

PHYTOSOCIOLOGICAL ANALYSIS OF STATE OF EXISTING VEGETATION IN RESERVED FOREST, COMPARTMENT 20 OF MARGALLAH HILLS NATIONAL PARK

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ABSTRACT

The Margallah hills are home of diverse flora and fauna in Pakistan. The whole study of Phytosociological Analysis of State of Existing Vegetation in Reserved Forest, compartment 20 of Margallah Hills National Park, basically aimed at % vegetation cover, stood 78%, shrubs and grasses cover, in total 79 vegetative species were found in the area, however 7 remained unidentified forage productivity remained 1160 kg/ha, animal units was almost .03. Pressures and threats to park and particular compartment are directly and indirectly increasing day by day. Major pressures are increasing human population, overgrazing by animals, environmental pollution, like water contamination and forest fires. A thing of concern was the identification of a fast depletion of indicator species "*Dodonea viscosa*". Forest fires occurred 1-2 times annually. All these factors show that vegetation is declining in the compartment.

INTRODUCTION

Status of this reserved forest compartment 20 of Margallah Hills National Park is un acquired by any organization or Capital Development Authority (CDA). Due to this reason pressures and threats to natural resources of the compartment are increasing. Major threats and pressures include cutting of timber, fuel wood, and collection of grasses for forage, herbs and medicinal plants for trade and domestic use unrestrictedly. Although all these activities are requirements of local people but are happening at an alarming rate with out any check and balance. All these human interventions are contributing to deterioration of vegetation and in 2nd phase of this whole destruction is the vanishing of natural habitats of wildlife. Study area includes 300-350 house holds with a population of 2800-3000 thousands. Population of animals is up to 1500 animals, major animals being the goats and buffaloes. Due to this heavy number of livestock vegetation cover is decreasing and carrying capacity of compartment is also low. These factors and others like water pollution are major threats to this compartment. Local people are contributing to water pollution by washing their clothes and direct dumping of other wastes into water. These wastages and some others are the main causal factors of fast algae growth in the running stream of this area. To find out the managerial recommendations for potential, threats and pressures, research was conducted for a period of 10 weeks (14 Mar to 23 of May 2005). Field visits were conducted to identify different species at present to compare with the old vegetation. Cover of individual species was also calculated along with total cover to know the present status and health of vegetation. Cover of the vegetation was calculated using 15 transects lines with standard length of 50 m randomly. These lines were taken along the slope on the plateau and along the stream bed. Vegetation cover was good if not affected as in the past. Carrying capacity was calculated to suggest suitable management measures for this

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compartment. The carrying capacity was calculated by throwing 1 m² quadrat randomly. Forty (40) quadrats were thrown randomly. Each grass sample was weighed and then average was taken. Selected samples were 1st air dried and then were oven dried in the laboratory of NARC. These average oven dried samples were used to find out carrying capacity of the area. For determination of carrying capacity Carrying capacity of the area stood low due to less moisture % age of vegetation and due to uncontrolled an unbalanced grazing. Major threats and pressures on compartment are uncontrolled cutting of timber and fuel wood, unmanaged grazing forest fires and pollution of the compartment. Due to excessive cutting of the wood, *Dodonea viscosa* is depleting from compartment at an alarmingly fast rate. Pollution includes the water contamination and environmental pollution. Forest fires are occurring annually with out any decrease in no and loss. Conclusion of the whole study is "vegetation is declining in reserved forest compartment 20 of MHNP". The best way for management is the protection and conservation of the area, along with the awareness of local people through environmental education.

MATERIALS AND METHODS

Literature reviewed.	(Previous research)
Vegetation Samples	(Dr. M.A.A.Qureshii)
Line Transect Method	(Dr. Akbar <i>et al.</i> , 1999)
Quadrat method	(PARC&CIDS1990)
Questionnaire	(Dr. Akbar <i>et al.</i> , 1999)

Surveys were carried out to conduct the study elegantly. Different locations were selected to measure the vegetation cover and carrying capacity of the area. Samples of different vegetation types were collected and identified. Carrying capacity of each animal and for a hectare was calculated. Some other parameters like species cover, frequency etc were calculated.

Some methods used are briefly given with their references

$$\text{Cover \%} = \frac{\text{Total intercept length of a species}}{\text{Total Transect length}}$$

$$\text{Composition \%} = \frac{\text{No. of individuals of a species}}{\text{Total No. of all species}}$$

Frequency = Number of times a species intercepted the transect line (50m)

$$\text{A.U of the area} = \frac{\text{ADF} \times (\text{PUF}) \times \text{TA}}{9\text{kg} \times 365 \text{ days}}$$

$$\text{CC of the area} = \frac{\text{Total area}}{\text{Total No. of A. U. that can graze}}$$

$$\text{Stocking Density} = \frac{\text{Total No. of A. U.}}{\text{Total Area}}$$

$$\text{Stocking rate} = \frac{\text{Total area}}{\text{Total No. of A. U.}}$$

$$\text{Grazing Pressure} = \frac{\text{Forage demand / A. U. / Day}}{\text{Available forage / ha}}$$

Literature was reviewed of different researchers and scientists of different institutions, organizations and universities. For vegetation sampling and identification field visits were conducted and different samples were collected. Samples were identified and were matched with authenticated books and other available materials. Expertise scientists were also called for help when required to abstain from any false statement. Samples were categorized into trees, shrubs, grasses along with herbs and medicinal plants together. Line transect method was used to measure the individual species cover, frequency of each species etc. For this purpose 50 meter long line was taken and individual species cover was calculated. These measurements were made on the slope along the stream bed and on the top of the hill (plateau). Frequency of each species was also calculated. These lines were taken randomly to avoid any interest of ease due to rough terrain and rugged topography of research area. The area was visited and was divided into uniform vegetation blocks. The vegetation was sampled with the help of 1 m² quadrat. Vegetation was clipped 2-3 cm above the ground. Non-graze able part from the sample was removed. Sample was weighted in fresh then was air dried followed by oven drying. After oven drying the moisture % age and dry matter production was calculated. (Oven and balance used was of NARC). An organized questionnaire was modified to conduct the Phytosociological aspect of research. It based on easy understanding and quick approach of respondent without wastage of time. Sequence of questions was maintained. Questionnaire was organized to collect more information with more accuracy and without faulty assumptions.

RESULTS AND DISCUSSIONS

- **Vegetation cover**

To measure vegetation cover 15 transects lines each of 50 m length were taken. These lines were taken along the stream bed on the slope and at the top of the hill

(plateau). No of times individual species intercepted and length of individual species intercepted was measured. Total vegetation cover was also estimated.

Table 1.

No	Local Name	Technical Name	Cover (%)	Interception length of each species (m)	Freq in 100 ft	Comp (%)
1	Batangi	<i>Pyrus pashia</i>	23.6	11.8	5	4.10
2	Bhan	<i>Rhus cotinus</i>	2	1	4	3.3
3	Baikar	<i>Justicia adhatoda</i>	20.8	10.4	12	9.8
4	Jungli booti	<i>Unidentified</i>	0.6	0.3	2	1.64
5	Kameela	<i>Mallotus philippiensis</i>	1	0.5	1	0.82
6	Pataki	<i>Gymnosporia roylena</i>	1.4	0.7	2	1.64
7	Khuti booti	<i>Oxalis corniculata</i>	0.2	0.1	1	0.82
8	Butti	<i>Xylosoma longifolium</i>	0.6	0.3	2	1.64
9	Garanda	<i>Carrisa opaca</i>	6	3	5	4.10
10	Sundoori	<i>Unidentified</i>	2	1	1	0.82
11	Gangher	<i>Sageretia theezans</i>	10.6	5.8	5	4.10
12	Dhailu	<i>Chrysopogon montanu</i>	3.2	1.6	6	4.92
13	Chhan	<i>Machilus odoratissima</i>	2	1	1	0.82
14	Bumboi	<i>Unidentified</i>	2	1	1	0.82
15	Khukhanr	<i>Myrsine Africana</i>	4.4	2.2	8	6.56
16	Daruna	<i>Punica granatum</i>	2	1	2	1.64
17	Chir	<i>Pimus roxburghii</i>	3.6	1.8	2	1.64
18	Banafsha	<i>Viola serpens</i>	1.4	0.7	7	5.74
19	Kikar	<i>Acacia nilotica</i>	0.8	0.4	1	0.82
20	Phulai	<i>Acacia modesta</i>	2	1	2	1.64
21	Kangar	<i>Pistacia chinesis</i>	0.8	0.4	1	0.82
22	Jungli palak	<i>Unidentified</i>	1	0.5	4	3.3
23	Phugari	<i>Unidentified</i>	10.4	5.2	2	1.64
24	Sariala	<i>Heteropogon controtus</i>	8.2	4.1	19	15.67
25	Sanatha	<i>Dodonea viscosa</i>	8.4	4.2	5	4.10
26	Barr	<i>Unidentified</i>	0.4	0.2	1	0.82
27	Kao	<i>Olea ferruginea</i>	10.8	5.4	2	1.64
28	Batkar	<i>Celtis australis</i>	8.6	4.3	1	0.82
29	Akhah	<i>Unidentified</i>	4	2	1	0.82
30	Loonder	<i>Themeda anathera</i>	15.6	7.8	15	12.30
31	Toot	<i>Morus alba</i>	8.4	4.4	1	0.82

Note: cover % age is more than 100 % as some species like trees and grasses overlap with each other.

SAMPLING AND IDENTIFICATION OF INDIVIDUAL SPECIES

Field visits were carried out to collect vegetation samples. Samples of all types of vegetation were collected and individually identified. Local names were asked to local people and technical/scientific names were certified by matching with the names given in

'local names in flora of Rawalpindi district Pakistan'. By S.R. Kashmiri. Total 79 vegetative species were identified including 22 tree species, 12 shrubs, 9 grasses and 29 as herbs or medicinal plants.

But 7 species were found unidentified, 2 tree, 2 shrubs and 3 species of herbs having some medicinal value. All these species categorized accordingly are given along with their technical/scientific names.

(Z. B. Mirza)

IDENTIFIED FLORAL SPECIES OF THE COMPARTMENT

TREES

Local Names	Scientific Names
Amaltas	<i>Cassia fistula</i>
Batangi	<i>Pyrus pashia</i>
Batti	<i>Xylosoma longifolium</i>
Bohr	<i>Ficus benghalensis</i>
Batkar	<i>Celtis australis</i>
Chan	<i>Machilus odoratissima</i>
Chir	<i>Pinus roxburghii</i>
Daruna	<i>Punica granatum</i>
Kachnar	<i>Bauhunia variegata</i>
Kala meva	<i>Solanum verbascifolium</i>
Kameela	<i>Mallotus philippiensis</i>
Kangar	<i>Pistacia chinesis</i>
Kao	<i>Olea ferruginea</i>
Khajoor	<i>Phoenix sylvestris</i>
Kikar	<i>Acacia nilotica</i>
Phugari	Unidentified
Phulaahi	<i>Acacia modesta</i>
Sakar	<i>Ehretia laevis</i>
Shirin	<i>Albizzia lebbek</i>
Sundoori	Unidentified
Tatri	<i>Rhus punjabensis</i>
Toot	<i>Morus alaba</i>

SHRUBS

Local Names	Scientific Names
Akhah	Unidentified
Arind	<i>Ricinus communis</i>
Ber	<i>Ziziphus mauritiana</i>
Bhan	<i>Rhus cotinus</i>
Bhaikar	<i>Justicia adhatoda</i>

Bumboi	<i>Unidentified</i>
Dhavi	<i>Woodfordia fruticosa</i>
Gangher	<i>Sageretia theezans</i>
Garanda	<i>Carissa opaca</i>
Khokhanr	<i>Myrsine Africana</i>
Pataki	<i>Gymnosporia roylena</i>
Sanatha	<i>Dodonaea viscosa</i>
Timber	<i>Zanthoizylum armatum</i>

GRASSES

Local Names	Scientific Names
Baru	<i>Sorghum halepense</i>
Bhabhar	<i>Eulaiopsis binata</i>
Chhat	<i>Iseilema prostratum</i>
Dhaultu	<i>Chrysopogon montanus</i>
Khabbal	<i>Cynodon dactylon</i>
Loonder	<i>Themeda anathera</i>
Palwan	<i>Dichanthium annulatum</i>
Rusa	<i>Cymbopogon schoenanthus</i>
Sariala	<i>Heteropogon controtus</i>

MEDICINAL PLANTS AND HERBS

Local Names	Scientific Names
Amaltas	<i>Cassia fistula</i>
Arind	<i>Ricinus communis</i>
Banufsha	<i>Viola serpens</i>
Bahr	<i>Unidentified</i>
Batho	<i>Chenopodium album</i>
Bohr	<i>Ficus benghalensis</i>
Bhaikar	<i>Justicia adhatoda</i>
Brahmi booti	<i>Centella asiatica</i>
Chir	<i>Pinus roxburghii</i>
Dareemuk	<i>Polygonum plebium</i>
Daruna	<i>Punica granatum</i>
Dhavi	<i>Woodfordia fruticosa</i>
Dhodhal	<i>Euphorbia heliscopia</i>
Garanda	<i>Carissa opaca</i>
Huns raj	<i>Adiantum veneris</i>
Jangli paluk	<i>Unidentified</i>
jangli booti	<i>Unidentified</i>
Kameela	<i>Mallotus philippiensis</i>
Kangar	<i>Pistacia chinensis</i>
Kao	<i>Olea ferruginea</i>
Khajoor	<i>Phoenix sylvestris</i>

Khatti booti	<i>Oxalis corniculata</i>
Kuchmach	<i>Solanum nigrum</i>
Lehli	<i>Convolvulus arvensis</i>
Phulahi	<i>Acacia modesta</i>
Sanatha	<i>Dodonaea viscosa</i>
Shirin	<i>Albizia lebbek</i>
Sunmbloo	<i>Berberis lycium</i>
Timber	<i>Zanthoxylum armatum</i>

(S. R. Kashmiri et al., 1998)

CARRYING CAPACITY AND SOME OTHER PARAMETERS

For the calculation of carrying capacity 40 quadrates were thrown randomly. Vegetation of these samples was clipped 2-3 cm above the ground to avoid any unpalatable part of it. These samples were weighed individually and then the average of these taken. A selected number of vegetation samples were 1st air dried for 24 hours then were dried in oven for 48 hours at a temperature of 60 Co with hot air. For calculated oven dry weight samples were oven dried and weighed in the laboratory of National Agriculture Research Centre.

The results are given;

Total fresh weight of all samples	=	8266 g
Average fresh wt of 40 quadrates	=	206 g
Average air dry wt of 40 quadrates	=	186 g
Average oven dried wt of selected samples	=	116 g
Moisture % age was	=	43.68
Total area	=	166 ha
Forage/ha	=	1160 kg
Forage/ha (PUF)	=	580 kg
A.U grazing at present	=	135
1 A.U grazing forage in 1 year	=	3285 kg
Total forage in compartment	=	192560 kg
Total forage in compartment (PUF)	=	96280 kg
Forage required for 135 A.U	=	1215 kg/day

CC of compartment	=	5.66 ha/AU/year
Stocking density	=	0.81/ ha
Stocking rate	=	1.23/ AU
Grazing pressure	=	2.62 AU/day

Carrying capacity was calculated using PUF as 0.5 considering half used half left. The most appropriate way of calculating controlled carrying capacity/grazing capacity. (Dr. G. Akbar, 1999)

THREATS TO COMPARTMENT 20

- Fires
- Cutting of fuel wood and timber
- Over grazing
- Pollution of water
- Waste generation

CONCLUSIONS

- Vegetation is declining
- Timber species have been badly affected
- Other key species have already been depleted hence Sanatha is under pressure
- Vegetation cover is good
- High grazing pressure
- Carrying capacity of area is too low
- Natural environment is being polluted by LP & CDA

RECOMMENDATIONS

- Alternatives for timber and fuel wood
- Special awareness during fire season
- Alternate sources for feeding animals be provide
- Wise disposal/use of garbage
- Awareness through EE about nature esp., water

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