer (severe)
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Steep slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Very long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	60 homesteads 2-5cows, 10-20goats, 1 donkey per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, seasonal/perennial Shrub land bare areas Loss of soil cover/widening gully’s

	Impassable feeder roads
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion Physical structural disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing, poor agriculture practice, mining and construction
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population, densely stoniness with disappearing grasses
Suggested mitigation measures and their viability	Construction of sand dams, water pans and farm ponds, River bank protection Terracing
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Sustainable water harvesting practices Sustainable agriculture practices



Figure 5 Photos from Maseki Village field observation

Table 6 Field observation notes for site 6

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Dominic Kiteme (Village admin)
Site Number: Photo numbers:	6 3
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kimo village
Location: Geographic (Lat/Long, Altitude)	Lat -0.57364 Long 38.14267 Altitude 919m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	High Sand, loam Gulley, reel Loss of organic layer (severe)
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparsely populated 1 to 3 homesteads 3cows,25goats,2sheeps,3donkeys per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc.	Scattered, seasonal/perennial Shrub land, bare areas

Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Loss off soil cover/vegetation cover
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion, physical structural disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing, mining and construction, poor agriculture practices
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population Densely stoniness with disappearing grasses
Suggested mitigation measures and their viability	Construction of sand dams and earth dams Boreholes Tree planting Water harvesting for irrigation
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Land use management Protect seasonal streams Manpower



Figure 6 Photos from Kimo Village field observation

Table 7 Field observation notes for site 7

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Dominic Kiteme (Village admin
Site Number: Photo numbers:	7 2
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kaliani kwa kamakya Primary- Kaliani village
Location: Geographic (Lat/Long, Altitude)	Lat -0.5558 Long 38.1366 Altitude 893m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gully, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Very high Clay Gully, reel Loss of organic layer (severe)
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	3cows,20goats,3sheeps, 3 donkeys per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, seasonal/perennial Shrub land, bare areas

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion, physical structural disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practice, overgrazing
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population
Suggested mitigation measures and their viability	Construction of gulley's, check dams, cut off drain, gulley control and sand dams
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Man power



Figure 7 Photos from Kaliani kwa Kamakya Primary- Kaliani Village field observation

Table 8 Field observation notes for site 8

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Stephen Wambua (Village admin
Site Number: Photo numbers:	8 6
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Manzuva area Mivukoni village
Location: Geographic (Lat/Long, Altitude)	Lat -0.38426 Long 38.25382 Altitude 721m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High to very high Sand, clay Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type: Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Dispersed settlement 200 homesteads 0-5cows,5-100goats,2-20sheeps,1-5donkeys per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, seasonal perennial Bare areas, shrub land

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing, poor agriculture practice
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population
Suggested mitigation measures and their viability	Construction of earth dams, terracing, fruit trees, boreholes and sand dams
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Land use management Labor Solar energy



Figure 8 Photos from Manzuvu area – Mivukoni Village field observation

Table 9 Field observation notes for site 9

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Kyuso Sub-county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Stephen Wambua (Village admin
Site Number: Photo numbers:	9 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kathima area Mivukoni village
Location: Geographic (Lat/Long, Altitude)	Lat -0.38239 Long 38.24699 Altitude 702m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High to very high Clay Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	142.2mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Very long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Dispersed settlement 200 homesteads 0-5cows,5-100goats,2-20sheeps,1-5donkeys per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land,	Scattered, seasonal/perennial

seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Shrub land, bare areas
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing, poor agriculture practices.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population, bare land
Suggested mitigation measures and their viability	Construction of sand dams, earth dams and boreholes
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Land use management Labor



Figure 9 Photo from Kathima area- Mivukoni Village field observation

Table 10 Field observation notes for site 10

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Tseikuru Ward
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Titus Mutui (Chief)
Site Number: Photo numbers:	10 4
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Ngalange Village
Location: Geographic (Lat/Long, Altitude)	Lat -0.28802 Long 38.23716 Altitude 632m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High to very high Clay, loam Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope Steep slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Very long
Vegetation (Type: Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land Poor Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	30 homestead 5-10cows, 10-100goats, 10-50sheeps,2-10 goats per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type:	Scattered, seasonal/perennial Bare areas, shrub land

Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Loss of vegetation and soil cover
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population Bare land
Suggested mitigation measures and their viability	Sensitization and awareness Gully control Controlled grazing
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Construction of sand dams, boreholes, solar energy. Terracing



Figure 10 Photos from Ngalange Village field observation

Table 11 Field observation notes for site 11

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County Mwingi North constituency Tseikuru Ward
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Titus Mutui (Chief
Site Number: Photo numbers:	11 2
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Itaa village Nzitu sub location (Kwamomba dam)
Location: Geographic (Lat/Long, Altitude)	Lat -0.29186 Long 38.22851 Altitude 604m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High Sand, loam Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land, water condition Poor but around the dam good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	80 homesteads 10-100cows, 10-100goats,10-50sheeps,2-10donkeys per homestead Agro-pastoral
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management	Scattered, seasonal/perennial, aquatic Shrub land, wetland, bare areas Water degradation

Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion, sedimentation, biological
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, overgrazing, mining and construction, poor agriculture practice.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population, reducing soil nutrient composition
Suggested mitigation measures and their viability	Desilting Solarization Fencing
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 11 Photos from Kwamomba dam field observation

Table 12 Field observation notes for site 12

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	12 3
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Osweni (Near market)
Location: Geographic (Lat/Long, Altitude)	Lat -0.14866 Long 38.18878 Altitude 431m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High Clay Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle flat
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland bare land
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type:	Scattered, seasonal/perennial

Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Shrub land, bare areas
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practice, overgrazing
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population Bare land
Suggested mitigation measures and their viability	Sustainable agriculture practices Land use management Tree planting
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 12 Photos from Osweni (near market) field observation

Table 13 Field observation notes for site 13

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	13 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Khangachini
Location: Geographic (Lat/Long, Altitude)	Lat -0.09556 Long 38.15065 Altitude 480m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	High Loam Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle flat
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, Seasonal woodland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	

Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, seasonal perennial Agriculture
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practice
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Reducing soil nutrient composition
Suggested mitigation measures and their viability	Sustainable agriculture practices, tree planting
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 13 Photo from Kathangachini field observation

Table 14 Field observation notes for site 14

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	14 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kathangachini
Location: Geographic (Lat/Long, Altitude)	Lat-0.11396 Long 38.11947 Altitude 581m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Medium to high Loam Gulley Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle flat
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	

Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered, cropped land, seasonal/perennial
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water Poor agricultural practices, deforestation
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Reducing soil nutrient composition Very sparse tree population
Suggested mitigation measures and their viability	Tree planting Sustainable land use management
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 14 Photo from Kathangachini field observation

Table 15 Field observation notes for site 15

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	15 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Khangachini
Location: Geographic (Lat/Long, Altitude)	Lat -0.11121 Long 38.0896 Altitude 640m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Medium to high Loam Gulley, reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle flat
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial seasonal woodland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management	Scattered, seasonal/perennial, cropped land Agriculture

Experienced changes:	Tree harvesting
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practice, deforestation
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Reducing soil nutrient composition Very sparse tree population
Suggested mitigation measures and their viability	Tree planting Sustainable agriculture practices
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 15 Photo from Kathangachini field observation

Table 16 Field observation notes for site 16

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	16 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Marimanti- Gatunga
Location: Geographic (Lat/Long, Altitude)	Lat -0.09955 Long 38.00729 Altitude 595m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Medium to high Loam Reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle flat
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management	Scattered, cropped land, seasonal/perennial m Agriculture, forest Tree harvesting

Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practices, deforestation
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Reducing soil composition, very sparse tree population
Suggested mitigation measures and their viability	Tree planting Sustainable land use management Sustainable agricultural practices
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 16 Photo from Gatunga field observation

Table 17 Field observation notes for site 17

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	17 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Marimanti -Chiakariga
Location: Geographic (La/Long, Altitude)	Lat -0.22153 Long 37.9501 Altitude 558m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Medium to high Clay, loam Reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope to steep slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium to long Slope part of the hill
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal woodland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Cropped land, seasonal/perennial Agriculture

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practices, deforestation
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population, reducing soil nutrient composition
Suggested mitigation measures and their viability	Tree planting Sustainable land use management Sustainable agriculture practices
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 17 Photo from Chiakariga field observation

Table 18 Field observation notes for site 18

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Tharaka Nithi County Tharaka South Sub - County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	18 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Marimanti- Chiakariga
Location: Geographic (Lat/Long, Altitude)	Lat -0.27831 Long 37.91454 Altitude 757m 1
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Medium to high Loam Reels Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium to high
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal grassland, woodland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Cropped land, seasonal/perennial

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion Physical structural disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, mining and construction, poor agriculture practices, deforestation
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population, reducing soil nutrient composition
Suggested mitigation measures and their viability	
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 18 Photo from Chiakariga field observation

Table 19 Field observation notes for site 19

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Embu County Mbeere South
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	
Site Number: Photo numbers:	19 1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kianjeru
Location: Geographic (Lat/Long, Altitude)	Lat -0.41973 Long 37.8527 Altitude 786m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Medium to high Loam Reel Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium to long
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Perennial, seasonal grassland, woodland
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Seasonal/ perennial, Agriculture, forest, grassland

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water, poor agriculture practices
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population Reducing soil nutrient composition
Suggested mitigation measures and their viability	Terracing Sustainable agricultural practices
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	



Figure 19 Photo from Kianjeru field observation

Annex 3 Data sheets Mwingi Central

Table 20: Kanguu Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kanguu , Mwingi Central sub county Kitui County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Site: Kanguu Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	01 01
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kanguu
Location: Geographic (Lat/Long, Altitude)	Lat 0°56'43.8" Long 38°5'52.4" E and alt 926m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Medium degradation Sandy loam Gully formation Loss of organic layer
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long, river valley
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Wooded grassland, agriculture (maize farming), cattle bare land
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	120HH per KM2 Location: Kalisasi Livestock 5
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Wooded (acacia) grassland, agriculture, agropastoral

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Low rainfall
Suggested mitigation measures and their viability	Gabions, tree planting, cut off drain and check dams
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Partnering with community, county government institutions (agriculture)

NOTES:

The site was in private land by the road side before Kanguu river as you get to its drift. The area was characterized by brown sandy loam soils while the landscape was defined by long slope length, gentle sloping topography ending into a river. Loss of organic matter from the soils was evident with some ground patches completely bare. The surrounding areas had scattered wooded trees of acacia species, grasses and agriculture crops including maize and Napier grass which were of good health. Human population in the area was estimated to 120HH/km² and livestock populations of 5 per HH.

Surface runoff compounded by presence of steep slope and low infiltration was main source of degradation. Huge gullies were already formed threatening both the road and homestead nearby this site. The site was classified as hot spot and require interventions by installation of gabions on the huge gullies, construction of cutoff drains, check dams on road side water ways and planting tree. The opportunities to utilize for interventions includes partnering with local communities and county government institution such as department of agriculture.



Figure 20: Kanguu with rills and gullies (Lat 0°56'43.8" Long 38°5'52.4" E and alt 926m)

Table 21: Katiliku River Drift Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Katiliku River Crossing near Lundi Mwingi Central, Middle Tana sub basin
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Site: Katiliku Drift Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	02 02
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Ngoo location, Lundi sub location Katiliku River Drift Crossing
Location: Geographic (Lat/Long, Altitude)	Lat 1 ⁰¹ ' 55.3"S, Long 38 ⁰ 10' 40.4"E and Alt 761m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Medium Sandy loam Sheet erosion, loss of top soil due to river erosion. River changes its course to form long gully
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Wooded grassland (acacia trees), agriculture (napier grass) River changed its course due to deposition of sand and flooded neighboring farms.
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	30HH per KM ² (average of 6 persons per HH) Livestock populations of 10 cattle, 25 goats, 5 sheep and 1 donkey per HH.
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management	Wooded grassland Land use type - agriculture

Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water / flash floods especially during rainy season
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Characterized by reducing soil nutrient
Suggested mitigation measures and their viability	River training, check dams
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions (agriculture, water) in county government.

NOTES:

This site was a few meters from the Katiliku river drift in Ngoo location. The river had changed its main course and passed through peoples' parcels of land and caused untold damages. The area had sandy loam soils with characteristic gentle long slope. The general vegetation comprised of riparian wooded grassland mostly of acacia species and agricultural crops such as maize which were in normal health. The is agropastoral area with human populations of 30HH per KM² and over 5 heads of livestock per HH. Apiculture was also a common source of livelihood.

Extensive depositions of silt and sand in the river bed was evident and was the probable cause of river diversion. This is an indication of extensive land degradation taking place in the upstream. The proposed solution to the problem is interventions upstream to control excessive surface runoff by use of terraces, retention ditches, check dams, planting of cover crops and trees. And in the downstream, extraction of sand, river training and opening up off the blocked river courses should be encouraged. These mitigation measures could exploit collaboration with relevant institutions like agriculture and water in county government and local community.



*Figure 21: River changed the course
38° 10' 40.4"E and Alt 761m)*



Figure 22: Katiliku Drift site (Lat 1°1' 55.3"S, Long

Table 22: Ngoo Ya Kati site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Ngoo Kati, Enziu sub catchment Mwingi Central sub county Kitui County
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Site: Ngoo ya Kati Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	03 03
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Ngoo location, Lundi sub location
Location: Geographic (Lat/Long, Altitude)	Lat 1°2'40.4"S Long 38°11'21.9"E alt 748m)
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Very high degradation Loamy clay Gullys Potential hot spot
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long slope length of 200m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Wooded grassland Road turned into river course
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	30HH per km ² Livestock populations of 10 cattle, 25 goats, 5 sheep and 1 donkey per HH.
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Land use type - settlement
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Reducing soil nutrients
Suggested mitigation measures and their viability	Catchment management, rehabilitation of river
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration among institutions county government (water, agriculture)

NOTES:

This site revealed actual degradation caused by flood water after River Katiliku changed its course and some of its water flowed on a road heading to Ngoo Kati market. The area was characterized by gentle sloping topography with long slope lengths of about 200m. The areas had dark clay soils which were quite susceptible to degradation by soil erosion from surface runoff. The area was agropastoral with wooded grassland for livestock grazing and agricultural crop production like maize, millet, sorghum, cowpeas. Vegetation health was normal except those for crops. This was a market / shopping center usually frequented by both people and domestic animals but the existing population was approximately 30HH per Km².

The flood water from River Katiliku caused an ECD class to be relocated, created a huge gully dividing the Ngoo Kati market into two and cutting off a road passing perpendicularly through it.

The site is a potential hot spot and urgent measures should be taken to stop flood water from River Katiliku passing through the market such as river training.



*Figure 23: Road turned into a river course
21.9"E alt 748m)*



Figure 24: Huge gully dividing market center (Lat 1°2'40.4"S Long 38°11'

Table 23: Ilekyia River Crossing site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Ilekyia river, Enziu sub catchment Mwingi central Kitui county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Site: Ilekyia river Crossing Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	03 03
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Ngoo Location Ngoo sub-location
Location: Geographic (Lat/Long, Altitude)	(Lat 1 ⁰² '40.4''S Long 38 ⁰¹¹ ' 21.9''E alt 748m)
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Medium degradation Sady loam soils Sheet erosion Flooding and encroachment of river valley
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	long of about 300m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Riparian vegetation with wood trees of acacia and ficus tree species. Flooding of adjacent farms, homes.
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	30HH per Km ² Livestock populations of 10 cattle, 25 goats, 5 sheep and 1 donkey per HH.
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Land use farming seasonal crops and grazing livestock Water pan River changed it course
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion in the upstream

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Surface Runoff
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Extensive depositions of silt and sand on the river bed.
Suggested mitigation measures and their viability	Community irrigation scheme, sand dam/weir (intake)
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration of institutions (water, agriculture) in county government.

NOTES:

This was another site but a different river called Ilekya which had changed its course and made its way through individual farms. The possible cause was huge deposition of silt and sand in the river bend from active land degradation occurring upstream parts of Enziu sub catchment.

The area was a riparian landscape, with gently flat topography and slope length of over 300m. Sandy loam soils were prevalent in the area. Human population was estimated at 30HH per Km² and majorly practiced agropastoralism. The land use was predominantly agriculture cropped land with riparian woodland vegetation of grasses, acacia and fig tree species. It was rated to having medium degree of degradation. There were evidences of flooding in adjacent farms and homes. This area was rated as potential hot spot due to flooding and encroachment of the river into peoples' farms.

The mitigation measures suggested included establishing irrigation scheme, construction of sand dam and weirs (intake). Opportunities available to achieve the suggested mitigations includes collaboration with county government institutions such as water and agriculture.



Figure 25: Ilekya River changed its main course (Lat 1° 4' 52.2" S Long 38° 11' 22.6" E alt. 725m)

Table 24:Kauai Village

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kauai Mui sub basin Mwingi sub county Kitui county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Kauai Village Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	05 05
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kauai Village, Ngoo location, Ngoo sub location
Location: Geographic (Lat/Long, Altitude)	<i>Lat 1° 5' 5.7"S Long 38° 12' 14"E, Alt 710m</i>
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Medium degradation Clay loam Gully erosion
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long slope length
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Vegetation is wooded grassland and shrub in good River spreads out over community land
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	100HH per km ² and each HH with average of of 10 cattle, 25 goats, 5 sheep and 1 donkey
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Wooded grassland with shrubs Land use type agriculture and settlement
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion, deposition of sediments in the river bed.

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off water is a major driver of degradation
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	River spreads out in community farms and public facilities and caused livestock deaths.
Suggested mitigation measures and their viability	Community water pan, river training
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institution in county government Agriculture and water.

NOTES:

The site was near water pan dug in a private parcel of land. River Ilekyia flooding during rainy season was reported by the area community as a norm, with water spreading out over community farms. The farm owner of the site visited had harvested flood water in his farm and those from the road side into a water pan for his domestic use especially during the dry spell. The community reported that about 200 water pans had been constructed in the area on individual farms. The county government made available the Bull Dozer and the prospective farmer would pay the machine Ksh. 8500 per hour during construction of the water pan.

The soils in the area were clay loam suitable for holding water in the water pan. Low land degradation was observed and the ground had a good grass cover. The general topography of the area was gentle flat with wooded grassland and shrubs vegetation. This area was identified as a bright spot.



Figure 26: Private water pan site (Lat 1° 5' 5.7"S, Long 38° 12' 14"E, Alt 710m)



Figure 27: Photos taken during river spreading over Kaui village

Table 25: Illekya River site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Elekya River, Mwingi Sub county and Athi sub basin
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Ellekya river Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	06 06
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Ngoo location, Ngoo Sub-Location.
Location: Geographic (Lat/Long, Altitude)	Lat 1 ⁰ 5' 32.4"S, Long 38 ⁰ 12' 42.1"E Alt 705m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	High degradation Clayey sandy Gulls formed
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	long slopes 200m River valley
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Wooded grassland and bushes
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	25HH per Km2 and livestock averaging 6 cattle, 25 goats, 10 sheep and 1 donkey.
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered bushes, grassland
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion and physical disturbances
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Surface runoff

General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Lot of silt and sand in the river bend was signs of degradation up stream
Suggested mitigation measures and their viability	Gabion, check dams and reseeded with grass seeds
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture and social economic practices etc.	Collaboration with relevant institutions, water, agriculture in county government.

The site is riparian area of Ilekyia river. Its topography was gentle sloping with long slope lengths of over 200m. Soils were sandy clayey and vegetation was scattered bushes with patches of bare land surface. The vegetation was natural bushes comprising of trees and grasses. Long gullies had already formed in the vicinity due to soil erosion. Human population was estimated at 25HH per KM² with livestock populations averaging 6 cattle, 25 goats, 10 sheep and 1 donkey.

Mitigation measures proposed for this site included tree planting, check dams and gabions. Collaboration between community, county government could be leveraged upon to rehabilitate this area. This area was marked as potential hot spot.



Figure 28: Ilekyia river

Table 26: Kathonzweni - Simitini

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kathonzweni – Simitini, Mwingi sub county Kitui county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Kathonzweni mining site Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mui location, Ngiluni sub location.
Location: Geographic (Lat/Long, Altitude)	Lat 1° 7' 19.5"S long 38° 12' 52.2"E Alt. 189m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Medium degradation Sandy loam Minor rills formed
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	long slopes 200m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Wooded acacia with grasses Excavation of limestone
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	20HH per Km ² and livestock averaging 6 cattle, 25 goats, 10 sheep and 1 donkey.
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Land use for agriculture and mining
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion and physical structural disturbances through mining

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Surface runoff and mining
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Open cast mining site
Suggested mitigation measures and their viability	Rehabilitation of quarry
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices among others.	Collaboration with relevant institutions, water, agriculture in county government.

NOTES:

The site was next to an open cast limestone mining area. It had sandy loam soils which had low content of organic matter and with patches of bare land. The general topography was gentle sloping with long slope lengths of about 100m. Vegetation was scattered trees shrubs of acacia species mixed with grasses. The human population was estimated to 20HH per KM² and substantial herds cattle, goats and donkeys. Bee keeping and subsistence crop farming of maize was also practiced.

Main agent of land degradation was soil erosion through surface runoff. However, physical structural disturbances of soil by quarrying could not be wished off. Rills had already started forming in nearby lands and open hole from mining activity lay unprotected. Increased degradation in the area may be ned by quarrying activities.

Proposed mitigation measures included rehabilitation of existing quarry and management of surface runoff by encouraging regeneration of grass by reseeding. Existing opportunities to effect mitigation measures include collaboration with county government and private actor players undertaking mining works.



Figure 29; Kathonzweni - simitini (Lat 1° 7' 19.5"S long 38° 12' 52.2"E Alt. 189m)

Table 27: Outskirts - East of Mwingi Town Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Outskirts to the east of Mwingi town, Mwingi sub-county Kitui county
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Ousskirts of Mwingi town Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	08 08
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mwingi town, Mwingi town sub location.
Location: Geographic (Lat/Long, Altitude)	Lat 0°56' 24"S Long 38° 4' 33"E Alt 974m
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Very high degradation Sandy loam Rills and huge gullies formed Undulating landscape
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Steep slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	long slopes 250m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered shrubs, with patches of bare land
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	50HH per Km2. Cattle and goats rearing
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Land use for settlement and rangeland
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Surface runoff and overgrazing
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land due to cutting of trees and overgrazing
Suggested mitigation measures and their viability	Cut off drain, check dams and terracing
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions, water, agriculture in county government.

The entire area was characterized by brown sandy loam with very low organic matter content. Much of the ground was denuded bare land with very little vegetation cover. Topography of the area was undulating, with long slope lengths estimated at 250m. Vegetation was natural with scattered shrubs of acacia species. The human population was estimated at 50HH per KM² and land use was settlement area. The severe land degradation in the area was attributed to cutting of trees and overgrazing. There were clear evidences of sheet erosion caused by surface runoff creating many rills some of which had graduated into gullies.

The proposed mitigation measures include construction of retention ditches, terraces, check dams to heal gullies and reseeding with grasses to improve the vegetation cover. Th is area was marked as hot spot.



Figure 30: Outskirts East of Mwingi Town (Lat 0°56' 24"S Long 38° 4' 33"E Alt 974m)

Table 28: Outskirts of Waita Market

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-County, Waita sub-location
Site visited; Scope/extent/area of coverage	Waita market outskirts
Informant/Data collector/contacts:	Nyambariga/Evance/Gichuki
Site Number:	009
Photo numbers:	Photos: set 9
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Waita sub-location
Location: Geographic (Lat/Long, Altitude)	Lat: 0.7748889S Long: 38.0923889E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Sandy loam Medium degradation Long profile>200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long>200m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered trees, shrubs and bare land Vegetation status is good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	25 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

This site was on the outskirts of Waita market along Mwingi - Kamuongo road. Improper disposal of roadside run off channeled with a culvert directing water to nearby farms had created a huge gully. This was clear evidence that development efforts like improvement of road infrastructure could lead to severe land degradation. In road constructions, proper means of channelling road side water safely without aggravating land degradation ought to be considered.

The soils of the area were brown sandy loam with scanty organic matter content. The topography was gentle sloping with long slope lengths estimated to about 200m. Vegetation in the area was natural consisting of scattered trees with minimal ground cover and with patches of bare land. the population was estimated to 30HH per KM², in an agropastoral zone. The effects of aridity complexed by grazing and other anthropogenic activities like cutting of trees could worsen land degradation in this area.

Proposed mitigation measures for this site included construction of gabions, check dams, and construction of terraces in the adjacent farms

This site was marked as potential hot spot.



Figure 31: Gully due to improper disposal of road side water (Lat 0° 46' 29.6"s Long 38° 5' 36.2" E alt 992m)

Table 29:Kamuongo - Individual Reclamation Efforts site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-county, Mwambui location
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Kamwongo Market Outskirts Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	010 Photos: set 10
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Waita sub-location
Location: Geographic (Lat/Long, Altitude)	Lat: 0.7286111S Long: 38.0897222E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Sandy loam Medium degradation Long profile>200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long>200m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered trees, shrubs and bare land Vegetation status is good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	25 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

This site was an example of individual reclamation efforts by rehabilitation of a former quarry site using retention ditches, terraces, zai pits, and planting of trees. The land is currently used for farming of crops such as maize, beans, cow peas, and fruit trees like mangoes.

Soils were brown sandy loam and general topography exhibited gentle slope with long slope lengths of over 100m. The soils had low content of organic matter possibly due to previous degradation in the land. Vegetation comprised of scattered trees, shrubs and agriculture crops like maize and cow peas and miraa/muguka. Human population in the area was estimated at 30HH per Km² and livestock farming of cattle and goats.

This area was marked as a bright spot because degradation had been controlled by land reclamation structures and a homestead had been constructed on the site. Land productivity was improving.



Figure 32: Reclamation of a former quarry site (Lat 0° 43' 43"S Long 38° 5' 23'S Alt 1028m)

Table 30:Kisole Earth Dam site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-county, Mwambui location
Site visited; Scope/extent/area of coverage	Kisole Earth Dam
Informant/Data collector/contacts:	Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	011 Photos: set 11
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kisole Earth Dam, Mwambui sub-location
Location: Geographic (Lat/Long, Altitude)	Lat: 0.7471944S Long: 38.0905E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Sandy loam Medium degradation Long profile>200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long>300m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Wooded grassland with scattered shrubs Vegetation status is good Natural vegetation Deposition of silt into earth dam
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	15 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

NOTES:

According to the area Assistant Chief, this earth dam serves an estimated population of about 30,000 people, and in addition to Waita prison. However, massive land degradation from the dam catchment had led to depositions of huge silt in the infrastructure, decreasing its overall total volume.

The area had sandy loam soils with very little organic matter. The land surfaces in the area nearby had patches of bare land. Vegetation of the area was scattered thorny shrubs and few trees which were natural. The general topography was gently sloping with long slope lengths estimated to about 300m. Sheet erosion was prevalent with some rills already formed but no gully was cited. Catchment management initiatives were proposed up stream which included terracing, erecting check dams, planting trees and reseeding with grasses to prevent silting of the dam. The earth dam should also be desilted. Opportunities available included collaboration with county departments of water and agriculture plus local communities for suitable interventions.



Figure 33: Kisolet Earth Dam (Lat 0° 43' 52.1"s long 38° 5' 25.8"E Alt 999M)

Table 31: Mwambui Ass. Chief's Office

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-county, Mwambui location
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Mwambui Asst. Chief's Office Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	012 Photos: set 12
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mwambui Asst. Chief's Office, Mwambui sub-location
Location: Geographic (Lat/Long, Altitude)	Lat: 0.7481667S Long: 38.0525556E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Sandy loam Medium degradation Long profile >200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long >250m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered trees, shrubs and bare land Vegetation status is good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	10 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

NOTES:

The site was public land belonging to Kisole Chief's Camp. The soils were red-brown loam with scanty organic matter content. Much of the ground surface was denuded off any vegetation cover and risked increased land degradation. Possible causes were overgrazing and cutting of trees. The general topography was gentle slope with long slope lengths estimated to slightly over 300m. upstream was a very steep slope with rock outcrops which could be responsible for speedy runoff causing erosion in the neighborhood. Vegetation comprised of few scattered shrubs and trees, which were natural. The area had multiple rills and large gullies some of which had graduated to ravines. Efforts to control increased degradation from surface run off were evident with presence of stone check dams on small rills, planted sisal and tree branches in some gullies, but they seemed inadequate.

Mitigation measures suggested included construction of cut-off drain, terraces, erecting of check dams with brushes in gullies, and planting of sisals. Opportunity available include leveraging on community cooperation with the local administration to carry out conservation works with assistance from county government and local NGOs.

This area was marked as a hot spot. If no actions will be taken, soil erosion threatens destroying both the chief's office, and the nearby dispensary with further destruction of farms downstream.



Figure 34: Mwambui Ass chief's Office (Lat 0° 44' 53.4"S Long 38° 3' 9.2"E alt 957M)

Table 32:Kisole Market Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-county, Mwambui location
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Kisole market outskirts Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	013 Photos: set 13
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kisole market outskirts Mwambui sub-location
Location: Geographic (Lat/Long, Altitude)	Lat:0.7471944E Long: 38.0751389E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Sandy loam Medium degradation Long profile>200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long>300m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered trees, shrubs and bare land Vegetation status is good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	40 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

NOTES:

Data was taken from this site which was opposite to Kisole shopping Centre. Soils of this area were reddish-brown sandy loam with little organic matter and many patches of bare land. The topography of the area was gentle sloping landscape with long slope lengths estimated to 300m. General vegetation of the area was natural consisting of perennial grasses and shrubs. Human population was estimated to 40HH per Km² and minimum of ten (10) heads of domestic animals (cattle, goats and donkeys) per household.

Soils erosion had led to rills and gullies which was evident and rampant. Possible cause was excessive surface run off over denuded slopy land surface. This was attributed to overgrazing and removal of tree / shrubs and their non-regeneration. This scenario was common phenomena in the locality as confirmed by the community engaged by the team. Proposed mitigation measures would include but not limited to healing gullies through erecting check dams and installing brushes, controlling excessive surface run off by terraces, planting of trees (sisal) and reseeding with grasses for vegetation cover.

This area was marked as a hot spot requiring rehabilitation. Collaboration between the local community, local NGO's and the county government will enable realization of rehabilitation efforts.



Figure 35: Kisole market (Lat 0° 44' 49.9"S long 38° 4' 30.5' E Alt 1000m)

Table 33: Bondoni Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-county, Mbondoni location
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Mbondoni Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	014 Photos: set 14
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mbondoni
Location: Geographic (Lat/Long, Altitude)	Lat: 0.9687777S Long: 38.0065E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Sandy loam Medium degradation Long profile >200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long >200m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered trees, shrubs and bare land Vegetation status is good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	40 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

NOTES:

Data was taken from a site next to the tarmac road before you get to Bondoni market from Mwingi town. Severe land degradation was evident in the area with multiple patches of total bare land. Major degrading factors were caused by soil erosion attributed to surface run off and physical structural soils disturbances from human and livestock.

Soils in the area were reddish sandy loam with very scanty organic matter content. There was minimal vegetation cover and crusted bare land surface quite prominent. The general topography of the area was gentle slope with long slope length estimated at 300m ending in the bottom of the valley. There was natural vegetation comprised of scattered trees and shrubs. Human population was estimated to 40HH per KM² and community's households each owning minimum of five (10) heads of livestock (cattle and goats) each.

Land degradation could worsen with combined aspects of aridity, denuded land and trampling of livestock. This area was marked as a potential hot spot. Proposed mitigation measures for this site were terraces, check dams and planting of trees (sisal).



Figure 36: Bondoni Site (Lat 0° 58' 7.6"S Long 38° 0' 23.4"E Alt 1025M)

Table 34: Bondoni GEBC Church Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Kitui County, Mwingi Sub-county, Mbondoni location
Site visited; Scope/extent/area of coverage	Mbondoni
Informant/Data collector/contacts: Evance Odhiambo	Nyambariga/Evance/Gichuki
Site Number: Photo numbers:	015 Photos: set 15
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mbondoni
Location: Geographic (Lat/Long, Altitude)	Lat: 0.9890279S Long: 37.9813889E
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Sandy loam Medium degradation Long profile >200m Gulleys, rills
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	635mm per year
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle slope
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long >200m
Vegetation (Type): Forest Agriculture - Perennial, Seasonal Grassland Woodland Bare land, Water Condition (Vegetation health) Very good, Good, Normal, Poor, Very Poor. Status – natural vegetation or planted Experienced changes	Scattered trees, shrubs and bare land Vegetation status is good
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	25 households per sq. km Maize farming, cattle and goat keeping
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrub land, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees, shrubs and bare land Agriculture, Scattered trees, shrubs and bare land, human settlement None Rills developing
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion

Drivers and agents of the Degrading factors; e.g. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Runoff water is a major driver of degradation.
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Site has scattered trees, grasses, bare land and
Suggested mitigation measures and their viability	Check dams; planting trees
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	Collaboration with relevant institutions including county government and the public

NOTES:

This site had brown sandy loam soils with glaring signs of land degradation evidenced by patches of bare land, rills and gullies at their initial stages.

Soils in the area were brown sandy loam with small gravel contents and very little organic matter. Much of the ground cover was totally denuded. The general topography was gentle slope with long slope length estimated at 300m. vegetation consisted of scattered trees and shrubs. Human population was estimated at 25HH per KM² and community practiced mixed farming.

Major degradation was caused by soil erosion whose main drivers / agents was surface run off and aggravated by arid weather conditions. The area exhibited reducing soil nutrients. Proposed mitigation measures for this area include; retention ditches, terraces and tree planting (sisal). This area was marked as a potential hot spot. Collaboration of the County government with local community in rehabilitation efforts will curb this menace.



Figure 37: Bondoni GEBC Church (Lat 0° 59' 20.5"S Long 37° 58' 53"E Alt 1204M)

Annex 4 Kitui South Data Sheets

The field exercise was carried out in Kitui South. Specific areas were; Yavwia, Kivyuni, Kenze, Itumba, Mutalani, Kyanguluu and Malungu.

Table 1 Yavwia Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui South Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	2km ² Allan Abwoga Emmah Odera Jacob Bosire Joan Terer
Site Number: Photo numbers:	1
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mutha location Ngaani sub-location Yavwia village
Location: Geographic (Lat/Long, Altitude)	-1.78626 38.43956 2104ft Acc; 4ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Brown Medium Sandy Gulley forming
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	251mm -300mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Planted vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as	Sparse

based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Seasonal/perennial Shrubland
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run-off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature Shrubland
Suggested mitigation measures and their viability	Construction of check dams. Construction of terraces. Construction of water pan
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES: Yavwia Area

Yavwia village is in Mutha, a densely populated area in Kitui South Constituency. It has a tropical savannah climate and an average annual rainfall of 251-300mm. The area has a brown, sandy soil type with medium degradation, evidenced by gully erosion due to runoff water. The terrain consists of gentle slopes with medium slope length. Vegetation is primarily seasonal shrubland with patches of cropland, though human settlement is sparse. Field observations indicated bare land with rocky terrain, sparse trees, and declining soil nutrients. Proposed mitigation measures included constructing check dams, terraces, and a water pan, leveraging available natural resources and land management opportunities.



Figure 38: Gulleys caused by runoff at Yavwia village

TABLE 2: KIVYUNI SITE

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui South Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	1km Daniel Mwangangi Allan Abwoga Emmah Odera Jacob Bosire Joan Terer
Site Number: Photo numbers:	2
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mathima location Kivyuni sub location Kaangungi village Kivyuni secondary school
Location: Geographic (Lat/Long, Altitude)	-1.84281 38.33974 2318ft Acc; 4ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Brown Medium Sandy Gulley
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	251mm – 300mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Medium
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Planted vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparse

Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Seasonal/ perennial Shrubland
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg. Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature
Suggested mitigation measures and their viability	Construction of water pan on government land
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES: Kivyuni Secondary School

Kivyuni Secondary School is in Mathima Location, Kivyuni sub-location and Kaangungi Village. Mathima location is an administrative division with an estimated terrain elevation above sea level of 641 metres. Kivyuni Secondary School has brown, sandy soil with medium degradation, and it experiences gully erosion caused by runoff water. Rainfall is low (251–300 mm annually), and the terrain consists of gentle slopes with medium slope lengths. Vegetation is primarily seasonal shrubland with planted species, while human settlement remains sparse. Field observations highlight bare land with rocky terrain, sparse trees, and declining soil nutrients. A key mitigation measure proposed is the construction of a water pan on government land, leveraging available natural resources and land management opportunities.



Figure 39a: Land degradation at Kivyuni Secondary School in Mathima Location Figure 2b: The Land degradation staff and local administration on site

TABLE 3 Kenze Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui East Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	1.5km ² Brian Wambua Allan Abwoga Emmah Odera Jacob Bosire Joan Terer
Site Number: Photo numbers:	3
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Mutomo location Mwala sub location Kenze village
Location: Geographic (Lat/Long, Altitude)	-1.85414 38.24248 2975ft Acc; 4ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Red High Sandy
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	151mm-250mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparse
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management	Seasonal/perennial Shrubland

Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature
Suggested mitigation measures and their viability	Gabions to heal the gulleys Soil conservation structures upstream
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES: Kenze Area

Kenze area is in Mutomo, a former district in the Eastern Province of Kenya and Mwala sub-location. The estimated terrain elevation above sea level is 846 meters. The site assessment covered an area of 1.5 km² that has red, sandy soil with high degradation, primarily due to runoff-induced soil erosion. Rainfall is low (151–250 mm annually), and the terrain consists of gentle slopes with long slope lengths. Vegetation is mainly seasonal shrubland with natural species. Land cover includes seasonal/perennial shrubland with sparse human settlements, but severe soil degradation has led to extensive bare, rocky land with poor soil nutrients. To address these challenges, the proposed mitigation measures included constructing gabions to stabilize gulleys and implementing soil conservation structures upstream, leveraging available natural resources and land management opportunities.



Figure 40: Deep Gully caused by runoff in Kenze Area

Table 4 Itumba Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui South Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	1km Okello Mulu Allan Abwoga Emmah Odera Jacob Bosire Joan Terer
Site Number: Photo numbers:	4
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Kibwea location Kaweru sub location Itumba village
Location: Geographic (Lat/Long, Altitude)	-1.80073 38.23983 2530ft Acc; 6ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Red High Sandy Gulley
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	301mm -350mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Steep
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparse
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees Seasonal/perennial Shrubland

Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature
Suggested mitigation measures and their viability	A rock catchment
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES: Itumba Area

The site assessment in Kibwea Location, Kaweru Sub-location, Itumba Village (Middle Tana, Kitui South Constituency) covered a 1 km stretch. The area is characterized by highly degraded red, sandy soil, primarily due to runoff-induced gully erosion, with sparse human settlement and bare, rocky terrain exhibiting poor soil nutrients. The terrain consists of steep slopes with long slope lengths, receiving an annual rainfall of 301–350 mm, and supports mainly seasonal shrubland with natural species and scattered trees. To mitigate this degradation, the construction of a rock catchment is proposed, utilizing existing natural resources for soil and water conservation.



Figure 41: Run-off induced bare land with poor soil nutrients

TABLE 5 Mutalani Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui East Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	4km ² Aphia Musembi
Site Number: Photo numbers:	4
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Endau location Katumbi sub location Mutalani village
Location: Geographic (Lat/Long, Altitude)	-1.29838 38.60051 1675ft 10ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Brown Medium Sandy Gulley
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	151mm -200mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Long
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparse
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial,	Scattered Seasonal/perennial Shrubland

exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature
Suggested mitigation measures and their viability	Terracing Construction of water harvesting pans and feedlots
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES : Mutalani Area

Mutalani area is located in Endau location and Katumbi sub location. It has an elevation of 1,035 metres. The site is located at -1.29838 latitude, 38.60051 longitude, and 1675ft altitude, and is characterized by brown, medium-level degraded, sandy soil experiencing gully erosion. Rainfall ranges from 151-200mm. The terrain consists of gentle, long slopes supporting sparse human settlement and seasonal shrubland with normal health and natural vegetation. Land use is primarily shrubland with scattered seasonal/perennial crops. The major degrading factor is soil erosion driven by runoff. The area exhibits a bare, rocky nature and very sparse tree population. Suggested mitigation measures include terracing and construction of water harvesting pans and feedlots.

Photo

TABLE 6 Kyangulu Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui Cental Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Felistus Munyoki
Site Number: Photo numbers:	6
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Wii location Wii sub location Kyangulu village
Location: Geographic (Lat/Long, Altitude)	-1.19712 37.96686 1385ft Acc; 6ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: 'potential hotspot site for active degradation'.	Brown Slight degradation Sandy Gulley
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	300mm -350mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Short
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Moderate.

Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management Experienced changes:	Scattered trees Seasonal/perennial Bare areas
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Bare land with extended rocky nature
Suggested mitigation measures and their viability	
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES: Kyangulu Area

A site assessment was conducted in Wii location, Wii sub-location, Kyangulu village (Middle Tana, Kitui Central Constituency). The site, located at -1.19712 latitude, 37.96686 longitude, and 1385ft altitude, has brown, slightly degraded, sandy soil with gully erosion. Rainfall ranges from 300-350mm. The terrain consists of gentle, short slopes supporting moderate human settlement and seasonal shrubland with normal vegetation health. Land cover includes scattered trees, seasonal/perennial crops, and bare areas. The major degrading factor is soil erosion caused by runoff. A bare, rocky nature characterizes the area.



TABLE 7 Malungu Site

ITEM DESCRIPTION	OBSERVATION NOTES
General Information of Region/Area/Sub basin/Catchment: County/region:	Middle Tana Kitui Central Constituency
Site visited; Scope/extent/area of coverage Informant/Data collector/contacts:	Mutua Kyonga
Site Number: Photo numbers:	7
Site name: (Preferred name – lowest administrative unit name or generic name - village, local name known)	Itoleka location Kangooni sub location Malungu village
Location: Geographic (Lat/Long, Altitude)	-1.2860 37.5560 1057ft Acc; 5ft
Soil Type: • Colour • Degree of degradation (Very High, High & Medium) • Texture – Sandy, clay, loam • Erosion type (Gulley, sheet, reel) • Profile appearance/length • Terrace or other degradation evidences, loss of organic layer NB: If very severe indicate: ‘potential hotspot site for active degradation’.	Brown Slight degradation Sandy Gulley
Rainfall data; Amount and intensity from available data Information on flooding, rainfall erosivity, percolation time	300mm -350 mm
Topography: Slope Steepness • Flat • Gentle flat • Gentle slope • Steep slope • Very steep slope	Gentle
Slope Length • Very long • Long • Medium • Short • Very Short NB: Describe general terrain-Slope part of the hill, river valley	Short
Vegetation (Type) : Forest Agriculture - Perennial, Seasonal Grassland Woodland Bareland ,Water Condition (Vegetation health) Very good Good ,Normal ,Poor ,Very Poor .Status – natural vegetation or planted Experienced changes	Seasonal shrubland Normal Natural vegetation
Population Human Settlement Estimated population coverage based on available data and/or your field of view e.g. homestead counts as based on visualized number of houses Livestock: Cows, goats and sheep/Livelihood activities/social economic aspects.	Sparse
Land use: Vegetation Cover – Sample descriptions planted e.g. aquatic, scattered, tall grasses Plantations; Cropped land, seasonal/perennial, exotic tree e.g. eucalyptus etc. Land use type: Agriculture, Forest, Grassland, Shrubland, Wetland, Bare areas, Settlement and water Land Management	Scattered trees Seasonal/perennial Grassland

Experienced changes:	
Major Degrading factors (Type); e.g., Soil erosion, sedimentation, Biological, chemical, leaching, physical structural disturbances etc.	Soil erosion
Drivers and agents of the Degrading factors; eg Runoff water, Chemical use, poor agriculture practice, overgrazing, deforestation, mining and construction	Run off
General Comments: Note down any other useful information to support the above observations e.g. • Very sparse tree population and terrace farming • Bare land with extended rocky nature • Densely stoniness with disappearing grasses, Reducing soil nutrient composition, presence of harmful chemicals on the land	Very sparse tree population and terrace farming
Suggested mitigation measures and their viability	Construction of terraces
Opportunities for implementing mitigation measures -Water resources and other natural resources, population, Land tenure, culture, social economic practices etc.	

NOTES: Malungu Area.

Malungu area is located in Kitui Central Constituency, Itoleka location and Kangooni sub-location. It has an elevation of 1,000 meters. The site, located at -1.2860 latitude, 37.5560 longitude, and 1057ft altitude, has brown, slightly degraded, sandy soil with gully erosion. Rainfall ranges from 300-350mm. The terrain consists of gentle, short slopes supporting sparse human settlement and seasonal shrubland with normal vegetation health. Land use comprises scattered trees and seasonal/perennial crops within a grassland environment. The major degrading factor is soil erosion caused by runoff. The area has a very sparse tree population and some terrace farming. A suggested mitigation measure is the construction of terraces.

photos?