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Global climate change is currently a major threat to humanity. At the regional level, numerous long term climatic changes have been observed. They include the widespread change in precipitation amounts and distribution of ocean salinity, wind patterns and aspects of extreme weather resulting to droughts, heavy precipitation, heat waves and the intensity of tropical cyclones. These changes threaten community livelihoods, food security, economic sectors, ecosystems and social groups^[1]. Local communities are experiencing significant climatic change impacts on food supply and security, water availability, infrastructure and agriculture income. Vulnerable populations are likely to become more vulnerable if structures are not put in place to proactively address challenges of climate change thus efforts are increasingly being made to enhance community adaptation to climate change. The adaptation measures may include changes in practices and technologies, diversification of livelihood systems, accessing financial resources such as micro-insurance and micro-credit, migration, reconfiguring labor or resource allocation and collective action to access services, resources or markets^[2].

Developing countries, Arid and Semi-arid Lands (ASALS), and the poor in society are the most vulnerable and likely to be affected by climate change due to their low adaptive capacity. The risks threaten approximately 70% of rural people living in extreme poverty around the world^[3], as well as the agricultural systems and food production in the entire sub-Saharan Africa which primarily relies on rain-fed production that is climate sensitive. In Kenya, the ASALS occupy 89% of the country and are home to about 14 million people and approximately 70% of the national livestock herd estimated at 60 million and kept under extensive production^[4,5] and prone to drought and other natural disasters.

The livestock sub-sector is the major enterprise in the ASALS and contributes 40% of the agricultural Gross Domestic Product (GDP) and 10% of Kenya's total GDP^[6-8]. The vulnerability of pastoralists in ASALS is escalating due to recurrent natural disasters coupled with the increasing population growth and declining carrying capacity of the land. In the ASALS, the livestock sub-sector employs 90% of the residents and contributes 95% of the family income^[7,9]. Therefore the government under vision 2030^[10] recognizes the potential of arid lands and the livestock sub-sector as important drivers for economic growth.

The ecosystems in ASALS are most vulnerable due to climate change thus compounding development challenges of enhancing the resilience of communities whose livelihoods depend entirely on climate-sensitive resources^[7,11]. Integrated land and water management in dry areas can contribute significantly to the recovery of agricultural production systems as well as reducing community vulnerabilities. This calls for proper land use planning^[12].

Concern for environmental planning in Kenya dates back to 1974 when conflicts resulting from competing land use interests led to the adoption of the National Environment Action Plan (NEAP)^[13]. This was followed by the 1979-1983 and 1994-1996 development plans all of which emphasized the integration of environmental concerns into national development. Principles of sustainable development are further enshrined in chapter five part 1 section 60(1) of the constitution which states that land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable^[14]. This shall include sound conservation and protection of ecologically sensitive areas like deltas as well as ensuring equitable sharing of the accruing benefits.

The Sessional paper No.1 of 2017 on National land policy emphasize on key environmental management principles and highlights a number of environmental problems affecting Kenya including degradation of natural resources such as forests, wildlife, water, marine and coastal resources^[15]. Section 3.12 of the sessional paper recognizes diverse ecosystems in Kenya which include forests, wetlands, marine and coastal ecosystems, national parks, arid and semi-arid lands, watersheds, lakes and river basins and emphasize on judicious management of natural resources including land.

Rivers provide wet zones in the ASALS that act as settlement havens and areas for increased agricultural production. In Kenya athi and tana rivers act as a source of livelihoods to the communities within the Tana River Basin's spatial extent of approximately 132,000 km² which is equivalent to about 23% of the total area of the republic of Kenya^[16] and contributes 32% of the total river runoff in Kenya^[16]. It is also the longest river and the only one with a delta, Tana River delta (TRD), in Kenya. The delta lies within the tana delta sub-county which is an ASAL as well as an important wetland consisting of a mosaic of floodplains and forests of high biodiversity^[17,18].

The Tana Delta is arguably Kenya's largest, most ecologically and biologically diverse and socioeconomically important wetland in Kenya [18,19]. It covers an estimated area of 130,000 Ha and is immensely valuable to the local people who have built an intricate relationship between their lifestyles and the dynamics of the delta's ecosystems [19]. Further, tana river delta is of global, regional and national importance in the conservation of biodiversity resources [20]. It is home to rare, vulnerable, migratory and threatened species. Some of the unique bird species found in the area are malindi pipit, basra reed-warbler and tana river cisticola. Other important biodiversity resources found in the Delta are: hippopotamus, crocodiles, mangrove forests, fisheries and fisheries spawning grounds. Given the ecological importance of the area, it has been designated as an important bird area to help consolidate conservation of the area [20]. The key economic activities practised by the local communities include small-scale farming, fishing and livestock-keeping all of which rely on the occurrence of floods during long and short rain seasons. In tana river delta, pastoralism and farming are the most commonly practiced livelihood activities [21,22]. These activities have however been negatively affected by climatic changes mainly frequent droughts [23].

Sustainable utilization of the delta resources need development projects that enhance the livelihoods of local communities and promote sound conservation practices coordinated through a land use plan [19,24]. It was evident that land use planning has the potential to guide efficient and sustainable management and utilization of natural resources occurring in the delta by the local communities and other stakeholders. The vastness (16,012 km²) and economic potential of the tana delta has attracted private investors, including small ranches and large scale agricultural-based enterprises which have begun setting up operations in the area even before a comprehensive land use plan is developed [24]. This is changing the communities transhumance mode of resource utilization to sedentary as evidenced by village towns and school and hospital facilities coming up spurred by devolution as witnessed by increased road network and upcoming shopping centres as was observed by Mireri [20]. This presents threats to the existing natural resources like forests and their biological diversity.

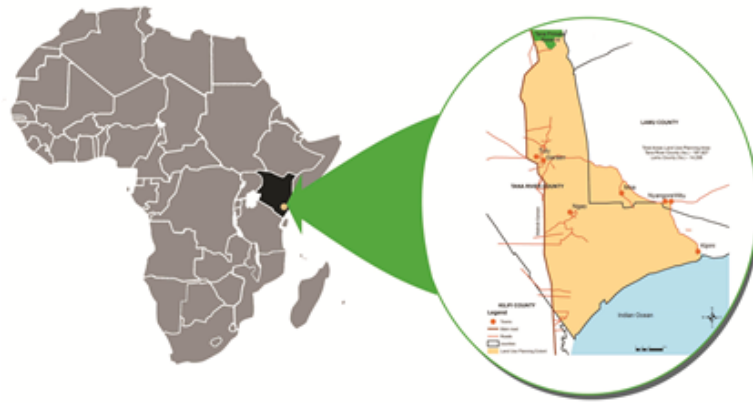
The trans boundary nature of delta resource use and access presents a formidable management challenge because of factors such as conflicting uses [25] and varied governance frameworks which lead to unsustainable exploitation of the resources as noted in Sessional paper No.1 of 2017 on national land policy. Other Acts relating to sustainable management of environmental resources and important ecosystems such as the Tana river delta include the forest conservation and management act [26], wildlife conservation and management act, the water act [27] and environmental management and coordination act [28], Tana and Athi river development authority that was formed by an act of parliament cap. 443 [29] and community land act, [30].

The declaration of TD as Kenya's 6th Ramsar site on 12th, October 2012 [18] presented an opportunity that obligates, the state, local and global citizens to ensure the delta is conserved and sustainably managed for biodiversity conservation and improved community livelihoods. This action marked a turning point in the conservation of the delta amid controversy over plans to undertake jatropha farming [31,32], large scale sugarcane farming [17,33], and oil exploration [19]. This paper presents results from a study undertaken to determine the community livelihood sources in Tana delta, community perception on management of delta resources and the development of a land use plan for the Tana delta [24] and the effects of community use of delta natural resources on their conservation and provides recommendations on how the resources could be sustainably managed.

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The study was undertaken in the Tana delta which lies within the Tana Delta Sub County (TDSC) that is part of the Tana River County (TRC) (Figure 1). The County is one of the six counties in the coast region of Kenya. It borders kitui county to the west, garissa county to the north-east, isiolo county to the north, lamu county to the south-east, and kilifi county to the south [12]. The county has a total area of 38,862.2 Km² with a projected population of 349,338 [34], 76.9% of whom live in absolute poverty [12]. The TDSC headquarters is situated in minjilla and the delta is a common use area for communities inhabiting the area and seasonal immigrants. The delta is named after the Tana River (TR), the largest river in Kenya that stretches over a total length of 1,000 km [17,18,35]. The river originates from Mt. Kenya and aberdare ranges in central Kenya and has a catchment area of about 95,000 Km², which is approximately 17% of Kenya's landmass [23]. The delta ranges between 2Km and up to 42Km in width.



) L J X U Map of tana delta showing the study sites.

According to Kenya census report of 2009, tana delta district (sub county) has human population of 96,664 with the two major tribes being the Orma (and its sub-tribe, the wardei) and the pokomo^[21,35,36]. While the pokomo are small-scale farmers who live along tana river, the orma are pastoralists. The smaller indigenous tribes include the marakote, giriama, bajuni and the Arabs while the non-indigenous tribes include the kamba, kikuyu, meru and the luo, majority of who have diversified livelihoods sources that include cultivation along the river, bee keeping, fishing and trade.

' D W D & R O O H F W L R Q O H W K R G V

Secondary data and information was collected from previous related studies, government departmental reports, community Based organizations (CBOs) and Non-Government Organizations ' (NGOs) reports. Primary data was collected through participatory rural appraisal tools comprising of community meetings, social mapping, and Focus Group Discussion (FGD). Community meetings were held to undertake social mapping which included; village resource mapping, mobility analysis, stakeholder analysis, household listing and household well-being ranking. This enabled the communities visualize, appreciate and arouse their interest and activate their energies and resources in order to participate in bringing the appropriate change in their area. The meetings were also held with village leaders to select individuals to participate in FGD and Key Informant (KI) discussion. The meetings ensured that all wellbeing ranks were represented and all stakeholders were included in the data collection process.

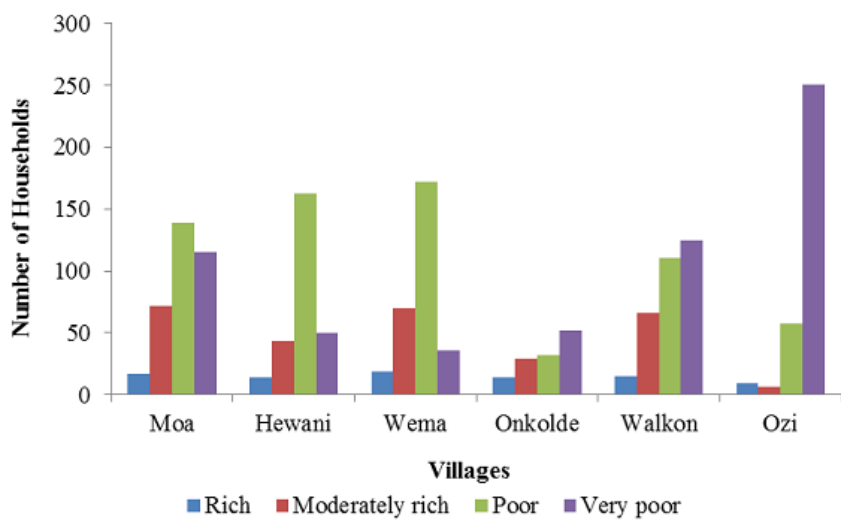
Focus group discussion selection was guided by well-being ranking and gender representation guided by village elders and project staff. The latter was done guided by ethnic group representation ensuring that those communities which do not allow youth especially female held meetings separately and their deliberations shared through plenary captured their perceptions. Wellbeing ranking was done in each of the villages while nine FGD were held in order to obtain information from the community and officials of the nature based enterprise groups.

Key informant participants were selected from the village meetings while government officers were consulted based on their duties and experience to provide information about issues on the delta resources and the communities. Semi-structured household questionnaires were administered to sampled households in the nine sample villages. Five hundred and twenty five (525) representative households from nine villages representing distinct ethnic, socio-economic and ecological features of communities residing in the Tana delta were sampled (**Table 1**). The questionnaire was structured along the Livelihood Framework Analysis (LFA) which is effective in planning, implementation, monitoring and evaluation of development projects.

7 D E O Study site communities and their major livelihood activities.

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that the enumerators could not get diversified responses from the respondents hence they might have up ended up with similar responses.



The wellbeing distribution among six study villages.

The high poverty level in tana delta was attributed to inadequate infrastructure development hence minimal investment and low education levels as shown in Table 3. The high poverty levels pose a challenge to the delta biodiversity which serves as a livelihood source for delta. This situation is being exacerbated by non-resident communities with some coming from neighboring districts, counties and countries.

School attendance in tana delta district.

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The study revealed that there are high illiteracy levels in the delta with only 11% of the respondents having attained primary school education. The results are consistent with those of GoK [38] which also established that majority of residents have either dropped out of school or have never attended school with only a small percentage attending school. Cultural factors such as nomadic lifestyles and early marriages of girls, especially in pastoral communities were attributed to low school enrollment levels. Furthermore, there are inadequate learning facilities in the area and few role models.

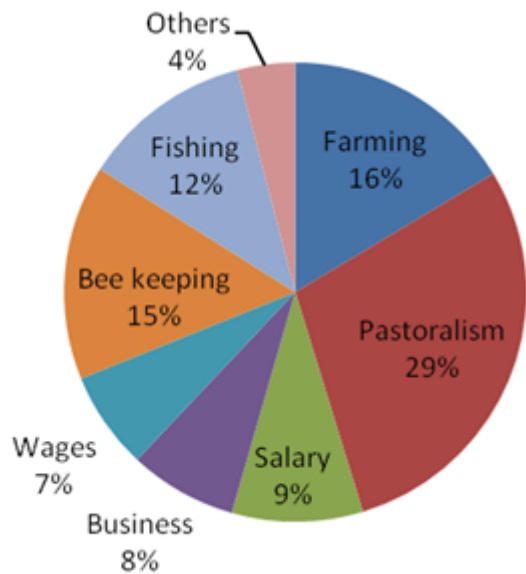
Focus group discussion and KI attributed poverty to low education levels; hence, there is need for the government, private sector and other stakeholders to put in place educational facilities as the number of schools and teachers in the sub-county is insufficient. Furthermore, there should be awareness creation to local communities on the importance of education as an investment venture. Focus group discussion agreed that punitive measures should be taken against parents who fail to enroll their children in school. These measures could help improve education standards in the area thus giving resident communities a high bargaining power in the job market. Further this could be improved through initiating income generating activities in the tana delta. Nature based enterprises could have a direct contribution to the Delta residents. However, their quantity and quality need to be enhanced in order to further improve the livelihoods of the resident communities and reduce the acute inequalities in terms of resource access and use, as well as power and influence. This shall play an important role in managing resource use conflicts. Further strategic and deliberate affirmative actions may be necessary to assist the disadvantaged groups benefit from the delta resources.

The study further revealed that over 80% of the delta population lives in rural areas with Garsen being the major urban area. Access to basic social amenities such as schools, hospitals and clean water is very limited with majority of the residents having to walk for several kilometers to access these amenities. Moreover the road network is very poor while electricity supply is limited to urban areas. Majority of the houses are temporary while the rest are either semi-permanent or

permanent. The semi-permanent houses are mainly found among the agriculturalists who build their houses with mud walls and corrugated iron roofs. The pastoralists however live in structures with thatched roofs and walls reinforced with poles.

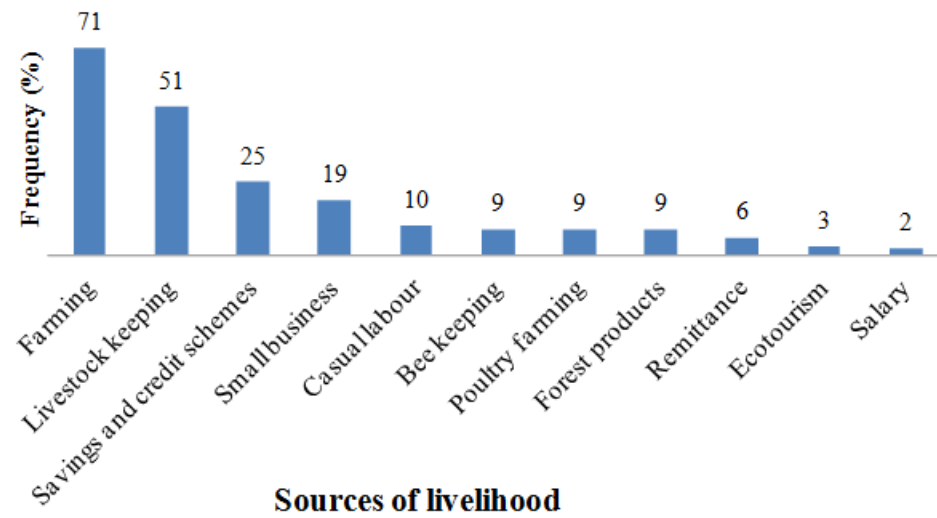
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Livestock production and farming were the main sources of livelihood in Tana delta in this study (Figure 3) as had been noted by Odhengo et al. [35]. Surprisingly the income from livestock does not equally trickle to the households in the Delta. Key informant and FGD attributed this scenario to the fact that a large portion of the livestock in the delta was owned by people residing outside the Tana delta as was also noted by Smalley, and Corbera [39]. The livestock sales the funds that flow back to the delta from the delta residents who own livestock, the salary paid to the workers engaged in the grazing of livestock in the delta and sale of milk by the herders as they are allowed to keep the milk sale proceeds by the livestock owners. The non-delta residents get the money after selling their livestock and use it elsewhere.



) L J X U Percentage contribution of various livelihood sources to household income.

Therefore, even though livestock production is undertaken on a larger scale in Tana Delta as compared to farming, the contribution of farming to household income was greater than that of livestock production (Figure 4). On the contrary, farming contributed directly to household incomes. On average farming contributed Ksh.64, 116 to household incomes per annum while livestock production contributed Ksh 46,055. Salary contributed the least to household income (Table 4).



) L J X U Percentage contribution of various livelihood sources to household income in the delta.

7 D E O Mean annual household income from various livelihood activities.

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Livestock production

Livestock keeping through pastoralism is the main livelihood production system in Tana delta. The orma and wardei are the main livestock keepers in the area [17]. The main livestock types kept are cattle, sheep and goats with cattle forming the bulk of all livestock. Donkeys are kept by the pastoralists as beasts of burden. The camel population is very small. Pastoralism is a major economic activity in the delta where local communities keep large herds of livestock as a sign of wealth and prestige. The orma and Wardei communities practice pastoralism which entails care of large herds of animals based on transhumance and whereby mobility is used as an adaptation strategy in search for water and grass and to avoid the presence of raiders.

Livestock movement in the delta is due to two main reasons. Firstly, the movement occurs due to the grazing patterns of the pastoralist and secondly due to trade in the livestock. During wet seasons in the delta, herders move West to as far as kitui and mwingi about 313 km. Key Informant indicated that they also graze in Somalia but as the rainy season ends they return to the delta as was noted by Mireri [20]. The driest months are between January and March when herds converge in the heart of the delta, passing through group ranches and crop farms causing conflicts as they move as was also noted by FAO [12]. Keeping large herds has however posed environmental and social challenges. For instance, although the migration of livestock in and out of the delta explains the importance of Tana river delta to pastoralists, it has often been a major source of conflicts between the orma and pokomo communities as migrating livestock graze on crops belonging to the Pokomo.

Results of the study indicate that there are at least 900,000 herds of cattle and over 1 million heads of goats and sheep. Majority of the pastoralists were reluctant to give the exact number of their livestock and indicated that counting the livestock would bring bad luck to them. The number of cattle reported by the study is therefore an under-estimate but give a rough estimate of livestock ownership in the delta and also noting different figures given by earlier studies as noted by Duvail et al. [36]. The economic returns from livestock farming is high considering that a mature cow and goat/sheep being sold at market price of Ksh 50,000 and Ksh 5,000 respectively, it would be expected that pastoralism would contribute significantly to household incomes.

The study revealed that the average annual contribution of pastoralism to household income is Ksh 46,055. This contribution was considered very low and was mainly attributed to the fact that most livestock were owned by outsiders, majority of those with the livestock are employed herders, who either live in temporary shelters in transit kraals or are housed by friends or tribesmen living in the delta. They only herd the animals to the market for the owners (decision makers) or the appointed agents to sell leaving them with scanty details of the true cash value of the livestock. The money earned from livestock sale is banked and hardly trickles as contribution to the local economy. The use of the delta resources to create wealth through pastoralism does not therefore trickle down directly to the locals with the herders benefiting mainly from milk production

and an annual compensation of one mature cow. Further, this lucrative economic activity hardly contributes to the development of the delta.

Indigenous poultry are kept mainly for sale by the pokomos who live mainly along the riverine and pastoral community women. Notably, commercial poultry keeping is also picking up slowly.

Crop farming

Small scale farming is the most important livelihood source which also contributes the highest amount of income to households in the delta, with the average size of land a household has access to being 1.5 hectares. The results are comparable to Hanshi, [25] which found farming to be the main source of household income. Perennial crops such as mangoes and bananas are mainly grown along the river bank while rice and grains are grown in the flood plains. The study indicates that farming is undertaken in all the sampled villages mainly for subsistence with the surplus produce being sold in the local market. The average annual household income from farming was estimated at Ksh 64,116. This income was considered low from the perspective of Tana Delta’s huge potential for farming [40]. Residents said that agricultural production was low due to lack of inputs such as quality seeds and fertilizers, frequent droughts and inadequate access to land and free grazing of livestock by pastoralists (Table 5).

7 D E O Challenges affecting livelihood activities in tana delta.

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Farming communities need to be capacity built so that they can embrace high value commercial crops such as horticultural crops in order to increase their incomes and adopt modern farming technologies. This should be further enhanced by value addition and ensuring market links. River Tana should also be harnessed for irrigation in order to increase production especially during dry periods. This should be further enhanced by value addition and ensuring market links. The Tana delta has a huge farming potential. Farming is however still limited to small scale cultivation along the river banks and in the flood plains. The ongoing land use planning should clearly aim at addressing these challenges while farming communities need to be capacity built so that they can embrace high value commercial crops such as horticultural crops so as to increase their incomes. River tana should also be harnessed for irrigation in order to increase production especially during drought.

Beekeeping

The study revealed that beekeeping is carried out as an economic activity in Walkon, Hewani, Kipini, Shirikisho and Hurara villages. It is an important economic activity in the tana delta with most of it occurring along the riverine area where nectar is abundant. Honey in the delta is produced by two main producers of honey comprising of individual farmers and registered community groups. Individual farmers tend to use traditional log hives made from logs taken from local trees and in which harvesting is done only once a year with major disruption to the hive’s structure and colony. Registered groups on the other hand tend to use modern manufactured top bar and langstroth hives in which harvesting can be done twice a year with little disruption to the hive or colony, and these hives are often given by donors such as Nature Kenya, world vision and arid lands resource management project, and often to groups. The study targeted groups that were supported by nature Kenya through funding from Department for International Development (DFID) which consisted of between 10-25 members. Beekeeping is good income source as it was reported that under good management, 20 kilograms of honey can be harvested from a Kenya top bar hive and 25 kilograms of honey from a langstroth (delta strategic environmental assessment baseline report ^[41]). The price of honey in 2013 in the local market stood at Ksh 300 per kilogram. With the current 20 Kenya top bar hives per group in each of the villages, and with two harvests per year each producing an average of 20 kilograms at a price of Ksh 300 per kilogram, the total income generated from honey per harvest would be Ksh 240,000 per group in each village.

Honey production in the delta was however found to be very low with the average annual income per group being Ksh 70,000, and the average annual contribution to household income being Ksh22,408. The low honey production and consequently low income derived from beekeeping was attributed to the fact that the farmers are still learning and face challenges due to poor management, low market prices and frequent droughts resulting to high bee absconding rates (Table 5). KI and FGD indicated that more training, capacity building and sensitization need to be carried out with a view of improving community skills in managing the beekeeping enterprises. The program also needs to help community members to find better and more profitable markets for their produce to enhance the gains made. Further there is need for value addition through building a bulking, processing and marketing centre coupled with branding the honey ‘tana delta natural honey’.

Fishing

Focus group discussion revealed that fishing is mainly practiced in Moa, Ozi, Hewani and Onkolde villages with Moa being the leading. It is done in the delta’s lakes and water courses with the main fishing communities being the Malakote, Bajuni and Luo. Fish farming has however been introduced to communities in the Tana River Delta mainly by donor projects such as the Nature Kenya-DFID program with an aim of diversifying income sources and improving community benefits from fishing enterprises. The fish farming enterprises are however still in their formative stages and therefore their economic contribution to community livelihoods could not be established yet.

Key Informant Interview and FGD indicated that there is presence of several riverine fish species most of which are found in the main river channels particularly in sheltered, low velocity areas, swamps and in oxbow lakes. Lake Moa had the

highest number of fish and this explains why Moa village was leading in fishing. The lake has 300 fishers and 30 boats with a total of 40 registered traders and reported 20 other illegal fishermen. Most of the fish is sold smoked, fried or sun dried. Fish from lake moa serves both local as well as markets in distant towns such as garsen, hola, malindi, gongoni and mombasa.

Fish is the second most important animal protein in Tana delta after livestock. Traditionally fish was not consumed by pastoral communities. Information obtained from focus group discussion indicate that the situation has changed and some pastoralists now eat fish besides obtaining income through fishing activities. This was attributed to the immigration of the Luo community who originates from the shores of Lake Victoria and is traditionally fish mongers into the Tana Delta which influenced the other communities and further enhanced the exploitation of fisheries for food, employment and income as was noted by Matiku^[42]. The average annual household income from fishing was found to be Ksh 17,706. Inadequate funds to improve fishing enterprises, poor storage facilities and declining fish stocks were attributed to low yields and consequently low household income (Table 4).

Therefore, more training, capacity building and sensitization need to be carried out with a view of improving community skills in managing the enterprises. Credit facilities should also be availed to enable community members expand these enterprises while initiatives to help community members access better and more profitable markets for their produce should be initiated.

Employment

Salaried employment was low across all the sampled villages. This scenario was largely attributed to the low education levels that hinder residents from accessing high end gainful permanent employment. Casual employment was more common in the farming communities of Wema and Hewani as opposed to pastoralist communities where it was very low. Majority of those in casual employment work in Tana and Athi river development authority rice farms. Although the number of people involved in casual employment was relatively low, it contributes a considerable amount of income to the households with employed members.

The nature based enterprises have a direct contribution to the delta residents (Table 4). However, their quantity and quality need to be enhanced in order to further improve the livelihoods of the resident communities and reduce the acute inequalities in terms of resource access and use, as well as power and influence. This shall play an important role in managing resource use conflicts. Further strategic and deliberate affirmative actions may be necessary to assist the disadvantaged groups benefit from the delta resources.

Therefore, more training, capacity building and sensitization need to be carried out with a view of improving community skills in managing the enterprises. Credit facilities should also be availed to enable community members expand these enterprises while initiatives to help community members access better and more profitable markets for their produce should be made. Table 5 highlights some of the challenges affecting livelihood activities in Tana Delta and the suggested means of addressing them as perceived by TD community during FGD.

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Farmer's lack of secure land ownership had prevented them from investing in land development and limited their access to land with the pastoralists accessing nearly all the land and occasionally interfering with their farms and/or even fueling conflicts^[22,25]. Land tenure is based on communal land ownership^[12], and land access rights are mainly acquired through inheritance^[12] but purchase and allocation by chiefs is common. The government realized the importance of land in livelihood improvement in Sessional paper no 1 of 2017 by indicating that "Land is needed to provide basic social services and to support economic activities in all sectors. While there has been significant progress over the past four decades, land ownership and use patterns still contribute to poverty and inequality, as there are inadequate opportunities for poor people to access^[15]".

The ongoing land use planning should clearly aim at addressing these challenges as land ownership remains an emotive issue and as such, the survey focussed on land use and access realizing that this study showed that more men participate in land use planning (Figure 5). It was evident that the community members are aware that the delta is a trust land^[30] under which although they are the "owners", other people have access to. They are also aware that their access rights are not secure and are hinging their hope on the new constitution and non-governmental organizations such as Nature Kenya who have been assisting them to advocate for their rights and develop a land use plan^[19]. Some villages, mainly those of pastoralists use the delta resources for grazing more than others, and the use often goes beyond the delta area and extends to other areas such as Marereni in Malindi and Mpeketoni in Lamu with instances where it goes to as far as Somalia.

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In both Kipini and Walkon villages, no females were either aware of or had participated in land use planning. The situation in Walkon could be attributed to cultural factors that confine women to domestic activities in the mainly pastoralist community. In Wema, Moa and Hewani, the level of female awareness and participation in land use planning was also low compared to that of their male counter parts. Shirikisho, Hurara and Onkolde had the highest percentage of female awareness and participation in land use planning with Shirikisho leading. This conforms to FAO [12] that many pastoral communities are patriarchal and men own livestock and land resources.

Generally, the level of awareness among females was low as compared to their male counterparts, and cultural factors could be responsible for this situation considering that women spend a considerable amount of their time performing domestic chores and hardly have time for other engagements. This was contributed by socio-cultural and other factors like high illiteracy levels that limit women participation in decision making [12]. Though the findings indicate low community participation, the level of awareness among resident members in villages such as Shirikisho and Hurara who are mainly crop farmers is high as opposed to pastoralists who are mostly non-residents. This scenario is expected to improve the social status of resident communities and ensure better access and use of tana delta resources hence reducing acute group inequalities, thus contributing to conflict management. The low levels of community participation in land use planning could be attributed to inadequate community awareness on the ongoing land use planning processes as well as the nomadic nature of most residents since those that were initially involved in the process might have moved out of the Tana Delta. Furthermore, current land use planning initiatives engage employed herders and small scale livestock keepers, who have little power and authority on grazing and delta resource use and access and may not be the ones who bring back the livestock in the subsequent years. Effective land use planning therefore requires active engagement of livestock owners as well as more awareness creation and capacity building on the ongoing land use planning process. This could be further enhanced by training Tana delta resident peer awareness teams by targeting the resident members.

Effective land use planning require active engagement of livestock owners who are the main decision makers in terms of access and use of delta resources as opposed to the herders who are merely decision implementers. Furthermore, there is need for deliberate engagement of the resident community members and building their capacity to act as agents for peer awareness creation since the herders who graze the animals in the delta are not necessarily the same who bring back their livestock year in year out in search of pasture and water.

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Sustainable management of the Delta must ensure effective land use planning that ensures a balance between conservation, community access to land resources for their livelihood activities and private development. This will ensure peaceful co-existence among the various user groups hence contributing to economic stability of the delta. Furthermore, there is need to constitute a multi-stakeholder forum that brings on board pastoralists, farmers, politicians, NGOs and the national government to spearhead peace building initiatives in the area. Targeted efforts should also be made to bring on board decision makers at the community level. These stakeholders should have clear roles, standards and enforcement procedures aimed at preventing conflicts while local solutions to conflict management should form an integral part of the peace building initiatives. The government (both national and county) should provide oversight and schematic technical and policy support to ensure sustainable use and management of the Delta resources.

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The authors are very grateful to the Tana delta community for provision of the information. We are very appreciative to the DFID through Nature Kenya for funding this study.

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