PRELIMINERY VEGETATION AND SOIL INVESTIGATIONS OF LOHIBHER RANGE

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Abstract

A range ecological survey was conducted in the Lohibher Range in January 1981 and September – October 1982. Vegetation was studied on different major land units viz, (i) dissecting rolling plains, (ii) stream beds, adjoining slopes and edges, (iii) eroded hill slopes and tops and (iv) gravely hills, laying adjustable decimal collapsible (ADC) quadrat in homogeneous stands of vegetation. Analysis of data resulted in four plant communites, i.e. *Chrysopogon montanus - Heteropogon contortus – Desmostachya bipinnata; Desmostachya bipinnata – Saccharum spontaneum – Chrysopogon montanus; Eleusine compressa – Cymbopogon schoenanthus – Capparis decidua* and: *Chrysopogon montanus – Adhatoda vasica – Eleusine compressa.*

The communities were finally named by combining the physical and biological features.

Introduction:

The Lohibher range located between 33°, 34′ and 33°, 36′ North and 73°, 05′ and 73°, 06′ East at an altitude of 500 metres with an area of 440 hectares is situated at a distance of 16 kilometers from Islamabad on right side of Islamabad – Lahore Highway. The range has long been used as a grazing land. Since. the range was not being managed scientifically, it suffered from deterioration and would be unproductive in due course. It was, therefore, imperative to undertake a proper scientific investigation on vegetation and soil to yield data for proper range management.

The range is bounded in the North by Chaklala Airport, in the West by Lohibher Village and Soan River runs along the Eastern and Southern sides. The physical features of Lohibher range exhibit a variety of plateaus, hillocks, valleys, ravines, streams, plains and other forms of topography. The rock formation is composed of tertiary sandstones and alluvial deposits. The Western and Northern portion is a plain with clayey loam soil and the hillocks are made of alluvial material with a large number of stones cemented together (Leh conglomerate). The sandstones apparently belong to the Sirmur and Siwalik series of the sub-Himalayan system. The pebble ridges, described as alluvial deposits in the Lohibher range are a peculiar feature of the Rawalpindi Tehsil and most of the forests in the district are on pebble ridges. Large isolated boulders in many places seem to point to a glacial epoch in the Pothowar plains. The Pothowar plains were formed during quarternary period and they are composed of alluvium and gravel caps. Soils of Lohibher range belong to the Rawalpindi series which have been derived from loess material (Ali, 1967).

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The climate of the area is sub-tropical continental low lands, sub-humid Pothowar plateau (Ahmad, 1951), with a mean annual precipitation of 940 mm., most of which falls in monsoon during the months of July and August. January is the coldest month (mean minimum temperature 0.6°C) while June is the hottest (mean maximum temperature 45°C). Highest relative humidlity of 83% and 76% is recorded in morning in the coldest months of December and January respectively while it is 51 and 46 percent in the evening. The lowest relative humidity recorded in May is 33% in the morning and 18% in the evening. The wind generally blows from North-West but during the monsoon season its general direction is South-east.

The major drainage systems are river Soan and Korang. A number of seasonal nullahs flow through the range besides Korang river, a part of which passes through the area. The whole area encloses reasonably large chunk of private lands on three sides and eight villages are located around the area.

Most of the animals as well as some migratory herds tend to graze in the area which cannot cater for their requirements of grazing.

Review of Literature:

Higgins and Ibrahim (1970) studied the climate, geology geomorphology and hydrology of Thal area. They described twenty one soil series and discussed thrity plant communiteies in relation to these soil series. In 1951 Said studied the effect of biotic interference, soil and flora of salt range forests and classified the forests into five local types. Rutter and Shaikh (1962) conducted an integrated vegetation and soil survey of wastelands around Lahore. They mentioned eight vegetation types and a correlation of these types with soil characteristics of the area.

Vegetation of Swabi and Gadoon area was investigated in 1978 by Baig. He divided the area into two vegetation zones and sixteen vegetation types were identified. Alizai and Naqvi (1976) surveyed the vegetation in the flood plains of the Indus River at Dera Ismail Khan and described five plant communities in relation to some edaphic characteristics and flooding. Baig and Repp (1965) studied the vegetation of different land units of the Porali plains of Lasbela and prepared a vegetation – land use map. Similarly Hussain (1964) described the vegetation of eleven land units of Nagar Parkar in relation to the soil types of the area. In a phytosociological study of Ayub National Park. Rawalpindi, Amin and Ashfaque (1982) recognized five plant communities based on physiogonomy, floristic composition, importance value of tree species and summation value of herbs and shrubs.

Materials and Methods:

A preliminary soil survey of the area using aerial photographs was carried out following Goosen, 1967 and soil samples collected were analysed for physicochemical characteristics by the standard procedures suggested by Richards, 1954. Vegetation was sampled by field traverses and with ADC quardrat on the various land forms viz dissecting rolling plains, stream beds, adjoining slopes and edges, oroded hill slopes and tops and gravely hills worked out through physiographic analysis of the area at 96% confidence limit. The plant communities

were delineated after Hussain, 1968. The plants were identified according to Stewart, 1975.

Results

As a result of the analysis of soil and vegetation data the following four plant communities and land forms were recognized:-

I. **Chrysopogon Montanus – Heteropogon Contortus – Desmostachya Bipinnata Community on Dissected Rolling Plains.**

This community extends over an area of 50 hectares with loamy to fine sandy loam soils having 0–8 percent slope. The soil pH ranges from 8.2 to 8.3 with cation exchange capacity varying from 0.35 to 0.55 percent, organic matter from 1.40 to 1.54 percent and available phosphorus 2.0 ppm. The saturation percentage is 33.7 percent upto to 15cms depth and 35.5 percent at 15–30 cms. depth.

The following species comprise the vegetation with corresponding aerial cover and frequency:-

S.No.	Species	Aerial Cover (%)	Frequency (%)
1.	*Chrysopogon montanus*	16	85
2.	*Heteropogon contortus*	15	84
3.	*Desmostachya bipinnata*	17	79
4.	*Acacia modesta*	11	70
5.	*Dicliptera roxburghiana*	6	54
6.	*Ziziphus nummularia*	5	24
7.	*Gymnosporia royleana*	4	21

II. **Desmostachya Bipinnata – Saccharum Spontaeneum – Chrysopogon Montanus Community on Stream Beds, adjoining Slopes and Edges.**

The area represented by this plant community is 183 hectares which is ranging from sandy loam to clayey having medium to fine textured mantles of varying thickness overlain on sandy substratum. The slope percentage varies from 8-15 percent with soil depth 35-50 cms. The saturation percentage decreases with increasing soil depth which is 37.7 percent at 0-15 cm. and 31 percent at 15-30 cms depth with pH value 8.1. The cation exchange capacity varies from 45-50 percent with organic matter ranging from 0.84 to 0.98 percent and available phosphorus from 2.0 to 2.6 ppm.

The aerial cover and frequency of dominant species alongwith their associates of this

community are as follows:-

S. No.	Species	Aerial Cover (%)	Frequency (%)
1.	*Desmostachya bipinnata*	29	93
2.	*Saccharum spontaneum*	16	62
3.	*Chrysopogon montanus*	23	61
4.	*Heteropogon contortus*	21	59
5.	*Ziziphys nummularia*	3	19
6.	*Acacia modesta*	5	15
7.	*Dicliptera roxburghiana*	1	14

III. **Eleusine Compressa – Cymbopogon Schoenanthus – Capparis Decidua Community on Eroded Hill Slopes and Tops.**

The total area under this community is 118 hectares with slope percentage varying from 15–30 percent. The soil depth is 10–30 cms with PH ranging from 8.1 to 8.3 and cation exchange capacity varying from 0.30 to 0.35 percent. The saturation percentage, at 0–15 cms soil depth is 26.6% and at 15–30 cms is 22.7%. The percentage organic matter content is 0.84% and available phosphorus is 2.6 pp,. These soil characteristics support the following plant species:–

S. No.	Species	Aerial Cover (%)	Frequency (%)
1.	*Eleusine compressa*	12	89
2.	*Cymbopogon schoenanthus*	11	79
3.	*Capparis decidua*	15	64
4.	*Heteropogon contortus*	4	41
5.	*Chrysopogon montanus*	2	27
6.	*Dicanthium annulatum*	3	26
7.	*Acacia modesta*	2	14
8.	*Desmostachya bipinnata*	2	12

IV. **Chrysopogon Montanus – Adhatoda Vasica – Eleusine Compressa Community on Gravely Hills**

This plant community is an indicator of gravelly colluvium, dark brown, slightly gravely sandy loam textured soils with soil depth less than 10 cms. The total area of 70 hectares is moderately sloping with saturation percentage varying from 31.3 to 33.3 percent and PH ranging from 8.3 to 8.4. The cation exchange capacity is 0.4%, organic matter varies from

0.84 to 0.98 percent and available phosphorus is 2.0 percent. The community is represented by the following species:–

S. No.	Species	Aerial Cover (%)	Frequency (%)
1.	*Chrysopogon montanus*	12	68
2.	*Adhatoda vasica*	7	49
3.	*Eleusine compressa*	2	24
4.	*Sporobolus coromandelianus*	3	20
5.	*Capparis decidua*	2	19
6.	*Otostegia limbata*	3	19
7.	*Cymbopogon schoenanthus*	3	17
8.	*Ziziphus nummularia*	2	16

Discussion

The soils of community–I have the highest percentage of organic matter and the progressive development of the profile has given a better and stable structure supporting a mixed vegetation cover of indigenous palatable species comprising of trees, shrubs, grasses and forbs. Similarly the presence of *Gymnosporia royleana* indicates better conditions for the management of range for livestock development. The community–II developed on steam beds, adjoining slopes and edges indicates sandy substratum. Areas where sandy substratum has been overlain by fine clay supports *Saccharum spontaneum* and sandy stream beds with slopes periodically flooded are dominated by *Desmostachya bipinnata* with the gradual replacement of *Chysopogon montanus* at the higher limits. The community–III developed on eroded hill slopes has the least water holding capacity due to decreasing saturation percentage with increasing soil depth. The community is dominated by *Eleusine compressa* and sporadically distributed non-palatable species like *Capparis decidua* and *Cymbopogon schoenanthus* indicating heavy grazing pressure in the past.

The community–IV on crevices of exposed rocks having soil depth of about 10 cms presents a mixed vegetation of palatable and non-palatable species like *Chysopogon montanus Ziziphys nummularia* and *Otostegia limbata, Eleusine compressa* Occupies community–III and IV indicating severe erosion hazard in the area.

Recommendations:

The study revealed that the area of community I and II may be managed for rangeland development with controlled grazing. Community–I may be reseeded with improved forage species and afforestation of fodder shrubs and trees in community–II. Community–III and IV require complete protection and improvement of the area through reseeding, planting, soil conservation measures to improve the soil depth.

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