PHYTOSOCIOLOGICAL SURVEY OF SAMAHNI VALLEY, BHIMBER, AZAD KASHMIR

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Abstract

The phytosociological analysis carried in Samahni Valley and the vegetation was sampled by using quadrats of 10x2m, 5x2m and 0.5x0.5m for trees, shrubs and herbs respectively. Density, frequency and coverage of each species in the different stands was recorded. It was changed to relative scales and then added together to get the importance value for each species in each stand. Communities were named after the 3 leading dominants. The following five communities were recognized: (I) *Melia-Lantana-Stellaria*, (II) *Morus-Dodonaea-Melilotus*, (III) *Dodonaea-Grewia-Melia*, (IV) *Stellaria-Zizyphus-Dodonaea*, (V) *Oxalis-Pinus-Olea* Communities. Index of diversity and its components decreased from low altitude to high altitude, but in *Oxalis-Pinus-Olea* community it was high. soils were generally loamy, sandy loamy to clayey loamy type with pH varying from 7.0 to 7.6, organic matter 0.8 to 1.6%, Potassium 70.4 ppm to a 99.1 ppm and Phosphorous 5.46 ppm to 14.97 ppm. The communities reflect highly deteriorated condition.

Introduction

The tract dealt with occupies the outer ranges of Sub-Himalayas, traversed by numerous ridges running mostly in the south east to north west direction and enclose wide open valleys. In Bhimber range the terrain is rugged, mountainous and steep. The presence of large number of ridges and spurs and their branching the ground slopes in all directions give rise to all types of slopes. The forests are found on all slopes but the condition of stocking and regeneration is very poor on exposed and hotter aspects. The climate of the area is of Sub-tropical with rather moderate seasonal fluctuations in temperature and rainfall characterized by hot summer and cold winter. The average mean maximum and minimum temperature of the year is 29.4 & 17.3°C respectively. The mean monthly rainfall of the year is 88.58 mm. The maximum rainfall occurs during the month of July and August

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having annual rainfall of 276.4 mm and 242.8 mm respectively. Relative humidity is low during day-time than at night. In cloudy days the relative humidity is higher. January, February, August & December generally are more humid than April, May & June.

Vegetation analysis envisages the association of plants with each other and with the existing environmental conditions. It is also a reflection of biotic influences. The glimpses of the original vegetation can still be seen at protected places such as in the graveyards. Chaughtai *et al.* (1983) reported vegetation composition of different areas. Similarly phytosociological work on other parts of the country also exists (Beg, 1965). But there is no such reference on the vegetation of Samahni Valley near Bhimber (AK). The objectives of this study were to investigate the floristic composition and the causes of its degradation in the area. The findings might help in the afforestation/reforestation efforts made for the area.

Review of Literature

Chaughtai and Ghawas (1976) studied the phytosociological aspects of Malakand area, N.W.F.P. they reported that herbs especially *Themeda anathera* got dominance due to less disturbance on north facing lower slopes than the upper slopes in Malakand Pass, N.W.F.P. Malik and Hussain (1990) reported the phytosociological results of some parts of Kotli hills, Azad Kashmir. They observed that *Themeda anathera* is one of the most abundant grass in Kotli area.

Tareen and Qadir (1991) reported that total coverage and species diversity tended to be high in protected areas than in unprotected areas of Quetta district. They concluded that ecological stability of community is related to species diversity, high species diversity mean higher stability of community. Hussain et al (1993) reported that *Acacia modesta* was the most abundant and widely distributed tree species of tropical deciduous forest of Swabi district that exhibited high importance value presumably due to protection as there is hardly any *Acacia* cover in the non protected sites in the same area.

Materials and Methods

Samahni Valley (district Bhimber, A.K.) was chosen for phytosociological analysis. The phytosociology of the area was conducted during Jan., 1998 at five randomly selected sites based on physiognomic contrast. The vegetation was analyzed using quadrate of 10x2 m for trees, 5x2 m for shrubs and 0.5x0.5 m for

herbs respectively. Circumference of wood species was recorded at breast height (DBH) and converted to coverage (basal area) using standard conversion table (Cox, 1967). The coverage of shrubs & herbs was calculated using the Daubenmire's coverage classes (Daubenmire, 1974). Density, frequency and canopy coverage of each species were converted to relative values which were added together to give importance values (IV) for that species (Hussain, 1989). Plant community was named after the three leading dominants with highest importance values. Simpson index of diversity was calculated after Simpson (1949) and Shannon-Weaver index of diversity was calculated after Shannon-Weaver (1963). Species richness, equitability was determined after Pichi-Sermolli's method (1948).

Plants were collected ,dried ,preserved and identified with the help of available literature (Nasir and Ali, 1970-1987).

Soil was sampled up to a depth of 15 cm and analyzed for physical and chemical features in the Soil Analysis Laboratory, Agriculture Research Centre, Muzaffarabad.

Results and Discussion

The results are summarized in the form of IV (importance values) and are presented in Table 2. Following five communities were established on the basis of their phytoecological attributes.

1. *Melia-Lantana-Stellaria* Community

The community was recognized at a height of 350m. It was dominated by *Melia azedarach* (IV-28.62), *Lantana camara* (IV-26.13) and *Stellaria media* (IV= 24.58). The co-dominants were *Fumaria indica* and *Lathyrus aphaca* with the IV of 21.36 each. *Cynodon dactylon* and *Achyranthes aspera* were the associated components of the community. The community was established on sandy loamy soil with pH of 7.6. The soil was rich in 'P' and 'K' while the organic matter was moderate. The high IV of *Melia azedarach* was chiefly contributed by highest relative value of canopy coverage while its relative density and frequency were quite lower than *Stellaria media* and *Lathyrus aphaca.*

Table 1. Physio-chemical analysis of soil in the five plant communities in Samahni valley

Parameters	Communities				
	MLS	MDM	DGM	SZD	OPO
Soil texture	Sandy loam	Loamy	Sandy loam	Sandy loam	Clay loam
Saturation(%)	30	33	24	28	46
Soil pH	7.6	7.9	7.5	7.2	7.0
Organic matter	1.2	1.6	1.0	0.9	0.8
P_2O_5 (ppm)	5.46	6.60	10.9	14.09	14.97
K_2O (ppm)	70.4	72.6	99.1	88.9	88.1

Key:

MLS= *Melia-Lantana-Stellaria* community
MDM= *Morus-Dodonaea-Melilotus* community
DGM= *Dodonaea-Grewia-Melia* community
SZD= *Stellaria-Zizyphus-Dodonaea* community
OPO= *Oxalis-Pinus-Olea* community
ppm= Parts per million.

Table 2. Importance values of different species around Samahni valley

	Communities				
	MLS	MDM	DGM	SZD	OPO
I. Tree layer					
Melia azedarach L.	28.62	-	25.36	21.5	-
Dalbergia sissoo Roxb.	16.27	-	23.83	21.42	-
Ficus palmata Forssk.	12.75	-	-	-	11.65
Olea ferruginea Royle	-	16.07	-	21.42	25.65
Zizyphus mauritiana Lam.	20.19	21.85	8.13	22.61	7.09
Morus alba L.	19.37	37.84	-	-	-
Acacia modesta Wall.	-	15.79	-	6.92	8.51

	Communities				
	MLS	MDM	DGM	SZD	OPO
Pinus roxburghii Sargent	-	-	10.27	-	27.97
II. Shrub Layer					
Lantana camara Roxb.	26.23	11.49	11.85	14.42	23.66
Adhatoda zeylanica Nees.	17.26	-	-	14.42	11.43
Ricinus communis L.	16.19	19.57	11.85	21.35	-
Dodonaea viscosa (L.) Jacq.	13.43	31.06	35.58	21.75	23.42
Grewia villosa Willd.	11.05	-	26.78	-	-
Cassia fistula L.	-	11.49	12.26	-	-
Zanthoxylum alatum Roxb.	-	11.49	10.27	-	-
Carissa opaca Stapf	-	-	-	10.82	14.33
Abutilon bidentatum Hochst.	-	-	-	-	14.82
Hibiscus micranthus Suppl.	-	-	-	7.12	14.93
III. Herb Layer					
Stellaria media (L.) Cyr.	24.58	22.24	18.06	27.16	25.12
Fumaria indica (Hausskn.) Pugsley	21.36	-	16.21	-	-
Lathyrus aphaca L.	21.36	16.61	-	13.76	-
Cynodon dactylon (L.) Pers.	19.22	-	18.97	-	-
Achyranthes aspera L.	17.6	-	16.21	14.57	20.72
Dicliptera roxburghiana Nees	14.38	-	-	-	-
Melilotus indica (L.) All.	-	26.4	21.86	20.37	-
Oxalis corniculata L.	-	25.89	20.56	21.28	38.39
Anagalis arvensis L.	-	17.12	17.73	-	-
Sonchus asper (L.) Hill.	-	14.57	-	-	-

	Communities				
	MLS	MDM	DGM	SZD	OPO
Themeda anathera (Nees.) Halk.	-	-	-	17.93	12.23
Viola odorata L.	-	-	-	-	11.73
Malvastrum coromandelianum (L.) Garcke	-	-	-	-	10.26
Fragaria nubicola Lindl.	-	-	-	-	7.222
Total Species	**16**	**15**	**17**	**17**	**18**

Key:

MLS = *Melia-Lantana Stellaria* Community
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2. *Morus-Dodonaea-Melilotus* Community

This community was present at an altitude of 365m. *Morus alba* (IV=37.84), *Dodonaea viscosa* (IV=31.06) and *Melilotus indica* (IV=26.4) were the dominants. This highly degraded community was present on loamy soil exhibiting high content of organic matter (Table 1). The nutrient status is poor which is probably due to poor vegetation cover.

3. *Dodonaea-Grewia-Melia* Community

The community is characterized by the dominance of *Dodonaea viscosa, Grewia villosa* and *Melia azedarach* respectively having importance values of 3[illegible]5.58, 26.78 and 25.36 at a height of 548 m (1800 ft.). The tree layer is present wh[illegible]ich is sharing the dominance. Absence of *Ficus palmata, Acacia modesta* and low [illegible]V of *Zizyphus mauritiana* due to felling by man. The soil conditions are relative[illegible]ly mesic that favour the establishment of *Melilotus, Oxalis, Cynodon.* Potassium [illegible] content is the highest of all the communities.

4. *Stellaria-Zizyphus-Dodonaea* Community

The dominants are *Stellaria media*, *Zizyphus mauritiana* and *Dodonaea viscosa*, the importance values are respectively 27.16, 22.61 and 21.75.

This community was confined to the sandy loam soil at a height of 568 m. Due to dry conditions *Dodonaea* emerges as one of the dominants as in previous community. The soil is sandy loam and exhibits relatively high amount of phosphorous. The total number of species is 17.

5. *Oxalis-Pinus-Olea* Community

The community is characterized by the dominance of *Oxalis corniculata, Pinus roxburghii* and *Olea ferruginea* respectively having importance values of 38.39, 27.97 and 25.65 at a height of 603m (1980ft.). The organic matter is the lowest of all the communities (Table 1). There are 18 species in this community.

The overall vegetation is highly degraded owing to immense overgrazing and deforestation. *Oxalis-Pinus-Olea* community which harbours protected site might be a ruminant patch of the original vegetation type. Majority of the species are sporadic. It shifts to *Stellaria-Zizyphus-Dodonaea* community where *Melia* and *Olea* were the Co-dominant members. Similarly in *Dodonaea-Grewia-Melia* community *Olea* is totally absent and in *Morus-Dodonaea-Melilotus* community it is insignificant. It appears that the vegetation might ultimately change to an open degraded scrub where non-palatable and less preferred species like *Grewia, Lantana, Dodonaea* and other allied components may dominate. The dominancy of *Dodonaea* in most of the communities suggests that it is a very common plant of dry hills in the sub-Himalayan tracts and grown on denuded soils where little else can grow (Stewart, 1958); quick growth and gregarious habit make it an excellent competitor (Abdullah, 1973). *D.viscosa* prefers dry habitat and leads to the formation of *Dodonaea* Scrub (Salim and Shahid, 1973). The *Dodonaea* has always been an important component of the shrub vegetation harbouring low hills. It covers extensive tracts in the drier region (Abdullah, 1973; Brandis, 1911). The complete absence of *Cynodon dactylon* from *Morus-Dodonaea-Melilotus, Stellaria-Zizyphus-Dodonaea* and *Oxalis-Pinus-Olea* communities showed the high degree of grazing. Chaughtai *et al.* (1978) reported similar results and showed that particularly deficiency of potassium and NO_3 may be held responsible for low IV of *C.dactylon.*

The ecological stability of community is related to species diversity, high species diversity mean higher stability of community. *Oxalis-Pinus-Olea* Community showed the highest diversity and the highest species richness at 603m (Table 3) while the *Morus-Dodonaea-Melilotus* Community showed the lowest diversity and the lowest species richness (Table 3). Thus highest diversity index (Shannon Index) of *Oxalis-Pinus-Olea* showed that community present in protected area. Similar results were shown by Tareen and Qadir (1991) in the areas of Quetta district. The complexity and stability of community are directly related to species richness and diversity (Odum, 1971). *Acacia modesta* has low importance value and is very limited species, regular use and deforestation might be one of the reasons for its reduced generation. *A. modesta* was often found on sandy loam soil. This tree is light demanding, drought resistance, used for afforestation in poor stony soils in the dry lower hills and plains (Khan, 1958). It needs more protection in the area. The deforestation and degradation has changed the vegetation to an open scrub in which heliophyte might invade and dominate. The predominance of annuals indicates disturbance by man. Once the natural balance is disturbed it becomes difficult for the vegetation to adopt the environmental conditions according to their needs. A degraded vegetation like this has low productivity both at primary and secondary level.

Table 3. Index of diversity & its components of plant communities

S.No.	Communities	Simpson Index	Shannon Index	Species richness	Equita-bility
1.	*Melia-Lantana-Stellaria*	7.80	3.33	1.02	0.83
2.	*Morus-Dodonaea-Melilotus*	7.26	4.07	0.91	1.04
3.	*Dodonaea-Grewia-Melia*	8.73	3.42	0.94	0.83
4.	*Stellaria-Zizyphus-Dodonaea*	7.79	3.37	0.94	0.82
5.	*Oxalis-Pinus-Olea*	6.08	4.09	1.09	0.98
	Total		18.28	4.914	4.513
	Mean		3.656	0.982	0.90

The area needs proper management and protection for the bioresources to survive. A lot of medicinal plants e.g., *Adhatoda zeylanica*, *Fumaria indica*, *Lantana camara*, *Oxalis corniculata* etc., can be protected by conservation programmes and with the help of local in habitants.

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