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Phytosociological assessment of vegetation at diveghat, northern gateway to the proposed international airport Purandar dist. Pune M.S. India

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Abstract
Phytosociological and floristic investigations provide essential baseline information for biodiversity conservation, ecological restoration, and sustainable landscape management. The present study focuses on Dive Ghat, a geographically significant region situated along National Highway 965 (Pune–Pandharpur Highway), serving as the northern gateway of Purandar Tehsil, Pune District, Maharashtra, and forming part of the corridor associated with the proposed international airport at Purandar. The area is also traversed annually by the renowned Alandi–Pandharpur Wari pilgrimage, a 240 km spiritual procession attracting millions of devotees (Warkaris), thereby creating unique interactions between cultural practices and environmental conservation.

The present assessment is supported by extensive field investigations conducted in Purandar Tehsil between 2014 and 2022. During this period, a comprehensive floristic inventory documenting 1,352 species of flowering plants was prepared, along with phytosociological analyses based on 300 herbaceous and 170 woody vegetation quadrats. Repeated field observations revealed significant threats to native vegetation, including road construction, land-use changes, solid waste pollution, and increasing developmental activities associated with urbanization and the proposed airport project. The region, characterized by semi-arid climatic conditions and continuous human disturbance, exhibits a pressing need for scientifically planned ecological restoration and conservation interventions.

Keywords: Dive Ghat, ecological restoration, roadside plantation, proposed international airport

Introduction

The quantitative structure of the study of vegetation has been called as 'Phyto-sociology' (Odum, 1971) [7]. Phytosociology is also called a Vegetation science, Vegetation ecology, Sociological geobotany, ecological geobotany etc. Plants naturally occur together in repetitive groups of associated plants and most frequent and abundant plants describe them well (Mueller- Dombois, 1974). Vegetation is an assemblage of plants growing together in a particular location and may be characterized either by its species composition or by combination of structural and functional characters that describe the appearance or physiognomy of vegetation (Goldsmith et.al. 1992) [3]. Vegetation form is a significant feature of the given area (Arey, 2010). Phytosociological and floristic studies are widely recognized in acquiring baseline data for the planning and management of any area (Mahajan, Shinde, 2021) [5]. Species composition patterns and outcrop communities are influenced by multiple environmental factors like soil type, elevation, aspect of rock outcrop and micro-environments. Complete diversity on the plateaus in the northern western ghats is not yet revealed satisfactorily (Rahangdale, 2014) [8].

Fig 1: Diveghat, Mastani Talao, Co-investigator and *Drimia Indica* (Year 2014-22)

The Alandi–Pandharpur Wari is one of the most significant spiritual pilgrimages in the state of Maharashtra, attracting lakhs of devotees, popularly known as Warkaris, every year. This iconic 21-day foot pilgrimage covers approximately 240 kilometers and culminates at the temple of Lord Vithoba in Pandharpur during the occasion of Ashadhi Ekadashi. The Warkaris march collectively while chanting devotional hymns such as "Dnyanba–Tukaram," symbolizing spiritual unity, devotion, and social harmony.

The pilgrimage route broadly follows National Highway 965 and traverses several important settlements including Alandi, Pune, Saswad, Jejuri, Walhe, Lonand in Purandar tehsil, Taradgaon, Phaltan, Natepute, Malshiras, Velapur, Wakhari, and finally Pandharpur in Solapur District. Among these, Dive Ghat is geographically significant as it serves as the northern gateway of the tehsil and is strategically associated with the proposed regional airport development.

Apart from its religious and cultural significance, the Wari has increasingly become a platform for environmental awareness and community participation. Recognizing this potential, SPPU has been organizing a student participation initiative under the National Service Scheme (NSS) since 2004. Each year, approximately 100 students and 10 senior college professors participate in the march, integrating environmental conservation activities with the traditional pilgrimage.

A major component of this initiative is the implementation of environment-based themes during the Wari. Activities undertaken by student volunteers include plantation drives, cleanliness campaigns, and the construction of continuous contour trenches in collaboration with the Forest Department. These interventions aim to promote ecological sustainability along the pilgrimage corridor. The investigator of the present study actively participated in the "Vrikshdindi" initiative during the year 2004, providing valuable experiential insights into the environmental dimensions of the Wari.

Previous plantation activities have been conducted at locations such as Wadaki Nallah, Daundaj, and other stretches along the pilgrimage route. However, recent widening of the existing highway infrastructure has increased the need for compensatory afforestation and sustainable roadside plantation initiatives. Therefore, there is an urgent requirement to evaluate existing environmental interventions and develop long-term ecological planning strategies for the Alandi–Pandharpur pilgrimage corridor.

Materials and Methods

Herbaceous Vegetation: In a phyto-sociological study, field sampling is the very first step. Biologists, Naturalists, Environmentalists use different implements and skills to perform phyto-sociological studies. The different ranges of considerations are in use as they are investigated to understand the vegetation structure. To learn the multiplicity of plant communities in the Purandar tehsil, following techniques of sampling were followed.

Quadrat of 1x 1m. for herbaceous vegetation, Scale-tape, GPS Instrument, Camera, String, nails, Plastic rods (04), Notebook and Field guide book, Maps, Field diary, Pen, Pencil, Eraser, Ruler etc. are essential. Plant communities or vegetation are best described by perceiving the identity and growth form of most abundant species. A community is characterized by detailing those species which most contribute to its characteristic structure and composition. The study of the structure and composition of each and every plant community is practically impossible. Therefore, rough estimate of species content of a locality has been done by observing the plant species at variety of places, in the habitat. The quadrat method was used for studying the plant communities. The size of a quadrat varies with the type of vegetation studies. For studying woody vegetation, a quadrat of 30mx 30m size was used. The methods used by Misra, (1968); Odum, (1971) [7]; Muller-Dombios (1974); Michael, (1984); and Trivedi, Goel, *et.al*., (1988) were followed for the quantification of the data.

Field Sampling

Herbaceous Vegetation: A quadrat is a square sample plot or unit of applicable size for detailed analysis of vegetation. It is actually a sample plot method (Weaver, and Frederic, *et al.,* 1938) [13]. For the herbaceous vegetation communities, 1m x1m. size quadrats were used.

Field Sampling

Woody Vegetation: A quadrat is a square sample plot or unit of applicable size for detailed analysis of vegetation. It is actually a sample plot method (Weaver, and Frederic, *et al.,* 1938) [13]. For the woody vegetation communities 30 x30 m. size quadrats were used. 170 quadrats were laid down for woody vegetation in the Purandar tehsil. GPS were noted for each and every locality and GBH was also noted of each and every tree species having thickness of stem more than 15 cm.

Materials and Methods

Woody Vegetation: In a phyto-sociological study, field sampling is the first step. Naturalists use different implements and skills. The different ranges of considerations are in use as they are investigated to understand the vegetation structure. To learn the multiplicity of plant communities in the Purandar tehsil, following techniques of sampling were followed. Quadrat of 30 x 30 m. for woody vegetation, Scale-tape, GPS Instrument, Paint, Rope, String nails, Plastic rods (04), Notebook and Field diary, Pen, Pencil, Eraser, Ruler etc. are essential.

Diveghat

It is the northern boundary of Purandar tehsil. It is the main ghat in between Pune and Saswad town. The villages located in this province are Dive, Pawarwadi, Jadhavwadi, Kalewadi and Zendewadi. The vegetation was distressed to a great extent due to selective tree felling and agriculture.

Table 1: Phyto-sociological analysis of herbaceous vegetation- Dive ghat

Botanical name	% Freq.	Freq. Cl.	Rel. Freq.	Abun.	Dens.	Rel. Den.	IVI
Oplismenus burmanii	100	E	6.67	1.00	29.80	15.39	22.06
Cynodon dactylon	70	D	4.67	0.70	21.20	10.95	15.62
Spermacoce hispida	40	B	2.67	0.40	20.90	10.80	13.46
Apluda mutica	90	E	6.00	0.90	13.70	7.08	13.08
Vigna radiata	60	C	4.00	0.60	15.00	7.75	11.75
Commelina sinensis	60	C	4.00	0.60	10.30	5.32	9.32
Aristida funiculata	50	C	3.33	0.50	7.70	3.98	7.31
Cosmos sulphureus	50	C	3.33	0.50	7.30	3.77	7.10
Leucas longifolia	50	C	3.33	0.50	6.80	3.51	6.85
Cynotis tuberosa	60	C	4.00	0.60	5.40	2.79	6.79
Chamaecrista pumilla	10	A	0.67	0.10	11.40	5.89	6.56
Trichodesma indicum	50	C	3.33	0.50	3.80	1.96	5.30
Heteropogon contortus	50	C	3.33	0.50	3.70	1.91	5.24
Vioca indica	50	C	3.33	0.50	2.40	1.24	4.57
Alysicarpus rugosus	50	C	3.33	0.50	1.90	0.98	4.31
Polygala chinensis	40	B	2.67	0.40	2.10	1.08	3.75
Indigofera cordifolia	20	A	1.33	0.20	4.50	2.32	3.66
Kyllinga bulbosa	20	A	1.33	0.20	3.80	1.96	3.30
Xanthium strumarium	30	B	2.00	0.30	2.20	1.14	3.14
Vigna trilobata	40	B	2.67	0.40	0.90	0.46	3.13
Glossocordia bosvallea	20	A	1.33	0.20	3.10	1.60	2.93
Lantana camara (Sap's)	40	B	2.67	0.40	0.40	0.21	2.87
Plectranthes barbatus	30	B	2.00	0.30	1.40	0.72	2.72
Acanthospermum sp	20	A	1.33	0.20	2.30	1.19	2.52
Stylosanthes fruticosa	30	B	2.00	0.30	1.00	0.52	2.52
Pulicaria wighitiana	30	B	2.00	0.30	0.50	0.26	2.26
Rhus mysorense	30	B	2.00	0.30	0.30	0.15	2.15
Sporobolus diander	20	A	1.33	0.20	1.10	0.57	1.90
Boerhavia erecta	20	A	1.33	0.20	0.80	0.41	1.75
Clematis heynei	20	A	1.33	0.20	0.80	0.41	1.75
Launea procumbens	20	A	1.33	0.20	0.40	0.21	1.54
Tridax procumbens	20	A	1.33	0.20	0.30	0.15	1.49
Flacourtia indica	20	A	1.33	0.20	0.30	0.15	1.49
Evolvulus alsinoides	20	A	1.33	0.20	0.30	0.15	1.49
Sida acuta	20	A	1.33	0.20	0.20	0.10	1.44
Carissa congesta	20	A	1.33	0.20	0.20	0.10	1.44
Ledebouria revoluta	10	A	0.67	0.10	1.30	0.67	1.34
Senna gaudichaudii	10	A	0.67	0.10	0.70	0.36	1.03
Caralluma adscandens	10	A	0.67	0.10	0.60	0.31	0.98
Galinsoga parviflora	10	A	0.67	0.10	0.50	0.26	0.92
Oxalis corniculata	10	A	0.67	0.10	0.50	0.26	0.92
Melanocenchris sp	10	A	0.67	0.10	0.40	0.21	0.87
Euphorbia hirta	10	A	0.67	0.10	0.30	0.15	0.82
Urochloea ramosa	10	A	0.67	0.10	0.30	0.15	0.82
Crotalaria calycina	10	A	0.67	0.10	0.20	0.10	0.77
Blumea malcolmii	10	A	0.67	0.10	0.20	0.10	0.77
Themeda triendra	10	A	0.67	0.10	0.20	0.10	0.77
Justicia simplex	10	A	0.67	0.10	0.10	0.05	0.72
Blainvillea latifolia	10	A	0.67	0.10	0.10	0.05	0.72
			100			100	200
Dive ghat N 18^0 24.911' EO 74^0 00.225'					Simpson Index Value = 0.92		
					Shannon Index Value = 3.006		

At Diveghat, the observations and analysis performed has been represented in Table 5.9 A grass *Oplismenus burmanii* shown highest percent frequency (100) followed by *Apluda mutica* (90), *Cynodon dactylon* (70), *Commelina sinensis* and *Cynotis tuberosa* (60 each), *Aristida funiculata, Cosmos sulphureus, Leucas longifolia, Chamaecrista pumilla, Vigna trilobata, Trichodesma indicum, Heteropogon contortus, Vicoa indica, Alysicarpus rugosus* (50 each) *Polygala chinensis*, *Lantana camara* (Saplings) 40 each. *Oplismenus* and *Cynodon* showed high relative frequency (6.67 and 4.67). The species studied were 49 and the individual accumulation number was 1936. Fig. *Oplismenus burmanii (*1.00) was the most abundant grass species. *Oplismenus burmanii* (22.06), *Cynodon dactylon* (15.62) *Spermacoce hispida* (13.46), *Apluda mutica* (13.08), *Vigna radiata* (11.75) shown maximum IVI Justicia simplex and Blainvillea latifolia shown least occurrence and IVI (0.72) respectively.

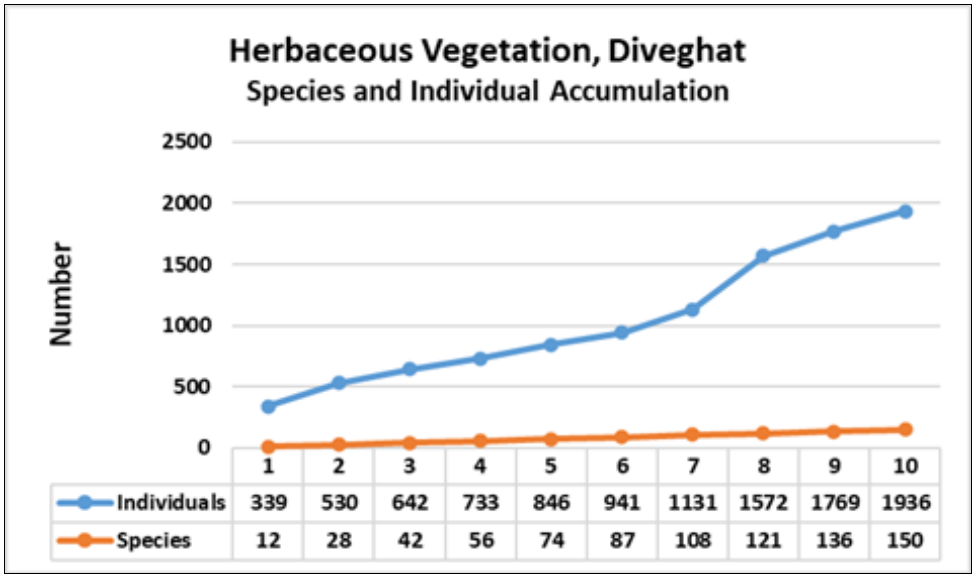

Fig 2: Species and Individuals Accumulation Curve, Diveghat

According to the results, frequency class A represented by 55.1%, indicating the high ratio of low frequency species, class B with 18.37%, class C shows 20.41%, class D 2.04% and class E represented by 4.08 % of the total number of species. As class A is represented by high percentage, it indicates that the vegetation was having more uncommon species resulting in heterogenous type. This region follows the Raunkier's law of frequency. The species are uniformly distributed. Based on these results the equation can be sited as A > B > C > D < E. At Diveghat, anthropogenic activities are being taking place on a very great extent. Due to this, a retrogressive succession is taking place leading to severe damage to the ecosystem.

Table 2: Some important figures and characters of the herbaceous vegetation

Place/ Village	No. of quad	No. of Sps.	No. of Ind.	Abundant species	Raunkiaer's Frequency equation
Diveghat	10	49	1936	*Oplismenus burmanii, Cynodon dactylon, Spermacoce hispida, Apluda mutica, Vigna radiate, Commelina sinensis*	A>B<C>D<E

Diveghat: Woody vegetation-

Analysis: The only species shown highest percentage and relative frequency (90 and 8.74) was *Tecoma stans*. These plants grew luxuriantly at Jejeri- Kadepathar. *Lantana camara* (80 and 7.77) was followed by *Tecoma stans* respectively. *Cissus woodrowii*, *Gliricidia sepium*, *Rhus mysorense* and *Ziziphus maurtiana* found next to *Lantana camara and Tecoma stans.* (70 and 6.80). The density and relative abundance were also high for these two species (13.9, 23.64 and 12.5 and 21.26 each). Table 3

Table 3: Phyto-sociological analysis of Woody vegetation-Diveghat

Botanical name	% Freq	Freq Cl.	Rel. Freq	Abun.	Den.	Rel. Den	Rel. Dom	IVI
Cissus woodrowii	70.00	D	6.80	4.43	3.1	5.27	0.34	12.40
Gliricidia sepium	70.00	D	6.80	7.71	5.4	9.18	98.78	114.7
Acacia leucophloea	50.00	C	4.85	1.60	0.8	1.36	0.09	6.30
Azadirachata indica	30.00	B	2.91	2.00	0.6	1.02	0.04	3.97
Tecoma stans	90.00	E	8.74	15.44	13.9	23.64	0.00	32.38
Lantana camara	80.00	D	7.77	15.63	12.5	21.26	0.00	29.03
Rhus mysorense	70.00	D	6.80	6.71	4.7	7.99	0.05	14.84
Ziziphus maurtiana	70.00	D	6.80	1.29	0.9	1.53	0.03	8.36
Cryptolepis buchnanii	20.00	A	1.94	1.00	0.2	0.34	0.00	2.28
Leucaena leucaecephala	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Sarcostemma intermedium	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Acacia nilotica	30.00	B	2.91	8.33	2.5	4.25	0.21	7.37
Carissa congesta	20.00	A	1.94	4.50	0.9	1.53	0.00	3.47
Acacia auriculiformis	20.00	A	1.94	1.00	0.2	0.34	0.00	2.28
Ficus racemosa	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Vitex negundo	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Diospyros melanoxylon	30.00	B	2.91	6.67	2	3.40	0.13	6.44
Flacourtia indica	50.00	C	4.85	4.80	2.4	4.08	0.03	8.96
Calotropis procera	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Caralluma adscandens	10.00	A	0.97	3.00	0.3	0.51	0.00	1.48
Clematis heynei	20.00	A	1.94	9.00	1.8	3.06	0.00	5.00
Garruga pinnata	10.00	A	0.97	4.00	0.4	0.68	0.00	1.65

Dalbergia lanceolaria	20.00	A	1.94	2.00	0.4	0.68	0.01	2.63
Gymnosporia emerginata	20.00	A	1.94	3.00	0.6	1.02	0.00	2.96
Phoenix sylvestris	10.00	A	0.97	2.00	0.2	0.34	0.01	1.32
Opuntia elatior	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Euphorbia lingularia	10.00	A	0.97	9.00	0.9	1.53	0.00	2.50
Cassia fistula	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Bauhinia racemosa	30.00	B	2.91	2.33	0.7	1.19	0.01	4.11
Eucalyptus globosus	10.00	A	0.97	2.00	0.2	0.34	0.01	1.32
Ailanthes excelsa	20.00	A	1.94	1.50	0.3	0.51	0.03	2.48
Santalum album	10.00	A	0.97	2.00	0.2	0.34	0.00	1.31
Hardwickia pinnata	20.00	A	1.94	1.50	0.3	0.51	0.01	2.46
Gmelina arborea	20.00	A	1.94	3.50	0.7	1.19	0.02	3.15
Tectona grandis	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Phyllanthes emblica	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Cassia siamia	10.00	A	0.97	4.00	0.4	0.68	0.00	1.65
Pongamia pinnata	10.00	A	0.97	1.00	0.1	0.17	0.00	1.14
Tamarindus indica	10.00	A	0.97	3.00	0.3	0.51	0.20	1.68
			100			100		300
Diveghat: Coordinates- N 18^0 24.911' EO 74^0 00.225						Simpson Ind.Value. = 0.87		
						Shannon Index Val.= 2.59		

The number of species studied were 39 and number of individuals were 588 Fig. *Lantana camara* and *Tecoma stans* were abundant (15.63 and 15.44). The highest IVI noted for *Gliricidia sepium* (114.76). The overall woody vegetation was combination of variety of species, the vegetation was heterogenous. *Cissus woodrowii, Gliricidia sepium* and *Acacia leucophloea* formed primary association while secondary was found among *Azadirachata indica, Tecoma stans* and *Lantana camara.*

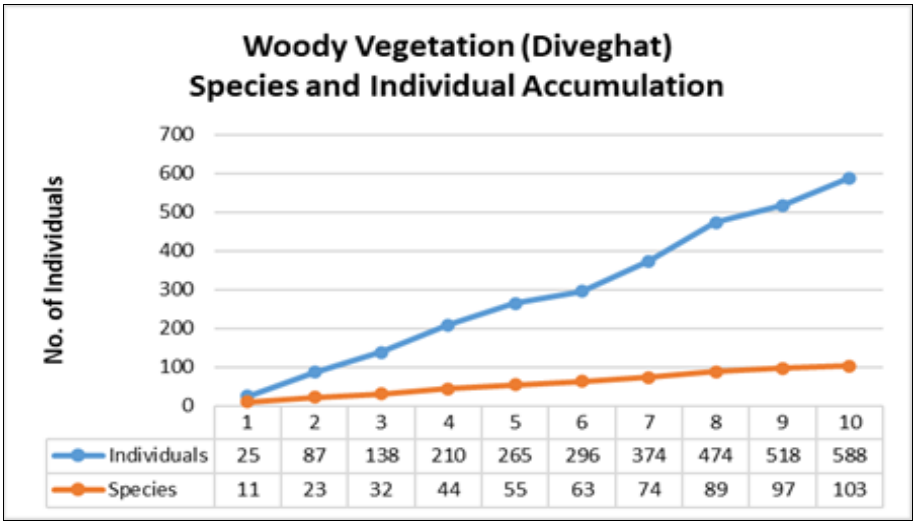

Fig 3: Species and Individuals Accumulation Curve, Diveghat

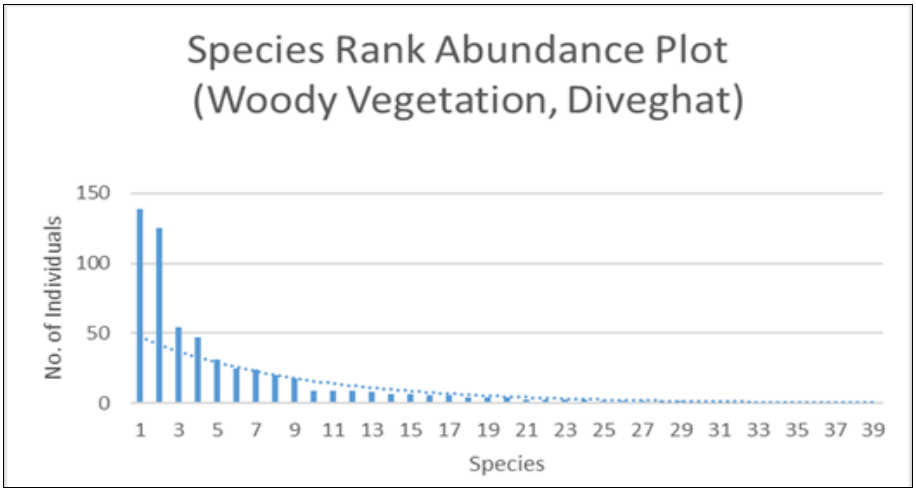

Fig 4: Species Rank Abundance Plot, Diveghat

1	*Tecoma stans*	21	*Caralluma adscandens*
2	*Lantana camara*	22	*Ailanthes excelsa*
3	*Gliricidia sepium*	23	*Hardwickia pinnata*
4	*Rhus mysorense*	24	*Tamarindus indica*
5	*Cissus woodrowii*	25	*Cryptolepis buchnanii*
6	*Acacia nilotica*	26	*Acacia auriculiformis*
7	*Flacourtia indica*	27	*Phoenix sylvestris*
8	*Diospyros melanoxylon*	28	*Eucalyptus globosus*
9	*Clematis heynei*	29	*Santalum album*
10	*Ziziphus maurtiana*	30	*Leucaena leucaecephala*
11	*Carissa congesta*	31	*Sarcostemma intermedium*
12	*Euphorbia lingularia*	32	*Ficus racemosa*
13	*Acacia leucophloea*	33	*Vitex negundo*
14	*Bauhinia racemosa*	34	*Calotropis procera*
15	*Gmelina arborea*	35	*Opuntia elatior*
16	*Azadirachata indica*	36	*Cassia fistula*
17	*Gymnosporia emerginata*	37	*Tectona grandis*
18	*Garruga pinnata*	38	*Phyllanthes emblica*
19	*Dalbergia lanceolaria*	39	*Pongamia pinnata*
20	*Cassia siamia*	40	*Caralluma adscandens*

Analysis

As per the Analysis, frequency class A represented by 69.23%, indicating the high ratio of low frequency species, class B with 10.26%, class C shows 5.13%, class D shows 12.82% and class E represented by 2.56% of the total number of species. Based on this, the equation for Raunkier's frequency classes can be A > B > C < D > E. As class A is represented by high percentage, it indicates that the vegetation was having more uncommon species resulting in heterogenous type.

Herbaceous Vegetation

Result: The villages located in the entire belt are Dive, Sonori, Zendewadi, Pawarwadi. The endemic plant found at Diveghat, in the month of April-May is *Drimia indica* (*Urgenia indica*) belonging to family Liliaceae. The stem of the plant is bulbous. (Modified underground stem). It was present on the rocky slopes of the Diveghat. The Marathi name of the species is Ran-kanda (Wild onion). It is an ephemeral, perennial herb. *Tragia plukanetti* was also found at Jadhav wadi. It belongs to family Euphorbiaceae. The plant is a perennial climbing herb with stinging hairs on the entire plant. It was found in scrub forest on plains. When stinging hair come in contact with human body it results in itching. In the field, one has to be very careful and should be aware of poisonous plants. The silky pods of *Mucuna pruriens* (Khaj-khujli) of family Fabaceae are also harmful. The flora was diverse but human activities has brought destruction to the environment.

The herbaceous plant species found in the region were as follows:

Acanthospermum hispidum, Alysicarpus rugosus, Apluda mutica, Aristida funiculata, Blainvillea latifolia, Blumea malcolmii, Boerhavia erecta, Caralluma adscandens, Carissa congesta, Chamaecrista pumilla, Clematis heynei, Commelina sinensis, Cosmos sulphureus. Crotalaria calycina, Cynodon dactylon, Cynotis tuberosa, Dendropthoe falcate, semi-epiphyte, Euphorbia hirta, Evolvulus alsinoides.

Flacourtia indica, Galinsoga parviflora, Glossocordia bosvallea, Heteropogon contortus, Indigofera cordifolia, Justicia simplex, Kyllinga bulbosa, Lantana camara, Launea procumbens, Ledebouria revoluta, Leucas longifolia, Melanocenchris jacquemontii, Oplismenus burmanii, Oxalis corniculata, Plectranthes barbatus, Polygala chinensis, Pulicaria wighitiana, Rhus mysorense, Senna gaudichaudii, Sida acuta, Spermacoce hispida, Sporobolus diander, Stylosanthes fruticosa, Themeda triendra, Trichodesma indicum, Tridax procumbens, Urochloea ramosa, Vigna radiata, Vigna trilobata, Vicoa indica, Viscum articulatum, epiphyte, an undershrub, an epiphyte grows on Acacia sps. Drimia indica belonging to Liliaceae were also reported. It is a perennial rhizomatous herb, it was found in flowering during April and May.

Diveghat: (Woody Vegetation) Result: It is on the northern boundary of Purandar tehsil. Though the flora is rich here, anthropogenic activities are taking place on a very large scale. The upper portion of the ghat section consists a lot more plastic, which have hapered the vegetation.

The woody vegetation consists of Acacia auriculiformis, Acacia leucophloea, Acacia nilotica, Ailanthes excelsa, Azadirachata indica, Bauhinia racemosa, Calotropis procera, Caralluma adscandens, Carissa congesta, Cassia fistula, Cassia siamia, Cissus woodrowii, Clematis heynei, Cryptolepis buchnanii, Dalbergia lanceolaria, Diospyros melanoxylon, Eucalyptus globosus, Euphorbia lingularia, Ficus racemosa, Flacourtia indica, Garruga pinnata, Gliricidia sepium, Gmelina arborea, Gymnosporia emerginata, Hardwickia pinnata, Lantana camara, Leucaena leucaecephala, Opuntia elatior, Phoenix sylvestris, Phyllanthes emblica, Pongamia pinnata, Rhus mysorense,

Santalum album, Sarcostemma intermedium, Tamarindus indica, Tecoma stans, Tectona grandis, Vitex negundo and Ziziphus maurtiana.

The flora represents families like Mimosaceae, Simaroubaceae, Meliaceae, Caesalpinaceae, Asclepiadaceae, Apocynaceae, Ranaculaceae, Fabaceae, Ebenaceae, Myrtaceae, Euphorbiaceae, Moraceae, Flacourtiaceae, Burseraceae, Verbenaceae, Celastraceae, Anacardiaceae, Santalaceae, Cactaceae, Bignoniaceae, and Rhamnaceae. *Phonix sylvestris*.

Ecological restoration is a practical aspect of ecology and it is essential for the re-gaining the degraded, damaged and deteriorated ecosystems. It is essential for health, reliability and the most important is the sustainability of the environment. The ecosystem restoration actions should be based on the assessment of the given area. A semi-arid as well as semi-critical tehsil like Purandar shares its borders with villages, agriculture and mountainous regions, due to which entire region always remains under continuous human disturbance that brings about the deterioration of the ecosystems.

The foremost step in strategizing the plan for the restoration and management of the project is the meticulous and thoughtful selection of workable plan. It is based on the status and features influencing an area. After repeated visits during 2014 to 2020 in the tehsil, it was observed that some major concerns should be taken into the consideration for the successful restoration and management of threatened and endangered plant species. The following are some of the concerns for depletion of the vegetation in the tehsil.

The Mukhymatri Gram Sadak Yojana (Chief Minister Village Road Development Scheme), road widening has resulted into loss of agricultural land (From Village Dive to Morgaon). Pollution in the form of plastic water bottles and wine bottles at the Dive ghat top portion as well as at some other places is not affordable.

Fig 4: Dive ghat: Present Scenario (Year 2026)

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Thanks to senior researcher's belongs to field Botany. Investigator has received 'Nehru Yuva Gaurav Award' Govt. of India (Youth & Sports Ministry) through National Service Scheme in the year 2005. He has documented 1,352 species of flowering plants and laid down 300 quadrats to study herbaceous vegetation and 170 quadrats ti study woody vegetation (Phytosociology) in Purandar Tehsil during the period 2014–2022 as part of his Ph.D. research work. His study on biodiversity has been extremely valuable and serves as an important guide for researchers.

His contributions in the fields of education, research, environmental conservation, biodiversity studies, and social service are highly remarkable. In recognition of his dedicated and service-oriented work, he was honored with the 'Paryavaran Seva Puraskar' by Minister of Information Technology, Government of Maharashtra, on 14th May 2025[2] at a function organized and sponsored by Purandar Pratishthan on the Purandar fort. (News Ref. Daily Sakal Marathi Newspaper, Pune Edition, dated 15th May 2025) [2]

Conclusion

Since 2004, environmental awareness initiatives coordinated through the National Service Scheme (NSS) of Savitribai Phule Pune University have integrated ecological activities with the Wari pilgrimage. These activities include plantation drives, cleanliness campaigns, and watershed development measures such as continuous contour trenching in collaboration with the Forest Department. However, recent infrastructure developments, particularly highway widening and rural road expansion under various development schemes, have resulted in habitat fragmentation, vegetation loss, and increased anthropogenic pressures within the region.

The fruit crops grown in Purandar tehsil are Custard apple, Figs, Guava, Chiku and Pomegranate while Marigold is grown on a very large scale. Few farmers has started the cultivation of cut flowers in polyhouses. After the completion of the proposed International air port project, fruits and cut flowers would be exported to foreign countries by farmers which will ultimately result in boosting the economy of the tehsil.

The study highlights the ecological importance of Dive Ghat as a biodiversity-rich landscape and recommends the development of long-term restoration strategies, compensatory afforestation programs, roadside plantation schemes, and conservation measures for threatened and endemic plant species. Furthermore, the integration of community participation through culturally significant events such as the Wari offers a sustainable model for environmental stewardship. The findings provide valuable baseline data for future ecological planning, biodiversity

conservation, and environmental impact assessment in Purandar Tehsil and the proposed airport influence zone.

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