

Yearning for an Apple: The Changing Lifestyle of the Tana River Delta Communities in Kenya and Implications on Livelihoods and Conservation of Natural Resources

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Abstract

Tana River Delta is occupied predominantly by pastoral and farming communities that inhabit defined zones in the Delta. A study was undertaken to assess changes in the lifestyle of communities living in the Delta and its implications on livelihoods and conservation of natural resources. Literature review, household questionnaires, social and resource mapping, key informant interviews, village-based focus group discussion and structured observations were used to collect data. It was evident that the delta communities are aware of the delta resources, their uses, utilization and best management options. Additionally, they were knowledgeable on the delta resources use by non-residents, the resultant conflicts and the food status in the community. They had a good understanding of the new food they would wish to have in their diets and the means of accessing them. Modernity has pushed the community to yearn for development ("Yearn for an Apple") to access foods that other parts of the country are eating, with implications on livelihoods and conservation of Delta resources. Reversing degradation and enhancing the development of the Delta area require the involvement of all stakeholders, informing and seeking the consensus of decision-makers and the real users of the Tana delta. The Government has to provide overall security and development.

Keywords

Tana Delta, Pastoralist, Development, Apple, Livelihood and Diet

1. Introduction

River deltas provide multiple ecosystem services and are major centres of agriculture, industry and commerce globally [1], making them vulnerable to intensive development and unsustainable utilization [2]. These ecosystems are, however, facing degradation [2] through erosion, subsidence and subsequent flooding. River deltas are home to a half-billion or more people and have uncharacteristically high population densities and support high biodiversity [3]. Threats facing these ecosystems include damming and diversion of water, construction, irrigation and land alteration. A better understanding of delta dynamics and vulnerability and a lot of political goodwill is needed to implement adaptive delta management, restoration, and rehabilitation strategies. The involvement of stakeholders and citizens helps generate societal support for management or policy decisions [3].

Tana Delta in Kenya is of global, regional, national and local importance in the conservation of biodiversity resources and has immense social and economic value [1] [4]. These values are conflicting with dire consequences on the Delta's biodiversity, which include endemic species such as Tana River red colobus (*Procolobus rufomitratus*) and Tana River crested Mangabey (*Cercocebus galericus*). The Tana Delta has been declared an Important Bird Area (IBA), providing habitat to more than 345 species of birds, including the threatened Basra reed warbler (*Acrocephalus grisealis*) and Tana River cisticola (*Cisticola restrictus*). Additionally, the Delta is a stronghold for two Near Threatened, restricted-range species, *Anthus melindae* and *Acrocephalus grisealis*, while supporting one of the very few breeding sites for colonial waterbirds in Kenya. The lower Tana riverine forests are part of the Coastal Forests of Eastern Africa Hotspot [5]. They are also a major faunal link between northern and southern biogeographic zone species.

The Delta is a common use area for the communities inhabiting the area and seasonal grazers from other parts of the country and neighbouring countries [4]. The Tana Delta supports diverse livelihoods of the communities residing in the Delta, mainly the farming and the pastoralist communities comprising diverse ethnic communities [6]. The Pokomos, who are a Bantu, are farmers, while the Orma and the Wardei are nomadic and transhumant pastoralists. The farmers and the pastoralists derive their livelihoods from the Delta. The farming and pastoralism lifestyles are distinct and often in competition, often creating periodic conflicts between these two communities, particularly during the dry season.

Owing to its unique biodiversity resources, Tana Delta has a vast potential for nature-based development, such as ecotourism, beekeeping and sustainable agriculture, which has been practiced by the local people since time immemorial. Despite the huge potential for conservation of biodiversity, Tana Delta is threatened by various factors [7], which include: population growth, weak conservation efforts, changing land-use practices within and upstream of the Delta

[4], dry season grazing area for pastoralists from as far as Wajir and Somalia, intensification of sedentary settlements, increased land selling, irrigation and rain-fed farming. Competing land-uses have often resulted in conflicts as farmers and pastoralists compete over key resources with siltation and discharge of chemical residues into the river, exerting pressure on the ecological integrity of the Delta. Additionally, the proposed developments would have far-reaching implications on biodiversity resources and community lifestyle, livelihoods and resource ownership. The situation would be worsened by the effects of strategic investment due to The Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) and global impact from countries like the Emirate of Qatar. They have expressed interest in leasing large areas of the Delta to produce food for their citizens.

The Delta community has been yearning for an apple through requiring their area to develop like the other parts of the country to ensure the betterment of humankind [8]. This development will ensure that social conditions within a nation (here a community) in which the authentic needs of its population are satisfied by the rational and sustainable use of natural resources and systems [9]. Development in Tana Delta needs to be viewed from modernization theory [9]. Modernization is a transformative process; for a society to move into modernity, its traditional structures and values must be replaced by a set of modern values. Further, it notes that modernization is an imminent process due to its systematic and transformative nature, which builds change into the social system. The term yearning for an apple has been used to describe the changing community lifestyles and subsequent desire to access modern diets and quest for a better quality life. As the delta community access the apple it may lead to degradation of TD resources if not well managed. This will call for a holistic approach to conservation and development as a means to meet the need for an apple by the delta community.

This study was part of two projects: the development of the Tana Delta Land Use Plan (LUP), which aims to ensure regulated access, sustainable use of resources and improved rangeland management that will lead to improved sustainable livelihoods, security and equity, and biodiversity conservation and the project on “Balancing water services for development and biodiversity in the Tana-Delta through support from the Darwin Initiative and Nature Kenya. The projects are being implemented in the heart of the Delta, where biodiversity is richest and access to water and land is hotly contested. The project supported several villages and two County Governments to balance water use for development and biodiversity conservation by establishing a Community Conservation Area (CCA) at the core of the Delta. It is also supported by a subset of the target 35,000 people comprising the poorest households to demonstrate to communities how to develop and diversify livelihoods within a CCA. The study assessed the Tana Delta baseline household well-being and socio-economic status, including change of lifestyles of the target communities, levels of conflicts over resources, their impact on livelihoods, and the proposed mitigation measures. The implications of local livelihoods and conservation of natural resources are hig-

highlighted in this paper.

2. Methodology

2.1. Study Area

The study was conducted in Tana Delta, which is within the Tana Delta Sub County of Tana River County in the Coast region of Kenya, which is over 90% Arid and Semi-Arid Lands (ASAL). It experiences bimodal rainfall pattern averaging 800 - 1000 mm p.a. The sub-county occupies 16,012 Km², out of which agricultural land is 3822 Km² and rangeland is 8964 Km² [1] [10]. The Delta ranges between two kilometers and up to forty-two kilometers in width (**Figure 1**). The river discharges, on average, 4000 million m³ of freshwater and 3 million

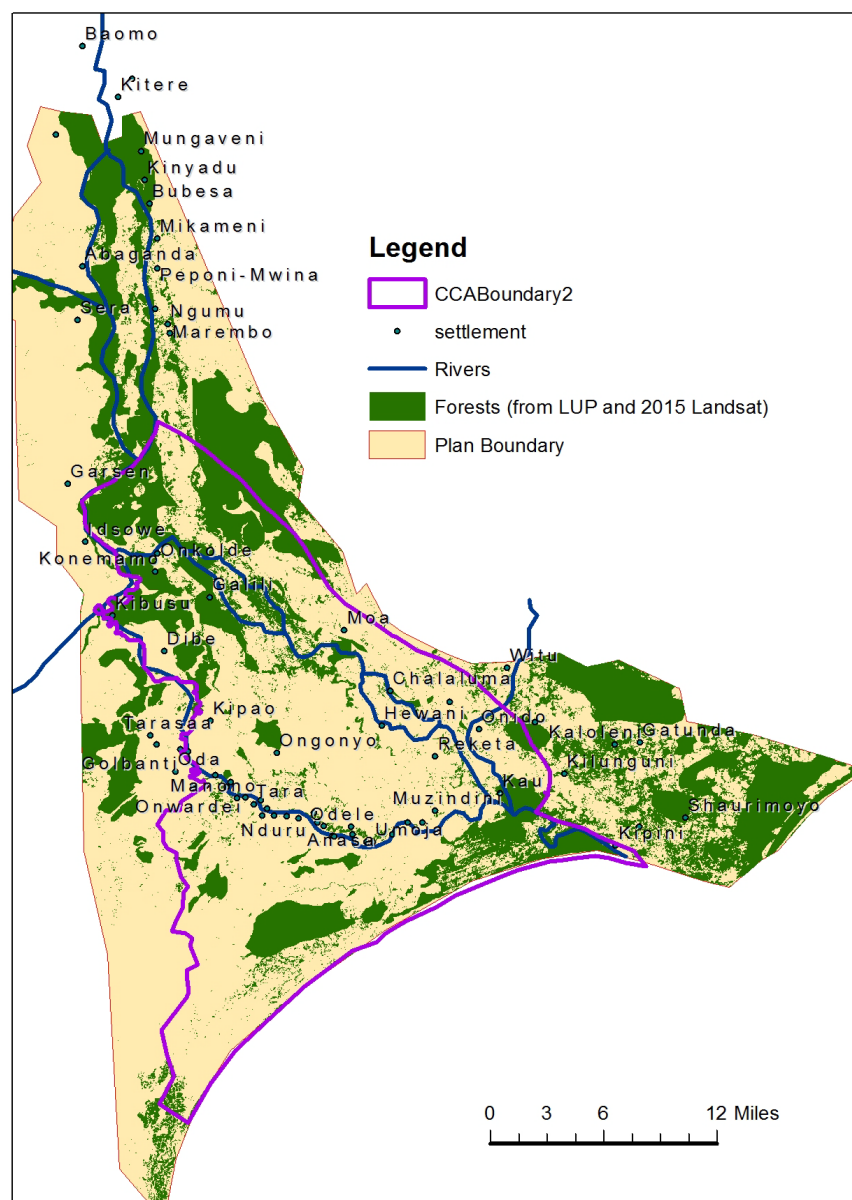


Figure 1. Tana delta and study villages (Source: Nature Kenya GIS).

tonnes of sediments annually, which enter the ocean near Kipini at Ungwana Bay [4]. The Tana Delta area and associated ecosystems cover an area of 1300 km². The Delta is subject to frequent flooding and changes in the network of channels and canals. The Delta has a coastal strip of 35 km protected by a 50 m high sand dune system [4].

The study area comprised of fourteen villages in Tana Delta as outlined in **Table 1**.

2.2. Data Collection Methods

Enumerators were selected from each of the participating villages and trained alongside the community leaders on the data collection approach. The community leaders were to sensitize the community on the data collection exercise and provide social support to the enumerators. Both qualitative and quantitative approaches were used to collect data. Sixteen Focus Group Discussion (FGD) were conducted with one FGD being held in each of the fourteen villages with selected community members comprising village committee members and ordinary residents with a vast knowledge of the respective villages. An additional two FGDs

Table 1. Demography of the study villages.

Village	Location	Major ethnic group	Major economic activity	Minor livelihood activity
Chaluma	Off Garsen Lamu Road, about 7 km from Witu town	Orma	Pastoralism	Subsistence farming
Handaraku	About 15 km North of Tarasaa town	Orma	Pastoralism	Irrigated farming along the banks of River Tana
Golbanti	7 km North West of Tarasaa town	Pokomo	Farming	Small scale businesses
Bularahma	Around 10 km left of the main Lamu-Malindi road past Gamba Police station	Wardei	Pastoralism	Farming, fishing and small scale trade/business
Didewaride	12 km off Garsen-Lamu road	Wardei	Pastoralism	Small-scale businesses
Hewani	3 km off the main Lamu-Malindi Road around Gamba area	Pokomo	Farming	Beekeeping, small scale businesses
Hurara	Located at the border between Tana River and Kilifi Counties along Lamu Malindi Road	Kamba and Giriama	Farming	Beekeeping, and small scale businesses
Nduru	5 km North West of Tarasaa town	Orma and Pokomo	Pastoralism and farming	
Ozi	Found in the lower part of TD and borders the Indian Ocean	Pokomo	Farming and fishing	
Onkolde	14 kms left of the main Lamu-Malindi road just past Galili Chief's office	Orma	Pastoralism	Small scale businesses, fishing and small scale farming
Shirikisho	km right off the Malindi Lamu Road near Minjilla	Pokomo	Farming	Beekeeping, small scale farming and small scale retail businesses
Moa	6 km right of the main Lamu-Malindi Road around Nyongoro	Luo, Orma, Giriama, Luhya and Kamba	Pastoralism, fishing and farming	Small scale businesses and poultry farming
Idsowe	2 km from Minjila and straddles the Garsen-Lamu road		Agricultural and small businesses	
Hamesa	Found within Garsen town	Orma and Wardhei	Pastoralists	Business and farming

were held with representatives from all the villages at the beginning and the end for feedback and validation. Key Informant Interviews (KII) were conducted with officers from Nature Kenya, representatives of local NGOs, Area Chiefs and village elders. Participatory Rural Appraisal (PRA) tools, including well-being ranking and resource mapping, were also used to obtain qualitative data.

PRA tools were used: household well-being characterization was done for each village and later consolidated to a general well-being ranks and characterization for the entire Delta area (**Appendix A**). The households were classified into four broad categories and the indicators for ranking households were based on the five capitals and included; livestock number, ability to educate children, authority and social status, farming type and farming area. The respondents indicated that there is a fifth category that has no means of survival that survives through God's grace with support from well-wishers. The ranks were; Rank A: perceived to be well-off or rich (in Kiswahili¹ referred to as Tajiri), Rank B: perceived to be moderately well-off or rich (in Kiswahili referred to as Tajiri wa kadri/Tajiri kiasi), Rank C: perceived to be slightly well-off or poor (in Kiswahili referred to as Maskini) and Rank D: perceived to be least-well-off or very poor (in Kiswahili referred to as Maskini sana). Social mapping was done to identify the delta stakeholders, resources and conflicts, undertake diet profiling and list what the communities are eating, their sources and identify the new diets they would wish to eat indicating how they would access the diets.

Besides, a total of 631 households were interviewed using semi-structured questionnaires to obtain community perceptions on natural resource management, land ownership, livelihood and income sources, diversity of diets and conflict management. The results were analyzed using MS-Excel computer software and subjected to descriptive statistics involving computation of sums, means, frequencies and percentages and presented through charts and graphs.

3. Results and Discussion

3.1. Characterisation of Respondents Household Well-Being Levels

Household well-being ranking indicated that the majority of communities living in Tana Delta were either poor (41%), very poor (39%) with the well-off being 15% and the most well-off (Rank A) being 5%. The KI and FGD attributed this situation to a lack of competitive market prices for their products, drought and diseases, which affect both crop farming and pastoralism negatively.

The high levels of poverty were attributed to inadequate rainfall that has limited the productivity of livelihood activities, mainly crop farming and livestock keeping, as well as incidences of conflicts in the Tana Delta, which disrupts livelihood activities. The findings of this study compare with earlier studies [11] which found that despite continued efforts to enhance agricultural productivity and the increased momentum towards globalization, along with increasing scarcity of land and water resources, poverty and resource degradation have in-

¹This is the official language for Kenya.

creased in some marginalised areas, especially in sub-Saharan Africa.

3.2. Status of Natural Resource in Tana Delta and Community Conserved Areas

Respondents expressed concern that the status of natural resources in Tana Delta has continued to deteriorate over time, and this was attributed to anthropogenic factors. These include deforestation (66%), change of river course (18%) and overgrazing by livestock owned by immigrants (16%), which was largely blamed for perennial drought and resource use conflicts witnessed in Tana Delta. Flooding remains a challenge though the community did not mention it. These findings vary from earlier studies [12] which summarised the main threats to the conservation of Tana Delta as poor governance, sectoral approach to resource management, lack of community access and participation in decision making, lack of access to environmental information for local communities, lack of a legal remedy and land tenure insecurity.

To address these challenges and improve the management of Tana Delta's natural resources, respondents proposed strict enforcement of rules and regulations governing the use of Tana Delta resources, community sensitization on sustainable natural resource management and implementation of afforestation and reforestation programmes. They also proposed restricting grazing of livestock from other areas, the introduction of alternative income-generating activities to relieve pressure on natural resources, non-interference with the river course and improved management of CCAs. Respondents expressed willingness to have the CCA well managed, with the majority (66%) proposing community-based management as the best management strategy. Another 34% proposed multi-stakeholder management to enhance accountability in the management of CCAs.

3.3. Land Ownership and Use

About 27% of land in Tana Delta was perceived by household respondents to be owned individually, while 73% as owned communally. In 2012, communal land ownership was over 80% [10]. The community recognizes community land ownership/tenure system. Of those with individual land ownership, only 13% have title deeds. Another 54% have sale agreements, 31% allotment letters and 2% lease certificate. As community land ownership decreases and individual ownership increases, there is a likelihood of non-delta residents purchasing land. This is likely to escalate resource use conflicts and more land appropriation. Furthermore, the high number of sale agreements is a pointer to increasing cases of land sub-division and sale that was mainly attributed to the strategic location of the Delta as a major component of the Lamu Port Southern Sudan-Ethiopia Transport (LAPSSET) corridor project being spearheaded by the Government of Kenya. A study conducted earlier [12] concurs that the proposed Lamu Port will have severe environmental consequences on the Tana Delta.

Respondents further recommended land adjudication as a remedy for ensur-

ing sustainable land management as well as averting the high cases of land-use conflicts recorded in Tana Delta, since most residents do not have land ownership documents. Though a positive move, individual land ownership is likely to have a negative impact on livestock grazing, the major community land use. Such a move would therefore require to be supported by awareness creation, the introduction of more profitable alternative land-use activities to replace livestock grazing and conserve wildlife conservation areas.

The average size of land used per household was 19.5 acres, land was allocated for various uses as follows; grazing area (48%), the area under trees (25%), crops (18%) and 9% under homestead. The land was generally said to be adequate, but land use planning at the location and village level is still a major challenge and could be addressed through the planned implementation of The Tana Delta land-use plan. There were reported cases of more investors coming into the Delta to engage in large scale commercial farming, a scenario that is likely to exacerbate conflicts as competition for land among farmers and pastoralists escalates as any increase in crop production and urbanization is expected to reduce grazing land.

These findings compare with past studies [13], which established that the ecological balance of the Tana Delta, which has been maintained by traditional land-use practices, is threatened by ill-conceived and unsustainable development projects in the upper catchment and at the Delta. Integrating environmental considerations into the management and the development of the delta area, to reconcile interests and ensuring that the development of the natural resources is in harmony with the ecological processes [13].

3.4. Main Livelihood Activities and Sources of Income

Farming was the main source of livelihood practiced by 71% of households in Tana Delta, while salary was the least source of livelihood (2%). Farming is, however, mainly practiced for subsistence with the only surplus produce sold in local markets (Figure 2), contributing less to household cash income.

The community, as indicated through FGD and KII, has numerous livelihood activities as outlined in Appendix B. It was evident that the community has a high diversity of livelihood sources [14]. Additionally, the organizations were aware of the challenges facing these livelihood activities and knew the best option to increase the livelihood sources. All Gender was involved in the livelihood activities, with a few being gender-specific.

Challenges Affecting Livelihood Activities

The livelihood/income-generating activities mentioned above, however, face several challenges that affect their productivity. Crop invasion by wild animals and diversion of Tana River was ranked (highest frequency) as the greatest challenges to productivity in Tana Delta (Table 2). Respondents recommended ways of addressing them through capacity building, provision of farm implements and improved road network and formation of marketing

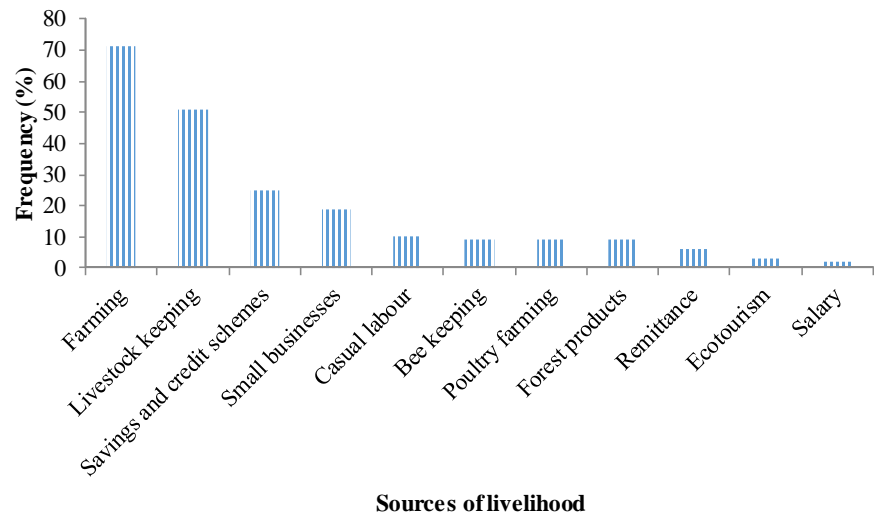


Figure 2. Main sources of livelihoods (Source: Field survey data).

Table 2. Challenges which limit productivity.

Challenge	Frequency (%)
Inadequate rainfall	82
Crop and livestock diseases	23
Attack of crops by wild animals	20
Diversion of Tana river	14
Inadequate capital	10
Inadequate crop farming skills	10
Poor market prices	9
Inadequate pasture	8
Ethnic conflicts	8
Inadequate arable land	7
An influx of livestock from outside the Delta	5
Inadequate quality seeds	2
Inadequate animal husbandry skills	2

cooperatives. This confirms the observation by [14] that in the Tana River Basin, livelihoods are clearly and inextricably linked to the natural environment in a co-evolving way such that people influence and are influenced by land cover.

The delta economy is agriculture-based with increased interest in improved poultry and cash crops. FGD indicated that this requires technical support to maximize production and its livelihood contribution as was similarly recommended earlier [10].

3.5. Income Sources in the Delta

Pastoral communities mainly practice livestock keeping for commercial value.

The majority of this livestock is, however, owned by people living outside the Delta; hence the benefits accrued do not directly translate to enhanced community livelihoods in the Tana Delta. This explains why farming ranked as the most important livelihood activity (**Figure 2**), although livestock farming generates more income (**Figure 3**).

Livestock keeping was the highest source of income (Ksh. 142,543 per annum) followed by savings and credit schemes with poultry farming being the least source of income at Ksh. 14,570. Analysis of average household income per annum per village revealed that male-headed households generated more income from the various livelihood activities as compared to the female-headed households (**Table 3**).

This could be attributed to lower women participation in major income generation activities, notably livestock keeping, savings and credit schemes, fishing and fish farming, forest products and small businesses (**Table 4**) by women. Respondents were of the opinion that women spend a substantial amount of time performing domestic chores and taking care of children and are thus often excluded from other development activities. Women's participation was very high in poultry keeping and farming. Affirmative action could enhance their participation in these and other IGAs. These findings compare with earlier observation [15] which found that men own more and higher value assets than women and empirical evidence shows that ownership and control of assets affect household income.

3.6. Diversity of Diets

The community has maize and rice as their staple food, but they would wish to eat foods that were hitherto considered for urban populations. This has been caused by good road network and Information Technology, which have increased their level of interaction with communities from outside the Delta.

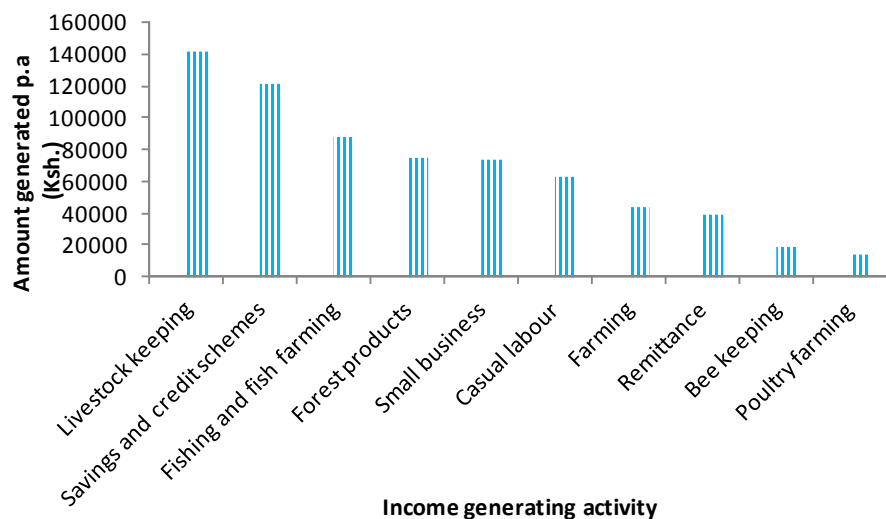


Figure 3. Main income-generating activities (Source: Field survey data).

Table 3. Average household income earned in 2017.

Village	Main IGA	Average household income earned in 2017 (Ksh.)	
		Male headed households	Female-headed households
Bularahma	Livestock keeping	25,179	27,771
Onkolde	Livestock keeping	54,714	73,500
Moa	Fishing and Farming	43,510	39,000
Shirikisho	Farming and Beekeeping	57,344	33,000
Idsowe	Farming and Trading	54,440	17,500
Golbanti	Farming	22,339	23,000
Nduru	Farming and Livestock keeping	159,419	40,000
Hewani	Farming	40,218	22,632
Hamesa	Farming and pastoralism	95,581	67,969
Hurara	Farming and Beekeeping	59,467	55,252
Handaraku	Livestock keeping	125,000	(No female-headed HH recorded)
Ozi	Farming and fishing	99,789	54,929
Didewaride	Livestock keeping and fishing	34,313	34,559
Chalaluma	Livestock keeping	48,238	21,938
Average		71,466	39,312

Table 4. Gender representation in main IGAs.

Income Generating Activity	% Men	% Women
Livestock keeping	71	29
Farming	53	47
Beekeeping	73	27
Fishing and fish farming	84	16
Casual labour	88	12
Small business	71	29
Forest products	81	19
Poultry farming	32	68
Savings and credit schemes	71	29

3.6.1. Main Types of Food Eaten

The type of food eaten is often used as a proxy of food security and the well-being status of a community. The main types of foods consumed by households in the Tana Delta are highlighted in **Figure 4**.

Maize and rice were the leading types of food consumed by 90% and 81% of the community respectively, while sorghum and honey were least consumed by 4% and 2% of the community respectively. The diversity of diets was assessed across the 14 sampled villages with results indicating variation in the level of

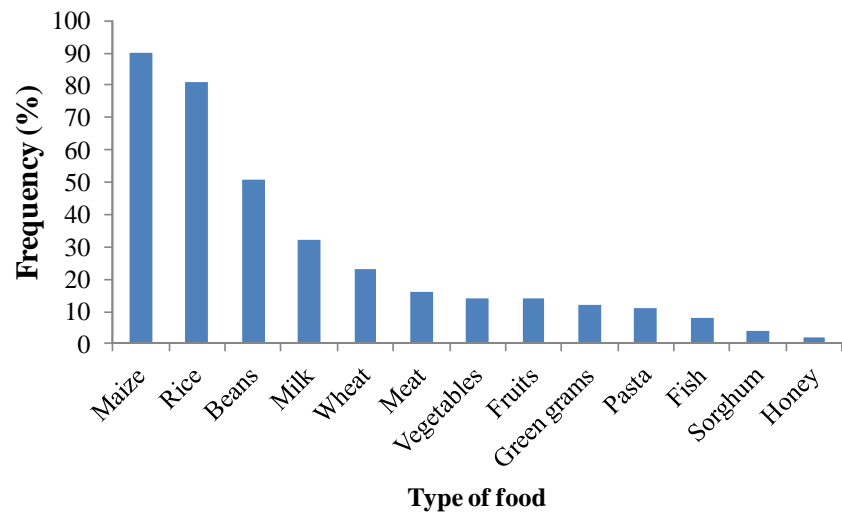


Figure 4. Main Types of food eaten in the Tana Delta (Source: Field survey data).

consumption of the main food types based on each village's main economic activities, relief food support and well-being status (**Table 5**).

Maize and rice were the most consumed foods, followed by beans. Consumption of vegetables and fruits was generally low, hence causing a major challenge to nutrition, as was exhibited by malnutrition among children. The World Food Programme (WFP) estimates that about 10 million people experience nutritional deficiency diseases due to a lack of access to quality foods [16].

Although the major foods consumed were found to be similar, the extent of consumption varied across the villages, depending on their socio-economic activities. All members of the household consume common meals; hence there were no food preferences recorded based on Gender and age. This was further exacerbated by the high cost of food, which makes household members eat available foods; 71% of the food eaten was purchased from shops while only 26% was produced on farms. Another 3% of the food eaten was obtained from relief agencies. Respondents expressed concern that households spend an average of Ksh. 25,186, which comprise about 90% of their household income on food with only 10% left to take care of other household expenses. The households require more activities to provide cash income to enable them to continue accessing food, which is mainly bought. Special measures need to be put in place to address the needs of poor households who may not have cash as means of securing their food security. In 2008, Kenya was found to suffer from chronic food insecurity with the majority of those affected being the very poor [17].

3.6.2. Annual Food Calendar

Food scarcity is a major challenge in the Delta with 35% of households reporting that they often go for more than 3 weeks without food. Another 11% of the households go for up to 1 week without food, while 17% reported going without food for between 2 - 3 weeks. Households have, however, developed mechanisms for coping during periods of food insufficiency; 48% borrow food from neighbours,

Table 5. Types of food eaten segregated into villages.

Village	Number of people consuming each food (%)												
	Maize	Rice	Beans	Milk	Wheat	Meat	Vegetables	Fruits	Green grams	Pasta	Fish	Honey	Sorghum
Bularahma	67	98	65	70	47	63	0	0	2	15	0	0	0
Onkolde	87	30	50	73	3	20	0	3	3	0	0	0	0
Moa	82	45	7	67	22	23	15	5	0	0	22		0
Shirikisho	98	80	50	5	42	2	5	7	5	38	3	7	0
Idsowe	100	93	93	17	47	33	47	47	0	0	0	13	0
Golbanti	97	80	37	30	23	17	60	0	23	0	17	3	0
Nduru	100	100	62	10	17	23	0	3	0	0	50	0	0
Hewani	98	85	35	7	7	2	5	8	60	5	3	5	43
Hamesa	93	97	97	7	10	3	17	0	7	20	0	0	0
Hurara	100	58	60	0	27	7	42	2	8	5	3	0	0
Handaraku	97	93	50	83	37	20	27	10	43	50	0	0	0
Ozi	63	100	35	1	33	3	5	93	15	7	8	0	0
Didewaride	95	85	62	10	0	17	3	0	0	18	0	0	0
Chalaluma	100	93	90	80	23	10	20	3	36	27	3	0	0

32% reduce the amount of food consumed, 19% depend on relief food and 1% obtain food items on credit from local shops. The National Drought Management Authority (NDMA) estimates that about 100,000 people in Tana River County, majority of whom are found within the Tana Delta, are hunger stricken due to failure of both short rains and long rains for two successive years and urgent interventions are needed to save lives [18].

Each village had a good knowledge of the food they eat throughout the year as represented by the annual food calendar for Chalaluma, as outlined in **Table 6**, which demonstrates that the community is faced with severe food shortage for eight months in a year.

The community indicated food scarcity was due to drought and poor livestock health. During the period of food scarcity, people may take up to four days without food. The scenario in Shirikisho village show how communities in the Delta cope with food shortage (**Table 7**).

3.6.3. Diet Analysis

Diet was indicative of the food eaten by the community. It was indicated that the communities in Tana Delta have a diversified diet that is not gender-specific with both men and women contributing equally to their provision, as shown in **Table 8**. The community listed the following as the main foods eaten by them; Cassava, Sweet potatoes, pineapples, Bananas, *Maduga*, watermelon and wild fruits (*Nkindu*, *nyambebe*, *Kaa* and *Njiga*). They indicated that there are minimal gender and ethnic diet differentiations, but well-being differences are significant. Fishing is done in May, June and July. The households with employed

Table 6. Annual food calendar for Chalaluma village as perceived by FGD.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ugali (a <i>solid paste made from a mixture of maize flour and water</i>) Tomato Amaranth Beans	Ugali Tomato stew Porridge for children	Ugali alone or tea without milk	Ugali with			Ugali Milk Fish		Ugali and vegetables or tomato stew			
Severe food scarcity	Food scarcity	Severe scarcity of food				Food sufficiency when livestock prices are good		Medium Food sufficiency			

Table 7. Sources of the different food types provided to households in Shirikisho village.

Stakeholder/Support	Maize	Beans	Rice	Cooking oil	Meat	Finger Millet	Green Grams	Maize flour
National Government	√	√	-	√	-	-	-	-
County Government	√	√	√	√	-	-	-	-
Red Cross	√	√	√	√	√	√	-	√
Nature Kenya	-	-	-	-	-	-	√	-
Turkey Government	-	-	-	-	√	-	-	-
Mama Hong NGO	-	√	-	-	-	-	-	√

Table 8. The foods which are eaten by the different Gender in Idsowe, Nduru and Shirikisho villages.

Diet	Children	Girls	Boys	Women	Men	Old men	Old Women
Bananas	√	√	√	√	√	√	√
Beans	-	√	√	√	√	√	√
Biriani (Rice meal)	√	√	√	√	√	√	√
Chapati	√	√	√	√	√	√	√
Eggs	√	√	-	-	-	-	√
Finger Millet	-	-	-	-	√	-	-
Fish	-	-	√	√	√	√	√
Fruits	√	√	√	√	√	√	√
Githeri	-	-	√	-	-	-	-
Green grams	√	√	√	√	√	√	√
Kales	-	√	√	√	√	√	√
Mangoes	-	-	√	√	-	-	-
Meat	-	√	√	-	√	-	-
Milk	√	√	-	√	-	-	√
Porridge	√	√	-	-	-	√	√
Potatoes	√	√	-	-	-	-	-
Soup	-	-	-	-	-	-	√
Spaghetti	√	√	√	√	√	√	√
Tea	√	√	√	√	√	√	√
Ugali	-	-	√	-	√	√	√
Vegetables	√	√	√	√	√	√	√
Viazi (sweet potatoes)	√	√	√	√	√	√	√

members eat modern food types comprising of the following: rice, chapatti, pasta/spaghetti, milk, blue band (margarine) and cooking oil. The diets are becoming modernized as local communities interact with communities from outside the Delta and the improved road network facilitates the movement of goods and services into and outside the Delta.

3.6.4. New Diets (The Apple)

About 91% of the respondents said they were willing to diversify their diets. They further suggested that they would wish to include meat (41%), vegetables (23%), pasta (22%), wheat (19%), fruits (15%), milk (14%), eggs (13%), rice (9%) and beans (8%). Other foods that residents would like to include in their diet were millet, mushrooms and honey at 2% each. Respondents recommended the introduction of poultry keeping in the area to provide them with eggs, which they mentioned was highly nutritious for children and easy to prepare. They further emphasized that although vegetables and fruits were being imported from other regions and sold in local markets, the prices were often very high and beyond their reach. Millet (for making porridge) and mushrooms were said to be highly nutritious for children and the elderly, while honey was preferred for its medicinal value. Sorghum is given as relief food by humanitarian organizations such as the Kenya Red Cross Society [19] but has been introduced as food and cash crop in Hurara village where it has already been introduced in the community's diet and has been instrumental in improving the nutritional status of children and elderly who consume it as porridge. The above indicates that the community are aware of what diet they need as outlined by FGD and KI (Table 9).

Table 9. New diet the delta community would wish to eat.

Food	Gender interested	Why
Apple	Men, Women, Children, Girls and Boys	We cannot produce expensive to buy
Avocado	Men, Women, Children, Girls and Boys	We cannot produce
Biriani	Women, Men and Boys	Gives energy
Bread	All Gender	Light food
Cake	All Gender	Most people would like to eat it
Camel meat	Men, Women, Children, Girls and Boys	We do not have Camel
Carrots	All	Improve eye sights
Cassava	All	Feed all and takes a long time to be digested We cannot produce
Chapati	All Gender	The community would wish to eat it
Chicken and Chips	Men, Boys and Women	We cannot afford but Gives energy
Coconut	Men, Women, Children, Girls and Boys	We cannot produce
Dates	All	Increase blood and control pressure
Eggs	All Gender	It has vitamins

Continued

Fermented milk (<i>Kirori, Kalba</i>)	Old men and Old Women	Energy food
Finger millet	Men, Women, Children, Girls and Boys	We cannot produce
Green grams	All	Relish and cheap to buy
<i>Halwa</i>	All	Sweet and appetizer
Mokimo*	Both Gender	Gives energy
Omena (sardines)	Men and Boys	Gives energy
Oranges	Men, Women, Children, Girls and Boys	We cannot produce
Pasta/Makoronya	All	Good food
Peanuts	Men, Women, Children, Girls and Boys	We do not produce
Pigeon peas	All	We cannot produce, but it's a relish
Pineapple	Men, Women, Children, Girls and Boys	We cannot afford
Pizza	Men and Women	Gives energy
Spaghetti	All Gender	Easy to cook
Spinach	All Gender	A new food type for good health. Train communities how to prepare them
Sweet potatoes	All	Energy giving
Yogurt	Men, Women, Children, Girls and Boys	We do not have skills and industrial marketing

*A cooked mixture of maize, beans, potatoes and greens.

3.7. Conflicts in Tana Delta

Respondents (41%) alluded that there are resource use conflicts and conforms to earlier observations [4] [6] [20]. The perceived types of conflicts by the households included; ethnic (41%), Resource use (24%), Human-wildlife (19%), land-use conflicts (14%) and conflicts between TARDA and local communities (2%). Conflicts disrupt rural livelihoods and destroy investments, uproot households from their homesteads, creating deep-rooted ethnic tensions. Boundary disputes were highlighted as a cause of conflicts in the Tana Delta [19].

These conflicts were mainly driven by inadequate land, ethnic animosity among diverse communities living in Tana Delta, scarce pasture and water resources and an influx of livestock from other areas (Figure 5). These findings confirm the causes of conflicts highlighted by [19].

Additionally, an analysis of the conflicts, their causes and proposed mitigation measures perceived by the community was provided through Focus Group Discussion and Key informants and outlined in Appendix C. Crop losses were mainly attributed to resource use conflicts that result in livestock owned by pastoralists invading crop farms in search of pasture hence causing destruction. These findings compare with earlier studies [19] which established that conflicts in Tana Delta are largely fuelled by conflicting land uses whereby pastoralists believe in a communal land system that would support their lifestyle while the farmers advocate for land adjudication of individual freeholds. One of the causes for the eruption of inter-tribal conflicts in the Tana Delta is connected to the

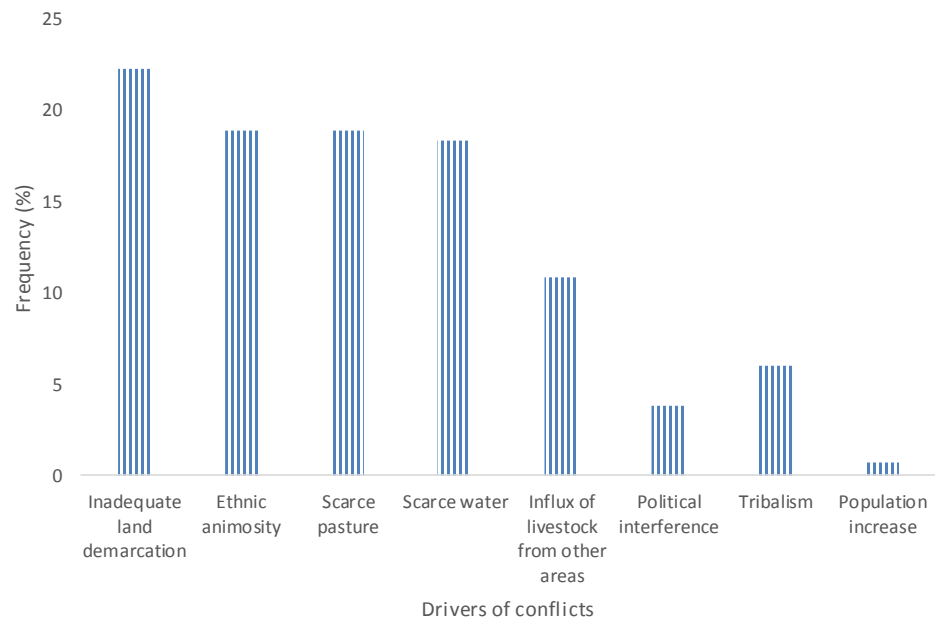


Figure 5. Drivers of conflicts in the Tana Delta (Source: Field survey data).

activities of the land adjudication commission [21]. The study further listed politics as another major cause of conflicts in the Tana Delta. To reverse the losses, respondents suggested several means of managing conflicts, including; sensitization of local communities on the importance of peaceful co-existence among various communities living in Tana Delta through local community leaders and the implementation of the land-use plan.

Conflicts often result in loss of essential livelihood assets, thus impoverishing local communities even further. On average, households living in Tana Delta lose the following assets per annum as a result of conflicts (Table 10).

These results compare with past studies [21] which summarised the main impacts of conflicts in Tana Delta as loss of lives, loss of property and livelihoods, increased levels of poverty, increase in the number of school dropouts, displacement and loss of economic growth.

3.8. Interventions to Access the Apple

The changing livelihoods and lifestyle in the Delta areas were evident. In addition to the existing IGAS, the communities are desirous of living a life that other global citizens are living. In this paper, this is presented by the yearning for an apple expressed during village social mapping, among many other livelihood and lifestyle changes households desired. The apple fruit in Kenya is imported and locally grown in Kiambu, Kitale and Nandi counties; the nearest county where the fruit is grown from Tana Delta is over 600 kilometres away. The numerous income-generating activities (Table 11) through Nature Kenya have contributed significantly to local livelihoods, as indicated by 70% of the respondents. This was perceived as a key step in contributing considerably towards the community accessing the new diets (Apple).

Table 10. Average household assets lost as a result of conflicts.

S/No.	Asset	Quantity lost
1	Crops (maize, green grams, watermelons and mangoes)	48,429 kg
2	Cows	380
3	Fish	23,367 kg
4	Poultry	2272
5	Goats	1173
6	Sheep	16
7	Donkeys	6

Table 11. Existing IGAs supported by the project.

IGA	Villages supported	Nature of support
Crop farming	Hewani, Wema and Chalaluma	<ul style="list-style-type: none"> • Provision of seeds, fertilizers, ploughing and harrowing services • Business management training • Solar installation
Livestock keeping	Onkolde and Bularahma	<ul style="list-style-type: none"> • Construction of cattle dip and purchase of acaricides • Provision of milk equipment • Installation of solar energy for the village in centralized locations for mobile phone charging to ease communication
	Didewaride	<ul style="list-style-type: none"> • Planned a livestock business scheme
Poultry farming	Moa and Hewani	<ul style="list-style-type: none"> • Construction of poultry houses, provision of improved indigenous chicken and poultry feeds • Training of the women on poultry keeping • Installation of solar energy for the village in centralized locations to ease communication
Fish farming	Moa	<ul style="list-style-type: none"> • Construction of fish ponds • Provision of fingerlings
Beekeeping	Hamesa, Ozi Golbanti, Nduru, Hamesa, Hurara, Onkolde and Shirikisho	<ul style="list-style-type: none"> • Purchase and distribution of beehives • Construction of apiary • Purchase and installation of beehives • Training on beekeeping and honey production
Ecotourism	Ozi	<ul style="list-style-type: none"> • Purchase of engine for the boat and refurbishment of the boat for ecotourism
Smart agriculture	Idsowe	<ul style="list-style-type: none"> • Training of the women on smart climate agriculture • Purchase and installation of smart agriculture technology-shed-net • Initiation of tree nurseries
Vegetable gardens	Moa	<ul style="list-style-type: none"> • Fencing of the farm • Provision of all farm inputs • Purchase of a tank for the women

Respondents acknowledged that Nature Kenya's project supported IGAs have contributed up to 60% of household incomes in the beneficiary villages. The income generated has enabled households to acquire household assets as well as purchase food for their families. The support provided by Nature Kenya includes capacity building, provision of soft loans, provision of certified seeds of maize and green grams, and subsidized ploughing services for farming communities, construction of greenhouses, fish ponds and apiaries, and provision of milk storage equipment, beehives and solar panels to meet the household energy needs.

Respondents alluded that they have gained skills following the numerous projects capacity building initiatives in improved farming methods (27%), business management skills (23%), best practices in beekeeping (15%), marketing skills (11%), good animal husbandry practices (11%), environmental conservation skills (4%), fish farming skills (1%), and crop and livestock pests and disease management (1%). Respondents, however, noted that they require more capacity building in accessing credit facilities and accessing competitive markets for their goods. Respondents further recommended that repeat pieces of training should be conducted and follow up visits done to enhance their skills for successful management of both existing and proposed new IGAs. Each village also recommended the use of Trainers of Trainers (ToT) as an appropriate strategy that should be used to enhance community skills in undertaking various income-generating activities as they transform the community to acquire the apple.

4. Conclusions

Farming was the main source of livelihood for communities living in Tana Delta. Although livestock keeping was the highest income-generating activity, they are owned by people living outside the Delta leading to less contribution to delta community livelihoods. The majority of the households in Tana Delta are either poor or very poor, with an average annual household income of Ksh. 71,466 and Ksh. 39,312 for male and female-headed households, respectively. The community acknowledged that there are a few households that are beyond the very poor who require special support to continue surviving. The participation of women in major income-generating activities, notably livestock keeping, savings and credit schemes and fishing and fish farming was low, hence the lower household incomes of female-headed households. Conflicts have had significant negative impacts on the livelihoods of communities living in Tana Delta. The conflicts are mainly resource-use conflicts driven by ethnic hatred, competing for land uses, competition over scarce water resources, and political interference.

Maize and rice were the most consumed foods by communities living in Tana Delta. Consumption of vegetables, fruits and pulses was generally low; this is a pointer to the poor nutritional status of the households. The low consumption of highly nutritious foods was attributed to the high cost of food that has seen households spend up to 90% of their income on food. Land demarcation, coupled with increased settlement and investment in the Delta, is reducing land for farming, grazing and wildlife areas. Availing land for sale may alienate the local communities with a possibility of escalating conflicts. The changing socio-economic development is compromising community climate change traditional coping systems.

The county government and development partners should invest more in technical support for agricultural development through inputs and specialized training. The partners need to initiate a multi-ethnic project as a means for

building cohesion among communities. The CCA would provide means for conserving biodiversity but requires its ownership secured supported by inclusive CCA governance systems, adequate community awareness and consultations to ensure the buy-in of decision-makers and the real resource users.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix A: Perceived General Household Well-Being Ranking Indicators for Tana Delta Community

Rank A indicators: Rich

- Ability to educate children up to college level
- Able to give a tithe
- Assists the public
- Has a maize milling machine
- Has three children
- Has the title for his land
- His decisions and authority are not opposed
- Income level of at least ksh. 300,000 p.a
- permanent house build with stones and tin-roofed house
- Ownership of 2 - 5 or more boats and fishing nets among the fishing villages of Moa and Ozi
- Ownership of vehicle/s and motorbikes
- Owns 100 and 1000 herds of cattle
- Own between 10 and 200 goats
- Own between 50 and 400 sheep
- Owns a big shop, including a hardware
- Owns a business-shop, water vending kiosk, etc
- Own a farm of between 4 to more 15 acres with title
- Owns a ranch
- Permanent employment
- Owns rental houses in urban centres
- Takes three or 4 meals a day and can eat anytime he/she wishes
- Travel using a vehicle, motorbike or Tuktuk
- Use of at least 4 to 10 acres of land for farming in the farming villages

Rank C Well-being indicators: Poor

- Cannot give a tithe
- Casual worker
- Engages in the small scale business
- Has five children
- Has no farm
- House-made of mud and tin-roofed or mud-walled and grass-thatched hut
- Income level of between ksh. 50,000 - 100,000 p.a
- Take children up to primary level, but a few may educate children up to secondary with bursary support
- Meets his/her basic needs through a struggle
- Mostly travels on foot but occasionally uses a motorbike
- Own between 20 - 50 goats
- Owns a bicycle with a few owning at least a motorbike
- Ownership of between 30 - 100 livestock among the pastoral communities.
- Owns 5 and 20 sheep
- Owns a boat and fishing net of 400 to 800 yards
- Owns a farm of 1 acre
- Owns five chicken
- Owns less than 10 cows
- Sell milk and fried potatoes
- Takes 2 meals per day with some taking three meals a day
- Use of at least 2 acres of land for farming in the farming villages

Rank B indicators: Moderately rich

- Ability to educate children either to primary or diploma level
- Casual employment
- Have enough food and most take three meals a day with a few taking four meals
- Farms five acres
- Could have; a permanent house build with stones and tin-roofed, or grass-thatched and mud-walled house or house tin-roofed and earthen floor
- Has farming tractor
- Has four children
- Has one rental house
- Has two households (two wives)
- Income level of between ksh. 100,000 - 250,000 p.a
- Ownership of a motorbike or a car
- Ownership of between 100 - 800 livestock among pastoral communities
- Owns a motorbike
- Owns at least 50 and 200 goats
- Own between 30 and 250 sheep
- Owns a shop
- Owns five acres without title
- Runs a small shop and butchery
- Ownership of between 1 - 4 boats among the fishing villages
- Travels using motorbike but occasionally walk
- Use of at least 5 acres of land for farming in the farming villages

Rank D Wellbeing indicators: Very poor

- Cannot afford bus fare but walks to all places
- Cannot take his children to school, but a few parents take their children up to primary with the support of relatives
- Does not have enough food and takes one meal a day
- Getting clothing is difficult
- Owns no land and in case he/she has it is less than 1 acre with no ownership documents, others have access to ½ acre for farming and rely on rain-fed agriculture
- Grass thatched house with incomplete mud wall with some are accommodated by neighbours and relatives.
- Has many children
- Has no cattle or goats but few own 1 sheep, 10 Chickens, 2 Cows, 7 Sheep and 8 Goats
- Has no respect from the community
- Income level of approximately ksh 15,000 p.a
- Lack of (No ownership) fishing boats among the fishing villages
- Lack of (No ownership) land for farming in the farming villages
- Not assured of a meal and often times goes without a meal or eats once per day
- Not employed
- Ownership of a bicycle by a few
- Purely casual employees as they lack alternative sources of income
- Sales charcoal and firewood
- Survives through support from the community and tokens

Appendix B: FGD Perceived Community Livelihood Analysis

Livelihood source	Gender involved in the production	Challenges faced	Means of enhancing livelihood
Basketry	Women, Old Men and Old Women	<ul style="list-style-type: none"> • Difficulty in obtaining raw material, poor market and exploitation by middlemen • Inaccessibility of villages by buyers and poor road network 	<ul style="list-style-type: none"> • Establish a trial plot for growing trees that produce basket making raw materials • Source for a reliable market
Beekeeping	Men and Women	<ul style="list-style-type: none"> • Theft of hives and honey, • Inadequate skills on beekeeping and use of traditional methods • Transport cost to the market and poor prices • Long drought spell hindering flowering of plants • Lack of modern beekeeping equipment and adequate protective harvesting gear 	<ul style="list-style-type: none"> • Provide farmers with harvesting equipment, training on modern beekeeping technologies, especially women and provide more beehives • Provision of water • Construction of an apiary • Prevent forest fires • Promote afforestation programmes
Bodaboda (Motorbike transport business)	Boys and Men	<ul style="list-style-type: none"> • Activity is halted during the rainy season • Too many motorbikes leading to a few customers and low income • Operators lack licenses • Lack of a fuelling Centre and spare parts in the village • Poor road network • The high cost of fuel 	<ul style="list-style-type: none"> • Improve road network • Train riders, issue them with licenses, organize them into riders cooperative societies • Riders to be • Create more income-generating activities • Government to regulate fuel prices
BGOKers (middlemen)	Girls, Boys, Men, Women and Old Men.	<ul style="list-style-type: none"> • School drop out • Drug abuse • Early marriage • Laziness and ignorance 	<ul style="list-style-type: none"> • Provide skills • Create awareness
Business	Girls, Boys, Men and Women	<ul style="list-style-type: none"> • School drop out • Drug abuse • Early marriage • Laziness and ignorance • Low business • Less money in the village • Poor and expensive transport means • Wild animals prevent easy access to forest products 	<ul style="list-style-type: none"> • Impact modern business skills, especially to youth to engage in business and gainful employment • Provide capital and skills
Cash transfers	Children, Old men and Old Women	<ul style="list-style-type: none"> • Irregular and delayed remittance • Few beneficiaries • Expensive to access due to long distances to the market centre 	<ul style="list-style-type: none"> • Take children to school to get a good paying job • Create local employment opportunities • Monitor to ensure government cash transfers reach recipients • Have more beneficiaries
Casual labour	Girls, Boys, Men, Women and Old Men	<ul style="list-style-type: none"> • Lack of skills, low wages and poor working conditions • Less farm work due to drought • Lack of employment opportunities • Poor working conditions and lack of insurance covers • Child labour and defilement • Overworking • Unwanted pregnancies 	<ul style="list-style-type: none"> • Increase wages • Establish small industries to create more employment • Build a polytechnic to improve skills • value addition I • Provide capital
Charcoal burning	Boys, Men and Women	<ul style="list-style-type: none"> • Inadequate skills in charcoal burning, poor technology, poor markets and prices • Government regulations and police harassment • Unavailability of medical facilities in case of injury • Deforestation and destruction of animal habitat • Risk of burns and health complications 	<ul style="list-style-type: none"> • Community sensitization on environment conservation • Training on appropriate charcoal production technologies and produce charcoal sustainably • Organize community into Charcoal Producer Associations (CPAs) • Advocate for improved prices and designate market points • Undertake re-afforestation

Continued

Crop farming	Children, Girls, Boys, Men, Women, Old men and Old Women	<ul style="list-style-type: none"> • Boys and girls missing schools • Climate change • Conflicts with pastoralists • Drought and inadequate water • Exploitation by middlemen • The high cost of farm inputs • Invasion of farms by wildlife/livestock • Lack of extension services • Lack of farm mechanization • Lack of funds to facilitate farm activities like the hire of tractors • Lack of irrigation equipment • Lack of seeds and pesticides • Low prices of farm produce • Low rainfall • Occasional destruction of crops by floods • Over-reliance on traditional farming methods • Pests and diseases • Poor market • Poor road network • Wildlife human conflict due to lack of fencing • Women have other commitments • Women lack ownership of farm produce 	<ul style="list-style-type: none"> • Availability of adequate water • Construction of all-weather roads to link the village to the market • Enforcement of regulations on trespass • Establish markets and ensure reasonable market prices • Establish cooperatives to assist in marketing and provision of loans • Establishment of livestock corridors through the fencing of the farms • Farmers to be provided with pesticides and certified seeds • Installation of solar panel in the farm • Institute effective wildlife management • The mechanization of farm activities • Obtain aid from the county government • Reduce the costs of farm inputs like certified seeds and pesticides • Provision of irrigation inputs (generators, pipes and water pump) • Restore original river flow by blocking diversions • Stop deforestation and sensitize on tree planting • Strengthening extension services • Training farmers on better farming methods
		<ul style="list-style-type: none"> • Lack of skills and employment opportunities • Child labour • Overworking and low salary • Insecurity • Poor transport • Government regulations such as paying tax • Low level of education and poor working conditions • Conflicts between Government and workers 	<ul style="list-style-type: none"> • County government to come up with alternatives employment opportunities • Offer better salaries • Improved security • Ensure a good road network • People to be more educated and trained • Government to improve all sectors • Government to address works conflicts through the labour department
Fishing and fishing business	Boys and Men, Old men and women	<ul style="list-style-type: none"> • Attack by hippos and crocodiles • Boys lack ownership of fishing gears • Child labour • Children missing school • Destruction of fishing gear by crocodiles • Drought and drying of lakes and rivers lowering fish catches • Fishermen lack insurance • High transport cost • Lack of proper fishing skills and fishing gears • Long-distance from the fishing area • Low catch and overfishing • Poor market and poor prices • Poor road network making it difficult reaching market • Saltwater mixing with freshwater limiting the availability of freshwater fish • Seasonality of the fishing sector • Shortage of fish • Exploitation by middlemen • Lack of storage equipment 	<ul style="list-style-type: none"> • Introduce fish farming, construction of fishponds and provide appropriate fishing gear • Provision of secure fishing gear • Construction of fish storage facilities • Ensure accessibility of the village by buyers • Provision of proper fishing gears and storage equipment • Introduce better fish breeds • Restore original river flow • Prevent boys from fishing • Build more fish market • Provide capital • Rehabilitation of dried lakes and degraded mangrove areas • Restoration of river flow • Train community on fish farming, modern fishing technologies, value addition and marketing

Continued

Government employment	Men, women	<ul style="list-style-type: none"> • Inadequate employment opportunities • Low education levels 	<ul style="list-style-type: none"> • Provision of bursaries for college education
Livestock (chicken, goats and ducks)	All Gender	<ul style="list-style-type: none"> • Children missing school • Conflicts between farmers and livestock keepers • Human/wildlife conflict • Drought and inadequate water • Lack of veterinary services and the high cost of drugs • Insufficient land for grazing and modern animal feed • Insecurity • Lack of finance • Lack of ownership by women • The long-distance involved scaring away women • Loss of livestock • Poor market and diseases • Women have to balance between livestock keeping with other duties 	<ul style="list-style-type: none"> • Construction of a slaughterhouse • Control influx of livestock from other counties • Designation of grazing areas away from farms • Ensure proper housing and disease control • Establish a market for livestock • Establishment of pasture sources • Exploring other alternatives such as irrigation farming • Fence farms • Fencing of the dam • Form marketing cooperatives and promote livestock marketing schemes • Construct a slaughterhouse to enhance value addition • Government to improve security and culprits to be punished • Introduce poultry farming • Keeping hybrid animal breeds • Livestock offtake programs supported by proper animal stocking • Avail and lower price of drugs, vaccines and pesticides • Planting livestock feeds and feed storage • Provision of grazing land • Provision of water and specific watering points • Strengthening local ranches • To obtain funds through loans. • Use of indigenous knowledge • Veterinary officers to be available
Masonry	Men, Boys	<ul style="list-style-type: none"> • Inadequate employment opportunities • Low wages 	<ul style="list-style-type: none"> • Increase wages • Establishment of village polytechnics
Mitumba* business	Women	<ul style="list-style-type: none"> • Unreliable markets 	<ul style="list-style-type: none"> • Availability of markets
Relief food	Men, Women, Old men and Old Women	<ul style="list-style-type: none"> • Only given to a targeted group of age • Not reliable and quantities insufficient 	<ul style="list-style-type: none"> • Making more people benefit • Improve farming
Remittance	Men, Women, Old Men and Old Women	<ul style="list-style-type: none"> • Not predictable • Not enough to meet the needs of the beneficiary • Delay in disbursement • A small fraction of beneficiaries • Huge transaction cost • Separation and break up of families 	<ul style="list-style-type: none"> • Increase employment opportunities • Take children to school to get a good paying job
Sale of milk	Boys, Women and Old Women	<ul style="list-style-type: none"> • Lack of pasture • Drought • Low milk production • Poor handling of milk • Price fluctuation 	<ul style="list-style-type: none"> • Provision of ice cubes and cool boxes • Purchase of milk handling equipment • Organize groups into cooperatives for milk business
Sale of forest products	Men and Women	<ul style="list-style-type: none"> • Low market and poor prices • Government regulations • Exposure to dangerous snakes and insects 	<ul style="list-style-type: none"> • Create awareness on forest access regulations • Encourage value addition and provide a market for products
Sale of water	Women and Men	<ul style="list-style-type: none"> • Inadequate supply 	<ul style="list-style-type: none"> • Drilling of wells and distributing piped water

Continued

Small business enterprises (kiosk)	Girls, Boys, Men, Women, Old men and Old Women	<ul style="list-style-type: none"> • High transport cost and poor road network that limits access to wholesale markets • Inadequate capital and vulnerability of business capital to other uses • Low purchasing power Long distances that raise the price of commodities • Insecurity and conflicts • Government policies • Late payment of goods taken on credit 	<ul style="list-style-type: none"> • Training on civic, financial and business skills • Introduction of loaning schemes • Construction of village market • Repair the roads to improve the accessibility of the village and lower transport costs • Enhanced co-existence in the community • Government to improve security • Improving the economy and living standards • Increase production capacity in the local area • Use of speed boat during flooding
Table banking	Girls, Women and Old Women	<ul style="list-style-type: none"> • Savings not done on time • Low ability to repay loans 	<ul style="list-style-type: none"> • Ensure loan repayment in done promptly

Appendix C: Community Perceived Conflicts through FGD

Conflict type	Village experienced	Causes	Mitigation
Farmers versus Pastoralists (Livestock grazing in farmlands and farmers farming in grazing areas)	Chaluma, Handaraku Didewaride Hewani Hurara Nduru Ozi Onkolde Moa	<ul style="list-style-type: none"> • Inadequate grass leading to livestock grazing in farms leading to clashes between farmers and cattle keepers • The killing of livestock by farmers and the destruction of food crops • killing of livestock leading to ethnic conflicts 	<ul style="list-style-type: none"> • Provide grass to livestock keepers • Create awareness to communities to exist and train them in leadership and management • Farmers to stop killing livestock • Put aside land for farming • Reduce the number of livestock • Designate livestock grazing areas, routes, grazing areas and watering points • Prayers • fencing of farms and homesteads • creation of parks and wildlife corridors • Implementation of the land use plan • Land ownership through title deeds issuance • Limit the number of livestock • Create national parks
Human-wildlife conflict	Chaluma, Handaraku, Golbanti, Bularahma Didewaride Nduru Ozi Onkolde Moa	<ul style="list-style-type: none"> • Wildlife killing humans, livestock and destroying crops • People moving at night being hurt 	<ul style="list-style-type: none"> • Create awareness on farmers not to kill wildlife and how to co-exists • Create barriers between farmers and cattle Land adjudication • Fencing farms to prevent wildlife • Provide more security to farmers • Proper management of CCAs • Increase KWS personnel to ensure adequate control measures • Provision of water and sufficient grass • Creating wildlife corridors • Create an animal sanctuary
Land	Handaraku, Golbanti Hewani Nduru	<ul style="list-style-type: none"> • Degradation of forest • Influx of outsiders • Land grabbers at lower Tana 	<ul style="list-style-type: none"> • Sensitize community on the benefit of co-existence • Invaders to go back to their motherland • Stop the creation of salt farm • Get court orders to remove land grabbers
Ethnic conflicts	Golbanti, Bularahma Didewaride Hewani Shirikisho	Competition for land, water and pasture	<ul style="list-style-type: none"> • Land adjudication and issuing of title deeds • community elders to create peace • Engaging the Government at national and county level • Provision of adequate resources like bulking grass to use in dray areas and provision of hay

Continued

Family conflicts	Hewani	Family property	<ul style="list-style-type: none">• Elders and training on Gender
Intra gender inequity in income	Ozi Idsowe	Lack of employment Marketing of produce	<ul style="list-style-type: none">• Training of youth and women groups• Companies employing locals• Training on Gender
Weather	Ozi	Drought	<ul style="list-style-type: none">• Buy a pump to facilitate access of water from the river for irrigation
Religious	Shirikisho		<ul style="list-style-type: none">• Create more awareness• Start activities that enhance social cohesion and integration
Fishing	Shirikisho	fishing ponds and swamps	<ul style="list-style-type: none">• Construct fish ponds
Political	Idsowe		<ul style="list-style-type: none">• Awareness creation
