PHYTO-ECOLOGICAL STUDIES IN MASLAKH RANGE FOREST PISHIN, BALUCHISTAN (PAKISTAN)

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Abstract

The vegetaion of Maslakh Range Forest, Pishin, studied during spring and summer (April to June) in 1984, was classified into four plant communities, viz: *Boissiera squarrosa-Stocksia brahuica-Poa sinaica* (BSP), *Artemisia maritima-Poa bulbosa-Haloxylon griffithii* (APH), *Poa sinaica-Boissiera squarrosa-Artemisia maritima* (PBA), *Artemisia maritima-Boissiera squarrosa-Stocksia brahuica* (ABS), on the basis of highest importance value. There are 81 plant species in the area, including 15 medicinal plants and 11 grasses.

Introduction

The Maslakh Range Forest was studied to present a natural picture of its vegetation which provides habitat for wildlife. It had previously been studied by different workers but no significant phytosociological work has been done in the area.

Repp and Khan (1958) studied vegetation in relation to topography, geomorphology and soils, recording also improvement of vegetation due to closure of the area.

Said and Hussain (1959), Irshad (1961) and Rafi (1965) investigated the vegetation of the area largely focussing on palatable species. However, Beg (1966) presented a preliminary picture of the vegetation of Quetta, recording plant ecological groups, in relation to habitats they indicate.

The present study aims at a greater detailed investigation of the vegetation of the area.

Location, Geology, Climatology

Maslakh Range Forest is situated at about 20 miles West of Quetta town between $30^{o}3'$ to $30^{o}21'$ north latitude and 66^{o} $31'$ to 66^{o} $49'$ east longitude, lying at altitudes between 1406 and 2428 m. It occupies an area of 115,040 acres, comprising plains, dry stream beds and dry slopes. The area, protected since 1951 till present, was known to be under great biotic pressure before protection. (Said and Hussain, 1959).

The outcrops of Khojak sand-stones and shales oligocene in origin, exist in the area. Siwalik red clays saturated with white salts are covered by recent and subrecent alluvium,

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pebbles and boulders. Due to white salts, these clays have poor quality of water. (Said and Hussain 1959). The whole area is slightly sloping from south-east to north-west and is drained by many nallas into a valley.

The climate of the area is dry temperate with dry and cold winters; summers are dry and bracing. Annual climatic variation establishes winter, spring, summer and autumn seasons. Mean annual precipitation is 26.6mm, which occurs more in winter than in other seasons. Highest maximum temperature is 39.4°C and lowest minimum temperature is 8.8°C (Table 1). Persistant dry winds blow over the area for greater part of the year which become more strong and persistent in winter.

Seeps, springs and brackish water are the sources of water in the area. The middle belt of about 5–8 miles in width has no surface or ground water.

Soils of the area vary from sandy to sandy loams. (Table 2). They are alkaline due to low precipitation and dessicating winds.

Materials and Methods

The vegetation was analysed by Single Plot Method. The quadrats of 5 x 1 m and 1 x 0.5 m were used for shrubs and herbs respectively. The quadrats were laid randomly and systematically. The area was divided into 4 stands, each having uniform composition. Trees were limited in the area, therefore, they were not considered for analysis. Density, frequency and canopy coverage recorded in each quadrat were changed to relative scales (Cox, 1967). Canopy coverage of each species was measured by crown diameter method (Mueller-Dombois and Ellenberg, 1974). The importance value of each species was calculated to establish communities on the basis of highest importance values of species in each stand (Curtis and Mcintosch, 1950). Communities were named after the three leading species with highest importance values. Soil samples, collected from each stand, were analysed chemically and physically in the soil testing laboratory of Hydrogeology project (WAPDA), Quetta. Nomenclature followed here is that of Stewart (1972). The study was carried out in the spring and summer of 1984.

Results and Discussion

Vegetation of Maslakh consisted of 4 plant communities, viz. *Boissiera squarrosa-Stocksia brahuica-Poa sinaica* (BSP), *Artemisia maritima-Poa bulbosa-Haloxylon griffithii* (APH), *Poa sinaica-Boissiera squarrosa-Haloxylon griffithii* (PBH), and *Artemisia maritima-Boissiera squarrosa-Stocksia brahuica* (ABS). Altogether 81 different species of plants were recorded in all these communities. The importance value of each species is represented in Table 3.

4 plant communities, recognized in relation to their habitat conditions, are given below:

1. *Boissiera squarrosa-Stocksia brahuica-Poa sinaica* community (BSP)

This community is present in the dry stream-beds from the north to the south of Maslak

and is dominated by *Boissiera squarrosa, Stocksia brahuica* and *Poa sinaica* (Table 3). The soil is sandy loam with pebbles of different sizes mixed thoroughly (Table 2). *Boissiera squarrosa* an annual grass, is a seasonal dominant and remains in dominance from April to the end of May. With the advent of summer, the climatic conditions change and the population of *Boissiera squarrosa* declines. *Stocksia brahuica*, the second leading dominant, a shrub dominates the site largely because of its ecology. Another reason of its dominance may be its non-palatability and spiny form, as it is neither liked by the grazing animals nor collected by the fuel hunters.

Poa sinaica, a perennial grass is another seasonal dominant and comes into prominence in spring and summer (April to June). It receives a great grazing pressure because of its palatability.

There are altogether 50 species reported from this community of which one is a shrub, 7 grasses and the remaining annual or perennial herbs.

2. *Artemisia maritima-Poa bulbosa-Haloxylon griffithii* community (APH)

This community was found confined to northern aspect of Maslakh and is dominated by *Artemisia maritima, Poa bulbosa* and *Haloxylon griffithii* (Table 3). The soil was sandy loams. The highest importance value of *Artemisia maritima* is due to its favourable habitat (Beg, 1966). The dominance of *Haloxylon griffithii* hints at deep disturbance of the soil profile. The community comprises 29 species probably because of limited number of niches available there.

3. *Poa sinaica-Boissiera squarrosa-Artemisia maritima* community (PBA)

The south-eastern part of maslakh, which comprises plains, supported *Poa sinaica, Boissiera squarrosa* and *Artemisia martitima* community (Table 3). The texture of the soil is sandy loam (Table 2). Of the 3 dominants, the two grasses *Poa sinaica* and *Boissiera squarrosa* were found to be seasonal dominants, attaining maximum importance value in spring. The importance value of *Artemisia maritima* is lower than that in APH community. This community receives the heaviest grazing pressure because of a large number of palatable grasses, it contains. Of the 43 species recorded, 8 are grasses.

4. *Artemisia maritima-Boissiera squarrosa-Stocksia brahuica* community (ABS)

This community is dominated by *Artemisia maritima, Boissiera squarrosa* and *Stocksia brahuica* and was found restricted to the recent and sub-recent geological deposits of Maslakh (Table 3). The community comprises 49 species of which 10 are grasses.

From table 3 it appears that *Artemisia maritima* and *Stocksia brahuica* have higher importance values in the analysed area on the average being 46.88 and 17.26 respectively. *Boissiera squarrosa*, an annual grass has on the average 37.40 importance value. *Poa sinaica* a perennial grass is the common species having on the average an importance value of 21.54.

Poa and *Boissiera* have seasonal dominance only while *Stocksia* and *Artemisia* persist throughout the year. *Boissiera squarrosa, Artemisia maritima, Poa sinaica* and *Alyssum desertorum* show 100% presence in the analysed area while *Stocksia* is absent from APH community (Table 3).

A limited number of trees of *Pistacia khinjuk* and *Fraxinus xanthoxyloides*, and shrubs of *Prunus brahuica*, remnants of the degraded steppe forest, are still found growing here and there in the area. As a result of degradation of woody species, the vegetation is tending to develop into a grassland. Supporting 7 palatable grasses, the Maslakh range can be managed for rotational grazing. In case the grazing is not controlled, the palatable grasses will be damaged to such an extent where the recovery would almost be impossible.

A number of drug species like *Anthemis gayana, Artemisia maritima Allium rubellum, Cotula aurea, Ducrosia anethifolia, Ephedra, Ferula, Haplophyllum, Lallemantia, Psammageton, Salvia, Sophora, Tulipa, Valeriana* and *Ziziphora* commonly grow in Maslakh. Some of these species are hitherto being exploited, for example *Ephedra* for extraction of ephedrine. Protection and proper management of the vegetation of Maslakh, therefore, would help in uplifting the economy of the area.

The shrubs like *Stocksia, brahuica, Pteropyrum olivieri, Zygophyllum atriplicoids* and *Prunus brahuica*, scattered in the area to provide shelter for the wildlife on the one hand and fuelwood for cooking on the other. More native arboreal species like *Fraxinus an thoayloides Pistacia kinium, Juniperus excelsa* an exotic pine, *Pinus brutea*, can be grown, in the area to improve the wildlife habitat on one hand and meet small timber and fuelwood requirements of the area in the long run on the other.

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Table 1. Climatological data of Maslakh Range (1977–1981)

(Source D.F.O., Quetta Division)

Month	Temperature °C				Mean Rainfall (mm)	No. of days of Rainfall
	Mean of Daily Max.	Min.	Highest Max.	Lowest Min.		
January	9.4	–2.7	16.8	–6.2	84.0	3
February	10.8	–0.9	20.2	–0.8	57.2	1
March	17.8	3.1	25.2	–4.2	59.7	4
April	26.7	8.6	32.4	–2.6	8.5	0
May	30.4	10.9	36.0	5.4	7.3	0
June	33.2	16.3	38.8	8.8	10.8	0
July	35.5	20.4	35.4	15.0	27.5	0
August	34.8	17.0	37.8	11.6	0.2	0
September	31.2	10.3	34.2	4.6	0.1	0
October	25.9	4.9	30.0	2.4	7.5	0
November	18.7	–2.2	26.2	6.8	12.3	0
December	15.1	–2.5	20.4	–8.8	44.2	0

Table 2. Physical and chemical analysis of soil of five stands in Maslakh.

Community	PH of Saturation Paste	Electric conductivity as ECX 10^3 at 250^oC	Soluble cations Meq/Litre ++ (Ca+Mg)	++ Na	Soluble Anions Meq/Litre — CO_3	– HCO_3	– CI	— SO_4	Sodium Adsorption Ration (SAR)	Cation Exchange capacity (Meq/100 Gms)
1. BSP	8.2	750	5.57	1.30	1.56	3.12	0.61	2.68	1.25	7.24
2. APH	8.7	500	3.25	1.04	1.56	2.34	0.73	0.36	1.37	4.99
3. PBA	8.2	500	3.25	0.08	–	1.56	1.70	1.46	1.18	4.72
4. ABS	8.6	500	3.72	1.52	1.56	0.35	0.15	0.73	0.84	4.78

Table 3. Importance Values (IV) of species in four communities of Maslakh Range.

S. No.	Species	Communities			
		BSP	APH	PBA	ABS
1.	*Acantholimon longiflorum* Boiss.	1.31	4.84	–	1.23
2.	*Acantholimon polystachyum* Boiss.	–	–	–	0.91
3.	*Acanthophyllum squarrosum* var. *stocksianum* Boiss.	7.42	4.84	–	3.43
4.	*Alhagi maurorum* Medic.	–	–	8.715	–
5.	*Alyssum desertorum* Stapf	4.38	7.04	4.51	6.36
6.	*Anthemis gayana* Boiss.	1.31	3.72	2.28	–
7.	*Arenaria serpyllifolia* Stocks	5.22	4.07	–	1.65
8.	*Arnebia decumbens* (Vent) Coss and Kral	–	–	0.912	–
9.	*Artemisia maritima* L.	16.89	96.66	27.07	46.89
10.	*Artemisia scoparia* Waldst. & Kit.	–	–	12.56	5.86
11.	*Astragalus* sp.	11.69	18.30	5.27	5.86
12.	*Astragalus sericostachys* Stocks	–	–	–	0.87
13.	*Atriplex canescens* James	–	–	3.42	–
14.	*Boissiera squarrosa* (Soland) Nevski	63.59	11.88	39.51	34.61
15.	*Bromus danthoniae* Trin.	6.21	4.79	6.46	7.65
16.	*Bromus tectorum* L.	–	10.34	3.60	7.92
17.	*Centaurea bruguieriana* (D.C.) Hand-Mazz.	0.42	2.49	–	0.83
18.	*Ceratocarpus arenarius* L.	1.31	5.94	5.91	1.72
19.	*Ceratocephalus falcatus* (L.) Pers.	2.06	–	–	–
20.	*Chrysopogon aucheri* (Boiss.) Stapf	5.22	1.02	2.74	1.32
21.	*Convolvulus spinosus* Burmn.	1.31	–	2.44	–
22.	*Cotula aurea* Loeffi	0.42	–	–	2.03
23.	*Cousinea alepidia* Boiss.	5.39	9.29	4.71	2.68
24.	*Cousinea griffithiana* (Coss) L.	–	1.02	–	–
25.	*Cymbopogon olivieri* (Boiss.) Bor	–	–	–	0.83
26.	*Cyperus rotundus* L.	–	2.47	–	4.38
27.	*Delphinium centeteroides* (Bruhl.) Munz.	–	–	–	1.32
28.	*Descurainia sophia* (L.) Webb. ex Prantl	–	–	1.26	–
29.	*Diarthron vesiculosum* (Fish. & Mey.) C.A. Mey	4.11	3.96	–	2.43
30.	*Draba hystrix* H. & T.	1.31	–	–	4.00
31.	*Ducrosia anethifolia* (D.C.) Boiss.	0.09	–	–	–
32.	*Ebenus stellatus* Boiss.	–	–	–	2.72
33.	*Echinops griffithianus* Boiss.	1.73	–	–	–
34.	*Ephedra ciliata* Fish. & Mey.	–	–	6.03	–
35.	*Ephedra intermedia* Schrenk et Mey.	–	–	6.03	–

S. No.	Species	Communities			
		BSP	APH	PBA	ABS
36.	*Eremopyrum bonapartis* (Spreng) Nevski	4.82	–	1.40	–
37.	*Erodium bryonifolium* Boiss.	2.22	–	–	–
38.	*Eryngium carlinoides* Boiss.	.84	–	3.04	4.56
39.	*Euphorbia osyridea* Boiss.	–	–	4.31	0.83
40.	*Ferula baluchistanica* Kita.	1.18	1.02	1.26	–
41.	*Gagea persica* Boiss.	–	–	–	2.41
42.	*Gentiana olivieri* Griseb.	–	–	–	0.83
43.	*Garhadiolus papposus* Boiss.	–	5.50	–	–
44.	*Haloxylon griffithii* (Moq) Bunge ex Boiss.	2.49	21.71	17.69	8.63
45.	*Haplophyllum tuberculatum* (Forsk.) A. Juss.	1.314	–	–	–
46.	*Holosteum umbellatum* L.	–	–	4.51	–
47.	*Hordeum murinum* L.	6.55	–	–	0.91
48.	*Koeplinia linearis* Pallas	3.14	1.51	–	–
49.	*Lactuca vimina* (L.) F.W. Schmidth	3.02	1.31	3.44	–
50.	*Limonium griffithii* (Aitch. & Hemsl.) O.K–tze	–	–	1.85	–
51.	*Matthiola flavida* Boiss.	6.49	–	5.50	2.50
52.	*Nonnea pulla* (L.) D.C.	–	–	1.26	–
53.	*Onobrychis taverniaefolia* Stocks ex Boiss.	0.42	–	–	–
54.	*Papaver cornigerum* Stocks	1.13	–	–	–
55.	*Peganum harmala* L.	4.38	–	6.85	2.13
56.	*Pistacia khinjuk* Stocks	1.31	–	–	–
57.	*Poa sinaica* Steud.	27.42	7.27	42.11	9.38
58.	*Poa bulbosa* var. *vivipara* Koel.	9.56	52.96	4.71	2.68
59.	*Poa* sp.	–	–	8.72	–
60.	*Polygonum afghanicum* Meissn.	1.63	–	7.73	7.84
61.	*Psammogeton biternatum* Edgew.	0.99	4.69	1.86	1.87
62.	*Pteropyrum olivieri* J. et S.	–	–	–	0.83
63.	*Pulicaria angustifolia* Stocks ex Boiss.	3.85	–	2.86	14.00
64.	*Salvia santolinaefolia* Boiss.	1.97	–	–	–
65.	*Scabiosa olivieri* Coult.	2.18	10.76	–	3.88
66.	*Senecio coronopifolius* Desf.	–	–	2.26	–
67.	*Silene griffithii* Boiss.	2.65	–	–	–
68.	*Sophora griffithii* Stocks	6.41	–	–	–
69.	*Stocksia brahuica* Bth.	38.25	–	8.06	22.75
70.	*Suaeda fruticosa* (L.) Forssk.	–	–	5.91	–
71.	*Taeniatherum crinitum* (Schred.) Nevski	7.33	1.26	1.26	–
72.	*Taverniera cuneifolia* Stocks	–	–	–	3.02
73.	*Torularia torulosa* (Desf.) O.E.S.	–	–	1.26	3.73

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		BSP	APH	PBA	ABS
74.	*Tulipa lehmanniana* Merchl.	–	–	–	0.83
75.	*Trigonella incisa* Bth.	5.52	–	1.26	1.00
76.	*Trigonella monantha* C.A. Mey.	–	–	–	1.00
77.	*Valeriana jatamansi* Jones	–	5.52	–	–
78.	*Valerianella dufresnia* Bunge ex Boiss.	2.52	–	–	–
79.	*Veronica biloba* L.	1.97	–	7.69	8.13
80.	*Ziziphora tenuior* L.	2.09	–	–	4.83
81.	*Zoegia purpurea* Freson	1.43	1.02	–	–

REFERENCES

1. Beg, A.R. (1966) Preliminary study of vegetation of Quetta. Proceedings of the First West Pakistan Range Mgmt. Conf. Peshawar, Oct., 5–7, 1966: pp. 245–253.

2. Cox, G.W. (1967) Laboratory Manual of General Ecology, W.M.C., Brown Co: Iowa, U.S.A. pp. 165.

3. Curtis, J.T. & R.P. Mcintosch (1950) The inter-relations of certain analytic and synthetic phytosociological characters. Ecology, 31: 434–455.

4. Repp., G.I. and A.H. Khan (1958) Integrated plant ecological studies in Maslakh Range Improvement Project. Technical Report No. 8, UNESCO Plant Ecological Project Pakistan Forest Institute, Peshawar.

5. Irshad, S.M. (1961) *Haloxylon* on Maslakh Range. Pak. J. For. 11:302–304.

6. Mueller-Dombois, D. & H. Ellenberg (1974) Aims and Methods of Vegetation Ecology. John Wiley and Sons, New York.

7. Rafi, M.M. (1965) Maslakh Range Project Quetta. Pak. J. For. 15: 319–338.

8. Said, M. & T. Hussain (1959) Range and pasture improvement project Maslakh. Pak. J. For. 9:160–182.

9. Stewart, R.R. (1972) An annotated catalogue of the vascular plants of West Pakistan and Kashmir. (ed.) E. Nasir and S.I. Ali. Flora of West Pakistan. University of Karachi, Pakistan pp. 1028.