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# WATER RESOURCE MANAGEMENT APPROACHES AND COMMUNITY LIVELIHOODS IN SAKU SUB-COUNTY, MARSABIT COUNTY, KENYA

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***Abstract:*** *Water is a crucial resource to human and livestock. The management of this scarce resource is critical in the face of recurrent droughts and growing water scarcity, especially in arid and semi-arid areas. The aim of this study is to examine water resource management approaches, attendant challenges and its implications on existing crops and livestock production systemsin Saku Sub-County. The study is grounded on Social Construction and Common Pool Theories. Qualitative approach (interviewing and observation) have been used for data collection and analysis. Field work was conducted over 2 months period in May-June, 2019. Data was collected in Saku sub-county from purposively sampled water management committee and shallow well managers. The study had a sample of 48 respondents comprising 3 Chairmen, 2 water company officials, one student and 38 Committee members drawn from Saku Sub-County who were purposively across Sagante/Jaldesa ward. Focus Group Discussions were done with mixed committee members, with different experience, gender and age brackets, complemented by key Informant interviews with key resource persons in Saku. The study revealed that both the traditional and conventional approaches were equally applied. The traditional approach has specific advantages related to consensus based decision making process, better performance in water sharing and use and improved individual accountability and responsibility resulting from stronger cultural ties between members. The conventional approaches based on formal written rules and regulations lays clearer roles for committee members. However, both approaches are prone to weaknesses. The traditional approach lack clear support and formal mandate to regulate water use while conventional approach with formal existence has challenges related to weak capacity, weak mechanisms for recovering costs of water service provision from users and weak accountability and transparency in the operation of existing water services. Since weak governance and overlapping mandates were found to be key challenges, there is a need to invest in strengthening the capacity of water management institutions. As such, the study recommends the need for water stakeholders to strengthen the capacity of institutions governing water and offer policy related support to improve both the legitimacy of the institutions and the rules/regulations for governing water sources.*

***Key Words****: Marsabit, County, Water resources, Water Management, production systems, Convention, Traditional*

## 1.1 Background of the Study

The Government approach towards sustainable approach natural resources management focused on increasing participation and spreading the benefits of resource management to communities. This shift was encouraged by global trends which promoted community based natural resourcesmanagement focused (CBNRM) as a sustainable way of managing natural resource through the Communal Areas Management Programme for indigenous Resources. (Madzudko and Hawkers, 1996; Mapedza 2007).

Globally, water is essential for agriculture and livestock production and to overall wellbeing of human. It`s central role imply that water management and the approaches are different in different countries. For example in Canada, the indigenous Aborigine people have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard (UNGA, 2007). In South Africa, water resource management has moved from a focus on private good, with a strong role of the state and institutions to a greater emphasis on public good and a network approach. While this shift has brought about short term social and economic benefits, the sustainability of water resources has been compromised. The challenges in implementing progressive legislation is reflected in a shortage of skilled people, weaknesses in management instruments and difficulties in finding a balance between the role of the state and institutions and the effective function of networks to achieve development outcomes (Claassen, 2013).

In Kenya, Arid and Semi-Arid Lands (ASAL) roughly makes up about 80% of the country's area and are home to nearly one-third of the population (Schwartz et al., 1991). The dominant livelihood system in such ASAL areas is pastoralism which is extensively practiced in communally managed rangeland environments (Middleton et. al., 2011).Because of the central role of water in drylands, the way the water resources are managed has implications on the livelihood of semi-arid people and the resilience of dry land system (Richard, 2016). Prior studies in Kenya have assessed water governance in different areas.

## 1.2 Statement of the Problem

Water is integral to pastoral and agro-pastoral livelihoods in arid and semi-arid areas. Water governance and rights, however, continue to pose challenges livelihoods particularly, in pastoral areas where communal governance and fuzzy resources boarders make water resource management unclear and fractious. Fractious, Weak governance of water and rangelands is a driver to conflict and constitute major threats to livelihood (Galgalo, 2016). Marsabit has no permanent rivers and thus many parts of the county is water deficient. Investments promote water provision by sinking boreholes, and establishing water pans, mostly, without clear management structure in place to regulate access and use. The weak management and governance system is the cause of regular conflicts among the multiple resource users. Water and pasture related conflicts can lead to loss of human lives and livestock losses to drought, especially when access to strategic grazing and water resources are hampered by conflicts.

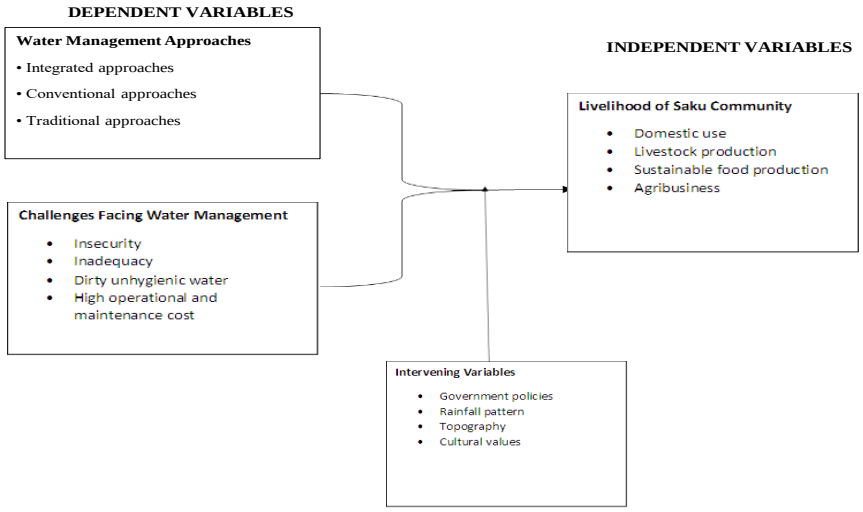
Water shortage that affects livelihoods in arid and semi-arid areas like Saku continue to be exacerbated by lack of clear, transparent and effective water tenure and resource governance system, particularly in the face of the emerging and different forms of water management structures, that is not well integrated with the existing traditional water management approaches. (Water Resource Management Authority, 2002), Despite the resilience of traditional methods (to the social, political and environmental changes) to manage communal water and rangeland in

pastoral areas, they are often ignored, undermined and sometimes not recognized by state authorities and current legislation (Mann and Smaller, 2010).In the same token, the new and modern institutions have not taken root in the community and still is under contested leadership and operations. In a situation where the traditional institutions have been undermined and the modern ones are not operational, governance systems collapse and this leads to conflicts and affects water and land use (Mann and Smaller, 2010). Therefore, this study examined the water management approaches used and how they impact on the livelihoods of the community of Saku Sub-County of Marsabit County. The study focused on the Sagante Jaldessa ward in Saku Sub-county.

## 1.3 Objectives of the Study

- To identify the water resource management approaches used in Saku Sub-county.
- To explore the impact of current water management approaches on the existing crop and livestock production systems.
- To establish the current challenges facing water resource management in Saku Sub-county.

## 1.4 Conceptual Framework




**Source:** *Researchers' own design, 2019*

## 1.5 Literature review

This study was grounded on the theory of Social Construction and the Common Pool Resource Theory. The theory of social construction is mainly concerned with the actors in social space and how they interpret, analyse and perceive the world around them. According to Gergen (1985), the key element of social construction is in the way actors illustrate or explain events around them in real world context. Social interaction create stock of shared knowledge that construct the reality we live in that shape individual behaviours (Schultz, Marx and Mead, Berger and Luckmann, 1991). However, to apply social construction to empirical investigation special focus is placed on the social production of knowledge within society and its influence on the perception of reality being investigated. Water resources management practices is not just a mere outcome of social processes regarding accumulation of community knowledge. It has other elements of leadership

and equitable sharing of resources. For this reason this theory will be complemented with the concept of water governance, which in its broadest sense means "range of political, social, economic, and administrative systems that are in place to develop and manage water resources and the delivery of water services at different levels of society and for different uses" (Cecelia, 2010, pg. 299).

Since water is a common pool resource governed by complex and intricate large institutional setting, the study will apply a complementary second theory of common-pool resource theory to explicitly answer explore the questions of water governance in pastoral context. Therefore, the assessment of the social organization and institution structures in water management will be complemented by Ostrom's design principles on Common Pool Resources (CPRs) to understand the role of institutions in managing communal water resources. Common Pool Theory focuses on the ability of people to act collectively to overcome the management dilemmas inherent to common-pool resources (Ostrom, 1990). Ostrom (1990) identified eight principles that are prerequisite for a stable Common Pool Resource. They include: clearly defined boundaries; congruence between appropriation and provision rules and local conditions; collective-choice arrangements allowing for the participation of most of the appropriators in the decision making process; effective monitoring by monitors who are part of or accountable to the appropriators; graduated sanctions for appropriators who do not respect community rules; conflict-resolution mechanisms which are cheap and easy to access; minimal recognition of rights to organize multiple layers of nested enterprises. However, not all common pool resources have all these characteristics. Edwards and Steins (1999) notes that the theory has come up with conditions that apply to most common pool resources that help community members to make good use of these resources. These conditions include indivisibility, uncertainty in location of production zones, production efficiency and administrative efficiency. These attributes generally emphasize on negotiating with not just community members but also others that are involved in the chain.

### *Empirical Review of literature*

#### *Approaches to natural resource management*

The concept of Integrated Natural Resources Management (INRM) started in 1996 and has been applied for decades now. The underlying philosophy is the consideration of natural resources in the context of the landscape and consideration of humans as part of the landscape and as such they need to be integral part of the planning, management and equitable utilization of natural resources (Stucki and Smith, 2011). This philosophy is much shaped by that of integrated water management that was initiated in at the International Conference on Water and Environment in 1992 and the Integrated Coastal Zone Management (ICZM). The essential characteristics of integrated resource management are i) inclusiveness, where broad spectrum of social, ecological, ecological and political factors are considered, ii) interconnectedness which consider interactions between the ecological and human systems, iii) goal oriented and strategic, where plans are proactively developed and strategically focused on environmental issues in the system, in order to achieve desired state (Carlson and Stelfox, 2009).

The second concept is of Ecosystem-Based Approach which emphasize a shift from short-term sector based approach to wider approach that moves spatially from smaller to larger scales, and from short-term to longer-term management practices. The ecosystem approach recognizes integral links between humankind and economic/social systems as parts of the ecosystem (Sherman and Duda, 1999). Such frame of looking at natural resource is essential for management

of common pool resources such as water, rangelands, fisheries and forest. The other is a communal approach to natural resources management which state that the management or decision-making goals should be with the local residents or resource users (Adams and Hulme, 2001). Communal approaches aims to strengthen the capacity of communities to manage its natural resources sustainably. Empowering community to make decision is considered to improve the success of natural resource management and lead to salutary changes such as reduced environmental degradation, efficient use of resources, improved livelihood security and effective participation in environmental management (Measham, 2007).

Water Resource Management

Reaching the goal of equitable water use involves having appropriate mix of water resource management approaches in place. This include the concept of Integrated Water Resources Management (IWRM) (Mitchell, 2004), rediscovered and embraced by many international institutions during the 1990s (Biswas, 2004). According to the Global Water Partnership (GWP) 2000, Integrated Water Resource Management (IWRM) is viewed simultaneously as a philosophy, process and approach which promotes the coordinated development and management of water and related natural resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP, 2000 as cited by Funke et al, 2007). Another one is the traditional water management approaches which are based on traditional values, knowledge and practices of local communities and are often developed and transmitted orally from generation to generation based on experience acquired over centuries and adapted to the local environment (Adeel*et al.,* 2008).

Through traditional management systems, crucial decisions on the location and the management of water points are passed, including, operational rules of specific water points, giving specific watering slots in rotational manners that assigns when livestock owners water their animals (Robinson *et al.,* 2010). For example, in pastoralist context, the arrangement that regulates when specific livestock could access water on specific day goes beyond water management to pasture management, which is a critical consideration in landscape level rangeland management. The cconventional water management approach which derive legitimacy from formal rules and regulations is another common water management approach. In Kenya, through the water Act of 2002, the ministry introduced institutions to govern water management. The decades of reforms in water sector in Kenya led to changes in governance. One significant change is the role of people involvement through self-organization in water management. This includes the water user associations (WUAs), selected and regulated by the Water Service Regulatory Board (Were et al 2008).

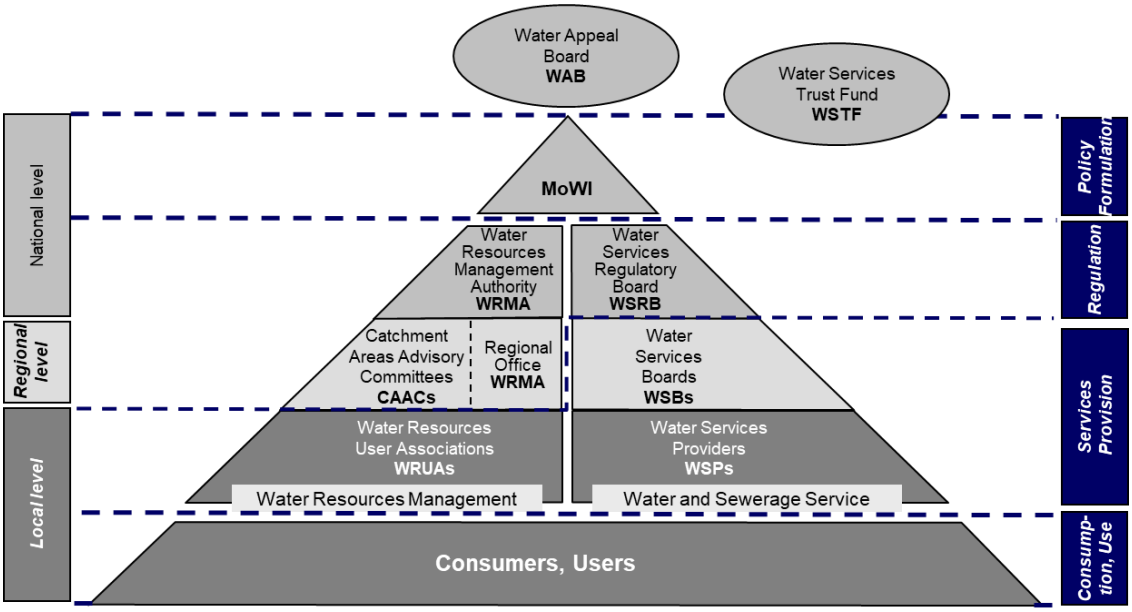



***Figure 1**: Institutional set-up under Water Act 2002*
***Source**: Water Service Trust Fund (WSTF), 2002*

## 1.6 Research Methodology

The study was carried out in Marsabit County in Saku Sub County. The study applied a qualitative research design to explore the water resource management uses in Marsabit County. Water points are not evenly distributed; some areas have more concentration of water points while others have fewer water points. A proportionate samples corresponding to the concentration of water points, targeting at least 80% of water facilities were selected from the long list of water points. Applying a stratified and purposive sampling, the study sampled48 participants drawn from five water projects, including 3 Chairpersons, 2 water company officials, one student and 42 Committee Members. The purposive sampling was done to ensure equal representation of water infrastructure were selected from different areas of the Sagante/Jaldesa ward. These participants were sampled through purposive method to ensure that only the targeted individuals were selected. Information of the type of water infrastructures, management approaches and challenges were collected from the water management committees and the key informants... Interview schedules and open ended questionnaire were used to conduct Focus Group Discussions with mixed participants, with different experience, gender and age brackets in a guided conversation. This was complemented by key Informant interviews with key resource persons with technical experience and familiarity with water management issues in Saku.

The questionnaire was carried out one week prior to the main study to the respective categories of respondents. Allan and Emma (2011) pointed out that the quality of the research outcome is determined by the quality of research instruments. Testing entailed picking 5 respondents who were not part of the eventual sample of the study. The necessary revisions were made and after the testing, the questionnaire was ready for final administration.

The data was analyzed in four phases, including data clean up, reduction, differentiation and explanation. Data clean-up involved editing, coding and tabulation in order to detect anomalies. The data from the field was appropriately coded based on the subject under investigation.The resultant data was analyzed using RQDA® qualitative data analysis software.

### 1.7 Research Findings and Discussion

The study sought to establish water resource management practices and how water management approaches impact community livelihoods in Saku Sub-County, Marsabit County. The data analysis is thematically analyzed based on the objectives of the study. The study assessed the most common livelihood practices in Saku Sub-County. Majority of the respondents indicated that Pastoralism is the major activity mixed with small-scale rain-fed farming and lastly, small-scale trade. Due to protracted droughts, there is high loss of livestock and many households have taken to farm-based income from *Khaat (Miraa)* and charcoal burning charcoal and sale. It was observed that these activities reflect the kind of environment found in Saku-Sub-County, which is an arid area.

Regarding the water sources in the Saku sub-county, it emerged that different wards have different potential for diverse water types. While water pans, shallow wells and boreholes were the most common water sources in Sagante/Jaldesa ward, Marsabit town water supply choices are constrained. Marsabit town mainly depend on Bakuli water source in Marsabit forest and few water pans such as HaroBoota that supply settlement (during rainy seasons) in the immediate neighborhood of Marsabit town. Sagante/Jaldesa Ward, in contrast, has relatively wider choice of water supply options.. For instance, it was reported that there were 3 water pans namely: HaroCifa, Damballa Gombo and Gotu Gombo. Additionally, there were about 25 shallow wells and 2 private bore holes within Dirib-Gombo and Sagantearea.Water and pasture uses are segregated at different levels – i) the primary users who are consider managers and owners of specific territory (including water and land), ii) occasional users which are the adjacent community that has user rights to water and grazing resources and we also have iii) external users, which are usually communities from far away counties and grazing areas but with reciprocal grazing and transit rights. The third category of users has shorter grazing right and are usually required to go back to their primary grazing areas. Such intricate user rights and time, imply that communities have slightly complex use and water management arrangements. The study noted that the water sources and by extension grazing lands were managed by both committees that are constituted by the community members and traditional institutions composing of elders.

The critical role of the *Dedha* customary governance mechanisms to manage water and grazing regime. A group of elders traditionally provide the checks and balances necessary to sustainably utilize water resources. The study also assessed the criteria for a person to be a member of the association. This information was corroborated by one of the WARMA officers who had this to say:

> *"In Saku, we have Marsabit Water and Sanitation Company. We have Bakuli 3 dam which is the common source of water within Marsabit town and its environs, also Jaldesa borehole, Kubi Qalo Bore hole and Dirib Gombo bore holes are vital in supplying water to the residents. All these boreholes have management committee to run their activities (Respondent 1, 3rd July 2019).*

It was established that the criteria for one to become a Committee Member was based on one's individual abilities as perceived by the community members. This was evident from one respondent who observed that:

> *"Members are selected based on individual's capacity of solving problems, and based on the patience of the person and based on his/her own development at*

> *his own family and also based on wisdom level of that person."*(Respondent 2, 3rd July 2019).

Itwas also found that one's educational background did not seem to matter and what was of more importance were the naturally occurring gifts as revealed by the following respondent:

> *"The community members that makes use of the waters elects committee members based on a candidates' intelligence, skills or based on their development track record. Skills looked for include guidance and counseling or ability to amicably solve conflicts between warring parties …. And this is not based on their level of education but rather their emotional intelligence as most of them have no formal education (Respondent 9, 6th July 2019)".*

This assertion was corroborated by another respondent who had almost similar views about the criteria used to select a committee member.

> *"Committee members are selected based on their capability of solving problems or conflicts between two fighting parties. It can also be based on his/her own development and how one manages his family. It can also be based on his/her own intelligence. For example, some people are gifted on different skills. For example, solving conflicts or counseling skills(Respondent 3, 4th July)".*

Based on this criterion, the representation and inclusiveness (e.g. youth, women, and minorities) was observed that, young people were rarely considered for leadership positions in these committees. For instance, it was noted that the youngest committee member was 30 years old while the oldest was 76 years old. Majority of the Committee Members were aged between 40-60 years. Similarly, the youngest chairman was 48 years while the oldest was 60 years old. This is a revelation that the committees were lacking the input of the young people despite being considered to constitute the largest population in most communities.

**Table 1:** Summary of Comparison between Traditional and Conventional Water Approaches

| Traditional Approaches | Conventional Approaches | Similarities |
|---|---|---|
| Rules and regulations to manage water is informal and unwritten | Rules and regulations governing committee are formal and written | Both access and management are based on some sort of rules |
| The rules and management derive legitimacy from traditional values | Rules and regulations for the committee is empowered by water Act 2002 (CAP 372) | Both rules are couched on some principles and agreed values |
| Water conflict arbitrations are done by council of elders | Arbitration are based on written agreement and resolutions | |
| Community owned Resources | Public Resources | Both have mechanisms for arbitrating in situation of conflict |
| | | Both have a management structure |
| Water is fetched manually | Pumped by machines and supplied through pipes | Both provide water for animals and human use |
| Payment is done once a year or no payment for management | Monthly payment for the management. | Different days are set aside for allocation of water for animals as seen at *Dabsu* and *Limalim* |
| No Security after 5pm (they use rules and regulations to manage) | Secure, since security is there at any one given time | |

| | | |
|---|---|---|
| Located in isolated places e.g., in the forest (Gombo and Sagante wells) | Located within the centre of the village | |
| Water shortage during dry season | Water is still plenty during dry season as this is the time solar systems work very well. | |
| Water is dirty for Human consumptions | Water is very clean | |
| Water is not accessible during late hours. Its located in a forest and isolated place. | Accessible at any time since its located in an open place, centre of the village and has a guard/security 24hours. | |

***Source**: Study findings, 2019.*

However, this was explained by one of the participants who summed it as follows:

> *Young people lack experience, wisdom, development track record and most of them are not interested anyway. In addition to lack of experience in handling these matters, many young people are involved in casual jobs and therefore have no time to manage the affairs of these water projects. They also dislike looking after the animals, an activity they consider to be too traditional and primitive and therefore, I can confidently say that they have no meaningful stakes in these projects (Respondent 14, 5th July 2019).*

One respondent had the following to say about the similarities and differences between conventional and traditional water management practices: Regarding the involvement of women in the management of the water resources, it was reported that women participate in various ways. However, it was noted that women's participation was relegated to helping during the construction of wells, constructing artificial mud troughsor watering animals, but were rarely appointed in management positions. Their role, it was noted, was simply ephemeral. One respondent had the following to say about participation of women:

> *During construction of the wells, women cook for men who are constructing. They also carry cements and sand to the construction area since the roads are not passable by any means of transport. Women also may fetch water from well to the Fachan [first trough] and then to the last trough where animals take water. However, this may only happen if her own cow is taking water that particular day (Respondent 3, 4th July 2019).*

The study noted that the management of water resources also involved drawing up animal watering schedules, making rules and allocating duties to individuals. For instance, there are those allocated duties to clean the troughs, organize how to fetch water from the main wells into the troughs and ensure there is order when watering animals. This helped to ensure equitable sharing of the water resources. The responses of the participants regarding the comparison between traditional and conventional water sources are summarized in Table 6 above.

> *Similarities in both approaches are that they have one or two elected or appointed members who is responsible. That is Chairman and vice chairman for conventional and Abba Erega (Manager) for traditional approaches.*

> *The difference between the two approaches is that conventional approach involve use of machines while the traditional approach uses hands to pump or draw water. …. And the conventional one, water is plenty at all season but the traditional approaches the well may dry up during dry season.*
>
> *In the conventional approach the water is clean since the borehole are covered and sealed while the traditional one the well is open and can also be accessed by world animals which may cause termination (Respondent 10, 6th July 2019).*

Challenges Facing Water Resource Management in Saku Sub-County

The study embarked on establishing the challenges facing management of water resources in Saku Sub-County. The respondents were asked to rank these challenges in terms of importance. In this respect, governance challenges appeared to be the most critical, followed by insecurity, security, fetching of water being too tiring and time consuming while poor roads came last. With respect to weak governance a number of challenges were mentioned by the respondents. The respondents discussed this challenge at two levels. The first level is lack of clear support for the traditional water management institutions. For example the traditional management systems are not recognized by government and therefore do not have a formal mandate for regulating access and use of water sources. Also, the traditional management is not regarded as legitimate by all sections of the community, especially the excluded groups. Therefore, there is little government acknowledgement of and support for traditional institutions and the management system while it was observed that government interventions have predominantly ignored local structures and systems for water management.The current state of inter-tribal security situation was captured by one committee member, who stated the following:

> *Borana and Gabra regular fights over resources such as water and grazing fields is a common occurrence. No one want to get into cross fire. The area is also home to fierce world animals such as elephants, buffaloes and others. So, life here is a gamble (Respondent 8, 5th July 2019).*

This problem was compounded by presence of wild animal -human conflicts at water points such as Sagante shallow wells .The problem of insecurity from wild animals was validated by a chair of one water management committee at Sagante shallow wells another respondent who had the following to say:

> *During late hours, no one can access water because there are a lot of wild animals since the water points is in the forest open for use by both humans and animals (Respondent 14, 5th July 2019). The problem of dirty water was also apparent especially in the water pans, shallow wells and other open water sources. This problem manifest itself when water users loosely adhere to rules and regulation of water use, access and management.. This feeling was captured by the shallow well manager at Sagante shallow well. Who stated the following::The open water sources are usually too dirty for human consumption and prone to (water-borne) diseases. We share the same water with animals such as monkeys and other world animals that urinate and also go for their long*

> *calls of nature inside the water which is definitely unhygienic. Human beings also step inside the water when fetching water. This is why we are prone to waterborne diseases (Respondent 11).*

Drawing of water from the wells manually was described as too tiresome and time consuming. Similarly, scoping of soil manually from the water pans during repairs were also described as hindering proper use and rehabilitation of water resources. Additionally, poor roads were also described as a hindrance to accessing the water resources in remote areas of Saku Sub-County. The harsh climatic conditions and the poor terrain dotted with rocks make made it hard to access the water sources. Regarding these conditions, one respondent observed that: Poor roads affect both animals and human beings as the roads are impassable due to heavy rocks all over. The authorities are doing very little to improve the infrastructure (Respondent 13, 6th July 2019).The challenges associated with traditional management approaches which were mainly characterized by manual processes were unequivocally described as slow, tedious and time consuming. This kind of challenges negatively affect residents' ability to have quality and adequate water sources. With ground recharge dwindling, the capacity of shallow wells and boreholes to recharge is gravely affected and this constrains the traditional regulations to manage watering days and schedule. One elder had this to say:

> *Digging of the wells and the water points manually takes time. The area is also too rocky and they don't have proper machine for digging the wells. There is also the challenge of wild animals taking back soils and rocks into the already dug wells which doubles the work for those people doing the work(Respondent 15, 6th July 2019).*

One respondent blamed the poor state of infrastructure on accessibility of the water sources by both the residents and their livestock. She stated the following:

> *Most of our roads are generally very poor. The roads here are too stony, thorny and bushy and affect access to water for both household and livestock (Respondent 9, 6th July 2019).*

Regarding the status of the condition of the water, the same respondent had this to say:

> *The water from the traditional sources is too dirty because animals stand inside when drinking while people also stands step inside the water when fetching the commodity. Most of the dirt is as a result of not covering the wells. Open water sources are subject to all manner of dirt especially from animals (Respondent 9, 6th July 2019).*

Impact of Conventional Approaches on Livelihood

This was captured in details by one of the Committee Members of one of the projects who had the following to say:

> *The conventional approach has a lot of challenges that range from corruption, to mismanagement of water resources to poor leadership, nepotism, sycophancy and blatant political interference. The repairs are frequent, costly and involve*

> *engineers. There is also frequent use of diesel on many occasions which is expensive. In the absence of solar power, diesel is required to run the pumps. Transporting this diesel to the water points takes time. The conventional machines also require frequent repairs from experts who are rarely found in the local towns. This becomes an expensive exercise to out-source for such expertise from far. Spares are also not available in the local towns and one may have to go as far as Nairobi which takes a couple of days and is also expensive to travel (Respondent 15, 6th July 2019).*

This observation implies that to consistently continue offering water supplies to the residents through the conventional approaches, sufficient funds are necessary. Without sufficient funds, the livelihoods of the residents, their animals and crops are likely to suffer from water deficiency. Building the capacity of the locals by imparting mechanical skills to manage the machinery would also be ideal. Heightened insecurity has seen escalation of fights between communities and destruction of water points as cited by the respondents in the Focus Group Discussion. This was revealed by one respondent who had the following to say:

> *We have witnessed people fight for these water resources. A recent fight resulted in destruction of a water point which was done though burning. However, the water point has now been restored (Respondent 16, 6th July 2019).*

Cold seasons were cited as problematic and expensive as they do not provide the much-needed sunlight to the solar panels that is necessary to power water pumps. This meant that they had to resort to using expensive diesel to power the machines. This was revealed by one respondent who noted that:

The cold season is problematic here as there is no solar energy to pump our water and therefore we have to use diesel which is expensive. Another challenge is that the local community lacks capacity to run water projects for the future as there are no sustainability measures to ensure posterity of these projects (Respondent 17, 6th July 2019).

**Composition of the Management Team**

The management teams were found to be an important cog in ensuring constant supply of water and equitable distribution of the commodity. For instance, they have to ensure man-power is available to offer services to the residents at the wells. This was pointed out by one of the respondents as follows:

> *The management committee has to always ensure that there are people to fetch water from the wells to the trough for the other users' animals and for home use. This is not easy especially when it comes to following people to pay monthly contributions. This has always been a challenge to those bestowed with the management of water resources. Failure to pay on time means that buying diesel to power water pumps become a big challenge. Poor management also implies poor delivery of services (Respondent 24, 6th July 2019).*

Maintenance of Water Projects

The study noted that the management committees had put in place several measures to ensure there was constant maintenance of water projects, pipelines and other repairs. Some of those measures including seeking of finances, involvement of communities and to a lesser extent hiring of casual workers .It was reported that a part from the monthly contributions from members, most of the management committees were writing proposals seeking for external funding mainly from NGOs. However, most of the maintenance work was done by community members. Hence, casuals are rarely hired. According to one of the respondents, a community member who is not available to offer manual work may be asked to pay Kenya shilling 500 to hire a casual to do tasks such as fetching firewood or to construct or repair wells.

## 1.8 Conclusion and recommendations

Saku Sub-County being an arid and semi-arid area, majorly the people rely on water pans, shallow wells and boreholes as the main source of water for their livelihood and livestock Due to the scarcity and water demand the available water sources are Due to the scarcity and water demand the available water sources are managed by committees that are constituted by the community members based on one's abilities and attributes such as the ability to solve conflicts, counselling skills, one's personal development record and intelligence. These committees are charged with the responsibility of overseeing the day to day operation of the water sources with the aim of ensuring equitable sharing of the scarce water resources among the residents and minimize incidences of water based conflicts. The study found that the traditional approaches to water management present some specific advantages related to consensus based decision making process. This gives water users the opportunity to voice their opinions while the performance at the lower levels is often stronger due to the close relationships between community members and stronger cultural ties between members improve individual accountability and promotes responsible water use. The conventional approach are based on Rules and regulations that are formal and written. The rules and regulations governing the conduct of the committee is empowered by water Act 2002 (CAP 372) and arbitration are based on written agreement and resolutions.

The core challenge to prudent use and access to water relates to weak governance at both traditional and convention levels. While the traditional approach lack of clear support, formal mandate for regulating access and use of water sources and predominantly ignored by government; the conventional approach that has formal existence, is saddled by weak capacity, weak mechanisms for recovering costs of water service provision from users, weak accountability and transparency in the operation of existing water service providers. Limited capability to enforce rules and regulations and ensure equitable and efficient water management has implications on the livelihood and livestock. With recurrent droughts and potential dwindling of ground recharge in Saku sub-county, the capacity of shallow wells and bore holes to recharge is gravely affected and this constrains the conventional and traditional regulations to manage watering days and schedule. As such the necessity to invest in strengthen the capacity of water management institutions cannot be overstated. The study recommends that all stakeholders involved in consumption, provision or management of water resources such as the residents, committee members and policy makers have important roles to play to ensure provision of sustainable, adequate quality water that is equitably shared among the residents.

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