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School of Engineering

DEPARTMENT OF CIVIL AND CONSTRUCTION ENGINEERING

Effectiveness of the Implementation of Sub-Catchment Management Plan using the WDC Process

(A case study of Awach Kano Water Resources Users Association)

Owiti Sylus Openji

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Declaration

I, Owiti Sylus Openji, hereby declare that this thesis report is my original work. To the best of my knowledge, the work presented here has not been presented for a degree in any other Institution of Higher Learning.

Owiti Sylus Openji
F56/69530/2013

Signature: ……..

Date:……

This thesis has been submitted for examination with my approval as university supervisor.

Professor Ezekiel Nyangeri Nyanchaga
Department of Civil and Construction Engineering
School of Engineering
University of Nairobi

Signature:……

Date:……

ANTIPLAGIARISM STATEMENT

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Name	**Signature**
Owiti Sylus Openji	_____

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DEDICATION

I dedicate this piece of work to my loving wife Lynette, daughter Natalia, son Emmanuel, parents Aloyce, Alice and siblings.

ABSTRACT

Water resources are of paramount importance in deriving the development of each and every country and support all the sectors of the economy. Various forums have emphasized the need to conserve and protect the water resources for the future generation. These includes the United Nations Conference on water held in 1977 in Mar del Plata, Argentina, International conference of Water and Environment held in Dublin, Ireland in 1992, the United Nations Conference on Environment and Development among others.

In Kenya, water sector reforms resulted in the adoption of the 2002 Water Act in Kenya, which established the Water Resource Management Authority (WRMA), that is vested with the responsibility of management of water resources in the Country. To support WRMA in the management of Water Resources within the Catchment region, there was a need to establish Water Resource Users Associations (WRUAs). The operations of these Associations are to be governed by the Sub-Catchment Management Plan (SCMP) developed with reference to the Water Resources Users Association Development Cycle as established by WRMA and Water Services Trust Fund (WSTF).

This study aimed at assessing the implementation of the SCMP using the WDC process in the management of Water Resources by Awach Kano WRUA. The study was conducted at four levels by administering one focus group discussion and WRUA Capacity Assessment tool with the management committee of Awach Kano WRUA, administering 98 semi-structured questionnaires to the members of Awach Kano WRUA and conducting two Key Informant Interviews with the WRMA sub regional office in Kisumu and the Water Services Trust Fund. Water quality analysis tests and desk reviews were also conducted.

The fooling tools were used for measuring the performance of the WRUA

1. WRUA Capacity Assessment tool
2. WDC toolkit
3. Global Water Partnership toolbox

According to the WRMA Sub Regional Office, the implementation of the SCMP was effective and rated it at 85% while the WRUA management committee rated it at 90%. According to the members of Awach Kano WRUA who were interviewed, 83% knew about the existence of the

Awach Kano Sub Catchment Management Plan while the rest (17%) did not know of its existence. For those who knew of its existence, 86% were involved in its development while 14% were not involved. For those who were involved, they were either involved in drafting and validating (48%), only drafting (12%) or only validating (40%) the SCMP.

Water pollution, deforestation and water abstraction are challenges faced in water resource management and the WRUA were seen as taking the following steps by the respondents to avert this: planting trees 30%, building gabions 30%, desiltation of pans 15%, mapping polluters 10%, water quality survey 8%, and mapping of water abstractors 7%. Actions taken against the water polluters were reported to local administrators (55%), creation of awareness on the importance of not polluting the water sources (29%) and restricting bathing along the river banks (14%).

Since the beginning of the operations of the WRUA, 100% of the respondents felt that there has been a change in the management of water resources. Averagely, 86% of the WRUAs felt that the actions taken by Awach Kano WRUA were effective in the management of Water Resources in the area. According to the members, the implementation of the SCMP was effective since it had resulted to: reduction in deforestation, reduction in water pollution/ improvement in water quality, reduction in gully erosion, reduction in illegal water abstraction and disiltation of pans.

The WRUA capacity assessment tool indicated that the WRUA is headed towards maturity, however there are some gaps the WRUA needed to work on to attain maturity.

Water Services Trust Fund indicated that Awach Kano WRUA had used the funds provided to them effectively and this made them qualify for the 3rd level funding. Some of the challenges faced by the WRUA were:

- Low allocation of funds to the WRUA by the WSTF.
- Low technical skills in the implementation.
- Slow understanding of the WDC concept by the WRUA members as the WRUA members had not appreciated the concept of Water Resources Management as opposed to Water Service Provision.
- Delayed funding from WSTF as the WRUA could not continue with their activities since they lacked financial resources.

In conclusion, the WRUA members were not adequately involved in the development and rolling out of the SCMP since not all participated in the whole process. The WRMA sub regional office had been actively involved in the development and rolling of the SCMP. A Support Organization helped in the development of the SCMP. The WRUA planted trees, sensitized the communities on forestation and prohibited charcoal burning in the sub catchment. Other activities undertaken by the WRUA included **c**onstruction of gabions, planting sisal, planting cactus and protecting riparian lands. Therefore, the WRUA effectively implemented the SCMP though the activities were achieved at a small scale. The activities undertaken were also effective since they helped reduce further erosion of the Awach Kano River and restoration of ecosystems by constructing gabions, planting trees and preventing more pollution. However, more funds are needed for the WRUA to realise a bigger impact.

The study recommends that WRMA should advocate for more funding resources on behalf of WRUAs in ensuring that the WRUAs have annual allocation from the National and County Governments to avoid dependency on donor funding. The WRUAs need to partner with other development agencies to support their operations. The WRUA should have an office and skilled staff to support in the implementation of activities to ensure more efficient and effective delivery of services. WRMA together with WSTF should revise the WDC to ensure that it addresses the issues of sustainability of the WRUA especially on ensuring that the WRUA receives other sources of funding. The revised WDC should also address the issues of technical capacity of the WRUA.

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CAAC	Catchment Area Advisory Committee
CRA	Commission on Revenue Allocation
FGD	Focus Group Discussion
GWP	Global Water Partnership
ICFW	International Conference on Fresh Water
ICWE	InternationalConference on Water and Environment
ICWRE	International Conference on Water Resources and Environment
IEA	Institute of Economic Affairs
IISD	International Institute for Sustainable Development
IWRM	Integrated Water Resource Management
KII	Key Informant Interview
KWAHO	Kenya Water for Health Organization
MWI	Ministry of Water and Irrigation
NWCM	National Water Commission of Mexico
NWRMS	National Water Resource Management Strategy
SCMP	Sub-Catchment Management Plan
SPSS	Statistical Package for Social Sciences
TVA	Tennessee Valley Authority
TWWF	Third World Water Forum
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCSD	Nations Conference on Sustainable Development
WAB	Water Appeals Board
WDC	Water Resource Users Association Development Cycle
WHO	World Health Organization
WRM	Water Resources Management
WRMA	Water Resources Management Authority
WRUA	Water Resource Users Association
WSB	Water Service Board
WSP	Water Service Providers
WSRB	Water Services regulatory Board
WSSD	World Summit on Sustainable Development
WSTF	Water Services Trust Fund

CHAPTER 1: INTRODUCTION

1.1 Background

In 2002, there was an enactment of the Water Act 2002(Republic of Kenya, 2002). This Act brought several reforms in the water sector. The Act established the Water Resources Management Authority (WRMA) which is mandated to develop the National Water Resources Management Strategy (NWRMS). The NWRMS is meant to prescribe the principles, goals, processes and institutional arrangements for the use, protection, management, conservation, development and control of water resources at the National level.

At the Catchment area levels, the Act authorizes establishment of regional offices close to or in any catchment area by WRMA. Following public consultation, WRMA is mandated to formulate a catchment management strategy for managing, usage, developing, conserving, protecting and controlling water resources within each catchment area. At the Sub-Catchment level, the Act established the Water Resources Users Associations, which are mandated to develop Sub-Catchment Management Plan (SCMP) which is used to manage, use, develop, conserve, protect and control water resources at the sub-catchment level. This SCMP is what is being used by the Awach Kano Water Resource Users Associations (Republic of Kenya, 2002).

Awach Kano is one of the WRUAs under the jurisdiction of Lake Victoria South Catchment Area which has the regional office in Kisumu. Currently Awach Kano is divided into three units comprising of the Upper sub-catchment zone, Middle sub-catchment zone and Lower sub-catchment zone. Awach Kano WRUA was established in the year 2008 and under the provision of the Water Act 2002 (Awach Kano WRUA, 2010).

Awach Kano WRUA has the following broad mandates (Awach Kano WRUA, 2010):

- Management of the sub-catchment area falling under its jurisdiction;
- Protection of Water Resources within the sub catchment area;
- Monitoring water abstraction and water use trade within the sub catchment; and
- Developing guidelines in the sub catchment area including the design, construction operations and maintenance of water and waste system within the sub catchment.

The following were the general problems identified by the WRUA in the SCMP(Awach Kano WRUA, 2010): Pollution of water sources, Deforestation, Gully erosion, Siltation of pans, Riverine cultivation, Illegal Water abstraction, Lack of operational staff(secretariat), Inadequate financial resources and poor access to potable water.

A study carried out on Nyando basin showed that the basin experiences the following environmental problems (Swallow *et al*., 2003).

1. **Water sources:** There are usually discrete water sources in Catchment Areas like springs, which are usually subjected to many uses by many people. If not properly managed, these sources may result to severe gully erosion
2. **Soil erosion sources:** Zones which are usually susceptible to high severe erosion comprise of walkways and waysides that often belongs to the community. Farms and grazing areas, that sometimes are personal or mutual property, varies more as causes of deposits.
3. **Pollution prone areas:** High discharges of industrial residues, insecticides or fertilizers may be associated with commercial farms
4. **Riparian areas:** Land beside watersheds is significant as possible or actual filters of soil and water. Areas like these are likely recognised as community zones which are usually under use of persons whose interests are conflicting

By looking at the identified problems by the Awach Kano SCMP and the results of the Nyando basin study, this research study focused on the following selected problems; Gully erosion, pollution of water sources, siltation of pans, deforestation and Illegal water abstraction.

1.2 Problem Statement

WRMA and WSTF have established a Water Resources Users Association Development Cycle (WDC) process which is being used by the WRUAs to come up with the Sub-Catchment Management Plan (SCMP). The SCMP is used in the implementation of activities in the management of water resources by WRUAs. Most of the WRUAs have identified several activities in line with the problems/challenges that their catchment area faces and how they want to tackle these challenges in the next 3-5years. However, it is worth noting that these WRUAs have experienced challenges in the implementation of the SCMPs. The study therefore sought to find out what the challenges were and their solutions in the implementation of the SCMPs and in particular focusing on Awach Kano WRUA.

1.3 Objectives

1.3.1 Overall Objective

The overall objective of the study was to assess the level of implementation of Awach Kano Sub-Catchment Management Plan in Water resources Management in the sub-catchment area.

1.3.2 Specific Objectives

The following were the specific objectives of the study:

1. To determine the roles played by the WRUA members, the WRUA management committee and the WRMA Regional Office in coming up with the Sub-Catchment Management Plan (SCMP).
2. To evaluate the success of the steps taken by Awach Kano WRUA to ensure reduction in pollution of water resources, gully erosion, deforestation and illegal water abstraction in the Sub-catchment area
3. To assess the effectiveness of actions taken to reduce pollution of water resources, gully erosion, deforestation and illegal water abstraction in Awach Kano Sub-catchment area.

1.4 Justification for the Study

The research was important since the findings were meant to be used by WRMA, WSTF and the Ministry of Water and Irrigation to gauge the level of success of the WDC in management and protection of water resources and thereby influence policies in line with water resource management in Awach Kano sub catchment area and by extension in the Country. The study was also significant in supporting integrated water resources management as a pillar in the management and protection of water resources.

CHAPTER 2: LITERATURE REVIEW

2.1 River Basin Development

River basin development includes actions that, sometimes may be away from river channels but within the drainage basin, and can include resources that include river water among others. River Basin development encompasses three key activities: planning, managing, and conflict resolution (Barrow, 1998). Recently, there have been considerable changes in water management methods due to the emergence of fresh paradigms. Traditional methods were basically single-sector (water) or hydro-centric oriented (Hooper, 2003).

In response to the changes/ demands exerted on rivers by people, and the fluctuating river environments there has been a need for basin planning to develop. Management of Watersheds carefully is important for best farming or forestation and regulates deterioration of soils (Brochet, 1993). China was the first place where management of hydrological cycle was attempted in an intelligent way. This was about two millennia ago (Pegram *et al*., 2013). Through the 1970s to 1980s it became obvious that having engineering approaches and solutions alone were not able to satisfactorily deal with the complicated issues of resource management, especially amongst competing interests and values in the trade-offs (Pegram *et al*., 2013).

2.1.1 Strategic Basin Planning

Strategic basin planning aims to choose from several likely management of water ideas which at the very best contributes to several opposing social, commercial and environmental aims (Pegram *et al*, 2013). Further, the achievement of such aims includes the contribution of several state entities and interested parties, outside the ones invested with management of water resources.

Strategic basin planning is characterized with the following (Pegram *et al*., 2013):

- A compromise amongst other social, financial and ecological purposes and amid current and possible upcoming needs.
- A complicated method to knowing ecological demands of water and the significance of water system working in delivering the things which are vital for human well-being.

- Knowing interactions in basins, comprising with several ecological, movement of water and socio and financial activities and actions that are working in a basin.

Key elements of river basin planning (Department of Environment, 2008) are: (i) the protection of all waters; (ii) the aim of making sure that all waters meet "good status"; (iii) the obligation for cross border coordination; (iv) the need of ensuring that there is active participation of all stakeholders in the management of water activities; (v) the condition for water pricing policies and making sure that the polluter pays; and (vi) balancing the interests of the environment with the dependents.

2.1.2 River Basin Planning around the World

Since 1930s, river basins have been applied in developing, planning and managing water. Numerous methods have been used in river basin development planning and management in several countries (Barrow, 1998).

2.1.2.1 The United States

The first basin wide management body was started in the USA in 1993 after the US had unique social and economic pressures which was created by the Great Depression. The body was called the Tennessee Valley Authority (TVA). There had been recognition by the US congress from 1920s that development of water resources would require planning and management. This would aid in improving transport systems, generation of electricity and increasing growth in agriculture in the Western parts of the US (Pegram *et al*., 2013).

There was an increase in engineering and scientific knowledge as a result of Creation of the TVA. This method supported not only development of resources of water directly by construction of dams and other structures, but likewise helped advanced and wider developing spirits like eradication of poverty, basic education, wellbeing and hygiene, and development of small business ventures. This method provided the 1st example of supporting river basin development outside its old and used WRM approaches. It focused on aiding in an all-inclusive socio-economic development policy programs (Pegram *et al*., 2013).

2.1.2.2 South Africa

In terms of Water availability per capita, the international standards rates South Africa lowly at about 60% of the world average. Additionally, South Africa has one of the lowest ratios of mean annual precipitation to mean annual run-off in the world at about 9% of rainfall enters rivers, compared with the World's average of 31% (Whitmore, 1971). In an effort to implement the IWRM, South African Government passed two regulations (Water Services Act of 1997 plus National Water Act of 1998). These Acts intended that management of water in South Africa would be conducted along water territorial boundaries (UNEP, 2014).

In South Africa, DWAF is the guardian of water resources and overall lead in water sector. In South Africa there are 19 Water Management Areas (WMAs) under the Catchment Management Agencies. Catchment Management Committees-CMCs have also been created by a Catchment Management Agency to accomplish any of its functions in a particular area or generally to give advice and Water User Associations (WUA) comprise of an association of water users that function within a given area of water at a localized level (GWP, 2009a)

2.1.2.3 China

China has for a long time given great consideration to water resources management due to the fact that the country undergoes common, severe drought and flood disasters. River basin planning laid the basis for WRM and development in the Country. Since the founding of China, Water resource management has evolved since 1949 over 3 key phases (Pegram *et al*., 2013).

The converging of the Chinese and EU approaches to Integrated River Basin Management has significantly been contributed by River Basin Management and Planning. This has worked on the governance of water resources in the Yangtze River basin focusing on institutional arrangements with an aim of enabling stakeholder participation and consultation. It has also worked in the Yellow River Basin which was tested at sub-basin level under the "Guideline on Stakeholder Participation" (Devco, 2012).

2.1.2.4 Australia

The origin of WRM in Murray-Darling basin of Australia may be viewed in 3 stages: a developing stage, a WRM stage, and an adjusting stage. The developing stage occurred upto

about the 1970s. At this phase, there was construction of large water storage structures, water schemes, and inter basin schemes by the government. The works were mainly done so as to aid in regional development. The 1915 River Murray Agreement coordinated most of the development in the Murray River (Pegram *et al*., 2013) which saw the setting up of a basin commission in 1917 to effect the 1915 River Murray Waters Agreement. This body was reporting to a cabinet committee which included representations from the states within the basin and the federal government. The key mandate was to control the trunk stream of the Murray in ensuring that the three lower states got their fair shares (Pegram *et al*., 2013).

There was again deterioration of the Basin's water resources in 1980s and during that period, management of water programs was with the 5 institutional State bodies in the Basin, that were not coordinated in development (Hooper, 2014). A common approach was required by the states in partnering with the Basin's urban and rural populations. In order to respond to this issues, there was the formation of the Murray-Darling Basin Commission in January 1988 within the confines of the Murray-Darling Basin Agreement chattered to (Hooper, 2014):

- Efficiently distribute and manage equitable River Murray water resources;
- To ensure that the water quality are protected and improved
- Give advice to the Council on any issues related to environment, land water management within the basin.

2.1.2.5 Mexico

In Mexico, River Basin Planning and Development was seen as a technique of passing by established entities that were considered to be dishonest, difficult or stagnant (King, 1965).In 1926, Mexico passed the Federal Irrigation Act, which established the National Irrigation Commission, that was seen as the beginning of WRM in Mexico. Ministry of Hydraulics Resources was created in 1945. This Ministry was the government Authority vested with the responsibility of developing irrigation structures, developing and administering irrigation districts, and managing and controlling the river with other responsibilities of municipal waste water management (Pegram *et al*., 2013).

The passage of a new National Water Act was done 1992 and updated in 2004. The Act brought major features of Integrated Water Resources Management. The act gave more powers to the National Water Commission (which was also known as 'Conagua'), clearly delineated the function of provincial stakeholders, encouraged public participation from both government, civil society, and water users, required establishment of basin councils, and set the basis for stakeholder participation process. The act resulted in establishment of a system of water rights, of which approximately 450,000 entitlements given out up to date. Policies in line with reforming the water sector have focused on privatization water infrastructure. An example is the handover of irrigation districts to agrarians (Le Quesne and Schreiner, 2012).

2.1.2.6 Europe

Europe has also had a long history of River basin planning especially in the Northern parts. In most of its main rivers, there has been a change of focus from, ensuring that rivers were more navigable and flood protection systems developed, through developing actions related to basin to return the quality of water, and currently on stressing on the protecting and restoring functioning ecologies of such rivers (Pegram *et al*., 2013).

River basin planning along the Rhine River was first driven by the reduction of salmon numbers in the late 19th century. Increase in industrial development resulted in Later, after the 2ndWorld War, increasing industrialization and urbanization resulted in bas quality of water due to fast reduction of ecological health in the river and fall in the number of fish caught. For this reason, several pacts were developed between 1950 to 1985, such as the in the 1963, there was a formation of International Commission for the Protection of the Rhine against Pollution (ICPR) (ICPR, 2012).

2.2 History of Integrated Water Resources Management

In many Countries, Integrated Water Resources Management (IWRM) has become the dominant paradigm for water policies (Houdret *et al*, 2013). The Global Water Partnership's definition is the most used definition which emphasizes the need for developing together the social, environmental and economic aspects of water in a way which is maintainable: "IWRM is a practice that encourages a synchronized management and development of environment and

resources associated with it with the aim of exploiting the benefits in a way which is impartial without compromising the sustainable of vital ecologies" (GWP, 2000 and 2003)

IWRM has been discussed in many platforms as part of the agenda. These forums include the United Nations Conference on water, International Conference on Water and Environment, The UN conference on Water and Environment, the World Water Forums, The International Conference on Freshwater, the World Summit and Sustainable Development, the UN conference on Sustainable development.

2.2.1 United Nations Conference on Water

The United Nations Conference on Water was conducted in 1977 in Argentina (Mar del Plata). There was a plan which was developed un the conference and approved that was the 1st globally method in Integrated Water Resource Management (Biswas, 2005). Implementation of several Mar del Plata principles were done in 1980s, but slowly, water worn out from international forums. Bruntland Commission Report that was core in championing for sustainable development had very little to do with water (WCED, 1987).

2.2.2 International Conference on Water and Environment

Water came up once more in the global arena after 15 years of the Mar del Plata Conference. International Conference on Water and Environment was held in January 1992 for the 21st Century in Dublin, Ireland, which served as a preparatory event for Rio UN Conference on Environment and Development (UNCED). The four principles that came as a result of the Conference in Dublin stressed on the significance of integrated water resource management, women inclusion in water resource management, economic value of water and participatory approach (ICWE, 1992). Even though there many issues related to these broad approaches, it is justified to say that thed Dublin Principles highly influenced the IWRM approach which is current thinking (Rahaman and Varis, 2005).

2.2.3 The UN Conference on Environment and Development

The Earth Summit which is also known as the UNCED was conducted between 3rd to 14th June 1992 in Rio de Janeiro. About 178 UN member States, 2400 NGOs and 17,000 people were in attendance. The participation of 108 heads of states or Governments in the conference made the

conference to be very powerful on its own way. Agenda 21 which was developed in the Conference was adopted and endorsed by the 178 States in Rio de Janeiro. Freshwater issues were exclusively dealt with under Chapter 18 of the Agenda 21 (UNCED, 1992). Seven program themes on freshwater sector with in depth guidelines for implementation in each thematic area were proposed by Agenda 21, Chapter 18. The program thematic areas are IWRM, protection of water resources; water resources assessment; water quality and aquatic ecosystems; water and sustainable urban development; drinking water supply and sanitation; water for sustainable food production and rural development.

The GWP was founded in 1996 as a result of the UNCED and informal adoption of the Dublin principles. The vision for GWP is for a water secure world. GWP was created in 1996 to foster IWRM, and to make sure that there is coordinated and management of land, water and related resources by capitalizing economic and social welfare without the sustainability of vital environmental systems being compromised (GWP, 2009b). GWP has developed a toolbox to assist countries in the development and management of Water Resources. It approaches the IWRM in 3 ways, namely; the enabling environment, Institutional roles and the management instruments (GWP, 2009b).

2.2.4 The 2nd World Water Forum

The 2ndWorld Water Forum was held in March 2000 in the Netherland, Hague. Different from Mar del Plata and Dublin, this conference assembled state members and professionals and also resulted in involvement of several partners in relation to management of water from both developed and developing countries. The major topics of discussion from this forum related to IWRM include privatization of water and public private partnerships; water services being charged at full cost with suitable subsidies to the needy; access rights for water and land as a way to ensure poverty are broken down; transparency in management of water, together with stakeholder involvement is meaningfully done among others (Rahaman *et al.*, 2004).

2.2.5 The International Conference on Freshwater

In December 2001, the International Conference on Freshwater was held in Germany, Bonn, with the aim of finding answers to universal water challenges and help in the planning of World Summit on Sustainable Development (WSSD) conference which was held in Johannesburg 2002

and 3rdWorld Water Forum held in Kyoto 2003. Several principles on water resources development were reviewed and it was acknowledged that there is a difference between executing and developing policies/ principles. The forum focused on finding day to day ieads the application of these measures. Identification of challenges and key targets were done, and at the same time there was a recommendation on implementing these policies at the field level (ICFW, 2001).

2.2.6 The World Summit on Sustainable Development

South Africa, Johannesburg, hosted the Sustainable Development and should be acknowledged for raising IWRM so high in the international arena. Implementation plan for WSSD recognizes that IWRM is important in the attainment of sustainable development and this plan gave a provision for explicit aims and guidelines for the implementation of IWRM. The aims for the summit included developing IWRM and water efficiency plans for all major river basins of the world by 2005; improving efficiency of water use, establishing public-private partnership; development and implementation of national or regional policies, strategies and programs with respect to Integrated water resource management; and developing gender sensitive guidelines and programs etc. (WSSD, 2002).

2.2.7 The 3rd World Water Forum

The 3rd World Water Forum was done in March 2003 in Japan, Kyoto. The conference also gave a recognition to IWRM as the best model in achieving long-term management of water resources.. A number of IWRM related principles were addressed by the ministerial declaration resulting from the Forum and also there was a vow to support developing countries to attain UN Millennium Development Goals. The declaration also committed fullest support by 2005 for developing IWRM and water efficiency plan in all river basins of the world (TWWF, 2003).

2.2.8 The 4th World Water Forum

The 4th World Water Forum was held from 16-22 March 2006 in Mexico. The forum discussed the Implementation of Integrated Water Resources Management as a theme. The conference noted that achieving IWRM needs patience, and noting that the process itself is a critical success factor, and that the process of IWRM should build on multi-stakeholder participation and integrated planning with emphasis on improving quality of life of the people. The conference

stated that IWRM plans ought to be part of broader national development plans, and there should be an increased support to countries lagging behind in the IWRM planning process by donors and development partners (NWCM, 2006).

2.2.9 The 5th World Water Forum

The 5th World Water Forum was held from 16th to 22nd March 2009 in Istanbul, Turkey. The forum had a theme bridging divides for water, under the sub theme of basin management and transboundary cooperation. A shift from water to ecosystem management was encouraged by the participants and the participants proposed that hydro-solidarity should be a new organizing framework for action on making sure that water resources and storage infrastructure meet agricultural, energy and urban demands, the positive and negative links between large water infrastructure and economic and social development was also discussed (IISD, 2009).

2.2.10 The International Conference on Water Resources and Environment

Morocco, Marrakech, hosted the International Conference on Water Resources and Environment in November 2011. There were a series of continuous–cycle of workshops, symposium and conferences of the Global Institute for Water, Environment and Health program with an intention of bridging the gap between the real policy, strategy and science in WRM and environmental fields and also to encourage the water and environmental communities to share knowledge and best practices in a changing environment (ICWRE, 2011).

2.2.11 International Conference on Integrated Water Resources Management

Germany, Dresden, hosted the International Conference on Integrated Water Resources Management in October 2011. The conference recognized that no solitary Integrated Water Resource Management subject is able to resolve problems associated with water like poor quality of water or lack of access. Innovations will discontinue if established financial sustainability, basics, and related capabilities are not adopted. Innovations will not have long term effect if they have adverse impacts on groundwater or on the public in general (Kirschke *et al.*, 2011).

2.2.12 The United Nations Conference on Sustainable Development

The UN Conference on Sustainable Development was held in Rio de Janeiro, Brazil from June 20-22, 2012. The 20th anniversary of the UN Conference on Environment and Development in

Rio in 1992conference was marked in the conference. Governments who participated in the 1992 meeting politically validated the main objective of sustainable development in the achievement of socio-economic and environmental development that meets the demands of the present in a way not to compromise the ability of future populations in sustaining their own demands. A goal of global access to safe and clean water and adequate sanitation, together with the reform of water and wastewater management was advocated in the conference (UNCSD, 2012).

2.2.13 The 6th World Water Forum

The 6th World Water Forum was held from 12-17 March 2012 in Marseille, Germany. The conference under the Water and Health roundtable passed the following main messages: Integrated Approach to Water, sanitation and hygiene need to support at the country level with all the leaders. There should be improved coordination between several stakeholders at the regional and national levels with the aim of achieving integrated principles for health and water (Nguyen *et al*., 2012).

2.2.14 The 7th International Conference on Sustainable Water Resource Management

This conference was conducted in the UK, New Forest, from 21 - 23 May 2013. The main aim of the Conference was to come up with new ways of managing water resources to foresee future developments and propose long-term solution. The necessity to offer enough water to fulfill the desires of ever expanding populations resulted in strain in the obtainability of such water resources. Human actions make this problem to become worse as it affects the water quality and insufficient distributions (Wessex, 2013).

2.2.15 Sustainable Development Goals

There was an extra ordinary commitment by World leaders in 2000 to eliminate extreme poverty and enhance the wellbeing of the Globe's poorest persons by the year 2015 (Pan America Health Organization, 2010). The commitment was approved in September 2000 at the Millennium Summit and was prescribed in the UN Millennium Declaration. The conference prescribed these aspirations into 8 agendas with time limits, called the Millennium Development Goals (MDGs).

In New York in September 2005 at a United Nations World Summit, there was a renewal of the MDG commitments by about one hundred and seventy heads of governments and states and

decided to act on several world problems (Pan America Health Organization, 2010). Water was under goal 7 which was to ensure environmental sustainability by 2015. The main aim of the goal was to halve the number of the people with no sustainable access to safe drinking water and basic sanitation by 2015 (UN, 2007).

In September 2015, at a Historic World Summit, World leaders adopted the 17 Sustainable Development Goals. These goals were the successor of the Millennium Development Goals. The goals officially came into effect on 1st of January 2016. The aim of the 17 Sustainable development Goals are to end all types of poverty, fight inequities and tackle climate change, while at the same time ensuring that no one is left behind by the year 2030 (UN, 2016). Water has also been given more prominent at Goal 6 with the aim to ensure accessibility for all and management of water and sanitation sustainably by 2030 (UN, 2016). Goal 6, section 6.5 talks specifically on IWRM. It aims at implementing IWRM at all levels, together with trans-boundary cooperation as appropriate by 2030 (UN,2016).

This study therefore, is in line with the aspirations of the Sustainable Development Goal specifically on Integrated Water Resource Management which is being implemented through guidance of GWP tool, WDC process, SCMP and WRUA Capacity Assessment tool.

2.3 Legal Framework and Policy of Water Sector in Kenya

2.3.1 General Background

The government launched the 1st Master Plan for Water in 1974. The Master Plan aimed at making sure that clean and safe water was available at a reasonable distance to every household by the year 2000. "*Water for all by 2000"* was the initiative's the slogan, which was to be attained by coming up with water supply schemes. Up to 1974, water management was done by the Department of Water Development (DWD) that was located in several ministries such as Agriculture, Public Works and Natural Resources. Within the spirit of the 1974 Initiative, the state created the Ministry of Water from the department of Water Development in the Agriculture Ministry. The New Ministry of Water The new Ministry embarked on action of ensuring that water was developed within the whole Country (IEA, 2007).

Notwithstanding the Ministry's actions and making huge investments, the goal was not realized. The state appreciated that on its own, it was impossible to realize the dream by the year 2000as envisioned. Consequently, there occurred a desire to think about the slogan again and come up with a new approach in ensuring the best way in achieving access to water by everyone. Therefore, the new approach involved into ensuring that all stakeholders participated in the provision of sewerage and water services. This practice was later known as "handing over." In 1997, there was a national guideline published by the Government on handing over rural water supply systems to communities (IEA, 2007).

There were 2 documents released by the Ministry of Water in 1992 which steered the water sector until 2000. The two documents were:

- Delineation Study: This study outlined a distinct and better delineation of functions, roles and responsibilities of key players in the water sector, with keen attention on the functions, roles and responsibilities which was suitable to the Ministry (Nyanchaga, 2011).

- The 2nd National Water Master Plan: The master plan prescribed sustainable goals for water sector reforms in managing and developing the sector. The Master Plan recommended the Ministry to come up with a water policy (Nyanchaga, 2011).

2.3.2 Water Policies

The state came up with a National Water Policy that was approved by the National Assembly in April, 1999 also called Sessional Paper No 1 of 1999 (Republic of Kenya, 1999). The sessional paper started working in August, 1999. This sessional paper was for handing over of water management and assets to those vested with the responsibilities of operations and maintenance. The policy recommended that the urban water companies to be handed over to independent local authority departments while those from rural areas to be handed over to the communities.

The institutions established were: Water Service Boards for asset management and development, Water Service Providers for water service provision, Water Services Trust Fund for financing the Water Sector, Water Services Regulatory Authority for regulation in the Water Sector, Water Resources Management Authority with its regional offices for regulation, management and

allocation of water resources and Water Appeals Board for resolving disputes within the Sector. In general, the Policy's direction was that the government should not be involved in direct service provision but should only be involved in policy direction in the water sector (IEA, 2007).

The policy recommended review of the water act, cap 372 to handover water utilities to water services providers (Republic of Kenya, 2002). When developing the National Water Policy, a National taskforce was also established with a mandate of reviewing and updating the water act and come up with proposed revisions. The publication of this bill was done on 15th March 2002, and the parliament approved it on 18th July of the same year. It was then gazetted on October 2002 and effected in 2003 as a Water Act 2002 (IEA, 2007).

The Water Act (2002) introduced a paradigm shift in water sector management:

- Separation of water resources management from services provision;
- Separation of policy making from regulation;
- Devolution of functions; and
- Involvement of non-state actors in resources management and services provision.

a) Draft Trans-boundary Water Policy

The draft trans-boundary water policy (MWI, 2011) is anchored on fundamental principles derived from a number of international legal and soft law instruments for the management of shared water resources, these principles provide minimum standards which countries are expected to adhere to, key among them being that:

- Available water resources shall be shared on the values of some for all instead of all for some.
- Water is not just an economic good but also a social good.
- The management of Water resources should be an integrated basis and on the basis for the basin catchment.
- Water has economic value. This is one of the Dublin Principle articulated at the International Conference on Water and the Environment, Dublin, 1992.

- Countries should strive to maximize and equitably share benefits in areas where water resources are shared between countries. In the utilization of shared water resources countries should strive to maximize and equitably share the benefits.

b) Draft Irrigation and Drainage Policy

The Irrigation and Drainage Policy (MWI, 2011) is built around the principle that Kenya has potential for expansion of agricultural land by harnessing available water resources for irrigation and draining water-logged or flooding areas to free them for economic use. The overall policy goal was to quicken sustainable development of drainage and irrigation in contributing to the national goals of food security, creation of wealth and employment and poverty eradication. This was also in line with the Country's goals for revolution of agriculture as supported by Vision 2030.

c) Draft National Water Harvesting and Storage Policy

The fundamental principles involved in the development of the National Water Harvesting and Storage policy (MWI, 2011) included development of infrastructure for harvesting and storage of water; regulation; licensing; effective management; equity and equality; gender responsiveness, partnerships; access to water resources; ecological stability; disaster responsiveness; access to health services; ethics and governance.

2.3.3 Legal Framework

2.3.3.1 Water Act 2002

The Water Act 2002 (Republic of Kenya, 2002) replaced the Water Act Cap 372 of 1952 (Republic of Kenya, 1964) in late 2002. It provides an improved legislative framework for more effective conservation, management, use and control of water resources and for the acquiring and regulating rights to water use; and provides for the regulating and managing water supply and sewerage services (Republic of Kenya, 2002)." The act provides legislative backing for many of the principles of the policy, including (World Bank, 2004):

- Separating WRM from water services as illustrated in Figure 2.1.

- Creating administrative authority autonomy by establishing the Water Resources Management Authority as an arm's length institution charged with the management of Kenya's water resources as illustrated in Figure 2.1.
- Forming catchment area WRM strategies, establishing catchment-based regional offices of the Water Resources Management Authority, and appointing catchment Area Advisory Committees (CAACs) as illustrated in Figure 2.1.
- Calling for a National Water Resources Management Strategy and Catchment Management Strategies.
- Providing for community involvement in WRM and conflict resolution through river water resources users associations.
- Introducing polluter pays principles for enforcing pollution control.
- Introducing a water reserve.

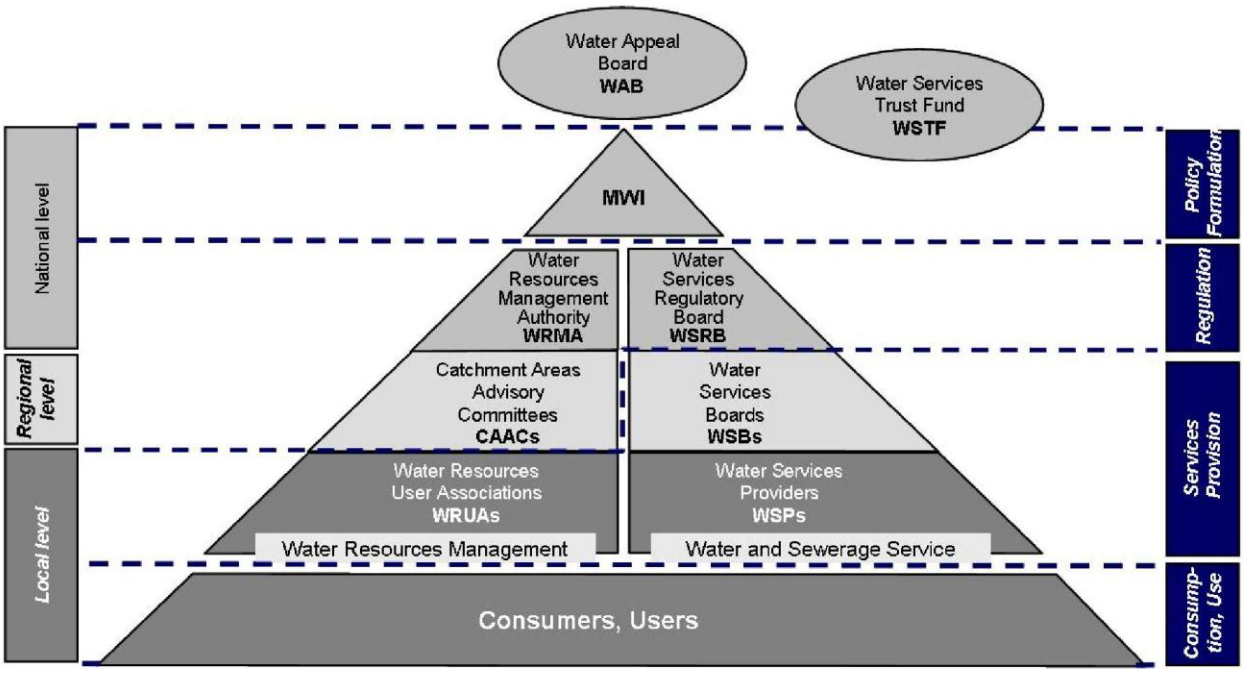

Figure 2.1: Institutional Framework under the Water Act, 2002

(Source: WSTF, 2009)

The Water Act 2002 established a platform for the creation of the following bodies as indicated in the above Figure 2.1.

a) Water Appeals Board

This is an independent body falling at the top of the triangle as shown in Figure 2.1 above. Its roles and responsibilities are outlined in section 85 and 87 in the water act 2002 and they include the following (KWAHO, 2009):

- Hearing and making determinations for appeals on judgments from WRMA, WASREB or the Minister of water.
- Dispute resolution within the sector.
- Coming up with new rules and changing them as need arises.
- Carrying out any other role relating to water resource use and development other judicial functions relating to use and development of water resources.

b) The Water Services Trust Fund

Water Services Trust Fund (WSTF) is authorized to aid in financing the provision of water services to areas of Kenya that are without adequate water services. WSTF finances water service provision to areas which were previously marginalized with the aim of increasing access to water resources within the Country (WSTF, 2008).

c) Water Resources Management Authority

According to the Institute of Economic Affairs report (IEA, 2007), WRMA has the responsibility of protecting, managing, conserving and apportioning of water resources together with other trans boundary waters. The country is divided into six drainage basins as shown in Figure 2.2 (WRMA, 2009a).

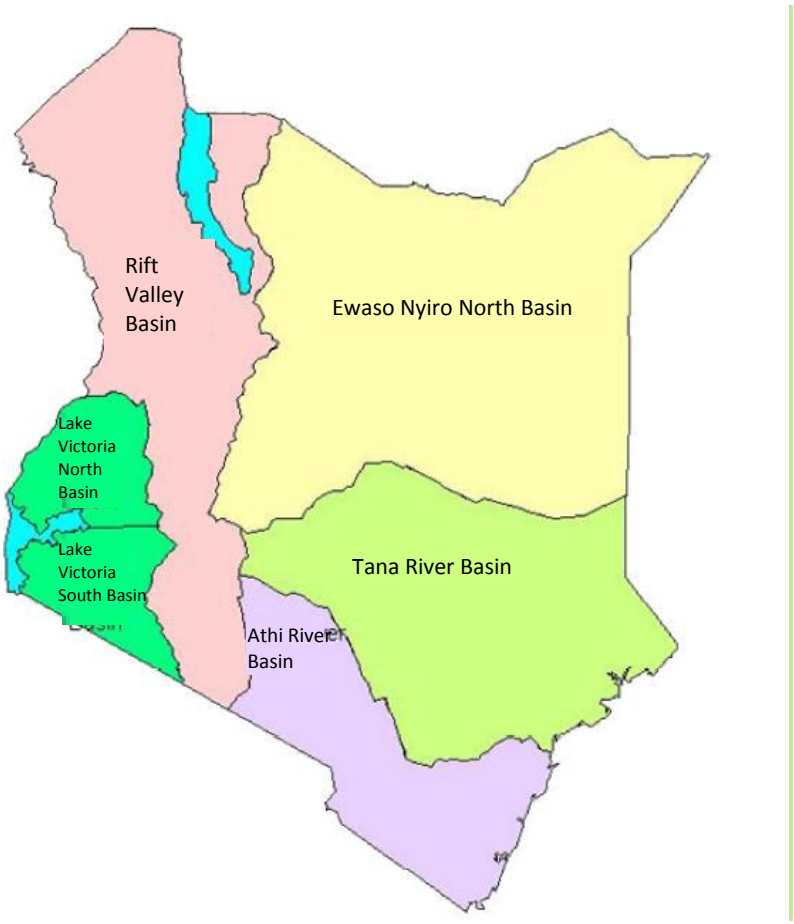

Figure 2.2: Catchment Areas of Kenya

WRMA is charged with (Republic of Kenya, 2002):

- Development of rules and guidelines for water resource allocation.
- Reviewing and implementing the National Water resource management strategy.
- Approval of permits on use of water.
- Ensuring that the conditions attached to a permit is adhered to.
- Regulating and protecting water quality from adverse effects.
- Management and protection of catchment areas.
- Coming up with charges for use of water resources.
- Advising government in any matter in connection with water resources.

WRMA has one National office, six Regional offices and twenty six Sub regional offices across the country (WRMA, 2013b).

d) Catchment Area Advisory Committees

The responsibility of these committees is to support WRMA in areas of water and environmental protection and management within the Catchment Areas. WRMA has set up sub regional offices to work closely with the WRUAs and the CAACs. As per the WRMA performance report (WRMA, 2015a), 6 CAACs have been established.

The responsibilities of CAACs as per the Institute of Economic Affairs report (IEA, 2007) are:

- Provision thorough information and advice concerning water resources in their areas of jurisdiction.
- Give advice on catchment characteristics, citing and utilization of storage facilities.
- To guide on trans-boundary WRM.
- To support WRUAs.
- To support in conflict resolution.

e) Water Services Regulatory Board

This body gives an oversight on Water service provision. The role of WASREB is outlined in section 47 of the Water Act 2002 as follows (KWAHO, 2009):

- Issuance of licenses for provision of water.
- Making determination for standards on water provision to users.
- Establishment of procedures for dealing with complaints from consumers.
- Monitoring of compliance on standards related to designs, construction, operations and maintenance phase of systems on water service provision.
- Giving advice on permits on processes for addressing complaints arising from consumers and in monitoring the operations of their actions.

f) Water Services Boards

There are eight WSBs in Kenya: Lake Victoria South Water Services Board, Athi Water Services Board, Coast Water Services Board, Lake Victoria North Water Services Board, the Rift Valley Water Services Board, Tana Water Services Board, Tana Athi Water Services Board, and Northern Water Services Board. These WSBs were established to take sole responsibility for water service provision with Water Service Providers by signing of Service Provision

Agreements (Owuor and Foeken, 2009). As per the Act, WSBs is the asset owners in their areas of activities. The following are the functions of WSBs (Krhoda, 2008):

- Building the capacities of communities to start provision of water as a business venture
- Drawing up of service provision agreements.
- Setting of tariffs and regulations to eliminate cartels.
- Zoning of community water service providers so as to ensure equitable distribution of water resources.

g) Water Resources Users Associations

The main responsibility of the WRUAs is to ensure there is harmony between water and agricultural activities, and between downstream and upstream users so as to prevent water related conflicts (IEA, 2007). As per the WDC, the following are the key objectives of a WRUA (WSTF, 2009):

- Ensure legal water use that recognizes community needs.
- Promote good water management practices.
- Promotion of water conservation practices in ensuring sufficient water resources in meeting the demands of the environmental, wildlife, livestock and all those communities who depend on the water resources.
- Work towards reducing and solving conflicts in use of the resources.

Figure 2.3 shows the governance structure of a WRUA which comprises of several committees (WSTF, 2009)

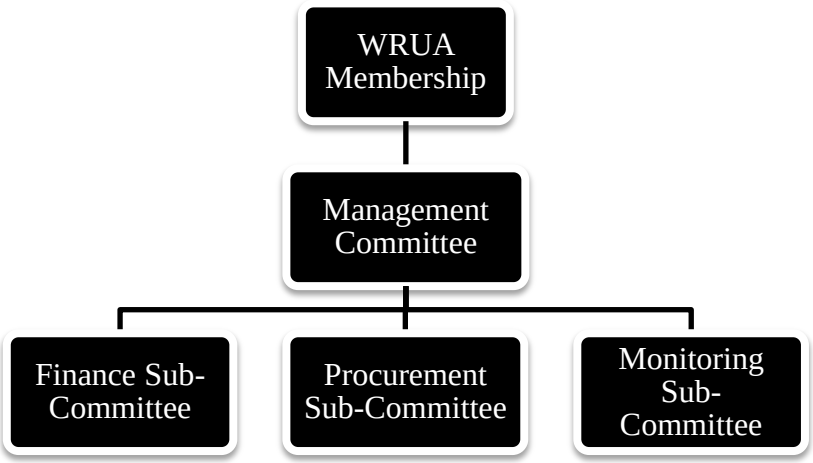

Figure 2.3: WRUA governance Structure

As per the WRMA performance report 4 of 2015 (WRMA, 2015a), there are 580 WRUAs established as indicated in Table 2.1.

Table 2.1 Number of WRUAs established in Kenya in different catchment areas

Catchment Areas	**WRAUs Established**
Lake Victoria North Catchment Area	99
Lake Victoria South Catchment Area	98
Rift Valley Catchment Area	68
Athi Catchment Area	121
Tana Catchment Area	121
EwasoNg'iro North Catchment Area	73
Total	580

h) Water Service Providers

These are business entities with the responsibilities of selling water and sewerage services to consumers. WSPs must function with a license and it can be any body selling at least 20,000 liters a day. Several Water Service Providers are owned by County governments after the

promulgation of the new constitution, although they are established as autonomous entities under the Companies Act. The main roles and responsibilities of the WSPs are (IEA, 2007):

- Giving of water bills for provision of services.
- Operations and Maintenance of water facilities.
- Ensuring compliance with standards and levels.
- Billing and collecting revenue.

2.3.3.2 The Constitution of Kenya 2010

In August 2010, Kenyans ushered in a new Constitution to replace the old one that had been in operation since independence. The New Constitution brings fundamental changes such as the establishment of the devolved governments, expansion of bills of rights, and establishment of the senate among others. Water is also addressed in the bills of rights meaning every Kenyan has a right to clean and safe water in adequate quantities (Republic of Kenya, 2010). Responsibility for provision of safe and clean water in adequate quantities (Republic of Kenya, 2010) is currently vested on the County and National governments. Everybody has a right to safe and clean water in adequate quantities as provided for in Section 43(1) (d):

- Adequate water
- Satisfactory water
- Safe water
- Accessibility
- Affordability

In Schedule Four, Part 2, Section 11(b) (Republic of Kenya, 2010), County governments have been mandated to take over existing delivery mechanism.

- Schedule Four Section 22(c) of Part 1 and Section 11(a) and 11(b) of Part 2, vests the responsibilities of services under National and County government respectively.
- The government and its agents shall respect, observe, promote, protect, and fulfil rights in Bill of Rights as in Article 21(1).

2.3.3.3 Water Act 2016

Due to the enactment of the New Constitution, there was a need to review the management of Water Sector so as to be consistent with the requirements of the New Constitution. As a result,

new water sector policies were stipulated in the draft National Water Policy 2012 (Niras, 2013) and in a new Water act 2016 that has just been assented to by the President. According to the new Water Act 2016 (Republic of Kenya, 2016), the guiding sector principles are:

- A pro-poor orientation in the achievement of right to water with.
- WRM and Water Services Separation.
- Using Integrated Water Resource Management (IWRM).
- Sector Wide Approach for enhanced development.
- Separation of policy from regulation and operation / implementation.
- Devolution of functions to the lowest appropriate level.
- Gender provisions in the management of Water Sector Institutions.
- Participatory approach and Public Private Partnership.
- The principles of "User pays and polluter pays".

The water act 2016 is supposed to bring some changes in some key institutions in the water sector. These institutions include (Republic of Kenya, 2016):

1. Water Resources Management Authority to Water Resources Authority.
2. Water Services Trust Fund to Water Sector Trust Fund.
3. Water services boards to Water Works Development Agencies.
4. Water Appeals Board to Water Tribunal.
5. National Water Conservation and Pipeline Corporation to National Water Harvesting and Storage Authority.
6. Establishment of National Public Water Works.

2.3.3.4 Formulated Strategies and Plans for Water Resources Management

a) The National Water Resources Management Strategy

Formulation and publishing of the NWRMS in the Kenya gazette is recommended by the Water Act 2002 (Republic of Kenya, 2002), with respect to the way water resources of Kenya are managed, developed, protected, conserved, used and controlled. This strategy ought to be reviewed periodically and prescribes the principles, procedures, objectives and setting up of entities for managing, protecting, using, developing, conserving, and controlling water resources and specifically (Republic of Kenya, 2002), for:

- determining in accordance with the requirements of the reserve for each water resource.
- classifying water resources.
- identifying areas which should be designated protected areas and ground water conservation areas.

WRMA has formulated and reviewed the NWRMS. The first NWRMS was developed and operationalized in 2008 (MWI, 2008) and a new one was developed and operationalized in 2010 to run through to 2016 (MWI, 2011).

b) Catchment Management Strategy

WRMA is mandated under the Act (Republic of Kenya, 2002) to develop a catchment management strategy for the protection, management, usage, development, conservation and control of water resources in each catchment area. As per the Act (Republic of Kenya, 2002), a catchment management strategy shall:

- Put into consideration of the classes of water resources and resource quality objectives
- prescribe the principles and institutional arrangements of the Authority for the management, usage, development, protection, conservation and control of water resources in each catchment area
- be in accordance with NWRMS
- provide tools and facilities to ensure that the communities and the public contribute in WRM in each catchment area
- have water allocation plans that prescribes principles for water allocation

Currently, WRMA has formulated catchment management strategies for all the six drainage basins. These include;

1. Lake Victoria South Catchment Management Strategy 2015-2022 (WRMA, 2015b) which is the current one under implementation.
2. Ewasong'iro North Catchment Management Strategy (WRMA, 2009a)
3. Lake Victoria South Catchment Management Strategy (WRMA, 2009b) which expired.
4. Rift Valley Catchment Management Strategy (WRMA, 2009c)
5. Athi Catchment Management Strategy (WRMA, 2009d)

6. Lake Victoria North Catchment Management Strategy (WRMA, 2008a)
7. Tana Catchment Management Strategy (WRMA, 2008b)

c) Sub-Catchment Management Plans

The SCMP gives a scrutiny of problems related to water within a specific area and prioritizes set of activities to deal with these problems over a period of 3-5 years. According to the WRMA performance report (WRMA, 2015a), the number of WRUAs established and Sub-Catchment Management Plans developed are as indicated in Table 2.2 (WRMA, 2015a).

Table 2.2: The number of SCMPs developed per sub catchment area

Catchment Areas	**WRUAS Established**	**SCMP developed**
Tana Catchment Area	121	159
Lake Victoria South Catchment Area	98	85
EwasoNg'iro North Catchment Area	73	63
Rift Valley Catchment Area	68	52
Lake Victoria North Catchment Area	99	92
Athi Catchment Area	121	147
Total	580	598

d) Water Resources Users Association Development Cycle (WDC)

According to WRMA and WSTF (WSTF, 2009), WDC is a process designed to support community based activities in WRM both financial and technical in a transparent way. WDC was established since more than half the citizens relied on water sources that were not safe and therefore, there was a need for communities, government and stakeholders to collaborate on WRM on which all water supplies depended on.

WDC (WSTF, 2009) is founded on the IWRM approach which recognizes that water resource management cannot be done properly without involving other components including:

- Institutional capacity;
- Technical knowledge;
- Financial resources;
- Stakeholder participation;

- Coordination and collaboration.

The objectives of WDC were (WSTF, 2009):

- Improvement of water resource quality and quantity to enhance livelihood.
- Enhancement of the capacity of catchments and riparian to provide hydrological services.
- To support in development of functional WRUAs.
- To promote governance in WRM.
- To enhance adherence to environmental standards and regulations.

The WDC toolkit is used as a reference document for people involved in the development and implementation of the SCMP and each chapter of the WDC relates to a chapter in the Sub Catchment Management Plan (WSTF, 2009). These modules include, Water Sector reform, Overview of the WDC, Catchment Characteristics, Development of SCMP, Water Balance and Management of Water demand, Resource Use and Allocation, Water Resource Protection, Conservation of Catchment and riparian lands, Institutional Development and Collaboration, Water Resource Infrastructure and Development, Rights Based Approach, Water Resource and Catchment Monitoring, Financial Management and Training module on the operational Guidelines (WSTF, 2009).

e) WRUA Capacity Assessment tool

WRUA Capacity Assessment tool was established as part of a programme that was being implemented in Naivasha, Kenya. The programme is known as Integrated Water Resource Action Plan (IWRAP) and implemented with funding from the Netherlands Embassy in Nairobi. The WRUA Capacity Assessment Tool (CAT) is based on a broad tool that is commonly used for organizational capacity assessment of NGOs, CBOs and other organisations worldwide, since the mid-1990s. It is especially used by NGOs from donor countries to assess and support their partner NGOs in developing countries. The methodology of the tool is taken from management audit practices and the initial focus of the CAT was to self-assess the organization management capabilities with a view of strengthening it. (WWF, 2014).

The programme has seven result areas and is implemented under the leadership of WWF Kenya Country Office through a partnership, consisting of : WWF Kenya, Imarisha Naivasha, the Water

Resource Management Authority, Kenya Flower Council, ITC /Technical University Twente from The Netherlands and two Dutch Regional Water Authorities, Hoogheemraadschap de Stichtse Rijnlanden and Noorderzijlvest.

The CAT is a flexible methodology to grade organizational capacity, using a number of indicators and with distinct standards of 4 stages of organizational growth: planting (1), seedling (2), maturing (3) and harvesting (4).

2.3.4 Environmental Management and Coordination Act (EMCA) 1999

This act is responsible for the development of proper authorized and institutional arrangements in managing environment and issues associated with it. It focuses on legislation of the environment and establishes legal and institutional tools for environmental management. It provides for enhanced legal and administrative coordination of the varied sector initiatives in order to improve the national capacity for management of the environment. This is in because of the fact that the environment is the basis of national socioeconomic, cultural and spiritual growth (Republic of Kenya, 1999).

CHAPTER 3: METHODOLOGY

3.1 Introduction

The Study was conducted in Awach Kano Sub Catchment Area. Awach Kano WRUA is an association of water users whose collective interests are based on Awach River Basin which is within Bureti, Nyakach, and Nyando Sub Counties. The WRUA was established in 2008 and has an office at Katito Market, in Nyando Sub County as indicated in Figure 3.2. The WRUA has since entered into an Understanding with WRMA to support the group. Awach Kano sub-catchment area experiences warm, moderate and temperate climate interchangeably during a calendar year. The climate condition of the area is sub tropical characterized by hot-humid mean temperatures range from 16 º -20 º c in wet months and 28 º -35 º c in dry seasons. Rainfall is bimodal with mean precipitation of 1800mm/year. Vegetation of the area includes bushes, shrubs and grass. Staple food crops grown in the sub catchment include maize, cassava, millet and potatoes among others. Mean rainfall is about 1106.7mm/year (Awach Kano WRUA, 2010). Awach Kano falls in the Lake Victoria South Catchment Area as indicated in Figure 3.1.

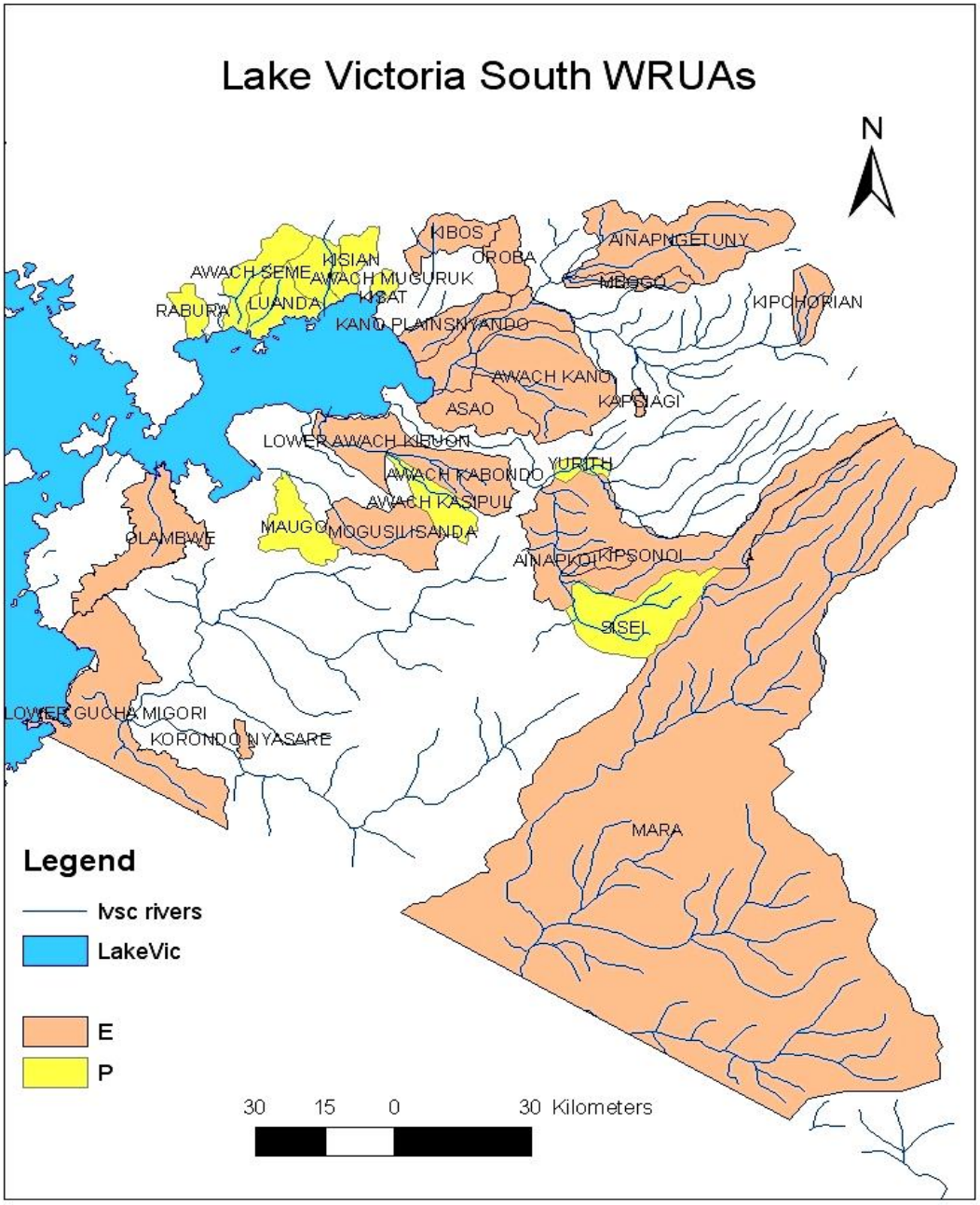

Figure 3.1: Lake Victoria South WRUAs

Figure 3.2: WRUA Office in Katito, Kisumu County

3.2 Awach Kano WRUA SCMP

Awach Kano SCMP was developed in March 2010. Key problems identified by the WRUA during the development of the SCMP included, severe soil erosion, water pollution, encroachment of river banks and spring catchments and wet lands, flooding, effluent discharge, sedimentation/Siltation, low income/poverty, poor infrastructural development, inadequate financial resources and deforestation on hillsides. These challenges affect the livelihood of the residents of the sub catchment area. The most serious effects are felt by the majority of the residents who are subsistence farmers (Awach Kano, 2010).

The farmers loose valuable land for farming as a result of soil erosion in the upper and middle catchments others most affected are families who depend on water pollution levels which are high as a result of effluent discharge, industrial pollution and soil erosion discharge (Awach Kano, 2010).

From the analysis of the SCMP, it was noted that the SCMP had a total budget of Ksh 77,460,000 which was meant for rehabilitation of 5 water pans, establishment of roof catchment in 50 institutions and construction of 2 pans. These 3 activities carried the huge budget of the SCMP at an amount of Kshs 73,000,000. The other activities proposed in the SCMP were establishment of baseline information, capacity building to the WRUA, determining the Sub

catchment water balance, determining the water resource allocation for the sub catchment, spring and surface water source protection, protection of forests, degraded areas, and riparian zones, and Monitoring and Evaluation (Awach Kano, 2010). However, the WRUA managed to receive Kshs 2,483,300 in tranche 1 and tranche 2 and were yet to receive another Kshs 5,000,000 from the Water Services Trust Fund. The research covered up to tranche 2 funding level.

3.3 The framework for the assessment of the implementation of the SCMP

The assessment of the implementation of the SCMP was done with reference to

1. **WDC document**

- Level of involvement of relevant stakeholders (members of the WRUA, Management Committee, WRMA, and WSTF) .e.g was it extremely low, low, moderate, high and extremely high. This was to be determined through activities which the stakeholders had been involved in.
- Activities undertaken by the WRUA in the implementation of the SCMP as per the WDC.
- Activities done by WRMA in the development and implementation of the SCMP.
- Activities undertaken by WSTF as per the WDC.
- Activities undertaken by WSTF in relation to implementation of the SCMP.

2. **WRUA Capacity Assessment tool**

- The assessment of the SCMP was also accessed with reference to some sections of the WRUA Capacity Assessment tool. The WRUA Capacity Assessment Tool entailed assessing policy development for the WRUA, knowledge and skills by the WRUA members, information management, general organization information, process and program management of the WRUA, legislation and financial management, culture and ethics awareness, communication and cooperation and participation of the WRUA members (WWF, 2014).

3. **Global Water Partnership toolbox**

- The assessment of the implementation of the SCMP was also done with respect to the GWP toolbox.
- Under this study, the implementation of the SCMP was to be measured under the following criteria in the GWP toolbox.

Toolbox	Sub heading	Summary of the requirements	The role of WRUA
GWP toolbox A1.2	Policies with relation to Water Resources	Governments, at both the national and local level to develop policies, plans and programmes of action that directly or indirectly affect WRM.	Development of SCMP, Bylaws on water quality, water quantity, abstraction etc
A2.2	Legislation for water quality	Measures to protect the quality of water resources should be encoded in legislation, and may be preventive (effluent and discharge regulations and economic instruments or corrective (compensation for damages, cease and desist orders, and economic losses, and abatement and remediation necessities).	Taking actions geared towards enactment of legislation on water quality Passing a bylaw in relation to water pollution, disiltation, and gulley erosion management
A3.1	Investment policies	The investment policies include, Macroeconomic policies, Public investment policies and Public and private investment in the water sector itself	Developing an investment policy and working with other development agencies for more resources
B1.11	Building partnerships	Establishing partnerships at both regional and country levels and basin partnerships.	The WRUA was expected to have built partnerships with several organizations apart from WRMA and WSTF
C2.3	Ground water management plan	The groundwater management plan, such as the national plan, ought to identify actions necessary to contribute to an effective WRM framework.	Developing an inventory of abstractors, ensuring that there is no illegal abstraction of water
C3	Improved efficiency of use	Education and communication together with programmes that work with users at school, community and institutional levels; Economic incentives, (tariffs and charges for water use and for the provision of environmental services and Subsidies or rebates for more efficient water use can be useful.	The WRUA should develop mechanisms of educating the general public on water use efficiency, have a framework for encouraging efficient use of water
C6.1	Regulations for	Regulatory instruments for	The WRUA needs to have contributed to enactment of

	water quality	monitoring quality of water aimed at controlling discharging at the source, or at managing the receiving environment which include regulations for waste minimization.	regulations to support water quality such as regulations on effluent discharge, use of chemicals, cultivation along the river banks, inappropriate use of water resources etc
C6.2	Regulation for water quantity	Ground and surface water quantity control regulatory instruments comprise of permits for ground and surface water abstractions.	Developing mechanisms aimed at conserving quantity of water e.g. water abstraction permits, inventories on water abstractors

To achieve the objectives of the study, the following questions were asked under each objective.

Under Specific Objective 1.

In the questionnaire (Appendix 3.1), under Section C:

- Was the member aware of the existence of Awach Kano WRUA? If yes, was the member involved and how was he/she involved?
- If, the member was involved, then what major problems did they consider that affected their catchment and why?
- What roles did the member play in the implementation of the SCMP?

In the FGD (Appendix 3.2) for the management Committee, the management committee members were asked the following questions:

- What roles did the management committee play in the development of the SCMP?
- How were the members of the WRUA involved in the development of the SCMP?
- What roles did the management committee play in the implementation of the SCMP?
- What activities had the WRMA regional office undertaken in the implementation of the SCMP? Was this been adequately done in the view of the management committee and why?
- What were some of the challenges that the WRMA faced in the implementation of the SCMP? Could this be attributed to the WDC process and why?

In the KII guide (Appendix 3.3) with the WRMA regional office, the following questions were asked:

- What roles did the WRMA regional office provide in the development of the SCMP?

- What support did the WRMA RO provide to the WRUA in the implementation of the SCMP?
- Please describe the kind of the relationship that exists between the WRUA and the WRMA regional office?

Under Specific Objective 2.

In the questionnaire (Appendix 3.1), under Section B: The members of the WRUA were asked the following

- What was their main source of Water?
- Was the source managed by Awach Kano WRUA? If yes, what kind of maintenance activities di they do? If yes, was there an improvement in the quality compared to when Awach WRUA did not exist?
- Was there an improvement in water quantity?
- Was there an improvement in access to water compared to when Awach Kano WRUA did not exist
- What were some of the activities the WRUA did with the water apart from domestic purposes

In the questionnaire under section D (Appendix 3.1): The WRUA members were asked the following,

- Was the member aware of any activity that the WRUA had undertaken in ensuring management of water resources? If yes, what were the activities?
- Was the member aware of any illegal water polluters in the area? If yes, who are they and what steps had been taken to curb illegal water pollution?
- Was the member aware of any illegal water abstractors in the area? If yes, who were they and what has been done to them?
- Had the WRUA undertaken any activity that aimed at reducing deforestation? If yes, what were the activities?
- Had the WRUA undertaken any activity that is aimed at reducing gully erosion? If yes, what were the activities?
- Has the WRUA undertaken any activity that is aimed at reducing gully erosion? If yes, what were the activities?

- Had the WRUA undertaken any activity resulting in disilting of pans? If yes, what were the activities?
- Has the WRUA undertaken any activity aimed at curbing illegal water abstraction? If yes, what were the activities?

In the FGD (Appendix 3.2) for the management Committee, the management committee members were asked the following questions;

- What were some of the sources of water pollution in the area? Did they have an inventory of water polluters in the area? Evidence?
- Do you have illegal polluters/ If yes then who are they? What actions have been taken on them and how effective were these activities?
- What were some of the activities that Awach WRUA has been involved in to ensure reduction of water pollution?
- What were the causes of deforestation in the area? Had the WRUA been involved in the reduction of deforestation in the area? If yes, then what were the activities involved in and how effective were these activities?
- Was there a case study about the activities that the WRUA has been involved to ensure reduction of deforestation that has been of success? If no, then why?
- What were the causes of gully erosion in the area? Were there activities that the WRUA has been involved in to ensure a reduction of gully erosion in the area? What were the activities and how effective were the activities?
- Had the WRUA been involved in activities to ensure there is no illegal water abstraction in the area? Did they have an inventory of water abstractors in the area? If yes please provide the list
- Had the WRUA undertaken a water quality survey? If yes, then what actions had been carried out as per the recommendations of the survey?

In the KII guide (Appendix 3.3) with the WRMA regional office, the following questions were asked;

- In terms of pollution, was s/he aware of activities that had been undertaken by Awach Kano WRUA to ensure a reduction of pollution of water sources? List the activities. How was the WRMA RO/National office involved?

- Was there an inventory of Water polluters in the area? Provide the list please
- In terms of deforestation, was s/he aware of activities that Awach Kano WRUA had been involved in to reduce deforestation in the area?
- In terms of gully erosion, was s/he aware of the activities that Awach Kano WRUA had been involved in to ensure reduction of gully erosion?
- In terms of illegal water abstraction, was s/he aware of activities that the WRUA had been involved in to ensure reduction of illegal water abstraction in the area? Name them. Was there an inventory of Water abstractors in the area?
- Had WRMA provided any training to the WRUA? What were the trainings? How was this helpful to the WRUA?

Under Specific Objective 3.

In the questionnaire (Appendix 3.1) under Section D:

- In a range of 1 to 10, how effective were the actions undertaken for management of illegal water pollution, illegal water abstraction, deforestation, gulley erosion and siltation of pans?
- Were there changes in the management of Water Resources that the member had witnessed since the WRUA started functioning? If yes, what were the changes?
- Are you aware of any challenges that the WRUA is experiencing in the implementation of the SCMP? What were the challenges?
- What ways did the member suggest to improve the success of the implementation of the SCMP?
- In the member's opinion, did the funds provided to the WRUA used effectively? Reasons?
- Did the WRUA achieve, their set objectives with the funds provided?

In the FGD (Appendix 3.2) for the management Committee, the management committee members were asked the following questions;

- In their own opinion, how did they rate (1 to 10) the success of the implementation of the SCMP 2010-2013 and why?
- What challenges were met in the implementation of the SCMP 2010-2013 and how were they addressed?

- What suggestions could you make to increase the efficiency in the implementation of the SCMP?
- In a range of 1 to 10, how effective were the actions taken by Awach Kano WRUA in the managing Water Resources in the area?

In the KII (Appendix 3.3) guide with the WRMA regional office, the following questions were asked;

- How did he/she rate (1 to 10) the level of implementation of the Awach Kano SCMP and why?
- What challenges did they observe in the implementation of SCMPs in the region?
- How was the challenges tackled in order to improve the implementation of the SCMP?
- Were all the objectives achieved with the funds that were given to Awach Kano WRUA? If not, what were the objectives and what were the justifications?

In the KII guide (Appendix 3.4) with the WSTF, the following questions were asked;

- According to the financial support given to Awach Kano, were there objectives that were not achieved? What were the objectives and why were they not achieved?
- Was there any mismanagement of funds by Awach Kano WRUA? What were the areas?
- What were the challenges faced in the administration of the WDC process? What are some of the areas of improvements?
- What experiences have you had with this WDC process that you would share even with other WRUAs apart from Awach Kano WRUA?
- In a range of 1 to 10, how would you rate Awach Kano WRUA in terms of efficiency and why?

The management committee were also asked the following questions as per the WRUA Capacity Assessment tool.

- Vision and mission, organization policies and procedures and hierarchy of decision making of the WRUA.
- Understanding and knowledge of Water Management, performance of WRUA as an agent of WRMA, organizational skills
- Job descriptions of staff, staffing levels, staff supervision, assessment and development, incentives for performance and openness to innovation, feedback and learning

- Availability collecting and storage of information
- Functioning of the governance structure, accountability mechanisms, structure of the organization and efficiency of use of resources
- Assets, infrastructure and transport facilities
- Understanding of and attention to project objectives, outputs, outcomes and performance
- Problem analysis and needs assessment, setting objectives and plans, activity planning, coordination and cooperation mechanisms
- Output monitoring/supervision and sustainability and scale outcomes
- Sustainability of the WRUA, financial policies and procedures, planning, budgeting, monitoring and administration and reporting
- Understanding the roles of the organization in its context, recognition by other stakeholders, relevance for target groups, commitments towards performance and clients
- Documentation and communication of decisions, monitoring and communication of outputs and outcomes
- Membership to networks and platforms, developing partnerships and platforms for collaboration
- Linkages and cooperation with governmental agencies.

3.4 Study Population

The study population included the members of the WRUA (98), Management Committee of the WRUA (5), the WRMA sub regional office in Kisumu and WSTF staff in Nairobi.

3.5 Sampling

In administering the semi structured questionnaire, the members of the WRUA were selected randomly from the catchment area. Since 60.1% of the rural populations (CRA, 2011) have access to improved safe drinking water, Cochran (1963:75) formula was used to determine sample size with degrees of accuracy set at 0.05.

$$n = \frac{Z^2 pq}{d^2}$$

where

n- Estimated sample size

Z-z value for the chosen confidence interval (usually 0.95 α=0.05=1.96)

p- Prevalence estimate Kisumu (60.1%) (CRA, 2011)

q- 1-p

$\mathbf{d^2}$-the precision required for the estimate (0.1)

Hence n= $(1.96^2*0.601*0.399)/0.1^2$=92.1=> Rounded off to 98 (including 5% for any error)

3.6 Data Collection Tools and Methodologies

Data was collected using ninety eighty (98) semi structured questionnaires (Appendix 3.1), one (1) FGD guide (Appendix 3.2), two (2) Key Informant Interview (KII) guides (Appendix 3.3 and 3.4), WRUA Capacity Assessment Tool, camera/observation, desk review and water sampling.

The semi structured questionnaires were administered exclusively to the members of the WRUA (98 members). These questionnaires were administered by two research assistants randomly to the members of the WRUA through the support of some members of the management committee for 6 days since the management committee members were conversant with the location of their members. FGD guide was administered to the management committee of the WRUA (5 members including the Chairman, Treasurer, Procurement Chairman and two members of the committee) by the researcher.

The two KIIs were administered to the officials of WRMA sub regional (Community Development Officer, Water Quality and Pollution Control Officer, Water Right Officer and Ground Water Officer) and to the official of the WSTF (Manager, Water Resources Investments) also by the researcher in their respective offices (Appendix 4.2).

In a focus group discussion with the management committee, the Capacity assessment tool was discussed. Indicator and the four stages of development were discussed with the members. The participants scored at which level the WRUA was at the moment in their perception. This final score per indicator was reached by calculating the average of all scores. The WRUA CAT described different levels of development (capacity stages) of a WRUA, resembling the maturing process of a crop. For each indicator (topic) four levels were described: capacity stage 1 - planting, capacity stage 2 - seedling, capacity stage 3 - maturing, capacity stage 4 - harvesting. Each stage is described per indicator, setting the standard for that stage of development.

Water sampling was also done from Awach Kano River to test on its suitability for safe drinking and analysis for bacteriological and chemical tests were conducted at WRMA Lake Victoria regional office. The last data collection methodology adopted for the research was transient walk/ observation and taking of photographs.

3.7 Sources of errors and their minimization

The following errors might occur in the process of undertaking this research as indicated in table 3.1.

Table 3.1: Sources of errors

No.	Types of Errors	Minimization
1.	Wrong entry of data	Data cleaning to identify wrongly entered data
2.	Wrong information provided	Verification of the data to ensure consistency with the questioned asked
3.	Errors arising from recording of answers	Keenness in hearing answers and putting them down. Verification by the lead researcher daily at the end of the day
4.	Bias due to non-response	Avoiding recording any response
5.	Deliberate deception	Verification of the data/ triangulation

3.8 Data Analysis

The data and information collected were entered in the computer, analyzed and evaluated using SPSS version 22, Ms Excel, and Ms Word. Data synthesis and analysis to both quantitative and qualitative data gathered during the field study investigations were carried out.

3.9 Ethical Consideration

Authorization to conduct the study was sought from WRMA sub regional office in Kisumu since it is the institution that deals directly with the WRUA and represents the interest of the WRMA regional and National office. The respondents were informed of the objectives of the study and the interviewer sought their consent to participate in the study.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 Demographic characteristics

4.1.1 Ages characteristics

Table 4.1 shows that most of the respondents of the WRUA members (54.2 %) were over 50 years old with the youngest being 25 years old. Age distribution is shown in table 4.1. Most of the respondents were married (62%) while those who were single were 4%. The widowed respondents were 34%.

Table 4.1: Age of the respondents

Age	Frequency (N=98)	Percent (%)
25-28	2	2
29-35	12	12
36-40	10	10
41-50	20	21
Over 50	54	55
Total	98	100

The differences in the age of the WRUA members could be attributed to the fact that in rural areas most of the voluntary work is taken up by retirees and people who have less work to do.

4.1.2 Education Level

Figure 4.1 shows that the education level attained by the highest number of respondents (39%, n=38) was upper primary, 19% (n=19) attained Post-Secondary, 17% (n=17) attained Lower primary education and 12% (n=12) attained Secondary education. The rest attained adult literacy class (2%, n=2) and Pre-primary at 2% (n=2).

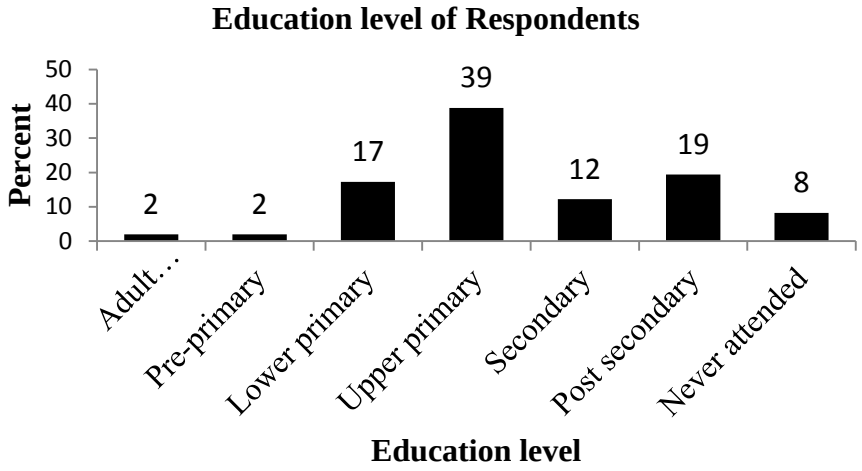

Figure 4.1: Education level of the respondents

The findings of this study are similar to that from Kenya Demographic Health Survey (KNBS and ICF Macro, 2010) in which majority of the rural population were found to have some primary education.

4.1.3 Occupation

Figure 4.2 shows that the major occupation of respondents was farming, followed by small scale business. Other occupations of the respondents were teaching, mining and driving.

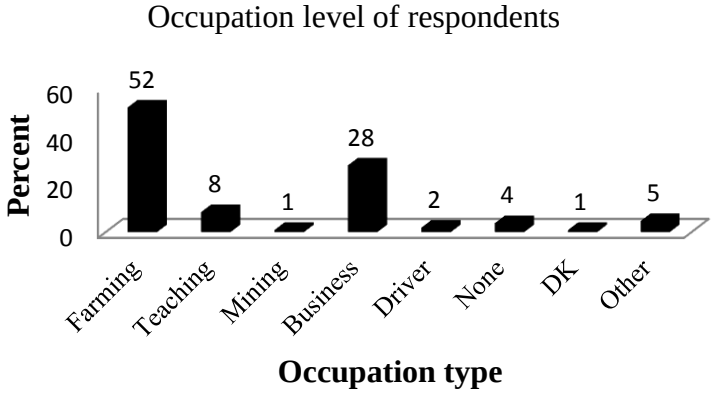

Figure 4.2: Occupation of the respondent of Awach Kano WRUA

Agriculture is a key livelihood activity in Nyakach and Nyando which could explain why majority of the respondents were farmers (Republic of Kenya, 2012).

4.1.4 House Hold Size

The average household size was 5 for Awach Kano members. Table 4.2 shows the distribution of household size. This finding agrees with the report of the Kenya Integrated Household Budget Survey report (KIHBS, 2006). Households with seven (7) or more members accounted for 26.5% of all households. This agrees with the report of the Kenya Integrated Household Budget Survey report (KIHBS, 2006).

Table 4.2: Household size

Household Size	Frequency (N=98)	Percent (%)
1-2	13	13.3
3-4	31	31.6
5-6	28	28.6
7-8	15	15.3
9-10	6	6.1
Over 10	5	5.1
Total	98	100.0

4.1.5 Water sources

The major water source in the sub catchment area is the River/Stream followed by roof catchment as shown in figure 4.3. The other sources in the area are boreholes, dams/pans and community tap.

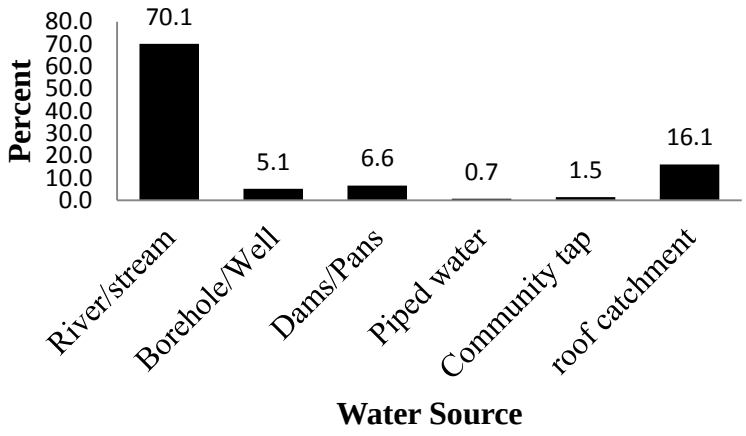

Figure 4.3: Major water sources

The water sources cited by the respondents are similar to the water sources reflected in the profiles of the 2 sub counties in the County strategic plan (Republic of Kenya, 2012), with river Awach being the major source of water for many.

4.1.6 Monthly Income

Table 4.3 shows that the highest number of respondents (41.8%, n=41) earned less than Kshs 5,000 while the least number of people at 9% earned more than Kshs 20,000. The average monthly income for the respondents was Kshs 9,158. This finding differs with the findings of World Bank which showed that the average monthly income in Kenya was Kshs 6,200 (World Bank, 2014). The differences could be attributed to the fact that this study collected data from one location while that of World Bank data is for the whole Country.

Table 4.3: Monthly income

Monthly income (Kshs)	Frequency	Percent (%)
<=5,000	41	41.8
5,0001-10,000	29	29.6
10,001-20,000	19	19.4
20,001-45,000	9	9.2
Total	98	100.0

4.1.7 Monthly Water Expenditure

Figure 4.4 shows that most of the respondents at 83.7% spent less than Kshs 1,000 on water whereas only 5.1% spent between Kshs 3,000 to Kshs 5,000.

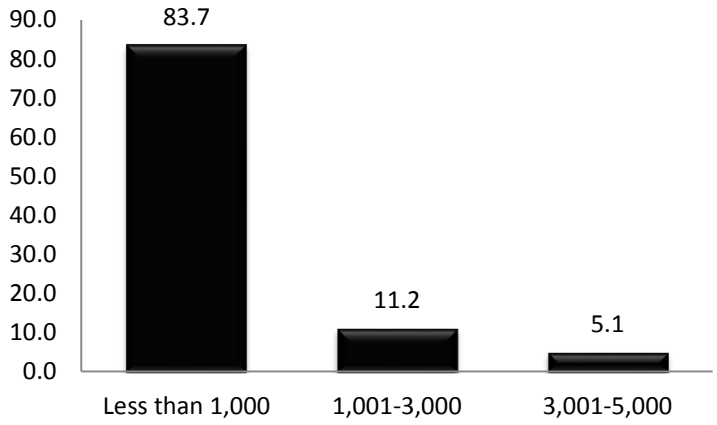

Figure 4.4: Monthly expenditure on water

This study agrees with the study conducted by Sana International that found out that most people in Nyando and Nyakach pay less than Kshs 1,000 on water (SANA, 2012).

4.2 Roles played by the Water Resources Management Entities in the development of the SCMP

4.2.1 Roles played by WRUA members and WRUA Management Committee in the development and Implementation of the SCMP

According to the members of Awach Kano WRUA who were interviewed, 83% (n= 81) knew about the existence of the Awach Kano Sub Catchment Management Plan while the rest (17%, n=17) did not know of its existence. It was expected that all the members were to know about the existence of the SCMP which was not the case. This could be due to the fact that some members were recruited but did not participate in the activities of the WRUA since most activities were voluntary and required a commitment as evidenced from the FGD. For those who knew of its existence, 86% (n=70) were involved in its development while 14% (n=11) were not involved.

Those who were not involved cited the reason as late recruitment when the SCMP had already been developed. For those who were involved, they were either involved in drafting and

validation (48%, n=34), only drafting (12%, n=8) or only validation (40%, n=28). The respondents who were involved in either drafting or validation only were the members who had other commitments and therefore did not complete the whole process. The major problems that were considered in terms of priority while developing the SCMP for the catchment were; gully erosion, water pollution, deforestation, riverine cultivation, siltation of pans/dams, poor access to portable water, inadequate finances and illegal water abstraction.

Under the FGD, the members of the committee reported that they undertook a needs assessment for the catchment area of Awach Kano River where various issues/ problems were raised and identified. At the same time, the members studied the existing Catchment Management Strategy for Lake Victoria South Catchment Area. In a workshop organized by WRMA sub regional office, the members also studied the Water Act 2002 so as to understand the roles of the WRUAs. The SCMP was thereafter developed participatory through a validation workshop where the two district commissioners for Nyakach and Nyando districts were the chief guests. Sub committees were then established. These sub committees were the procurement, finance, monitoring and evaluation sub committees.

According to Awach Kano SCMP (Awach Kano WRUA, 2010), the SCMP was developed during a five day workshop involving different stakeholders –key among these were members of Awach Kano WRUA, WRMA and Major step Consultants. The Key tasks during the development of the SCMP were:

1. Identification of key problem (water) in the sub catchment area.
2. Identification of solutions to the problems.
3. Formulation of action plan including.
4. A time frame for the action plan.

As the Support Organization, Major step Consultants were responsible for consolidating the information and developing a SCMP that addressed technical, institutional and policy levels for Awach Kano WRUA to implement in a specified timeframe.

The development of the SCMP was in line with the WDC process module 3 and module 4 which demands that communities have to do stakeholder mapping, problem identification and analysis

and development the SCMP (WSTF, 2009). At the same time, the development of this SCMP was in line with the GWP toolbox (A1.2) on the recommendation of development of policies with relation to water resources. The GWP suggests that Governments at both national and local level should come up with plans, policies, and programs which affect WRM (GWP, 2010).

4.2.2 Role of WRMA sub regional office in the implementation of the SCMP

Based on the FGD conducted with WRMA sub regional office, during the development of the SCMP, WRMA undertook a sensitization to the members of the WRUA, provided technical assistance in the development of the Constitution, problem identification/ analysis and community mobilization. The WRMA provided quality assurance to the WRUA in the implementation of various and activities and incase of need of any specialized services, the WRMA office linked the WRUA with the relevant institutions such as National Environmental Management Authority, Ministry of Agriculture and Kenya Forest Services.

According to the WRMA/WSTF (WSTF, 2009), the role of the Sub regional office was to: i) Support WRUA formation; ii) Offer guidance on matters related to Water Resources Management; iii) Provide technical skills in the development and implementation of the SCMP; iv) Support WRUAs in developing WDC application to WRMA and WSTF; v) Under take routine monitoring of WDC implementation; and vi) Support the WRUAs in developing contracts in engaging Support organizations. It is worth noting that the WRMA sub regional office undertook their responsibilities as outlined in the WDC. The process outlined in the WDC was also followed which was to involve all the stakeholders and WRMA and address the problems within the sub catchment over the next 3-5 years.

4.3 Steps taken by Awach Kano WRUA in WRM in the Sub-catchment area

4.3.1 WRUA Activities

Among those who were interviewed, 98% (n=96) were aware of the activities undertaken by the WRUA while only 2% (n=2) were not aware. The activities mentioned by those who were aware were planting trees 30% (n=29), building gabions 30% (n=29), desiltation of pans 15% (n=15), mapping polluters 10% (n=10), water quality survey 8% (n=8), and mapping of water abstractors 7% (n=7).

Figure 4.5 shows a section of gabions constructed by Awach Kano WRUA. Figure 4.6 shows a fish pond with a 5m3 tank that was not completed due to lack of funds.

Figure 4.5: Gabions Constructed by Awach Kano WRUA

Figure 4.6: Uncompleted Fish Pond

Comparing the findings of this study with that of WWF (2008), the activities of the WRUA were; facilitation of implementation of irrigation by-laws, facilitation of exchange visit among water users, spearheaded the formation of Community Forest Association. It can be noted that this WRUA was dealing with conservation of Lake Bogoria as compared to Awach Kano WRUA which was dealing with conservation of river Awach hence the difference in activities.

As per the WRUA WDC (WSTF, 2009), these activities undertaken by the WRUA are in line with the objectives of the WDC and in particular related to:

- Enhancing water resources quality and quantity in supporting livelihoods;
- Improving the capacity of provision of hydrological services by catchment and riparian areas; and
- Developing well governed and self-reliant WRUAs.

4.3.2 Water Quality management and access improvement

According to the respondents, 97% (n=95) felt that the quality of water has improved since Awach Kano started its operation along the river while only 3% felt that the quality of water has remained the same. Before 2008, due to gully erosion, the river water was more turbid as compared to the current status in which the WRUA has undertaken gully erosion management as reported by Management Committee members. Majority 72% (n=71) of the respondents felt that through the activities of the WRUA, there has been improved access to water sources.This could be attributed to creation of access to water sources; disiltation of dams/ ponds/pans and construction of water pans. Apart from the domestic water use, the other major use of water in the catchment area was irrigation. This could be due to the fact that majority of the respondents were farmers. Other members of the WRUA sell the water. Those who sell the water were small scale water vendors.

Since the people interviewed indicated that they use Awach Kano Water for drinking purposes, it was therefore important to determine if this water was safe for drinking. A look at table 4.4 below indicates that the water was too turbid and the total suspended solids were slightly higher than the recommended standards by WRMA.

Table 4.4: Results of Water quality tests carried out by WRMA on Awach Kano River

Date Sampled	pH (Scale)	DO (mg/l)	Turbidity (NTU)	EC (µS)	TSS (mg/l)	TDS (mg/l)
14/6/2008	7.80		54	93		45
24/10/2011	7.66		150	80		40
5/2/2013	7.54	7.42	152		123	100
10/4/2013	7.75		961	78.2		52.1
3/9/2013	8.10		577	95		48
6/11/2013	7.80	7.17	153	106	73.5	53
23/7/2014	7.70		269	42		21
22/6/2015	7.24	6.65	150	102		51

From the results of the bacteriological tests (Appendix 4.1) carried out during the research at WRMA regional office, it was evident that Awach Kano Water was not safe for human drinking without treatment. This is because, the result showed that there were too numerous total

coliforms to count. The number of E.coli present in the water was also too numerous to count indicating that the water was total not safe for direct drinking (WHO, 2011).

Table 4.5 indicates that the results pH, BOD_5, COD and total suspended solids were within the recommended standards by WRMA and WHO standards (WHO, 2011). However, the turbidity of the water was too much and therefore unsafe for direct human consumption. This is an indicator of the effects of runoff from agricultural practices, construction, discharges, logging activity and other sources within the sub catchment. This means that the WRUA still has a lot of responsibility in ensuring the water was safe for human consumption.

Table 4.5: Results of water quality analysis

Parameters	**Unit**	**Results**	**Effluent Standards**	**Remarks**
			Discharge into Environment WRMA	
pH	pH scale	7.6	6.5-8.5	Okay
Conductivity	µ S/cm	170		
BOD5 days at 200C	mgO2/l	31	30	Okay
COD	mgO2/l	64	50	Okay
Total suspended solids	mg/l	45	30	Okay
Total dissolved solids	mg/l	85	1200	Not okay
Turbidity	mg/l	180	0.1	
Dissolved Oxygen	mg/l	7.7		

4.3.3 **Water pollution reduction**

Most of the respondents (58%, n=57) felt that there were no illegal water polluters in the area. According to the members of the committee through the FGD, the major pollution activities were:

- Pollution from Livestock
- Human wastes
- Chemicals from horticultural farms
- Direct bathing in the river
- Washing of motorbikes in the river

Based on observations and FDG with members of the WRUA, pollution from livestock was because many livestock keepers relied on water from the river for their livestock and the river lacks livestock drinking troughs along its banks. Pollution from human wastes was because of lack of water at the homestead level hence the community members use water for bathing and washing at the river source. Chemicals from horticultural farms were due to irrigation along the river banks where the chemicals used for the horticultural crops are washed into the river. Washing of motorbikes into the river was due to lack of water within the homesteads.

The following steps have been taken against the water polluters:

- Reporting to local administrators (55%, n=31)
- Creation of awareness on the importance of not polluting the water sources (29%, n=17)
- Restricting bathing/showering along the river banks (14%, n=8)

Reporting to local administrators was reported as the most taken measure but was not very effective as reported by the members through the FGD. This was because the polluters could be reported but would later be released without taking any action against them due to bribery/ corruption. The most effective method was restricting bathing/ showering along the river banks.

The WRUA had no inventory of water polluters but as per the KII held with the WRMA sub regional office, there exists pollution inventory. This did not comply with the recommendation of the WDC module 7 that requires the WRUAs to undertake Water pollution survey and develop and inventory of water polluters. At the same time, the WRUA is expected to develop effluent control plans which had not been developed by the WRUA (WSTF, 2009).

The major polluters in the Sub Catchment as per WRMA were Soin Sugar Company and Kiboiywo Farmers' Cooperative Society as indicated in Appendix 4.2. This inventory was developed through literature review, water abstraction and pollution survey. The two are illegal polluters since they have not developed effluent discharge control plan hence WRMA sub regional office had not given them the effluent discharge permit. However, Soin Sugar Company was closed down during the time of research. Samples taken and tested by the WRMA sub regional office on 1st June 2012 indicated that the effluent characteristics for Soin Sugar was higher than the recommended effluent characteristics as indicated in Table 4.6.

Table 4.6: Effluent Discharge characteristics for Soin Sugar Company

No	Elements	Soin Sugar values	Recommended values
1.	BOD (mg/L)	4500	30
2.	TSS (mg/L)	1060	30
3.	pH	4.4	5-9
4.	DO (mg/L)	3.7	
5.	TDS (mg/L)	Above 2000	1200
6.	Temperature ^{o}C	30.1	$\pm$ 5 Ambient Temp

(Source: WRMA, 2015a))

As per WRMA, poor land use activities by the destroying the riparian lands also leads to pollution of water sources in the sub catchment area.

This activity undertaken by the WRUA is in line with the recommendation of the GWP toolbox A2.2 which talks about Legislation for water quality. GWP suggests that measures be put in place to protect the quality of water resources (GWP, 2010). At the same time GWP toolbox C6.1 on regulations for water quality suggests that there should be regulatory instruments for controlling water quality (GWP, 2010). Therefore, the WRUA is lacking by law on regulation of water quality.

4.3.4 Water abstraction management

Most of the respondents (68%, n=67) felt that there were no illegal water abstractors in the sub catchment area. This was confirmed by the WRMA sub regional office which indicated that there were no illegal water abstractors. Majority of those who felt that there were illegal water abstractors, 97% (n=28) had taken initiatives to report them to local administration authorities while 3% (n=1) had restricted them from abstracting the water. According to the FGD carried out, the members felt that water vendors were the illegal water abstractors in the catchment area.

The WRUA committed to ensure that illegal water abstraction were stopped. According to the KII conducted with the WRMA officials, it was noted that most of the members of the WRUA had directed the abstractors to get permits from WRMA before abstraction of the water. This was mentioned as one of the effective ways of curbing illegal water abstraction. The WRUA did not

have an inventory of the water abstractors but according to the KII, WRMA sub regional office had the inventory as attached in Appendix 4.3. From the WRMA sub regional office, it was noted that there are no illegal water abstractors.

This practice where the WRUA did not have an inventory was not in line with the WDC document module 4 on Water resource allocation and use. The WRUA was expected to develop Water abstraction data from water abstraction survey but this was not done (WSTF, 2009).

GWP toolbox C2.3 on groundwater management plans, suggests that there should be a groundwater management plan, which aims at harmonizing the utilization of resource (GWP, 2010). In terms of demand management, the GWP toolbox C3 on efficiency in Water use-Managing demand states that demand management can support in reducing wasteful use of resources representing an opportunity lost as well as the usage of water with no an economic purpose (GWP, 2010). The WRUA is therefore being encouraged to develop the inventory of water abstractors in the area so as to comply with the suggestions of the GWP toolbox.

4.3.5 Deforestation reduction

Majority of the respondents (98%, n=96)) of Awach Kano WRUA knew of activities meant to stop deforestation by the WRUA. The activities undertaken by the WRUA as reported by the respondents in order of priority were:

- Planting trees;
- Sensitization/ awareness creation to stop deforestation activities; and
- Prohibiting charcoal burning in the area.

From the transient walk conducted, it was noted that the WRUA had planted trees along the river in a land that was eroded and dry. Currently the land is under trees and erosion effects have been reduced as indicated in Figures 4.7 and 4.8.

Figure 4.7: Tree planted by Awach Kano WRUA

Figure 4.8: Sisal planted by Awach Kano WRUA

Some of the major causes of deforestation in the area as indicated by the members of the committee are; cutting down on trees and not planting, overgrazing/ overstocking, and drought. According to the committee, the following steps have been taken to ensure deforestation is reduced/ stopped:

- Encouraging all the WRUA members to have a tree nursery which has been actualized.
- Conservation of existing trees.
- Planting of live fence.
- Planting of trees along the river banks/ riparian lands e.g. TokTeko.

This activity was in line with the WDC document module 8 on catchment and riparian conservation which requires the WRUAs to undertake activities such as tree planting and re-afforestation (WSTF, 2009). The WRUA also had a tree nursery. The GWP toolbox C6.4 on land use planning controls and nature protection suggests that specific soil protection and measures of control of erosion, like cultivating along the river banks and planting trees, should be put in place (GWP, 2010). This shows that the WRUA is on track with the GWP toolbox recommendation.

4.3.6 Gully erosion reduction

Almost all the respondents (99%, n=97) were aware of the activities undertaken by the WRUA in reducing gully erosion. The activities undertaken by the WRUA in order of priorities were**;** **c**onstruction of gabions, planting trees, planting sisal, planting cactus and protecting riparian

lands. According to the FGD conducted with the members of the management committee of the WRUA, the major causes of gully erosion in the sub catchment were:

- Poor soil porosity
- Water run off
- Steep/ rough terrain causing high river velocity

Figure 4.9: A section of an eroded gulley

Figure 4.10: Trees planted to reduce further erosion

From the transient walk, and as shown in Figure 4.9 and Figure 4.10, it was observed that gully erosion was one of the greatest problems faced within the sub catchment. Though steps have been taken by Awach Kano WRUA to reduce this menace, this has not eliminated the problem fully. This could be due to the little financial resources given/ accorded to the WRUA.

This activity was in line with the recommendation of the WDC module 8 on catchment and Riparian Conservation which requires the WRUAs to come up with activities that controls runoff and soil erosion (WRMA, 2010). However, the WRUA is expected to develop soil and water conservation plan which was not in place at the time of the research. The GWP toolbox also suggests that measures should be put in place to ensure soil protection and erosion control (GWP, 2010). The WRUA is therefore fulfilling the desires of the GWP toolbox.

4.3.7 Disiltation of Pans/dams

Majority (57%, n=56) of the respondents were aware of the activities undertaken by the WRUA in disilting of pans/ dams. However, 19%, (n=19) were not aware while 24% (n=23) did not have an idea. During the transient walk, one of the water pans constructed and managed by the WRUA was Kakich Dam. From the FGD, it was reported that there were other pans disilted by the WRUA.

This activity was in line with the WDC requirement module 10 on Water resource infrastructure development that recommends that WRUAs can undertake Water resources infrastructure development e.g. dam and pan construction (WSTF, 2009).

4.4 Effectiveness of actions taken by Awach Kano WRUA in WRM in the area

4.4.1 Changes in the management of water resources

Since the beginning of the operations of the WRUA, 100% (n=98) of the respondents felt that there has been a change in the management of water resources in the catchment. This is because all the WRUA members could have been involved in at least one of the activities. The changes reported in order of priority were:

- Reduction in deforestation.
- Reduction in water pollution/ improvement in water quality.
- Reduction in gully erosion.
- Reduction in illegal water abstraction.
- Disiltation of pans.

The changes are in line with the objectives of the WRUA as stipulated in the WRUA WDC (WSTF, 2009).

Figure 4.11 shows trees that were planted by Awach Kano WRUA to reduce gully erosion in the area, which has been of great success.

Figure 4.11: A section of an area where the WRUA has planted trees

4.4.2 Effectiveness of the implementation of the Sub Catchment Management Plan

Based on a scale of 1 to 10, (very bad (1&2), bad (3), below average (4), average (5), fair (6), good (7), excellent (8, 9 and10)) the WRUA members were asked how they would rate various efforts undertaken by the WRUA. The effectiveness of reducing water pollution activities had a rating of 8.5 meaning excellent, effectiveness of reducing illegal abstraction activities had 8.6 also meaning excellent, effectiveness of gulley reduction activities had 8.2 (also excellent), effectiveness of reduction in deforestation activities had 9.2 (excellent) and effectiveness of disiltation of pan activities had 8.3 (excellent). The average of the effectiveness of these activities was 8.6 which translate to 86% meaning the actions taken by the WRUA were very excellent and very effective.

Based on a scale of 1 to 10, the WRUA Management committee, and WSTF were asked to rate the implementation of the SCMP. The WRUA Management Committee gave an average rating of 9, while WSTF gave a rating of 8. This rating averages to 8.5 equivalent to 85% for both level of implementation and efficiency which was an excellent performance. Based on a scale of 1 to 10, the WRMA gave a rating of 8.5 which is equivalent to 85% as the level of implementation of Awach Kano SCMP. This implies that the level of implementation of the SCMP is excellent.

In a scale of 1-10, the Water Services Trust Fund also rated the implementation of the SCMP at 8.5 which is equivalent to 85%. This therefore means that the average rating of the SCMP is at 85% meaning that the implementation was excellent hence quite effective.

From all the effectiveness from WRUA members, WRUA management Committee and WRMA and WSTF, it can be noted that the average rating is 85%. This means that the implementation was excellent and quite effectives at 85%. However, there was room for improvement on the same.

4.4.3 Funds management efficiency and effectiveness

Almost all (97%, n=95) the respondents felt that the WRUA had used the funds provided to it effectively and efficiently. Out of these respondents, 97% (n=92) felt that the objectives of the WRUA had been achieved as was envisioned. This was confirmed by WRMA, WSTF and the management committee. It was noted that WSTF had done an audit to determine if the WRUA qualified for the 3rdlevel funding. From this audit, it was that the WRUA had passed the audit test hence qualified for further funding.

The WRUA had received a total of Kshs 2,483,300 and was yet to receive approximately Kshs 5,000,000 for the 3rdlevel funding. This is much lower than what they had planned for in the SCMP. According to WSTF, part of the other funding was to be sourced through partnership of the WRUA with other organizations which at the time of the research, the WRUA had not secured. For the WRUA to effectively and efficiently manage the water resources in the sub catchment there is need for the WRUA to collaborate with other agencies and not only WSTF. This should be done in a structured manner both from the government and the other agencies. This is when the impact will be bigger and tangible.

This suggestion is in line with the GWP toolbox A3.1 Investment policies, which proposes that financing for WRM should be pursued from communities, government, individuals, the private sector, commercial banks and the donor community (GWP, 2010). This suggestion also is in line with the GWP toolbox B1.11 Building Partnerships which encourages organizations to partner with one another in the management and protection of water resources (GWP, 2010).

4.5 WRUA Capacity Assessment tool

From the focus group discussion held with the management committee of Awach Kano WRUA, the following were the key responses as shown in Table 4.7. The following were the implications of the rating; planting (1), seedling (2), maturing (3), harvesting (4).

Table 4.7: WRUA Capacity Assessment tool with responses

Indicator	**Score**	**Comments**
1.1 Policy development		
- Vision and mission	4	Has a vision and a mission statement
- Organizational Policies and Procedures	4	Has organization policies and procedures
- Decision making (Hierarchical versus participatory)	4	Has a decision making organ
Score Policy development = 4		
1.2 Knowledge and skills		
- Understanding and knowledge of Water Management	4	They hand a deep understanding of water management
- Performance of WRUA as agent of WRMA	4	Is performing excellently
- Knowledge management and best practices	4	Always being referred to others for learning purposes by WRMA
- Organizational Skills	2	Has basic organizational skills
- Job Descriptions	1	No employees hence no job descriptions
- Staffing levels (quantity and quality) in relation to organizations' objectives	1	No staff as at the time of interview
- Staff supervision, assessment and development	1	Not in place
- Incentives for performance	1	Not in place
- Openness to innovation, feedback and learning	3	Are open to innovation, feedback and learning
Score Knowledge and skills =2.33		
1.3 Information management		

- Availability of information	2	Has basic information for their operations
- Collecting and storing of information	2	Has basic ways of collecting and storing information such as shelves but no computers
Score Information management =2		
2.1 Organization: General		
- Functioning of the governance structure	4	Has a functioning governance structure with different departments
- Accountability mechanisms / Openness / Transparency	4	They are able to share all the information in their custody
- Structure of the organization	3	Has an organogram for the organization with the WRUA members on top of the hierarchy, followed by the management committee, and the sub committees
- Efficiency of use of resources	3	Are efficient in use of the resources in implementing activities
- Assets, infrastructure and transport facilities	1	Have limited assets and vehicles, computers etc
- Encouragement of teamwork	3	Uses teamwork approach in implementation of their activities
- Diversity and anti-discrimination policies and practices	3	Has a representation from both upper, middle and lower regions of Awach Kano
Score Organisational: General =3		
2.2 Process and program management		
- Understanding of, and attention to project objectives, outputs, outcomes and performance	3	Studies the project documents and has ability to understand project objectives, outputs, outcomes and performance
- Problem analysis and Needs assessment	3	Able to analyse problems
Setting objectives and plans	2	Has basic knowledge in setting objectives and plans which is perfected by WRMA
- Activity Planning	2	Plans as a team
- Coordination and cooperation in	2	Some members of the WRUA don't work well

implementation		with others even when called upon to do so. They don't come at all
- Output monitoring / supervision	3	Good at ensuring that all the outputs are achieved
- Sustainability and scale of outcomes	2	Tries to work with other development organization and seek for partnerships though with limited success
Score Process and program management =2.43		
2.3 Legislation and financial administration and management		
- Sustainability of the WRUA	2	Is limited since it depends on funds from WSTF only at the moment
- Financial Policies and Procedures	3	Has developed policies for operations of the WRUA such as financial policies, human resources
- Financial Planning, budgeting, monitoring and administration	3	The financial subcommittee is responsible for proper planning and use of financial resources
- Financial reporting	3	Always reports on financial use and status of funds which is submitted to WRMA and WSTF
- Local community / members financial contributions	1	Very limited
- Resources received from WRMA, as their agent	4	WRMA has trust in the WRUA hence provide trainings and first-hand information on new trends. Also refers other institutions and WRUAs to Awach Kano WRUA
- Funding from Water Services Trust Fund	3	Has currently received funding from WSTF for level I and level II.
- Funding model, other external financial resource mobilization and diversification of funds	1	Currently no external financial resources received
Score Legislation and financial administration & management) =2.5		
3.1 Culture and ethics (awareness)		

- Understanding of role of the organization in its context	3	They understand their roles as a WRUA in the water resources conservation, protection and management
- Recognition by other stakeholders (target groups, other organizations)	3	Always being recognised by WRMA as one of the outstanding WRUAs
- Relevance for target group	3	Provide services such as riverine protection, protection of water pans, planting of trees etc which are relevant to the communities they serve
- Commitment towards performance and clients	4	Maintains high level of performance and ensures that outputs are achieved as was proposed
- Shared Core Values / Beliefs	4	Believes in integrity, honesty, accountability and reliability
Score Culture and ethics (awareness)=3.4		
3.2 Communication		
- Documentation and communication of decisions	3	Currently keep basic documents such as the SCMP, Proposals, expenditures, minutes etc, with no Computers. The Chairman communicates decisions on behalf of the WRUA
- Monitoring and communication of outputs and outcomes as an organization	3	Monitoring of outputs is done by the WRUA implementation subcommittee through the support of WRMA sub regional office and outputs communicated through the chairman.
Score Communication	3	
3.3 Cooperation and Participation		
- Membership to networks and platforms	1	Not a member of any network or any platform
- Developing partnerships and platforms for collaboration on specific issues / conflicts	2	Have partnered with SANA with WRMA, WSTF and SANA International
- Links and cooperation with governmental agencies	4	Have linkages with WRMA, WSTF, Forestry department and SANA international. Currently fostering relations with the County Government

Score Cooperation and participation	2.33	
Total Average Score *=2.78* *The average score indicates that the WRUA is headed towards maturity. Which the members agreed is a true reflection of the WRUA status*		

From the table above it can be noted as follows:

a) Policy development: The WRUA has developed adequate policy documents for financial management and implementation.
b) Knowledge and skills: The WRUA understands water management issues though limited in organization skills, no job descriptions, and lack incentives for performance. This was due to the fact that the funding had been depleted.
c) Information Management: The WRUA has limited information management skills with dire need of current information management technologies.
d) General Organization: Has excellent governance structure with the members on top of the hierarchy followed by the Executive Committee with independent sub committees. However, the WRUA has limited assets, infrastructure, and transport facilities. The WRUA encourages teamwork, diversity and anti-discrimination policies.
e) Process and program management: The WRUA understands project activities and needs assessment. However, the WRUA has limited understanding on planning and coordination.
f) Legislation and financial administration: The WRUA has limited strategies to sustain itself though has been trying to partner with other organizations without tangible success. The WRUA has put in place strategies to ensure outputs are well monitored and administered.
g) Culture and Ethics: The WRUA understands their role as an organization championing for good management of water resources and are recognized by other stakeholders. The WRUA is committed towards client's satisfaction and work along the lines of their core values.

h) Communication: Documentations and monitoring of outputs is done well through filing systems in place though the WRUA lacks computers for proper documentation. All official communications are done through the Chairperson.

i) Cooperation and participation: The WRUA is not a member of any platform apart from being a member of WRUAs in the region. They strive to develop partnerships with other entities.

4.6 Challenges and recommendations on the implementation of the SCMP

4.6.1 Challenges faced in the implementation of the SCMP

Most (81%, n=79) of the respondents reported that the WRUA was facing some challenges in the implementation of the SCMP. The major challenges mentioned were: Inadequate funding at 70% (n=55), uncooperative members at 26% (n=21), and inadequate personnel at 2% (n=1). According to the members of the WRUA, the following were major challenges faced in the implementation of the SCMP:

- Delay in disbursement of funds for the 3rd level funding which has delayed up the time of data collection. This had delayed for more than 2 years and the activities of the WRUA had almost come to a halt.
- Inadequate funding from WSTF.
- Uncooperative members during the implementation of the activities.
- Inadequate personnel i.e. the WRUA depended on the WRUA members to implement the activities rather than having staff to assist in the implementation.

Challenges cited by the WRUA management members were:

- Low allocation of funds for some activities resulting to late implementation of these activities. To realign the resources required authorization from Water Services Trust Fund in Nairobi which was a long process.
- Less technical knowhow on the implementation of gabion projects from the WRUA.
- Drought: There was drought during the implementation of some activities which affected their implementation.

- Misunderstanding by some members of the community who thought that their lands were being taken away from them especially the riparian owners.

Other challenges mentioned by the WRMA sub regional office that affected the implementation of the SCMP were:

- The Office bearers had family relations which were not required by the WSTF and WRMA. They had to convince them that it was unethical for this to continue. The office had to do an election to align the office with this requirement.
- Low technical skills in the sub catchment area since most of the technical skills were to be sourced from the local area.
- Low funding/ delayed funding, however, the members were encouraged to work with other stakeholders to sustain some of their activities.

According to the WSTF, the following are some of the challenges faced:

- Slow implementation of activities because of the nature of voluntary work involved hence slow growth from one level to another.
- Low absorption of funds/ slow burn rate by the WRUA.
- Slow understanding of the WDC process i.e. some members of the WRUA have not fully understood the whole concept of the WDC and at times thinks that the resources allocated can be used for any other activity.
- Concept of Water Resources Management- Water resources Management is a new concept which is different from Water Service Provision.

A close analysis of the challenges outlined above, the common challenges were:

- Low allocation of funds to the WRUA by the WSTF.
- Low technical skills in the implementation.
- Slow understanding of the WDC concept by the WRUA members as the WRUA members had not appreciated the concept of Water Resources Management as opposed to Water Service Provision.
- Lack of assets, infrastructure and transport means

- Delayed funding from WSTF as the WRUA could not continue with their activities since they lacked financial resources.

4.6.2 Recommendations on the implementation of the SCMP by the members of the WRUA

The members and the management committee suggested the following:

- More funding should be provided to the WRUA through the National treasury and the county government to sustain the activities of the WRUA.
- All members need to cooperate with the existing office holders in the implementation of the SCMP.
- More seminars/trainings need to be held regularly to ensure that the members are equipped on their roles and duties.
- The WRUA office needs to be equipped with the required office equipment and machines.
- The WRUAs should also be involved in doing other income generating activities for sustainability e.g. every member has a kitchen garden, climate change mechanism is also being implemented by the WRUA.
- New office holders need to be elected to take over the operations of the WRUA.
- More members need to be recruited.
- Members should be thoroughly informed of the uses of funds so that there is no misconception that the funds can be used for any other activity.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1 Conclusions

Based on the research, it is worth noting that the WRUA members were adequately involved in the development and rolling out of the SCMP. They effectively discharged their duties in line with the WDC, GWP toolbox and WRUA CAT. The WRMA sub regional office had been actively involved in the development and rolling of the SCMP by sensitizing the members and capacity building them on their roles and the reforms in the water sector. They also provided technical backstopping in the implementation of various activities as confirmed by both parties.

It can also be noted that the WRUA had taken steps in ensuring that the water resources are conserved and protected in the sub catchment. They had planted trees, sensitized the communities on forestation and prohibiting charcoal burning in the sub catchment. Other activities undertaken the WRUA were; construction of gabions, planting sisal, planting cactus and protecting riparian lands. These activities partly supported in the conservation, protection and management of water resources.

The WRUA had effectively implemented the SCMP as was expected and that was why they were eligible for the 3rd level funding as indicated by WSTF which had been approved by both WRMA and WSTF. The overall rating was at 85% meaning this was an excellent performance, but there was room for improvement. The activities undertaken were also effective since they helped reduce further erosion of the Awach Kano River and restoration of ecosystems by constructing gabions, planting trees and preventing more pollution. Nevertheless, the total funding that the WRUA had received was much less than what had been planned for in the SCMP. The WRUA failed to marshal other funding sources from other development agencies which limited their capacity to carry out all the activities mentioned in the SCMP. This means that some of the results had not been achieved within the required timeframe of the SCMP hence a bigger impact was not realized. It is worth noting that, the effectiveness of the implementation of the SCMP requires not only adherence to the WDC and GWP but also depends on the resource available.

5.2 Recommendations

The following are the recommendations based on the study findings:

1. WRMA to advocate for more funding from the National and County Governments to ensure that there are adequate funds for the WRUA activities. The County Government in particular

should have a kitty dedicated to the WRUAs for management, protection and conservation of Water Resources. Parliament should also allocate resources to the WRUAs.

2. The WRUAs also need to partner with both civil societies and private sector so as to increase their financial base and undertake more impactful activities.
3. The WRUA should have an office and skilled staff to support in the implementation of activities to ensure efficiency and effectiveness in the delivery of services.
4. WRMA together with WSTF should revise the WDC to ensure that it addresses the issues of sustainability of the WRUA especially on ensuring that the WRUA receives other sources of funding. The revised WDC should also address the issues of technical capacity of the WRUA.
5. Subsequent studies should be undertaken by other researchers on the implementation of SCMP by other WRUAs to determine how effective other WRUAs are so as to give the overall picture on the performance of WRUAs in Kenya.

The recommendations of this study should be taken up by WRMA to advocate for allocation of funds by the National and County Governments. WRMA should also use the findings of this study especially on the activities undertaken by the WRUA to showcase to other WRUAs to ensure that all the WRUAs are effective in their implementation of their activities. The WSTF should also consider advocating for the WRUAs to receive other funding and not entirely depend on donor funding. Both parliament and Senate should also ensure allocation of funds by National and County Government. The Ministry should ensure there is a policy to guide WRUA implementation activities to address issues of funding, technical capacity and Monitoring and Evaluation. These will ensure that the WRUAs are sustainable and are impactful in their activities.

Way forward

The researcher is planning to:

- Disseminate findings to Awach Kano WRUA, the County government, WRMA, WSTF, Ministry of Water and Irrigation, Ministry of Finance, the National Assembly and the Senate.
- Publish the research work to be available to researchers and scientists.
- Participate in National and International conferences to share research findings.

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APPENDICES

Appendix 3.1: Semi Structured Questionnaire for members of the WRUA

QUESTIONNEIRE TO THE MEMBERS OF AWACH KANO WRUA

Hello. My name is _____I am conducting an assessment on the effectiveness of the Implementation of Sub-Catchment Management Plan using the WDC Process using Awach Kano WRUA as a case study. You have been selected by chance among other participants as a member of Awach WRUA. I would like to ask you some questions related to this study.

Participation in this survey is voluntary and you can choose not to take part. All information you will give will be confidential and will be used to make a general report. No names will be included in the report and there will be no way to identify you as one of the people who gave information.

If you have any questions about the survey, feel free to ask me.

Do you mind if we proceed?

Respondent agreed to be interviewed: Circle one

1. Yes 2. No

Name of interviewer _____Signature of interviewer _____

EFFECTIVENESS OF THE IMPLEMENTATION OF SUB-CATCHMENT MANAGEMENT PLAN USING THE WDC PROCESS
(A CASE STUDY OF AWACH KANO WATER RESOURCES USERS ASSOCIATION)

Questionnaire No: _____ Date of Interview _____

Name of Respondent:_____

SECTION A: SOCIO ECONOMIC AND DEMOGRAPHIC INFORMATION

1. Demographic Information

A1	A2	A3	A4	A5	A6
How old are you? (in Years) 1. Below 18 2. 18-20 3. 21-24 4. 25-28 5. 29-35 6. 35-40 7. 41-50 8. Over 50	What is your marital status? 1. Married 2. Single 3. Divorced 4. Widowed 5. Separated	How are you related to this household? 1. Head 2. Spouse 3. Son/Daughter 4. Brother/Sister 5. Father/Mother 6. Grand Child 7. Other relative 8. Non-relative 88 DK	What is your highest level of education? 1. Adult Literacy Class 2. Pre-Primary 3. Lower Primary 4. Upper Primary 5. Secondary 6. Post-Secondary 7. Never attended 66 N/ A 88 DK	What is your occupation? 1. Farming 2. Teaching 3. Public servant 4. Mining 5. Fishing 6. Business 99. Other (Specify)	What is your household size? 1. 1-2 2. 3-4 3. 5-6 4. 7-8 5. 9-10 6. Over 10

2. Socio-economic Information

A7	A8	A9	A10
How much is your average household monthly income?(Kshs) 1. Less than or equal to 5,000 2. 5,001-10,000 3. 10,001-20,000 4. 20,001-45,000 5. 45,001-60,000 6. Above 60,000	How much is your average household monthly expenditure on food? (Kshs) 1. Less than or equal to 1,000 2. 1,001-3,000 3. 3,001-5,000 4. 5,001-10,000 5. 10,001-20,000 6. Above 20,000	How much is your average household monthly expenditure on transport? (Kshs) 1. Less than or equal to 1,000 2. 1,001-3,000 3. 3,001-5,000 4. 5,001-10,000 5. 10,001-20,000 Above 20,000	How much is your individual monthly expenditure on water services?(Kshs) 1. Less than or equal to 1,000 2. 1,001-3,000 3. 3,001-5,000 4. 5,001-10,000 5. 10,001-20,000 Above 20,000

SECTION B: WRUA MANAGEMENT

B1	B2	B3	B4
What is your main source of water? 1. River/ stream 2. Borehole/ well 3. Dam/pans 4. Piped water into household 5. Community tap 6. Roof catchment 99 Others (specify)	Is this water source being managed by Awach Kano WRUA? 1. Yes=> B3, B4, B5, B6, B7 **2.** No=>Section C	If yes, What kind of maintenance activities do they do?	If yes, Is there an improvement in water quality compared to when Awach WRUA did not exist? 1. Yes 2. No 88. DK

B5	B6	B7		
Is there an improvement in water Quantity compared to when Awach WRUA did not exist? 1. Yes 2. No	Is there an improvement in access to water compared to when Awach WRUA did not exist? 1. Yes 2. No	What are some of the activities that you do with this water apart from domestic purposes? 1. Irrigation 2. Selling 3. Industrial 99. Other (Specify)		

SECTION C: SUB-CATCHMENT MANAGEMENT PLAN DEVELOPMENT AND IMPLEMENTATION PROCESS

C1.	C2.	C3	C4	C5
Are you aware of the existence of Awach Kano SCMP? 1. Yes => C2 2. No =>C4	If yes in C1, Were you involved in its development? 1. Yes => C3 2. No => C4	If yes in C2, How were you involved? 1. Participated in both drafting and validation 2. Participated only in drafting 3. Participated only in validation 99. Others (Specify)	What major problems did you consider that affects your catchment area 1. Pollution of water sources 2. Deforestation 3. Gully erosion 4. Siltation of pans 5. Riverine cultivation 6. Illegal Water abstraction 7. Inadequate financial resources 8. Poor access to portable water 99. Others (Specify) 88. DK	What roles have you played in the implementation of the SCMP?

SECTION D: WRUA ACTIVITIES

D1	D2	D3	D4	D5	D6
Are you aware of any activity that the WRUA has undertaken to ensure management of	If yes in D1, What are the activities 1. Planting of trees 2. Building of gabions 3. Siltation of pans 4. Water quality	Are there illegal water polluters in the area? 1. Yes=>D4 2. No=>D6	If yes, What steps have been taken to curb illegal water pollution?	In a range of 1 to 10, how effective has these steps been?	Are there illegal water abstractors in the area? 1. Yes=>D6 No=>D9

Water Resources? 1. Yes=> D2 2. No=>D3	Survey 5. Mapping of Water abstractors 6. Mapping of polluters 99. Others (Specify)				

D7	**D8**	**D9**	**D10**	**D11**	**D12**
If yes in D6, What has been done to reduce this trend?	In a range of 1 to 10, how effective have these steps been?	Has the WRUA undertaken any activity that is aimed at reducing deforestation? 1. Yes=>D8 2. No=>D12 88. DK=>D12	If Yes, What are the activities?	In a range of 1 to 10, how effective have these activities been?	Has the WRUA undertaken any activity that is aimed at reducing gully erosion? 1. Yes=>D10 2. No=>D11 88. DK

D13	**D14**	**D15**	**D16**	**D17**	**D18**
If yes, What are the activities?	In a range of 1 to 10, how effective have these activities been?	Has the WRUA undertaken an activity aimed at disilting pans in the area? 1. Yes 2. No 88. DK If yes, what are the activities	In a range of 1 to 10, how effective have these activities been?	Are there changes in the management of Water Resources that you have witnessed since the WRUA started operating 1. Yes=>D13 2. No=>D14	If yes, What are the Changes 1. Reduction of illegal water abstraction 2. Reduction in water pollution/ improvement of water quality 3. Reduction in deforestation 4. Reduction in gully erosion 5. Distillation of pans

D19	**D20**	**D21**	**D22**
Has the WRUA undertaken any activity aimed at curbing illegal water abstraction 1. Yes=> D15 2. No=> D17	If Yes, What are the activities?	Are you aware of any challenges that the WRUA is experiencing in the implementation of the SCMP/	What are the challenges?

88. DK		1. Yes=> D18 2. No 88. DK	

D23
What ways would you suggest for the improvement of the success of the implementation of the SCMP? 1. 2. 3.

D24	**D25**	**D26**
In your opinion, were the funds given to the WRUA properly used? 1. Yes 2. No=> 21 88. DK	If no, give reasons 1. 2. 3.	Did the WRUA achieve their set objectives with the funds provided? 1. Yes 2. No 88. DK

D22. Any other issue that you would raise relating to the implementation of the SCMP?

1._____

2._____

4._____

THANK YOU FOR YOUR TIME!

Appendix 3.2: Questionnaire for FGD for the Management Committee

Name of moderator..... Date.....

Name of the person taking notes..... Place.....

Q1. What roles did the management committee play in the development of the sub-catchment management plan?

Q2. How were the members of the WRUA involved in the development of the sub- Catchment Management Plan?

Q3. What activities did the WRUA members play in rolling out of the SCMP?

Q4. What roles did the management committee play in the implementation of the sub-catchment management plan?

Q5. What are some of the sources of water pollution in the area? Do you have an inventory of water polluters in the area? Please provide the list if any.

Q6. Do you have illegal polluters/ If yes then who are they? What actions have been taken on them?

Q7. What are some of the activities that Awach WRUA has been involved in to ensure reduction of water pollution?

Q8. What are the causes of deforestation in the area? Has the WRUA been involved in the reduction of deforestation in the area? If yes, then what are the activities involved in? Was the WRUA involved in the development of the designs for forestation? How?

Q9. Is there a case study about the activities that the WRUA has been involved to ensure reduction of deforestation that has been of success? If no, then why?

Q10. What are the causes of gully erosion in the area? Are there activities that the WRUA has been involved in to ensure a reduction of gully erosion in the area?

Q11. Has the WRUA been involved in activities to ensure there is no illegal water abstraction in the area? Do you have an inventory of water abstractors in the area? If yes please provide the list

Q12. Has the WRUA undertaken a water quality survey? If yes, then what actions have been carried out as per the recommendations of this survey?

Q13. What are the successes of the WRUA water resource management practices in the sub-catchment area which have resulted from the implementation of the SCMP?

Q14. Has the management committee been involved in resource mobilization with other organisations and what are the successes?

Q15. What activities have the WRMA regional office undertaken in the implementation of the SCMP? Has this been adequately done in the view of the management committee and why? What are some of the challenges that the WRMA faced in the implementation of the SCMP? Can this be attributed to the WDC process and why?

Q16. In your own opinion, how can you rate the (1 to 10) success of the implementation of the SCMP 2010-2013 and why?

Q17. What challenges were met in the implementation of the SCMP 2010-2013 and how were they addressed?

Q18. What suggestions could you make to increase the efficiency in the implementation of the SCMP?

Appendix 3.3: Key Informant Interview guide for the WRMA regional office/ National Office

Name of the Respondent..... Date.....

Job title..... Gender.....

Q1. What roles did the WRMA regional office provide in the development of the SCMP?

Q2. What support did the WRMA RO provide to the WRUA in the implementation of the SCMP?

Q3. Please describe the kind of the relationship that exists between the WRUA and the WRMA regional office?

Q4. How can he/she rate (1 to 10) the level of implementation of the Awach Kano SCMP and why?

Q5. In terms of pollution, are you aware of activities that have been undertaken by Awach Kano WRUA to ensure a reduction of pollution of water sources? List the activities. How was the WRMA RO/National office involved?

Q6. Is there an inventory of Water polluters in the area? Provide the list please

Q7. In terms of deforestation, are you aware of activities that Awach Kano WRUA has been involved in to reduce deforestation in the area?

How effective were the activities if any and how was the WRMA RO involved?

Q8. In terms of gully erosion, are you aware of the activities that Awach Kano WRUA has been involved in to ensure reduction of gully erosion?

How effective were the activities if any and how was the WRMA RO involved?

Q9. In terms of illegal water abstraction, are you aware of activities that the WRUA has been involved in to ensure reduction of illegal water abstraction in the area?Name them

Is there an inventory of Water abstractors in the area?

Q10. Have you provided any training to the WRUA? What were the trainings? How was this helpful to the WRUA?

Q11.What challenges have they observed in the implementation of SCMPs in the region?

Q12. How can these challenges be tackled in order to improve the implementation of the SCMP?

Q13. Were all the objectives achieved with the funds that were given to Awach Kano WRUA? If not, what were the objectives and what were the justifications?

Appendix 3.4: Key Informant Interview guide for the WSTF office

Name of the Respondent..... Date.....

Job title..... Gender.....

1. According to the financial support given to Awach Kano, were there objectives that were not achieved? What were the objectives and why were they not achieved?
2. Was there any mismanagement of funds by Awach Kano WRUA? What were the areas?
3. What were the challenges faced in the administration of the WDC process? What are some of the areas of improvements?
4. What experiences have you had with this WDC process that you would share even with other WRUAs apart from Awach Kano WRUA?
5. In a range of 1 to 10, how would you rate Awach Kano WRUA in terms of efficiency and why?

Appendix 3.5: List of participants

No	Name	Organization	Title	Contact
1.	Phoebe Misente	WRMA National Office		
2.	Joshua Osiyo	WRMA Sub Regional Office	Water Right Officer	0713113287
3.	Arsher Ogembo	WRMA Sub Regional Office	Community Development Officer	0720799481
4.	Sammy Mathenge	WRMA Sub Regional Office	Ground Water Officer	
5.	Charles Oleko	WRMA Sub Regional Office	Water Quality and Pollution Control Officer	0701097203
6.	Eng. Rose Nyikari	WSTF	Manager, Water Resources Investments	0722682789
7.	OchollaOngudi	Awach Kano WRUA	Chairman	0721972106
8.	SiproseOnunga	Awach Kano WRUA	Treasurer	
9.	Moses Okoth	Awach Kano WRUA	Procurement Chairman	
10	Patricia JumaOkeyo	Awach Kano WRUA	Member, Finance Committee	
11	Danis Akuku Olando	Awach Kano WRUA	Committee member	

Appendix 4.1: Certificate for the bacteriological and chemical tests conducted at WRMA sub regional office in Kisumu

	WATER RESOURCES MANAGEMENT AUTHORITY	
	TITLE: Water Sample Analytical Certificate - Bacteriological Results	**REF. NO:** F/9/1/6
		ISSUE NO: 01
	DEPARTMENT: Technical	**REV. NO:** 00
	ISSUED BY: DTCM	**DATE OF ISSUE:** 15th April, 2013
	AUTHORIZED BY: TCM	**PAGE:** 1 of 2

SERIAL NO………**2**……………………Sample No…**756/15**………………………

Name of customer…**SILAS OPENJI** ….Address……**1137 -40100 KISUMU**……….

Purpose of sampling…**ASSESSMENT**…County……**KISUMU** ……………….……..

Date Sampled……**07/10/2015**……………Date Received…**08/10/2015**…………………..

Source…**AWACH KANO RIVER**…….Date compiled…..**14/10/2015**……………

Is it protected? … ……**NO**………………………………………………………………………

If so, how? ……… …. ……………………………………………… ….

(Is it completely covered, or sides only?)

Is there a pump?…….. ………………….. ……………………… ……………………………………

If so, how long has it been in use? ……………………………… ……………………………

Has it been overhauled recently? ………. ……………………………………………………

EXACT SITE SAMPLE TAKEN FROM……… **DIRECT FROM THE RIVER**……………

(i.e. tap in kitchen, through cistern or direct from the mains)

IS IT A CHLORINATED SUPPLY? (Indicate Residual Levels)………**NO** ………………………

EXAMINATION RESULTS

Total Coliforms organisms per 100 ml……. **TOO NUMEROUS TO COUNT**……………………

E. Coli per 100 ml………….. **TOO NUMEROUS TO COUNT** ………………………………

Legionella ssp per 100 ml……………….not done………………………………………………

Other microorganisms………………… not done ………………………………………………

	WATER RESOURCES MANAGEMENT AUTHORITY	
	TITLE: Water Sample Analytical Certificate - Bacteriological Results	**REF. NO:** F/9/1/6
		ISSUE NO: 01
	DEPARTMENT: Technical	**REV. NO:** 00
	ISSUED BY: DTCM	**DATE OF ISSUE:** 15th April, 2013
	AUTHORIZED BY: TCM	**PAGE:** 2 of 2

Name of analyst…**FLORENCE OKOTH** …Signature……

A comment by head of laboratory…**The water is highly bacteriologically contaminated**……

Name…**FANUEL ONYANGO**……

Signature……Date……**14/10/2015**……

Issued by: ……

(Deputy Technical Coordination Manager)

Approved by: ……

(Technical Coordination Manager)

WATER RESOURCES MANAGEMENT AUTHORITY	
TITLE: Water Sample Analytical Certificate -Effluent Results	**REF. NO:** F/9/1/5
	ISSUE NO: 01
DEPARTMENT: Technical	**REV. NO:** 00
ISSUED BY: DTCM	**DATE OF ISSUE:** 15th April, 2013
AUTHORIZED BY: TCM	**PAGE:** 1 of 2

SERIAL NO**.....1**.....Sample No…**756/15**.....

Name of customer…**SILAS OPENJI**…..Address **P.O BOX 1137-40100…KISUMU**…….

Purpose of sampling **ASSESSMENT**…County… **KISUMU**…..……..

Date Sampled…**07/10/2015**……Date Received…**08/10/2015**……..

Source**……AWACH KANO RIVER**……Date compiled……**14/10/2015**……

PARAMETERS	UNIT	RESULTS	EFFLUENT STANDARDS	
			DISCHARGE INTO ENVIRONMENT	DISCHARGE INTO PUBLIC SEWER
Temperature	°C		±3 ambient temp.	20-30
pH	pH Scale	**7.6**	6.5-8.5	6-9
Conductivity	µ S/cm	**170**	-	-
BOD5 days at 20 °C	mgO_2/l	**31**	30	500
COD	mgO_2/l	**64**	50	1000
Total Alkalinity	$mgCaCO_3/l$		-	-
Total Suspended Solids	mg/l	**45**	30	250
Total Dissolved Solids	mg/l	**85**	1200	2000
Turbidity	mg/l	**180**	0.1	2
Oil + Grease	mg/l		Nil	5 or 10
4 Hr Permanganate Value	mgO_2/l		-	-
Nitrates	mg/l		-	20
Nitrite	mg/l		-	-
Total Nitrogen as N	mg/l		Two guideline value	-
Dissolved oxygen	mg/l	**7.7**		
Detergents (MBAS)	mg/l		Nil	15
Heavy Metals – Chromium, Cr	mg/l		0.05	0.05
Lead, Pb	mg/l		0.01	1.0
Copper, Cu	mg/l		1.0	1.0
Cadmium, Cd	mg/l		0.01	0.5
Zinc, Zn	mg/l		0.5	5.0
Arsenic, As	µg/l		0.02	0.02
Phenols	mg/l		0.001	10

Name of analyst **FLORENCE OKOTH**……Signature……

	WATER RESOURCES MANAGEMENT AUTHORITY	
	TITLE: Water Sample Analytical Certificate -Effluent Results	**REF. NO:** F/9/1/5
		ISSUE NO: 01
	DEPARTMENT: Technical	**REV. NO:** 00
	ISSUED BY: DTCM	**DATE OF ISSUE:** 15th April, 2013
	AUTHORIZED BY: TCM	**PAGE:** 2 of 2

Comments by head of laboratory .....**Based on the parameters analyzed the water is turbid. However the other parameters are within the stipulated limits as per the WRMA rules.....**

Name.....**FANUEL ONYANGO**.....

Signature.....Date.....**14/10/2015**.....

Issued by: .....

(Deputy Technical Coordination Manager)

Approved by: .....

(Technical Coordination Manager)

Appendix 4.2: List of Polluters in Awach Kano Sub Catchment Area

No	Point Source	Type	River Catchment	Location	Latitude	Longitude	Type of Industry	Receiving Water Body
1.	Soin Sugar Company	Industry	Awach Kano	Soin	00.08818 ^{0} S	35.09825^{0} E	Sugar Processing	Chulchuliet tributary of Awach Kano River
2.	Kiboiywo Farmers' Cooperative Society	Industrial	Awach Kano	Kaitui	00.29234 ^{0} S	35.16725^{0} E	Coffee Processing	Kiboiywo River tributary of Awach Kano

Appendix 4.3: List of legal water abstractors in Awach Kano Sub Catchment Area

No	Name of the abstractors	Type of abstraction
1.	Jerwa Community Water Project	Borehole
2.	Kapedo Community Water Project	Borehole
3.	William Otieno Okoth	Borehole
4.	Gaebriel Oduogo Othige	Borehole
5.	Chebulu-Kablel Community Water Project	Surface water
6.	Kibingo community water project	Borehole
7.	Wilson Ongete Ochola	Borehole
8.	Bishop Okumu Mixed Secondary School	Borehole
9.	Nyakach Girls High School	Borehole
10.	Soin Sugar Company	Surface Water
11.	Soliatlocatual Water Project	Surface Water
12.	Nyakach Elders development group	Borehole

Appendix 4.4: Answered FGD for the Management Committee

Name of moderator: Sylus Openji Date: 13th April 2015

Name of the person taking notes: Julius Ojino Place: WRUA offices in Katito

Q1. What roles did the management committee play in the development of the sub-catchment management plan?

- They undertook a needs assessment for the catchment area of Awach Kano River where various issues/ problems were raised and identified.
- They studied the existing Catchment Management Strategy for Lake Victoria South Catchment Area with an intention of incorporating it into the SCMP
- Attended a workshop organized by WRMA sub regional office for the development of the SCMP
- The members also studied the Water Act 2002 so as to understand the roles of the WRUAs.
- They thereafter developed the SCMP participatory through a validation workshop where the two district commissioners for Nyakach and Nyando districts were the chief guests.
- They established some sub committees were then established. These sub committees were the procurement, finance, monitoring and evaluation sub committees.

Q2. How were the members of the WRUA involved in the development of the sub- Catchment Management Plan?

- The functions above were taken together with the members of the WRUA since this was an initial stage

Q3. What activities did the WRUA members play in rolling out of the SCMP?

- The Management Committee had a meeting with all the WRUA members at A chief's Baraza where they came up with a way forward such as increased mobilization of more members, development of proposal to WSTF. Planning on how to undertake the activities once the proposal is approved

Q4. What roles did the management committee play in the implementation of the sub-catchment management plan?

- The management committee reported that they brokedown the SCMP to their members in a meeting
- They then developed the 3 proposals through the support WRMA and WSTF
- They mobilized the members to support in planting of trees, construction of gabions, sisal planting, construction of fish ponds among other activities
- They did reporting and accounting for the funds provided by the WSTF
- They participated in activities such as planting of trees, sial planting, gabion construction among others
- They represented the WRUA in other development forums in the Water sector

Q5. What are some of the sources of water pollution in the area? Do you have an inventory of water polluters in the area? Please provide the list if any.

- The major source of Water in the area is River Awach Kano
- Other sources mentioned were private boreholes, water pans and shallow wells
- They indicated they don't have inventory of polluters but reported illegal polluters to WRMA in the sub region office in Kisumu

Q6. Do you have illegal polluters/ If yes then who are they? What actions have been taken on them?

- They indicated that they have illegal polluters in the areas
- Some of the illegal water pollution activities indicated were; Pollution from livestock , Pollution from human wastes, Chemicals from horticultural farms, Washing of motorbikes into the river.
- Actions taken by the WRUA included reporting them to the area chiefs, reporting the WRMA. However, they complained that these actions wre not effective since the illegal pollution had not reduced

Q7. What are some of the activities that Awach WRUA has been involved in to ensure reduction of water pollution?

- Planting of trees, construction of gabions, planting of sisals were some of the activities involved by the WRUA

Q8. What are the causes of deforestation in the area? Has the WRUA been involved in the reduction of deforestation in the area? If yes, then what are the activities involved in?

- Causes of deforestation in the area include cutting down on trees and not planting, overgrazing/ overstocking, and drought
- Some of the activities done by the WRUA to reduce deforestation included encouraging all the WRUA members to have a tree nursery, conservation of existing trees, planting of live fence and planting of trees along the river banks/ riparian lands e.g. TokTeko

Q9. Is there a case study about the activities that the WRUA has been involved to ensure reduction of deforestation that has been of success? If no, then why?

- They had planted trees in Tok teko which had changed the areas from a dry are without plantation to a green area with plantations.

Q10. What are the causes of gully erosion in the area? Are there activities that the WRUA has been involved in to ensure a reduction of gully erosion in the area?

- Causes of gully erosion mention by the management committee were, poor soil porosity, water runoff and steep/ rough terrain causing high river velocity
- Activities done by the WRUA include planting of trees along river banks, construction of gabions, planting of sisal

Q11. Has the WRUA been involved in activities to ensure there is no illegal water abstraction in the area? Do you have an inventory of water abstractors in the area? If yes please provide the list

- The WRUA had undertaken some actions related to reducing illegal water abstraction. These included reporting illegal water abstractors to the administration and WRMA
- They dint have an inventory

Q12. Has the WRUA undertaken a water quality survey? If yes, then what actions have been carried out as per the recommendations of this survey?

- Water quality survey had not been done by the WRUA since the funding for this activity had not be provided

Q13. What are the successes of the WRUA water resource management practices in the sub-catchment area which have resulted from the implementation of the SCMP?

- Planting of trees at To teko
- Planting of sisal to restrict usage of Kakich water pan
- Construction of gabions alongAwach Kano river

Q14. Has the management committee been involved in resource mobilization with other organisations and what are the successes?

- They have worked closely with other organizations but no financial resources directly been given to them by these organizations
- No successes so far

Q15. What activities have the WRMA regional office undertaken in the implementation of the SCMP? Has this been adequately done in the view of the management committee and why? What are some of the challenges that the WRMA faced in the implementation of the SCMP? Can this be attributed to the WDC process and why?

- WRMA undertook a sensitization to the members of the WRUA, provided technical assistance in the development of the Constitution, problem identification/ analysis and community mobilization. The WRMA also provided quality assurance to the WRUA in the implementation of various and activities and incase of need of any specialized services, the WRMA office linked the WRUA with the relevant institutions such as National Environmental Management Authority, Ministry of Agriculture and Kenya Forest Services
- The management committee said that they had received an excellent support from WRMA and were satisfied by their performance

Q16. In your own opinion, how can you rate the (1 to 10) success of the implementation of the SCMP 2010-2013 and why?

- They gave an average rating of 9. This they measured with the fact that they were able to implement the 1st and the 2nd levels successfully and that WSTF were satisfied with their performance. They also indicated that they had done good work on the ground with the resources provided

Q17. What challenges were met in the implementation of the SCMP 2010-2013 and how were they addressed?

Some of the challenges mention by WRUA management committee included

- Low allocation of funds for some activities resulting to late implementation of these activities. To realign the resources required authorization from Water Services Trust Fund in Nairobi which was a long process.
- Less technical knowhow on the implementation of gabion projects from the WRUA.
- Drought: There was drought during the implementation of some activities which affected their implementation.
- Misunderstanding by some members of the community who thought that their lands were being taken away from them especially the riparian owners.

Q18. What suggestions could you make to increase the efficiency in the implementation of the SCMP?

- More funding should be provided to the WRUA through the National treasury and the county government to sustain the activities of the WRUA.
- All members need to cooperate with the existing office holders in the implementation of the SCMP.
- More seminars/trainings need to be held regularly to ensure that the members are equipped on their roles and duties.
- The WRUA office needs to be equipped with the required office equipment and machines.

- The WRUAs should also be involved in doing other income generating activities for sustainability e.g. every member has a kitchen garden, climate change mechanism is also being implemented by the WRUA.
- New office holders need to be elected to take over the operations of the WRUA.
- More members need to be recruited.
- Members should be thoroughly informed of the uses of funds so that there is no misconception that the funds can be used for any other activity.

Appendix 4.5: Answered Key Informant Interview guide for the WRMA regional office/ National Office

Name of the Respondent: Joshua Osiyo, Arsher Ogembo, and Charles Oleko Date: 14th April 2015

Job titles; Water Right Officer, Community Development Officer, Water Quality and Pollution Control Officer respectively Gender: All were Male

Q1. What roles did the WRMA regional office provide in the development of the SCMP?

- WRMA undertook a sensitization to the members of the WRUA, they provided technical assistance in the development of the Constitution, did problem identification/ analysis and community mobilization.

Q2. What support did the WRMA RO provide to the WRUA in the implementation of the SCMP?

- The WRMA provided quality assurance to the WRUA in the implementation of various and activities and incase of need of any specialized services, the WRMA office linked the WRUA with the relevant institutions such as National Environmental Management Authority, Ministry of Agriculture and Kenya Forest Services.

Q3. Please describe the kind of the relationship that exists between the WRUA and the WRMA regional office?

- A good working relations since WRMA is happy with the WRUA as one of their performing WRUA

Q4. How can he/she rate (1 to 10) the level of implementation of the Awach Kano SCMP and why?

- Averagely 8.5 which is an excellent performance by the WRUA in undertaking the activities prescribed in the proposal

Q5. In terms of pollution, are you aware of activities that have been undertaken by Awach Kano WRUA to ensure a reduction of pollution of water sources? List the activities. How was the WRMA RO/National office involved?

- The activities involved by the WRUA in pollution reduction are planting of trees, construction of gabions, protection of water pans among others
- The WRMA sub regional office was involved in ensuring quality deliverables by doing monitoring and providing guidance during the implementation.

Q6. Is there an inventory of Water polluters in the area? Provide the list please

The office has an inventory of water polluters in the area which was provided and is attached as appendix 4.2

Q7. In terms of deforestation, are you aware of activities that Awach Kano WRUA has been involved in to reduce deforestation in the area?

- Planting of trees and discouraging people for cutting down trees for charcoal burning

How effective were the activities if any and how was the WRMA RO involved?

- They have been able to plant trees in areas which were prone to soil erosion hence improving the ecstatic environment value.

Q8. In terms of gully erosion, are you aware of the activities that Awach Kano WRUA has been involved in to ensure reduction of gully erosion?

- Planting of trees, construction of gabions and awareness creation on effects of gully erosion.

How effective were the activities if any and how was the WRMA RO involved?

- Reduction in scouring of river banks
- Improved water quality

Q9. In terms of illegal water abstraction, are you aware of activities that the WRUA has been involved in to ensure reduction of illegal water abstraction in the area? Name them

Is there an inventory of Water abstractors in the area?

- WRUA members directed the abstractors to get permits from WRMA before abstraction of the water
- The WRUA did not have an inventory of the water abstractors
- WRMA sub regional office had the inventory as attached in Appendix 4.3.
- No illegal water abstractors.

Q10. Have you provided any training to the WRUA? What were the trainings? How was this helpful to the WRUA?

- No formal training except technical backstopping and follow up, monitoring of activities and budget lines, financial management

Q11.What challenges have they observed in the implementation of SCMPs in the region?

- The Office bearers had family relations which were not required by the WSTF and WRMA. They had to convince them that it was unethical for this to continue. The office had to do an election to align the office with this requirement.

- Low technical skills in the sub catchment area since most of the technical skills were to be sourced from the local area.
- Low funding/ delayed funding, however, the members were encouraged to work with other stakeholders to sustain some of their activities

Q12. How can these challenges be tackled in order to improve the implementation of the SCMP?

- Sensitization to the WRUA before conducting elections and monitoring the results of the elections of the WRUA
- Allocation of funds for the emoluments for the technical skills in the proposal
- Several resource mobilization strategies to support the WRUA
- Allocation of funding to the WRUA by the County governments

Q13. Were all the objectives achieved with the funds that were given to Awach Kano WRUA? If not, what were the objectives and what were the justifications?

- All the objectives were achieved by the WRUA as per the proposal. However follow ups needs to be done on the projects undertaken to ensure sustainability

Appendix 4.6: Answered Key Informant Interview guide for the WSTF office

Name of the Respondent: Eng. Rose Nyikari Date: 20th April 2015

Job title: Manager, Water Resources Investments Gender: Female

1. According to the financial support given to Awach Kano, were there objectives that were not achieved? What were the objectives and why were they not achieved?

– The WRUA achieved all the objectives as were proposed. However, there delay in disbursement of funds hence the timeline had to be adjusted.

2. Was there any mismanagement of funds by Awach Kano WRUA? What were the areas?

- No mismanagement of funds were reported but only reallocation of funds which was done in good time with our approval

3. What were the challenges faced in the administration of the WDC process? What are some of the areas of improvements?

- Slow implementation of activities because of the nature of voluntary work involved hence slow growth from one level to another.
- Low absorption of funds/ slow burn rate by the WRUA.
- Slow understanding of the WDC process i.e. some members of the WRUA have not fully understood the whole concept of the WDC and at times thinks that the resources allocated can be used for any other activity.
- Concept of Water Resources Management- Water resources Management is a new concept which is different from Water Service Provision.

4. What experiences have you had with this WDC process that you would share even with other WRUAs apart from Awach Kano WRUA?

- It has been a learning process for WSTF on the applications of WDC and hence some adjustments need to be made. The WRUAs need not to only depend on WSTF as their sole source of funding but should be supported by other development agencies for sustainable implementation of Water resource programs. Other key players needs to be identified so as to support the WRUAs since sometimes there is a break or delay in funding.

5. In a range of 1 to 10, how would you rate Awach Kano WRUA in terms of efficiency and why?

WSTF rated the WRUA at 8.5 meaning excellent performance by the WRUA. This because the WRUA had achieved almost all the deliverable expected from them and compliance with the WDC requirements that they adhered to.