

PHYTOSOCIOLOGICAL STUDIES OF SULEIMAN MOUNTAINS IN BALOCHISTAN

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ABSTRACT

Vegetation surveys were carried out in November, 1989 in Suleiman mountains in the habitat of markhor. A study of communities was carried out according to the method of Braun-Blanquet. Two major plant communities were identified, namely *Olea cuspidata* - *Pistacia cabulica* community at the lower elevation and *Pinus gerardiana* - *Ephedra nebrodensis* - *Cotoneaster nummularia* community at higher elevation of the habitat. The first community was found to be the best habitat for Suleiman markhor because it possessed ample number of food plants, shelter and spring water for the animal. Improvement of this habitat is, therefore, essential for the protection of the animal against biotic interference.

INTRODUCTION

Koh-e-Suleiman lies at a distance of 80 Km from Zhob city towards the north. The mountains are famous for having Takht-e-Suleiman due to local inhabitants spiritual attachment over there.

Secondly these mountains form ecological niches for Suleiman markhor (*Capra falconeri jerdoni*), an endangered animal of Pakistan. The mountain ranges also have forests of chilgoza pine, which are a source of income for the people. The mountains are surrounded by Shnighar ranges to the west, towards the east by Torghar towards the north lies S.Waziristan agency, while towards south by Manikhor mountains. The mountain

under study area lies in Kesaghar, which consists of pure chilgoza pine (*Pinus gerardiana*) stands. The highest peak in the ranges is Takht-e-Suleiman, almost 4000 m in elevation. These mountains in addition to Suleiman markhor also have chukor and sessee. Wolves are present as predators. The mountains form a barrier between S.Waziristan and Zhob agencies. The whole area is inhabited by Marani and Sherani tribes.

Climatically winters are long and severe and a thick cover of snowfall is present from November to March. In winter, the temperature falls down to -12°C. Summers are pleasant and rainfall is from July to September.

The soils in the area are generally shallow. The parent rocks are calcareous. They are generally clay loamy in texture. The best growth of the young seedlings was observed, where the soil was covered with humus contents underneath the pine trees.

Biotic factors also play important role in the area. Due to tribal feuds, people cut pine trees ruthlessly. This practice also allows entry of fungi and insects, which kill many trees. Nomadic grazing is also a problem. Because of human interference and competition for food with grazing animals at lower altitudes, markhor, a very sensitive animal rather tends to stay at higher altitudes.

MATERIAL AND METHODS

For the study of vegetation 135

relevés were laid out in the reasonably homogeneous sites. The size of each quadrat was 100 m². The vegetation data were recorded and analysed after the method of Braun-Blanquet (1965) and community tables were prepared according to the preferential constant dominant method of Cetik (1971). The nomenclature of plants was followed after Stewart (1972).

RESULTS AND DISCUSSION

Vegetation

The vegetation is mostly of xerophytic nature. From Manikhor to the base of the mountains at 2000 m, the habitat is occupied by species like *Artimisia maritima*, *Astragalus subuliformis*, *Salsola kali*, *Sophora griffithii*, *Calotropis procera*, *Withania coagulans*, *Solanum xanthocarpum*. In such habitats, sporadic apple orchards have been established near water channel. Grazing pressure is high in the area.

Along the sides and bottom of the water channel at 2300 m elevation, dominant species are; *Olea cuspidata*, *Pistacia cabulica*, *Fraxinus xanthoxyloides*, *Mentha viridis*, *Saccharum griffithii*, *Verbascum thapsus*, *Nerium oleander*, *Perovskia abrotanoides*, *Ephedra nebrodensis*, *Daphne oleoides*, along with grasses such as *Cymbopogon parkeri*, *Chrysopogon aucheri*, *Tetrapogon villosus*, *Cenchrus pennisetiformis*, *Eragrostis poaoides*, *Bromus tectorum*, *Aegilops tauschii*, *Pennisetum orientale*, are quite abundant. Some other associates are *Conyza banariensis*, *Phlomis stewartii*, *Heliotropium cabulicum*, *Fagonia cretica*, *Peganum harmala*, *Paracaryum asperum*, *Centaurea iberica*, *Ebenus stellata*, *Kickxia* species (Table 1).

At 2500 m to 3500 m, pure consociations of Chilgoza pine (*Pinus gerardiana*) are present. Where the sole dominant tree occupying the habitat. The coverage and abundance value are quite high. The species in an area of 100 m² has 80% coverage, abundance values. Density is varying from 3-5 trees. Regeneration is found underneath the trees, where sufficient humus is present. It varies from 7 to 10 young seedlings. Some of the associate species in the *P. gerardiana* community (Table 2); are *Ephedra nebrodensis*, *Cotoneaster nummularia*, *Lonicera quinquelocularis*, *Berberis baluchistanica*, *Daphne oleoides*, *Caragana ambigua*, *Sophora griffithii*, *Prunus eburnea*, *Fraxinus xanthoxyloides*, *Pistacia cabulica*. *Acer* sp. *Thymus serpyllum*, *Silene conoides*, *Plectranthus rugosus*, *Polygonum polygonoides*, *Rosa moschata*, *Ziziphora tenuior*, *Asparagus gracilis*, *Acantholimon stocksii*, *Achillea santolina*, *Tulipa stellata*, *Onobrychis cornuta*, *Polygala chinensis*, *Adiantum* sp, *Gnaphaleum lutealbum*, *Artimisia maritima*, *Launaea procumbens*, *Zygophyllum artiplicoides*, *Campanula colorata*, *Nepeta glomerulosa*, *Phlomis stewartii*, *Alyssum desertorum*, *Stachys parviflora*, *Sisymbrium irio*, *Anagallis arvensis*, *Teucrium stocksianum*, *Scabiosa cana*, *Spiraea boissieri*, *Veronica biloba*, *Gentiana oliveri*, *Euphorbia asyridea*, *Scorzonera hemilasia*, *Lactuca serriola*, *Zataria multiflora*, *Paracaryum asperum*, *Onosma hispidum*, *Limonium griffithii*, *Plantago ovata*, *Rochelia stellata*, *Galium aparine*, *Hyoscyamus insanus*, *Convolvulus spinosa*, *Orobanchae aegyptica*, *Scutellaria stocksii*, *Clematis orientalis*, *Campanula leucoclada*, *Hertia intermedia*, *Gaillonia eriantha*, *Pulicaria gnaphalodes*, *Centaurea pergamacea*, *Iris sisyrinchium*, *Eremurus aurantiacus*, *Cotoneaster nummularia*, *Andropogon* sp, *Cymbopogon* sp, *Pennisetum* sp, and *Ferula narthex*.

DISCUSSION

Some grasses are quite common on the higher slopes. They are *Pennisetum orientale*, *Poa bulbosa*, *Melica persica*, *Cymbopogon parkeri*, *Stipa barbata*, *Eragrostis poaeoides*, *Bromus tectorum*, *Chrysopogon aucheri*, *Hordeum murianum*. They have 90% dominance value, are present on deep soils, where moisture contents are comparatively high.

Some habitat possess poisonous, obnoxious and unpalatable species, which

will be included in the future studies. At some sites from where cutting of *Pinus gerardiana* trees has been done a few years before given rise to disclimax species like *Acantholimon stocksii*, *Caragana ambigua*, *Astragalus trichocarpus*, *Cotoneaster nummularia*, *Lonicera quinquelocularis*, *Ephedra intermedia*. Out of these species, plants like *Acantholimon*, *Caragana* and *Astragalus* cause mouth injury to the animal because of the their barbed spiny habit.

Table No.1 HABITAT: Suleiman Hills (Lower Habitat)

Olea Cuspidata - *Pistacia cabulica* Community

	Presence	Frequency %	Constancy Class
Quadrat No.	22	27	30
Area (m ²).....	100	100	100
Elevation (m)	2000	2100	2200
Direction	S	N	W
Slopes %	50	70	80
Percent rock	Calcareous	Calcareous	Calcareous
Vegetation coverage and abundance %	70	80	85
Total No. of species	27	23	23
<u>1st Storey</u>			
<i>Olea cuspidata</i>	1	2	1
<i>Pistacia cabulica</i>	2	1	1
<i>Fraxinus Xanthoxy loides</i> +	-	-	2
<u>2nd Storey</u>			
<i>Saccharum graffithii</i>	+	0	1
<i>Nerium oleander</i>	+	4	-
<i>Ephedra nebrodensis</i>	+	-	+
<i>Daphne oleodites</i>	+	1	-
<i>Prunus amygdalus</i>	+	-	1
<i>Berberis baluchistanica</i>	-	1	+
<u>3rd Storey</u>			
<i>Mentha viridis</i>	1	-	+
<i>Verbascum thapsus</i>	+	-	+
<i>Perovskia abrotanoides</i>	-	-	1
<i>Heliotropium cabulicum</i>	+	-	1
<i>Conyza bonariensis</i>	+	-	+
<i>Phlomis stewartii</i>	+	-	1

<i>Aquilegia vulgaris</i>	-	+	+	2	66	III
<i>Scorzonera tuberosa</i>	-	+	+	2	66	III
<i>Eremurus aucharianus</i>	+	-	1	2	66	III
<i>Fagonia cretica</i>	+	-	+	2	66	III
<i>Solanum xanthocarpum</i>	-	+	1	2	66	III
<i>Ebenus stellata</i>	+	+	-	2	66	III
<i>Bromus japonica</i>	+	1	-	2	66	III
<i>Peganum hermala</i>	1	+	-	2	66	III
<i>Pennisetum orientale</i>	+	1	-	2	66	III
<i>Allium capitallatum</i>	-	+	1	2	66	III
<i>Aegilops tauschii</i>	-	+	1	2	66	III
<i>Gaillonia eriantha</i>	+	+	-	2	66	III
<i>Chrysopogon parkeri</i>	1	+	-	2	66	III
<i>Tetrapogon villosus</i>	+	-	1	2	66	III
<i>Cenchrus pennisetiformis</i>	+	-	1	2	66	III
<i>Bupleurum falcatum</i>	+	+	-	2	66	III

Table 2. Habitat: Suleiman Hills (Upper Habitat)
Pinus gerardiana - *Ephedra nebrodensis* -
Cotoneaster nummularia Community

Quadrate No.	35	37	40	Presence	Frequency %	Constancy Class
Area (m ²)	100	100	100			
Elevation(m)	2500	3000	3500			
Direction	N	W	E			
Slope (%)	80	85	90			
Parent rock	Calcareous	Calcareous	Calcareous			
HCL reaction	++	++	++			
Vegetation coverage and abundance (%)	95	90	85			
No of species	59	47	34			
<u>First storey.</u>						
<i>Pinus gerardiana</i>	3	3	3	3	100	V
<i>Fraxinus xanthoxyloides</i>	1	-	2	2	66	III
<i>Pistacia cabulica</i>	1	2	-	2	66	III
<u>2nd storey.</u>						
<i>Ephedra nebrodensis</i>	3	2	2	3	100	V
<i>Cotoneaster nummularia</i>	2	3	3	3	100	V
<i>Sophora griffithii</i>	1	2	-	2	66	III
<i>Lonicera quinquelocularis</i>	2	+	-	2	66	III
<i>Daphne oleodites</i>	2	+	-	2	66	III
<i>Caragana ambigua</i>	2	-	+	2	66	III
<i>Prunus eburnea</i>	2	+	-	2	66	III
<i>Berberis baluchistanica</i>	2	+	-	2	66	III
<i>Rosa moschata</i>	+	2	-	2	66	III
<i>Artimisia maritima</i>	1	-	+	2	66	III

3rd storey

<i>Thymus serpyllum</i>	1	-	+	2	66	III
<i>Silene conoides</i>	+	-	1	2	66	III
<i>Plectranthus rugosus</i>	+	1	-	2	66	III
<i>Polygonum polygonoides</i>	1	+	-	2	66	III
<i>Ziziphora tenuior</i>	+	-	+	2	66	III
<i>Asparagus gracilis</i>	+	+	-	2	66	III
<i>Acantholimon stocksii</i>	+	-	1	2	66	III
<i>Achillea santolina</i>	+	+	-	2	66	III
<i>Tulipa stellata</i>	+	+	-	2	66	III
<i>Onobrychis cornuta</i>	1	+	-	2	66	III
<i>Polygala chinensis</i>	+	-	+	2	66	III
<i>Gnaphalium lutealbum</i>	+	1	-	2	66	III
<i>Astragalus trichocarpus</i>	+	-	1	2	66	III
<i>Launea procumbense</i>	+	-	+	2	66	III
<i>Zygophyllum atriplicoides</i>	2	+	-	2	66	III
<i>Campanulata colorata</i>	-	+	+	2	66	III
<i>Nepeta glomerulosa</i>	2	+	-	2	66	III
<i>Phlomis stewartii</i>	1	-	+	2	66	III
<i>Alyssum desertorum</i>	+	+	-	2	66	III
<i>Stachys parviflora</i>	1	-	+	2	66	III
<i>Sisymbrium irio</i>	+	+	-	2	66	III
<i>Anagalis arvensis</i>	+	-	+	2	66	III
<i>Teucrium stocksianum</i>	1	+	-	2	66	III
<i>Scabiosa cana</i>	1	+	-	2	66	III
<i>Veronica biloba</i>	+	-	+	2	66	III
<i>Gentiana oliveri</i>	+	+	-	2	66	III
<i>Euphorbia asyrides</i>	-	+	+	2	66	III
<i>Scorzonera hemilasia</i>	+	-	1	2	66	III
<i>Lactuca sariola</i>	+	+	-	2	66	III
<i>Zataria multiflora</i>	-	+	+	2	66	III
<i>Paracaryum asperum</i>	1	+	-	2	66	III
<i>Onosma hispidum</i>	+	-	1	2	66	III
<i>Limonium griffithii</i>	+	+	-	2	66	III
<i>Plantago ovata</i>	-	1	+	2	66	III
<i>Rochelia stellata</i>	+	-	+	2	66	III
<i>Galium aparina</i>	+	+	-	2	66	III
<i>Hyoscyamus insanus</i>	1	-	+	2	66	III
<i>Convolvulus spinosa</i>	1	+	-	2	66	III
<i>Orobancha aegyptica</i>	+	+	-	2	66	III
<i>Scutellaria stocksii</i>	+	1	-	2	66	III
<i>Clematis orientalis</i>	+	1	-	2	66	III
<i>Campanula leucoclada</i>	-	+	+	2	66	III
<i>Hertia intermedia</i>	+	+	-	2	66	III
<i>Gaillonia eriantha</i>	1	+	-	2	66	III
<i>Pulicaria gnaphaloides</i>	-	+	+	2	66	III
<i>Centaurea peragamacea</i>	-	1	+	2	66	III
<i>Iris sisyrinchium</i>	+	+	-	2	66	III
<i>Poa bulbosa</i>	1	+	-	2	66	III

<i>Cymbopogon parkeri</i>	+	1	-	2	66	III
<i>Hordeum murianum</i>	+	-	+	2	66	III
<i>Stipa barbata</i>	+	-	1	2	66	III
<i>Bromus tectorum</i>	-	1	+	2	66	III
<i>Acantholimon stocksii</i>	1	+	-	2	66	III

CONCLUSION

The habitat is quite rich in both species coverage and abundance as well as in fulfilling all the three basic requirements, i.e. water, shelter and food for the animal, necessary for its survival. Ample number of relished plants are available. The habitat only needs protection from biotic interference. In order to protect the wildlife, further cutting of trees be minimized and the people be provided alternate opportunities. Artificial plantation be established on the bare sites from where the pine tree have been cut. Introduction of species like *Pistacia cabulica*, *Prunus amygdalus* and *Fraxinus xanthoxyloides* will be a useful which will improve the habitat for the animal.

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