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Quantitative and Qualitative Study of Trees and Shrubs in Pune Hills, Maharashtra, India

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ABSTRACT
In the present study 49 families, 137 genera and 187 species of trees and shrubs were found from five selected hills namely Hanuman, Chaturshrungi, Vetal, Katraj and Taljai in Pune city in Maharashtra. Frequency, density, abundance, frequency percentage, relative density, relative frequency, relative dominance, importance value index (IVI), beta diversity and species association between hills were assessed. Stratified random sampling technique, Jaccard's index and Nonmetric Multidimensional Scaling (NMDS) methods were used. Plants belonging to the family Fabaceae were found to be most abundant in the study areas. Taljai hills showed maximum diversity and highest species richness, while Katraj hill had lowest species richness. Jaccard's index indicated significant similarity. This was also reflected in the beta diversity values which showed a high dissimilarity between Katraj and other hills. The results imply significant effect of anthropogenic activities. This research indicates that there could be more effective conservation measures to preserve the biodiversity of the Katraj hills. Although the dissimilarity was not as significant for the other hills, preservation of the biodiversity of all the hills is the need of the hour.

Key words: Conservation, Vegetation, Biodiversity, Species area curve, Jaccard's index.

INTRODUCTION

The city of Pune is surrounded by hills. The hills serve as the source of carbon sinks thus providing clean and fresh air to city dwellers. There has been drastic increase in population since the 1961 flood in Pune (Shinde 2017). The government provided resettlement and rehabilitation for people affected by flood in the form of nissen huts and plinth tenements. Thus, the city expanded including the peripheral hills where the population resettled and gradually increased. Pune is a prestigious centre of education and diverse industries which has attracted many people from all walks of life and has also resulted in increase in population. There is a need for better planning and management for protection of these hills. This need can be met by ecological studies of these hills. The lack of ecological information significantly hampers the assessment of existing species, their present status and threats which might facilitate their long term conservation (Lohbeck et al. 2014).

Many floristic studies were done in Pune hills and surrounding area (Ezekiel 1917, Bhinde et al. 1920, Phadnis 1925, Razi 1951, Vartak 1962, 1964, Varadpande 1974, Ghate and Vartak 1981, Kulkarni et al. 1989, Joshi et al. 1992, Kulkarni and Kumbhojkar 1995, 1997, Joshi and Kumbhojkar 1997, Patwardhan 2000, 2001, Datar 2006, Punalekar et al. 2010, Pande et al. 2013, Nerlekar and Kulkarni 2015, Shinde and Mahajan 2021, Samudra and Shinde 2021). However, the ecology of the area is not studied adequately. This is the first attempt to understand the species relationships between different hills in Pune. The present investigation is undertaken to assess the status of biodiversity of tree and shrub species in Pune hills.

MATERIALS AND METHODS

Site description

The city of Pune is covering 430 km^2. It is located between 18.42° to 18.62°N latitudes and 73.75° to 73.96°E longitudes on the eastern slopes of Sahyadri ranges in Pune district (Fig. 1). The maximum and minimum temperature ranges between 41°C in summer and 8°C in winter. The highest total rainfall is 376.9 mm in summer and lowest is 1.8 mm in

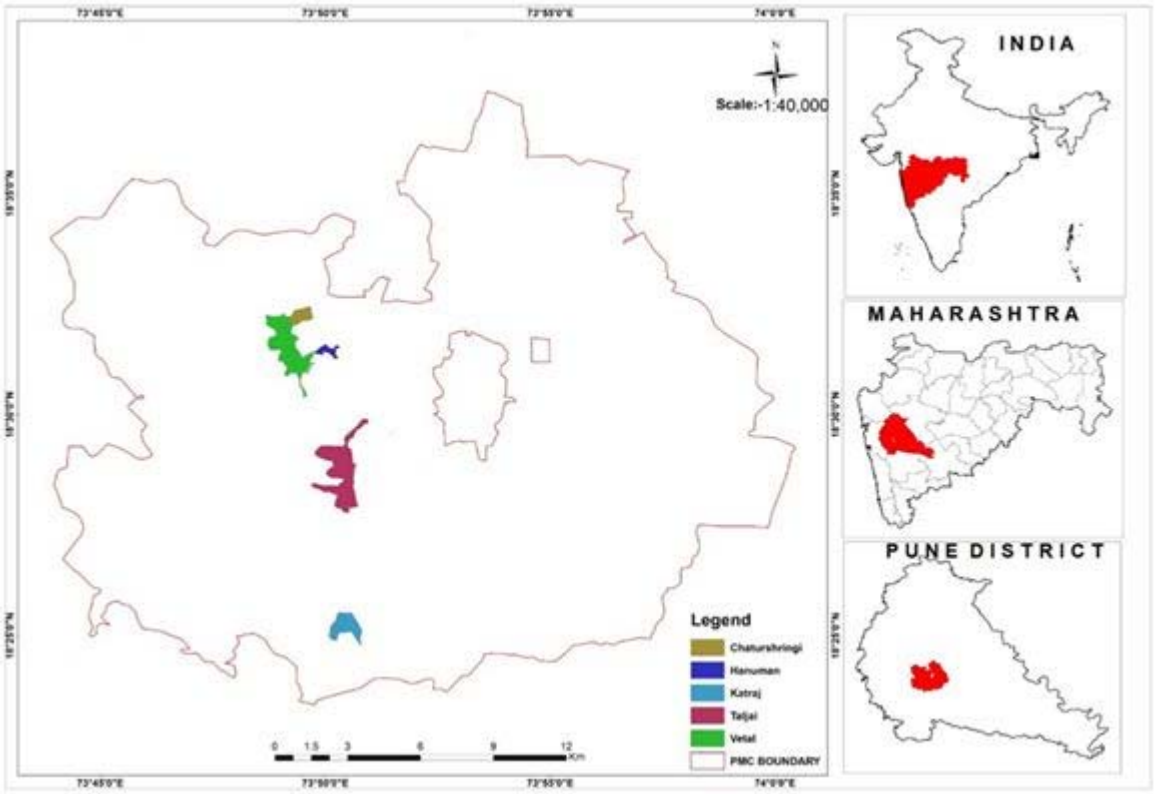

Figure 1. Map of study area indicating the location of the five hills

winter. The mean relative humidity is 91% in winter and 20% in summer.

Data collection

For both quantitative and qualitative analyses hills were visited several times during 2019-2021. Data collection was carried out during pre- and post-monsoon months. To study the community stratified random sampling technique was used (Bano et al. 2017) and the size of the quadrats were 20 x 20 m (Kharat 2018). Satellite images of vegetation cover served as an aid in laying the quadrats in the right area. The number of quadrats laid per site was decided on the basis of heterogenesity and size of the area and species area curve (Datar 2016). The total number of quadrats studied was 105.

Ecological analysis

The quantitative analyses of density, abundance, frequency, relative values, IVI and species richness was done as per Pala et al. (2016), Prasad et al. (2021) and Raunkiaer's frequency classes distribution was done following the procedure suggested by Raunkiaer (1934). NMDS was performed with two dimensions (k=2) to visualize the species associations among the different hills. All sites from each hill were used for the analysis. Each site data was calculated by pooling the species presence in all the quadrats. Jaccard's index was then used for calculating the distance between these sites. NMDS is an ordination technique used in converting and visualizing higher dimensional data. These data are transformed into two or three dimensions which then can be visualized easily. Jaccard's index was used to calculate the beta diversity between the different hills. This index was used since it only considers species presence in its calculation. Value of 1 implies complete similarity between the two samples (or localities) (i.e. both samples/localities while 0 implies complete dissimilarity (no species are shared between the two samples/locations). All the analyses were carried out using Paleontological Statistics Software Package for Education and Data Analysis (PAST) according to Hammer et al. (2001).

RESULTS

Floristic composition

In the present study 49 families, 137 genera and 187 species of trees and shrubs are recorded from the

study area (Annexures 1 to 5). Highest number of species were present in Taljai (112 species) and lowest in Katraj (46 species). Highest number of genera were present in Vetal (91 genera) and lowest in Katraj (37 genera). Dicotyledons were the dominant vegetation in all the hills. Chaturshrungi and Katraj had only dicotyledons (Fig. 2). Highest number of families were recorded in Vetal (39 families) followed by Hanuman, Taljai, Chaturshrungi (35, 30, 28 families, respectively) and least in Katraj (23 families). The dominant family in all the five hills was Fabaceae (Fig. 3) while other prevalent families included Poaceae, Phyllanthaceae, Apocynaceae, Bignonaceae and Malvaceae.

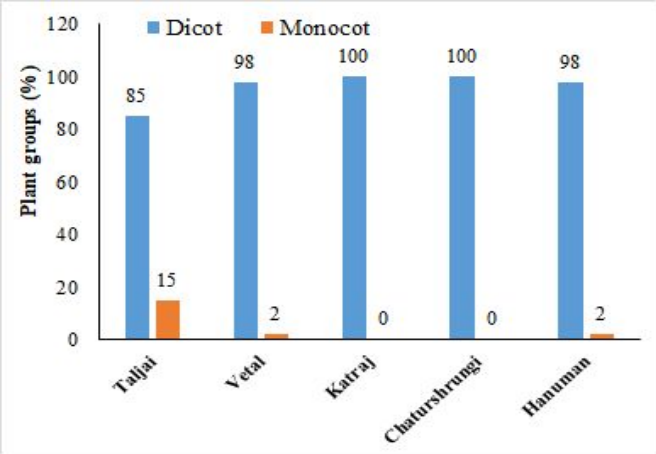

Figure 2. Percentage of trees and shrubs in five hills

Quantitative and qualitative analysis

Density

Among tree species highest density was observed for *Dalbergia melanoxylon* in Vetal (13.4) and in Taljai (12.1) followed by *Bauhinia purpurea* in Chaturshrungi (7.29), *Acacia catechu* in Katraj (5.82), *Leucaena leucocephala* in Hanuman (5.13). Among shrubs *Lantana camara* showed highest density in Katraj (34.5) followed by Vetal, Taljai and Chaturshrungi (16.4, 13.6, 7.07, respectively) and for *Opuntia cochenillifera* in Hanuman (4.63). High density for a species in an area indicates the status of species in that community and positive response with environmental factors.

Abundance

Among tree species highest abundance for *Ceiba pentendra* was in Chaturshrungi (28), followed by *Dalbergia melanoxylon* (24.79), *Bauhinia purpurea* (23.8), *Gamelina arborea* (18) in Katraj and for *Gliricidia sepium* (9.43) in Hanuman. Among shrubs *Lantana camara* showed highest abundance in Katraj and Vetal (34.5, 23.61, respectively) followed by Taljai and Chaturshrungi (15.7, 14.1, respectively). *Ricinnus communis* had highest abundance in Hanuman. Species with high abundance were found to show wind dispersal and better germinating ability in the study area.

Frequency

Among tree species highest frequency was for *Gliricidia sepium* in Chaturshrungi (157), followed

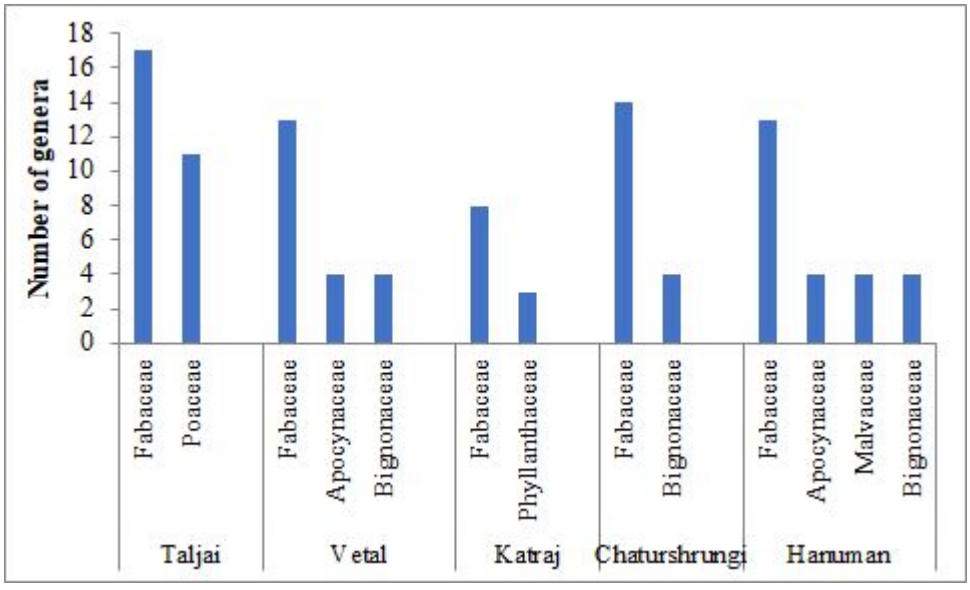

Figure 3. Dominant families in five hills

by *Acacia catechu* and *Azadirachta indica* in Katraj (82), *Leucaena leucocephala* in Taljai (61), *Dalbergia melanoxylon* in Vetal (54). Among shrubs *Lantana camara* had highest frequency in Katraj,Taljai, Vetal and Hanuman (100, 87, 69, 50, respectively) *Cissus woodroo* and *Lantana camara* in Chaturshrungi (50). High frequency of a species in an area indicates their wide distribution.

Importance Value Index

Among tree species *Gliricidia sepium* has highest IVI in Chaturshrungi (167.55), followed by *Acacia catechu* in Katraj (93.58), *Azadirachta indica* in Hanuman (84.00), *Dalbergia melanoxylon* in Vetal, *Leucaena leucocephala* in Taljai (73.49). However, among shrubs *Lantana camera* showed highest IVI in Katraj, Taljai, Vetal, Chaturshrungi (165.63, 104.82, 93.29, 68.78, respectively) followed by *Opuntia cochenillifera* in Hanuman (59.96). These species occupy most sampled area hence are dominant in study area. Species richness was highest in Taljai hill (13.561) and the least in Katraj hill (6.733).

Raunkiaer's frequency class

The frequency class 'A' was dominant in Taljai hill (95 species) followed by Vetal (89 species), Hanuman (68 species), Chaturshrungi (46 species) and Katraj (28 species) (Fig. 4).

Non-metric multidimensional scaling

NMDS showed that Katraj and Hanuman hills were distinct from the other three hills with Katraj hill being the farthest from the rest implying a distinct community association. Species like *Acacia ferruginea, Cipadessa baccifera* and *Senegalia ferruginea* were only found on this hill. There was an overlap between the vegetal elements of Vetal, Taljai and Chatushringi hills with species like *Albizia lebbeck, Bombax ceiba* and *Ehretia aspera* seen on all three hills (Fig. 5). This was also reflected in the beta diversity values (Table 1) which showed a high dissimilarity between Katraj and other hills (<0.3 for all hills as compared to Katraj). Taljai and Vetal hills showed a high similarity (0.40) while the highest was observed between Hanuman and Vetal hills (0.44). Jaccard's index cluster image which used for floristic similarity assessment showed Katraj had distinct flora as compared to other hills (Fig. 6). This could be due to soil factors as Katraj shows unique soil type and Taljai shows 2 types of soil, one similar to Katraj and other silimar to the other hills. Other reasons could be to increase greenary in hills *Gliricidia* was introduced in all the hills except Katraj.

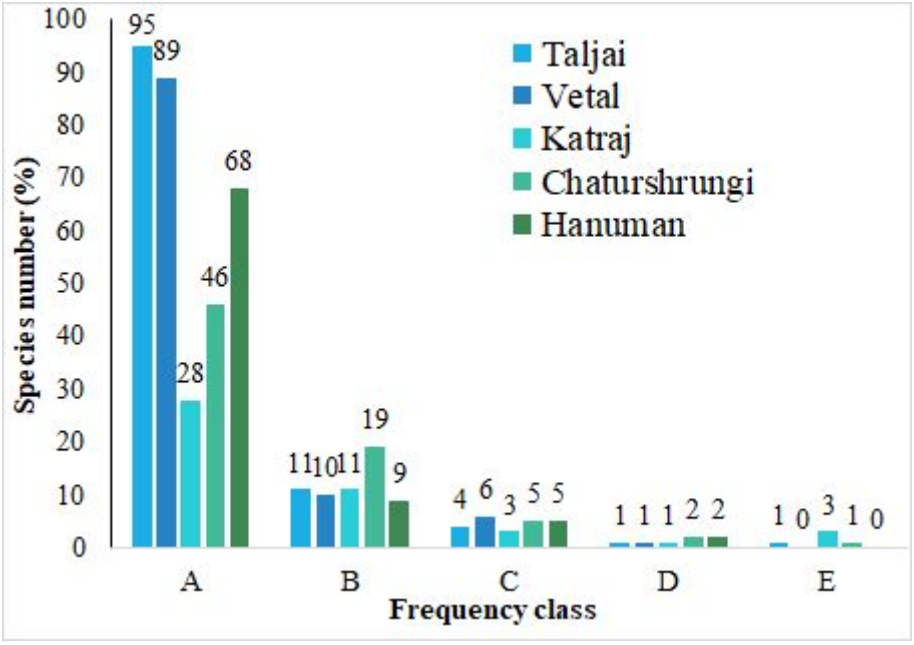

Figure 4. Frequency class distribution of plants in five hills

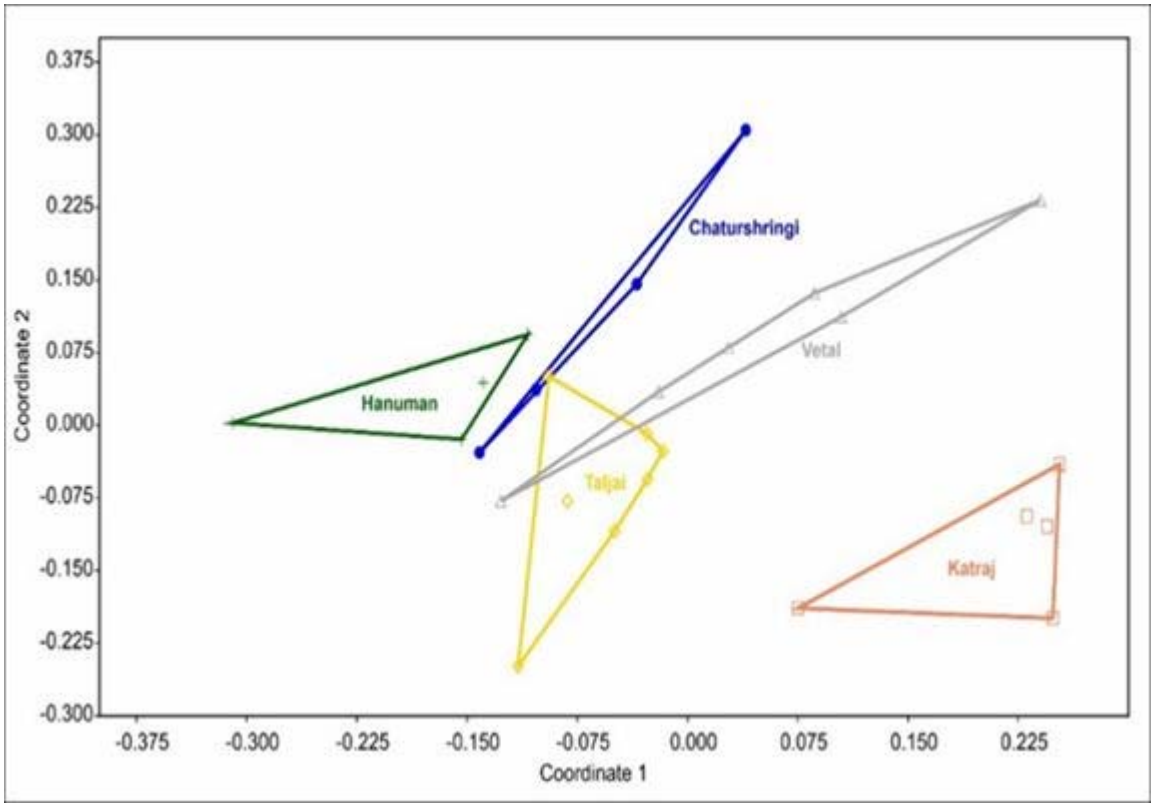

Figure 5. NMDS of the floral data of five hills

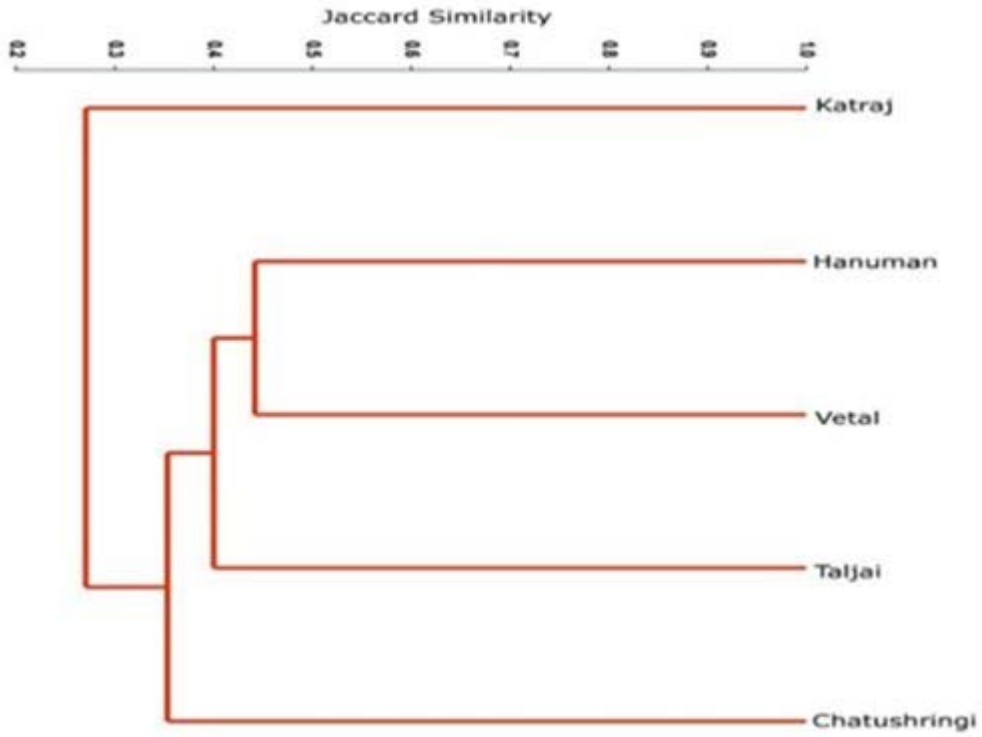

Figure 6. Jaccard's index of similarity of five hills (paired group UPGMA)

Table 1. Jaccard index values for hill pairs

	Chaturshringi	Hanuman	Katraj	Taljai	Vetal
Chaturshringi	1.000				
Hanuman	0.353	1.000			
Katraj	0.302	0.221	1.000		
Taljai	0.350	0.394	0.277	1.000	
Vetal	0.356	0.442	0.282	0.406	1.000

DISCUSSION

Ezekiel (1917) recorded 134 plant species from Chaturshrungi from ecological point of view. Joshi et al. (1992) in their assessment found that 30 species out of 134 recorded by Ezekiel (1917) were not present. From Chaturshrungi and Vetal plateau Joshi et al. (1992) records a total of 410 flowering plant species and among them 276 plants were not recorded from earlier studies. In the present study 73 species from Chaturshrungi and in 107 from Vetal are present. According to Phadnis (1925), *Boswellia serrata* was the dominant species in Chaturshrungi. In the present study *Gliricidia sepium* was dominant and *Boswellia serrata* was least dominant indicating that there were factors responsible for the disappearance of *B. serrata.*

Vartak (1960) in the study of the flora of the Katraj Ghat records 601 species, 412 genera belonging from 100 families of which the tree species were 84 and shrubs 41. The percentage of dicots species is 73.5% (441), monocots 25.3% (152) and Pteridophytes 1.35% (8). However, the present study records 46 species with 30 species of trees and 16 species of shrubs, 37 genera belonging to 23 families. The percentage of dicots according to number of species is 100% (46) and no monocots. He also records *Boswellia serrata* was dominant tree and sub-dominant trees *Anogeissus latifolia, Lanneae grandis, Ougenia dalbergoides, Diospiros melanoxylon* in Katraj. The present study shows *Acacia catechu* as dominat tree, *Lantana camara* as dominant shrub. Sub-dominant species are *Gamelina arborea*, *Ricinnus communis* etc.

The study by Vartak (1960) records soil type in Katraj as loose gravel. Joshi et al. (1992) reveals soil type in Chaturshrungi, Vetal, Katraj, Pachgaon Prvati as dark clay, calcareous, loamy and alluvial type. The present study shows two types of soils in study area slightly deep, moderately well drained, fine soils and very shallow, excessively drained, loamy soil. Joshi et al. (1992) records the predominant tree species in Chaturshrungi and Vetal as *Dalbergia lanceolaria, Gliricidia sepium, Boswelia serrata, Anogeissus latifolia, Grewia tilifolia, Dolichondrone falcata, Acacia chundra, Dalbergia sissoo.* Among the shrubs *Lantana camara, Jatropha gossypiifolia, Dodonaea viscosa, Mimosa hamata* and *Carissa carandas.* Punalekar et al. (2010) reported dominant plants in different sites of Vetal were *Dalbergia melanoxylon, Gliricidia sepium, Leucaena leucocephala* and *Lantana camara*. The frequent species were *Boswelia serrata* and *Capparis grandis*. IVI was high for *Capparis grandis*. In the present study dominant tree species in Chaturshrungi and Vetal are *Gliricidia sepium, Ceiba pentandra, Bauhinia purpurea, Acacia nilotica, Dalbergia melanoxylon* and *Leucaena leucocephal* and shrub species is *Lantana camara.* IVI was highest in *Lantana camara* in Vetal. Only *Gliricidia sepium* and *Lantana camara* are dominant as reported earlier, the rest are not similar. Kulkarni et al. (1989) recorded 414 species of flowering plants from 314 genera and 94 families from Pachgaon Parvati hills. Pande et al. (2013) documented 805 species from 215 families from flora and fauna of Parvati Pachgaon Reserve Forest. However, the present study from ecological point of view records 112 species of trees and shrubs from 85 genera belonging to 30 families.

Among tree species, highest density, abundance, frequency, relative density, relative frequency, relative dominance, IVI were not same for all hills. Among the shrub species *Lantana camara* showed domination in Taljai, Vetal, Katraj and Chaturshrungi. However, highest relative frequency was also seen for *Cissus woodroo* among shrub species in

Chaturshrungi hill. In Hanuman highest frequency, relative density, relative frequency was seen for *Lantana camara,* relative dominance and abundance were seen for *Ricinnus communis* and density and IVI for *Opuntia cochenillifera.* It was observed that among shrubs *Lantana camera* is frequently present and is predominant species in the sampled area. The present study reveals there are a lot of changes in vegetation.

CONCLUSIONS

There is very little similarity between the earlier reports of the hills in Pune and the present study. The number of species reduced at an alarming rate (Nerlekar and Kulkarni 2015). This could be due to human interference, environmental factors and change in fauna. Hence it is suggested that native plants be introduced as they can thrive in local community and can sequester carbon for longer duration (Mahajan and Shinde 2021). The hills around Pune need to be conserved as there are few remaining green spaces available for conservation of biodiversity and to maintain ecological balance. This ecological study can be used as a guide line in understanding the ecology of hills and further foster better sustainable management and planning of hills.

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Conflict of interest: Authors declare that there is no conflict of interest.

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Annexure 1. Trees and shrubs of Taljai hill.

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
1	*Acacia catechu* (L.f.) Willd.	Fabaceae	T	0.26	1.43	18	A	0.28	18.42	0.32	19.02
2	*Acacia auriculiformis* Benth.	Fabaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
3	*Acacia nilotica* (L.) Delile	Fabaceae	T	0.16	1	16	A	0.17	15.79	0.23	16.18
4	*Agave americana* L.	Asparagaceae	S	2.63	12.5	21	B	2.79	21.05	2.82	26.66
5	*Albizia lebbeck* (L.) Benth	Fabaceae	T	0.13	1	13	A	0.14	13.16	0.23	13.52
6	*Albizia odoratissima* (L.f.) Benth.	Fabaceae	T	0.18	7	3	A	0.20	2.63	1.58	4.41
7	*Alstonia scholaris* (L.) R. Br.	Apocynaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
8	*Annona squamosa* L.	Annonaceae	T	0.24	1.8	13	A	0.25	13.16	0.41	13.82
9	*Artocarpus heterophyllus* Lam	Moraceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
10	*Azadirachta indica* A.Juss.	Meliaceae	T	1.37	4	34	C	1.45	34.21	0.90	36.56
11	*Bambusa balcooa* Roxb.	Poaceae	T	0.05	2	3	A	0.06	2.63	0.45	3.14
12	*Bambusa bambos* (L.) Voss	Poaceae	T	0.21	2.67	8	A	0.22	7.90	0.60	8.72
13	*Bambusa multiplex* (Lour.) Raeusch. ex Schult.f.	Poaceae	T	0.05	2	3	A	0.06	2.63	0.45	3.14
14	*Bambusa pallida* Munro	Poaceae	T	0.47	6	8	A	0.50	7.90	1.35	9.75
15	*Bauhinia purpurea* L.	Fabaceae	T	10.6	**23.8**	45	C	11.26	44.74	5.36	61.36
16	*Bauhinia racemosa* Lam.	Fabaceae	T	0.68	2.36	29	B	0.73	28.95	0.53	30.20
17	*Bombax ceiba* L.	Malvaceae	T	0.05	0.67	8	A	0.06	7.90	0.15	8.10
18	*Boswellia serrata* Roxb.	Burseraceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
19	*Bridelia retusa* (L.) A.Juss	Phyllanthaceae	T	0.21	1.6	13	A	0.22	13.16	0.36	13.74
20	*Broussonetia papyrifera* (L.) L'Hér. ex Vent.	Moraceae	T	0.11	2	5	A	0.11	5.26	0.45	5.83
21	*Butea monosperma* (Lam.) Taub.	Fabaceae	T	0.32	1.5	21	B	0.33	21.05	0.34	21.73
22	*Caesalpinia bonduc* (L.)Roxb.	Fabaceae	S	0.05	2	3	A	0.06	2.63	0.45	3.14
23	*Capparis grandis* L.f.	Capparaceae	S	0.05	2	3	A	0.06	2.63	0.45	3.14
24	*Carissa carandas* L.	Apocynaceae	S	0.18	1.75	11	A	0.20	10.53	0.40	11.12
25	*Carissa spinarum* L.	Apocynaceae	S	0.32	2.4	13	A	0.33	13.16	0.54	14.03
26	*Cascabela thevetia* (L.) Lippold	Apocynaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
27	*Cassia fistula* L.	Fabaceae	T	0.11	4	3	A	0.11	2.63	0.90	3.65
28	*Ceiba pentandra* (L.) Gaertn.	Malvaceae	T	0.05	2	3	A	0.06	2.63	0.45	3.14
29	*Chromolaena odorata* (L.) R.M.King & H.Rob.F	Asteraceae	S	0.95	6	16	A	1.00	15.79	1.35	18.15
30	*Cleistanthus collinus* (Roxb.) Benth. ex Hook.f.	Phyllanthaceae	T	0.76	14.5	5	A	0.81	5.26	3.27	9.34
31	*Combretum ovalifolium* Roxb.	Combretaceae	S	0.03	1	3	A	0.03	2.63	0.23	2.89
32	*Dalbergia lanceolaria* L.f.	Fabaceae	T	0.21	1	21	B	0.22	21.05	0.23	21.50
33	*Dalbergia latifolia* Roxb.	Fabaceae	T	0.08	3	3	A	0.08	2.63	0.68	3.39
34	*Dalbergia melanoxylon* Guill. & Perr.	Fabaceae	T	**12.1**	23	53	C	12.82	52.63	5.19	70.64
35	*Dalbergia sissoo* DC.	Fabaceae	T	0.42	8	5	A	0.45	5.26	1.81	7.51
36	*Delonix regia* (Bojer ex Hook.) Raf.	Fabaceae	T	2.63	7.14	37	B	2.79	36.84	1.61	41.24
37	*Dendrocalamus asper* (Schult.f.) Backer	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
38	*Dendrocalamus brandisii* (Munro) Kurz	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
39	*Dendrocalamus longispathus* (Kurz) Kurz	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
40	*Dendrocalamus strictus* (Roxb.) Nees	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
41	*Dinochloa andamanica* Kurz	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
42	*Diospyros melanoxylon* Roxb.	Fabaceae	T	0.82	5.17	16	A	0.86	15.79	1.17	17.82
43	*Ehretia aspera* Willd.	Boraginaceae	T	0.13	1	13	A	0.14	13.16	0.23	13.52
44	*Erythrina stricta* Roxb.	Fabaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
45	*Erythrina suberosa* Roxb.	Fabaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
46	*Eucalyptus globulus* Labill.	Myrtaceae	T	0.26	1.43	18	A	0.28	18.42	0.32	19.02
47	*Ficus benghalensis* L.	Moraceae	T	1.95	6.17	32	B	2.06	31.58	1.39	35.03
48	*Ficus benjamina* L.	Moraceae	T	0.08	3	3	A	0.08	2.63	0.68	3.39
49	*Ficus racemosa* L.	Moraceae	T	0.42	2.29	18	A	0.45	18.42	0.52	19.38
50	*Ficus religiosa* L.	Moraceae	T	0.37	2.8	13	A	0.39	13.16	0.63	14.18
51	*Flueggea leucopyrus* Willd.	Phyllanthaceae	T	0.21	0.89	24	B	0.22	23.68	0.20	24.11
52	*Gliricidia sepium* (Jacq.) Walp.	Fabaceae	T	9.97	18.1	55	C	10.56	55.26	4.07	69.90
53	*Gmelina arborea* Roxb.	Lamiaceae	T	0.45	3.4	13	A	0.47	13.16	0.77	14.40
54	*Grewia asiatica* L.	Malvaceae	S	0.03	1	3	A	0.03	2.63	0.23	2.89
55	*Grewia flavescens* Juss.	Malvaceae	S	0.34	6.5	5	A	0.36	5.26	1.47	7.09
56	*Grewia hirsuta* Vahl.	Malvaceae	S	0.95	7.2	13	A	1.00	13.16	1.62	15.79
57	*Grewia tiliifolia* Vahl	Malvaceae	S	0.13	1.25	11	A	0.14	10.53	0.28	10.95
58	*Guadua angustifolia* Kunth	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
59	*Gymnosporia emarginata* (Willd.) Thwaites	Celastraceae	T	0.29	2.2	13	A	0.31	13.16	0.50	13.96
60	*Heterophragma quadriloculare*(Roxb.) K.Schum.	Bignonaceae	T	0.24	4.5	5	A	0.25	5.26	1.02	6.53
61	*Hibiscus schizopetalus* (Dyer) Hook.f.	Malvaceae	S	0.05	2	3	A	0.06	2.63	0.45	3.14
62	*Holoptelea integrifolia* (Roxb.) Planch.	Boraginaceae	T	0.05	1	5	A	0.06	5.26	0.23	5.55
63	*Kigelia africana* (Lam.) Benth.	Bignoniaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
64	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	T	1	6.33	16	A	1.06	15.79	1.43	18.28
65	*Lannea coromandelica* (Houtt.) Merr.	Anacaradiaceae	T	0.87	2.75	32	B	0.92	31.58	0.62	33.12
66	*Lantana camara* L.	Verbenaceae	S	***13.6***	***15.7***	***87***	***E***	***14.44***	***86.84***	***3.54***	***104.82***
67	*Lawsonia inermis* L.	Lythraceae	S	0.03	1	3	A	0.03	2.63	0.23	2.89
68	*Leucaena leucocephala* (Lam.) de Wit.	Fabaceae	T	9.05	15	**61**	**D**	9.59	**60.53**	3.38	**73.49**
69	*Madhuca longifolia* (J.Koenig ex L.) J.F.Macbr.	Sapotaceae	T	0.08	3	3	A	0.08	2.63	0.68	3.39
70	*Madhuca neriifolia* (Moon) H.J.Lam	Sapotaceae	T	0.34	6.5	5	A	0.36	5.26	1.47	7.09
71	*Mangifera indica* L.	Anacaradiaceae	T	0.05	2	3	A	0.06	2.63	0.45	3.14
72	*Melocanna baccifera* (Roxb.) Kurz	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
73	*Millingtonia hortensis* L. f.	Bignonaceae	T	0.05	1	5	A	0.06	5.26	0.23	5.55
74	*Mimusops elengi* L.	Sapotaceae	T	0.47	3	16	A	0.50	15.79	0.68	16.97
75	*Morinda citrifolia* L.	Rubiaceae	T	0.08	1.5	5	A	0.08	5.26	0.34	5.69
76	*Morinda pubescens* Sm.	Rubiaceae	T	0.08	1.5	5	A	0.08	5.26	0.34	5.69
77	*Muntingia calabura* L.	Muntingiaceae	T	3.95	30	13	A	4.18	13.16	**6.77**	24.11
78	*Murraya koenigii* (L.) Spreng.	Rutaceae	T	0.08	3	3	A	0.08	2.63	0.68	3.39

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
79	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae	T	0.08	1.5	5	A	0.08	5.26	0.34	5.69
80	*Opuntia auberi* Pfeiff.	Cacteaceae	S	0.05	2	3	A	0.06	2.63	0.45	3.14
81	*Peltophorum pterocarpum* (DC.) K.Heyne	Fabaceae	T	0.11	1.33	8	A	0.11	7.90	0.30	8.31
82	*Phoenix dactylifera* L.	Arecaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
83	*Phyllanthus emblica* L.	Phyllanthaceae	T	0.47	3	16	A	0.50	15.79	0.68	16.97
84	*Phyllostachys mannii* Gamble	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
85	*Phyllostachys parvifolia* C.D.Chu & H.Y.Chou	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
86	*Pithecellobium dulce* (Roxb.)Benth.	Fabaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
87	*Plumeria rubra* L.	Apocynaceae	T	0.08	3	3	A	0.08	2.63	0.68	3.39
88	*Pongamia pinnata* (L.)Pierre	Fabaceae	T	0.55	3	18	A	0.59	18.42	0.68	19.68
89	*Pseudosasa japonica* (Siebold & Zucc. ex Steud.) Makino ex Nakai	*Poaceae*	T	0.03	1	3	A	0.03	2.63	0.23	2.89
90	*Pseudoxytenanthera stocksii* (Munro) T.Q.Nguyen	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
91	*Santalum album* L.	Santalaceae	T	0.84	2.91	29	B	0.89	28.95	0.66	30.50
92	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	Fabaceae	T	0.05	2	3	A	0.06	2.63	0.45	3.14
93	*Senegalia polyacantha* (Willd.) Seigler & Ebinger	Fabaceae	T	0.68	2.89	24	B	0.73	23.68	0.65	25.06
94	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Fabaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
95	*Solanum rudepannum* Dunal	Solanaceae	S	0.24	2.25	11	A	0.25	10.53	0.51	11.29
96	*Syzygium cumini* (L.) Skeels	Myrtaceae	T	0.39	3.75	11	A	0.42	10.53	0.85	11.79
97	*Tabebuia rosea* (Bertol.) Bertero ex A.DC.	Bignonaceae	T	0.71	9	8	A	0.75	7.90	2.03	10.68
98	*Tamarindus indica* L.	Fabaceae	T	0.82	3.44	24	B	0.86	23.68	0.78	25.32
99	*Tecoma stans* (L.) Juss. ex Kunth	Bignonaceae	S	0.26	2	13	A	0.28	13.16	0.45	13.89
100	*Tectona grandis* L.f.	Lamiaceae	T	0.55	10.5	5	A	0.59	5.26	2.37	8.22
101	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	T	0.74	9.33	8	A	0.78	7.90	2.11	10.78
102	*Terminalia catappa* L.	Combretaceae	T	2.61	14.1	18	A	2.76	18.42	3.19	24.37
103	*Sterculia urens* Roxb.	Malvaceae	T	0.24	3	8	A	0.25	7.90	0.68	8.82
104	*Thespesia populnea* (L.) Sol. ex Corrêa	Malvaceae	T	0.24	2.25	11	A	0.25	10.53	0.51	11.29
105	*Thyrsostachys oliveri* Gamble	Poaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
106	*Toona ciliata* M.Roem.	Meliaceae	T	1.11	14	8	A	1.17	7.90	3.16	12.22
107	*Trema orientalis* Blume	Cannabaceae	T	0.13	1.67	8	A	0.14	7.90	0.38	8.41
108	*Withania somnifera* (L.) Dunal	Solanaceae	S	0.11	4	3	A	0.11	2.63	0.90	3.65
109	*Ziziphus jujuba* Mill.	Rhmanaceae	T	0.08	1.5	5	A	0.08	5.26	0.34	5.69
110	*Ziziphus mauritiana* Lam.	Rhmanaceae	T	0.03	1	3	A	0.03	2.63	0.23	2.89
111	*Ziziphus oenopolia* (L.) Miller	Rhmanaceae	S	0.32	2	16	A	0.33	15.79	0.45	16.57
112	*Ziziphus xylopyrus* (Retz.) Willd.	Rhmanaceae	T	0.13	1.67	8	A	0.14	7.90	0.38	8.41

Total number of species (S) = 112; Total number of individuals (N) = 3588; Species Richness = 13.561

H = Habit; T = Tree; S = Shrub; D = Density; A = Abundance; F% = Frequency Percentage; FC = Frequency Class; RDe = Relative Density; RF = Relative Frequency; RDo = Relative dominance; IVI = Importance Value Index Scientific names as per Plants of the word online (POWO). **Bold**: Highest value (Tree), ***Bold italics***: Highest value (Shrub)

Annexure 2. Trees and shrubs of Vetal hill.

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
1	*Acacia auriculiformis* Benth.	Fabaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
2	*Acacia catechu* (L.f.) Willd.	Fabaceae	T	2.35	5.55	42	C	2.65	42.31	1.31	46.27
3	*Acacia nilotica* (L.) Delile	Fabaceae	T	0.31	0.89	35	B	0.35	34.62	0.21	35.18
4	*Aegle marmelos* (L.) Correa	Rutaceae	T	0.08	2	4	A	0.09	3.85	0.47	4.41
5	*Agave americana* L.	Asparagaceae	S	3.96	20.6	19	A	4.48	19.23	4.87	28.58
6	*Albizia lebbeck* (L.) Benth	Fabaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
7	*Annona squamosa* L	Annonaceae	T	0.35	1.5	23	B	0.39	23.08	0.36	23.82
8	*Anogeissus sericea* Brandis	Combretaceae	T	0.54	14	4	A	0.61	3.85	3.31	7.77
9	*Artocarpus heterophyllus* Lam.	Moraceae	T	0.12	1.5	8	A	0.13	7.69	0.36	8.18
10	*Asclepias curassavica* L.	Apocynaceae	S	0.27	7	4	A	0.30	3.85	1.66	5.80
11	*Azadirachta indica* A.Juss.	Meliaceae	T	1.04	3.38	31	B	1.17	30.77	0.80	32.74
12	*Bauhinia purpurea* L.	Fabaceae	T	0.77	2.5	31	B	0.87	30.77	0.59	32.23
13	*Bauhinia racemosa* Lam.	Fabaceae	T	0.58	3.75	15	A	0.65	15.39	0.89	16.92
14	*Bombax ceiba* L.	Malvaceae	T	0.12	1.5	8	A	0.13	7.69	0.36	8.18
15	*Boswellia serrata* Roxb. ex Colebr.	Burseraceae	T	1.5	5.57	27	B	1.70	26.92	1.32	29.94
16	*Bougainvillaea spectapilis* Willd.	Nyctaginaceae	S	0.23	3	8	A	0.26	7.69	0.71	8.66
17	*Butea monosperma* (Lam.) Taub.	Fabaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
18	*Calophyllum inophyllum* L.	Callophyllaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
19	*Capparis grandis* L.f.	Capparaceae	S	0.19	1.67	12	A	0.22	11.54	0.40	12.15
20	*Carissa carandas* L.	Apocynaceae	S	0.54	3.5	15	A	0.61	15.39	0.83	16.82
21	*Carissa spinarum* L.	Apocynaceae	S	0.12	1	12	A	0.13	11.54	0.24	11.90
22	*Carrica papaya* L.	Caricaceae	T	0.08	1	8	A	0.09	7.69	0.24	8.02
23	*Cascabela thevetia* (L.) Lippold	Apocynaceae	T	0.15	1.33	12	A	0.17	11.54	0.31	12.02
24	*Cassia fistula* L.	Fabaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
25	*Catharanthus roseus* (L.) G.Don	Apocynaceae	S	0.04	1	4	A	0.04	3.85	0.24	4.12
26	*Celastrus paniculatus* Willd.	Celastraceae	S	0.04	1	4	A	0.04	3.85	0.24	4.12
27	*Chromolaena odorata* (L.) R.M.King & H.Rob.F	Asteraceae	S	0.04	1	4	A	0.04	3.85	0.24	4.12
28	*Citrus limon* (L.) Osbeck	Rutaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
29	*Cochlospermum religiosum* (L.) Alston	Bixaceae	T	0.5	2.6	19	A	0.57	19.23	0.62	20.42
30	*Cordia dichotoma* G.Forst	Boraginaceae	T	0.12	3	4	A	0.13	3.85	0.71	4.69
31	*Dalbergia lanceolaria* L.f.	Fabaceae	T	0.27	2.33	12	A	0.30	11.54	0.55	12.39
32	*Dalbergia latifolia* Roxb.	Fabaceae	T	0.12	3	4	A	0.13	3.85	0.71	4.69
33	*Dalbergia melanoxylon* Guill. & Perr.	Fabaceae	T	**13.4**	**24.79**	**54**	**C**	**15.09**	**53.85**	**5.86**	**74.80**
34	*Dalbergia sissoo* DC.	Fabaceae	T	0.5	3.25	15	A	0.57	15.39	0.77	16.72
35	*Delonix regia* (Bojer ex Hook.) Raf.	Fabaceae	T	0.38	2	19	A	0.43	19.23	0.47	20.13
36	*Dendrocalamus strictus* (Roxb.) Nees	Poaceae	T	0.27	1.75	15	A	0.30	15.39	0.41	16.10
37	*Diospyros melanoxylon* Roxb.	Ebenaceae	T	0.15	2	8	A	0.17	7.69	0.47	8.34
38	*Dolichandrone falcata* (Wall. ex DC.) Seem.	Bignonaceae	T	0.54	3.5	15	A	0.61	15.39	0.83	16.82

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
39	*Dracaena fragrans* (L.) Ker Gawl.	Asparagaceae	S	1.5	39	4	A	1.70	3.85	**9.22**	14.77
40	*Ehretia aspera* Willd.	Boraginaceae	T	1.19	5.17	23	B	1.35	23.08	1.22	25.65
41	*Ficus benghalensis* L.	Moraceae	T	0.62	3.2	19	A	0.70	19.23	0.76	20.69
42	*Ficus benjamina* L.	Moraceae	T	0.12	1.5	8	A	0.13	7.69	0.36	8.18
43	*Ficus racemosa* L.	Moraceae	T	0.15	4	4	A	0.17	3.85	0.95	4.96
44	*Ficus religiosa* L.	Moraceae	T	0.42	2.2	19	A	0.48	19.23	0.52	20.23
45	*Flueggea leucopyrus* Willd.	Phyllanthaceae	T	0.81	4.2	19	A	0.91	19.23	0.99	21.13
46	*Gliricidia sepium* (Jacq.) Walp.	Fabaceae	T	12	24.08	50	C	13.61	50.00	5.69	69.30
47	*Gmelina arborea*Roxb.	Lamiaceae	T	0.54	3.5	15	A	0.61	15.39	0.83	16.82
48	*Grevillea robusta* A.Cunn. ex R.Br.	Proteaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
49	*Grewia hirsuta* Vahl.	Malvaceae	S	2.85	6.73	42	C	3.22	42.31	1.59	47.12
50	*Grewia tiliifolia* Vahl	Malvaceae	S	0.04	1	4	A	0.04	3.85	0.24	4.12
51	*Gymnosporia emarginata* (Willd.) Thwaites	Celastraceae	T	0.38	3.33	12	A	0.43	11.54	0.79	12.76
52	*Heterophragma quadriloculare* (Roxb.) K.Schum.	Bignonaceae	T	0.15	4	4	A	0.17	3.85	0.95	4.96
53	*Hibiscus rosa-sinensis* L.	Malvaceae	S	0.04	1	4	A	0.04	3.85	0.24	4.12
54	*Hibiscus schizopetalus* (Dyer) Hook.f.	Malvaceae	S	0.08	2	4	A	0.09	3.85	0.47	4.41
55	*Holoptelea integrifolia* (Roxb.) Planch.	Ulmaceae	T	0.23	1.2	19	A	0.26	19.23	0.28	19.78
56	*Jatropha podagrica* Hook.	Euphorbiaceae	S	0.65	8.5	8	A	0.74	7.69	2.01	10.44
57	*Khaya senegalensis* (Desv.) A.Juss.	Meliaceae	T	0.12	1.5	8	A	0.13	7.69	0.36	8.18
58	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	T	0.5	3.25	15	A	0.57	15.39	0.77	16.72
59	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	T	1.58	3.73	42	A	1.78	42.31	0.88	44.97
60	*Lantana camara* L.	Verbenaceae	S	***16.4***	***23.61***	***69***	***D***	***18.48***	***69.23***	***5.58***	***93.29***
61	*Lawsonia inermis* L.	Lythraceae	S	0.23	6	4	A	0.26	3.85	1.42	5.52
62	*Leucaena leucocephala* (Lam.) de Wit.	Fabaceae	T	5.46	11.83	46	C	6.17	46.15	2.80	55.12
63	*Mangifera indica* L.	Anacardiaceae	T	0.23	2	12	A	0.26	11.54	0.47	12.27
64	*Manilkara zapota* (L.) P. Royen	Sapotaceae	T	0.04	1	4	A	0.04	3.85		4.12
65	*Millingtonia hortensis* L. f.	Bignonaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
66	*Mimusops elengi* L.	Sapotaceae	T	0.12	3	4	A	0.13	3.85	0.71	4.69
67	*Morinda citrifolia* L.	Rubiaceae	T	0.46	2.4	19	A	0.52	19.23	0.57	20.32
68	*Morinda pubescens* Sm.	Rubiaceae	T	0.38	2	19	A	0.43	19.23	0.47	20.13
69	*Moringa oleifera* Lam.	Moringacaeae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
70	*Morus alba* L.	Moraceae	T	0.31	2.67	12	A	0.35	11.54	0.63	12.52
71	*Muntingia calabura* L	Muntingiaceae	T	1.38	18	8	A	1.57	7.69	4.26	13.52
72	*Nyctanthes arbor-tristis* L.	Oleaceae	T	0.23	2	12	A	0.26	11.54	0.47	12.27
73	*Osyris lanceolata* Hochst. & Steud.	Santalaceae	S	0.96	4.17	23	B	1.09	23.08	0.99	25.15
74	*Peltophorum pterocarpum* (DC.) K.Heyne	Fabaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
75	*Phoenix dactylifera* L.	Arecaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
76	*Phyllanthus emblica* L.	Phyllanthaceae	T	0.42	2.75	15	A	0.48	15.39	0.65	16.52
77	*Plumeria rubra* L.	Apocynaceae	T	0.08	2	4	A	0.09	3.85	0.47	4.41
78	*Polyalthia longifolia* (Sonn.) Thwaites	Annonaceae	T	0.08	2	4	A	0.09	3.85	0.47	4.41

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
79	*Pongamia pinnata* (L.)Pierre	Fabaceae	T	0.69	3.6	19	A	0.78	19.23	0.85	20.86
80	*Prunus dulcis* (Mill.) D.A.Webb	Rosaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
81	*Psidium guajava* L.	Myrtaceae	T	0.08	1	8	A	0.09	7.69	0.24	8.02
82	*Punica granatum* L.	Lythraceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
83	*Santalum album* L.	Santalaceae	T	1.04	3.38	31	B	1.17	30.77	0.80	32.74
84	*Schleichera oleosa* (Lour.) Oken	Sapindaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
85	*Semecarpus anacardium*L.f	Anacardiaceae	T	0.12	1.5	8	A	0.13	7.69	0.36	8.18
86	*Senna surattensis var. glauca* (Lam.) X.Y. Zhu	Fabaceae	T	0.31	4	8	A	0.35	7.69	0.95	8.99
87	*Strobilanthes callosa* Nees	Acanthaceae	S	0.04	1	4	A	0.04	3.85	0.24	4.12
88	*Syzygium cumini* (L.) Skeels	Myrtaceae	T	0.23	2	12	A	0.26	11.54	0.47	12.27
89	*Tamarindus indica* L.	Fabaceae	T	0.77	2.86	27	B	0.87	26.92	0.68	28.47
90	*Tecoma stans* (L.) Juss. ex Kunth	Bignonaceae	S	0.27	3.5	8	A	0.30	7.69	0.83	8.82
91	*Tectona grandis* L.f.	Lamiaceae	T	0.08	1	8	A	0.09	7.69	0.24	8.02
92	*Terminalia anogeissiana* Gere & Boatwr.	Combretaceae	T	1.38	9	15	A	1.57	15.39	2.13	19.08
93	*Terminalia arjuna* (Roxb. ex DC.) Wight &Arn.	Combretaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
94	*Sterculia urens* Roxb.	Malvaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
95	*Thunbergia erecta* (Benth.) T.Anderson	Acanthaceae	S	0.27	7	4	A	0.30	3.85	1.66	5.80
96	*Toona ciliata* M.Roem.	Meliaceae	T	0.12	3	4	A	0.13	3.85	0.71	4.69
97	*Trema orientalis* Blume	Cannabaceae	T	0.04	1	4	A	0.04	3.85	0.24	4.12
98	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.	Fabaceae	T	0.23	3	8	A	0.26	7.69	0.71	8.66
99	*Vitex negundo* L.	Lamiaceae	T	0.19	5	4	A	0.22	3.85	1.18	5.25
100	*Volkameria inermis* L.	Lamiaceae	S	0.38	5	8	A	0.43	7.69	1.18	9.30
101	*Woodfordia fruticosa* (L.) Kurz	Lythraceae	S	0.27	2.33	12	A	0.30	11.54	0.55	12.39
102	*Ziziphus jujuba* Mill.	Rhmanaceae	T	0.08	2	4	A	0.09	3.85	0.47	4.41
103	*Ziziphus nummularia* (Burm.f.) Wight &Arn.	Rhmanaceae	S	0.73	2.38	31	B	0.83	30.77	0.56	32.16
104	*Ziziphus oenopolia* (L.) Miller	Rhmanaceae	S	0.08	1	8	A	0.09	7.69	0.24	8.02
105	*Ziziphus xylopyrus* (Retz.) Willd.	Rhmanaceae	T	0.15	1	15	A	0.17	15.39	0.24	15.79

Total number of species (S) = 105; Total number of individuals (N) = 2300; Species Richness -= 13.436

H = Habit; T = Tree; S = Shrub; D = Density; A = Abundance; F% = Frequency Percentage; FC = Frequency Class; RDe = Relative Density; RF = Relative Frequency; RDo = Relative dominance; IVI = Importance Value Index Scientific names as per Plants of the word online (POWO). **Bold**: Highest value (Tree), ***Bold italics***: Highest value (Shrub)

Annexure 3. Trees and shrubs of Katraj hill.

Sr. No.	Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
1	*Acacia catechu* (L.f.) Willd.	Fabaceae	T	**5.82**	7.11	**82**	**E**	**8.01**	**81.82**	3.76	**93.58**
2	*Acacia ferruginea* DC.	Fabaceae	T	0.73	2	36	B	1.00	36.36	1.06	38.42
3	*Acacia leucophloea* (Roxb.) Willd.	Fabaceae	T	0.27	1.5	18	A	0.38	18.18	0.79	19.35
4	*Aegle marmelos* L.	Rutaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
5	*Azadirachta indica* A.Juss.	Meliaceae	T	2	2.44	**82**	**E**	2.75	**81.82**	1.29	85.86
6	*Bauhinia racemosa* Lam.	Fabaceae	T	0.36	1.33	27	B	0.50	27.27	0.70	28.48
7	*Bridelia retusa* (L.) A.Juss	Phyllanthaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
8	*Butea monosperma* (Lam.) Taub.	Fabaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
9	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	S	0.36	2	18	A	0.50	18.18	1.06	19.74
10	*Carissa carandas* L.	Apocynaceae	S	0.82	3	27	B	1.13	27.27	1.58	29.98
11	*Cassia fistula* L.	Fabaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
12	*Celastrus paniculatus* Willd.	Celastraceae	S	0.45	2.5	18	A	0.63	18.18	1.32	20.13
13	*Chromolaena odorata* (L.) R.M.King & H.Rob.F	Asteraceae	S	2.64	9.67	27	B	3.63	27.27	5.11	36.01
14	*Cipadessa baccifera* (Roxb. ex Roth) Miq.	Meliaceae	S	1.64	6	27	B	2.25	27.27	3.17	32.70
15	*Dalbergia lanceolaria paniculata* (Roxb.)Thoth.	Fabaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
16	*Dalbergia melanoxylon* Guill. & Perr.	Fabaceae	T	1.64	3.6	45	C	2.25	45.46	1.90	49.61
17	*Dalbergia sissoo* DC.	Fabaceae	T	0.45	5	9	A	0.63	9.09	2.64	12.36
18	*Diospyros melanoxylon* Roxb.	Ebenaceae	T	0.45	2.5	18	A	0.63	18.18	1.32	20.13
19	*Flueggea leucopyrus* Willd.	Phyllanthaceae	T	1.27	2.33	55	C	1.75	54.55	1.23	57.53
20	*Gmelina arborea* Roxb.	Lamiaceae	T	1.64	**18**	9	A	2.25	9.09	**9.51**	20.85
21	*Grevillea robusta* A.Cunn. ex R.Br.	Proteaceae	T	0.18	2	9	A	0.25	9.09	1.06	10.40
22	*Grewia asiatica* L.	Malvaceae	S	0.18	1	18	A	0.25	18.18	0.53	18.96
23	*Grewia flavescens* Juss.	Malvaceae	S	0.18	1	18	A	0.25	18.18	0.53	18.96
24	*Grewia tiliifolia* Vahl	Malvaceae	S	0.36	1	36	B	0.50	36.36	0.53	37.39
25	*Gymnosporia emarginata* (Willd.) Thwaites	Celastraceae	T	1	3.67	27	B	1.38	27.27	1.94	30.59
26	*Heterophragma quadriloculare* (Roxb.) K.Schum.	Bignonaceae	T	0.18	1	18	A	0.25	18.18	0.53	18.96
27	*Holoptelea integrifolia* (Roxb.) Planch.	Ulmaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
28	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	T	1.09	3	36	B	1.50	36.36	1.58	39.45
29	*Lantana camara* L.	Verbenaceae	S	**34.5**	**34.5**	**100**	**E**	**47.43**	**100.00**	**18.19**	***165.63***
30	*Muntingia calabura* L.	Muntingiaceae	T	0.36	4	9	A	0.50	9.09	2.11	11.70
31	*Osyris lanceolata* Hochst. & Steud.	Santalaceae	S	2.36	6.5	36	B	3.25	36.36	3.43	43.05
32	*Phyllanthus emblica* L.	Phyllanthaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
33	*Ricinus communis* L.	Euphorbiaceae	S	2	22	9	A	2.75	9.09	11.62	23.46
34	*Santalum album* L.	Santalaceae	T	0.09	1	9	A	0.13	9.09	0.53	9.74
35	*Searsia mysorensis* (G.Don) Moffett	Anacardiaceae	T	2	7.33	27	B	2.75	27.27	3.87	33.90
36	*Senegalia ferruginea* (DC.) Pedley	Fabaceae	T	1.45	2.67	55	C	2.00	54.55	1.41	57.96
37	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Fabaceae	T	0.27	1.5	18	A	0.38	18.18	0.79	19.35
38	*Solanum rudepannum* Dunal	Solanaceae	S	0.09	1	9	A	0.13	9.09	0.53	9.74

Sr. No.	Species Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
39	*Tecoma stans* (L.) Juss. ex Kunth	Bignonaceae	S	2.82	4.43	64	D	3.88	63.64	2.34	69.86
40	*Trema orientalis* Blume	Cannabaceae	T	0.27	3	9	A	0.38	9.09	1.58	11.05
41	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.	Fabaceae	T	0.55	3	18	A	0.75	18.18	1.58	20.52
42	*Woodfordia fruticosa* (L.) Kurz	Lythraceae	S	0.55	3	18	A	0.75	18.18	1.58	20.52
43	*Ziziphus jujuba* Mill.	Rhmanaceae	T	0.36	1.33	27	B	0.50	27.27	0.70	28.48
44	*Ziziphus nummularia* (Burm.f.) Wight &Arn.	Rhmanaceae	S	0.18	2	9	A	0.25	9.09	1.06	10.40
45	*Ziziphus oenopolia* (L.) Miller	Rhmanaceae	S	0.18	2	9	A	0.25	9.09	1.06	10.40
46	*Ziziphus xylopyrus* (Retz.) Willd.	Rhmanaceae	T	0.27	1.5	18	A	0.38	18.18	0.79	19.35

Total number of species (S) = 46; Total number of individuals (N) = 799; Species Richness = 6.733

H = Habit; T = Tree; S = Shrub; D = Density; A = Abundance; F% = Frequency Percentage; FC = Frequency Class; RDe = Relative Density; RF = Relative Frequency; RDo = Relative dominance; IVI = Importance Value Index Scientific names as per Plants of the word online (POWO). **Bold**: Highest value (Tree), ***Bold italics***: Highest value (Shrub)

Annexure 4. Trees and shrubs of Chaturshrungi hill.

Sr. No.	Species Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
1	*Acacia catechu* (L.f.) Willd.	Fabaceae	T	0.14	1	14	A	0.26	14.29	0.42	14.97
2	*Acacia nilotica* (L.) Delile	Fabaceae	T	1.64	2.3	71	D	2.98	71.43	0.97	75.38
3	*Acacia leucophloea* (Roxb.) Willd.	Fabaceae	T	0.93	2.17	43	C	1.68	42.86	0.91	45.46
4	*Albizia lebbeck* (L.) Benth	Fabaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
5	*Alstonia scholaris* (L.) R. Br.	Apocynaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
6	*Annona reticulata* L.	Annonaceae	T	0.43	6	7	A	0.78	7.14	2.53	10.45
7	*Annona squamosa* L.	Annonaceae	T	0.5	3.5	14	A	0.91	14.29	1.47	16.67
8	*Azadirachta indica* A.Juss.	Meliaceae	T	2.21	3.44	64	D	4.02	64.29	1.45	69.75
9	*Bauhinia purpurea* L.	Fabaceae	T	**7.29**	17	43	C	**13.21**	42.86	7.16	63.23
10	*Bauhinia racemosa* Lam.	Fabaceae	T	0.21	1	21	B	0.39	21.43	0.42	22.24
11	*Bauhinia tomentosa* L.	Fabaceae	T	0.21	3	7	A	0.39	7.14	1.26	8.80
12	*Boswellia serrata* Roxb. ex Colebr.	Burseraceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
13	*Bougainvillaea spectapilis* Willd.	Nyctaginaceae	S	0.14	2	7	A	0.26	7.14	0.84	8.24
14	*Butea monosperma* (Lam.) Taub.	Fabaceae	T	0.36	1.25	29	B	0.65	28.57	0.53	29.75
15	*Caesalpinia bondus* (L.)Roxb.	Fabaceae	S	0.21	1	21	B	0.39	21.43	0.42	22.24
16	*Caesalpinia coriaria* (Jacq.) Willd.	Fabaceae	T	0.21	1.5	14	A	0.39	14.29	0.63	15.31
17	*Caesalpinia pulcherrima* (L.) Sw	Fabaceae	S	0.14	1	14	A	0.26	14.29	0.42	14.97
18	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	S	0.21	1	21	B	0.39	21.43	0.42	22.24
19	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	S	0.21	3	7	A	0.39	7.14	1.26	8.80
20	*Carissa carandas* L.	Apocynaceae	S	0.29	2	14	A	0.52	14.29	0.84	15.65
21	*Cassia fistula* L.	Fabaceae	T	0.14	1	14	A	0.26	14.29	0.42	14.97
22	*Cassine glauca* (Rottb.) Kuntze	Celastraceae	T	0.14	1	14	A	0.26	14.29	0.42	14.97
23	*Ceiba pentandra* (L.) Gaertn.	Malvaceae	T	4	28	14	A	7.25	14.29	**11.79**	33.33
24	*Chromolaena odorata* (L.) R.M.King & H.Rob.F	Asteraceae	S	0.5	3.5	14	A	0.91	14.29	1.47	16.67
25	*Cissus woodrowii* (Stapf ex Cooke) Santapau	Vitaceae	S	1.93	3.86	***50***	C	3.50	***50.00***	1.63	55.12
26	*Citrus limon* (L.) Osbeck	Rutaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
27	*Cordia dichotoma* G.Forst	Boraginaceae	T	0.14	2	7	A	0.26	7.14	0.84	8.24
28	*Cordia sinensis* Lam.	Boraginaceae	T	0.36	2.5	14	A	0.65	14.29	1.05	15.99
29	*Dalbergia lanceolaria paniculata* (Roxb.)Thoth.	Fabaceae	T	0.29	1.33	21	B	0.52	21.43	0.56	22.51
30	*Dalbergia melanoxylon* Guill. & Perr.	Fabaceae	T	1	3.5	29	B	1.81	28.57	1.47	31.86
31	*Dalbergia sissoo* DC.	Fabaceae	T	1.71	4.8	36	B	3.11	35.71	2.02	40.84
32	*Delonix regia* (Bojer ex Hook.) Raf.	Fabaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
33	*Dolichandrone falcata* (Wall. ex DC.) Seem.	Bignonaceae	T	0.43	6	7	A	0.78	7.14	2.53	10.45
34	*Ehretia laevis* Roxb.	Boraginaceae	T	0.21	3	7	A	0.39	7.14	1.26	8.80
35	*Erythrina stricta* Roxb.	Fabaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
36	*Erythrina variegata* L.	Fabaceae	T	0.29	4	7	A	0.52	7.14	1.68	9.35
37	*Erythrina suberosa* Roxb.	Fabaceae	T	0.14	1	14	A	0.26	14.29	0.42	14.97
38	*Ficus amplissima* Sm.	Moraceae	T	0.64	9	7	A	1.17	7.14	3.79	12.10

Sr. No.	Species Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
39	*Ficus benghalensis* L.	Moraceae	T	0.43	1.5	29	B	0.78	28.57	0.63	29.98
40	*Ficus racemosa* L.	Moraceae	T	0.5	2.33	21	B	0.91	21.43	0.98	23.32
41	*Ficus religiosa* L.	Moraceae	T	0.43	2	21	B	0.78	21.43	0.84	23.05
42	*Gliricidia sepium* (Jacq.) Walp.	Fabaceae	T	5	3.18	**157**	**E**	9.07	**157.14**	1.34	**167.55**
43	*Gmelina arborea* Roxb.	Lamiaceae	T	0.64	1.8	36	B	1.17	35.71	0.76	37.64
44	*Grewia hirsuta* Vahl.	Malvaceae	S	0.07	1	7	A	0.13	7.14	0.42	7.69
45	*Heterophragma quadriloculare* (Roxb.) K.Schum.	Bignonaceae	T	1.36	19	7	A	2.46	7.14	8.00	17.60
46	*Holoptelea grandis* (Hutch.) Mildbr.	Ulmaceae	T	0.21	1.5	14	A	0.39	14.29	0.63	15.31
47	*Lagerstroemia speciosa* (L.) Pers.	Lathyraceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
48	*Lantana camara* L.	Verbenaceae	S	***7.07***	***14.1***	***50***	***C***	***12.82***	***50.00***	***5.95***	***68.78***
49	*Leucaena leucocephala* (Lam.) de Wit.	Fabaceae	T	1.07	3	36	B	1.94	35.71	1.26	38.92
50	*Mangifera indica* L.	Anacardiaceae	T	0.21	1.5	14	A	0.39	14.29	0.63	15.31
51	*Millingtonia hortensis* L. f.	Bignonaceae	T	1.86	8.67	21	B	3.37	21.43	3.65	28.45
52	*Morinda pubescens* Sm.	Rubiaceae	T	0.07	0.5	14	A	0.13	14.29	0.21	14.63
53	*Nyctanthes arbor-tristis* L.	Oleaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
54	*Phyllanthus emblica* L.	Phyllanthaceae	T	0.36	1.67	21	B	0.65	21.43	0.70	22.78
55	*Pongamia pinnata* (L.)Pierre	Fabaceae	T	2.57	6	43	C	4.66	42.86	2.53	50.05
56	*Prunus dulcis* (Mill.) D.A.Webb	Rosaceae	T	0.14	2	7	A	0.26	7.14	0.84	8.24
57	*Psidium guajava* L.	Myrtaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
58	*Pterospermum acerifolium* (L.) Willd.	Malvaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
59	*Putranjiva roxburghii* Wall.	Putranjivaceae	T	0.29	4	7	A	0.52	7.14	1.68	9.35
60	*Santalum album* L.	Santalaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
61	*Semecarpus anacardium*L.f	Anacardiaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
62	*Senna auriculata* (L.) Roxb.	Fabaceae	T	0.57	4	14	A	1.04	14.29	1.68	17.01
63	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Fabaceae	T	0.36	1.67	21	B	0.65	21.43	0.70	22.78
64	*Syzygium cumini* (L.) Skeels	Myrtaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
65	*Tamarindus indica* L.	Fabaceae	T	0.5	1.4	36	B	0.91	35.71	0.59	37.21
66	*Tecoma stans* (L.) Juss. ex Kunth	Bignonaceae	S	0.57	2.67	21	B	1.04	21.43	1.12	23.59
67	*Tectona grandis* L.f.	Lamiaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
68	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	T	1.14	4	29	B	2.07	28.57	1.68	32.33
69	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	T	0.29	2	14	A	0.52	14.29	0.84	15.65
70	*Terminalia catappa* L.	Combretaceae	T	0.07	1	7	A	0.13	7.14	0.42	7.69
71	*Woodfordia fruticosa* (L.) Kurz	Lythraceae	S	0.14	1	14	A	0.26	14.29	0.42	14.97
72	*Ziziphus jujuba* Mill.	Rhmanaceae	T	0.43	3	14	A	0.78	14.29	1.26	16.33
73	Ziziphus sps.	Rhmanaceae	T	0.5	2.33	21	B	0.91	21.43	0.98	23.32

Total number of species (S) = 73; Total number of individuals (N) = 772; Species Richness = 10.829

H = Habit; T = Tree; S = Shrub; D = Density; A = Abundance; F% = Frequency Percentage; FC = Frequency Class; RDe = Relative Density; RF = Relative Frequency; RDo = Relative dominance; IVI = Importance Value Index Scientific names as per Plants of the word online (POWO). **Bold**: Highest value (Tree), ***Bold italics***: Highest value (Shrub)

Annexure 5. Trees and shrubs of Hanuman hill.

Sr. No.	Species Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
1	*Acacia auriculiformis* Benth.	Fabaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
2	*Acacia nilotica* (L.) Delile	Fabaceae	T	0.56	4.5	13	A	1.37	12.50	2.09	15.97
3	*Aegle marmelos* (L.) Correa	Rutaceae	T	0.13	1	13	A	0.31	12.50	0.47	13.27
4	*Agave americana* L.	Asparagaceae	S	0.38	3	13	A	0.92	12.50	1.40	14.81
5	*Albizia saman* (Jacq.) Merr.	Fabaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
6	*Alstonia scholaris* (L.) R. Br.	Apocynaceae	T	0.63	2.5	25	B	1.53	25.00	1.16	27.69
7	*Annona squamosa* L.	Annonaceae	T	0.56	2.25	25	B	1.37	25.00	1.05	27.42
8	*Anogeissus sericea* Brandis	Combretaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
9	*Araucaria columnaris* (G.Forst.) Hook.	Auracariaceae	T	0.19	3	6	A	0.46	6.25	1.40	8.10
10	*Artocarpus heterophyllus* Lam.	Moraceae	T	0.13	2	6	A	0.31	6.25	0.93	7.49
11	*Azadirachta indica* A.Juss.	Meliaceae	T	2.94	3.92	75	D	7.18	75.00	1.82	84.00
13	*Barleria prionitis* L.	Acanthaceae	S	0.13	2	6	A	0.31	6.25	0.93	7.49
14	*Bauhinia purpurea* L.	Fabaceae	T	0.63	2	31	B	1.53	31.25	0.93	33.71
15	*Bauhinia racemosa* Lam.	Fabaceae	T	0.31	2.5	13	A	0.76	12.50	1.16	14.43
16	*Bombax ceiba* L.	Malvaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
17	*Boswellia serrata* Roxb. ex Colebr.	Burseraceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
18	*Butea monosperma* (Lam.) Taub.	Fabaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
19	*Carissa carandas* L.	Fabaceae	S	0.31	2.5	13	A	0.76	12.50	1.16	14.43
20	*Carrica papaya* L.	Caricaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
21	*Cascabela thevetia* (L.) Lippold	Apocynaceae	T	0.69	3.67	19	A	1.68	18.75	1.71	22.14
22	*Cassia fistula* L.	Fabaceae	T	0.5	2	25	B	1.22	25.00	0.93	27.15
23	*Ceiba pentandra* (L.) Gaertn.	Malvaceae	T	0.13	2	6	A	0.31	6.25	0.93	7.49
24	*Conocarpus lancifolius* Engl	Combretaceae	T	0.25	4	6	A	0.61	6.25	1.86	8.72
25	*Couroupita guianensis* Aubl.	Lecythidaceae	T	0.13	2	6	A	0.31	6.25	0.93	7.49
26	*Dalbergia lanceolaria* L.f.	Fabaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
27	*Dalbergia melanoxylon* Guill. & Perr.	Fabaceae	T	0.44	2.33	19	A	1.07	18.75	1.08	20.90
28	*Dalbergia sissoo* DC.	Fabaceae	T	0.31	2.5	13	A	0.76	12.50	1.16	14.43
29	*Delonix regia* (Bojer ex Hook.) Raf.	Fabaceae	T	0.44	1.75	25	B	1.07	25.00	0.81	26.88
30	*Dolichandrone falcata* (Wall. ex DC.) Seem.	Bignoniaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
31	*Eucalyptus globulus* Labill.	Myrtaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
32	*Euphorbia tithymaloides* L.	Euphorbiaceae	S	0.19	3	6	A	0.46	6.25	1.40	8.10
33	*Ficus benghalensis* L.	Moraceae	T	1.44	3.29	44	C	3.51	43.75	1.53	48.79
34	*Ficus benjamina* L.	Moraceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
35	*Ficus religiosa* L.	Moraceae	T	1	3.2	31	B	2.44	31.25	1.49	35.18
36	*Flueggea leucopyrus* Willd.	Phyllanthaceae	T	0.31	2.5	13	A	0.76	12.50	1.16	14.43
37	*Gliricidia sepium* (Jacq.) Walp.	Fabaceae	T	4.13	**9.43**	44	C	10.08	43.75	**4.38**	58.21
38	*Gmelina arborea* Roxb.	Lamiaceae	T	0.13	1	13	A	0.31	12.50	0.47	13.27
39	*Grewia tilifolia* Vahl	Malvaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87

Sr. No.	Species Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
40	*Gymnosporia emarginata* (Willd.) Thwaites	Celastraceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
41	*Hamelia patens* Jacq.	Rubiaceae	S	0.06	1	6	A	0.15	6.25	0.47	6.87
42	*Hibiscus schizopetalus* (Dyer) Hook.f.	Malvaceae	S	0.38	3	13	A	0.92	12.50	1.40	14.81
43	*Holarrhena pubescens* Wall. *ex* G.Don	Apocynaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
44	*Holoptelea grandis* (Hutch.) Mildbr.	Ulmaceae	T	0.25	2	13	A	0.61	12.50	0.93	14.04
45	*Jatropha curcas* L.	Euphorbiaceae	S	0.19	3	6	A	0.46	6.25	1.40	8.10
46	*Jatropha gossypiifolia* L.	Euphorbiaceae	S	0.44	7	6	A	1.07	6.25	3.26	10.57
47	*Kigelia africana* (Lam.) Benth.	Bignoniaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
48	*Lagerstroemia speciosa* (L.) Pers.	Lathyraceae	T	0.38	2	19	A	0.92	18.75	0.93	20.60
49	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	T	0.13	2	6	A	0.31	6.25	0.93	7.49
50	*Lantana camara* L.	Verbenaceae	S	2.19	4.38	***50***	C	***5.34***	***50.00***	2.04	57.38
51	*Leucaena leucocephala* (Lam.) de Wit.	Fabaceae	T	**5.13**	8.2	63	D	**12.52**	62.50	3.81	78.83
52	*Magnolia champaca* (L.) Baill. ex Pierre	Magnoloaceae	T	0.5	2.67	19	A	1.22	18.75	1.24	21.21
53	*Mangifera indica* L.	Anacardiaceae	T	0.38	3	13	A	0.92	12.50	1.40	14.81
54	*Melia azedarach* L.	Meliaceae	T	0.19	1.5	13	A	0.46	12.50	0.70	13.66
55	*Millingtonia hortensis* L. f.	Bignoniaceae	T	0.19	3	6	A	0.46	6.25	1.40	8.10
56	*Mimusops elengi* L.	Sapotaceae	T	0.25	2	13	A	0.61	12.50	0.93	14.04
57	*Morinda citrifolia* L.	Rubiaceae	T	0.13	2	6	A	0.31	6.25	0.93	7.49
58	*Morinda pubescens* Sm.	Rubiaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
59	*Moringa oleifera* Lam.	Moringiaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
60	*Morus alba* L.	Moraceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
61	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae	T	0.81	6.5	13	A	1.99	12.50	3.02	17.51
62	*Nerium oleander* L.	Apocynaceae	S	0.06	1	6	A	0.15	6.25	0.47	6.87
63	*Nyctanthes arbor-tristis* L.	Oleaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
64	*Opuntia cochenillifera* (L.) Mill	Cactaceae	S	***4.63***	10.6	44	C	11.30	43.75	4.91	***59.96***
65	*Peltophorum pterocarpum* (DC.) K.Heyne	Fabaceae	T	0.13	1	13	A	0.31	12.50	0.47	13.27
66	*Phyllanthus emblica* L.	Phyllanthaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
67	*Plumeria rubra* L.	Apocnaceae	T	0.19	1.5	13	A	0.46	12.50	0.70	13.66
68	*Pongamia pinnata* (L.)Pierre	Fabaceae	T	1.19	3.17	38	B	2.90	37.50	1.47	41.88
69	*Prunus dulcis* (Mill.) D.A.Webb	Rosaceae	T	0.19	1.5	13	A	0.46	12.50	0.70	13.66
70	*Psidium guajava* L.	Myrtaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
71	*Punica granatum* L.	Lythraceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
72	*Putranjiva roxburghii* Wall.	Putranjivaceae	T	0.25	1	25	B	0.61	25.00	0.47	26.08
73	*Ricinus communis* L.	Euphorbiaceae	S	1.25	20	6	A	3.05	6.25	9.30	18.60
74	*Santalum album* L.	Santalaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
75	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Fabaceae	T	0.25	4	6	A	0.61	6.25	1.86	8.72
76	*Syzygium cumini* (L.) Skeels	Myrtaceae	T	0.19	1.5	13	A	0.46	12.50	0.70	13.66
77	*Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.	Apocynaceae	S	0.06	1	6	A	0.15	6.25	0.47	6.87
78	*Tamarindus indica* L.	Fabaceae	T	1.31	3	44	C	3.21	43.75	1.40	48.35
79	*Tecoma stans* (L.) Juss. ex Kunth	Bignoniaceae	S	0.06	1	6	A	0.15	6.25	0.47	6.87

Sr. No.	Species Botanical Name	Family	H	D	A	F %	FC	RDe %	RF%	RDo%	IVI
80	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	T	0.13	2	6	A	0.31	6.25	0.93	7.49
81	*Terminalia catappa* L.	Combretaceae	T	0.06	1	6	A	0.15	6.25	0.47	6.87
82	*Thespesia populnea* (L.) Sol. ex Corrêa	Malvaceae	T	0.19	1.5	13	A	0.46	12.50	0.70	13.66
83	*Toona ciliata* M.Roem	Meliaceae	T	0.38	6	6	A	0.92	6.25	2.79	9.96
84	*Ziziphus jujuba* Mill.	Rhamnaceae	T	0.31	1.25	25	B	0.76	25.00	0.58	26.34

Total number of species (S) = 84; Total number of individuals (N) = 655; Species Richness = 12.799

H = Habit; T = Tree; S = Shrub; D = Density; A = Abundance; F% = Frequency Percentage; FC = Frequency Class; RDe = Relative Density; RF = Relative Frequency; RDo = Relative dominance; IVI = Importance Value Index Scientific names as per Plants of the word online (POWO). **Bold**: Highest value (Tree), ***Bold italics***: Highest value (Shrub)