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Abandonment of natural breeding sites by vultures in Orchha, Tikamgarh District, Madhya Pradesh, India: A case of preventable disturbance

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Fig.1a: Egyptian vulture in nest

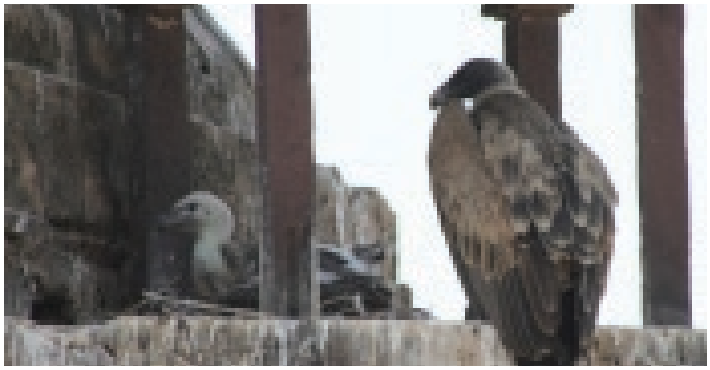

Fig.1b: Long-billed or Indian vulture with Chick

Abstract

Vultures are an integral part of the ecosystem where they play a role of scavengers. The declining population of vultures reflects imbalances leading to consequences such as a rise in the population of feral dogs and increasing attacks on humans and other wildlife (per. observations). Orchha in Tikamgarh district of Madhya Pradesh is one such place which is well known for a good population of Critically Endangered Long-billed or Indian Vultures (*Gyps indicus*) and Endangered Egyptian Vultures (*Neophron percnopterus*). Both these species are breeding in the niches in monuments of the holy city famous for its Raja Ram Temple. We are regularly monitoring this population since 2008. The coordinated efforts of various government departments and NGO's in the past had contributed in maintaining the vulture population in Orchha. However, the recent activities due to human negligence are encouraging the scavengers to move away from Orchha. The problem is becoming all the more complicated with the upcoming 3 day Namaste Orchha Festival from 6th to 8th March 2020. The case study of Orchha reflects the contradictory approach of conservation agencies towards vulture protection. While spending significant finances on *ex-situ* conservation the encouragement to such festivals in vulture habitats is disturbing the in-situ natural breeding sites. The situation requires urgent actions and co-ordination by the concerned departments to protect the in-situ breeding habitat of the dwindling vulture population and provide them the protection that is due for Critically Endangered birds.

Introduction

The declining population of vultures is multi-factorial and has consequences such as increase in other scavenging species like feral dogs which in turn pose significant threats to wild life and humans. The

Table 1: Number of nests in the monuments of Orchha

S.No	Monument	Nests in 2018	Nests in 2019	Species
1.	Chaturbhuj temple	8	2	*Gyps indicus*
2.	Cenotaphs	14	9	*Gyps indicus, Neophron percnopterus*
3.	Ramnagar Gate	1	0	*Neophron percnopterus*
	Total	**23**	**11**	

number of natural habitats occupied by the vulture colonies is decreasing everyday reducing the chances of revival of these highly evolved scavengers. Orchha in Tikamgarh district of Madhya Pradesh is one such place which is well known for the promising population of Critically Endangered Long-billed Vultures (*Gyps indicus*) and Endangered Egyptian Vultures (*Neophron percnopterus*) that are breeding in the monuments of Orcha city famous for its architect and Raja Ram Temple (Fig.1a & b).

Methodology

This study was undertaken from December 2018 to December 2019 to document the status of the unremitting affect of human activities on the surviving vulture population in Orchha in Tikamgarh district, Madhya Pradesh. Human activities were recorded during the monitoring of different vulture species in the study site. Observations were made from a distance of about 500 m from the nests, using binoculars, without disturbing the vultures in the morning from 8:00-10:00 hour, 11:00-13:00 hour in the noon and 15:00-17:00 hour in the evening. For analysis, activities were grouped in five categories according to the type of disturbance to the vulture species. The five categories include: renovation / cleaning, lighting, camera shooting, use of drones and tourists activities at nesting / roosting sites.

Result and Discussion

The cleaning and renovation of monuments has resulted in the direct destruction of nests as well as disturbances that indirectly encourage the breeding pair to abandon the nest. The number of nests has reduced to almost half as compared with the previous year (Table 1).

The number of nests within a decade has also declined drastically. A decade before, about nine different monuments in Orchha provided suitable nesting site to the vultures with about 35 nests in active position with successful breeding (Kushwaha 2014). At present the number of monuments inhabited by vultures is only two having only 11 nests (Table 2).

Table 2: Decreasing number of nests within a decade at Orchha: comparison between years.

S.No.	Monument/Temple	2010-11	2019-20
1.	Laxmi Narayan Temple	2	0
2.	Raja Ram Mandir	2	0
3.	Phool Bagshish Mahal	2	0
4.	Chaturbhuj Mandir	8	2
5.	Jahangir Mahal	5	0
6.	Toopchi ki Hawaeli	2	0
7.	Cenotaphs (Chhatris)	12	9
8.	Ramnagar Gate	1	0
9.	Suparishaav ka Mahal	1	0
	Total	**35**	**11**

Fig.2: Cleaning of monuments for Orchha festival

Vultures are slowly and steadily leaving various nest sites on Orcha monuments. Jehangir Mahal, Laxmi Narayan Temple, Phool Bagshish Mahal, Raja Ram Mandir, Toopchi ki Hawaeli, Ramnagar Gate and Suparishaav ka Mahal are some of the memorials that have been deserted by the vultures.

In the past, the coordinated efforts of various departments had helped in maintaining the vulture population in Orchha (Kushwaha *et al*., 2016; Kushwaha & Rawat 2016). There were disturbances to the vultures in year 2010 and 2011 due to various reasons such as colouring and renovation of temples and monuments and also because of cinema shooting by renowned film industry (Kanaujia & Kushwaha, 2015). This threat was taken seriously by the then Forest Department after researchers and conservationists took the matter to the Ministry. With the active support from the Archaeological Department, prompt measures were taken to ensure the protection of vultures. Press and other media played an important role in stopping the cinema shooting further reducing disturbance (Kushwaha 2014; Kanaujia & Kushwaha, 2015). It was found that renovation work and shooting of advertisements and movies if carried out during the breeding period of vultures leads to significant disturbance (i.e. September to May).

However, resuming of recent human activities is pushing the vultures to abandon the breeding sites of Orchha. The problem is likely to increase with the upcoming Orchha Festival in March 2020. The renovation and decorations of the structures sheltering vulture nests as a part of Orchha Festival are having a negative effect on breeding Long-billed Vultures. There is reduction in parental attendance at nests due to human disturbance and reduced parental care that is known to negatively affect growth of the nestlings

Fig.3 Closed entrance of cenotaphs till 2018

Fig.4: Notice board regarding importance of vultures

(Fig.2). Vultures are sensitive birds; and the disturbances caused due to various activities by the labor are forcing them to reduce the number of visits to the occupied nest with chick. The vultures were observed for more than 75% of time budget perching on nearby lamp posts or other structures watching the nests from a distance and spending less than 25% of time budget on the nest. Vulture chick is altricial and poikilothermic for several days after hatching. Therefore parents brood it until it is able to thermoregulate. The disturbances are forcing the parent vultures to leave the chicks unattended in the extreme low temperature of December-January (2°C-15°C). This is likely to lead to morbidity or mortality in nestlings of Long-billed vultures in Orchha. Late provisioning of food has been described as a cause of vulture chick mortality in Long-billed Vultures (Pande et al 2015) thereby emphasizing the need for steady food supply at nest site. Disturbance at nest can therefore be quite fatal and importance of absence of disturbance .during breeding season cannot be neglected.

In the past active involvement of Forest Department had lead to the organization of a number of multi-disciplinary awareness programs and workshops in Orchha. As a result of this various initiatives were taken for the protection and monitoring of the vultures breeding in the monuments. However, over a period of time this co-ordination started losing strength. The archeology staff used to keep upper floors of cenotaphs closed for all the visitors so as to minimize the disturbances to the breeding birds. A signage was also placed to emphasize the importance of vultures (Fig.3 & 4). Recently, the scenario has changed and visitors are allowed to go the upper floors, thereby causing disturbance to breeding vultures.

The recent lack of coordination between the Forest and Archaeological epartments in Orchha has lead to the abandonment of natural breeding sites by few Long-billed Vultures and Egyptian vultures. Although it was agreed that the spatial and chronological restrictions should be undertaken to protect vultures during the sensitive period of breeding, the ground scenario is on the contrary (Kushwaha, 2014). Several studies have been undertaken on the behavioral responses of vultures as to how, when or what type of human activities may be disturbing the breeding vulture population so as to optimize the management and conservation actions (Kanaujia & Kushwaha 2009a & b; Kanaujia & Kushwaha 2012; Kushwaha 2014; Kushwaha 2016; Kushwaha & Kumar 2018). The case study of Orchha reflects the need of immediate Government inter-disciplinary coordination to save the breeding sites of vultures for their long term conservation. On one hand significant amounts are spent on *ex-situ* conservation of vultures (captive breeding, GIS studies and vulture census) and on the other hand protection of the natural *in-situ* habitats of the Critically Endangered vultures is being neglected. Strict implementation of the provisions of the Wildlife Protection Act, 1972 should be used to stop disturbance to the nesting sites of the Critically Endangered species for their conservation.

Conclusion

Orchha, a town with cultural heritage and historic monuments is a tourist destination on national

and international importance. With a increasing tourist pressure, the Archeological department is unintentionally allowing disturbance to nesting vulture population on cenotaphs and archeological monuments. The situation requires urgent conservation measures and co-ordination between the concerned departments so as to bring to a halt the reducing vulture population by way of site abandonment and provide them the protection that is needed for Critically Endangered birds.

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Authors thank Mr. Narayan Singh (Retd), Caretaker of Cenotaphs, Department of Archeology, Orcha, for his love for the vultures who kept a keen eye on them while performing his daily duty.

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Report of four species of flowering plants from Satpuda hill Ranges of Jalgaon district, Maharashtra.

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Abstract

The present paper reports four species of flowering plants, two from Orchidaceae family and one each from Apocynaceae and Lentibulariaceae family. The species reported for the first time from Jalgaon district, Maharashtra are *Peristylus plantagineus* (Lindl.) Lindl., *Eulophia ochreata* Lindl., *Heterostemma dalzellii* Hook and *Utricularia aurea* Lour. Occurrence of these species from Satpuda hill ranges highlights the quality of biotope of this forest and also the need for conservation of their unique habitats. The study provides relevant and detailed taxonomic, morphological information and photographs of these plants.

Introduction

Jalgaon one of the thirty-six districts of Maharashtra, is situated at the northernmost border of the state. The district is bordered by Madhya Pradesh in the north, and by Aurangabad district in the south. The Bheels, Pawaras and Tadavis are the dominant tribes in Satpuda hills, having a rich cultural diversity. In some remote areas, they still lead their traditional way of life, untouched by modernity. They are totally dependent on forests for their day-to-day requirements. The forests of Jalgaon district are of the tropical dry deciduous type. The general topography of the area consists of steep hills with open as well as dense forest patches of dry deciduous forest. Wherein the *Tectona grandis* L.f., *Hardwickia binata* Roxb., *Garuga pinnata* Roxb., *Boswellia serrata* Roxb., *Lannea coromandelica* (Houtt.) Merr., are the predominant species of trees, intermingled with several associated species such as *Bombax ceiba* L., *Mitragyna parviflora* Roxb., *Lagerstroemia parviflora* Roxb., *Terminalia arjuna* (Roxb.) Wight & Arn., *Haldina cordifolia* Roxb., *Wrightia tinctoria* R. Br. etc.

The forest undergrowth is dominated by *Cassia pumila* Lam., *Trichodesma indicum* L., *Justicia spp., Leucas spp., Canscora diffusa* Vahl., *Cleome monophylla* L. etc. Grasses like *Melanocenchris jacquemontii* Jaub & Spach., *Alleteropsis cimicina* (L.) Stapf., *Capillipedium filiculme* (Hook. f.) Stapf., *Spodiopogon rhizophorus* (Steud.) Pilger., *Paspalidium flavidum* (Retz.) A. Camus., *Apluda mutica* L., *Themeda spp., Aristida spp., Setaria spp.,* etc. are commonly found in these forests. 10 species of orchids have been reported from Jalgaon district so far (Kshirsagar, 2008, Khan, 2019). Though much of the forest patches are dry except monsoon season, some pockets of the Satpuda hills remain wet even during the driest part of the year. These forest patches provide a unique habitat for some of the rare plants of the region.

During our botanical exploration in Satpuda hills and around Hatnur dam back-waters, 4 interesting plants were observed for the first time, two from Orchidaceae, one from Apocynaceae and one from Lentibulariaceae family. Both the orchids observed are terrestrial orchids found on the slopes of the hills under the shade of trees amongst the bamboo clumps. Close examination with the help of literature and morphological scrutiny of the plant specimens reveals that they are not recorded earlier from Satpuda ranges of Jalgaon district. These four plant specimens are identified as *Peristylus plantagineus* **(**Lindl.) Lindl., *Eulophia ochreata* Lindl., *Heterostemma dalzellii* Hook. f. *and Utricularia aurea* Lour. which are new records to the flora of Jalgaon district.

Materials and methods

During our biodiversity expedition visits in Satpuda hill ranges of Jalgaon district and Hatnur dam back-waters from January 2018 to December 2019 we came across four interesting plant species, *Peristylus plantagineus* (Lindl.) (Orchidaceae) Lindl from Aamba-pani forest. 7 individuals of this species were observed growing on hill slopes in leaf litter amongst bamboo clumps along a stream under the shade of trees like *Terminalia elliptica Willdenow., Albizia amara* (Roxb.) Boiv. *and Mitragyna parviflora* Roxb., *Eulophia ochreata* Lindl. (Orchidaceae) from Munjoba forest, was seen growing on hill slopes in loose soil along a stream, with yellow flowers appearing with leaves. *Heterostemma dalzellii* Hook (Apocynaceae) from Mandapnala forest on hill slopes in damp patches of the forest in leaf-litter along the ground, sharing habitat with *Habenaria furcifera* Lindl. and *Habenaria plantaginea* Lindl.. *Utricularia aurea* Lour. (Lentibulariaceae) from Hatnur dam was seen in flowering in the dam's back-waters along the bank of rivers Tapi and Purna in association with other aquatics like *Ipomoea aquatica* Forssk., *Marselia quadrifolia* L. etc. The species were identified by pertinent literature (Hook, 1890; Lakshminarasimhan et al 1996; Singh et al, 2001, Jalal 2018; Jalal, 2019, Pande et al, 2010, Ingalhalikar, S. 2007) and were also confirmed by Dr. R.G.Khose, Ahmednagar and Dr. Milind Sardesai, Department of Botany, S.P.Pune University, Pune. GPS reading for the location, date of findings of plants were extracted from GPS enabled digital camera. All photographs of plants are captured by Prasad Sonawane. No herbarium of plant specimens is made as only a few individuals of these species were seen on the field.

Observations

Peristylus plantagineus **(**Lindl.) Lindl. Gen. Sp. Orchid. 300. 1835; Cooke, Fl. Pres. Bombay 2: 711. 1907; Santapau & Kapadia, Orch. Bombay 51. 1966;

Lakshmin. in B. D. Sharma *et al*., Fl. Maharashtra: Monocot. 57. 1996; Pande & Sant, Wild Orch. Nor. Wes. Gh. 112. 2010; Jalal, Orch. Maha. 193. 2018; Singh, S. *et al*, Orch. India, 422. 2019; *Habenaria wightii* Trim. Cat. Ceyl. Pl. 91.1885; Hook. f. Fl. Brit. India 6: 162.1890; *Herminium plantagineum* Lindl., Edwards's Bot. Reg. 18: t. 1499. 1832. *Peristylus elatus* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 344. 1851. "Tongue Orchid", "Jivha Pushp".

Herbs, 20-90 cm high; tubers 2, oblong or ellipsoid. Stems robust, sheathed below leaves. Leaves 4-6, 8-24 × 4-9 cm, oblong, oblong-lanceolate to broadly elliptic or elliptic-ovate, acute, margin entire, minutely papillose, nerved, Spikes 10-30 cm long, erect, densely many-flowered. Flowers sessile, bracteate, white-brown. Lip: 0.2-0.35 cm. White, shortly trilobed. Globose spur. Capsules c 1.0 ×0.2 cm, curved at apex.

Tongue Orchid is a terrestrial, annual, tuberous, herb, growing 20-90 cm high in moist deciduous forests to semi-evergreen forests, also grasslands in forested areas. Tubers 2, ellipsoid or oblong. Stem is stout, brown, sheathed by the leaf bases. Leaves 4-8, clustered at the middle of the stem, 10-20 cm, sheathing, sessile, oblong, acute, 5-7 nerved. Flowers are borne in dense upright spikes 10-30 cm long. Peduncle is 5-10 cm long; bracts 2 cm. Spur is globose shorter than the sepals. Lip of the flower resembles tongue, hence the name, tongue orchid. Capsules 1 cm, curved at apex, ribbed.

Flowering and fruiting: July – October

GPS reading- N 21^{0}35' 42.30'' E 75 ^{0} 60' 53.78''

Distribution- Rare. In Satpuda hills grows on the slopes of the hills under the shade of trees amongst the bamboo clumps, also in cleared forest areas and along forest paths, along the streams. In Maharashtra it is reported from Bombay, Chandrapur, Kolhapur, Pune, Raigad, Ratnagiri, Sindhudurg, Thane, Yavatmal.

Eulophia ochreata Lindl. In J. Linn. Soc., Bot. 3. 24. 1858; Hook. f. Fl. Brit. India 6: 2. 1890; Cooke, Fl. Pres. Bombay 2: 693. 1907; Santapau & Kapadia Orch. Bombay 109, t.27. 1966; Lakshmin. in B. D. Sharma *et al*., Fl. Maharashtra: Monocot. 29. 1996; Pande & Sant *Wild Orch. Nor. Wes. Ghats* 80, 2010; Jalal, Orch. Maha. 98. 2018; Singh, S. *et al*, Orch. India, 287. 2019; "Gold Crest" "Suvarna Shikha" "Pivla Amarkand".

Pseudobulbs c 4.0×2.5 cm, ovoid-conical, markings,

irregular, transverse and longitudinal. Leaves 2-5, arising from base of pseudobulb, 13-28 × 4-10 cm, sheathing at base, oblong-lanceolate, lanceolate-ovate or ovate–elliptic, acute, entire. Scapes appearing with leaves from pseudostem, 25-45 cm long. Flowers in dense racemes, clustered at top of scape, c 1.5 cm across. Capsules – not observed.

Small terrestrial herb, 20-30 cm high. Pseudobulbs are green, 3-4 cm, ovoid conical and sheathed. 2-5 leaves arise from the pseudostem, 13-28×4-10 cm, lanceolate, oblong and acute. Leaves show with very prominent parallel venation. Flowers yellow red, in dense racemes 10 cm, on scapes 20-40 cm; scapes arising from the base of the pseudobulbs; pedicels 1 cm; bracts 1 cm, linear-lanceolate; sepals 1 cm, linear, nerved; lip 1.3 cm; obscurely trilobed, yellow, purplish at base.

Flowering & fruiting- June – October

GPS reading- N 21^{0}32' 99.27'' E 75 ^{0} 59' 36.23''

Distribution- Rare terrestrial orchid. Found in dry and moist deciduous forests. Also occurs in grass fields. In Satpuda hills found on hill slopes on loose soil, in crevices of rocks, flowers appear simultaneously with leaves usually in undergrowth of thin forests under the shade of trees amongst bamboo clumps. In Maharashtra it is reported from Amravati, Mumbai, Chandrapur,

Kolhapur, Pune, Thane.

Heterostemma dalzellii Hook. f. Fl. Brit. India 4:48. 1883; Cooke, Fl. Pres. Bombay 2: 168. 1904; Santapau & Irani in Univ. Bombay Bot. Mem. no. 4:51. 1962; Jagtap et N.P. Singh in Fasc. Fl. India 24: 249. 1999; Singh, N. P. *et al* Fl. Maha. Dicotyledons. 2: 365, 2001; Ingalhalikar, S. *Furt. Flo. Sahy*. 345. 2007; *Heterostemma wallichii* Dalz. & Gibs. Bomb. Fl. 152. 1861, non Wight,1834.

Twining shrubs; stems terete, swollen at nodes, sparingly branched, puberulous, internodes longer near base with purple tinge. Leaves opposite, petiolate, 16×13 cm, broadly ovate, apex subacute, base rounded, petioles 3-7 cm, upper leaves 9-12× 4-6 cm, ovate-oblong, sparingly appressed hairy above. Flowers in lateral, umbellate cymes on stout peduncles; peduncles arising from between petioles; pedicels 6mm; peduncles and pedicels pubescent; corolla 1.0-1.5 cm across, rotate, glabrous within, lobes divided 1/2 way down, ovate, acute; corona of 5, large lobes, purple, adnate to staminal column and projecting horizontally; gynostegium 1 mm long. Follicles in pairs, 9-10 cm long, straight, gradually tapering at apex, cylindric, purple.

Flowering & fruiting- September-October
GPS reading- N $21^0$35' 44.68'' E 75 ^{0} 60' 64.53''
Distribution- In Satpuda, rare in undergrowth of forests on hill slopes along streams. In Maharashtra it is reported from Mumbai, Pune, Ratnagiri.

Utricularia aurea Lour. Fl. Cochinch. 1: 26. 1790; Janarthanam & Henry. Bladderworts of India 30, f. 5.1992; Singh, N. P. Fl. Maha. Dicotyledons. 2: 563, 2001; Ingalhalikar, S. *Furt. Flo. Sah.* 468. 2007; *U. flexuosa* Vahl, Enum. Pl. 1: 198, 1804; C. B. Cl. In Hook. f. Fl. Brit. India 4: 329. 1884; Cooke, Fl. Pres Bombay 2: 316. 1907; 'Son Jathari'.

Herbs, aquatic, stoloniferous. Leaves 3-6 cm long, in whorls, filiform, globose bladders near base of each pinna. Flowers yellow, in erect racemes; peduncles 20-22 cm long. Capsules- not observed.

Utricularia aurea Lour. is a small submerged, floating, aquatic herb; roots floating as mass in water. Leaves 3-6 cm, in whorls of 4, pinnately divided in 3-5 segments, each segment with a bladder. Flowers 5-10, in erect racemes 10-20 cm; peduncles without floats; pedicels 8-15 mm, spur as long as lip.

Flowering and fruiting- November –March
GPS reading- N $21^0$07' 81.33'' E 76 ^{0} 01' 29.14''
Distribution- Frequent in backwaters of Hatnur dam and along the bank of Purna river. In Maharashtra reported from Bombay, Chandrapur, Pune.

Result

We have gone through all pertinent literature (Kshirsagar, 2008; Patil, 2003, Khan, 2019) to find out the occurrence, distribution and habitat of above reported species. We found that, these species were not reported in any of the Jalgaon and even Dhule and Nandurbar district floras. This clearly reveals that, these species are rare to flora of these districts and even Maharashtra state on the whole. These species are new record to the flora of Jalgaon district of Maharashtra State. On detailed scrutiny of literature published till today on these taxa, it can be claimed that these are

new records for Satpuda range of Jalgaon district of Maharashtra. These species are very rare to Jalgaon district, and are facing major threat to their survival because of habitat loss from encroachment by misuse of Forest Rights Act, cattle grazing & trampling, deliberate forest fires, invasion of alien plant species, unsustainable exploitation etc. A major crucial step in saving floral diversity is to secure the places where such species live. Hence effective environmental awareness programmes need to be carried out amongst the tribals to involve them in conservation of pristine Satpuda forest.

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Diversity, Status and Frequency of Butterflies at Pachamalai Hills, Thuraiyur Range, Eastern Ghats, India

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Abstract

This study was undertaken to record the current diversity and status of butterflies in the Pachamalai hills (11° 09' 00'' to 11° 27' 00'' N and of 78° 28' 00'' to 78°49' 00'' E) in central Tamil Nadu, India. The study was conducted in six reserve forests (RF) including tropical thorn forests, deciduous forests and evergreen forests in Pachamalai hills following point count, opportunistic search and transect or Pollard walk method. The obtained data were analysed for diversity, relative abundance, status and frequency. 122 species of butterflies approximately 39 % of the butterflies found in Tamilnadu were recorded. 37 species of very rare butterflies and 10 species of butterflies listed in Wildlife Protection Act necessitates the conservation and in-depth research in the area.

Key words: Status, butterflies, Pachamalai Hills, Eastern Ghats

Introduction

Information on faunal diversity can be used as a baseline for measuring changes in the environment. Butterflies are commonly used as indicators of the state of the environment because of their biological suitability (short lifecycles, identification simplicity) and because of their popularity and beauty (Van Swaay *et al*., 2008). India's butterfly diversity was first studied by Brigadier William Harry Evans, a lepidopterist and British Army officer who served in India; he had recorded approximately 1439 species of butterfly from British India, including Ceylon and Burma. After 1947,when India became independent and the rise of several new nations led to a reduction of the area forming part of India proper, and the number of species has been noted to be an estimated 1318 species. (*Evans, W.H. (1932), The Identification of Indian Butterflies*).

Review of Literature

Quite a few studies on butterflies had been undertaken in Eastern Ghats. Medicinal plants (Kolar and Basha, 2013, and tree species (Kanagaraj *et al.,*2016) have been recorded. About 150 species of butterflies were recorded in Eastern Ghats by Gunathilagaraj *et al.,* 1998 and seasonality, larval and adult nectar host plants, mating behavior, and life cycle stages were described for 70 species of them (Gunathilagaraj *et al.,* 1998, Venkataramana, 2010). The validation of longitudinal migrating swarms of danaids from Western Ghats to Eastern Ghats implies the significance and need of further exploration of the region. (Johnson 1969; Williams 1958). However there is lacuna in studies pertaining to status and other biological butterflies in Pachamalai hills. So the present study was undertaken to fill the void that would enlighten with the status of butterfly species in the Pachamalai hills.

Aim

To determine the diversity, status and frequency of butterflies at Pachamalai hills, Thuraiyur range Eastern Ghats, India

Study Area

The Pachamalai hills are situated in North-western border of Tiruchirappalli district. The Pachamalai hills with latitudes 11° 09' 00'' to 11° 27' 00'' N and longitudes of 78° 28' 00'' to 78°49' 00'' E are situated at the central region of Tamil Nadu, India. They occupy an area of about 527.61 sq. km with altitudes ranging from 160 to 1072 m AMSL. The mean annual rainfall ranges between 110 -150 cm and maximum amount of rainfall is received during northeast monsoon. The vegetated area is distributed into 35 Reserved Forests totalling 19075.96 ha. In Reserved Forests, all activities

Figure 1: Study Site Map

such as hunting, logging, harvesting of forest products are prohibited unless permitted. Practically all these forests are classified under three types namely Scrub Jungles – up to 400m (foot hills) Deciduous forest – 300 to 900m (slopes) Evergreen forest - 800 to 1300m (Plateau).

The present study was carried out in six reserve forests (RF) in Pachamalai Hills namely Sengattupatti RF (281m AMSL), Sengattupatti Extension RF (347m AMSL), Solaimathi RF (842m AMSL), Kannimar Solai RF (706m AMSL), Manaloodai RF (628m AMSL), Melur RF (219m AMSL). Six locations, two sites in each forest types were selected for the study including two slopes to the east and west sides of the hill (Fig 1).

Methodology

The observations were made fortnightly from July 2014 to June 2016 during morning between 8·30a.m. to 11·30 a.m. when the butterflies were most active (Kunte, 1997). Three methods were followed for the study. Point count census was carried out at every 100m point along the transect (1.0km) in each selected site; and in all 11 points were sampled along the entire length of the transect. The second method used was opportunistic search which was a survey carried out in a smaller area or micro habitat whenever encountered mainly to record the microhabitat specific butterfly species. Finally, transect method or Pollard walk method was followed in which individual adult butterflies along the set routes (Pollard 1977; Pollard & Yates 1993) were recorded by walking at a slow and constant pace, covering the transect line in about 30 minutes; all individuals seen up to 5m heights and distances from the transect were recorded. The data were analysed for diversity, relative abundance, status and frequency class. The status were categorized into five categories on the basis of their abundance. VC - very common (11-12 months sightings; C – common (8 – 10 months sightings); NR - not rare (5-7 months sightings); R – rare (3 – 4 months sightings) and VR - very rare (1-2 months sightings) (Ramana, 2010).

Results

Diversity of butterflies at Pachamalai hills

The study of butterflies at Thuraiyur range of Pachamalai Hills, Eastern Ghats during the period July 2014 to June 2016 revealed the presence of 122 species belonging to five families – Hesperidae -19

species, Papilionidae - 10species, Pieridae - 23species, Lycanidae - 35species and Nymphalidae - 35species. Approximately 39 % of the butterflies found in Tamilnadu were recorded in Pachamalai hills demonstrating the significance and richness of the region.


Southern Birdwing


Blue Oakleaf


Common Rose


Slate Flash

Table 1: Diversity of butterflies at Pachamalai hills and Tamilnadu

Family of butterflies	No. of species in Pachamalai	No. of species in Tamilnadu	% ratio
Hesperidae	19	83	22.9
Papilionidae	10	19	52.6
Pieridae	23	32	71.9
Lycanidae	35	92	38.0
Nymphalidae	35	96	36.1
Total	**122**	**312**	**39.1**

Table 2: Diversity, status and frequency of butterflies at Pachamalai Hills

S. No	*Common Name*	*Occurrence (Months)*	*Relative Abundance*	*Status*	*Frequency Class*
	HESPERIIDAE				
1	Orange Awlet**	7-8	*	VR	A
2	Orange- tail Awl^{+}	8,10	*	VR	A
3	Oriental Common Banded Awl	6-10	***	NR	D
4	White banded Awl$^{\#}$	10	*	VR	A
5	Plain banded awl$^{+\#}$	10	*	VR	A
6	Brown Awl**	5-8	**	R	A
7	Malabar Spotted Flat	9-11	**	R	B
8	Common Small Flat**	7,9-12	***	NR	B
9	Indian Skipper	8-11	**	R	C
10	African marbled skipper	9-11	**	R	C
11	Suffused Snow Flat**	10-12	**	R	A
12	Common Grass Dart	2,8	*	VR	A
13	Common Dartlet	7,11	*	VR	A
14	African sSraight Swift	7-11	***	NR	A
15	Rice Swift	7-11	***	NR	D
16	Bevan's Swift	7,8,10-12	***	NR	B
17	Indian Palm Bob	7,11	*	VR	A
18	Chesnut Bob	7,8	*	VR	A
19	Bush Hopper	8	*	VR	A

	PAPILIONIDAE				
20	Common Bluebottle**	6	*	VR	A
21	Common Jay	6-8,11-2	****	C	B
22	Tailed Jay	7,8,10-12,2-4	****	C	A
23	Common Mormon	1-12	*****	VC	E
24	Blue Mormon	1-12	*****	VC	E
25	Lime Butterfly	2,3,6-9	***	NR	C
26	Common Banded Peacock	7-9,3,5	***	NR	E
27	Common Rose	2-7	***	NR	E
28	Crimson Rose+	4,7-2	****	C	E
29	Southern Birdwing	8-10,1	**	R	B
S. No	Common Name	***Occurrence (Months)***	***Relative Abundance***	***Status***	***Frequency Class***
	PIERIDAE				
30	One Spot Grass Yellow	9,10	*	VR	B
31	Three Spot Grass Yellow	6-12,1	****	C	E
32	Small Grass Yellow	9-2	***	NR	E
33	Common Grass Yellow	1-12	*****	VC	E
34	Spotless Grass Yellow	7-9,12-2	***	NR	E
35	Common Emigrant	1-12	*****	VC	E
36	Mottled Emigrant	1-12	*****	VC	E
37	Small Salmon Arab	4,7,10	**	R	D
38	Large Salmon Arab	5,7,9,12	**	R	C
39	Crimson Tip	5-7	**	R	A
40	Small Orange Tip	10-12,3-6	****	C	D
41	Plain Orange Tip	6-7	*	VR	A
42	White Orange Tip	8-9,11-3,5,	****	C	E
43	Yellow Orange Tip	1-12	*****	VC	E
44	Great Orange Tip	4-1	*****	VC	E
45	Dark Wanderer	2,3	*	VR	B
46	Common Wanderer	7,11	*	VR	D
47	Common Albatross +	1-12	*****	VC	E
48	Western Striped Albatross	7-9,12-3	****	C	E
49	**Common Gull+**	1-12	*****	VC	E
50	Common Jezebel	7-2	****	C	E
51	Psyche	7,8,11-3	****	C	E
52	Pioneer	10-3	***	NR	C
	Lycaenidae				
53	Apefly	10	*	VR	A
54	Indian Sunbean	6-7	*	VR	A
55	Common Acacia Blue	9,11	*	VR	A
56	Yamfly	6-9	**	R	C

57	Monkey Puzzle	6,7	*	VR	C
58	Guava Blue	7,9	*	VR	B
59	Large Guava Blue	9	*	VR	B
60	Cornelian	9,10,1	**	R	B
61	Slate Flash	7-11	***	NR	B
62	Common Silverline	6-9	**	R	A
63	Angled Pierrot	12-3	**	R	B
64	Banded Blue Pierrot	1-2	*	VR	A
65	Common Pierrot+	8,11-3	***	NR	E
66	Zebra Blue	11-1,5,6	***	NR	D
67	Common Lineblue	10-1	**	R	A
68	Tailless Lineblue	10-1	**	R	A
69	Dark Cerulean	11-2	**	R	D
70	Common Cerulean	7,8,11-1	***	NR	E
71	Forget-Me-Not	8,1,2	**	R	C
72	Pea Blue+	6-8	**	R	A
73	Striped Pierrot	9,11-2	**	R	D
74	Dark Grass Blue	7,10,11,2,3	***	NR	D
75	Pale Grass Blue	7,2-4	**	R	C
76	Eastern Grass Jewel	7,8	*	VR	B
77	Lesser Grass Blue	7,2-4	**	R	C
78	Tiny Grass Blue	7,1-4	***	NR	E
79	Bright Babulblue	9,10	*	VR	B
80	African Babulblue	9	*	VR	B
81	Indian Cupid	7-9	**	R	A
82	Small Cupid	7,9,10	**	R	A
83	Red Pierrot	7	*	VR	A
84	Malayan+	8,12	*	VR	A
85	Common Hedgeblue	12	*	VR	A
86	Lime Blue	7,10-2	***	NR	B
87	Plum Judy	6-8	**	R	C
	Nymphalidae				
88	Common Beak**	7,8	*	VR	B
89	Club Beak**	7,8	*	VR	B
90	Blue Tiger	1-12	*****	VC	E
91	Dark Blue Tiger	1-12	*****	VC	D
92	Striped Tiger	7,8,2-4	***	NR	A
93	Plain Tiger	6-12,4	****	C	D
94	Glassy Tiger	7,10	*	VR	C
95	Double Banded Crow	7,9,12,1	**	R	A
96	Common Indian Crow +	1-12	*****	VC	E
97	Common Nawab#	6,7	*	VR	A
98	Common Evening Brown	10-3	***	NR	C

99	Common Tree Brown**	11	*	VR	A
100	Common Bush Brown	10-3	***	NR	B
101	Glad Eye Bush Brown**	8-10	**	R	B
102	Common Three Ring	8-11	**	R	A
103	White Four Ring	8-12,2,3	****	C	B
104	Common Four Ring**	7,8,10	**	R	B
405	Tawny Coster	6-1	****	C	D
106	Rustic	8-10	**	R	B
107	Common Leopard	8.9,12-2	***	NR	D
108	Common Lascar**	7-11	***	NR	A
109	Common Sailer	4-1	*****	VC	E
110	Clear Sailer	10,12	*	VR	A
111	Short Banded Sailer+	8,10	*	VR	A
112	Common Baron	7	*	VR	A
113	Angled Castor	1-12	*****	VC	E
114	Common Castor	1-12	*****	VC	E
115	Joker	9	*	VR	A
116	Yellow Pansy	10	*	VR	B
117	Chocolate Pansy	1-12	*****	VC	E
118	Peacock Pansy	8	*	VR	A
119	Lemon Pansy	1-12	*****	VC	E
120	Great Eggfly	7,10-12	**	R	B
121	Danaid Eggfly+	7,10,11	**	R	D
122	Blue Oakleaf#	6,7,11,12	**	R	A

+ Butterflies Listed in Indian Wildlife (Protection) Act 1972
 # Found only in Tropical Thorn Forest (TTF)
***** Found only in Evergreen Forest (EGF)***
VC- Very Common C- Common NR- Not Rare R- Rare VR- Very Rare
**** Very rare; ** rare; *** not rare; **** common; ***** very common***

The above table 2 reveal that among the 122 species recorded 4 species were recorded only in Tropical thorn forest and 11 species were recorded only in Evergreen forest.

Table 3: Status distribution of butterflies at Pachamalai hills

Status	*Number*
VC	*17*
C	*12*
NR	*25*
R	*31*
VR	*37*

Table 3 shows the status and frequency of butterflies at Pachamalai Hills. Among the 122 species, 17 species of very common butterflies including common Mormon, Blue Mormon, Common Grass Yellow, Yellow Orange Tip, Common Albatross, Common Gull, Common Crow, Blue Tiger, Dark Blue Tiger, Common Castor, Angled Castor, Lemon Pansy were present throughout the year. The papilionids were the most common among the five families. 5 species (50%) were either common or very common. Common Blue Bottle was the only butterfly in very rare category. Among nymphalids 11 species (31%) were found to be either common or very common. However, there were no very

common butterflies among the skippers (hesperidae) and blues (lycanidae).

The figure 2 shows that there were only 12 (10%) species of common butterflies. There were no common butterflies in skippers (hesperidae) and blues (lycanidae) too. Many lycanid caterpillars, feed on low-growing herbs, especially papilionaceous herbs. These herbs grow and die during a period of four months, from July to November (Kunte, 1997). So these lycanids are found coinciding with these four months period. Hence, they are not very common or common in occurrence. There were only 25 (21%) species of not rare butterflies; 31 (25%) species of rare butterflies and 37 (30%) species of very rare butterflies. Thus there are more of rarer species and lesser of common species.

Figure 2: Status of butterflies at Pachamalai Hills

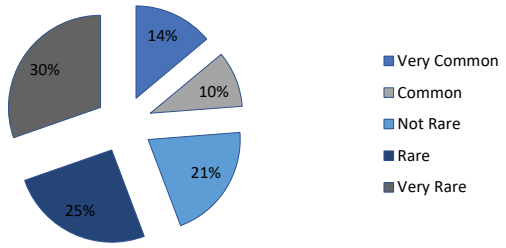
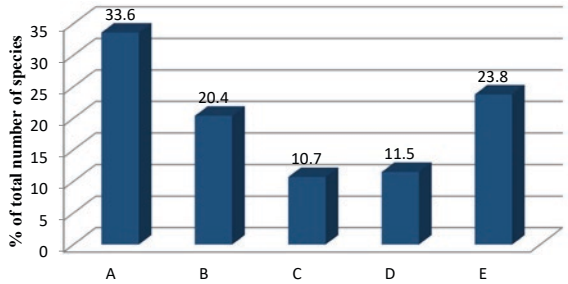


Fig 3 : Raunkiaer'sFrequency diagram for butterflies at Pachamalai Hills



The figure 3 shows that the Raunkiaer's frequency formula is A>B>C>=D<E. The above diagrams show that Pachamalai butterfly frequency coincides with the Raunkiaer's frequency class. It is stated that if the number of species belonging to the A (1-20%) and E (81-100%) frequency classes is high when compared to the B (21-40%), C (41-60%) and D (61-80%) then the community under the study is relatively undisturbed in nature. 29 species of butterflies are found to be very less frequent indicating the need for conservation (Fig 3).

S. No	Common Name	Status	Frequency Class
1	Common Mormon	VC	1200221255 E
2	Blue Mormon	VC	E
3	Common banded peacock	NR	E
4	Common rose	NR	E
5	**Crimson rose**+	1200221255 C	E
6	Three spot grass yellow	C	E
7	Small grass yellow	NR	E
8	Common grass yellow	VC	1200221255 E
9	Spotless grass yellow	NR	E
10	Common emigrant	VC	E
11	Mottled emigrant	VC	E
12	White orange tip	C	E
13	Yellow orange tip	VC	E
14	Great orange tip	VC	E
15	**Common albatross** +	VC	E
16	Western striped albatross	C	E
17	**Common gull**+	VC	E
18	Common jezebel	C	E
19	Psyche	C	E
20	**Common pierrot**+	NR	E
21	Common cerulean	NR	E
22	Tiny grass blue	NR	E
23	Blue tiger	VC	E
24	**Common Indian crow** +	VC	E
25	Common sailer	VC	E
26	Angled castor	VC	E
27	Common castor	VC	E
28	Chocolate pansy	VC	E
29	Lemon pansy	VC	E

Conclusion

The two year study of butterflies at Pachamalai Hills in Eastern Ghats revealed the presence of 122 species of butterflies belonging to all the five families. The presence of 39% of the butterfly species in relation to butterflies found in Tamilnadu asserts the significance and richness of the region. The Raunkiaer's frequency implies the relatively undisturbed nature of the community. However presence of very less frequent species and the presence of 4 species exclusive only to tropical thorn forest and 11 species exclusive only to evergreen forest signify the need for protection and conservation of these habitats. The occurrence of 37 species of very rare butterflies and 10 species of butterflies listed in Wildlife Protection Act

implies that the region has to be protected, conserved and further in-depth studies are justified.

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Sighting of six threatened species of vultures in Madhya Pradesh

Ajay Gadikar and Neel Gadikar
(The Nature Volunteers, Indore)

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- **Name of species:** Red headed vulture, Indian Vulture, Cinereous vulture, Himalayan griffon, Eurasian griffon and Egyptian vulture.
- **Scientific name:** *Sarcogyps calvus, Gyps indicus, Aegypius monachus, Gyps himalayensis, Gyps fulvus and Neophron percnopterus*
- **Status:** Resident as well as migratory. Two species are critically endangered, one is endangered, two near threatened and one least concern.
- **Date of Sighting:** 09 Dec 2019
- **Number of Birds:** 60 (Very important was out of 60 vultures seen, 07 were Red headed vulture which could be a first of a kind of record after the diclofenac menace among the vultures and the presence of 04 migratory Cinereous vulture at a single place, which is also very rare as they are **generally seen solitary.**
- **Gender of birds:** Not known
- **Location:** 23.789 & 78.365 or 23*47'20.4" N and 78*21'54.0" E
- **Habitat description:** It was barren land (where carrion is thrown for disposal) with forested hills in the backdrop. Just adjoin to it were farmlands and was around 1 Km from the Sagar-Vidisha **highway.**
- **Distance from human habitation:** Roughly 1.5 km.
- **Bird behaviour:** Feeding and Resting
- **Photographs:** Yes, attached.
- **Threats:** No observable threat present.
- **Previous records:** No previous records.

Recent Sighting of Brown Capped Pygmy Woodpecker *Yungipicus nanus* in Pune, Maharashtra

Satish Karmalkar, Pramod Deshpande , Atmaprakash Sahoo and Abhiram Rajandekar
(Email: pramod.deshpande@gmail.com)

Citation: Karmalkar Satish, Pramod Deshpande, Atmaprakash Sahoo and Abhiram Rajandekar (2020). Recent Sighting of Brown Capped Pygmy Woodpecker *Yungipicus nanus* in Pune, Maharashtra

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30 March 2020

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- **Name of species**- Brown Capped Pygmy Woodpecker
- **Scientific Name**- *Yungipicus nanus*
- **Status**- Least Concern. (IUCN Red List, 2015).
- **Date of sighting**- 11th February 2020.
- **Time of sighting**- 10.30 AM.
- **Weather parameters**- Sunny.
- **Number of times sighted**- Thrice.
- **Number of birds**- Pair.
- **Gender of bird**- Male and Female.
- **Locality**- Tamhini Forest area, 3 Km from Vinzai temple, Tamhini Village. 70 Km from Pune City in Pune district of Maharashtra.
- **Habitat description**- Deciduous forest with several of Silk Cotton trees.
- **Distance from human habitation**- Approximately 2-3 km.
- **Any other bird/animal associates**- None.
- **Bird behaviour**- Typical drilling sound due to trunk hammering. Two woodpeckers were boring a hole in dead and trunk of Silk Cotton tree. Upon approaching, the pair flew to an adjacent tree. After 10-15 min female bird came to the same tree to bore the hole. On second visit the pair was seen at the same location confirming ongoing breeding activity.
- **Threats to the habitat**- Advancing human habitation.
- **Photographs**- Attached.
- **Previous records**- Multiple sighting records from Pune Sinhagad Valley and Tamhini area. This could be the first breeding record for this species from this area.

Recent Sighting of Albino Large Grey Babbler *Turdoides malcolmi* in Anand, Gujarat

Subhash Ghule
(Email: ghulesubhash@gmail.com)

Citation: Ghule Subhash (2020). Recent Sighting of Albino Large Grey Babbler *Turdoides malcolmi* in Anand, Gujarat

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- **Name of species- Large Grey Babbler**
- **Scientific Name-** *Turdoides malcolmi*
- **Status**- Least Concern. (IUCN Red List, 2015).
- **Date of sighting**- 10th February 2020.
- **Time of sighting**- 8:49 am.
- **Weather parameters**- Pleasant, cloudless.
- **Number of times sighted**- Once.
- **Number of birds**- Single.
- **Gender of bird**- Unidentified.
- **Locality**- Near Shri Krishna Medical Hospital, about fifteen kms from Anand town in Anand district of Gujarat.
- **Habitat description- H**opping on the ground in open areas.
- **Distance from human habitation**- Approximately 100 feet.
- **Any other bird/animal associates**- None.
- **Bird behaviour**- Saw single bird hopping and feeding in lawn. It was isolated from its group upon approaching closer the bird started hopping away from me but it did not fly. All the feathers on the body including wings were white. It had white coloured upperparts, white under-wing coverts, and pink legs and iris.
- **Threats to the habitat**- Habitat destruction.
- **Photographs**- Attached.
- **Previous records** – For albino babbler species, one record each from Kutch District from Gujarat on 24th May 1886, from Nagpur on 25th June 2005, from Jaipur District from Rajasthan in 2011 and Nalgonda district of Andhra Pradesh on 2012.

Sighting of Leucistic House *Crow Corvus* splendens in Kolvihire village, Taluka Purandar, District Pune, Maharashtra

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Citation: Sankpal Rushikesh, Sanket Ghate, Satish Pande (2020). Sighting of Leucistic House *Crow Corvus* splendens in Kolvihire village, Taluka Purandar, District Pune, Maharashtra

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- **Name of Species:-** House Crow
- Scientific Name:- *Corvus splendens*
- **Status: -** Resident
- **Date of sighting:-** 25 September 2019
- **Time of sighting:-** 04.00 pm
- **Weather parameters: -** Sunny
- **Number of times sighted: -** Four
- **Number of birds:-** 4
- **Gender of bird:**
- **Locality: -** A/p- Kolvihire, Tal Purandar, Dist Pune (18°16'01.9"N 74°12'14.2"E)
- **Habitat description: -**: Rural, Agricultural.
- **Distance from human habitation:- 0** km.
- **Any other bird/animal associates:** House Sparrow, Common Myna, Large Grey Babbler
- **Bird Behaviour: -** Perching
- **Threats to the habitat: -** Habitat modification.
- **Photographs: -** Attached.
- **Previous records: -** None from this region.

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