

# **SUB-CATCHMENT MANAGEMENT** **PLAN (SCMP)**

**Version: 1**

**NAME OF WRUA: MKUNGI/KITIRI**  
**REGION: RIFT VALLEY**

<b>Prepared by:</b>	<b>SUB REGIONAL MANAGER</b>
	<b>NAIVASHA SUBREGION</b>
<b>Name of WRUA</b>	<b>MKUNGI/KITIRI</b>
<b>Postal Address:</b>	<b>63 North Kinangop</b>
<b>Physical address:</b>	<b>Ndunyu Njeru Nyandarua South District</b>

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Appendix A Maps

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## **1 INTRODUCTION**

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### **1.0 INTRODUCTION TO SCMP**

During this contract year, one of the objectives in the Performance Contract for the Water Resources Management Authority is the production of one Sub Catchment Management Plan (SCMP) in line with Catchment Management Strategy (CMS) for Rift Valley Catchment Area which is also in line with the National Water Resource Management Strategy (NWRMS). This necessitated the formation of Mkungu/Kitiri Sub Catchment Management Plan as one of the planned SCMPs in Naivasha Sub Region.

A brief introduction of the meaning and the objectives of the SCMP were given by Moses Macharia. He said that the main objective of the SCMP is to produce a plan of activities that will be used as a working tool for Mkungu/Kitiri WRUA to solve the water resource problems in the sub catchments. It will also be used as a basis for WRMA/WSTF and other development partners funding for WRUA activities as per the WRUA development cycle (WDC).

He reminded the participants some of WRUA objectives that conform with the SCMP as:-

- Prescribe the principles, objectives, procedures and institutional arrangements to manage, protect, use, develop, conserve and control water resources of the Sub Catchment
- Promote afforestation and re-afforestation of the catchment to improve on water quality and quantity
- Provide mechanisms and facilities for enabling the public and communities to participate in managing water resources of the sub catchment.
- To promote Water and Soil Conservation without destroying soils along the rivers
- Conflict Resolution along the Sub catchments

## 2.1 Overview of SCMP Development

Mkungi Kitiri draft SCMP was developed in April 2008. This was developed by use of participatory focused group discussions with the help of WRMA staff, WWF staff, WRUA members and other relevant stakeholders in the sub catchment .

## 3 OVERVIEW OF SUB-CATCHMENT

General description of sub-catchment including:

- **Hydrology**

Mkungi Kitiri is one of upper catchments of the Lake Naivasha basin. The sub catchment borders the Aberdare National Park to the east, Wanjohi WRUA to the North, Lower Malewa to the west and Upper Turasha Kinja to the south.

There are two major tributaries in the sub catchment i.e. Mkungi river and Kitiri river which mainly drain other small streams and springs originating from the Aberdares. It has an average annual rainfall of 2000mm and an average altitude of 2800 m a.s.l.

- **Land use**

The main land use activities in the area are livestock and crop farming, agro forestry and urban settlements. The main crops are vegetables and potatoes grown both for subsistence and commercial purposes.

There are poor farm practices especially on the riparian land and sloppy areas, charcoal burning and logging for posts has contributed to the depletion of the water resource in the sub catchment. Continuous land sub division occasioned by population is putting great pressure on the water resources and land remains affordable to only able members of the community.

- **Population**

The area is composed of various settlement schemes which took place in 1963 and covers seven sub locations within North Kinangop and Kipipiri divisions.

The population is as tabulated below:

No.	SUBLOCATION	AREA Km <sup>2</sup>	DENSITY	POPULATION
1	Mawingo	65	210	12,000
2	Kagongo	60.4	50	4780
3	Nandarasi	44.83	209.49	11176
4	Mkungi	30.51	204.51	7425
5	Mikaro	61.08	47.91	3482
6	Kitiri	57.73	72.33	4969

7	Kinja	40.24	197.46	9455
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- **Economic activities**

The area is a highly potential agricultural area. The main source of income is dairy farming. They also grow vegetables, snow peas, onions and potatoes which are highly perishable. This affects the prices of the commodities and the communities have no control of the prices for there is no reliable market. Poor road infrastructure contributes highly to the poor prices for buyers and investors shy away.

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#### **4 WATER RESOURCE PROBLEMS**

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What are the main water resource problems?

##### **PROBLEMS (ISSUES)**

The following problems were identified:

1. Inadequate water
  2. Poor water quality (Water Pollution)
  3. Soil erosion
  4. Wild Life menace
  5. Cultivation on the riparian land
  6. Deforestation
  7. Climate changes
  8. Over abstraction
  9. Undesirable tree species (e.g. Blue gum)
  10. Lack of management skills
  11. Poor Urban sanitation
1. Encroachment to forests (Illegal loggers)
  2. Illegal honey hunting
  3. Overgrazing
  4. Charcoal burning
  5. Pollution by Slaughter houses-
  6. Lack of water storage facilities
  7. Poor cultivation practices on the sloppy areas
  8. Pollution by farm chemicals
  9. Car washing in the rivers
  10. Direct animal watering in the rivers
  11. Industrial waste from e.g. hospitals, creameries

The issues brought out were then clustered into groups and the following major problems were identified.

1. Inadequate water resources
2. Catchment degradation
3. Water pollution
4. Undemarcated riparian lands

##### **3.1 Problem, Causes and Effects,**

Item	Problem	Cause	Effect
1	Inadequate water resources	Drought Deforestation Undesirable species Over abstraction Lack of storage facilities Interference at intakes	Water use conflicts
2	Catchment degradation	Deforestation Overgrazing Charcoal burning Cultivation of riparian land/encroachment Poor cultivation along the slopes	Soil erosion Siltation of the intake works and pipes
3	Water pollution	Lack of sanitation facilities in the urban areas Improper use of agrochemicals Car washing in the rivers Watering animals directly in the rivers Dumping of domestic waste Slaughter houses effluent discharges Washing of farm produce e.g. Carrots	Water borne diseases
4	Undemarcated riparian lands	Conflicting acts of various government departments/sectoral laws Poor law enforcement mechanisms Lack of community awareness	Water/Land disputes Lack of access to water sources

### 3.2 Pair wise Ranking of Problems

The problems were ranked in order of priority

	Inadequate water (IW)	Catchment degradation (CD)	Pollution	Un demarcated Riparian land(RL)	Score	Rank

			(P)			
Inadequate water (IW)		CD	IW	IW	2	2
Catchment degradation (CD)			CD	CD	3	1
Water pollution(WP)				RL	0	4
Un demarcated Riparian land(RL)					1	3

### Key

- CD Catchment degradation  
 IW Inadequate water  
 RL Un-demarcated Riparian land  
 WP Water pollution

What is the strategy to solve these problems?

### 3.3 SOLUTIONS

Out of the problems and causes identified, possible solutions or interventions were discussed as listed below

PROBLEMS	CAUSES	POSSIBLE SOLUTIONS
Inadequate water	Drought	Planting of trees, protection and conservation of the existing ones
	Over abstraction	Enforcement of the law e.g. Installation of measuring devices Common intake construction
	Siltation	Soil conservation measures up hill and down hill Regular desilting of the existing intakes and dams
	Lack of storage facilities	Awareness creation on rainwater harvesting e.g. roof catchment, Pans, water holes, earth dams
	Intake interference	Fencing of the intakes
Catchment degradation	Deforestation	Afforestation
	Overgrazing	Discourage grazing in the catchment area Controlled grazing Set grazing areas, seasons Maintain carrying capacities



	Lack of protecting the catchment vegetation	Fencing of the catchment area/gazettelement of the area
	Uncontrolled human activities in the forest areas	Restrict activities which negatively affect the catchment areas e.g. Unsustainable logging, grazing,
	Cultivating along river banks and steep slopes	Create awareness on riparian conservation Pegging of riparian land Plant water friendly trees, conserve natural vegetation,
	Poor law enforcement	Sensitization on legal requirement and benefits Continuous liaison with relevant departments on law enforcement

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## 5 MANAGEMENT APPROACH

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Key Themes:

- **Management Unit**

Mkungi/Kitiri Wrua is in Lake Naivasha basin and covers part of the upper catchment in 2GC management unit

- **Classification**

The water in the catchment is mainly used for ecological and livelihood support. However the community is being encouraged in future to use the water commercially e.g. for irrigation, fish farming and mineral water bottling, etc.

- Status of the WRUA

- **When was WRUA formed**

- Mkungi/Kitiri was formed in the year 2006

- **By whom?**

- It was formed by all water users along Mkungi and Kitiri rivers sub catchments in collaboration with WRMA, Provincial Admin, WWF, Rural Focus and other key stakeholders.

- **Why?**

- The WRUA was formed as a forum for conflict resolution and cooperative management of water resources within the area.

- **What is the WRUA registration status?**

- It was registered under the Societies Act (laws of Kenya) on 19<sup>th</sup> April, 2007

- **What is the boundary of the WRUA area?**

The sub catchment borders the Aberdare National Park on the east, Wanjohi WRUA to the North, Lower Malewa to the west and Upper Turasha Kinja to the south

Resource map and the WRUA boundary map for the sub catchment ( Refer to Appendix A)

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## 6 WATER BALANCE

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Key Themes:

- Assessment of water resource potential
- Assessment of Reserve
- Assessment of Water Demand
- Assessment of water balance

### 6.1 Current Status

The water resource potential which is exploited is mainly surface water. Due to high amount of rainfall received in the area, there is potential for rain water harvesting structures to ease the pressure on river water. Ground water potential has not been exploited for there are only a few individual boreholes in the area.

The reserve is adequate because the rivers flow throughout the year. However it is threatened by the destruction of the catchment and over abstraction by WSPs because many of them have no measuring devices which encourage misuse of the resource.

Abstraction survey of all the abstractors in the sub catchment has been undertaken which gives us the water demand

### 6.2 Targets

To assess & promote exploitation of the water resources potential, water demand, balance and maintain the reserve

### 5.3 Proposed Outputs

- Water resources potential
- Demand
- Balance
- Reserve

### 6.4 Proposed Activities

Gauging of rivers Mkungi and Kitiri

Computation of the potential, demand, balance and the reserve

<b>Water Balance</b>			
<b>Target</b>	To assess, the water resources potential, reserve and balance		
<b>Output</b>			
<b>Activity</b>	<b>Sub-Activity</b>	<b>Timeframe</b>	<b>Budget</b>
Gauging of rivers Mkungi and Kitiri rivers	Identification of gauging points along Mkungi, Kitiri rivers & their tributaries	7 days	Fuel: 40ltrs/d*7*110 = 30800 Lunches: WRUA 2*300*7 = 4200 Total: 77700
	Gauging at the identified points	2day*12Months	Fuel: 40ltrs/d*2*110*12=105600 Lunches: WRUA 1*300*2*12 = 7200 Total: 112800
Computation of demand, reserve	Computation of demand, reserve and balance	12months	Stationeries 3000 (lump sum)

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## **7 WATER ALLOCATION**

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### Key Themes:

- Current abstraction
- Compliance with permits
- Development of Water Allocation Plan
- Improvements to Water use efficiency

### **7.1 Current Status**

Abstraction survey of all the abstractors in the sub catchment has been undertaken which does not give us the actual abstraction because only 10% of the abstractors have fitted measuring devices.

Majority of the abstractors are permitted though minority have their permits renewed.

No water allocation plan is in place

Water use efficiency cannot be determined since all consumers at household level are not metered

### **7.2 Targets**

To develop a water allocation Plan

### **7.3 Proposed Outputs**

Water allocation plan

### **7.4 Proposed Activities**

- Verification/determination of the actual abstraction
- Enforcement of compliance to permit conditions
- Development of a water allocation plan
- Capacity building of community/PMC on water use efficiency

<b>Water Balance</b>			
<b>Target</b>	To develop a water allocation Plan		
<b>Output</b>	Water allocation plan		
<b>Activity</b>	<b>Sub-Activity</b>	<b>Timeframe</b>	<b>Budget</b>
Verification/determination of the actual abstraction	Measurement of actual water abstracted e.g. volumetric, flow meter	14 days	Fuel: 40ltrs/d*14*110 = 61600 Lunches: WRUA 3*300*14 = 12600 Security Guards:2*300*7=4200 Total - 78400
Enforcement of compliance to permit conditions	Issue of WRMA orders, disconnections, reconnections, prosecutions	Quarterly	Lump sum 25000 per qtr*4*5yrs=500000
Development of a water allocation plan	Hire a consultant	2months	Lump sum 1,500,000
Capacity building of community/PMC on water use efficiency	10public Barazas	10days	Fuel: 40ltrs/d*10*110= 44000 Lunches: WRUA 5*300*10 = 15000 PA 1*10*450=4500 Total 63500

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## 8 RESOURCE PROTECTION

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Key Themes:

- Protection of Reserve - Quantity
- Protection of Reserve – Quality
- Pollution Surveys
- Environmental Impact Assessments
- Pollution & effluent control
- Catchment and groundwater protection areas

### 8.1 Current Status

- **Protection of reserve – Quantity and quality**

Tree planting initiatives in the catchment and along the riparian land are being undertaken towards protection of the reserve quantity and quality. The WRUA has been sensitizing members on maintenance of natural vegetation along the riverine and water sources and removal eucalyptus in these areas

- **Pollution surveys**

Pollution surveys are yet to be done comprehensively, however some water sampling has been done upstream and down stream of Ndunyu Njeru town.

- **Environmental Impact Assessment**

No EIA was undertaken when most of the projects were initiated but all new projects are supposed to submit an EIA reports to NEMA before implementation

- **Pollution & effluent control**

Urban centers have no sewerage systems and treatment works. The effluent from the urban centers is disposed directly into the river especially Kitiri River.

- **Catchment and groundwater protection areas**

Aberdare National Park has been fenced off and gazetted by KWS as a protected area. The community needs to be capacity build on good land use practices, though there is some initiative to identify degraded areas and plant trees. The PELIS (Plantation Establishment for Livelihood Improved Scheme) system is being introduced in the area.

### 8.2 Targets

Protection of the reserve quantity and quality in Mkungi/Kitiri Rivers and tributaries

### 8.3 Proposed Outputs

- Protected reserve quantity and quality
- Pollution survey reports and effluent control plans
- Gazetted catchments and ground water conservation areas

## 8.4 Proposed Activities

- Protect reserve quantity

Resource protection			
Target	Protection of the reserve quantity and quality in Mkungi/Kitiri rivers and tributaries		
Output	<ul style="list-style-type: none"> <li>• Protected reserve quantity and quality</li> <li>• Pollution survey reports and effluent control plans</li> <li>• Gazetted catchments and ground water conservation areas</li> </ul>		
Activity	Sub-Activity	Timeframe	Budget
Protect reserve quantity	River flow gauging for analysis of Q95 at the identified points	1day*12Months	Covered in chapter 5 (water balance)
	Review of existing data (Mkungi 2GC10 and Kitiri 2GC 5 and rainfall stations)	4days	Lunches:4 *450 =1800
	Computation of existing data	3days	Stationary: 1000/=
	Preparation of flow duration curves	3days	Lunches: 3 *450 =1350
	Installation of traffic light system gauges/signboards along the rivers and at a significant public place	5days	4 gauges: No cost 1 sign post:10,000 Painting &panel beating 5000 Fuel: 50ltrs/d*1*110= 5500 Lunches: WRUA 5*300*5 = 7500  Total: 28000
Protect reserve quantity/quality	Enforce Maintenance of the reserve quantity/quality	Quarterly	Fuel: 70ltrs/d*1*110*4= 30800 Lunches: WRUA 2*300*4=2400 Total - 33200
Establish the current WQ status	<ul style="list-style-type: none"> <li>• Identified points and the hotspots in the sub catchment (Conduct Pollution survey)</li> </ul>	2days	Fuel: 50ltrs/d*1*110= 5500 Lunches: WRUA 5*300*2 = 3000 Total 8500
	<ul style="list-style-type: none"> <li>• sampling, analysis</li> </ul>	1day (sampling) 2day (analysis)	Fuel: 70ltrs/d*1*110= 7700 Total:7700
	<ul style="list-style-type: none"> <li>• Map point &amp; non point sources of pollution</li> </ul>	1 day	Stationery: 2000/=
Sensitization on EIA	Capacity Building (10 barazas)	10 days	Covered in chapter 6 (water balance)
Gazetted catchments and ground water	Sensitization on PELIS and good land use practices	6 days	Fuel: 40Lts*110*3= 13200 Lunch: WRUA 5*300*6=9000 PA/Agric/Forester:3*500*6=9000

conservation areas			Total: 31200
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## 9 CATCHMENT PROTECTION

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Key Themes:

- Surveys & conservation of Riparian areas
- Erosion/sediment surveys
- Soil and water conservation plans
- Catchment rehabilitation

### 9.1 Current Status

- Surveys & conservation of Riparian areas

Sensitization of communities along the riparian land on river bank pegging has been undertaken. 10 Kms of riparian land planted with indigenous trees and live fence along the Mkungi, Kitiri, kamirangi, Kahuria Rivers. Removal of eucalyptus trees along the rivers is being carried out.

- Erosion/sediment surveys

No initiative taken yet on erosion/sediment surveys.

- Soil and water conservation plans

Process on preparation of land use plans is at its initial stage.

- Catchment rehabilitation

About 100,000 tree seedlings planted on Kirima, Kitiri, ndunyu ruthiu hills, and kahuria areas. The Aberdare national park has been fenced off to protect the catchment. When a seedling dries/destroyed the community replaces at their own cost while weeding. This encourages responsibility and commitment.

### 9.2 Targets

To protect & conserve the catchment

### 9.3 Proposed Outputs

- Controlled soil erosion
- Increased water flow in quality & quantity
- Controlled evaporation rate

### 9.4 Proposed Activities

- Catchment Rehabilitation
- Pegging & protection of riparian land: 65Km
- Soil conservation

Catchment Protection			
Target	To protect & conserve the catchment		
Output	<ul style="list-style-type: none"> <li>• Controlled soil erosion</li> <li>• Increased water flow in quality &amp; quantity</li> <li>• Controlled evaporation rate</li> </ul>		
Activity	Sub-Activity	Timeframe	Budget (KShs.)
Catchment Rehabilitation (afforestation)	site identification	10 days	Fuel: 70ltrs/d*10*110= 77000 Lunch: WRUA/CFA 3*300*10 = 9000 Lunch: Forester/Agric: 2*500*10 = 10000 Total: 96000
	pitting	5 years	Labor: 10million holes @5/-= 50,000,000



	Purchase of seedlings	5 years	10,000,000seedlings@ 15/- =150,000,000
	d) Transport	5 years (2seasons/year)	10,000,000 seedlings @ 25cents =2,500,000
	e) Planting	5 years	10,000,000 seedlings@ 1/-=10,000,000 (community)
	f) Spot weeding	5 years	10,000,000 seedlings @ 1/-*3 times=30,000,000
	g) Monitoring, follow up and evaluation	5 years	30,000 lump sum
Pegging & protection of riparian land: 65Km	<ul style="list-style-type: none"> <li>• identify areas which area affected</li> </ul>	10 days	See catchment rehabilitation (identify areas )
	<ul style="list-style-type: none"> <li>• Pegging Mukungi -20km, Kitiri:15km, Kianjogu:20km, Kamirangi:10km Total: 65km</li> </ul>	2 weeks	Lunch: WRUA-4@300*14dys=16800 Lunch: Agric/PA-3@500*14=21,000 Fuel: 3lts/@110*14*2=9240/=
	Planting of live fence	5 years	Covered under catchment rehabilitation (Planting)
	Planting of water friendly trees along the riparian land	5 years	Covered under catchment rehabilitation (Planting)
	Follow-up	5 years	30,000 lump sum
• Soil conservation	<ul style="list-style-type: none"> <li>• Identify sites</li> </ul>	10 days	Covered under catchment rehabilitation (site identification)
	<ul style="list-style-type: none"> <li>• Sensitization of farmers on soil conservation</li> </ul>		See chapter 7 resource protection (sensitization on good land use practices)
	<ul style="list-style-type: none"> <li>• Demonstration on soil conservation methods</li> </ul>	9 days (3 sites)	Terraces, gabions, strip farming Materials: 2 chain links @ 4000*3=24,000 2 lorries hardcore@ 2000*3= 12,000 Labour: 3days@200*2*3=3,600 Lunch: Agric 1@500*3*3=4,500 Total:44,100
	<ul style="list-style-type: none"> <li>• Follow up to ensure the practice is adopted by the community</li> </ul>	5 years	Covered under catchment rehabilitation

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## 10 INSTITUTIONAL DEVELOPMENT

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Key Themes:

- WRUA Capacity Building
  - Mobilization
  - Membership sensitization
  - Communication
  - Human Resource Development
  - Facilities
- Stakeholder Coordination Activities
  - Roles and responsibilities

### 10.1 Current Status

- WRUA Capacity Building

Membership mobilization and sensitization undertaken during the formation stage but there is needed to sensitize new members to join the WRUA.

Capacity building has been done on water sector reforms; however there is need to conduct a Training Needs Assessment for the WRUA to undertake a comprehensive Capacity building programme.

The WRUA has a rented an office that requires furniture, computer, communication facilities, mobility and stationery. There is need to acquire land and construct an a permanent office.

- Stakeholder Coordination Activities

The WRUA is currently working in collaboration with partners such as WRMA, WWF, KFS, CFA, Agriculture, and Provincial Administration.

### Identification

The main objective of SCMP is to enhance stakeholder's participation on water resource management.

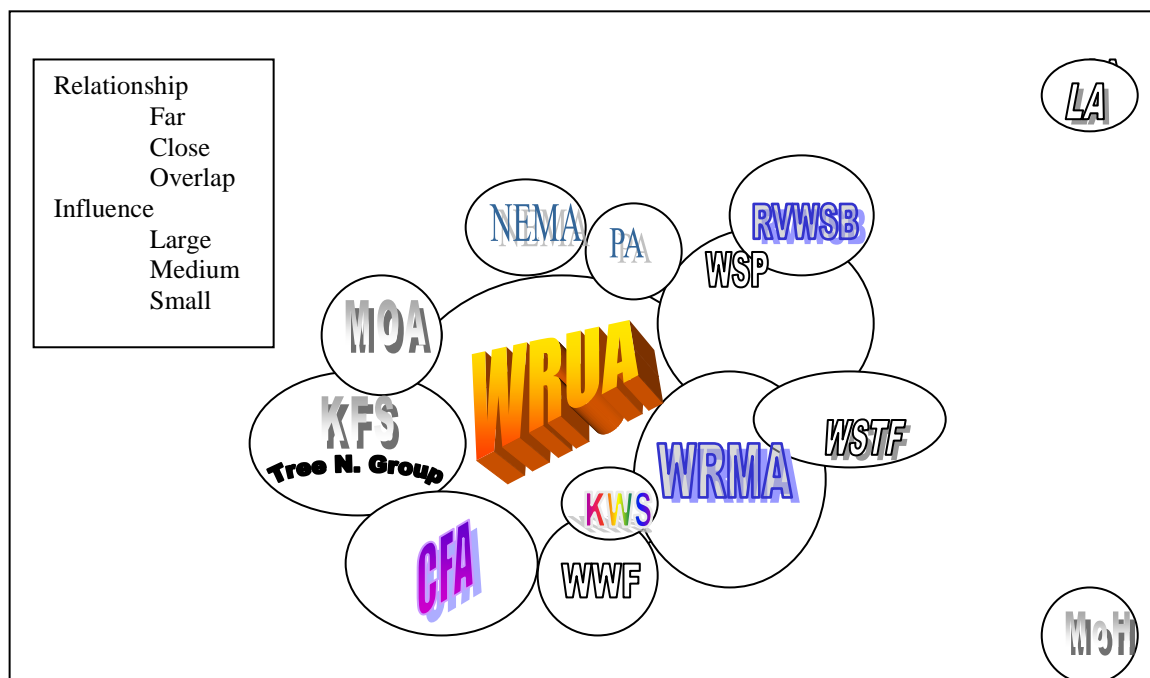
The following stakeholders were identified:

1. WRUA
2. Water Resources Management Authority (WRMA)
3. World Wide Fund for Nature (WWF)
4. Tree Nursery Groups
5. Local Authorities
6. Rift Valley Water Services Board (RVWSB)
7. Ministry of Agriculture (MoA)
8. Provincial Administration (PA)
9. National Environment Management Authority (NEMA)
10. Ministry of Lands
11. Learning Institutions (Inst.)
12. Social Services (SS)
13. Community Forest Association (CFA)

- 14. KWS
- 15. Ministry of Public Health and Sanitation

**Stakeholder Analysis (Chapatti Method)**

The Venn diagram (Chapatti) shows the key institutions and individuals in the community and their relationships and importance in decision making process. Taking into consideration the popularity and influence of the stakeholder over the resource issues, the each stakeholder was allocated a chapatti as shown in the diagram below based on :-



- WRUA Capacity Building
  - Mobilisation
  - Membership sensitization
  - Communication
  - Human Resource Development
  - Facilities
- Stakeholder Coordination Activities
  - Roles and responsibilities

**10.2 Targets**

Strengthen the WRUA through capacity building  
 To understand and promote stakeholders roles and responsibilities

**10.3 Proposed Outputs**

Strong and effective WRUA

**10.4 Proposed Activities**

Conduct TNA  
 Conduct Trainings

<b>Institutional Development</b>			
<b>Target</b>	Strengthen the WRUA through capacity building To understand and promote stakeholders roles and responsibilities		
<b>Output</b>	Strong and effective WRUA		
<b>Activity</b>	<b>Sub-Activity</b>	<b>Timeframe</b>	<b>Budget (KShs.)</b>
Conduct TNA	Develop assessment tool	2 days	Office stationery = 2000/-
	Distribution/collection of the TNA tool	1 week	Transport WRUA:28 members@200= 5600 Lunch WRUA= 28 members@300= 8400 Total=14000
	Produce TNA report	1 week	Office stationery = 2000/-
Conduct Trainings	Prepare Training Plan	2 days	Office stationery = 2000/-
	Carry out training	3 days	Hall hire: 3dys@1500=4500 Fuel: 30ltrs/d*3*110= 9900 Meals: 35@500*3=52,500 Facilitators: 5@3500 *3= 52500 WRUA transport 28 members@200*3 = 16800 Stationery: 5000 (Lump sum ) Total=141,200
	Prepare Training Report	1 week	Office stationery = 2000/-

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## 11 INFRASTRUCTURE DEVELOPMENT

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Key Themes:

- Storage at different levels (household, farm, sub-catchment)
- Groundwater storage
- Flood mitigation

### 11.1 Current Status

There are no water harvesting facilities in the area and about 60% of the population have piped water. There are 3no public dams 2no individual ones in the area though encroached and highly silted up. No ground water storage has been identified however there 4no individual boreholes. The area is not prone to floods due to its topography

### 11.2 Targets

- To increase water storage facilities

### 11.3 Proposed Outputs

- Improved infrastructure leading to increased water quantity
- Reduced water use conflicts

### 11.4 Proposed Activities

- Rain water harvesting
- Reclamation of encroached areas
- Dam/Pan desilting
- Construction of new dams/pans
- Construction of common intakes for the projects

Infrastructure Development			
Target	To increase water storage facilities		
Output	Increased water storage		
Activity	Sub-Activity	Timeframe	Budget (KShs.)
Rain water harvesting	Sensitization/Demonstration on water harvesting technologies	1 month	3 No. Plastic Tanks:@ 30,000=90000 Guttering materials: 10,000*3=30000 Transport: 6000 Labor: 12500 lump sum (community) PA 1*3*500=1500 Total = 140000

Reclaiming of encroached dam land	establish status/boundary/ownership of dam	10 days	Lunch WRUA: 3@300*10=9000 PA: 10*500=5000 Total:14000
	Verification of titles from relevant offices (lands and settlement)	10 days	Transport: 200*3*5=3000(Local) Lunch/DSA WRUA Nairobi 600*1*3=1800 1200*1*2=2400 Search fee: 3@100=300  Total=7500
	Processing of legal documents	6 months	3 dams @20000 = 60,000 WRMA permit & Title deed
Dam/Pan desilting	Survey of dams	20 days	Fuel: 40Lts@110*20=88000 WRUA:3 @300*20=18000 Total= 106000
	Float quotation	2 days	Postage: 5contractors@200=1000
	Desilting	40 months	3dams @ 5,000,000=15,000,000
	Fencing		3 dams @ 20,000 = 60000
Construction of new dams/pans	Feasibility study	2 days	Fuel: 40Lts@110*2=8800 Lunch WRUA: 3@300*2=1800 Total=10600
	Survey of the area	10 days	10 days@3500*3 = 105,000 10@300*5 = 15,000 (community/WRUA) Total=120000
	Carry out design	2 month	Stationary=50,000 (lump sum)
	Conduct EIA	10 days	300,000 lump sum
	Tendering	2 days	Postage: 5contractors@200=1000
	Construction of dams/pans	5years	3 dams @ 10,000,000 = 30,000,000
Construction of common intakes for the projects (5No)	Feasibility study	3 days	Fuel: 40Lts@110*3=13200 WRMA Lunch: 3 @500*3=4500 Lunch WRUA: 3@300*3=2700 Total=20400
	Survey of the area	5 days	5@300*5 = 7500 (community/WRUA) Total=7500
	Carry out design	2 month	Stationary=100,000 (lump sum)

	Conduct EIA (5sites)	10 days	250,000 lump sum
	Tendering	2 days	Postage: 5contractors@200= 1000
	Construction common intake	5years	5 intakes @ 3,000,000 = 15,000,000

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## 12 RIGHTS BASED APPROACH / POVERTY REDUCTION

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Key Themes:

- Threats to water rights
- Conflict issues
- Gender issues
- Environment issues
- Sustainable livelihoods

### 12.1 Current Status

Everybody in the area has a right to access water. Conflict issues are not experienced in the area and the only one experienced was solved by the WRUA. Women are included in decision making in water matters though in low percentage but the youths are ignorant and they need to be encouraged to take initiative.

There are several point source pollution sites that are denying the downstream water users the right to water supply of the right quality. The disabled and the disadvantaged are included in the decision making on environmental matters. The ecosystem is not threatened for the reserve water is maintained in the rivers.

The area has enough rainfall and the farmers practice dairy and subsistence farming to sustain their livelihoods. A few farmers practice irrigation during dry seasons but majority rely on rainfall.

Bee keeping, small holder floriculture farming, tree growing for commercial purposes are activities that have emerged as alternative sources of livelihood and reducing poverty levels. Awareness on HIV and Aids and behavior change is being carried out by a local group –the Areca Daps who are members of the WRUA.

### 12.2 Targets

Equitably access to quality water (gender in consideration) to enhance sustainable livelihoods

### 12.3 Proposed Outputs

Equitable access to water

### 12.4 Proposed Activities

Awareness creation

Encourage good farming practices

Enforce mitigation measures on effluent discharging

<b>Right Based Approach/Poverty Reduction</b>	
<b>Target</b>	Access to quality water equitably (gender in consideration) to enhance sustainable livelihoods
<b>Output</b>	Equitable access to water



Activity	Sub-Activity	Timeframe	Budget (KShs.)
Awareness creation	10 barazas (two in every sub location)	10 days	Fuel=40ltrs/d*10*110= 44000 Lunches = WRUA/Area Daps 5@300*10dys = 15000 PA=1*10*450=4500 Total 63500
Encourage good farming practices	Demonstrations/field visits	10days	Fuel=40ltrs/d*10*110= 44000 Lunches = WRUA 5@300*10dys = 15000 PA=1*10*450=4500 Agr. =10* 500=5000 Total 68500
Enforce mitigation measures on effluent discharging	Sensitization of the community	10days	Covered above (Awareness creation)
	Identifying defaulters	2days	Fuel=40ltrs/d*2*110= 8800 Lunches = WRUA 5@300*2days = 3000 PA=1*2*450=900 Public Health. =2* 500=1000 Total 13700
	Issue warnings to non compliant people/institutions	2days	Fuel=40ltrs/d*2*110= 8800 Lunches = WRUA 5@300*2days = 3000 PA=1*2*450=900 Public Health. =2* 500=1000 Total 13700
	Sue the offenders		Court expenses 150,000 (lump sum)

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s:

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- ater resource monitoring
- Water quality monitoring
- Water use monitoring
- Pollution monitoring
- Information sharing arrangements

### 13.1 Current Status

There are 2No gauging stations (2GC10 and 2GC5) in the sub catchment which are being monitored and have data. However they don't give the representation of the whole catchment. There are 3No of rainfall stations. (Geta, Karima and Ndunyu Njeru chiefs' camp which is not operational currently). The annual average rainfall of the area is about 1500mm.

Water quality/pollution monitoring has been initiated and three samples collected upstream, middle and downstream of Kitiri river in January 2009. Upper catchment the water was rated satisfactory. It was submitted to government chemistry, Nairobi for analysis. Middle was also satisfactory. The lower part was not satisfactory.

Abstraction survey was undertaken however the actual water use could not be determined for none of the abstractors are fitted with measuring devices.

WRUA and WRMA share information on water sector reforms and policy matters through capacity building forums, barazas and exchange visits/tours. Inter WRUA meetings in Lake Naivasha basin are undertaken every two months.

Water resource monitoring is currently being undertaken by WRMA. However the WRUA makes comments on water use permit applications.

- Water resource monitoring
- Water quality monitoring
- Water use monitoring
- Pollution monitoring
- Information sharing arrangements

### 13.2 Targets

Proper water resource monitoring by the WRUA/WRMA

### 13.3 Proposed Outputs

Quality and quantity of water determined

### 13.4 Proposed Activities

Monitoring of quantity, quality and water use

<b>Monitoring and Information</b>			
<b>Target</b>	Proper water resource monitoring by the WRUA/WRMA		
<b>Output</b>	Quality and quantity of water determined		
<b>Activity</b>	<b>Sub-Activity</b>	<b>Timeframe</b>	<b>Budget (KShs.)</b>
Monitoring of quantity, quality and water use	Site identification	5days	Fuel=40ltrs/d*5*110= 22000 Lunches = WRUA 5@300*5dys = 7500 Total 29500
	Sampling	2days/quarter	Fuel=40ltrs/d*2*110 *4= 32200 Lunches = WRUA 3@300*2dys*4 = 7200 Laboratory Fee=36000*4=144000 Total=183400
	Gauging	2days	Covered in chapter 5 (water balance)
	Determination of the actual water use	10days (quarterly)	Fuel=40ltrs/d*10*110 *4= 176000 Lunches = WRUA 3@300*10dys*4= 36000 Total=212000
	Creation of a water resource	1day	Stationery 1000 lump sum

	monitoring data base		
	Sharing the information	Quarterly	Transport= 8000 lump sum Lunches= 12000 lump sum Stationary=4000 lump sum Total= 24000

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## 14 FINANCING AND IMPLEMENTATION

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Key Themes:

- WRUA operational budget
- Mechanisms to meet WRUA operational budget
- SCMP investment budget
- Mechanisms to raise SCMP investment budget

### 14.1 CURRENT STATUS

#### **WRUA operational budget**

The WRUA has a savings Bank account with Muki FOSA bank at Ndunyu Njeru. Sources of income for the WRUA are:

There are a total of 28 members but only 18 are active currently

#### **Mechanisms to meet WRUA operational budget**

The WRUA expenses are higher than the income for the members offer voluntary services e.g. buying stationary, sitting allowance and transport.

- membership registration fee 1000/=
- monthly contribution 200/= per member
- Development partners contributions

#### **SCMP investment budget**

The SCMP investment budget has been prepared as per appendix B below

#### **Mechanisms to raise SCMP investment budget**

This is expected to be achieved through proposal to WSTF, GOK, CDF, development partners, well wishers and community contribution both in kind and material.

#### 14.2 Targets

To Ensure WRUA is financially sustainable

#### 14.3 Proposed Outputs

Financially sustainable WRUA

#### 14.4 Proposed Activities

Capacity building on:

- Financial management
- Resource mobilization
- Project management

<b>Financing and Implementation</b>			
<b>Target</b>	To Ensure WRUA is financially sustainable		
<b>Output</b>	Financially sustainable WRUA		
<b>Activity</b>	<b>Sub-Activity</b>	<b>Timeframe</b>	<b>Budget (KShs.)</b>
Capacity building	• Financial management	2 days	Fuel=40ltrs/d*2*110= 8800 Lunches = WRUA 28@300*2dys = 16800 Venue:@1500*2=3000 Consultant fee =1@10000*2=20000 Total =48600
	• Resource mobilization	1 day	Fuel=40ltrs/d*1*110= 4400 Lunches = WRUA 28@300*1dys = 8400 Venue:@1500*1=1500 Consultant fee =1@10000*1=10000 Total =24300
	• Project Proposal preparations	5 years(2 proposals per quarter)	3000*4*5=60000
	• Project management	2 days	Fuel=40ltrs/d*2*110= 8800 Lunches = WRUA 28@300*2dys = 16800 Venue:@1500*2=3000 Consultant fee =1@10000*2=20000 Total =48600

APPENDIX A

COMMUNITY RESOURCE MAP



**APPENDIX B**  
**WORKPLAN AND BUDGET**

*(Use Excel Worksheet)*

SUB-CATCHMENT MANAGEMENT PLAN								
	WRUA	MKUNGI KITIRI		FINANCING				
CH	TOPIC	ACTIVITY	SET	BUDGET	WDC FUNDS	WRUA FUNDS	WRUA IN-KIND	OTHERS FUNDS
3	Catchment Characteristics	1.						
	Target							
	Output							
	Activity							
	1							
	2							
	3							
4	Management							
	Target							
	Output							
	Activity							
	1							
	2							
	3							
5	Water Balance							
	Target	To assess, the water resources						

		potential, reserve and balance						
<b>Output</b>		Established water resource potential, reserve and balance						
<b>Activity</b>		Gauging of rivers Mkungu and Kitiri rivers						
		1 Identification of gauging points along Mkungu, Kitiri rivers & their tributaries	1	77700	66045	0	11655	0
		2 Gauging at the identified points	2	190500	161925	11400	7175	10000
<b>Activity</b>		Computation of demand, reserve and balance						
		1 Computation of demand, reserve and balance	3	3000	2550	450	0	0
<b>6 Water Allocation</b>								
<b>Target</b>		To develop a water allocation Plan						
<b>Output</b>		Water allocation plan						
<b>Activity</b>		Verification/determination of the actual abstraction						
		1 Measurement of actual water abstracted e.g. volumetric, flow meter	1	78400	62640	11760	0	0
<b>Activity</b>		Enforcement of compliance to permit conditions						
		1 Issue of WRMA orders, disconnections, reconnections, prosecutions	2	500000	425000	75000	0	0
<b>Activity</b>		Development of a water allocation plan						

	1	Hire a consultant	3	1,500,000	1275000			225000
<b>Activity</b>		Capacity building of community/PMC on water use efficiency						
1		10public Barazas	2	63500	53975	9525	0	0
<b>7 Resource Protection</b>								
<b>Target</b>		Protection of the reserve quantity and quality in Mkungi/Kitiri rivers and tributaries						
<b>Output</b>		<ul style="list-style-type: none"> <li>Protected reserve quantity and quality</li> <li>Pollution survey reports and effluent control plans</li> </ul> Gazetted catchments and ground water conservation areas						
<b>Activity</b>		Protect reserve quantity						
	1	River flow gauging for analysis of Q95 at the identified points	2	0	0	0	0	0
	2	Review of existing data (Mkungi 2GC10 and Kitiri 2GC 5 and rainfall stations)	2	1800	0	1800	0	0
	3	Computation of existing data		1000	0	1000	0	0
	4	Preparation of flow duration curves		1350	0	1350	0	0
	5	Installation of traffic light system gauges/signboards along the rivers and at a significant public	1	28000	23800	0	0	4200



		place						
<b>Activity</b>		Protect reserve quantity/quality						
	1	Enforce Maintenance of the reserve quantity/quality	2	33200	28220	4980	0	0
<b>Activity</b>		Establish the current WQ status						
	1	• Identified points and the hotspots in the sub catchment (Conduct Pollution survey)	1	8500	7225	1275	0	0
	2	• sampling, analysis	2	7700	0	0	0	7700
	3	• Map point & non point sources of pollution	1	2000	1700	300	0	0
<b>Activity</b>		Sensitization on EIA						
	1	Capacity Building(10 barazas)	1	0	0	0	0	0
<b>Activity</b>		Gazetted catchments and ground water conservation areas						
	1	Sensitization on PELIS and good land use practices	1	31200	26520	0	0	4680
<b>8</b>	<b>Catchment Protection</b>							
<b>Target</b>		To protect & conserve the catchment						
<b>Output</b>		• Controlled soil erosion • Increased water flow in quality & quantity Controlled evaporation rate						
<b>Activity</b>		Catchment Rehabilitation (Afforestation)						
	1	site identification	1	96000	81600	4400	0	10000
	2	pitting	1	50000000	42500000	0	7500000	0

	3	Purchase of seedlings	2	150000000	127500000	0	0	22500000
	4	Transport	3	2500000	2125000	200000	30000	145000
	5	Planting	2	100000000	0	0	100000000	0
	6	Spot weeding	2	30000000	25500000	0	1500000	3000000
	7	Monitoring, follow up and evaluation	3	30000	25500	3000	1500	0
	<b>Activity</b>	Pegging & protection of riparian land: 65Km						
	1	• identify areas which area affected	1	0	0	0	0	0
	2	• Pegging Mkungi -20km, Kitiri:15km, Kianjogu:20km, Kamirangi:10km Total: 65km	1	47040	39984	0	7056	0
	3	Planting of live fence	2	0	0	0	0	0
	4	Planting of water friendly trees along the riparian land	2	0	0	0	0	0
	5	Follow-up	3	30000	25500	0	4500	0
	<b>Activity</b>	• Soil conservation						
		• Identify sites	1	0	0	0	0	0
		• Sensitization of farmers on soil conservation	1	0	0	0	0	0
		• Demonstration on soil conservation methods	2	44100	37485	0	0	6615
		• Follow up to ensure the practice is adopted by the community	3	0	0	0	0	0
	<b>9 Institutional Development</b>							
	<b>Target</b>	Strengthen the WRUA through capacity building						

		To understand and promote stakeholders roles and responsibilities						
<b>Output</b>		Strong and effective WRUA						
<b>Activity</b>		Conduct TNA						
	1	Develop assessment tool	1	2000	1700	300	0	0
	2	Distribution/collection of the TNA tool	1	14000	11900	2100	0	0
	3	Produce TNA report	2	2000	1700	300	0	0
<b>Activity</b>		Conduct Trainings						
	1	Prepare Training Plan	2	2000	1700	300	0	0
	2	Carry out training	3	141200	120020	0	0	21180
	3	Prepare Training Report	3	2000	1700	300	0	0
<b>10 Water Infrastructure Development</b>								
<b>Target</b>		To increase water storage facilities						
<b>Output</b>		Increased water storage						
<b>Activity</b>		Rain water harvesting						
	1	Sensitization/Demonstration on water harvesting technologies	1	140000	119000	21000	0	0
<b>Activity</b>		Reclaiming of encroached dam land						
	1	Establish status/boundary/ownership of dam	1	14000	11900	2100	0	0
	2	Verification of titles from relevant offices (lands and settlement)	2	7500	6375	1125	0	0
	3	Processing of legal documents	3	60000	51000	9000	0	0

	<b>Activity</b>	De-silting of Dams/Pan					0	0
	1	Survey of dams	3	106000	90100	15900	0	0
	2	Float quotation	3	1000	0	1000	0	0
	3	De-silting	3	15000000	12750000	0	2250000	0
	4	Fencing	3	60000	51000	0	9000	0
	<b>Activity</b>	Construction of new dams/ pans						
	1	Feasibility study	1	10600	9010	1590	0	0
	2	Survey of the area	2	120000	102000	18000	0	0
	3	Carry out design	2	50000	42500	7500	0	0
	4	Conduct EIA (5sites)	3	300000	255000	45000	0	0
	5	Tendering	3	1000	850	150	0	0
	6	Construction of 3 no. dams / pans	3	30000000	25500000	4500000	0	0
	<b>Activity</b>	Construction of common intakes for the projects (5No)						
	1	Feasibility study	1	20400	17340	3060	0	0
	2	Survey of the area	2	7500	6375	1125	0	0
	3	Carry out design	3	100000	85000	15000	0	0
	4	Conduct EIA (5sites)	3	250000	212500	0	0	37500
	5	Tendering	3	1000	0	1000	0	0
	6	Construction of 5no. common intakes	3	15000000	12750000	500000	250000	1500000
<b>11</b>	<b>Rights Based Approach</b>							
	<b>Target</b>	Access to quality water equitably (gender inconsideration)to enhance sustainable livelihoods						
	<b>Output</b>	Equitable access to water						

	<b>Activity:</b>	Awareness creation						
		10 barazas (two in every sub location)	1	63500	53975	9525	0	0
	<b>Activity:</b>	Encourage good farming practices						
		1 Demonstrations/field visits	1	68500	58225	10275	0	0
	<b>Activity:</b>	Enforce mitigation measures on effluent discharging						
		1 Sensitization of the community	2	0	0	0	0	0
		2 Identifying defaulters	2	13700	0	13700	0	0
		3 Issue warnings to non compliant people/institutions	2	13700	4000	9700	0	0
		4 Sue the offenders	3	150000	0	0	0	0
<b>12</b>	<b>Monitoring &amp; Information</b>							
	<b>Target</b>	Proper water resource monitoring by the WRUA/WRMA						
	<b>Output</b>	Quality and quantity of water determined						
	<b>Activity:</b>	Monitoring of quantity, quality and water use						
		1 Site identification	1	29500	25075	4425	0	0
		2 Sampling	1	183400	155890			27510
		3 Gauging	3	0	0	0	0	0
		4 Determination of the actual	2	212000	180200	31800	0	0

		water use						
		Creation of a water resource						
	5	monitoring data base	3	1000	0	1000	0	0
	6	Sharing the information	3	24000	24,000	0	0	0
<b>13</b>	<b>Financing &amp; Implementation</b>							
	<b>Target</b>	To Ensure WRUA is financially sustainable						
	<b>Output</b>	Financially sustainable WRUA						
	<b>Activity</b>	Capacity building						
	1	Financial management	1	48600	41310	0	0	7290
	2	Resource mobilization	2	24300	20655	3645	0	0
	3	Project Proposal preparations	3	60000	51000	9000	0	0
	4	Project management	3	48600	41310	7290	0	0
		<b>SUMMARY</b>						
		<b>Total Budget Activity Set</b>	<b>1</b>	<b>50964690</b>	<b>43318839</b>	<b>73460</b>	<b>7518711</b>	<b>53680</b>
		<b>Total Budget Activity Set</b>	<b>2</b>	<b>191293500</b>	<b>154072110</b>	<b>189900</b>	<b>11507175</b>	<b>25524315</b>
		<b>Total Budget Activity Set</b>	<b>3</b>	<b>65369800</b>	<b>55564530</b>	<b>5329090</b>	<b>2545000</b>	<b>1931180</b>
		<b>Grand budget activity sets</b>		<b>307627990</b>	<b>252955479</b>	<b>5592450</b>	<b>21570886</b>	<b>27509175</b>

**APPENDIX C**  
**LIST OF ATTENDANCE**

	NAME	AREA	CONTACT	SEX
1	John W. Nganga	Mawingo	0720643655	M
2	Kihiko kibui	Tia Wira	0726549890	M
3	Agnes W. Maina	Mukungi	0729489623	F
4	Joseph Mwaniki N.	Chairman WRUA	0720965240	M
5	Daniel Mureithi K.	Laigiri	0728486610	M
6	Michael N. Macharia	Laigiri	0725130649	M
7	John Ndungu	Nandarasi	0725427901	M
8	Samuel M. Maina	Nandarasi	0729439921	M
9	Peter Wanyoike	Kitiri	0710862900	M
10	Charles Mathenge	N.K.C. Hospital	0721447779	M
11	Jack K. Kamau	Mkungi	0723241797	M
12	James Wainaina	Nandarasi	0711137993	M
13	C. M. Gathimba	Mukungi	0725815711	M
14	Benjamin Macharia	Kitiri	0721830826	M
15	Mburu Mwaniki	Kitiri	0727483133	M
16	Jonah Macharia	Mikaro	0721736712	M
17	Gitonga G. Nduru	Nandarasi		M
18	Tarasisio Mbaro	Raitha	0728922627	M
19	Christine Kagombe	WRMA	0722647158	F
20	Nelly Onyango	WWF	0720220581	F
21	Peter Shimon	WWF	0722791868	M
22	Mary N. Muya	Kitiri		F
23	James K. Muriu	Geta	0726234942	M
24	Nyaga Ndonga	3M	0723984824	M
25	John Kihake	KNCCI	0720440954	M
26	Jesse G. Njoroge	CAAC	0724229105	M
27	Enock Okemwa	WRMA	0722627281	M
28	Yuvenciah Nyakweba	WRMA	0721280406	F
29	Rufus T. Kigo	Nandarasi	0720673930	M
30	Regina Githua	WRMA	0721256238	F
31	Moses K. Macharia	WRMA	0721250160	M
32	Pauline Wairimu	Mikaro		F
33	Esther Wanjiru	Mikaro		F
34	Paul K. Kamondo	Mukungi	0720619926	M
35	Gitaka Kagera	Kitiri	0725140945	M
36	Jamlick M. Gichuki	Geta CFA	0723278563	M
37	Harrison Kiiru	Nandarasi	0725307471	M
38	Jackson G. Mwangi	WRMA	0723259534	M

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**APPENDIX D ABBREVIATIONS AND ACRONYMS**

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CAAC	Catchment Area Advisory Committee
CMS	Catchment Management Strategy
KWS	Kenya Wildlife Service
MWI	Ministry of Water and Irrigation
NWRMS	National Water Resources Management Strategy
SW	Surface Water
WQ	Water Quality
GW	Groundwater
WRMA	Water Resources Management Authority
WSB	Water Service Board
WRUA	Water Resources User Association
WSP	Water Service Providers
LA	Local Authority
WWF	World Wide Fund
CFA	Community Forest Association
MoA	Ministry of Agriculture
NEMA	National Environmental Management Authority
MoH	Ministry of Health
KFS	Kenya Forest Service
PA	Provincial Administration
Inst	Institutions
LANAWRUA	Lake Naivasha WRUA
TARDA	Tana and Athi Rivers Development Authority