

# **FACTORS INFLUENCING PERFORMANCE OF WATER RESOURCE USERS ASSOCIATIONS IN WATER RESOURCES MANAGEMENT IN LAIKIPIA COUNTY, KENYA**

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## **ABSTRACT**

Water is a fundamental resource needed for social and economic development. However, water resources scarcity has emerged as a major problem and in fact the world is facing a global freshwater crisis. The objectives of this study were to establish the influence of the organizational set up of the Water Resources Users Associations in water resources management, to determine the influence of the functions of the Water Resources Users Associations in water resources management and to find out the influence of the legal framework of WRUAs in water resources management within their areas of jurisdiction. Research questions set out in this study were meant to assist in data gathering on the independent variable (performance of Water Resources Users Associations) and its influence on the dependent variable (water resources management). The study was carried out in Laikipia County in Kenya. Laikipia County borders Nakuru, Baringo, Nyandarua, Nyeri, Isiolo, Meru and Samburu Counties. However it targeted the Upper Ewaso Ngiro sub region under the Ewaso Ngiro North Drainage Basin of the Water Resources Authority. The study was undertaken in five Water Resource Users Associations (WRUAs) out of the existing nineteen WRUAs namely Naromoru, Nanyuki, Ngusishi, Likii and Ontulili. The research design applied in this study was the cross sectional survey since it allows for generalization of findings to a larger population. The target population for this study was 2291 being the population of the WRUA membership of all the WRUAs that are in the Upper Ewaso Ngiro sub

region, Laikipia County. From this target population, 295 respondents were sampled and used in this study. Data collection was done by use of simply structured questionnaires. The research instruments were tested for reliability and validity. Data obtained was analysed by use of statistical package for social sciences (SPSS) and excel spread sheets. Data was analysed both qualitatively and quantitatively. This analysis generated quantitative results through tabulations, percentages, and measures of central tendency. The results of the analysis were presented in form of tables and frequency distributions. The study found that the community was well represented in the Water Resource Users Associations. All the Water Resource Users Associations had management committees and they held management committee meetings annually and quarterly. The study found out that the involvement of the community, water resources sharing and resolution of water use conflicts was high. The study also found that WRUAs had constitution/by laws and most of the members had personal copies of the constitution. The study concluded that organizational structure had the greatest influence on performance of WRUAs in water resources management, followed by legal framework, while functions had the least influence on the performance of WRUAs in water resources management. The study recommended that stakeholders should be included in all assessment and pre-planning activities as well as planning and implementation as this will help to increase the chances for the WRUAs performance and enhance effective water resources management through more ideas. The study further recommends that the County Government of Laikipia to

engage through multi sectoral approach in policy formulation for an integrated water resources management plan to address issues surrounding water availability and use in order to avert conflicts that may erupt in the future due to the ever increasing water use demand. Finally the study suggests further studies on the effect

of devolution on the performance of water resources users association as well as on the influence of devolution on water resources management in the counties.

***Key Words:*** *performance, water resource users associations, water resources management, Laikipia County, Kenya*

## **INTRODUCTION**

Increasing global demands for food and freshwater is putting pressures on freshwater resources. With this increase in demand, water governance has become a salient global issue and in response to this, the United Nations General Assembly declared 2013 as the UN's "International Year of Water Cooperation", with the objective of raising awareness for increased cooperation for access to water and challenges facing water management (Burnett, 2013). Environment is the fundamental resource on which humans can rely for subsistence, development and well-being. It provides essential resources and services which interact with the human initiatives for the production of food, energy and for the creation of healthy living conditions. Ideally those interactions should evolve within equilibrate processes through which the exploitation of environmental resources does not disrupt the ecosystem. The chain of environmental factors which play a fundamental role within the interaction man-environment, includes water, soil, and biological processes. The non-proper management of these multi-factorial processes might trigger negative cycles with long-lasting negative consequences on populations, including their social and political stability. Even though a single factor by itself does not normally induce a critical situation or a conflict, the interlinking of several factors can create the conditions by which the entire stability of an ecosystem and of populations living on it are put under threat. Such a danger is more actual in those regions of the world where there is a tendency to demographic increase, combined with adverse conditions for the economic and the social development (water scarcity, land degradation, poverty and political instability). The same danger is nowadays more relevant due to the perspectives of climate change which, according to the most recent models, could even exacerbate the present un-favorable environmental conditions. The basic approach to avoid negative consequences implies a variety of initiatives aimed at increasing the awareness of populations, and to support the decisions of governments and policy makers, with studies and analysis to design and plan programmes for an equilibrate exploitation of environmental resources and services. It is also essential the involvement of international organisations and agencies in order to face the challenge of preserving the environment towards new possible scenarios related to the global climate change and consequent phenomena. It is recognized that environmental issues do not respect political and/or cultural borders, but they follow the natural development of natural phenomena and events. The factors which may alter the equilibrium of the environment are various and interact at different levels regardless national or international borders. The security of the environment

refers to a status in which the overall functions and services of the environment are accessible to populations leaving on it, without competition and/or conflicts with other subjects. The disruption of such a status might not be fully perceived as a potential threat to the security of populations. As a matter of fact, the term security is normally associated with criminal and military scenarios, but the competition and tension originating from a degraded environment could put in danger the peaceful living of populations. For such a reason the political consequences of a non-stable/degraded environment should take a high rank in the agenda of governments, public institutions and international organisations (Pedrazzini, 2011).

Similarly according to the United Nations status report on application of integrated approaches to water resources management (United Nations Environmental Programme [UNEP], (2012) the United Nations Conference on Environment and Development held in 1992 recognised the challenges of managing water resources for a multiplicity of uses and threats which are set within the much broader contexts of changes in the economic, social and political landscapes. This UN report indicates that since 1992, 80% of countries have embarked on reforms to improve the enabling environment for water resources management based on the application of integrated approaches. 79% of countries report changes in their water policy, though translating policy and legal changes into implementation is a slow process and that institutional reforms have been undertaken in many countries (71% of countries), correlating well with countries implementing legal and policy reforms.

The African region on the other hand has embraced the challenges of integrated water resources management and in 2000 published its Africa Water Vision 2025 and subsequently formed the African Ministers' Council on Water (AMCOW) in 2002 as a framework for coordination of issues relating to water policies and actions across the countries of Africa (African Ministers' Council on Water [AMCOW], 2012). The government of Kenya under its vision 2030 blue print has identified three pillars based on the economic, political and social aspects of the Kenyan society. The economic pillar aims to improve the prosperity of all Kenyans through an economic development programme while the political pillar aims to realise a democratic political system founded on issue based politics that respects rule of law, and protects the rights and freedoms of every individual in the Kenyan society and the social pillar seeks to build a just and cohesive society with social equity in a secure and clean environment (Republic of Kenya, 2008). Water resources form a major part of the environment and also a major factor of economic and social development in any given society.

Every person in Kenya has the right to clean and safe water in adequate quality and quantity (Constitution of Kenya, 2010). However, Kenya faces a number of serious challenges related to water resources management. A number of these challenges are as a result of factors both within and outside the water sector. Climate variability and increasing demand for water as a result of development and population pressure are factors that the sector may not be able to control but can initiate mitigation measures to ensure sustainable water resource development (Kenya National Development Report, 2005). The state shall encourage public participation in the management, protection and conservation of the environment and utilise the

environment and natural resources for the benefit of the people of Kenya (Constitution of Kenya, 2010) and in the same spirit of the constitution every person has a duty to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

In order to enhance public participation in water resources management at the lowest level in the society, the formation of water resources users associations for conflict resolution and co-operative management of water resources in designated water catchment areas is highly encouraged (Water Act, 2016). Under the provision of the Water Act 2016, the Water Resources Management Authority and other actors in the water sector had facilitated formation of 599 WRUAs in the country by June 2015 out of a potential of 1237 WRUAs which is 48% achievement (WRMA, 2016), with defined roles and responsibilities, are operational and at different stages of development. Quite a number of these WRUAs have received technical and financial support from different actors in the field of water resources management. The government of Kenya has funded some of these WRUAs through the Water Sector Trust Fund (WSTF) while others have been funded by other actors an amount totalling to over 180 million Kenya shillings (WRMA, 2011) as a way of enhancing their capacity to carry out their mandate.

Wang'ombe (2013), found out that strong WRUA leadership ability is required in order to reduce water use related conflicts. He also found out that more WRUA trainings and capacity enhancement is required to enable reduction of water use conflicts and went further to recommend that WRUA leaders should be trained and empowered on how to go about conflict management and resolution through negotiation, mediation, reconciliation and arbitration without compromising their quality of leadership. According to Simon (2012), an increase in the number of the Water Resources Users Associations (WRUAs) executive committees with at least secondary level education resulted in increased performance level of the WRUA. He also found out that WRUAs require diversified consistent external support to improve their performance until they reach sustainability stage. Musyoki (2013) found out that the inability of communities to maintain projects within their localities was due to their inability to consistently contribute towards those projects.

It's therefore upon this basis that research on factors influencing performance of water resources users associations in water resources management with reference to WRUAs in Upper Ewaso Ng'iro Sub Region, Laikipia County was undertaken.

## **STATEMENT OF THE PROBLEM**

In Kenya, the government as well as the community have been involved in developing and sustaining water supply and sanitation projects. Unfortunately, for many years, water resources management has not been given the attention and weight it deserves (Adopted from water resources management in Kenya, a guide to the Water Act, 2002). According to (The Water Act, 2016) which replaced the Water Act CAP 372 Laws of Kenya and the latter Water Act 2002, the government recognizes the need to involve the community to enhance co-operative management of water resources and resolution of water related conflicts through

formation and development of the institution of Water Resources Users Associations (WRUAs). The WRUA institution which is guided by the WRUA development cycle (WDC) process (WRMA & WSTF, 2014) has been in existence for over seventeen years and currently there are over 599 WRUAs formed in Kenya (WRMA, 2015). Thirty four WRUAs have been formed in Laikipia County and are at different development stages (WRMA, 2014). Out of these thirty four, twenty one WRUAs are located entirely in Laikipia County; six traverse Laikipia and Meru Counties, another six Laikipia and Nyeri Counties, nine Laikipia and Nyandarua Counties while one WRUA traverses Laikipia and Samburu Counties. This has been dictated by demarcation of the sub catchments where these WRUAs operate. Performance of the WRUA as an institution like many other community based institutions can be influenced by many factors and can also influence how things are done and in this particular case how water resources are managed. Study done by (Water Resources Management Authority, 2014) on WRUA impact assessment highlighted funding as being a long process with several stages of vetting and approval, high illiteracy levels among some WRUA members was raised as a challenge which makes it difficult to draft documents like Constitution, SCMP and also prepare reports and accounting for funds allocated to the WRUAs, distance between the WRMA offices and WRUA areas of operation was also seen as a challenge in the same study. According to Lalampaa (2012), institutional governance significantly influences poverty reduction. He also recommended that the government and non-governmental organisations should enhance accessibility of financial resources to community based institutions. Within the Upper Ewaso Ng'iro Sub Region, eighteen WRUAs have been formed and are at different operational stages. This study focused on five WRUAs formed between 2009 and 2010. The WRUAs have been implementing water resources and catchment management activities for over five years and it appears like there has not been an assessment of their performance and implementation of activities towards achieving effective and sustainable water resource management in their areas of operation, and especially against the framework upon which the WRUAs were established. This study therefore assessed the factors that influence performance of WRUAs in effective water resources management with reference to WRUAs in Upper Ewaso Ng'iro sub region, Laikipia County.

## **PURPOSE OF THE STUDY**

The purpose of this study was therefore to assess the factors that influence performance of Water Resource Users Associations in water resources management. The study examined the factors influencing performance of WRUAs in water resources management in five WRUAs in Upper Ewaso Ng'iro Sub Region, Laikipia County in their task of ensuring effective development, conservation and equitable sharing of water resources at the sub catchment level.

## **RESEARCH OBJECTIVES**

1. To establish the influence of organizational set up of Water Resource Users Associations in Water Resources Management.

2. To determine the influence of the functions of Water Resource Users Associations in Water Resources Management.
3. To find out the influence of the legal framework of Water Resources Users Associations in Water Resources Management.

## **LITERATURE REVIEW**

### **Organizational Structure of Water Resource Users Associations and Water Resources Management**

According to Rupert (2007) at the outset, a prospective WRUA may comprise no more than a few interested individuals determined to band together for the better management of their water resource. Even if the group gets no further than this, failing to achieve formal recognition or registration, many of its objectives may still have been achieved. Arguably, the process of establishing a WRUA is just as important as the end result, and going through this will give users the opportunity to meet and respect the views of each other, and hopefully unite them in a common goal. The enthusiasm with which users embrace the idea of a WRUA varies enormously. Some river systems have experienced no real water shortages and so far, no dispute over the resource's allocation. In such river systems the idea of a WRUA as an entity is to better manage the resource, and to prevent possible future conflicts. On the contrast the formation of other WRUAs is driven by a very real danger of conflict as users in the lower reaches begin edging upstream in response to a disappearing river. Generally, upstream users are harder to convince of the benefits of an association, as they enjoy the privileged position of never experiencing water shortages. Even when members of a WRUA come together, it may still be difficult to persuade them to share the burden of water rationing when this is necessary. There is also no doubt that attendance of WRUA meetings is far higher when water is scarce.

There is utmost importance of the knowledge and rational use of natural resources, and in particular water, vis-à-vis the growing demand in both quality and quantity. The study of water resources must be undertaken with the parametrical relationships of the other natural and anthropic systems in mind, especially when it is desired to establish the rules for their management, control and preservation, when social and economic conditioning become very significant in relation to the cultural universe in which they are inserted (Maxwell 1982). According to Rupert (2007), membership and management of WRUAs is detailed in their constitution, the contents of which are largely governed by their legal status. The constitution of an Association, registered under the Societies Act, is often based upon the specimen provided by the Registrar, as modified to suit individual requirements. More detailed management provisions may be contained in by-laws made subsidiary to the constitution. The potentially complex issue of WRUA membership seems efficiently managed by the creation of different categories of membership, thus ensuring that all water users are represented, either directly or indirectly, in the Association.

Riparian landowners are all usually entitled to membership, while community water projects with their own off-take either elect one or more representatives to membership of the Association or automatically nominate one or two of their office-bearers. The responsibilities of membership of the WRUA often take time to absorb, and project representatives may be lax in reporting back decisions made at meetings, as well as the rationale behind them, to their project members. Large-scale users like flower farms, Water Service Providers are represented on their Association as individual or commercial members, and pay a higher membership fee; abstractors with portable pumps may also qualify for such membership. To ease administration some associations also divide their river into geophysical sections, perhaps three, upper, middle and lower, or even more as need may dictate; and each of these sections may have the right to elect an Area Member. Finally, to help distinguish between primary and secondary stakeholders, there may be an Observer Member category for those who are not water users but have an interest in the activities of the WRUA and the conservation of the resource it manages.

Management of the WRUA lies upon a management committee, usually made up of the Association's office bearers, and other members drawn from different sections of the sub catchment, or members representing various interest groups. The frequency of both committee and general members' meetings varies, but members seem to meet on average about once a quarter, with the committee meetings being called in response to specific issues. One of the members' meetings will be the Annual General Meeting. Some WRUAs organise rotational meetings that are hosted by different members enabling members to have an experience in different part of the river system or the sub catchment, and the problems associated with it, each time; there is also a social dimension to these meetings, with common lunch provided afterwards.

Any WRUA would be far better run if it could afford to employ an executive officer responsible to the executive committee. However, on top of the salary are transport costs, office space and general infrastructural back-up, and these ratchets up the WRUA's financial requirements dramatically.

### **Functions of Water Resource Users Associations and Water Resources Management**

When public involvement is not included in the budget as a line item, it is almost sure to be slighted, and thus the prospect of implementation will be reduced. Helweg suggests four principles of public involvement in implementation of water resources plans. These are seeking and using input from all interested publics during all the pertinent steps of the planning process. He also suggests the need for understanding limitations in public involvement and that the planner must be honest and must empathize with various interest groups as well as diversifying the means by which to involve the public other than just using public meetings (Otto, 1985). Study by Emery (2000), found out that governments have many ways to innovate, support and encourage the inclusion of indigenous knowledge and the participation of indigenous people in the development of their national, regional or local resources and the well-being of their citizens. He continues to say that contracts are a means

of defining what everyone wants and agrees to. Being able to agree to a contract is not confrontational, it clarifies the agreement so that everyone knows what to expect.

According to Water Resources Management Authority and Water Services Trust Fund (2014), WRUAs, like other organisations, need to develop proper financial systems which include bank accounts, asset registers, budgets and expenditure statements, audits, procurement systems and financial reporting to the membership since this enhances the ability of WRUAs to undertake their mandate and functions. Various fund raising options are open to WRUAs and these may be internal or external. Internal means include membership registration fees and annual subscriptions, voluntary contributions as well as payment of services rendered by the WRUA. External sources include WRA who can support the WRUAs directly or indirectly depending on the need, priority of the intended activity, and confidence in the WRUA to implement the activity. Other sources are the WSTF through submission of proposals that are vetted by WRA, the Constituency Development Fund (CDF), and the Community Development Trust Fund (CDTF) as well as through proposal writing to Non-Governmental Organisations (NGOs) with interest in water and sanitation. As per the (Water Resources Management Authority and Water Services Trust Fund, 2014) investment thresholds are meant to increase as the WRUA absorption capacity increases. Four investment thresholds have been anticipated which are one million five hundred thousand for WRUAs receiving initial funding, five million paid in two sums for WRUAs who have developed a sub catchment management plan, ten million paid in two sums to WRUAs who have effectively utilised initial five million and upper ceiling of fifty million to any one WRUA within any one ten year period. An element of local contribution has also been determined and set at fifteen percent and twenty five percent of budget for sub catchments in alarm and alert status respectively.

Simon (2012), found out that WRUAs require diversified consistent external support to improve their performance until they reach sustainability stage. (Musyoki, 2013) found out that the inability of communities to maintain projects within their localities was due to their inability to consistently contribute towards those projects. On the other hand (Lalampaa, 2012) recommended that the government and non-governmental organisations should enhance accessibility of financial resources to community based institutions.

According to memorandum of understanding between the Water Resources Authority and the Water Resources Users Associations, for cooperation in relation to management of water resources, the functions of WRUAs include implementation of approved sub catchment management plan, promoting a dynamic, interactive and multi-sectoral approach to water resources management, including the identification and protection of potential sources of freshwater supply that integrates technological, socio-economic, environmental and human health considerations. Similarly it's the role of the WRUAs to plan for the sustainable and rational utilization, protection, conservation and management of water resources based on community needs and priorities within the framework of Ministry of Environment, Water and Natural Resources and WRA policies, identifying and strengthening or developing the appropriate institutional and financial mechanisms to ensure sustainability of water resources

management, undertaking integrated measures for the protection and conservation of potential sources of fresh water supply, with land-use planning, forest resource utilization, protection of mountain slopes, riparian zones and riverbanks and other development and conservation activities as well as to resolve water resource use related conflicts. The roles of the WRUAs are also contained in the various sub catchment management plans that are developed by the WRUAs with technical support from different stakeholders. According to a Sub Catchment Management Plan (SCMP), it is the role of the WRUA to implement the activities contained in the SCMP. The SCMP is a product arising from water resource problems highlighted by the WRUA, their root causes, effects, possible interventions and the strategies that can be put in place to solve or reduce the identified problems. These activities pegged to the various strategies are spread over ten different themes that are all related to the management of water resources. These themes deal with issues on WRUA management approach, sub catchment characteristics, water balance and allocation, water resource protection, catchment protection, WRUA institutional development, infrastructure development, water rights based approach, monitoring and information sharing as well as financing and implementation (WRMA, WSTF, 2014).

According to Global Water Partnership (2001), a case study on Basin Committees in Sao Paulo State, Brazil as instruments of participatory integrated water resources management (IWRM) reveal that before 1990, water management in Sao Paulo was controlled by government agencies and focused on technical solutions, including water transfer. Users were scarcely involved in water management. The water management regime proved to be neither cost effective nor socially acceptable, resulting in growing water crisis. The state of Sao Paulo was the first to adopt a law following a basin approach in 1991. River basin committees with equal representation of the state, municipalities and civil society manage water resources integrating the various needs and demands. River basin committees offer the opportunity for public discussion, conflict resolution, planning and management, encouraging a more client based approach. A state fund for water resources was created as a financial instrument supporting the implementation of the state plan at basin level. A water charge system for water extraction, consumption and disposal/treatment for the various consumers (municipalities, industries and farmers) was also established.

Study done by Ikuathu (2013), found out that water conflict resolution by WRUAs was efficient. Water use conflict resolution is a major role of the water resource users associations in their respective areas of operation. This has been efficient and successful irrespective of the funding constraints experienced by the WRUAs while implementing their SCMPs.

### **Legal Framework of Water Resource Users Associations and Water Resources Management**

According to Water Witness International, all water users, from the villager to multinational agribusinesses and hydro-power companies have a duty to be responsible water stewards. We define water stewardship as taking action locally, at basin scale and within ones chain of influence to achieve water security for all. This emphasises the need for all water users to

minimise the risks and impacts associated with their own water use, and to work collectively to minimise 'upstream' risks and impacts – because 'we are all downstream'. (Akombi R., Luwesi C., Mahiri I., Mathenge J., Mutiso M. & Shisanya C., 2014) found out that overall performance of community water governance institutions in Ngaciuma – Kinyaritha sub catchment performed fairly well in both water resources management and farming water development (62%) and ensuring water supply sustainability (50%). However, all the community water governance institutions within the Ngaciuma – Kinyaritha sub catchment recorded a fairly poor contribution to water security most likely due to insufficient and inadequate technological means and lack of contingent plans to curb water disasters.

According to Emery (2000), before anything else is done in a community, it's important to create a group to speak on behalf of the community. This should be done in many ways that add to the richness of the community traditions. The people chosen become a team with each member having different responsibilities and tasks and also members should be chosen on the basis of the skills they can bring to the project. Having a representative group of indigenous people empowered by the entire community to represent it, can make negotiations smoother. According to (Maxwell, 1982) emphasis is recommended on community participation, be it before the execution of a programme as well as during and after its materialization, so that the community may feel represented and motivated.

According to Hofkes et al., (1987) three approaches for community involvement may be distinguished, a standard approach, individual arrangement and a compromise combination. In Latin America, a standard approach has been used with fixed selection procedures, formal delegation of responsibilities and authority, supplemented by training and supervision. Elsewhere individual arrangements are common which are adapted to the existing community organization. However these arrangements lack a legal base and their effectiveness is often limited. As a compromise some flexibility can be brought into the standard approach to suit the local, social and cultural pattern. This relates to matters such as selection procedures, scope of community organization and division of responsibilities and authority.

Emery (2000), suggested five guidelines that can assist governments at all levels to focus their attention in a few critical areas that can significantly improve the capacity of any government to benefit from the inclusion of indigenous people and their traditional knowledge. One of these guidelines is to establish policies to foster sustainable development. Most indigenous people are interested in maintaining the cultural and natural environment in an evolving, but sustainable fashion that reflects generations of wisdom through traditional practice. Secondly, is by developing strategies by involving all stakeholders. By including all potential stakeholders, including indigenous people, a greater likelihood of reaching the goals is achieved. Thirdly is by separating program delivery departments from regulatory departments. Separating programs that encourage the use of harvest of resources from the departments or agencies that enforce, regulate or conserve, removes much of the potential for conflict of interest. Fourthly, is acknowledging the traditional resources rights of indigenous people and fifthly funding traditional knowledge capacity building amongst the nation's indigenous people.

According to United Nations Development Programme (2006), Integrated Water Resources Management (IWRM) has been defined as a systematic process for the sustainable development, allocation, and monitoring of water resources. The concept and principles of IWRM were articulated at the International Conference on Water and Environment held in Dublin in 1992 and in Chapter 18 of *Agenda 21*, a consensus document from the United Nations Conference on Environment and Development (UNCED), held in Rio also of 1992. IWRM is a cross-sectoral holistic approach to water management, in response to the growing competing demands for finite freshwater supplies. It is an approach that aims to ensure the coordinated development of water, land and related resources to optimise economic and social welfare without compromising the sustainability of environmental systems (Global Water Partnership, 2000). Policy makers, analysts, international organisations and governments have sought consensus on principles to guide the setting of priorities, policy making and the elaboration of specific initiatives in IWRM.

Key principles include facilitation by the government to enable the sustainable development of water resources by the provision of integrated water policies and regulatory frameworks. Secondly water should be treated as an economic, social, and environmental good. Thirdly water policies should focus on the management of water as a whole and not just on the provision of water. Fourth is that water resources should be managed at the lowest appropriate level and lastly women should be recognised as central to the provision, management and safeguarding of water resources. The application of IWRM as a philosophy, policy, and implementation guideline can assist in addressing the need for improved water governance and for increased coordination and collaboration among various water sectors, such as drinking water supply and sanitation, irrigation, and ecosystem maintenance, potential competition and conflicts among different stakeholders from all sectors and among individuals, communities, and governments, environmental degradation that is threatening all life on the planet, gender and social disparities in terms of equitable access to and control over resources, benefits, costs, and decision making between women and men and the need for sustainable water resources development as a key to poverty eradication.

According to the Global Water Partnership (2001), the key to encouraging an IWRM oriented civil society lies in the creation of shared visions, through joint diagnosis, joint creation of options, joint implementation and joint monitoring. This itself requires broad stakeholder participation in water planning and operating decisions and is another strong tool for encouraging such new civil orientation. Participatory approaches in IWRM are powerful instruments for social change. At all levels national, regional and local, it is often the most deprived social groups that need to be involved in the participatory process. The fullest possible participation is a key pillar of IWRM, but there are some groups of stakeholders whom it is harder to engage. Such groups may include indigenous minorities or women where social and cultural structures do not encourage their active participation, even though they have an important role to play. Stakeholder analysis helps identify these groups, but additional analysis may be needed to ensure women or particularly disadvantaged groups are not overlooked. Gender and social analysis is a particular form of stakeholder analysis and examines decision making within the household and community, and is a tool that supports

women's participation. It can provide new insights into the distribution of power and resources in a community, and assumes that women are major stakeholders in development projects (Abstracts of IWRM cases pg. 7).

In the area of water resources management, an uncoordinated and sectoral approach has resulted in environmental degradation from overexploitation of water resources, inappropriate allocations among competing uses, inequitable distribution of benefits and burdens, and inadequate operation and maintenance of infrastructure. Inadequate involvement of both women and men has hindered programmes and projects aimed at addressing sustainability in water resources management. Community participation and management approaches have failed to address these issues, largely because communities are often seen as a collection of people with a common purpose. The reality is that a community is not a collection of equal people living in a particular geographic region. It is usually made up of individuals and groups who command different levels of power, wealth, influence and ability to express their needs, concerns and rights. Communities contain competing interest groups. Where resources are scarce, there is competition for supplies, and those at the lowest end of the power spectrum - poor women and men - will go without. Unequal power relations place women in a disadvantaged position. Applying a gender analysis helps water sector agencies allocate their resources better to meet the needs of different women and men and marginalised groups.

People-centred approaches do not always ensure that gender perspectives are taken into account. Thus, a deliberate strategy of gender mainstreaming can be useful to ensure that these issues that affect women and men are part of analysis, programme and functions, implementation, and evaluation. More importantly, gender mainstreaming can assist in bringing about institutional and organisational change necessary to ensure gender equality as an on-going commitment.

The United Nations Development Programme (2005), suggested several issues to be addressed with respect to water resources management which include participation of women in decision making and involvement in water committees, focus on women to implement and manage water systems, women specific budget and women initiatives, valuing and compensating contribution from women, training in technical and basic management and water resource management skills must include women. (A targeted effort to encourage women enrolment in water related courses), gender elements in training curriculum e.g. Inbuilt gender aspects in Participatory Learning and Action and Participatory Rapid Appraisal, recruitment of staff at all levels must include women and privatisation of water which poses negative impact on the livelihoods of women. Similarly women should also be encouraged and given equal opportunities as men in water related training institutions to enhance their skills and knowledge in water issues. Literacy ratio for females to males increased from 81% in 1989 to 90.5% in 2000 (MDGs 2003).

According to the catchment management strategy for Ewaso Ngiro North Catchment area, the water sector reform requires a paradigm shift in the approach on how to manage the limited water resources in the country. The new management paradigm calls for participation of stakeholders and interest groups. Water Resources Management Authority (WRMA) as the

lead agency seeks a close cooperation with the other agencies involved in water and catchment management. Through these institutions and collaboration WRA provides an avenue for cooperate management of water resources. WRA in conjunction with the Water Sector Trust Fund (WSTF) has developed a framework for harmonised WRUA development and operation (WRUA Development Cycle).

From the above consideration, it is clear that the purpose for a strategy on stakeholder participation is to optimize the process of reaching stakeholders for their effective participation in water resources management and the effective facilitation of public participation in the development and implementation of the Catchment Management Strategy. Corporate governance, which is liaison and integration of planning between national government departments, county and local authorities is an important factor to be considered in the overall integrated water resources management to ensure compounded benefits to all users in any catchment. Adequate management capacity at all levels of water resources management is required to ensure that participatory management of water resources is successful. As a way of enhancing decision making in water resources management, a water resources users association is supposed to develop a sub catchment management plan (SCMP) in a participatory manner. A SCMP is a water resources management tool that identifies water resources problems, prioritizes them and suggests possible interventions to address the identified problems.

## **THEORETICAL FRAMEWORK**

In order to understand the factors that influence performance of water resource users associations in effective water resources management, this study will be based on the Natural Resource Policy Analysis and Rational Choice Theory. Natural resource policy analysis focuses on the context and consequences of collective decisions regarding the allocation and distribution of natural resources (Debra J. Salazar and Robert G. Lee, 1990). Applications of rational choice theory to natural resource and environmental issues have generated a consistent set of policy prescriptions: where resources are publicly-owned, alienate them to the private sector; private ownership and management will almost invariably yield more desirable social outcomes than public ownership and management. Where public agencies regulate private firms to protect environmental quality, minimize the extent of regulatory requirements and design regulatory regimes to mimic market processes; attach a price to pollution and firms will economize on it. These solutions emerge whether the focus of analysis is air, water, forests, wilderness, or wildlife.

The rational choice theory comprises of two thoughts which are the property rights school in economics and the other is the public choice literature in political science. The property rights paradigm has extended the explanatory scope of economic theory to extra-market decision making. This extension is the result of three insights. The first is derived from a shift in analytical focus from the firm level to the individual decision maker. Instead of positing the firm as a profit maximizer, property rights economists posit individual members of the firm as utility maximizers. Thus we should expect firms and other organizations to behave efficiently only to the extent that individuals within these organizations face appropriate

incentives. Second, property rights economists examine institutional arrangements, especially property arrangements. Property, as a social institution, allocates rights and obligations to social actors in order to regulate the use of objects. The set of rights and obligations that are associated with property ownership varies among societies and through time in the same society. Property rights economists evaluate the effects of the structure of property arrangements on the incentives faced by individuals and on resource allocation.

Public choice constitutes a second branch of rational choice theory. Analysis of political phenomena such as voting, electoral competition, and legislator behaviour is the focus of public choice theory. While public choice theorists have appropriated economic principles to study decision making in political contexts, public choice differs from neoclassical economics in its focus on institutions and on the nature of goods. Public choice theorists have focused on two characteristics of goods that influence resource allocation; the extent to which goods may be jointly consumed' and the ease with which others may be excluded from their use. Economists have traditionally used the attribute of jointness of consumption to define a public good.' Public choice theorists argue that public goods are defined by both joint consumption and costly exclusion. Furthermore, it is the attribute of costly exclusion that creates collective action problems. The public choice analysis of goods facilitates identification of the conditions under which particular goods will be optimally provided and suggests institutional arrangements appropriate for provision of each type of good.

The theory of rational choice therefore is defined by three elements; the postulate of purposive individual choice; the presumption that institutions matter; and the focus on the nature of Rational choice theory employs the individual as the basic unit of analysis and postulates that individuals behave purposively. At the most general level, rational choice theory may be characterized by methodological individualism, a focus on the individual decision maker. The premise underlying this focus is that firms and bureaucracies do not make decisions, only individuals do. Organizations and other social institutions provide incentives that guide individual choices as well as rules for aggregating those choices. But all collective actions may be reduced to a set of individual decisions. Thus the appropriate unit of analysis for rational choice theory is the individual decision maker. The postulate of purposive choice asserts that individuals maximize an objective function. The nature of this function is determined by an ordering of tastes or preferences that is assumed to be transitive and stable.' Maximization is constrained by limited resources. In order to predict behaviour in particular contexts, the rational choice analyst must identify a decision maker's objective (for example, wealth accumulation, status, re-election), specify an objective function, identify constraints, and analyse the institutional setting. A second defining element of rational choice theory is the presumption that institutions matter. Rules and norms that define procedures for making collective choices favour some interests over others and some outcomes over others. Whether it be public versus private ownership or unanimity versus majority voting rules, the nature of institutional arrangements affects individual behaviour and subsequent collective action. Thus rational choice theorists devote considerable effort to analysis of social institutions. The three elements outlined above-the postulate of purposive individual behaviour, a focus on institutional arrangements, and frameworks for analyzing the nature of

goods-are central to rational choice theory. They invite exploration of three kinds of questions. How does the nature of a good affect the development of institutional arrangements? How do institutions affect individual decisions regarding resource provision and use? What are the social consequences of particular choices?

## **RESEARCH METHODOLOGY**

### **Research Design**

This study assessed the factors that influence performance of WRUAs in management of water resources in their area of operation. It involved looking at how the involvement of WRUAs' had contributed towards achieving effective water resources management. The research design used in carrying out this study was cross sectional survey. This design was chosen since it allowed for generalization of findings to a larger population. Both qualitative and quantitative data were collected in this study. Qualitative data was in form of words and expressions, among others to allow for detailed description of the findings while seeking to establish the respondents' attitude, opinions as well as behaviour while considering the factors influencing performance of WRUAs in water resources management. Quantitative data collected and used in this study was inform of numbers and thus quantifiable. This data enabled application of statistical methods of data analysis while considering numerical data that was collected.

### **Target Population**

The target population for this study was 2291 which was the number of members of the nineteen WRUAs that existed in the study area under consideration.

### **Sampling Procedure and Sample Size**

Due to limitation of time and cost consideration among other factors it was not possible to carry out a census inquiry, and thus a representative sample from the target population was selected and used in this study. From the target population of 2291, an accessible population of 1543 derived from 13 WRUAs that had been funded and had been implementing various projects and activities was determined. Purposive sampling technique was used and the criteria of selection was based on the WRUA funding level whereby WRUAs in funding level three and four was picked and used in this study. Similarly, simple random sampling was used to select WRUAs to be considered under funding level two. Since there were six WRUAs in funding level two, 30% of six is 1.8 rounded to 2 and therefore two WRUAs were selected. Thus Naromoru, Nanyuki, Ngusishi, Likii and Ontulili WRUAs were used in this study and the respondents were randomly selected from the WRUA membership. Based on Krejcie and Morgan table for determination of sample size (Krejcie R.V. & Morgan D.W, 1970), and which applied the formula:

$$s = \frac{\chi^2 NP (1 - P)}{[d^2 (N - 1) + \chi^2 P (1 - P)]}$$

Where:  $s$  = required sample size;  $\chi^2$  = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841);  $N$  = the population size;  $P$  = the population proportion (assumed to be 50% so as to provide the maximum sample size);  $d$  = the degree of accuracy of the sample estimate expressed as a proportion (0.05)

Using the above formula, a sample size of 295 respondents was applied in this study.

### **Methods of Data Collection**

There are several data collection methods from which data can be obtained in the field. Selection of data collection method was determined by suitability of the method, funding available, time allocated for the research and also the targeted respondents. In this study, simply structured questionnaire was used for data collection. The researcher visited the WRUAs at their areas of operation in their offices and interacted with the respondents to get in depth details from them as they responded to the questions raised in the questionnaire. The researcher also assessed records maintained by the WRUAs at their offices to collect data on WRUA operations, management, and day to day running of the WRUA affairs. The questionnaires were coded to enhance confidentiality and facilitate easier analysis of the forms.

### **Research Instruments**

Structured questionnaires were used in this study. They were administered to the respondents who included WRUA management committees and other WRUA members. The first section was designed to determine fundamental issues including the demographic characteristics of the respondents and the second part consisted of questions where three variables were considered and focused on. The researcher also administered a different questionnaire to WRUA stakeholders to collect data on interactions between the WRUA and their stakeholders.

### **Methods of Data Analysis**

Data analysis for this study was based on the type of data collected. In this case both qualitative and quantitative data was collected. Data collected was cleaned, coded fed into the computer and analysed through the computer programme SPSS Version 20. Qualitative data was organized into themes and concepts to establish patterns, trends and relationships to enable formulation of generalizations from the findings. Quantitative data collected was summarized by application of descriptive statistics. While applying descriptive statistics, measures of central tendency which are mode, mean and median were determined and measures of variability or dispersion were also used to effectively describe distribution of scores. Similarly, frequency distribution and measure of relationships between the variables were also done. Inferential statistics techniques such as correlation and regression analysis were applied in order to assist in making inferences about the population based on results obtained from the sample of the study and hence made relevant conclusions and recommendations about this study.

## **RESEARCH RESULTS**

The study sought to establish the influence of organizational set up of WRUAs in Water Resources Management. The study found that majority of the WRUAs had been there for long. They have existed for over three years. The study also found that majority of the members had been members of the WRUAs for three years and above and were recruited if they were riparian land owners (individual), abstractors who directly draw water from water points such as rivers or springs (e.g., community group, schools, hospitals, and churches), commercial and industrial businesses and ex-officio members such as relevant government departments and non-governmental organizations operating within the sub catchments. The study established that the community was well represented in the WRUAs as this stood at 65.5%. The WRUAs experience leadership and management challenges and that most of them held management committee meetings quarterly and annually. Further the study found out that increase in organizational structure of WRUAs would lead to increase in score of performance of WRUAs in water resources management by 0.812 if other variables are held constant.

The research also sought to determine the influence of the functions of WRUAs in Water Resources Management. The findings show that the water resources situation had improved after formation of the Water Resources Users Association. The findings reveal that water resource availability and status of riparian areas were very high with mean of 4.36 and 4.00. Further, the involvement of the community, water resources sharing and resolution of water use conflicts was high while occurrence of water use conflicts was low. The study also found that majority of the WRUAs use member subscriptions (61.6%) as main sources of funds for their respective WRUA operations while they depended more on Water Sector Trust Fund (77.6%) as the main source of funds for the WRUA projects. The flow of funds was also found to be very good (37.6%) where most of the WRUAs kept their financial records using receipt books and bank statements at 29.0% and 25.5% respectively. The study also found that they kept other records such as minute books, asset registers and attendance registers. The study found out that Water Resources Authority at a mean of 4.214, Ministry of Environment, Water & Natural Resources mean of 4.143 and County government mean of 3.976 were very highly involved in WRUA activities. Further, the ministry of agriculture, non-governmental organisations, National Environment Management Authority and Kenya Forest Service were highly involved in WRUA activities. Moreover, Kenya wildlife service and Provincial administration were lowly involved in WRUA activities. Further the study found out a unit increase in functions, leads to 0.712 increase in the performance of WRUAs in water resources management.

The study sought to find out the influence of the legal framework of WRUAs in water resources management. It was established that all the WRUAs had constitution/by laws. The study found that most of the members had personal copies of the constitution (89.6%). The study found that most of the WRUAs had reviewed the constitution/by laws at some time and this was done by most of the WRUAs last three years. The study also found that conflict due to leadership issues were very high by mean of 4.4404, conflict due to finances were high by

mean of 3.8899 while conflict due to political interferences was low. The study further showed that unit increase in scores of legal framework of WRUAs would lead to 0.772 increase in scores of performance of WRUAs in water resources management.

**REGRESSION ANALYSIS**

Regression analysis was applied to determine the relative importance of organizational structure, functions and legal framework with respect to the performance of WRUAs in water resources management. The findings were presented in Table 1, 2 and 3.

**Table 1: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.891	0.793	0.791	0.555

From the findings, the independent variables were statistically significant predicting the dependent variable since adjusted R square was 0.791. This implied that 79.1% variations in performance of WRUAs in effective water resources management are explained by organizational structure, functions and legal framework. Other factors influencing performance of WRUAs in water resources management that were not covered in this study accounted for 20.9% which form the basis for further studies.

**Table 2: ANOVA Test**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	299.121	3	99.707	320.782	0.000
Residual	78.017	251	0.311		
Total	377.138	254			

From the ANOVA Table, p-value was 0.000 and F-calculated was 320.782. Since p-value was less than 0.05 and the F-calculated was greater than F-critical (2.6049), then the regression relationship was significant in determining how organizational structure, functions and legal framework influenced performance of WRUAs in water resources management.

**Table 3: Coefficients of Determination**

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	1.267	0.182		6.962	.000
Organizational structure	0.812	0.196	0.714	4.143	.000
Functions	0.712	0.208	0.611	3.423	.001
Legal framework	0.771	0.312	0.672	2.471	.015

The established model for the study was:

$$Y = 1.267 + 0.812X_1 + 0.712X_2 + 0.771X_3$$

Where: Y= performance of WRUAs in effective water resources management; X<sub>1</sub>= Organizational structure; X<sub>2</sub>= functions; X<sub>3</sub>= Legal framework

The regression equation above has established that taking (organizational structure, functions and legal framework) at constant, performance of WRUAs in water resources management will be 1.267. The findings presented also show that increase in the organizational structure leads to 0.812 increase in the score of performance of WRUAs in effective water resources management if all other variables are held constant. This variable was significant since the p-value  $0.000 < 0.05$ .

Further, it was found that if functions increase, there is a 0.712 increase in performance of WRUAs in water resources management. This variable was significant since its p-value 0.001 was less than 0.05. The study also found that a unit increases in the scores of legal frameworks would lead to a 0.771 increase in the scores of performances of WRUAs in water resources management. The variable was significant as its p-value  $0.015 < 0.05$ .

Overall, organizational structure had the greatest influence on performance of WRUAs in water resources management, followed by legal framework, while functions had the least influence on the performance of WRUAs in water resources management. All the variables were significant since their p-values were less than 0.05.

## **CONCLUSION**

The research concluded that organizational structure has a statistically significant influence on the performance of WRUAs in water resources management. The study concluded that upstream users are harder to convince of the benefits of an association, as they enjoy the privileged position of never experiencing water shortages. The study also concluded that the frequency of both committee and general members' meetings affect the response to specific issues.

The study concludes that WRUA Functions have a positive and significant influence on the performance of WRUAs in water resources management. The study concluded that the functions of WRUAs include implementation of approved sub catchment management plans, promoting a dynamic, interactive and multi-sectoral approach to water resources management, including the identification and protection of potential sources of freshwater supply that integrates technological, socio-economic, environmental and human health considerations. The study also concludes that sustainable community managed water supplies, should have sound financial base arising from reliable sources of funding.

The study also deduced that legal framework has a significant effect on the performance of WRUAs in water resources management. The study concluded that interaction with government officers determines the effectiveness of project future sustainability, applying an integrated government approach and intervention can act as an effective means in supporting sustainability of community based projects. The study also concluded that the application of IWRM as a philosophy, policy, and implementation guideline can assist in addressing the need for improved water governance and for increased coordination and collaboration among various water sectors, such as drinking water supply and sanitation, irrigation, and ecosystem maintenance, potential competition and conflicts among different stakeholders from all

sectors and among individuals, communities, and governments, environmental degradation that is threatening all life on the planet, gender and social disparities in terms of equitable access to and control over resources, benefits, costs, and decision making between women and men and the need for sustainable water resources development as a key to poverty eradication.

## **RECOMMENDATIONS**

The study recommends that stakeholders should be included in all assessment and pre-planning activities as well as planning and implementation as this will help to increase the chances for the WRUAs performance and enhance effective water resources management through more ideas. The management should periodically organize training sessions for the management team; as this will help to equip the managing team with the requisite management skills which are fundamental for daily operations.

The study recommends that capacity building programs for the local communities should be implemented. This will help to promote the development of local capacity skills that are required to improve the effectiveness of water resources management and addressing their problems in a manner consistent with their aspirations. It is recommended that WRUA management committees in Upper Ewaso Ng'iro Sub Region, Laikipia County should fully engage government departments right from conception, planning and implementation of water resources projects as this will enhance the performance of WRUAs.

The study recommends that the management of WRUAs should mobilize all the stakeholders especially those providing financial assistance to ensure that the WRUAs have reliable financial base. The study also recommends the management committee must carefully assess the stakeholders' interest; as this will help to eliminate intergroup conflicts and thus enhancing the performance of the WRUAs and that the management needs to formulate strategies which will guarantee effective communication between parties engaged in project implementation process.

They study recommends the County Government of Laikipia to engage WRUAs and other actors in a multi sectoral approach in policy formulation for an integrated water resources management plan as this would promote performance of WRUAs especially in management of water catchments and riparian areas that remain threatened due to limitations of what WRUAs can effectively be able to deal with.

The study recommends that there should be creation of environmental awareness on water resources management through public barazas across the entire Upper Ewaso Ng'iro Sub Region to promote and enhance knowledge among the community on water resources management. It is further suggested that environmental management policy is formulated to oversee both legal and activity implementation aspects of water conservation within Upper Ewaso Ng'iro Sub Region, Laikipia County.

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