Community Water Projects Sustainability for Climate Change Resilience and Adaptation in Suam Catchment Area of West Pokot County, Kenya

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Abstract. Managing water resources still remains a challenge to most of the players in the water sector. This is even made worse by climate change impacts that are experienced globally in the recent past. It is evident in most parts of the African continent that women and young children shoulder the burden of providing water to the family. This leaves them with little time for other demanding day-to-day assignments. The study sought to analyze how Integrated Water Resources Management (IWRM) advances the Sustainability of Community water projects in the Suam Catchment area of West Pokot County. The study looked at the governance structure, steps that are taken in developing capacities in Community water projects, mechanisms that are used in monitoring and implementing Community water projects in relation to sustainability in the Suam Catchment Area of West Pokot County. The sample was drawn from the staff of Kerio Valley Development Authority, Ministry of Water, Environment and Natural Resources, County Government of West Pokot, Water Resources Management Authority, Kapenguria Water and Sanitation Company, Ministry of Agriculture, Water Resources Users Associations, and local people all are stakeholders. Purposive sampling, as well as simple random sampling, was used. The sample composed of 96 respondents, the sample was evenly distributed with 12 persons per group. The study found that the leadership and management of community water projects were vested in appointed/elected leaders (45%) and water officers (16%). The findings indicated that 60% of the respondents had been trained on water usage and management. It was also clear that 53.8% of the respondents had never had access to IWRM policy documents even though 61.3% had been involved in the monitoring and implementation of community water projects in the area. In the ranking of the Integrated Water Resource Management policy factors, consideration of climate resilience and adaptation was ranked first (3.28), water-related information gathering was ranked second (3.14), monitoring and evaluation were ranked third (3.13), engagement with local communities was ranked fourth (3.08). The study recommends that there is an urgent need for community sensitization on climate change, climate resilience, and adaptation in the context of sustainability of the Community water projects.

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1 Introduction

Access to water resources remains a daily challenge to most families across the globe even though it is one of the basic fundamental rights of human existence. Water is essential and has a very significant role in the well-being and development of the eco-systems (Brauman 2015), supports life forms including various animal species and vegetation. It is also imperative to point out that the human community, various local economies and natural systems solely rely on water resources for their normal functioning; thus, destructive and non-sustainable measures normally practiced towards the use of water resources destroy ecosystems (UNICEF 2012). This has set a pace for the adoption of the Integrated Water Resources Management (IWRM) policy across the globe (Savenije 2008). This has also seen many players in the Water sector fronting several mechanisms that aim at full implementation and realization of the policy mandates and objectives. Pegram (2013) asserts that in Europe, the Water Framework Directive provides a high-level legal framework within which the Member States are responsible for developing river basin-based approaches for meeting good ecological status for all waters. Similarly, in Canada, the South Saskatchewan River Basin (SSRB) provides an example of river basin governance,the situation here is characterized by decentralized, multilevel assigned water licenses as asserted by Hurlbert and Diaz (2013). In developing countries, IWRM has been carried out with the objective of empowering people, poverty alleviation, improving livelihoods, and promoting economic growth (Merrey *et al*. 2005). In Zimbabwe, IWRM sought to bring together fragmented water institutions and users into integrated planning, allocation, and management framework (Chifamba 2013). According to Sokile and Koppen (2004) Tanzania's Integrated Water Resources Management has demonstrated a bias towards the formal state-based institutions for water management resulting in an escalation of state-based formal institutional arrangements through which Water Resources Users Associations (WRUAs) are formed besides providing frameworks for water allocation. A number of countries that have attempted to develop reform processes based on Integrated Water Resources Management principles have faced significant challenges (Pegram 2013). As Jiang (2009) posits, water resource management has been inefficient,which has led to an increased vulnerability to increasingly severe water scarcity. Moreover, water resources management challenges have increased ranging from flash floods, poor water quality, reduced water quantity, catchment degradation, lack of community participation and involvement, and increased water- related conflicts (Pegram *et al*. 2013). Yet, as a framework for managing water resources, Galli *et al*. (2012) argue that IWRM has helped nations to develop integrated systems and approaches that can best inform decision-making hence, best practices implemented.

In Kenya, Integrated Water Resources Management has informed water resource management practices aimed at achieving the goal of access to clean, safe, and increased water availability, which is a key determinant of health (Plummer 2015). Water is a key resource in Kenya, critical to the conservation of ecosystems and the development

of agriculture, industry, power generation, livestock production, and other important economic activities (Mango *et al.* 2011). Climate change has led to increased water resources vulnerability and demand precipitating difficulty in allocating water, given the limited water resources (Baker *et al.* 2015). Consequently, Suam River Basin is one of the major catchment areas that were intended to be impacted by the Integrated Water Resources Management policy. However, since the time policy document on water management through the water act, of 2016 of Kenya, there have been limited studies to assess how plans developed for Integrated Water Resources Management, particularly relating to Suam Catchment Area, have succeeded or failed to meet the objectives set out.

1.1 Statement of the Problem

Unforeseen factors such as climate change related conditions are expected to increase the pressure exerted on water resources in most of these regions. Kenya being a developing nation has implemented various water reforms that have targeted the water sector starting with the Water Act 2002 and now Water Act 2016. However, various issues remain which include but are not limited to health concerns that are still on the rise: distance and time covered to water points, which remains worryingly lengthy, prolonged queuing at water sources by the communities, and ever-skyrocketing costs. These often make water inaccessible. In the instances of glaring water challenges, communities and other local stakeholders have come up with adaptive mechanisms and local water provision projects to ensure the smooth provision and sustainability of water management. However, despite the initiation and implementation of these water projects, their relative success hardly lasts to complete a cycle and achieve the expected goals. This situation has been attributed to factors such as inadequate funding, low community participation, ineffective management support systems, and unfavorable climatic conditions that have affected the sustainable operations of water supply projects.

1.2 The Rationale of the Study

This research sought to analyze how Integrated Water Resource Management (IWRM) advances the sustainability of community water projects in the Suam Catchment Area of West Pokot County in Kenya in light of climate change. This assessment was important because the findings shall have both practical and theoretical benefits to various water stakeholders, policymakers, planners, donor agencies, and relevant government agencies in formulating relevant policies. Secondly, the communities in the Suam Water Catchment Area will gain a lot from the findings as they will be sensitized to the importance of environmental conservation in the context of water sustainability and this may lead to low environmental degradation. Thirdly the communities will be sensitized about climate change resilience and adaptation.

1.3 Purpose of This Study

The purpose of this study was to assess how Integrated Water Resources Management (IWRM) advances the Sustainability of Community Water Projects in the Suam Catchment Area of West Pokot County in Kenya; as a tool for climate change resilience and adaptation.

1.4 Specific Objectives

The following were the specific objectives:

1) To examine the governance structures of the Community Water Projects in relation to water sustainability in the Suam Water Catchment Area of West Pokot County.
2) To evaluate whether there are efforts to develop capacities among the local people on Community Water projects in relation to water sustainability in the Suam Water Catchment Area of West Pokot County.
3) To analyze mechanisms used to monitor and implement Community Water projects in relation to water sustainability in the Suam Water Catchment Area of West Pokot County.

1.5 Scope of the Study

The assessment involved the study of the Suam River Basin in North Pokot Sub-County, West Pokot County comprising surface water, particularly river discharge. Secondly, only residents and water managers in the said area were the respondents. This assessment attempted to investigate various ways that have been developed in the catchment area to find out whether they have resulted in reduced water stress on the riverine ecosystem and improved climate change resilience and adaptation. The assessment highlights measures to be undertaken to place greater focus on legal, institutional, economic, social, and ecological factors that have lived up to or alternatively failed to meet expectations as far as Sustainability of Community Water projects is concerned in light of climate change.

2 Literature Review

2.1 Climate Change in Perspective

According to IPCC's (2014) fifth assessment report (AR5), the climate in a wider sense is the state, including a statistical description of the climate system of the atmosphere, observed over comparable time periods. There is a distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes. Climate change directly interrupts natural capital, and thus the resource base for human livelihood (ACCESS/IUCN 2014).

2.2 Climate Change Resilience and Adaptation

Resilience refers to the ability of a system to stand up to shocks or changes and maintain an acceptable level of function and performance (Folke 2006; Nelson et al. 2007); likewise, adaptation refers to adjustments to limit the negative effects, or take advantage of the positive effects of climate change. Adaptation is especially important in developing countries since those countries are predicted to bear the brunt of the effects of global warming (Farber 2007; Cole 2008). Thus, the capacity and potential for humans and other natural systems to adapt are unevenly distributed across different regions and populations, and developing countries generally have less capacity to adapt (Schneider et al. 2007). Furthermore, the degree of adaptation relates directly to the situational focus on environmental issues (Nyongesa et al. 2016). Adaptive capacity is closely linked to social and economic development (Ruth and Ibarrarian 2009). The adaptation challenge grows with the magnitude and the rate of climate change (IPCC 2007). Figure 1 explains the relationships between risk, hazard mitigation, resilience, adaptation, and climate cha*nge.*

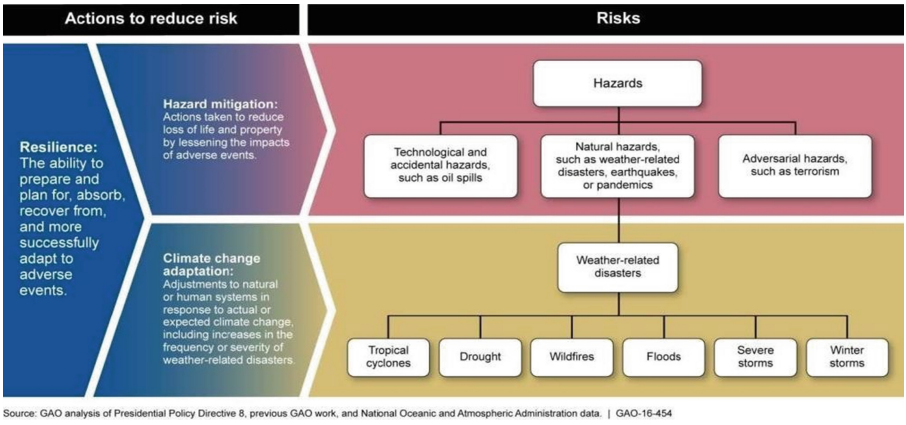

Fig. 1. The relationships between Risk, Hazard mitigation, Resilience, Adaptation, and Climate change. Source: GAO report: www.gao.gov/products/ GAO-16-454 CLIMATE CHANGE.

Governments have approached adaptation through Laws and Long-Term Plans. Another response to climate change is known as climate change mitigation (Verbruggen 2007). Even the most effective reductions in emissions, however, would not prevent further climate change impacts, making the need for adaptation unavoidable (Klein 2007). Nyongesa et al. (2016) concluded that in the absence of mitigation efforts, the effects of climate change would reach such a magnitude as to make adaptation impossible for some natural ecosystems. Others are concerned that climate adaptation programs might interfere with the existing development programs and thus lead to unintended consequences for vulnerable groups (Misra 2016). For human systems, the economic and social costs of unmitigated climate change would be very high (Opperman et al. 2009).

2.3 Climate Change Impacts on Water Resources in Africa

Many countries in Africa live under water stress; defined as those using more than 20% of their renewable water resources while withdrawals of over 40% implies serious

water stress (Pittock 2007). For example, reports show that water withdrawal in Nigeria during the 1990s was 28 cubic meters per person per year (Gleick 2000; World Bank 2003). The Dialogue on Water and Climate (2004) noted that water stress would increase significantly in those regions that are already relatively dry (such as sub-Saharan Africa). About 25% of the contemporary African population experiences water stress, while 69% live under conditions of relative water abundance (Vorosmarty et al. 2005), but abundance does not necessarily mean availability. Over time, human activities such as forest clearing, deforestation, and agriculture, among others have disturbing influences on the water cycle including vapor-transpiration, flow regimes, groundwater table, and sea level (Stolberg et al. 2003). In addition, human activities influence cloud formation via the emission of aerosols and their gaseous precursors (Kruger and Gracie 2002), change in the CO2 absorption by the oceans and other carbon sinks increases in extreme precipitation events (Stolberg et al. 2003). According to UNEP (2003), climate, water resources, biophysical and socio-economic systems are interconnected in complex ways, so a change in any one of these induces a change in another. Anthropogenic climate change adds major pressure to nations that are already confronting the issue of sustainable water resource use in Africa. This can be in a form not often recognized, namely as water vapor from the transpiration of crops and evaporation from natural and man-made lakes which is called moisture feedback Nyongesa et al. (2016).

2.4 Water Resources Management and Sustainability of Community Water Projects

It is therefore important to assert that enactment of various policies that promote the inclusivity and integration of primary water users in the management and implementation of water projects is critical (UNDP 2017). This approach will make the available water resources to meet communities' water demands fully even in dry seasons,this is if it is well formulated and adhered to by all the stakeholders in Kenya and especially in water catchment areas such as the Suam Catchment Area. This is based on the abstract fact that having several community water projects by various actors may reduce stresses related to inadequate supply. There is a growing global concern over the future of the world's water resources due to the increasing human pressure on the intricate and finite water resources. The water resource is not only a basic need but is also a centerpiece of sustainable development and a crucial part of poverty alleviation (Foch and Thiemann 2004). The Dublin principles and the Earth Summit's Agenda 21, also emphasize the need for integrated water management, recognizing water as one of the natural resource elements that need to be managed in a sustainable manner (Figueres et al. 2003). Many parts of the world, markedly the Middle East and sub-Saharan Africa (SSA) are experiencing intense competition over water resources due to management failures (Taha 2007).

In this context, water is a precious resource on which all dimensions of an extended security concept (food security, economic security, and livelihood security) depend (Liu et al. 2010). This is in the wider context of human safety. This study on sustainable utilization of regional water resources in China indicates that water resources are one of the most important factors hindering the sustainable development of the world economy and society. This makes water resources one of the main factors restricting local sustainable development. This, therefore, calls for tilting in Water Resources Management

(WRM) from raindrops to rivers and lakes, a strategy that would widen the prioritization of water management and policy options (UN 2017). Access to water resources still remains a daily challenge to most families across the globe even though it is one of the basic fundamental rights of human existence. Water plays a very significant role in the well-being and development of ecosystems (Brauman 2015). However, as observed by Kalbus (2012) and UNICEF (2012) more than 0.9 billion people across the globe do not have access to safe drinking water and about 2.6 billion people are living without adequate sanitation. Meanwhile, an increasing number of countries continue to experience water crises with most river basins having non-existent or unsatisfactory mechanisms and institutions to manage the available water resources (Biswas 2012). This, therefore, means that in order to attain sustainable development, improving water resources management should be considered fundamental to realizing social and economic growth as well as providing environmental services that are sustainable oriented. Biswas (2012) alludes that there have been rising concerns that management of water resources is inhibited by various constraints that are dynamic and complex hence requiring an integrated water resources management approach that involves all stakeholders. As a result of this, the United Water Conference held in 1977 in Mar del Plata, Spain formally coined and ratified the concept of IWRM as the only way to correctly tackle and solve most water resource management-related issues (Rahaman 2005). The population at risk of increased water stress in Africa is projected to be 75–250 million and 350–600 million people by the 2020s and 2050s, respectively (Arnell 2004).

Similarly, Annan (2000) noted that about one-third of the world's population already live in countries considered being water-stressed, where consumption exceeds 10% of the total supply. Yet, as a framework for managing water resources, IWRM can help develop integrated ecosystem approaches that can potentially best inform decision-makers in tackling multiple issues while attempting to meet the needs of various sectors concurrently (Cai et al. 2003). Similarly, it can help with the integration of technical, economic, environmental, social, and legal aspects into a coherent analytical framework. According to Plummer (2015) in Kenya, Integrated Water Resources Management has informed water resource management practices aimed to achieve the goal of access to clean, safe and increased water availability, which is a key determinant of health water as a critical resource in Kenya. Kenya as a water-scarce country in Arid and Semi-Arid Lands (ASALs) has an annual average rainfall of about 630 mm with a population of nearly 40 million people that is rapidly expanding (Plummer 2015). In addition, climatic changes have led to increased water resources vulnerability. Consequently, Suam River Basin is one of the major catchments that were intended to be impacted by the Integrated Water Resources Management implementation. However, since the inception of the policy framework through the passing of the Water Act 2016, there have been limited studies to assess how plans developed for Integrated Water Resources Management, particularly relating to Suam Catchment Area, have succeeded or failed to meet the objectives set out. Kenya being one of the developing nations, there has been various water reforms that have targeted the water sector starting with the Water Act of 2002.

2.5 Theoretical Framework

This study used the Complex Adaptive System (CAS) theory to guide it. Complex Adaptive System (CAS) theory is a theoretical basis for analyzing the dynamics of social-ecological systems (Rammel et al.2007). A Complex Adaptive System (CAS) is a nonlinear, interactive system that has the ability to adapt to a changing environment. In this study, the components of the study that will be considered comprise governance structures, capacity development, and monitoring of the implementation process. Accordingly, governance structures represent the acknowledgment of the essential role of institutions (legal frameworks, cultural norms) of individual and collective actors (governmental and non-governmental). This will help highlight the conditions for the success and failure of governance arrangements. According to Pahl-Wostl (2009), polycentric and adaptive governance systems are particularly complex, and therefore to reduce problems of fit between administrative and biophysical boundaries new formal institutions ought to be initiated in line with the world hydrological principles.

2.6 Conceptual Framework

The conceptual framework presented in Fig. 2 shows a schematic representation of the link between the variables. The independent and dependent variables are likely to be moderated by Government policy, Project financing and Climate Change, Climate Change Resilience, Mitigation, and Adaptation.

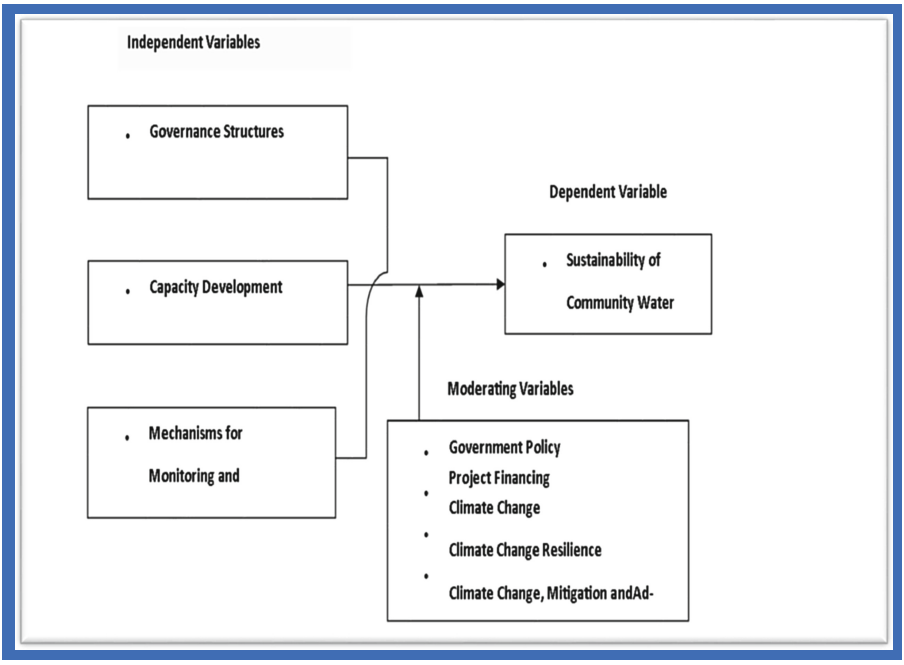

Fig. 2. Conceptual Framework Showing Interrelationships between variables in the study.

3 Methodologies

3.1 Research Design

A descriptive survey research design was used in the study which attempted to describe the phenomenon under study in terms of behavior, attitudes, knowledge and perceptions as far as sustainability of community water projects and Integrated Water Resources Management was concerned.

3.2 Target Population of the Study

The target population of the study comprised of key stakeholders who are people associated with the Suam River Basin management and development. This included Water Resources Users Associations (WRUAs), local organizations, community members, employees of Kerio Valley Development Authority; Ministry of Interior and Coordination of National Government employees, Water Resources Management Authority employees, Ministry of Water, Environment and Natural Resources employees, County government officials; Kapenguria Water and Sanitation Company employees, Ministry of Agriculture; and the Local communities along the Suam River Basin.

3.3 Sample Size, Sampling Techniques and Data Collection Tools

Purposive and simple random sampling techniques were used. Simple random sampling was used to select 12 respondents from stakeholder groups. Consequently, a sample size of 12 people from each sampling group ensured adequate data from each sampling group. The total sample size was 96 respondents. Data for this study was collected using questionnaires and interview schedules.

4 Results

4.1 Governance Structures in Relation to Sustainability of Community Water Projects

Leidel (2012) observes that good water governance always includes aspects of democracy where decisions are made based on the agreed modes from each and every community member affected by the community water projects. Dietz et al. (2013) observe that, there exist visible imbalances in governance among various stakeholders and decisions on water resource allocation, development, management and protection. The researcher ascertained whether the various leaders were democratically elected and appointed or not. This is illustrated in Table 1.

Table 1. People in-charge are democratically elected

	Frequency	Valid%	Cumulative%
Yes	12	15	15
No	68	85	10
Total	**80**	**100**	

As illustrated in Table 1, most of the leadership and management of community water projects were not democratically appointed or selected. The study ranked various water governance issues and factors that resonate with Integrated Water Resources Management principles. A Likert scale type of question was used where 1 represented Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree and 5 Strongly Agree. Table 2 shows the Factors, Mean, Standard Deviation and the Rank of the factors respectively.

Table 2. Ranking of governance matters

Factors	Mean	S.Dev	Rank
1. Some members of the governing council are hostile and prejudiced	3.03	1.147	1
2. The governance of community water projects is rational	2.83	1.111	2
3. The respondents will highly accept to be part of the governance council	2.76	1.183	3
4. The governance of water projects is drawn from community members	2.31	1.239	4
5. Individuals charged with the management of community water are knowledgeable	2.58	1.3	5
6. There is all-inclusive governance of community waters	2.1	1.323	6

As illustrated in Table 2, the study revealed that the respondents sampled disagreed with the notion that "there was an all-inclusive governance of community water projects in the area". This report concurs with the democracy approach in terms of governance of integrated water resource management how it adopts a bottom-up structure. The one-way ANOVA test on whether governance of community water projects had any significant relationship with the sustainability of the said water projects reveals that, the F-value (46.347) was found to be significant at a 0.002 significance level with a degree of freedom of 1% as illustrated in Table 3.

Table 3. ANOVA test for governance structure

	Sum of squares	d.f	Mean square	F	Signifant difference
Between Groups	31.322	1	21.222	46.347	0.002
Within Groups	69.254	176	0.449		
Total	**100.576**	**177**			

As illustrated in ANOVA Table 3, it is clear that the significance value is 0.002 is below 0.05, and there is a statistically significant difference in the mean of governance structures put in place and the sustainability of community water projects within the Suam water catchment areas of West Pokot County.

4.2 Development of Capacities and Sustainability of Water Projects

The second objective of the study was to ascertain whether there are efforts to develop capacities among the communities on Community Water projects in relation to sustainability. This analysis ascertained whether the respondents sampled had ever been trained on how to effectively and efficiently use water resources in the and this was mainly to validate the whole issue of sustainability of the existing community water projects in the area. This is illustrated in Table 4, which shows the Frequency, Valid Percent and the Cumulative Percent respectively.

Table 4. Training on how to effectively and efficiently use Water Resources

	Frequency	Valid percent	Cumulative percent
Yes	48	60	60
No	32	40	100
Total	80	100	100

Table 4 clearly shows that (60%) of respondents had training on how to effectively and efficiently use water resources with (40%) de-affrming. It was also revealed that most of the target population of this study was individuals working in the water sector and in one way or the other had qualifications in water management. Kalbus (2012) observes that successful implementation and monitoring of community water projects under Integrated Water Resources Management solely depends on the capacity development of staff and other personnel working in the field of water resources management. This study noted that this will ensure that various strategies and mechanisms put in place are clearly followed and implemented as far as the realization of the Integrated Water Resources Management is concerned. This was basically to assess the need for water knowledge among the water users and managers given the dynamics surrounding the water sector. This is illustrated in Table 5.

Table 5. The Rate at which Refresher Courses on Water use need to be conducted

Duration	Frequency	Valid%	Cumulative%
Annually	24	30	30
Quarterly	15	18.8	48.8
Monthly	25	31.3	80
As need maybe	16	20	100
Total	**80**	**100**	

Table 5 shows that there were varied views in regard to the frequency of conducting refresher and/or other trainings. Leidel (2012) found out that there was need to enable and support practical implementation of Water Resources management capacities which may include knowledge transfer and development of resources for implementation, particularly in terms of technical, financial, and administrative capacities. Capacity building and development should be tailored to the catchment conditions in order to increase impact. This was necessary as it was the main agenda of this research study. This is illustrated in Table 6.

Table 6. Access to integrated water resource management policy

	Frequency	Valid%	Cumulative%
Yes	37	46.3	46.3
No	43	53.8	100
Total	80	100	

As illustrated in Table 6, (53.8%) of the respondents were not familiar with the Integrated Water Resource Management Policy. 46.3% of the respondents had accessed the IWRM policy. In the ranking of these sentiments on a Likert scale question as used in Table 2 and 9, the mean and standard deviation was used in answering as illustrated in Table 7.

Table 7. Issues relating to IWRM policy

Factor	Mean	S.Dev	Rank
Consideration of Climate Resilience and Adaptation	3.28	1.396	1
Water related information gathering	3.13	1.267	2
Monitoring and evaluation	3.08	1.491	3
Engagement with local communities	2.98	1.441	4
Implementation of basin strategies	2.94	1.215	5
Transparency in water allocation	2.81	1.284	6
Managing water quality	2.53	1.396	7
Provision of Water is a basic right	2.51	1.432	8
Protection of the Riparian Areas	2.48	1.449	9

Table 7 shows that in ranking of the Integrated Water Resource Management policy issues, factors consideration of Climate Resilience and Adaptation was ranked first (3.28),"Water related information gathering" was ranked second (3.14), "Monitoring and evaluation" was ranked third (3.13), "Engagement with local communities" was ranked fourth (3.08), "Existence and implementation of basin strategies" was ranked fifth (2.98), "Transparency in water allocation" was ranked sixth (2.94), "Managing water quality" was ranked seventh (2.81), "Provision of Water is a basic right" was ranked eight (2.53), "Protection of the Riparian areas" was ranked ninth (2.51) and "Distribution of Functions, responsibilities and authority across levels" was ranked tenth (2.48). Further probing on this revealed that there were Water Users Committees that were formed and were concerned with the collection of information relating to water use and management. These committees were basically drawn from the local people. The finding that agrees with Ruiter (2015) who sees that sensitizing common water users about how to mitigate water challenges is the first step in enhancing the capacity of the local community and the nation whose water resource conservation practices ensure water resources are sustainably handed down to future generations.

4.3 Mechanisms Used to Monitor and Implement Community Water Projects

The third objective of the study was to establish mechanisms used to monitor and implement Community water projects in relation to sustainability in the Suam Water Catchment Areas of West Pokot County. The sampled respondents were asked to state whether they had ever been involved in the implementation and monitoring of community water projects in the area. This was basically to assess whether in one way or the other they are involved in the matters affecting the communities they serve or reside as this was part of the main agenda of this research. This is illustrated in Table 8.

Table 8. Involvement in monitoring and implementation of water projects

	Frequency	Valid%	Cumulative%
Yes	49	61.3	60
No	31	38.8	100
Total	**80**	**100**	

Table 8 shows that most people (61.3%) of the respondents in the study had in one way or the other been involved in the monitoring and implementation of community water projects in the area. This clearly shows how community members are valued and called upon by the water implementers to offer their services in the projects that affect their livelihood at large; and that Integrated Water Resources Management requires adaptive capacities where resource governance and management systems, processes, and structural elements are transformed as a response to experienced or expected changes in the environment, internal as well as external, societal and natural. In the rating of the factors that relate to monitoring and implementation of community water projects and their sustainability, a Likert scale question was used as in Table 2 and 7.

Table 9. Ranking of monitoring and implementation factors

Factors	Mean	Std. D	Rank
Knowledge sharing and training	3.93	1.439	1
Existence of adaptation Strategy	3.76	0.984	2
Availability and creation of knowledge for Climate adaptation	3.71	1.017	3
Resources capacity Financial	3.56	0.966	4
Sustainability	3.56	1.157	5
Protection against droughts	2.48	1.067	6
Protection against floods	2.46	1.158	7
Construction and operation of water storage facilities	2.31	1.228	8
Enlisting of women in water governance	2.3	1.237	9
Maintenance of environmental quality	2.15	0.969	10

As illustrated in Table 9, it's clear that the respondents rated "Knowledge sharing and training "as first (3.93), "Existence of adaptation Strategy" second (3.76), "Availability and creation of knowledge for adaptation" third (3.71), "Human Resources capacity" fourth (3.56), "Financial Sustainability" fifth (3.56), "Protection against droughts" sixth (2.48), "Protection against floods" seventh (2.46), "Construction and operation of water storage facilities" eighth (2.31), "Enlisting of women in water governance" ninth (2.30) and "Maintenance of environmental quality" tenth (2.15). Thus, among these factors emphasis on knowledge sharing and training of the individuals charged with water management was majorly agreed by majority of the respondents. This analysis found it eminent to identify the people charged with the management of community water projects in Suam catchment areas of West Pokot County and this was basically to identify the authority behind the community water monitoring and implementation. This is illustrated in Table 10.

Table 10. People charged with monitoring and implementation of projects

People responsible	Frequency	Valid%	Cumulative%
Local leaders	40	50	50
Area Provincial Administrators	35	43.75	93.75
Appointed/Elected Local Residents	5	6.25	100
Totals	**80**	**100**	

5 Conclusion

The study makes conclusions that there is community water projects in the Suam water catchment area of West Pokot County and that in one way or the other, the local community members are involved in the management of the same water projects. The study established that 85% of the sampled respondents held views that the management and leadership of the said community water projects were not democratically elected and/or appointed. This analysis concludes that the leadership of the community water projects in the area is imposed on the people without their input and this greatly dims the hopes for the sustainability of the same projects and hence their use for climate change resilience and adaptation. The study also found out that 60% of the sampled respondents had actually had training on how to effectively and efficiently make use of water resources. The study, therefore, makes conclusions that there are efforts by the people concerned with water management to continuously and effectively train the community members on how to manage and use the water resources in the catchment area. The study further established that 53.8% of the sampled population was not familiar with the Integrated Water Resource Management Policy. The study makes conclusions that most of the water managers in the area are not following the IWRM principles and thus they are not very familiar as far as policy statements are concerned. An ability to recognize sustainable practices and the attainment of sustainability goals will require a well-designed measuring system (Emerson et al. 2012). As a result, there is a need for monitoring and evaluation of management practices and outcomes for the Suam Catchment Area and the Community Water Projects to enhance their sustainability in the context of climate change resilience and adaptation.

6 Recommendations for Policy Action

Based on the findings, the study offers the following recommendations: 1) There is an urgent need for the ministry of water and natural resources to avail the necessary materials, personnel, and IWRM policy documents to water officers in the area as this will greatly aid in the conservation of the water catchment zone. 2) The entire population residing in the Suam Water Catchment area should be sensitized and be trained on effective and efficient water usage.3) There is also an urgent need for the election of the water management committees and those involved in the monitoring and implementation of community water projects in the Suam Water Catchment areas of West Pokot County to involve the community members in identifying them through an open and democratic process.

Moreover, it is increasingly recognized that inadequate governance structures and especially the gap between existing and necessary capacities, rather than technical challenges, are constraints for enhanced water resources management. IWRM must deal with complex and dynamic adaptive systems that comprise political, economic, social, environmental, and technical factors and their interactions (Leidel et al. 2012). This makes capacity development a key issue in river basin management in community projects such as Suam Water Catchment Area in West Pokot County. The operation is at three levels including human capacity development level such as enhancing trained actors,organizational capacity development level, including improving processes within organizations; and capacity development level involving creating an

enabling environment through legislative, administrative, judicial, and organizational arrangements.

7 Suggestions for Further Research

This study proposes that a similar studies need to be developed on the importance of implementing correctly the Integrated Water Resource Management policy drawing from the cases resulting from conflicts on available scarce water resources in the area, the local pastoralist communities are forced to crossover to neighboring Uganda for the search of the commodity. The study also suggests that where possible a descriptive survey on the effective methods of capacity building of the rural communities, especially in arid and semi-arid areas should be carried out with the main purpose of aiding the entire process of IWRM implementation.

Appendix 1

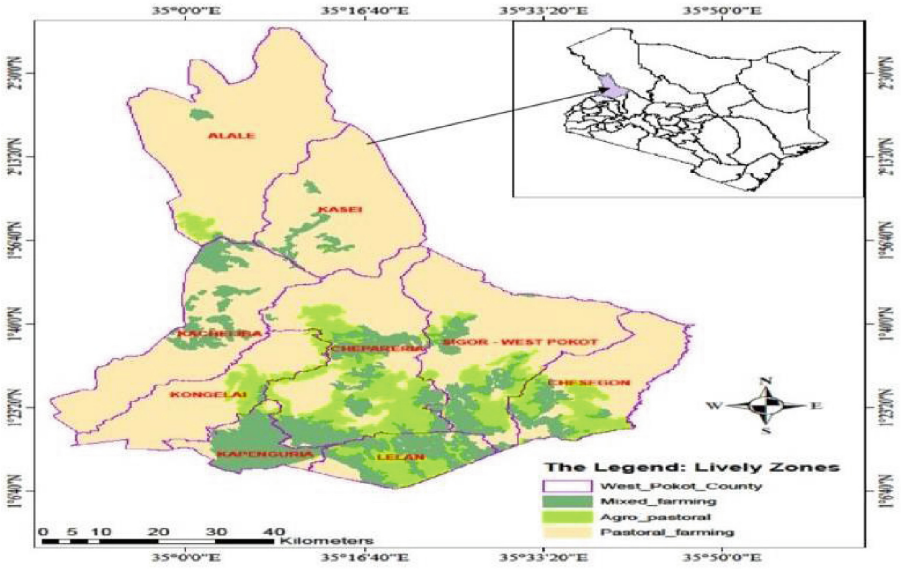

Diagram 1. Map-of-West-Pokot-County and its Location in Kenya. Source: UNDP (2017).

Appendix II

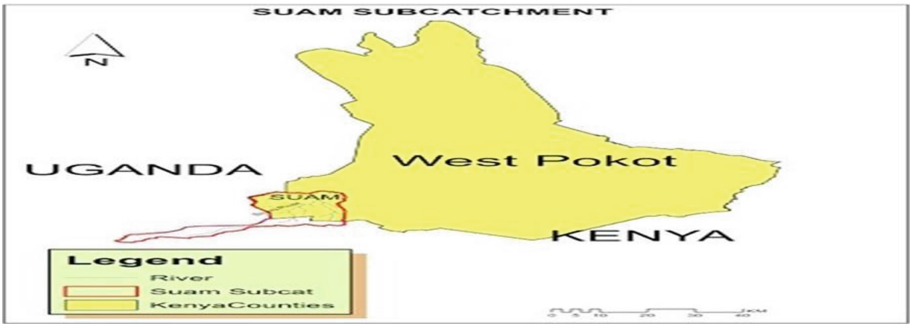

Diagram 2. Trans boundary Location of the Suam Region Between Kenya and Uganda. Source: UNDP (2017).

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