Herders' local knowledge and capacity development needs for sustainable rangeland management in Tanzania

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Abstract

Pastoralists in Tanzania are facing a myriad of threats and challenges in managing rangelands. One of the concrete ways of responding to these challenges and myths about pastoralism is through training, advocacy and public awareness. The study was conducted to examine the existing capacity among pastoralists on rangeland management practices in seven districts (zones) which represent the diverse pastoral ecosystems in Tanzania. The sites vary significantly in terms of climatic conditions which are largely differentiated by rainfall availability and distribution. A total of 221 pastoralists were interviewed using a structured questionnaire. The study used cross sectional design in data collection. More information was triangulated through Focus Group Discussions and Key Informant Interviews. Quantitative and qualitative data were analysed using SPSS and content analysis, respectively. It was found that most pastoralists have rich indigenous knowledge yet they received limited training on rangeland related issues. The existing local knowledge related to management of rangeland resources, were found poorly integrated into management practices such as reseeding, bush control, soil and moisture conservation. The study established further that pastoral communities require capacity development in the areas of rain water harvesting, soil and moisture conservation, control of invasive weeds and adaptation strategies

to climate change. Therefore, it is recommended to engage local communities by building their capacity on rangeland ecological carrying capacity, diversification of livelihoods strategies, fodder management and establishment of improved pastures. **Keywords:** Training needs, pastoral community, Rangeland management, capacity development, Tanzania.

1.0 Introduction

Despite the crucial role that pastoralism plays in Tanzania pastoralists continue to face a myriad of threats and challenges in managing rangelands (Olekao and Sangeda, 2018). These threats range from land tenure insecurity, degradation of rangeland resources, restrictions on mobility, effects of climate change and unimplementable policies (FAO, 2016). Previous research revealed that the value of pastoralism and rangelands in most East African countries is usually underestimated and the pastoralists remain marginalized (Oba and Kaitira 2006; Liwenga 2008, Selemani et al., 2012). To confront the challenges faced by pastoralists in Tanzania, it requires interventions that not only address the direct challenges they face but also reverse the negative pre-conception that often portray pastoralism as primitive, unproductive and environmentally destructive (UNEP, 2015). One of the concrete ways of responding to these challenges and myths about pastoralism is through effective information and knowledge exchange that can be done through training, advocacy and public awareness (Oba and Kaitira, 2006). Sustainable utilization of rangeland resources and improvement of degraded rangelands require skills and knowledge of rangeland management among the practitioners (Ruvuga et al., 2019). Despite the increasing number of experts in rangeland management discipline, there is limited harmonized training protocol that reflects the existing ecological and social context of the Tanzanian landscape. The limited understanding of the important dimensions of rangeland use has restricted their proper management and sustainable development, which represent a major challenge for Tanzania's rangelands.

Capacity development is thought to be one of viable solutions to this problem and may ultimately lead to improved rangeland management in the country. Based on this hypothesis, a study was conducted in Tanzania to examine training needs for sustainable rangeland management among pastoral communities and other practitioners. The paper reports the empirical findings and critical observations from the needs assessment. The paper specifically addresses the following questions i) What is the current status of range resource utilization and improvement practices performed by Pastoralists in Tanzania?' ii) What is the existing knowledge among pastoralists on range management practices? iii) What are the training needs of pastoralists in Tanzania? Responses to these questions will provide information useful for future planning and capacity development interventions to manage rangelands and other natural resources in pastoral communities of Tanzania.

2.0 Methodology

2.1 Study sites

The study was conducted in seven districts representing a diverse pastoral ecosystem in Tanzania (Fig 1) at the beginning of dry season, August 2019. The study sites vary significantly in terms of climatic conditions which are largely differentiated by rainfall availability and distribution. The central zone (Chemba district), Western zone (Igunga district), Lake zone (Meatu district) and Northern zone (Monduli district) are characterized by semi-arid areas with low and unpredictable rainfall ranging from 400 to 900 mm per annum (Kabote et al., 2013). The Eastern zone (Mvomero district), Southern zone (Kilwa district) and Southern Highland (Mbarali district) are characterized by sub-humid to humid climate with relatively reliable amount of rainfall. Selection of these seven districts was based on the intention to capture information from all formal agro-ecological zones of Tanzania (Figure 1) on status of pastoral community, rangeland condition and management practices. The selected districts and villages from each zone are dominated by agro/pastoral communities with high livestock population.

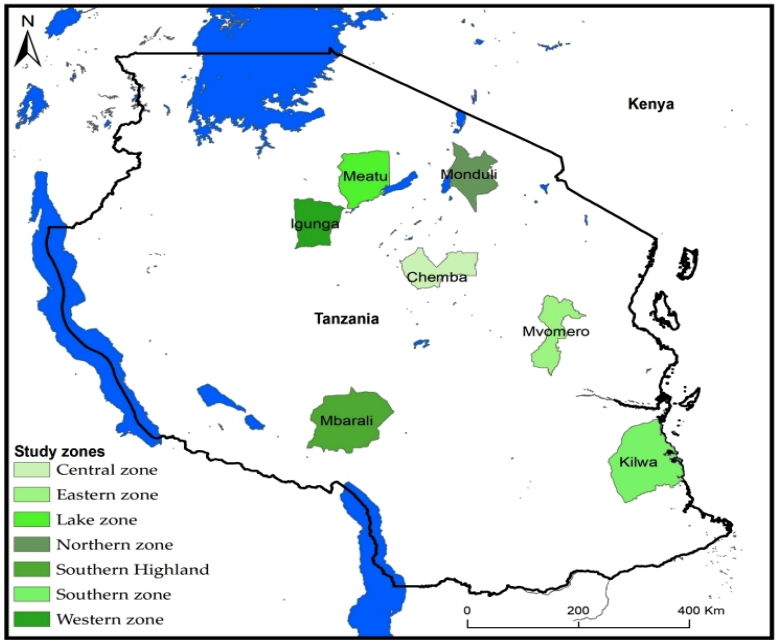


Figure 1. Map of Tanzania indicating study sites

2.2 Study design and sampling

This study used cross sectional design where data from respondents were collected once by a team of trained enumerators. This was purposeful done due to cost implication and the nature of study (training needs assessment), which is pragmatically done once before development of training programme and/or teaching materials. In order to sample a diverse group of pastoralists in the country, all the seven districts were included where one village within a district was selected to be a sample unit as shown in Table 1.

Table 1. Sampling of pastoralists in the seven ecological zones of Tanzania

S/N	Village	Ward	District	Region	Zone	N
1	Kidoka	Kidoka	Chemba	Dodoma	Central	32
2	Bukoko	Bukoko	Igunga	Tabora	Western	31
3	Mwangudo	Mwangudo	Meatu	Shimiyu	Lake	31
4	Emairete	Monduli juu	Monduli	Arusha	Northern	31
5	Msongozi	Mkata	Mvomero	Morogoro	Eastern	32
6	Matebete	Itamboleo	Mbarali	Mbeya	Southern Highlands	32
7	Matandu	Kivinje	Kilwa	Lindi	Southern	32
	Total					**221**

Before actual data collection, field tools were pretested in a pastoral village located at Mvomero district, Morogoro Tanzania. A total of 20 questionnaires were piloted and results were used for modifying questionnaires for the survey based on the pre-testing outcomes. This was done during training of enumerators on how to effectively administer the questionnaires and also check out any challenges regarding translation of questions and responses (from English to Kiswahili, the national language in Tanzania).

2.3 Data collection

2.3.1 Questionnaire survey

A total of 221 pastoralists were involved as respondents in a questionnaire survey where data were collected using Open Data Kit Collect (ODK) devices. ODK Collect is an open-source Android application that replaces paper forms in survey-based data gathering. It supports a wide range of questions and answers types, and is designed to work well without network connectivity. Enumerators worked easily with the App and were able to save the submission at any point during data collection. Finalized submissions were sent to a project server and accessed by the project staff for confirmation. ODK helped to collect other

information such as location (coordinates), images and video that were useful for the study. Targeted respondents were the heads of households. The key issues included in the questionnaire were; range resources availability, utilization pressure, seasonal fluctuation in range resources, management strategies for improvement of degraded rangeland, community awareness on sustainable resources utilization and challenges facing management of rangeland resources.

2.3.2 Focus group discussions (FDGs)

Data was also collected through Focused Group Discussions (FDGs) done in each zone. This is a research method in which a small group of participants gather to discuss a specified topic or an issue to generate data (Wong, 2008). It reveals a wealth of detailed information and deep insight. The discussion capitalizes on communication between the researcher and participants to generate data (Kitzinger, 1995). Participants for the FGDs were drawn from the groups of youths, women, men, pastoral groups, and elders among others. The FGD participants were identified with the help of village leaders. The discussions were recorded with consent from participants. The discussions involved diversified members (in terms of gender and age) of the community with a range of 6 to 10 individuals in each village. FDGs were guided by use of pre-prepared checklist.

2.3.3 Key informant interviews (KIIs)

This is a qualitative and in-depth method of data collection through interviews with people who know at first-hand the subject matter (ACAPS, 2011). It is carried out in the form of a loosely structured conversation with selected individuals that have specialized knowledge about a topic in question (ACAPS, 2011). Key informants for this study were selected from the seven districts in each zone and eight governmental ministries related to rangeland management (Ministry of Livestock and Fisheries, Ministry of Land, Housing and Settlement, Ministry of Agriculture, Ministry of State in the VPO_Union Affairs and

Environment, Ministry of Energy and Minerals, Ministry of Natural Resources and Tourism, Ministry of Water and Irrigation and Ministry Local Government). Under district level KII involved District officers (Heads of Departments-Natural resources, Livestock, Agriculture, Water, Lands and Community Development), whereas in the village level, village leaders and distinguished elders and influential persons in the community were engaged. In the ministerial level, important key officials such as permanent secretaries, directors and heads of departments were involved. Interviews with key informants were managed by use of pre-prepared checklist. Key issues discussed include, policy issues and governance, land use conflicts, capacity building, effect of climate change on rangeland resources, rangeland infrastructure, livelihood diversification strategies, gender inclusiveness, modern and traditional knowledge on rangeland management.

2.4 Data analysis

Data from the household survey were downloaded from the project saver, cleaned and subjected to IBM SPSS version 25 for analysis. Descriptive statistics mainly through cross tabulation was done to generate tables and graphs to address the objectives of the study which are presented in the results section. Information collected from FGDs and KIIs were analysed through filtering the discussion points to get the content in every particular context (content analysis). Most of these data were used to triangulate information generated through questionnaire survey.

3.0 Results

3.1 Socio economic information

Decisions on rangeland resources utilization and management are to some extent linked with social structure and economic development of the community. Age class, gender participation, education levels and marital status are four crucial socio-economic aspects affecting livestock productivity in many pastoral communities. Results reveals that majority of interviewed

respondents (which were the heads of households) were youth as shown in Figure 2. Very few elders with age class of 60 to 80 years old were recorded.

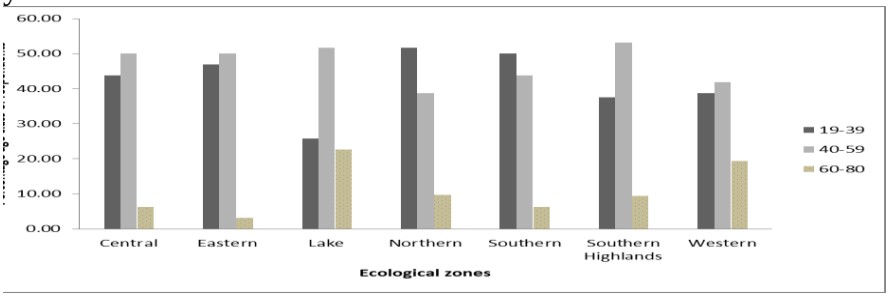


Figure 2. Age-class (years) of respondents in the seven surveyed zones of Tanzania

The current study revealed that few women are engaged in decision making on rangeland management issues. It has been noted that only a few of households' heads were female (Table 2). The decision on the rangeland management is normally based on the social structure and economic development in many pastoral and agro-pastoralist communities. The higher representation of youth and adults as heads of households in this study imply that range resources use and management are controlled by both youth and adult people in pastoral communities of Tanzania.

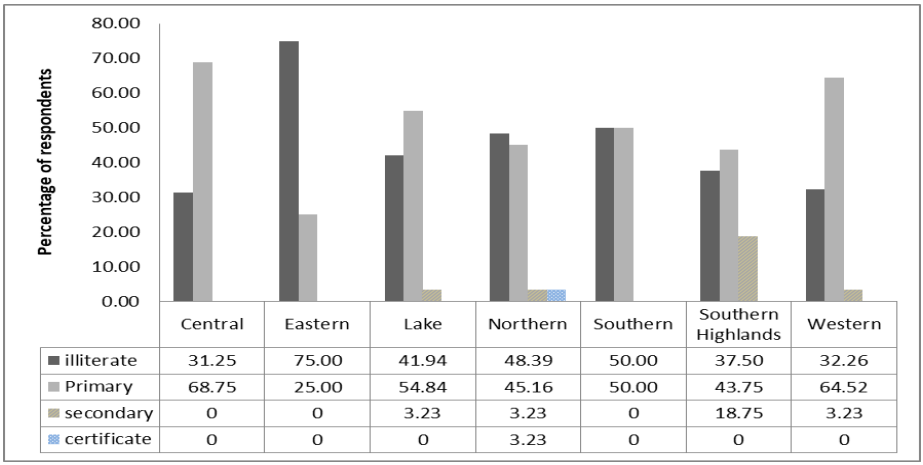
Table 2. Gender composition from interviewed pastoral heads of households in seven zones of Tanzania

	Percentage (%) of gender as heads of households			
		Female	**Male**	**Both**
Agro-Ecological zones	Central	3.13	96.88	0.00
	Eastern	0.00	93.75	6.25
	Lake	6.45	93.55	0.00
	Northern	9.68	90.32	0.00
	Southern	0.00	87.50	12.50
	Southern Highlands	0.00	81.25	18.75
	Western	3.23	96.77	0.00
	Average	**3.21**	**91.43**	**5.36**

Despite attempts to mainstream gender at national and international levels, few women are engaged in decision making on rangeland management issues. Equal participation in community-based decision-making remains complex and difficult aspect in pastoral communities. Despite the fact that female are involved in many livestock related activities but decisions on resources utilization and management are done by the heads of households which in most households are males. Homewood (2008) uphold that, pastoral women are typically responsible for house-building, herding livestock, child care and all domestic chores but are little involved in decision making with regard to resource utilization. Besides, in Tanzania context, the legal and policy (Land Use Policy, 1997 and Village Land Act, 1999) safeguards the women through provision of equal opportunities for access the land, security of tenure and entitlement, participation in dispute settlement, female representation in village council and other forum. However, the existence complex cultural and social dynamics among pastoral groups hinder equal opportunities with regard to decision making and participation in rangeland resources management. For example, among Maasai, the youths and young men of the warrior age-set take responsibility for dangerous activities such as herd movement where senior elders make decision on grazing management and negotiation on social and political issues (Homewood, 2008). In addition to age class, gender and education level, marital status plays decisive role on resources utilization and management. According to Jan and Akhtar (2008), unmarried women normally possess low decision-making power on resources utilization and management in the households which could also apply the same to their counterpart men. Participants in the KIIs proposed that, awareness creation on rangeland resources management should be gender sensitive, actively engaging both men and female with diverse class age.

The current study also revealed that, most of interviewed respondents (Figure 3) had either no formal education or attended

primary schools. Very few respondents attended secondary schools and tertiary level. Moreover, variation in education levels were noted across studied zones.



	Central	Eastern	Lake	Northern	Southern	Southern Highlands	Western
illiterate	31.25	75.00	41.94	48.39	50.00	37.50	32.26
Primary	68.75	25.00	54.84	45.16	50.00	43.75	64.52
secondary	0	0	3.23	3.23	0	18.75	3.23
certificate	0	0	0	3.23	0	0	0

Figure 3. Education levels of interviewed pastoralists in the seven zones of Tanzania

Awareness on sustainable utilization and management of rangeland resources among pastoral and agro pastoral groups is partly enhanced by education levels and training programs. Low level of education noted under the current study might have negative implication with regard to capacity development initiatives and awareness on range resources management and utilization. Most of range management practices require some knowledge and technical skills for better outcomes. Adoption of simple innovations and technologies is hardly possible with illiterate communities. Many studies found that highly educated people tend to adopt new technologies faster than less education people (Riddell and Song, 2012). Furthermore, majority of respondents declared that, limited training was conducted on range management practices, land use planning, biodiversity conservation, pasture establishment and climate change.

Furthermore, the study found that, most of respondents were married (Table 3) which could imply fully participation in range resource management. However, very little variations were noted across the seven zones, whereas slight rate of divorce and unmarried respondents were found in the Western zone and Lake Zone respectively.

Table 3. Composition structure of marital status of interviewed respondents

Zone	Percentage (%) of marital status of respondents			
	Widowed	**Divorced**	**Married**	**Single**
Central	3.13	0.00	93.75	3.13
Eastern	0.00	0.00	96.88	3.13
Lake	3.23	0.00	90.32	6.45
Northern	0.00	0.00	96.77	3.23
Southern	0.00	0.00	100.00	0.00
Southern Highlands	0.00	0.00	100.00	0.00
Western	0.00	6.45	90.32	3.23
Average	**0.91**	**0.92**	**95.43**	**2.74**

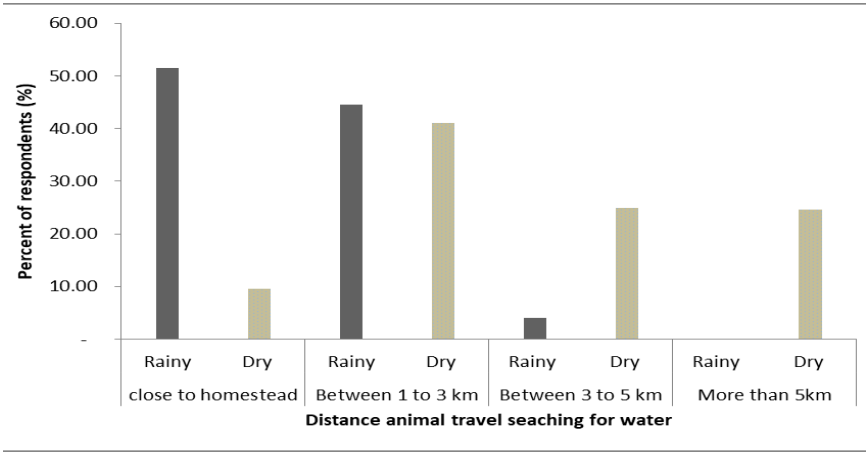
3.2 Rangeland resources utilization

The study found significant variations in both forage and water resources between rainy and dry season in all the seven zones, which were reflected by distances animals were traveling searching for particular resources. Generally, longer distances were reported during dry season compared to rainy season where animals were reported to graze close to homesteads (Table 4). More than 40% of respondents claimed that, animals were moved more than 5 km away from homestead to search for forage resources.

Table 4. The distances animals travel searching for forage resources in Tanzania

	Distance to grazing land (%) in rainy and dry season							
	Close to homestead		Between 1 to 3 km		Between 3 to 5 km		More than 5 km	
Zone	**Rainy**	**Dry**	**Rainy**	**Dry**	**Rainy**	**Dry**	**Rain**	**Dry**
Central	21.88	3.13	37.50	31.25	25.00	46.88	15.6	18.75
Eastern	3.13	-	65.63	-	31.25	9.38	-	90.63
Lake	32.26	12.90	29.03	29.03	19.35	35.48	19.3	22.58
Northern	64.52	12.90	32.26	38.71	3.23	32.26	-	16.13
Southern	25.00	-	53.13	6.25	21.88	56.25	-	37.50
Southern Highlands	3.13	-	15.63	-	71.88	3.13	9.38	96.88
Western	54.84	16.13	41.94	41.94	-	22.58	3.23	19.35
Average	**29.25**	**6.44**	**39.30**	**21.03**	**24.65**	**29.42**	**6.80**	**43.12**

Similar pattern was reported with regard to distances moved by animals searching for water resources during rainy and dry season. More than 50% of respondents claimed that during rainy season animals tend to graze close to homestead where about 24% reported that animals move more than 5 km away from homestead searching for water resources.



Rangeland resources utilization and management depend on availability of resources which are largely influenced by fluctuation in seasons. Availability of forage and water are key resources in the pastoral ecosystems. The study found significant variations in both forage and water resources between rainy and dry season in all seven zones, which reflected by distances animals were traveling searching for particular resources as supported by the study of Mwilawa et al. (2008) that claimed availability and quality of natural pasture remains high for short period of rainy season but declines tremendously during dry season.

Training on range improvement requires understanding of the rangeland health status or condition. Range resources appraisal particularly the levels of utilization provide a quick picture on which aspects should be given priority in the training. The current study indicates that, grazing land has frequently been reported by respondents as important resource highly utilized by pastoral communities in almost all seven zones.

Surprisingly, water resource besides its importance in physiological process of animals, it was claimed to be utilized very little by many respondents. Similarly, minerals were reported as one of resources that are not often used by many respondents (Table 5).

Table 5. The levels of range resource utilization by pastoral communities in Tanzania

		Level of utilization (%)							
		Central	**Eastern**	**Lake**	**Northern**	**Southern**	**Southern Highl**	**Western**	**Average**
Grazing land	Not used	9.4	0.0	0.0	16.1	0.0	0.0	12.9	**5.5**
	Very low	21.9	12.5	25.8	29.0	6.3	15.6	22.6	**19.1**
	Moderate	28.1	12.5	16.1	32.3	34.4	21.9	32.3	**25.4**
	High	31.3	68.8	32.3	19.4	59.4	62.5	29.0	**43.2**
	Very high	9.4	6.3	25.8	3.2	0.0	0.0	3.2	**6.8**
	Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Water	Not used	21.9	0.0	6.5	16.1	12.5	3.1	41.9	**14.6**
	Very low	15.6	37.5	35.5	25.8	40.6	43.8	9.7	**29.8**
	Moderate	3.1	56.3	22.6	16.1	31.3	43.8	3.2	**25.2**
	High	46.9	6.3	32.3	25.8	9.4	9.4	45.2	**25.0**
	Very high	12.5	0.0	3.2	16.1	6.3	0.0	0.0	**5.4**
	Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Mineral	Not used	75.0	75.0	48.4	67.7	67.7	75.0	34.4	**63.3**
	Very low	15.6	15.6	29.0	19.4	19.4	18.8	37.5	**22.2**
	Moderate	6.3	9.4	19.4	9.7	9.7	3.1	21.9	**11.3**
	High	0.0	0.0	3.2	3.2	3.2	3.1	6.3	**2.7**
	Very high	3.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.4**
	Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

In addition to resources utilization, there are some important factors to consider in the training of range management such as policy issues, land tenure, livestock population and other land uses. Most respondents claimed that, livestock population and water scarcity affect negatively rangeland condition. On the contrary, land tenure and invasive species were reported to have less effect (Table 6).

Table 6. Factors affecting management of rangelands in Tanzania

Factors	Level of effect	Central	Eastern	Lake	Northern	Southern	Southern Highlands	Western	Average
Land Tenure	No effect	25	50	32.	41.9	34.38	37.5	45.16	38.0
	Less	12.5	12.5	0	6.5	12.5	34.38	6.45	12.1
	Average	0	9.37	3.2	0	12.5	9.38	0	4.93
	More	62.5	0	48.	48.4	12.5	0	35.48	29.6
	No idea	0	28.1	16.	3.2	28.12	18.75	12.9	15.3
	Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	100
Livestock population	No effect	28.1	21.8	19.	12.9	21.88	15.63	32.2	21.7
	Less	6.25	25	22.	9.68	18.75	25	9.68	16.7
	Average	0	25	9.6	6.45	28.13	31.25	3.23	14.8
	More	65.6	28.1	45.	67.74	28.13	25	51.6	44.4
	No idea	0	0	3.2	3.23	3.13	3.13	3.23	2.28
	Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	100
Invasive species	No effect	59.38	3.13	64.52	25.81	28.13	40.63	54.84	39.49
	Less	18.75	9.38	25.81	9.68	25	15.63	22.58	18.12
	Average	0	25	3.23	19.35	6.25	9.38	12.9	10.87
	More	12.5	56.25	3.23	38.71	18.75	9.38	6.45	20.75
	No idea	9.38	6.25	3.23	6.45	21.88	25	3.23	10.77
	Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	100
Water scarcity	No effect	37.5	0	6.45	22.58	3.13	3.13	19.35	13.16
	Less	21.88	0	3.23	22.58	21.88	12.5	3.23	12.18
	Average	12.5	6.25	6.45	19.35	21.88	12.5	3.23	11.74
	More	28.13	93.75	83.87	35.48	53.13	68.75	74.19	62.47
	No idea	0	0	0	0	0	3.13	0	0.45
	Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Livestock mobility searching for either forage or water resources has ecological implication on range resource management. Movement of large herds of livestock results into severe rangeland degradation through tramping. In addition, the higher the distance animals travel the more energy expenditure, which

leads to poor performance of animals (Turner et al., 2014). The study also established that grazing land was among the highly utilized resources by pastoral and agro-pastoral groups in Tanzania the fact that was attributed with increasing livestock population and diminishing grazing lands. Currently, Tanzania is a third country in Africa with highest livestock population with estimated 33.9 million cattle, 24.5 goats and 8.5 sheep (URT, 2021). Nevertheless, many respondents in this study claimed that increase in livestock population affect negatively rangeland health. On the other hand, the grazing land is shrinking due to expansion of crop production and protected areas; estimated to cover only 10% of total land in Tanzania (NAFORMA, 2015). Surprisingly, utilization of water resources was very low, which could probably be due to scarcity of water resources where some pastoral communities tend to skip some days to avoid energy expenditure for longer distance to water sources. Given the important of water for physiological functioning of animals and productivity, it is imperative to consider adequate development and even distribution of water resources in the rangelands.

3.3 Training needs and capacity development for pastoralists in Tanzania

The level of awareness of pastoral communities on important range management practices is foremost important consideration during training. In this study, pastoral communities reported to be more conversant with issues on conflict management and pests and disease control. However, majority of respondents did not receive training in many aspects including range management practices, land use planning, biodiversity conservation, and pasture establishment, climate change, and control of invasive species and soil moisture conservation practices as shown in Figure 5.

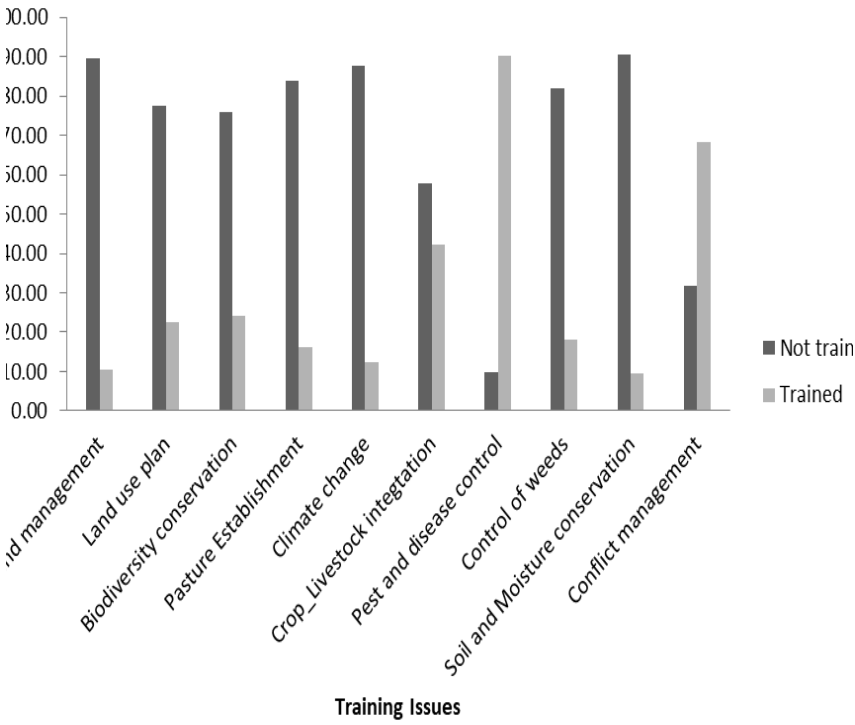


Figure 5. Training needs of Pastoralists in Tanzania

Further analysis of data revealed a detailed list of key training needs by pastoral communities as presented in Table 7. These were considered as common issues across seven zones and if addressed, pastoral communities would achieve sustainable development and improve their livelihoods.

Table 7. Summary of key issues (herders' knowledge and capacity development potentials) raised in the study areas

Zones	Factors contributing to degradation of rangelands	Issues to combat rangeland degradation	Training needs
All seven zones of Tanzania	Overstocking above land capacity Lack of land use plans and ownership of grazing lands Shifting cultivation and agricultural land expansion Drought, bush fires (July-Nov) and climate change Illegal tree cutting and soil erosion Increase of weeds and invasive species (Jatropher, *Mbigiri*, Datura, Pathenium spp, Kongwa weed etc). Migration of large herds and people from other regions Low number of extension and livestock officers (wards & villages) Limited transport facilities for extension officers Conflicts between villages and land users Limited water resources within joint grazing lands during drought (e.g Lahaki in central	Increase number of extension officers Demarcate grazing lands through land use plans Avail transport facilities for responsible officers Build capacity of officers on management of rangelands and climate change (refresher courses) Build capacity of the pastoral association for management of LAHAKI Do exchange visits to successful areas Solve existing conflicts between land users Construct deep wells, water troughs and Chaco dams (*Malambo*) near grazing lands Establish improved pasture and fodder species Improve existing Deeping tanks Re-open blocked stock routes (farms	Importance of animal harvesting and destocking to match carrying capacity Markets for animals and their products (value chain and value addition) Management of fodder, improved pastures and animal breeds Carrying capacity of our grazing lands How to formalize ownership of grazing lands Principles of good animal husbandry Proper placement of animal identification (*chapa*) Principles of fodder conservation and utilization (e.g maize, paddy and millet hay) Importance of alternative animal feeds (supplements) Management and conservation of water sources Rain water harvesting (surface and roof) Diagnosis &treatment of animal

Zones	Factors contributing to degradation of rangelands	Issues to combat rangeland degradation	Training needs
	zone) Limited access to pasture seeds Weak institutional structures (village – district committees) Pests e.g. Herbivory by termites on grasses	and other infrastructures) Put strategies to combat invasive species Initiate joint grazing lands and associations Apply bush control methods	diseases (cattle, goats and sheep) Advocacy on the negative effects of nomadism Management of invasive species How to manage incoming wildlife

Source: Synthesis of results from FGDs and KIIs

Sustainable development of pastoral families requires participation of local people whose livelihoods depends on rangeland resources. Unfortunately, in Tanzania, integration of local knowledge to rangeland management has made limited progress (Roba and Oba, 2009). In the context of this study, results further showed that a traditional livestock practice does not fit into 'modern' guidelines on rangeland management. It was therefore recommended to integrate traditional knowledge and practices such as traditional pasture reserves (*Ngitili* for Sukuma and *Alalili* for Masaai) into national frameworks for rangeland management in the country.

4.0 Conclusions

This study has revealed that most pastoral communities have good indigenous knowledge which is not yet in-cooperated into national frameworks for range management. It has also revealed that government training is skewed towards pest control and conflict management living behind other important issues. Based on these facts, livestock practitioners and stakeholders in Tanzania need to prepare training programs with harmonized materials to address the skills identified by pastoral communities to fulfil the knowledge and develop their capacity for sustainable management of rangeland resources in Tanzania.

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