The Role of Plant Richness & Diversity on Ecological Equilibrium of Rangeland Habitats on Alborz Mountain (North of Iran)

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Key words : plant diversity and richness , ecological equilibrium , habitat , rangeland , soil erosion .

Introduction Ecological equilibrium in rangeland habitat refers to maintenance of vegetation cover and their roots which protects the soil of the ecosystem from erosion . Plant diversity and richness can provide health conditions to maintain an equilibrium ecosystem . Löffler (2004) , in his research , has shown that change in the composition of soil and plant species due to high grazing pressure . Continuous overgrazing continuously not only increases erosion (Harden , 1993 ; Molinillo , 1993) .The present paper has the objective of throwing more light on the influence of biotic and abiotic factors on ecosystem equilibrium .

Material and method The area of study has been in the summer ranges of the Ramsar in Mazandaran Province of Iran . The average annual precipitation is about 650-750 mm and the climate , based of Emberger method , can be defined as cool-wet to cool-dry($>$2800 m) . Since there are two range types , grass and shrub types , on the upland , two amplitude of a crest were chosen .The Daubenmire method was selected to analyse rangeland health conditions as it has certain factors of rangeland like percentage of vegetation , litter , soil conservation , plant regeneration and plant composition . The MPSIAC method was selected to analyze soil erosion .Analysis of the hierarchical datas has been done by regression model .Compare mean between two habitats have been done by T-test method in SPSS software . Plant richness and diversity have been calculated by Ecological Methodology software .

Results Correlation between soil erosion and rangeland condition has been analyzed by simple regression which has shown maximum correlation between them .Rangeland condition in the both habitats of shrubland and grassland has reacted to soil erosion(Table 1) Some vegetation characteristics used for analysis in which there were some differences between two habitats (Figure 1) .The regression model for shrubland habitat is as defined in continues : $Y= -0.4 (M) -0.51 (S)$;(1) Where , Y is soil erosion , M is Margalef's index and S is Shannon's index . It has been found that soil erosion has been justified by plant diversity (0.51) and richness index (0.41) . Model regression in grassland is defined in continue : $Y= -0.18(M)+0.99(S)$; (2) where , plant diversity (0.99) and richness index (0.18) have justified variance of soil erosion in grassland habitat . Rangeland condition has significantly related to plant diversity and richness indices (Table 1) . There is a 97.7% correlation between rangeland condition and indices in shrubland habitat . And about 95% changes of rangeland condition have been justified by indices .
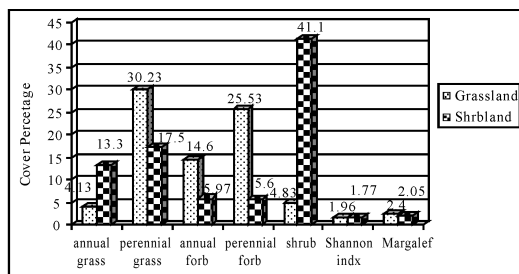

Figure 1 _comparative condition of two habitats based of vegetation status ._

Table 1 _Correlation between Soil erosion with rangeland condition and indices and also rangeland condition with indices ._

Soil erosion [*]	Predictors [**]	R [(a)]	R² [(b)]	F [(C)]	Sig .[(for F)]
Shrubland habitat	rangeland condition	87.1	75.8	87.84	0.00
Grassland habitat	rangeland condition	80.9	65.4	52.95	0.00
Soil eresion [*]					
Shrubland Habitat	Margalef and Shanon	79.4	63.3	23.07	0.00
Grassland Habitat	Margalef and Shanon	90.2	81.3	58.83	0.00
Rangeland conditions [*]					
Shrubland Habitat	Margalef and Shanon	97.5	95	255.83	0.00
Grassland Habitat	Margalef and Shanon	85.0	72.3	73.4	0.00

[*] and [**] : Dependent and independent variables
(a) Person coefficient , (b) Justification coefficient and (c) F-Fisher

Conclusions Based of climatology , annual precipitation is high in study areas . It might theoretically have sufficient diversity and richness , but the results showed both habitats have poor conditions . Climate has a big role to play in the study area as a function component . Therefore , animal grazing causes a decrease in plant diversity and richness . Grazing as an effective component can change plant composition and expanse annual plant . Then it can indirectly influence on soil cover and it also increase soil erosion . The result shows a high degree of relationship between soil erosion and rangeland condition with indices and vegetation factors in which the indices has positively relationship to habitat situation in good condition or negative relationship to soil erosion (as an stability index of ecosystem) in poor condition of rangeland . So , unbalancing between plant species can cause the changing of ecosystem equilibrium as ecosystem stability .