

**THE ROLE OF COMMUNICATION IN ENVIRONMENTAL MANAGEMENT  
AND CONSERVATION IN KENYA: A CASE STUDY OF NYANTURAGO  
WATER CATCHMENT AREA IN KISII COUNTY.**

**BY**

**MENGE STEPHEN NYAKUNDI**

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STUDIES.**

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**DECLARATION**

I declare that this research project is my original work and it has never been presented to any other university for whatever degree award.

Signature..... Date .....

**Menge Stephen Nyakundi**

**K50/70862/2011**

This project has been submitted with my approval as the supervisor on behalf of the University of Nairobi-School of Journalism and Mass Communication (SOJMC).

Signature..... Date .....

**Mr. Silas Oriaso**

## **DEDICATION**

This project is dedicated to my beloved wife Joyce Nyakundi and my sons Caleb Omari, Joshua Okari and my daughter Charity Kemunto. Special dedication goes to my father Shadrack Menge Omari and my late mother Abigail Mogute.

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## **DEFINITION OF TERMS**

<b>Allelopathy</b>	Tree exuding chemicals to prevent other seeds, and roots from competing for moisture.
<b>EIS</b>	Environment Impact Assessment
<b>EMCA</b>	Environmental Management and Coordination Act
<b>FAO</b>	Food and Agriculture Organization
<b>HIV</b>	Human Immuno- Deficiency Virus
<b>KEFRI</b>	Kenya Forest Research Institute
<b>KFS</b>	Kenya Forest Services
<b>MDG</b>	Millennium Development Goal
<b>Munyua Mai</b>	Heavy Water Consumer
<b>NEC</b>	National Environment Council
<b>NEMA</b>	National Environment Management Authority
<b>Pinus</b>	Botanical Name for Pine tree
<b>Spp</b>	Species
<b>TB</b>	Tuberculosis
<b>UNCBD</b>	United Nations Convention on Biological Diversity
<b>WRMA</b>	Water Resource Management Authority
<b>WRUA</b>	Water Resource Users Association

## **ABSTRACT**

The purpose of this study was to find out the role of communication in environmental management and conservation at Nyanturago Water Catchment in Kisii County. This was because, out of 22 water springs at the wetland, four had dried up forcing the residents to travel long distances in search of the precious commodity. Eucalyptus trees have been criticised for consuming a lot of water draining the wetland and reducing water volume at Nyanturago River prompting its rehabilitation.

The study engaged 40 farmers in FGDs from four sub-locations of Nyamecheo, Kabos, Kiemenyinga and Kirwa and examined their knowledge on environmental conservation especially about eucalyptus trees. Six key informants from NEMA, KEFRI, WRMA, KFS, Agriculture and the Chairman of the rehabilitation program were interviewed to ascertain their knowledge on environmental conservation and how they passed the information to the affected area. They were selected through purposive sampling because they had the required information for the study.

The study found out that NEMA implemented the rehabilitation project without fully engaging other actors such as KFS and Agriculture departments. There was therefore, lack of coordination among relevant actors towards the rehabilitation project to restore the wetland.

Top- bottom approach was used by the implementers of the rehabilitation project which the study found unacceptable to the beneficiaries. Implementers employed casuals to cut down the eucalyptus trees and purchased recommended tree seedlings for them. The study revealed that the tree seedlings were planted on the affected farms by casuals who did not do it well. Farmers were not given time to internalise the idea before acting on it.

The study was guided by two theories namely the two step- flow theory and the diffusion of innovation theory as knowledge on environmental conservation and management was crucial in effecting the desired change in the community.

## **CHAPTER ONE: INTRODUCTION**

### **1.0 Introduction**

The main issues discussed in this chapter include, the background, environmental concerns in Kenya, trees and environmental conservation, environmental communication, environmental concerns of Eucalyptus trees in Kisii County, the profile of Nyanturago water catchment area, the problem statement, objectives of the study, justification and scope and limitations of the study.

### **1.1 Background of the Study**

Environmental concerns have encompassed the world forcing many nations around the globe to come together and deliberate on how best to address environmental issues that threaten to ground the world to a halt. Regardless of one's geographical location, environmental issues are cross cutting and the need for concerted efforts to tackle them has become more real than ever before.

According to an Inhabitat Journal about Environment (2012), a number of studies have frequently cited the dim future the planet will face if the world does not change its habits and activities. The Organization for Economic Development (2012) refers the environment outlook of the planet as quite "grim". This therefore calls for an urgent need to consider the most important environmental issues with a view of taking bold steps to create a healthy future. Among the most pressing global environmental issues include, water pollution due to industrial effluents and its scarcity, deforestation thus encouraging desertification, energy, transportation, waste management and global warming among others according to the Organization of Economic Development Journal (2012).

The Kyoto Protocol of December 11, 1997 set a framework for all United Nations to follow and signed an environmental treaty to bind them in the commitment to environmental conservation activities especially in the reduction of industrial emissions. A total of 190 countries signed the treaty which has since been ratified with amendments. Many nations have since come up with environmental conservation frameworks to address environmental issues affecting them.

Since environmental concerns are many and diverse depending on the locale, the concerns have made governments and other environmental organizations to react instead of being pro-active to avert any impending environmental crisis. This means that the governments do not provide adequate information of the concerns to enable the affected people make informed choices or decisions on how to deal with environmental concerns before them.

### **1.1.1 Environmental Concerns in Kenya**

Kenya is faced with a number of environmental conservations and management concerns that need to be addressed through sustainable communication strategies in order to bring about the desired change in society. According to the Kenya Country Environment Profile Final Report (2006), there are a number of environmental concerns affecting the country.

Among the environmental problems include natural resource degradation (land, water, vegetation cover), loss of biodiversity in the country's main ecosystem including wetlands, forests, marine ecosystems and socio economic environment: drooping socio-economic indicators in health (high prevalence of major diseases, HIV/Aids, malaria, and TB), access to water and education. Forces leading to resource degradation include increasing pressure on limited resources of land, water and energy. High pressure on land in the high potential zones lead to utilization of sloping lands, riverbanks and wetlands without applying appropriate environmental conservation measures. This study aimed at getting effective communication strategies to manage and conserve the environment for future generation.

Kenya has a comprehensive environmental legislation framework such as the Environment Management and Coordination Act (EMCA1999) that provides for an establishment of legal and institutional framework for the management of environment. The EMCA is administered by the National Environment Council (NEC) and implemented by the National Environment Management Authority (NEMA). Other relevant legislation include the Environmental Impact Assessment (EIS) and Audit Regulations (2003), the Environment Management Order (2004) Lake Naivasha Plan, the Forest Act (2005), the Water Act (2002) and about 77 sectorial and other laws in agriculture, mining and factory among others.

Above all, Kenya is a signatory to a number of world environmental and United Nations (UN) bodies committed to conserving the environment among them the Kyoto Protocol (1997), UN Convention on Biological Diversity (UNCDB, 1992), UN Framework Convention on Climate Change (1992) and UN Convention to Combat Desertification (1994). It is however important to note that the communication aspect of the environmental conservation is not addressed. The information on environmental management and conservations is enormous but how it is communicated to the public to make a difference in their lives and the society at large has not been given attention.

### **1.1.2 Trees and Environmental Conservation**

Trees form a vital component in environmental conservation in Kenya whose vegetation cover of 2.7 per cent is still below the 10 percent as recommended by the joint United Nations Environment Program (UNEP, 2009) and World Conservation Monitoring Centre (WCMC) and Forest Gap Analysis (2009). Due to the ever increasing population, the demand for fuel wood, construction materials, timber and other commercial purposes has increased steadily. The scenario has forced people to resort to planting fast growing trees to meet their demands.

One of the most popular tree species in forestry is the eucalyptus that is widely grown in many parts of Rift Valley, Central Kenya, Western, Nyanza regions and many other parts in the country. It is preferred to other tree species because it grows very fast to meet the ever increasing demand for fuel wood and building materials.

Eucalyptus trees which have been given various names such as *blue gum*, *mti mbaao*, *Munyua mai* depending on where it is grown, have provided fuel wood for rural people in Kenya for a long time. Introduced in Kenya in 1902 to provide fuel wood for the Kenya Uganda railway and with the decline in the use of fuel wood for railways in 1948, the eucalyptus plantations were converted to produce poles for electricity transmission lines and telecommunications and timber.

The area under eucalyptus is estimated at 100,000 hectares where 15,000 hectares are gazetted forests, 35,000 hectares are owned by large companies, while 50,000 hectares are owned by individual farmers and local authorities in the form of wood lots, ornamental, boundary planting, avenue planting and scattered on communal land (KFS, 2009). Growing of eucalyptus is expanding rapidly because of the high demand for fuel wood for renewable energy, carbon sequestration and mitigating climate change (Ball, 1995, Binkley and Stape, 2004, FAO 2009).

Most eucalyptus trees are currently grown as investments and for economic purpose. However, when planting eucalyptus, environmentally sensitive areas such as wetlands and water catchment areas are excluded according to (KFS, 2009; Oballa, P. et al, 2010 and EMCA Act 108 of 1998). This is because, despite its effectiveness in meeting the growing needs of both rural and urban communities, the exotic tree species has been found to be unfavorable to the environment especially on wetlands, along river banks and water catchment areas.



According to the KFS guide to On-farm Eucalyptus growing (2009), Eucalyptus should not be planted on wetlands, marshy areas, along rivers , around lakes, ponds, swamps, estuary and any other body of standing water, irrigated farmlands and areas with less than 400mm of rainfall. This is because the tree species consumes a lot of water during its growth leaving the area dry and, to safeguard the rivers and wetlands from imminent extinct, KFS advises farmers to plant it away from these areas. This is to avoid competition from the eucalyptus tree that has a tendency to take in a lot of water.

The KFS further recommends that eucalyptus should be planted in areas degraded by soil erosion and loss of soil fertility, waterlogged areas to drain the water, areas with saline soils and farmlands as plantations or firewood. It also recommends that eucalyptus should not be planted in land sizes of less than a quarter an acre while planting it near buildings could be a disaster in waiting as branches and stem of some species break easily. The main objectives of developing a guide to On-Farm Eucalyptus Growing in the country include to:

1. Promote cultivation of the tree without compromising environmental conservation
2. Assist farmers make informed decisions in planting, managing, utilizing, and marketing the tree and their products and
3. Reduce and resolve conflicts relating to investing or planting the tree.

Poor documentation and low literacy levels amongst farmers limit the use of information for environmental conservation. It is therefore at the discretion of forest extension officers to pass the information in whichever manner they deem fit.

When the former Minister for Environment the late John Michuki gave a directive in mid-2009s to cut all the eucalyptus trees along river banks to conserve water, it was received with mixed feelings by different people especially those who grow it because, eucalyptus is a darling to many small scale farmers in the country (The Star Newspaper June, 2009). Since eucalyptus has many uses, the directive to uproot it require a prudent approach to convince the farmers to replace it with other tree species which are early maturing and do not affect the environment.

A survey done by the Kenya Forest Research Institute (KEFRI, 2008), indicate that a newly introduced eucalyptus hybrid from Zimbabwe is on high demand due to its fast growth. This is easily adopted as farmers strive to meet the high demand for fuel wood and commercial purposes. It matures within three years despite its negative environmental impact. Fast growth means massive intake of water from the soils which will eventually dry the rivers and streams of water besides draining up swamps destroying the ecosystem.

This study therefore tries to understand the intricacies involved in communicating environmental conservation programs especially on eucalyptus at Nyanturago water catchment in Kisii County. It also endeavors to unravel communication issues that hinder the passing of environmental messages to the public with a view of finding lasting solutions.

### **1.1.3 Environmental Communication**

A Michigan University Professor Raymond De Young (2011) says most environmental problems are people problems. This means that environmental problems come into being as a result of human activities. The Professor who is also the coordinator of the behavior, education, and communication field study argues that finding solutions to environmental problems require an understanding of how individuals and organizations think, what they care about, what motivates them, how they communicate and the conditions under which they behave most reasonably and creatively.

Trees form part of the environmental conservation strategy where eucalyptus is widely grown within and outside Kenya. Environmental communication is therefore crucial in ensuring that the messages about the wonder tree reach the target audience so that environmental concern about the species could be addressed in time before it gets out of hand.

Mark Meisner of the State University of New York- College of Environmental Science and Forestry (2011) defines Environmental communication as the study and practice of how individuals, institutions, societies, cultures craft, distribute, receive, understand and use messages about the environment. This process comprises a wide range of possible interactions from interpersonal to virtual communities, participatory decision making and environmental media coverage.

According to Alexander Flors, (2012) environmental communication involves the application of communication approaches, principles, strategies and techniques to environmental management and protection. The communication approaches applied are geared towards creating change of attitude and behavior in the targeted community.

The Center For Environmental Communication at Loyola University in New Orleans USA (2013) says, Environmental Communication deals with environmental affairs including evaluation of how media covers environmental issues, the rhetoric of environmental debates and decision making and the discourse around how to solve environmental problems. In this case, all forms of communication are involved and they include; interpersonal, group, public, and organizational, mass media among others that intersect with social debates about environmental issues. Environmental communication therefore seeks to enhance the ability of society to respond appropriately to environmental signals relevant to the wellbeing of both human civilization and natural biological systems (Cox, 2007).

Environmental Communication scholars (James Cantrill and Christine Oravec 1996) state that “the environment we experience and affect is largely a product of how we come to talk about the world i.e., the way we communicate with one another about the environment, powerfully affect how we perceive both it and the environment and therefore how we define ourselves with the natural world. The images of information that we receive from friends, blogs, the news media, Facebook or popular films, play a powerful role in influencing not only how we perceive the environment but also what actions we take, (Cantrill and Oravec 1996).

#### **1.1.4 Specific Concerns of Eucalyptus on Environment in Kisii**

Eucalyptus tree is widely grown in Kisii and besides satisfying the needs of the Gusii residents in terms of fuel wood and building materials, the tree products are transported to various parts of the country where the demand is very high. The Eucalyptus poles are sold to the Kenya Power and Lighting Company while tea factories are not left behind as they take a big share of the trees for curing tea at the factories, (KFS, 2009).

All efforts are therefore made by farmers to plant the tree in swampy areas, at wetlands and riverbanks where they grow fast to meet the ever increasing demand. Due to its massive consumption of water as it grows, eucalyptus is criticized for drying of streams and draining wetlands thus destroying the biodiversity at Nyanturago water catchment among other areas in Kisii County (Star Daily 2011).

For this reason, the National Environment Management Authority (NEMA) started a pilot project along river Nyanturago in 2009 to save the river from imminent extinction. About 15.4 kilometers were earmarked for clearing and the work has been completed. The work was done in two phases where nine kilometers were cleared in the first phase while 6.4 kilometers were done in the second phase and indigenous trees planted along the river bank. The eucalyptus trees were then planted 30 meters way from the river bank so that they do not interfere with wetlands and water springs in the area.

### **1.1.5 The Profile of Nyanturago Water Catchment Area**

Nyanturago Water Catchment was hived out of the four sub locations of Nyamecheo, Kabos, Kiemenyinga and Kirwa in Kisii County. The water catchment area that was under the trustee of the defunct Kisii County Council covers about 840 hectares but most of it has been encroached.

The residents in search of land drained the water catchment by planting a lot of eucalyptus trees that drained all the water paving way for human settlement. The defunct Kisii County Council had allocated 200 acres of the wetland to Kisii University, 400 acres to tea factories to plant eucalyptus trees for purposes of curing tea while four schools and seven churches were also allocated part of the water catchment. The remaining part of the land has been encroached by area residents who have built their homes and continue with their social economic activities oblivious of the dangers they pose to the wetland and the ecosystem (Imbwaga, 2013).

However, when the residents started complaining about lack of water and loss of biodiversity, the NEMA County Director Samson Bokea conducted a feasibility study that found out that the water catchment area had been interfered with heralding an environmental crisis. NEMA therefore started a pilot project in 2009 to rehabilitate Nyanturago Water Catchment Area for posterity. After it's successfully implementation, the programme would then be replicated in other areas in the county. Water Resource Management Authority (WRMA) also came in and mobilized the residents to form Water Resource Users Association (WRUA) to care for water resources at the water catchment area.

Despite the NEMA efforts to rehabilitate the Water Catchment area, the residents continue to carry out activities that threaten the existence of the rivers hence need for a sustainable communication approach to enable the people change their attitude towards environmental conservation activities.

## **1.2 Problem Statement**

Many farmers grow eucalyptus on swampy or marshy areas and within two to three years, all water drains out and the swamps become dry. Many swampy areas have become dry posing an imminent environmental crisis especially now in the era of global warming which is a concern not only to Kenya but the world over.

In Kisii County, many swampy areas have dried up due to the eucalyptus trees that have devastated the ecosystem. And, according to Kisii County NEMA Director Samson Bokea, out of 22 springs along River Nyanturago, four of them have dried up forcing the residents to travel over long distances in search of water. Ironically, the rivers they fetch the water from are also threatened with extinction because the eucalyptus species continue to be grown unabated.

The major question is, are the residents aware of the dangers of the eucalyptus trees? And who actually conveys the message to them? Some of the rivers have been reduced to seasonal rivers as farmers are interested in short term gains as opposed to long term positive gains.

The communication about the eucalyptus tree and its dangers on the environment, have adopted a top bottom approach. This was in total disregard of the interest of the community, what they care about, what motivates them, how they communicate and the conditions under which they live. Actors in environmental conservation are not well coordinated to communicate the same message for meaningful change in environmental conservation especially in cutting down eucalyptus trees from the water catchment areas to save water sources from imminent extinct.

Unless urgent measures are taken to sensitize the community on the dangers of the eucalypts trees with a view of changing their attitude, the future of the water supply is at stake. Conflicts surrounding water scarcity will be inevitable. Therefore, prevention is better than cure, hence the basis of the study.

### **1.3 Research Objectives**

- i. To find out how information flows amongst farmers growing eucalyptus at Nyanturago.
- ii. To find out how farmers utilize information in environmental conservation and growing of eucalyptus.
- iii. To identify effective forms of communication in promoting positive change in an environmental conservation.



### **1.3.1 Overall Objective**

To identify environmental communication strategies that are effective in conveying environmental conservation and protection messages with a view of connecting the environmental policy makers with the Nyanturago residents.

### **1.3.2 Specific Objectives**

- i. To find out the environmental knowledge the people have on the eucalyptus trees and its effect on the environment and water sources.
- ii. To determine forms of communication used to convey information on eucalyptus trees and environmental conservation among Nyanturago residents.
- iii. To identify the impact of such communication on forestry practice and farming practice.

### **1.4 Research Questions**

- i. How did they receive the information they have in growing trees especially eucalyptus?
- ii. How are farmers utilizing the information they have on environmental conservation to grow trees at Nyanturago water catchment?
- iii. What forms and communication strategies are effective in promoting change among Nyanturago residents?

## **1.5 Justification**

Global warming is a real threat to environment not only in Kenya but the world over. Conservation of water sources is therefore imperative through environmental communication to mitigate against imminent effects of global warming. The Millennium Development Goal (MDG) number seven (7) stresses the importance of environmental conservation and the need to provide a clean and sustainable environment for all.

Vision 2030 borrows heavily from the MDGs. A report presented by the former Minister for Planning, Wycliff Oparanya at a London Investment Summit in July 31, 2012 described environment, water and sanitation as foundations for national transformation. It is upon this foundation that communication should be taken seriously to enable the society change for the better. Massive growing of eucalyptus especially along the river banks and around water sources may lead to the drying up of rivers and reduction of water levels. It is therefore important to design messages which are geared towards changing the attitudes and increase their knowledge on environmental issues to avert a crisis.

## **1.6 Significance of the Study**

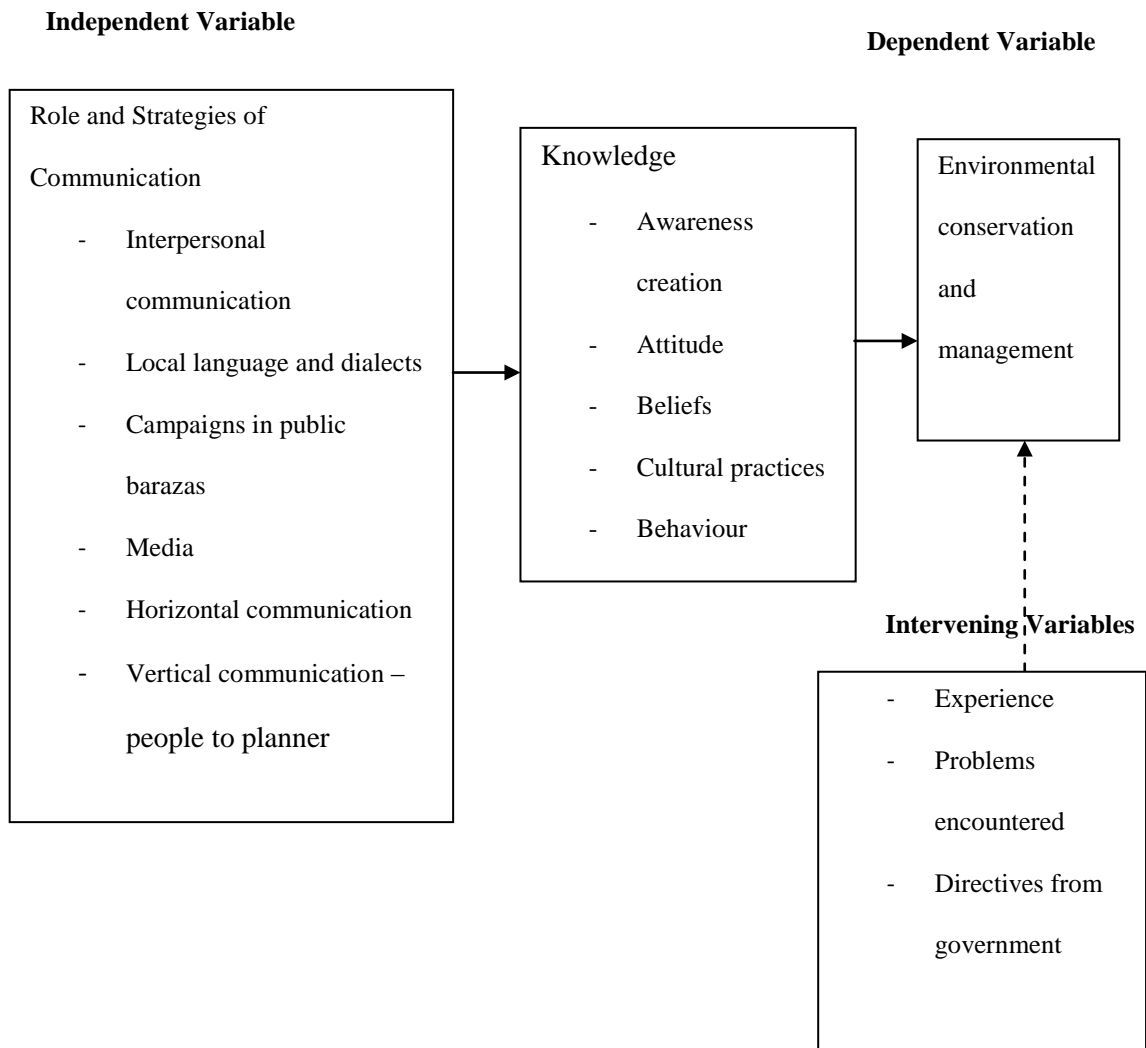
The Study will contribute to Environmental Communication which has not taken root especially in Kenya besides forming a body of knowledge on Environmental Communication and act as a reference for future studies. It will also be an important repository for NEMA, Forest and other environmental organizations in communicating their messages to the target audience. It will also be helpful to the public who will be able to benefit from environmental information to avert environmental crisis. The study also

recommends effective communication strategies that involve active participation of all actors in environmental management and conservation activities with a view of creating a favorable and healthy environment for all as enshrined in the Kenya Constitution Bill of Rights.

### **1.7 Scope and Limitations of the Study**

The study covered 15.4 kilometer stretch along Nyanturago River where NEMA carried out a pilot project to cut down eucalyptus trees which they replaced with indigenous trees. The 15.4 kilometers are long but the researcher grouped famers into four Focus Group Discussions (FGDs) to cover four sub locations that comprise the project site. The study took a lot of time coupled with financial constraints because it was carried out in a remote part of Kisii County. The terrain was rough and the researcher had to use private transport to and from the research site.

## 1.8 Conceptual Framework



Environmental conservation and management depends on the effectiveness of communication strategies used. Behaviour and attitude of the community would be changed if the messages are packaged to influence them but not coercion to make them accept what they do not believe in.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Introduction**

A lot of research has been carried out detailing the pros and cons of growing eucalyptus. (Anwar, 1991; Bansal et al 1992; Sanginga and Swift, 1992). Owing to complaints from all over the world about the dangers the tree poses to the environment, besides its enormous benefits, scientists have tried to balance the two so that the tree growing can go on to alleviate fuel wood shortage and building materials especially in many parts of Africa. Therefore, how to communicate the message about the dangers of eucalyptus trees on the environment has not been articulated to enable farmers know the exact dangers of the tree because much of the tree is grown due to its fast growth to satisfy the ever increasing demand for wood fuel and commercial purposes. A number of findings have been arrived at by different researchers with recommendations on where to grow it to avert dangers posed by the eucalyptus tree to the environment but the missing link is how to communicate the same to the communities to change their attitudes so that they can start conserving the environment.

### **2.1 MDGs and Environmental Conservation**

The Millennium Development Goals (MDGs), target number 7 born out of the millennium declaration and signed by 189 countries with 147 heads of state in September 2,000, values the environment and stipulates that governments should ensure environmental sustainability by integrating the principles of sustainable development in their respective policies and programmes to reverse loss of environmental resources.

The target of halving the proportion of people without sustainable access to safe drinking water by 2015 means that, the available water should be sustainable to ensure constant supply of the precious commodity. Unfortunately, if the water is interfered with by the eucalyptus tree, then the goal may not be achieved. Despite the emphasis put by the MGDs on how to conserve the environment, the communication aspect has not been addressed fully as those concerned with environmental conservation struggle to pass or convey the information do it without considering how the message is received by the public.

A well-coordinated communication system has not been established to ensure a sustainable communication strategy to continue conveying environmental messages to the public. This study therefore explored how best environmental messages can be communicated to enhance environmental conservation to avert environmental crisis. It is therefore upon the government to come up with policies and programmes to tackle the communication aspect to address environmental concerns affecting Nyanturago water catchment and other areas in the country.

In many cases, the government is reactive instead of being proactive in matters pertaining to environmental concerns. Reports and research on various environmental concerns have been done but communicating the same to the public is rather uncoordinated.

## **2.2 Studies on the Eucalyptus Tree and its Dangers**

Eucalyptus is blamed for fueling fire because it has an inflammable substance especially *eucalyptus grandis*. In 1991, Oakland firestorm destroyed 3,000 homes and killed 25 people. This species produces volatile chemicals such as pipestone and phelledrene, (Varro et al 1981).

Apart from being heavy consumers of water, eucalyptus trees are capable of causing a lot of damage to the environment and even cause deaths according to Varro. Due to its inflammable substances, it is advisable that eucalyptus trees need be planted away from residential places to avoid being caught up in fire tragedies. Planting the eucalyptus near homesteads can be dangerous in case of fire outbreaks which are sometimes inevitable due to the ever changing lifestyles and unpredictable weather conditions. Smoking in such areas or having picnics near eucalyptus plantations is dangerous especially during dry seasons. A small spark of fire can cause immense damage. Extra caution need to be exercised by farmers who grow eucalyptus for either commercial or domestic use.

In Ethiopia, it was commonly believed that eucalyptus tended to dry rivers and wells creating a situation where in 1913, a declaration was issued ordering partial destruction of all standing eucalyptus to be replaced with mulberry trees, according to (Richard Punkhrust, 2001).

It is evident that even as early as 1913, the eucalyptus trees have always been associated with heavy consumption of water wherever they were planted. While the declaration was justified to conserve the water resources for future generations, mulberry trees could not provide the kind of wood products that eucalyptus trees were able to provide to the affected citizens of that country. The affected communities ought to have been consulted on the way forward when the exotic tree species was found to be unfavorable to the environment.

The research by Punkhrust does not therefore, show or indicate how the message was communicated to the tree growers to sensitize them on the dangers of the species. It is equally important to note that orders or decrees from the state leadership are geared towards their immediate implementation whether subjects are convinced or not.

And this is the scenario at Nyanturago Water Catchment Area where eucalyptus were cut and replaced with what the residents call inferior tree species which are not comparable to the eucalyptus trees that provide quality wood products for both domestic and commercial purposes.

Sanker and Raid (1963) found out that leaf extracts from *eucalyptus camaldulensis* produces strong volatile toxins identified as phenols and terpenes. The allelopathic effects of aqueous leaf extracts of eucalyptus species was also reported to reduce considerably seed germination and seedling growth of a wide variety of crops, (Anwar,1991,Bansal et al 1992,Sanginga and Swift, 1992).



Due to their fast growth, wide adaptability and multiple uses, eucalyptus spp have overshadowed the indigenous tree species in plantation forestry in many countries. And, in California where the trees are grown in large quantities, oak woods have been replaced with eucalyptus thus raising environmental concerns (Henter, Heather 2005).

The concerns include loss of biological diversity through loss of acorns that mammals and birds feed on, absence of hollow in oak trees that provide shelter and nesting site for birds, small mammals and bee colonies. Eucalyptus is criticized because they compete with native plants and they do not support them. Here again, the methods used to disseminate the information are not visible.

In Italy it is grown in swampy areas to fight malaria as it drains water from swamps destroying breeding ground for the malaria vectors. While this is a welcome idea and relief to the residents who may not be subjected to the use of insecticides, the benefit of biodiversity at the swamps were overlooked as draining them was a blow to the ecosystem (Robert Santos 1997).

Draining swamps to destroy breeding ground for the malaria vectors, could easily be received and internalized by the beneficiaries who would strive to grow it to avert spread of malaria. However, communication with a view of changing the already established attitude requires sustainable communication strategy.

An International Journal of Agriculture and Biology states that eucalyptus commonly grown in agro forestry, consumes huge volumes of water as supported by the research they conducted in Pakitsan (Din Muhamed and Nawaz 2007). This shows that the exotic species consumes a lot of water thus creating competitions not only to other plants and crops but the human race that uses water for domestic and industrial activities besides use by livestock and wild game. Failure to manage and conserve water portends a serious environmental crisis in the human race.

Another research by Myers in Canada on the growth and water use of *eucalyptus grandis* and *pinus radiata* plantation irrigated with effluents showed that both species grew rapidly but water use by eucalyptus was considerably higher than pinus radiata. The study further indicates that in the third year, eucalyptus had used 22% more water than pinus (Meryers et al 1992).

As eucalyptus trees grow, they increase the amount of water they consume and if planted among other trees, the eucalyptus trees will definitely have an advantage over the other trees over water use. After the findings, Meyers does not indicate how the message will be communicated to the target groups for implementation for better management and conservation of the environment especially water that continues to remain scarce.

A renowned environmental crusader in Kenya the late professor Wangari Mathai was passionate about doing away with the tree especially along river valleys and water catchment areas. The Nobel Prize Laureate and founder of the Green Belt Movement argue that the alien trees are “over-promoted for commercial reasons.” (Science Development Journal 2009).

The late Mathai does not however give an alternative to the eucalyptus tree that has spread very fast in Kenya due to its easy propagation to give quality wood products for commercial and domestic use. She does not also explain how the information should be communicated to communities that grow the exotic tree to effect the changes. Effective Communication requires patience as it moves down to the targeted groups at the village level where the exotic tree is grown.

During the second World Congress of Agro forestry in Nairobi, in August 24, 2009 Prof. Maathai lamented that eucalyptus represented a dark chapter on Africa's environment systems. She observed that mitigating the effects of climate change would be difficult in East Africa because planting of eucalyptus along river banks, wetlands and watersheds continue unabated (Science Development Journal 2009).

“As long as we continue planting these trees in watershed areas and in our forests, we will continue to experience water shortage and it will even become a bigger problem as climate change hits us,” Maathai had told the conference. She said, the trees are good for the beauty that they offer but consume a lot of water when planted along rivers and around wetlands and watersheds. She said, apart from the negative impact on water systems, the eucalyptus, which in Kikuyu language is known as *Munyua mai* meaning the water consumer, is also hostile to other tree species and almost the entire local biodiversity (Science Development Journal 2009).

The Science Development Journal says, Former Minister of Environment, the late John Michuki, in June 2009 ordered the uprooting of eucalyptus trees from wetlands and banned their planting along rivers and watershed to avert threat to environment especially in water catchment areas. Similar controls, the late Mathai said, have been instituted in a number of countries including Australia, Brazil, and South Africa where some of the alien tree's species have been banned. Research findings on the dangers of the tree species have been documented by researchers who still continue to carry out further research to recommend on what needs to be done. Who is well placed to communicate the research findings to the affected communities? This is a gap that this study intends to address.

### **2.3 Positive Impact of Eucalyptus Trees**

On the other hand, eucalyptus affects the environment positively. It was found to have beneficial effects on soil structure and compared favorably with pine and *shorea robusta* on treeless site where it restores soil fertility through decayed leaves and litter. A research done by the Kenya Forest Research Institute based at Maseno Station (Nyambati, R. et al, 2008), indicates that eucalyptus is a fast growing tree which can be harvested within three years. In addition, it converts water into biomass more than other trees and it is easy to propagate besides being able to regenerate or coppice. According to the research, eucalyptus is important to the lumber industry while extracts from their barks are used in the manufacture of dyes and drugs.

The growing of eucalyptus trees does not require a lot of care and therefore farmers have an easy time propagating it. And because of its characteristics of growing in diverse conditions, it spreads very fast and the farmers prefer it to other tree species.

With controversial views about eucalyptus tree species, especially their ill effects on the environment, in terms of soil toxicity, the study was undertaken with the objective of investigating the allelopathic effects of eucalyptus on two important agricultural crops (maize and beans) in western Kenya.

The tree does not allow other crops to grow underneath because of the allelopathic effects and this means that food production will continue to dwindle. Due to the high population density in the area, the demand on fuel wood has increased steadily. It therefore calls for proper balancing of fuel wood production and food production to meet the demands of the population living in the area.

An extension officer at Kenya Forest Services (KFS) Mr Patrick Kariuki likens eucalyptus to a Friesian cow that consumes a lot of grass and water and gives high milk yields. “Can you do away with the cow just because it consumes so much and gives you a lot of milk,”? he wonders.

This therefore encourages farmers to grow the eucalyptus in plenty for both fuel wood and commercial purposes. The farmers will overlook the environmental conservation aspect and concentrate on the commercial aspects because they need economic stability.

Communicating to farmers to conserve the environment becomes difficult because the experts in forestry have endorsed the tree oblivious of the ever dwindling land in rural Kenya due to population increase. The farmers are therefore on a collision course with environmental conservation bodies that required them to cut the cherished tree from the riverbanks to conserve water.

#### **2.4 Role of Communication on Environmental Conservation**

The Public Sector Innovation Journal, (2011) states that environmental communication is the management and usage of strategic communication processes and media products to enhance efficiency of policy makers, civil participation and project development toward sustainable development. Environmental communication can therefore be described as a two way social interaction process that invites the sensitivity of the society to understand key environmental factors, their relationships to human activities and the symbiotic effect of environment on human life. This will eventually allow social policies and practices that permit proactive responses to environmental problems (The Innovation Journal 2011). Communications therefore plays and will continue to play a crucial role in relaying information to ensure that the audience understands its importance and proactively responds to related environmental issues affecting them directly or indirectly.

African communication scholars such as Nwuneli and Opubor (1988), Obeng-Quoidoo (1980), and Moemeka (1991) have strong faith in the role of communication either as an independent or an intervening variable in development process. As an intervening variable, they emphasize the influence of communication media at awareness level of information processing in development.

As an independent variable, they emphasize the indirect role of mass media in attitude and behavioral change along with or through a nexus of other interpersonal, group and traditional media in the society (Kwame Boafo 1993). Mass media must therefore be properly integrated with personal, interpersonal or group communication methods for message multiplication effect and for possible change of attitudes, behavior or opinions.

Mody (1991) recommends what she describes as a systematic Audience Dialogue-based Approach that stresses the need for horizontal communication within and between groups and vertical or people-to-planer information flow on needs, priorities and preferred modes meeting the needs (Kwame Baofu 1993).

It is important to note that many programs including promotion and information campaigns in rural areas fail because planners and implementers have inadequate knowledge on ruralities, their cultural backgrounds, needs, likes, dislikes and characteristics.

## **2.5 Research Gaps**

Many studies have been conducted on environmental conservation and management and in this case the eucalyptus trees and the environmental concerns raised by researchers. The role of communication has however not been articulated as an important component in changing the attitude and behavior of the target communities. Quite often, studies conducted ignore this important factor, the communication aspect of the research to propagate new ideas with a view of enhancing environmental conservation and management in targeted areas.

Since communication is the sharing of meaning, farmers at Nyanturago Water Catchment have not been fully convinced why they should cut down the eucalyptus from the river banks. The National Environment Management Authority (NEMA) planned and implemented the program in the area creating a misunderstanding between the farmers and the implementers. Strategies used in communicating such information to the farmers did not create a desired impact to change the farmers' attitude and behavior. Research was not done to involve the area residents in addressing environmental problems facing them. Farmers input were ignored and this study interrogates the role of communication in environmental conservation at Nyanturago water catchment area.

## **2.6 Theoretical Framework**

The passing of information from the receiver to the target audience is a complex undertaking that requires careful planning to create a desired impact. The information should therefore be packaged in a way that is convincing to the target audience to enable them change the way they look at and interpret issues.

The study relied on many theories to explain what works and an eclectic approach was used to build the theoretic framework. Two theories namely; the Two-Step-Flow Theory and the Diffusion of Innovation Theory were used to identify existing discourse and insights in addition to providing an understanding the strengths and limitations of the current knowledge (Higgs, Horsfall and Sandra 2009).



### **2.6.1 The Two- Step- Flow Theory**

The theory advanced by Paul Lazarsfeld and Katz (1944) postulates that information moves from the mass media channels to the opinion leaders who interpret the message before they pass it on to the less active members of the public for action. Opinion leaders are respected members of the community whose word is taken seriously because the community trusts them. Opinion leaders could be church leaders, teachers, politicians, clan elders, and experts in social, economic and cultural spheres.

In other words, information can flow from policy makers to opinion leaders who filter it before it reaches the other members of the society. The two-step-flow theory endeavors to ensure that no one is left out when information is conveyed. It is also important to note that since the audience is not homogenous, people listen, receive, interpret and act selectively. It is therefore crucial to consider the opinion leaders who are capable of breaking the barriers of communication and the selectivity of the diverse audience to create maximum impact.

According to studies conducted by Glock and Nicosia (1966), opinion leaders act as a source of social pressure towards a particular choice and a source of social support to reinforce that choice which has been made. Glock explains that opinion leaders develop leadership positions in their social circles and achieve the positions based on their knowledge of situations outside their circles (1952).

Social pressure is important in making things move. A little bit of pressure on the target audience is desirable if things have to be done while social support makes other people to feel that what they are intending or trying to do is good so that they accomplish it after being given the moral support.

Opinion leaders are therefore important in providing the reinforcement of an idea to create an impact. The social pressure may not be necessarily using force but frequent and sustained pressure to carry out a certain activity will eventually become fruitful. Lazarsfeld gave five characteristics of personal contact to make the theory credible and valid;

- 1) Non-purposive/casualness. One must have a reason of tuning a political speech on television but political conversations can “just pop up”. In this situation, the people are less likely to have their defenses up in preparation; they are more likely to engage in conversation.
- 2) Flexibility. There is always an opportunity to counter any resistance during conversations which is not so in both print and electronic media.
- 3) Trust. A personal contact carries more weight and trust than the media and, as people interact, they are better placed and able through observation of body language and vocal cues to judge the honesty and sincerity of the person in the discussion.
- 4) Persuasion without conviction. The traditional media is forced to persuade or change strongly held opinions but in personal communication, sometimes friendly insistence can cause action without affecting any comprehension of issues.

To amplify the two-step- flow theory, Menzel, (1963) argues that the abundance of information channels “choked” with all types of journals, conferences and commercial messages, distracts and confuses their target. And with a barrage of information, humans are flooded with daily; it is not hard to understand why someone might turn to a peer for help evaluating all of it.

The arguments clearly indicate that the most efficient media is the word-of -mouth and it is by reaching the opinion leaders with other forms of media (print and electronic media) that the word- of- mouth is generated to spark off conversations. Opinion leaders therefore comprise a very important component of society to digest and articulate issues for the common good of the public.

It is also important to note that Paul lazarsfeld two- *step -flow theory* did not address other issues such as opinion leaders participating actively not only in passing the information but adopting what they have learnt and known as true. The enthusiasm of the opinion leaders to adopt a new idea is crucial in influencing the general public to adopt and change behavior and attitude for the better. And since the two- step- flow theory could not fully explain other aspects of the study such as the process of adopting a new idea or ideas, the second theory of Diffusion of innovation was used to further enrich the study as the desired impact remains the aim of any communication campaign.

The two-step flow theory helped to explain why certain media campaigns failed to alter the community`s attitude and behavior in environmental conservation programs in the area. It provided the ability to predict effects of media messages on audience behavior

besides explaining the role of opinion leaders in exerting influence on the community to change their negative attitude and instead embrace environmental conservation activities for sustainable development. The theory also helped to show a strong interpersonal relationship in total mass communication process while at the same time established informal personal contacts in influencing the community to achieve a sustainable development through environmental conservation activities.

Since many people formed their opinions and made decisions under the influence of opinion leaders, the research interrogated the role of influencers in information processing and dissemination for effective communication. The two- step- flow theory helped the researcher to identify a core set of connectors within the topic and showed how they fitted together in passing environmental messages to the community and in addition provided a basic approach to understanding what happened in the community as regards to passing of vital information on environmental conservation. The theory further enabled the researcher to make sense out of the study.

Since the two-step-flow could not fully explain how the information was received and adopted by the community to effect the desired change, the researcher used the second theory of Diffusion of innovation to explain how the idea spread in the community, how it was received and the changes made among members of the community. The Diffusion of innovation therefore bridged the gaps and provided an insight into communication aspects that could not be addressed by the two-step-flow theory.

### **2.6.2 Diffusion of Innovation**

Everett Rogers (1962) came up with the theory of diffusion of innovation to explain how, over time, an idea or product gains momentum and diffuses through a specific population or social system. Rodgers says, eventually, people as part of social system; adopt a new idea, behavior or product. Adoption means a person does something differently than what they had previously. The key to adoption is that a person must perceive the idea, behavior or product as a new innovation and it is through this that diffusion is possible.

He further states that a new idea, behavior or product i.e. information does not happen simultaneously, but rather a process whereby some people are more apt to adopt an innovation than others. According to researchers, people who adopt an innovation early have different characteristics from people who adopt an innovation later. It is therefore important to understand the characteristics of the target population in order to know what will help or hinder the adoption of the innovation with a view of making necessary changes to suit the situation.

According to Roger, there are five established adopter categories that depict characteristics of the target audience which is usually heterogeneous. During the promotion of an innovation, there are different strategies which are usually put in place to appeal to the different adopter categories. The categories include,

1. Innovators- those who want to try the innovation first. They are interested in new ideas and willing to take risks. Appealing to these people is not difficult because they want to try new ideas, products etc.

2. Early adopters-These are people who represent opinion leaders. These people play leadership roles and are ready to embrace change opportunities. Because they are already aware of the need to change, they are comfortable adopting new ideas. They rarely need information to convince them to change.
3. Early majority-these people are not leaders but they tend to adopt new ideas before an average person. They need a prove that the innovation works to convince them to adopt it. To appeal to this category of people, success stories and evidence of the effectiveness of the innovation is crucial.
4. Late majority-this is a skeptical category of people who will only adopt an innovation after it has been tried by the majority. To reach this category of people, information on how many people have tried it successfully is paramount.
5. Laggards-In any society, there are conservatives bound by the traditions and other cultural norms. Despite being skeptical about change, they are the hardest to convince with a view of bringing them on board. To convince this category, the communicator requires statistics, fear appeal and pressure from other adopter groups.

To adopt an innovation, a person requires to undergo several stages among them awareness of the need for an innovation, a decision to adopt or reject an innovation, an initial use of the innovation to test it and continued use of the innovation. And consequently, there are five main factors that influence adoption of an innovation, and each of the factors are at play to a different extent in the five adopter categories. The five factors include:

1. Relative advantage- If the degree to which an innovation is seen as better than the idea, program or product it replaces, then the innovation is adopted.
2. Compatibility- how consistent the innovation is with the values, experiences and needs of the potential adopters.
3. Complexity- How difficult the innovation is to understand or use.
4. Triability- the extent to which the innovation can be tested or experimented with before a commitment to adopt it is made.
5. Observability- the extent to which the innovation provides tangible results.

The diffusion of innovation therefore looks at the communication aspect critically with a view of reaching the target audience without taking chances. It takes cognizance of the fact that people are different in terms of understanding, reception of innovation and adoption. This is because people have different perceptions in all aspects thus requiring a more elaborate strategy to reach them. This study therefore tries to unravel communication aspects that are complex and need further explanations. An assumption that the message was understood does not arise because people are unique in their own ways hence require different approaches to meet their different communication needs.

The diffusion of innovation therefore widens the scope of understanding how an idea about eucalyptus is acquired, who gives out such information and how it is received by the target audience, reasons why some adopt the idea and why others refuse or are sluggish in adopting it. The theory will guide the study to understand that people in the community are not the same because they have diverse reasons why they act the way they do.

## **2.7 Conclusion**

In the Two-Step –Flow theory, it is important to note that experts in the area of environment digest or interpret the information before they pass it on to the communities. Interpretation of complex environmental conservation information is therefore crucial so that the farmers do not misinterpret the message. Environmental conservation jargons should therefore be simplified for the communities to understand and use it to create the desired change. Since environmental conservation is a new idea, Diffusion of Innovation theory helps to show how an idea spreads among community members and how it is adopted. As different people have different understanding of a message, adoption also takes time and the community ought to be given time to digest before they make a decision whether to adopt or not to adopt a new idea. Change does not occur automatically but takes time and environmental experts and the government ought to know this so that they do not force people to change but allow communication to create an effective change.



## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.0 Introduction**

This chapter presents a number of approaches that the researcher used to make the project legitimate. The approaches used were expected to produce a result to prove the communication aspects that were crucial in reaching the target audience in depth to enable them understand the dangers of the eucalypts especially on the stress it caused on water. Research site, research design, sample size and sampling techniques, data collection and data analysis are therefore discussed in this chapter.

### **3.1 Research Design**

The study was descriptive in nature where the researcher conducted a case study of Nyanturago Water Catchment. To obtain reliable information, the researcher conducted interviews where six key informants from NEMA, KFS, Ministry of Agriculture, WRMA and KEFRI were interviewed. Four Focus Group Discussions (FGDs) were identified with the help Nyanturago River Rehabilitation committee. A total of 40 farmers were identified, ten from each of the four sub-locations of Nyamecheo, Kabos, Kiemenyinga and Kirwa.

### **3.2 Research Site**

The study was conducted at Nyanturago Water Catchment Area along Nyanturago River in Kisii County. The area is about 15 kilometers from Kisii town where the Kenya National Environment Management Authority (NEMA) completed a pilot project to clear and uproot all the eucalyptus trees from the water catchment area. The eucalyptus were

replaced with indigenous trees and other tree species such as gravilia which environmental experts recommend because they do not destroy the ecosystem around water sources. Eucalyptus was recommended to be planted about 30 meters away from the river bank.

The project covered a 15.4 kilometer stretch along the river and the government through NEMA, funded the project to restore the water level in the river and salvage the wetland from further destruction. The first phase of the project saw the clearance of nine kilometers while the last phase was completed early this year. The researcher chose the site because;

1. Nyanturago water catchment had all the environmental concerns especially eucalyptus trees that NEMA had cut down to restore reduced water levels in rivers and dried up springs.
2. NEMA carried out a pilot program to clear all the eucalyptus trees from the banks of River Nyanturago and planted indigenous trees while eucalyptus trees was planted about 30 meters away from the riparian land.
3. Despite the fact that they had been sensitized on the dangers of the eucalyptus growing along the river banks, the farmers continued planting it in the same area.

The study therefore undertook a qualitative type of research to get in-depth information on the role of communication in addressing environmental conservation and management.

### **3.3 Target Population**

The study targeted a 15.4 kilometer stretch where people living on either side of River Nyanturago were involved in the pilot project of rehabilitating the river. Residents of four sub-locations of Nyamecheo, Kabos, Kiemenyinga and Kirwa were targeted because they fall under the Nyanturago Water Catchment area where NEMA conducted the rehabilitation project.

### **3.4. Sample Size and Sampling Technique**

The sample size selected through purposive sampling had the required characteristics that the study was interested in. Residents and the experts on environmental conservation and management formed the sample size while the sampling techniques used was biased sampling.

#### **3.4.1 Sample Size**

The researcher interviewed 40 farmers and six key informants. The sample was a representative of a population of the entire project site because the 40 farmers were drawn from four sub-location along the 15.4 kilometer stretch along the riparian land. The key informants were directly concerned with environmental conservation by virtue of the departments or organizations they worked for. The key informants were therefore drawn from the department of Agriculture, KEFRI, NEMA, County Forest Officer, WRUA and Nyanturago Water Catchment area Chairman.

### **3.4.2 Sampling Techniques**

The researcher used non-probability or biased sampling technique whereby purposive sampling strategy was adopted because the cases picked had the required information in respect of the objectives of the study. The cases offered in-depth information because they had a lot of interest in environmental conservation and more especially about the discussions revolving around the eucalyptus tree and its effect on the water catchment area. The cases were handpicked because they possessed the required information about Nyanturago water Catchment area. The Chairman of Nyanturago River Rehabilitation Project helped to identify the subjects because he understood the area well.

### **3.5 Data Collection Methods**

The study used three data gathering techniques to get the necessary information to determine the role of communication in addressing environmental conservation in the area. The three methods used include; interviews, Focus Group Discussion (FGD) and observation.

#### **3.5.1 Interviews**

Interviews are face-to-face encounters with the key informants in order to get in-depth information of the study (Mugenda, 2003). The researcher collected data from key informants -people who are directly concerned with environmental conservation activities at the Nyanturago water catchment through interviews. The Key informants included, Director of NEMA- Kisii County, Water Officer, Agriculture Officer, Kenya Forest Services officer and KEFRI based in Nairobi because it is the only research institution on forestry.

### **3.5.2 Focus Group Discussion**

The researcher carried out focus group discussion of 40 farmers. Four discussion groups comprised 8- 10 members each. The FGD brought out the inner feelings of the area residents in a relaxed atmosphere. Some people may feel insecure when they are interviewed as individuals but when in a group, they get psyched to give a lot of information which could have otherwise been difficult to obtain. The study ensured that the dominant speakers gave room for others to speak also.

### **3.5.3 Observation**

Observations were made on whether the eucalyptus trees had been cleared from the river banks and whether indigenous trees had been planted. The researcher also observed whether the area cleared was actually 30 meters away from the river banks. Water sources especially water springs were also observed to ascertain whether eucalyptus had been cleared to restore water supply to the community.

### **3.6 Validity and Reliability**

To ensure the accuracy and consistency of the research instruments used, the researcher pre-tested the interview schedules with a few key informants and a few farmers. The questions that were not clear were made clear to obtain the desired data while those that were not meeting the objectives of the study were not incorporated.

### **3.7 Data Collection Procedures**

The data collection was both primary and secondary where the researcher conducted interviews in four FGDs, key informants, books and journals. Field notes were also taken and coded for analysis. The research also used one research assistant who recorded the discussions using a tape recorder.

### **3.8 Data Analysis and Presentation Techniques**

Data collected was analyzed using qualitative technique. The data was analyzed in a systematic manner in order to draw useful conclusions and recommendations. From the information gathered, the researcher established patterns, trends and relationships for systematic analysis of the data.

The data was also analyzed thematically in terms of; the knowledge of both key informants and farmers about environmental concerns at the research site, how they acquired the information and how the information had impacted on them in terms change of attitude to adopt what they had been taught-cutting down the eucalyptus trees to conserve water.

### **3.9 Conclusion**

The research methodology that the researcher used to collect data was primary in nature as interviews were conducted at the field while secondary data was collected from books and journals. It was fitting because what the interviewees discussed was gauged against what was written in the journals in order to provide comprehensive findings for the study.

## **CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION**

### **4.0 Introduction**

This chapter presents the findings of the study and subsequent analysis and interpretations to show the role of communication in addressing environmental concerns at the research site. The researcher provides a detailed account of the findings from the key informants, focus group discussions and the observations made during the study. The chapter therefore revolves around the knowledge the community has on the environment particularly the eucalyptus tree and its environmental concerns, the communication forms used to pass the information to the community and whether the information had any impact on forestry and farming practice in the area.

The presentation of data collected from key informants, has been organized in terms knowledge, how it was communicated and levels of implementation of conservation program after sensitizing the community. Data from the FGD was also presented in terms of how much knowledge they had in environmental conservation, environmental concerns at Nyanturago Water Catchment area, how they received it and the impact it has had in the community.

### **4.1 Environmental Conservation Knowledge of Key informants**

The first objective was to find out the knowledge that the key informants had on the environmental concerns at Nyanturago Water Catchment area.

#### **4.1.1 Environmental Concerns at Nyanturago Water Catchment**

The Kisii County NEMA Director Mr. Samson Bokea (August 2013), said, the wetland has been encroached and residents have sub-divided the land amongst themselves for agricultural activities while eucalyptus is grown rampantly despite the fact that the community had been and are being told about its dangers. He further explained that Eucalyptus had been allowed to invade the area because it is easily propagated by the farmers though it has brought about water scarcity in the area especially in River Nyanturago where water volumes have reduced while four springs had dried up.

Rivers and streams of water had reduced because of the eucalyptus menace and the wetland had been interfered with thus destroying the ecosystems. Sub-County Agricultural Officer concurs with the NEMA and said, Kisii may not have reliable water supply in the near future due to the rampant growing of eucalyptus not only at the Nyanturago Wetlands but also in the Sub-County at large.

*“Kisii will not have reliable rivers in ten years’ time because eucalyptus trees are competing with the residents in using the water,”* he said.

Kisii Sub-Region Water Resource Management (WARMA) Coordinator Mrs. Josephine Oyaro said, water sources especially springs are running dry and that is why they have formed Water Resource Users Association (WRUA) to protect waters resources in the area by cutting down eucalyptus that has been criticized for drying up some spring at the water catchment area.



Kisii County Forest Services Director who is also known as County Ecosystems Forest Conservator Mr. Gilbert Imbwaga said the wetland which was under the trustee of the defunct Gusii County Council had 864 hectares of land under its care. But proper demarcation could not be identified because, 200 hectares were donated to Kisii University for development, 400 hectares were dished out to tea factories to plant eucalyptus for curing tea in their respective factories while four schools and seven churches were also allocated unknown amount of land for their use. He said the rest of the wetland has been massively encroached destroying the ecosystem in the area.

The Kenya Forest Services (KFS) Deputy Director of Forest Extension services Mr Patrick Kariuki said, the department has produced a book to give guidelines on the growing of eucalyptus not only at Nyanturago but the country at large. Likening eucalyptus tree to a Friesian dairy cow, Mr. Kariuki quipped,

*“You cannot vilify a Friesian cow that consumes a lot of water and pasture and in return gives a lot of milk for your consumption and surplus for sale.”*

He was of the view that, while it is a fact that eucalyptus consumes a lot of water and efficiently converts it into biomass to meet the domestic use and surplus for sale, it should not be demonized. It should instead be grown according to the guidelines they had given in their book to farmers. The Kenya Forest Research Institute (KEFRI) that conducts research on trees and forest products concurs with KFS and says the problem is not the tree but where it is grown. KEFRI has also written a book (Oballa et al 2009) to demystify the scaring knowledge that people have on eucalyptus trees.

The key informants comprising government departments and researchers had a wide knowledge on the environmental concerns in the area but it has not been harmonized to enable them read from the same script and develop consensus. Uniform knowledge on eucalyptus trees is important in building a common front towards environmental concern at the water catchment. Some key informants have a lot of information about the wetland while others seem to know a small bit of it. A wide understanding of the wetland will enable all the key informants who are in one way or another linked to the wetland to help them develop a common strategy to approach the concerns.

#### **4.1.2 Environmental Concerns that Eucalyptus Trees Pose Along River Nyanturago and the Water Catchment Area**

NEMA County Director said, Nyanturago residents complained about lack of water in the community as the volume of the water in Nyanturago river reduced and some springs either yielded very little water while four others dried up. During dry spells, water becomes very scarce forcing the area residents to travel long distances in search of clean water for domestic use. NEMA conducted a survey with the assistance of Dr .Kennedy Ondimu Iyega, to find out the cause of the problem. The findings indicated that the problem was the eucalyptus tree that had consumed water thus reducing water volume in rivers and springs in the area.

County Ecosystems Forest Conservator said, eucalyptus has the tendency to take in a lot of water leaving the ground dry. It also interferes with the water table as the eucalyptus tap roots go deep into the earth`s surface to look for water. Water therefore disappears

from the earth surface as the water table is lowered making crops near the eucalyptus tree to dry up. He said, crops with shallow roots cannot therefore compete with the eucalyptus trees which have advantage over the other crops. Kisii Sub region WRMA coordinator said,

*“meri yemeringamu nigo ekorasa buna ensara korigia amache” meaning eucalyptus roots shoot like an arrow in its quest for water.”*

She further said that a fully grown eucalyptus consumes about 75 liters of water per day and observes that it was dangerous to grow the eucalyptus along the river banks, water catchment areas or near water sources.

Kisii Sub-county Agricultural Officer said that many complaints at the water catchment area and other surrounding areas include boundary disputes occasioned by the eucalyptus tree. He said Eucalyptus trees planted along the boundaries to separate one farmer from the other, have made farmers to quarrel because the area beneath the eucalyptus trees become dry and unproductive as the eucalyptus does not allow any plant to grow near it.

The Agricultural Officer said, he refers such complaints to the Kenya Forest Services (KFS) officers for arbitration. Apart from the massive consumption of water by the eucalyptus tree, he said that the trees cause conflicts among neighbors as crops grown on either side of the boundary do not do well because eucalyptus affects their growth and production. According to the research done by KEFRI in the Western Kenya Region (Nyambati and Oballa, 2002), such disputes are common in the region and are usually solved when the affected farmers make an agreement to harvest the trees in turns so that each one them benefits.

Nyambati says when a farmer harvests one tree from along the boundary; the next tree is harvested by a neighbor regardless of who planted it because the tree feeds from either side of the boundary. This minimizes the boundary disputes but the area beneath the trees will not allow any crop to grow and this becomes a problem if one farmer wants to grow a different crop from what a neighbor grows.

All the key informants know that eucalyptus trees have an effect on the environment despite the economic importance. How to balance between the economic value and the negative impact of the tree is however a problem to the key informants because some get biased and emphasize more on its economic value. Also note that due to the scarcity of land at the research site, the only place available to grow the trees is either towards the end of a farm usually near rivers or water springs. Planting the eucalyptus trees to separate individual farms is a crisis in waiting. Due to the scarcity of land, the farmers have no option other than planting the eucalyptus trees to demarcate their boundaries but it is not sustainable owing to the aggressiveness and invasive nature of the tree that has already been criticized for massive water intake.

Studies conducted in Canada (Meryers et al, 1992), attests to this fact that eucalyptus is a heavy consumer of water as it consumed 22 per cent more than the Pinus. And in Egypt Punkhrust ( 2001), says, Emperor Menelik issued a decree in 1913 to uproot all eucalyptus tree because it was found out that the eucalyptus trees consumed so much water that they were going to make the area dry.

Therefore the effect of eucalyptus tree on water sources cannot be underestimated. A Bold step is therefore necessary to save waters sources from extinct. Another study by Calder et al (1997) and White et al (2002) reported that the roots of the eucalyptus penetrate into deeper soil layers and extract water from reservoirs. Robertson (2005) also observes that when eucalyptus and other alien trees were cleared from river systems, the flow of the river was restored to normal within a decade indicating that ground water accumulates and springs up to restore the water volumes in rivers. Scot and Welch (1996) reported similar experience in South Africa at Mokobulan Region where the eucalyptus dried up the stream after some years. After trees were felled, or cleared, the stream flow returned to normal after five years, Oballa (2010). Note that the communication component has not been integrated into the Nyanturago project to convince the farmers so that they could act voluntarily because the effects of eucalyptus are real.

#### **4.1.3 How They Knew About the Concerns**

All the key informants agree that they learnt about the concerns from research conducted in the area and elsewhere in Kenya and beyond, books, workshops, seminars and scientific research conducted by research institutions such as KEFRI. It is also important to know that when farmers complained about lack of water in the area, the relevant authorities such as NEMA went to the ground to find out reasons for the discontentment and discovered that the problem was brought about by the many eucalyptus trees grown along the river and water sources. Some of the information was through observation as key informants such as WRMA also went to the site and made observations and drew conclusions to the effect that the many eucalyptus trees were the source of the water scarcity.

#### **4.1.4 Sources of Communication on Environmental Management and Conservation Through De-forestation of Eucalyptus**

The NEMA County Director said that his department was responsible for the communication of the messages to the Nyanturago community and elsewhere in the county. They disseminated the information through public barazas, during public holidays and during the annual World Environment Day. They also disseminated the information over the radio where they aired programs at Egesa FM vernacular Radio station at 9.00 am. He said, about four sessions were done before it stopped indefinitely due to lack of funds.

They also used the chiefs and assistant chiefs to convey the message about the eucalyptus. And, in order to remain closer to the community, they constituted Nyanturago River rehabilitation project to spearhead the rehabilitation of the River whose extinction was imminent. A Site Management Committee was put in place comprising 11 members headed by Mzee Elijah Nyabiya Anyona as the chairman to enhance the propagation of similar messages to the farmers.

The activities of the rehabilitation were however limited to the availability of funds and when funds were not availed by the NEMA headquarters, environmental conservation activities grounded to a halt. When NEMA started clearing eucalyptus trees from the Nyanturago river, lack of funds delayed the implementation program and, even when the clearing started, it stalled for a while when funds were exhausted and this forced the county director to have the project implemented in two phases.

The Ministry of Agriculture also communicated the information to the public. It implements programs in collaboration with the office of the president-County Commissioners and Regional Commissioners but was categorical that the Nyanturago Water Catchment Project was being implemented by NEMA. The Water Resource Management Authority also disseminated the information on how to conserve the environment and undertook activities to sensitize the community on the need to protect water sources to ensure constant supply of clean water at all seasons. “We are given the funds to carry out the activities and when funds are exhausted, we get stuck,” WRUA said. The departments charged with the responsibility of dissemination the information depended solely on the funding from the donor agencies. Once the funds got exhausted, the activities also stalled indefinitely until more funds were allocated. This means that such activities could not be sustainable because the affected persons had not been incorporated into the environmental conservation program.

Environmental conservation communication was vibrant when funds had been allocated to the project but as soon as the funds were exhausted, the project was forgotten until funding resumed. Those concerned with environmental conservation activities rarely visited the project site because there was nothing they could do without funds. When the researcher asked one of the key informants to accompany him to the field during the survey, he said

*“These people are just after money and you may not conduct even your research without giving them money.”*

However, when the researcher went out, he gathered the data without being asked for money from the participants especially during the FGDs. This indicated that the people had been misunderstood and that they could do nothing to conserve and manage their environment unless they are given money.

The people charged with the responsibility of passing the information to the target groups had offered monetary rewards to influence them to work during the environmental conservation initiative and the commitment to such program dwindled when funds were exhausted. Due to the dangers posed by the eucalyptus, halting the activity means aggravating the problem. It is important to ensure that strategies of passing information to the community are sustainable by delegating them to the community concerned. In doing so, the sensitization will continue with or without the funds and once the community owns the project; they may not even need the funds but spread the message for the good of the entire community.

#### **4.2 The Reception of the Message**

When messages were conveyed, they were received differently by different receivers and interpreted differently to suit their diverse needs. It is therefore the receivers who choose what to listen to and what to receive and because human beings are rational beings, they feel comfortable with the choice they make and associate themselves with it.



#### **4.2.1 How the Rehabilitation Information was Received**

The county Director of NEMA said, the information was received well because the organization was able to cut down the eucalyptus trees along the Nyanturago River. The trees were cut and the market was sought for them to sell the felled trees to avoid loss. He said NEMA facilitated the cutting of trees so that farm owners who were unable to cut the trees were not involved since the exercise required resources to do so.

Mr. Bokea said to make them accept the message; they had to use the fear appeal to show the seriousness of the eucalyptus trees and need to cut them down.

The message is *“you are going to miss water soon if you do not cut down the trees from the river banks.”*

However, there are those who never received the message well because the eucalyptus is of great economic importance to them. The trees had to be cut down to pave way for the growing of the indigenous trees so that water in the river and water springs in the Water Catchment area could be restored. County Ecosystems Forest Conservator said, Forest extension officers are expected to provide the information to the farmers but they are few meaning it became difficult to reach the farmers. He said his department does not facilitate the cutting of trees but gives the mandate to the individual farmers to cut down the trees out of their own volition.

To reinforce their message, the department also uses fear appeal to the effect that “the rivers in the area will dry up soon if they do not cut down the trees.” The scary message forces the farmers to cut down the trees. Those who do get scared with the message of course continue with their normal activities waiting for any eventuality.

The Water Resources Management Authority through the WRUA is also charged with the responsibility of disseminating the message to the affected community. The WRUA was provided with the funds to protect springs and during their meetings, they sensitized one another about the environmental conservation issues and how to deal with the eucalyptus tree that had been described as a menace along rivers and at water catchment areas. The individual farmers then cut down the trees out of their own volition but not through coercion. The department of Agriculture said the farmers received the information well but they needed an alternative to the eucalyptus that they cherish. They were ready to cut down the trees but they needed an alternative that could equally bring them the much needed income.

To enable farmers take the message seriously and receive it warmly, the Agricultural Officer gave the farmers fish farming as an alternative to growing the eucalyptus trees. To protect riverbanks after cutting down the eucalyptus trees, the Sub County Agricultural Officer said he encouraged the farmers around the area and elsewhere in the sub county to construct fish ponds near the rivers to grow fish. The Agricultural Officer used “Njaa Marufuku Program” in his department to influence farmers to cut down the trees along river banks and instead start fish farming which he described as more paying within six months than the eucalyptus trees that take at least five years to be ready for harvest. “Farmers took it up with gladness but due to limited funding, we were unable to continue with the program,” he said.

Despite the fact that residents of Nyanturago area come from similar cultural background, they received and interpreted the message differently. Depending on the importance they had already attached to the eucalyptus over the years, they acted to suit their desires. The fear appeal used to scare the farmers was not sustainable because due to the frequent rainfall in the area, they had not experienced dry rivers though water volumes had reduced. Use of persuasive communication to articulate issues will be of immense benefit to them.

#### **4.2.2 Whether the Ministerial Directive to Eradicate Eucalyptus Trees has been Implemented Satisfactorily at Nyanturago Riparian land.**

County Director of NEMA said the directive had been implemented as required because the 15.4 kilometer stretch from Kiemenyinga to Nyakondiye had been cleared of the eucalyptus and indigenous trees planted. He rates the achievement at 100 per cent because all the work he was expected to do had been accomplished.

The Department of Agriculture and the county Director of Ecosystems and Forest Service's Conservator said the work was facilitated by NEMA because they were not incorporated into the program as all arrangements had been made by the department. They did not involve them in the planning of the whole process as they only came in to sort of endorse what they had already been planned.

The funds had already been availed and “they just informed us” of the program and requested for support. “If they did not involve us in the planning and the mapping out of the targeted areas, how do we get involved in the implementation,” they wondered. They said, there was no center of coordination on the ground as the department implemented the project without involving other related sectors. The Agriculture department anticipated that the Agricultural Sector Development Support Program (SDSP) would bring all sectors together to deal with cross cutting issues such as environmental conservation and management in the area and elsewhere in the country.

Response from key informants clearly indicated that it was only NEMA that participated in the rehabilitation of Nyanturago River. And because the other departments were not involved in the planning, they could not engage in the implementation of a program they did not understand fully.

While it is true that the Agriculture Department has a regulation that prohibits farmers from cultivating on the riparian land and allows them only to do farming 30 meters away from either side of any river, they were not involved in the demarcation of the riparian land.

So, NEMA went ahead with the implementation because it was their project as the other departments were only made aware that such a project was going on. When all the departments converge to communicate to the farmers about problems affecting them and how to tackle them, the target group is likely to understand and respond accordingly for the good of the affected community.

### **4.3 The Effect of the Communication at the Nyanturago Water Catchment**

The effect of any communication campaign is the response the receiver gives to the communicator and the changes made in response to what the message required of them. Communication is therefore expected to change the attitude and the behavior of the community targeted in order to make their lives better.

#### **4.3.1 Achievements Made at the Water Catchment as a Result of Communication to Conserve the Environment**

NEMA County Director said the program that started in November 2010, ended in May 2013 with what he described as outstanding performance because in the first phase that covered nine kilometers, they planted 50,000 tree seedlings while in the last phase that covered 6.4 kilometers they planted 52,000 seedlings. The trees planted include *gravalia*, *casolina* and pine among other indigenous tree species.

Though he rates the achievement at 100 percent, the main challenge he said was that when the trees were cut, a lot of pasture grew and the farmers released the livestock to graze and in the process, they destroyed the tree seedlings. He said that NEMA employed people to cut down the trees and they did it as required. They had also employed 40 people to plant the tree seedlings which they had bought for them to replace the eucalyptus trees that were cut down. This means that the issue of resistance did not arise because they used the directive to make them accept.

Since the departments of Agriculture, KFS and KEFRI among others were not involved in the implementation, they had left everything to the NEMA to do what they had planned without any interference. The NEMA was just satisfied with the achievement and expressed readiness to implement the project elsewhere if funds could be availed to his department.

Farmers lamented over the tree seedlings that were destroyed by the livestock and those that did not survive after being planted during a dry season because NEMA had not put in place mechanisms to buy more seedlings for replanting. As the program came to an end, NEMA expressed hope that the affected farmers could replant the trees. However, the likelihood of the farmers to replant the eucalyptus tree is irresistible. This is because; eucalyptus trees do not need a lot of care. Once planted, the production goes on over a long period because it coppices-regenerates once it has been cut unless the tree stumps are treated with *magadi soda* to inhibit regeneration.

#### **4.4 FGD- Environmental Conservation Knowledge the Farmers had**

Awareness creation is the first step towards gauging whether the information reached the targeted people. On the other hand, individual experience by virtue of living in the community could provide a wide knowledge on the subject area under study. Participants in Focus Group Discussions were given an opportunity to express themselves on what they knew about the environment though they were unable to explain what environment meant in vernacular-*Ekegusii*. But they understood generally what environment was all about and what environmental degradation entails.

#### **4.4.1 Environmental Concerns Found at Nyaturago Water Catchment Area**

Participants in the FDGs conducted agreed that the water levels in rivers and water springs had gone down because of the eucalyptus. They explained that volumes of water in big rivers such as *Chirichiro*, *Gucha* and *Nyanturago* had reduced drastically as result of planting the eucalyptus along the rivers. Notable features that existed but now operates at a low ebb include waterfalls at *Nyakwana* (*Ekeera kia Nyakwana*) along River *Gucha*, a water fall at *Maseses`* along *Chirichiro* and another water fall at *Nyakundi`s* place.

*Participant 1: "Water used to make a lot of noise as it hit the bottom of the water fall but now you do not hear it anymore because water levels have reduced drastically."*

Livestock find problems of accessing water downstream because water volumes continue to dwindle while some residents travel over long distances to draw clean water for domestic use. At *Kiemenyinga*, the FGD explained that water springs at *Ayuka`s*, *Ontiri`s* and *Kabesa`s* had dried up. It forces women to travel over long distances to fetch water and waste a lot of time while looking for the precious commodity.

*Participant 2: "When I go to fetch water from our water spring, it takes long to fill a twenty liter jerrican because water drops from the pipes of the protected water spring. So you have to patiently wait."*

The African mud fish that existed in those days was no longer available now because the wetland is already destroyed. Furthermore, herbal medicines used by herbal specialists to cure certain ailments were as well not found.

The first hand experiences they had encountered indicated that the community was aware of the environmental changes that had taken place over the years at the water catchment area. The farmers easily related the present with the past and agreed that things were changing for the worst as resources especially water had become scarce while the wetland was extinct.

#### **4.4.2 The Farmers` Awareness of Environmental Impact of Eucalyptus Trees on Water and Wetlands in the Area**

Even before the farmers were told that the tree had an effect on the environment, they had first had experience on the effect of the eucalyptus tree on their farms. Their intelligence should therefore not be underestimated. They could not explain the effects scientifically but they could somehow explain to bring out their point of view from a layman's understanding. When the farmers were asked whether they were aware of the effect of eucalyptus trees on water and wetland, they responded that when one plants eucalyptus near a tea farm, tea bushes near the eucalyptus trees get dry because the eucalyptus has an advantage over other crops. Long roots of the eucalyptus tree unfavorably compete with tea which has fibrous roots that do not go deep into the soil.

The FGDs also observed that water springs that used to be permanent had dried up at the onset of a dry spell. They were told by NEMA that it was the effect of the eucalyptus trees planted at the water sources and along the rivers in the area. The majority agreed that it was eucalyptus that brought about water scarcity in the area.



*Participant 10: "It is true that when eucalyptus was planted in the wetland, all the water disappeared and now we can comfortably build on the swamps because the soils are strong and firm."*

Farming activities that never used to be done on the wetland are now possible. It was not possible to walk across the swamp but because of the eucalyptus, the soil was now able to bear any weight unlike in the past. Another participant supported;

*Participant 5: "Eucalyptus takes in many gallons of water per day and if it is allowed to grow near water sources or near the rivers, it can drain them."*

Yet others said, the firmness of the swamps was as a result of trenches or water channels which had been dug to drain water out of the swamps.

*Participant 30: "The eucalyptus is being criticized for nothing because the tree is quite beneficial to us. It does not consume water as some people claim because there is still water in our rivers."*

From the responses given during the FGD, not all community members at the water catchment area agreed that eucalyptus had negative impact on water sources. The reason could be that those who argued for the idea had genuinely been convinced of the impact and were ready to change while those against the idea needed more time to be convinced because they would like to wait and see what others were doing. If the initiative succeeded then they would join the rest of the community members. The duration they would take to be convinced may not be known but laggards would rather wait and see before they internalize and adopt an idea.

#### **4.4.3 How the Farmers Got the Information about the Environmental Concerns in the Area**

The farmers were also asked how they got informed about environmental problems associated with eucalyptus tree and they were quick to point out that when NEMA gave them information about the dangers of the eucalyptus, they agreed with the department because the impact was already felt by the community. The major question was however how they could cope up with the situation if they did away with the eucalyptus they had cherished over many years due to its economic importance and fuel wood provision.

Some of them said they got the information over the Royal Media Services- Egesa FM which is a radio station broadcast in *Ekegusii* language. However, others said, the timing was wrong when NEMA program was being aired at 9.00am because people were already in farms while the 9.00 pm could be accessed by some of the participants. Other participants said, such messages used to be passed on to the community in chief's barazas. Yet others said, they had not been told clearly about the environmental concerns in the area and how to mitigate them. This is because some of them never had an opportunity to attend the barazas or listen to the radio program for that matter.

The farmers response clearly indicated that NEMA made an assumption that four radio broadcast sessions over Egesa FM and announcement in chief's barazas, every community member became aware automatically which was not the case. Some members missed both channels because of the social and economic commitments they engage in.

Efforts should therefore be made to meet them in other fora such as merry-go-round gatherings or *Chama* and even during church services on Saturdays and Sundays.

#### **4.5 The Reception of the Message**

The study also interrogated how the farmers received the message from the key informants and media about eucalyptus and its effects on the environment.

##### **4.5.1 How They Received the Message**

The farmers said they received it well and were thinking what to do to reverse the trend. But, NEMA went ahead to cut down the trees without further consultation with the farmers. NEMA had received the money from Nairobi and they wanted to use it. They employed people who cut down the trees.

*Participant 25: "I was in the church on Saturday and when I came back for lunch, all my trees had been cut down," The woman participant lamented."*

Another participant interjected,

*Participant 29: "Why do you (NEMA) cut down eucalyptus trees along the river and not the ones at the source of the river? Is cutting the eucalyptus trees constitutional? I need someone to tell me. You have really hurt us."*

It was a bitter experience for some of the participants who were shocked when the trees were cut down by NEMA. They told the chairman of Nyanturago River rehabilitation committee that they were angered by the cutting of eucalyptus.

*Participant 15: “We could have beaten you up when you cut down our trees...but because you are one of our own, we just shelved the idea.” A Male participant expressed his anger.”*

Others said, eucalyptus tree was their source of livelihood and cutting it down was a big mistake. It had become difficult to access food and money for various activities. And when the trees were cut down, NEMA employed about 40 casuals to plant indigenous tree seedlings.

*Participant 35: “It is clear that the people employed were interested in putting the trees into the holes without applying enough soils while in other situations, they could not remove polythene bags before planting. It is unfortunate that, NEMA brought the trees when rains had subsided and the result was disastrous as most of the planted tree seedlings dried up. You think we could be happy that NEMA had bought seedlings and planted them to replace the cut trees? Far from it, we are not happy because the casuals employed were after the money but not the welfare of the community at heart.”*

Some wondered why NEMA could not give them the seedlings individually to plant instead of involving second and third parties. They felt belittled as if they were not mature enough to take care of the seedlings.

*Participant 18: “Why can’t they give us the seedlings and come after a while to check the progress instead of spending a lot of money to employ casuals who could not continue taking care of the seedlings until maturity?”*

The anger portrayed by the participants indicated that the approach used by NEMA did not take cognizance of their views and their beliefs and practices. The farmers detested the unwelcome approach NEMA used to indiscriminately fell eucalyptus trees and subsequent planting of indigenous tree seedlings to replace those that were cut down.

According to the participants, if indeed NEMA wanted to spend the funds, they could have delivered the seedlings during the rainy season and commission the affected farmers to plant them. And if they deemed it fit, they could have given them the funds they used to employ casuals so that the farmers could use it to even water the seedlings in case of dry spell and care for them to maturity. The community did own the project because NEMA cut down the trees and planted seedlings which the affected people thought, the organization could care for them until they matured. Ownership of any project is important for its sustainability and in this case the rehabilitation Nyanturago River to restore its water. To achieve this, communication must play a crucial role in building a common understanding among all actors at the water catchment.

#### **4.6 The Impact of the Communication**

The study further examined the effectiveness or impact of the communication on the lives of the farmers and whether the farmers put into practice what they had been told by the environmental conservation and management experts.

#### **4.6.1 How the Information Helped Farmers to Practice Environmental Conservation Activities at the Water Catchment**

The farmers were also asked whether the information they had acquired helped them to engage in environmental activities at the Water Catchment area but the crucial question that the participants asked was,

*Participant 6: “What else are we expected to do when NEMA has cut down our eucalyptus trees and planted indigenous tree seedlings on our behalf on our own farms?”*

The farmers decided to wait and see how the things unfold because the project had come to an end. In other words, the farmers were never given time to think and decide what to do as everything had been done for them.

The tree seedlings they delivered and planted had dried up and they appealed to NEMA to send another consignment during the rainy season. The residents had not taken the initiative to look for the seedling because NEMA took care of the purchase and the planting without committing them. The information was important and they could have put it to practice were they given time to do so. They could have even watered the seedlings in case the failure of rain if NEMA empowered them financially instead of employing casuals who were interested in getting the money but not the interest of the environment, the participants responded.

*Participant 2: “Otherwise, some of the tree seedlings they planted in our farms are mere shrubs and trees for sheds which may not help us much in building and even for commercial purposes.”*

For effective communication, the farmers needed time and free hand to put into practice what they had been told. The diffusion of innovation theory articulates that the spread of a new idea requires time to spread so that the target community internalizes the idea to make an informed choice. In the case of Nyanturago Water Catchment, NEMA undertook all activities including the purchase and planting of seedlings as the farmers sat back and watched. The farmers were therefore not attached to the program. The participants indicated that they ought to have been allowed to plant seedlings in their farms but not other people to plant for them. The cultural aspects should have been put into perspective and farmers privacy respected. Culturally, it is the owner of the farm who looks for someone to assist him in his farm and if somebody gets him one, the farm owner sets terms and conditions before the person starts working. But in the case of the rehabilitation project, the farmers saw people in their farms planting the seedlings and could not understand as the act amounted to trespass.

#### **4.6.2 The People the Farmers Said Should Be Giving Them Information**

The participants responded that Chiefs and assistant chiefs were in better position and had the capacity to pass the information to them. They said they had put them in those positions to give them information on all aspects including environmental conservation.

#### **4.6.3 Any Other Way the Farmers Considered Effective in being Communicated To**

When the farmers were asked how they would like the information to be passed to them, they said, there was need to consider passing the information also through churches because many people missed public barazas which NEMA gave the priority.

Since church worship was a weekly event, using the clergy to pass the information was important because people rarely miss attending church worship services on Saturdays or Sundays. They said schools should not be ignored because the pupils will be made aware of environmental conservation early in life while teachers as elites in the society were able to read and interpret information for the less educated. The children were important members of the society who should not be ignored, they noted.

The participants had seen the gap that some important members of the community had not been fully incorporated into the program. While it is unfortunate that the program had come to an end, it is important to use churches and schools in disseminating information to other members of the public. They should be incorporated in future programs to galvanize environmental conservation and management activities in a sustainable manner.

#### **4.7 Observations**

Nyanturago water catchment has numerous environmental concerns. The streams were becoming smaller; some springs were on the verge of extinction while others had dried up. A 20 liter jerrican takes about 20 minutes to get filled up unlike in the past when it could take less than a minute. Those who draw the water especially, the women take long fetching the water. After the first two FGDs, the third discussion group was charged as there were more people than the previous groups. The participants vented their anger on the chairman who had accompanied the researcher.



They put him to task to explain why he had not informed them of the indiscriminate felling of eucalyptus without prior information. This indicated that some sections of the community did not get the information thus creating resistance against the rehabilitation of the water catchment area. After the last discussion group, an 80- year old grandmother in a frail voice begged to speak and said,

*Participant 40: “You can now go but remember that getting clean water for domestic use is a big problem here. Remember us please when you go.”*

The forlorn voice is reminiscent of the long journey the grandmother has to make to fetch water because water springs around her home had dried up. It is a nerve wrecking experience that requires agent attention. She is not the only one but spoke for the majority.

#### **4.8 Conclusion**

Awareness about environmental conservation especially as pertains the eucalyptus trees and their positive and negative effects has been made. It is important that those who provide such information incorporate all relevant actors including communication experts to develop communication strategies which will create harmony to achieve desirable environmental conservation and management change.

## **CHAPTER FIVE: SUMMARY OF FINDINGS AND RECOMMENDATIONS**

### **5.0 Introduction**

The study sought to know the role communication plays in addressing environmental concerns at Nyanturago water catchment area in Kisii County. Environmental Communication was found to be crucial in addressing environmental concerns in the country and need to be approached with a lot of tact. This would enable communicators to reach the target audience with a view to create a desired change and improve the wellbeing of the affected community. This chapter therefore gives a summary of the key findings of the study in terms of knowledge, utilization of the knowledge and impact.

### **5.1 Summary of the Key Findings During the FGDs**

The study interrogated the knowledge farmers and key informants had on environmental conservation especially of eucalyptus trees that have been criticized for consuming a lot of water which threatens to create an environmental crisis.

### **5.2 Knowledge the Farmers had on Environmental Conservation**

The study found out that the residents had acquired a lot of knowledge on environmental conservation especially about eucalyptus tree that has been criticized for the drying of some springs and reducing of water levels in rivers at the Nyanturago Water Catchment Area. The information was received from many actors among them NEMA, KEFRI, Ministry of Agriculture and Water Resource Management Authority (WRMA). They either disseminated the information physically to organized groups or in public barazas. Chiefs and assistant chiefs were also used in the dissemination of the information beside the print and electronic media. It is however interesting to note that the information they

had was not harmonized. This was evident in the directive that the former Environment Minister the late John Michuki gave to uproot eucalyptus from along the river banks. The KEFRI and KFS dismissed it as misplaced and described it as blanket directive which did not have a scientific basis. The directive was ignored and instead, the two organizations published guidelines on where and how to grow eucalyptus instead of demonizing it. The farmers were put in an awkward situation, to obey the directive or ignore it. It is therefore important to give definite information to the target group to avert any confusion that may interfere with the reception of the message.

There was no collaboration among the main actors in the dissemination and implementation of the project at the water catchment area. Some actors accused NEMA of making all plans to rehabilitate the Nyanturago River and only invited them for a meeting to endorse and support the plans they had finalized. It was therefore difficult to support the project they were not privy to. A deliberate effort should therefore be made to involve all actors in the relevant departments and organizations to forge a common front in tackling environmental issues.

Due to the limited number of forest extension staff at the county level, it was difficult to pass information to farmers and address any concerns raised at the farm level. The government (both National and county governments), should consider employing forest extension staff to assist farmers overcome problems of establishing forestry.

Time given to the dissemination of environmental concerns, was limited due to lack of funds. Constant dissemination of information is crucial for effective communication because the target audience would like to be reminded frequently about growing eucalyptus trees away from water sources to enable them change their attitudes. Communication is crucial in achieving any desired change in society and when it is curtailed due to lack of funds, it will not achieve its intended purpose. Adequate resources should therefore be set aside to fully fund communication strategies for any program.

### **5.3 How Farmers Utilized the Information they had on Environmental Conservation to Grow Trees**

When the researcher interrogated how the farmers utilized the knowledge they had received on environmental conservation especially on forestry, the study revealed that despite the fact that many farmers had information about the environmental dangers of growing eucalyptus trees along Nyanturago River, NEMA had taken the initiative of buying the seedlings and planting them on behalf of the farmers. The farmers had therefore very little to do because everything was done for them. It was however sad to note that the seedlings were delivered when rains have subsided but the casuals employed by NEMA went ahead and planted them while knowing very well that they could not survive. Many seedlings dried up and the farmers had requested NEMA to once again deliver the tree seedlings. NEMA did not involve individual farmers to be responsible for the cutting of the eucalyptus trees planting of the indigenous seedlings to replace the felled trees.

#### **5.4 How the Information had Changed the Community**

Asked how the information had changed their attitude and behavior, the farmers responded that they were not given time to digest the ideas advanced to them on why they should cut down eucalyptus along the river banks. NEMA had given them the idea and suggested the action to take without considering their input. They also said that since the trees were cut down, they had not experienced a remarkable improvement in the increase of water volumes in the river and the water springs in the area. The farmers did not know how long it would take to restore water volumes in the river and springs of water after clearing the trees. They could therefore not adopt the idea without such facts conveyed to them.

#### **5.5 Summary of the Findings During the Interviews of Key informants**

Key informants were the main communicators of the information on environmental conservation to the Nyanturago community. Due to their frequent involvement in environmental conservation activities, they were useful in the study in terms of knowledge and how they communicated the same to the community.

##### **5.5.1 Knowledge of Key Informants about Environmental Conservations**

The study found out that the entire key informant had a wide knowledge on environmental conservation and were responsible for the dissemination of the information to the community. They understood all the environmental dangers posed by the eucalyptus trees because they had and continue acquiring the information from research findings and workshops.

### **5.5.2 How the Information was Received in the Community**

The researcher interrogated how the information was received in the community and found out that Key informants gave the information but did not reach all the targeted people. And because only NEMA implemented the Rehabilitation project, the other key informants were not incorporated and therefore did not participate in the project implementation. Farmers therefore singled out NEMA as the owner of the project while the rest did not get concerned with what was happening at the Water Catchment Area.

### **5.5.3 The Impact of the Information on the Farmers**

When the researcher examined the impact of the message, the farmers had not changed their attitude because NEMA had taken up the responsibility of cutting the trees on behalf of the farmers while KFS advised that the farmers should cut down the trees out of their own volition but not through coercion. When the Former Minister Michuki issued a directive to cut down the Eucalyptus trees, KEFRI and KFS did not approve of the idea and this left the farmers confused. The information of environmental conservation and in this case eucalyptus trees should be uniform so that farmers could make informed decisions.

## **5.4 Conclusion**

The first objective of the study was to find out the environmental knowledge the people had on eucalyptus and its effects on environment and water sources. The study found out that farmers had information on the effects of the eucalyptus through experience because they had been growing the tree over a long period of time.

Their knowledge was reinforced by what the environmental experts told them. It is therefore important to provide the farmers with clear information to enable them make informed choices instead of giving them conflicting information that left them in a dilemma.

The second objective was to determine the forms of communication used to convey information on eucalyptus trees and environmental conservation at Nyanturago Water Catchment Area. The forms of communication used as the study found out, were not adequate because communication experts were not involved in the planning process. Sustainable communication strategy had not been put in place to ensure that all the farmers were reached and convinced on the next course of action.

The third objective was to determine the impact of the communication to the Nyanturago residents on the forestry and farming practices. According to the study findings, the residents had not been allowed to digest the information they were given and put it into practice because their trees were cut down by NEMA and the alternative seedlings they were provided with, failed to grow. Many farmers still grow the eucalyptus trees along the river banks despite the spirited campaign to eradicate them to restore the wetlands.

It was also found out that the defunct Gusii County Council which was a trustee of the wetland had dished out the land out to a number of institutions oblivious of the environmental crisis they would cause. This indicated that that there was no political good will in matters pertaining to environmental conservation and management.

Another finding that was interesting was that the top-bottom approach to environmental conservation and management was used at the Nyanturago Water Catchment Area. The farmers were not happy because the trees were cut without consultation while some of them were away. The tree seedlings to replace the cut trees were not planted in the right way and at the right time because the farmers were not involved.

## **5.5 Recommendations**

The study identified a number of areas that require attention to make future environmental communication effective and viable.

### **5.5.1 Recommendations for Policy**

1. Communication experts should be involved during feasibility studies, planning and implementation of projects to address communication aspects that will ensure sustainability of such projects.
2. All departments dealing with environmental related activities should establish a central coordinating committee to harmonize activities and communication strategies for the common good of the ordinary citizen.
3. Politicians should not be left out in the crusade against environmental degradation because as respected members of the community, they wield influence over the areas they represent and can therefore bring the much desired environmental changes.



### **5.5.2 Recommendations for Further Research**

1. There is urgent need for researchers to conduct a research on eucalyptus in Kenya so that uniform information is disseminated to the target groups instead of giving conflicting information from people considered by communities as enlightened.
2. The top bottom approach of dealing with community issues should stop so that the targeted communities get actively involved in the organization and dissemination of information.
3. There was need to conduct a research on environmental communication to address numerous environmental communication issues affecting communities in both urban and rural areas.

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## APPENDICES

### APPENDIX I

#### Interview Guide for FGDs

1. What environmental concerns are being found in this area-Nyanturago water catchment?
2. Are you aware of environmental impact of eucalyptus on water and wetlands in this area?
3. How did you get information about environmental concerns in this area?
4. Who was given these messages to pass to you?
5. Was the media involved in passing the information to you?
6. How did you receive it and why?
7. Have you cut down the trees as per the directive?
8. What motivated you to take that action?
9. How has the information helped you in environmental conservation activities at the water catchment?
10. Who do you expect to be giving you information about environmental conservation?

## **APPENDIX II**

### **Interview Schedule for Key Informants**

1. What are the environmental issues at Nyanturago water catchment area?
2. What are the environmental dangers caused by growing eucalyptus along river valleys, water catchment areas and wetlands in this area?
3. How did you know about these issues?
4. Who is responsible for communicating the information to the target groups at Nyanturago?
5. How is the information received by the target community?
6. Has the directive to uproot trees implemented satisfactorily?
7. To what extent have you implemented the project? Please give the rate of the achievement made.
8. What makes you feel that you have made the achievement mentioned above?
9. How many people have accepted the Project on uprooting the eucalyptus and why?
10. How many rejected the idea and why?