Journal of Biodiversity and Ecological Sciences
(JBES©)
Vol. 3, Issue 3
ISSN: 2008-9287
Summer 2013 JBES

Original Article

Diversity and Frequency of Wildlife in Association with Different Ranges Condition on the Bijar Protected, Western Iran

Received Date:09/23/2011
Accepted Date:05/27/2012

S. Hosseini[1*]
N. Safaian[2]
M. Shokri[3]
J. Ghorbani[4]
A. Imani[5]

[1]*Horticulture Department, Faculty of Agriculture, Malayer University, Malayer, Iran.*
[2] *Professor,Sari University of Agriculture Science & Natural Resources,Iran.*
[3] *Professor,Sari University of Agriculture Science & Natural Resources,Iran.*
[4] *Assistant Professor,Sari University of Agriculture Science & Natural Resources,Iran.*
[5] *Former Student of Environmental Science, Islamic Azad University of Tehran, Science and Research Branch,Tehran,Iran*

***Corresponding Author:**
Email: hlsib@yahoo.com

ABSTRACT

Due to human pressures, living organisms in natural landscapes are in a critical condition. Protected areas are the last refuges to protect and maintain biodiversity.This research study assessed and monitored vegetations and wildlife within three secure locations 1:(C-poor condition) 2:(S-good condition), 3:(G- fair condition) of Bijar protected area in the west of Iran over 31000 ha.To study of vegetations 10 transects were established in each area, Pasture Value (PV) method was used to determine ranges condition.Data of seven seasons(summer and winter) were collected and used to evaluate wildlife condition.To compare means of rangelands factors include: Rangelands condition,vegetation cover,diversity and richness Analysis of variance was used and to compare wildlife frequency,diversity and richness Kruskal-Wallis Test was used. The results of rangelands show that, Shanonn-winer diversity index, species richness and evenness in fair rangeland are greater than the two other rangelands.The results of wildlife study during the study period showed that diversity index (Shannon-Weiner) and wildlife frequency were greater in fair rangelands.Wild sheep and Boar frequency on fair rangelands were higher than the two othere areas and had significant difference among the three areas.Ghamchogha secure location with fair condition was consider as a better habitate for wildlife.

KEYWORDS: *Biodiversity, wildlife, range condition, protect area, vegetation.*

INTRODUCTION

Information is lacking on the influence of range condition on wildlife populations Smith et al., 1996). Rangelands have important effects on wildlife diversity.Little information is available on the threats against biodiversity in the world (Okello,et.al.,2007). Management strategies for conservation of natural ecosystems must attend on conservation of whole living components include structure and genetic diversity and special processes of ecosystems (Kaufmann et al., 1994). The most common definition of biodiversity is the variety of life and processes related to it in a place (Salwasser, 1990). Biodiversity refer to species diversity and species diversity still devotes too much attention to itself and it is more understandable compare to genetic and ecosystem diversity (West, 1993). The definition of protected areas is derived from the IV world congress on national parks and protected areas meeting in Caracas (1992): An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources , and managed through legal or other effective means.The protected areas shoud not be islands in a sea of development but must be part of every strategy of countries for sustainable management and the wise use of its natural resources, and must be set in a regional planning context.Very large protected areas in the world are allotted to rangelands.

Rangelands cover 49% of global and surfaces providing habitates for domestic livestock,wild plants and wild animals(Niamir,et al.,2012). Rangelands are geographical regions dominated by grass and grass-like species with or without scatterd woody plants (Caracas, 1992). Rangelands are home both significant concentrations of large mammals and plants with a high value in both leisure and significant terms and to human populations that have historically been excluded and marginalized, pastoralists and hunter-gatherers.Plants have been degraded by overgrazing

domestic herbivorous, in lead to much fewer productions for both wild and domestic populations (Blench and Sommer, 1999). Due primarily to anthropogenic influences such as land use change, exotic species introductions, livestock grazing, altered hunting regimes, and predator control, wild ungulate populations have undergone tremendous shifts in recent decades in the protected areas (Weisberg & Bugmann, 2003).Vegetation degradation leads to reduction of range condition. (Smith et al.,1996) while study of two ranges with good and excellent conditions found that range with good condition had the higher vegetation diversity compare to range with excellent condition, also total mammals sightings/km2 during the study period were higher on the good compare to excellent condition range. Lack of diversity in vegetation composition and structure appear to explain the lower wildlife sightings on the excellent condition range (Smith et al., 1996). The total number of species (defined as a population of organisms which are able to interbreed freely under natural conditions) is estimated to range from 5 million to 100 million globally(Okello and Kiringe,2007) though less than 1.7 million have actually been described. Al-Khalife et al.(2012) studid two wildlife areas, the main objective of their study was to conduct a wildlife base.line assessment in the oilfields of JO-Wafra and to identify potential habitats of endangered or threatened species that could occur on site. The wildlife survey covered the winter and early spring seasons. Although short and insufficient to provide a detailed assessment, the field data collected indicated significant differences in the number of individuals and wildlife fauna species within the fenced and unfenced oilfields.It also showed that the fenced JO-Wafra has rich and diverse wildlife fauna species, an indication of ecological health The wildlife and rangeland resources management major introduces the theory and practice of appropriately managing soil-plant- animal relationships on both private and public lands (BSC,2012). In order to understand and conserve biodiversity one need to measure it effectively, with species richness being the most frequently used measure of biodiversity(De Vere,2008). McCarthy et al. (2010) studied wildlife of Tien Shan Mountains of Kyrgyzstan Ancillary Camera- trap Photos.The study was conducted in two separate areas; one that had been declared a strictly protected national park, and the second that had no formal protection but it was used as a hunting reserve by foreign interests ungulates.The photo rates of ungulates were highest, and those for large carnivores were lowest, in the ‘‘strictly protected area,’’ which suggested an effect from illicit control of predators by occupants of the surrounding villages. In contrast, in the unprotected area, where hunting was managed and local residents and visitors were few, the species diversity and photo rates for most species were higher differences in species abundances between areas with different conservation histories. In addition and indicates the importance of continued outreach and collaboration with villagers to ensure effective wildlife conservation within Kyrgyz national parks. This research has been tried to assign ranges condition, vegetation diversity, wildlife frequency and diversity (mammals) on three secure locations of Bijar protected area. Finally relations between vegetation and wildlife frequency on three secure locations (three study areas).

MATERIALS & METHODS

Study area

Bijar protected area is located on Kurdistan province in the west of Iran. This area is a part of Sefid rood watershed. Bijar protected area is 30175 ha(Fig1).Total of rangelands inside the protected area is 17500 ha. .Approximately the topography at half of lands of protected area is in form of hill and high ground and the rest of lands have slopes under 12%. Bijar protected area has three secure locations (Fig.1).The northern and southern border of Bijar protected area is limited by two rivers include: Gham Chogha at the northern border and Ghezel Awzan at the southern border. Soils of three secure locations approximately are similar(Loam, Clay-Loam).

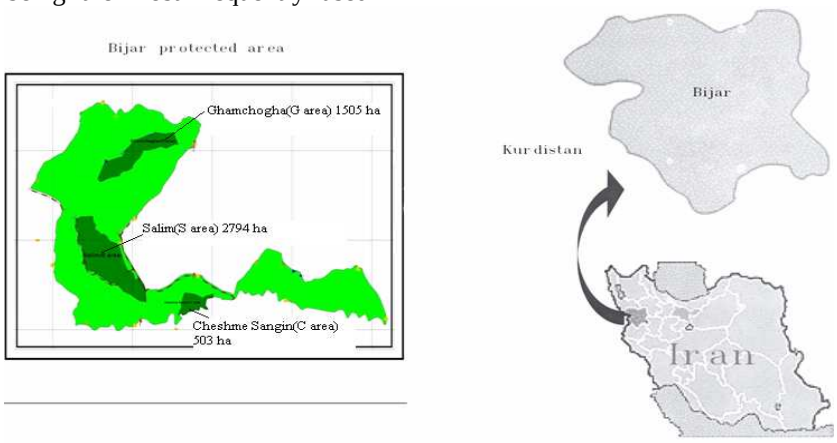


Fig.1. Map of Bijar protected area

Rangelands study

The Value of rangeland(Safaian and Shokri,2002) was used to determine rangelands management

$$V.P.S=1/K \sum \left[n_i / N100 \right] IS \; R.v$$

VP:degree of range condition, s:ecological unit, maximum vegetation rank, ni:species importance, N:total species importance, IS:palatability index, RV:percent of vegetation of site.

K:maximum score was given to the plants,that is 10 in this recmmendation

Classification:

For PV>51 the rangeland is excellent,with grazing capacity of 1.5-2 animal unit per hectare.

For 39<PV<51,the rangeland is good,with grazing capacity of 1animal unit per hectare.

For 26<PV<39,the rangeland is fair,with grazing capacity of 0.75 animal unit per hectare.

For 13<PV<26,the rangeland is poor,with grazing capacity of 0.5 animal unit per hectare.

For 0<PV<13,the rangeland is very poor,with grazing capacity of 0.25 animal unit per hectare.

This method has been used for other regions same area(Hosseini,2007).

For each study area (secure locations) one vegetation type was chosen, because local people occupied adjacend lands and they have changed these lands to agriculture and secure locations were limited.10 transects in length 50 meters (Safaian and Shokri,2002) by using random-systematic method were established on each type. Foliar cover data (%) were collected along these transects in spring. The line-intercept method (Canfield, 1941) as modified by Smith *et al.* (1996) was used to determine percent cover. A meter stick was used instead of a line. Sampling spaces was 1 m intervals on each transect. The meter stick was placed perpendicular(Smith *et al*., 1996) to the transect and the intercept of the plants were measured (Smith *et al*., 1996). Plants were identified in the botanic laboratory of Mazendaran university.

Analysis of Variance (ANOVA) was used to compare vegetation cover composition among ranges of the three secure locations, except where empty cells occurred. The Shannon-Weiner diversity index (Smith *et al*., 1996) was used to evaluate vegetation diversity index on the ranges of three secure locations.Analysis of Variance (ANOVA) was used to compare ranges condition among the three areas.

Ecological methodology 6.0 was used to compute indices(Hosseini,2007). Species richness and evenness of vegetation cover were computed in the three secure locations.Comparison between treatments was used using LSD method using SPSS 19.

Wildlife evaluation

Data of seven seasons (summers of 2008, 2009, 2010, 2011 and winters of 2009, 2010, 2011) were collected to evaluate wildlife. These data are available in Environmental department of Iran(Tehran). Data was taken in the early morning, so that they coincides with maximum animal activity (Smith *et al*., 1996). Wildlife species of Bijar protected area include: Birds, Mammals, Reptiles, Amphibians and fish.

Census data include:

1- Wild sheep (*Ovis orientalis gmelini*)
2- Wild boar (*Sus scrofs*)
3- Wolf (*Canis lupus*)
4- Fox (*Vulpes volpes*)
5- Rabbit (*Lepus capensis*)
6- Hyena (*Hyaena hyaena*)
7- Jackal (*Canis aureus*)
8- Badger (*Meles meles*)

Wild sheep is the important species of Bijar protected area and it is a vulnerable species. Frequency of observing species in each season were categorized for statistical evaluation. Mean species numbers(frequency) of wildlife were computed by Kruskal-Wallis test and Spearman correlation was used to evaluate correlation between wildlife mean and vegetation cover. The Shannon-Weiner diversity index (Smith *et al*., 1996) was used to evaluate wildlife diversity on the three areas.

RESULTS

In each secure location one identified type of vegetation was determined:

- In the C area(Poor condition) *Ephedra-Amygdalus*
- In the G area(Fair condition) *Festuca-Bromus-Amygdalus*
- In the S area(Good condition) *Bromus-Amygdalus-Ferola*

In fair rangelands condition the species of *Bromus tomentellus*, *Amygdalus lysioides*, *Astragalus sp*, *Festuca ovina*, and *Ephedra major* had the highest cover (canopy%) respectively. In comparison among sites, The higher cover (canopy %) of %72 was obtained for S good condition area compare to C poor and G fair areas with average values of %29.1 and %41.5 respectively (Table.1).

Results of ANOVA showed no significant differences among three sites for shrubs and brushes. However for forbs and grasses the higher values were obtained in the S good condition areas (Table 1).

The species richness with average values of 10.0 was higher for G fair area than that for C poor area (8.4) and S good (8.1) protected area (Table 2). There was no differences between three sites, for evenness, the values of 0.26, 0.25 and 024 were obtained for S good G fair area and C poor area, respectively.

Results of means comparison for other factors include, vegetation diversity, species richness and

vegetation cover evenness among the three secure locations showed no differences. In contrast, threre was significant differences for range conditions in the three areas. The means of S good, G fair and C poor condition area were 41.47, 31.39 and 13.31, respectively (Table 2).

Table 1. Results of means comparisons for covers (Canopy%) in three secure location.

	Brushes	Forbs	Grasses	Shrubs	Total Cover
C Poor	11.1 a	5.0 b	7.9 c	5.1 a	29.00 b
S Good	7.7 a	18.2 a	41.8 a	4.3 a	72.07 a
G Fair	9.09 a	9.6 b	17.42 b	6.0 a	41.56 b

Means with the same letter are not significantly different ($\rho<0.05$).

Table 2. Results of LSD means for Range condition, Shannon-Weiner diversity index, Species richness, Evenness in three secure location.

Factors	Range condition	Shannon-Weiner diversity index	Species richness	Evenness
C Poor	13.31 c	2.02 a	8.40 a	0.24 a
S Good	41.47 a	2.12 a	8.10 a	0.26 a
G Fair	31.39 b	2.47 a	10.00 a	0.25 a

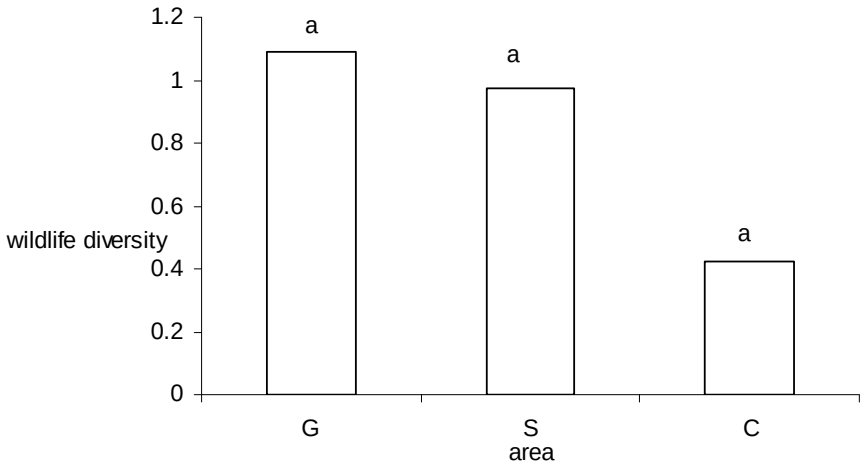
Means with the same letter are not significantly different ($\rho<0.05$).

Table 3. Results of means comparison for wildlife mean frequency in three secure location by Kruskal-Wallis test .

Area	Wild sheep	Boar	Wolves	Rabbit	Fox	Jackal	Badger	Hyaena
C Poor	24.4 c	0.73 b	1.14 a	0.143 a	1.57 a	0.00 a	0.00 a	0.000 a
S Good	65.9 b	0.00 b	2.14 a	0.429 a	1.43 a	0.70 a	0.00 a	0.286 a
G Fair	205.1 a	53.1 a	3.29 a	1.71 a	2.29 a	0.00 a	0.28 a	0.571 a

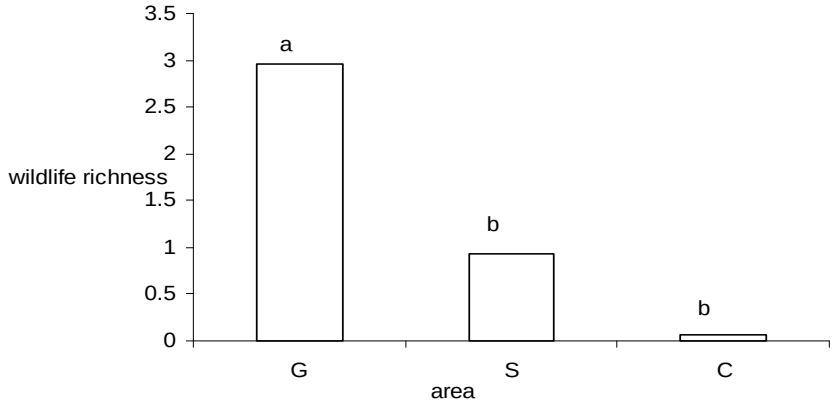
Means with the same letter are not significantly different ($\rho<0.05$).

Wildlife diversity index (Shannon) on the three secure locations S good G fair and C poor area, were 0.813, 0.503 and 0.968, respectively. Wildlife richness on the three secure locations S good G fair and C poor area, were 0.93, 2.96 and 0.63, respectively. Sheep frequency in G Fair, S Good and C Poor were 205.1, 65.9 and 24.4, respectively. For Boar the higher frequency with average values 53.1 was obtained in G Fair condition area (Table3).

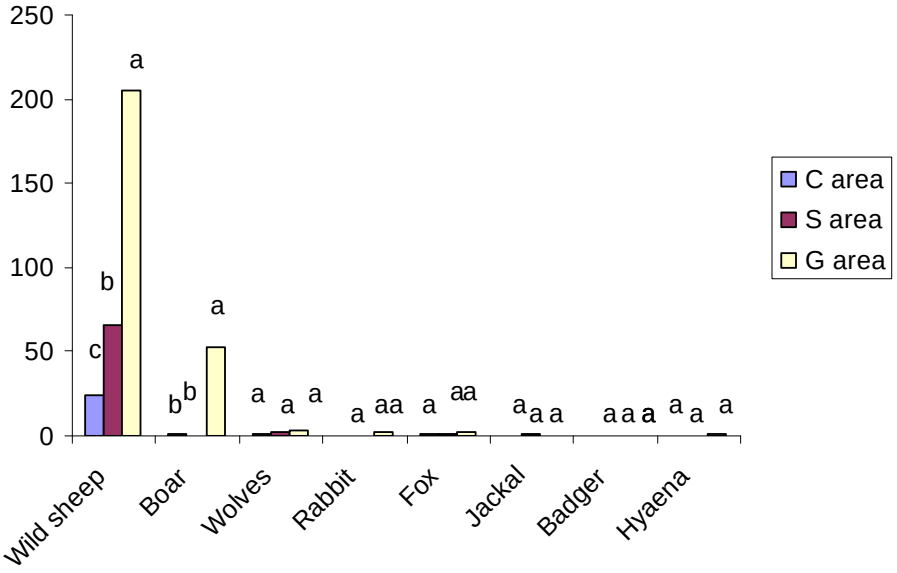


Means of column with the same letter are not significantly different ($\rho<0.05$).

Fig. 3. Wildlife diversity index(Shannon)



Means of column with the same letter are not significantly different (ρ<0.05).
Fig. 4. Richness of wildlife



Means of column with the same letter are not significantly different (ρ<0.05).
Fig. 5. Wildlife frequency

Results of comparison for wildlife frequency by using Kruskal-Wallis analyse showed significant differences (Sheep and Boar) among the three secure locations. Results of Kruskal-Wallis analyse for differences frequency of wild sheep on the three secure locations obtained x^2=7.28, P<0.05 and for Boar x^2=13.28, P<0.05and to show main differences Mann-Whitney Test was used.There were not significant difrences among another wildlife frequency on the three secure locations (P>0.05).

Result of Spesrman's rho showed no significant correlation between wildlife frequency and vegetation cover(P=0.84%).

DISCUSSION AND CONCLUSION

Biodiversity conservation is of a major importance internationally because humans derive their food, biological diversity of the wild and its domesticated components. It also gives future generations,the opportunity to enjoy nature(Al-Khalifa *et al*., 2012). There are two main reasons for monitoring biodiversity at rangelands and enterprise level,To support decision-making around land use and management,to provide a measure of environmental performance(Fisher *et al*.,2006).

Rangelands vegetation cover of G fair area had the highest diversity index and species richness among the three secure locations. Rangelands of C poor area condition had low vegetation diversity and S good area had medium vegetation diversity.

Evenness of vegetation cover on S good area was higher and this area had the highest percentage of vegetation cover and had the most of palatable species include*: Ferula ovina, Bromus tomentellus* but shrubs cover were less than the two other areas and forb cover was more than the two other areas.

Wildlife diversity in this area was lower than the two other areas because of wildlife species use brushes for camouflage and even for living but the area with good condition without concidering the other habitat status lack of this factor.

Our results are consistent with those of Daniel *et al*. (1993) found open grassland areas had the lowest wildlife densities while areas dominated by shrubs were intermediate and areas with an interspersion of grasses, forbs and shrubs had the highest wildlife densities.

Results of this study show that range with G fair area had the highest frequency of wildlife, we attribute this to interspersion of grasses, forbs and shrubs on the range with fair condition, range with poor condition had higher frequency of wildlife than the range with good condition while vegetation diversity of good range is higher than poor range. Poor range has high density of shrubs include Almond (*Amygdalus lysioides*) and brunches include Meadow sweet (*ephedra major*) also slopes of poor range is sunny and warm that can be suitable location to live wildelife in the cold seasons specially for wild sheep while good range is open area and altitude of this area is high and in the winter entirely coverd by snow so vegetation cover of good range (S area) maybe in the crisis on the winter.

There are significant difference among three areas about wild Sheep and Boar. There was not any wild boar in the good range because boar speciec is dependent on water (Firouz, 2009) but there is no permanent river in the good range. The permanent river in the fair range (Ghamchogha river) and poor range (Ghezel awzan), due to these rivers Otter species (*Lutra lutra*) exists on the fair and poor secure locations, Otter completely is dependent on the two rivers.

The othere animal species include, jackal, rabbit and hyaena were less observed because most of mammals are nocturnal also they have high power of camouflage and they live in the special places. Rabbits live under the brushes and few reveal themselves (Firouz, 2009). Jackals were observed nearby the villages and places where there are garbage and get their food from humanity hysteresis. Hyaena hides among valleys and hole of rocks also hyaena is a scavenger and less follows huntng diet and shoud be expected that after hunting by natural predators, hyaena shoud be observed. In this study we can say most of the wildlife biodiversity were observed in the fair ranges will better meet the needs of most wildlife species than ranges in higher or lower conditions and conservation of vegetation diversity due to protection of wildlife diversity in these habitats is imperative. Total mammals sightings were higher on fair than good area or poor area ranges. Wood (1969) found that populations of small mammals were high on the good range compare to range with near climax ranges in the chihuahuan.

The main protected area species in Bijar protected area is wild sheep (Ovis orientalis gmelinii) that frequency of this species on fair range (G area) is higher than the two other areas.

Our results are consistent with those of Clemente (1993) and Smith *et al*. (1996) showed that Pronghorn used Chihuahuan desert ranges in good ecological condition was more than ranges in lower or higher successional stages. Our results are consistent with former studies because our results showed that the ranges in fair ecological condition had the higher wildlife diversity than ranges in lower or higher successional stages because ranges in fair condition has a mixture of grasses, forbs and shrubs compare to ranges in higher condition that most had range with lower condition that most had shrubs. In Iran there are not much climax successional stage and in the most of the rangelands, good condition is the best condition for ranges, our results for different successional stages for Bijar protected area are match with different successional stages in the results of Smith *et al*. (1996) because in the Bijar protected area there is not climax for vegetation and good condition is the highest condition and our results for ranges with fair condition match with results of Smith *et al*. (1996) for good condition (dominated by a mixture of grasses, forbs and shrubs)

Wildlife of Bijar protected area specially wild sheep (*ovis orientalis*) have local migrations among three secure locations and dominator factors for these migrations are ecological status specially weathering condition. Despite of this area is protected but as was observed ranges of three secure locations had different successional stages therefore managing factors area dominator.The good condition condition is placed on the center of Bijar protected area also its mean altitude is high so this area was less damaged by adjacent people activities include: domestic animals overgrazing and land use changes, while in poor condition in southern border and fair condition placed in northern border of protected area, thus these two areas (poor and fair) are endangered by adjacent people activities and as mentioned because of sunny and flat slopes, lands of poor area was changed into farm lands, this action lead to reduce of rangelands value and just as Desmond (2003) has said differences between management on two same rangelands lead to creation to completely rangeland habitats.

Biodiversity conservation is of a major importance internationally because human derive their food, medicines and industrial products from biological diversity of the wild and its domesticated components. It also gives future generations the opportunity to enjoy nature(Al-Khalife *et al*.,2012).. In addition, biodiversity is important for the recycling of essential elements, such as carbon, oxygen, and nitrogen (Nally et al.,2003).

REFRENCES

Al-Khalifa,H., Al-Nasser, A., Safar Abbas,M., Dashti J.,2012, Biodiversity and conservaton of Wildlife at the Wafra area in Kuwait, *Jour. of Biodiversity*, 2012, 3 (3): 179-188

Blench, R., sommer,F.,1999, Understanding rangeland biodiversity over seas

Development Institute Portland House stag place London SWIE 5pp Chameleon press, London SW18 4SG working paper 121.

BSC in Environmental and Conservation Science Wildlife and Rangeland Resources Management Major,2012,University of Alberta ,Faculty of Agriculturals Life and Environmental Science.

Canfield, R.H., 1941, Application of the line intercept method in sampling range vegetation. *Jour. of Forest*. 39:388-394.

Clementh, F.1993,Influence of Range condition, Cattle, and watering hole distribution on a pronghorn population in southcentral New Mexico, Ph.D. thesis,New Mexico State Univ., Lancruces,N.M.

Daniel, A.J., Holechek,R., Valdez,A.Tembo,L.Saiwann,M. Fusco,and M. Cardenas. 1993. Jackrabbit densities on fair and good condition Chihuahuan desert *Jour. of Range Manage*.46:524-528.

Desmond, M., 2003, Effects of grazing practices and fossorial rodents on a winter avian community in Chihuahua, Mexico Department of Fishery and Wildlife Sciences.

De Vere,N.,National Botanic Garden of Wales,2008,EDIT summer school modern taxonomy and field work,UK.

Fisher,A.,Hunt Kuh,A.,Mazzer,T.,2006,Biodiversity Monitoring in the Rangelands: A way Forward,Volum 2:case studies,Desert Knoweledge CRC,Alice Springs.

Firouz, E.,2009,A guide to the Fauna of Iran,University Press Center,491p.

IV world congress on national parks and protected areas meeting in Caracas ,1992 Guidelines for Protected Areas Management Categories, IUCN world Commission on Protected Areas ,with the world Conservation on Monitoring Centre.

Hosseini S., 2007,Investigation of Ecological Biodiversity of Bijar Protected Area(Kurdistan). MS thesis,University of Mazandaran,Faculty of Natural Resources.

Kaufmann, M.R., Graham, R.T.,[et al.],1994, An ecological basis for ecosystem management, Department of Agriculture, Forest Service,*Jour. of Rocky Montain Forest and Range Experiment Station*, 22pp.

Mc Carthy,J.L.,Mc Carthy,T.M.,Fuller,K.T.,2010 Assessing Variation in Wildlife Biodiversity in the Tien Shan Mountains of Kyrgyzstan Using Ancillary Camera-trap Photos, International Mountain Society.

Nally,R.M.,Ellis m.,Barrett G.,2003,Avian biodiversity monitoring in Australian rangeland , Australian centre for Biodiversity, School of Bilogical science , Melbourne , Victoria 3800

Niamir Fuller,M.,Kerven,C.,Robin,R.,Milner-Gulland,E.,2012,Co-existence of Wildlife and Pastoralism on Extensive Rangelands:Competition or compatibility?

Okello,M.M.,Kiringe,J.W.,2007,Threats and Their Relative Severity to Wildlife Protected Areas of Kenya,The School for Field Studies, Center for Wildlife Management Studies, Nairobi,Kenya.

Salwasser, Hul., 1990, Conservation biological diversity: a perspective on scope and approaches, *Jour. Of Forest Ecology and Management*, 35:79-90.

Safaian,N.,Shokri,M., An Innovative Approach to Determine Condition and Capasity in North of Iran,2002,Jour.*of Naturale resources*,n:4,volum 55(In Persian).

Smith,G.,Holechek,L.J. and Caredenas, M.,1996,Wildlife numbers on exelent and good condition Chihuahuan desert rangelands, *Jour. of Range Management*, 49:489-493

Weisberg, P.J.,Bugman,H.,2003,Forest dynamics and ungulate herbivory:From leaf to landscape ,*Jour. of Forest Ecology and Management* ,Volum 8 Issues 1-2, 3 Page 1-12.

West, N.E.1993,Biodiversity of Rangeland,*Jour. of Range Management* 46(1)pp.2-13.

Wood, J.E. 1969, Rodent populations and their impact on desert rangelands, New Mexico Agri. Exp. Sta. Bull.555.