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Effects of Water Policy Implementation and Management of Common Pool Resources in Turkana County, Kenya

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Abstract

Kenya and the sub-Saharan Africa nations could not accomplish the millennial advancement objectives plan on water and consequently the administration of water is in the core of manageable improvement objectives. This paper explored several reasons explaining why water policies are ineffective in Kenya, including; weak institutional frameworks, poor and unsustainable management schemes, fragmented approach to development of water resources and inadequate development of water infrastructure caused by conflict of interest by the implementing agencies. This study used descriptive research design, and targeted household heads and the county water staff in Loima Sub County. The study sample comprised 392 respondents. Data was collected using semi-structured questionnaire and KII. The study findings revealed that, community participation in water resource project management cycle was important for managing water as a shared resource. Moreover, the study established that non-governmental groups and the private sector were better at managing water as a shared resource. Furthermore, community participation in the management of water as a resource for common use was found not to be a determining factor in such management. The study concludes that water is a development challenge in Loima Sub County; it is thus essential to involve the community in the management of water as a common pool resource. The study therefore recommends that Turkana water government should improve performance of utilities through operationalize Turkana County Water Act 2019 and develop robust performance improvement plans based on diagnostic of the utility's key challenges. Additionally, development of water and governance policy ought to guide management through co-creation in development of coherent and robust policy framework, operationalization roadmap and redesign the structure of water management committees through adoption of appropriate service delivery options based on context.

Keywords: *Water assets, Policy implementation, Decision making, Pool resources, Challenges*

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1.0 Introduction

The maintainability in the administration of water as a typical pool asset keep on representing a test all over the planet. The partial non- renewable characteristic of the water resources is one of the challenges hindering sustainability in the management of the resource. The two characteristics of common pool resources that hinder sustainable management include; they are large enough that it is costly to exclude users from consuming the resource and the usage of one unit by one consumer prevents access of the unit from other consumers (Gardner *et al.*, 1990). The availability of multiple users of water as a common pool resource makes management difficult due to the strong free-rider incentives (Ansink & Weikard, 2020).

In California, management of the ground water as a typical pool asset is done at the grass root levels. There are institutions such as special acts districts, court adjudications and local grounds water management that are mandated to manage ground water in the state (Torres, 2012). The California parliament passed an act known as the Sustainable Ground Water Management Act (SGWMA) to curb the increasing decline in ground water. In 2015 the department of water developed a strategic plan to implement SGWMA. Each ground water is managed at the grass root level and there are sustainability agencies to implement the sustainability plan. The department of water offers technical input and advice to the institutions mandated with the management of the common pool resources (bet al., 2016).

In Africa, the nations embraced the test of coordinated way to deal with water asset the board. In 2000 the African nations fostered the African water vision 2025. This prompted the beginning of the African Pastor's Board on Water (AMCOW), and it's inevitable joining into the African Association Commission as a Specific Specialized Panel. This provided the framework for the action of the African water vision coordination. This took account of the emerging issues in the development of trans-boundary water management, climate change and infrastructure development. During the 2002 World Highest point on Reasonable Turn of events (WSSD), held in Johannesburg, South Africa. One hundred and ninety-three nations consented to the Johannesburg Plan of Execution, requiring the turn of events and execution of IWRM and water proficiency procedures, plans, and projects at public and at local levels, with public level IWRM plans to be created by 2005.

When common pool resources such as water are left unregulated by no institution or organization or a group of people, they become an unrestricted access resource. This leads to majority of water management problems when everyone has free access to the resource. The resource will deplete at a fast rate due to lack of control and this leads to a situation known as the tragedy of the commons. The common pool resources problem occurs when the resource is an unrestricted access resource leading to an increase in competition over the resource. The resource becomes scarce and therefore these calls for administration of water as a typical pool asset especially in the demand and supply unbalances (Rhoads, 2009).

The management of water as a common pool resource remains a challenge in Kenya. To curb the challenges, the National Government enacted the Water Act of 2016. This act established institutions and boards that are required to guide the management of water resource. Which include the National Water Harvesting and Storage Authority, the Water Resources Authority, the Water Services Regulatory Board, the Water Sector Trust Fund, and the Water Tribunal. The Act establishes guidelines for water resource ownership, usage, and management. The Ministry of water has developed strategic plans to implement the Act. Kenya also used a participatory

approach to build the new river basin governance structure. The participation of water experts, development partners, community members, and non-governmental organizations (NGOs) in the development of the Act, water policy, and strategic plans resulted in institutional architecture that was consistent with the literature on sustainable water management systems.

The Kenya government has been working on policy reforms in relation to Management of common Pool resources. The reform process started in 1986 and resulted in the formulation of the National Water Master plan (NWMP) of 1992 (WRMA, 2012). This plan recommended separation of water service provision from water resources management which aimed at ensuring that water sources and the catchment areas received equal and fair attention to that given to the water services side. Session Paper No. 1 of 1999 on National Policy on Water Resources Management and Development addressed issues related to water resources management, water and sewerage development, institutional framework, and funding the sector (GOK, 1999). The policy lays forth the framework whose objective is to support comprehensive water resource management and development with decentralized institutions. Additionally, while implementing integrated water resource management (IWRM), it permitted stakeholder involvement in water management practices.

1.1 Statement of the Problem

The continuous growth in population and underlying climate change has caused an increasing pressure on water which is a common pool resources over time. This has led to severe repercussions in developing countries. Kenya is not an exception to this mounting pressure on water extraction. This pressure has led to water scarcity and water pollution. The ever-increasing population growth leads to the increase in demand of the water resource. Water supply and availability difficulties arise as a result, bringing new development challenges. Water scarcity has the likelihood of bringing about compromise in the environment, agriculture, energy, industry as well as other aspects of society. With a high consumption rate and accompanying increasing population pressure, a wide gap exists in the demand and supply of water resources. Increase in water pollution often led to various river tracts where aquifers are no longer able to sustain water ecosystems which in turn hinders human activities (Adam 2021). Additionally, because of increasing pollutant loads emanating from diverse sources, surface water quality and that of groundwater deteriorate.

Water resource management has been a key issue in Kenya and Sub-Saharan Africa in general. Kenya and other nations in Sub-Saharan Africa failed to meet the water-related Millennium Development Goals, hence water management is at the heart of the Sustainable Development Goals. There are several reasons explaining why water policies are ineffective in Kenya. These include; weak institutional frameworks, poor and unsustainable management schemes, fragmented approach to development of water resources and inadequate development of water infrastructure caused by conflict of interest by the implementing agencies. Since most water resources are interdependent, the management of common pool resources become difficult with the silo approach to the implementation of water policies (Moronge, 2015). In Kenya, the management of water resource is marred with challenges during the implementation of the water policies. These challenges include; underfunding, ineffective project management process and lack of public involvement in the project management process. This has posed a challenge in the management of water as a common pool resource in Kenya. This current study thus sought

to identify the impact of implementing water policy in the management of water as a common pool resource.

1.2 Research Objective

To study the influence of community participation on resource management decisions in the Loima Sub-County of Turkana County, Kenya.

2.1 Theoretical Review

2.1.1 Common Pool Resource Theory

Garrett Hardin (1968) proposed the common pool resource theory, claiming that if humans were left to our own devices, we would use all the resources available to us. This theory of common pool resources can be described by categorizing goods into four distinct categories: private, common, club and public goods. There are two dimensions to this categorizing scheme. Excludability is the first criterion. Excludable goods are those that can be prevented from being accessed. Rivalry in consumption is the second dimension. Consumption rivalry exists between exhausted goods. Because I have previously eaten an apple, you will not be able to eat the same apple. Because private things are transferable, they can be bought and sold.

As a result, these items are both rivalrous and excludable in terms of consumption (if I buy a car, no one else can buy the same automobile). Public goods are goods that are non-excludable and non-rivalries in consumption. These are the things that everybody may appreciate. Consuming them does not eliminate the chance that someone else will have the same opportunity. Air is a shared resource. Everyone can breathe without fear of being unable to do so at some moment due to the presence of another person breathing.

Finally, common commodities, also known as common pool resources, are no excludable but competitive in consumption goods. Water in an aquifer or a lake, fish in a fishery, trees in a forest all these natural resources are public goods and thus pool resources. What makes common pool resources so intriguing is even though humans are meant to be selfish, when faced with scarcity, we can self-organize and administer our common pool resources (our 'commons') in a sustainable manner, according to (Elinor Ostrom 1990). One of the reasons for Ostrom's success was that her notion of cooperative ways to resource control ran counter to Hardin's tragedy of the commons concept. Instead of being too self-centered as to desire to catch all the shrimp, Ostrom discovered that fishermen were cooperative. Ostrom was not as selfish as he wanted to catch all the shrimp (for example) and found that fishermen reached a collective bargaining agreement and reduced their consumption for the greater benefit of the group.

Obviously, this is a relatively small example. It is not yet known if global cooperation can be achieved to protect the Global Commons. One way to think about it is through the lens of the world's public goods. This theory will be used as the anchor theory and is relevant to the study since it explains the dynamics around common pool resources.

2.1.2 Theory of change

Kurt Lewin(year) produced the theory. Theory focuses on building a model that focuses on a development project's fundamental assumptions, impacts, logic, expected outcomes, and causal links (Jackson, 2013). Furthermore, theory of change is an effective instrument for designing social problem solutions. The theory of change is critical in this study because it focuses on the changes

that will occur because of water policy implementation in the management of water as a common pool resource.

2.2 Empirical Review

2.2.1 Community participation and management of water as a common pool resource

Ochieng (2016) conducted research to determine the impact of community participation on the long-term viability of water projects in the Mara basin. The study used descriptive study design and data was collected using semi-structured. Inferential, content, and descriptive analyses were used. The study focused on the sustainability bit leaving out the management. This is the gap the current study seeks to address.

Kwame (2012) conducted a study on the community involvement in the management of water resources in South Africa. The study used a multi-research study design, with main data acquired using semi structured questionnaires and secondary data collected from other sources. The study used a purposive sampling technique. The study found out that the community are involved through their leaders who at times do not relay the information to them efficiently. The management gives the information to the community members in a complex and technical language making the community members excluded in the process due to information asymmetry. The community is involved as an adds on in the process. This makes the involvement in the management of the water resource ineffective since the community do not get the benefits thereof. This study was conducted in South Africa and the current study wants to establish if the results will be replicated in Kenya or if the situation is different.

Ambado (2017) investigated the effects of community participation in rural water management in Kenya's Athi Basin. Primary and secondary data were employed in the investigation. The study discovered that communities' participation in water resource management had enhanced their livelihood. In Kisumu, Anaga 2015) investigated the role of community participation in water production and management. Primary and secondary data were employed in the investigation. According to the conclusions of the study, community participation is ineffective since the data supplied to them is technical and they do not grasp it.

3.0 Methodology

The research used descriptive research design which was essential in addressing the study question on community participation affects the management of water as a common pool resource. The target population was Loima Sub County Household heads and the county water staff as key informants. The Household population is 19, 438 as per Kenya bureau of statistics Census, 2019 population for Loima Sub County.

The study used questionnaire for data collection. The tool was pretested in the same context and improved before conducting the main study. The data collection was done upon a formal approval the link to the questionnaire was shared to staff in Loima water department and the data clerks collected data through interviewing the community members using google forms

The responses from the google forms, were downloaded into an excel spreadsheet and checked for completeness and consistency. The quantitative data was analyzed through descriptive statistics, and presented through charts, tables and explained in prose. This was done through means, percentages, frequency distributions and standard deviations. The qualitative data was coded into the specific objectives and analysis done through content analysis. The analysis was done with the

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help of the Statistical Package for Social Sciences (SPSS) software which helped in the generation of descriptive statistics and frequencies as well as the inferential statistics which aided in establishing the relationship between the study variables as well as developing the regression model and the correlational analysis. The Pearson correlation analysis was done to determine the influence that the independent variable have on the dependent variable.

The multiple linear regression model was as follows:

$$Y_0 = \beta_0 + \beta X + \varepsilon$$

Where;

Y_0 is management of water as a common pool resource

β_0 is constant

β, – coefficients or regressors

X is community participation

ε is the error term

4.0 Study Findings

The sample size for the study was 393 and the response rate was 117%. This is because 459 persons responded to the questionnaire. Since the data was being collected by research assistants and more people were willing to give feedback, the researcher found it okay to get their responses.

4.1 Descriptive Analysis

Water Resource Management

Sustainable access to affordable, safe, and adequate water for household and productive uses is a function not only of the capacities of individuals, households, and communities but of the larger ecosystem of public and private actors that govern and manage water resources and that engage directly in water provision (urban and rural) to communities and households.

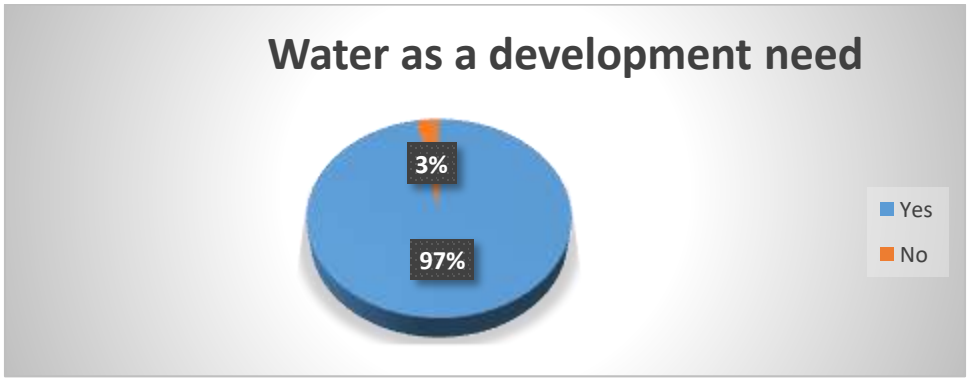

Figure 1: Water as Development Need

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As depicted by Figure 1, out of the 459 respondents, 97% agreed that water is a development need in Loima Sub County. This is in tandem with a report by UNICEF (2022) which indicated that the Loima area suffers acute water shortage. This is because it sits in a salty aquifer which makes the water not portable. The frequency of access to portable water is two to three weeks in good times. This makes residents go to long distances or have water transported to the tanks by vehicles which is then distributed.

According to a study by Mulwa et al. (2021), Kenya's problem with water scarcity cannot be understated. This is brought on by the increasing urban and rural population increase as well as other competing demands for the resource, such as home water consumption, industrial use, and agricultural use. 74% of children under the age of 18 do not have access to safe drinking water, according to the Turkana County government's CIDP (2018-22). Deprivation rate in Turkana County is 11 times higher than the least deprived county in Kenya which is Nairobi at 11%. The county has vast sources of saline water from Lake Turkana and other aquifers but lacks the technology to make the water portable.

Involvement of Community in Management of CPR

Participation and engagement from the community are necessary for effective water management for usage in development, for water supply, management, and access. This study examines how and under what circumstances community participation in water and sanitation interventions relates to the availability of safe water and sanitation, a change in behavior or health, and the longevity of water resources.

Figure 2: Community Participation

Figure 2 depicts that, majority of the respondents (82%) agreed that the major actors in water resource management involve the community in decision making about their water needs while 18% of the respondents disagreed. The county government1and the non-governmental organizations involve the residents in the project design, implementation, and management through the water management committees (Turkana County water policy 2017). Out of the 459 respondents, 66% agreed that there is active participation of community members in the water resource management in the Sub County while 34% disagreed.

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Table 1: Descriptive statistics of community involvement in water resource Management

Statement	S.D	D	N	A	S.A
Community involvement in implementation of water projects leads to better water resource management	0.9%	3.9%	11.5%	21.1%	62.5%
Participation of communities in water policy implementations makes water projects more sustainable	0.2%	4.1%	9.6%	19%	67.1%
Community engagement in budgetary process has led to improved budget allocation for water resource management	6.1%	6.3%	11.8%	20.5%	55.3%
Community involvement in rural water management leads to improved livelihoods	0.2%	3.7%	8.5%	15.9%	71.7%
Community participation in rural water management leads to improved access to water resources	0.4%	2%	7%	15.3%	75.4%
Involvement of the community members allows them to own the water projects and ensure they are well managed	0.2%	2.2%	7.8%	19.4%	70.4%

Out of the 459 respondents, 0.9% strongly disagreed, 3.9% disagreed, 11.5% were neutral, 21.1% agreed while 62.5% strongly agreed that community involvement in implementation of water projects leads to better water resource management. The mean was 4.46 on a Likert scale of 1 to 5 where 1 was strongly disagree and 5 strongly agree. The findings indicated that when community members are involved, they willingly attend management meetings, provide labor, willing involve themselves against vandalism and pay bills on time and other financial requirements towards the management of water resources. Out of the 456 respondents, 0.2% strongly disagreed, 4.1% agreed, 9.6% were neutral, 19% agreed while 67.1% strongly agreed that participation of communities in water policy implementations makes water projects more sustainable. These findings are in tandem with a study done by Ananga (2015) on the role of community members in the management of water resources.

Out of the 459 respondents, 6.1% strongly disagreed, 6.3%, 11.8% were neutral, 20.5% agreed while 55.3% strongly agreed that community engagement in budgetary process has led to improved budget allocation for water resource management. A study by Naker (2019) indicated that the participation in the budgeting process for water projects is key. This is because the community members can halt the process of implementation at any stage if they are not involved. Therefore, it is imperative for the community members to be informed how the allocated funds are used. This helps in improving the allocation of resources to water sector in subsequent budgetary allocation.

Out of the 459 respondents, 0.2% strongly disagreed, 3.7% disagreed, 8.5% were neutral, 15.9% agreed while 71.7% strongly agreed that community involvement in rural water management leads to improved livelihoods. Majority of the respondents strongly agreed (75.4%), 15.3% agreed, 7% were neutral, 2% disagreed while 0.4% strongly disagreed that community participation in rural

water management leads to improved access to water resources. Majority of the respondents, 70.4% strongly agreed, 19.4|% agreed, 7.8% were neutral, 2.2% disagreed while 0.2% strongly disagreed that involvement of the community members allows them to own the water projects and ensure they are managed well.

Table 2: Descriptive statistics of community participation in project management cycle

Project Management Stage	Least Involved	Somewhat Involved	Not At All	Sometimes Involved	Highly Involved	Mean
Project Identification	14.8%	19.6%	14.8%	14.6%	36.2%	3.38
Project Planning	16.6%	18.3%	15.9%	17.6%	31.6%	3.29
Project Design	21.4%	17.6%	19.4%	15%	26.6%	3.08
Project Inception	21.8%	17.6%	14.8%	15%	30.7%	3.15
Project Implementation	16.6%	17.2%	15.5%	15.9%	34.9%	3.35
Project M&E	16.6%	13.3%	17.6%	15.5%	37%	3.43
Project Commissioning	18.3%	15%	15.3%	17.2%	34.2%	3.34
Project Sustainability	16.6%	11.5%	16.8%	14.8%	40.3%	3.51

Source: Author, 2022

Out of the 459 respondents, 36.2% stated that they are highly involved in project identification, 14.6% stated they are involved sometimes, 14.8% are not involved at all, 19.6% somewhat involved while 14% are least involved. Morella (2011) indicated that the involvement of community members in the identification of the projects and the feasibility studies of water projects increases the ownership of the community members on the project. This makes management easier enhancing sustainability of the project.

In the project planning phase, 16.6% of the respondents indicated that they are least involved, 18.3% are somewhat involved, 15.9% are not involved at all, 17.6% are sometimes involved while 31.6% are highly involved. A study by Nakar (2019) indicated that the involvement of the community in project planning ensures that the funds allocated are able to meet both long term and short-term goals of the project.

In the project design phase, 21.8% of the respondents indicated that they are least involved, 17.6% are somewhat involved, 19.4% are not involved at all, 15% are sometimes involved while 26.6% are highly involved. Out of the 459 respondents, 21.8% said they are least involved in the project inception, 17.6% are somewhat involved, 14.8% are not involved at all, 15% are sometimes involved while 30.7% are highly involved. Alabaster (2010) indicated that it is important to involve all stakeholders in the inception of the project. This ensures that they are engaged in the whole conceptualization to ensure that the project meets their needs and the budgetary allocations. This helps in ensuring sustainability of the project from start to the end. In the project

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implementation phase, 16.6% indicated that they are least involved, 17.2% are somewhat involved, 15.5% are not at all involved, 15.9% are sometimes involved while 34.9% are highly involved.

In the project monitoring and evaluation phase, 16.6% are least involved, 13.3% are somewhat involved, 17.6% are not involved at all, 15.5% are sometimes involved while 37% are highly involved. A study by Odour (2020) indicated that monitoring and evaluation explain 58% of the management of water projects. The findings further indicated that community participation in M&E of water projects significantly influences management of water resources. In the project commissioning phase, 18.3% are least involved, 15% are somewhat involved, 15.3% are not involved at all, 17.2% are sometimes involved while 34.2% are highly involved. In the project sustainability phase, 16.6% of the respondents are least involved, 11.5% are somewhat involved, 16.8% are not involved at all, 14.8% are sometimes involved while 40.8% are highly involved.

4.2 Regression Analysis

Regression analysis for community participation and management of water as a common pool resource.

Table 1: Regression Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.238	.307		13.818	.000
	X	.013	.068	.009	.191	.849
a. Dependent Variable: management of water as a common pool resource.						

Source: Author, 2022

Revised linear model: Y=4.238+0.13X

Table 3 gives the coefficient for the linear model of community participation in management of water as a common pool resource. The linear model shows that community participation is not a significant predictor of management of water as a common pool resource since the p-value is 0.849 which is greater than 0.05. The linear model indicates that management of water as a common pool resource is explained by 4.238 without community participation in the management of water resources. A unit increase in the participation of communities in the management of water resources increases the management of water resource management by 0.13 units

4.3 Summary of findings

Community CPR management at Sub County level: Management of water in the sub county is majorly done by government both local and national level. There are other actors too who manage 14% of the water sources. These include the private sector and non-governmental organizations. Majority of the residents are not satisfied with the management of water sources. They cited the following reasons: the water management committees are not active; the committees lack capacity and skills to manage the water sources; there are insufficient water sources making it difficult to meet the needs of the community members; there is no proper plan to ensure that the available water is distributed to all parts of the sub county; the management committees use the water for their own uses such as irrigation when it is not even sufficient for domestic use for all

residents; some community members are marginalized when it comes to water distribution; the water management committee does not involve the residents in the management of water sources; and lack of sustainability plans for the water resources.

5.0 Conclusions

The study concluded that water is a development challenge in Loima Sub County. This research study also concluded that it is essential to involve the community in the management of water as a common pool resource. According to the study's findings, community participation in the water resource project management cycle is important for managing water as a shared resource. According to the study's findings, non-governmental groups and the private sector are better at managing water as a shared resource. The study's findings suggest that community participation in the management of water as a resource for common use is not a determining factor in such management. This is because most of the community members lack the knowhow of managing water resources and there are capacity gaps among the community members.

6.0 Recommendations

Addressing existing water insecurity in Turkana County means far more than simply providing access to water to meet household and productive needs. To enhance sustainability of water availability and accessibility, key attention needs to be given to other cross-cutting issues such as climate change and ensure holistic integration within water resources management activities. Strengthening water governance means more than building infrastructure but also addressing systemic barriers on core water governance functions such county sector policy and strategy while ensuring clear structure of its operationalization, monitoring and evaluation, coordination, and sector financing through budgetary allocation at county level.

The study gives the following policy recommendations based on the objectives as follows:

Improvement performance of utilities: Operationalize Turkana County Water Act 2019 and develop robust performance improvement plans based on diagnostic of the utility's key challenges. Improved performance and institutionalized reforms of peri-urban water service providers (utilities) is key in access to safe drinking water for vulnerable communities

County Government through water sector in close consultations with stakeholders to develop a flexible budget including operations and maintenance cost and allocate appropriately and co – invest with national government and partners working on water sector for sustainability.

The study recommends that all departments both in county and national government to work in cooperation to ensure that security in the area is maintained so that vandalism of water resources and pumps is minimized. The county government to put structures in place to ensure that there is equity in the distribution of water in the sub county.

Development of water and governance policy to guide management; Co-creation in development of coherent and robust policy framework operationalization roadmap. Water policy instruments are key to creating an enabling environment for water governance and overall effectiveness and sustainable Common Pool Resources services delivery.

The county to implement the existing policy on water and sewerage policy to ensure that water is made available to all residents. Redesign the structure of water management committees: Operationalize Turkana County Water Act 2019 and adopt appropriate service delivery options based on context.

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The County Government through water department should co-create with water partners and leveraging on newly developed Water Services Regulatory Board (WASREB) rural water management guideline will aim to design service delivery models (SDMs) that seek to enhance professionalization and uptake of private sectors in rural water service delivery sub-sector.

REFERENCES

Achieng, A. (2016). *Influence of community participation in the sustainability of water projects in the Mara Basin.* Nairobi: University of Nairobi.

Adam, A. M. A., Saad, H. A., Atta, A. A., Alsawat, M., Hegab, M. S., Altalhi, T. A., & Refat, M. S. (2021). Utilization of charge-transfer complexation to generate carbon-based nanomaterial for the adsorption of pollutants from contaminated water: Reaction between urea and vacant orbital acceptors. *Journal of Molecular Liquids*, *341*, 117416. https://doi.org/10.1016/j.molliq.2021.117416

Alabaster, G. (2010). Urbanization and water management – trends, challenges and perspectives.

Ambado, J. (2017). The impact of community participation in rural water management in Ndarugu-Thiririka sub-catchment, Athi Basin, Kenya. *Ethiopian Journal of Environmental Studies and Management*, 79-87.

Anaga, E. (2015). *The Role of Community Participation in Water production and management; a case study of Kisumu.* Florida: University of South Florida.

Ansink, E., & Weikard, H.-P. (2019). *Common pool resources with support.* New York: Martin Shubik. https://doi.org/10.1111/nrm.12249

Apipalakul, C. (2014). Development of Community Participation on Water Resource. *Procedia - Social and Behavioral Sciences*, 90-99.

Banerjee, S. G., & Morella, E. (2011). *Africa's water and sanitation infrastructure: access, affordability, and alternatives*. World Bank Publications. https://doi.org/10.1596/978-0-8213-8457-2

Baumgard, L. H. (2009). Effects of heat stress and plane of nutrition on lactating Holstein cows: I. Production, metabolism, and aspects of circulating somatotropin. *Journal of dairy science*, *92*(5), 1986-1997. https://doi.org/10.3168/jds.2008-1641

Bet-Moushoul, E., Mansourpanah, Y., Farhadi, K., & Tabatabaei, M. (2016). TiO2 nanocomposite based polymeric membranes: a review on performance improvement for various applications in chemical engineering processes. *Chemical Engineering Journal*, *283*, 29-46. https://doi.org/10.1016/j.cej.2015.06.124

Boakye, M. K. (2012). Community Participation in Water Resources. *International Journal of Environmental Science and Development*, 67-89. https://doi.org/10.7763/IJESD.2012.V3.277

Cooper, D. R., Schindler, P. S., & Sun, J. (2006). *Business research methods* (Vol. 9, pp. 1-744).

Drinking-water (GLAAS) 2017 report: financing universal water, sanitation and hygiene under the sustainable development goals.

Dvir, D. R. (2015). An empirical analysis of the relationship between project planning and project. *International Journal of Project Management*, 1-7.

Ecosystemwater use efficiency response to drought over southwestChina. *Ecohydrology*, *15*(5),e2317.

Elonen, S. &. (2015). Problems in managing internal development projects in multi-project environment. *International journal of project management, vol 21(6)* , 395-402. https://doi.org/10.1016/j.molliq.2021.117416.

Garbharran, H., & Govender, J. (2012). *Critical success factors influencing project.* Durban: Durban University of Technology.

Gardner, R. (1990). The Nature of Common-Pool Resource Problems. *Journal of Law and Economics*, 521-576.

Ghauri, P. &. (2005). *Research Methods in Business Studies: A Practical Guide, (4th Edition).* England: Person Education Ltd.

Government of Kenya (1999). The Water Act 1999. Kenya Gazette Supplement No. 107

Hardin, G. (1998). Extensions of" the tragedy of the commons". *Science*, *280*(5364), 682-683. https://doi.org/10.1126/science.280.5364.682

Henry, G. T. (1990). *Practical sampling* (Vol. 21). Sage. https://doi.org/10.4135/9781412985451

Jackson, A. Y., & Mazzei, L. A. (2013). Plugging one text into another: Thinking with theory in qualitative research. *Qualitative inquiry*, *19*(4), 261-271. https://doi.org/10.1177/1077800412471510

James, R. (2018). Factors influencing performance of community development projects in Kenya: a case of Kisii Central District. *Strategic Journal of Business & Change Management*, 77-98.

KNBS, E. (2018). Kenya National Bureau of Statistics: Nairobi.

Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.

Kwame, M. (2012). Community Participation in Water Resources Management in South Africa. *International Journal of Environmental Science and Development*, 67-78.

Kyalo, M. (2020). *Influence of project management in the successful implementation of boreholes projects in Makueni County.* Nairobi: Jomo Kenyatta University of Technology .

Lecomber, A. (2013). *Project Management for IT Professionals: Education and Training Issues.* Newton Square: Project Management Institute . https://doi.org/10.1007/978-3-662-45770-2_2

Macharia, E. W., Mbassana, M., & Oduor, J. (2015). Assessing sustainability of rural water projects in naivasha, Kenya, case study: Maraigushu water project. *European Journal of Business and Social Sciences*, *4*(7), 52-83.

Millington, J. D. (2018). *A companion to environmental geography*. Chichester: Wiley-Blackwell.

Mokhtar, A., He, H., Alsafadi, K., Mohammed, S., He, W., Li, Y.,.. & Gyasi-Agyei, Y. (2022).

Mrangu, R. G. (2018). *Sustainability of community based projects has been an intricate process.* New York.

Mugenda, O. M., & Mugenda, A. G. (2003). Research methods: Quantitative and. *Qualitative.*

Mulwa, F., Li, Z., & Fangninou, F. F. (2021). Water scarcity in Kenya: current status, challenges and future solutions. *Open Access Library Journal*, *8*(1), 1-15. https://doi.org/10.4236/oalib.1107096

Ndubi, J. M. (2018). Influence of project management on sustainability of water and sanitation projects in kibra. *Strategic Journal for Business Management*, 77-98.

Ochieng, J., Kirimi, L., & Mathenge, M. (2016). Effects of climate variability and change on agricultural production: The case of small scale farmers in Kenya. *NJAS-Wageningen journal of life sciences*, *77*, 71-78.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*

Presentation at World Water Week Stockholm (online

Rhoads, M. L., Rhoads, R. P., VanBaale, M. J., Collier, R. J., Sanders, S. R., Weber, W. J., ... &

Robinson, M. D., McCarthy, D. J., & Smyth, G. K. (2010). edgeR: a Bioconductor package for differential expression analysis of digital gene expression data. *Bioinformatics*, *26*(1), 139-140. https://doi.org/10.1093/bioinformatics/btp616

Water Resources Management Authority Strategic Plan, 2012-2017 (2012). 1: 10, 17-19, 35

WHO/UNICEF Joint Water Supply, & Sanitation Monitoring Programme. (2014). *Progress on drinking water and sanitation: 2014 Update*.