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National Environmental Policy 2013 Adaptation Strategies for Sustainability of Samburu Pastoral Community in Samburu Central Sub-County Kenya

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Abstract

The purpose of this paper is to underscore the importance of environmental policy implementation for sustainable development among the Samburu pastoralist community of Kenya. The need to manage environment in order to reduce loss of biodiversity and the adverse effects of climate variability is the preoccupation of many governments. Adaptation strategies have been suggested by global institutions to protect the rural vulnerable communities, to adapt to climate variability, resourced based conflicts and environmental degradation. Kenyan National Government enacted The National Environmental Policy 2013 to address the management of the ecosystem and sustainable use of natural resources to foster sustainability of especially the vulnerable pastoral and nomadic communities like the Samburu. Existing literature on the implementation of the Government environmental policy 2013 suggests that little has been achieved to find out traditional knowledge of the Samburu people on adaptation strategies on the administration of environment and natural resources for their own sustainability. The study was guided by the following questions: What are the adaptation strategies to loss of bio-diversity among the Samburu pastoral community in Samburu Central Sub-County? How do the Samburu pastoral community manage pasture and water resources for their sustainability? What are the strategies the Samburu people use to enhance food security? The study employed hermeneutic phenomenology qualitative research design. Ecosystem theory was used to guide the study. Both primary and secondary data were used by the study. Primary data was collected using semi-structured questionares, in-depth interviews, written field notes, Focused Group Discussions and recording of the interviews to collect invaluable information from 20 participants composed of Samburu elders *(lpayani),* morans *(Lmuran),* women *(ntomonok)* in Samburu Central Sub-County, Samburu County. Secondary data was collected by reviewing literature from google scholar, jystor, mendeley desktop, online

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libraries, National and County Government websites to access academic journal articles, books and reports. Purposive sampling technique was used to identify key informers from the Samburu community who participated and have valuable knowledge in the environmental administration and sustainable use of natural resources among the Samburu pastoral community. Ethical consideration was adhered to while conducting research at every stage. Data collected from the field was filtered into themes, coded, interpreted and reported as the main findings. The study found out that the success of the adaptation strategies advocated by the Environmental policy 2013 for sustainability of the Samburu pastoralist community of Kenya depends on how the National and County Government is able to incorporate traditional knowledge of the Samburu people on environmental administration and sustainable use of pasture and water. The fact that the Samburu people have been able to adopt to adverse of loss of bio-diversity, harsh climatic conditions that complicated the management of pasture and water, and diversification of livelihoods to address food insecurity points to the need to integrate traditional knowledge with scientific knowledge.
Keywords: *Environmental management, National Environmental Policy 2013, Adaptation Strategies, Samburu pastoralist, Sustainability*

1.0 INTRODUCTION

The aim of this paper is to discuss the importance of environmental policy implementation for sustainable development of the Samburu pastoralist community of Kenya. The study was shaped by a number of experiences both from work related and academic journey at Tangaza University College, Nairobi. My experience working in the Catholic Diocese of Maralal as the Coordinator for the Catholic Justice and Peace Commission gave me the opportunity to visit pastoralists communities (such as the Samburu, Pokot and Turkana) in the County to find out issues affecting them and engage them in finding out grassroots solutions to issues such as cattle rustling, resource-based conflicts, effects of climate change and environmental hazards. Conducting trainings for community groups in climate change, conflict management and peacebuilding, assisted me to understand their experiences on how they were affected and their responses towards sustaining their livelihoods for survival. My engagement with the County Government of Samburu in the department of Environment and Natural resources enabled me to participate in the development of the Climate change policy for the County where I learnt on how policies of that nature are made with focus on thematic areas and processes. Attending PhD class on Environmental Policy and Administration, students were expected to appraise the existing environmental policy programs and administrative systems both at the international, national and local levels. Students were also tasked to look at their geographical areas and identify the environmental issues affecting the local populations. This exercise led me to interrogate on the existing National and County Government environmental policies in relations to the environmental management among the Samburu pastoral community in Samburu Central Sub-County, Kenya.

Studies conducted by various scholars have revealed that Kenya is today considered one of the Eastern African countries that is not only struggling to combat effects of climate change but also environmental crisis in relation to her pursuit for sustainable development (Ahmed & Mlay, 2014; Group, 2021; Authority, 2021). According to Wellington and Justus (2000), some of the key environmental challenges facing Kenya include deforestation, water shortage and pollution, ‘land degradation and decline of agricultural productivity and ‘Land use policy and Land use Planning’, population growth, distribution and impact on natural resources’, ‘refugees influx in the ASALs’,

'settlement patterns, 'sedentarisation of pastoralists and squatterism', 'loss of genetic resources and biodiversity', 'lack of participatory management of natural resources' and 'conflicts in resource utilisation' (pp.14-17). Studies further reveal that the most affected areas are the Arid and Semi-Arid Lands (ASALs) especially among the pastoralists communities which periodically face climate variations causing food shortage, children malnutrition, pasture and water crisis, death of livestock and loss of vegetation cover (Authority, 2021).

To address the climate change issues and environmental crisis in Kenya, the Government has put in place strategies and policies to address climate change and environmental management for sustainability of mostly affected communities especially in the Arid and Semi-Arid Lands (Ongugo et al, 2014; Joseph et al. 2017; Kenya, 2010). Moreover, to address issues of management of ecosystems and sustainable use of natural resources in Kenya, the Government of Kenya established National Environmental Policy 2013 to highlight strategies for the sustainability of communities (Kenya, 2013). To support the Government's efforts in searching for sustainable strategies for the Kenyan communities there is need there is integrate both local and scientific knowledge in regards to environmental management (Raymond et al. 2010)

The Samburu people of Kenya are one of the 45 tribes of Kenya inhabiting in the Northern Central Rift Valley (Anthoney, 2015). Today they live in the present-day Samburu County and also are found in other counties such as Laikipia, Marsabit and Isiolo due to historical displacement and migration. It is one of the African traditional societies which still rely on their own traditional knowledge in the administration of the environment in which they live in. Faced with environmental issues such as harsh climatic conditions, perennial droughts, sporadic resourced based conflicts, loss of biodiversity, diminishing of water volumes and availability of pastures for the livestock, the Samburu people have been affected in crop farming and livestock keeping exposing them to increased level of poverty (Samburu, 2018). Traditional knowledge on environment administration among the Samburu is not fully recorded, while the Samburu culture continues to fade away and eventually get lost due to widespread of appealing lifestyle of globalization and western modernization. A number of studies have been undertaken in Samburu County especially in climate change and its effects, governing grazing and mobility, peace and conflicts and human wild-life conflicts (Pas, 2018). However little studies have focused on the importance of environmental policy implementation for sustainability of the Samburu pastoralist community of Kenya.

This paper employed phenomenological (hermeneutic) qualitative approach of research because of its specific characteristics that fits this study. According to Creswell and Poth (2018), hermeneutic phenomenology research is designed to be conducted from lived experiences of groups of people who have shared experiences about certain phenomenon and interpreting the 'texts' of life in order to arrive at the common understanding of the phenomenon. The phenomenological qualitative research was applied in this study because the focus of the study was the Samburu pastoralist community in Samburu Central Sub-County with the intent of acquiring primary data from the participants to be interviewed based on lived experiences. Using specific objectives, the study addressed the research questions supported by the secondary and primary data.

Therefore, the study is informed by three questions as follows: What are the adaptation strategies to loss of bio-diversity among the Samburu pastoral community in Samburu Central Sub-County? How do the Samburu pastoral community manage Pasture and water resources for their sustainability? What are the strategies in which the Samburu people use to enhance food security in Samburu Central Sub-County?

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2.0 LITERATURE REVIEW

In this section, the study reviews previous studies related to the concepts and variables that are investigated in this study. This enabled the researcher to identify common themes and conceptualize the study variables.

2.1 Adaptation strategies to loss of biodiversity among the Samburu pastoral community in Samburu Central Sub-County.

Adaptation strategies are commonly used in the field of climate change and especially in regards to climate change adaptation in order for communities to protect themselves from harsh climatic variations threatening their livelihoods and sustainability (Basiago, 1999; Kaiser et al. 2011). Apart from adaptation strategies for climate change, scholars like Subrahmanyam (2015) did research on effective climate change adaptation strategies employed in bio-diversity conservation. Among the climate change adaptation strategies that the author found out include 'identification and analysis of existing stressors', 'initiation of strategic zoning of land uses', 'better preparation for major disturbances', 'identification and designation of reserves', and 'increased communication of knowledge to stakeholders (Barrow, 2005).

Various scholars have given their own understanding on what the concept of Biodiversity could mean. For this study, biodiversity is understood to mean a **"**variety of different forms of life on earth, including the different plants, animals, micro-organisms, the genes they contain and the ecosystem they form" (Rawat and Agarwal 2015). In this regard, biodiversity is not classified as genetic diversity and species diversity but also ecosystem diversity (Rawat and Agarwal, 2015).

Kenya has a variety in biodiversity and it contributes positively towards a number of environmental services that include "regulation of the gaseous composition of the atmosphere, protection of coastal zone, regulation of the hydrological cycle and climate, generation and conservation of fertile soils, dispersal and breakdown of wastes, pollination of many crops and absorption of pollutants" (Kenya, 2013). It is today argued the biodiversity has a number of benefits that are not limited to human health, wellbeing, production for genetic resources for food and agriculture that enhances food security and support for human livelihoods (Kenya, 2013, p.19).

To support the above claim, Rawat and Agarwal (2015) argued the importance of biodiversity is seen in regards to utilitarian benefits, provision of ecosystem services, ethical and moral benefits, and has aesthetic value which human beings are the main beneficiaries.

The loss of biodiversity in Kenya is seen to be driven by a number of factors which include 'land degradation', 'climate change', 'pollution', 'unsustainable harvesting of natural resources', 'unsustainable patterns of consumption and production and introduction of invasive and alien species' (Kenya, 2013,). This is for example revealed by a study conducted in Mt Kenya forest which revealed that the main causes of the loss of biodiversity leading to frequent wild fires were the human activities and climate change causing destruction of forest vegetation such as bush and grassland, indigenous forest, plantation and bamboo forest (Poletti et al., 2019).

Loss of bio-diversity also happens at Samburu County as revealed by a number of studies. This is the case of a study conducted among the Samburu pastoralists in Samburu County which found out that the loss of biodiversity was manifested through land degradation that resulted to "the increase of bare ground and the replacement of perennial grasses by undesirable plant species, primarily *Acacia reficiens* and *Opuntia stricta*, resulting in reduced forage availability" (Kimiti et al., 2017).

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According to the National Environmental Policy 2013, among the strategies that the Government has put in place to address challenge of loss of biodiversity are as follows: formulation of strategies to increase tree cover especially through tree planting initiatives, the need to develop and implement a national strategy that enhances rehabilitation and restoration of degraded forests ecosystem and water catchment areas where local communities are actively involved, effective implementation of the forest policies and laws, development and implementation of the national standards, principles and criteria of sustainable forest management, encourage and implement appropriate forestry-based investment programmes and projects, and finally, provide initiatives where communities are not only involved but also empowered in the management of forest ecosystems (Kenya, 2013). According to Rawat U.S. and Agarwal (2015) community participation in planning, management and monitoring conservation programmes by the Government and non-governmental Organizations in forests management is not only meant to abide with the stipulated legal provisions but also in attaining sustainable and successful conservation strategies.

Other studies conducted in the community conservancies in Samburu County have shown that to combat the loss of biodiversity in the community, the common adaptation strategies employed included "mechanical clearing coupled with reseeding to combat *A. reficiens* spread" and the "use of both traditional and modern mobile cattle enclosures (commonly referred to as bomas)" to "create vegetation patches in areas with increasing bare ground" (Kimiti et al. 2017).

2.2 Pasture and water resource management adaptation strategies for sustainability of the Samburu pastoralists in Samburu Central Sub-County

Pasture and water resource management is an important strategy in the development of any environmental policy geared towards sustainability of communities in their setups. In Kenya, the Government of Kenya has stipulated various ways in which the pasture and water resources are managed for the sustainability of the Samburu pastoral communities under the framework of the National environmental policy, 2013 (Kenya, 2013). The policy envisioned the management of pasture and water in the section that deals with the 'management of ecosystems and sustainable use of the natural resources' (Kenya, 2013).

The National environment policy 2013 outlines the importance of land to the Kenyan populace both as the main 'basis of livelihoods' and a 'foundation of economic development' (Kenya, 2013). While acknowledging the limitedness of the land resources, the policy cites that increase rate of human population necessitates increase in the supply of basic needs such as food and shelter. According to the policy one of the major causes of unsustainability of land use in Kenya is environmental impacts (Raymond, Fazey, Reed, Lindsay, Stringer, Robinson & Evely, 2010).

This is evidenced in the land degradation majorly caused by human and natural factors such as 'unsuitable agricultural land use', 'poor soil and water management practices', 'deforestation and Overgrazing', 'droughts', 'floods' and 'landslides' (Kenya, 2013).

The Government of Kenya has laid down a number of strategies for sustainable land use in the Country including Samburu County (Kenya, 2013). Firstly, the Government commits to implement the Constitution of the Kenya and the National Land Policy to ensure that sustainable conservation and management of the environment and land resources are put into consideration. Secondly it seeks to employ best practices that will result to sustainable land use in the country. Thirdly, the Government of Kenya will ensure that that urban and peri-urban land uses are sustainable. Moreover, land restoration policies are envisioned to be under put in place and promoted. The Government also advices the adoption of high rise building in the country to ensure

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that there is practice of 'efficient land utilization.' Lastly the Government commits resource to carry out research on land use in regards to the built environment.

Apart from laying the strategies for sustainable land use promoted in the Country, the Government of Kenya laid down a number of strategies for sustainable use of water. In this regard, the National environmental policy 2013 discusses government strategies under the framework of 'fresh water and wetland ecosystem' (Kenya, 2013). The policy pointed out the importance of the fresh water and wetland ecosystem in Kenya in regards to 'provisioning', 'regulatory' and 'Supporting services. The cited provisioning services include 'storage and retention of water for domestic, agricultural and industrial use' and the 'regulating services' included 'modifying water flows', 'recharging and discharging groundwater resources' and 'diluting or removing pollutants.' 'Supporting services' instead focuses on issues such as 'soil formation and retention'; and 'nutrient cycling'. Moreover, the importance of the fresh water and wetland ecosystems is also seen in the preservation of habitats for both plant and animal species.

According to the policy, the fresh water and wetland ecosystems have faced a number of 'threats' that included 'human population pressure' 'land use changes' for agricultural use, settlements and commercial developments, 'pollution', 'sedimentation' and 'over-exploitation of wetland resource' 'introduction of alien species' and 'encroachment of riparian reserves' and 'adverse effects of climate variability' (Kenya, 2013). For the policy, all the above issues have led to 'degradation', 'reduction in water quality and quantity', 'loss of freshwater and wetland ecosystem goods and services'

To remedy the above situation the policy stipulated a number of government strategies on how to sustainably manage the fresh water and wetland ecosystem (Kenya, 2013). These strategies are as follows; development and implementation of integrated freshwater ad wetland resources management strategies and action plans; promotion and institutionalization of payment for environmental services schemes to support catchment protection and conservation; promotion of sustainable use of freshwater and wetland resources and the conservation of river and lake ecosystems through development and implementation of river basin management plans; development and implementation of a national wetland policy and regulations; development and implementation of catchment-based wetland management plans for all Ramsar sites through a participatory process; rehabilitation and restoration of degraded wetlands, riverbanks and lakeshore; harmonization and coordination of the roles of various regulatory agencies charged with the management of freshwater and wetland ecosystems; Involving and empowering communities in the management of fresh water and wetland ecosystems (Ezenwa, Ibe, Geraldine, Ochor & Onyekachi 2018).

A number of studies have investigated on the adaptation strategies employed by the Samburu pastoralist in management of pasture and water resources. A study conducted by the NDMA Samburu has revealed that the Samburu pastoralists faced with the water shortage for both domestic and animal use have used water sources such as 'wells', 'boreholes', 'pans' and 'dams' in order to sustain their livelihood (NDMA, 2021) The same study indicated that one of the strategies employed by Samburu pastoralists in pasture management was seen in trekking for long distances for animals in order to search grazing lands and water points (NDMA, 2021).

2.3 Food security adaptation strategies for sustainability of the Samburu pastoralists in Samburu Central Sub-County

Various scholars and world organizations (United Nations, FAO, World Bank) have provided a plethora of definitions of food security illustrating variant interpretation of the concept and the

continued revolution of the concept over history (Maxwell and Smith, 1992; Peng and Berry, 2019; World Bank, 1986). For this paper, the definitions of the concept of food security will be drawn from two documents of the World Food Summit undertaken by FAO. According to FAO (2002), food security is understood to mean a situation that occurs when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2002). In addition to this definition which outlined three dimension of food security (availability, accessibility, utilization), the 2009 World Summit on Food Security added the fourth dimension, that is, stability – understood to mean ability of food systems to withstand natural and manmade shocks (FAO, 2009).
The National environmental policy 2013 has not only highlighted the importance of livestock activity in the Semi-Arid Lands (ASALs) but also provided various strategies to enhance food security in the Counties, including Samburu County (Kenya 2013). According to the policy, the main activity carried out in Semi-Arid Lands (ASALs) is livestock production whose importance is seen in its contribution to Gross Domestic Product and provision of labour force in the agricultural sector. The policy while highlighting the role of overstocking in land degradation in the ASALs, identified keys issues in livestock production include waste management (water pollution) and 'disposal of effluents' especially from abattoirs, butcheries and tanneries (Peng &Berry, 2019).

To address the food insecurity in the counties, the National Environmental policy 2013, has stipulated three main strategies (Kenya, 2013). Firstly, the Government intended to oversee the development and implementation of environmentally friendly livestock production that put into consideration factors such as livestock mobility and 'communal management of natural resources. Secondly, the Government will enforce regulations especially on waste management in the livestock production industry. Finally, the Government will embark on enforcement of regulations in regards to livestock movement and disease control to be realized through application of 'commercially viable productive systems.' When faced with drought and harsh economic situations, the Samburu people have historically invented ways in which they can sustain their livelihoods for survival. According to Grillo (2014), some of the strategies to diversify their livelihoods for food security include slaughtering of cattle for meat during the drought period, depending on milk for feeding the household, hunting of 'wild fruits' and 'other plant resources and illegal hunting of wildlife.

3.0 METHODOLOGY

The main purpose of the study was to underscore the importance of environmental policy implementation for sustainable development among the Samburu pastoralist community of Kenya. The study employed hermeneutic phenomenological research design in order to find out the perceptions of the Samburu people in regards to adaptation strategies in regards to loss of biodiversity, pasture and water management, and food security (Creswell and Poth 2018). The first stage of the study involved conducting a documentary analysis and definitions of key words related to adaptation strategies, biodiversity, pasture and water management, and food security within the context of the Samburu pastoralists in Samburu Central Sub-County. The second stage of the study gave attention to the National environmental policy 2013 with the aim of finding out the adaptation strategies employed by the Government of Kenya in regards to loss of bio-diversity, lack of sufficient pasture and water for the livestock and food insecurity in Samburu Central Sub-County.

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The third stage involved interviewing 20 participants composed of Samburu elders *(lpayani),* morans *(Lmuran)* and women *(ntomonok)* in Samburu Central Sub-County, Samburu County on adaptation strategies employed by the Samburu people on loss of biodiversity, pasture and water management and food insecurity.

The study collected both primary and secondary data. Primary data was collected using semi-structured questionares, in-dept interviews, written field notes, Focused Group Discussions and recording of the interviews to collect invaluable information from the elders, morans and women. The interest of the researcher was to collect data in regards to qualitative research. The Secondary data was collected from Tangaza University Library and an online review of literature from google scholar, United Nations, Food and Agriculture Organzation, Integovernmental Panel on Climate Change, jystor, Sage Publications, mendeley desktop, Elsevier, International Journal Disaster Risk Science, Kenyan County and National Government sources The literature review discussed key concepts of the study (biodiversity, pasture and water management, and food security) and the adaptation strategies employed by the Government through the National Environmental policy 2013.

Purposive sampling technique was used to identify key informers (elders-*lpayani,* morans-*Lmuran,* women-*ntomonok)* from the Samburu pastoral community who not only participated in the environmental governance but also possess valuable knowledge in the environmental administration and sustainable use of natural resources. The elders *(lpayani)* were chosen because they govern the Samburu community and they take decisions on behalf of the community on environmental governance. The morans *(Lmuran)* are vital in the study because they take part of decision making, implementers of the decision from the elders, protect the community from aggressors and wild animals, and are in charge of the daily herding of animals to ensure that pasture and water are available. The women *(ntomonok)* are targeted by the study because of their relevance in household management in ensuring that shelter, food, water and firewood are catered for in the families. Therefore, they possess knowledge on how the Samburu people manage forests, land and water.

The study took into considerations all the ethical issues in regards to seeking consent, confidentiality and objectivity. The study employed descriptive statistics and qualitative data obtained in the field was then filtered, coded, interpreted and reported as the main findings.

This study was carried out in Samburu Central Sub-County, Samburu County in Kenya from August to December 2022.

4.0 FINDINGS

This study is informed by three questions. The following are the findings as per each of the research questions that guided this study.

4.1 Adaptation strategies to loss of biodiversity among the Samburu pastoral community in Samburu Central Sub-County.

The study sought to establish the adaptive strategies that the Samburu Pastoralist Community in Samburu Central Sub-County were adopting in order to prevent the loss of biodiversity. The findings are as presented below.

The researcher engaged the participants with the following question: What are the adaptative strategies to loss of bio-diversity among the Samburu pastoral community in Samburu Central Sub-County?

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The participants pointed out that indeed loss of biodiversity is taking place in Samburu Central and this is mainly caused by factors such as human activities in regards to deforestation, drought, soil erosion, pollution of water bodies and rivers, human-wild life conflicts, and overstocking

In order to address the loss of biodiversity in Samburu Central Sub-County, the participants indicated that among the strategies employed by the Samburu people include: Establishment of rotational grazing plans and Human settlement on hilly or high grounds. The participants also indicated that the Samburu people occasionally establish rules governing the rotational grazing of livestock in a given areas. This is not only intended to protect the environment at that given time but also to ensure that there is availability of pasture and water for the livestock during the dry spells. Settlement on hilly or high grounds **is** another important strategy identified by the participants. The participants clarified that when the Samburu pastoralists are faced by flooding that often leads to destruction of properties and loss of life, the Samburu people deliberatively relocate to safer grounds mostly in the hilly areas or in the higher-level grounds.

In summary, the study found out that there exist adaptations strategies to loss of biodiversity employed both by the Government of Kenya and the Samburu people. The Government strategies focused on increasing tree cover, rehabilitation and restoration of degraded forest ecosystems and water catchment areas, effective implementation of the forest policies and laws, development and implementation of the national standards, principles and criteria of sustainable forest management, forestry-based investment programmes and projects, and the management of forest ecosystems in the community. The Samburu adaptation strategies instead aimed at establishment of rotational grazing plans to preserve the environment and human settlement on hilly or high grounds to avoid being carried away during floods.

4.2 Pasture and water resource management adaptation strategies for sustainability of the Samburu pastoralists in Samburu Central Sub-County

The study also sought to find out how the pastoral community in Samburu manages pasture and water resources sustainably. This section was guided by the question, how do the Samburu pastoral community manage Pasture and water resources for their sustainability? The findings are as follows.

When asked about the key strategies that the Samburu people have employed to manage pasture and water, these strategies were provided by the participants: Establishment of livestock rotational watering of livestock, putting restrictions (*Aaen Nkop or mpaka*) digging of wells (*Atur Larriak*), migration, protection of waterpoints and dialogue with resident elders for pasture and water.

The Samburu, when faced with lack of water for livestock use, establish a rotational procedure for providing water to livestock based on agreed days and zones. This is done in order to ensure that there are no conflicts arising from competition of water.

Another important strategy identified by the participants is *Eneta e nkop or mpaka*, putting restrictions of grazing of livestock in designated areas for a specific period of time. The *eneta e nkop* is declared by the elders of the Samburu during the rainy season where there is plenty of pasture and water. The logic behind this strategy is that when all the livestock in the area are allowed to graze in all places there will be no sufficient pasture and water for the livestock during the dry spells. In addition, *Atur Larriak*, digging of wells is a vital strategy for the availability of water. Faced with water shortage for both domestic and animal use the Samburu people identify areas with underground or rivers and decide to dig either shallow wells or deep wells depending on near or far the water table is from the surface.

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Migration (*aiwuo*t) is a common practice of the Samburu pastoral community when faced with pasture and water deficiencies in the drought period. The migration to areas with plenty of pasture and water depends on the rainy seasons in the area where the pastoralists tend to migrate areas that received rainfall. Having knowledge on the rainy seasons and where they happen enable the Samburu to identify areas where they migrate at specific time of the year to address pasture and water shortage.

Protection of water points is yet another strategy to manage water among the Samburu pastoral community. When wells (*lariiak*) and shallow dams (*lturot*) are dug by the morans or elders in specific areas, the Samburu leadership ensures that they are faced to protect them from children and animals who can easily fall into them. They leadership also ensure that there is close monitoring of the status of wells and dams so that they can be repaired when needed.

Lastly the Samburu pastoral community also employ *aamonu nkujit or nkare,* dialogue between elders from different localities in order to ask permission to use the available water and pasture in times of need. The resident elders will therefore accept the request by the other party and in some cases, rules are put in place to guide the time and location of the pasture and water.

In conclusion, the study has found out pasture and water adaptation strategies employed by the Government of Kenya and the Samburu pastoralists in Samburu Central Sub-County. For the Environmental policy 2013, the government strategies are geared towards the development and implementation of integrated freshwater and wetland resources management strategies and action plans; promotion and institutionalization of payment for environmental services schemes; sustainable use of freshwater and wetland resources and the conservation of river and lake ecosystems; development and implementation of a national wetland policy and regulations; implementation of catchment-based wetland management plan; rehabilitation and restoration of degraded wetlands, riverbanks and lakeshore; harmonization and coordination of the roles of various regulatory agencies charged with the management of freshwater and wetland ecosystems; Involving and empowering communities in the management of fresh water and wetland ecosystems. The Samburu people use strategies such as establishment of livestock rotational watering of livestock, putting restrictions on grazing and water resources (*Aaen Nkop or mpaka*), digging of wells (*Atur Larriak*), migration, protection of water points and dialogue.

4.3 Food security adaptation strategies for sustainability of the Samburu pastoralists in Samburu Central Sub-County

Finally, the study sought to establish the strategies adopted by Samburu pastoralists in Samburu Central so as to achieve sustainable food security. This section was guided by the question, what are the ways in which the Samburu people diversify their livelihoods for food security?

The researcher sought to find out the strategies in which the Samburu pastoral communities in Samburu Central Sub-County ensured that food security was enhanced. Eight key strategies were identified as follows: Agro-pastoral farming, poultry farming, traditional honey keeping, diet from wild fruits and roots, traditional conservation of meat (sirikan), selling of animals through livestock markets, taboos on taking certain diets at same time, paran e suom.

Agro-pastoral farming has been identified as one of the strategies that the Samburu pastoral community has recently embraced. It is argued that the Samburu have traditional kept livestock (cows, sheep, goats and camels) as the source of livelihoods but in the recent past they have resulted to subsistence farming where they plant crops such as maize, beans and kales for domestic consumption and commercial purpose. In this case the food basket at the household level is enhanced. This is made possible by the fact Samburu central is suited for agricultural practices.

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The participants have also identified poultry farming as an upcoming strategy that the Samburu pastoralist have slowly adopted to enhance food security. While the community greatly agreed that eating of chicken was a taboo in the past, this view has recently changed as the Samburu pastoral communities have now embarked on poultry keeping either for consumption or for commercial purposes.

Traditional honey keeping was identified as another key strategy for ensure that food security is addressed by the Samburu pastoral community. For many decades the Samburu pastoral community have kept traditional beehives where honey harvested was consumed at the family level but also in some cases sold in order to earn money or in exchange of animals like goats. In this regard the families were able to have food during the dry spells where other sources of food were unreliable.

Diversification of diet has been a common practice among the Samburu pastoralist. Faced with food shortage especially during the dry seasons of the year, the Samburu pastoral community rely on wild fruits (*lpupo, sitet, njasin*) and other tree products such as *Lordo* (tree leaves from certain trees cooked) for food. Apart from the diet taken at home, those who are herding the animals during the day eat the wild fruits as lunch and this sustained them until evening when they return back home. Other ways that diet was diversified was taking of milk and animal blood especially during difficult moments where other sources of food was unavailable.

Another strategy to ensure that food was made available was through traditional conservation of animal products such as meat (*sirikan*) and milk (*kule na oto*). As a way to ensure that there is food that lasts for a number of days, the Samburu slaughter animals such as cows and dried meat in a form of long strings *(Sirikan*) which lasted many days without being spoiled. Apart from meat, milk was also collected in traditional calabashes (*malasin*) and store for a given number of days when the milk gets solidified, conserved well and consumed in different moments. This ensured that food was made available to the family.

Selling of animals through livestock markets has been recognized as the recent strategy employed by the Samburu pastoralists to enhance food security. Contrary to the fact that keeping of livestock was considered as a cultural prestige and sign of wealth, the Samburu pastoralist have recently commercialized the livestock propelled by introduction of livestock markets in different parts of the County. When the pastoralists sell their livestock, they get money to cater for household needs such as food, shelter and clothing.

A number of taboos on taking certain diets at same time have been introduced by the Samburu pastoralists in the past to ensure that food was reserved for other days. This occurred especially in regards to meat and milk. When food is insufficient in the family, livestock such as goat and cows were slaughtered for meat but during this time, there is a taboo that no one should eat meat and take milk at the same time. The reason given is for health reasons (constipation). Participants while partly agreed on this justification found out that the taboo was used to preserve milk for days when there is no meat and therefore the family could have food to feed on.

Paran e suom, is a form community safety net where the Samburu pastoralists have adopted to ensure that food security was upheld within the needy family. The participants pointed to the fact it was culturally acceptable for people to go and ask for assistance (borrow) from those who had plenty of animals or food in two ways. The first type of *paran e suom* is where a person seeks for help from another person to cater for family needs and therefore when granted the assistance, he/she was not supposed to return back what was given. The second type of *paran e suom* is where the person who needed help will ask for help from someone but with a condition to pay back at the given time the equivalent of what was given already provided. *Paran e suom* was important to

the Samburu pastoralist as this practice ensured that even the families who faced food shortage were supported until their situation is normalized and therefore free from hunger.

In summary, the study identified adaptation strategies for food security employed by both the Government of Kenya and the Samburu pastoralists in Samburu Central Sub-County. The Government of Kenya's adaptation strategies include implementation of environmentally friendly livestock production, enforcement of regulations on waste management in the livestock production industry and enforcement of regulations in regards to livestock movement and disease control. The Samburu pastoralists instead employ the following strategies such as agro-pastoral farming, poultry farming, traditional honey keeping, diet from wild fruits and roots, traditional conservation of meat (sirikan), selling of animals through livestock markets, taboos on taking certain diets at same time, *paran e suom.*

5.0 DISCUSSION

The study found that the Samburu Community have traditional strategies that they use to adapt to loss of biodiversity, to ensure that the available pasture and water resources are sustainable and to ensure their food security.

5.1 Adaptation Strategies to Loss of Biodiversity

The study sought to establish the importance of biodiversity to the Samburu community and the environment in general. The study has revealed that the Government of Kenya and Samburu pastoralist community agree that biodiversity has great importance in regards to provision of environmental services and benefits to the local communities. Environmental services provided by biodiversity are argued to regulate the gases composition of the atmosphere, protection of coastal zone and regulates hydrological cycle (Kenya, 2013). It is today argued the biodiversity has a number of benefits that are not limited to human health, wellbeing, production for genetic resources for food and agriculture that enhances food security and support for human livelihoods (Kenya, 2013).

The study found biodiversity to be both important for the environment and to have human benefits. This is in line with the findings of Rawat and Agarwal (2015) who found biodiversity to have benefits to the entire ecosystem. As such, the conservation of biodiversity in Samburu County is tasked to the leadership of the National and County Government agencies (Kenya Wild Services, Conservancies) in regards to strengthening implementation of policy and regulations on conservation of the biodiversity.

The findings from the study revealed that the Samburu pastoralists have a great consideration for the importance of biodiversity as they depend entirely dependent on what the biodiversity provides. This ranges from food security, shelter and housing, possibility to practice pastoralism in the verse grasslands and mountains, the source of medicinal plants without which the Samburu people would not have survived the many life-threatening diseases such as malaria, the source of cultural sites such as the Mt Nyiro where the Samburu people believe that God (*Nkai*) resides and oversee the lives of the Samburu people. This means that when biodiversity is not protected and preserved, the heritage and socio-cultural and political practices of the Samburu people are at risk of extinction. It is also argued that present and future existence of pastoralism of the pastoral communities will depend on how the Samburu people will able to protect and preserve the biodiversity in the County.

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Having noted the importance of biodiversity to the Samburu people, it is paramount that the Samburu traditional leadership (the elders, the morans and the women) should ensure that they not only abide to the Government regulations on conservation but also strengthened traditional rules that govern the same biodiversity. The conservation of biodiversity in Samburu County will be efficient when both the Government and Samburu traditional leadership structures create linkages to ensure harmonization of regulations and interventions.

From the literature review, the study found that Government of Kenya through the National Environmental policy 2013 has enacted adaptation strategies such as increase of forest cover, rehabilitation and restoration of degraded forest ecosystems and water catchment areas with active community involvement/participation, implementation of the forest and other related policies and laws, implement national standards, principles and criteria of sustainable forest management, implementation of appropriate forestry-based investment programmes and projects, and the idea of involving and empowering communities in the management of forest ecosystems (Kenya, 2013).

Despite all these strategies in place laid by the Government of Kenya on loss of biodiversity there is still a lot to be achieved curb the ongoing loss of biodiversity in Samburu County propelled by actions such as deforestation, land degradation, climate change, unsustainable harvesting of the available natural resources, introduction of the invasive alien species and unsustainable consumption and production little advocacy done in educating the Samburu pastoralist on the importance of conserving the biodiversity and also involving them in the environmental conservation (Kenya, 2013). The persistence of the above causes of loss of biodiversity indicate that the Government strategies are not really working and some more initiatives need to be in place. Through the Council of Governors, the County Government and National Government should strengthen the inter-agencies coordinative mechanisms both in the fundraising initiatives for resources and especially in timely and efficiently addressing perennial disasters in the County.

The respondents affirmed that two major strategies were employed by the Samburu pastoralists in combating loss of biodiversity, they include the establishment of grazing plans to avoid overgrazing causing land degradation and settlement on hilly or high grounds to avoid being swiped away by floods. While establishment of grazing plans for better resource allocation and sharing has worked for some areas where community land is still available, this will be a challenge in the future as what is now the community land for grazing will not be available. The Samburu leadership structures (the elders and morans) need to be strengthened through capacity building so that they may be aware on land polices and their applications in their respective areas.

The idea to involve fully the Samburu pastoralists community in various adaptation strategies (tree planting, forest management, implementation of forests and other policies) is paramount not only as a constitutional requirement but also in bringing on board traditional knowledge on the same. According to Rawat and Agarwal (2015) community participation in the all processes of conservation programmes (planning, management and monitoring) by the Government and any other non-governmental organizations in fulfilling laws and regulations but also successful implementation of the conservation programmes.

5.2 Pasture and water resource management adaptation strategies for sustainability of the Samburu pastoralists in Samburu Central Sub-County

Secondly, the study sought to establish how the Samburu pastoral community manage pasture and water resources for their sustainability. The study revealed that both the Government through the National Environmental policy 2013 and the Samburu pastoralists community believe that pasture

and water management are key strategies for sustainability of the Samburu pastoral community. In this regard the study found out that pasture and water resources are the main drivers of inter-ethnic conflicts in Samburu County.

According to the National Environmental policy 2013, land is an importance factor to the Kenyan populace as it is the one that sustains their livelihoods and an important factor of economic development (Kenya, 2013). For the policy the main environment impacts are considered the main causes of unsuitable land use. The Government initiatives to bring peaceful co-existence among the Samburu, Pokots and Turkana are not bearing good success as the County continues to be affected by cattle rustling due to resourced based conflicts.

Under this question most of the participants who were interviewed were of the opinion that the main causes of inter-ethnic conflicts among the Samburu, Turkana and Pokots were largely due to competition of the scarce resources. Among the major contributors were the issues of land and water and this happened mostly during the dry spells. The question of land arises because after the promulgation of the Kenyan Constitution 2010, land in Samburu County was transition from community land ownership to private and group ranches. When the process was completed each one of the members was allocate a piece of land and therefore this restricted other users to access the land. This reduced the possibility of the pastoralist to access most of the land for grazing as there was no more community land. When the drought strikes in the Samburu County the livestock a challenge to access grass for their livestock resulting in forceful intrusion into private lands causing immediate conflicts.

Apart from conflicts originating from land issues and competition for pastures, scarcity of water for the livestock causes conflicts among the pastoralists in Samburu County especially during the drought period. Despite numerous initiatives to drill boreholes and dams by the County and National Governments, Non-Government Organizations and faith based in most parts of the County availability of water to the County residents and also to the livestock remains a challenge. What causes lack of enough water for the livestock in the dry spells is attributed to the low water table of the available boreholes. Little availability of water during the drought period easily leads the pastoralists to compete for it and in most cases resulting to violent conflicts that leads to lose of lives and property. This situation calls for a robust program to allocate enough resources to address water scarcity and also the need for community to foster dialogue in order to share the available resources. In order to curb resourced based conflicts, the Government security structures, Samburu traditional structures and the non-governmental organizations have to come together and invent stakeholder approach to peace and conflicts. What is crucial is the issue of early warning and immediate interventions in case of eruption of conflicts in the conflict zones.

In the second question pertaining the pasture and water adaptation strategies the study found out that migration is one of the key strategies to ensure that there is availability of pasture and water for the domestic and livestock. The findings from the literature review of the Samburu County and the interviews of the Samburu elders, morans and women show that the practice of migration of the pastoralists as a strategy to get pasture and water in the drought period is not without challenges that even question its future sustainability. In this regard, Grillo (2014) posited that in the past, the movement of the pastoralists from one area to another was made possible by the fact that all the household were involved but in the recent past the livestock were moved while the homesteads (households) would remain in a particular area until the livestock are returned (Grillo, 2014). In drought period the Samburu pastoral communities even move from highland to lowlands and sometimes even to other neighbouring counties such as Laikipia and Baringo. The movement of the Samburu pastoral communities in Laikipia in search for grass and water for their livestock have

not only caused recurrent inter-ethnic conflicts but also seen an increased violent resourced based conflicts with the private ranges (Pellis, Pas & Duineveld 2018). These conflicts result to deaths, destruction of property and loss of animals.

The findings from the Interviewers suggest that the Samburu pastoralists, when faced with lack of pasture and water, migrate to areas where there is rainfall and they will stay there until rainfall takes place in their respective homes. The migration of Samburu pastoralists is slowly facing challenges due to sub-division of lands to individuals and therefore shrinking the public space for grazing the animals. This puts the future of pastoralism in question as more conflicts arise and the livestock stolen.

In order to address issues of migration of pastoralists from one area to another there is need to have inter-county framework for the movement of livestock and people from one area to another. The neighbouring counties to engage in establishment of policies that allow movement of livestock and people during the dry spells to sustain their livelihoods. The Samburu traditional leadership also should make an effort to dialogue with respective neighbouring communities in case of migration and ask permission for accessing pasture and water resources in terms of drought. This will not avoid further conflicts leading to deaths and destruction of property but also ensures that there is equitable sharing of resources as advocated by the African 'ubuntu', brotherhood.

In addressing the issue of pasture and water management adaptation strategies for the sustainability of the Samburu people the Government of Kenya through the National environmental policy 2013 has managed to do the following: Firstly, it highlighted environmental impacts and unsustainable human agricultural practices as the main contributors of unsustainable land use. This point was also affirmed by the corresponds in the field who cited that lack of pasture and water in Samburu County was largely contributed by natural calamities such as drought, overgrazing and deforestation.

Cognizant of the role that the Samburu pastoralists play in unsustainable land use, there will be need to do advocacy at the community level to create awareness of the importance of adopted sustainable land use that promote better management of pasture and water. In regards to adaptation strategies employed by the National Government on pasture and water management, the policy identified strategies such as the implementation of the Constitution of Kenya and National land policy, establishment of land restoration policies, allocation of resources to conduct research on land use and a robust plan to put in place integrated fresh water and wetland resources management strategies and action plans. This has seen establishment of wells, boreholes, pans and dams for water (NDMA, 2021). The challenge here is that even with availability of these sources of water provided by the Government, the pastoralists periodically lack water during the dry spells hence begging the question; what can be done to avert this situation?

The responses from the field work focused on the digging of wells or shallow dams and Moreso how to manage the already available pasture and water resources. Despite the above strategies both from government and Samburu pastoralist resourced based conflicts were still evident in different parts of Samburu causing loss of lives and property. A stakeholder approach is crucial in ensuring the adaptation strategies are supported and implement by all the actors in the County and even learning can be achieved to better the sustainability of the Samburu people.

5.3 Food security adaptation strategies for sustainability of the Samburu pastoralists in Samburu Central Sub-County

Finally, the study sought to examine the strategies adopted by Samburu pastoralists in Samburu Central for food security sustainability. The third question of the study (what are the ways in which

the Samburu people diversify their livelihoods for food security?) found out that both the Government of Kenya and the Samburu pastoral communities have put in place strategies to diversify the livelihoods for food security of the Samburu pastoral community.

The National Environmental policy 2013 envisioned that there was need to involve and empower local communities in the management of forest ecosystems (Kenya, 2013). Most of the forests in Samburu County continue to be depleted due to overgrazing and cutting of trees as a source of energy for cooking and construction purposes. These human activities will not end soon due to the demand for energy for cooking and the type of housing that needs timber.

The remedy for this situation is to find other sources of energy for cooking so that illegal logging could not continue reducing already little forest cover in the County. According to the interviewed members of the Samburu pastoralists, forests were important to the Samburu people as it a source of traditional medicines, source of pasture and water, supports pastoralism and supports cultural value systems. Therefore, attempts to involve the Samburu pastoralists by the Government in the forest conservation initiatives like tree planting is being embraced by the communities in Samburu central and this will enable the community to appreciate their role on the need to conserve environment.

According to National environmental policy 2013 among the strategies to be employed by Government to enhance food security include promotion of livestock production, enforcement of regulations that addresses on waste management in the livestock and the enforcement of regulations on livestock movement and disease control (Kenya, 2013). All these strategies have been challenged recently by harsh climatic conditions that led to drought causing deaths of many livestock and hence increasing the hunger among the Samburu pastoralist community. When the pastoralists sell their animals, they do not get fair prices or ready market for their products hence do not get enough money to buy other foodstuffs. Moreover, while Grillo (2014) agrees with the strategies that the participants have adopted especially on drying of meat to be eaten in another day, drinking of milk, illegal hunting of wildlife, hunting of wild fruits and plant resources, there are limitations to some of the strategies. While in the past, the Samburu people engaged with hunting of wildlife as a source of food today this practice is not allowed by the Government of Kenya due to the wild life conservation measures that protects the wild life against poaching. Also, the hunting of fruits and plant resources is limited now due to continued destruction of forests and environment making these resources unavailable. The Samburu pastoral communities will need to embrace commercial business in order to earn income to diversify their diet and become food secure during the frequent drought periods.

All the government structures involved in the livelihoods of people in the County, the NGOs and the Samburu pastoral leadership to work together to identify gaps in food security improve food policy development and implementation.

6.0 CONCLUSION

The study has developed a strategy for advocacy plan. The National Government of Kenya to continue to promote sustainability of communities especially in the Arid and Semi-Arid Lands which are commonly faced with climate change that leads to drought. Through the National Environment policy 2013, the Government need to employ strategies geared towards sustainability of the Samburu people in regards to loss of bio-diversity, pasture and water management and diversification of livelihoods for food security. To fill the gaps on the strategies proposed by the National Environment policy 2013, the Samburu people should implement their own strategies to

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address issue such as effects loss of biodiversity, competition for pasture and water and food insecurity. However due to adverse effects of climate change. Environmental degradation and perennial resourced based conflicts the sustainability of the Samburu people is always at stake. The researcher will envisage to undertake advocacy plan at the end of the study as follows: Firstly, there is need to conduct a stakeholder mapping to identify the target audience for advocacy for the dissemination of the research findings. Secondly, formation of community groups (men, women and youth) at the grass root level is vital to identify the environmental issues affecting them in their respective areas and find out how they can be able find solutions to them.

Thirdly there is need to conduct capacity building of targeted community groups on various thematic areas. The stakeholders working in Samburu County will therefore need to engage with the community groups with the aim of Identifying advocacy challenges and available opportunities to resolve them at the community at the grass root level. Most importantly is that community groups and the relevant stakeholders to develop action points and possible plans to execute them in order to develop applicable strategies that promotes sustainability of the community. Finally, community groups will need to formulate mechanisms to monitor and evaluate their activities for learning purposes and tracking the implementation of planned actions.

To achieve this, the Samburu Pastoralist Community must work together with the local governments in order to achieve sustainability for the community so as to avoid the challenges that they face. Given climate change in the modern day has made effects more pronounced with extreme climate as well as extended drought witnessed in the area. Previously predictable weather patterns have become unreliable. In order for the pastoralist community to be self-sustainable and to be food secure, they need to embrace modern livestock practices and formalize their livestock farming by joining the meat industry supply chain and using proceeds to diversify their economic activities. Others may engage in business and engage in crop and poultry farming.

In addition, the government together with other partners such as NGOs can engage in efforts to restore agriculture, forested and pasture lands so as to take care of the environment. This can be done by training residents on how to regenerate indigenous trees and shrubs by using roots, tree stumps and seeds. This can help to positively affect income and hence reduce poverty, food security through amount of food produced, energy and diversity in the diet of the community. Most importantly however is the management of natural resources. Despite the fact that the Samburu Community have been able to manage the resources impressively in the past, increase in population as well as a depletion of resources due to climate change makes access to water and pasture more difficult especially during the dry seasons. As such, government intervention is needed to encourage other income generating activities so that families are not entirely reliant on livestock to survive (Njoroge, Ratter, Atieno, 2017).

The Samburu traditional structure (the elders, morans and women) are very instrumental in ensuring that the rules are established at the community level in conserving the forests. The relevant government structures that are concerned with the forest conservation should liaise with the Samburu traditional structures for capacity building initiatives and ownership of government initiatives towards forest conservation.

With regards to biodiversity, the changes in climate may lead to conflicts between humans, livestock and wild animals. The Samburu have lived alongside wild animals for centuries and it is important that their relationship with wild animals remains as it has in the past. Elephants often lead trails to water sources and break branches that locals can use for firewood. The Samburu Community way of life contributes to the conservation of biodiversity partly because of their traditional customary laws that advocate for environmental conservation. As such, policies and

efforts must be made by all stakeholders to ensure the pastoralist community in Samburu can sustainably prevent loss of biodiversity, have sustainable pasture and water in line with their pastoralist lifestyle and food security in light of the current changes in climatic conditions.

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