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Original Research

Determining Factors of Rangeland management Practices in Borana Zone, Oromia National Regional State, Southern Ethiopia

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Abstract

This study was aimed to investigate the local knowledge of pastureland managing practices in Borana that has been managed by traditional institutions. Despite the fact, several researches have been done on rangeland management practices but little study has been done with respect to the local knowledge of pastoral communities and the determining limits with the start of various pressures in the study context. The paper aimed to address the demographic, socioeconomic and institutional aspects that determine the local knowledge of rangeland management. The study selected three districts that all were from pastoralists. Purposive sampling techniques were employed to select representative districts based on their livelihood practices. The study employed descriptive and inferential statistical methods to analyze the data using SPSS version 24. The study looked at the extent at which the household heads manage rangeland productivity. The research result indicated 157(62.549%), majority of the respondents greatly exercising traditional mode of rangeland management that was enhancing mobility while the rest 94(37.451%) poorly engaged in. The finding also revealed the high illiteracy level 54.98% balancing to the elders. In the study context, the interventions and strategies are ended up with little success story due to the environmental degradations. Looking into indigenous rangeland management practices of pastoral community is a useful way to develop sustainable rangeland productivity.

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INTRODUCTION

In Ethiopia, livestock population of the country is estimated as the largest in Africa, which large number of heads are from pastoral areas and plays a significant role in national economy (CARE Ethiopia, 2009). The livestock populations of the country estimated to be approximately 43 million cattle, 23.6 million sheep, 18.6 million goats, 5 million horses and mules, 2 million camels, and 34 million poultry (Belay, 2013).

The Borana production system is under increasing tension from various stressors, such as human population growth, degrading and shrinking rangelands, insecure communal land rights, market failures and recurrent climatic shocks (Angassa and Oba 2007). Rangeland plays an essential role in the livelihood activities of Ethiopian pastoralists as well as Ethiopian economy. Even though, pastoralism plays a significant role to gross

domestic production (GDP) in many east African countries Many policy makers in East African countries downplay the importance of pastoralism, its contribution to economic growth in particular (Oxfam, 2008).

In the country, rangelands cover about 61 to 65% of the total area of the country that are characterized by arid and semi-arid agro-ecologies. In pastoral areas of Ethiopia, especially in Borana pastoral communities the climate change is characterized by scarce rainfall which falls unreliably within short rainy periods (ATPS, 2013). These arid and semi-arid agro-ecologies experience a relatively harsh climate with low, unreliable, and erratic rainfall. Such areas are home to 12%-15% and 26% of the human and total livestock population respectively (Teshome *et al.,* 2009). In the lowlands of the country, which are predominantly pastoralists, livestock is the major source of food (meat, milk) and non-food items such as transport services.

In Ethiopia, Livestock sector ranks second to coffee in generating foreign exchange. It is the major sources of cash income from the sales of live animals and livestock products like milk, butter, hides and skins. In addition, livestock is a measure of wealth and social status in pastoral communities (Canna, 2010).

Borana pastoral communities usually have a deta iled knowledge to classify rangelands which is acquired through extensive observation and conti nuous herding practices. These indigenous knowledge practices provide a useful source of information for the sustainable use and conservation of natural resources (Gufu *et al.,* 2008). Community based knowledge in assessing rangelands has been widely acknowledged (Gimenez & Maria, 2000). The indigenous knowledge for adaptation mechanism to climate variability is mobility that is a systematical escape from adverse situation and knowledge for ecological resilience and rangeland management through seasonal grazing movement (Leoard, *et al.,* 2013).

In Borana it is characterized by extreme weather episode such as increased drought frequency which has worse impact on people. None functionality of the indigenous rangeland management and other policy pressures highly determined the communal grazing areas of Borana (Ayana and Fekadu, 2003). The researcher intended to study the determining variables limiting the local knowledge that the people exercising to manage rangeland production in the study context .

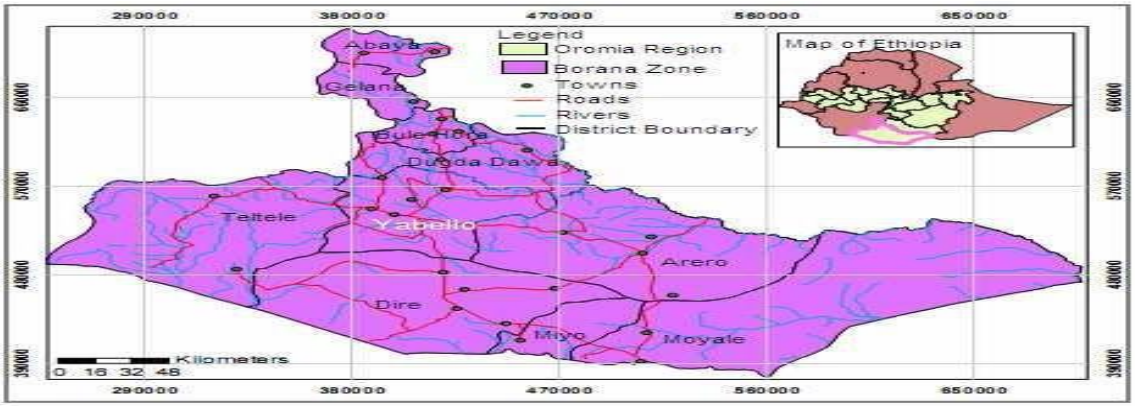

Figure 1: Map of the Study Area

MATERIALS AND METHODS

Description of the Study Site

The study was carried out in Borana pastoral communities Yabello, Dire and Taltale woreda; purposively based on their livestock population. Yabello is the playing the leading role by about 222,008 TLU and followed by Dire, Taltale, Miyo and with total livestock population of 170,740, 145,372, and 127,014 TLU respectively. (CARE Ethiopia, 2009) (Figure 1).

Sampling Techniques

In order to select a representative sample; the researcher purposively draw 9(nine) kebeles among the given three woreda, then the sample household heads were selected randomly. Proportional to the population size techniques was used due to the varied size across the kebeles (Yemane, 1967) formulas at 95% confidence interval was employed to determine the sample size.

$$n = \frac{N}{1 + N (e)^2}$$

Where, n is the sample size, N is the total population of pastoralist households and e is the margin of errors (error terms) at 5%.

Data Gathering Instruments

The study hired a combination of data collection techniques like semi-structured interview questionnaires, focus group discussion and key informant. Focus group discussion was based on their activity to carry out their local knowledge. Key informants like local leaders, *'elders'*, *'abba Gada' 'Jaarsa dheeda', 'Jaarsa maddaa'***,** *'abba herrega'*, *'abba olla'* and development agents.

Statistical Data Analysis

The collected data were coded, entered and edited before running of analysis. Both descriptive analysis and inferential analysis was used for data analysis. Qualitative types of data were analyzed by using explanation, narration and interpretation. Econometrics model (Binary logistic regression model) was also employed (Vasisht, 2000).

RESULTS AND DISCUSSION

Demographic aspects of the HHs

Regarding the extent of HHs' rangeland management practices; majority of respondents 157(62.549%) were greatly exercise their indigenous knowledge during rangeland management whereas 94 (37.451%) of the respondents were poorly exercising it.

Table 1: Extent of the indigenous rangeland management practices among the respondents

Extent of practicing	**Proportion of responses in percentages**	
	Frequency (n)	%age
Great	157	62.549
Poor	94	37.451
Total	251	100

Source*: Own survey data August 2019*

Age status of the respondents

From the given results the Pearson's correlation analysis result, there is a positive relationship between age of household heads and indigenous knowledge practices(Table 1). When age increases, household heads become experienced to the area in which they live and are responsible for indigenous management practices. The results of t-test indicate that there is statistical significance difference between the ages of greatly and poorly practice at 1% (t= 6.69, p= 0.000) significant level (Table 2)l. This result was similarly reported with the results of integrating the indigenous knowledge of Borana rangeland management strategies in southern Ethiopia that has been shown by Homann and Rischkowsky (2005).

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Table 2: Age differences with the extent of indigenous rangeland management practices

Particulars	Respondents practice	n	Max.	Min …..	Mean	St.dev	Mean differ.	t-value	P-value
Age	Greatly	154	76	26	49.79	11.33	-13.03	6.69	.000***
	Poorly	94	69	21	47.67	12.78			
	Total	251	76	21	47.97	13.24			

*Note: *** 1% level of significance respectively, Source: Own survey data August 2019*

Educational status of the respondents

The result below (Table 3) showed total sample respondents 54.98% for illiterate, 23.51% could read and write, and 21.51% have attained primary education (1-8). There were no household heads who attained high school and above among the selected respondents. Generally, it was found that majority of the respondents were illiterate.

The chi-square test shows that there is statically significant difference between the respondents great and poor exercise the indigenous knowledge during rangeland management at 1% (χ^2= 19.35, P=.000) significant level. This finding is consistent with the study made on educational status of pastoralists in Brighton institute of development studies respectively (Kratli, 2000).

Table 3: Education status of the respondents with the extent of indigenous rangeland management practices

		Respondents							
Particulars	Response	greatly exercise		poorly exercise		Total		Chi-square(χ^2)	P-value
		n	%	n	%	n	%		
Educational status	Illiterate	99	63.06	39	41.49	138	54.98	19.35	.000***
	Read and write	36	22.93	23	24.46	59	23.51		
	Elementary school (1-8)	22	14.01	32	34.05	54	21.51		
	Total	157	100	94	100	251	100		

*Note: *** indicates 1% level of significance, Source: Own survey data August, 2019*

Socio-Economic aspect of the HHs

Livestock ownership of the respondents

The minimum and maximum livestock unit of the sample household heads greatly exercise indigenous knowledge of rangeland management is 6.59 TLU and 54.63 TLU respectively. The minimum and maximum livestock unit of sample household heads poorly practice it is 0 TLU and 6.17 TLU respectively. The mean livestock holding of the total sample respondents was 12.49 TLU. The mean livestock unit of the respondents those greatly practice indigenous rangeland management is 22.51 TLU and poorly practice is 2.49 TLU. No statistically significant difference between both the sample respondents(Table 4). Though livestock holding is one of the main livelihood assets in pastoral area, scarcity of the feed shortages severely affect the rangeland production in the study context, as the same time livestock productivity influenced due to drought in pastoral areas, this finding is consistent with the study of (Amaha, 2006).

Table 4: Differences of the Livestock holdings with the extent of rangeland management practice

Particulars	Respondents practices	n	Max.	Min.	Mean	St.dev	Mean differ.	t-value	p-value
Livestock holding	greatly	157	54.63	6.59	22.51	10.20	16.19	2.09	.34NS
	poorly	94	6.17	0	2.49	0.89			
	Total	251	54.63	0	12.49	11.38			

Note: NS= Not Significant; Source: Own survey data August 2019

Land size for farm in hectare

The minimum and maximum cultivated land Indigenous management practices are 0.51 and 3 hectares respectively. The minimum and maximum cultivated land in hectares for the sample poorly exercise is 1 and 6 hectares respectively. The mean cultivated land in hectares for both the respondents is 0.76 and 4.09 hectares respectively. The mean cultivated farmland size of the total sample respondents in the study area is 2.425 hectares. The t-test shows that there is statistically significant difference between the HHs greatly and poorly practice traditional rangeland management at 1% (t= -7.83, p= .00) significant in hectares for the sample greatly exercises level. It has a negative correlation with traditional rangeland management practices. The gradual increments of uncontrolled farmland size intensify conflicts among the indigenous communities. The competition over feeding grassland is increasing (Table 5).The more increasing the farmland size the more decreasing collective management of rangeland in Borana pastoral communities; this finding arecorrespondent with the study made on rangeland management in the Southern Ethiopia by Oba(1998).

Table 5: Cultivated land sizes and differences by the extent of rangeland management practices

Particulars	Respondents	n	Max.	Min.	Mean	St. dev	Mean d/ce	t-value	p-value
Cultivated land size	greatly exercise	157	3	0.51	0.76	0.61	4.715	-7.83	.000**
	poorly exercise	94	6	1	4.09	2.93			
	Total	251	6	0.51	2.425	2.17			

***Note:** ** 5% level of significance respectively. Source: Own survey data August 2019*

Institutional aspects of the HHs

Access into the water points

The sources of water that the respondents use were traditional wells that was very utilized at 41.45%, *haroo* (ponds) 29.08%, harvested water during the rainy season 7.97%, underground water utilization 7.17%, hand pump 4.38%, motorized deep wells 3.98%, Donors and government distribution 2.79%, spring water 1.99% and Floods sources 1.19%. From the findings increases the efficient use of grazing resources more the respondents utilize the traditional wells which is very famous in Borana(Table 6).

To overcome the competition for space between fellow citizens trying to divert runoff to their water points to create haroo (pond sources) in Borana pastoral communities. The low availability of surface water exists in Borana that was often very variable from place to place (Fekadu, 2008).

Table 6. Sources of water in the study area

Water sources	n	%age
Traditional deep wells around tulla	104	41.45
Haroo (pond sources	73	29.08
Harvested rain water	20	7.97
Underground water utilization	18	7.17
Hand pump	11	4.38
Motorized deep wells (boreholes)	10	3.98
Donors and government distribution	7	2.79
Spring water	5	1.99
Floods sources	3	1.19
Total	**251**	**100**

n= Frequency of the respondents; Source: Own survey data August, 2019

Coping means to overcome feed shortages

In Borana pastoral areas; during the critical feed shortage seasons in December, January, February and *Ganna* and *Hagayya* (June, July and August) livestock owners use different strategies to alleviate feed problem (Ayana and Gufu 2008). The finding reveals that during the animal feed shortages 43.43%, 28.29%, 17.13%, 7.57%, 3.58% of the total respondents rely on natural vegetation *(woody plant species),* herd movement *'foora',* rely on market (feeding '*sooda'* during wet season and selling the old animals to buy the young one), rely on stored feed and rely on farm residues buying from neighbors respectively. In the study context, the coping strategies of animal feed shortage are utilization of natural vegetation or natural pasture (Table 7). In Borana feed shortage is characterized by invasion of undesirable woody species, unpalatable forbs, losses of grass layer and increased soil erosion. *The* feed shortage occurred in Borana rangeland assumed to be caused by rangeland degradation and erraticism of rain fall amounts (Anteneh & Alemayehu, 2005).

Table 7. Coping mechanisms to overcome the challenges of feed shortage

Particulars	Responses	n	%age
Strategies to cope with animal feed shortages in Borana	Rely on natural vegetation *(woody plant species)*	109	43.43
	Herd movement *'foora'*	71	28.29
	Rely on market (feeding '*sooda'* during wet season and selling the old animals to buy the young one)	43	17.13
	Rely on stored feed	19	7.57
	Rely on farm residues buying from neighbors	9	3.58
	Total	251	100

Source: Own survey data August 2019

CONCLUSION AND RECOMMENDATIONS

Conclusions

The study revealed that the elders are extremely f amiliarized with the indigenous ways of rangeland management and livestock rearing than younger pastoralists. From the results' findings, more of the respondents greatly exercised the traditional mode of rangeland management that was appropriate for traditional pastoralists. The more the age increasing the more the HHs practicing and valuing the local knowledge for rangeland production. In study concerned, education was

very significant that to improve and add value to the local knowledge however among the representative respondents (251) contacted; majority of the respondents were illiterate 138(54.98%). Education has its own positive impact on the decision making of natural resource management but, in the study case education is correlated negatively due when education level of household heads increase less emphasis for traditional management practices, and household heads practice modern patterns.

With regard to the livestock ownership livestock productivity was influenced due to the none-functionality of the indigenous rangeland production in Borana. Livestock holding is one of the important livelihood assets. The large herds are sighted as the result of the pastoralists with reputation and status, supposedly being their main concerns. Then the high number of livestock unit, the high coming to practice traditional rangeland management practices whereas the low livestock owned by the household heads, the low participating in practices of traditional pastoralism.

Drought severely affecting the environment and causing it not to be productive was a very natural force affecting pastoral communities in Borana. The finding also revealed that the more the land for farm and for private ownership increasing the more decreasing the traditional livestock production that was basically found in mobility. The more exercising of the crop cultivation is negatively correlated to the traditional mode of livestock production.

Recommendations

- ☑ Promoting customarily rangeland manageme nt practices, communal grazing lands and focusing on the institutional building, engaging the experienced elders to exercise their indigenous knowledge for rangeland production that couldn't leading to overgrazing and overstocking.
- ☑ Elders' structural representation in decision making process and provision of the policy support for economic, environmental and sociopolitical concerns in pastoral areas.
- ☑ Strengthening the role of indigenous institutions and concerning for the demographic aspects of the pastoral communities to achieve sustainable uses of rangeland resources.
- ☑ Since there was a high illiteracy level in the study area the government should provide due attention to expansion of educational institutions in the area.
- ☑ For pastoralists herd mobility is used for efficient resource utilization to avoid the over exploitation of the range resources by re ducing concentration of livestock in one area. Supporting of the indigenous strate gies that are herd mobility during dry and wet seasons rather than blocking herd movement because in the area there is a problem of low and unpredictable rain fall in nature.
- ☑ Sustainable natural resource use and management must become the rule rather than the exception to safe the rangeland from degradation.

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COMPETING INTERESTS

The writer states that not at all competing interests.

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