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Laikipia Wildlife Forum

KENWEB

Water Conservation Strategy for Laikipia County

2014 – 2018

Laikipia Water Conservation Strategy

Vision

"Sustainable water resource management, planning and usage for benefits of Northern Ewaso Ng'iro inhabitants and environment"

Mission

The strategic mission of the Laikipia Water Conservation Strategy is that:
"Water resources are used and managed to ensure sustainable social and economic growth and maintenance of water-dependent environments"

Strategic Objectives

- Efficient Water Use and Allocation
- Environmental Sustainability
- Water Resource Management and Governance

WATER CONSERVATION STRATEGY FOR LAIKIPIA COUNTY 2014 – 2018

USAID
FROM THE AMERICAN PEOPLE

KENWEB

NATIONAL MUSEUMS OF KENYA
WHERE HERITAGE LIVES ON

Laikipia Wildlife Forum

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The members of the strategy, documentary and monitoring guide development team provided their time and technical knowledge in water governance and environmental protection: Dr. Mordecai Ogada (Executive Director, LWF), James Mwangi (Water Program Officer, LWF), Brian Ochieng (Communications Technician, LWF), Gilbert Momanyi (Monitoring and evaluation officer, LWF), Prof. Nathan Gichuki (UoNbi/KENWEB), Dr. Wanja Dorothy Nyingi (National Museums of Kenya / KENWEB), Stephanie Duvail (IRD), Dr. Olivier Hamerlynck (KENWEB), Quentin Luke (NMK/KENWEB), Joseph Gathua (NMK/KENWEB), Chege Njoroge (KENWEB), Gilbert Kosgei (UoNbi/KENWEB) and Steve Omari (KENWEB).

Our deep appreciation goes to all WRUAs of Laikipia County that took time for stakeholder meetings and accepted to host the team for individual visits to compile information on their operations in water governance at sub-catchment level.

The following provided important input to the strategy: WRMA former and current Laikipia Assistant Technical Coordinating Managers (William Hamisi and Gibson Mwangi); Upper Ewaso Ng'iro Catchment Management Officer (Felix Ooko); the Laikipia County Government (Deputy Governor, Gitonga Kabugi), LWF Forest Program Officer (Anthony Ochino).

Abbreviations and Acronyms

ADC	:	Agricultural Development Corporation
ASAL	:	Arid and semi-arid lands
AWF	:	African Wildlife Foundation
CBNRM	:	Community Based Natural Resource Management
CBO	:	Community Based Organization
CDTF	:	Community Development Trust Fund
CETRAD	:	Center for training and Integrated Research In ASAL Development
CFA	:	Community Forest Association
EDCP	:	Effluent Discharge Control Plan
EIA	:	Environmental Impact Assessment
ENNCA	:	Ewaso Ngiro North Catchment Area, ENNCA
GEF-SGP	:	Global Environment Facility Small Grants Programme
IWRM	:	Integrated Water Resource Management
JICA	:	Japan International Cooperation Agency
KENWEB	:	Kenya Wetlands Biodiversity Research Group
KWS	:	Kenya Wildlife Service
KFS	:	Kenya Forest Service
LWF	:	Laikipia Wildlife Forum
NAWASCO	:	Nanyuki Water and Sewerage Company
NEMA	:	National Environment Management Authority
NRM	:	Natural Resource Management
RGS	:	River Gauge Station
SCMP	:	Sub-Catchment Management Plan
WASH	:	Water Sanitation and Health
WAP	:	Water Allocation Plan
WRUA	:	Water Resource Users Association
WRMA	:	Water Resource Management Authority
WSTF	:	Water Services Trust Fund

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Foreword

The global demand for water has continued to grow due to increased population, urbanization, climate change, degradation of water catchments, loss and aging of water supply infrastructure among others.

Laikipia County has not been spared of this global trend. Being in a water scarce county, Laikipia has undergone a great amount of conflict between upstream and downstream water users in relation to water allocation. Human-Wildlife Conflicts also abound due to the coexistence of wildlife and communities. In spite of these challenges, both social and economic growth has continued to increase, which if kept unmanaged will be the cause of further conflict and environmental degradation. For this purpose, the county recognizes the importance of a Water Conservation Strategy.

Challenges of water allocation and conservation present great opportunities for which Laikipia County is well placed to seize in order to ensure that the water sector is able to support economic growth needs. For this purpose, the Water Ministry has championed the Laikipia County Water Conservation Master Plan in order to ensure continued supply to clean water for all users while protecting the natural infrastructure that supports this supply. Laikipia has now the opportunity to showcase its efforts in adopting technologies and solutions, while fostering a water sector that will not only encourage continued growth of our economy but also protect our water for our children and grandchildren.

The county government recognizes that the engagement of water users in water allocation and conservation through Water Users Associations (WRUAs). These associations comprised of communities dependent on water supply from a particular sub-catchment require continued support and capacity building in order to fulfill their role in water supply governance at the grass-root level.

As Minister of Water for Laikipia County, I encourage Laikipia Wildlife Forum and all stakeholders in this sector to move this strategy forward, pursuing all possible opportunities to ensure that the water sector continues to provide economic and social benefits for all Laikipians.

His Excellency Gitonga Kabugi
Deputy Governor and Minister of Water, Laikipia County

Preface

Water resources form a critical component of the ecosystem and are an essential condition to improved livelihoods. On the other hand, water resources are threatened by the competing human activities at the catchment areas. In addition to the existing threats such as illegal abstractions, catchment degradation, etc. future threats are likely to be driven by the increasing population, food insecurity, and climate change.

LWF is seeking to strengthen its role in promoting proper water resource management and utilization in a way that best serves the long-term interests of the land users, the ecosystem and the wider population. In order to achieve this, the Laikipia Wildlife Forum has developed the Laikipia Water Conservation Strategy (LWCS) 2014- 2018. The Strategy describes some key aspects on the status of water resources within Laikipia and it outlines the challenges requiring intervention and defines the roles and responsibilities of various stakeholders in supporting water conservation in the County.

The Strategy distinguishes equity in water provision as the utmost priority in water management, basically through ensuring that all people especially the poor and previously marginalized communities are no longer disadvantaged. The Strategy outlines ways and means of ensuring that water resources are managed and utilized sustainably as a means to achieving the greater objective of economic and social growth leading to improved and productive livelihoods.

Through the Strategy roles of the local communities as direct users are highlighted to enable them to address the challenges of governance in Water Resource Users Associations (WRUAs). It has also highlighted collaboration among Stakeholders including County government, National Water Agencies (including Water Resources Management Agency) and researchers (including Mpala Research Centre, CETRAD, Kenya Wetlands Biodiversity Research Group and others). The Strategy also provides opportunities for review of the actions proposed. In addition, it provides an opportunity to evaluate progress in implementation of actions through monitoring and evaluation based on a variety of indicators selected through an interactive process involving WRUAs, WRMA and County government

LWF intends to provide unremitting support through its donors and member support to implement the Strategy in ensuring that water resources in Laikipia are protected, sustainably utilized, conserved and managed in accordance with relevant policies and laws, for the benefit of all.

Josephat M. Musyima

Acting Executive Director, Laikipia Wildlife Forum

CHAPTER 1: Introduction

Water is vital for life and the provision of clean, safe and secure water is a fundamental human right. The universal challenge of water allocation is that while the demand for water is growing the supply continues to become more and more limited. In many cases water allocation has been based on quantity based administration allocation programs aimed at equity in water sharing and satisfying a greater public demand. However as water becomes economically scarce the "efficient" aspect of allocation becomes more important than equity.Efficiency is however highly ignored in most water allocation strategies. A good example is the great importance that every economy has placed on water allocation for irrigation. Even though the ultimate goal is to ensure food security, irrigation consumes over 80% of water requirements and is very low on water use efficiency.

With increasing human population, changes of lifestyle, and more agricultural investment – the demand for water has gone up. In addition, climate change affects amount of rain, which support river flow and ground water. The resulting change in rainfall patterns is the main cause of increased severity of droughts and of unpredictable devastating flooding events. There is a need to consider the diversity of water pressures within various scales – local and national; and temporal and spatial. When the available water in a river basin is not adequate to supply all the demands from its water users, the basin is referred to as "closed." If the supply and demands are not managed in a sustainable manner, the river basin will be over exploited and water supply becomes degraded.

A water strategy is important as it sets out how demand and supply of water resources should be managed. Water issues should be regarded in their entirety: managing abstraction, flood risk, water quality; and to plan in the short, medium and long term – a strategic approach to managing public water supplies. A water strategy sets out actions to promote responsibility among water users, abstractors and water companies in efficient use of water while considering the environment, and secures that users do not compromise the quality and quantity of water resources. A water resource strategy needs to consider the needs of "people" and "the environment" and thus needs to underscore means of securing water supply while safeguarding the environment.

Why are environmental considerations important? Changing water environment affects areas where plants and animals (flora and fauna) can survive. Some species are hardy and able to adapt easily to changing environment but others that are more sensitive will disappear. Such organisms are important to monitor,and are commonly referred to as indicators of ecosystem health.

Actions that the strategy should support include:Protection of important conservation areas; resolution of licensing issues; safeguard water resources through catchment management and considering water quality and quantity; reduce treatment costs for water users; improve understanding of interaction between the water environment and ecology; better protect vital water supply infrastructure; improve understanding of the risks and uncertainties of climate change; support housing and investment demands to ensure the water environment can cope with additional pressure; allow targeted approach in areas where water stress and conflicts exist; reduce wastage and leakage of water and increased responsibility including "water efficiency commitment" by water users; allow water company to address challenges of water allocation; encourage informed communication and information among water users; and increase investment in technology for all types of use including agriculture and industry.

In order to ensure that a water strategy is as inclusive as possible and accepted by a wide range of stakeholders, the following considerations need to be met:

- Multi-stakeholder involvement – water users (diverse), NGOs, researchers, resource managers
- Multi-sectoral approach – water, forest, environment, local government
- Agree on the short, medium and long-term goals and actions
- Review good practice and promote sharing of information
- Ensure that the diverse water resource users develop ownership of the strategy development
- Ensure that the strategy conforms or is supported by water resource management policies
- Consider models of water governance, resource allocation and good practice in integrated water resource management

In Kenya, the fundamental objectives for managing water resources are enshrined in Section 11(1) and 11(2) of the Water Act 2002. The Act's provisions define the National Water Resource Management Strategy (NWRMS) outlining how water resources of Kenya "*shall be managed, protected, used, developed, conserved and controlled*".

The Water Act 2002 in Section 11(3) also provides that the NWRMS should prescribe the principles, objectives, procedures and institutional arrangements for the conservation and control of water resources including: classifying of water resources; determination of requirement of the reserve for each water resource; identifying areas for designation as protected areas and groundwater conservation areas; facilitating development of Water Resource Users Associations (WRUAs); and water conservation structures. The overall principles of the NWRMS aim to achieve equitable access to water and sustainable, efficient and effective water use.

The Water Resource Management Authority (WRMA), was established under the Water Act 2002 Section 7 (1) as the lead agency in water resource management.In pursuant with Section 14 of the Water Act 2002 WRMA has delineated six catchment areas in Kenya namely Lake Victoria North, Lake Victoria South, Rift Valley, Athi River, Tana River and Ewaso Ng'iro North.

WRMA regional office for Laikipia County, within the Ewaso Ng'iro North Catchment Area (ENNCA), is located in Nanyuki while two subregional offices namely the Upper Ewaso Ng'iro sub-region and Engare Narok/Merghis sub-region are located in Nanyuki and Rumuruti respectively. Even though these subregional offices are recognised to be inadequate for effective management of the water resources, WRMA has no plans to establish additional offices until these are considered to be fully operational. As with other subregional offices of the Northern Ewaso Ng'iro catchment, these lack adequate space for expansion and to accommodate all staff including facilities for support of WRUAs.

WRMA has so far supported the development of 65WRUAswithin the Ewaso Ng'iro North catchment in order to develop and plan water resource management are sub-catchment level and particularly to oversee the regulation of water abstraction. These are however fewer than the those planned for the catchment.Almost all rivers in ENNCA are at an **Alarm Status** meaning a lot of destruction of the catchment has taken place. However, others are on **Alert Status** meaning progressive ecological destruction is taking place and **Satisfactory Status** meaning not much has changed within the catchment (pristine).

The Laikipia County government has developed the Water and Sanitation Services Bill, 2013 "to provide for development, regulation and management of the county public works related to water

and sanitation services, storm water management systems and water conservation for connected purposes." The Bill proposes the establishment of the County Water and Sanitation Services Corporation, which willmanage the Water and Sanitation Companies operating in the county under the Water Act, 2002. The Corporation is aimed at ensuring that: every person has access to safe and clean water; water is accessible for agriculture, livestock and industrial use and that there is equitable distribution of water between urban and rural areas.

The bill will also establish the Water and Sanitation Services Board to regulate water and sanitation services; regulate and issue authorization and permits for development of infrastructure, services and systems for water and sanitation services; receive and address complaints from water users; and maintain data and information regarding water and sanitation services.

The main challenges the Laikipia County government will face in regards to water and sanitation regulation in Laikipia is the lack of adequate information regarding the quantity and quality of water available. This information is necessary in order to ensure equity in water allocation for all users while maintaining water for environmental functions that maintain ecosystem services within the county. The latter consideration is inadequately addressed in the Water and Sanitation Services Bill, 2013.

CHAPTER 2: Background

2.1 Geographical location and features

Laikipia County is located between latitudes 0°17'S0°45'N and longitudes 36°10'E37°3'E in the Great Rift Valley and is part of the vast Ewaso ecosystem. Laikipia landscape is a highland plateau with average altitude of 2000m and rises to 2500m at the slopes of Aberdare ranges.It borders the Counties of Samburu to the North, Isiolo and Meru to the East, Baringo to the west and Nyeri and Nyandarua to the South. Notable physical features include the Aberdares range to the west, Mt. Kenya to the south and southeast, and Mukogodo hills to the east.

Laikipia posses a great diversity of vegetation including forests, wooded savannah and grasslands depending on the amount of rainfall and soil type. Wet forests are found at higher altitude areas rich in young volcanic soils and receiving considerably higher rainfall. These are areas bordering the Aberdares in the south-western part of the County. Dry forests are found in the slopes of Mt. Kenya where rainfall is less and Mukogodo hills in the northern parts where soil is of granitic composition. Wooded savannah and grasslands are distributed throughout the northern and central parts of the County where rainfall is less and the soil has lots of clay particles.

2.2 North Ewaso Ng'iro Catchment

The North Ewaso Ng'iro catchment covers an area of approximately 210,226 km^2 which is about 36% of Kenya's total area and spreading over 36 administrative counties within four provinces namely: North Eastern Province (Garissa, Mandera and Wajir), Eastern Province (Meru North, Meru Central, Marsabit), Central Province (Nyandarua and Nyeri) and Rift Valley (Laikipia and Samburu).

Within Laikipia County, the catchment is dominated by two major rivers, which cut into generally grassy volcanic ridges: Rivers Ewaso Narok and Ewaso Ng'iro both characterised by several tributaries flowing from the Aberdares and Mt. Kenya. Ewaso Narok has its source at Lake Ol Bolossat whose catchment is the western and southern part of Aberdare ranges. It then snakes down forming Thomson Falls in Nyahururu town. This river also sustains Ewaso Narok and Rumuruti forests, Ngare Narok swamp and flows through several ranches before finally joining Ewaso Ng'iro North River at Mpala ranch.

River Ewaso Ng'iro has its source on the Eastern Aberdare ranges with many tributaries arising from Mt. Kenya including Naro Moru, Rongai, Burguret and Nanyuki. Several other tributary arise from the Aberdares ranges with Lamuria and Ngobit being the major streams. The river then flows northwards through Laikipia plains where it joins Ewaso Narok to form the larger the main Ewaso Ng'iro North River.

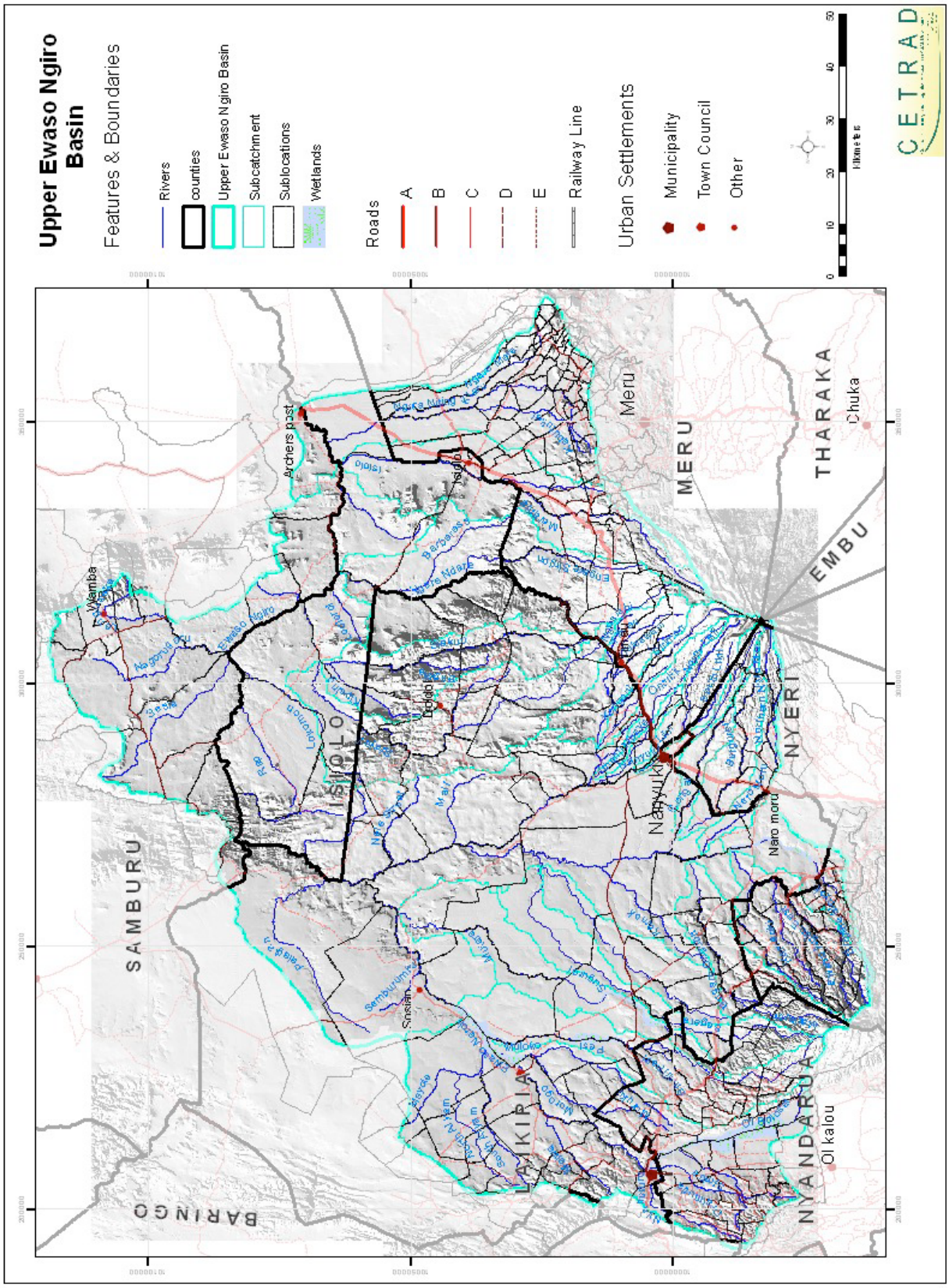

Figure 1: Map of Laikipia County showing main tributaries of the N. Ewaso Ng'iro River

CHAPTER 3: The Strategy Development Process

3.1 Strategy development team

The Laikipia Water Conservation Strategy was developed in line with the objectives of the Water Program of the Laikipia Wildlife Forum. This plan was compiled by the Kenya Wetlands Biodiversity Research Group (KENWEB), with participation of LWF water program officer (James Mwangi), 26 WRUAs, and consultation with WRMA former and current Laikipia Assistant Technical Coordinating Managers (William Hamisi and Gibson Mwangi); Upper Ewaso Ng'iro Catchment Management Officer (Felix Ooko); the Laikipia County Government (Deputy Governor, Gitonga Kabugi), LWF Forest Program Officer (Anthony Ochino).

The Water Strategy development aimed at ensuring three outputs: Laikipia Water Conservation Strategy for the Ewaso Ng'iro North; A monitoring guide for Ecosytem Health of Streams and Wetlands of Laikipia and a Documentary on Water Governance and the role of WRUAs in the Ewaso Ng'iro North.

Members of the strategy, documentary and monitoring guide development team were: Dr. Mordecai Ogada (Executive Director, LWF), James Mwangi (Water Program Officer, LWF), Brian Ochieng (Communication Technician, LWF), Gilbert Momanyi (Monitoring and evaluation officer, LWF), Prof. Nathan Gichuki (UoNbi/KENWEB), Dr. Wanja Dorothy Nyingi (National Museums of Kenya / KENWEB), Dr. Olivier Hamerlynck (KENWEB), Quentin Luke (NMK/KENWEB), Joseph Gathua (NMK/KENWEB), Chege Njoroge (KENWEB), Gilbert Kosgei (UoNbi/KENWEB) and Steve Omari (KENWEB).

3.2 Stages of the Water Conservation Strategy development

- **Initiation Stakeholders meeting** held on the 23rd to 24th May 2013 at Nanyuki Sportsman Arms where the Chairpersons of 25 WRUAs attended in order to provide inputs on elements which the strategy should address including its vision, mission and key issues including water allocation, water governance and environmental sustainability.

- **Field visits** to 26 WRUAs for further consultative discussions to follow up on the main themes discussed at the Stakeholders meetings. Discussions focused on challenges and strengths of the WRUAs in Water allocation particularly in regards to their capacity to ensure enforcement of regulations, compliance by members and governance of the group. The WRUAs also discussed priority areas that partnerships would be required to support efficiency in water allocation and governance.

- **Consultations with WRMA**: The purpose of this step was first to discuss with WRMA the findings from the field visits in order to find out what support WRUAs have received so far in order to overcome challenges in enforcement, compliance and governance. Secondly, the team was able to discuss the sub-catchment plans developed for the various WRUAs and gather information on characteristics of the sub-catchments and the water resources in use and managed by the WRUAs; challenges, causes and remedies in water allocation and governance.

- **Consultations with the Laikipia County Government** took place between August and December 2013 whereby LWF Water Program Officer held discussions with county Governor

and Deputy Governor regarding water policies, the role of county in development of the water sector and contributed to the refining of the draft Water and Sanitation Services Bill, 2013 through stakeholder consultative meetings.

- **Stakeholder Validation**: The draft strategy was circulated to stakeholders (including WRUAs, County representatives, WRMA, conservation and government agencies and others) in January 2014 for comments. At a stakeholder's validation workshop held on 13th and 14th February 2014, the strategy was presented to all stakeholders to allow further input and validation of contents.

3.3 Structure of the Water Conservation Strategy

CHAPTER 4 – CHARACTERIZATION OF SUB-CATCHMENTS AND WRUAs:

This section summarizes key features and water resources of the sub-catchments and the WRUAs within them. The main source of this information is the sub-catchment plans. The section also highlights some challenges faced by WRUAs in water allocation, and provides remedies suggested during the development or formalization of the WRUAs or during the development of the sub-catchment plans.

CHAPTER 5 – COMPLIANCE, ENFORCEMENT AND GOVERNANCE:

This section presents a recent characterization of the present status of challenges in water allocation based on findings from field visits with WRUAs and other stakeholders. It underscores challenges in enforcement of by-laws, compliance by members and governance of the WRUA.

CHAPTER 6 – VISION, MISSION, STRATEGIC OBJECTIVES AND ACTION:

This section outline the overall strategic objectives of the Water Conservation Strategy including specific objectives within three strategic areas: Water use and allocation; environmental sustainability and water management and governance. The actions to be taken in order to address these objectives are also outlined for each strategic area.

CHAPTER 7 – REPORTING, MONITORING AND EVALUATION:

This section deals with formats for reporting, monitoring and evaluation of the implementation of the Strategy. The indicators for monitoring and evaluation of progress in implementation and effectiveness of actions are based on the priority areas to be addressed between 2014 and 2018. These will provide for review of the strategy and for lessons learnt for replication or improvement.

CHAPTER 4: Characterization of Sub-catchments

A WRUA is an association of individuals who use a common water resource for various purposes, or individuals affected by or have an interest in a water resource within a delineated sub-catchment. The Water Act 2002 recognizes WRUAs as agencies for collaborative management of water resources as sub-catchment level. A WRUA in order to be considered as a legitimate partner in water resource management requires a constitution which underlines its capacity to promote collaborative management of specific water bodies and geared towards promoting public participation, conflict resolution, gender main-streaming and environmental sustainability.

Laikipia Wildlife Forum has since 2009 supported the formation and operationalization of 31 WRUAs of the ENNCA. These WRUAs are less than the required number for optimal water allocation governance and catchment protection.

4.1 Equator Sub-Catchment

The Equator River is approximately 40 km long and is fed by two springs around Ngano area. River Kahuaga runs almost parallel to Equator River and is approximately 60 km draining into Nyahururu River near St Bernard's Secondary School. Nyahururu River is a major tributary of Equator River and confluences near Ngomongo. Munanda spring also drains into Equator River near Riverside estate. Oraimutia joins Equator River near Kibathi area and the whole system finally drains into Ewaso Narok system at Manguo area (Hippo pool).

The following **water resources** are recognized and utilized by the WRUAs:

Off stream dams

1. ExColony Dam – Plot No Nyandarua/Oljoro Orok West/51 And 52
2. Gatimu Dam In Gatimu
3. Olbolosat Dam (Gatothua Dam)
4. Suera Dam – Private
5. Wahome Dam (ex Shah Dam) – Private

Main in stream dams

1. TRossPlot Nyandarua / Oljoro Orok West/49
2. ExJohn Phillip Nyandarua / Oljoro Orok West/61
3. Gathanji Dam Nyandarua / Oljoro Orok West/184
4. ExSmith Dam Nyandarua / Oljoro Orok West/196
5. Kamwana Dam Nyandarua / Oljoro Orok West/1839

Boreholes

1. Ngano – Public
2. Njoro borehole – Public
3. John Phillip – Public
4. Suera Pondo farm – private

Challenges and Opportunities: The challenges, causes and remedies that the WRUA considers for immediate development and improvement are outlined in the table below.

CHALLENGES	CAUSES	REMEDIES
Water shortage	Planting of water unfriendly trees in the riparian area (blue gums) Drought High population increase Broken Spillways Underground seepage Dilapidated dams Deforestation and or degradation of vegetation Water weeds Soil erosion Inefficient usage of water Inadequate water storage facility Over abstraction	Uproot and replace unfriendly species of trees with indigenous trees Increase water storage and harvesting Afforestation and protection of the seedlings Initiate soil and water conservation programs Rehabilitate dams
Destruction/ encroachment of riparian land	Unidentified dam boundaries Unpegged riparian areas Land grabbing Illegal logging	Land-use planning Pegging of the riparian area Reclamation of grabbed land Reforestation Enforcement of the law
Pollution	Washing of vehicles, milk cans, clothes and bathing Agricultural chemicals disposal Direct watering of animals Slaughter house effluent discharge and sewerage overflow Shallow pit latrines Encroachment of riparian land Flooding and surface runoff Inadequate sewerage system coverage	Enforcement of the relevant laws Erection of antipollution sign posts Sensitization and awareness Fencing of dams and springs Recommend expansion of sewerage system Construction of designated washing area Construction of cut-off drains
Illegal abstraction	Ignorance of the law Disrespect of the water governing laws Land disputes	Improved enforcement Establishment of conflict resolution committee Establish a monitoring system
Weak WRUA	Inadequate resources (financial and technical support) Inadequate collaboration /coordination among stakeholders Conflicting laws/policies inadequate political support	Capacity building and exposure visits Initiate income generating activities Enhance collaboration with other stake holders Harmonize policies Implement the Sub-catchment Management Plan

4.2 Ndivai Sub-Catchment

The NWRUA sub-catchment is generally a dry area with seasonal dams and streams. It has minimal rainfall with two seasons March-April and October-November. The Ndivai Sub-catchment has no permanent rivers save for several small streams that feed the main seasonal Muruku River. However the area is endowed with many dams.

Many of the dams are silted due to erosion from bare sections in the SC. The catchment that serves this area is Ndaragwa Forest in Aberdare Ranges. The SC has several marshes of which some are on private land, therefore, there is need to sensitise the land owners on their importance in water balance.

Ndivai Water Resource Users Association (NWRUA) traverses Nyandarua North, Nyahururu and Laikipia West Districts. It neighbours Upper Ewaso Narok to the West, Pesi WRUA to the East and Lower Ewaso Narok to the North. The WRUA was formed to address challenges emanating mainly from water scarcity. The Sub-catchment is mainly arid but has a big potential especially in farming. This is evident in neighbouring areas, which have a vibrant agricultural sector as a result of increased access to water resources.

The following **water resources** are recognized and utilized by the WRUAs:

Seasonal Streams

1. Kwa Njora
2. Mukoe
3. Ngetha
4. Gwa Kung'u
5. Gachonjoma
6. Mathanji
7. Muruku

Springs

1. Gachonjoma
2. Gathimiti
3. Mukoe
4. Community
5. Gatemu
6. Gathima
7. Njora
8. Kiboya
9. Gacengo
10. Methu
11. Ririshwa
12. Kamwathi
13. WaRugu
14. Gathanji
15. Ngawa
16. Kiregethi
17. Nyandarua
18. Sadam
19. Gichini
20. Thagana

In stream dams

Along the Muruku stream

1. Kahembe
2. Wakaro
3. Gicuguma
4. NairobiA
5. Mabakuri

Along Mukoe Stream

6. Wachanga
7. WaNdubiri
8. Kimemia
9. Nyaga

Kwa Njora

10. ung'etho
11. Kwa Njora
12. Elliot

Off Stream Dams

1. Kamwathi
2. Kairu
3. Keregethi
4. Nairobi Dogino
5. Gathiri
6. WaRugu
7. Ngawa
8. Gitau
9. Kirathimo
10. Wang'ondu (private)
11. Kamatu (private)
12. Kiahiti
13. Pondo 1
14. Pondo 2
15. Upper Raichiri
16. Mayu
17. Mama Wambui
18. NdemuNdune

Boreholes

1. Karagoini
2. Kihingo
3. Mutanga
4. Pondo 2
5. Elliot
6. Salama New
7. Salama Old
8. Kahembe Dispensary
9. Pondo Catholic
10. Upper raichiri
11. Mung`etho

Rainfall: The sub-catchment receives a fair amount of rain in most parts. The average annual rainfall in the area is 750mm with the highest annual rainfall being 1000mm the areas with the lowest annual rainfall receive about 500mm.

Challenges and Opportunities: The WRUA has identified the following challenges, causes and remedies:

Challenges	Causes	Possible Solutions
Water Scarcity	Absence of a permanent river Prolonged drought Silting of the water sources Population increase Diminishing indigenous tree cover Increased planting of water unfriendly trees e.g. Eucalyptus trees Exposed water sources Inadequate storage facility Lack of exploitation of ground water Ignorance on water resource management	Rehabilitate and increase water storage and availability Encourage water harvesting and storage Afforestation Regulate and Control water abstraction Promote efficient water use and technology Recycling of Water Discourage planting of Eucalyptus Sink more boreholes
Pollution	Overflow from Pit latrine in rainy seasons Direct watering of animals Effluent discharge from the slaughter house at Gwa Kung'u Agrochemical discharge Motorcycle and clothes washing in the water resources	Sensitising the community Construction of cattle troughs Construction of washing areas and toilets Initiate sampling and analysis of water samples Promote good usage of water Construction of washing zones Enforce Public Health Act
Dam Siltation	Soil Erosion Encroachment of river banks and catchment areas Emerging of water weeds in the dams Flash floods Poor farming methods Overstocking of livestock	River bank protection Increase vegetation Plant indigenous trees Keep manageable livestock Construct Check dams

Water Use Conflicts	Uncontrolled and illegal abstraction Lack of water supply channels Water competition and conflict between farmers and pastoralists Human wildlife conflict	Designated watering points Capacity and training on conflict resolution Ensure equitable water access by all users Develop a water allocation Plan
Weak WRUA governance	Inadequate financial resources Limited management skills Young WRUA Lack of exposure	Training on management skills. Start income generating activities Resource Mobilisation WRUA exchange visits Recruit more members Enforce the WRUA constitution and bylaws
Catchment/ Riparian land Degradation	Logging Charcoal burning Forest fires Poor farming methods Encroachment of riparian land	Control charcoal burning Eliminate illegal logging Promote soil conservation Embrace proper farming methods

4.3 Oraimutia Sub-Catchment

The Oraimutia WRUA is situated in Nyandarua West District, Oljoro Orok, part of Weru and Gatimu Divisions. The Sub-catchment is considered to be in the **ALERT** status.

Oraimutia sub-catchment is endowed with plenty of water resources most of which are dams that were constructed back in the colonial times. The following **water resources** are recognized and used by the WRUA:

Dams

Along Simba River

1. Kwa Bernard Cege (private)
2. Kilometric (public)
3. Gathua(public)
4. Kibindo (public)
5. Muthinja (public)
6. AyubMwangi (public)
7. Jacob (public)
8. Ephraim Dam (public)

Along Oraimutia River

9. Wagako (private)
10. Ngugi (public)
11. Ha Nyaga (private)
12. Gichaka/Uhuru (public)
13. Pyrethrum board (Institutional)
14. Oraimutia (public)
15. Nyakariang'a (public)
16. KARI dam (institutional)

Springs: Several springs within the sub-catchment feed the rivers and dams including:

1. Jasho
2. Kanyingi
3. Gwa Ciira
4. Muinamu
5. Njunu
6. Munanda
7. Maji Chemuka
8. Ha Mathenge
9. Mukuua
10. Njenga
11. Kamau wa Rui
12. Karihia
13. Ngunjiri
14. Wa Gako
15. Muthemba

Boreholes

1. Mbombo (public)
2. Itegi (Private)
3. Primarosa (Private)
4. Alice Ndungu (Private)
5. Jerusalem (public)
6. Kariko
7. NjueNjagi (Private)
8. Mugewa Farm (Private)
9. Nyairoko
10. Kasuku Dispensary
11. Major Gatheca (Private)
12. Catholic Parish Ol Joroorok (Private)
13. Tabor Hill (Private)
14. Suera (Private)
15. Shivogo farm (Private)
16. Njunu
17. ATC Oljoroorok
18. Rehabilitation centre

Rainfall: The area receives rainfall twice per year (bimodal), i.e. long rains in March to August and short rains in October to December. These have been erratic and inconsistent in the past decade.

Challenges and Opportunities: The WRUA has identified the following challenges, causes and remedies:

CHALLENGE	CAUSES	REMEDIES
Encroachment in Riparian area	Lack of community awareness Underutilisation of dams and other water sources	Hold sensitization meetings targeting the affected areas Initiate projects such as tree nurseries Engage a surveyor to determine the boundaries Fencing off the dams and riparian pegging
Siltation of water	Lack of proper soil and water conservation measures Deforestation	WRUA to organize barazas, workshops in collaboration on soil conservation Plant water friendly trees with the help of KFS.
Reduction of water levels.	Blue gum plantations Over-abstraction of streams	Organize consultative meetings with landowners around the dams and rivers. Enforcement by NEMA
Water pollution	Direct watering of animals Washing of vehicles clothes and milk cans. Effluents from raw wastewater and agricultural chemicals Pit latrines near water sources.	Sensitization and enforcement of water rules. Erection of antipollution signposts Construction of common intakes Construction of septic tanks and washing areas
Soil erosion	Overgrazing	Encourage proper stocking rates. Initiate soil and water conservation plans
Weak WRUA	Young and inexperienced, Inadequate financial resources	Training by WRMA on IWRM WRUA exchange visits Mobilize resource Capacity build the WRUA

4.4 Rongai Sub-Catchment

The Rongai river sub-catchment is located within the Ewaso Ng'iro north catchment area (ENNCA) and traverses Nyeri and Laikipia Counties. The Rongai Sub-catchment covers a total area of 107km^2, with its perimeter indicated as 103km with an area perimeter ratio of 1.04. The highest point is 3400m above sea level while the lowest point is 1790m.above sea level.

The area is characterized by moderate rainfall and temperature.The mean maximum temperatures vary from less than 16^o C in the upper zone to 24^o C in the mean annual minimum temperatures vary from less than 4^o C to 12^o C. The rainfall station that could provide rainfall input into Rongai sub-catchment s is located at Githiuru forest station. Analysis of rainfall records from this station indicates that the rainfall exhibits abnormal pattern with two rainy peaks in April and November and without an absolute dry period. The long rains fall during the March to May period and the short rains in October to November. The area also receives continental rains July and August. The average annual rainfall in the sub-catchment s is approximately 945mm.

Water shortage is the main source of conflict among residents along the Rongai River is water shortage due to the irregularity of the river flow. The main causes of this revolve around unregulated water use and degradation of both the riparian and catchment areas. Water use conflicts between upper and lower users and between users and water authorities is also a major issue within the River. Indeed some of these conflicts have sometimes threatened to degenerate into violence. Water abstraction from the River is wholly through portable pumps for the upper and middle catchment while on the lower catchment water users rely on furrows. Unlike other rivers within the Ewaso Ngi'iro North Catchment, no piped community water project abstract water from the Rongai River.

Plate 1: Rongai dam

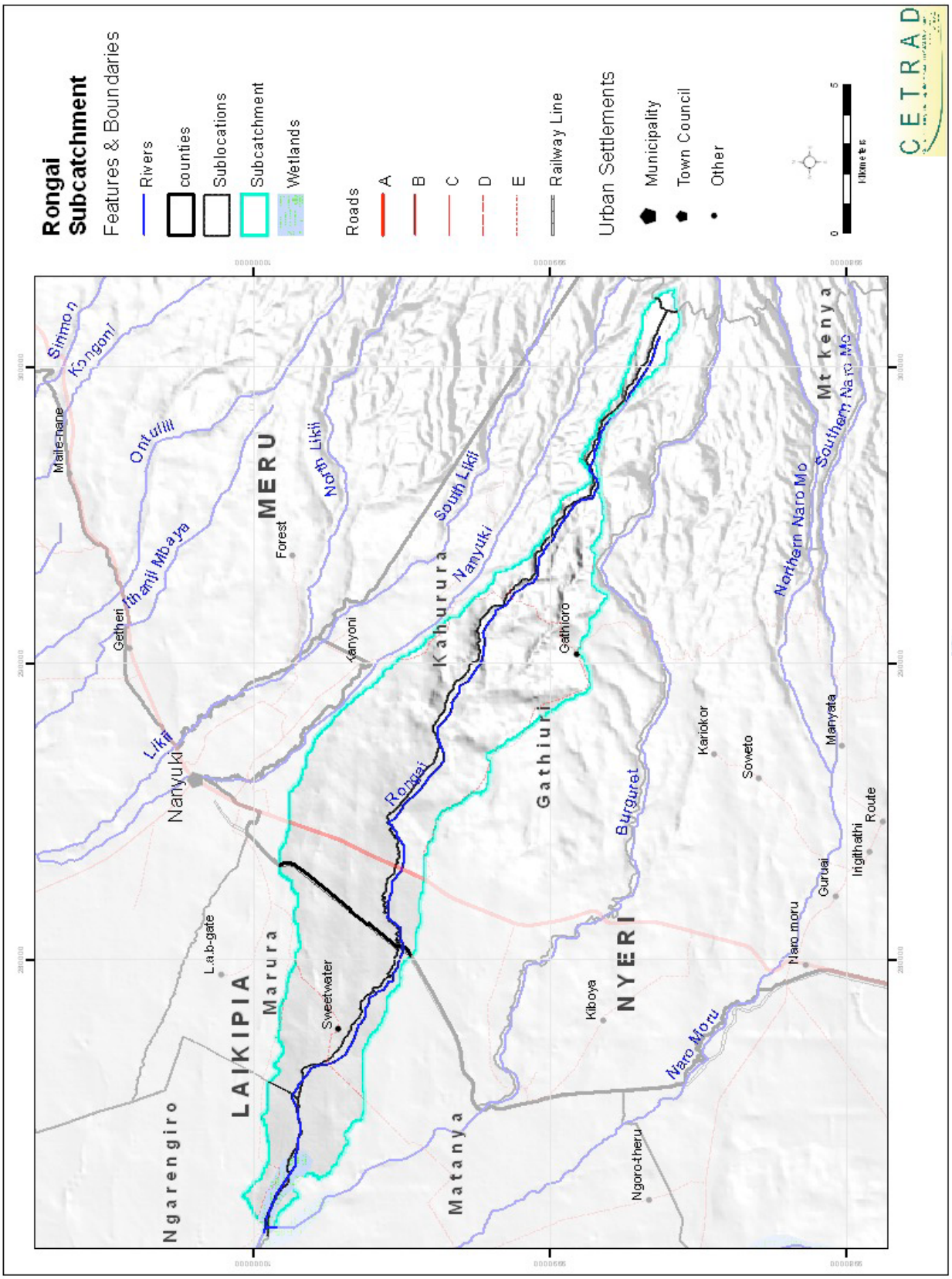

Figure 2: Map of Rongai Sub-Catchment

Challenges and Opportunities: The WRUA has identified the following challenges, causes and remedies:

CHALLENGE	CAUSES	REMEDIES
Water shortage	Wasteful use of water Destruction of catchment and riparian land Over abstraction (pumps and furrows) Increased population and settlements	Water harvesting and storage Construct 280 water pans Rehabilitation of 4 dams through desilting, fencing, tree planting and construction of livestock watering troughs (Yard A, Njoguini, Mirera and Gathingi Construct a 50 acre dam in the forest Ensure users have permits and enforce permit conditions Embark on aggressive registration campaigns to the WRUA Ensure monitoring of water use Enforce WRUA constitution Install RGSs Undertake an abstraction survey Construct common intakes and pipes Drip kit system
Degradation of riparian land	Planting of blue gum trees Cultivation on river bank	Replant indigenous along the riparian areas Establish indigenous trees nursery River pegging Plant of Napier grass along the riparian areas Liaise with authorities (chief) to enforce pegging regulations
Destruction of catchment	Demand for firewood, charcoal, and timber	Plant trees in Gathiuru Forest Enforcement to reduce deforestation Collaborate with adjacent sub-catchment WRUAs to enhance forest protection and monitoring
Encroachment on springs	Drought Lack legislation/laws	Plant trees along degraded springs Awareness building on springs conservation
Inadequate awareness on NRM	Inadequate capacity in WRUA Inadequate resources within WRUA	Train WRUA committee on CBNRM, water sector reforms Seek support from WRMA Sensitization through barazas, churches etc WRUA exchange visits

4.5 Mutara Sub-Catchment

The Mutara sub-catchment is located in Nyandarua North and Laikipia West districts, Ndaragwa and Rumuruti divisions. The Mutara River stretches 75kms, passing through Wiyumiririe, Kiamariga, Mutara and Thome sub-locations which all fall within a semiarid area. Mutara River has its source in Aberdare ranges and runs underground before resurfacing at Thigio. There are two RGS in the sub-catchment one on the upstream [5AD1] and another one [5AD4] in the lower stream.

Resources and hydrological features: Mutara River is also fed by another springs at Subego. The rocky geological formation of the river in Raya contributes water during the dry spells. The river forms a wetland along its course stretching from Kiamariga through ADC to Kihika farm. The wetland has the functional

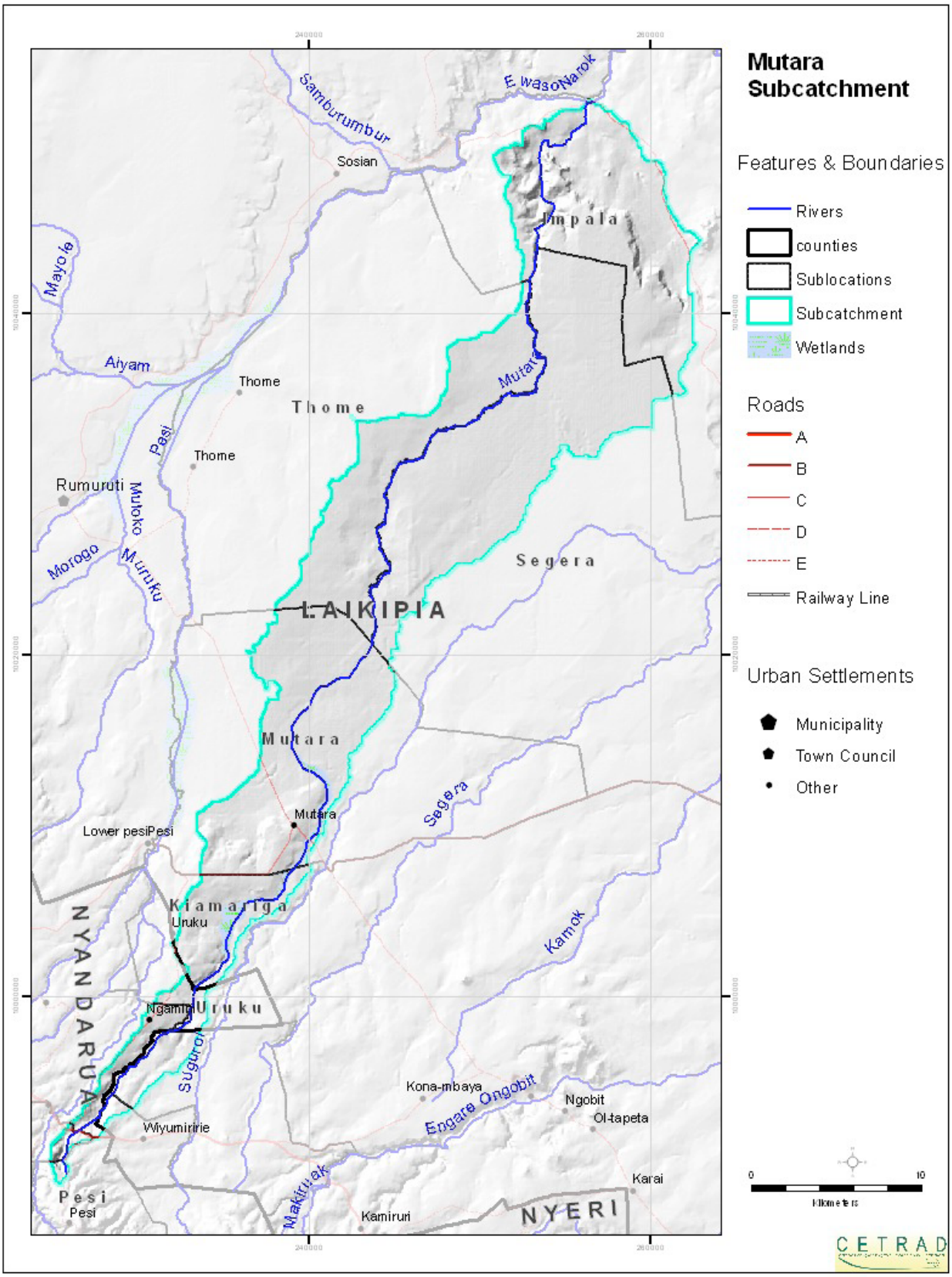

Figure 3: Map of Mutara Sub-Catchment

importance of filtering water and acting as water reservoir. At the lower zone the river is smaller, silted and usually dries up during dry spell.

At the lower zone various water resources are found along the river: a seasonal tributaryat Nyangegu contributes to additional river flow; at Mathira, a check dam built in 1953 occupies an area of approximately ¼ acre; and a waterfall at Kihika farm, which the WRUA members named Nyururu waterfalls. Finally, the river stretches through Segera Ranch and drains into Ewaso Narok River near Oldoinyo Lemboro and Suyian Ranches.

Rainfall: The sub-catchment receives rainfall twice per year (bimodal), i.e. long rains in March to August and short rains in October to December. The area has been receiving erratic rainfall for the last five years due to global climatic changes.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water scarcity and diminished downstream flow	Encroachment of wetlands and riparian areas Over abstraction and illegal abstraction Increased pollution Inefficient methods of irrigation (pumps and furrows) Population increase Lack of water storage facilities Lack of alternative sources	Create awareness Pegging of the riparian area Plant water friendly species Efficient water use improved agricultural techniques including drip irrigation Water harvesting and storage Wetland reclamation Afforestation Reforestation and forestation Encourage zero grazing Store and harvest water from flash floods [ground water recharge] Compliance and WAP
Soil erosion	Poor cultivation methods Overgrazing Poor farming methods Forest Fires	Create awareness Restrict direct watering of animals Construct cattle troughs Promote appropriate stocking of cattle Terracing of agricultural land
Pollution	Discharge of Agrochemicals Bathing in the river Human waste in the nearby bushes Washing of cars	Proper disposal of agro and industrial chemicals Construct bathrooms, carwashes, bridges, culverts Encourage use of pit latrines
Water use conflict	Poor water management Over abstraction Lack of storage Noncompliance Poverty Human-wildlife conflicts in wildlife corridors Political interference Conflicting government policies	Encourage zero grazing Enhance soil and water conservation methods Store and harvest water from flash floods to encourage ground water recharge

Water scarcity / high water demand	Ready market for horticultural products Limited resources Lack of awareness Poor farming method Climate change Unprotected water sources Unfriendly vegetation Encroachment of wetlands and catchment areas Forest fires Soil erosion Poor water mgmt. strategies	Capacity and awareness building Compliance and WAP Introduce income generating activities Construct corridors and electric fences Strengthening the WRUA through funding Create political goodwill Harmonize local policies to government policies

4.6 Kurum Sub-Catchment

The Kurum Sub-catchment is largely an arid region with low rainfall, which to a large extent affects the livelihood of the community. The key focus in the Sub-catchment is the Kurum Lagga that cuts through the Murupusi Group ranch to join the Sinyai Lagga and eventually confluences with the Ewaso Ng'iro River. This is the main water resource in the Sub-catchment and if it dries up the users walk up to 4Km to the Sinyai Lagga.

The main **Kurum lagga** is approximately 60 Km long. The **Sinyai Lagga** is fed by the following laggas:

1. Loloirienito
2. Lolkole
3. Nemuruguti
4. Nolgirigir
5. Nenkelelit
6. Saramba
7. Noolkonol
8. Terenkwe
9. Leramat
10. Lekasana
11. Nolpushuruti

The Sub-catchment receives rainfall in the months of April and November. The average rainfall is below 500mm per year.

Plate 2: Kurum lagga

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies :

CHALLENGES	CAUSES	REMEDIES
Water scarcity	Lack of storage facilities Lack of rain water harvesting facilities Destruction of the catchment Climate change Population growth Poor management of water resource Destruction of water infrastructure by elephants Sand mining Lack of skills and resources to construct and rehabilitate storage facilities	Construction of water storage facilities e.g. sad dams, rock catchments Construction of water harvesting infrastructure e.g. roof tanks, pans Awareness creation on effects of tree cutting and planting of drought resistant trees. Awareness creation on family planning Institute management committees for water projects Collaborate with KWS, LWF, AWF for electric fencing around water infrastructures Collaborate with group ranch committee for identification of measures to control sand harvesting. Enforce the group ranch and WRUA bylaws. Mobilize resources and engage experts for infrastructural development.
Weak institutions	Newly formed WRUA	Capacity build the WRUA in various areas e.g. leadership Mobilization/awareness creation to members Establish WRUA office Recruitment of members and increase membership to 200
Catchment degradation	Charcoal burning Soil erosion Overgrazing Population growth Tree felling and damage by elephants Poor enforcement of the law	Awareness creation Soil conservation by using e.g. gabions, re-vegetation Introduction of Holistic management within the group ranch Control grazing by zoning and destocking Enforce the bylaws Create awareness on family planning Collaborate with K.W.S Promote nature based enterprises e.g. beekeeping, aloe planting
Water pollution	Population growth Lack of awareness	Create awareness on proper hygiene and sanitation Enforce the bylaws

4.7 Muhotetu Sub-Catchment

The Muhotetu Sub-catchment is situated in Laikipia West district, Muhotetu Division and covers Muhotetu and Karaba locations. The Sub-catchment is endowed with plenty of water resources, which mainly comprise of springs and wetlands. However, a poor allocation system hinders the full utilization of these resources.

Muhotetu Sub-catchment has a combination of several **water resources**, which include wetlands, dams, springs and boreholes. Each resource has its own unique challenges.

Major springs:

1. Lariak
2. Kiambogo
3. Kagumo
4. Muhotetu
5. Kangumo
6. Squarter
7. Gathimindire
8. Gatami
9. Gachoro
10. Raria
11. Bireti
12. Mutarakwa
13. Michatha

The **major wetlands** are Muhotetu, Kahinga and Kinyungu

Boreholes: Muhotetu Girls, Chemu community, Muhotetu Catholic, Chereta primary.

Dams:

1. Muhotetu
2. Chui
3. Majani
4. Chereta
5. Munanda
6. Njaukuri
7. Ibangua
8. Kabage
9. Ndathimi
10. Soilo
11. Namogot
12. Shem (proposed)

The area receives rainfall twice a year, long rains from March to August and short rains from October to December. In the past three years rainfall pattern has changed which has resulted to erratic rainfall seasons.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water scarcity	Inadequate water harvesting and storage facilities. Poor water storage infrastructure design and destruction by flooding. Degraded catchments. Lack of a WAP. Degraded catchments.	Mobilize resources to facilitate rehabilitate and construct water harvesting and storage facilities. Engage technical experts in developing proper designs for the infrastructures. Promote to the community efficient water harvesting and storage means at the household level. Plant appropriate trees and other vegetation at the catchment areas. Institute management committees for the infrastructures Develop an efficient WAP Construct common intakes/self-regulating weirs Protection of the catchment areas by e.g. fencing of the spring area.

Water pollution and siltation	Poor cultivation methods. Overgrazing Direct watering of livestock Car/clothes washing and bathing in or close to the water sources.	Encourage responsible cultivation and grazing methods. Observe right stocking rates. Construct livestock watering troughs. Construct public washing and bathing facilities. Enforce compliance to the by-laws.
3. Weak WRUA	Poor management skills	Capacity building the WRUA on various issues pertaining to governance, financial management. WRUA exchange visits Mobilization/sensitization barazas Increase the number of members

4.8 Mid Ewaso Sub-Catchment

The Mid-Ewaso Ng'iro River traverses the Laikipia, Isiolo and Samburu counties. The main inhabitants are the Mukogodo Maasai, Samburu, Turkana, Borana and Somalis. The Sub-catchment is classified as ASAL with the main land use being pastoralism, ranching and tourism in the lower zones with tourist facilities including Buffalo springs lodge, Sarova Shaba and the Samburu National reserve.

RESOURCES: The main river is the Ewaso Ng'iro River, which in recent years has dried up more frequently affecting the downstream ecosystem negative.

There are a number of **springs**exist with the main one being the **Buffalo Springs**, which are protected and conserved by the Buffalo Springs Lodge. The springs are very important as they recharge the downstream flows of the river. The length of the Ewaso covered by the Mid-Ewaso Ng'iro WRUA (MEWRUA) is approximately 140Km.

There are also **seasonal rivers / laggas** that drain into the Ewaso which include:

1. Loosupukiai
2. Leshashi
3. Kirimon
4. Parkare
5. Nkoteiya
6. Looseketet
7. Logaaman
8. Longoopito
9. Kipsing
10. Loloroi
11. Ngare Ntare
12. Mugur Nanyori
13. Isiolo River
14. Ngare mara
15. Sesia
16. Nagor Oworu
17. Pukur
18. Laresoro
19 Shaba (protected by Sarova Shaba Lodge)

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water scarcity	Lack of water harvesting techniques Uncontrolled abstractions Climate change Siltation of existing sources Destruction of vegetation around water sources Destruction of the catchment areas	Construction of harvesting infrastructures i.e. dams, pans, rock catchments, sand dams, storage tanks (roof harvesting) Enforcement of water act 2002 Catchment protection Alternative sources of water e.g. borehole, shallow wells, trans basin water; Awareness creation on conservation of water sources

Soil erosion and siltation	Encroachment of riparian areas Soil erosion Deforestation Poor land use practices Poor management of water sources	Protection and conservation of water sources Soil conservation capacity building Desilting of dams and pans Re-afforestation land use planning
Pollution	Surface runoff Agrochemical wastes Poor cultivation methods. Overgrazing Direct watering of livestock Car/clothes washing and bathing in or close to the water sources.	Promote vegetation cover Discourage riparian area cultivation Avoid discharging agricultural waste into the water sources Encourage Water Sanitation and Health (WASH)
Soil erosion	Land degradation Over stocking Surface runoffs Poor agricultural practices	Enhance proper land management practices i.e. gabions, check dams, tree planting, reseeding, cutoff drains Reclaim grazing areas invaded by unpalatable species Planned grazing
Destruction of the sub-catchment ecosystem through tree cutting and sand harvesting	Leading to encroachment of forest areas Increased demand for farming land Lack of income generating activities resulting in Charcoal burning Poor enforcement of policies	Rehabilitate and conserve the existing ecosystem areas Tree planting, Awareness on the importance of ecosystem management Sensitize and enforcement of the relevant acts

Plate 3: Mid Ewaso water tank construction in 2012

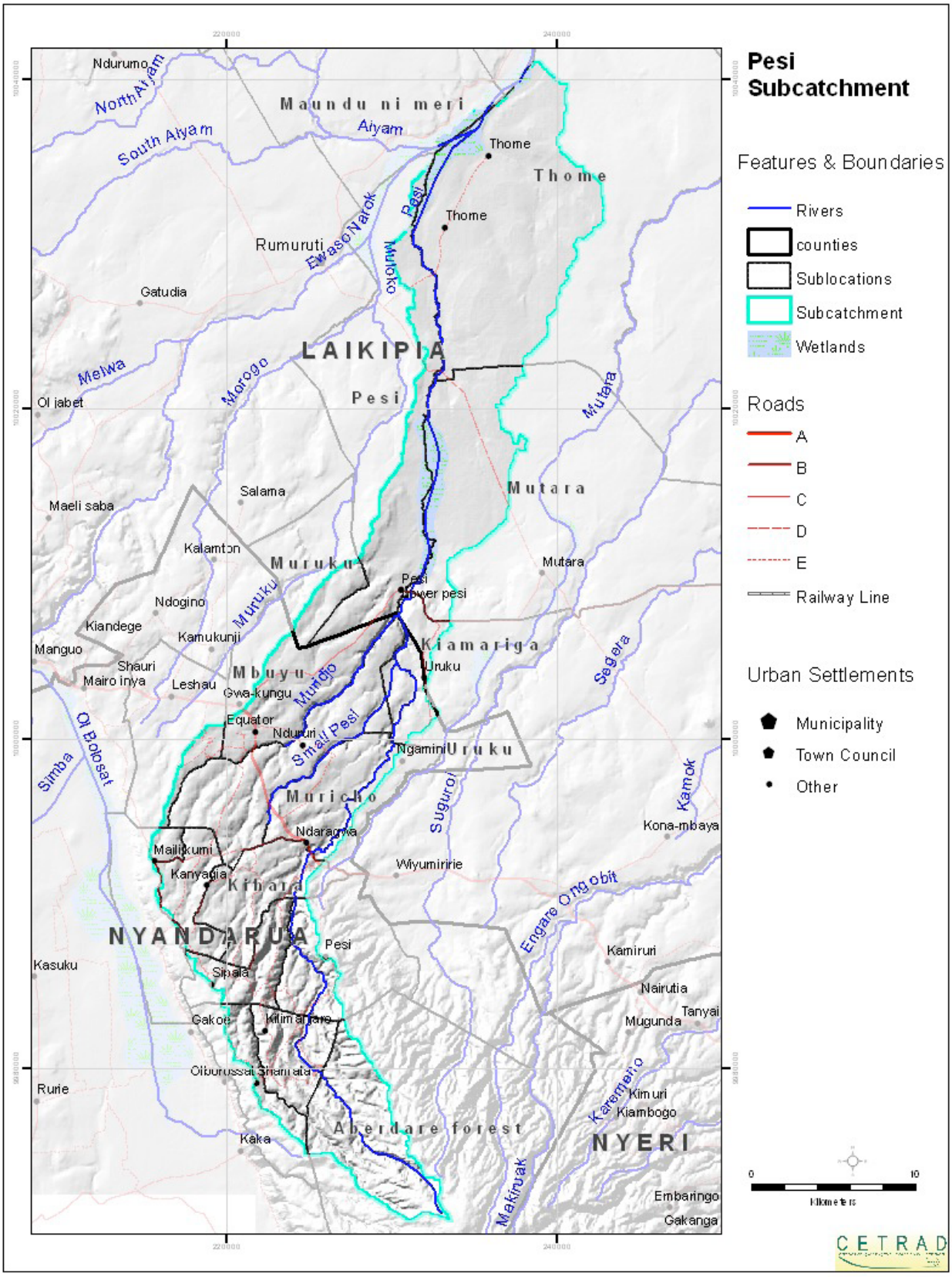

Figure 4: Map of Pesi Sub-Catchment

4.9 Pesi Sub-Catchment

The Pesi river is 97km long and has its source from the Aberdare Mountain in Nyandarua South and traverses through Laikipia west where it joins Ewaso Narok near Mathira settlement scheme. The upper area of the Aberdares Mountain receives heavy rainfall of about 1020 mm per annum. The mid-sub region is sub humid with about 800mm per annum of rainfall and the lower side of the sub-catchment is semiarid and receives approximately 610mm per annum of rainfall.

Resources: There are many small streams emerging from the upper zone that later joins to form the Pesi River. The average rainfall within the region is 800mm per annum.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water Shortage	Increased drought periods Over abstraction Silted dams Non functional boreholes Lack of water harvesting and storage facilities	Conserve the environment Law enforcement Build common intakes Desilting and maintenance of dams Repair boreholes Increase storage tanks Discourage furrow irrigation and unlicensed water pumps
Catchment destruction	Tree cutting Riparian cultivation Cultivation of sloppy areas Charcoal burning	Afforestation Capacity building River pegging and riparian rehabilitation Enforcement of agriculture act Energy saving jikos and alternative sources of fuel energy
Water pollution	Direct watering of livestock Disposal of chemical cans Washing of clothes and vehicles in the river Cattle spraying near water source	Construct common washing areas and watering trough Enforcement on pollution control
Weak WRUA	Lack of capacity on water governance	Organize capacity building workshops WRUA awareness building and exchange visits

4.10 Ngare Ndare Sub-Catchment

The total length of the Ngare Ndare River is 82.5 km while the total approximate length of all rivers within the catchment is 1057 km. There are a total of 10 recorded abstraction points; and no gauging stations. The larger Ngare Ndare sub-catchment covers a total area of 1012km^{2,} with its perimeter indicated as 243km with an area perimeter ratio of 4:16.The highest point is 3580 m above sea level, while the lowest point is 900m above sea level. The average annual rainfall is 655mm, with a high of 1000mm and low of 470mm in different regions of the sub-catchment. It borders the Ngare Nyting and Timau sub-catchments.

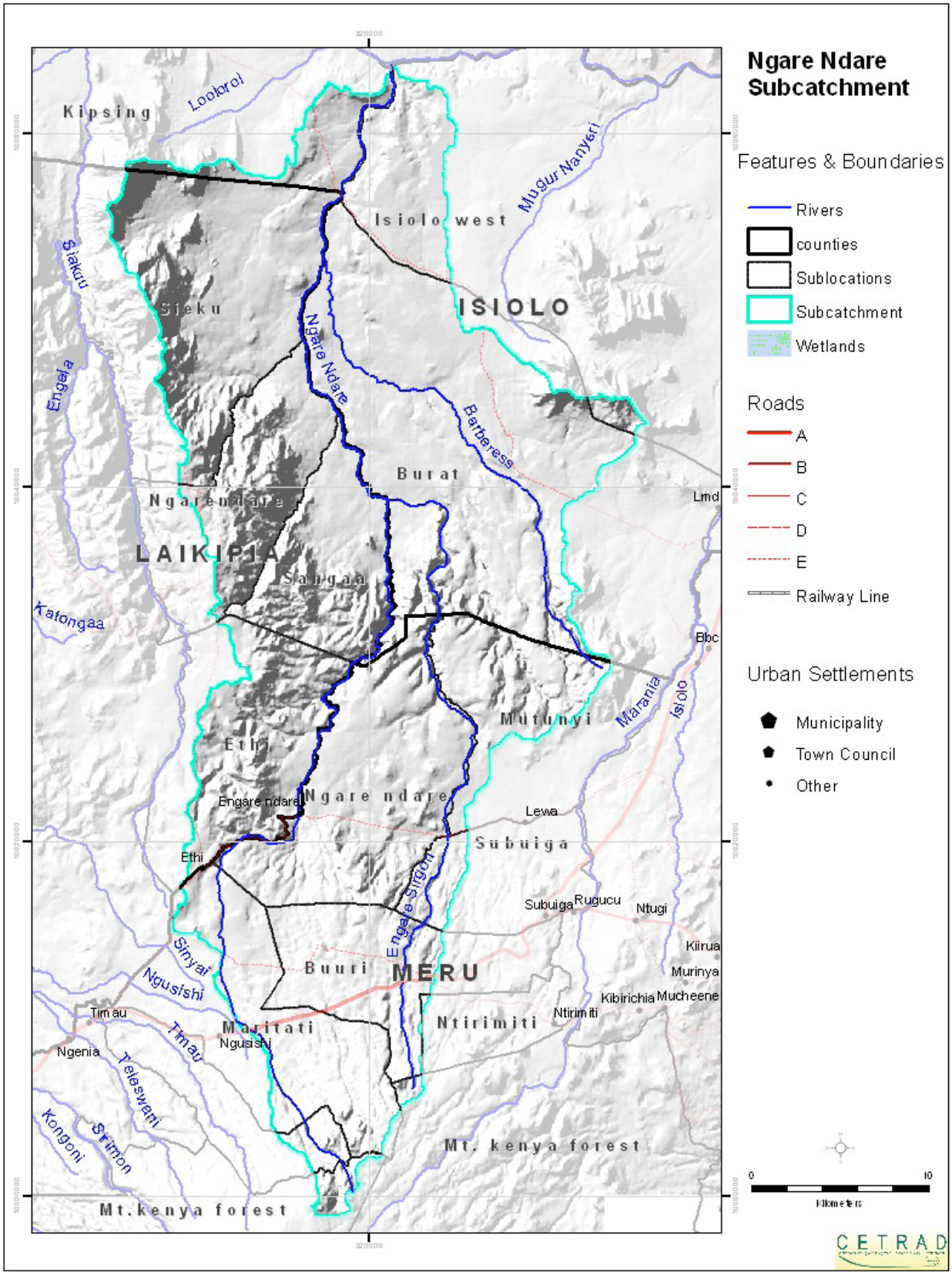

Figure 5: Map of Ngare Ndare Sub-Catchment

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water Shortage	Over/Illegal abstraction Water on use conflicts Environmental degradation Population increase Inadequate enforcement of the WRUA constitution Wasteful/inefficient water use Poor allocation of water use permits Lack of alternative water sources/ unexploited water sources Inefficient water use: wasteful irrigation methods (furrows and overheads)	Construction of harvesting infrastructures i.e. dams, pans, rock catchments, sand dams, storage tanks (roof harvesting) Enforcement of water act 2002 Catchment protection Alternative sources of water e.g. borehole, shallow wells, trans basin water; Awareness creation on efficient irrigation methods including drip irrigation
Catchment degradation	Inappropriate farming practices Land ownership conflicts Tree cutting in the forest and on riparian land Replacement of indigenous vegetation with exotic trees Grazing in the forest and along springs	Afforestation Capacity building River pegging and riparian rehabilitation Enforcement of agriculture act Energy saving jikos and alternative sources of fuel energy
Weak WRUA	Inadequate capacity among management committee Inadequate support from WRMA Lack of funds Large catchment and great diversity of land-use	Capacity building of committee on water governance Increased support from WRMA for enforcement and member mobilization Improved communication between upper, mid and lower zones

Plate 4: Ngare Ndare river

4.11 Teleswani Sub-Catchment

The Teleswani sub-catchment traverses two districts namely, Meru Central and Laikipia East. The total length of the Timau River is 38 km while the approximate length of all the rivers within the catchment is 246km.There was a total of 77 abstraction points along the river and eight (8) gauging stations. The Teleswani WRUA is found in the larger Timau sub-catchment that covers an area of 268 Km^2. With a perimeter of 128km, the highest point is 3580m and a low point of 1830m.The average annual rainfall is 738mm with a high of 880mm and low of 600mm.It is in the ALARM status.

There are a number of wells, springs, wetlands, rock catchments and laggas within the subcatchment although a survey is required to determine their number and record their location.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water pollution	Dumping garbage near the river (Ken trout and Mia Moja market) Agrochemicals from farming activities	Improve garbage disposal and enforcement on pollution control
Degradation of catchment	Deforestationand soil erosion Riparian cultivation Land ownership conflicts and encroachment in wetlands and spring areas Replacement of indigenous trees with exotic especially Eucalyptus	Wetland reclamation and pegging of riparian areas Discourage planting of eucalyptus by enforcement of NEMA regulations
Water Shortage	Lack of water harvesting and storage Over / illegal abstraction (furrows and pumps Wasteful/inefficient water use	Use of appropriate technology such as drip kits Increase awareness on efficient water use methods use of water meters for projects and households
Weak WRUA	WRUA doesn't have adequate resources Little support from water authorities Poor/low community participation in WRUA activities	Capacity building of committee on water governance Mobilization campaigns of WRUA members Increased support from WRMA on water abstraction permits

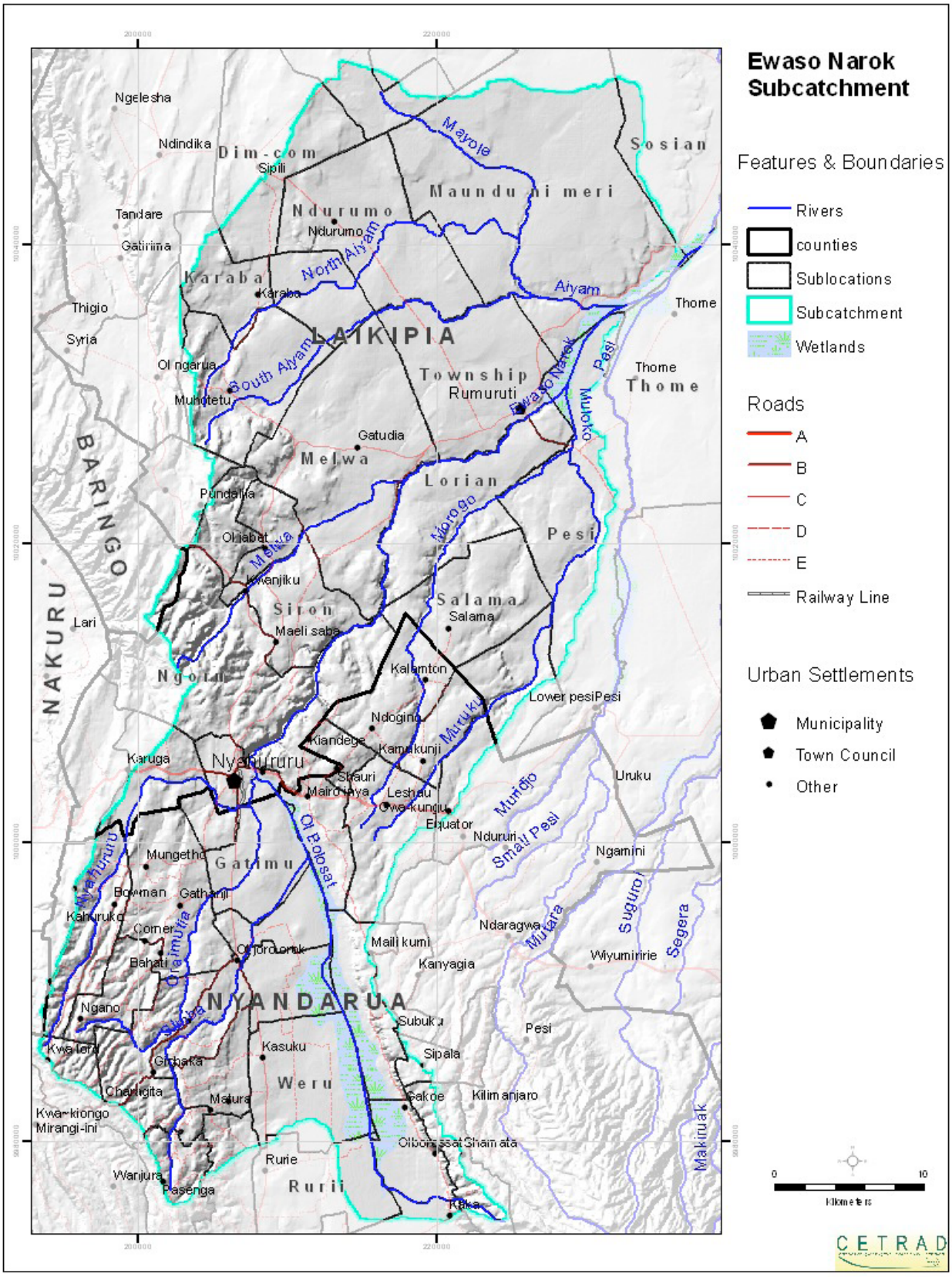

Figure 6: Map of Ewaso Narok Sub-Catchment

4.12 Lower Ewaso Narok Sub-Catchment

The Lower Ewaso Narok river flows from the bridge along Rumuruti/ Nanyuki road for less than 1km before entering the famous Ewaso Narok Papyrus swamp. The swamp is fed by the seasonal Muruku stream and the Pesi River from the southern side and Kandutura and the Aiyam (seasonal). On the North bank the swamp stretches for 17km up to the Veterinary Outspan at Ol Maisor.

The Ewaso Narok thereafter continues its flow to confluence with the Ewaso Ng'iro at Loisaba/Mpala Ranch junction. The Ewaso Narok River is also fed by the Mutara (seasonal) which comes past Mathira 2 and through Ol Doinyo Lemboro Ranch (Tomlinson).The total length of Ewaso Narok Main River is 95km and has two gauging stations at Rumuruti/Nanyuki Bridge (5AC15) and 5AC8 near Loisaba ranch.

Ewaso Narok sub-catchment receives a fair amount of rain in most parts. The average annual rainfall in the area is 840mm with a range of 450-1090mm. The upper zone has higher rainfall and people practise rain fed agriculture with no irrigation possible due to the deep channel of the river in this zone. Several community water projects exist in the upper zone. The Nyahururu Water and Sanitation Company (NYAHUWASCO) supplies water to urban populations including the Rumuruti Town's council.

The Lower Ewaso Ng'iro WRUA (LENWRUA) has been categorized as being in the ALARM status by the WRMA.

Plate 5: Car wash at Rumuruti

The following **water resources** are recognized by the WRUA:

Water Projects

1. Mutamayu
2. Aiyam underground
3. Thome water development

Dams

1. Thomis
2. Ol Maisor
3. Suyian Ranch
4. Ngurale

Boreholes

1. Shabaha
2. Catholic (3 church 1 community)
3. Bobong
4. Maji Mingi
5. Glois
6. Macunguru
7. Suyian Ranch
8. St Louis
9. Sosian (1 church; 1 community)
10. Ngare Mare
11. Alenya
12. Njangiri
13. Ol Maisor
14. Ngurale

Fish ponds

1. Kango Mami
2. Rumuruti advocacy

CHALLENGES AND OPPORTUNITIES: The WRUA was established during mobilisation meetings in order to discuss various challenges listed below. The causes and remedies in regards to these are also summarized:

CHALLENGES	CAUSES	REMEDIES
Water Scarcity	Over irrigation due to high population Illegal /over abstractions Poor irrigation methods e.g. furrows Lack of water harvesting and storage Lack of awareness on permitting Lack of awareness and techniques of spring protection Destruction of spring resources Encroachment of water sources	Riparian pegging and conservation Desilting dams and catchment protection Promote efficient irrigation methods Tree planting Enforcement of laws Develop/promote storage reservoirs Protection of springs Abstraction survey Water allocation plan Support members in developing hydrological reports, master meters and individual meters Delineation of water source boundaries
Catchment degradation	Lack of awareness Lack of enforcement of laws Lack of agriculture extension support Absenteeism of land owners especially on government lands Overgrazing Overpopulation Poor land use methods e.g. quarries, and cultivation in riparian areas	Training/capacity building Enforcement of WRUA bylaws Land-use planning to promote alternative land use system and ecotourism Training on proper stock rates of livestock Promote climate change adaptation techniques Riparian pegging and conservation

CHALLENGES	CAUSES	REMEDIES
Weak WRUA	WRUA still at the formative stage Lack of capacity/ exposure Lack of resources (transport, finances, office) Poor communication methods/poor network coverage Poor collaboration with other stakeholders Lack of commitment WRUA not yet known by residents	Capacity building and WRUA exchange visits Exposure tours Resource mobilisation Membership recruitment Purchase of communication equipment Improve collaboration through regular meetings and joint activities Organise stakeholders forum Replace committee as per the bylaws
Pollution	Poor use of agrichemicals Direct discharge of effluent into the river Direct washing of clothes, cars, people, cattle Lack of enforcement of public health policy Lack of sewage infrastructure within the Rumuruti town Lack of water treatment works Spraying of cattle near the river	Undertake pollution survey Awareness creation on effects of pollution and its control Awareness creation on proper hygiene and sanitation practices Strengthen and enforce Bylaws to discourage direct washing, spraying, livestock watering etc. Construction of sewage and treatments works Advocate for review of pollution penalties
Encroachment of wetlands	Poverty and landlessness Aridity of surrounding areas High potentialof land assumed to be idle Lack of awareness on importance of the wetland Displacement of people due to insecurity in surrounding farmlands	Undertake evaluations of activities in wetlands and their impacts Delineation, conservation and establishment of a management system for the wetland Awareness creation on the importance of the wetlands Resettlement of the landless and displaced persons Improve security in the sub-catchment

4.13 Suguroi Sub-Catchment

The Suguroi Sub catchment covers an area of 399Km^2 from the Aberdare forests through Wiyumiririe farms, Suguroi ranch, Subego, Wamula, ADC Mutara, Thome and Ngorare. The River is approximately 90 km long and has 45 recorded abstraction points and one gauging station. The tributaries are Kariogo and Kabongo. Alongside there are springs, two boreholes and several dams that need desilting. Rainfall ranges between 520mm980mm.

The Aberdare National Park is located in the upper zone and protects sectins of the water source. The upper zone is also characterized by highly irrigated riparian cultivation while in the middle zone this is impossible due to the deep channel of the river.Suguroi ranch is located in this middle zone and protects a relatively large number of wildlife that uses the river water; there are also several woodlots blue gum trees along the riverbank in this zone. In the lower zone there is high riparian cultivation that relies almost entirely on irrigation.

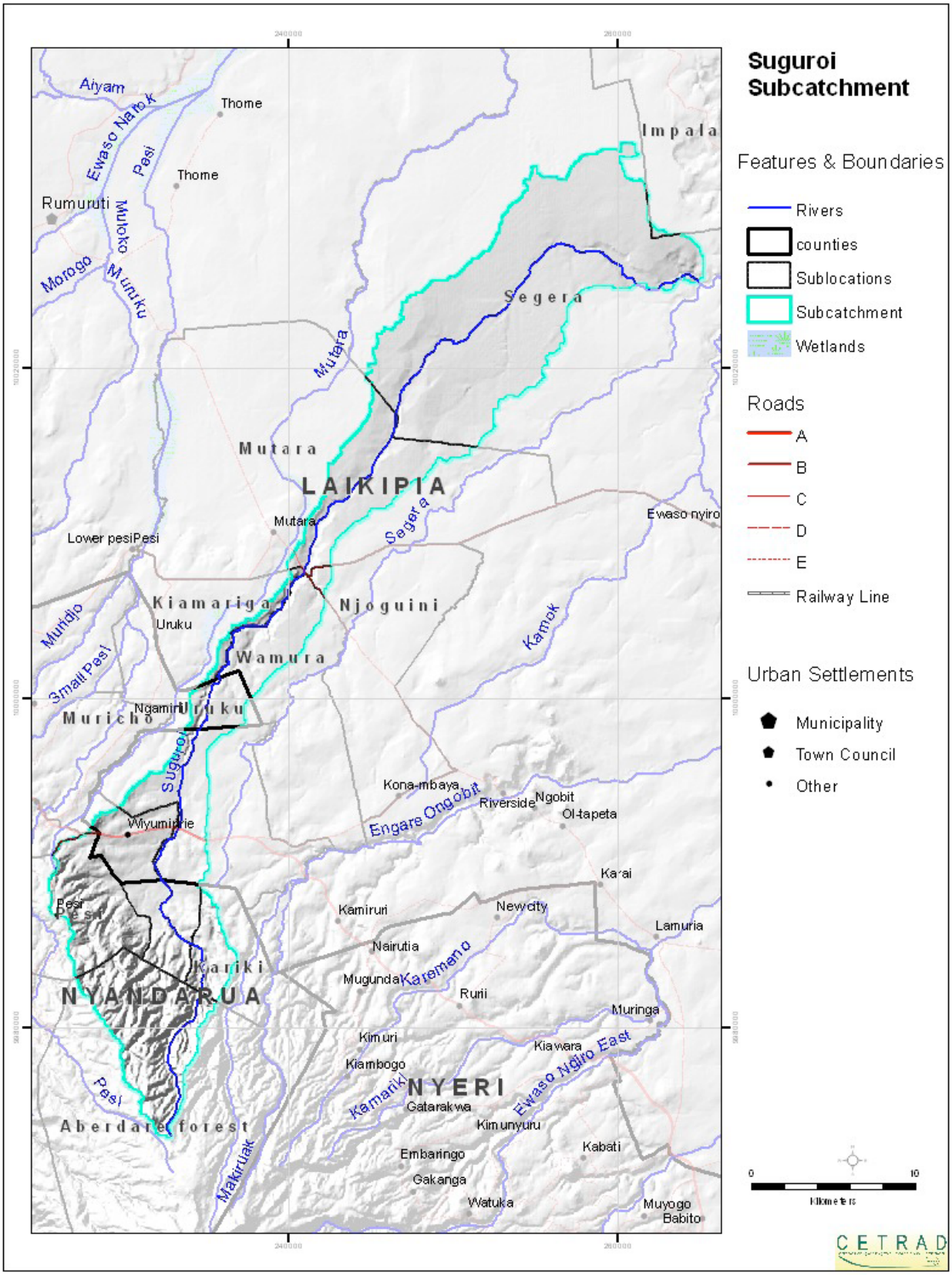

Figure 7: Map of Suguroi Sub-Catchment

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water Shortage	Lack of water harvesting and storage Poor policy enforcement Planting of water unfriendly trees i.e. Blue gum Inefficient water use methods Illegal and Over abstractions due to difficulty of attaining abstraction permits	Catchment and riparian area conservation Construction of dam/roof catchments Awareness creation and strengthening of WRUA Capacity building on efficient water use methods
Catchment destruction	Cutting down of trees Illegal logging Fire outbreaks Riparian cultivation Charcoal burning	Afforestation and protection of forests and woodlots Riparian pegging Planting of water friendly plants along the riparian area Diversification of fuel options besides wood fuel and charcoal
Water pollution	Washing of clothes and vehicles in rivers Direct watering of animals Agricultural chemicals Dumping of raw sewage from Wiyumiririe	Address the raw sewage dumping issue Create awareness on disposal of agricultural chemicals tins or cans Enforcement of bylaws
Weak WRUA	Inadequate institutional capacity Poor mobilization of members Inadequate resources Poor communication Poor collaboration with WRMA Poor financial capacity Lack of adherence to bylaws by members	New member recruitment Mobilization of members Mobilization of locally available resources Training of committee members Awareness creation to members Improve communication through use of mobile phones and email among committee members.

4.14 Nanyuki Sub-Catchment

The Nanyuki River arises from high altitude of Mt. Kenya, flows through mid-altitude around Nanyuki town then through the low-lying plateau of Dol Dol before joining Ewaso Ng'iro. It is joined by rivers Likii, Timau and Naromoru and is perennial in most times of the year, drying during severe drought periods.

The upper part of the sub-catchment has high to medium agriculture potential and a higher proportion is forested. Rain dependent subsistence and commercial farming is practiced and supplemented by irrigation in dry months. The mid altitude zone passes through Nanyuki town with a population of fifty thousand persons, while the lower zone is semiarid with the main socio economic activity being ranching and agro pastoralism.

The Nanyuki sub-catchment receives bimodal rainfall averaging 400mm/yr. in the lower areas and 1200mm/yr. in the high lands. The winds are very strong and dry, and normally influence the rainfall pattern. Temperatures range from 12°C in the high lands and goes up to 40°C in the ASAL areas.

Based on geology, climate and altitude the sub-catchment can be sub-divided into:

- High potential zone: high altitude areas above 1976m above sea level along the slopes of Mt. Kenya.
- Medium potential zone (sub humid areas): medium to high altitude grasslands with scattered trees and scrubs occurring on the southern and eastern slopes of Mt. Kenya between 912m and 1824m above sea level.
- Low potential zone. arid low altitude areas characterized by woody shrubs dominated by Acacia.

The Nanyuki WRUA was established in September 2000 and was officially registered on Sept 2001. There are 5 community projects and several individuals are abstracting water.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDY
Water Shortage	Lack of water harvesting and storage facilities Over/illegal abstraction	Rain water harvesting and storage development Enforcement of abstraction Development of WAP
Soil erosion and sedimentation	Settlement and cultivation in springs and riparian areas Catchment degradation through deforestation and overgrazing Charcoal burning Flooding	Afforestation Pegging of riparian areas Enforcement of stocking rates of livestock and improved soil conservation techniques in farms Flood control infrastructure Promoting energy efficient jikos
Pollution	Inefficient treatment works Lack of public awareness Effluent discharge Solid waste disposal	Waste treatment plant Enforcing compliance with pollution laws Proper solid disposal and Incineration Recycling
Weak WRUA	Lack of capacity in committee Lack of member mobilization and inability to enforce bylaws	Empowering WRUA members Collaboration with WRMA Capacity building of committee members in water governance

4.15 Sirimon River

The Sirimon River has its source in Mt Kenya and is 46km long flowing downstream to joins Timau River. The sub-catchment covers an area of 184km2; altitude ranges from 1830 to 4520m above sea level. The monthly temperature ranges from 7.6 in the higher areas to 22°C at the lower areas. The river's flow is measured by two river gauging system but only data for one station is regularly collected. The Sirimon River is perennial however, during the dry months it dries up in the lower reaches. In the past ten years, the river has dried up in increasing regularity. This is attributable to high abstraction to support human, livestock and irrigation demand. The populations of upper and middle zonesabstract water by gravity while the lower zone mostly us portable pumps.

Sirimon settlement scheme established in the area in 1972 was the first settlement scheme, followed by Kalalu scheme in 1984 and more recently Nyayo settlement scheme in 2000. This precipitated land use changes from a large-scale livestock and wheat production to large-scale farming both irrigated and rain fed. The area has in recent years increase in horticultural farming with Homegrown, Everest, KHE and Kongoni Farms and amongst the local population through an out growers system supported by the big farmers.

Water Resources: Kongoni River and boreholes at Kalalu, Muramati, Tetu and Kirimara schools.

Dams

1. John Nthia dam

Pans

1. T.S.S/147 (1.6 ha)
2. T.S.S 143 (0.4 ha)
3. T.S.S 144 (3.3 ha)
4. T.S.S 148 (0.8 ha)
5. Kirimara B101/201 (0.26 ha)

Streams/ Rivers

1. River Sirimon
2. River Gakau
3. Mutethia stream
4. Gakoe stream

Boreholes

1. Kirimara
2. Finlays
3. Batina

A number of other boreholes on private farms with limited access

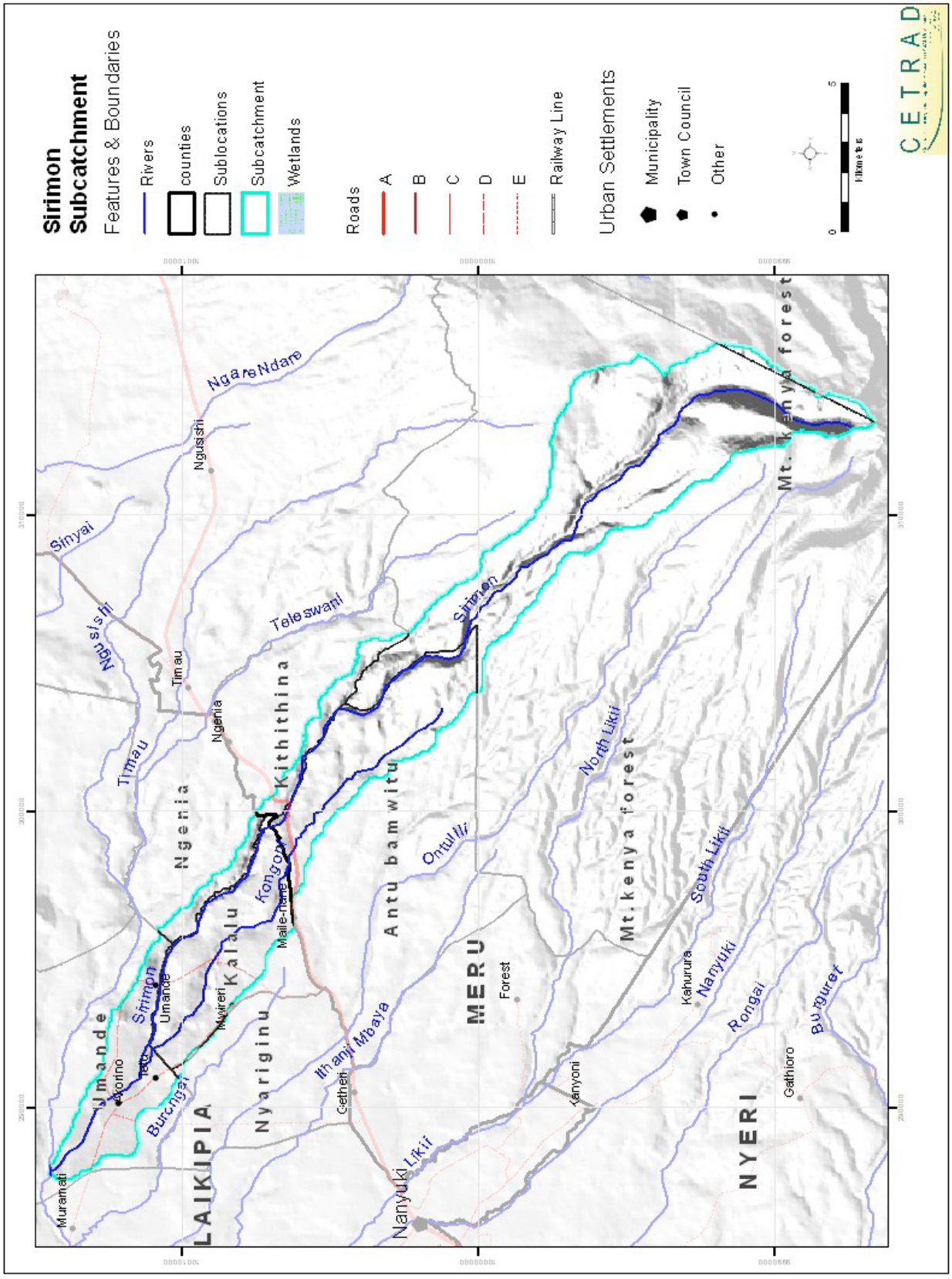

Figure 8: Map of Sirimon Sub-Catchment

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water Scarcity	Lack of water storage and harvesting infrastructure Encroachment of riparian areas Over/illegal abstractions Lack of common intakes intakes River bank / catchment degradation	Development and rehabilitation of water infrastructure Construction of common intakes for farming projects Enforcement of bylaws and WRMA regulations Development of WAP Improve water irrigation techniques Installation of water meters at project and household level abstractors Restoring the catchment area especially in the forest and riparian lands
Pollution	A variety of point and nonpoint sources including from farms, washing in the rivers (laundry, vehicles), animal watering, sewage	Address sources of pollution Awareness building Enforcement of laws
Weak WRUA	Lack of awareness on WRUA and water sector reforms Suspicions between the upper, lower zone and horticultural communities Conflicts over water use Poor participation of the members and stakeholders in WRUA.	Mobilization and awareness creation for the water users on the WRUA and water act 2002 Recruitment of members Capacity building of the WRUA members and community on water resource management issues. WRUA exchange visits Networking and collaboration with partners and relevant stakeholders.

4.16 Ngusishi Sub-Catchment

The Ngusishi River has a length of 17.6km and lies at an altitude of between 2000 and 2600m above sea level. The sub-catchment covers an area of 24km^2 and the. Rainfall is bimodal and often less than 1000mm/yr. The acreage under cultivation is over 16,000 acres growing a variety of horticultural crops.

Water resources include five springs, six wells, seven separate wetlands, eight rock catchments, nine boreholes and one dam. Four more dams have been proposed for the catchments area with only one having been surveyed to date (14 Feb 2014).

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges. Challenges, causes and remedies shown in the table below:

Challenges	Remedies
Water Shortage, illegal water abstraction and use	Rehabilitation of already existing water dams Rainwater harvesting Construction of water pans and new dams Sensitize the stakeholders on water use efficiency Introduction of user charge to members by water meters at project and household levels Training on meter reading and maintenance Information gathering on water abstractions and abstraction survey
Pollution	Water sampling and testing Sensitization on quality maintenance Pollution monitoring preferably using bioindicators Institute water pollution penalties.
Catchment degradation	Carrying out environmental audits Hold sensitization meetings to decrease riparian area encroachment Pegging of riparian areas Reforestation with indigenous trees
Erosion and sedimentation	Reforestation Carrying out sensitization meetings Improved farming techniques to conserve soil eg terracing and enforcement of recommended livestock stock density
Weak WRUA	Capacity building of management committee and staff on water governance

4.17 Ngobit Sub-Catchment

Ngobit River has its source in Arberdare ranges and flows through Nyeri and Laikipia counties before joining Ewaso Ng'iro River.The Ngobit sub-catchment covers a total area 359km^2 with a perimeter of 155km. The highest point is 3970m above sea level and the lowest is 1780m above sea level. The average annual rainfall is 970mm. Ngobit river is 68km long while the approximate length of all rivers within the catchment is 478km. the tributaries that drain into Ngobit are Kariguini, Makiriwaki, Gathima, Mirera springs and Ngurunga. It has one river gauging station. Individual land tenure is prevalent with the main use being farming and livestock farming. Ranching and ecotourism is also practiced. Charcoal burning on absentee landlords' land and riparian land is practiced.

Water Resources: A number of resources have been identified within the sub catchment including:

Dams

1. Karungu I
2. Karungu II
3. Githuri
4. Konambaya
5. Gichogoo
6. Gathwara
7. Ruai
8. Sirima
9. Withare
10. Kaugawa

Streams/tributaries:

1. Karigu- ini,
2. Makirwaki,
3. Mugaai,
4. Gathima,
5. Mirera
6. Ngurunga

Boreholes

1. Karungu
2. Njoguini
3. Githira
4. Kijabe
5. Segera
6. Imenti
7. Nyamugishi
8. Njurunga
9. Withare Gachoro
10. Serengeti (privately owned)
11. Kingsmason (privately owned)

Springs

1. Gachoro
2. Mivera
3. Giatutu
4. Githioro
5. Gatherukop

Plate 6: Tree seedlings (Ngobit)

Plate 7: Furrow irrigation in Ngobit

Plate 8: Irrigation by water bumping (Ngobit)

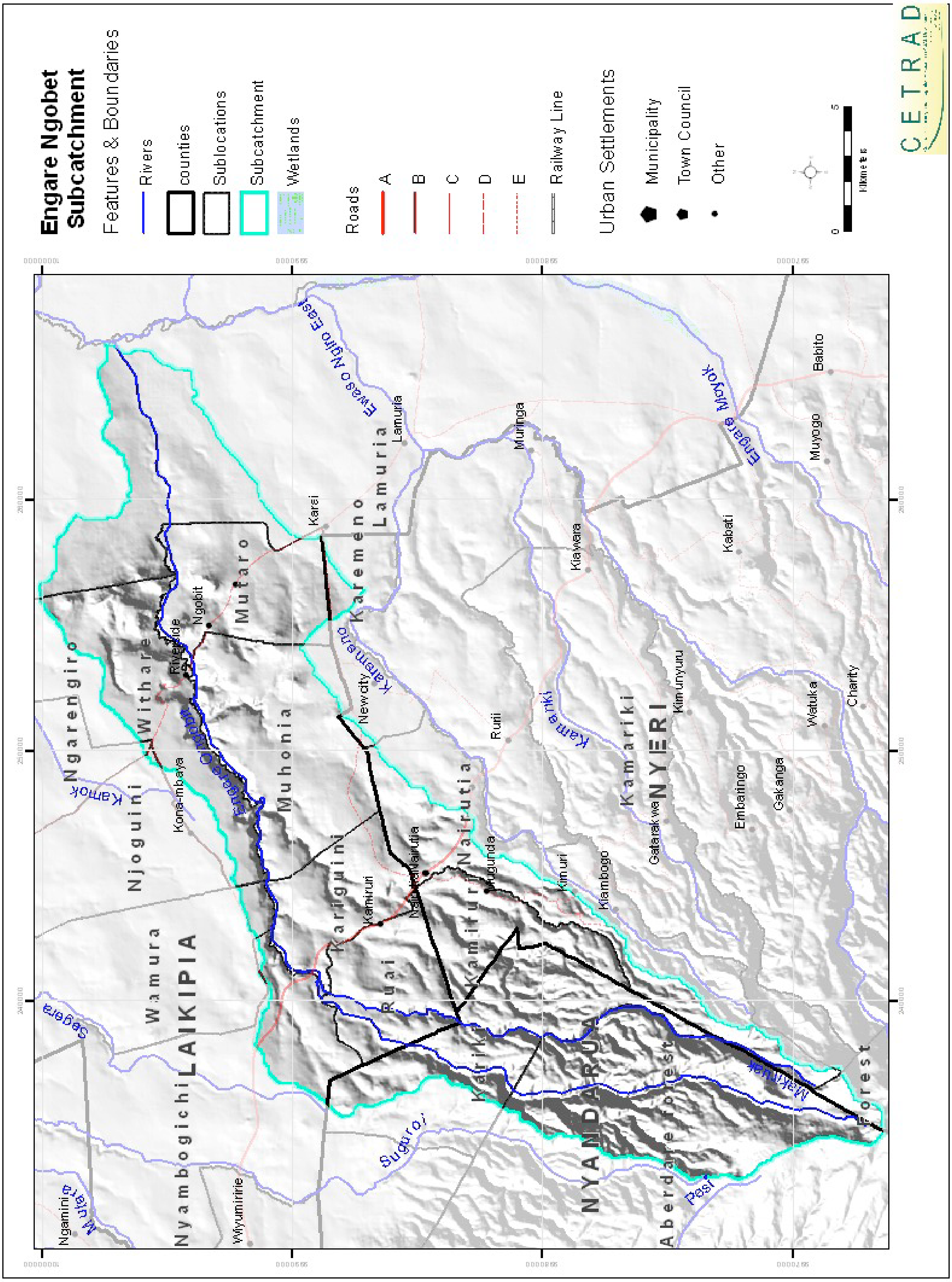

Figure 9: Map of Engare Ngobet Sub-Catchment

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges. Challenges, causes, effects and remedies shown in the table below:

CHALLENGES	CAUSES	REMEDIES
Water Shortage	Over abstraction of river water Increase of human and livestock population Noncompliance with permit/ authorization conditions Lack of information on permitting and permit Weak WRUA which is unable to enforce its bylaws Lack of water meters Inappropriate WAP Inadequate river monitoring Wasteful irrigation methods.	Review of WAP Sensitization on efficient water use Exploitation of alternative water sources including ground water River water monitoring through river gauge system Improved irrigation methods Conducting of a water abstraction survey Construction of storage dams and improved rain water harvesting
Catchment degradation	Planting of eucalyptus trees along the riparian land Tree cutting at the sources by illegal loggers/poachers Forest fires Tree felling and destruction by elephants Poor cultivation methods on the river bank	River pegging Enforcement of pegging requirements Tree planting on riparian and water sources Community sensitization
Flooding	Catchment and riparian degradation Riparian land encroachment.	Construction of check dams along valleys Construction of flood mitigation structures e.g. terraces Observation and enforcement of river pegging requirements Planting nippier grass and other appropriate vegetation along river banks Rehabilitating the catchment and riparian areas
Weak WRUA	Lack of and inadequate awareness of WRUA activities among community members/ water users Lack of frequent meetings at the community level Poor community attitude towards WRUA activities Lack of resources on the part of WRUA and large sub-catchment which hinders communication	Adherence to the agreed and formulated work plan Increasing/intensifying sensitization of WRUA activities to the community members Embarking on exposure tours mobilizing resources for WRUA activities Sub dividing the catchment into zones for easy management Engaging the services of scouts for river monitoring Strengthening the management committee through training on water sector reforms.
Water pollution	Agrochemicals Cloth washing along river bank Poor sanitation and or inappropriate sanitation practices.	Engaging scouts in river monitoring Liaising with law enforcers Training/sensitization on hygiene and sanitation Construction of livestock watering troughs

4.18 Naromoru Sub-Catchment

The Naromoru sub-catchment covers approximately 188km^2 and a length of 103 km. Naromoru is among the earliest settlement schemes in Ewaso Ng'iro basin. Initially there existed large-scale livestock production and wildlife habitat but currently most of these have been sub divided into small-scale settlement and few large-scale farms. The soil is predominantly black cotton soil.

The main economic activities include rain fed/irrigated crop production, livestock production and mountain climbing/tourism. Mixed farming is the main activity. There is minor irrigation for horticultural crops. In the lower catchment, livestock keeping is the mainstay of the people. However, in recent years, a lot of cultivation along the river has peaked leading to degradation and river abstraction and this has led to increased conflicts.

Naro moru sub-catchment falls in two counties; Nyeri (64%) and Laikipia (36%). The upper zone is heavily populated and depends on rain fed agriculture and minor irrigation. 37% of the area falls in the reserve areas (forests).

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water Shortage	Over/illegal abstraction Inefficient water use Non compliance with WRUA bylaws Poor policy enforcement Inappropriate farming methods	Compliance and enforcement of bylaws and policies Adoption of water efficient farming techniques Water harvesting and storage
Degradation of river bank and catchment	Cutting down of treesindigenous trees Riparian cultivation Over grazing Poor policy enforcement	Afforestation and reforestation River pegging Support from WRMA and KFS for enforcement
Weak WRUA	Poor coordination and delegation by committee Inadequate resources both human and material Proper management capacity	Capacity building in water governance Fund raising for catchment protection and to accomplish WRUA objectives Member mobilization
Pollution	Poor planning of garbage disposal areas and cattle dips Effluents from agricultural activities (agrochemicals)	Enforcement of rules and guidelines Proper training on disposal of pollutants

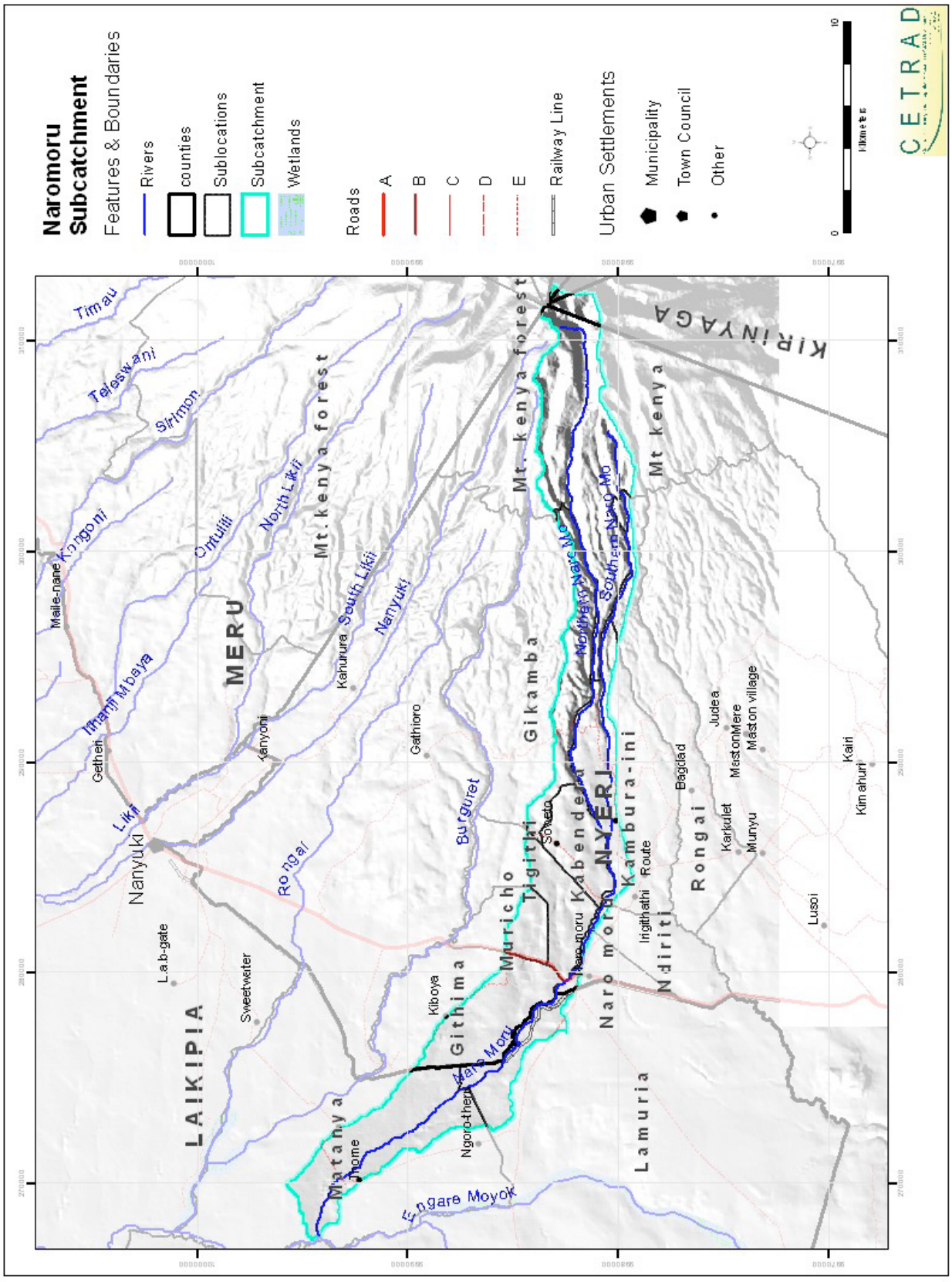

Figure 10: Map of Naromoru Sub-Catchment

4.19 Ontulili Sub-Catchment

The Ontulili River is 44km long; total length in the sub-catchment is 124km with an area of 107km^2. The river originates from Mt. Kenya National Park and flows downwards to join the Timau River near Naibor. The average rainfall is 800mm with long rains in April and May and the short rains between October and November. Maximum recorded temperature is 31°C.

The area was settled after independence and land use changes have been influenced by water availability. The upper zone has more settlements and populations practice both rains fed and irrigated commercial/subsistence agriculture, while the lower zones, characterized by semiarid climate, combine both subsistence irrigation and pastoralism.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

Challenges and Causes	Remedies
Drying up of rivers and springs due to encroachment	Conservation of riparian land and adoption of soil and water conservation techniques Protection of spring source areas
Destruction of the catchment area along the riparian land and felling of trees within the Ontulili forest	Networking and liaising with stakeholders e.g. KWS, community forest association and KFS Afforestation programs within the catchment Conservation of riparian land and adoption of soil and water conservation techniques Afforestation programs within the catchment Promotion of energy efficient jikos and creation of woodlots at households and institutions
Weak WRUA Lack of awareness on the WRUA among the membership and community Lack of institutional capacity among the WRUA	Mobilization meetings in all zones for awareness creation and recruitment of members to the WRUA Build the institutional capacity of the WRUA through training programs and purchase of equipment for the office
Over grazing leading to soil erosion	Mobilizing internal resources from members and external resources from development activities for financial sustainability and implementation of the SCMP
Use of inefficient irrigation methods Over/illegal abstractions in the river	Capacity building of WRUA members to understand their role in water resource management with special emphasis on the lower zone members Redesigning of intakes to allow reserve flows and flood flows or construction of common intakes Scouting to monitor activities along the river Construction of both small and large scale storage at the catchment, household and farm level Promote rain water harvesting techniques at the catchment, house hold and institutional level

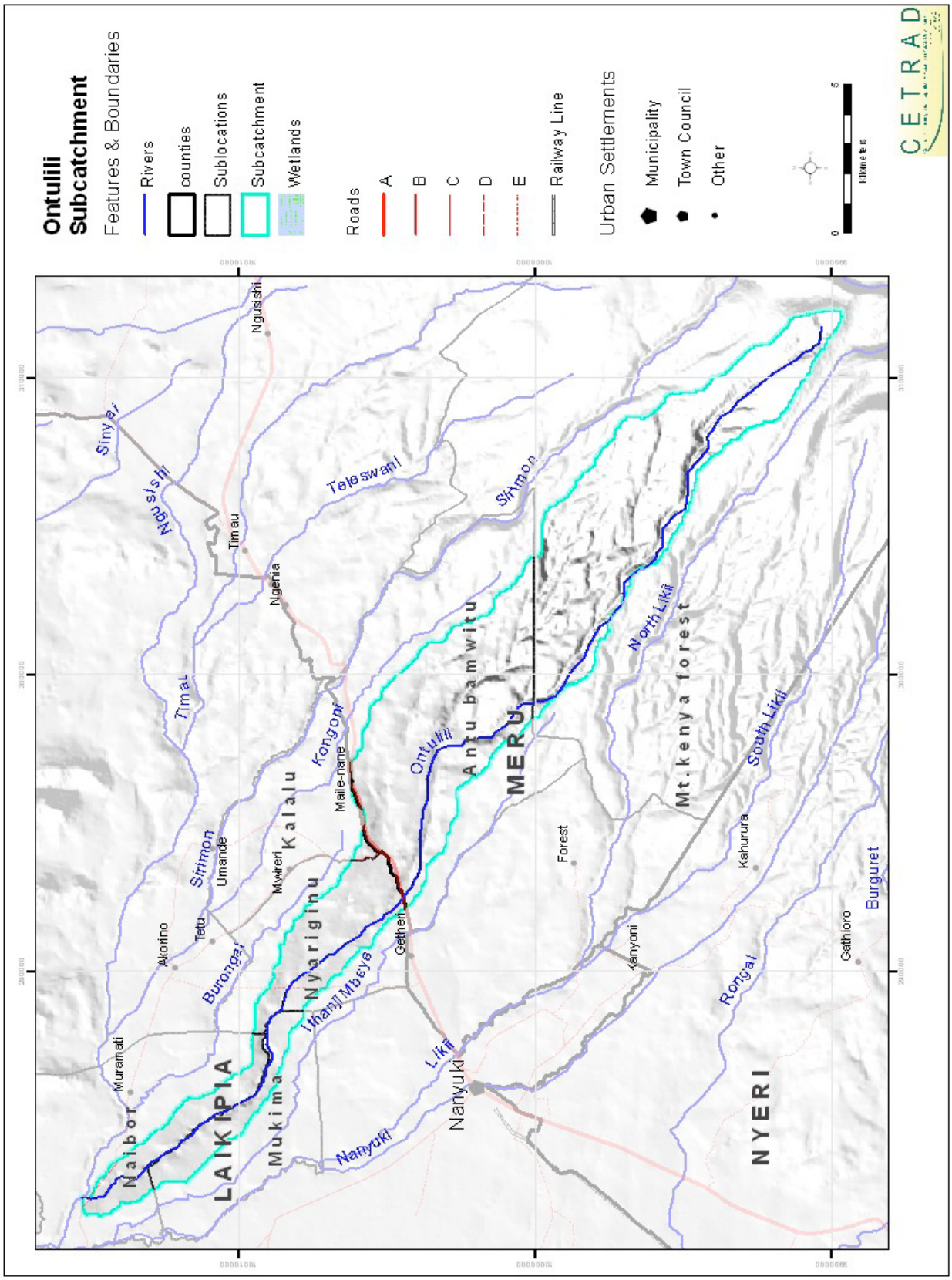

Figure 11: Map of Ontulili Sub-Catchment

4.20 Loisukut Sub-Catchment

The Loisukut sub-catchment is within an arid area traversing Laikipia and Isiolo counties. The River Loisukut earlier known as Sinyai River is approximately 93km long. The sub-catchment receives an average annual rainfall of 590mm with a range of 490mm to 740mm.

The community depends on livestock as the main source of livelihood and heard indigenous breeds of cattle. However, the vegetation is severely depleted due to over stocking and wildlife especially elephants have contributed to further degradation of vegetation due to felling of trees. In addition *Opuntia* species is prevalent in the area with negative impacts on browsers especially goats thereby decreasing their productivity. Other activities including ranching, sand harvesting, apiculture and subsistence are also practiced.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water shortage	Drying up of river Reduced rainfall and severe droughts Lack of water harvesting and storage Sand harvesting	Water harvesting and storage facilities Borehole drilling Controlled sand harvesting Catchment conservation
Catchment degradation	Charcoal burning Overgrazing Communal land ownership	Planned grazing and enforcement of stocking densities Tree planting in catchment Controlled sand harvesting
Weak WRUA	Formative stage of the WRUA Poor institutional capacity Few members Inadequate financial resources	Sensitization and mobilization of members Capacity building of committee on water governance Mobilization of financial resources
Pollution	Solid waste/sewage from Dol Dol town Chemicals from cattle spraying	Proper waste disposal Community sensitization and enforcement of pollution controls Proper location of livestock spraying structures

4.21 Likii Sub-Catchment

The Likii Sub-catchment covers an area of about 184km^2 traversing Meru, Laikipia and Nyeri counties. The Likii River supplies Nanyuki town with domestic and industrial water and also supplies private farms, community water projects and individual users. The river originates from Mt. Kenya at an altitude of about 5000m above sea level and flows through Laikipia plateau before joining Nanyuki River at an altitude of 1856m above sea level. The slope ranges from 4% and 48%. The monthly mean temperature ranges from 4° C in the high cool areas to 22° in the lower parts of the sub-catchment. The distribution of rainfall is bimodal. The highest rainfall is in the upper-forested zone at an average of 1100mm pa then decreases downwards to 750mm at the semiarid Laikipia plateau.
The communities in the area depend on surface water fromRiver Likii and also utilize surface water pans, supplied by the river. There are seven water pans and ten boreholes in total.

Water Resources:

Water pans
Kangaita Farm (2)
Likii River Farm (3)
Katheri Livestock Pans (2)

Boreholes
Likii River Farm (3)
Kangaita Farm (1)
Ferusi Ltd (1)
Christ the King Catholic Church (1)
Nanyuki Children's Home (1)
Mahiga (1)
Nturukuma Area (2)

Tributaries
Likii North
Likii Middle
Likii South

CHALLENGES AND OPPORTUNITIES: The WRUA faces several challenges, some challenges, causes and remedies are summarized below:

CHALLENGES	CAUSES	REMEDIES
Water scarcity	Inadequate water harvesting and storage facilities. Poor water storage infrastructure design and destruction by flooding. Degraded catchments. Lack of a WAP. Degraded catchments.	Mobilize resources to facilitate rehabilitate and construct water harvesting and storage facilities. Engage technical experts in developing proper designs for the infrastructures. Promote to the community efficient water harvesting and storage means at the household level. Plant appropriate trees and other vegetation at the catchment areas. Institute management committees for the infrastructures Develop an efficient WAP Construct common intakes/self-regulating weirs Protection of the catchment areas by e.g. fencing of the spring area.

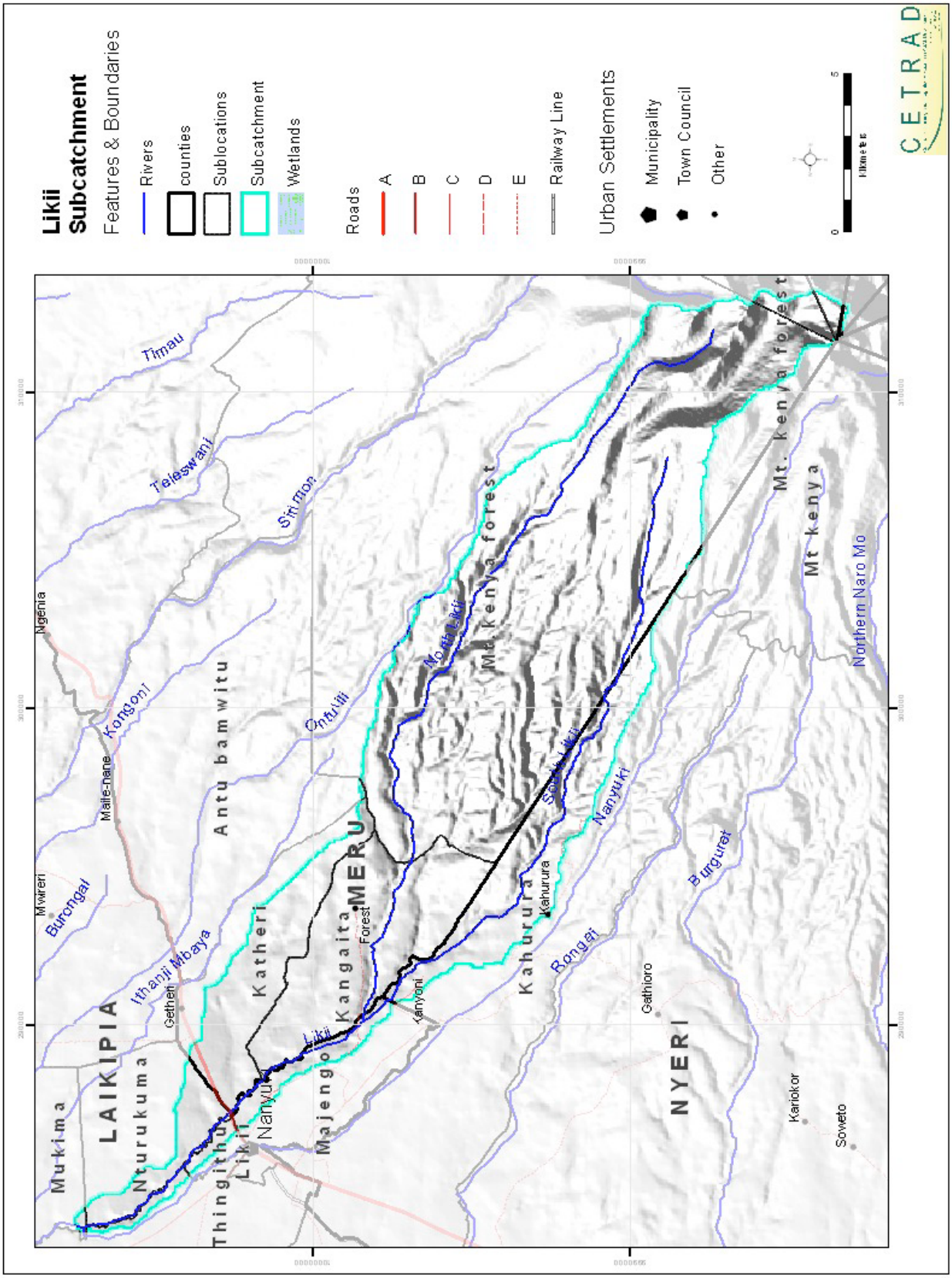

Figure 11: Map of Likii Sub-Catchment

Water pollution and siltation	Poor cultivation methods. Overgrazing Direct watering of livestock Car/clothes washing and bathing in or close to the water sources.	Encourage responsible cultivation and grazing methods. Observe right stocking rates. Construct livestock watering troughs. Construct public washing and bathing facilities. Enforce compliance to the bylaws.
3. Weak WRUA	Poor management skills	Capacity building the WRUA on various issues pertaining to governance, financial management. WRUA exchange visits Mobilization/sensitization barazas Increase the number of members

4.22 Ngare Nyting Sub-Catchment

The Ngare Ndare sub-catchment covers a total are of 1012 km^2 with its perimeter indicated as 243km. The highest point is 3580m above sea level while the lowest point is 900m above sea level. Average annual rainfall is 655mm with the highest being 1000mm and the lowest 470mm. The total length of Ngare Ndare River is 82.5 km while the total approximate length of all rivers including Ngare Nything river, within catchment is 1057km and a total of 10 abstraction points. The vegetation cover is composed of grassland (45%), woody grassland (60%), forest (12%) and cropland (13%).

The economic activities within the sub-catchment range from small-scale irrigation and rain fed crop production to pure nomadic based pastoralism. There is also one large-scale horticultural farm. In the upper catchment, rain fed and irrigated crop production is prevalent though livestock production is also common. In the middle catchment, irrigated agriculture is practiced supplemented by livestock keeping where farmers keep relatively larger herds than those in upper zone. In the lower catchment, nomadic based pastoralism is the main economic activity. Due to compatibility of livestock production and wildlife conservation, ecotourism has emerged as an important economic activity.

Water Resources: Some of the resources in the sub-catchment include: dams and boreholes at Leparua and springs within Kisima farm. Dams in Kisima and Lewa; and the following springs: Buju, Mwangania, Mithetene, Elijah, Murone and Ntumburi.




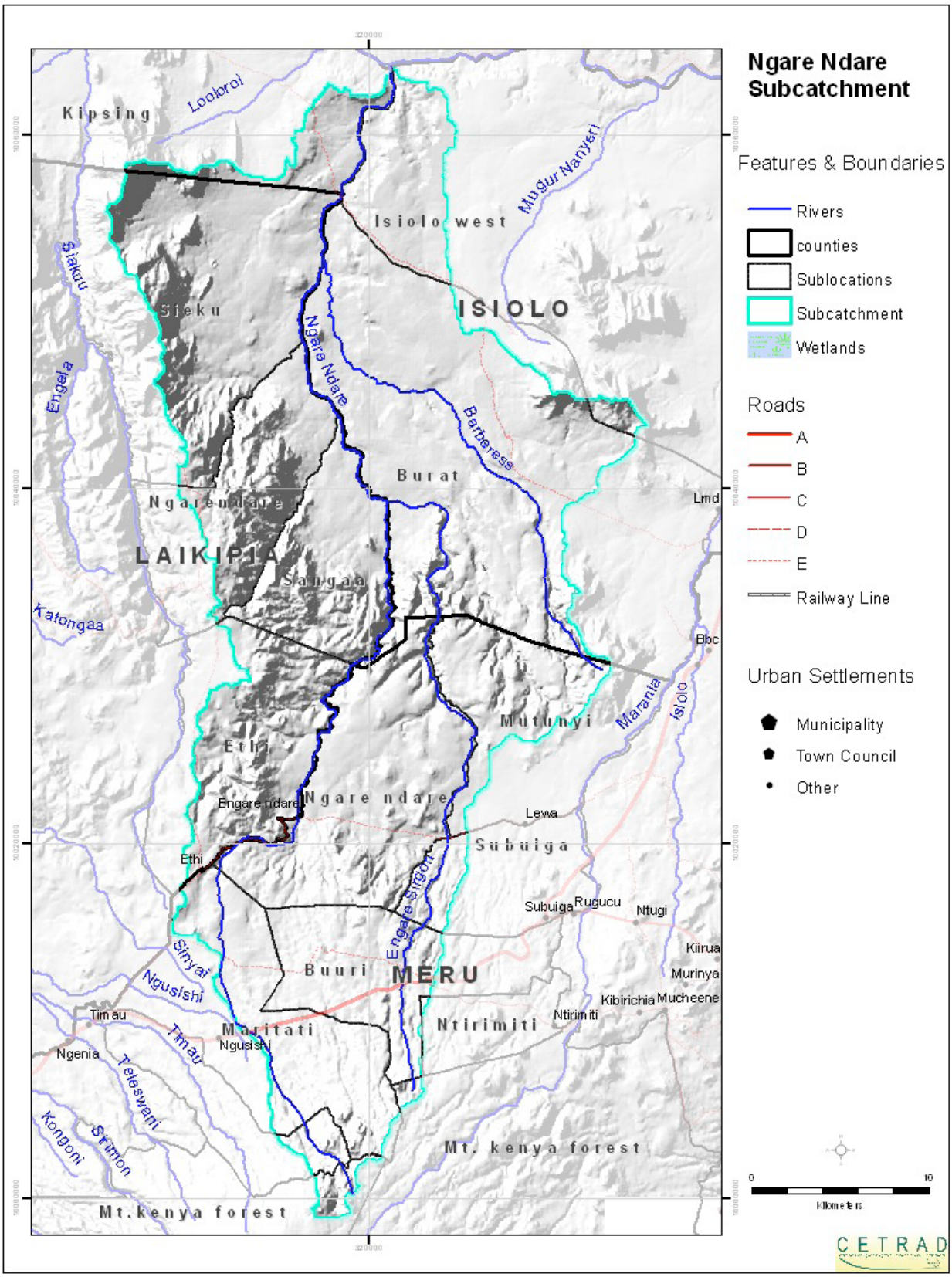

Figure 12: Map of Ngare Ndare Sub-Catchment

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes and remedies:

CHALLENGES	CAUSES	REMEDIES
Water shortage	Unequal distribution of water within projects Unexploited water resources Poor design of community water supply projects Lack/inadequate storage at both projects and household levels Over/illegal abstraction of water Vandalism of projects intakes	Construction of dams and rehabilitation of existing dams and boreholes Introduction of meters at household level and project level Provide tanks for rainwater harvesting to households Undertaking an abstraction survey Installation of river gauging system Installation of drip kits for demonstration purposes Establishing water abstraction and use monitoring program. Upgrading of furrows to piped systems
Catchment degradation and encroachment of springs and riparian land	Encroachment on river bank through cultivation, Inappropriate tree species along river banks Land ownership (some are important sources located on private property) Conflicting legislation Planting of blue gum on river banks/water source	Planting one million trees in the catchment River pegging and liaise with authorities to enforcement Lobbying WRMA and provincial administration to uproot and cut down exotic trees
Lack of common intakes and pipelines	Inadequate technical expertise on common intakes and inadequate funds	Mobilizing resources to upgrade furrows to piped schemes Construction of four common intakes in the upper zone, two each for middle and lower zones Training projects committee on operation and maintenance
Weak WRUA	Lack of a secretariat Poor information flow between WRUA officials and project members Inadequate communication between WRUA and authorities Inadequate capacity (technical and financial) Inadequate awareness on water sector reforms within WRUA committee and community members Ineffective enforcement of WRUA constitution.	Mobilization of resources for WRUA activities and trainings and operations Strengthening WRUA through training committee on water sector reforms Holding four awareness creation meetings on the role of WRUA Procuring funds for building an office, employing project manager and purchase of equipment. Employment of scouts Establishing water abstraction and use monitoring program,

4.23 Burguret Sub-Catchment

The Burguret River sub-catchment covers 210km^2 and serves over 25,000 persons in the sub-catchment and more from Rongai and Naro Moru sub-catchments. The flow of the Burguret River has been monitored since 1946 by means of a gauging station 5BC6. Flow data from this station has shown that even though the flow has been declining over a long period of time, the rate of change has only in recent years become increasingly alarming.

CHALLENGES AND OPPORTUNITIES: Some challenges, causes and possible remedies are summarized below:

CHALLENGE	CAUSES	REMEDIES
WRUA weak institutionalization and member cooperation	Current perception of water as a free good requires strong enforcement to control usage Lack of water act awareness Lack of WAP Conflicts within the committee and inability to cooperate with large farms	Develop by laws for BRWUA that can guide and harmonize members activities Negotiate with WRMA to coordinate stakeholders and for enforcement Enhance participation through general community policing Develop methods of capturing and punishing offenders in a just and fair way
Water Scarcity	Large-scale abstractions up stream Destruction and subsequent degradation of the catchment area Destruction of river bank Intensification of horticultural farming Patrols by the downstream users often turn violent and property is destroyed Lack of water storage and harvesting facilities	Construction of water intake up stream River flow monitoring Promote water and soil conservation measures in catchment Define riparian catchment areas Identify livestock watering points and construct watering troughs Construction of medium to large scale dams and desitling of existing ones Improved water harvesting and storage
Water pollution and siltation	Poor cultivation methods. Overgrazing Direct watering of livestock Car/clothes washing and bathing in or close to the water sources.	Encourage responsible cultivation and grazing methods. Observe right stocking rates. Construct livestock watering troughs. Construct public washing and bathing facilities. Enforce compliance to the bylaws.

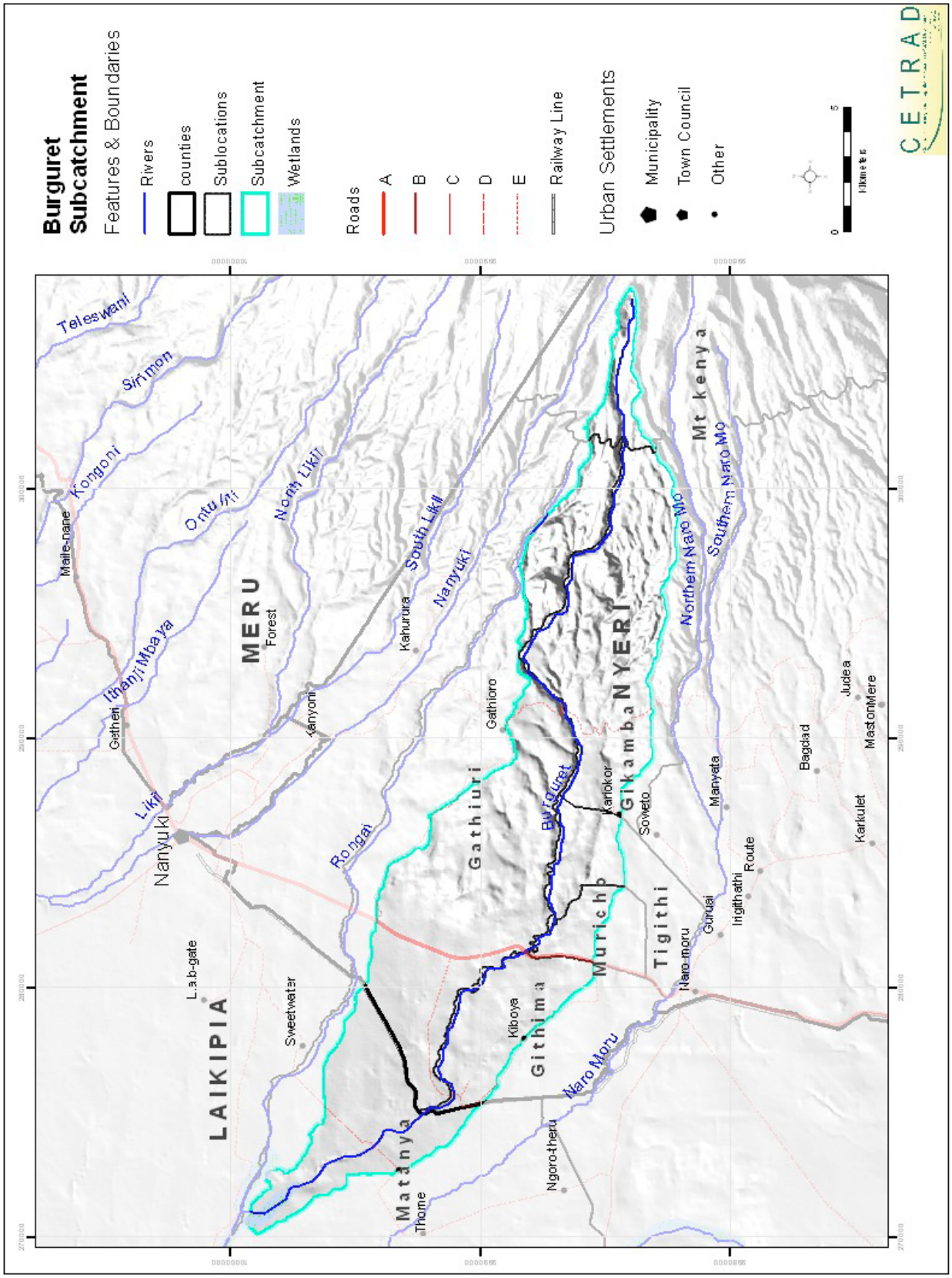

Figure 13: Map of Burguret Sub-Catchment

4.24 Timau Sub-Catchment

The Timau Sub-catchment traverses Meru and Laikipia counties and covers a total area of 240km^2. The Timau River rises from numerous springs within Mt.Kenya forest and flows downstream to the confluence with the Nanyuki River. It passes through Timau town, which is the administrative centre for Buuri District in Meru County. The altitude ranges from 3,815m above sea level in the Mt. Kenya up to 1,770m above sea level at the confluence with the Nanyuki River. The mean altitude is 2,228m above sea level.

The total length of the main Timau River is 43 km while the total approximate length of all rivers within catchment, including Timau River is 246 km. The main Timau River starts from the Mt. Kenya and flows all the way to the confluence with the Nanyuki River.

Water resources: The Timau from the source is formed by **four main tributaries** namely Kongoni, Gatharantandi, Rugirandu, Gakirikiri. **Other tributaries** that join the Timau River further downstream include the Ngusishi, Timau, Sirimon and Ontulili.

There are also **springs** that contribute flows through the Sub-catchment. Abstractions along all the tributaries and the springs pose a major threat to the continuous flows of the Timau especially during the dry season.

Rainfall data interpolated from selected stations between 1991 and 2000 indicate that the annual rainfall quantity (volume) of the sub-catchment is 199,000,000m3 with the average annual rainfall being 738mm. Rainfall varies from 1100mm in the Mt Kenya forest to 700mm in the lower parts of the Laikipia plateau.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, remedies and planned actions:

CHALLENGE	REMEDY AND SPECIFIC PLANNED ACTIONS
Degradation of catchment and riparian land	Rehabilitation of 15kms of riparian land along both sides of the river through tree planting Rehabilitation of catchment area through planting 30,000 trees to cover 15kms River pegging and awareness creation on the importance of pegging Negotiations for replacement of Eucalyptus trees River pegging Enforce WRUA by laws through strengthening WRUA governance structures
Weak WRUA institutional structure	Train WRUA committee on water sectors reforms and Organisational Development and Institutional Strengthening Awareness creation through barazas, churches, social functions, projects meetings Establish a WRUA office Purchase motorbikes and employ scouts to patrol the catchment Train WRUA members on Water Resource management

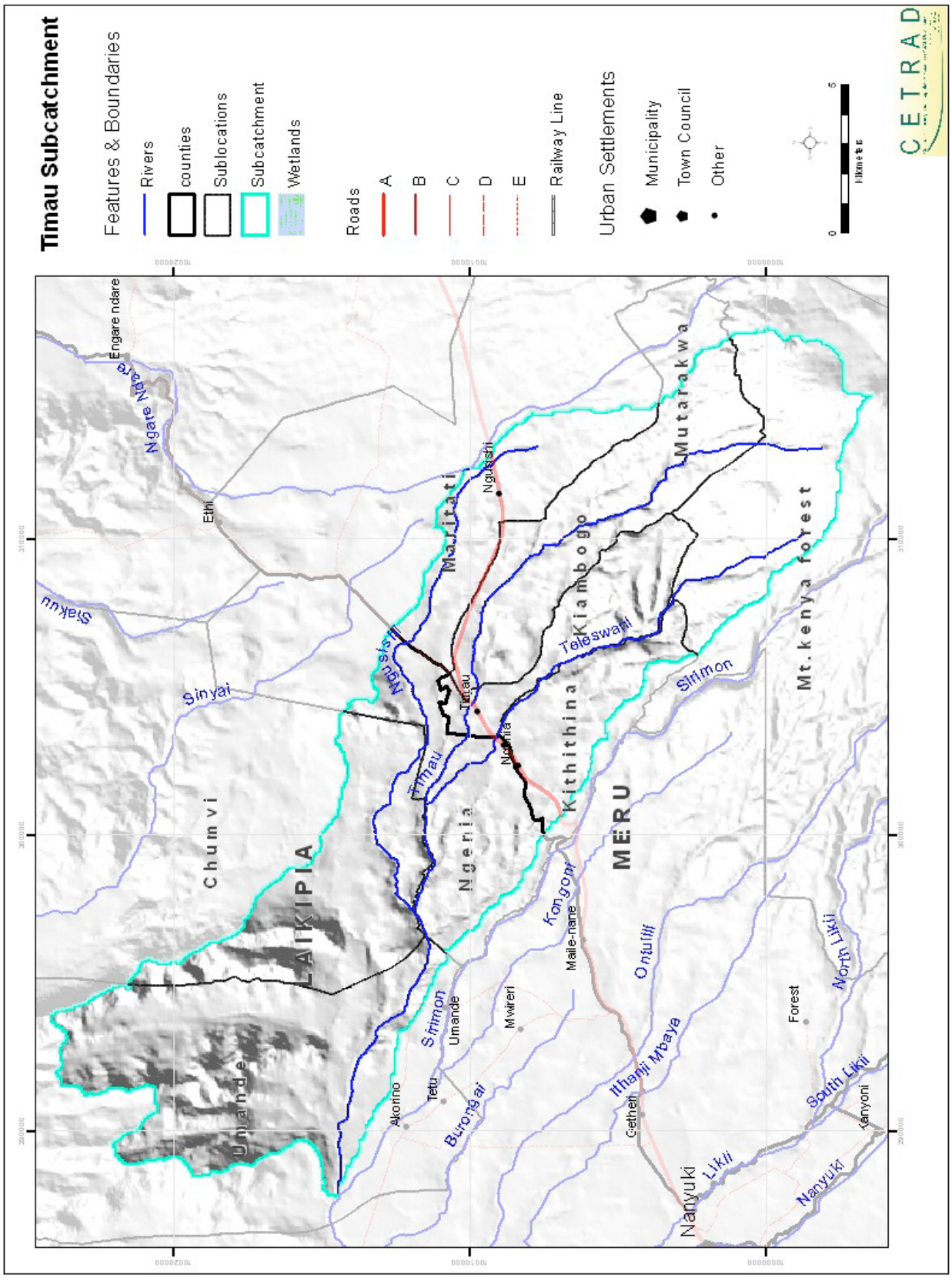

Figure 14: Map of Timau Sub-Catchment

Water pollution	Awareness creation Liaise with public health department Undertake pollution surveys Enforce WRUA by laws through strengthening WRUA governance structures Construction of pollution control structures at pollution points Carry out regular water sampling Erect warning signs against pollution at strategic points
Illegal abstractions and Inefficient water use	Awareness creation on legal water use Promote metering and billing system at the household level Assist projects in the installation of master meters Promote the construction of 6 common intakes
Inadequate water for irrigation and domestic use	Construction of one dam in the forest Desilting and fencing of 3 existing dams Protection and conservation of 8 springs Supply of 10 drip kits Construction of 10 water pans Assist 10 existing water pans with lining Assist abstractors to comply with permit regulations Enforce with support from WRMA the compliance to permits Awareness creation on legal water use and economic use of water
Lack of alternative water sources	Rehabilitation of one borehole Rehabilitation of five dams 30 roof catchment tanks for institutions and associated equipment Identification, surveying, design and approvals of one large scale dam in the forest

4.25 Upper Ewaso Ng'iro Sub-Catchment

The Upper Ewaso Ng'iro Sub-catchment covers a total area of 433km2, a perimeter of 141 km and thus an area perimeter ratio of 3.07. The highest point is 3890 m above sea level while the lowest point is 1810m above sea level. The average altitude is 2380m above sea level. Rainfall data interpolated from selected stations between 1991 and 2000 indicate that the annual rainfall quantity (volume) of the sub-catchment is 346,400,000m3 with the average annual rainfall in the catchment area being 800mm. The location with the highest annual rainfall had 950mm in the upper parts and this reduces gradually to the lower arid areas that get 500mm.The rainfall pattern is bimodal with the long rains occurring between the Months of March to June and the short rains between October to December.

The Upper Ewaso Ng'iro River starts from the Aberdare forest up to the confluence with the Nanyuki River. The Length of the main Upper Ewaso Ng'iro River to this confluence is approximately 140Km. The river supports agricultural production upstream and pastoralism in the lower parts of the sub-catchment. It traverses Nyeri North, Kieni East and Laikipia counties. The Sub-catchment area lies within the leeward side of both the Mt. Kenya and Aberdare Mountains, thus the climate generally ranges from semiarid to arid in the lower parts.

The main **water resources** are summarized below:

Main tributaries are Karuthingitu, Kamariki, Nyamindi, Karage, Gathegethe, MunyuMuiru, Gitushu, Gathambara, Kamigogo and Kanyiriri. The above tributaries feed the North and South Ewaso Ng'iro streams which join up to form the main Ewaso Ng'iro River. Other tributaries include Manoro and Gatondo.

Springs are mainly concentrated in the upper zone. These are Kamwanya, Gathambara, KaruiKananu and the spring feeding Kiria dam.

Water Projects include: Edana, Tarakwa, Lamuria, Endarasha, Watuka, Embaringo, Ganyuthe and Trevoskifuruti.

The current level of water abstractions is unknown; however, in 2004 CETRAD identified a total of 310 abstraction points.

CHALLENGES AND OPPORTUNITIES: The WRUA has identified the following challenges, causes, effects and remedies:

CHALLENGE	CAUSES	REMEDIES
Water shortage	Destruction of the Forest catchment area Riparian degradation Diversion of water through furrows and pumps Inefficient water use Over and illegal abstraction Poor maintenance of water sources Lack of water harvesting and storage infrastructure	Encouraging water harvesting, storage and efficient use Undertake an inventory of existing water resources including condition and status Encourage adoption of rain and flood water harvesting at the household and farm level Increase storage capacity at the project level Rehabilitation of 10 dams and 6 boreholes Contract expertise to explore the feasibility of water pans and other storage facilities Encourage use of drip irrigation Diversify sources of income to avoid over reliance on irrigation-fed farming Upgrade furrows to piped schemes and construct common intakes
Destruction/ degradation of riparian land and catchment	Poor enforcement of the law Encroachment/cultivation on the River bank Absentee land owners High population of Elephants and people Increasing demand for fuel wood e.g. by the tea factories Replacement of indigenous trees with exotic trees	River pegging Signing management agreement/MoU with riparian land owners Rehabilitation of riparian land through planting appropriate tree species and good agricultural practices

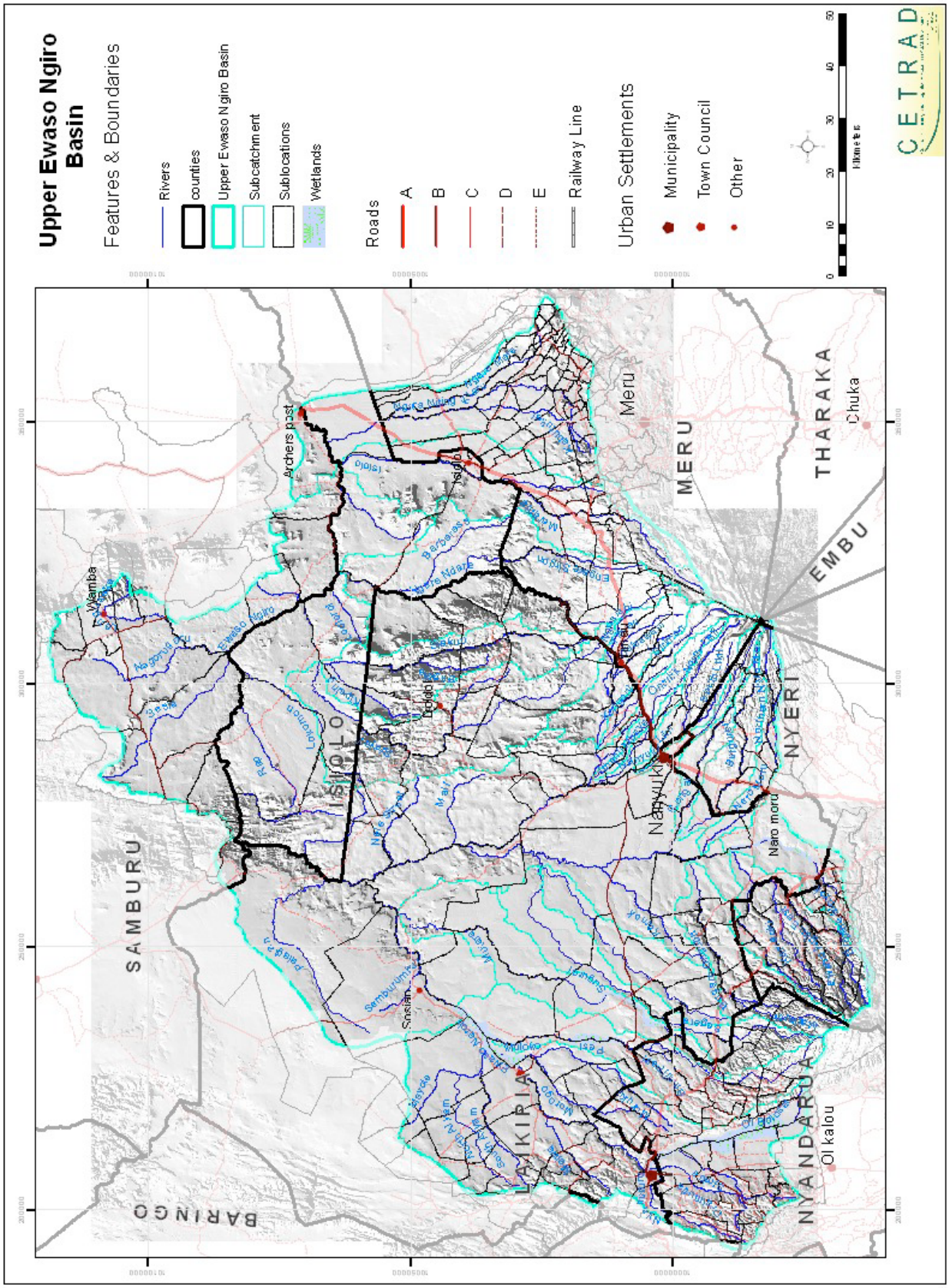

Figure 15: Map of Upper Ewaso Ngiro Basin

Water pollution	Lack of awareness on effects of pollution Poor enforcement of the law Poor use and disposal of agrochemicals Washing clothes/bathing on the river bank, washing cars, direct livestock watering Sewage discharge into river	Enforce rules and regulations Sensitize members on water pollution Impose penalties Water sample tests and analysis Undertake pollution surveys
Illegal/over abstraction of water	Ignorance of the regulations Lack of water meters Use of furrows and portable pumps Poor enforcement of the law	Sensitize community on water laws Enhance enforcement of by-laws through monitoring, fines etc Facilitate the installation of controlling devices including master and individual meters
Weak WRUA	Inadequate financial resources Communication breakdown among WRUA members Inadequate awareness on water sector reforms and the role of various institutions	Train WRUA committee on water sector reforms WRUA exchange visits Create awareness among the community on the role of WRUA/WRMA Increase membership WRUA to adhere to schedule of AGM and committee meetings Establish WRUA office and secretariat Mobilize resources for running of WRUA activities Involve WRMA and other observer members in WRUA meetings Establishment of transparent financial systems

CHAPTER 5: Compliance, Enforcement and Governance

The Laikipia WaterConservation Strategy team visited 25 WRUAs of the Ewaso Ng'iro Catchment in order to discuss further various issues raised at the first stakeholders meeting (23-24th March 2013) regarding challenges faced by WRUAs in compliance, enforcement and governance.

There is a great diversity in the performance of WRUAs in ENNCA. Various by-laws have been compiled in WRUA constitutions in line with regulations by WRMA on water allocation and governance. Even though in many cases, members are aware of their responsibilities, they are often unwilling to comply with these regulations. On the other hand, WRUAs are not equipped or adequately mandated to enforce their by-laws.

The main challenge faced by WRUAs is that of governance. The team noted that several WRUA leaders fail to be accountable and transparent with funds and that there is limited turn over of members of the executive committee due to suppression of elections and refusal to hold AGMs. The problem with this is that members lose faith in the ability of the WRUA to accomplish its task in equitable and efficient water allocation and in presenting their challenges to WRMA and the county government to ensure improved water and sanitation services.

The effect of this is continued defaulting in membership fees, lack of compliance to by-laws and other regulations and continued degradation of water catchment.

This chapter highlights the status of 25 WRUAs in their governance structure and their challenges in compliance and enforcement; summarises the partnerships and assistance WRUAs have received so far since their formation and areas, which they wish to continue collaborating with LWF and other organizations.

5.1 Upper Ewaso Ng'iro WRUA

The Upper Ewaso Ng'iro WRUA is unique in that it sustains a functioning weather station close to Murera Farm (at the former Ministry of Works), consisting of the following instruments: a manual rain gauge, an automatic rain gauge (unfortunately faulty at the moment), an evaporation pan (also in need of repair), minimum and maximum thermometer. Data from this station is collected by WRMA and has been useful for drought pattern predictions.

Governance: The Upper Ewaso Ng'iro WRUA (UEWRUA) covers the upper part of the Ewaso Ng'iro River up to the confluence with the Nanyuki River. The Upper Ewaso Ng'iro WRUA was registered in 2012 and is composed of over 60 registered members. It is divided into upper zone (Aberdare-Kiahuko), Middle zone (Kiahuko-Ol Pejeta) and lower zone (Ol Pejeta Confluence).

Committees in the upper, mid and lower zones composed of nine members govern the WRUA. Five members of each zone form the 15 members WRUA Executive Committee. The WRUA has had regular AGMs where elections are held annually and has over 60 members.The WRUA has an MOU with WRMA since July 2013 and collect annual subscriptions for water use at 25cents/m3. Persons with portable

Upper Ewaso Ng'iro WRUA


Kareminu WRUA


Ngobit WRUA


Mutara WRUA

Pesi WRUA


Likii WRUA


Loisukut WRUA


Kurum WRUA


Ngare WRUA

Ngusishi WRUA


Sipili WRUA


Nyahururu WRUA


Lower Ewaso Narok WRUA


Muhotetu WRUA


Kinamba WRUA


Mid Ewaso WRUA (Kimanjo)


Ngare Nyting WRUA


Tereswani WRUA


Timau WRUA


Ontulili WRUA

Sirimon WRUA


Rongai WRUA


Naro Moru WRUA


Burguret WRUA

pumps pay 5000 KES per year. The WRUA has acquired land near the District Officer's office for which they hope to receive facilitation for a WRUA office.

Compliance and Enforcement: The following issues are the main challenges that the WRUA faces in compliance by members and water users to its by-laws and to environmental protection regulations, and enforcement:

- Lack of individual water permits and water meters to support effective and efficient water allocation
- Management of water unfriendly trees in riparian areas including blue gum
- Lack of representation of ranches located in the lower zone into WRUA
- Inability to carry out effective patrolling and scouting to control lack of compliance particularly during the drought season
- Inability to control of portable pumps is difficult due to sporadic shifting; there is need for common intake
- Lack of collaboration by community members in enforcement due to their allegiance to neighbours and fear of denouncement in their own lack of compliance.
- Concerns that if Solio Ranch is subdivided and sold the forest area and thus the water catchment area would be compromised

Partnerships: Upper Ewaso Ng'iro WRUA has so far received assistance from LWF for: Inception of WRUA; development of sub-catchment plan; abstraction survey implemented through Rural Focus; scouting of water users.

The WRUA has noted the following areas they hope to receive partnerships in the near future:
- Construction of Dam at Thome
- Management of Lamurai Water Project, which is operating below its potential. Even though it was initiated to provide for 250 residents, is currently operating 100. The main constraint is in piping of water and meters; the project incurred a debt of 4.7 million KES owed to WRMA which, thanks to successful negotiations has now been reduced to 500,000/=.
- Baseline surveys and catchment protection.
- In order to improve governance and administration, this WRUA requires facilitation in order to establish an office; review of by-laws and the sub-catchment plan.

5.2 Kareminu WRUA

General information and Governance: Karimenu WRUA was established in 2010 and registered with the Ministry of Social Services shortly after. The initial stages involved capacity building to educate the community on membership. However, this training was inadequate and more is required to ensure understanding of water allocation program. Several projects exist although they are not registered with WRMA, the most dominant include Muthangari and Kareminu Projects.

The bylaws in the constitution are inconclusive and there is need to have a sub-catchment plan review; baseline survey, catchment protection plans.

The fact that the catchment is shared between Nyeri and Laikipia counties is a great challenge that needs to be addressed through cooperation among the county governments.

Compliance and Enforcement: Kareminu WRUA has identified these are the main areas they wish to partner in order to ensure compliance and enforcement of by-laws and to ensure equity, effective and efficiency in water allocation:

- Common intake to control sporadic abstraction due to pump owners
- Require facilitation in water allocation to tackle the resistance of members to water rationing program. This can be through: installation of master meters, piping of water, improved agricultural technology to reduce water waste.
- Pollution control and catchment protection required: tree planting along river, washing areas at a distance from rivers (car wash, watering troughs, clothes washing areas)
- Require the employment of scouts and facilitation for monitoring water users; by-laws are rarely followed due to the inability to enforce

5.3 Ngobit WRUA

General information and governance: Ngobit WRUA was formed in 2008 and registered in 2009. The SCMP was adopted in 2010. The WRUA has four subcommittees (executive, procurement, finance and monitoring) all under the main management committee. Each subcommittee has five members made up of both males and females. The WRUA has received a number of capacity building workshops focussing on leadership and governance with support from WSTF.

The WRUA has over 400 members of which only 140 are fully paid and renewed in 2013. 15 projects each served by intakes from the forest area exist. The WRUA has great challenges in managing members due to the lack of an office, in addition, the large nature of the catchment requires mobility of the executive committee, which is difficult due to the rough terrain and the high transport cost required to ensure adequate reach.

Compliance and Enforcement: Ngobit WRUA has identified these are the main areas they wish to partner in order to ensure compliance and enforcement of by-laws and to ensure equity, effective and efficiency in water allocation:

- Mobilization of members and building awareness on the various permits required
- Water users who have leased land in the area refuse to join WRUA
- Members refuse to renew permits
- Encroachment of riparian areas by farmers
- Illegal abstraction and sporadic pumping along the river thus need of a common intake
- Community has refused to accept rationing program
- WRUA has no office and thus members have no place to come to interact with the committee and seek assistance
- The WRUA works within a vast area that is difficult to patrol and lacks means of scouting
- Communities unwilling to denounce neighbours who are non-compliant
- WRUA authority in water allocation is not accepted.

Partnerships: Ngobit WRUA has received support for various projects and initiative including the following:

- Water Trust funds of KES 2.957m in 2012 November that was used for capacity building; Construction of Njore dam in Kariguini near Nairutia; pegging activities; Awareness building and

sensitization; tree planting and abstraction survey
- LWF has supported planting of 2500 trees in households since 2009
- Catholic missions of Mugunda and Sirima Parish have helped to provide piped water to adjacent communities
- LWF and Rural Focus have supported an abstraction survey
- Ol pejeta has supported WRUA in paying of registration fees

Ngobit WRUA requires partnership for the following: abstraction survey; tree nurseries; storage tanks to avoid long travel for water in some remote sections.

5.4 Mutara WRUA

General information and governance: Mutara WRUA was registered in 2009. The WRUA is served by the following intakes: Muthaiga, Gatitu, Raya, Kinanda, Kiangoru and Ngamini.

The WRUA has noted the concentration of several projects within Ngamini sublocation including: Muthaiga, Gatitu, Raya, Kinanda and Kiangoru projects. These projects carry out intensive agriculture and have the potential to bring funds for protection of the water sources and management of the WRUAs if well managed. However for the moment several challenges are faced in governance including the inability to ensure requirement of frequent meetings by the executive committee and the WRUA members.

Compliance and Enforcement: The WRUA has identified the following issues as the main constraints to compliance to by-laws and enforcement by the executive committee:

- Great variation in water piping and thus need for harmonization and standards
- Regulation of water use at night has been difficult due to lack of acceptance by community
- There are over 2000 unlicensed water pumps in the area and are defiant and community members are defiant and hide pumps during scouting
- Need to control portable pumpsthrough development of common intakes
- Water users who have leased land in the area refuse to join WRUA and cooperate
- Land grabbing and encroachment into wetlands and riparian areas compromises environmental protections

Partnerships:
- Mutara WRUA received 67,000 KES in 2010 from the Water Service Trust Fund (WSTF), which they used for tree planting, soil erosion control, and two capacity building workshops
- ADC Mutara also assisted in surveillance and monitoring
- LWF has provided 5000 trees for planting of which less than 1500 survived

5.5 Pesi WRUA

Governance: Pesi WRUA was established in 2001 and registered in 2003. The WRUA was created to overcome conflicts due to extreme water shortage in the lower zone (Thome) caused by over abstraction particularly furrows in the middle zone. The management committee is composed of 6 persons delegated from mid-zone, 5 from upper and 5 from lower zone. Pesi River has a large catchment and a wide dispersal of WRUA members. Due to this, management of the WRUA is difficult. Some of the problems include: inability to mobilize members for registration and renewals. Many of

the upper zone members have been paying their water usage fees directly to WRMA.

WRUA has office space but would like to partner to purchase office supplies and engage a manager. They also would like to embark on construction of dams (at least 3) to capture water from runoff. In addition, they require rehabilitation of old water pans and furrows build during the colonial times around Marura village up to Kiambogo.

Compliance and Enforcement: Pesi WRUA has noted the following as the main constraints to equity and efficient water allocation:

- Pollution abundant due to domestic use such as washing along rivers; there is a need for household piping of water
- Water scarcity heightened during the dry seasons due to water diversions furrows and illegal abstraction
- Refusal by communities to accept rationing programs compromises water allocation plans
- There is a lack of capacity for scouting and patrolling of the water users activities

Partnerships: Pesi WRUA has received support from a variety of sources:

- LWF assisted the drafting of the Sub-catchment Management Plan in 2009 implemented through Rural Focus.
- LWF (through Rural Focus) for a proposal to WSTF of 574,000 KES in 2010. The funds were used for inventory of boreholes
- Additional funds of 1.495 million after receiving WSTF in order to carry out capacity building by means of a one-week training on management skills.
- LWF has also provided seedlings for reforestation and riparian protection
- LWF helped unite mid and lower and also bring upper WRUA on board. They also through rural focus facilitated sensitization for WRUA to be established and to work together.

5.6 Likii WRUA

Governance: Likii WRUA was established in 2001 and registered in May 2002; a manager was hired in 2007. A new constitution drafted in 2009 enabled enhanced partnerships and enhanced fundraising. Likii WRUA consists of 17 registered projects; 9 community water projects; 5 commercial members (four hotels and the Nanyuki Water and Sewerage Company); Kangaita and Likii Villages. It is categorized as ALARM status by WRMA.

Compliance and Enforcement: The following areas have been identified by Likii WRUA as weaknesses in regards to compliance and enforcement of WRUA by-laws and environmental protection laws:

- Sedimentation from farms and quarries
- Challenge in dealing with the riparian owners who continue to encroach into the river
- Furrows, illegal abstractions and unregistered pumps contribute to continued water shortage
- Informal settlements not connected to main sewerage hence are an important source of sewage and solid waste pollution into water sources and rivers; other sources of pollution include Chagaa brewers, household washing areas and car wash along the river
- Lack of surveillance and scouting of river system has compromised enforcement

Partnerships: Likii WRUA has in the years attracted several partnerships for development projects including the following:

- Office and resource centre supplies and furniture have been facilitated by LWF, CDTF and GEF-Small Grants Program
- LWF purchased a 2.5 acre piece of land for construction of office.
- Tree planting assisted by LWF 2008/2009 with a survival rate of 40% in riparian areas and 70% in farms. There was no monitoring of tree survival particularly in Ontulili forest where the community has tree planting projects
- LWF through rural focus has assisted in development of SCMP.
- GEF-SGP provided funding for motorbike
- CDTF funds amounting to KES 27.7Million was acquired for: institution strengthening; promotion of income generation for communities, tree planting, water resource management, individual meters for communities, tree nurseries,
- WSTF has been used for development of drip irrigation, capacity building of management.

The following community projects have been initiated and supported through the WRUA:

- Biogas
- Energy saving stoves
- Climate change biogas projects.

5.7 Loisukut WRUA

Governance: Loisukut WRUA was first registered as Loisukut self-help group before it became a WRUA in November 2008. Membership engagement was reactivated in 2011 and an annual fee of 200KES agreed upon. All persons within the vicinity of thelaggas are members of the WRUA.

Compliance and Enforcement: The WRUA since its establishment has identified various constraints to water governance in their sub-catchment. They are however mostly unaffected by many issues affecting WRUAs along rivers including over abstraction, illegal pumps, pollution among others.

- Members of the WRUA are reported to be highly compliant to regulations due to a unique cultural system that ensures any defaulters answer to the elders and fines paid directly to them; there is also fear of curses arising from lack of compliance
- Since crop farming is not carried out, problems related to water abstraction are inexistence.
- Sand harvesting in Laggas by construction companies from Laikipia and surrounding counties is a challenge, in spite of areas prohibited and managed through NEMA
- Sand harvesters are obliged to use local labour and this may be used as a means to controlling levels of harvest
- Riverine vegetation has been highly reduced due to pastoralism and elephants felling of trees; there is a need to protect riparian areas from pastroralists and elephants
- Garbage disposal is also not a problem because community burns paper and other solid waste to protect cattle from consuming plastic. This therefore also protects laggas.

Partnerships: The WRUA has partnered with LWF in various development projects implemented directly through their programs or by Rural Focus:

- LWF through Rural Focus assisted in the establishment of the WRUA in November 2008
- LWF continues support to construct Laggas
- LWF and WRMA supported the development of a 5 year plan and budgets and in drafting funding proposals
- Through Rural Focus support, WRUA received KES425,000 in 2009 for sensitization, tree planting and membership mobilization and for the construction of a lagga
- In 2012, additional funding of KES1.9 million was received from WSTF for dam desiltation and additional laggas, which further attracted membership to the current 115 members.

5.8 Kurum WRUA

Governance: Kurum WRUA was initially part of Loisukut WRUA. It was established on 21st January 2011. 6 sand sand dams are currently managed by WRUA, 4 of which are new. The current number of members is 950 paying an annual membership of 200KES each.

Compliance and Enforcement: As with Loisukut WRUA, Kurum has managed to maintain compliance to by-laws and cultural systems for environmental protection and mutual respect through a system governed by elders. Some of the issues raised in regards to compliance and enforcement include:

- Members of the WRUA comply to constitution and bylaws due to customary regulations and a system governed by elders.
- Non compliance is subjected to fines of 2000KES or the risk of expulsion from the WRUA and other social structures
- Sand harvesting in Laggas by construction companies from Laikipia and surrounding counties is the main challenge
- There is need for setting aside areas where sand harvesting should not be carried out and clear labelling of these with sign boards
- Water allocation is inadequate particularly during the dry season and thus need for construction of additional sand dams

Partnerships: Kurum WRUA has only till 2013 begun to partner with LWF. So far they have received support for the construction of sand dams (April 2013); exchange visit with Eastern Province WRUAs; and proposal writing for funding of the sand dams. Loata Sand Cooperative has also assisted in erecting billboards along laggas where sand harvesting is prohibited or controlled.

5.9 Ngare Ndare WRUA

Governance: Ngare Ndare is administered by an executive committee and has engaged a manager. Large-scale farms in the sub-catchment include: Afro organic, Muli water project and Litari water project.

Compliance and Enforcement: The WRUA has noted some areas of defaulting in regards to compliance of by-laws and their inability to ensure compliance through enforcement.

Most small-scale farmers are supportive to WRUA and comply to water allocation and governance regulations. The large-scale farms are however not cooperative and some do not recognise the authority of WRUAs; many lack meters for their water use and prefer to deal directly with WRMA for payments and licencing without reporting to the WRUA

Partnerships: The WRUA has received support for various tree planting initiatives including: WSTF of KES 500,000 in 2009; 400 acacia trees planted by Ngare Ndare Trust in Nov. 2012 (less than 30 survived); Safaricom Trust in November 2012 also planted trees.

5.10 Ngusishi WRUA

Governance: The Ngusishi WRUA (NRWUA) was established in May 1998 as a response to intense competition for the limited water resources available in Ngusishi watercourse and springs. It was formally registered in 2003. The sub-catchment has been classified in ALARM stage by WRMA. Water demand has risen due increasing irrigated agriculture especially in the upper part and settlements throughout the catchment area. Membership consists of 14 entities, which represent the water projects, farms or villages within the catchment area.

Ngusishi WRUA has been shown to be the best-managed and most effective WRUA in the country. This is attributed to its efficient management.The 16 member executive committee meets monthly while a management team meets on a quarterly basis. Annual General Meetings occur each year. Ngusishi WRUA has16 projects with intakes at springs with water allocated through pipes and no furrows. All intakes are metered. Due to an MoU with WRMA the WRUA is able to keep 50 cents for every 1 shilling charged on water usage.

Compliance and Enforcement: WRUA has established a very successful membership engagement mechanism that has ensured compliance to bylaws: Some challenges at present include sewage pollution from Ngusishi market

- There are no direct river users; no problems with pastoralists; no car washes along rivers; illegal abstractions are greatly reduced;
- Riparian land owners are least cooperative in following water allocation regulations; they are also less reluctant to participate in tree planting
- Enforcement is carried out through the presence of five scouts, one in each of the 5 villages; patrol is carried out by use of vehicle purchased by WRUA.
- There is planting of trees every rainy season with a survival rate of 25% due to lack of collaboration by riparian landowners. Trees on farms have good results at 60%

Partnerships that the WRUA has had so far include:
- Office and equipment through WSTF, Lolomarik farm, Ol donyo farm, Batian Farm and LWF
- Research and data acquisition through: LWF and CETRAD
- Policy support by WRMA
- Water treatment chemicals from Transparency International
    - LWF support has been used for development of the SCMP (through Rural Focus); water diversion and river gauges and to support exchange tours with WRUAs in Kibwezi and Machakos; seminars on leadership and management, drip kits for water use.
    - CETRAD has supported capacity building of communities, mapping of sub-catchment, tour of Ewaso Ng'iro river catchment area

The WRUA has requested for facilitation for improved agricultural technology (green houses); water treatment plants and laboratory testing for domestic water to ensure its quality.

5.11 Sipili WRUA

Governance: Sipili WRUA was established in September 2012 after a decision at stakeholders meetings to discuss the need for construction of shallow wells and boreholes to provide communities within the sub-catchment with household and livestock water requirements. The meeting was facilitated by the local administration, WRMA and LWF.The executive committee of Sipili WRUA is composed of 21 members from the dam, springs, boreholes and shallow wells users.

The WRUA has 76 members in total although not all have renewed their membership. Annual membership fees charged as follows: Projects 500KES; Boreholes 500KES; Shallow wells 300KES; Abstractors 500KES; Irrigation 1000KES and Individuals 200KES. The WRUA due to the fact that it is new requires much support including for the following:

- Development of Sub-catchment Management Plan
- Member mobilization;
- Workshops for WRUA training
- Tree nursery development
- Livelihood diversification: bee keeping, ecotourism
- Desilting of dams
- Construction of office

Compliance and Enforcement: Sipili WRUA has so far identified the following weaknesses in compliance to by-laws and their ability to carryout enforcement.

- Registration fee defaulting and refusal by communities to join and accept WRUA's authority. There is therefore a need for mobilization of water users for compliance in registration
- Pollution abundant from domestic waste, vehicles, pesticides and fertilizers among others; there is need for designated washing areas
- Illegal and unregistered pumps are abundant
- There is no riparian protection and thus a need to have areas pegged, fencing of dams
- WRUA has no capacity for scouting and surveillance and at present enforcement has been supported by the local administration (chief and District Officer)

Partnerships received by the WRUA so far include:
- Tree planting from CDTF in collaboration with Muhotetu WRUA
- LWF has provided tours to Nanyuki and Ngusushi WRUAs and provided training in bylaws and the constitution
- Boreholes from JICA, Redcross

5.12 Nyahururu WRUA

Nyahururu WRUA established in 2009. The **water resources** within the catchment include: Nyahururu and Gathara rivers; and several dams including: Nguruka, Kamwangi, Gerishon, Inyonyi, Mukuru, Tumaini, Iregi and G.G dam.Even though most dams are open for use by all members of the community, private developers have grabbed some dams that have no projects or specific community initiatives. The WRUA is thus recommending support to carry out fish farming, ecotourism and water sporting activities in order to enhance income and the protection of these dams.

Compliance and Enforcement: The WRUA since its establishment in 2009 has continued to struggle as with many along river catchments with compliance of by-laws and enforcement capacity:

- No scouting and surveillance at present exists due to the lack of capacity and funding for this
- Furrow irrigation is rampant and there is a need to purchase of master meters
- Cultivation up to riparian area compromises the protection of river basins
- Pollution from Maina slums sewer and garbage waste draining to the rivers; other sources include pesticide and herbicides from farms
- Certain members of the community have encroached into springs and dams and excluded others; there has been a case of intentional polluting of a well (by pouring diesel) to prevent others from fetching the water.
- Introduction of water weeds by duck shooting "sportsmen" has caused problems in water sources

Partnerships of the WRUA to date include the following:

- LWF in provision of 30,000 tree seedlings, planted in riparian area between 2011-2012.
- Nguruka water project started piping water to households using CDTF funds
- Lake Bogoria WRUA supported educational tours to Naivasha WRUA
- Tree is life (NGO) introduced Energy saving Jikos. CBO projects
- The WRUA requires partnership to deal with desilting of dams, rehabilitation of Ngobito Springs, which are encroached.

5.13 Lower Ewaso Narok WRUA

Governance: The Lower Ewaso Narok WRUA was established in 2011. A sub catchment management plan followed in August 2012 with the support of WRUA members, WRMA, LWF and Rural Focus. The SCMP was reviewed in September 2013. No abstraction surveys along the river have been conducted to date. The WRUA committee is made up of five subcommittees (management, finance, procurement, monitoring and executive) with a total of 16 members. Three of these are women. No capacity building workshops have been carried out to date. The WRUA currently has no office space and no office facilities. It has been using WRMA offices for their meetings. It has a membership of 130 members.

Compliance and Enforcement: The WRUA has faced various challenges in enforcement of by-laws and in ensuring compliance by members. Some of these include:

- Lack of water users compliance, which has lead to excessive river abstraction particularly from portable pumps
- Enforcement is difficult because water users are unwilling to denounce others and report illegal users**;**
- WRUA struggling with members resistance to WRUA authority

- Most wetland areas have been grabbed for farming and other activities; there is a need for rehabilitation and recapture.
- Pollution is a major problem as is cutting of grasses for sale and the burning of pastureland.
- The WRUA requests for partnerships to carry out abstraction and hydrological surveys

Partnerships: LWF, through WRMA funded the development of the Sub-catchment Management Plan. HOPE, an NGO provided 4000 tree seedlings.

5.14 Muhotetu WRUA

Governance: Muhotetu WRUA was established in 2008 with support from WRMA and LWF (implemented through Rural Focus). The WRUA's constitution was written in 2010 followed by the sub catchment management plan in 2011 again with support from WRMA, LWF and Rural Focus. The SCMP had one review in July 2013. The committee is comprised of five sub committees, made up of three men and one woman each, including management, executive, procurement, finance and monitoring. To date, no annual general meeting has been held. The committee has received a number of capacity building workshops in 2013 focussing on training needs assessment and financial management. However, the WRUA does not currently have an office and lacks basic facilities and presently uses the chief's office grounds to conduct meetings.

Compliance and Enforcement: The WRUA has identified the following constraints to compliance of by-laws by members and enforcement capacity by the WRUA to deal with defaulters:

- WRUA has currently not been able to mobilize membership and create adequate awareness on by-laws
- Pollution in a major constraint to maintaining water quality due to vehicle washing in rivers particularly motor bikes; surface runoff from urban areas; cattle dips and domestic use
- Conservation of water sources is compromised by grabbing of wetlands, cultivation in riparian areas, tree cutting for firewood and charcoal burning
- Scouting and surveillance of water users activities has not been possible

Partnerships: The WRUA has so far benefited from the following partnerships:
- WSTF funded establishment of Karaba water project (installed pumps and piping);
- LWF facilitated the main meter at the intake and individual meters.
- CDTF has supported tree planting including fruit trees (mangoes and orange). Muhotetu is further seeking partnership to carry out hydrological surveys for five springs

5.15 Kinamba WRUA

Governance: Kinamba WRUA has 72 registered members and was developed in 2010 and registered in the Ministry of Social Services, prompted by lack of water downstream due to over abstraction in the upper and mid stream sections. Capacity building was initially carried out to create awareness and enhance membership. The sub-catchment lies within Laikipia and Nyeri counties and is thus its management is a challenge.Kinamba WRUA does not have an office or manager.

The WRUA notes the need for facilitation to enable management of projects and riparian area protection (in partnership with forest sector). Mutitu water project if recognised and registered with WRMA whereas Muthangari and Karimenu are not; individual projects are also not registered and

evade permits and registration.The WRUA has also proposed a borehole in Kamwenje village, Milimani.

Compliance and Enforcement: Various compliance and enforcement constraints have affected the WRUAs efficiency in water governance and allocation:

- Water users do not recognise the authority of WRUAs and thus they are unwilling to make payments for registration or renewals; WRMA has had to step in to oblige people to register particularly those involved in drilling of boreholes
- Water allocation is not managed due to existence of sporadic pumps along the rivers
- Pollution is abundant due to direct washing in rivers (vehicles, clothes), herbicides, pesticides and fertilizer run off, solid waste garbage particularly polythene bags
- Enforcement is a challenge and requires assistance from WRMA and local authorities to deal with illegal abstractors

Partnerships: The WRUA has so far partnered with the following:
- Home Grown in water source protection
- LWF support for awareness tour to Nanyuki WRUA
- LWF through Rural Focus have supported the development of the Sub-catchment Management Plan
- Loriak Forest Conservation Project provided seedlings to farmers and schools and hospitals with up to 75% survival rate. Members sign commitment letter for survival of seedlings.

5.16 Mid Ewaso WRUA (Kimanjo)

Governance: Mid Ewaso WRUA (Kimanjo) was established in 2009 due to the scarcity of water due to abstraction by large-scale farms in the main course of the river. Some of the important members of the WRUA include Mpala Ranch.

The WRUA requires facilitation to repair water troughs in Kimanjo destroyed by elephants and to construct a reservoir in Kimanjo town.

Compliance and Enforcement: The WRUA faces the following challenges in ensuring compliance of by-laws, participation of members and enforcement:

- Pollution is a major constraint to water quality including from pesticides from flower farms and direct bathing; there is also a need for toilet facilities along rivers for pastoralists
- Kimanjo WRUA has a wide variety of members including ranchers, hoteliers, group ranches and individual projects but few are compliant in paying fees.

Partnerships: Mid Ewaso WRUA (Kimanjo) has so far partnered with the following organizations for development of the WRUA and projects:

- Capacity building on management of WRUA has been funded by AWF, Rural focus and WRMA particularly dealing with awareness on water act
- LWF has also supported through Rural Focus the development and review of Sub-catchment Managment Plan
- Desert Edge has pledged an office space to be used by the WRUA
- Ranchers in the sub-catchment have assisted WRUA in transportation for scouting and surveillance

of water abstraction
- LWF facilitated a visit to Ngusishi WRUA to allow learning on water allocation

5.17 Ngare Nyting WRUA

Governance: The Ngare Nyting WRUA was established in 1997 and registered thereafter under the societies act. The general description of Ngare Nything sub-catchment has been derived from information collected for the larger Ngare Ndare sub-catchment within which Ngare Nything River falls.

Ngare Nyting WRUA has one master meter since its establishment, which is read every three months by WRMA and charged at appropriately. The project pays KES140,000 during dry spell and KES 100,000 during the rainy season. Non-members have been obliged to join the WRUA in order to use the water.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- The WRUA has managed to create awareness among members that has ensured compliance to bylaws and appreciation of the water resources
- Noncompliance of regulations is dealt with by two warnings after which defaulters get a fine. If it continues they risk expulsion from the WRUA.

The main concern of the WRUA is that of erosion due to deforestation and degradation of the riparian areas; it has been difficult to peg the riverine area due to the small size of the river and land occupied by the communities

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- LWF support for the establishment of the WRUA
- Africa DIGNA an NGO funded the construction of bathrooms, toilets and domestic washing tabs to avoid pollution. The community carried out the manual work for construction
- Lewa is a member and has funded the construction of an intake and piping of water.
- LWF through Rural focus funded the capacity building of scouting activities

5.18 Tereswani WRUA

Governance: Tereswani WRUA was registered in 2002. The constitution was written in the same year with the support of LWF and WRMA and has had one review to date. A sub catchment management plan followed in 2008, developed by the WRUA members, LWF and Rural Focus. The SCMP has not been reviewed to date. The WRUA has a management committee made up of 10 men and five women, with four subcommittees (finance, procurement, monitoring and executive) falling under the main management committee. Elections of executive committee takes place every three years. The constitution was reviewed in 2011. The last AGM was held on the 2nd May 2013. A number of capacity building workshops have been carried out with the support of WRMA, focussing on financial management and water sector reforms. The WRUA has an office which is supported by WRUA members with all the basic facilities including a computer, printer and furniture. The WRUA has employed a manager since and has an office in Timau. Currently 40 members are registered and 54 projects.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Severe soil erosion due over grazing, deforestation and the failure of tree planting initiatives;
- Encroachment of riparian areas and water intakes and trampling of river banks by livestock and humans crossing due to lack of bridges;
- Inability to enforce the rationing program during the drought season due to illegal abstraction by means of portable pumps;
- Members continued planting of blue gum trees affects ground water.

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- WSTF
- CETRAD
- LWF
- KWS

The WRUA has noted the following areas for future collaboration:

- Maintenance of water pipes in the forest area
- Implementation of Constitution
- Hydrological surveys
- Individual meters and permits for water use

5.19 Timau WRUA

Governance: Timau WRUA was registered in 2005 and members at present pay KES3000/= for registration. The last election of executive committee was in 2010 with four representatives from each zone (upper, mid and lower).

The Timau WRUA is categorised by WRMA ENNCA in the ALARM status. Timau WRUA was formed by the community dependent on the Timau River as a way to reduce the constant conflicts arising over water. The Timau WRUA is among some of the earliest WRUAs formed within the ENNCA region. It got registered with the registrar of societies in 2005. It was formed mainly to resolve conflicts over water use along the Timau River. The former committee had governance problems and through WRMA assistance the community elected a new committee in November 2011.

The WRUA has a management committee of 13 people; 10 are men and 3 are women. Each zone elects 4 people each to the management committee and the commercial farmers elect one representative. It also has the finance, procurement and monitoring subcommittees each comprising of 4 people. For management purposes the river has been zoned into three:

- Upper: covers the game park up to Nanyuki Meru tarmac road;
- Middle: includes the Nanyuki Meru road up to Umande;
- Lower: includes area from Umande to the confluence with the Nanyuki River.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Difficulty in managing the water rationing program due to lack of compliance by larger projects and growers groups
- The inability to enforce fines on illegal pumps also compromises water allocation program
- The lack of resources for monitoring of the catchment in order to ensure compliance to regulations
- Conflict in enforcement of bylaws amongst members
- Delays by WRMA to issue permits for users whose water is not metered compromises rationing program
- There is a lack of cooperation with WRUA in other tributaries due to the lack of a sub-form of WRUAs

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- Timau has received WSTF (749,000KES) for the drafting of the sub-catchment management plan
- They have also partnered with CETRAD and LWF for tree planting and capacity building of WRUA management

The WRUA has noted the following areas for continued partnership:

- Construction of common intakes.
- Construction of a sewerage system in town and improved sanitation to prevent pollution
- Car washes and garages away from the riverine
- More funding for gauges, permits and hydrological surveys.

5.20 Ontulili WRUA

Governance: Ontulili WRUA was established in the year 2000 due to emerging conflicts between downstream and upstream users. According to WRMA classification, it is in ALERT status. It was registered in 2003 with the registrar of societies and received a certificate in 2008.

The WRUA office has been provided by the current chairman who has served for several terms.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Tree planting in the catchment scarcely implemented
- Lack of protection of water source; haphazard water abstraction
- Rationing programme difficult to implement during the drought season and over abstraction leading to dry river beds
- Insecurity of infrastructure including destruction and stealing of water meters; water wastage at individual level
- Farming and encroachment of river basin
- Inability to monitor and scout the sub-catchment for compliance
- Lack of ability to monitor water levels compromises the efficiency of the rationing program

Partnerships:
The WRUA wishes to partner with WRMA in rationalization of water services payments to ensure some funds return for WRUA office operation sustainability. This will require negotiation with WRMA to share proceeds from water use e.g. 20%; or additional cost for WRUA

5.21 Sirimon WRUA

Governance: Sirimon River Water Users Association was formed in 1997 and registered in 2004. It however changed its name during registration and became the Sirimon Water Resource Users Association. The WRUA has a constitution, which was written in 2006 followed by the SCMP in 2009 none of which have been reviewed to date. The WRUA is made up of five committees including management, executive, finance, procurement and monitoring. The committee includes women, men and youth within it however the majority of members in each subcommittee are women. The committee has received a number of capacity building workshops between 2008 and 2013 facilitated by LWF, CETRAD, WRMA and ENNCA focussing on resource use and conflict management, water sector reforms, financial management, monitoring and evaluation and advocacy. The WRUA has an office, which it is able to rent through member contributions however basic facilities such as computer, shelving and furniture are lacking. The WRUA membership is comprised mainly 21 water projects and three large horticultural farms to date.

Annual AGMs are held in January or February with the most recent being February 2012. Elections of WRUA leaders will be held in 2014. Currently the WRUA shares an office with the Sirimon EU- funded Water project.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Lack of jurisdiction to enforce compliance especially by big farms
- Illegal abstraction by portable pumps
- Pollution due to car washes and direct use by households of the water
- Most water users are not registered with the WRUA
- Inability to monitor and scout the sub-catchment for compliance
- Deforestation within the sub-catchment is rampant and the WRUA and CFA have had limited ability to control this practice

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- LWF
- Rural Focus
- WSTF
- CETRAD
- LWF
- KWS

The WRUA wishes for partnerships for:

- Capacity building of WRUA membership and sensitization on tariffs to villages and large projects and farms
- Sustainability of governance structure and further coordination of WRUA members.

5.22 Nanyuki WRUA

Governance: Nanyuki WRUA was established in 1998. Even though it has had many successes in catchment protection and member mobilization, the WRUA has experienced in recent times wrangles within its committee that have caused division. Recently one of the groups within the WRUA formed an association that has represented itself as the legitimate WRUA. It is however not recognized by WRMA.

The WRUA has noted the need for criteria for membership allowing vetting of members and monitoring of members activities based on a code of conduct and by laws.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Pollution from urban area wastes into river and stream, clothes and car washes; trampling by livestock.
- Deforestation due to timber demand resulting in increased soil erosion
- Rationing programme difficult to implement during the drought season; there is a need for storage tanks
- Membership recruitment is a challenge due to reluctance of certain members to join and make payments
- Maintenance and monitoring of water levels in the river is a challenge
- WRUA pegging program has so far only covered a small section of the sub-catchment where its has slowed down encroachment of the river areas but needs expansion
- Constructions and infrastructure in the river channel
- Encroachment into wetlands e.g. army barracks, British army, Huruma wetland
- Riparian tree cutting

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- WSTF
- CETRAD
- LWF
- KWS

The WRUA wishes for continued partnership for:

- Collaboration with local government for waste disposal and NAWASCO for sewerage
- Lobbying with physical planners, local government and others to consider water users and WRUA bylaws
- Collaboration with CFAs and KFS in the forest area management of the water sources

5.23 Rongai WRUA

Governance: The WRUA established in 2009 has no water projects at present, which limits the funding of the WRUA. There are currently no set structures allowing for renewal of leaders through elections and no AGMs have been held.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Encroachment into wetlands and riparian areas
- All abstraction currently is through portable pumps and thus rationing program not possible
- Planting of blue gum trees is rampant
- Pollution of water by car washes and direct use of rivers; trampling by livestock
- Inability of WRUA to implement enforcement due to lack of scouts and adequate mandate for monitoring member activities

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- Tree planting initiatives by LWF
- Mid-Zone have two dams. One has been rehabilitated by CDF funds in 2010 and fenced; the second requires de-silting and fencing
- JICA borehole project in lower zone (Marura) is a hand operated pump that is close to the hospital and useful for household and livestock water
- Proposal for construction of water dam in upper zone has yet to receive responses by Water Trust Fund

Areas requiring further collaboration include:

- Reforestation efforts: local nurseries; fencing and care of trees to maturity
- De-silting and fencing of dam in mid-zone
- Rehabilitation of dried out borehole in middle zone

5.24 Naro Moru WRUA

Governance: The Naromoru WRUA was formed in 1997 and registered in 2003 as a self-help group and then later registered as a WRUA in 2007. It was formed as a response to constant water conflicts, water shortage problems and catchment destruction. According to WRMA classification, the sub-catchment is in ALARM stage.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Difficulty in engaging members due to lack of commitment to WRUA
- Rationing program difficult in the dry season due to illegal abstraction

- Lack of compliance by growers groups and large projects
- Soil erosion and degradation of riparian areas

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- WSTF
- CETRAD
- LWF
- KWS

5.25 Burguret WRUA

Governance: The Burguret WRUA was established in 1999. It has eight membership categories: all river riparian land owners, community water projects, farmers with portable pumps, hoteliers, ranchers, large scale farmers, livestock farmers and observer member.

Compliance and Enforcement: The WRUA has identified the following as the main constraints in regards to compliance to by-laws and regulations and enforcement to deal with defaulters:

- Inconclusive by laws due to an outdated constitution
- Lack of compliance during the dry season particularly to the rationing program by illegal portable pumps
- Inability to carry out monitoring and scouting
- Lack of cooperation by large farms and growers groups

Partnerships: Some partnerships that the WRUA has had so far to support its development and projects have included:

- WSTF
- CETRAD
- LWF
- KWS

The WRUA wishes to continue partnerships in the following:

- Water harvesting and storage strategies
- Water storage tanks at household levels and installation of individual meters
- Rehabilitation of several colonial dams and five boreholes

CHAPTER 6 : Vision, Mission, Strategic Objectives and Actions

6.1 Vision

"Sustainable water resource management, planning and usage for the benefit of Northern Ewaso Ng'iro inhabitants and the environment"

6.2 Mission

The strategic mission of the Laikipia Water Conservation Strategy is that:
"Water resources are used and managed to ensure sustainable social and economic growth and maintenance of water-dependent environments"

6.3 Strategic Objectives and Actions

The Strategic objectives of the Laikipia Water Conservation Strategy are categorized into three thematic areas namely: Water use and allocation, Environmental sustainability, and Water governance. This categorization is based on group discussions held during the first stakeholder's meeting of water users composed of WRUAs and representatives from the private sector from Anek Green Enterprises (drip irrigation and dam experts). This meeting was held on the 23-24 March 2013. The overall objective and specific objectives for each category are outlined.

6.3.1 Water allocation and use:

The strategy should ensure that there is continuouswater availability throughout the year both for the maintenance of human health, sanitation and livelihoods but also adequate water reserve for the environment.

Ensure reserve is always maintained for the environment to ensure continued ecosystem services. This will require knowledge of the hydrological status of the water sources in the catchment;

In order to **prevent water conflict** between downstream and upstream users resulting from scarcity during dry season and to ensure adequate supply of water for all users year round, water storage technology facilities need to be prioritized. These will include: dams, water pans, water tanks (at individual household and community level)

Efficiency in water allocation and use also requires shared responsibility in water conservation. Consumers can share this responsibility through payments of water services based on regulated use measured by water meters; meters at both project and household level ensure wastage is controlled particularly resulting from burst pipes, or from illegal wasteful abstractions.

Water storage is also an important consideration within this objective ensuring that households and projects are able to take advantage of rainy seasons to harvest roof-top water for use during the dry season and also to ensure that rivers and ground water sources are not over utilized.

In addition to the above, **enhanced efficiency in utilization of water resources** needs to be promoted through improved agricultural technology including drip irrigation and curbing of wasteful methods such as furrows and direct pumping from rivers.

Actions to address water allocation and use:

- Capacity building/awareness creation in the following areas: laws and regulations governing water use and allocation, efficient and economical use of water, water efficient agricultural technology including drip irrigation, water harvesting and storage.
- Water abstraction surveys to monitor the number of users, their requirements and means used by water users in water abstraction and give recommendations
- Hydrological surveys in order to understand the quantity of water available for abstraction and the requirement for the environment to ensure maintenance of ecosystem services
- Improved health and sanitation of communities within sub-catchments by provision of clean and adequate water
- Tree nursery establishment to provide seedlings for catchment rehabilitation
- Pegging and putting up of gabions along the river to protect the river bank from over-grazing and trampling and promote rehabilitation of riparian vegetation
- Enhanced enforcement of regulations, laws, policies regarding water use and allocation
- Installation of River Gauging Stations (RGS) to monitor the levels of water in the river year round and provide data for planning of water abstraction
- Use of new technologies e.g. drip irrigation which minimize water use
- Construction of lined water storage dams and ponds to reduce losses through infiltration into the ground
- Development of water allocation plan (WAP) for all sub-catchments

6.3.2 Ecosystems Management

Ecosystem Management is the main approach for the realization of a green economy, which combines economic growth with sound natural resource management. In regards to water, the 3-Rs i.e. recharging, retaining and reusing are critical to securing both water and land buffers. Recharge adds water into the system, which occurs naturally through infiltration of rain and runoff water into the ground. Retention slows down the outflow, raises the water levels and thus increases the amount of water available for allocation. Re-use ensures recirculation of water in the system by reducing losses through evaporation and uneconomical user practices such as furrows, and ensuring processes that can recycle water usage.

The Water Conservation Strategy should ensure that water allocation considers the need to maintain water for the environment to maintain its ecosystem services. In addition, water quality should be monitored and maintained in order to ensure provision of clean water to households.

Actions to addressEcosystem Management

- Capacity building in environmental protection to ensure the reduction of pollution in rivers and water sources
- Awareness building on rules and regulations regarding pollution, illegal abstraction and destruction of riparian areas.
- Monitoring of indicators of ecosystem health including through carrying out ecosystem assessments and monitoring; and collection of data that may be used in understanding the ecological status of sub-catchments in order to make appropriate recommendations for rehabilitation
- Protection of important conservation areas such as wetlands through designation of protected areas where agriculture, pastoralism and other activities are restricted including through fencing
- Reduce wastage and leakage of water from piping and increase responsibility of water users including by application of "water efficiency commitment"
- Awareness on sanitation including; solid waste and sewage disposal through improved sanitation within riparian areas by construction of: public toilets and bath areas and ensuring improved sewerage services
- Control soil erosion and rehabilitation of riparian vegetation through gabions, terracing, reseeding of grasses; mulching, and reforestation.
- Promote groundwater recharge and retention along river beds by regulation of sand and pebble harvesting
- Monitoring of water wastage due to broken pipes, irresponsible use by unregulated pumps and furrows.
- Control of invasive species through creation of awareness, identifying, and controlling by uprooting and burning as they compromise ecosystem health
- Reforestation by use of endemic tree species suitable for the area and that are water friendly, avoidance of exotic water depleting species such as the blue gum.
- Ensuring a health environment by promoting increased availability of water for maintained ecosystem services
- Ensuring wetlands and forested areas are protected to promote their ecosystem functions
- Improved water basin protection to prevent soil erosion, pollution and encroachment of riparian areas

6.3.3 Water Resource Management:

Water resource management in Kenya as governed by the Water Act 2002 is structured in a vertical relationship between the national, regional and local levels. At the top of this structure, at national level, is the Water Appeal Board (WAB) with the function of policy regulation. WRMA and the Water Services Regulatory Board (WSRB) also work at this level and have regulatory function.At the Regional level are the Catchment Areas Advisory Committees (CAACs) and the Water Services Boards (WSBs) operate to provide water services. The local level of the structure consists of WRUAs who carry out water resource management at local level and Water Service Providers (WSPs) who provide water and sewerage services. The consumers are at the bottom of this pyramid and are the users of the water.

The major challenge of the above structure to integrated water resource management is the lack of adequate understanding of consumers of the existence of these bodies, their mandates and roles in water resource management. The disconnect between the national and regional and the regional and local levels is noticeable particularly in the operations of WRUAs and WSPs. In addition, quite often water resource management in Laikipia and Kenya in general, water resource management considers human and livestock users while ignoring the needs of wildlife and environmental reserves.

In order for water resource management to be successful, there is a greater need for more participatory approaches in decision-making and the adoption of a bottom up approach. The objectives of Water Strategy in regard to water resource management is to ensure that:

1/ **Water Resource management in Laikipia is in line with National and County policies, bills and regulations:**

- Laikipia County government supports the development of water reforms and alignment of county initiatives to policies, bills and water governance regulations
- Supports the development of human capacity in regulatory bodies, civil society organizations, service providers, and central and county government officials in IWRM principles
- Implement stakeholder participation as a basis for decision making that considers needs of water users and the environment
- Essential information is processed and packaged at the right level for specific managers and stakeholders to support transparent decision-making and to gain commitment and political support for the decisions made.
- Water use efficiency improving through use of financial instruments and economic management
- Major water users are known and are managed through WRUAs and regulated through a licensing (or permit) system
- WRUA activities improved due to increased investment and partnerships
- Regulatory and economic instruments to allocate water
- The water allocation system is effective and permits are being complied with.
- The Pollution control system is effective and permits are being complied with.
- Knowledge of water resources availability is a basis for management.

2/ WRUAs are involved more effectively in natural resource management

- Involve WRUAs in forest management plan as they are constantly involved in tree planting and protection of springs and water sources in and adjascent to the forest
- Participation in land-use development and plans
- Capacity development for policies and governance issues related to Natural resource management
- Involvement in decision making on Natural Resource management (bottom up approach)
- WRUA involvement in resource mobilization (proposal/concept development) and managing

finances for purposes of environmental protection based on WRUA priorities
- Be consulted when developing water infrastructure and resources e.g. drilling of bore holes; ensure that WRUAs are awareand involved in the acquisition of permits from WRMA and in EIAs.

3/ Promote knowledge sharing and promotion of best practice among WRUAs and other groups:

- Strengthening WRUA Forum for the following purposes:Knowledge sharing and promoting good practice; capacity building for reporting; to give one voice for WRUAs with sub-forums defined by tributary connections and common issues; fund raising for NRM and joint implementation of the Water Conservation Strategy
- Include other stakeholders into WRUA Forum including WRMA, Ministry of Agriculture, Fisheries and Livestock, County representatives, Ewaso Nyiro North Development Authority (ENNDA), National Drought Management Authority (NDMA), GROOTS Kenya, World Vision, Rural Focus, SNV, Tree is Life, Red Cross, NCCK, Caritas, AMREF, Child Fund, NEMA, CFAs, AWF, KFS. KWS, LWF, CETRAD, KENWEB as participants of the WRUA Forum
- Exchange programs among WRUAs to access various differences and adaptation methods to resolve challenges; learning from others experiences.
- Documentaries on best practice and challenges for persons to know what WRUAs are doing

6.4 Synergies between WRUAs and CFAs

Even though WRUAs and CFAs work under different agencies (WRMA and KFS respectively), its been noted that there are several areas of overlap in their mandates on the ground particularly in regards to riparian area protection around water in takes.

WRUAs in Laikipia have had a relatively long history of collaborating with partners in tree planting for catchment rehabilitation. Many have reported funding and partnerships with LWF, WSTF and CTDF for tree planting averaging to over 10,000 seedlings planted in the various sub-catchments per year. This does not account for the total tree planting initiatives in the sub-catchments since CFAs are also doing the same. One would expect large expanses of forest and woodlots from these efforts, which is not the case. In many cases, less than 30% percent survival of trees attributed to various reasons including: browsing of seedlings by livestock; drought and lack of accountability (in some cases these seedlings have been diverted to other areas). Tree planting by WRUAs has shown greater success up to 80% survival rates when seedlings have been planted in homesteads and in schools.

A common forum of WRUAs and CFAs: It has been noted that the members forming WRUAs in many zones or sub-catchments are also the same members of the CFAs. Due to this and the overlap in some mandates and activities, a common platform is necessary to enable sharing of resources including funds and planning of natural resource management within forested areas where water resources require protection.

Such a forum would carry out various activities *inter alia*:

1/ Tree planting initiatives: indigenous tree planting; joint nurturing of trees to increase survival; management of tree nurseries; riparian area regeneration activities by enhancing non-tree vegetation and protected areas respected by both groups.

2/ Administrative offices for management of membership and activities: All CFAs in Laikipia have been allocated space by KFS for office construction. On the other hand, there are many WRUAs that are yet to acquire land and construct offices. In order to save funds and administrative work, WRUAs and CFAs in some sub-catchments may share offices and office staff.

3/ Fund raising for NRM: a joint WRUA/CFA forum would have greater leverage in fund-raising as it would enhance donor trust and ensure their ability to carry out integrated work natural resource management. Some donors and partners may be incorporated as observers in the forum.

4/ Joint forum gives both groups a stronger voice in participation in policy discussions and in ensuring their views are incorporated at county discussions on environmental issues and NRM. In addition, WRUAs and CFAs would be able to develop joint management plans in areas that require joint protection for water and forest resources

5/ Assessments and Monitoring of the environment can be enhanced by the two groups working together in providing data on various aspects of forest and water to enable transparent planning and allocation of resource use. Such data can be managed by LWF in partnership with CETRAD in order to provide planning tools such as maps in collaboration with members of the forum.

6/ The joint forum would be able to carry out joint capacity building and awareness building on various themes including NRM and enhance membership to both WRUA and CFA groups. They would be able to carry out training of trainers who would carry on into the village levels and thus ensure that awareness building is continuous.

THE LAIKIPIA WILDLIFE FORUM
(Water and Wetlands Programme)

Laikipia Wildlife Forum, established in 1992 by communal and private landowners in the Laikipia County, is a membership-based organisation with a varied, yet democratically representative governance structure. Since its inception, the forum has grown substantially into a non-profit organisation with a vast membership of private and communal landowners with a common interest in conserving, managing and profiting from natural resources in and around Laikipia. With programmes ranging from wildlife conservation, conservation enterprise, environmental education and tourism sector support, among others, the forum takes an especially holistic approach to conservation.

The Water and Wetlands programme, which falls under the Conservation Sub-committee of the LWF board, is no different and is dedicated to improving the lives of people through supporting livelihoods while generating sustainable and dependable access to essential water resources. Laikipia Wildlife Forum, through the Water and Wetland Programme, directly supports the formation and development of WRUA's within the upper catchments of the Ewaso Nyiro River. The programme seeks to strengthen these organisational structures by way of capacity building and awareness; empowering WRUA's to manage and develop their associations, sensitizing their respective communities in water resource conservation and management. LWF envisages a situation where water resources users will collaborate freely in the management and development of their water resources through their respective Water Resource Users Associations (WRUAs); taking water as an economic good, exploiting it for financial gain and willingly paying for what has been used.

6.5 Implementation of the Water Resource Strategy

Priorities to be addressed in implementation of the Water Resource Strategy: The priorities to be addressed by this first edition of the strategy are also the basis of evaluation to be carried out of progress in implementation. These include:

WATER ALLOCATION: Allocating water to major water users and uses; and maintaining minimum levels for social and environmental use while addressing equity and economic development needs.

COMPLIANCE AND ENFORCEMENT: Implement effective monitoring systems that provide resource managers and users (WRUAs and WRMA) and law enforcers with information and means of ensuring compliance with regulations and ability to enforce them.

TECHNICAL AND FINANCIAL MANAGEMENT CAPACITY: Applying economic and financial tools for behaviour change in financial accountability by WRUAs and other stakeholders. Providing platform for capacity development for innovations that enhance sustainable and responsible water use and management.

POLLUTION CONTROL: Managing water pollution through improved enforcement and public awareness.

INFORMATION MANAGEMENT: Provide essential data necessary to make informed and transparent decisions for development and sustainable management of water resources in the basin

STAKEHOLDER INVOLVEMENT AND PARTICIPATION: Implement stakeholder participation as a basis for decision-making that considers needs of water users and the environment and to ensure financial and technical support for water conservation and management

The roles and responsibilities of the Rivers and Wetlands Programme Officer:
The role and responsibilities of the water program officerin implementation of the Water Conservation Resource Strategyare contained in the Terms of Reference of his/her engagement and include the following:

- Support programme implementation by preparing work plans, monitoring logs and reports on project achievements and recommendations;
- Mobilize and motivate Water Resource Users Associations to implement activities outlined in Sub Catchment Management Plans;
- Organize activities for capacity building in the water resource management sector;
- Establish sustainable financing mechanisms for WRUAs in close co-operation with the Water Resource Management Authority and other relevant government line ministries;
- Attend to sector forum meetings to ensure that institutional priorities are on track and to share lessons learned;

- Educate communities on water sources protection and catchments management;
- Empower communities and their leaders on the water policy, water legislation and related strategy;
- Prepare training manuals and awareness creation packages for stakeholder participation in integrated water resources management;
- Prepare technical reports for internal and donor reporting;
- Establish a best practice database;
- Prepare funding proposals for the programme.

Activities for joint collaboration among NRM management agencies:

- Capacity building and community sensitization for environmental protection and wise use of resources – should be continuous activity: county government, LWF, CETRAD,
- Tree nursery establishment at WRUA level – KFS (technical and financial), WRUA initiative from wild seedling collections; Water Service Trust Fund; LWF; WRMA; CETRAD; other donors; local community
- Land-use planning – Ministry of Lands (Survey); LWF; WRUAs, AWF
- Water resource pegging – WRMA, WRUAs, WSTF, KFS, "NEMA", CFAs, LWF, Ministry of Lands (Survey)
- Restoration of riparian areas and water catchments
- Infrastructure support e.g. fencing off water sources, building cattle troughs and washing stands and common car washes; public toilets
- Reseeding to control soil erosion- Water Service Trust Fund; LWF; WRMA; CETRAD; other donors; local community
- Construction of gabions and terraces to control soil erosion
- Planting of fruit trees and fodder crops (napier) - Water Service Trust Fund; LWF; WRMA; CETRAD; other donors; local community
- Wildlife protection, Information and monitoring of biodiversity – KWS, KENWEB, AWF, LWF
- Planned grazing eg paddocking to deal with pressures from pastoral activities – WRUAs, CFA, KFS, KWS

CHAPTER 7: Reporting, Monitoring & Evaluation

Monitoring and Evaluation of the Laikipia Water Strategy will be key in tracking progress and making reviews over time. The monitoring component will track progress made through data collection and analyses during the implementation cycle. Monitoring will provide constant feedback on progress made towards meeting the strategic objectives. The evaluation component will consist of regular assessment of outputs and will determine whether these outputs have been achieved in a timely, efficient and effective manner with the intended impacts being achieved. This will both provide the Water Program officer with the information required in order to make improvements in the implementation plans, project designs and ensuring lessons learnt are applied within the course of the programme.

The LWF Water Program will work in collaboration with the Monitoring and Evaluation Program to develop formats for reports. The frequency of reporting will depend on the timelines and specific activities highlighted in the priority actions to be addressed by this strategy.

Under this strategy, there will be need for capacity building of WRUAs Reporting, Monitoring and Evaluation. WRUAs will be invited to discuss the indicators for M& E with LWF and other stakeholders including WRMA and CETRAD, and develop a common reporting template. WRUAs will also be able to acquire support and information on their sub-catchments from various partners including WRMA, CETRAD and Kenya Meteorological Department.

Stakeholder reporting meetings: WRUAs will be invited for semi-annual reporting meetings where they will share information on their progress in the strategic areas of the Water Strategy, but also on their progress in water governance particularly in compliance and enforcement issues. They will also at such meetings be required to report on the number of meetings, and the decisions made at such meetings. They will be able to share information among each other on water users governance and in partnerships for development projects. At least one of these meetings can be held in tandem with the Joint WRUA/CFA forum.

Written reports: WRUAs will be required to submit a progress report on a quarterly basis. The report will include:

- The summary progress report which will brief on activities undertaken during a 6 months period under the following themes;
- Water Resources (information on stream flow and spring flow)
- Water Use (meter readings, new permits, illegal abstractions)
- Catchment Status (Riparian areas, Spring vegetation, Natural forests, eroded areas, degraded forests, wetlands)
- Partnerships and collaborations

- Institutional development (Meetings held; AGM & SGM, General Election held, Special Election; Review of Constitution, Others- Employment of staff, IGA)
- Infrastructure development (New intakes, Dams, Boreholes, RGS, Sub Surface dams)

Dissemination: Laikipia Wildlife Forum will facilitate dissemination of progress reports and facilitate surveys in collaboration with WRMA based on needs and priorities of the different WRUAs including: hydrological and abstraction surveys. LWF will facilitate dissemination of the surveys results, study findings, and other data collected during the reporting period on water issues. Such data will be used for development of Sub-catchment Naturalised Flow Duration Curve, water quality analysis reports and climate trends and predictions.

The **key questions for monitoring indicators** of performance of the Water Strategy include: Where are we now? Where do we want to be? Are we on the right track to get there? Are we there yet?

INDICATORS SET FOR WATER RESOURCE MANAGEMENT STRATEGY

FUNCTION	WATER MANAGEMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
WATER ALLOCATION: Allocating water to major water users and uses; and maintaining minimum levels for social and environmental use while addressing equity and development needs of Society.	Major water users are known and are managed through WRUAs.	Number of surface and groundwater users (registered with WRUA)	Number members Number of licenses issued. May be further subdivided by use (dam, borehole, stream).
			Review. Examine allocation criteria for compliance with IWRM principles.
	Water allocation is in line with sustainable use and social equity principles. Water Allocation Plans are developed	Proportion of time environmental and social reserve is maintained in major water courses	% of records from water resource monitoring stations (RGS) with flows lower than the reserve divided by the total records x 100.

FUNCTION	WATER MANAGEMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
POLLUTION CONTROL Managing water pollution through improved enforcement and public awareness.	Reduced water pollution	% of reduction in surface water pollution.	%. Number of samples / water sources below set standard based on indicators of ecosystem health or on measurements of a few key water quality parameters.
	Improved enforcement and awareness of anti-pollution laws.	% of reduction in surface water pollution and number of water pollution related incidents recorded.	%. Number of samples below set standard based on measurements of a few key water quality parameters. Numbers of arrest/incidences; number of information, education and communication messages

FUNCTION	WATER MANAGEMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
ENFORCEMENT Implement effective monitoring systems that provide resource managers and users (WRUAs and WRMA) and law enforcers with information and means of ensuring compliance with regulations and ability to enforce them.	The water allocation system is effective.	Number of water allocation permit holders complying with permit conditions Number of incidences of upper-lower zone water conflicts	Numbers From monitoring visits the number and spot checks of not complying with conditions divided by the total number of visits.
	Knowledge of water resources availability.	Number of water resource monitoring stations producing reliable data	Number. Number of stations with reliable data records.
	Knowledge of water resources availability.	Creation of database on status of water resources exists and is continuously updated	Number Hydrological surveys Abstraction surveys
		Number of groundwater monitoring stations with declining water levels.	Numbers Comparison of water levels over a 5-year period.

FUNCTION	WATER MANAGEMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
TECHNICAL AND FINANCIAL MANAGEMENT CAPACITY: Applying economic and financial tools for behaviour change in financial accountability by WRUAs and other stakeholders. Providing platform for capacity development for innovations that enhance sustainable and responsible water use and management.	Water use efficiency improved through use of external financial instruments	Charges and fees for water allocation is harmonized to between commercial and domestic users	Review Examine for the application of economic and financial tools in water allocation.
	WRUA activities improved due through investment and partnerships	Revenue received from WRUA activities	%. Total revenue divided by the total amount billed.
		Number of partnerships for implementation of projects	Review. Examine partnerships application and economic and financial tools including grants
	Formation of a WRUA platform for self- regulation	Operational WRUA platform	Number

FUNCTION	WATER MANAGEMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
INFORMATION MANAGEMENT Provide essential data necessary to make informed and transparent decisions for development and sustainable management of water resources in the basin	Essential information is shared at the right level for specific managers and stakeholders	Number of information available and shared	Number - Information (water flow; abstraction; partnerships; regulations ….) - Stakeholder
- Database is transferable across basins for trans-boundary systems	Database is established in formats compatible with other river basin management organizations		Number Examine availability of basin data and reports

FUNCTION	WATER MANAGEMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
STAKEHOLDER PARTICIPATION: Implement stakeholder participation as a basis for decision-making that considers needs of water users and the environment and to ensure financial and technical support for water conservation and management	Stakeholder's are identified and categorized;	Number of stakeholders identified	Number Stakeholder's analyses done and roles identified Stakeholder committee formed
	Effective cooperation among government agencies with responsibilities for water use management and the environment.	Number of formalized MoUs among government agencies	Number of MoUs

FUNCTION	COUNTY AND NATIONAL GOVERNAMENT ENGAMENT OBJECTIVES	PROGRESS INDICATOR	UNIT / DEFINITION
COUNTY AND NATIONAL GOVERNMENT ENGAGEMENT: Water Resource management in Laikipia is in line with National and County policies.	Laikipia County government supports the development of water reforms and alignment of county water policy to national water policies and governance regulations	Laikipia county government water bill in water governance and regulation	Review Time, effort and partnerships built by county representatives in discussions and initiatives in the water sector
		Ewaso Ng'iro catchment water committee composed of water ministers of trans-boundary counties	Operational
		Number of policy relevant communication for decision making	Number of policy briefs

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APPENDICES

Appendix 1: Participants of the Integrated Water Resource Management Stakeholder's Workshop on 23rd to 24th May 2013

	NAME	ORGANISATION	GENDER	
			Male	Female
1.	James T. Moiyare	Kurum WRUA	√	
2.	Nteere Gitonga	Ngare Ndare WRUA	√	
3.	Simon M. Leniya	Sinka WRUA	√	
4.	Chrisphine M. Kingori	Sipili WRUA	√	
5.	Leah Gitau	Kinamba WRUA		√
6.	Peter Wachira Githae	Karameno	√	
7.	Generose E. Andeso	Ngobit WRUA		√
8.	Banis Wairimu	Pesi WRUA		√
9.	Njogu Njagi	Muhotetu WRUA	√	
10.	Robert K. Kariuki	Upper Ewaso Nyiro WRUA	√	
11.	Martin Mate	Burguret WRUA	√	
12.	Regula Wacker	Kiboya Dam SHG		√
13.	James Mwangi	Laikipia Wildlife Forum	√	
14.	Gathua Joseph	KENWEB	√	
15.	Simon M'Leroiya	Sinka WRUA	√	
16.	Elijah Wichanguru	Northern Rangeland Trust	√	
18.	Alice Kariithi	ANEK Enterprises		√
19.	Samson Kitunji	Ontillili C.F.A.	√	
21.	Julius Mwaniki	Narumoru WRUA	√	
22.	David G. Mugania	Sirimon WRUA		√
23.	Samuel Santa	Mid- Ewaso WRUA	√	
24.	Longonyeki F. Sameri	KIP / Meibae WRUA	√	
25.	Joy Makena Nabea	Executive Officer		√
26.	W.O. Hamisi	SRM WRUA	√	
27.	Bernard Kamawira	Melwa WRUA	√	
28.	Patrick Kirobi	Loisukut WRUA	√	
29.	James Olemoiyare	Kurum WRUA	√	
30.	Michael Kibera	Mount Kenya West C.F.A	√	
31.	Hilda Gakia	Mount Kenya West C.F.A		√
32.	Longonyek Samefi	Kip/ Meibae WRUA	√	
33.	Julius K. Mbiti	Timau WRUA	√	
34.	Samuel Sanya	Mid-Ewaso WRUA	√	
35.	Peter M. Kinyua	Lower Ewaso Narok WRUA	√	
36.	Peter Wachira Ngatia	Nyahururu WRUA	√	
37.	Jenifer Meme	Nanyuki WRUA		√
39.	Olivier Hamerlynck	KENWEB	√	
40.	Stephane Duvail	IRD – KENWEB		√
41.	Emanuel Fondo	World Vision Kenya	√	
42.	Steve Omari	KENWEB	√	
43.	John Murungi	Teleswani WRUA	√	
44.	Peter M. Kinyua	Lower Ewaso Narok WRUA	√	

45. Daniel Kunga	Ontilili C.F.A	√	
46. Stanley K. Mundia	Ontulili C.F.A	√	
47. Robert Myall	Nanyuki WRUA	√	
48. Mordecai O. Ogada	E.D Laikipia Wildlife Forum	√	
50. Samson Kithinji Ikiara	C.F.A. Ontulili	√	
51. Chrisphine Mwangi Kingori	Sipili WRUA	√	
52. Benson Lengaden	AWF	√	
53. Longonyek Sameri	KIP/Meibae WRUA	√	
54. Theo Way	AWF	√	
55. Nicholae Kinyanjui	Olmoran WRUA	√	
57. Anastacia Kamau	Mutara WRUA		√
58. Purity Gathigia	Moyok WRUA		√
59. Robert N. Kaniaru	Upper Ewaso Nyiro WRUA	√	
60. Wanja Nyingi	KENWEB		√
61. Joseph Mathenge	Rongai WRUA	√	
62. Christine Muuthia	Rural Focus Ltd.		√
64. Purity Gathigia	Moyok WRUA		√
65. Murithi Muthuri	Nguishi WRUA	√	
66. Michael N. Kibera	Nanyuki C.F.A	√	
67. Peter W. Githae	Karemero WRUA	√	
69. Nicholas Kinyanjui	Olmoran WRUA	√	
70. Rispa Reisan	Renote WRUA		√
71. Nathan Gichuki	University of Nairobi	√	
72. Linda Gakii	Mt. Kenya West Nanyuki C.F.A.		√
73. Keen Marai	Ngushishu WRUA	√	

Appendix 2: Participants of the Water Conservation Strategy Validation Workshop held on the 13th to 14thFebruary, 2014

	Name	Organisation / Area	Designation / Title	Gender		Age	
				Male	Female	0 -35	+ 35
1.	Rahab N. Nyururu	WRMA	C.M.O		√		√
2.	Charles Njuki	Ihuho WRUA	Chairperson	√			√
3.	Banis Wairimu	Pesi WRUA	Chairperson		√		√
4.	Bernard Kamawira	Melwa WRUA	Chairperson	√			√
5.	Amos Kingori	Nyahururu WRUA	Chairperson	√			√
6.	Fredrick Mbaabu	Ngare ……	Ex. Officer	√		√	
7.	Simon K. Mwangi	Olmoran WRUA	Chairperson	√			√
8.	Ann. W. Ndugu	Karemeno WRUA	Member		√		√
9.	Jane N. Kagema	Rumuruti WRUA	Member		√		√
10.	George W. Mbuthia	Ontulili WRUA	Chairperson	√			√
11.	James Tikoshi	Kurum WRUA	Chairperson	√			√
12.	John M. Muritu	Upper Ewaso Nyiro WRUA	Chairperson	√			√
13.	Sheilla Funwell	KENWEB	Member		√	√	
14.	Justus Mureithi	Burguret WRUA	Ex. Office	√			√
15.	Generose E. Andeso	Ngobit WRUA	Chairperson		√		√
16.	Joseph M. Mwangi	Sipili WRUA	Chairperson	√			√
17.	Julius Mwaniki	Naromoru WRUA	Chairperson	√			√
18.	Samuel Santa	Mid–Ewaso WRUA	Chairperson	√			√
19.	Murithi Muthuri	Ngushishi WRUA	Chairperson	√			√
20.	Julius K. Mbithi	Timau WRUA	Chairperson	√			√
21.	John Mwirichia	Ewaso North WRUA	Member	√			√
22.	David Mwigama	Sirimon WRUA	Chairperson	√			√
23.	John Murungi	Teleswani	Chairperson	√			√
24.	Jackson Mwihuri	R.F.L		√			√
25.	Felix Ooko	WRMA	C.M.O.	√			√
26.	Patrick Muraguri	County Gvt.	P.A.	√			√
27.	Gilbert Kosgey	KENWEB	R. Intern	√		√	
28.	David Njoroge	Nanyuki WRUA	Vice – Chair	√			√
29.	Martin Mate	Burguret WRUA	Chairperson	√			√
30.	James Mwangi	LWF	RWPO	√			√

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