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Journal homepage: www.rangeland.ir



Research and Full Length Article:

Competition on Rangeland Utilizations Conflict Source among Users in Semi-Arid Areas at Eldebeibat, South Kordofan State-Sudan

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Received on: 24/04/2019

Accepted on: 26/10/2019

Abstract. This study was conducted at Eldebeibat area in South Kordofan State, Sudan. The aim of this study was to assess the role of competition on rangelands utilization in the occurrence of conflicts between land users in the semi-arid areas of Eldebeibat, Sudan. Two target questionnaires were designed to collect data from two groups of land users namely nomadic pastoralists and sedentary farmers that are using the area. The data were analyzed using Statistical Package for Social Science (SPSS). The results showed that illiteracy was high in both groups. The crop production was the main source of income in the sedentary communities while pastoralists practiced cultivation beside livestock rising at the same time. However, both groups preferred raising mixed species of livestock in their herd structure. In addition, it was found that milk production represented the main goal of livestock keeping for the both groups. The results also indicated that the main reason of the livestock health deterioration was shortage of forage. Moreover, pastoralists followed the restricted routes to practice grazing. All respondents included in this study considered the occurrence of conflicts among them as a normal phenomenon and the causes of conflicts are different between them. Most of the nomad pastoralists considered blockage of routes of livestock movement by farms as the main cause of conflicts whereas sedentary groups attributed the occurrence of conflicts for damaging their farms by pastoralists' livestock for entrance to and exit from grazing land and during grazing that was increased during rainy seasons in particular. The two groups resort to traditional local administration (Godeyah) for reconciliation and solving the conflicts among them.

Key words: Rangelands, Conflicts, Nomad pastoralists, Sedentary farmers

Introduction

Most of the rural areas of the Sudan are dominated by a population of pastoralists and agro-pastoralists who are predominantly dependent on land and its natural resources for support of their livelihoods. The traditional natural resource tenure system used to be effective for meeting the demands of herders and farmers without harming the overall environment (UNDP, 2006). However, the increase in human and animal populations, horizontal expansion in mechanized farming, and the series of droughts inflicted the fragile ecosystem, e.g. those of the northern parts of the Sudan, leading to the breakdown of the tenure system (UNDP, 2006; Ahmed and Abu Sabah, 1993). This worsening situation has disrupted transhumance routes and forced pastoralists to move further south, subjecting nomads to conflicts with existing farmers and pastoral land users. Moreover, the current legislations on pastoral livelihood system are fragmented and not reconciled with existing customary local rules. The formal land allocation system also marginalized customary rights and procedures (Elhassan, 2007). Though customary law states that agriculture land after harvest is subjected to public grazing, during the crop growing period from mid-July to mid-January, no animals are allowed to enter the fields. This period coincides with the passing of the herds of the pastoralists, and the time of greatest pressure on pastoral resources in region. Conflicts between pastoralists and resident farmers over crop damage are increasing due to the increase in number of animals in area as well as the expansion of productive fields into areas which were used for grazing and as livestock corridors (Egeimi *et al.*, 2003; Ahmed and Abu Sabah, 1993). According to Elhassan (2007) and UNDP (2006), the legislation issue, the search for water, fodder and safe stock routes are not limited to the northern states but are also manifested to some degree in many areas of southern Kordofan.

Moreover, the civil war, inter-tribal frictions and militia fighting in South have resulted in a state of insecurity which in turn has created new pressures on livestock movement between seasonal pastures. The stock routes known as Morhal are recognized as corridors for animal movements through farmed areas between rainy and dry season pastures; conflicts along these routes have become common in El Dilling locality and are generally triggered by increasing demand for cropland, expansion of mechanized agriculture, shortage of water points and land degradation. Rules, agreements, acts and resolution committees have been initiated for governing transhumance routes but they remained ineffective due to lack of satisfactory involvement of farmers and herders (UNDP, 2006). Fashir (2014) stated that the existence of conflicts in El Dilling area between same tribes of herders on water sources and rangelands utilization is common especially in dry seasons when forage and water are not enough for their livestock. Also, conflicts occur in this area between herders and farmers for rangeland resources and other land uses particularly in the rainy season when farmers grow crops on transhumance routes of livestock which leads to their blockage resulting in herders damage to the farms while practicing grazing or when moving to other places in the area. The aim of this study was to assess the role of competition on rangelands' utilization in the occurrence of conflicts between land users in the semi-arid areas of Sudan.

Material and Methods

Study area

The insecurity situation in the southern parts of Kordofan state such as civil war, inter-tribal friction and militia presence forces the people to escape from their villages or well-known locations where they practice their grazing or cultivation activities. This area represented the most important part of South Kordofan State, particularly in recent times to practice

cultivation and animal rearing that leads to overgrazing and ultimately causes deterioration of natural resources, particularly rangelands and forested areas which are used as grazing areas, particularly in the dry seasons. According to Fashir (2014), when the civil war started in the 1980s, cattle herding pastoralists started penetrating deeper into northern parts of South Kordofan State in search for water and grazing land for their livestock due to loss of their areas in southern parts as a result of civil war.

The study area lies between latitude $11^{\circ}45' - 12^{\circ}49' N$ and $25^{\circ} 29' - 30^{\circ} 0' E$. The area is about 5700Km^2 , which belongs to El- Dilling Locality. It represented 27% of locality area and 7.3% of the total area of the South Kordofan State (Musa, 2001). The area is located in northern part of State and it has vast sandy areas suitable for grazing practices especially during rainy seasons (Fig. 1).

Data collection and analysis

The data of this study were gathered through two targeted questionnaires. A total of 243 respondents were chosen from five villages for sedentary farmers that represent 6% of the total population in study area according to local leaders (Omda). Also, 129 respondents of nomad's pastoralists were chosen representing 5% of total pastoralists using the area in the rainy season. In addition, discussions were conducted with the local leaders such as Omads and Sheikhs.

To analyze the data gathered from respondents in the study area, the Statistical Package for Social Science (SPSS) was used to obtain frequency and percentage of data.

Results and Discussion

Education levels

According to education levels among nomadic pastoralists, about 43% of them were illiterate, 23% had basic education, 11% had religious education solely Quran at khalwah, 23% had secondary school education followed by 2.0% who were university graduates.

Sedentary families were compared with pastoralists according to the education levels (Table 1) where 31% of them had basic education, 22% secondary level, 19% illiterate, 16.0% university level and 12% khalwah. The high illiteracy among pastoralists' families may be attributed to the lack of schools in places where they are living or the school timing contradicts with their life pattern. But illiteracy among sedentary families may be due to cultural back ground and lack of awareness about the importance of education. Despite of their stability in one place and availability of schools surrounding their villages, most of sedentary families educate their children for just basic education, this also may be due to early marriage among them and migration of most young boys to cities looking for other sources of income practicing marginal works, particularly at the national capital of Sudan, Khartoum.

Table 1. Education levels for both respondent groups at Eldebeibat area (South Kordofan State, Sudan)

Education levels	Pastoralists		Sedentary	
	Frequency	%	Frequency	%
Illiterate	55	41	47	19
Khalwa	14	11	29	12
Primary	29	23	74	31
Secondary	29	23	54	22
University	2	2	39	16
Total	129	100	243	100

Livelihood practices

According to the source of income among pastoral communities, the results showed that 61% of them were raising livestock and practicing cultivation, 25% practice livestock raising, 14% practice trade and only 1% as employee in government.

Sedentary families were compared to pastoralists regarding the source of income where 61% of them practice cultivation, 32% practice cultivation and livestock raising, 5% trade and 2% only livestock raising (Table 2). Cultivation is still the

basic form of land use in the area; this may be due to the shortage of rangelands and restricted grazing in some places because of the security situation in most parts of the State. For these reasons, the pastoralists change their livelihood pattern and opted to practice agriculture beside livestock raising. This agreed with Tubiana and Tubiana (1977) who stated that the Zaghawa tribes in Darfur cultivate beside their main activity (grazing) to meet their life needs from crops.

Table 2. Source of income for both respondent groups at Eldebeibat area (South Kordofan State)

Sources of income	Pastoralists		Sedentary	
	Frequency	%	Frequency	%
Cultivation	0.0	0.0	149	61
Animals raising	32	25	5	2
Animals rising and cultivation	78	61	77	32
Trade	18	14	12	5
Employee	1	1	0.0	0.0
Total	129	100	243	100

Herd structure

According to herd structure, about 68% of nomads pastoralists preferred to raise mixed herds of animals. While 11% keep goats, 10% cows, 6% camels and 5% sheep. This could be attributed to the reason that pastoralists prefer a mixture of animals to meet their life requirements and also, different animals differ in their food preference and as such are more efficient to use the rangeland than one kind of animals. Morton (1989) stated that mixed herds of camels, cattle, sheep, and goats are very efficient in exploiting rangeland. These are considered as good indicators of

awareness of pastoralists using the rangelands in the area. The sedentary families were compared to pastoralists regarding type of animals where 40% of them preferred mixed herds, 27% keep goats, 12% sheep and 12% raise cows (Table 3). This may be attributed to various uses of animals in the area such where male cattle are used in the land preparation for cultivation and for carrying agricultural products from farms to villages; female cattle for milk production while other livestock (sheep and goats) are sold to earn petty cash to cover various life requirements.

Table 3. Type of animals owned by nomadic and sedentary herders in study area

Type of animals	Pastoralists		Sedentary	
	Frequency	%	Frequency	%
Cows	13	10	28	11
Sheep	6	5	30	12
Goats	14	11	65	27
Camels	8	6	0.0	0.0
Mixed of Animals	88	68	96	40
Missing	0.0	0.0	24	9
Total	129	100	243	99

Purpose of livestock keeping

The two groups have been investigated and according to results (Table 4), among nomadic pastoralists, 71% of animals are kept for milk, 27% for trading and 2% for prestige. On the other hand, 75% of Sedentary groups considered milk production as the main reason for keeping livestock while 13% keep livestock for trading, and 3% for meat (Table 4). These differences between the two communities may be due to the reason that pastoralists' families are depending on milk for consumption and selling it to earn cash to

buy their needs of life such as clothes, drugs and sugar, etc. and to reduce selling of livestock (Coppock, 1994). Traditionally, herders consume most of the milk produced, any surplus is usually shared with neighbors, exchanged in barter or sold in urban areas. In Somalia, a commercial milk chain through a cooperative has been established among the pastoralists for marketing, camel milk in Mogadishu as source of income to buy sugar, clothes and medicines (Herren, 1990).

Table 4. Purpose of animal's raising by nomadic and sedentary herders in study area

Purpose of animal raising	Sedentary		Pastoralists	
	Frequency	%	Frequency	%
Milk	181	75	92	71
Meat	6	3	0.0	0.0
Trade	32	13	35	27
For prestige	0.0	0.0	2	2
Missing	24	9	0.0	0.0
Total	243	100	129	100

Livestock health

Most respondents being 61% of nomads pastoralists stated that the health of their animals was deteriorated in both rainy and dry seasons, 15% reported very good animal health, 13% good, 7% moderate, and 5% excellent (Fig. 1). This could be attributed to the rangeland deterioration as

a result of overstocking in the area, and insecurity situation in the State which restricted livestock from moving in most parts of the northern State. Musa (2001) stated that "Eldebeibat area accommodated 65% of the State's animals during rainy season."

Reasons of livestock’s health deterioration

Majority of respondents (70%) stated that livestock’s health deterioration was due to shortage of forage, 25% diseases and 5% insecurity in most parts of State (Fig. 2). This may be due to restriction of population (pastoralists and sedentary) in more secure areas, particularly in northern parts of the State such as El Dilling locality and Eldebeibat area and deterioration of range consequential from overgrazing, and early grazing also causes deterioration of livestock’s health.

Livestock number

Most respondents (77%) said that the numbers of livestock are decreasing while 16% reported an increase and 8% reported that livestock numbers are stable and do

not change (Fig. 3). This may be attributed to decreased rangeland area, insecurity situation, increasing of life requirements and diseases.

Reasons of livestock’s number decrease

A total of 39% of the respondents of pastoralists consider the decreased livestock number due to shortage of forage, 22% to diseases, 9.0% to conflicts and 7% to selling livestock to cover life needs (Fig. 4). Decline of grazing areas caused by expansion of cultivation and absence of supplementary feeding in the study area may be blamed. Thomas (1980) stated that agricultural expansion forces pastoralists to use the remaining grazing areas intensively and that leads to rangelands’ deterioration.

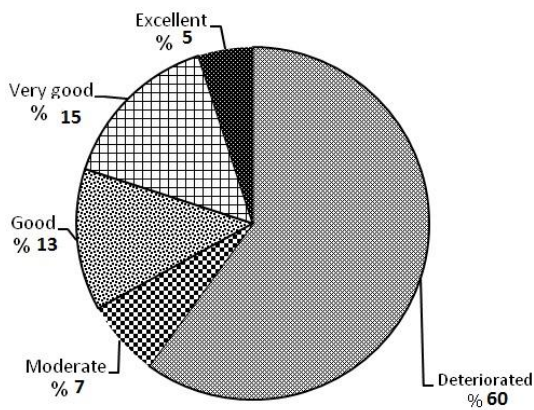


Fig. 1. Livestock health according to pastoralist’s respondents

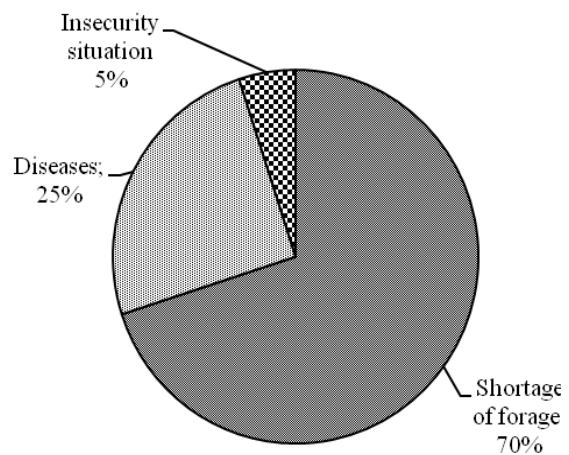


Fig. 2. Reasons of livestock’s health deterioration in study area

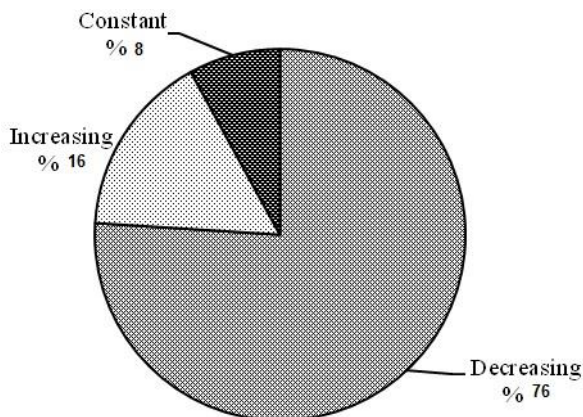


Fig. 3. Status of livestock numbers in study area

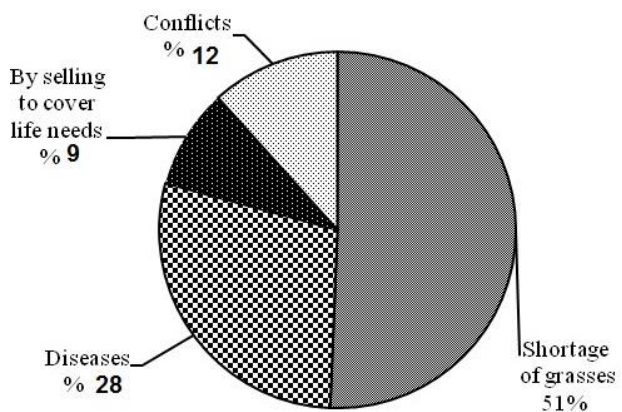


Fig. 4. Reasons of livestock’s numbers decreasing in study area

Change of livelihood pattern among mobile pastoralists pattern

The majority of respondents (97%) in the pastoralists investigated stated that the pattern of livelihood was decreased whereas only 3% stated that there was no change in their grazing pattern (Fig. 5). Also regarding the reasons that led the pastoralists to change their livelihood pattern, 98% stated that it was due to expansion of agriculture into grazing area and 2% due to insecurity situation in the State (Fig. 6). This may be related to increasing population in northern parts of the State, and increase of crops production that affect pastoralists' activities in the area. According to Garcia (1981), the main problem of African rangelands is the

expansion of agriculture into pastoralists grazing areas.

Status of milk production

The majority of respondents (90%) stated that the amounts of milk production were decreasing and 10% said the amount of milk production was increasing (Fig. 7). Moreover, 71% stated that the reason of milk production decrease was shortage of grasses whereas 19% attributed that to spread of diseases among their livestock (Fig. 8) that may be due to overstocking, expansion of cultivation in grazing areas and insecurity situation in the State which forced people to practice their activities in the most secure part of the State, which led to overstocking in this area.

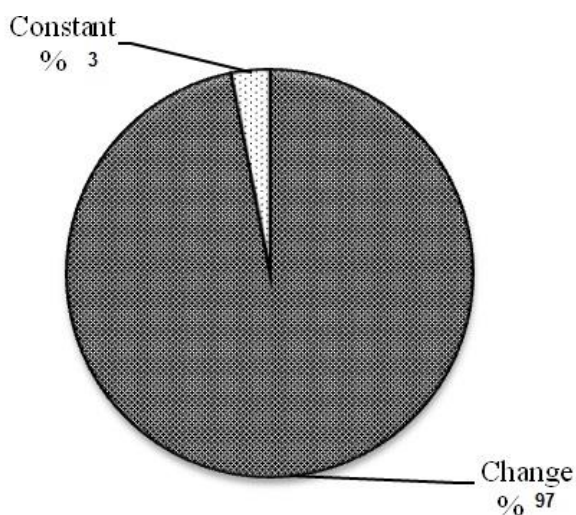


Fig. 5. Changes of livelihood pattern within pastoralist's respondents

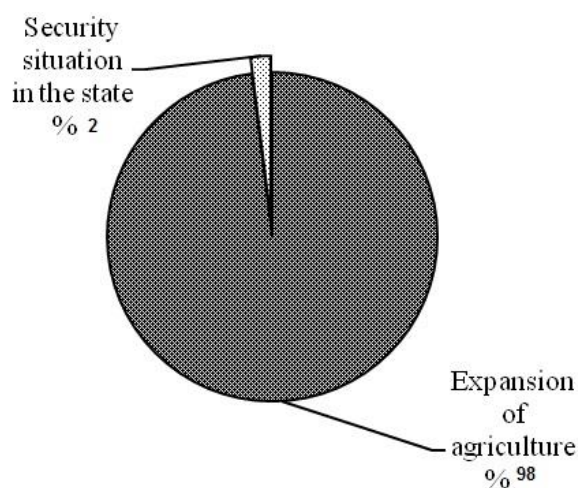


Fig. 6. Reasons of livelihood pattern changes according to pastoralist's respondents

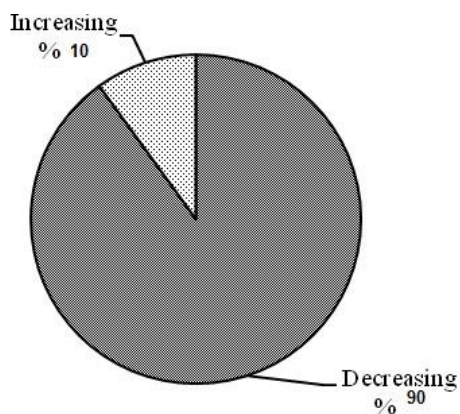


Fig. 7. Status of milk production according to pastoralists in study area

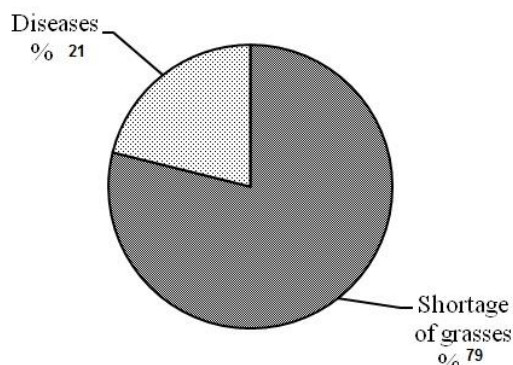


Fig. 8. Reasons of decreasing milk production according to pastoralists in study area

Strategy to face forage shortage

Pastoralists were asked how they face forage shortage. About 89% of them said they buy crops residues from farmers to cover shortage of forage and 6% said they tend to use trees and shrubs and 5% said they use the grasses which they collected in the time of plenty in wet season (Fig. 9). This may explain why the pastoralists do not move away from rainy season domain because of insecurity situation in most parts of State, which force the nomadic pastoralists to practice grazing close to sedentary settlements.

Using specific routes to practice grazing

About 91% of pastoralists use restricted routes while 9% did not complain from restriction of their movement within specific limited routes (Fig. 10). This could be attributed to insecurity situation and blocking of some routes by farms and expansion of agriculture into grazing land that led pastoralists to be constrained

within limited rangeland resources to practice grazing, and limited routes to enter into and exit from grazing areas.

About 91% of respondents reported that grazing land decreased (Fig. 11). These could be attributed to expansions of cultivation scheme into grazing land and loss of grazing areas resulting from civil war in some parts of the State particularly in the southern parts.

According to decreased grazing land, most of respondents (94%) from nomadic pastoralist communities stated that the expansion of cultivation into rangelands was the main cause of the decrease in grazing land (Fig. 12). This could be attributed to improper land uses in the area and insecurity situation in all State contributed in expansion of agriculture into rangelands. Garcia (1981) stated that the main problem of African rangelands in the semi-arid zones is expansion of agriculture into pastoralists grazing areas.

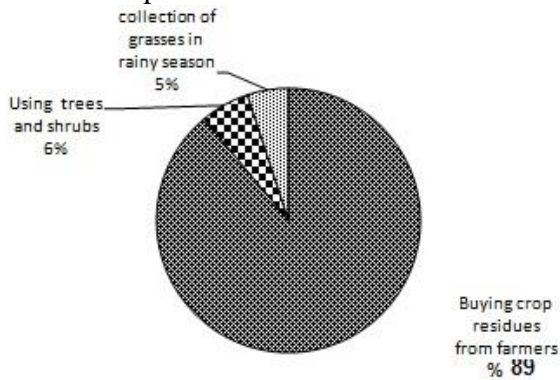


Fig. 9. Types of strategies to face forage shortage in nomadic pastoralists

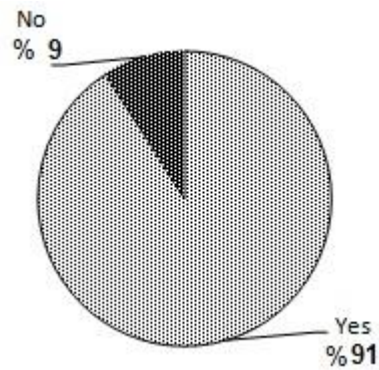


Fig. 10. Using limited routes to enter and exit from range in the rainy season “Makhraf”

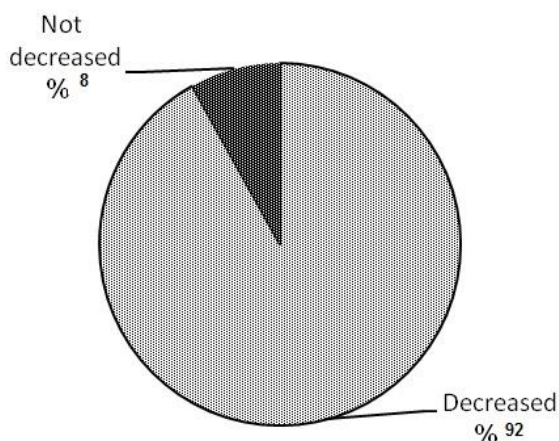


Fig. 11. Decreasing of the grazing areas in the rainy season

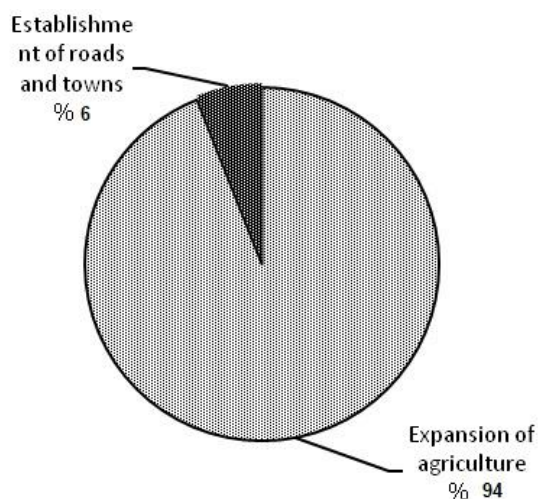


Fig. 12. Reasons of decreasing rangeland area in the rainy season domain "Makhrif"

Conflicts between two groups in rainy season and reasons of conflicts

Conflicts were common between pastoralists and settled groups in the study area. About 85% of respondents from nomadic groups reported that they had conflicts with sedentary farmers while 15% said they experienced no conflicts. Also, the majority of sedentary (77%) groups investigated about conflicts said that they have conflicts with pastoralists while 22% said they had not experienced conflicts (Table 5). Reasons of conflicts as stated by nomadic pastoralists were narrow routes (67%) as resulted in expansion of agriculture into grazing areas, shortage of pasture (13%), and shortage of water (5.0%).

In case of settled farmers, 66% of them reported having conflicts with pastoralists

resulting mainly from damaging farms by pastoralists' livestock whereas 8.0% said that competition on grazing land was the cause of conflicts while 4.0% attributed conflicts to competition over water sources (Table. 6). These results indicated that the expansion of agriculture and damage of farms by pastoralists' livestock were the main causes of conflicts in the area. Garcia (1981) stated that the main problem of African rangelands is expansion of agriculture into pastoralists' grazing areas. Salih (2001) stated that most of pastoralists do not use the traditional routes, which had been determined by government so that they search about the good grazing areas anywhere and this leads to damage of the settler's farms in the area and finally causes the conflict between them.

Table 5. Conflicts within respondents from the two communities in study area

Category	Pastoralists		Sedentary	
	Frequency	%	Frequency	%
Conflicts occurred	109	85	188	77
Conflicts not occurred	22	15	52	23
Total	131	100	240	100

Table 6. Reasons of conflicts between respondent groups in study area

Reasons	Pastoralists		Sedentary	
	Frequency	%	Frequency	%
Blocking routes by cultivation	86	67	0.0	0.0
Shortage of water	7	5	0.0	0.0
Shortage of range	17	13	0.0	0.0
Damage of agriculture by nomads	0.0	0.0	161	66
Competition on grazing	0.0	0.0	19	8
Competition on water sources	0.0	0.0	10	4
Missing	19	15	53	22
Total	129	100	243	100

Time of conflicts increasing

Concerning time of conflicts increase, 34% of sedentary farmers said that it was increased during nomadic pastoralists grazing period, 24% when the pastoralists enter the rainy season domain “Makhraf”, and 19% said when the pastoralists return to summer season domain “Masyaf” (Table. 7). This might be due to the expansion of cultivation into the grazing areas which led to blocking and narrowing some routes.

Pastoralists also were investigated about period of conflicts increasing. Their response revealed that 46% of them said during grazing, 23% when they enter the rainy season domain “Makhraf”, 13% when exit from rainy season domain, followed by 2% at water sources. This may be due to expansion of cultivation into the area of grazing due to reduction of grazing areas and blockage of transhumance routes

that are used to move between rainy season domain and summer season domain.

Conflicts’ transformation (solve)

According to sedentary respondents, 31% prefer traditional administrative reconciliation methods (Godeyah) to solve their conflicts with pastoralists, 23% pay fine, 17% settlement, 5% pay fine and prison, and 1% poisoned.

The pastoralists’ families were investigated about conflicts solution, most of them (67%) solved their conflicts with other tribes through leaders of tribes and 18% preferred court (Table 8). This may be due to the short period which pastoralists spend in rainy season domain, and to the close relationship between them and pastoralist who do not stay for a long time in the area; for this reason, they prefer to solve the conflicts by their tribal’ leaders.

Table 7. Period of conflicts increase between both respondent groups in study area

Period of conflicts’	Pastoralists		% Sedentary	
	Frequency	%	Frequency	%
When mobile pastoralists enter to rainy season domain	30	23	59	24
When mobile pastoralists return to summer domain	0.0	0.0	47	19
Through grazing time	59	46	83	34
Through drinking of livestock	3	2	0.0	0.0
When pastoralists exit from rainy season domain	17	13	0.0	0.0
Missing	20	16	54	23
Total	129	100	243	100

Table 8. Methods of conflict transformation between the two responding groups in study area

Methods	Pastoralists		Sedentary	
	Frequency	%	Frequency	%
Pay fine	0.0	0.0	56	23
Prison	0.0	0.0	3	1
Settlement	0.0	0.0	41	17
Pay fine and prison	0.0	0.0	13	5
Local administrative (Gowdyah)	86	67	76	31
Court	23	18	0.0	0.0
Missing	20	15	54	23
Total	129	100	243	100

Conclusion and recommendations

The study concluded that illiteracy was high within the two investigated groups. Cultivation was considered the main source of income within sedentary communities while pastoralists practiced cultivation beside animals rising at the same time. Both groups preferred raising mixed kinds of livestock in their herds. Milk production was the main goal of livestock keeping for the two groups. The main reason of the livestock health deterioration was shortage of forage. Moreover, all respondents included in this study considered the occurrence of conflicts among them is a normal phenomenon and the causes of conflicts were different between them; most of nomadic pastoralists considered blocking of routes of livestock movement by farms was the main cause of conflicts while sedentary group attributed occurrence of conflicts to damaging cultivation by pastoralists' livestock when entrance and dwelling into grazing land and during the practice of grazing. Conflicts mainly occur around farms and increase when nomad's pastoralists enter the rainy season domain. All respondents preferred traditional administrative authorities "Godeyah" to solve the conflicts. The study also showed that the main causes of conflicts among the two groups in the area is the expansion of cultivation into grazing land and blockage

of routes of livestock movement. Consequently, it was recommended that laws and legislations of utilization of natural resources, particularly rangelands should be activated and applied to organize utilization of these resources among different users in the study area that should lead to reduce the conflicts among users.

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رقابت بر سر استفاده از مراتع اصلی مورد نزاع از سوی بهره برداران در مناطق نیمه خشک الدیببات، کردوفان جنوبی، ایالت سودان

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چکیده. این مطالعه در منطقه الدیببات در ایالت کوردوفان جنوبی سودان انجام شده است. هدف از این مطالعه بررسی نقش رقابت در بهره‌برداری از مراتع در بروز درگیری بین بهره‌برداران اراضی مرتعی در مناطق نیمه خشک الدیببات، سودان بود. دو پرسشنامه هدف برای جمع‌آوری داده‌ها از دو گروه بهره‌بردار، یعنی گله‌داران عشایری و کشاورزان غیر مهاجر که از منطقه استفاده می‌کنند، طراحی شد. داده‌ها با استفاده از بسته‌های آماری علوم اجتماعی (SPSS) تجزیه و تحلیل شدند. نتایج نشان داد که بی‌سوادی در هر دو گروه بالا است. تولید محصول، منبع اصلی درآمد در جوامع غیر مهاجر بود در حالی که گله‌داران هم‌زمان با افزایش دام در همان زمان اقدام به کشت می‌کردند. با این حال، هر دو گروه ترجیح می‌دادند گونه‌های مختلفی از دام را در ساختار گله خود پرورش دهند. علاوه بر این، مشخص شد که تولید شیر اصلی‌ترین هدف دامداری برای هر دو گروه بود. نتایج همچنین حاکی از آن بود که دلیل اصلی عدم سلامت دام کمبود علوفه است. علاوه بر این، گله‌داران مسیرهای محدودی را برای چرانیدن دنبال می‌کردند. همه پاسخ دهندگان در این مطالعه، بروز درگیری میان آنها را یک پدیده طبیعی و دلایل درگیری بین آنها متفاوت دانسته‌اند. اکثر گله‌داران عشایری مسدود کردن مسیرهای حرکت دام توسط مزارع را عامل اصلی درگیری می‌دانند در حالی که گروه‌های غیر مهاجر دلیل درگیری را آسیب رساندن به مزارع خود توسط ورود و خروج دام از چراگاه‌ها و در هنگام کوچ به ویژه در فصول بارانی می‌دانند. این دو گروه بصورت عرفی برای آشتی و حل اختلافات به حکومت محلی (گودیا) مراجعه می‌کنند.

کلمات کلیدی: مراتع، درگیری‌ها، گله‌داران موند، کشاورزان غیر مهاجر