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Impact of Livestock and Human Activities on the Floral Distribution of Gulmarg Wildlife Sanctuary, Kashmir

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Abstract:
Gulmarg is an outstanding tourist destination and is home to rich biodiversity. But the areas biodiversity is under continuous threat. Uncontrolled grazing has become a major biotic interference leading to removal of protective plant cover, reduction in regrowth capacity, soil compaction. In addition, deforestation, fuel wood collection, trespassing, forest fires, unregulated tourist inflow, etc are among other factors. The cumulative effect of the biotic interferences was significantly seen in the reduction of vegetation cover. The study carried out from March, 2012 to Dec., 2012 provides an assessment of the impact of anthropogenic pressures on the vegetation of Gulmarg Wildlife Sanctuary. The various disturbances were assessed by selecting a total of 4 sites to compare the vegetation at Control and Degraded sites, under the various operative anthropogenic factors. It was concluded that these disturbances have a great influence on frequency, density, abundance, diversity, richness and evenness of plant species. It was also revealed that much of the disturbances support the growth of aggressive weeds and shrubs which compete with the availability of resources. Herb analysis showed an increase of frequency, density, abundance from Degraded to Control site. Similar results were revealed in case of trees but Shrub analysis showed opposite trend where there was a decrease of frequency, density, abundance from Degraded to Control site.

Key words: *Biodiversity, deforestation, anthropogenic pressure*

1. Introduction

The manipulations made by living components especially human beings to the environment, leads to the changes in the state and flows of the biosphere. These interferences may occur in the form of habitat destruction and fragmentation, extension of agriculture, conversion of rich biodiversity site for human settlement and industrial development, disturbance and pollution etc. All these interferences have led to decline in the biodiversity, which is not only essential for human survival and economic well being but also helps in the maintenance of functions and stability of an ecosystem (Singh, 2002).

2. Methodology

Vegetation survey was conducted in the selected sites by randomly laying 20 quadrats of $1\times1m^2$ and $5\times5m^2$ size for herbs and shrubs respectively (Sharma *et al*., 1983).The tree layer was analyzed by sampling 10 quadrats of $10\times10m^2$ sizes (Misra, 1968; Kershaw, 1973).The vegetation data recorded was quantitatively analyzed for density, frequency and abundance (Curtis and McIntosh, 1950). The relative values of these indices were determined as per Phillips (1959). These values were summed up to get Importance Value Index of individual species (Curtis, 1959).

3. Observations

During the study period, a total of 26 species of **herbs** were recorded at the control meadow site and only 15 species were recorded from the degraded meadow site. A perusal of data revealed that the total frequency, density and abundance of herbs are more at control meadow site than degraded meadow site. The results showed that the IVI at degraded site ranges from maximum for *Cyanodon dactylon* to minimum for *Geranium* and *Rumex nepalensis.* While it ranges maximum again for *Cyanodon* sp. to minimum for *Atropa acuminate* at control meadow site (Table 01,02)

Species	Frequency (%)	Density(Ind./m^2)	Abundance	Importance Value Index
Aegilopes sp. (poaceae)	100	3	3	7.28
Atropa acuminate (Solanaceae)	5	0.2	2	0.89
Aconogonum alpinum (Polygonaceae)	20	0.3	1.5	1.60
Cerastium glomeratum(Caryophyllacae)	80	18.4	20	15.84
Cyanodon dactylon	100	54.5	54.5	38.07
Fragaria nubicola (Rosaceae)	80	17.6	22	16.16
Geranium sp. (Geraniaceae)	60	3.6	6	6.12
Iris sp. (Iridaceae)	20	0.3	1.5	1.60
Lactuca sp.(Asteraceae)	60	4.8	8	7.06
Leucanthemum vulgare (Asteraceae)	90	20	22.22	17.52
Medicago sativa (Papilionaceae)	50	3.5	7	5.81
Myosotis arrensis (Boraginaceae)	30	1.2	4	3.14
Oxalis corniculatus (Oxalidaceae)	90	25.2	28	20.79
Ophioglossum vulgatum (Ophioglossaceae)	100	5	5	8.47
Plantago sp. (Plantaginaceae)	100	15	15	14.45
Poa annua (poaceae)	100	30	30	17.98
Prunella vulgare (Lamiaceae)	55	0.55	1	3.47
Potentilla sp.(Rosaceae)	100	27.2	27.2	21.75
Ranunculus laetus (Ranunculaceae)	60	1.2	2	4.22
Ranunculus muricatus (Ranunculaceae)	60	2.4	4	5.17
Rumex nepalensis (Polygonaceae)	60	0.3	0.5	3.52
Setaria sp. (Poaceae)	100	42	42	30.59
Solanum nigrum (Solanaceae)	20	0.4	2	1.77
Stellaria sp. (Caryphyllaceae)	100	2	2	6.67
Taraxacum officinale (Asteraceae)	80	5.1	6.37	7.80
Trifolium pretense	100	35	35	26.41

Table 1.Community characteristics of herbs at Control meadow site

Species	Frequency (%)	Density(Ind./m^2)	Abundance	Importance Value Index
Cyanodon dactylon	100	45	45	76.80
Fragaria nubicola (Rosaceae)	45	1.8	4	9.56
Geranium sp. (Geraniaceae)	20	0.2	1	3.26
Leucanthemum vulgare (Asteraceae)	55	2.75	5	12.17
Medicago sativa (Papilionaceae)	30	0.6	2	5.46
Oxalis corniculatus (Oxalidaceae)	40	4.8	12	16.65
Plantago sp. (Plantaginaceae)	70	2.1	3	12.15
Poa annua (poaceae)	100	23	23	45.20
Potentilla sp.(Rosaceae)	50	12	6	19.23
Ranunculus laetus (Ranunculaceae)	40	0.4	1	5.85
Ranunculus muricatus (Ranunculaceae)	30	0.9	3	6.27
Rumex nepalensis (Polygonaceae)	20	0.2	1	3.26
Setaria sp. (Poaceae)	100	29	29	53.82
Taraxacum officinale (Asteraceae)	30	0.6	2	5.46
Trifolium pretense	90	9	10	24.57

Table 2. Community characteristics of herbs at degraded meadow site

The species diversity has higher values for control meadow site (2.58) than degraded meadow site (1.85). So far as similarity is concerned, Sorenson index shows 73% similarity between the two sites. The value of Simpson dominance index was 0.938 for control meadow site while for degraded meadow site, it was 0.860.

Shrub analysis showed decrease of abundance, frequency, density from degraded to control site. The value of frequency, density, abundance for *Vibernum grandiflorum* was 100, 2, 2 resp. for degraded site while it was 80, 0.8, 1 resp. for control site. Similarly, the value of frequency, density, abundance for *sambucas* sp. was 25, 0.5, 2 resp. for degraded site while it was 15, 0.15, 1 for control meadow site.

Species	Degraded site				Control site			
	Relative Frequency (RF)	Relative Density (RD)	Relative Abundance (RA)	Importance Value Index(IVI)	RF	RD	RA	IVI
Vibernum grandiflorum	80	80	50	210	84.2	84.2	50	218.41
Sambucas sp.	20	20	50	90	15.78	15.78	50	81.56

Table 3. Comparison of relative frequency, relative density and relative abundance between Control meadow site and degraded meadow site

Tree analysis revealed that the value of frequency, density, abundance gets decreased from Control forest site to degraded forest site. The frequency ranges from 20 to 80 at the control forest site and 10 to 60 at degraded forest site. The density at control site ranges from 0.20 to 2.5 and at degraded site, it ranges from 0.1 to 1.5. Similarly, the values of abundance at control site ranges from 1.0 to 3.1 and at degraded site, it ranges from 1 to 2.5.

Control forest site				
Species	**Relative frequency**	**Relative density**	**Relative abundance**	**Importance Value Index**
Pinus sp.	41.17	42.55	40.86	124.58
Abies sp.	47.05	53.19	44.80	104.49
Piceae sp.	11.76	4.255	14.33	30.34

Table 4. The values of relative frequency, density and abundance at Control forest site

Degraded forest site				
Species	**Relative frequency**	**Relative density**	**Relative abundance**	**Importance Value Index**
Pinus sp.	41.66	33.33	31.37	106.36
Abies sp.	50	62.5	49.01	161.51
Piceae sp.	8.33	4.16	19.60	32.09

Table 5. The values of relative frequency, density and abundance at degraded forest site

4. Conclusion

It is evident that the anthropogenic pressures markedly change the phytosociology of the area as regards the different life form classes like herbs, shrubs and trees. Gulmarg Wildlife Sanctuary is not only getting modified but degraded and deteriorated. Thus, it can be concluded that the Gulmarg is experiencing lot of biotic interferences which may pose threat to its enviroment. The need of the hour is to determine the tourism carrying capacity of Gulmarg so that this precious natural as well as national resource is saved from degradation.

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