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Effect of management and rangeland's area on vegetative characteristics (case study: Taleghan watershed)

Maryam Haji Mohammad Ebrahim Zanjani[1*], Hossein Arzani[2], Mehdi Farahpour[3], Seyed Akbar Javadi[1], Ehsan Zandi Esfahan[3], Mohammad Reza Bihamta[4]

[1]*Department of Range Management, Science and Research Branch, Islamic Azad University, Tehran, Iran*

[2]*College of Natural Resources, University of Tehran, P.O. Box 31585-4314, Karaj, Iran*

[3]*Research Institute of Forests and Rangelands, P.O. Box 13185-116, Tehran, Iran*

[4]*College of Agriculture, University of Tehran, P.O. Box 31585-4314, Karaj, Iran*

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Abstract

Property rights are one of the main tools to achieve sustainable development and natural resource management which encourage the owners to continue their ownership. In Iran, range management plans are considered as one of the main tools for management and utilization of rangelands and also establishment of owners' rights. In this research, effects of property type and rangeland's area on vegetation and soil factors were studied. Twelve summer rangelands of Taleghan watershed were investigated. Rangelands were selected as two types of management (rural and collective) and three areas of 0-550 ha, 550-1100 ha and more than 1100 ha were included. In each rangeland, Physiognomic-Floristic method was applied to determine the vegetation types. Area of the sampling quadrates was calculated based on the minimal area method and number of quadrates was statistically determined with regard to the variations of the vegetation. In each unit, sampling was carried out along with three transects with a length of 150 m. Fifteen quadrates of $1m^2$ with intervals of 10 m were established on each transact and vegetation and soil factors were evaluated at the time of range readiness. All collected data were statistically analyzed by SPSS software based upon factor analysis and factorial experiment in a completely randomized design. According to the results, a better condition was identified for vegetative factors in rural rangelands and also in those categorized in an area of more than 1100 ha compared to the collective rangelands and those with an area of 0-550 ha, 550-1100 ha.

***Corresponding Author:** Maryam Haji Mohammad Ebrahim Zanjani ✉ m_haji637@yahoo.com

Introduction

Rangelands are of renewable natural resources in each country which in terms of water production, soil conservation, forage production, wild life habitat, air purification, recreation and so forth are of utmost importance (Hurd *et al.,* 1953) . So the only Value of forage production includes 10 to 20 percent of rangeland services(Khlilian *et al.,* 2000).

Rangelands are dynamic ecosystems which change following the occurrence of environmental disturbances; therefore sustainable use of rangelands is possible only when these changes are known (Dyksterhuis, 1949). Since no resource management is possible without its comprehensive and scientific recognition (Arzani *et al.,* 1999).Rangeland monitoring studies enable the expert to judge about the changes resulting from management activities and also ecological changes. Appropriate recognition and evaluation of the rangeland will result in accurate decision making on capabilities and also eliminating the limitations. If targeted programs of vegetation management are designed and implemented, sustainable use of the vegetation will be guaranteed. In addition, vegetative information effectively plays a key role in management interpretation and recommendations for a watershed. To avoid rangeland destruction, the effects of management activities should be investigated (Dyksterhuis, 1949).
Status and classification of plants are considered as an important measure in ecological assessment of the rangelands. Plants and vegetation indicate the health and events occurred in the rangelands Sarukhani ,2006). Failure to observe the balance of livestock and rangeland, and over-exploitation of rangelands in Iran has caused irreparable damage to these resources and to vegetation and soil. One of these factors which could ultimately affect the rate of rangeland utilization can be attributed to the type of rangeland utilization. Both the range and pasture specialist believe that rangelands and pastures of the word are being destroyed due to the overgrazing and selective grazing; therefore, the balance of livestock and rangeland is essential for range management (Kellner, 1992).

In customary and traditional system of Iran, rangelands are utilized in three types of council, collective and private management. As in council management (rural rangelands), the grazing license has been issued in the name of the Islamic village council and rural residents utilize the rangelands based upon the list of members included in the grazing license. Collective management is defined as social units with definite members, distinctive boundary, common utilization, cooperation, and culture of sharing among members (Bromley, 1991).
This research was aimed to investigate the effect of human factors, including the management and implementation of programs, as well as non-human factors such as rangeland's area on some soil and vegetation characteristics of rangelands. The mentioned factors affect the quantity and quality of forage production and other rangeland's products. Therefore, the effects of two management types, implemented in most of the rangelands of Iran, and three rangeland's area were investigated on some soil and vegetation characteristics. This paper tries to determine which of these two range management types have positive effects on soil and vegetation characteristics and whether the rangeland's area can affect these characteristics in rangelands with identical management or not. Various researches have been conducted in this regard as follows:

Abdollahpour (1997) introduces collective management as the cause of all destruction and lack of investment in range improvement by private sector and believes that collective management is the main cause of rangeland destruction through early and overgrazing. However, Timah *et al.* (2008), studied the effects of population growth in Noblesse on conservation of natural resources in villages of southern Cameroon and showed that despite the rapid population growth, natives of this region are familiar with conservation of forest ecosystems in Central Africa because of high dependence on natural resources and low agriculture and population growth does not damage the preservation of natural resources.

Viadrich & Oses-Eraso (2007 b) presented a model for a region in which collective management was performed through cooperative and non- cooperative agencies. In this model, social cooperation in collective management was identified as a positive mechanism with suitable influence on sustainable management of natural resources.Adhikari et al. 2004 investigated the characteristics of rural families and their dependence on rural property management in Nepal and introduced collective management as one of the permanent functions to reduce poverty.

Maggs & Hoddinott, 1999 studied the income of rural households in developing countries and showed council management as a source of rural family income and single owner model will cause adverse effects in range management. Netting (1976) studied the management system of rangelands and pastures in Vallaye village of Torbel (Alpine rangelands) and stated that common use in these regions had no history of chaos and could be considered as sustainable management. In Iran, preparation of range management plans also has been considered as a principal policy of Technical Bureau of Forests and Rangelands organization to reduce the grazing pressure and implementation of successful range management since 1968. Range management booklets include the measures prepared by Forests, Rangelands and Watershed Organization in order to manage the rangelands and for preservation and restoration, development and proper utilization in certain areas of rangelands delegated to the executor or executors after approval by the offices of official documents in the form of Thirty-year-old ownership document provided that the provisions of the plan booklet. Range management plan is a program with aims of improvement, reclamation and sustainable utilization of rangelands which will have the highest efficiency if the participation of utilizers. Participation is defined as stimulating people's sensitivity and consequently increasing their understanding and ability to respond to the development plans. In other words, participation includes intervention of people in the decision making process, project implementation and their share of the benefits of development projects and intervention in evaluation of the projects. Actually, range management plan is one of the main tools for range management and utilization in Iran which high importance should be given to their preparation considering ecological characteristics of the region in one hand and social issues on the other hand. Hassanzadeh (2001) stated that index of rangeland degradation was increased with increasing of the number of beneficiary households while it was decreased with increasing of the land area per household. To investigate the effects of different utilization methods on rangeland improvement and degradation, Khalighi (2004) compared six methods of rangeland utilization including private, collective and council (with or without range plan) in 24 range allotments of Amirkabir watershed. Range condition, forage production and range trend were compared in this study and eventually private management with range plan was identified as the best method with regard to the range improvement, less surplus livestock, and more rangeland area per household.

Kepe *et al.* (2005) based upon the economic and ecological observations stated that relationship between sustainable development and land with large areas was stronger than other important factors in sustainable development[12].Many scientists believe that largeness and continuity of the rangelands are two important factors for management in these areas (Senft *et al.,* 1985; Stult, 1991; Bailey *et al.,* 1996). Teague & Dowhower (2002) studied the effects of management type on range condition and concluded that rangeland size and grazing system were effective as the rangeland size is bigger, the range condition is better. They also showed that rotational grazing system was better than alternate grazing with regard to the range improvement and preventing the destruction. World Bank (1990) introduced six factors as important and principal causes of poverty in rural communities like limited access to the land and low productivity .Arzani et al. (1999) concluded that environmental degradation and erosion is higher in units that do not have appropriate economic size

because human needs and investment costs are met by application of range management principals and balance of livestock and rangeland in appropriate economic units.

In this research, effects of two management types implemented in most of the rangelands and three surface area levels on some attributes of soil and vegetation were studied and compared in rangelands of Taleghan watershed.

Material and methods

Study area

Taleghan watershed is located northwest of Tehran between 50ْ 26ً-51ْ 11ً longitude and36ْ -36ْ 21ً latitude. The study area is geographically located in Iran-Torani region. All rangelands of the study area are semi-steppe. The vegetation cover is less than expected for climax condition due to the shallow soil depth, rocky soils, and inappropriate grazing management in some areas. All rangelands were selected in a watershed as the most similarity was considered with regard to the climate, topography and vegetation. Finally, 12 rangelands with range management plan were selected (Table 1).

Research method

Two types of management (rural or private and collective management) and three surface areas (0-550, 550-1100 and more than 1100 ha) were considered and then in each rangeland, vegetation type was defined through physiognomic-floristic approach. In each vegetation type, the key area was identified and plot area was determined by the minimal area method. Number of plots was statistically calculated based upon variations of the vegetation. In the study area, 1m² and 45 were respectively calculated as the plot area and plot number. In each unit, sampling was performed along three 150 m transects. Vegetation cover, vegetation yield (production), density, and amount of litter, bare soil stone and gravel-stone were sampled. Plant species were coded in three palatability classes of I, II and III based upon the vegetation composition and growth stage. All data were analyzed by SPSS software in a factor analysis(table 2) and also a factorial experiment in completely randomized design. The classification of the studied rangelands is as follows Fig. 1. The difference of the values between rural (private) and collective rangelands and also among different surface areas with regard to the vegetation and soil parameters were investigated as the hypotheses of the current research.

Results

The effect of management type

Significant differences were found at the significance level of 1% under different management types (rural and collective) with regard to the vegetation (canopy) cover percentage of class I and class III species, total yield, yield of class II and class III species, total density, and density of the species in classes of I, II and III, percentage of density and yield of the grass species, density of the forbs, and percentage yield of the shrubs (Table 3).

Also, significant differences were found at the significance level of 5% in vegetation (canopy) cover percentage of class II species and yield of class I species while no significant differences were observed in vegetation percentage of grass species, forbs and shrubs, density percentage of shrubs, yield percentage of forbs, and bare soil percentage (Table 3) .

The effect of surface area

According to the results, significant differences were found at significance level of 1% among different surface areas with regard to the canopy cover percentage of class II species, yield of class I species, yield percentage of forbs, density percentage of class I and class II species, yield percentage of grass species, density percentage of shrubs, and litter percentage.

Also, significant differences were found at significance level of 5% in total canopy cover percentage, the canopy cover percentage of class I species, vegetation percentage of grass species and shrubs, density percentage of class III species and forbs , yield percentage of shrubs While no significant

differences were found at significance level of 5% and 1% in other factors.

The interaction effect of management type and surface area

Our results showed that significant differences were found in the canopy cover percentage of class II species, yield of class I species, density of class I&II species and shrubs, also bare soil and stone gravel percentage with regard to the interaction effect of management type and surface area at significance level of 1%. On the other hand, canopy cover percentage of class III, I and shrubs, and also yield of the grass species differed significantly in a significance level of 5% while no significant differences were found for the other studied parameters.

Table 1. Characteristic of the studied rangeland

Number of utilizers	Type of Management	Number of livestock	Area(ha)	Name
A representative of council	Rural	638	755.9454	Amirna
A representative of council	Rural	300	398.4341	Angeh
A representative of council	Rural	538	1041.468	Varkesh
A representative of council	Rural	804	1543.641	Pargeh
A representative of council	Rural	630	1092.89	Asfaran
A representative of council	Rural	1500	368.5914	Segran
A representative of council	Rural	600	701.752	Nesa
19	collective	1350	2341.935	Lohran
75	collective	2800	3140.034	Khochireh
65	collective	625	999.2984	Kash
2	collective	600	1172.955	Ochan
38	collective	1150	544.7879	Sohan

Table 2. Rotated Component Matrix[a].

	Component					
	1	2	3	4	5	6
Total canopy cover	.786	.345	.184	.236	.101	.122
Canopy cover percentage of class I	.109	.912	-.081	.011	.201	-.032
Canopy cover percentage of class II	-.029	-.006	.956	-.035	.032	.034
Canopy cover percentage of class III	.790	.094	-.233	.307	.023	.128
Total yield	.800	.254	.253	-.092	.342	.017
yield of class I	.084	.892	-.065	-.043	.211	-.046
yield of class II	-.049	.016	.860	-.118	.230	-.083
yield of class III	.892	-.061	-.102	-.025	.193	.084
Total density	.172	.463	.225	.800	-.118	.113
density of class I	.148	.779	-.102	.243	-.206	.076
density of class II	-.027	-.109	.780	.161	-.071	.035
density of class III	.168	.060	-.095	.896	.037	.046
Canopy cover of grass	.023	.435	.608	-.011	-.174	.334
Density of grass	.114	.648	.328	.313	-.324	.198
Yield of grass	.014	.658	.540	-.003	-.080	.072
Canopy cover of forbs	.005	.024	-.078	.292	.816	.026
Density of forbs	-.065	-.073	-6.633E-5	.846	.366	-.061
Yield of forbs	.099	.051	.122	-.007	.848	.026
Canopy cover of shrubs	.873	.139	-.070	.123	-.257	-.043
Density of shrubs	.457	.187	.013	.361	-.384	.072
Yield of shrubs	.913	-.089	-.051	-.094	-.117	-.014
Percentage of litter	.047	.008	.154	-.002	.118	.463
Percentage of stone and gravel	-.294	-.186	.028	-.149	.062	-.883
Percentage of bare soil	-.487	-.152	-.245	-.089	-.190	.657

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Table 3. Mean comparison of studied factors.

		Total canopy cover percentage	canopy cover percentage of class I	canopy cover percentage of class II	canopy cover percentage of class III	Total yield gr/m2	yield of class I gr/m2	yield of class II gr/m2	yield of class III gr/m2	Total Density number/ m2	Density of class I number/ m2	Density of class II number/ m2	Density of class III number/ m2
Management	Rural	32.294	2.163	7.424	19.333	38.088	4.807	13.806	18.477	9.665	2.161	2.863	4.720
	Collective	31.948	.951	5.807	25.081	46.097	2.600	8.177	35.041	5.864	.326	1.894	3.563
Area	0-500(He)	29.819	1.108	5.228	21.378	39.229	2.135	10.496	25.190	7.183	2.000	1.589	3.511
	550-1100(He)	34.849	1.192	7.719	22.961	41.808	3.127	9.977	28.196	8.269	.819	2.939	4.614
	1100 <	31.694	2.370	6.900	22.283	45.240	5.849	12.501	26.890	7.841	.911	2.607	4.300
Rural	0-550(ha) * Rural	31.772	2.217	4.478	20.733	35.602	4.271	12.319	16.198	9.478	4.000	1.133	4.178
	550-1100(ha) * Rural	34.208	2.094	9.306	17.033	37.252	5.463	13.483	18.128	9.494	1.283	3.811	4.806
	1100(ha)< * Rural	30.900	2.178	8.489	20.233	41.409	4.688	15.616	21.105	10.022	1.200	3.644	5.178
Collective	0-550(ha) * Collective	27.867	.000	5.978	22.022	42.857	8.882E-16	8.674	34.183	4.889	-2.220E-16	2.044	2.844
	550-1100(ha) * Collective	35.489	.289	6.133	28.889	46.363	.792	6.471	38.264	7.044	.356	2.067	4.422
	1100(ha)< * Collective	32.489	2.563	5.311	24.333	49.071	7.009	9.387	32.675	5.659	.622	1.570	3.422

Table 3. Mean comparison of studied factor.

		canopy cover percentage of Grass	Density of Grass number/ m2	Yield of Grass gr/m2	canopy cover percentage of Forbs	Density of Grass number/ m2	Yield of Forbs gr/m2	canopy cover percentage of Shrubs	Density of Shrubs number/ m2	Yield of Shrubs gr/m2	percentage of Litter	percentage of Stone& Gravel	percentage of Bare soil
Management	Rural	10.816	4.524	14.012	9.378	3.028	10.610	11.626	2.057	12.527	5.322	16.980	45.405
	Collective	9.526	1.852	6.827	9.326	1.869	7.749	12.817	2.010	30.469	5.217	15.499	47.047
Area	0-500(He)	9.014	3.611	7.470	9.814	1.833	7.697	10.547	1.656	22.655	4.883	18.961	46.192
	550-1100(He)	11.632	3.208	11.468	8.114	2.553	4.871	15.014	2.408	25.076	4.800	14.997	45.221
	1100 <	9.867	2.744	12.320	10.128	2.959	14.970	11.104	2.037	16.764	6.126	14.759	47.265
Rural	0-550(He) * Rural	8.583	5.467	10.583	9.739	2.000	10.208	12.428	1.844	11.997	4.211	23.411	40.606
	550-1100(He)* Rural	13.108	4.194	16.910	8.672	3.217	5.192	12.428	2.083	15.150	5.222	14.994	45.575
	1100(He)< * Rural	10.756	3.911	14.544	9.722	3.867	16.429	10.022	2.244	10.435	6.533	12.533	50.033
Collective	0-550(He) * Collective	9.444	1.756	4.358	9.889	1.667	5.187	8.667	1.467	33.313	5.556	14.511	51.778
	550-1100(He)* Collective	10.156	2.222	6.026	7.556	1.889	4.550	17.600	2.733	35.002	4.378	15.000	44.867
	1100(He)< * Collective	8.978	1.578	10.097	10.533	2.052	13.511	12.185	1.830	23.093	5.719	16.985	44.496

Table 4. Result of factorial test.

	degree of freedom	Total canopy cover percentage		canopy cover percentage of class I		canopy cover percentage of class II		canopy cover percentage of class III		Total yield gr/m²		yield of class I gr/m²		yield of class II Gr/M²		yield of class III gr/m²	
		Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig
Management	1	11.831	.827 ns	145.778	.003**	259.228	.013*	779.661	.000**	6362.823	.008**	483.201	.030*	3142.017	.000**	27212.686	.000**
Area	2	861.418	.032*	66.330	.020*	207.563	.008**	13.059	.721ns	1164.305	.271ns	481.605	.009**	242.723	.232ns	295.794	.639ns
Management* Area	2	299.394	.299ns	64.501	.022*	229.229	.005**	.327	.018*	32.271	.964ns	519.115	.006**	98.975	.551ns	680.744	.357ns
Error	534	247.571		16.858		42.163		4.028		889.807		101.635		165.799		659.429	

Table 5. Result of factorial test.

	degree of freedom	Total Density number/ m²		Density of class I number/ m²		Density of class II number/ m²		Density of class III number/ m²		canopy cover percentage Grass of		Density of Grass number/ m²		Yield of Grass gr/m²		percentage of Bare soil	
		Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig
Management	1	1432.678	.000**	334.041	.000**	93.156	.000**	132.866	.001**	165.004	.077ns	708.248	.000**	5120.930	.000**	267.508	.300ns
Area	2	38.795	.227ns	54.454	.001**	63.201	.000**	41.368	.032*	239.099	.011*	24.003	.137ns	841.430	.006**	145.565	.557ns
Management * Area	2	47.312	.164ns	111.281	.000**	84.065	.000**	17.258	.236ns	122.494	.098ns	26.797	.108ns	385.822	.094*	2323.098	.000**
Error	534	26.055		8.269		7.513		11.925		52.544		12.014		162.268		248.693	

Table 6. Result of factorial test.

	degree of freedom	canopy cover percentage of Forbs		Density of Grass M²/Number		Yield of Forbs gr/m²		canopy cover percentage of Shrubs		Density of Shrubs number/ m²		Yield of Shrubs gr/m²		percentage of Litter		percentage of Stone& Gravel	
		Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig	Mean Square	Sig
Management	1	.267	.946 ns	133.149	.000**	811.573	.067 ns	140.775	.393ns	.224	.763ns	31928.574	.000**	1.092	.786ns	217.506	.350ns
Area	2	163.382	.063 ns	40.969	.012*	3731.108	.000**	810.778	.015*	18.584	.001**	2514.361	.010*	74.324	.007**	700.039	.061ns
Management* Area	2	33.537	.565 ns	17.937	.143 ns	157.790	.520 ns	665.287	.032*	12.631	.006**	707.408	.275ns	49.605	.036*	1454.506	.003**
Error	534	58.728		9.189		241.339		192.518		2.466		546.144		14.869		248.305	

ns: not significant; :*significant at 5%; **:significant at 1%

Conclusion

According to the results of the factor analysis (table2), total canopy cover, canopy cover of class III species, total yield, yield of class III species, canopy cove percentage and yield of the shrubs were identified as the most influential variables. Some factors, such as percentage of gravel and stone, and the percentage of bare soil were recognized as the least effective factors .Some variables like litter percentage and density of the shrubs were not entered the model.

The mentioned factors were also examined in a factorial test. According to the results of the factorial test, as expected, significant differences were observed in most factors evaluated in rangelands with private and collective management and also in rangelands with different surface area. However,

some exceptions were also observed in this connection.

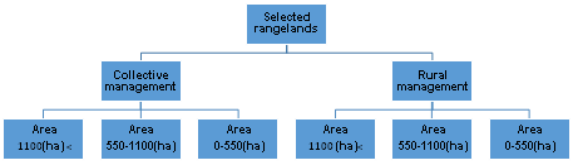

Fig. 1. The classification of the studied rangelands.

Vegetation (canopy cover)

The results of the canopy cover percentage showed that although the average of the total canopy cover in private range management (rural rangelands) especially in medium and large surface area were higher than that of the collective range management, no significant differences were observed in total canopy cover of private and collective managements. In connection with this result, it is noteworthy to state that it is largely influenced by social issues as in rangelands of Taleghan, management of the rural rangelands is done by association of the village council. In this type of management, a person as the rancher's representative is responsible for range management, entry and exit control, allowed number of livestock, and range improvement. Indeed in these rangelands, although utilizers use the rangeland as a group, the rangeland is managed by a single management.

Some of the rural rangelands are recently managed in this way and perhaps more time is needed for range improvement after implementing this type of management. On the other hand, in some collective rangelands there is no family relationship among the utilizers and conversely in some rangelands, members of a family or people with a close family relationship utilize it.

Wherever this family relationship is stronger, rangelands will have a better condition in terms of vegetation because of greater sense of ownership and consequently greater responsibility. Average of the canopy cover percentage of class I species in rural rangelands with both small or medium surface areas was significantly greater than that of collective rangelands while in large rural rangelands it was a little less than that of collective ones. Average of the canopy cover percentage of class II species in rural rangelands especially with medium and large surface areas was significantly greater than that of collective rangelands while in small rural rangelands it was significantly lesser than that of collective ones (Table 4).

It is for this reason that some rural rangelands have been recently under council association and this change of management still needs more time to be influential on recovery of plant species of class I and II destroyed in some rangelands due to mismanagement.

Average of the canopy cover percentage of class III species in all surface areas of rural rangelands was lesser than that of the collective rangelands but it was insignificant. Private management (in rural rangelands) has had positive effects on reduction of class III species which mainly are of unpalatable, poisonous and woody plants. In other words, with improve of rangeland's vegetation, vegetation composition will go toward palatable species of class I and II. But this is not a sign of complete replacement of palatable species in the region and complete elimination of palatable species in rural rangelands.

In collective rangelands, overgrazing or early grazing reduced species of class I and II and increased palatable species in comparison with rural rangelands with a significant difference. No significant differences were observed in canopy cover percentage of grasses, forbs and shrubs in both private and collective management while significant differences were recorded for the mentioned traits in response to different surface areas except canopy cover percentage of forbs.

(Table 3) shows that average canopy cover percentage of grasses, forbs and shrubs in rural rangelands were greater than that of the collective ones. However, in collective rangelands, canopy cover percentage of grasses in small rangelands and canopy cover

percentage of forbs in small and medium rangelands are greater than to the rural ones. But this is due to the fact that vegetation cover of invasive and annual plants is grater in degraded rangelands.

With regard to the fact that grazing pressure in collective rangelands is higher than that of rural ones, therefore the presence of annual grasses and forbs which are often dependant on climate and season conditions is greater and influences the results. Average canopy cover percentage of shrubs in collective rangelands was greater than that of rural ones and this is only much more in small rural rangelands; Because in small rangelands, which range management is not economical for meeting the costs, grazing pressure is higher than that of other rangelands and more time is needed to change the vegetation composition.

Yield

Total yield, and yield of class I, II and class III species in private and collective managements showed significant differences but among the mentioned factors, significant differences just were recorded for the yield of class I species in different surface areas and managements and surface area of the rangeland and its interaction with management type had no significant differences on other factors (Table4). (Table3) showed that average yield of class I and II species in rural rangelands was greater than that of the collective ones but yield of class III species was lesser. Yield variations in these rangelands largely follow the changes of canopy cover of plant species in class I, II and III. But this trend was not observed in comparison of yield and total canopy cover due to the yield of class III species as class III species were often woody and unpalatable which mainly had a protective role instead of being effective in forage yield (forage production). On the other hand, considering high diversity of plant species in the study area and differences of plants water tissue, some differences could be influenced by the mentioned issues. But in general, it was found that management type was effective on forage yield (production) while in the study area no significant effects were recorded for surface area and also for interaction effect of management type and surface area.

Forage yield of the grass species in private (rural) and collective rangelands significantly differed while no significant differences were recorded for forage yield of the forbs and shrubs in the rangelands with different surface areas. The effect of management on these factors was also insignificant. According to the results, forage yield of the forbs and grasses in rural (private) rangelands for all surface areas was higher than that of the collective rangelands.

A contrary trend was observed for shrubs as forge yield of the shrubs in collective rangelands for all surface areas was more than that of the private rangelands. This result is mainly due to the vegetation composition of the collective rangelands in which class III and woody species are dominant. Usually when rangelands in good condition are degraded, the total yield (production) is not reduced in the first place but the yield of palatable forbs and grass species are reduced in comparison with shrubs which it is compatible with our results.

Density

Significant differences were observed in density of the class I, II and III species among different management types and surface areas while total density was just affected by management. Average density of class I, II and III species and also total density of rural rangelands were more than that of collective rangelands (table3). The single exception is related to the density of class II species in small rural rangelands because of the gradual changes in vegetation composition of the mentioned rangelands which recently have been under the management of Village Council.

Density of forbs and grass species in private and collective managements differed significantly while no significant differences were recorded for density percentage of shrub species. On the other hand,

density of forbs and shrub species in rangelands with different surface areas showed significant differences but no significant differences were observed in density of grass species. Average density of grass and forbs species in different surface areas of the rural rangelands was more than that of collective ones while average density of shrub species in collective rangelands was higher except in rural rangelands with medium surface area. Because in collective rangelands, shrubs and class III species are the major part of vegetation composition in collective rangelands.

Exceptions may also be due to the large size of some plant species compared to the others. Some species are smaller than the others due to the accessibility or being more grazed in the path of livestock movement compared to the other areas as livestock grazing does not give the opportunity of regrowth to the plant species. In fact, increase of vegetation cover in some areas may be related to the increased growth of single shrubs. Overgrazing in some areas may cause a weakness in plant species and reduction of sexual or vegetative reproduction. On the other hand, count of new seedlings produced from old species through vegetative reproduction or in annual grass and forbs or bunch grasses with no distinct bunches, may cause a problem or mistake in the counting and appearance of some exceptions in the results.

Litter

The percentage of litter significantly differed just in different surface areas of the rangelands and despite that average percentage of litter in rural rangelands was more than that of collective ones, management type did not affect the litter significantly. Average percentage of litter in rural rangelands with small surface area was lesser than that of collective rangelands considered as the only exception in results of litter. Maybe it could be justified as despite the type of management was private (rural rangelands) and the Council had delegated responsibility to a representative, livestock grazing in such a small area may lead to more use and grazing of aerial parts of the plants and consequently lesser material would return to the soil surface as litter.

Percentage of the bare soil

Percentage of the bare soil in rural and collective rangelands showed no significant differences. Also, the effect of surface area was not solely significant While interaction effect of the management type and surface area was significant ($p<0.01$).The average percentage of the bare soil in collective rangelands was more than that of rural ones (table3).Wherever average percentage of litter and gravel and stones is high, the percentage of bare soil will be low and vise-versa. The only exception is related to the rural rangelands with medium and large surface areas in which percentage of the bare soil is more than that of the collective ones.

Although the percentage of litter in these rangelands is higher compared to the collective rangelands, amount of stone and gravel is more which result in the obtained difference (Table3). As explained above, it could be concluded that range condition of rural rangelands is better than collective ones. Because its management has been delegated to a representative by the Village Council and it can be said although the number of utilizers in these rangelands is higher, the type of management is systematic and unit.

Our results are compatible with results of Timah et al., 2008 who studied the effects of population growth in Noblesse on conservation of natural resources in villages of south Cameroon and also results of the studies done by Viadrich & Oses-Eraso, 2007 b; Adhikari *et al.,* 2004; Maggs & Hoddinott, 1999; Netting (1976) and Abdollahpour (1997).

As a final conclusion, it could be stated that surface area of the rangelands is considered as an effective factor on vegetative and soil parameters due to the fact that rangeland size affects the income of the rancher as more income would be obtained in rangelands with larger surface areas.Of course, the role of management, climate condition, range

condition, range composition and so forth should not be ignored because the complex of the mentioned factors affect the income obtained from a rangeland.

The results of the current research also showed that vegetative parameters in rangelands with large surface areas had a better condition compared to the rangelands with medium and small surface areas which this result is compatible with what has been stated (Arzani *et al.,* 1999; Kepe *et al.,* 2005; Teague & Dowhower, 2002; World Bank, 1990; Senft *et al.*, 1985; Stult, 1991; Bailey *et al.,* 1996.

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