

# Role of Community Water Conservation in Taita Taveta County, Kenya

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**Abstract** - Environmental issues present some of the most profound and complex challenges requiring attention today and in the coming decades. Sensitizing people and expecting them to take action to counteract present environmental crisis is therefore quite urgent. The Rio Summit recognized the need for individuals, groups and organizations to directly participate in environmental conservation and to know about and participate in decisions which potentially affect the communities in which they live and work. Potentially promising interventions include those that build on the social resources that have been found to be particularly critical for the protection and conservation of the environment. This study focused on the role of one form of social resources—Community-Based Organization in household ability to conserve and protect water resources. The objective of the study was to assess the role of Taita Taveta Wildlife Forum in conserving water on household heads in Werugha Location, Taita Taveta county of Kenya. A descriptive survey design was adopted targeting house hold heads, heads of learning instructions, health officials and Community organization administrators from 120 out of 8046 residents in Werugha location. The researcher used both primary and secondary sources of data. Primary data was collected through administration of questionnaires, interview schedules and direct observations through visits to water sources and organization's office and teachers/administrators plus a checklist were used. Qualitative study was organized into themes, categories, and patterns relevant to the study by tabulation. Data collected was then organized and analyzed using statistical package for social sciences software. The results indicated that there was co-relation between level of environmental awareness and water conservation  $r = 0.582$ ,  $n = 120$  and  $p = 0.05$ . The higher the level of environmental awareness the more the concern to conserve water. The study revealed that there is need to fund, restructure and allocate more resources for its activities. Recommendations were made to the Ministry of environment and natural resources to in-service Community organization staff and evaluate organizations in communities. The study formed a basis for further research to establish contributions of Community organizations in the rest of sub-counties in Kenya.

**Keywords:** Biodiversity, Catchment Area, Community Organization, Indigenous Knowledge, Community, Conflict, Conservation Awareness, Institutions, Likert Scale, Livelihood, Mitigation, Natural Resources, Outreach Programmes, Policy, Sustainability.

## I. INTRODUCTION

### 1.1 Background

In 1992, the United Nations and representatives from 178 countries met in Rio de Janeiro to discuss the state of the environment and social/economic development and to craft a political course of action for these topics. The Rio Summit was the result of an identified need to develop more appropriate, sustainable strategies in addressing development. It stated, "There is the need for individuals, groups and organizations to directly participate in Environmental conservation and to know about and participate in decisions which potentially affect the communities in which they live and work" (UNESCO 1992).

Water is the most important resource available, particularly in forest reserves because trees in forests can trap more water than those in the dry scrub brush. While it is not valuable, its scarcity leads to many struggles. Catchment forest policy began developing in the 1980s to protect these important water sources (Rodgers 1993). Numerous different assets are accessible from water such as sand, medicine, fish, and wood. Many of these traditional resources are now within the borders of parks and secured zones. (Harcourt, Pennington, Weber 1986) post that "Several surveys have shown roughly the same numbers of people support protected areas and water while the others believe that protected areas should be used for agriculture; the same results were found in both Africa and the U.S." These investigations further demonstrated that a relationship between respondents' levels of education and probability of supporting secured regions, with lower educated people are less inclined to indicate support (Harcourt *et. al.* 1986).

There is developing worry that water policies and programmes might contribute aberrations in water supply. However, there is contradiction concerning which mix of water and non-water sector intercessions may best conserve water. Conceivably encouraging intercessions to incorporate those that expand on the social assets have been observed to be especially basic for the insurance and conservation of the environment. Social assets lie along

range, from unmistakable institutions for example enrolled community-based organizations (CBOs), through unregistered gathering of close companions, to the minimum noticeable familial relations.

Managing the environment requires investment in the local community for two powerful reasons say (EPA/USDA 1998) as the people are close to the resources. These reasons are: Firstly, Local activities affect the quality of the local environment and secondary

Community members for instance Werugha location have a common interest in protecting and improving their community's quality of life. This understanding has led both US EPA and USDA to promote environmental management via local decision making and voluntary compliance with regulations. It has also prompted these agencies to consider how they can better support these local processes and offer more effective environmental education to support them.

### *1.2 Community Based Organizations as Social Resources*

Across the globe, Social assets lie along a range, from unmistakable institutions, for example, enrolled community-based organizations (CBOs), through unregistered gatherings of close companions, to the minimum noticeable familial relations. Given that policies and programs are increasingly seeking to engage and utilize resources within civil society for water conservation (Loewenson2003), affiliations and gatherings past the ties of close family, regardless of whether enrolled or unregistered, are quite compelling in their capability to give water to families. Such associations are probably going to incorporate both those that are expected at impacting on family unit level utilization levels and affordability and those that are through Environmental Education. The triumphs and difficulties that indigenous social plans and water conservation and hazard sharing components have are probably going to offer imperative lessons for, and potential passage focuses for working with, civil society to limit shortage issues in various ways, including through Community Based Health Insurance (CBHIs) and Microfinance Institutions (MFIs).

According to (Muthoka, *et. al*, 1998) environmental awareness is a process of learning about the environment in order to benefit from it sustainably. (Howa and John 1988) also defined environmental awareness as process that aims at developing environmentally literate citizens with skills, knowledge and inclinations to make informed choices concerning the environment. Environmental education refers to organized efforts to teach about the natural environmental functions. More specifically, it is a systematic public education approach aimed at modifying the behavior of people for a better ecosystem management and sustainable use of resources. Environmental education

changes people's perceptions and attitudes towards the natural environment. This leads to improved environmental stewardship by the general public. The importance of environmental education was underscored at the 1997 UNESCO conference when Mr. Tolba, the then Executive Director of UNEP stated that: "community based organization should promote attitudes, which encourage individuals to discipline themselves in order to not impair the quality of the environment and to play a positive role in imparting it"

Environmental education has been defined as the learning that occurs in habitats that include wildlife parks, nature centers, museums, aquaria, arboretum wildlife refuge camps and many others. It also includes the mass media such as television, radio, newspaper, and newspapers when used away from schools to disseminate information on environmental issues (Howa and John 1988). This education closely linked to out-door education and these two disciplines complement each other though they have unique philosophies. Out-door is entrenched on curriculum enriched through teaching that involves outdoor experiences. (<http://en.wikipedia.org>,2010).Community based organization also helps individuals to comprehend the capacity as well as the constraints of the environment with respect to the broad global environment that enables them to make collective or individual decisions that are economically as well as ecologically sound (UNESCO-UNEP, 1997).

Drawing on (Uphoff 1986), "organizations may be distinguished by whether they operate at the group, community or locality level. At group level, organizations are self-identified sets of persons with some common interests such as neighborhood, occupation or gender. At community level, organizations are relatively self-contained socio-economic residential units, and at locality level they are sets of communities having socio-economic relations". Ison R. (1998), contend that associations working at various levels fuse distinctive limits of exercises and basic leadership, with numerous non-government associations (NGOs) now liking to work through region level associations. Drawing on the social capital from writing, network associations can likewise be sorted by whether enrollment recommends connections that are holding, spanning or connecting (Lyon 2000).

These methods for arranging associations are corresponding. Group- and community- level associations will probably have holding and crossing over connections and region level associations more inclined to incorporate connecting connections, including to and among bigger NGOs.

In the mid-1990s there were an estimated 5– 17 CBOs in each town, and an estimated 300 000 in provincial Kenya (WB/Republic of Kenya 1996). There has been some

endeavor to recognize diverse kinds of CBOs, there are obviously enormous overlaps. There are a total of 114 cooperative societies in the County of which 57 are active, and 57 are dormant (Taita Taveta County Government, 2013). Savings and Credit Cooperative Organization (SACCO) societies form the bulk, totaling 42 in number, followed by Agro-marketing cooperatives and housing cooperatives with a total number of 24 and 20 respectively.

There are a few Non-Governmental Organizations (NGOs) operating in Taita Taveta County which are involved in environmental protection. International NGOs include World Vision Kenya (WVK), Wildlife Works, United Nation's World Food Programme and United States Agency for International Development (USAID). WVK is involved in a number of activities geared towards poverty alleviation through programs such as food for assets, educational improvement through provision of bursaries to needy students, health improvement especially for Orphans and Vulnerable Children (OVCs) by supporting them through medical assistance, feeding programmes, and cash transfers to care-givers of these children. Through APHIA Plus programme, USAID undertakes activities that primarily focus on AIDS, poverty, and health through an integrated approach, with the overall goal of empowering vulnerable individuals in a community set-up. Wildlife Works is an NGO that primarily focuses on environmental protection and climate change mitigation. In particular, the organization supports carbon trading initiatives through involvement of ranch management. On top of direct money benefits to ranch owners, the local community has benefited from community projects supported by the NGO in health, education and water areas.

Others include: Mwatate Well Project- Amsha Africa Foundation being a community driven project to mobilize the community on the need to create water in the region. Milonyi Water Project, Kitobo Community Organization and Taita Environmental Initiative (TEI) which aims at water conservation and advocacy on better living. ([www.taitataveta.environmental](http://www.taitataveta.environmental). ([www.taitataveta.environmental/initiative](http://www.taitataveta.environmental/initiative)))

### 1.3 Spatial Access to Water Resources

Analysis of access to water sources in Kenya demonstrates that in all districts channeled water, waterways and springs have been the primary wellsprings of water utilized by most of the family units. An overview directed in 1988 (Kenya Demographic Health Survey, 1989), demonstrated that around 30.7 percent of the populace utilized channeled water as their principle wellspring of water contrasted with 32.1 percent in 1994. Another 36.8 percent utilized streams in 1988 contrasted with 24.9 percent in 1994. About 37 and 25 percent of

Kenyans acquired their water straightforwardly from waterways 1988 and 1994. The 31 and 32 percent who utilized channeled water in 1988 and 1994 got it specifically from waterways. Altogether, around 868 and 67 percent of Kenyans acquired their water from streams either directly or 16 indirectly in 1988 and 1994 separately. These figures show the significance of surface water as the fundamental wellspring of clean water to Kenyans. It is estimated that the country's renewable fresh water endowment stands at 548m<sup>3</sup> per capita per year, against the UN recommended threshold of 1000 m<sup>3</sup> (UNEP 2007). Approximately 55% of Kenyans had access to an improved water supply in 2008 (UNDP 2011). This proposes social assets will assume a vital role in averting and adapting to the scarce water supply (Bebbington, 1999).

Residents of Taita Taveta County rely on water for their social –economic activities. However, due to increased population and climate change they have encroached water catchment areas which require mitigation and controlling measures through planning system and contributions from CBOs. See fig below.

Plate 1.1



Plate 1.1. Encroachment to catchment area cultivation near water dam Kisenyi werugha sub –location

(Photo courtesy Author Isaac Oroni 2016)

Werugha location comprises of Werugha, Saghasa, Mlondo and Marumange sub locations of Taita Taveta County. The natives in the location is the Taita sub tribe of the larger Mijikenda but the population composition within the location is cosmopolitan in nature consisting of Kamba, Luo, Kisii, Giriama and the Kikuyu sub tribes. Economically, people depend on dairy farming, small-scale business, horticulture and fishing. This is a region once endowed with luxuriant trees and springs but now disappearing at an alarming rate. There is need to ensure sustainability in forest resources and conservation of catchment areas and help balance between people's sources of livelihood and environmental conservation.

## II. THEORETICAL FRAMEWORK

The study area experiences water scarcity which is a challenge to attainment of sustainable development. Community based organizations create environmental awareness by engaging in activities such as tree planting, soil and water conservation, waste recycling, conducting barazas and wildlife conservation among others. In doing this, CBO experience certain constraints that include lack or insufficient funds, lack of support from the administration, time limit, lack of commitment by some members among others. Management of these constraints could lead to, sufficient and clean water supply, pollution reduction, afforestation, poverty reduction, reduction of time wastage, and many more. Lack of management of the constraints leads to increased environmental degradation characterized by insufficient water supply, increased poverty, water related diseases, deforestation, and soil erosion among others as shown in figure 1.1

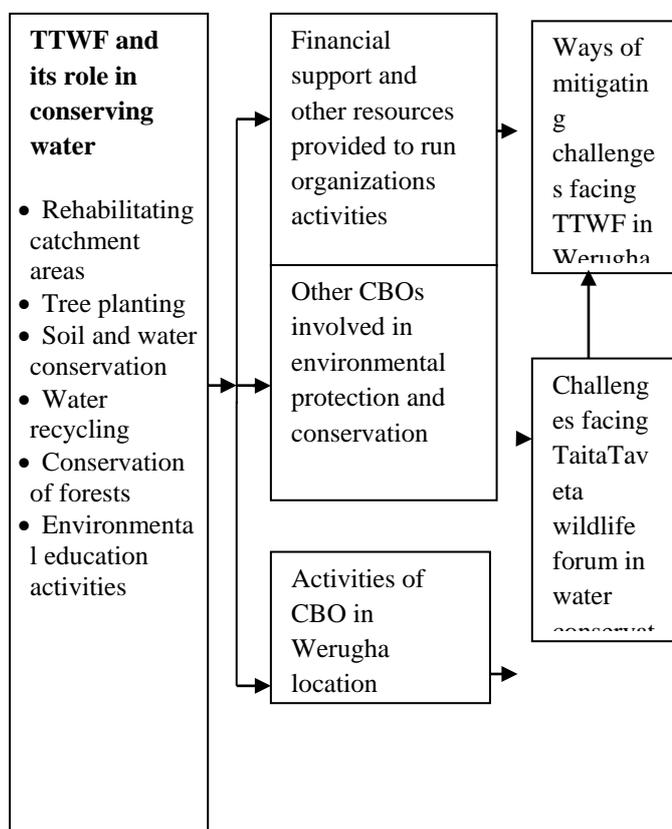


Figure 1.1: Conceptual Framework (Source: Adapted and modified from Mwangangi, N. 2012)

The study area experiences water shortage which is a challenge to attainment of sustainable development. The framework shows how water issues can be contained through the introduction of environmental community awareness programs, a number of awareness strategies, and rehabilitation measures will be put in place to ensure water conservation and sustainable development in Werugha. It identifies environmental issues, CBO activities and expected outcomes. From Figure 1.1, the

independent variable in this study is community based organization in Werugha location, TaitaTaveta County. The framework gives various activities of this organization: tree planting, soil and water conservation, water recycling, conservation of wildlife, and Environmental Education activities among others. Community based organization need financial and material support from well-wishers, favorable policies which encourage growth and development of CBO activities in locations and adequate time to allow officials to actively participate in organizations activities. The financial and infrastructural support, policies on - CBO activities and time allocations for these activities are therefore the Intervening Variables in this study. They are supposed to help household heads to actively participate in CBOs activities and by extension enhance environmental awareness of water conservation in the location.

## III. PREVIOUS WORK

### *Environmental status*

The Rio summit of 1992 created agenda 21. This worldwide agreement built up a procedure for tending to the feasible advancement all through the world. By calling for expanded support in tending to ecological, social, and monetary worries that influence their locale. Agenda 21 was a vital result of the Rio summit, and concentrated the world's consideration on the goals important to achieve sustainable development. Agenda 21 expressed that with a specific end goal to achieve these targets. 17[There is] the need for people, gatherings and associations to directly take an interest in Environmental impact evaluations and to think about and take part in choices which conceivably influence the communities in which they live and work (UNESCO, 2008). Traditional thinking has been that we can change behavior by making human beings more knowledgeable about environmental and associated issues. This has largely been linked to assumption that, if we make human beings more knowledgeable, they will in turn become more aware of the environment and its problems, and thus be more motivated to act toward the environment in more responsible ways. This theory has linked knowledge to attitudes and attitudes to behavior (Gouldson and Sullivan, 2012). Community based organizations (CBOs) have made numerous profitable commitments to social orders and advancement universally, and is perceived for the essential job it has in enhancing occupations around the world. Quality instruction provided by the CBOs ought to plan social orders to effectively take part in ecological protection and financial matters and in addition furnish individuals with aptitudes important to settle on educated choices and take capable activities. All through the world social orders have perceived instruction as a key segment of sustainable development (Hart, 1997). In the 1mid-1990s there were

an estimated 5– 17 CBOs in each town, and an estimated 300 000 in provincial Kenya (WB/Republic of Kenya 1996). There has been some endeavor to recognize diverse kinds of CBOs, there are obviously enormous overlaps.

### 2.21 Global status of water

Water may appear to be copious, but less than one percent of the world's water can be utilized for human needs. (The Global Water Crisis, 2010), “this amount has to be shared by many competing users. Stress on freshwater resources due to rising demand is already leading to water scarcity in many places.” The joint monitoring program for water supply and sanitation set up by the world health organization (WHO) United Nations International Conference on (UNICEF ) defines safe drinking water as water with microbial chemical and physical characteristics that meets WHO guidelines or national standards on drinking quality. (The Global Water Crisis, 2010). Water scarcity or lack of safe drinking water is one of the world’s leading problems affecting more than 1.1 billion people meaning that in every six people one lacks access to safe drinking water (http://www.water scarcity risk and vulnerability, 2012.) According to The Global Water Crisis, (2010), Water shortage is estimated in different ways, including per capita accessibility and level of water assets utilized. While political, social, and financial factors all assist determine access to water, proportions of physical water accessibility offer a beginning stage to survey current and future water shortage. “One of the most commonly used measures of water availability is the per capita freshwater availability within national boundaries. The total number of people living in a country determines the per capita availability of water resources in that country. As a general benchmark, countries can be classified as water scarce if there are fewer than 1,000 cubic meters of renewable freshwater available per person per year, and as water stressed if there are between 1,000 and 1,667 cubic meters available per person per year. Approximately 2 billion people are currently living in areas faced with water stress or scarcity. Water scarcity affects all social and economic sectors and threatens the health of ecosystems” (The Global Water Crisis, 2010).

### Status of Water in Africa

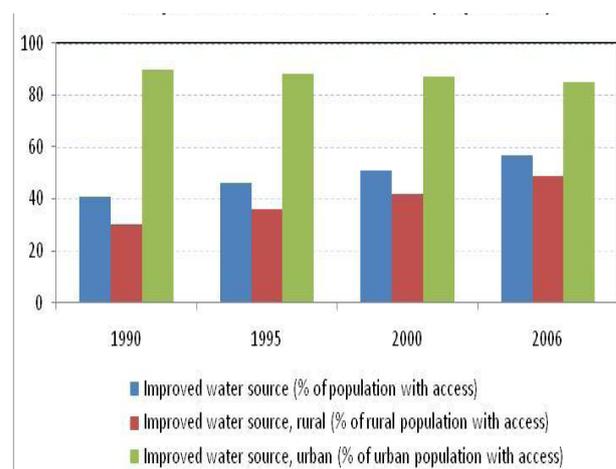
Access to fresh water for domestic, agricultural and industrial use remains a key development challenge around the world. Access to safe drinking water and sanitation is critical to maintaining and improving health. Poor water supply and sanitation is a major public health problem throughout Africa (UNEP 2006). Improvements in water supply and in particular, hygiene and sanitation can reduce the incidence of cholera, diarrhea and infant and child mortality. As of 2006 , one third of the nations suffered from clean water scarcity (http://www.

Water scarcity risky and vulnerability, 2012) but Sub – Saharan Africa had the largest number of water stressed countries of any other place on the planet and of an estimated 800 million people who live in Africa 300 million live in a water stressed environment. (http://www. Waterscacityriskyandvulnerability, 2012). According to findings presented at the 2012 Conference on Water Scarcity in Africa Issues and Challenges ((http://www. Waterscacityissues challenges, 2013).

### 2.23 Status of water Kenya

Kenya’s fresh water resources drive key economic activities including agriculture, manufacturing, tourism, fisheries and forestry and they sustain the environment and biodiversity. Water availability and accessibility impacts all the three components of sustainable development: environment, society and economy. Kenya is below the international water scarcity threshold (1000m<sup>3</sup> per person per year with only 935m<sup>3</sup> available per person per year. (FAO, 2007) and population growth is forecast to reduce this figure to 359m<sup>3</sup> by 2020. (UN Water, 2006). Kenya’s water resources are unevenly distributed. Many of its arid areas receive only 250 mm or less of rainfall per year. Highly stressed water systems include; Lake Victoria, Nakuru, Nzoia, Nyando, Turkwel, Athi, Kerio, Naivasha, Voi, Tana, Ewaso Nyiro rivers. Women have the main responsibility for managing their household’s needs for water, sanitation, and health. In a number of regions, women and girls spend many hours a day fetching water. In the Samburu District of Central Kenya for example, some women walk for more than nine kilometers daily to find water. (Aquirre, 2007).

Figure 2.1: Access to Clean Water in Kenya



(For available years during 1990-2006)

Source: World Bank (2010) *World Development Indicators*

*Water in Taita Taveta and Werugha Location*

The situation in Werugha Location, TaitaTaveta County is not in any way different. Prolonged drought experienced in the past 10 years accentuated by climate change has seen streams drying up and long queues of households at the water source (Kenya Food Security 2008). The role of the community based organizations like Taita Wildlife Forum ought to be assessed. Such organizations have the capacity to sensitize and create awareness about the environment. Community based organizations serve as education centers. Environmental education centers complement school programs and provide households with an opportunity to study particular aspects of environment sustainability in the areas where the centers are located (Ballantyne, R. and Packets.J. 2008). The centers are located in different environments to include forests, beaches, and estuaries and in fresh water areas. He further notes that environmental education which is not entirely school-based is moderately successful since it emphasizes incorporation of outdoor activities as the best approach for teaching environmental concepts and awareness. The goals of out of school environmental education are as diverse as the areas of teaching they include; acquisition of environmental knowledge, development of relevant skills, problem solving and action programs (Howel, R.W. andJohn .F.1998).



Plate 2.1 Residents of WerughaLocation queuing for water fetching: Photo courtesy Author 2016

### *Sustainable Conservation*

Sustainable conservation is the utilization of natural resources in manner that ensures that the natural resources remain available for future generations. The term was developed based on the principles of sustainable development (SD). Sustainable development is the development that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs (WCED,1987). Sustainable development gives rise to economic growth that does not exceed carrying capacity of the environment (SADC/REEP, 2005). Sustainable development is based on the understanding that excessive pressure on the

environment would lead to its fragility. This in turn leads to high poverty levels and unsustainable production and consumption patterns (NEEMA, 2008). Sustainable development is actually a pattern of resource use that aims to meet human needs while keeping the environment as pristine as naturally possible based on ideal seeking behavior (McKeon, 2002).

### *Participation in Environmental Activities*

One of the aims of Environmental community based organizations is to provide residents with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environmental resources. CBO is therefore meant to create opportunities and capacity for residents to actively engage in addressing environmental challenges. This will involve taking individual as well as corporate responsibility (Erol and Gezer, 2006). Participation is the point of action towards environmental protection. It is the final stage in CBO conceptual framework depicting an informed citizenry with capacity to make informed decisions and take action. Effective participation process should be creative and flexible drawing on the wide array of approaches and methods. It should therefore encourage a creative and original approach in the use of participation techniques (Sarkar, 2011).

Participation is a kind of dynamic activity that enables and encourages people to better play their function in developmental undertakings. In this process, any individual benefits from the right of participating in decision making related to his way of life. The arising question is to find out the factors influencing individuals' participation in environmental activities. Besides this, research has also shown that individual characteristics, such as: sex, maturity, idea development, one's familiarity with participation, being alert of the prevailing problems, information concerning the precedent pertinent activities are some other important factors of participation (Akabayashi, 2003). The 28United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 reiterated, in Agenda 21, that through community based organizations; household heads 28are obliged to participate actively in guarding the quality of the environment. This is because they28are highly vulnerable to the effects of environmental degradation now and in the future (United Nations, 1994).

### *Participatory Development and Community-Based Conservation*

According to Campbell and Vainio-Mattila (2003) "the motivation behind participatory improvement is to draw in operators of giver organizations to enable local performers to execute ventures and objectives that thusly, are effective. With this methodology, benefactors invest

energy in a specific area actualizing ventures as opposed to sending cash and expecting execution from another person. Customary, contributor based activities take a gander at compelling preservation of natural resources and not the connection among individuals and their regular assets. This regularly improves participatory advancement a model in rural conservation.” Community based conservation has two fundamental objectives, (1) to upgrade biodiversity, and (2) to give impetuses, for the most part financial, for local individuals (Campbell and Vainio-Mattila 2003). Community-based conservation centers in light of recognizing the advantages of preservation for local individuals from the community with the goal that they will take responsibility for and bolster preservation based activities after benefactor offices 7leave (Campbell and Vainio-Mattila 2003). “Water catchment and protected areas emphasize the separation between locals and wildlife that can conflict with the long standing traditions of the .The downside to community-based conservation models is that most do not specify what it means to participate in a project. Many studies found individuals did not actively participate, partially due to their education level” (Campbell and Vainio-Mattila 2003). Participation must be specifically designed for the project to be successful; otherwise, some communities might not gain any more rights than they had before the plan was implemented (Campbell and Vainio-Mattila 2003).

#### *Taita Taveta Wildlife Forum (TTWWF)*

The Taita Taveta Wildlife Forum is a charitable not for profit making organization whose main objective is to educate the Taita Taveta residents 34on the importance of conserving wildlife and the environment. The purpose of the organization was to create awareness and provide free environmental education aimed at sensitizing residents and the general population on the need to appreciate and conserve Kenya's biodiversity. To date, the forum has hosted programmes thousands of residents on environmental education. (.[http://www.taitatavetawildlife forum](http://www.taitatavetawildlifeforum) , 2000).The Taita Taveta Wildlife Forum focuses mainly on education and public awareness on endangered wildlife and the environmental conservation. The children training programme run at the TTWF on Education for Sustainable Development (SD) is seen as a response to Kenya's ESD implementation strategy (2005-2014) which called on the different players to fully implement ESD in this country. It states that, “Non-governmental organizations will help in capacity building through training and materials production both at the national and local levels” (NEMA, 2008). The same strategy calls on research institutions to carry out research with the aim of improving community based organizations for Sustainable Development (SD) practices. TTWF sensitizes residents, especially the household heads 34on the importance of

conserving nature and the environment so that they can take the initiative of preserving their own biodiversity. The forum holds clean up exercise in collaboration with other stakeholders and creates awareness to the community. It also holds county environmental competitions where students 34in four age group categories compete in essay writing, wildlife art and nature photography. The forum is also involved in Environmental Education and Education for Sustainable Development resource material development and education of the many visiting groups at the premises on daily basis. By doing this the residents are able to 34put into practice what they learn as well as teach the community on how to take actions for a better environment. (<http://www.taitatavetawildlifeforum>, 2000). According to a study that was carried out in Iowa, Wisconsin and Minnesota States in United States of America, environmental education (community organizations) programmes expose citizens into close contact with nature. Findings from the study indicated that, students who took part in these programmes were more effective in fostering positive attitudes towards environment than the in-class programme.

The students who were interviewed revealed that they enjoyed the outdoor learning the most, while their Parents were happy with the Socio-economic benefits of the programme (El-Rahman, 2005). Although school based learning provide strong environmental education experiences, the impact of out-of-school experiences decreases with time but remains significant. According to Howe and John, (1988), environmental education has consistently indicated that many students and adults attribute a large amount of their environmental concepts, problems and issues to out of class interaction with environment and experiences. Moreover students and young adults also attribute their attitudes and values to the same experiences. Residential environmental awareness programmes offered to student by community based organizations are of paramount importance. Good Environmental awareness for sustainability does not only entail the transfer of information and knowledge but also requires students to engage themselves actively in the learning process through observations, in going out in nature and all these needs to be integrated into classroom manual that would help the students to meet these needs. The non-formal educational sector to include conservation education centers, formal education and the informal educational sector are key in the implementation of environmental conservation and they must work cooperatively in order to educate people in all walks of life (Mckeown, 2002). The key objectives of the Taita Taveta wildlife forum are to educate the public and the youth of Taita Taveta on sustainable conservation through community based groups. They provide residents with opportunities to acquire the knowledge, values, attitudes,

commitment and skills needed to protect and improve the environmental resources including water. It also supports conservation measures geared towards conserving the endangered flora and fauna species in the county. “The community members remain to being the main target of the organization to join hands in order to address acute water scarcity, the rampant human wildlife conflict in the region, environmental degradation, and the quest for benefit sharing from Tsavo National Park.” (Taita taveta wildlife forum, 2000)

### *Catchment Areas Management*

Land use and land management practices have a major impact on natural resources including water, soil, nutrients, plants and animals. Land use information can be used to develop solutions for natural resource management issues such as salinity, ecosystem balance and water quality. For instance, water bodies in a region that has been deforested or having erosion will have different water quality than those in areas that are forested. Increased carbon dioxide in the atmosphere has led to decreasing alkalinity of seawater and there is some concern that this may adversely affect organisms living in the water. In particular, with decreasing alkalinity, land use and land management practices have a major impact on natural resources including water, soil, nutrients, plants and animals. Land use information can be used to develop solutions for natural resource management issues such as salinity, ecosystem balance and water quality. For instance, water bodies in a region that has been deforested or having erosion will have different water quality than those in areas that are forested (Garrison, 2004). Vegetation can change the quantity of water on the surface, in the soil or groundwater, or in the atmosphere. This in turn changes erosion rates and the availability of water for either ecosystem functions or human services. Tropical rainforests produce about 30% of our planet's fresh water (Field, 2006).

TTWF sets out on the management of water catchment regions to guarantee that there is sufficient water for residential, cultivating and business utilization. The conservation of the endemic Sagalla Caelian through catchment and habitat restoration has seen livelihood improvement to the local community. Enhancing its niche (Sagalla hill) and appropriate land use and farming methods. The activities to rehabilitate catchment areas include, tree planting –indigenous and appropriate exotics such as grevillea, training on appropriate farming techniques, and introduction of appropriate nature based food generation strategies such as fish –farming, bananas (<http://www.taitatavetawildlife.com>, 2000).

### *Environmental Literacy*

Environmental literacy is awareness of one's environment. It enriches one with the knowledge to realize the imbalances and threats the environment faces and enable some to form positive attitudes towards it with the aim of developing skills to resolve and prevent environmental problems and urge to protect and improve the environment for the present and future generations by active participation. (Swanepoel, 2002: 30). Education for sustainable development comprises the subjects of environmental protection, the efficient utilisation of natural resources, the maintenance of the ecosystem and responsible attitudes among members of society and the business community. Environmental literacy is thus an integral aspect for water conservation. There is a need for continuous public education to influence behaviour. Education makes people aware of which environmentally harmful acts are prohibited (UNESCO, 1992). A healthy environment therefore is a fundamental pre-requisite for human development and survival. Strategies for environmental literacy include:

#### *Use of Indigenous Knowledge Systems (Ethno-Ecological Knowledge)*

Environmental awareness cannot be addressed adequately through only the formal education; awareness must also be created through non-formal methods (Chowdhury, 2004). Indigenous knowledge systems are based on this argument. IK is that body of accumulated wisdom that has ‘evolved from years of experience and trial and error problem solving by groups of people working to meet the challenges they face in their local environments, drawing upon the resources they have at hand’ (Green, 1996). Recent studies show that indigenous knowledge of ecological zones, natural resources, agriculture, aquaculture, forest and game management, to be far more sophisticated than previously assumed (UNESCO, 2005). Moreover such knowledge offers new approaches for development that are both ecologically and socially sound. The UNEP strategic plan identifies the need to “Encourage active and informed participation of local communities and indigenous people, in particular women and youth, in the conservation and wise use of natural resources. It also calls for action to apply the guidelines for establishing and strengthening local communities’ and indigenous people’s participation in the management of natural resources (UNEP 2004).

#### *2.6.2 Knowledge Exchange and Capacity Building*

According to Chowdhury, (2004), “one of the greatest advantages of participatory management is its potential to blend local environmental knowledge with scientific understanding for more effective resource management. Local people, particularly if they are users of wetland resources, have the opportunity for continuous observation of their surroundings, and often have detailed knowledge

of the local ecosystem.” Frequently this local environmental knowledge (LEK) has been developed over numerous ages, with the goal that a decent comprehension is gathered of the long-term cycles acting in the territory and the long haul effects of specific asset employments. Where wetland asset chiefs are responsive to LEK they can stay away from expensive mistakes and dispense with or diminish the requirement for broad research programs. With a specific end goal to profit by LEK, resource managers need to indicate regard for local knowledge and an eagerness to include local individuals in wetland management. They also need to acknowledge and translate local ecological, taxonomic and different ideas which might be very unique to western logical methodologies (UNEP 2004).

#### *Environmental Conservation Awareness Community Barazas, Seminars Agricultural shows, Films*

Within the programs of international conferences there are range of opportunities to increase understanding of water scarcity and environmental issues. Environmental programs introduced in communities help residents gain knowledge about environmental issues, acquire organizational skills and discover their role by implementing the three R's (Jose, 2009). Such environmental programs in communities not only help in protecting the environment but also contribute into the creation of well-informed citizens now and in the future to take onus of safeguarding the environment (Rhyner, et al, 1995). Ideas can be generated to make communities get conservation programs which can benefit both the local environment and the household community and also have positive effects on the wider environment (Donnelley, 2010). There is need therefore to closely look into ways of sensitizing household heads so as to aspire to be better managers of the environment in relation to water shortage. The environmental programs should also include reaching out to household heads and making them see water conservation as a necessity and not compulsion (Shri, 2009) Networking mechanisms such as regular meetings, newsletters, and radio programs achieve information exchange and educational purposes. Basic Ramsar concepts, stewardship principles and ecological values can be conveyed through the community based organizations. Lastly, conservation Centre's can catalyse active and informed participation of local people; serve as demonstration sites for sustainable wetland management; support formal, informal and non-formal educational programmes that involve a wide range of stakeholders; help to bring community concerns to the attention of decision-makers; and provide information and advice on wetlands and their management (Jose, 2009). Since the environment is place to live, is 'a human collectivity, a shared living place, apolitical concern, the focus is of a critical analysis (Sauve, 1996). It calls for solidarity,

democracy, personal and collective involvement in order to participate in the evolution of the community on environmental matters. (Sauve, 1996), associates community based organizations with the development of the theory of daily life; The pedagogical process aims to transform each of us so that we may transform our daily reality: Therefore, based on the foregone argument, creation of community environmental awareness through public barazas and seminars are central in environmental conservation.

#### *Summary and Gap Identification*

Through world conferences like the Rio Summit, it was recommended that strategies be put in place to address adverse environmental conditions. Affiliations and gatherings past the ties of close family, regardless of whether enrolled or unregistered, are quite compelling in their capability to give protection for households to the environment. Such associations are probably going to incorporate both those that are expected at impacting on family unit level utilization levels and those that are not. The world is getting more concerned about the unsustainable consumption of water. The above review of literature presents evidence of current state of water and future expectations. Community based organizations have played major roles in solving environmental problems for instance rehabilitation of catchment areas, water recycling, tree planting and environmental awareness. It is worthy to note that all these data has been collected in different areas. The roles of CBOs differ significantly over different areas depending on the nature of the CBO in the study area. It was of vital importance to collect this information from the study area. In addition, most of the collected data had assessed the roles of the CBO therefore it was necessary to collect such data in relation to TTWF and the associated mitigation measures of challenges that the CBO faces.

In this section author should discuss about related research has been done in the same domain or related domains with the name of the researcher and should be mentioned in the references.

#### IV. PROPOSED METHODOLOGY

The study was conducted within Werugha location Taita Taveta County.

##### *Research Design*

The study adopted descriptive survey design which was used to collect information, record the information, analyses and report conditions that existed. This method was suitable because it is the best method available to social scientists interested in collecting original data for the purpose of describing the population which is too large

to observe directly like the population in Werughalocation. This design was therefore suitable to the study because the target population was household heads who had already been exposed to Environmental conservation through the community based organization and therefore their environmental awareness was already determined and the researcher could not manipulate them. Secondly, the issue being studied which is the role played by CBO in creating environmental awareness, had both qualitative and quantitative aspects.

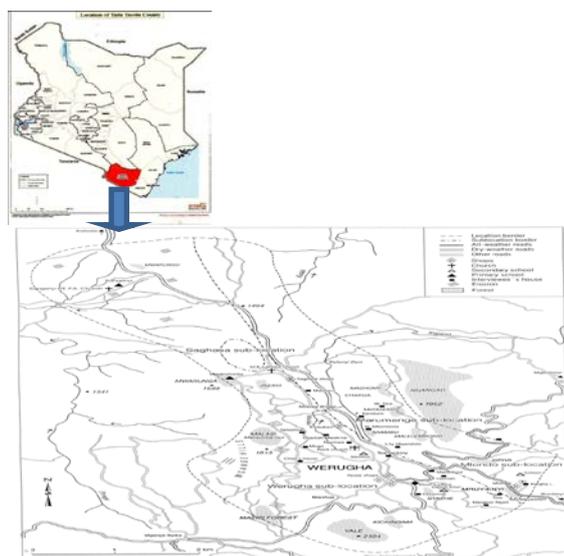


Figure 3.1 Map of Werugha Location

(Source: :Hurskainen, S. and Perkka, R. 2004)

#### *Target Population*

The target population was household heads of Werugha location, people in water scarce areas, policy makers and other researchers and students interested in expanding knowledge.

#### *Sample Size and Sampling Procedures*

The sample population was household heads of Werugha location. The location has four sub-locations with different populations. This selection of residents was done using purposive sampling in which (Mugenda, A.G. M&Mugenda, O.M. (1999), argues that the researcher targets a group of people who are believed to be reliable. In this case samples of households' heads from each sub location were selected to represent the four sub-locations. The researcher visited Wundanyi Sub-County Officer's office to establish the total number of residents in the location so as to establish the number that is representative in the sample. As the total population of Werugha location is 8576 (G.O.K. 2009). A sample size of 120 households was chosen.

#### *Data Collection Procedure*

These are the techniques that were employed in collecting and recording of data for the research.

#### *Non-Reactive Approach*

Published data from newspapers and magazines, journals and articles, relevant text –books and the internet were reviewed in order to assess roles of CBOs, environmental literacy programs and established measures thus collecting a pool of data for the study.

#### *Use of Questionnaires*

The researcher employed questionnaires as the main data collection instruments. This questionnaire consisted of open-ended questions and closed-ended questions that were used to collect the relevant data for the study. Questionnaires were considered where direct interviews were not appropriate to collect data on opinions of CBO's workers and relevant authorities (local administration and heads of institutions) on possible causes of water scarcity, challenges of CBO and mitigating

#### *Interview Schedule*

An oral interview was carried out to the local administration officials. This helped to get the detailed history and background to CBO in the area and the resultant environmental impacts. The researcher as well administered a checklist to determine the state and scope of environmental education.

#### *Observation*

Observations were made during transect walks and data was collected as guided by observation checklist to show activities and features. Photography revealed information related to natural resource degradation that the location may not have been aware of. The Likert scale was used to establish the rating of the community's view on the importance of wetland resources (Saul, 2007). The researcher carried out an observation with the strata to physically establish the state of the catchment sites and the extent to which land has been degraded. 3.7 Data Collection Procedures

#### *Pilot Study*

A pilot study was conducted to test the suitability of the questionnaires. Five household heads 23 from the study area were randomly selected and interviewed. This excluded the ones from which data were collected. Assistant Health Officer and assistant Environmental Officer were also interviewed. Results from the pilot study were used to correct vague questions in order to collect relevant data to answer research questions. They were also analyzed to check if the method of analysis suggested was appropriate.

### Data Analysis

The researcher employed the split – half technique to test the reliability of the data obtained from the study questionnaires (Green, 2006). The data that was having a higher split –half reliability is the one with a higher correlation coefficient. This correlation was tested using Spearman rank order (rho) of correlation whereby; the closer it was to one, the more reliable the instrument was. Correlation analysis was used to explain the benefits of CBO and water conservation. Qualitative data was organized into themes, categories, and patterns relevant to the study by tabulation. Quantitative data was coded and analyzed using statistical package for social sciences (SPSS). then results were presented using descriptive statistics such as percentages, means, modes, frequency distribution tables, bar graphs, histogram and pie- charts. Findings of this research were then used to make meaningful generations and conclusions.

### Validity of the Instruments

Validity can be expressed as accuracy and meaningfulness of inferences drawn from research study. In this research it involved comparison of existing facts and the data from the research to support statistical analysis. Pre-testing was carried out so as to assist in determining accuracy, clarity and suitability of the research instrument. The purpose of the pre-test was to aid the researcher to recognize the items which were inappropriate so as to make necessary corrections, examine responses to determine the level of ambiguity of the questions and determine the percentage of responses. The Pilot study was conducted to validate the instruments where the responses were checked to verify whether they answered what they were intended to answer in order to ensure instruments validity. Based on the analysis of the pre-test, the researcher was able to make corrections, adjustments and additions to the research instruments. Water scarcity and environmental awareness were used to recommend measures to be taken to mitigate the problem.

### Hypotheses Testing

Hypotheses are set from past experience, literature review or existing theories. A hypothesis is a researchers' anticipated explanation or opinion based on the results of the study. It expresses possible differences, relationships, or causes between two variables or concepts. The test of a hypothesis entails collection and analysis of data. Results may either support or fail to support the hypothesis. Failure to support the hypothesis does not mean that the study has failed but that the existing theories or principles need to be revised or re- tested under various situations (Mugenda and Mugenda, 1999). Researchers usually base their conclusions on the results of the tests of their hypotheses. To test the hypothesis, the researcher

formulated the null hypothesis statements (section 1.5), selected the probability (alpha,  $\alpha$ ) level at 0.05 and then collected and analysed data using Statistical Package for Social Sciences (SPSS) which provided the probability value (p) for statistical test. The hypothesis was either accepted or rejected depending on the p-value obtained. If the p- value of the statistical test was less than the  $\alpha$ -level, the null hypothesis was rejected. If p value was greater than 0.05, the hypothesis was accepted. Tests that indicated significant difference were rejected and assumed that the observed error was not due to sampling only (Baumgartner et al, 2002)

## V. EXPERIMENTAL RESULTS

### Water in the Households

Most of the study area had few rivers. Some households relied on reservoirs or dams and streams for instance Mwandalia stream. Scarcity of water contributed to long distance walk to water points in the region. Hired motorcycle riders were mostly involved in fetching water during drought season. The long distances to the water points affected household income as the distances covered took time.

Table 4.5: sources of Water used at Home

Source of water at home	Frequency	Percentage
Reservoirs/dams	18	15
Tap	68	56.66
Well	6	5
River/streams	17	14.16
Tanks	11	9.12
Total	120	100

### Activities of Community Based Organization

#### Training of Trainers Workshops

The research found out that TTWF has conducted environmental education programmes each year for the Kenyan youth. In the course of training students, it became evident that, teachers in participating schools also needed to be trained environmental education that has up to now benefitted hundreds of teachers; this was to build capacity of the adults so that they could disseminate the same to the community members that they interact with. The main aim of these workshops is to empower the society through the learning institutions to enable them to act on environmental matters in order to nurture positive environmental, economic and social change. This entails equipping them with the relevant skills and knowledge to come up with solutions for challenges facing the environment.

#### Educational Field Trips

The Taita Taveta wild life forum conducts educational field trips for the under privileged children coming from needy families and living in slums and rehabilitation centers. The programme also takes into consideration students in most of the public primary and secondary schools.

#### *Environmental Awareness Competition*

This is an annual competition that covers various categories from kindergarten to the tertiary levels of learning. The competitions feature questions that present the environment in a holistic manner. The aim is to equip the youth with the ability to think critically, analyze and come up with solutions to challenges afflicting the environment in their localities. Surrounding schools like Ngangao, Kitumbi, Werugha primary have participated in this exercise from which learners have acquired relevant skills and attitude for environmental conservation.

#### *Participation in National Agricultural Exhibitions*

TTWF participates in the ASDSP .TTWF participates in national agricultural exhibitions like the Agriculture Sector Development Programme (ASDSP). The TTWF erects its stand and assign staff members are assigned various roles to play .Through this forum TTWF could show how economical occupations are tied to natural preservation. Protection of forests and catchment areas is basic need for social economic development.

#### *TTWF offers Strategic Partner Support to DaBiCo's CDTF Funded Project*

TTWF has kept on supporting Dawida Biodiversity Conservation Group (DaBiCo), a site bolster group it helped in framing in the execution of the Community Development Trust Funded Taita Hills Conservation venture (CDTF) The preparation of Eco Guides and enrollment of the Ngangao Forest Guides Association; The training of men, ladies and youth in basketry and calfskin tanning/make in Vichwala and Nganga so that the residents can be financially reliable to reduce the challenge of encroaching water catchment areas; Identification of degraded forest sites in conjunction with KFS for rehabilitation; the rehabilitated areas will restore the degraded areas. Recognizable proof of corrupted riverine zones related to individual WRUAs; Training support for CFA and WRUA panels. TTWF is attempting a Baseline study for the undertaking for motivations behind the foundation of benchmarks against which venture achievement will be pegged.



*Plate 4.1: Planting trees next to Ngangao Forest Werugha location :( Photo courtesy TTWF 2014)*

#### *Conservation Awareness to School Children*

4.4.6 Conservation Awareness to School Children The cbo conducts landscape models to schools. Following the effective finish of the 3 D scene models by 2 secondary schools, Allan Mjomba and Ngangao and two elementary schools, Kungu and Mazola under the National Geographic Support, 50 understudies were gifted with an excursion to Tsavo East National Park. The excursion was organized by TTWF and KWS where the latter waived gate entrance charges and gave its transport to ship the energized students and their patrons. This is a push to create conservation awareness among school kids in order to raise them to wind up better stalwarts of preservation through such efforts other students from the location are encouraged to participate and by so doing they facilitate environmental conservation which also caters for water conservation



*Plate 4.2 Pupils and teachers of Kungu and Mazola Primary Schools during the tour*

*(Photo courtesy TTWF 2014)*

#### *Knowledge Exchange and Capacity Building*

Knowledge Exchange and Capacity Building The TTWF endeavors to mix local natural learning with scientific comprehension for more powerful resource management. Local individuals of Werugha area, especially as they are clients of wetland resources, have the open door for a constant perception of their environment, and frequently

have definite information of the local ecosystem. This. This has been achieved through Systems administration components, for example, standard gatherings, pamphlets, and radio projects to accomplish data trade and instructive purpose. Ideas are generated to make the location get conservation programs which can benefit both the local environment and the household community and also have positive effects on the wider environment. Frequently this local environmental knowledge (LEK) has been developed over numerous ages, with the goal that a decent comprehension is aggregated of the long-term cycles acting in the region and the long haul impacts on water asset utilize. Where wetland asset managers are open to LEK they can stay away from exorbitant oversights and wipe out or lessen the requirement for broad research programs.

*Consolidating Indigenous Forest Connectivity in the Taita Hills for Biodiversity Conservation Project*

Consolidating Indigenous Forest Connectivity in the Taita Hills for Biodiversity Conservation Project In addition to the many activities that the CBO is engaged in, it has initiated the establishment of safeguarding indigenous tress within the location. They do identify indigenous trees; provide seedlings to the residents who are empowered to supervise their protection. Wetlands are well taken care of through these initiatives.



*Plate 4.3 Indigenous tree Seedlings prepared by TTWF. (Photo courtesy TTWF 2016)*

*Sponsoring Werugha Community Members*

Sponsoring Werugha Community Members TTWF sponsors household heads to attend a “come and See” workshops held in various parts of the country under the aegis of TIST (The International Small Groups & Tree Planting Program). The programme includes agriculturists framing gatherings of 6-12 individuals drawn from a minimum of like three distinct family units that thusly join to shape a bunch (30-60 gatherings). The agents are as of now leading a progression of awareness campaigns. Through these field demonstrations the members’ area

sensitized on water conservation measures by planting of trees and on adverse effects of environmental degradation. Therefore numerous community members have now joined the program where they will plant trees and in the long run acquire 'carbon credits'. This is another money trim for individuals and beyond any doubt, a method for empowering tree growing. After the workshops the household heads are issued with certificates.



*Plate 4.4 Respondents hold certificates after sensitization program: (Photo courtesy TTWF 2016)*

*Catchment Areas Management*

Management TTWF embarks on management of water catchment areas to ensure that there is adequate water for domestic, farming and commercial use. The conservation of the endemic Sagalla Caelian through catchment and habitat restoration has seen livelihood improvement to the local community. Enhancing its niche (Sagalla hill) and appropriate land use and farming methods. The activities to rehabilitate catchment areas include, tree planting –indigenous and appropriate exotics such as grevillea, training on appropriate farming techniques, and introduction of appropriate nature based food generation strategies such as fish –farming, bananas.

*Proper Methods of Farming Sensitization*

TTWF has noted that climate change has carried with it water shortage, longer droughts and late beginning/early discontinuance of rainy seasons. The population is likewise growing, expanding the interest for water for agribusiness. Water security has been undermined in numerous parts of the world and Taita Hills in Kenya isn't an exemption. Methodologies to adjust to the impacts of environmental change are presently important particularly to the small-scale ranchers rehearsing precipitation bolstered farming who are among those most helpless against the effect of environmental change



Plate 4.5 Community members in the field at Werugha in Taita Hills for the drip irrigation installation. (Photo courtesy TTWF 2016)

CHIESA Project creates and shares adjustment choices with the ranchers in its exploration regions to lessen their helplessness and furthermore enhance food security. The venture introduced ten drip irrigation system units in Mwatate (low height); Wundanyi (mid elevation) and Werugha (high height zone) in the Taita Hills. Drip irrigation system has been praised as one of the best advancements in horticulture. Plants are watered one drop at once; no water gets squandered as spillover and all the water goes to the foundation of the particular plant where it is required. The procedure was initiated with the ranchers clearing the land and setting up a plot of 7m by 15m.



Plate 4.6 The participants preparing the demonstration plot in Werugha. (Photo courtesy TTWF 2014)

The gathering at that point assembled a stand a meter high from the ground to hold the plastic tank. The members cooperated as a group with the direction of the engineers from Kenya Agricultural and Livestock Research Organization (KALRO), Mr. Fabien and Mr. Karanja.



Plate 4.7 Building a one meter high stand for the tank. (Photo courtesy TTWF 2014)

Trickle water system can be viewed as a climate change adjustment technique since it takes into consideration the adequate utilization of water and compost or excrement; the dampness substance of the root zone is all around kept up notwithstanding when the temperatures are high; there is less disintegration from overflow water; water is consistently circulated to the individual arrangement along these lines water is preserved. This type of water system is financially savvy as it utilizes less weight in this manner less vitality cost and it isn't work concentrated.

#### Challenges Facing the Community Organization

##### Financial Constraints

Taita Taveta Wild life organization is faced with the same financial constraints as other nonprofits which hinder smooth running of its programs. Community organization is in dire need of financial support to be able to carry its activities. At the moment, CBO rely almost entirely on voluntary contributions from members and well-wishers. it occasionally receives some financial support from benefactors, but even here there is very little leverage for independent and planned expenditure from the organization itself. The results show that the CBOs lack funding for all the planned programs. As with the workforce, donors to CBO's are often internally and goal motivated, and funding can be subject to constraints or specific instructions as to how it can be spent. Funds are often directed at program or mission specific goals, rarely to general IT support or professional development opportunities for staff. The researcher found out that there are financial obligations to be undertaken by the CBO .finances are required to transverse the county in order to sensitize the residents on the need to participate in environmental protection. The funds are availed by nongovernmental organizations and individual well-wishers CBO. The funds also are used to reward specific exemplary groups have demonstrated their eagerness to safeguard catchment areas for instance the reorganization of schools and rewards that are extended to them. This secretariat is sponsored to attend international trade fares and environmental exhibitions. Furthermore competitions in land scraping models are organized using funds. Without adequate resources many activities have come to a standstill. Trips offered to students from different schools as motivational tokens require the funds. This will stretch the limited resources.

##### Human Resources

The community organization relied on temporary staff to implement its programs. Time constraints of the staff since the members of the CBO are not full time workers; they

are engaged in other personal activities. Sometimes when they are required may not be available. 15Characteristic of most nonprofit organizations, the CBO's has a diverse workforce of volunteers and staff, with varied motivations and skills. There is however, a shortage of personnel with strong skills in information technology who are interested in working in the organization in general. Of the official s involved in the running of the organization, they lack most basic skills on environmental protection. This knowledge is necessary so as to equip the resident with the required perceptions on environment and specifically water conservation. In depth knowledge of cause and effect of water scarcity is prerequisite for effective dissemination of knowledge. Moreover, expertise knowledge on the application of related information technology, proposal , report writing and grant seeking. This hinders the public awareness campaigns which are vital in environmental conservation skills.

#### *Ignorance and Negative Attitude towards the Environment*

The threats in these water catchment areas are similar to other regions within the Eastern Arc Mountains. The only difference would be the order of priority. The following threats were identified as the priority concerns in Werugha location: Encroachment (for settlement; agriculture and livestock grazing). Residents have degraded water banks in order to grow vegetables and other crops. This is due to the assumption that they can easily access water for irrigation. Moreover, most groups expect to be either funded for their environment programmes within their schools/communities and therefore get disappointed when they realize it cannot happen. ? 6Lack of coordination among various conservation projects and stakeholders and the piecemeal implementation of interventions were identified as key challenges that stakeholders needed to overcome in order for any interventions to realize significant results and impacts.

#### *Material Resources*

Community organization was found to lack the basic equipment that would be required for project implementation. Some basic equipment including computers, printers, photocopiers, or scanning machines that would be used for production and reproduction of materials for advocacy, community mobilization or training were not available in the organization. Other equipment found to be lacking were vehicles for transport, or basic equipment for transportation such as motorcycles or bicycles. Mobilizing people within rugged terrain of Werugha location for action demands substantial time and effort. Making the calls and personal contacts to bring about a change in community policy, for example, cannot be done solely by volunteers. The stimulation and coordination of community work, like any other valued work, should be paid for. Without salaries for community

mobilizers or organizers, follow-up on planned actions is rare.

		Quality of environmental awareness	House hold head	Head learning institution
Quality of environmental awareness Household head	Pearson correlation	1.582*	1	1
Head learning institution	Pearson correlation	.661*		
*. Correlation is significant at the 0.05 level (2-tailed).				

#### *Overcoming the Challenges*

##### *Awareness Creation*

Some of the ways through which the challenges faced by the CBOs in mitigating water scarcity may be overcome include but are not limited to: Awareness creation on the existence of the TTWF among the CBOs. This can be realized through the need to use methods of advertising or calling for proposals other than the newspaper that can be easily accessed by CBOs including, also the ones in the rural areas. Radios have a wider reach compared to newspapers and may be used for the calls. ? In order to do this, sufficient information should be passed on to the public water officers and/or the capacity of the relevant officers should be built. The trained officers in turn should provide information and technical support to the CBOs on water conservation. 4.6.3 Conservation Projects with Benefits. The 6local community members are willing to participate in conservation activities; however, the poverty situation hinders them. Therefore, there is need to formulate conservation projects that would also promote livelihood generation.6Conservation is an expensive undertaking both in time and resources. Therefore, long-term funding is necessary to ensure an uninterrupted programme unlike has been the case.

##### *Trust Participation*

In wetland administration includes various diverse parties working intimately with the shared objective of practical asset administration. Right now, association in participatory procedures is another experience for most partners, including government organizations and networks. Thus, inclusion 4 requires changes in tasks and desires for all individuals – changes that are regularly observed as being loaded with chance. For the procedure

to be effective it should be actualized in an atmosphere of trust.

### *Hypotheses Testing*

In order to test the significant relationship between the environmental awareness programmes and their impact to household heads the Pearson Product Moment correlation was used. The research data was combined and analyzed to check the strength of the relationship. The analysis was as presented below in Table 4.12

Table 4.12: Correlation Coefficients for Variables

With regards to the quality of environmental awareness, there was a positive correlation between the variables. Specifically, it was noted that there was a positive correlation between quality of Environmental awareness and increased water conservation among household heads,  $r (.582)$  and learning institutions,  $r (.661)$ . Based on these findings we reject the null hypothesis and fail to reject the alternate hypothesis.

## VI. CONCLUSION

The world is getting more concerned about the unsustainable consumption of water. From the data collected it is evident that Werugha location experiences water scarcity. Community based organizations have played major roles in solving environmental problems for instance rehabilitation of catchment areas, water recycling , tree planting and environmental awareness. It is worthy to note TTWF has faced many challenges such as financial constraints, lack expertise skills, limited human resources and technological skills -which have rendered it ineffective of achieving its objectives. The roles of CBOs differ significantly over different areas depending on the nature of the CBO in the study area. It was of vital importance to collect this information from the study area. In 2addition, most of the collected data had assessed the roles of the CBO 2therefore it was necessary to collect such data in relation to TTWF and the associated mitigation measure of challenges that the CBO faces. Urgent and stringent measures ought to be taken by the national and county Government in order to address the challenges facing the CBO and consequently solve water scarcity and promote sustainable development in the location. Throughout the sub locations covered by this survey, there was lack of one resource or the other that is required for implementing water conservation program. On the one hand, the CBOs lacked the people to run the programs – most of their staffs are volunteers. They lacked equipment and materials to run the projects with, and they lacked the finances to help them run the programs. Probably most important, they lacked the skills that would give them the capacity to apply for and implement the programs. On the other hand and 64

probably even more important, they lack the voice to speak for them where it matters, and where their voice needs to heard. If there was a voice in CBOs, someone would have listened to the cry for proper representation and involvement of CBOs in equitable sharing of the funds that are available for conserving water in Werugha location.

In this section conclusion of the research work should be explained.

## VII. FUTURE SCOPES

The study focused on the roles of community organization in mitigating water scarcity in Werugha location but did not address the roles of other CBOS in the rest of the county as well as other parts of the country with similar challenges.

- i. More focus should be on the cognitive aspect of learning which was not addressed by this research.
- ii. Similar studies should be done in other regions in the country experiencing similar challenges.
- iii. Investigations should be conducted to find out the challenges faced by TAVEVO in the course of supplying people with water within Taita Taveta county.
- iv. Further research should be carried out to help formulate guidelines for protection and prescribe measures for integrated natural resource management.
- v. Further research should be carried out to investigate the impact of water scarcity to the household heads of Werugha location.

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