IGAD CENTRE FOR PASTORAL AREAS AND LIVESTOCK DEVELOPMENT (ICPALD)

REGIONAL INTEGRATION SUPPORT PROGRAMME (RISP III)

ASSESSMENT OF THE TOTAL ECONOMIC VALUATION OF PASTORALISM IN KENYA

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ACRONYMS AND ABBREVIATIONS

ASAL	Arid and Semi Arid Lands
CELEP	European Lobbies on Eastern African Pastoralism
CGOM	Council of Governors of Mandera
CIDP	County Integrated Development Plan
DRR	Disaster Risk Reduction
EAC	East African Community
ERS	Economic Recovery Strategy
FAO	Food Agriculture Organisation
GDP	Gross Domestic Product
GECL	General Counsel and Legal Services Department
GNP	Gross National Product
ICPAC	Intergovernmental Climate Prediction and Application Centre
IFPRI	International Food Policy Research Institute
IGAD	Intergovernmental Authority for Development
ILRI	International Livestock Research Institute
IRIN	Integrated Regional Information Network
KACCAL	Kenya Adaptation to Climate Change in Arid Lands
KIRA	Kenya Inter-Agency Rapid Assessment
KNBS	Kenya National Bureau of Statistics
KRDS	Kenya Rural Development Strategy
KRDS	Kenya Rural Development Strategy
MoNKOAL	Ministry of Northern Kenya and Other Arid Lands
NASEP	National Agricultural Sector Extension Policy
NDMA	National Drought Management Authority
NEMA	National Environment Management Authority
NNP	Net National Product
NNP	Net National Product
REGLAP	Regional Learning and Advocacy Programme
SRA	Strategy for Revitalising Agriculture
TCDP	Turkana County Development plan
TCDP	Turkana County Development Plans
TCDP	Turkana County Development Plan
TCFIDP	Turkana County First integrated development plan
TCIDP	Turkana County Integrated Development plan
TEV	Total Economic Value
UNECA	United Nations Economic Commission for Africa
WISP	World Initiative for Sustainable Pastoralism

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EXECUTIVE SUMMARY

Pastoralism remains central to providing a means of livelihood in the arid and semi-arid lands of Kenya, and contributes immensely to the local and national economies. Despite these benefits, pastoralism is often undervalued due to limited information on the economic value of the pastoral systems, resulting in inadequate policy and institutional support for the systems.

A worldwide debate is underway to deepen the understanding of the valuable role of pastoralism and advocate for policy and institutions to support the production system. However, this debate would only be successful and meaningful if adequate information was available on the value of pastoralism and its role in economic growth, a problem this study seeks to address. The main objective of this study was, therefore, to fill information gaps regarding the significance of pastoralism by providing an initial assessment of the Total Economic Value (TEV) of pastoralism in Kenya. To achieve this, four counties in the northern rangelands—Turkana, Mandera, Wajir and Marsabit—and Loitokitok Sub-county in the southern rangelands were purposively sampled for the study. The selected four counties were selected on the basis of data availability and ease of access to data and information. However, Loitokitok Sub-county was randomly selected among other sub-counties in Kajiado County to provide detailed information on the non-traditional values of pastoralism that were not captured in the secondary data of the selected counties while also ensuring that southern rangelands are represented.

The data collected include aspects of traditional pastoral values such as pastoral livestock populations, slaughter and milk offtakes, and herd structure. Further, monetary valuation of the livestock and various livestock products was done from the data available—including valuation of slaughter, milk, blood and manure offtakes. In addition, data were collected on non-traditional pastoral values such as honey, bees wax, herbs, firewood, fishing and tourism.

Based on the analyses, suggestions are provided on how to improve pastoralism so that it may make a greater contribution to the local and national economies. Part of these suggestions is the use of TEV in advocacy and priority setting, especially national budgetary allocation, and coherence in policy implementation on pastoral production. Information on policy context is largely based on a review of relevant government documents, and on keeping abreast of the policy literature. Currently, Kenya's pastoral sector has an economic worth of Kshs 94.92 billion (US$0.95 billion) with traditional values, specifically livestock and related products, accounting for 90.5% of the total value (Kshs 85.90 billion) and non-traditional values, such as honey, wax, tourism and fish, accounting for the remaining 9.5 per cent (Kshs 9.02 billion). In terms of the national traditional pastoral values, pastoral livestock offtake was valued at Kshs 18.9 billion ($0.189 billion) and annual meat offtake estimated at 154,968 tonnes valued at Kshs 38.9 billion ($0.389 billion). Out of this offtake and value, camel meat constituted 9,872 tonnes valued at Kshs 2.47 billion (US$0.0247 billion), mutton 1,609 tonnes valued at Kshs 0.4 billion (US$0.004 billion) and chevon 33,614 tonnes with a value of Kshs 8.4 billion (US$0.084 billion). Further, at the national level, the amount of meat consumed annually is about 553,200 tonnes, of which pastoral meat contributes 154,968 tonnes or 28% of the total national consumption. The rest comes from ranches and/or 'large farms' and smallholders. The pastoral population is estimated to consume 110,640 tonnes of meat. Thus, it implies that out of the total meat offtake from pastoral herds about 71.7 per cent was consumed locally while the rest was a surplus which went to support the rest of the country's population.

At present, the national milk production is estimated at 58,708 tonnes, out of which pastoral milk from cattle, sheep, goats and camels constitute about 21 per cent of the total milk produced in the

country, valued at Kshs 28.3 billion (US$ 0.28 billion). Pastoral cattle contributes approximately 1.6% of the national cattle milk (3,713,069 litres) worth Kshs 1.76 billion (US$ 0.018 billion). Similarly, annual pastoral goat milk is estimated at 80,241,960 litres valued at Kshs 1.2 billion, contributing about 30 per cent of the national goat milk, while milk from sheep is estimated at 3,267 tonnes, valued at Kshs 32.7 million (US$0.33 million). Similarly, the overall value of pastoralism in the four selected counties of Turkana, Mandera, Marsabit and Wajir is estimated at Kshs 54.25 billion (US$ 0.54 billion), which is about 57.2% of the national pastoral value. The economic worth of pastoralism in the selected four counties was Kshs 21.97 billion (US$ 0.22 billion) for Turkana; Kshs 14.65 billion for Wajir, Kshs 13.82 billion for Mandera and Kshs 3.81 billion for Marsabit. The traditional value of pastoralism for the four counties ranged between 55.97% and 97.37%.

Further to the values shown above, livestock are a source of bride price and a measure of wealth and social status among the ASAL communities. They also have value as a source of manure and traction, and as investment that is converted into cash to purchase food or is directly exchanged for food or slaughtered for the same. Thus, the major areas of contribution are with respect to local and national food security through increased output of livestock and non-livestock products, employment and income generation. Pastoralism provides direct employment to about 2.2 million people in Kenya. The indirect employment that is difficult to quantify is in ranching, trade in livestock, transport services, leather industry, slaughter houses, butcheries, and eating houses. This is a clear demonstration, therefore, that products and incomes from pastoral slaughter, milk offtake and other sources have implications on the national food security and poverty.

To enhance its economic contribution, the integration of the pastoral economy to the national and regional economies needs strengthening. For example, livestock markets and value chains are not well developed—livestock prices fluctuate depending on weather dynamics and there are limited industries—thus livestock products are often sold unprocessed and consequently fetching low prices. Also, institutions mandated to handle the purchase and sale of livestock, such as the Kenya Meat Commission (KMC), are not operating efficiently; veterinary services are either inadequate or not available; and, relative to other industries, government gives low priority to the livestock sector and by extension the pastoral economy. Therefore, government needs to promote initiatives that enhance livestock husbandry in the ASALs, since it is the major economic activity in these areas. Examples include climate-smart livestock breeds and strengthening formal marketing channels for livestock and non-traditional pastoral products such bees wax, honey and firewood. This would specifically involve mobilisation of pastoralists into groups to help them bargain for better prices. Additionally, the non-traditional products of pastoralism which have often been ignored can be more fully exploited to generate extra value. Therefore, the analysis of TEV of pastoralism offers a great opportunity as a tool for lobbying and advocacy among stakeholders by providing evidence that demonstrates that in deed pastoralism has potential to take centre-stage in the achievement of Kenya's Vision 2030 and sustainable development goals.

1 INTRODUCTION

1.1 BACKGROUND

Pastoralism contributes to the livelihoods of millions of people across Africa, in some of the poorest and most deprived areas. It is a critical source of economic activity in dryland areas, where other forms of agriculture are impossible (Integrated Regional Information Network (IRIN), 2013). Pastoralism contributes between 10 and 44 per cent of the gross domestic product (GDP) of African countries. Further, an estimated 1.3 billion people benefit from livestock value chain (International Livestock Research Institute (ILRI), 2013). In the Horn of Africa and the Sahel, this figure rises to between 10 to 20 per cent of the total population of some countries. For instance, pastoralism directly supports an estimated 20 million people and produces 80 per cent of the total annual milk supply in Ethiopia, provides 90 per cent of the meat consumed in East Africa, and contributes 19 per cent, 13 per cent and 8 per cent of GDP in Ethiopia, Kenya and Uganda, respectively (United Nations Economic Commission for Africa (UNECA), 2016). In addition, it contributes close to 60 per cent of the meat and milk products consumed in western countries. Therefore, pastoralism has one of the greatest potentials to grow the economy and create a large number of job opportunities to fulfil Kenya's Vision 2030.

Pastoralism is a way of life based primarily on raising livestock, particularly small ruminants, cattle and camels. Pastoral systems are mostly found in Africa's vast arid and semiarid areas characterized by marked rainfall variability, and associated uncertainties in the spatial and temporal distribution of water resources and grazing for animals. Pastoralists have developed management systems based on strategic mobility, which are well-adapted to these difficult conditions. Pastoral systems are sustainable low-input systems that are extremely adaptable to the particular environment and to the specific socioeconomic conditions. Yet, pastoral communities are often marginalized, lacking proper political and institutional support (Amwata *et al.,* 2015). As a result, they are often confronted with difficult access to natural resources and insecure land and water tenure rights, which frequently causes conflicts. In addition, people in pastoral areas often lack proper infrastructure and have limited access to markets and basic services.

Several studies have evaluated or reported on the contribution of pastoralism (Nyariki, 2004; Nyariki and Ngugi, 2002; Hesse and MacGregor, 2006). However, evidence on this issue remains scanty and at best scattered, and may not translate into adequate policy and development support. Even though, Mdoe and Mnenwa (2007) conducted a study on the total economic value (TEV) of pastoralism in Tanzania, regional and geographical differences are likely to cause variations in policy implications. Therefore, a total economic valuation' framework for Kenya is needed, taking into consideration the direct and indirect values to provide a knowledge base in support of sustainable development of pastoral areas in Kenya.

Besides studies on the economic contribution of pastoralism, several declarations have been drafted to support the pastoralists' way of life. These declarations need to be pushed forward through the international and national policy influencing agenda. Further, various initiatives have been undertaken across different levels to support pastoralism and its networks. To mention a few, globally, World Initiative for Sustainable Pastoralism (WISP) empowers pastoralists to sustainably manage dryland resources. At the continental level, the Pan-Africa Policy Framework for Pastoralism aims to secure, protect and improve the lives, livelihoods and rights of African pastoralists through mobilizing and coordinating political commitment to pastoral development in Africa (Africa Union, 2010).

Other examples include the Coalition for European Lobbies on Eastern African Pastoralism (CELEP) that groups together a large number of pastoralist actors and supporting NGOs; and the recently launched United Nations Food and Agriculture Organisation (UNFAO)-led project—Pastoralism Knowledge Hub—aiming at increasing the capacity of pastoralist organizations to participate in decision-making processes by empowering pastoralist civil society. Despite all these efforts, there is a paucity of data on the total economic value of pastoralism. In most cases, the direct values are documented while the indirect values are underestimated (Hissed and MacGregor, 2006). Nyariki (2004) studied the contribution of pastoralism to the local and national economies in Kenya. In his study he quantified the direct and indirect benefits but ignored the option and existence values of pastoralism. On its part, the Intergovernmental Authority on Development (IGAD) established that the contribution of livestock to agricultural GDP in Kenya, was about two and half times greater than official estimates (IRIN, 2013).

There are enormous numbers of studies on pastoralism in Africa, including Kenya. According to IRIN (2013), most articles on pastoralism portray its shortcomings rather than its benefits. For example, in Kenya, 93 per cent of news articles on pastoralists were about drought and conflict, with about 51 per cent of these articles mentioning conflict presenting pastoralists as the cause of the problems rather than the victims of conflicts. Similarly, in India, they noted that 60 per cent of articles reviewed portrayed pastoralists as victims who have lost access to grazing land because of the growth of industrial agriculture, the dominance of more powerful social groups and limits to grazing in forested land.

1.2 OBJECTIVES

As indicated in the background, limited information on the economic value of the pastoral systems is responsible for the inadequate policy and institutional support for the systems. The lack of recognition of pastoralism as an important partner in economic development has led to marginalization of the pastoral communities thereby deepening the severity of poverty in pastoral areas. A worldwide debate is called upon to deepen the understanding of the valuable role of pastoralism not only on the local economies, but also on the regional and global economies, and advocate for policy and institutions to support the production system. However, this debate would be successful and meaningful if adequate information was available on the total value of pastoralism and its role in economic growth, a problem which this study seeks to contribute to its solution. The main objective of this study is therefore to fill information gaps regarding the significance of pastoralism by providing an initial assessment of

the Total Economic Value (TEV) of pastoralism in Kenya in terms of methodological review; literature review relevant to TEV; and overview of the TEV of pastoralism in Kenya.

1.3 JUSTIFICATION AND SIGNIFICANCE

The total economic valuation of pastoralism in Kenya is critical in providing evidence on the multiple economic values of pastoralism that inform policy makers, development partners and other relevant stakeholders and fills the knowledge gaps that exist in the area of total economic benefits of pastoralism by exploring both its direct and indirect benefits. Further, it facilitates the design of comprehensive pastoral development strategies that will appreciate the social, ecological, environmental and economic values of the pastoral system and its resource base.

2 LITERATURE REVIEW

2.1 MEASUREMENT OF ECONOMIC VALUES OF PASTORALISM

2.1.1 Review of Methodologies and Approaches

This section provides a review of the literature on methodological approaches for assessing and measuring economic values of various economic activities. This review highlights the theoretical and methodological explanation of the misconception of pastoralism. It is argued that the inadequate support to pastoralism has its roots in the economic theory and the methodologies used in measuring economic values of various economic activities associated with pastoralism. A review of the theoretical background of economic valuation is therefore important prior to undertaking a valuation of pastoral goods and services. In this review, we cover the economic valuation concepts; methodologies for measuring economic valuation; the emergence of the TEV approach; and the application of the approach.

2.1.2 Concepts of Economic Valuation

The methods used in economic valuing of natural resources, biodiversity and ecosystems revolve around sustainability and capital theory concepts (Mdoe and Mnenwa, 2007). They further presented two thoughts on sustainability and capital theory namely weak sustainability and strong sustainability. Weak sustainability assumes complete elasticity of substitution between natural and man-made capital such that a reduction in total assets is offset or compensated by an increase in the value of other assets in order to sustain the units income; commonly known as compensation or intergenerational equity. It could be achieved by investing rents from depleted capital into other forms of capital assuming that there could be positive technological and population changes that could lead to increased output and consumption (Lange and Wright, 2004; Collados and Duane, 1999). Therefore, this view puts emphasis on aggregate capital stock and ignores the necessary requirements to calculate separately the components of total economic value in determining sustainability, thus overlooks degradation of certain types of capital such as natural capital. This view received criticism because of the (i) limits to technological changes as is not something automatic; (ii) limits to substitution between natural and manmade capital stocks; and (iii) counterproductive effects of population growth that is likely to deplete natural resources.

Strong sustainability view builds on the criticisms of the weak sustainability approach and disputes the substitutability of capital as being sufficient to protect the overall level of capital noting that some capital is not substitutable. In contrast, different forms of capital should be maintained independently or separately which therefore assumes that reproducible capital and natural capital are complements rather than substitutes. The view acknowledges the difficulty in capital substitution emanating from the

environmental characteristics limits such as irreversibility in the context of environmental degradation or loss of biodiversity; scientific uncertainty and the existence of critical components of natural capital. In this concept, it is argued that the view that capital stocks be constant be applied to stocks of environmental capital on an individual basis and not to the aggregate of natural and manmade capital because the rates of depletion of resources differ significantly.

The indicators used in measuring weak sustainability include savings, and welfare per capita, net national product (NNP), and the difference between the gross national product (GNP) and depreciation of produced capital. For instance, most governments and other development agencies have used the conventional measures of national income such as Gross Domestic Product (GDP), Gross National Product (GNP) and Net National Product (NNP) in decision making and development planning. These measures were designed principally to monitor temporal changes in aggregate economic activities (Prato, 1998; Peskin, 1991). Hassan *et al.* (1998); Peskin (1991); Turner and Tschrhart (1999) reports that the above measures were never intended to be measures of wealth and societal welfare since they do not account for the value of natural resources and changes in environment upon production depends, thus not credible and often misleading. Moreover, the conventional national accounts measures treat gradual wear of physical capital as depletion rather than income; hence respond poorly to depletion of natural resources (El Serafy, 1989). The main argument regarding natural resource accounting is not to prevent societies from using it: but rather to have proper measurement of values to guide consumption and investment in order to maintain a constant or increasing level of income (Santos and Zaratan, 1997).

This approach may not apply in the pastoral systems since the national income accounts neglect subsistence activities and focuses on production of market goods and services (Hassan *et al.*, 1998; Peskin, 1989), thus misses the benefits derived from the use of tangible and intangible nonmarket goods and services. These benefits include the value of firewood collected directly by many households, the carbon sink function of standing forests and watershed protection and other services offered by various eco-systems (Hassan *et al.*, 1998). In support, Peskin (1989) reports that failure to take into account the non-market activities, including those that lead to negative externalities such as pollution, in the national data system, gives false impression of the economic behavior. This is likely to result in sub-optimal allocation and unsustainable extraction and use of natural resources (Hassan *et al.*, 1998; Winter-Nelson, 1995; El Serafy, 1997).

Given the above shortcomings, the concept of total economic value (TEV) was born. It captures all the economic values for man-made capital assets and natural resources while incorporating non-marketed goods and services such as values of eco-systems in economic analysis. The total economic value of an ecosystem consists of its use values and non-use values. The use of TEV enables a holistic assessment of all the critical values of eco-systems and could be an important tool for generating information for policy makers and overall framework for decision-making and pro-pastoralist policy dialogue.

2.1.3 Concept of Total Economic Valuation (TEV)

The valuation approach benefited from the previous work by Hatfield and Davies (2006). The concept of TEV underlies that pastoralism is a way of life that adapts to marginal environments, characterized by climatic uncertainty and low-grade resources. It has considerable economic value and latent potential in the drylands, and is central to the livelihoods and well-being of millions of the world's poor. However, the state of knowledge regarding this sector of the economy is weak. Pastoral system is not simply a mode of livestock production, rather a complex system that needs adequate and careful valuation. They are also consumption systems that support millions of mobile pastoralists globally. They are natural resource management systems that provide a wide range of services and products that are nationally and globally valued, such as biodiversity, tourism and raw materials. There is a multiple and extensive set of values associated with pastoralism: some are tangible but many are not; some can be measured but many cannot; and those that can be measured are often underestimated.

Two broad categories of value are emphasized in this study following Hatfield and Davies (2006):

a) Direct values consist of measurable products and outputs such as livestock sales, meat, milk, hair and hides. They also include less easily measured values such as employment, transport, knowledge and skills;

b) Indirect values of pastoralism include tangible benefits such as inputs into agriculture (manure, traction, transport, breeding stock, etc.) and complementary products such as gum arabic, honey, medicinal plants, wildlife and tourism. They also include less tangible values including financial services (investment, insurance, credit and risk management), ecosystem services (such as biodiversity, nutrient cycling and energy flow) and a range of social and cultural values.

Although this broad framework is adopted, valuation of the various components of the system is dictated by the availability of information and database and local context.

2.2 PREVIOUS STUDIES ON PASTORALISM IN KENYA AND OTHER COUNTRIES IN AFRICA

2.2.1 Definition of Pastoralism

The definition of pastoralism varies across authors depending on contexts and objectives of their studies. For example, Nyariki (2004) defines pastoralism as a production and a socio-cultural system consisting of an interaction between herders, animals and a given mode of resource. He further describes a pastoralist as any person whose means of livelihood is mainly tending grazing (and or browsing) animals. Wakhungu *et al.* (2014) and Fitzgibbon (2012) state that pastoralism is a society found in arid and semi-arid lands (ASAL) that derives majority of their food and income from livestock.

In this study, pastoralism is defined as a production system found in the rangelands whose livelihood

mainly depends on traditional livestock resources but also non-traditional resources provided by natural ecosystems, such as wildlife, medicines, honey, fish and firewood.

2.2.2 Overview of TEV in Kenya

Using the existing information, this section presents an assessment of the TEV of pastoralism and the way its different value components are treated in the computation of the national accounts of the national economy. This assessment is intended to show the significance of pastoralism in the country so as to position it in the national economy and review its contribution to the improvement of the overall livelihoods and reduction of poverty. Important aspects covered include values of marketed products, supplementary products, subsistence production, inputs to agriculture, tourist services and market chain linkages.

According to Nyariki (2004), the 'economic contribution' of pastoralism should integrate economic and social systems of a country or community or group of communities. A 'social system' refers to the interdependent relationships between the economic factors of production (land, labour, and capital) and non-economic factors (e.g. attitudes towards life and work, administrative structures, patterns of kinship and religion, cultural traditions, and systems of land tenure). Therefore, in his study, he defined 'pastoral economy' as a collection of pastoral activities, mainly management, herding and security that leads to the production of mainly livestock and livestock products for domestic consumption (non-marketed) and for the market. However, his study failed to appreciate the contribution of pastoralism to the environment. Therefore this current study defines economics of pastoralism as a system that integrates economic, social and environmental values associated with livelihoods in the ASALs. These includes direct and indirect benefits related to ASAL resources include livestock, wildlife, people, natural products like gum, timber, honey, beeswax and micro-organisms among others.

2.2.3 Review of Studies on Pastoralism

There are several studies on various aspects of pastoral development in Kenya and other countries in Africa. For instance, Manger and Ghaffar (2000) has highlighted on the contribution of resource management to pastoral and agropastoral societies in the drylands of East Africa. Also, Aklifu *et al.* (2002) appreciates market development as a key factor in ensuring success of other development programs in pastoral areas in Kenya, Ethiopia and Sudan. They seek a better understanding of how existing marketing systems function in the three countries, their key constraints and potentials, providing a simple descriptive account of how livestock, meat and hides and skins are marketed in the three countries. On the other hand, Sosovele *et al.* (2006) studied the socio-economic root causes of biodiversity loss in the Ruaha Catchment Area with focus on policies, institutional dynamics, market forces and human factors and their interlinkages. He recommends an economic and environmental assessment of the large-scale rice irrigation farms in the Usangu Plains to determine their economic feasibility, in the light of increasing costs of production and environmental degradation associated with this form of production.

2.3 REVIEW OF STUDIES ON ECONOMIC VALUATION OF PASTORALISM

2.3.1 Concept of Total Economic Valuation

The concept of total economic value is increasingly being used as a framework for valuing pastoralism (Barbier *et al.*, 1997; Nyariki, 2004; Davis, 2006). In these studies, they consider the various values of pastoralism; direct commercial values, subsistence, non-market values, ecological functions and non-use benefits singly or in combination. These studies clearly demonstrate the high and wide range of economic benefits associated with pastoralism, which extend beyond the direct use values. In Uganda, the economic contribution of pastoralism has been assessed using national statistics mainly GDP and export revenue earning (Muhereza, 2004), which fails to capture the cultural, ecological and environmental values of pastoralism. Hesse and MacGregor (2006) reported pastoralism as a drylands invisible asset. In their study, they identified a broad framework for assessing the benefits of pastoralism that looks beyond the immediate benefits of livestock and livestock products.

In support, Hatfield *et al.* (2006) acknowledged pastoralism as integral system and went further to highlight with three key components critical for TEV namely: i) resource stocks or assets; (ii) flows of environmental services; and (iii) the attributes of an ecosystem. Further, they elaborated on the values of pastoralism as follows: direct measurable values (live animals, milk, hides and other derivatives); direct unmeasured values (employment, production and environmental management skills); indirect measurable values (subsistence, inputs to tourism, inputs to agriculture, market linkages, taxes); and indirect unmeasured values (ecological and rangeland services, agricultural services, socio-cultural values, option and existence values).

Letara *et al*. (2006) estimated the economic significance of pastoralism in Tanzania focusing on *nyama choma* sector. They established the contribution of *nyama choma* businesses to the economy of Arusha municipality by linking their findings on the sector and its supply chains back to pastoral systems that provide meat that act as the raw material; thus demonstrated the contribution of pastoralism to the local and regional economies that are often ignored in official statistics. Also, Odhiambo (2006) conducted a study on economic valuations of pastoralism using milk offtake as an example in Kenya, Tanzania, Uganda and Sudan. He confirms the paucity of data about the value of pastoralism to national economies, not because that contribution is lacking, but mainly because the analytical framework of these economies does not permit its full appreciation. He further reports that most data collected is limited to data on livestock and livestock products such as milk, hides and skins sold at national markets while ignores the non-monetised values such as manure, draught power, control of bush and weeds, recycling of household waste and role of pastoralism the conservation and wildlife-based tourism.

Lastly, Davis (2006) conducted a study on TEV in Kenya. His study used the TEV approach to assess the economic value of pastoralism in Kenya. However, his study focused more direct and indirect values of pastoralism while ignoring the non-monetary uses. Besides, his study was focused more on secondary data at national level while he underestimated the contribution of pastoralism at the household level which would have captured cultural and environmental values of pastoralism. Therefore, this study

will integrate the optional and existence value of pastoralism that have been overlooked while also integrating information at both national, county and household levels, to holistically contribute to the growing knowledge on total economic valuation of pastoralism in Kenya.

2.3.2 Valuation of Pastoral Products in Kenya

Pastoralism makes a significant contribution to Kenya's economy with livestock production accounting for 50 per cent of agricultural GDP, which is 20 - 30 per cent of the total GDP (Nyariki, 2004 and Fitzgibbon, 2012). The contribution of livestock to GDP is, however, considerably masked and seriously underestimated. The GDP only considers livestock and livestock product that are marketed ignoring the non-marketed products including subsistence, which is a core component of pastoralism. In support, Behnke and Muthami (2011) estimated the contribution of ruminant livestock to national agricultural production to be 150 per cent higher than previously thought at Kshs 319 billion (US$3.8 billion). Odhiambo (2006) reports that in Tanzania, the value of most of the products coming from the extensive livestock system dominated by agro-pastoralists and pastoralists that comprises of about 95 per cent of the total livestock population were not reflected in the GDP. He further highlights the failure of national data to distinguish and disintegrate the contribution of pastoralism from other forms of livestock production such as commercial ranching, large-scale farmers, pastoralists and smallholders.

Nyariki (2004) estimated Kenya's pastoral sector to be worth Kshs 60 billion (US$800 million); with the internal trade alone netting in about 6 billion shillings (US$80) a year. He further reported that the monetary value of livestock from the pastoral sector is estimated at Kshs 60 - 70 billion with a 'conservative' total annual marketed value both locally and nationally being between Kshs 5 billion - Kshs 8 billion annually. These estimates focused only on the traditional sources of value and failed to capture non-traditional sources of value.

Camels are found in the pastoral areas of northern Kenya and have traditionally provided milk, meat, blood for subsistence and have had socio-cultural values to these dryland communities (Field 2005, Guliye, 2007; Kuria *et al.,* 2016). The unique physiological, morphological and anatomical features including reduced water requirements and ability to yield milk throughout the year with or without drought makes camel the livestock species of choice in climate adaptation and resilience (Field, 2005). Kenya is home to a camel population of 2.9 million (GoK, 2010) which produce 7,000 tonnes of meat worth Kshs 1 billion, and 200 million litres of milk worth Kshs 2 billion annually. Because camels are probably the most versatile of the domestic animals, camel keeping is gradually extending to the South Rift region and is expected to expand to other parts of the country in the coming decades. Presently, camel rearing in Kenya has been increasingly gaining commercial value (Matofari *et al.,* 2007, Noor *et al.,* 2012). In 2011, camel milk production in Kenya was estimated at 553 million litres, about 7 per cent of the national total worth of about Kshs 16 billion (Behnke and Muthami, 2011; Kuria *et al.,* 2016). Similarly, in the same year, camel meat worth Kshs 54 billion was sold. Thus expanding market-oriented camel production offers greater potentials for poorer households to enhance their food and income security and their overall well-being (SRA, 2004).

Milk production in Kenya constitutes about 50 per cent (over 40 billion Kenya shillings) of the total value of livestock products. Milk offtake from pastoral herds is rarely quantified compared to slaughter offtake. Therefore little information is available on this, particularly on commercial offtake. According to government statistics, however, milk production has increased more than two-fold, from about 1,000 million litres to around 2,600 million litres between 1980 and 2002 (Nyariki, 2004). Most of the milk produced comes from the large scale producers and smallholders, while the rest (25 per cent) comes from the zebu herd—a large number of these coming from the pastoral herds.

Tourism is one of the key economic sectors critical for the development in Kenyan (Table 2.1). The sector earns foreign exchange through tourism levies and taxes and sale of art crafts among others. However, from Table 2.1 the contribution of tourism to per cent GDP has fluctuated substantially over the years, from 13.6 per cent to 9.8 per cent in 2016. Most tourist attractions in 2007, previously the best recorded year in tourist arrivals and earnings, the tourism sector contributed approximately 12 per cent of Gross Domestic Product and accounted for more than 9per cent of total wage employment, with 400,000 jobs in the formal sector and a further 600,000 in the informal sector (RoK, 2012). Performance in 2010 surpassed the 2007 figures; earning Kshs 74 billion in revenue. Consequently the impact of tourism is unevenly distributed: tourist areas in the south are over-developed, while the north has room for expansion, particularly through community-driven initiatives.

Table 2.1: Kenya Tourism earnings (earnings in billion Kshs) and per cent contribution to the GDP, 2010-2015

Year	2010	2011	2012	2013	2014	2015	2016
Earnings in Billions (Kshs)	73.7	97.7	96	94	87.1	84.6	
per cent of GDP	11.1	11.5	11.5	10.5	10.4	9.8	9.8

Source: World Bank and www/knoema.com/atlas/Kenya/topics/Tourism/Travel-and-Tourism-Total-Contribution-to-GDP/Contribution-of-travel-and-tourism-to-GDP/;

3 METHODOLOGY

3.1 STUDY AREA

Four ASAL counties in the northern rangelands, namely Turkana, Marsabit, Wajir andMandera, and Loitokitok Sub-County in the southern rangelands, were selected as samples for total economic valuation of pastoralism for this study (Figure 3.1). These counties were selected because they had consistent secondary data on livestock and other pastoral products for several years by the National Drought Management Authority (NDMA), Kenya National Bureau of Statistics, and Faostat database. Additionally, primary data were collected from Loitokitok Sub-County in Kajiado Country as a case study of TEV and also comparisons were made in an attempt to verify the values presented by secondary data, where possible. Each of the study sites or counties is discussed below.

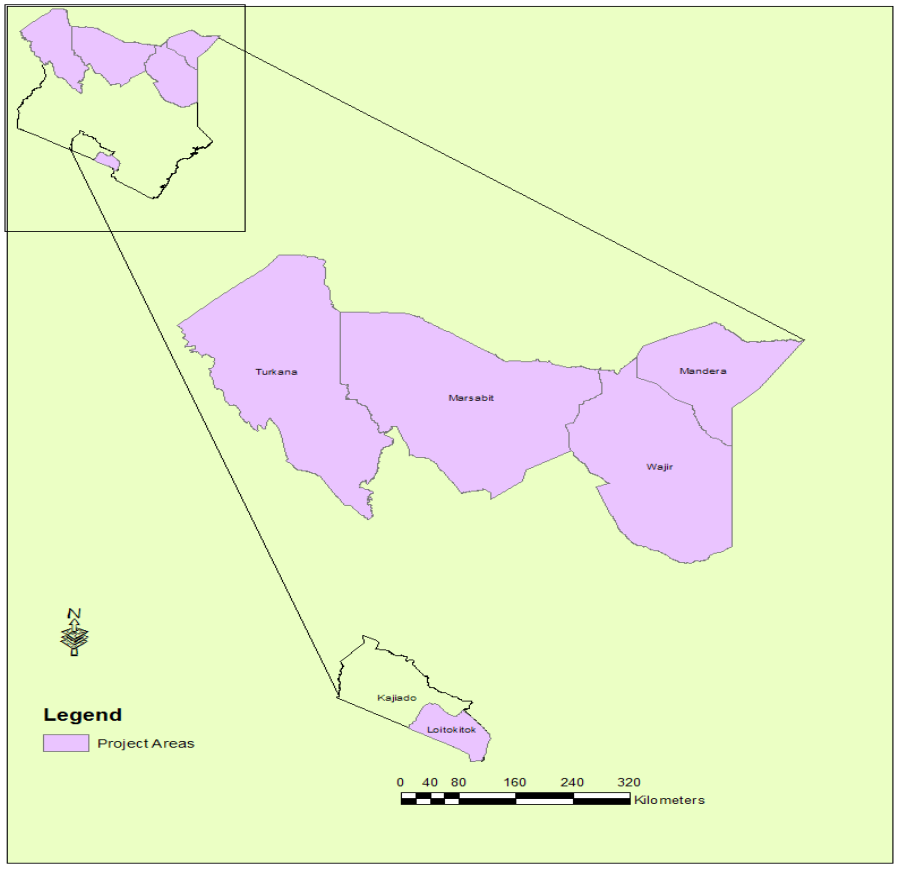


Figure 3.1: Location of the study area in Kenya

3.1.1 Turkana County

3.1.1.1 Location and size

Turkana County is situated on the North western part of Kenya and lies between Latitudes 0° 50° and 5° 30° N and Longitudes 34° 0° and 36° 40° E (Figure 3.2). It borders Uganda to the west, Sudan and Ethiopia to the north, Marsabit and Samburu Count ies to the east and Baringo and West Pokot Counties to the south (KNBS, 2013). Much of the Eastern of the counties is on Lake Turkana, which

stretc.hes North-South for more than 200 km. Turkana lies within Kenya's zone 5, 6 and 7 and it is classified as arid and semi-arid lands (TCDP, 2013). Of these, about 65 per cent is very arid, 29 per cent arid, 3 per cent semi-arid and 3 per cent other lands. The County is generally hot and dry for most part of the year with average rainfall of about 150 - 550 mm. Although annual precipitation can be considered low, the events occur in short duration but with high intensities. According to NDMA (2016) report indicates that evapo-transpiration rates are also very high, ranging from 1650 - 2800 mm/year. The County poses the twin challenges of low water storage especially in open reservoirs due to high evaporation and low agricultural productivity.

The county is inhabited by the Turkana ethnic community. The KNBS (2010) reveals that the total population of the county according to the census held in the year 2009 was 855,399. It is the largest county covering an area of 77,000 km^2, which includes Lake Turkana that forms the eastern boundary.

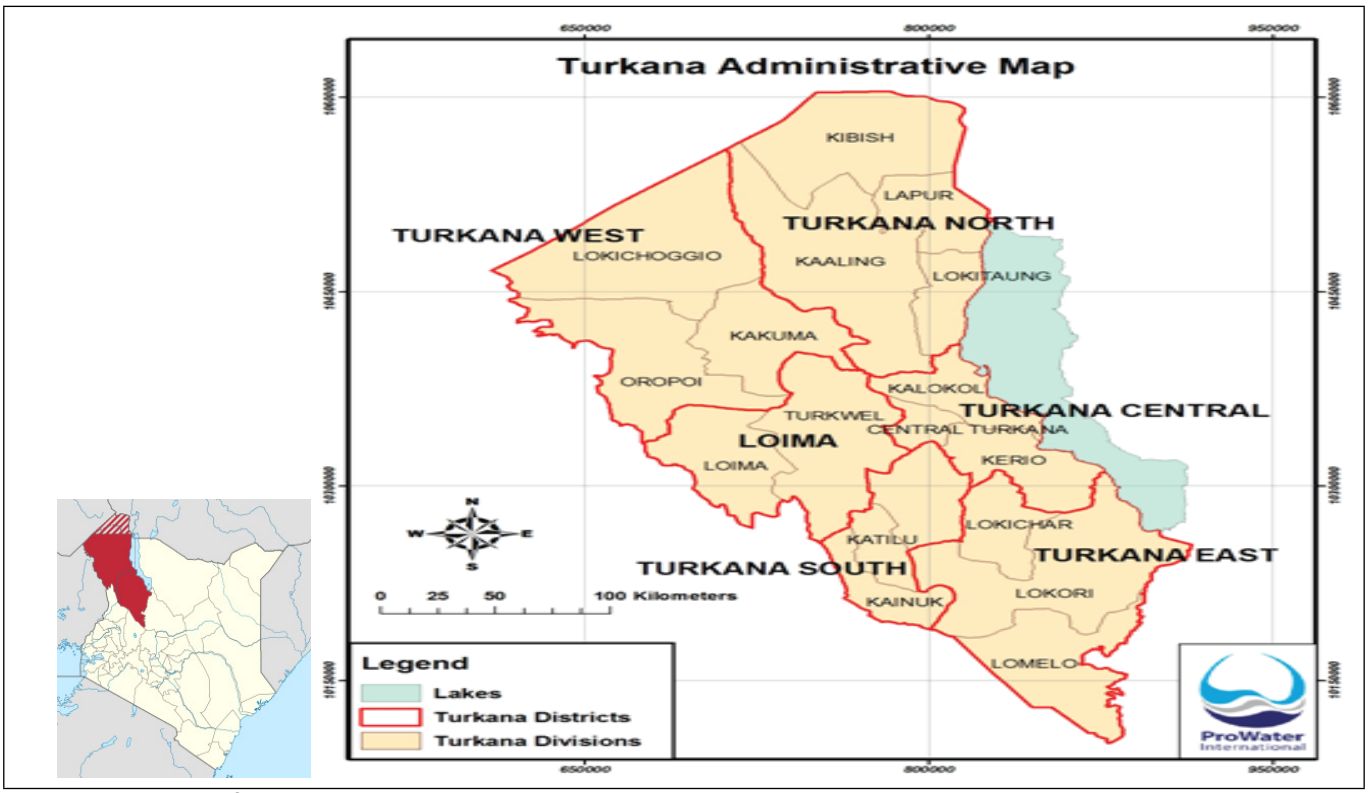


Figure 3.2: A Map of Turkana County and its administration boundaries

Source: Food Security Master Plan for Turkana County (2012).

3.1.1.2 Physical and topographic features of Turkana County

Turkana County occupies the north-western part of Kenya and to the West of Lake Turkana (TCDP, 2013). Most of the county consists of low lying plains with isolated mountains and hill ranges. The altitude is about 900 m at the foot of the escarpment marking the Ugandan border to the west, and then falls to 369 m to the shores of Lake Turkana in the east. The altitude of the mountain ranges are between 1,500 and 1800 m in the east reaching the peak at Loima, which forms undulating hills for a stretch of some 65 km. The isolated mountains are mainly found in the central area with plains around Lodwar and more specifically the Lotikippi Plains in the north. In the south-east, the Suguta Valley follows a tectonic trough bordering the Samburu uplands. The Lake is situated in the eastern side of

the county, with fishing being the major activity in the Lake. TCIDP (2013) reveals that the county has two perennial rivers namely Turkwel and Kerio, both originating in the highlands to the south. The temperatures range between 24°C to and 38°C with a mean of 30°C. The county has a bimodal rainfall seasons with the long rains occurring between March and July and the short rains between October and November. The rainfall is erratic in distribution and timing; ranging between 120 mm and 500 mm per year.

3.1.1.3 Livestock production

Research Gate (2012) and TCDP (2013) notes that livestock production is the main livelihood of the Turkana community with cattle, camels, goats, donkeys and sheep being the most common livestock species. Fishing is also practiced by those living adjacent to Lake Turkana. Other alternative livelihoods include charcoal burning, collection and sale of firewood, casual labour and petty trading at the water points. Cattle and camel are the major contributors to household resource of production while sheep and goats are minor contributors. The sheep and goats are the highest in population compared to the camels and cattle in the households. The number of livestock in the county is shown in Table 3.1.

Table 3.1. Livestock population of Turkana County

S/No	Livestock Species	Number
1	Cattle	1,534,612
2	Sheep	3,519,148
3	Goats	5,994,881
4	Camels	832,462
5	Donkeys	558,189
6	Poultry (indigenous	165,349
7	Poultry (commercial)	15,449
8	Bee hives	32,581

Source: KNBS (2009). The 2009 Population Census

Crop production is mainly irrigation and rainfed and crops grown include sorghum, millet, maize, beans, green grams, mangoes, paw paws, water melon and vegetables (TCIDP, 2014), majorly for subsistence. Irigation is carried out along Rivers Turkwel and Kerio; and irrigation schemes include Kekarongole, Katilu and Kabulokor. Other tree crops grown include guavas, grapes, lemons, oranges, dates, coconuts and Aloe vera. There are no cash crops currently being grown in the county although previously cotton used to be grown at Katilu Irrigation Scheme. The arable in the county is approximately 2,500,000 Ha. Fishing is also an important economic activity in this county with fish types such as tilapia, mudfish, nile perch and king fish among others. The county has twenty three registered landing beaches and some of these are Long'ech, Eliye Springs, Kalimapus/Namadak, Merier, Lowareng'ak, Lomekwi, and Kaloko. Other economic activities include trade, weaving, tourism and mining. The discovery of a water aquifer in the northern part of the county means future increased reliance on irrigation.

3.1.2 Marsabit County

3.1.2.1 Location and size

Marsabit County is in the northern tip of former Eastern Province of Kenya (KIRA, 2014) (Figure 3.3). The County borders Ethiopia to the North and North East, Wajir County to the East, Isiolo County to the South East, Samburu County to the South and South West and Lake Turkana to the West and North West (MSCDP, 2013). It lies between latitude 02° 45°north and 04° 27°north and longitude 37° 57° east and 39°21°east. Marsabit County is the second largest county in Kenya after Turkana covering a total surface area of 70,961.2 km² (Muthini and Mungutu, 2013). KNBS (2010) report reveals that the Marsabit County had a total population of 291,166 as per the Kenya population and housing census held in the year 2009. Administratively, the county is divided into four administrative sub counties namely: Marsabit Central, Laisamis, North Horr, and Moyale. Sub-counties are further divided into 20 wards and administrative villages (Muthini and Mungutu, 2013).

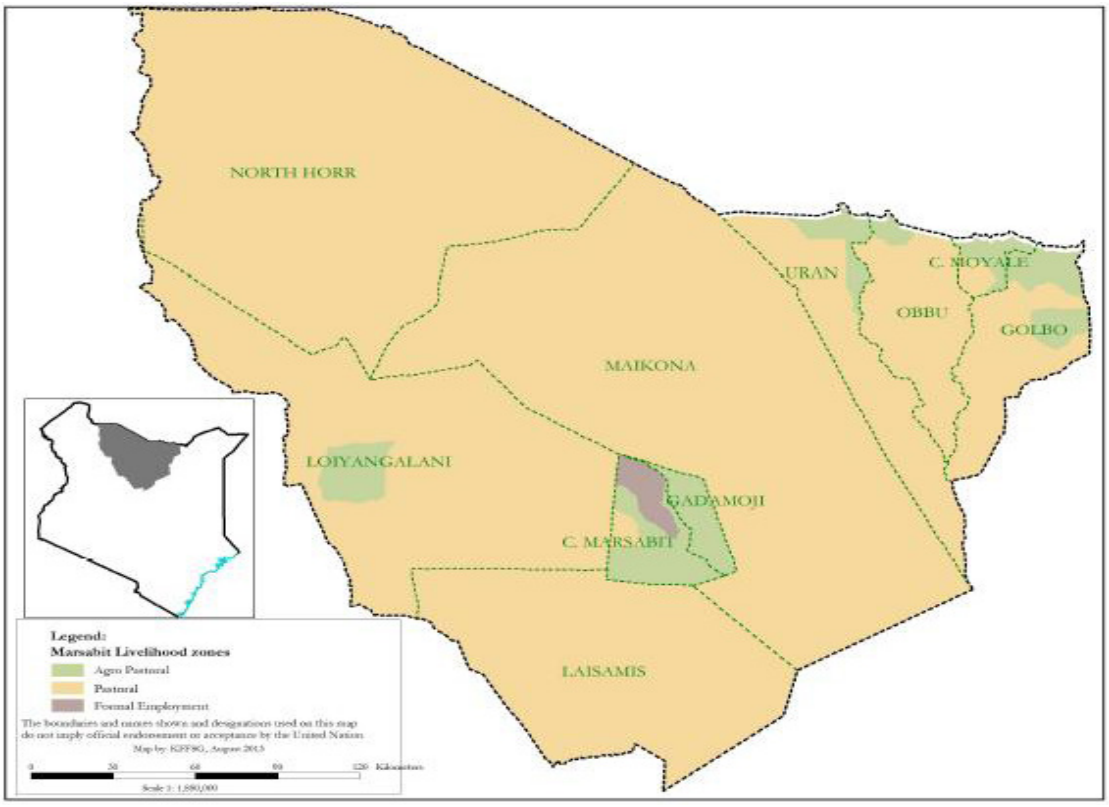


Figure 3.3: A Map of Marsabit County and its administration boundaries

Source: Marsabit County Integrated Development Plan 2013-2017

3.1.2.2 Physical and topographic features

The county is classified as 100 per cent arid and semi-arid land (ASAL) zone that experiences cycles of drought and famine year after year diminishing the community source of livelihood (Concern Worldwide, 2013). It lies between altitude 300m and 900m above sea level. The west and north plains are bordered by hills and mountain ranges. The temperatures of the county ranges from a minimum of 10.1°C to a maximum of 30.2°C, with an annual average of 20.1°C (MSCIDP, 2013). Rainfall amount is between 200mm and 1,000mm per annum with the rainy season being in months of March to May

and the dry periods between June - September. The plain is bordered to the west and north by hills and mountain ranges and is broken by volcanic cones and calderas (MSCDP, 2013). The most notable topographical features of the county are; Ol Donyo Ranges (2066m above sea level) in the South West, Mt. Marsabit (1865m above sea level) in the Central part of the county, Hurri Hills (1685m above sea level) in the North Eastern part of the county, Mt. Kulal (2235m above sea level) in North West and the mountains around Sololo-Moyale escarpment (up to 1400m above sea level) in the North East (MSCDP, 2013).

The main physical feature is the Chalbi Desert, which forms a large depression covering an area of 948km^2 and lies between 435m and 500m elevation. The depression is separated from Lake Turkana, which is 65-100m lower in elevation, by a ridge that rises to 700m. There are no permanent rivers in the county, but four drainage systems exist, covering an area of 948 Km^2. Chalbi Desert is the largest of these drainage systems. The depression receives run-off from the surrounding lava and basement surfaces of Mt. Marsabit, Hurri Hills, Mt. Kulal and the Ethiopian plateau. The seasonal rivers of Milgis and Merille to the extreme south flow eastward and drain into the Sori Adio Swamp. Other drainage systems include the Dida Galgallu plains which receive run-off from the eastern slopes of Hurri hills, and Lake Turkana into which drain seasonal rivers from Kulal and Nyiru Mountains.

The main economic activities include livestock rearing, small- scale fishing, sand harvesting, stone mining, salt mining, mining of gems and precious stones and small scale trading in agricultural products such as beef, maize, beans, wheat, pulses, fruit and Miraa. Livestock keeping is the main economic activity in the county and it contributes 80per cent of income in pastoral livelihood zones (KIRA, 2014). The main livestock products are milk, beef, mutton and camel meat.

Table 3.2: Livestock population of Marsabit County

S/No	Livestock Species	Number of livestock
1	Cattle	424,603
2	Goats	1,143,480
3	Sheep	960,004
4	Camels	203,320
5	Donkeys	63,861
6	Chicken	50,690
7	Bee-hives	2,691

Source: Marsabit County Integrated Development Plan, 2013-2017

Crop farming in the county does not thrive well because of erratic climatic conditions (MSCIDP 2013) and is confined to the high and medium potential areas of around Marsabit town, Hurri Hills, Mt Kulal and Moyale (GOK, 2001). However, there are some regions around Mt. Marsabit and Moyale where crop farming does well during rainy season. According to MSCIDP (2013) the population working in agriculture is estimated to be about 2 per cent. Main grown in the county includes vegetables, fruits, maize, teff, beans, millet and khat (*miraa*). The RoK (2001) indicates that almost all the food crops grown in the County is consumed at the household level, leaving only insignificant quantities for sale to supplement household income. In addition, Lake Turkana is the main source of fish, supporting 1,400

of fishermen and 400 fish farming families (MSCIDP 2013). The species of fish caught are Tilapia, Labeo and Nile perch. The county has 10 landing beaches but only four are gazetted.

3.1.3 Mandera County

3.1.3.1 Location and size

Mandera County is one of the four Counties in North Eastern part of Kenya (KIRA 2015) (Figure 3.4). Mandera County borders Ethiopia to the North, Somalia Republic to the East and Wajir County to the South (MCIDP, 2013). The County lies between latitude 2 1°1° north, and 4° 17° north, and longitudes 39° 47° east and 41° 4.8° east and it covers an area of 26,474 square kilometres (MDCIDP 2013). According to the KNBS (2010) report Mandera County had a total population of 1,025,756 as per the Kenya population and housing census held in the year 2009. The Mandera Central Division has the highest population density of 436 per square km. The high density is due to the fact that it is the district's headquarters and is served with social amenities. Other divisions with high densities include Rhamu, Banissa and Elwak, which have permanent water sources. The County Administratively is subdivided into six Sub Counties namely Mandera West, Mandera South, Banisa, Mandera North, Mandera East and Lafey and 30 administrative wards (KIRA 2015).

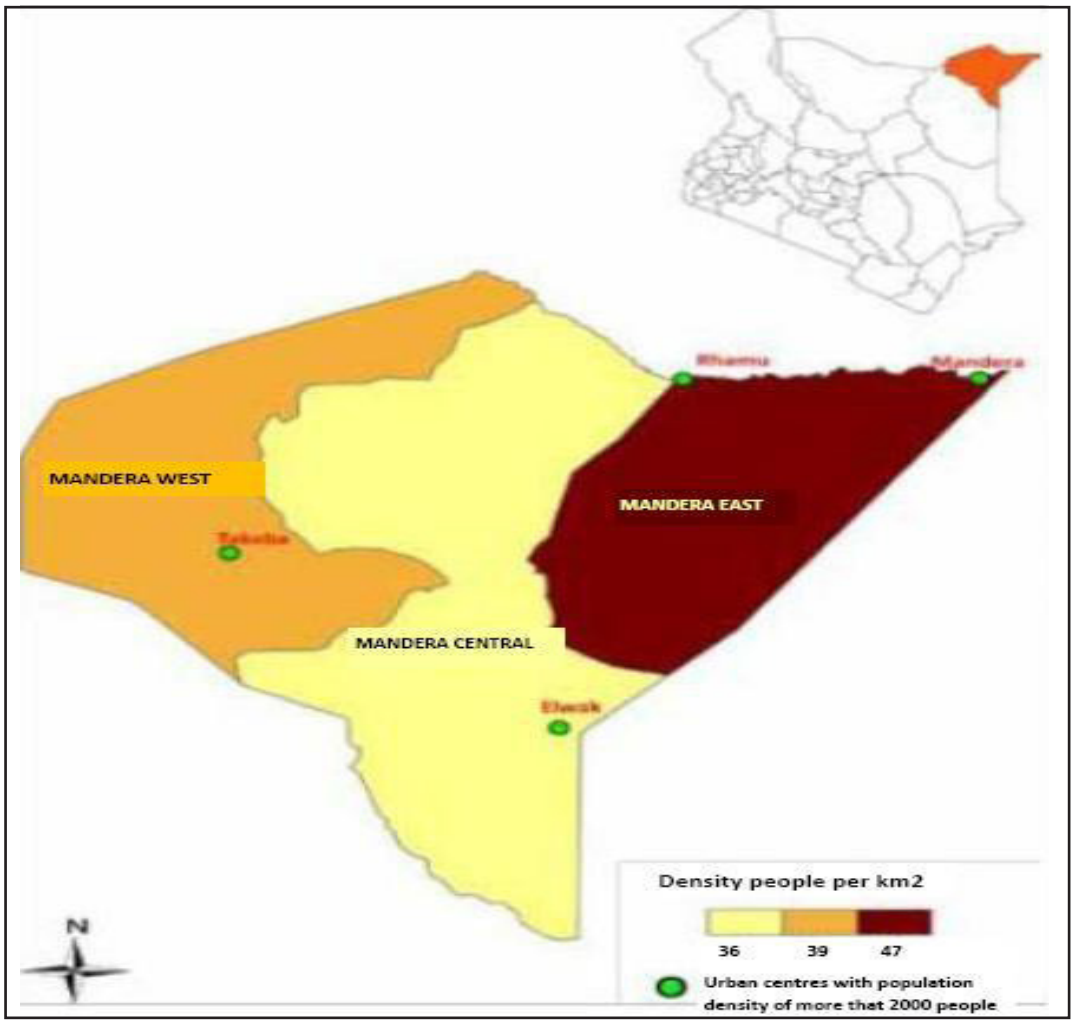


Figure 3.4: A Map of Mandera County showing the administration boundaries

Source: Mandera County Development Plan 2013 – 2017

3.1.3.2 Physical and topographic features

Mandera has a largely semi-arid climate with most areas lacking permanent water sources or water mass, and reporting low rainfalls throughout the year. The county receives bi-modal rains with long rains occurring in the months of April and May while the short rains occur in October to November. Rainfall is scanty and unpredictable averaging 255mm. Temperatures are relatively high with a minimum and a maximum of 24^0C and 42^0C in July and February respectively. However, due to impacts of climate change, the temperatures and precipitation in the county are expected to change and impact on agriculture development. About 95per cent of the county is semi-arid with dense vegetation of thorny shrubs and '*mathenge*' trees (MDCIDP, 2013).

Mandera County Development Profile (2013-2017) indicates that the county is characterized by low lying rocky hills located on the plains that rise gradually from 400m above sea level in the south at Elwak to 970m above sea level on the border with Ethiopia. The rest of topography is low lying, characterized by dense vegetation with thorny shrubs of savannah type (MDCIDP, 2013). This is especially found along foots of isolated hills, and the area are covered by bushes, shrubs, boulders and invasive "*mathenge*" coverage. The flat plains make drainage very poor, causing floods during heavy rain downpours. There are no lakes, swamps or dams but earth pans are common in the county.

3.1. 3.2 Livestock production

The main economic activity in the county is pastoralism which practiced by 80per cent of the people and supporting 90 per cent of the population (GECL, 2010). Main livestock species include goats (Galla breeds), cattle (Borana breed), camels Somali breed, sheep Somali breed black head, donkey (Somali breed) and indigenous chicken breed**.** The livestock population in the county is estimated shown as shown in Table 3.3.

Table 3.3. Livestock population of Mandera County

S/No	Livestock Species	Number of livestock
1	Cattle	1,076,978
2	Goats	3,929,747
3	Sheep	1,632794
4	Camels	930,819
5	Donkeys	191,664
6	Indigenous chicken	200,722
7	Exotic chicken	27,008
8	Beehives	53,502

KNBS (2009)

3.1. 3.3 Crop production

The county falls under agro- ecological zone VI and receives 252 mm of rainfall annually (RoK 2001). The rainfall is erratic and inadequate hence rain-fed crops are unpredictable. ASDSP (2013) indicates saline soils in most parts of the county pose a challenge for crop farming. However, small-scale crop production is carried out under irrigation along river Daua. Crops grown under irrigation includes sorghum, millet, simsim, maize, vegetables (*sukuma wiki,* cow pea, onions, spinach, tomato) and fruits (guavas, mango, bananas, lemons, paw paws, water melon). The cash crops are horticultural and oil crops (simsim, sunflower and groundnuts). The acreage under food crops and cash crops is approximately 716.58 hectares (MDCIDP, 2013). Besides agriculture, other economic activities in the county include: mining, manufacturing, exploitation of forest timber and non-timber products. Quarrying and sand harvesting are some of the mining activities undertaken in the county. Oil exploration is currently going on in Ashabito and Kotulo in Mandera North Constituency to ascertain its viability (MDCIDP, 2013). The county has no gazetted forests. The main forest products include firewood, building materials, charcoal, gum and honey. The high dependency on firewood (95.6 per cent of all households) may result in depletion of forest cover in the county. Over-grazing, charcoal burning, and quarrying activities are the leading causes of environmental degradation. The only game reserve in the county is Malkamari Game Reserve in Banissa Constituency, with a potential for tourism. Other potential tourist attractions include the presence of hilly landscapes, wild animals and birds. The county is home to wild animals such as lions, hyena, cheetah, leopards, Oryx, baboons, gerenuk, dik dik, antelopes, gazelles, crocodiles, water bucks and reticulated giraffes (MDCIDP, 2013).There are 20 formal manufacturing or processing industries in the county. However, the county relies on importing industrial products from neighbouring counties and abroad. There are no fishing activities in the county due to absence of permanent water masses. However, during the rainy season, mud fish are found in river Daua (MDCDP. 2013).

3.1.4 Wajir County

3.1.4.1 Location and size

Wajir County is located in the north eastern region of Kenya and covers an area of 61,650.8 km^2. It borders Republics of Somalia to the east and Ethiopia to the north, Counties of Mandera to the north east, Isiolo to the south west, Marsabit to the west and Garissa to the south (Figure 3.5). According to the Kenya Population and Housing Census (KPHC) of 2009, the county was reported to hold a total human population of 661,945 persons.

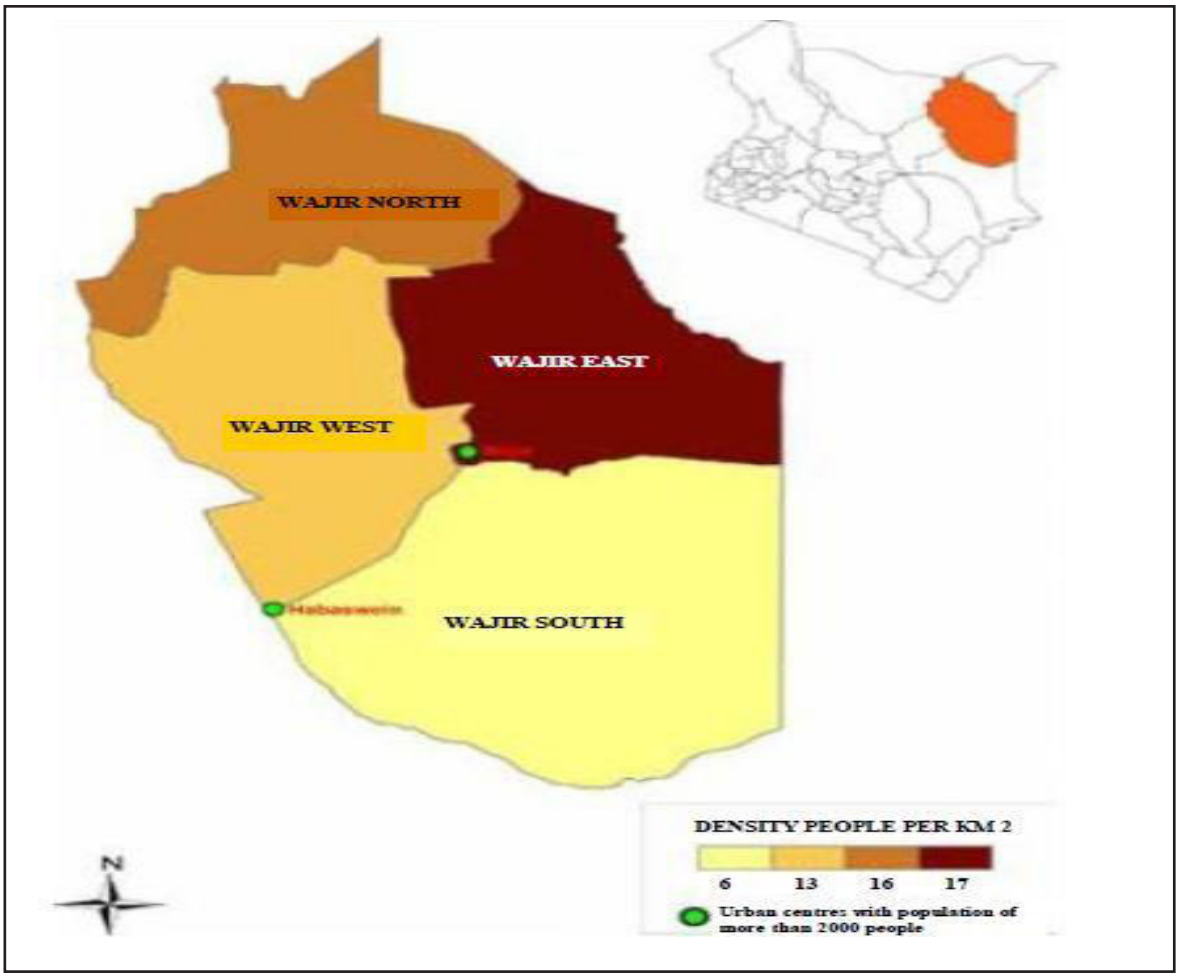


Figure 3.5: A Map of Wajir County showing the Administration Boundaries

Source: Wajir County Strategic Plan (2013)

3.1.4.2 Physical and topographic features

Wajir County is a semi-arid, falling ecological zone V-VI (Wajir, CIDP 2013). The county has bimodal rainfall with short rains occurring between October to December and the long rains from March to May each year. Zone V receives rainfall between 300-600mm annually, has low trees, grass and shrubs. Zone VI receives an annual rainfall of 200-400mm. The rainfall is usually erratic and short, making it unfavourable for vegetation growth. The county's annual average relative humidity is 61.8 per cent, and ranges from 56per cent in February to 68 per cent in June. The county receives an average of 240mm precipitation annually. There are 24 days annually in which greater than 0.1mm of precipitation (rain, sleet, snow or hail). June is the driest month with an average of 1mm of rain across zero days while April is the wettest month with an average of 68 mm of rain, sleet, hail or snow across 6 days. The higher areas of Bute and Gurar receive higher rainfall of between 500mm and 700mm. The average temperature is 27.9°C. The range of average monthly temperatures is 3.5°C. The warmest months are February and March with an average of 36°C while the coolest months are June, July, August & September with an average low of 21°C.

3.1.4.3 Livestock production

Livestock production activities are practiced county wide. Poultry keeping is more pronounced in Wajir town. Livestock population density in the county is low due to the low land-carrying capacity of the rangeland. Droughts, livestock diseases and pests adversely affect livestock development in the county. The entire county is categorized as trust land apart from a small percentage of the total area occupied by townships. The land is mostly used communally for nomadic pastoralism. The mean household land holding size for the county is approximately 7.8 ha. Pastoralism is the main economic activity where majority of the households own livestock according to the KIHBS (2005/06). Based on the 2009 census, there were, 1,406,883 sheep, 1,866,226 goats, 432,540 camels, 115,503 donkeys, and 162,247 chicken. Main livestock kept include cattle (borana), camels (dromedary-Somali type), goats (galla), sheep (black head persian), donkeys and poultry (Indigenous birds and hybrid layers).

Table 3.4: Livestock population in Wajir County

S/No	Livestock Species	Number of livestock
1	Cattle	794,552
2	Goats	1,866,226
3	Sheep	1,406,883
4	Camels	432,540
5	Donkeys	115,503
6	Chicken	162,247

Source: Wajir County Development Plan (2013)

3.1.4.4 Crop production

Some small areas are, however, exclusively under small scale crop agriculture practised by individuals or groups. Crop activities are carried out in Lorian Swamp and along the drainage lines in Bute Ward in Wajir North Constituency. There are initiatives by NGOs and the State Department of Agriculture to promote greenhouse farming in Wajir East Constituency. According to Wajir Annual Development Plan 2015/16, small-scale farming is practiced and the acreage under food crops is approximate 3,823 Ha with the total arable land being 1,024.06 $Km^{2.}$ The crops grown include sorghum, drought resistant maize, beans, melons, cowpeas and green grams. Other horticultural crops such as tomatoes, capsicums, spinach, kales, pawpaw sweet and hot peppers are also grown. However, there are indications of huge potential in this sector as witnessed by the water melons flooding the markets across the county during rainy season (WCIDP, 2013). Crop activities are carried out in Lorian swamp and along the drainage lines in Bute Ward in Wajir North Constituency. There are initiatives by NGOs and the department of agriculture to promote greenhouse farming in Wajir East Constituency. The activities include selling of charcoal, firewood, herbs, resins and gum. Most of the charcoal burning takes place in Wajir South constituency due to the proximity to the refugee camps in Dadaab constituency in Garissa County and the high demand of wood fuel from the high population of refugees which is estimated to be over 400,000.

3.2 METHODS AND APPROACHES

3.2.1 Approach

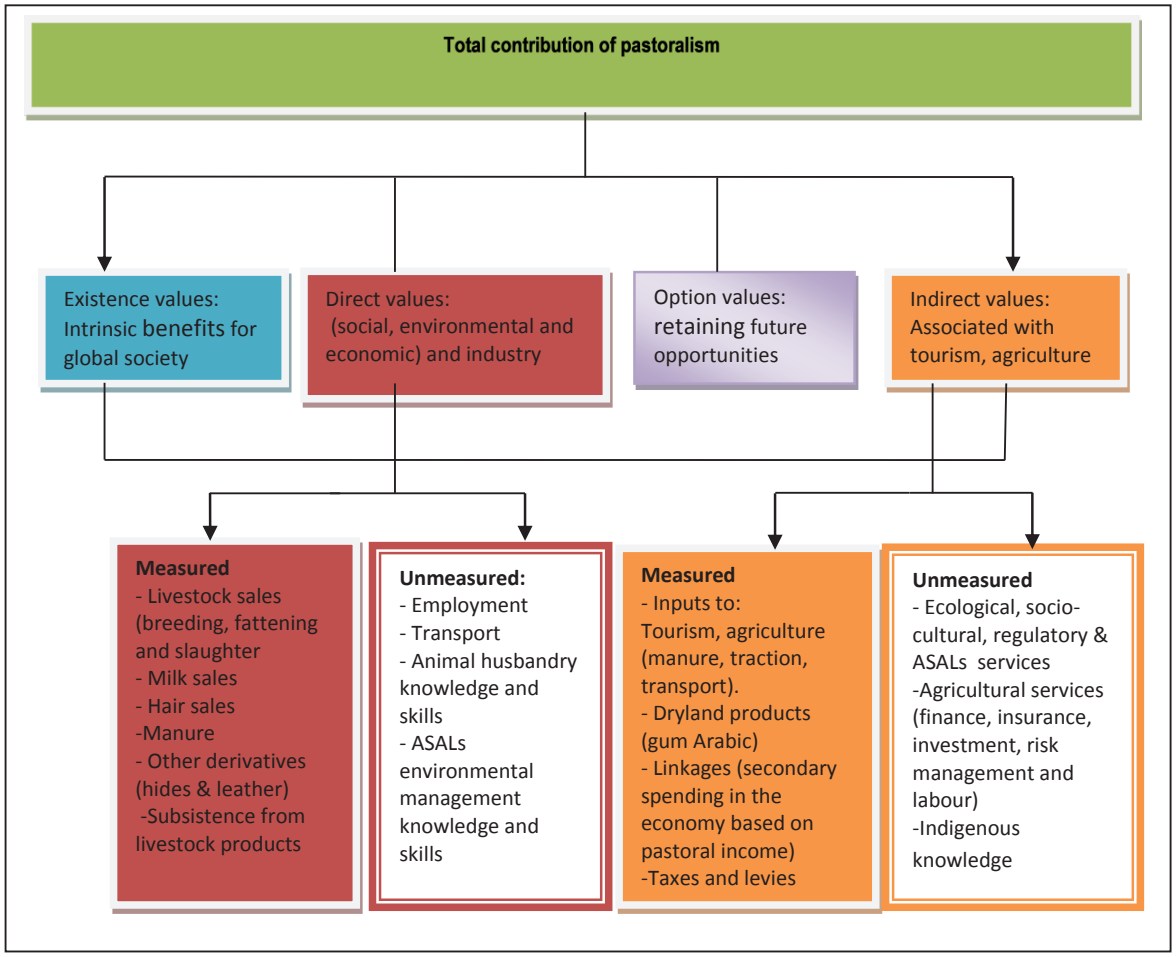
This study adopts Total Economic Value (TEV) approach for data collection and analysis. In pastoral systems, TEV is categorized into two, namely: use values and non-use values. The use values include direct use values, indirect use values and option values. The non-use values include bequest values and existence values that people hold for a pastoral area which are in no way linked to the use of the area. The conceptual framework is presented in Figure 3.6.

Building on the conceptual framework (Figure 3.6), data was collected from five main areas as outline in Table 3.4.

Table 3.4: Value of pastoralism and the type of data needed

Value of pastoralism	Type of data
1. Sales	- Household, county and national levels data on sales of livestock and its related products (meat, eggs, milk, hides, manure) - In-country and selected county market data national statistics for GDP and foreign exchange earnings
2. Subsistence	Household or county level data estimates from selected counties and or neighbouring countries
3. Complementary products	Household and/or market data on extent and magnitude of associated dryland products such as medicinal plants, gum Arabic (county and national statistics)
4.Tourism	- Percentage of tourism sector supported by pastoral landscapes - Value of tourism to GDP and foreign exchange earnings - Number of people employed directly and indirectly in tourism annually (including incomes as a per cent of GDP)
5. Market chain linkages	- Review of pastoralist-related 'value-added' market chains and multiplier

Source: Adopted from Mdoe and Mnenwa (2007)



Source: Modified from Hesse and MacGregor, 2006 and Davis 2007

Figure 3.6: Conceptual framework for Total Economic Valuation of Pastoralism

3.2.2 Methodology

Both primary and secondary data were used in this study. The primary data were generated through participatory approaches involving pastoralist communities and actors working with the communities including the government, NGOs and donors.

3.2.2.1 Desk review

Desk review involved a review of existing documentation of the following:

a) Relevant methodological approaches for assessing and carrying out an economic analysis of pastoralism. The review covers earlier methodologies, concept of sustainability and capital theory; measuring economic values of a pastoral system and the emergence of the total economic valuation; and the application of the total economic value approach.

b) A review of previous studies on pastoralism undertaken in the selected four counties and elsewhere in Kenya and other sub-regions in Africa.

3.2.2.2 Secondary data collection

A wide range of the available secondary data was collected from relevant government and non-governmental entities at national and county levels. National level livestock statistics, agricultural census data, trade and export of live animals and livestock products were collected from the Kenya National Bureau of Statistics (KNBS), Ministry of Agriculture, Livestock, Fisheries and Blue Economy (MoAL&F), Ministry of Finance, Planning and Development (MoFPD), Ministry of Trade, National Drought Management Authority marketing and trade cooperatives and agencies, abattoirs, previous research documents (Nyariki, 2004, Davis, 2007etc.), experiments and studies' reports, development project reports, databases of the international and regional organizations, such as FAO, IFPRI, World Bank and ICPAC, among others. County level data on livestock statistics and livestock trade were collected from ministry reports obtained from Turkana, Wajir, Marsabit and Mandera County departments of agriculture, livestock and fisheries officers during the field visits in May 2017. In addition, data from NDMA collected monthly and bi-annually on livestock as assets, savings, offtake were filtered to complement the secondary data.

3.2.2.3 Social surveys

Primary data were collected through social surveys by use of questionnaires, focus group discussions and interviews. In addition, other primary data sources such as NDMA were used to complement the field surveys.

4 TOTAL ECONOMIC VALUATION OF PASTORALISM

4.1 PASTORAL SECTOR ECONOMIC WORTH

4.1.1 Traditional Pastoral Values

To estimate the economic worth of pastoralism in Kenya, the pastoral values were categorised into two—traditional and non-traditional pastoral values. The traditional values include those of livestock and its related products such as milk, meat, hides and skins; other pastoral products such as forest products such as honey, firewood, wax, gum resin; and tourism. It may also be important to note that the pastoral economy is majorly subsistence oriented and most products are consumed at the pastoral household level.

4.1.1.1 Livestock numbers

The accuracy of the estimation of the economic contribution of livestock and its products will depend on accurate livestock numbers. Table 4.1 provides livestock (ruminants and non-ruminants) population trends over a six (6) year period (2010 to 2015) in Kenya. These numbers form the capital base for livestock products and services. They seem to depict a slight trending upwards for most animals even though data from other sources show the contrary. However, most of these figures are not based on recent censuses, and are simply projections based on FAO, Kenya National Bureau of Statistics (KNBS) and/or official statistics. For the period 2010 to 2015, the annual average numbers of national livestock by species were as follows: Cattle 18,097,379, sheep 17,108,355, goats 26,170,733, camels 2,965,692, pigs 452,386, chicken 45,127,000, and beehives 1,610,297 (Table 4.1).

The national population numbers in Table 4.1 were used to generate the size of pastoral livestock herd. The proportion of the pastoral herd as a percentage of the national population has been reported by various scholars (Nyariki, 2004; Davis, 2006; Fitzgibbon, 2012). According to Nyariki (2004) and Davis (2006), the proportions of the pastoral herd as percentages of the national livestock population across different species were: cattle 44 per cent, sheep 57 per cent, goats 50 per cent and camels 100 per cent. However, Fitzgibbon (2009) reported higher percentages, which were: cattle 70 per cent, sheep 87 per cent, goats 91 per cent and camels 100 per cent, as shown in (Table 4.2).

Table 4.1: Trends in national livestock numbers by species from 2010-2015

Year	No. of beehives	No. of camels	No. of cattle	No. of sheep	No. of goats	No. of pigs	No of chicken (000s)
2009	1,842,496	2,971,111	17,467,774	17,129,606	27,740,152	334,689	31,828
2010	1,459,539	3,030,600	17,862,852	17,562,104	28,174,158	347,413	30,398
2011	1,334,023	3,091,200	18,173,500	17,821,600	28,860,700	344,155	30,966
2012	1,801,871	2,864,732	19,129,800	16,115,701	22,181,935	408,703	34,583
2013	1,796,283	2,899,244	18,138,500	16,600,911	24,637,393	432,979	39,872
2014	1,427,572	2,937,262	17,811,845	17,420,207	25,430,058	430,844	42,413
2015*	1,610,297	2,965,692	18,097,379	17,108,355	26,170,733	452386	45127

***Authors' projections**

Source: www.faostats data.

Table 4.2: Livestock Populations in Kenya

	Total livestock population	Pastoral livestock population	Total Population (2009 Census)	ASAL Population (2009 Census)
Cattle	9,000,000	4,000,000 (44%)	17,467,774	12,155,974 (70%)
Sheep	7,000,000	4,000,000 (57%)	17,129,606	14,354,925 (87%)
Goats	12,000,000	6,000,000 (50%)	27,740,153	25,250,865 (91%)
Camel	1,000,000	1,000,000 (100%)	2,971,111	2,968,670 (100%)
Source: Nyariki (2004) and Davis (2006)			**Source: Fitzgibbon (2012)**	

This study chooses to use estimates by Nyariki (2004) and Davis (2006) for projections because the numbers proposed by Fitzgibbon (2012) seem to be too high and may lead to over-valuation of pastoralism. Using these estimates, the pastoral livestock herd as a proportion of the national livestock population is shown in Table 4.3. Generally, the livestock numbers have continued to decline over the last five years for both the national and pastoral herds with the exception of sheep and goats.

To estimate the value of pastoral livestock in Kenya, the number of pastoral livestock was categorized into different classes based on purpose and nature of production, specifically, cows in milk, non-milk cows, bulls, heifers, calves and steers as reported by Nyariki *et al.* (2009).

Table 4.3: National livestock population in relation to pastoral herds in Kenya, 2010-2015

Year	Cattle		Sheep		Goats		Camels	
	National	Pastoral	National	Pastoral	National	Pastoral	National	Pastoral
2010	17,862852	7,859,655	17,562104	10,010,399	28,174,158	14,087,079	3,030,600	3,030,600
2011	18,173500	7,996,340	17,821,600	10,158,312	28,860,700	14,430,350	3,091,200	3,091,200
2012	19,129800	8,417,112	16,115,701	9,185,950	22,181,935	11,090,968	2,864,732	2,864,732
2013	18,138500	7,980,940	16,600,911	9,462,519	24,637,393	12,318,697	2,899,244	2,899,244
2014	17,811845	7,837,212	17,420,207	9,929,518	25,430,058	12,715,029	2,937,262	2,937,262
2015	18,223,299	8,018,252	17,104,105	9,747,340	25,856,849	12,928,424	2937262	2,964,608

Source: Faostats (2014); the pastoral livestock numbers are derived from percentages of national population reported by Nyariki (2004) and Davis (2006)

To estimate the value of the pastoral herd in Kenya, the different livestock species were standardized into tropical livestock units (TLU) to take into consideration the different classes of livestock. Therefore, livestock herd structure was established and used to derive the pastoral TLU and their value. Using the herd structure averages from Nyariki *et al*. (2009 in Maasai Mara and Otte and Chiloda (2002) in pastoral areas of Kenya, the herd structure for the households was as follows: cows in milk 17 per cent, non-milk cows 23.7 per cent, bulls 5.5 per cent, steers 17.9 per cent and steers/heifers 19.6 per cent. These figures were used in this study to establish the pastoral cattle herd structure as shown in Table 4.4.

Table 4.4: Pastoral cattle herd structure

Year	Pastoral cattle by composition, 2010-2015						
	Cattle	Milk cows	Non-milk cows	Bulls	Heifers	Steers	Calves
2,010	7,859,655	1,336,141	1,862,738	432,281	1,540,492	1,406,878	1,281,124
2,011	7,996,340	1,359,378	1,895,133	439,799	1,567,283	1,431,345	1,303,403
2,012	8,417,112	1,430,909	1,994,856	462,941	1,649,754	1,506,663	1,371,989
2,013	7,980,940	1,356,760	1,891,483	438,952	1,564,264	1,428,588	1,300,893
2,014	7,837,212	1,332,326	1,857,419	431,047	1,536,094	1,402,861	1,277,466
2,015	8,018,252	1,363,103	1,900,326	441,004	1,571,577	1,435,267	1,306,975

Using the livestock herd structure as presented in Table 4.4, the pastoral herd was converted into TLU to standardize the livestock species into a common unit (Tables 4.5 and 4.6). The conversion factors for tropical livestock units are as recommended by Mbuza *et al* (2014) and Peden *et al* (2002) where TLU values were as follows: a bull 1 TLU; cows and heifers 0.7, calves 0.3; sheep 0.1; goats 0.1 and steers 0.8, as shown in Table 4.6 below.

Table 4.5: Pastoral cattle herd composition in TLU

Year	Cattle TLU					
	Cows	Bulls	Heifers	Steers	Calves	Total TLU
2010	2,640,058	432,281	1,155,369	1,125,502	384,337	5,737,547
2011	2,685,971	439,799	1,175,462	1,145,076	391,021	5,837,329
2012	2,827,308	462,941	1,237,316	1,205,330	411,597	6,144,492
2013	2,680,798	438,952	1,173,198	1,142,870	390,268	5,826,086
2014	2,632,519	431,047	1,152,071	1,122,289	383,240	5,721,165
2015	2,693,331	441,004	1,178,683	1,148,214	392,093	5,853,324

Source: Calculated from Faostats; County Integrated Development Plans (2013)

Table 4.6: Kenya pastoral TLU by species

	National pastoral TLU					Total TLU
Year	Cattle	Sheep	Goats	Camels	Chicken	
2010	5,737,547	1,001,040	1,408,708	3,636,720	3,040	11,787,055
2011	5,837,329	1,015,831	1,443,035	3,709,440	3,097	12,008,732
2012	6,144,492	918,595	1,109,097	3,437,678	3,458	11,613,320
2013	5,826,086	946,252	1,231,870	3,479,093	3,987	11,487,288
2014	5,721,165	992,952	1,271,503	3,524,714	4,241	11,514,576
2015	5,853,324	974,934	1,292,842	3,557,529	4,513	11,683,142

Source: Faostats (2014), Kenya National Bureau of Statistics (2009); Statistical Abstract (2016)

The average annual pastoral TLU is estimated at 11,683,143, with cattle contributing 50 per cent of the total pastoral TLU followed by camels at 30 per cent, goats at 11 per cent and sheep at 8 per cent. To estimate the value of pastoral live animals in Kenya, the total pastoral TLU less the annual offtake was multiplied by Kshs 20,000 ($200), an average price for an animal weighing 250kg in the pastoral areas. Thus, the value of pastoral live animals in Kenya is estimated at Kshs 233.7 billion ($2.337 billion).

4.1.1.2 Pastoral herd offtake

Offtake is defined as the removal of live animals or their products from the herd to within the household, mainly for consumption, or gifts, cultural and religious practices to outside destinations such as other households or to markets for sale (Nyariki, 2009; King-Okumu *et al.,* 2016). The most important livestock-related offtake is the live form. According to Davis (2006) and Nyariki (2009), livestock offtake is defined as the percentage of the current year's herd that is removed through sales, deaths, gifts, home-slaughter or even theft. This kind of offtake is calculated from the total herd size kept in a year. There are various forms of livestock-related offtake. These include live animals, milk, meat, hides and skins, manure, among others. The rate of livestock offtake from pastoral herds in Kenya has been

estimated at 10 per cent per annum (Evangelou, 1984; Nyariki, 2004, Davis, 2006), compared to that from ranches of 25 per cent (Coppock, 1994; Nyariki and Munei, 1993). According to RoK (2000) and Nyariki (2004), livestock offtake in the arid and semi-arid areas is as follows: cattle 10 per cent, camels 2 per cent, and sheep and goats 7 per cent. Similarly, Okumu-Caroline *et al* (2016) have established livestock offtake rates for Kenya pastoral counties such as Isiolo to be: cattle - 15 per cent, camels - 1.7 per cent, sheep - 13.2 per cent and goats - 13.7 per cent. The current study adopts a combination of King-Okumu *et al.* (2016) and Nyariki (2004) livestock offtake rates of 12.5 per cent for cattle, 1.85 per cent for camels, 10.1 per cent for sheep and 10.4 per cent for goats. The annual offtake for different livestock species is shown in Table 4.7.

Table 4.7: Kenya pastoral livestock offtake for the period 2010 to 2015

	Type of livestock						Value of pastoral livestock offtake in Kshs (billion)	Value of pastoral livestock offtake in $ (billion)
Year	Cattle	Sheep	Goats	Camels	Chicken	Total offtake		
2010	717,193	11,011	146,506	67,279	669	942,659	18.85	0.189
2011	729,666	11,174	150,076	68,625	681	960,222	19.20	0.192
2012	768,062	10,105	115,346	63,597	761	957,870	19.16	0.192
2013	728,261	10,409	128,114	64,363	877	932,024	18.64	0.186
2014	715,146	10,922	132,236	65,207	933	924,445	18.49	0.185
2015	731,666	10,724	134,456	65,814	993	943,652	18.87	0.189
Average annual offtake	**731,665**	**10,724**	**134,456**	**65,814**	**819**	**943,479**	**18.87**	**0.189**

Source: Calculated from faostats (2016); Statistical Abstract (2016); producer price of livestock per TLU = Kshs 20,000 and foreign exchange rate of $1 is Kshs 100

Taking a 6-year (2010-2015) average, these rates then translate into 731,665 TLU for cattle; 65,814 TLU for camels, 134,456 TLU for goats, 10,724 TLU for sheep and 819 TLU for chicken, which are removed from pastoral herds annually. If values are attached to this offtake, a total annual marketed value, both locally and nationally, is close to Kshs 18.9 billion or $0.189 billion (Table 4.7). This figure is more than two times the estimate of Kshs 8 billion or $0.08 billion reported by RoK (2000) and Nyariki (2004). The main reason for this difference is that livestock prices have since doubled. In 2004, the price for a bull was Kshs 10,000 ($100) while the price currently is Kshs 20,000 ($200). Similarly, a camel was sold at Kshs 10,000 ($200) while currently it is being sold at Kshs 24,000 ($240). Besides, chicken were not included in the previous study.

In terms of meat supply, if the average offtake in Table 4.8 and the average carcass weights of livestock as shown in the table are used, the pastoral herds produce in the order of 154,968 tonnes of meat from the various livestock species annually, a figure double the estimate of 71,118 tonnes reported by Nyariki (2004), suggesting an underestimation by the earlier study. Whilst the exact amount of what the pastoralists require for their own meat needs is not known as they subsidize meat with milk, blood and grains, this figure is much beyond what they consume.

Table 4.8: Average annual meat offtake from pastoral herds

Species	Average live weight (kg)	Average carcass weight (kg)	Average annual offtake (TLU)	Average annual offtake (tonnes)	Value in Kshs (billion)	Value in $ (billion)
Cattle	250	150	731,665	109,750	27.4	0.274
Sheep	30	20	10,724	1,609	0.40	0.004
Goats	30	20	134,456	33,614	8.40	0.084
Camels	250	150	65,814	9,872	2.47	0.0247
Chicken	1.2	0.8	8 19	123	0.03	0.0003
				154,968	**38.74**	**0.3874**

Source of data: RoK (2000), Nyariki (2004)

RoK (2010) estimated the annual meat from camels at 7,000 tonnes, valued at Kshs 2 billion ($0.02 billion) annually. In 2015, this study estimates the annual meat from camels at 9,872 tonnes valued at Kshs 2.47 billion ($0.0247 billion), an increase of Kshs 0.47 billion ($0.0047 billion) in 15 years.

Using the 2009 population census and a growth rate of 2.9 per cent per year, the Kenyan population was estimated at 46.1 million people (World Bank, 2017). Per capita consumption of meat is estimated at 12kg in 2002 (FAO, 2002; Nyariki, 2004). Therefore the amount of meat consumed annually is about 553,200 tonnes. To this, the pastoral areas contribute about 154,986 tonnes or 28 per cent of the total national consumption. The rest comes from ranches, 'large farms,' and smallholders (Figure 4.1).

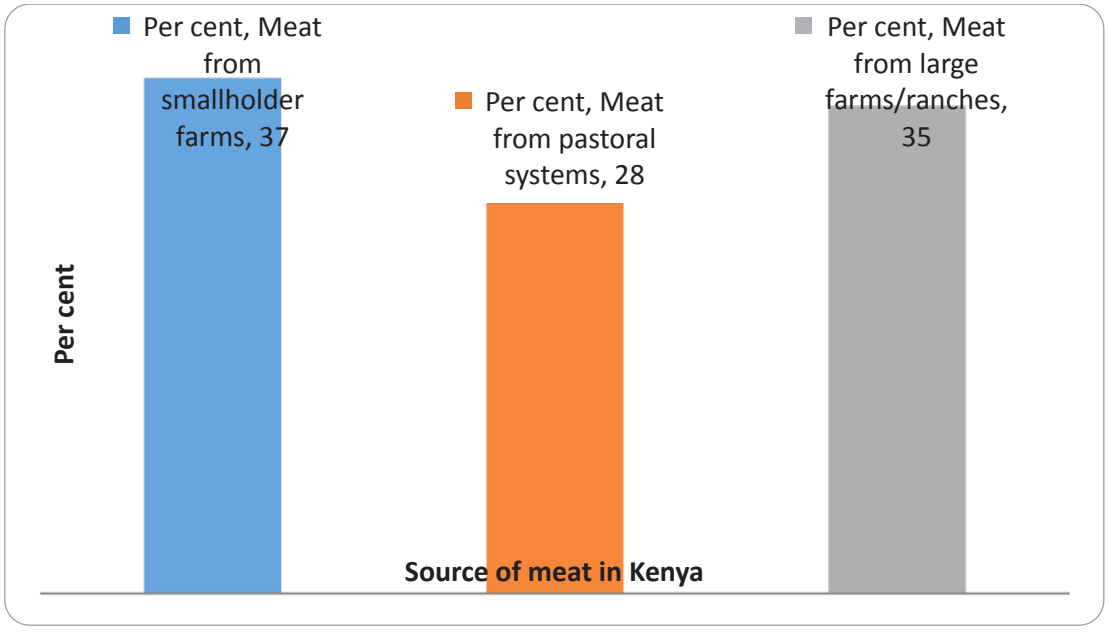


Figure 4.1. The contribution of pastoralism to the national meat output

According to RoK (2010), the annual mutton and chevon production was estimated at 84,000 tonnes valued at about KSh 14 billion or $0.14 billion). The current study estimates annual pastoral mutton at 1,609 tonnes valued at Kshs 0.4 billion or $0.004 billion and that of chevon at 33,614 tonnes valued at Kshs 8.4 billion or $0.084 billion). This implies that pastoral chevon is about 42 per cent of 2010 figures of national meat from goats.

Nyariki *et al.* (2009) estimates the population of pastoralists at 20 per cent of the national population. Using the 2015 human population estimate of 46.1 million people by the World Bank (2017)) and the same percentage to estimate the current population of pastoralists, we obtain about 9.22 million people that would consume 110,640 tonnes of meat. Thus, it implies that out of the total meat offtake from pastoral herds, about 71.7 per cent is consumed locally while the rest is a surplus which goes to support the rest of the country's population. In other words, pastoralists are net meat 'exporters.' At an average producer price of Kshs 250 or $2.5 per kg of meat (RoK, 2016), the total amount of money equivalent to 154,968 tonnes of meat is over Kshs 38.7 billion ($0387 billion). This is what may be regarded as annual income both in monetary terms and in 'kind' from slaughter. About18.3 per cent of this accrues as direct monetary income that goes to meet pastoral household requirements—clothing, shelter, health, fees and miscellaneous.

4.1.1.3 Milk production in pastoral systems

According to Nyariki (2004), milk production in Kenya constitutes about 50 per cent (over 40 billion Kenya shillings) of the total value of livestock products. Milk offtake from pastoral herds is rarely quantified compared to slaughter offtake. Therefore little information is available on this, particularly on commercial offtake. According to government statistics, however, milk production has increased more than two-fold, from about 1,000 million litres to around 2,600 million litres between 1980 and 2002. Most of the milk produced comes from large scale producers and smallholders, while the rest (25 per cent) comes from the zebu herd—a large number of these coming from the pastoral herds.

To calculate the volume of livestock milk production, we used the following rates in relation to herd numbers in ASAL areas, as identified by Nyariki (2004), Behnke and Muthami (2011), and King-Okumu (2016):

- Cattle—59 litres per head for cattle herds (McPeak and Doss, 2004)
- Camels—186 litres per head, estimated 34 per cent of the total herd lactating and 547 litres per lactating camel per year (Musinga *et al.,* 2008)
- Sheep and goats—51.2 litres per head, assuming 40 per cent of the flock are does or adult females, each producing 0.351 litres per day (Field, 1985).

Using these estimates, from 2010 to 2015, the average annual national pastoral milk production from cattle is estimated at 58,708 tonnes, approximately 1.6 per cent of the national cattle milk (3,713,069 litres) with an estimated value of Kshs 1.76 billion ($0.0176 billion). Similarly, annual pastoral goat milk is estimated at 80, 241, 960 litres valued at Kshs 1.2 billion, constituting about 30 per cent of the national goat milk. Also, sheep milk in pastoral areas is estimated at 3,267 tonnes, valued at Kshs 32.7 million ($0.327 million) (Table 4.9). In total, pastoral milk from cattle, sheep, goats and camels constitute about 21 per cent of the milk produced in the country, valued at Kshs 28.3 billion ($0.283 billion).

Table 4.9: Average amount (tonnes) and value (Kshs) of national and pastoral milk offtake in Kenya for the period 2010 to 2015

Livestock species	National (000 tonnes)	Value in Kshs billion	Pastoral milk in (000 tonnes)	Value of pastoral milk in Kshs billion	Value of pastoral milk in $ billion
Cattle	3,713	111.4	59	1.76	0.0176
Goats	267	4.0	80	1.2	0.0120
Sheep	33	0.49	3	0.03	0.0003
Camels	877	26.3	877	26.3	0.2630
Total	**4,890**	**142.19**	**1,016**	**28.29**	**0.2829**

In support, Nyariki (2004) established that pastoral areas contribute 21.7 per cent of the national milk production. However, the contribution of camel milk to the national total milk production has increased to 18 per cent from 12.5 reported in 2004. Given the current total milk production, pastoral milk production stands at 1 billion litres annually up from 0.6 billion reported in 2004, with pastoral cattle and camels producing annual quantities of 0.05 and 0.88 billion litres, respectively. Currently, the amount of camel milk is estimated at 877 million litres, valued at Kshs 26.3 billion ($0.263 billion). According to Behnke and Muthami (2011) and Kuria *et al* (2016), annual camel milk production is estimated at 553 million litres, valued at Kshs 16 billion ($0.16 billion). Annual camel milk production has also been estimated by the Government of Kenya (RoK, 2010) at Kshs 200 million litres, valued at Kshs 2 billion ($0.02 billion).

According to Nyariki (2004), the level of home consumption for an average pastoral household was 85 per cent of the total milk produced. However, milk is normally hawked in small quantities (15 per cent) in townships and trading centres when it is produced in excess of household requirements, especially during the wet season, or when forced sales occur due to urgent demands. In terms of value, milk from pastoral herds is worth Kshs 28.29 billion, a figure that is seven (7) times higher than the Kshs 4.1 billion estimate in 2004. Besides, the contribution of pastoral milk production to national production has doubled to 20 per cent compared to 10 per cent as reported by Nyariki (2004). This is Kshs 24 billion and Kshs 4.29 billion worth of home-consumed and sold milk respectively. The reason for the differences shown between Nyariki (2004) and the current study is that the price for milk has quadrupled from Kshs 15/litre in 2004 to Kshs 60/litre in 2015. Besides, goat and sheep milk was not accounted for but is increasingly becoming an important source of protein to pastoral households when the cows have moved to dry season grazing areas. Further, camel and goat milk is increasingly being recommended for people with special health conditions such as HIV/AIDS and Diabetes because of its high nutritive value.

4.1.2 Non-Traditional Pastoral Values

4.1.2.1 Honey and wax production in the pastoral areas of Kenya

Honey is one of the products from the pastoral areas in Kenya. According to the National Farmers Information Service (NAFIS), 80 per cent of honey comes from pastoral areas and specifically from the ASAL traditional log hives (www.nafis.go.ke/livestock/beekeeping/. Kiptarus and Asiko (2014) and Honey Care Africa (2010) estimate annual honey production in Kenya at 100,000 metric tonnes annually valued at Kshs 4.3 billion. The pastoral region contributes 80,000 tonnes of honey valued at Kshs 3.44 billion. From the national census carried out in 2009, Kenya had 2 million hives producing about 25,000 metric tonnes of honey (KNBS, 2009), of which 20,000 tonnes (80 per cent) came from pastoral areas.

In terms of bee wax production, it is not documented how much wax comes from pastoral areas. However, for this study, it was logical to adopt a similar percentage (80 per cent) to estimate the value of wax from pastoral areas. The national average annual bees wax estimate from 2010-2015 is USD 12.8 million (Kshs 1.3 billion, at an exchange rate of Kshs100/USD) (Table 4.10). Thus, pastoral bees wax is estimated at Kshs 1.03 billion.

Table 4.10: Bees wax gross production value (current million US$)

Year	2010	2011	2012	2013	2014	2015*	Average					
Gross production Value (Million Kshs)	700	668	650	1,460	2,270	1,900	1,280					

*** 2015 Figures are author estimates; $1 is Kshs 100**

Source: Faostat (2014)

4.1.2.2 Tourism

Pastoralism plays a number of roles in supporting the tourism industry: particularly through cultural and environmental services. Pastoralism promotes peaceful co-existence with wildlife; it ensures land is conserved in its natural state, making the land suitable for wildlife, a major tourist attraction in pastoral land. Kenya has 54 parks and reserves of which about 60 per cent are found in the pastoral areas (Annex 10). However, the revenues from the parks and reserves have continued to decline from Kshs 7.7 billion ($0.077 billion) in 2011 to Kshs 1.25 billion ($0.125 billion) in 2013 as a result of terrorism threats and attacks.

Kenya's contribution of travel and tourism to GDP has fluctuated substantially in the recent years, and has tended to decrease through 1997 - 2016 period ending at 9.81% in 2016. In an effort to build confidence in the tourism sector, the Government of Kenya launched a national tourism recovery marketing strategy through campaigns, promotions, and *Tembea Kenya Initiative* that has seen the rise in the number of visitors and the revenue in the parks and reserves from 1.25 billion in 2013 to 2.34

billion in 2015. World Travel and Tourism Council (WTTC) "Economic Impact 2017 Kenya" estimates the direct contribution of tourism and travel sector to GDP at $2.5 billion (3.7 per cent) in 2016. In addition, it directly employed 399,000 Kenyans, or 3.4 per cent of the total workforce that year (Oxford Business Group, 2014).

The value of tourism in pastoral Kenya, as an indirect contribution by pastoralism, was estimated through park entry fees by national and foreign residents as reported in the Statistical Abstract of 2016. Similar approaches have been used by Ericksen *et al.* (2011), Silvestri *et al.* (2013) and King-Okumu *et al*. (2016). In Kenya, the value of tourism in pastoral areas is estimated at Kshs 2.91 billion ($0.029 billion) of which Kshs 1.264 billion ($0.013 billion) (43.5%) comes from Amboseli National Park, as shown in Table 4.11. The indirect pastoral revenue is underestimated because the revenue from hotels and reserves were not included in this analysis due to data limitations.

Table 4.11: Kenya pastoral parks and reserves revenue in billion Kshs

Conservation area	2011	2012	2013	2014	2015	Total	Average
Amboseli National Park	5.40	0.06	0.06	0.50	0.30	6.32	1.26
Tsavo West National Park	0.30	0.20	0.20	0.10	0.08	0.88	0.18
Tsavo East National Park	0.80	0.50	0.40	0.30	0.20	2.20	0.44
Maasai Mara National Reserve	0.50	0.40	0.40	0.70	0.60	2.60	0.52
Hallers Park	0.01	0.02	0.02	0.02	0.70	0.77	0.15
Meru National Park	0.03	0.02	0.02	0.06	0.05	0.18	0.04
Samburu	0.05	0.06	0.002	0.07	0.03	0.21	0.04
Kisite Marine	0.04	0.04	0.05	0.02	0.02	0.17	0.03
Watamu Marine	0.50	0.03	0.03	0.03	0.30	0.89	0.18
Others*	0.07	0.06	0.07	0.06	0.06	0.32	0.06
Total value in billion Kshs	**7.70**	**1.39**	**1.252**	**1.86**	**2.34**	**14.54**	**2.91**
Total value in billion $	**0.077**	**0.0139**	**0.01252**	**0.0186**	**0.0234**	**0.1454**	**0.0291**

***Others include Marsabit, Sibiloi, Chyulu, Ruma National Park, Mwea National Reserve, Kiunga; $1 is Kshs 100**

4.1.2.3 Value of fishing in pastoral areas of Kenya

Fish is an emerging product in pastoral areas but quite often is not considered an important resource in pastoralism. With increasing impacts of climate change especially drought conditions, pastoralists have accepted fish as an important resource for enhancing resilience. Fishing is growing rapidly in pastoral areas especially from rivers, natural lakes and other artificial aquaculture systems such as ponds. However, This study only considers the value of fish obtained from natural water bodies existing in pastoral areas such as rivers and lakes, as shown in Table 4.12.

Table 4.12: Pastoral fish production in metric tonnes and value to fishermen in million Kshs

Year	2011		2012		2013		2014		2015	
Types of Fish	Production (metric tones	Value in Kshs (millions)	Production (metric tonnes)	Value in Kshs (millions)	Production (metric tonnes)	Value in Kshs (millions)	Production (metric tonnes)	Value in Kshs (millions)	Production (metric tonnes)	Value in Kshs (millions)
Fresh water fish	9,093	441	4,403	434	5,684	573	5,769	659	5,730	653
Marine water fish	6,722	527	6584	722	6774	774	6876	868	6,354	853
Crustaceans	404	120	509	191	576	233	391	190	537	194
Molluscs	538	55	587	89	608	84	587	114	900	450
Total Kshs million	**16,757**	**1,143**	**12,083**	**1,436**	**13,642**	**1,664**	**13,623**	**1,831**	**13,521**	**2,150**
Total $million	**167.57**	**11.43**	**120.83**	**14.36**	**136.42**	**16.64**	**136.23**	**18.31**	**135.521**	**21.50**

KNBS (2016); Statistical Abstract (2016); $1 is Kshs 100

The average annual value of fish from the pastoral areas is estimated at Kshs 1.65 billion ($0.0165 billion) with a minimum of Kshs1.143 billion ($0.01143 billion) in 2011 to a maximum of 2.15 billion ($0.0215 billion) in 2015. These figures exclude the value of fish through aquaculture and fish farming. The contribution of ASAL fish production to the total national fish production is estimated at between 8 and 11 per cent (on average 9 per cent) as illustrated in Table 4.13.

Table 4.13: Contribution of ASAL fish to the national fish production in metric tonnes

Regions	2011	2012	2013	2014	2015
ASAL	16,757 (11)	12,083 (8)	13,645 (8)	13,623 (8)	13,521 (9)
Non-ASAL	132,289 (89)	141,932 (92)	149,744 (92)	154,790 (92)	130816 (91)
Total	**149,046 (100)**	**154,015 (100)**	**163,389 (100)**	**168,413 (100)**	**144,337 (100)**

***Figures in brackets are percentages**

4.1.3 Total Pastoral Economic Value

In summary, the total economic value of pastoral systems in Kenya is shown in Table 4.14. Live animals as a capital resource for pastoral production and a key component of the pastoral system was valued at Kshs 233.7 billion ($2.337 billion). The traditional pastoral value is estimated at Kshs 85.89 billion ($0.8589 billion) and constitutes 90.5 per cent of the pastoral economic worth. Overall, meat constitutes about 40.80 per cent of the pastoral worth, followed by milk at 28.29 per cent. The non-traditional pastoral products such as honey and wax have also begun to make a noticeable contribution to the pastoral economy, accounting for 9.5% of the pastoral value.

Table 4.14: Overall Total Economic Value of Pastoralism in Kenya

Pastoral products	Value in Kshs (billion)	Value in $ (billion)	Proportion of total value (%)
Traditional pastoral products			
Livestock offtake	18.90	0.189	19.90
meat (kg)	38.70	0.387	40.80
Milk	28.29	0.2829	29.80
Sub-total	85.89	0.8589	90.5
Non-traditional pastoral products			
Honey	3.44	0.0344	3.60
Wax	1.03	0.0103	1.10
Tourism	2.91	0.0291	3.10
Fish	1.65	0.0165	1.70
Sub-total	9.03	0.0903	9.50
Total	**94.92**	**0.9492**	**100.00**

4.1.4 Other Indirect Values of Pastoralism

4.1.3.1 Provision of draft power and transport

Pastoral livestock provide traction and transport within the pastoral production system and as a service to other producers (e.g. cultivators). The value of transportation, particularly of goods to and from the market, but also of sick to hospital, is difficult to quantify or monetize realistically; therefore, there is need for more data to get a better understanding of the extent of transportation and its contribution to pastoral economies.

4.1.3.2 Risk and diversification management

The pastoral communities derive several benefits from livestock keeping, including the provision of credit, insurance, and as a means of sharing risk. The credit benefits of livestock derive from the ability of livestock owners to 'cash in' their animals for particular purposes at a time that they choose. This flexibility gives livestock owners access to money without the need to borrow, and confers an additional financial benefit beyond the sale, slaughter or transfer value of their livestock. This additional financial benefit can be estimated as the opportunity cost of rural credit – what it would otherwise cost a livestock owner in rural areas to obtain funds comparable to those produced by liquidating a part of the herd. Employing this estimation, the additional finance value of a livestock holding is equivalent to the interest that the owners would be required to pay to obtain loans equal to the value of their livestock offtake. Interest rates in rural Kenya are currently running at about 25 per cent per annum in institutionalized channels, but about half of lending in rural Kenya is done privately by neighbours, friends and kin, resulting in low rural interest rates averaging 6.3 per cent per annum. In this case the financial value of livestock offtake is about Kshs 4.230 billion ($0.0423).

4.1.3.3 Socio-cultural values of pastoralism

Livestock is a source of bride price and a measure of wealth and social status among the pastoralists and agropastoralists. Livestock have value as a source of manure and traction, and as investment that is converted into cash to purchase food or is directly exchanged for food or slaughtered for the same. Thus, the major areas of contribution are with respect to local and national food security through increased output of livestock and non-livestock products, employment and income generation. For example, in Ethiopia the Borana accumulate animals as social and economic assets rather as a source of income (Coppock, 1994; Bekure *et al*., 1991). In this way they also protect themselves from perturbations which are part and parcel of pastoral production (Pratt and Gwynne, 1977).

4.1.3.4 Household nutrition security

Pastoralism plays a significant contribution to household nutrition directly through provision of protein as essential elements for human diet or in directly through sale of the livestock products to purchase other essential elements in the human diet such as cereals, minerals, carbohydrates. These livestock products include milk, meat and blood. Table 4.15 shows the national average protein supply in relation to animal protein supply/g/capita/day for a three-year average for the period 1990 to 2011. The national average protein supply for Kenya is between 54 to 61g/capita/day. Table 4.15 shows a gradual increase in the protein supply at national level with exceptions of 1993/95 and 1999/2003, which reported a downward trend. However, the supply of animal protein has been stagnant between 1993 and 2003, with an increase in 2005.

Table 4.15: National average protein supply (g/capita/day) in relation to average protein supply of animal origin (g/capita/day) for a 3 years average, 1990-2011

Year	Average protein supply/g/capita/day	Average supply of protein from animal origin (g/capita/day)
1989-1991	56	_
1991-1993	54	16
1993-1995	57	15
1995-1997	59	15
1997-1999	59	15
1999-2001	58	15
2001-2003	57	15
2003-2005	58	17
2005-2007	60	17
2007-2009	59	17
2009-2011	61	17

Source: www.faostatics.org/downloaded 6th june2017/

4.1.3.5 Source of Employment and income

In the arid and semi-arid areas, the livestock sector accounts for 90 per cent of employment and more than 95 per cent of household incomes. Most of the livestock slaughtered in major urban centres originate in these areas, with an annual slaughter of about 1.6 million tropical livestock units

(Nyariki, 2004). Pastoralism provides direct employment to about 2.2 million people in Kenya. Indirect employment that is difficult to quantify is in ranching, trade in livestock, transport services, leather industry, slaughter houses, butcheries, and eating houses. A huge proportion of people employed in these areas depend to a large extent on pastoral livestock.

4.1.3.5 Pastoralism as input to agriculture

Similarly the sale of manure is gaining momentum in pastoral areas. As prolonged drought is making it hard to find pasture and food, many households in pastoral areas are selling manure helps me buy food and pay hospital bills. Using manure for farming helps store carbon in the soil and prevents it from being released into the atmosphere, and in this way, communities contribute to reducing climate-changing emissions. According to Thomson Reuters Foundation (2017), in Kajiado-Kenya, from a 40 head of cattle herd, a farmer collects 8 tonnes of manure every month, which is sold at Kshs 36,000 ($360) and is used to fertilise 1.5 acres (0.6 hectares) of tea plantation in central Kenya. A tea plant normally yields about 1.5 kg of leaves a year, but when enriched with manure, it can produce as much as 3 kg. Therefore application of manure increases tea production by 100 per cent. There is enormous potential in manure sales in the pastoral areas, which is yet to be exploited. At present, manure contributes 7.54 per cent (Kshs 27.829 billion or $0.278 billion) of the gross value of livestock, but these figures are likely to rise tremendously if marketing of manure is commercialized into an organized marketing system. For instance, if 40 head of cattle produce 8 tonnes of manure in a month, this translates to 96 tonnes of manure in a year valued at USD 4176. Using the 2009 livestock population census, where pastoral cattle population was estimated at 12,155,974 head. The total value of manure in a year, *if marketed*, could be USD 1.27 trillion (Kshs 127 trillion), a figure that can finance 50 times Kenya's national annual budget for 2017/2018 of Sh2.6 trillion! Since the value of manure is neither well-documented nor realised, we chose not to include it in our valuation of TEV of pastoralism.

4.1.4.6 Other pastoral sources of income

Pastoral areas are known to generate resources that are sold for income. The income from manure sales, livestock and milk offtake and sale of hay has implications on food security, people's security, poverty, and environmental and ecosystem health. In the absence of pastoral livestock products (beef/meat and milk), the pastoralists have no choice but to look for alternative sources of food, including relief food, cattle rustling, or rural to urban migration in search of jobs. Quite often, the government relies on donor support in times of hunger crises which have led to loss of lives and livestock and further degradation of ecosystems through destructive rangeland resource utilization such as charcoal burning and cultivation. With the application coping strategies such as cattle raiding, people may feel insecure and may not be involved in productive engagements such as herding, but will spend time and resources trying to protect themselves—leading to loss of production, which cannot be easily quantified. Further, insecurity curtails pastoral movements, yet mobility is critical for maximization of pasture use in pastoral areas. This reduces production of livestock and the productivity of pastoral herds. It will also mean that pastoralists will be concentrated in limited range areas, leading to land degradation and ultimately the 'tragedy of the commons'.

4.2 TEV OF PASTORALISM: CASE STUDIES OF TURKANA, MARSABIT, WAJIR AND MANDERA COUNTIES

To illustrate the total economic value of pastoralism in Kenya, four pastoral counties, namely Turkana, Marsabit, Wajir and Mandera, were selected as a case. The criteria were based on the availability of consistent and reliable secondary data. All these counties are located in northern Kenya. However, Loitokitok Sub-county was randomly selected for comparison based on primary data to give more insights and a detailed understanding of the non-traditional benefits from pastoralism. .To assess TEV, pastoralism was categorised into traditional and non-traditional pastoralism as shown below.

4.2.1 Traditional pastoralism

Traditional pastoralism was majorly livestock production. The main types of livestock species considered in the four counties include cattle, sheep, goats and camels.

Cattle numbers

Cattle numbers in the selected four counties varied with Turkana having the highest number of cattle followed by Wajir, Mandera and Marsabit Counties in descending order, as shown in Figure 4.2.

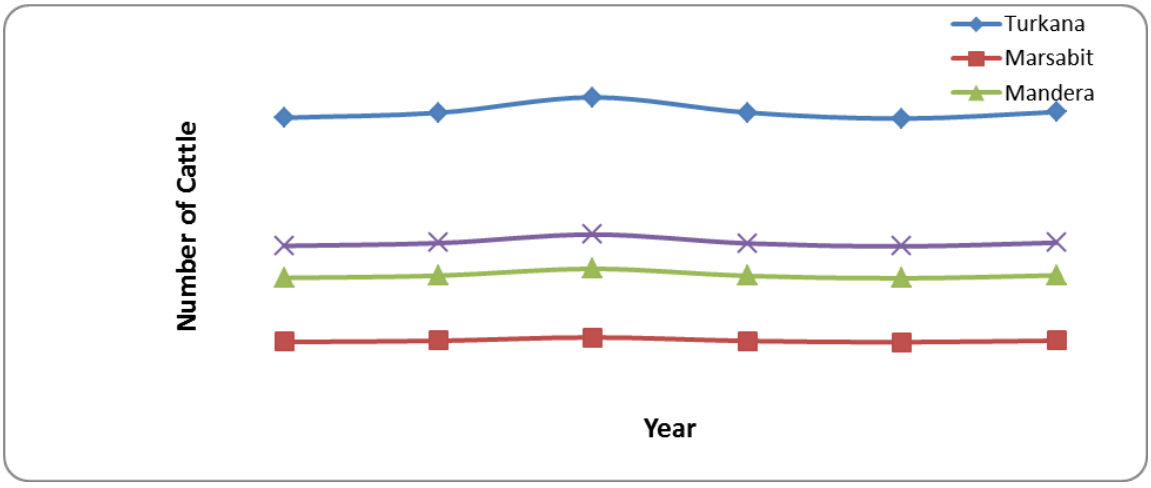


Figure 4.2: Trends in cattle numbers in Turkana, Mandera, Marsabit and Wajir, 2010-2015

Source: Faostats (2014); Turkana, Mandera, Marsabit and Wajir Counties Integrated Development Plans

Turkana County contributes 9 per cent of the national cattle population compared to 5 per cent, 4 per cent and 2.4 per cent for Wajir, Mandera and Marsabit respectively as shown in Table 4.16

Table 4.16: Contribution of livestock population in the selected counties as a proportion of the national livestock, 2010-2015

County	Per cent contribution of livestock					
	Cattle	Sheep	Goats	Camels	Chicken	Donkey
Marsabit	2.4	5.6	4.1	6.8	1	3.5
Turkana	9	20.5	21.6	28	1	31
Wajir	5	8	7	18	1	6
Mandera	4	5.8	8.3	20.1	1	10.8

Source: KNBS (2009); Faostats 2010-2014

***2015: Estimates by the author**

To estimate the economic value of the different livestock species in the selected counties, the livestock was converted into tropical livestock units as described by Nyariki (2004), Mbuza *et al* (2014) and Peden *et al.* (2002), where a bull is 1 TLU; heifers 075 TLU; Calves 0.3, sheep 0.1; goats 0.1; camel 0.1 and steers 0.8 as shown in Table 4.17 and 4.18. In the four selected ASAL counties, cattle contributed 51.6 per cent of the total TLU followed by camels at 30.1 per cent goats 10.3 per cent and sheep (8 per cent). These four selected counties constitute about 64.4 per cent of the pastoral livestock in Kenya with Turkana being the richest in terms of livestock wealth while Marsabit had the lowest.

Table 4.17: Livestock in numbers and TLU for Turkana, Marsabit, Mandera and Wajir Counties

Livestock	Turkana		Marsabit		Mandera		Wajir	
	Average number of livestock	Total TLU	Average number of livestock	Total TLU	Average number of livestock	Total TLU	Average number of livestock	Total TLU
Cattle	1,640,802	1,640,802	364,466	364,466	911,165	911,165	911,165	911,165
Goats	5,598,008	559,801	1,060,131	106,013	1,809,979	180,998	1,809,979	180,998
Sheep	3,506,341	350,634	957,830	95,783	1,368,328	136,833	1,368,328	136,833
Camels	595,886	595,886	201,593	201,593	533,629	533,629	533,629	533,629
Total		3,147,123		767,855		1,762,625		1,762,625

Table 4.18: Total value of livestock numbers in Turkana, Marsabit, Mandera and Wajir Counties

Livestock	Turkana		Marsabit		Mandera		Wajir	
	TLU (000)	Value (Kshs billion	TLU (000)	Value (Kshs billion	TLU (000)	Value (Kshs billion	TLU (000)	Value (Kshs billion
Cattle	1,641	32.8	364	7.3	911	14.6	911	18.2
Goats	560	11.2	106	2.1	181	4.3	181	3.6
Sheep	351	7.0	96	1.9	137	1.98	137	2.7
Camels	596	11.7	202	4.0	534	16.6	534	10.7
Total in Kshs		62.9		15.4		37.5		35.2
Total value in $		0.629		0.154		0.375		0.352

Value of 1 TLU is estimated at Kshs 20,000; $1 is Kshs 100

4.2.2 Livestock Offtake in the selected four ASAL Counties

To estimate livestock offtake in the four selected counties of Marsabit, Wajir, Mandera and Marsabit, the values by Nyariki (2004) and King-Okumu (2016) were used as follow: cattle 12.5 per cent; camels 1.85 per cent; sheep 10.1 per cent and goats 10.4 per cent. Using these values, the livestock offtake for various species by county are as shown in Table 4.19.

Table 4.19: Livestock offtakes in Marsabit, Wajir, Mandera and Marsabit Counties

	Turkana		Marsabit		Mandera		Wajir	
	TLU	Offtake (TLU)	TLU	Offtake (TLU)	TLU	Offtake (TLU)	TLU	Offtake (TLU)
Cattle	1640802	205100	364466	45558	728932	91117	911165	113896
Goats	559801	58219	106013	11025	214612	22320	180998	18824
Sheep	350634	35414	95783	9674	99204	10020	136833	13820
Camels	595886	11024	201593	3729	830090	15357	533629	9872

Source: County Integrated development plans (2013), KNBS (2009)

Table 4.19 was used to generate the quantity and value of meat for the selected counties. According to Nyariki (2004), from each TLU, a 150kg of meat is obtained. This was multiplied by Kshs 250/kg, as the producer average price as shown in Table 4.20, 4.21 and 4.22.

Table 4.20: Meat offtake in TLU for Marsabit, Wajir, Mandera and Marsabit Counties

	Turkana		Marsabit		Mandera		Wajir	
	Offtake	Meat (kg)	Offtake	Meat (kg)	Offtake	Meat (kg)	Offtake	Meat (kg)
Cattle	205,100	30,765,038	45,558	6,833,738	91117	13,667,475	113,896	17,084,344
Goats	58,219	8,732,892	11,025	1,653,804	22320	3,347,946	18,824	2,823,567
Sheep	35,414	5,312,107	9,674	1,451,112	10020	1,502,938	13,820	2,073,017
Camels	11,024	1,653,584	3,729	559,421	15357	2,303,500	9,872	1480820
Total	**309,757**	**46,463,621**	**69,986**	**10,498,075**	**138,814**	**20,821,859**	**156,412**	**23,461,748**

The total meat offtake for the four counties is estimated at 101.25 million Kgs valued at Kshs 25.32 billion ($0.253 billion) (Table 4.22). According to Nyariki (2016), the national livestock offtake estimate excluding poultry meat was estimated at Kshs 67.15 billion ($0.672 billion. Therefore, these four counties contribute about 37.7% of the national livestock offtake.

Table 4.22: Average meat offtake in quantity and value for Turkana, Marsabit, Mandera and Wajir Counties

Livestock	Turkana		Marsabit		Mandera		Wajir	
	Meat (000kg)	Value (Kshs billion)	Meat (000kg)	Value (Kshs billion)	Meat (000kg)	Value (Kshs billion)	Meat (000kg)	Value (Kshs billion)
Cattle	30,765	7.69	6,834	1.71	13,667	3.42	17,084	4.27
Goats	8,733	2.18	1,654	0.41	3,348	0.84	2,824	0.71
Sheep	5,312	1.33	1,451	0.36	1,503	0.38	2,073	0.52
Camels	1,654	0.41	559	0.14	2,304,	0.58	1,481	0.37
Total	**46,464**	11.62	**10,499**	2.62	**20,822**	5.21	**23,462,**	5.87

4.2.3 Milk Production

In the selected four counties, milk is obtained from cattle, sheep, goats and camels. The value of milk in the four counties is estimated at 531 million litres valued at Kshs 10.4 billion ($0.104 billion). According to Nyariki (2016), national milk production is valued at Kshs 257.8 billion ($2.578 billion); therefore, these four counties constitute 4 per cent of the national milk production. Turkana County had the highest amount of milk (241 million litres valued at Kshs 4.4 billion ($0.044 billion) followed by Mandera, Wajir and Marsabit in a descending order (Table 4.23)

Table 4.23: Milk offtake in quantity and value in Turkana, Marsabit, Mandera and Wajir Counties

	Turkana Milk (000 litres)	Value (000 Kshs)	Marsabit Milk (litres)	Value (Kshs)	Mandera Milk (litres)	Value (Kshs)	Wajir Milk (litres)	Value (Kshs)
Cattle	16,457	493,717	3,655,594	109,667,819	7,311,188	109,667,819	9,138,985	274,169,549
Goats	114,647	1,719,708	21,711,483	325,672,243	43,952,517	659,287,757	37,068,370	556,025,549
Sheep	71,810	1,077,148	19,616,358	294,245,376	20,316,938	304,754,074	28,023,357	420,350,362
Camels	37,684	1,130,515	12,748,741	382,462,240	52,494,892	1,574,846,748	33,746,698	1,012,400,939
Totals	240,598	4,421,088	57,732,176	1,112,047,678	124,075,535	2,648,556,398	107,977,410	2,262,946,399
Total (millions)	241	4,421	58	1,112	124	2,649	108	2,263
Totals value in USD($)		44.21		11.12		26.49		22.63

$1 is Kshs 100

In conclusion, the overall value of pastoralism in the four selected counties: Turkana, Mandera, Marsabit and Wajir is estimated at Kshs 54.25 billion ($0.543 billion) (Table 4.24). The value of pastoralism in Turkana is estimated at Kshs 21.97 billion ($0.220 billion) followed by Wajir, Mandera, and Marsabit in descending order. The traditional value of pastoralism for the four counties ranged between 55.97% and 97.37% as shown in Table 4.15. In Turkana County, the value was estimated at Kshs 16.02 billion ($0.160 billion), followed by Wajir at Kshs 14.65 billion ($0.1465 billion), then Mandera and Marsabit Counties in descending order.

Table 4.15: Summary of total economic valuation in Turkana, Marsabit, Wajir and Mandera

Pastoral products	Value (Kshs billion)	Overall summary of the pastoral values in four selected Counties, Kenya						
		Turkana	Marsabit		Mandera		Wajir	
		Proportion of total value (%)	Value (Kshs billion)	Proportion of total value (%)	Value (Kshs billion)	Proportion of total value (%)	Value (Kshs billion)	Proportion of total value (%)
Traditional								
Meat (Kg)	11.60	52.80	2.6	68.24	5.20	37.63	5.90	40.27
Milk production	4.42	20.12	1.11	29.13	2.70	19.54	2.30	15.70
Sub-total	16.02	72.92	3.71	97.37	7.90	57.17	8.20	55.97
Non- traditional								
Honey	0.02	9.1	0.02	0.52	0.10	0.72	0.03	0.20
Tourism	0.01	4.55	0.01	0.26	-	-		
Firewood	5.91	26.90	0.06	1.57	5.75	41.61	6.40	43.69
Gum resin	-		-		0.05	0.36	-	
Hides and Skin	0.01	4.55	0.01		0.02	1.45	0.02	0.14
Sub-total	5.95	17.08	0.10	2.63	5.92	42.83	6.45	44.03
Total Value (Kshs)	**21.97**	**100**	**3.81**	**100.00**	**13.82**	**100.00**	**14.65**	**100.00**
Total value $	**0.2197**		**0.0381**		**0.1382**		**0.1465**	

Source: KNBS (2009); County Integrated Development Plans (2013-2017); County profiles, County Annual Reports; Statistical Abstract (2016); $1 is Kshs 100

5 TEV OF PASTORALISM IN THE SOUTHERN RANGELANDS: LOITOKITOK SUB-COUNTY CASE STUDY

5.1 INTRODUCTION

This chapter presents the results of a case study of TEV of pastoralism in Loitokitok Sub-County. The case study approach was intended to provide a means for providing a greater level of detail and insight about the economic values of pastoralism discussed in the previous section. Further, it estimates and documents the non-traditional values of pastoralism that have not been valued at the national level due to limited data.

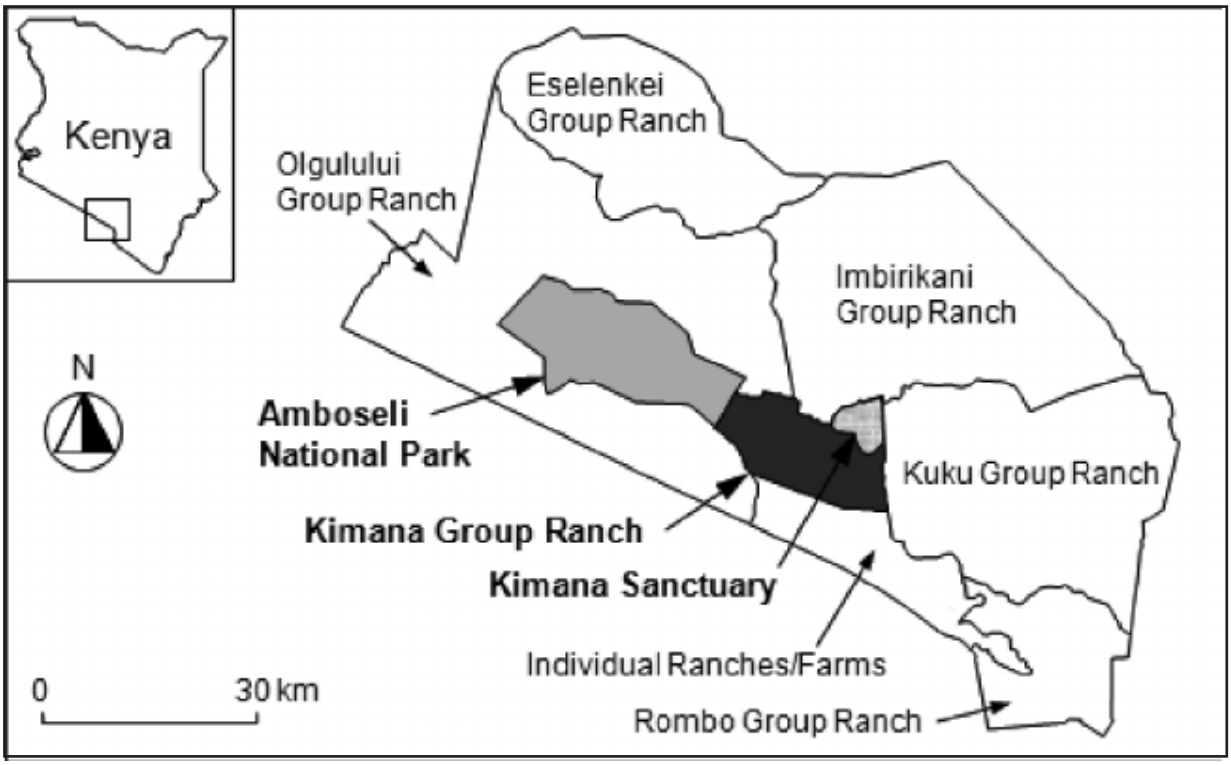


Figure 5.1: Location of Loitokitok Sub-County, Kenya
Source: Ministry of Livestock Sub-County Report (2013)

5.2 LIVESTOCK AS AN ASSET AND A SOURCE OF WEALTH

In Loitokitok Sub-County, livestock plays an important role among the Maasai community as an asset that can be sold to meet household and a source of wealth the main livestock species kept include cattle, sheep, goats, donkeys and chicken. The number of cattle kept ranged between 2 and 400; sheep kept ranged between 0 and 100; goats kept were between 0 and 300. The average numbers of livestock kept per household were cattle - 28, sheep – 49, goats – 47, donkeys – 2 and chicken – 10. The total value of live animals in the study site is shown in Table 5.1 below.

Table 5.1: Total number and value of live animals in the study site

Livestock	Numbers	Study area (n = 50 households)		
		Average value/animal (Kshs)	Total value Kshs (000)	Total value $ (000)
Cattle	1,380	22,200	29,180	291.8
Sheep	2,425	2,180	5,755	57.55
Goats	2,370	2,584	7,360	73.60
Donkeys	102	6,922	706	7.06
Chicken	495	288	143	1.43
Camels	-	-	-	-
Total			**43,144**	**431.44**

$1 is Kshs 100

The total value of live animals for the 50 respondents is estimated at Kshs 43.114 million ($0.4311 million), and constitutes 9.30 per cent of the total live animals in Loitokitok Sub-County. According to the Loitokitok Ministry of Livestock Annual Reports 2010 to 2015, the prices for live animals have been rising for cattle, sheep and goats. The prices for cattle have ranged between Kshs 18,000 and 32,000 ($180 to 320), sheep and goats prices have ranged between Kshs 2,000 to 4,000 ($20 to 40) while that of camels have remained constant over the five year period at Kshs 60,000 ($600) as shown in Figure 5.1.

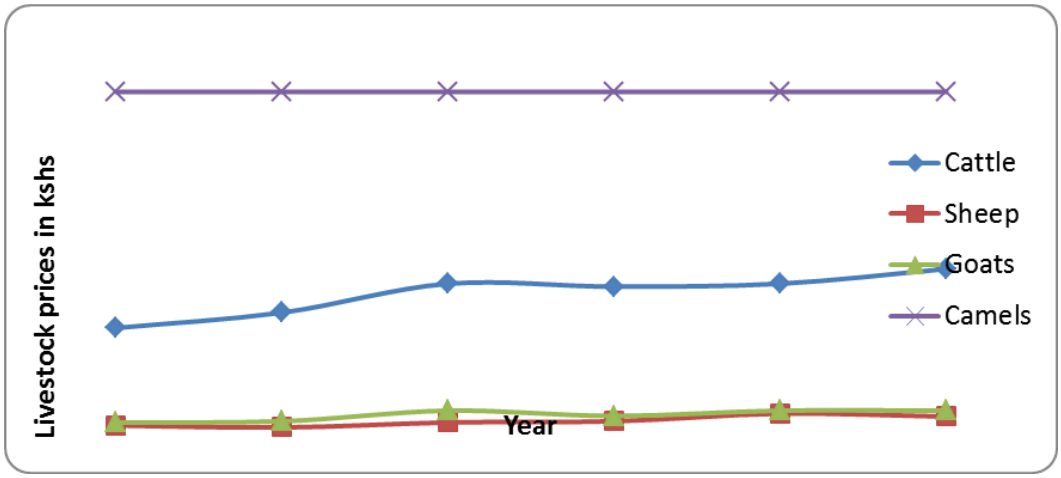


Figure 5.1: Trends in livestock prices in Loitokitok Sub-County (2010-2015)
Source: Loitokitok Sub-County Ministry of Livestock annual reports (2010-2015)

5.3 TRADITIONAL VALUES OF PASTORALISM IN THE LOITOKITOK SUB-COUNTY

An assessment was made during this study regarding the value of traditional pastoral products in Loitokitok Sub-County including live animals as the input for the production of meat, milk and eggs,. It is estimated that livestock production ranks the first in GDP contribution in Kajiado County, in which Loitokitok Sub-County is located. Since about 86 per cent of the livestock contribution comes from pastoralism, the contribution of pastoralism to the economy of the county is considerably high (Kajiado County Integrated Development Plan 2013-2017).

5.3.1 Livestock Numbers

The information collected from this study, shows that the number of live animals sold from the study area in the last one year (January to December 2016) stood at approximately 368 cattle, 869 sheep, 581 goats and 136 chicken with a value of approximately Kshs 10,720,844 ($ 107,208.44 annually. to

In the study area, livestock provide food as a source of meat. In many occasions livestock are slaughtered to provide meat for the household. However, cattle are rarely slaughtered unless there was a cultural ceremony. The most common livestock slaughtered by households are the small ruminants as sheep and goat (Table 5.2). Cattle slaughtered in the study area constitute 2.2 per cent of the cattle population while sheep and goats constitute 11.4 per cent and 15.7 per cent respectively. The annual value of slaughter for the study area is estimated at Kshs 2,555,854 ($25,558.54, approximately 23.8 per cent of the total livestock value for the study area. Similarly, the value of livestock slaughter at sub-county level is estimated at Kshs 63.4 million ($0.634 million annually.

Table 5.2: Livestock slaughtered annually for home consumption in the study area

Livestock	Study Area		Loitokitok Sub-County	
	Number slaughtered	Value (Kshs)	Number slaughtered	Total value (000Kshs)
Cattle	31	735,320	2,304	51,840
Sheep	277	856,700	2,493	5,435
Goats	373	963,834	2564	6,525
Total		**2,555,854**		63,800

Source: Author survey; Loitokitok Sub-County Annual Reports (2010-2015); average prices for livestock was as follows: cattle= Kshs 22,500; sheep= Kshs 2180; goats Kshs 2,584

5.3.2 Milk Production and Marketing

In Loitokitok Sub-County, milk is obtained from cattle, sheep and goats. However, the most preferred milk is from the cattle followed by goats and lastly sheep. The milk from goat and sheep is slowly being accepted by the Maasai community but only for household consumption, during drought conditions when lactating cows have migrated long distances in search of pasture

and sufficient grazing. In terms of milk prices, cattle milk was the most expensive at an average price of Kshs 52.2, followed by Goat milk at Kshs 30 and lastly sheep milk at Kshs 27.2 as shown in Table 5.3. Approximately 152,154 litres of milk valued at Kshs 6,177,967 ($61,779.67) is produced in the study area annually. Of the total milk produced, about 80 per cent is consumed by the households while the remaining 20 per cent is offered for sale to meet the basic household needs.

Table 5.3 Value of livestock milk in the study area (n = 50)

Livestock milk	Produced (litres)	Value (Kshs)	Consumed (litres)	Value in Kshs	Sold (litres)	Value (Kshs)
Cattle milk	103,394	5,397,167	73,029	3,812,114	30,365	1,585,053
Sheep milk	25,000	680,000	25,000	680,000	0	0
Goat milk	23,760	712,800	23,760	712,800	0	0
Total	152,154	6,177,967	121,789	5,204,914	30,365	1,585,053

5.3.3 Marketing of Livestock Hides and Skins

Hides and skins have traditionally used as beddings by the Maasai community in Loitokitok Sub-County. Currently, the households are selling these products for as low as Kshs 125 for hides while sheep and goat skins have been going for between Kshs 20 and Kshs 30 (Table 5.4). To mitigate low pricing for hides and skins, the Government of Kenya has set up a Kshs 700 million leather processing factory in Narok County to offer market and value addition to hides and skins. The factory has a capacity to process 10,000 tonnes of hides and skins per day, create 1,000 jobs and boost leather exports from Sh4 billion to Sh10 billion per year after value addition.

Table 5.4: Annual sale and value of hides and skins in the study area

Hides and skins	Animals slaughtered for home consumption	Number sold	Total value (Kshs)	Total value ($)
Cattle hides	-	1210	151,000	1,510
Sheep and goat skin	-	2068	47345	473.45
Total	**-**	**-**	**198,345**	**1,983. 45**

5.3.4 Production and Marketing of Chicken and Chicken Products

Chicken is one of the most common poultry kept in the study area and Loitikitok Sub-County. At the sub-county, the indigenous chicken population was estimated at 14,542 valued at Kshs 3.2 million ($0.03.2 million) (Table 5.5). Similarly, the total amount of eggs produced by the indigenous chicken was estimated at Kshs7.7 million (Table 5.5). The respondents in the study area had an average of eight (8) chicken valued at Kshs 185,900 ($1,859) annually (Table 5.6). Chicken were able to lay a total of 50,280 eggs annually valued at Kshs 603,360 ($6,033.6). Eating of eggs is not a common practice among pastoral households. Only 10 per cent of the eggs produced are consumed by the households while a majority (90 per cent) is sold to complement household income. In general, about 26 per cent of the values of chicken and chicken products are consumed within the households with the remaining 74 per cent being offered for sale.

Table 5.5: Number and value of chicken and chicken products in the study area and sub-county

Chicken and related products	Study area		Loitokitok Sub-County	
	Quantity	Value (000Kshs)	Quantity	Value (000 Kshs)
Indigenous chicken (numbers)	419	185,900	14,542	3,199
Indigenous chicken (egg trays)	1,680	603,360	35,084	7,718
Total		789,260		10,917

Table 5.6: Production and sales of chicken and its products in the study area

Chicken products	Quantity of production (Number)	Value of production (Kshs)	Quantity consumed (Number)	Value consumption (Kshs)	Quantity sold (Number)	Value sold (Kshs)
Chicken eggs	50,280	603,360	4,828	57,936	45,452	545,424
Chicken	419	185,900	326	144,638	93	41,262
Total	-	789,260	-	202,574	-	586,686

Source: Author survey

5.3.5 Production and Marketing of Other Livestock related Products

There are two additional livestock related products for marketing namely chicken oil and manure. Chicken oil plays an important role in pastoral households especially in treatment of aching ear or constipation. The annual value of chicken oil is estimated at Kshs 47,800 per year, of which 84 per cent is consumed and the remaining 16per cent sold for income (Table 5.7).

Table 5.7: Production and sales of other livestock products in the study area

Other livestock products	Quantity of Production (kg)	Value produced (Kshs)	Quantity Consumed (kg)	Value consumed (Kshs)	Quantity sold (kg)	Value sold (Kshs)
Chicken oil	478	47,800	400	40,000	78	7800
Manure	110, 000	330,000	80,000	240,000	30,000	90,000

Source: Author survey

Similarly, in terms of manure, the study population produces about 110 tonnes of manure on annual basis valued at Kshs 330,000, of which 73 per cent are used by households on their farms with only 27 per cent being offered for sale at a price of Kshs 3,000/tonnes. Even though a lot of manure is produced in the study area, mostly it is not considered a marketable product by the households.

5.4 NON-TADITIONAL PASTORAL PRODUCTS IN LOITOKITOK SUB-COUNTY

The other non-livestock marketed products in the study area include honey, firewood and herbs (Table 5.7). About 68 per cent of the honey produced in the study area is sold for income while most of the firewood (96 per cent) and herbs (74 per cent) are used for home consumption. In addition, pasture is one of the most important resources in the pastoral areas that are used by animals for grazing. However, baling of pasture in form of hay is becoming an economic activity in the study area. The extra pasture baled by the households was worth Kshs 1,514,320 on annual basis.

Some of the non-livestock products in the sub-county include honey, firewood and herbs. Using the sample population from the household survey, the value of the non-livestock products is estimated at Kshs 393 million as shown in (Table 5.8). Firewood contributes about 95% of the pastoral forest products. However, there was inadequate data on pastures and bee wax, so they were excluded in the sub-county analysis. The value of pastoral forest products are shown in Table 5.9.

Table 5.8: Value of non-traditional pastoral products in Loitokitok Sub-County

Non-livestock pastoral products	Quantity	Value (Kshs)	Value ($)
Honey	10,000kg	2,500,000	25,000
Firewood	50,000 tonnes	375,000,000	3,750,000
Herbs	105,443kg	15,816,450	158,164.50
Total		393,316,450	3,933,164.50

A bundle of firewood is 20kg valued @ Kshs 150

Table 5.9: Production and sale of selected pastoral products

Other pastoral products	Quantity of production (kg)	Value produced (Kshs)	Quantity consumed (kg)	Value consumed (Kshs)	Quantity sold (kg)	Value sold (Kshs)
Honey	607	182,100 (1,821)	196	58,800 (585)	411	123,300 (1,233)
Bees wax	141	14,100 (141)	-	-	141	14,100 (141)
Firewood	101,850	1,018,500 (10,185)	98,210	982,100 (9,821)	3640	36,400 (364)
Herbs	443	66,450 (664.5)	328	49200 (492)	115	17,250 (172.50)
Extra pasture (hay in bales)	4,560	1,514,320 (15143.20)	-	-	4,560	1,514,320 (15143.20)
Total		2,795,470 (27,954.70)		1,090,100 (10,901)		1,705,370 (17,053.70)

***A bundle of firewood is an equivalent of about 20kg weight; a bundle of firewood @ Kshs150; a kg of honey @ Kshs 300; Figures in brackets are $1 is Kshs 100**

5.5 PASTORAL GIFTS AND DOWRY MANAGEMENT

In the study area different livestock species, namely cattle, sheep, goats and chicken, were given out as a gift or payment of bride price. Among the Maasai, only cattle were given out as bride price while for non-Maasai, sheep and goats were given as bride price. Table 5.10 shows the number of livestock and their associated value given out as gifts and bride price. Chicken was rarely given as gifts, and in most cases given by grandparents when young grandchildren went visiting.

Table 5.10: Value of livestock given out as bride price

Livestock species	No. of animals as gifts or bride price	Value of the bride price (Kshs)	Value of the bride price ($)
Cattle	68	1,509,600	15,096
Sheep	94	204,920	2,049.20
Goats	135	348,840	3,488.40
Chicken	20	8,000	80
Total		**2,071,360**	**20,713.60**

$1 is Kshs 100

5.6 REVENUE FROM CURIO SHOPS, ART CRAFTS AND CULTURAL BOMAS

It is apparently notable that the role of pastoralism in the tourism industry is always not acknowledged and promoted. Pastoral systems contribute to tourism through many ways but three obvious aspects are wildlife tourism, cultural tourism, and aesthetic landscape (Table 5.8). There were two cultural *bomas,* namely Oldonyo Oiborr and Osiram Sienna, and curio shops were valued in terms of their sales revenue on annual basis (Table 5.9). In the cultural *bomas* tourists got to enjoy the rich Maasai culture, tradition and traditional dances and songs. The average revenue from the cultural *bomas* and curio shops is estimated at Kshs 5.5 million ($0.055 million) annually. However, there has been annual increase in revenue from Kshs 3.58 million in 2013 to Kshs 7.3 million ($0.073 million) in 2016.

Table 5.9: Revenue received from tourism and related products (cultural *bomas* and curio shops) from 2013 to 2016

Amboseli Ecosystem	2013	2014	2015	2016
Oldonyo Oiborr	960,000	1,240,000	1,920,000	1,968,000
Osiram Siana	600,000	860,000	1,420,560	1,646,000
Curio shops	2,020,000	2,680,000	2,900,000	3,550,000
Total	**3,580,000**	**4,780,000**	**6,240,560**	**7,264,000**

Source: Author estimates based on personal interviews; $1 is Kshs 100

Table 5.10: Summary of TEV in the study area, Loitokitok sub-county

Value of pastoralism in the study area		
Traditional pastoral products	Value in Kshs (millions)	Value in per cent
Livestock offtake	2.6	14.3
Milk offtake	6.2	34.0
sub-total	**8.6**	**47.2**
Non-traditional pastoral products		
Tourism/ curios/bomas	5.5	30.2
hides and skins	0.2	1.1
chicken/ oil/eggs/	0.85	4.7
livestock manure	0.3	1.6
Honey	0.18	1.0
Bees wax	0.014	0.1
Firewood	1.01	5.5
Herbs	0.07	0.4
Extra pasture hay	1.5	8.2
Sub-total	**9.624**	**52.8**
Total	**18.224**	**100.0**

6 OPPORTUNITIES AND SLOW-DOWNS OF PASTORALISM IN KENYA

6.1 OPPORTUNITIES

There are several opportunities that have promoted pastoralism in Kenya. Some of these are discussed in the paragraphs below.

6.1.1 Policy and Legislative Frameworks

Kenya has come up with strong policies and strategies that integrate drylands and pastoralism into the mainstream economy. For example, the country's development blue print, Vision 2030, recognises arid and semi-arid lands' unique needs. Besides, other national policies such as Arid and Semi-Arid Land Policy (2007), Wildlife and Conservation Management Policy (2013) and Climate Change Policy (2015) are critical in addressing pastoral issues. At the regional level, there are frameworks and instruments that support pastoralism, namely: African Union (AU) Policy Framework on Pastoralism, AU Framework and Guidelines for Land Policy in Africa, East Africa Protocol on Environment and Natural Resources, East Africa Climate Change Policy, and the Intergovernmental Authority on Development (IGAD) Livestock Policy Initiative.

6.1.2 Programmes and Projects on Strengthening Pastoralism

There are several projects and programmes initiated in Kenya to promote pastoralism by enhancing resilience, building capacity, promoting advocacy and socio-economic development among others. Examples of these initiatives include Drought Disaster Resilience and Sustainability Initiative (IDDRSI), IGAD-Drought Resilience and Sustainable Livelihood Program in the Horn of Africa (PHASE I), IGAD-Biodiversity Management Program, Regional Pastoral Livelihoods Resilience, Drought Management for Pastoral Livelihoods, Pastoralist Integrated Support Programme (PISP), Assessing the Economic Value of Pastoralism, Regional Learning and Advocacy Programme (REGLAP), Strengthening IGAD's Capacity to Enhance Drought Resilience in the Horn of Africa (SCIDA-II), and Politics of Changing Pastoral Livelihoods in the Horn of Africa.

6.1.2 Creation of Institutions, Networks and Dialogue Platforms

Institutions, networks and dialogue platforms have been established to promote issues of pastoralism at county, national, regional and global levels. Examples include World Initiative for Sustainable Pastoralism (WISP), Pastoralist Integrated Support Programme (PISP), UNDP Drylands Development Centre-Nairobi, Pastoral and Environmental Network in the Horn of Africa (PENHA), Enhanced Livelihoods in the Mandera Triangle, and the Kenya Pastoralists Parliamentary Group.

6.2 KENYA PASTORALISM 'SLOW-DOWNS'

Kenya has made significant progress in addressing issues of pastoralism at the national and county levels. However, there have been several setbacks that have hindered maximum gains in addressing the pastoralism issues. Some of these setbacks are outlined below.

6.2.1 Climate Change

Impacts of climate change especially drought have triggered conflicts on shared trans-boundary resources among counties and neighbouring countries such as Uganda, Sudan and Somalia. So far, there have been partnerships and networks among the different organizations (CBOs, Local NGOs, and other stakeholders) on cross-border issues contributing immensely to peace building and resource conflict resolution. However, more still needs to be done especially in terms of holistic engagement and concerted efforts by the respective governments if cross-border conflicts within these areas are going to be effectively addressed.

6.2.2 Weak Policy and Legislative Implementation Framework

Relevant policies and legislation are in place in many African countries including Kenya. However, the implementation of the policies remains a huge setback. Some of the policies are conflicting with other sectoral policies. An example is ASAL Policy and the Agriculture Policy, where efforts to increase crop cultivation in the pastoral areas through irrigation are recommended yet water is a limiting factor in these areas, which makes cropping unsustainable in the long-run. Besides, the destruction of vegetation to leave room for agriculture exposes the soil to erosion, leading to land degradation.

6.2.3 Rural-Urban Migration

Migration to urban centres is a result of a breakdown in pastoral institutions that provide leadership in pastoral areas. An example is land sub-divisions that have led to sale of land to non-pastoral communities. These have curtailed mobility, a key strategy for use of pastoral sparse resources, leading to a collapse of pastoral systems, forcing young people to move to urban areas for employment opportunities, in turn causing a reduction in labour to effectively support pastoralism.

6.2.4 Financial and Technical Resource Gaps

There is limited access to financing and technical expertise to implement pastoral development projects, especially those that promote resilience such as strengthening climate change adaptation and marketing mechanisms. Quite often, development in these areas is pegged on development partner support, which sometimes is restricted and may not be necessarily in the priority areas of the region. Besides, upon project expiry, there is no sustainability.

6.3 WAY FORWARD

Given these slow-downs, the main recommendations to enhance the economic worth of pastoralism include:

1. TEV of pastoralism should be used as an advocacy tool to lobby for budgetary allocations and relevant policies to strengthen pastoralism in the drylands
2. Promotion of appropriate mechanisms within the IGAD member countries, the East African Community, and the African Union (AU) to enable cross-border migration and conflict resolution, while incorporating lessons from past experiences to ensure national security is not compromised.
3. Strengthening of existing linkages with development partners, regional bodies and governments in order to invest more in appropriate development initiatives that integrate climate change adaptation and build resilience in pastoral areas.
4. Strengthening of traditional and indigenous institutions as avenues for community dialogue and reconciliation especially on issues of resource use conflicts.
5. Enhancing government commitment to multi-year contribution to critical pastoral aspects such as generation of data and information based on sound science for decision making. These would include investment in practical action research and information dissemination.

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