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Biodiversity of Simhachalam hill ranges from Visakhapatnam, Andhra Pradesh, India

Eastern Ghats, one of the nine floristic zones in India is comprised of several broken hill ranges extending from Phulbani in the north-east to Nilgiris in the south (Prasad 2020). Fortunately, in Andhra Pradesh, the north coastal districts-Srikakulam, Vizianagaram, Visakhapatnam, Anakapalli, Alluri Sitharama Raju, West Godavari, and East Godavari are few of the biodiversity rich areas of Eastern Ghats (Pullaiah & Rao 2002).

Among the many hill ranges in Visakhapatnam lies a pristine, highly diverse range of forests the Simhachalam Hills which is a comparatively less documented, species-rich hotspot. It is a Reserved Forest with dry evergreen and dry deciduous vegetation laden with seasonal streams and ponds. The soil nature, rainfall and climatic conditions here together influenced by the sea level, supports abundant growth of flora and fauna. The hills also contain medicinal herbs used to cure cattle and human diseases. It generally receives more rainfall than the rest of the city. Due to good forest cover and comparatively less disturbances, the abundance of wildlife is more here.

Few studies on these hill ranges are narrowed on the floral diversity through surveys and published books on its floral, tree diversity since 2001 (Pullaiah & Rao 2002; Pullaiah & Murthy 2001; Pullaiah et al. 2018). Few notable studies on avifaunal diversity in these hill ranges include Araku valley and Maredumalli ranges by Kumar et al. (2010), Papikonda National Park by Ray et al. (2020) for their rich avian diversity especially in the winter months. Similarly, Gnaneswar et al. (2016) reported few species of herpetofauna from this region along with other biodiversity hotspots in the state.

In this paper, we present our preliminary observations, results and furnish a checklist of flora and fauna including birds, butterflies, mammals, reptiles & amphibians sighted here.

Study Area

The observations are from Simhachalam Hills located in Visakhapatnam District, Andhra Pradesh. The hill ranges are dotted with dry evergreen and dry deciduous forest with elevation varying 100-800 m. The hill which is 800 m (2,600 ft) above sea level is situated at a distance of 14 km north of Visakhapatnam. The hill range is a part of the Eastern Ghats and is named Kailasa. The assessment surveys were carried out in the entire expanse of the hills. It included the main temple shrine and its surroundings, throughout the road that leads to the main shrine, foothills of the hills towards the Bus Rapid Trans System (BRTS) road, foothills towards Mudsarlova lake. Three major trek paths were followed - Venkojipalem to shrine (14 km), Madhavdhara to Shrine (3 km), Staircase from Simhachalam junction to shrine (2 km). Herpetofaunal surveys were conducted during the night along all the above-mentioned paths.

The observations on the various flora and fauna were made from January 2014 till March, 2020. All the taxa were identified up to species level



Map showing location of Simhachalam Hill in Visakhapatnam District, Andhra Pradesh (Courtesy: Google Earth; Note: The above map is indicative and is not to scale).

with the help of floras and literature (Gamble & Fischer 1915–1935; Subbarao & Kumari 2008). All the plant species were arranged according to alphabetical order of their scientific names. Nomenclature as far as possible has been made up-to date (www.plantlist.org; www. plantsoftheworldonline.org).

Surveys of birds were carried out with two to three visits per month all-round the year. The bird-watching group included not the same members every time essentially. Bird records were done following line transect method. Identification of the birds were based on Grimmet et al. (2016). Scientific names, common names and taxonomic classification of birds are after Praveen et al. (2016).

Butterflies were observed during their peak movement- 0800–1100 h and 1500–1800 h. Their classification and nomenclature was done based on Kunte (2000). Mammals were recorded through direct sightings or by recording indirect evidences such as footprints, paw marks, droppings and road kills. Their classification and nomenclature was done following Menon (2014). Herpetofaunal surveys were conducted mostly at night for usually 2–3 hours. Nocturnal species of birds and mammals were also recorded during these surveys. Scientific names, common names and taxonomic classification of reptiles were done based on Whitaker & Captain (2004). Observation time for all species varied with seasonal changes and accessibility.

Results and Discussion

The biodiversity of Simhachalam Hill ranges is represented by both flora and fauna in this paper. Flora counting to 211 plant species belonging to 51 families were documented (Table 1). A total of 234 species of fauna consisting of amphibians (7), reptiles (40), mammals (18), birds (87), and butterflies (82) were recorded during the survey (Table 2–6).

Flora

Understanding the floral diversity of a habitat plays a major role in understanding the larger patterns of distribution of its biodiversity. A total of 211 species of plant species under 51 families and 170 genera were identified from



A—Acacia auriculiformis Benth. | B—Carissa spinarum L. | C—Chloroxylon swietenia DC. | D—Dodonaea viscosa (L.) Jacq. | E—Gmelina asiatica L. | F—Gymnosporia emarginata (Willd.) Thwaites | G—Heteropogon contortus (L.) P. Beauv. ex Roem. &Schult. | H—Holarrhena pubescens Wall. ex G. Don. © J Prakasa Rao.



A—Hugonia mystax Cav. | B—Olax scandens Roxb. | C—Senna auriculata (L.) Roxb. | D—Polyalthia cerasoides (Roxb.) Bedd. | E—Terenna asiatica (L.) Kuntze ex K.Schum. | F—Trema orientalis (L.) Blume | G—Wrightia tinctoria R. Br. | H—Ziziphus oenopolia (L.)Mill. © J Prakasa Rao.

Table 1. Floral diversity of Simhachalam Hills.

	Botanical Name	Habit	Family
1	Abrus precatorius L.	Cl	Fabaceae
2	Abutilon hirsutum (Vell.) K.Schum.	Н	Malvaceae
3	Abutilon indicum (L.) Sweet	н	Malvaceae
4	Acacia auriculiformis Benth.	Т	Fabaceae
5	Acacia caesia (L.) Willd.	Cl	Fabaceae
6	Acacia chundra (Rottler) Willd.	Т	Fabaceae
7	Acacia leucophloea (Roxb.) Willd.	Т	Fabaceae
8	Acacia torta (Roxb.) Craib	Cl	Fabaceae
9	Acalypha indica L.	Н	Euphrobiaceae
10	Achyranthes aspera L.	Н	Amaranthaceae
11	Aegle marmelos (L.) Corrêa	Т	Rutaceae
12	Aerva lanata (L.) Juss.	Н	Amaranthaceae
13	Alangium salviifolium (L.f.) Wangerin	т	Cornaceae
14	Albizia saman (Jacq.) Merr.	Т	Fabaceae
15	Allophylus cobbe (L.) Raeusch.	Sh	Sapindaceae
16	Alstonia scholaris (L.) R. Br.	т	Apocynaceae
17	Alstonia venenata R.Br.	Т	Apocynaceae
18	Alternanthera paronychioides A.StHil.	Н	Amaranthaceae
19	Anacardium occidentale L.	Т	Anacardiaceae
20	Andrographis paniculata (Burm.f.) Nees	Н	Acanthaceae
21	Anisomeles indica (L.) Kuntze	н	Lamiaceae
22	Annona reticulata L.	Т	Annonaceae
23	Anogeissus acuminata (Roxb. ex DC.) Wall. ex Guillem. & Perr.	Т	Combretaceae
24	Argyreia nervosa (Burm. f.) Bojer	Cl	Convolvulaceae
25	Aristida adscensionis L.	Н	Poaceae
26	Aristolochia indica L.	Cl	Aristolochiaceae
27	Arundinella pumila (Hochst.) Steud.	Н	Poaceae
28	Asparagus racemosus Willd.	Cl	Asparagaceae
29	Azadirachta indica A.Juss.	Т	Meliaceae
30	Barleria prionitis L.	Sh	Acanthaceae
31	Bauhinia racemosa Lam.	Т	Fabaceae
32	Bergia ammannioides Roxb. ex Roth	Н	Elatinaceae
33	Blepharis integrifolia (L.f.) E.Mey. & Drège ex Schinz	Н	Acanthaceae
34	Blepharis maderaspatensis (L.) B.Heyne ex Roth	Н	Acanthaceae
35	Blumea axillaris (Lam.) DC.	Н	Asteraceae
36	Breynia vitis-idaea (Burm.f.) C.E.C.Fisch.	Sh	Phyllanthaceae
37	Bridelia retusa (L.) A.Juss.	Т	Phyllanthaceae
38	Bridelia stipularis (L.) Blume	Cl	Phyllanthaceae
39	Cajanus scarabaeoides (L.) Thouars	Cl	Fabaceae
40	Calotropis gigantea (L.) Dryand.	Sh	Apocynaceae
41	Canthium coromandelicum (Burm.f.) Alston	Sh	Rubiaceae
42	Capparis zeylanica L.	Cl	Capparaceae
43	Carissa spinarum L.	Sh	Apocynaceae

	Botanical Name	Habit	Family
44	Cassia fistula L.	Т	Fabaceae
45	Cassytha filiformis L.	Cl	Lauraceae
46	Catharanthus roseus (L.) G.Don	Н	Apocynaceae
47	Catunaregam spinosa (Thunb.) Tirveng.	Sh	Rubiaceae
48	Celastrus paniculatus Willd.	Cl	Celastraceae
49	Chloris barbata Sw.	Н	Poaceae
50	Chloroxylon swietenia DC.	Т	Rutaceae
51	Chromolaena odorata (L.) R.M.King & H.Rob.	Sh	Asteraceae
52	Cipadessa baccifera (Roth) Miq.	Sh	Meliaceae
53	Cissampelos pareira L.	Cl	Menispermaceae
54	Coccinia grandis (L.) Voigt	Cl	Cucurbitaceae
55	Cocculus hirsutus (L.) W.Theob.	Cl	Menispermaceae
56	Coldenia procumbens L.	Н	Boraginaceae
57	Combretum albidum G.Don	Cl	Combretaceae
58	Combretum ovalifolium Roxb.	Cl	Combretaceae
59	Commelina diffusa Burm.f.	Н	Commelinaceae
60	Crotalaria hebecarpa (DC.) Rudd	Н	Fabaceae
61	Crotalaria medicaginea Lam.	Н	Fabaceae
62	Croton bonplandianus Baill.	Н	Euphrobiaceae
63	Curculigo orchioides Gaertn.	Н	Hypoxidaceae
64	Cyanthillium cinereum (L.) H.Rob.	Н	Asteraceae
65	Dactyloctenium aegyptium (L.) Willd.	Н	Poaceae
66	Dalbergia lanceolaria subsp. paniculata (Roxb.) Thoth.	Т	Fabaceae
67	Dalbergia latifolia Roxb.	Т	Fabaceae
68	Dalbergia sissoo DC.	Т	Fabaceae
69	Datura stramonium L.	Н	Solanaceae
70	Delonix regia (Hook.) Raf.	Т	Fabaceae
71	Derris scandens (Roxb.) Benth.	Cl	Fabaceae
72	Desmodium gangeticum (L.) DC.	Н	Fabaceae
73	Desmodium triflorum (L.) DC.	Н	Fabaceae
74	Dichrostachys cinerea (L.) Wight & Arn.	Sh	Fabaceae
75	Dioscorea oppositifolia L.	Cl	Dioscoreaceae
76	Diospyros chloroxylon Roxb.	Т	Ebenaceae
77	Diospyros melanoxylon Roxb.	Т	Ebenaceae
78	Diospyros sylvatica Roxb.	Т	Ebenaceae
79	Diospyros vera (Lour.) A.Chev.	Т	Ebenaceae
80	Diplocyclos palmatus (L.) C.Jeffrey	Cl	Cucurbitaceae
81	Dipteracanthus prostratus (Poir.) Nees	Н	Acanthaceae
82	Dodonaea viscosa (L.) Jacq.	Sh	Sapindaceae
83	Dolichos trilobus L.	Cl	Fabaceae
84	Echinochloa colona (L.) Link	Н	Poaceae
85	Ehretia microphylla Lam.	Sh	Boraginaceae
86	Erioglossum rubiginosum (Roxb.) Blume	т	Sapindaceae
87	Eugenia roxburghii DC.	Sh	Myrtaceae
88	Euphorbia heterophylla L.	Н	Euphrobiaceae

	Botanical Name	Habit	Family
89	Euphorbia hirta L.	Н	Euphrobiaceae
90	Evolvulus alsinoides (L.) L.	Н	Convolvulaceae
91	Evolvulus nummularius (L.) L.	Н	Convolvulaceae
92	Ficus benghalensis L.	Т	Moraceae
93	Ficus religiosa L.	Т	Moraceae
94	Flacourtia indica (Burm.f.) Merr.	Sh	Salicaceae
95	<i>Flueggea virosa</i> (Roxb. ex Willd.) Royle	Sh	Phyllanthaceae
96	Gardenia gummifera L.f.	Sh	Rubiaceae
97	Garuga pinnata Roxb.	Т	Burseraceae
98	Glycosmis mauritiana (Lam.) Tanaka	Sh	Rutaceae
99	Gmelina asiatica L.	Sh	Lamiaceae
100	Grewia hirsuta Vahl	Sh	Malvaceae
101	Grewia tiliifolia Vahl	Т	Malvaceae
102	Gymnema sylvestre (Retz.) R.Br. ex Sm.	Cl	Apocynaceae
103	<i>Gymnosporia emarginata</i> (Willd.) Thwaites	Sh	Celastraceae
104	Gymnosporia montana (Roth) Benth.	Sh	Celastraceae
105	Helicteres isora L.	Sh	Malvaceae
106	Hemidesmus indicus (L.) R. Br. ex Schult.	Cl	Apocynaceae
107	Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.	Н	Poaceae
108	Hibiscus micranthus L.f.	Н	Malvaceae
109	Hibiscus vitifolius L.	Н	Malvaceae
110	Holarrhena pubescens Wall. ex G.Don	Т	Apocynaceae
111	Hugonia mystax Cav.	Cl	Linaceae
112	Hybanthus enneaspermus (L.) F.Muell.	Н	Violaceae
113	Hyptis suaveolens (L.) Poit.	Н	Lamiaceae
114	Ichnocarpus frutescens (L.) W.T.Aiton	Cl	Apocynaceae
115	Indigofera trita L.f.	Н	Fabaceae
116	Ipomoea marginata (Desr.) Verdc.	Cl	Convolvulaceae
117	Ipomoea obscura (L.) Ker Gawl.	Cl	Convolvulaceae
118	Ipomoea pes-caprae (L.) R. Br.	Cl	Convolvulaceae
119	Ixora pavetta Andr.	Т	Rubiaceae
120	Jasminum auriculatum Vahl	Cl	Oleaceae
121	Jatropha gossypiifolia L.	Sh	Euphrobiaceae
122	Justicia glauca Rottler	Н	Acanthaceae
123	Justicia procumbens L.	Н	Acanthaceae
124	Kigelia africana (Lam.) Benth.	Т	Bignoniaceae
125	Lannea coromandelica (Houtt.) Merr.	Т	Anacardiaceae
126	Lantana camara L.	Sh	Verbenaceae
127	Lepisanthes tetraphylla Radlk.	Т	Sapindaceae
128	Leucaena leucocephala (Lam.) de Wit	Т	Fabaceae
129	Litsea deccanensis Gamble	Т	Lauraceae
130	Mallotus philippensis (Lam.) Müll.Arg.	Т	Euphrobiaceae
131	Malvastrum coromandelianum (L.) Garcke	Н	Malvaceae
132	Manilkara hexandra (Roxb.) Dubard	Т	Sapotaceae
133	Manilkara zapota (L.) P.Royen	Т	Sapotaceae

	Botanical Name	Habit	Family
134	Melochia corchorifolia L.	Н	Malvaceae
135	Merremia emarginata (Burm. f.) Hallier f.	Н	Convolvulaceae
136	Merremia hederacea (Burm. f.) Hallier f.	Cl	Convolvulaceae
137	Merremia tridentata (L.) Hallier f.	Cl	Convolvulaceae
138	Microstachys chamaelea (L.) Müll.Arg.	Н	Euphrobiaceae
139	Millingtonia hortensis L.f.	Т	Bignoniaceae
140	Mimosa pudica L.	Н	Fabaceae
141	Mimusops elengi L.	Т	Sapotaceae
142	Mollugo pentaphylla L.	Н	Molluginaceae
143	Morinda coreia BuchHam.	Т	Rubiaceae
144	Mukia maderaspatana (L.) M.Roem.	Cl	Cucurbitaceae
145	Muntingia calabura L.	Т	Muntingiaceae
146	Murraya koenigii (L.) Spreng.	Т	Rutaceae
147	Naringi crenulata (Roxb.) Nicolson	Т	Rutaceae
148	Ochna obtusata DC.	Sh	Ochnaceae
149	Ocimum tenuiflorum L.	Н	Lamiaceae
150	Olax scandens Boxb.	Cl	Olacaceae
151	Oldenlandia corymbosa l	н	Rubiaceae
152	Oldenlandia diffusa (Willd) Poyh	н	Rubiaceae
152	Operculing turnethum (L.) Silva Manso		Convolvulação
155	Opercultur turpetrium (L.) Silva Ivianso	CI	Onilianaa
154		CI	Opiliaceae
155	Oxystelma esculentum (L. f.) Sm.	CI	Apocynaceae
156	Parthenium hysterophorus L.	H	Asteraceae
157	Pavonia zeylanica (L.) Cav.	Н	Malvaceae
158	Peltophorum pterocarpum (DC.) K.Heyne	Т	Fabaceae
159	Perotis indica (L.) Kuntze	Н	Poaceae
160	Phyla nodiflora (L.) Greene	н	Verbenaceae
161	Phyllanthus amarus Schumach. & Thonn.	н	Phyllanthaceae
162	Phyllanthus maderaspatensis L.	н	Phyllanthaceae
163	Phyllanthus virgatus G.Forst.	Н	Phyllanthaceae
164	Physalis minima L.	Н	Solanaceae
165	Polyalthia cerasoides (Roxb.) Bedd.	т	Annonaceae
166	Pongamia pinnata (L.) Pierre	т	Fabaceae
167	Premna mollissima Roth	Т	Lamiaceae
168	Pseudarthria viscida (L.) Wight & Arn.	н	Fabaceae
169	Psydrax dicoccos Gaertn.	т	Rubiaceae
170	Pterolobium hexapetalum (Roth) Santapau & Wagh	Cl	Fabaceae
171	Pterospermum xylocarpum (Gaertn.) Oken	т	Malvaceae
172	Reissantia indica (Willd.) N.Hallé	CI	Celastraceae
173	Rhynchosia cana (Willd.) DC.	Sh	Fabaceae
174	Rhynchosia minima (L.) DC.	Cl	Fabaceae
175	Ricinus communis L.	Т	Fuphrobiaceae
176	Sansevieria royhurahiang Schult & Schult f	н 	
177	Sanindus emarginatus Vahl	т	Sanindaceae
170	Supinuus eniurginuus van	۱ ۲	Bhampaccas
1/8	Sculla myruna (Burmil) Kurz	50	планнасеае

	Botanical Name	Habit	Family	
179	Senna auriculata (L.) Roxb.	Sh	Fabaceae	
180	Senna occidentalis (L.) Link	н	Fabaceae	
181	Senna siamea (Lam.) H.S.Irwin & Barneby	Т	Fabaceae	
182	Sida acuta Burm.f.	Н	Malvaceae	
183	Sida cordata (Burm.f.) Borss.Waalk.	н	Malvaceae	
184	Sida cordifolia L.	н	Malvaceae	
185	Solanum americanum Mill.	Н	Solanaceae	
186	Spermacoce hispida L.	н	Rubiaceae	
187	Spermacoce pusilla Wall.	н	Rubiaceae	
188	Sterculia foetida L.	Т	Malvaceae	
189	Streblus asper Lour.	Т	Moraceae	
190	Strychnos nux-vomica L.	Т	Loganiaceae	
191	Symphorema involucratum Roxb.	Cl	Lamiaceae	
192	Syzygium cumini (L.) Skeels	Т	Myrtaceae	
193	Tabebuia rosea (Bertol.) Bertero ex A.DC.	Т	Bignoniaceae	
194	Tarenna asiatica (L.) Kuntze ex K.Schum.	Sh	Rubiaceae	
195	Tephrosia purpurea (L.) Pers.	н	Fabaceae	
196	Tephrosia villosa (L.) Pers.	н	Fabaceae	
197	Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	Т	Combretaceae	
198	Terminalia catappa L.	Т	Combretaceae	
199	Thespesia populnea (L.) Sol. ex Corrêa	Т	Malvaceae	
200	Tinospora cordifolia (Willd.) Miers	Cl	Menispermaceae	
201	Toddalia asiatica (L.) Lam.	Sh	Rutaceae	
202	Tragia involucrata L.	Cl	Euphrobiaceae	
203	Trema orientalis (L.) Blume	Т	Cannabaceae	
204	Tridax procumbens (L.) L.	н	Asteraceae	
205	Triumfetta pentandra A.Rich.	н	Malvaceae	
206	Tylophora indica (Burm. f.) Merr.	Cl	Apocynaceae	
207	Waltheria indica L.	н	Malvaceae	
208	Wrightia tinctoria R.Br.	Т	Apocynaceae	
209	Ziziphus jujuba Mill.	Т	Rhamnaceae	
210	Ziziphus oenopolia (L.) Mill.	Sh	Rhamnaceae	
211	Ziziphus xylopyrus (Retz.) Willd.	Т	Rhamnaceae	
T—Tree H—Herb Sh—Shrub Cl—Climber				

Table 2. Amphibian diversity of Simhachalam hills.

	Order	Family	Common Name	Scientific Name
1		Bufonidae	Common Indian Toad	Duttaphrynus melanostictus
2			Indian Bull Frog	Hoplobatrachus tigerinus
3	Anura	Dicroglossidae	Indian Skittering Frog	Euphlyctis cyanophlyctis
4			Burrowing Frog	Sphaerotheca sp.
5			Wart Frog	Fejervarya sp.
6		Microhylidae	Ornate Narrow-Mouthed Frog	Microhyla ornata
7		Rhacophoridae	Indian Tree Frog	Polypedates maculatus

the study area (Table 1). Among the 51 families, Fabaceae is the dominant one with 35 (16.59%) species followed by Malvaceae with 18 (8.53%) species, Apocynaceae with 12 (5.69%) species, Rubinaceae with 11 (5.21%) species. Genus Acacia occupies first with five species followed by Diospyros 4, Ipomoea, Merremia, Phyllanthus, Senna, Sida, and Ziziphus are with three species, 20 genera with two species and remaining 141 genera with only single species were reported. Andhra Pradesh Red List of medicinal plants like Aegle marmelos, Celastrus paniculatus, Gymnema sylvestre, Pseudarthria viscida and other important medicinal plants natural populations of *Santalum album* and Litsea deccanensis were reported. Cultivation and plantations of Anacardium occidentalis (Cashew nut), Ananas comosus (Pineapple) Artocarpus heterophyllus (Jack fruit), Magnolia champaca (Sampenga Chettu), Cananga odorata (Pachha Sampenga) also observed.

Fauna

Amphibians

Seven species of amphibians belonging to four families are found in Simhachalam Hills (Table 2). The monsoon plays a huge role in the survival of amphibian populations. The rain water gets collected in several depressions on the ground, creating puddles across the hills. These puddles act as breeding grounds and hotspots for egg laying. The altitude vegetation of Simhachalam also favors the amphibian diversity. *Duttaphrynus melanostictus, Polypedates maculatus* and *Fejervarya* species are the commonly spotted frogs in Simhachalam Hills.

Reptiles

A total of 40 species of reptiles belonging to two orders and 14 families among which Coloubridae family represented highest of 10 species followed by Gekkonidae (7), Elapidae (3), Agamidae (3), Scinidae (3). The list of reptiles found in the study area is given in Table 3. These hill ranges are representatives of a very active, vital habitat type amidst the city chaos. With increased sightings in urban and suburban areas, the human-reptile conflict is in the rise in major cities nowadays. Playing an important role in the food chain as both 'prey' & 'predator', reptiles (especially snakes) are equally affected because of encroachment and deforestation as any other animal on earth. The diverse reptile richness of these hills also makes them a focal point for students and researchers for their study and research activities. Species such as Trimeresurus gramineus, Bungarus caeruleus and Indotyphlops braminus hold the unique status of being first described in Visakhapatnam (Bauer 1998; McDiarmid et al. 1999).

Mammals

Eighteen mammals were observed from this study area. They include Wild Boar, Spotted Deer, Mouse Deer, Jungle Cat, Indian Pangolin, Indian Crested Porcupine and more (Table 4). The basic factors that decide the presence of mammals such as food availability (seasonal patterns), ambient temperature, rainfall, spatial distribution of the interlinking habitat types can be observed in this area. The Rusty-spotted Cat, the smallest wild cat in the world which is Near Threatened as per the IUCN Red List was recorded here during the study period in the form of a road kill.



A—Bamboo Pit Viper | B—Bronzeback Tree Snake | C—Green Vine Snake | D—Sandboa | E—Elliot's Shieldtail | F—Leopard Gecko | G—Golden Gecko | H—Indian Chameleon. © A—G- Vivek Rathod, H- Ch Avinash.

Table 3. Reptilian diversity of Simhachalam hills.

	Order	Sub-order	Family	Common Name	Scientific Name			
1				Common Garden Lizard	Calotes veriscolor			
2			Agamidae	Peninsular Rock Agama	Pssamophilus dorsalis			
3				Fan-throated Lizard	Sitana ponticeriana			
4			Chameleonidae	Indian Chameleon	Chamaeleo zeylanicus			
5				Clouded Indian Gecko	Cyrtodactylus nebulosus			
6				Termite Hill Gecko	Hemidactylus triedrus			
7				Dutta's Mahendragiri Gecko	Hemidactylus sushildattai			
8		Courio	Gekkonidae	Asian House Gecko	Hemidactylus cf. Frenatus			
9		Sauria		Yellow-bellied House Gecko	Hemidactylus flaviviridus			
10				Spotted House Gecko	Hemidactylus parvimaculatus			
11				Indian Golden Gecko	Calodactylodes aureus			
12			Eublepharidae	East Indian Leopard Gecko	Eublepharis hardweickii			
13				Bronzed Grass Skink	Eutrophis cf. macularia			
14			Scinidae	Many-keeled Grass Skink	Eutropis carinata			
15				Common Snake Skink	Lygosoma punctata			
16			Varanidae	Indian Monitor Lizard	Varanus bengalensis			
17				Green Vine Snake	Ahaetulla nasuta			
18				Common Cat Snake	Boiga trigonata			
19				Yellow-green Cat Snake	Boiga flaviviridis			
20	Cauamata			Barred Wolf Snake	Lycodon striatus			
21	Squamata		Coloubridao	Common Wolf Snake	Lycodon aulicus			
22			Coloublidae	Bronze-back Tree Snake	Dendrelaphis tristis			
23							Common Kukri	Oligodon arnensis
24	_			Russell's Kukri	Oligodon taeniolatus			
25	_						Indian Rat Snake	Ptyas mucosa
26	_			Dumeril's Black-headed Snake	Sibynophis subpunctatus			
27	_	Sernentes		Indian Spectacled Cobra	Naja naja			
28	_	Serpences	Elapidae	Slender Coral Snake	Calliophis melanurus			
29	_			Common Krait	Bungarus caerleus			
30	_		Natricidae	Checkered Keelback	Fowlea piscator			
31	_		Natheldae	Striped Keelback	Amphisema stolatum			
32	_		Typhlopidae	Brahminy Blind Snake	Indotyphlops braminus			
33	-		Туртораас	Beaked Worm Snake	Grypoytyphlops acutus			
34	-		Uropeltidae	Elliot's Shieldtail	Uropeltis cf. elliotii			
35	-		Boidae	Common Sand Boa	Eryx conicus			
36	-		Pythonidae	Indian Rock Python	Python molurus			
37	-		Viperidae	Russell's Viper	Daboia russelli			
38	-		Thereade	Bamboo Pit Viper	Trimeresurus gramineus			
39	-	Testudines	Geoemydidae	Indian Black Turtle	Melanochelys trijuga			
40		icstudiles	Testudinidae	Indian Star Tortoise	Geochelone elegans			

Table 4. Mammalian diversity of Simhachalam Hills.

	Order	Family	Common Name	Scientific Name
1		Suidae	Wild Boar	Sus scrofa
2			Spotted Deer	Axis axis
3	Artiodactyla	Cervidae	Sambar	Rusa unicolor
4			Barking Deer/ Indian Muntjac	Muntiacus muntjak
5		Tragulidae	Mouse Deer / Indian Chevrotain	Moschiola indica
6			Leopard*	Panthera pardus
7	Carnivora	Felidae	Rusty-spotted Cat	Prionailurus rubiginosus
8			Jungle Cat	Felis chaus
9	Lagomorpha	Leporidae	Black-naped Hare/ Indian Hare	Lepus nigricollis
10	Pholidota	Manidae	Indian Pangolin	Manis crassicaudata
11	Scandentia	Tupaiidae	Madras Treeshrew	Anathana ellioti
12		Hystricidae	Indian-crested Porcupine	Hystrix indica
13	Dedentie	Sciuridae	Three-striped Palm Squirrel	Funambulus palmarum
14	Rodentia	Muridaa	House Rat	Rattus rattus
15		wuridae	Indian Gerbil	Tatera indica
16		Pteropodidae	Indian Flying Fox	Pteropus giganteus
17	Chiroptera	Rhinopomatidae	Lesser Mouse Tailed Bat	Megaderma spasma
18		Vespertilionidae	Indian Pipistrelle	Pipistrellus pipistrellus
*Recorded in 2015 (Secondary sources). Not seen or recorded by the authors.				

Birds

Birds from 37 families representing 12 orders were recorded here during the study period. A total of 87 species of avifauna was recorded (Table 5). Out of them, Passeriformes represented the highest order having 45 (51.7%) species, followed by Accipitriformes with 11 species (12.6%), Columbiformes and Coraciiformes with five species (5.7%), Cuculiformes with four species (4.6%), Galliformes, Psittaciformes and Strigiformes with three species (3.4%), Bucerotiformes, Caprimulgiformes, Charadriiformes, and Piciformes with two species (2.3%) each.

Ali (1933, 1934) had recorded birds from the Eastern Ghats section but focused more on the Araku and Lambasingi valley. With notable diversity in birds of prey, the Simhachalam Hills are home to more than 50 resident bird species. Species such as Orange-breasted Green Pigeon, Crested Goshawk, Bonelli's Eagle, Indian Grey Hornbill, Black-naped Oriole, Asian Brown Flycatcher, Brown-breasted Flycatcher, Verditer Flycatcher, and Tickell's Blue Flycatcher are notable ones with some of them being winter and local migrants.

Butterflies

Eighty-two species of butterflies belonging to five families were recorded in the study area (Table 6). Nymphalidae represented the highest family having 27 species followed by Pieridae with 22 species, Lycaenidae with 18 species and Papilionidae and Herperiidae with each 10 and five species, respectively.

Threats

Recent developments in the hills have resulted in serious disturbances to the wildlife here.



A—Shikra | B—Black-winged Kite | C—Crested Serpent-Eagle | D—Brahminy Kite | E—Orange-headed Thrush | F— Blue-tailed Bee-Eater | G—Rose-ringed Parakeet | H—Alexandrine Parakeet. © A—C & E—H- Vivek Rathod, D- Ch Avinash.

Table 5. Avian diversity of Simhachalam Hills.

	1	T	r	1
	Order	Family	Common Name	Scientific Name
1			Grey Francolin	Francolinus pondicerianus
2	Galliformes	Phasianidae	Indian Peafowl	Pavo cristatus
3			Painted Spurfowl	Galloperdix lunulata
4			Laughing Dove	Streptopelia senegalensis
5			Orange-breasted Green-Pigeon	Treron bicinctus
6	Columbiformes	Columbidae	Rock Dove	Columbia livia
7			Spotted Dove	Streptopelia chinensis
8			Yellow-footed Green-Pigeon	Treron phoenicopterus
9	Caprimulgiformos	Caprimulgidaa	Grey Nightjar	Caprimulgus indicus
10	Caprimugitormes	Caprinuigidae	Indian Nightjar	Caprimulgus asiaticus
11			Asian Koel	Eudynamys scolopaceus
12	Cuculiformere	Cuculidae	Common Hawk-Cuckoo	Hierococcyx varius
13	Cuculiformes	Cuculidae	Greater Coucal	Centropus sinensis
14			Sirkeer Malkoha	Taccocua leschenaultii
15		Chaus duiide a	Red-wattled Lapwing	Vanellus indicus
16	Charadriiformes	Charadriidae	Yellow-wattled Lapwing	Vanellus malabaricus
17			Black Eagle	Ictinaetus malaiensis
18			Black Kite	Milvus migrans
19			Black-winged Kite	Elanus caeruleus
20			Bonelli's Eagle	Aquila fasciata
21			Booted Eagle	Hieraaetus pennatus
22	Accipitriformes	Accipitridae	Brahminy Kite	Haliastur indus
23			Crested Goshawk	Accipiter trivirgatus
24			Crested Serpent-Eagle	Spilornis cheela
25			Shikra	Accipiter badius
26			White-eyed Buzzard	Butastur teesa
27			White-bellied Sea-Eagle	Haliaeetus leucogaster
28			Common Barn Owl	Tyto alba
29	Strigiformes	Strigidae	Indian Eagle-Owl	Bubo bengalensis
30			Spotted Owlet	Athene brama
31	Ducenetiferra	Bucerotidae	Indian Grey Hornbill	Ocyceros birostris
32	Bucerotiformes	Upupidae	Eurasian Hoopoe	Upupa epops
33	Piciformes	Picidae	Lesser Goldenbacked Wood- pecker	Dinopium benghalense
34		Ramphastidae	Coppersmith Barbet	Psilopogon haemacephalus
35			Blue Tailed Bee-eater	Merops philippinus
36		Meropidae	Chestnut-headed Bee-eater	Merops leschenaulti
37	Coraciiformes		Green Bee-eater	Merops orientalis
38		Coraciidae	Indian Roller	Coracias benghalensis
39		Alcedinidae	White-throated Kingfisher	Halcyon smyrnensis
40			Alexandrine Parakeet	Psittacula eupatria
41	Psittaciformes	Psittaculidae	Plum-headed Parakeet	Psittacula cyanocephala
42			Rose-ringed Parakeet	Psittacula krameri

	Order	Family	Common Name	Scientific Name
43			Large Cuckooshrike	Coracina javensis
44	-	Campephigidae	Orange Minivet	Pericrocotus flammeus
45	-		Black-naped Oriole	Oriolus chinensis
46		Oriolidae	Black-hooded Oriole	Oriolus xanthornus
47			Indian Golden Oriole	Oriolus kundoo
48		Vangidae	Common Woodshrike	Tephrodornis pondicerianus
49		Aegithinidae	Common Iora	Aegithina tiphia
50		Dicruridae	Black Drongo	Dicrurus macrocercus
51		Laniidae	Brown Shrike	Lanius cristatus
52		Latinuae	Long-tailed Shrike	Lanius schach
53			House Crow	Corvus splendens
54		Corvidae	Large-billed Crow	Corvus macrorhynchos
55			Rufous Treepie	Dendrocitta vagabunda
56	_	Monarchidae	Asian Paradise Flycatcher	Terpsiphone paradisi
57		Dicaeidae	Pale-billed Flowerpecker	Dicaeum erythrorhynchos
58	_	Noctariniidaa	Purple-rumped Sunbird	Leptocoma zeylonica
59	_	Nectarinidae	Purple Sunbird	Cinnyris asiaticus
60	_	Irenidae	Jerdon's Leafbird	Chloropsis jerdoni
61	_	Passeridae	House Sparrow	Passer domesticus
62		Alaudidae	Ashy-crowned Sparrow-Lark	Eremopterix griseus
63	_		Ashy Prinia	Prinia socialis
64	_	Cisticolidae	Common Tailorbird	Orthotomus sutorius
65	Passeriformes		Plain Prinia	Prinia inornata
66	_	Acrocenhalidae	Blyth's Reed Warbler	Acrocephalus dumetorum
67	_	Acrocephandae	Booted Warbler	Iduna caligata
68	_	Hirundinidae	Barn Swallow	Hirundo rustica
69	-		Red-vented Bulbul	Pycnonotus cafer
70	_	Pycnonotidae	Red-whiskered Bulbul	Pycnonotus jocosus
71	_		White-browed Bulbul	Pycnonotus luteolus
72	_		Common Chiffchaff	Phylloscopus collybita
73	_	Phylloscopidae	Greenish Leaf Warbler	Phylloscopus trochiloides
74	_		Hume's Leaf Warbler	Abrornis humei
75	-	Leiothrichidae	Yellow-billed Babbler	Turdoides affinis
76	-		Asian Pied Starling	Gracupica contra
77	-	Sturinidae	Brahminy Starling	Sturnia pagodarum
78	-		Common Myna	Acridotheres tristis
79			Rosy Starling	Pastor roseus
80	-		Asian Brown Flycatcher	Muscica padauurica
81	-		Brown-breasted Flycatcher	Muscicapa muttui
82			Indian Robin	Saxicoloides fulicatus
83	1	Muscicapidae	Oriental Magpie-Robin	Copsychus saularis
84			Taiga Flycatcher	Ficedula albicilla
85			Tickell's Blue Flycatcher	Cyornis tickelliae
86	-		Verditer Flycatcher	Eumyias thalassinus
87		Turdidae	Orange-headed Thrush	Geokichla citrina



A—Chestnut Bob | B—Black Rajah | C—Common Jezebel | D—Common Four Ring | E—Common Crow | F—Indian Hare | G—Three Striped Palm Squirrel | H—Lesser Mouse Tailed Bat. © Vivek Rathod.

Table 6. Butterfly diversity of Simhachalam Hills.

	Family	Common Name	Scientific Name
1		Blue Mormon	Papilio polymnestor
2		Common Bluebottle	Graphium sarpedon
3		Common Jay	Graphium doson
4	-	Common Mime	Papilio clytia
5		Common Mormon	Papilio polytes
6	Papilionidae	Common Rose	Pachliopta aristolochiae
7	-	Crimson Rose	Pachliopta hector
8		Lime	Papilio demoleus
9		Spot Swordtail	Graphium nomius
10		Tailed Jay	Graphium agamemnon
11		Common Albatross	Appias albina
12		Common Crow	Euploea core
13		Common Emigrant	Catopsilia pomona
14		Common Grass Yellow	Eurema hecabe
15		Common Gull	Cepora nerissa
16		Common Jezebel	Delias eucharis
17		Common Wanderer	Pareronia valeria
18		Crimson Red Tip	Colotis danae danae
19	_	Crimson Tip	Colotis danae
20		Large Salmon Arab	Colotis fausta
21	Dioridao	Little Orange Tip	Colotis etrida
22	Plenuae	Mottled Emigrant	Catopsilia pyranthe
23	_	Pioneer	Belenois aurota
24	_	Plain Orange Tip	Colotis aurora
25		Psyche	Leptosia nina
26	_	Purple Leaf Blue	Amblypodia anita
27	_	Yellow Orange Tip	Ixias pyrene
28	_	Small Grass Yellow	Eurema brigitta
29	-	White Orange Tip	Ixias marianne
30		Small Salmon Arab	Colotis amata
31	4	Indian Sunbeam	Curetis thetis
32		Common Apefly	Spalgis epius
33		Baronet	Euthalia nais
34	-	Blue Pancy	Junonia orithya
35	-	Blue Tiger	Tirumala limniace
36		Chocolate Pansy	Junonia iphita
37	-	Common Baron	Euthalia aconthea
38	Nymphalidae	Common Bush Brown	Mycalesis perseus
39		Common Castor	Ariadne merione
40		Common Evening Brown	Melanitis leda
41	-	Common Four Ring	Ypthima huebneri
42	-	Common Leapord	Phalanta phalantha
43		Common Nawab	Polyura athamas

	Family	Common Name	Scientific Name
44		Common Sailor	Neptis hylas
45		Danaid Eggfly	Hypolimnas misippus
46		Glassy Tiger	Parantica aglea
47		Great Eggfly	Hypolimnas bolina
48		Grey Pansy	Junonia atlites
49		Indian Tortoise Shell	Aglais caschmirensis
50		Joker	Byblia ilithyia
51		Lemon Pansy	Junonia lemonias
52	Nymphalidae	Plain Tiger	Danaus chrysippus
53		Striped Tiger	Danaus genutia
54		Tawny Coaster	Acraea terpsicore
55		Yellow Pansy	Junonia hierta
56		Black Rajah	Charaxes solon
57		Peacock Pansy	Junonia almana
58		Angled Castor	Ariadne merione
59		Common Lascar	Pantoporia hordonia
60		Common Cerulean	Jamides celeno
61		Common Pierrot	Castalius rosimon
62		Common Silverline	Cigaritis vulcanus
63		Dark Grass Blue	Zizeeria karsandra
64		Forget-Me-Not	Catochrysops strabo
65		Gram Blue	Euchrysops cnejus
66		Indian Cupid	Cupido lacturnus
67		Indian Oak Blue	Arhopala atrax
68	lycaonidae	Lesser Grass Blue	Zizina otis
69	Гусаетиае	Monkeys Puzzle	Rathinda amor
70		Pale Grass Blue	Pseudozizeeria maha
71	_	Pea Blue	Lampides boeticus
72		Plains Cupid	Chilades pandava
73		Red Pierrot	Talicada nyseus
74		Small Cupid	Chilades parrhasius
75		Tailless Line Blue	Prosotas dubiosa indica
76		Zebra Blue	Leptotes plinius
77		Grass Jewel	Freyeria trochylus
78		Common Banded Awl	Hasora chromus
79		Grass Demon	Udaspes folus
80	Hesperiidae	Indian Palm Bob	Suastus gremius
81		Indian Skipper	Hesperia sassacus
82		Small Branded Swift	Pelopidas mathias

The mud road on the hilltop is being used more frequently than in the past by trekkers and goatherds. Camping activities are on the rise in these hills by explorers during the night. Invasive and unsuitable plants such as Terminalia mantaly, Conocarpus erustus are being planted which is causing damage to natural eco systems. Also, the road from BRTS lane leading to the Devasthanam (main deity) separates the Simhachalam and Kambalakonda Hills and has become a hotspot for road kills. Improper solid waste management including plastic, construction debris and other wastes poses a major threat to the biodiversity here. The foothills have been surrounded almost from all sides with constructions and housing colonies, which are causing landslides and pressingly impacting the wildlife corridors. Poaching activities have dropped gradually but occasional hunting of small mammals is still being witnessed.

Conclusion

This terrain is noteworthy to conduct habitat and movement pattern studies on wildlife. With a rich faunal diversity, needless to mention the equally and even more diverse floral diversity here, the value of these hills in terms to education and research is noteworthy to mention. These hills are a haven to several species of wildlife which are otherwise not commonly seen elsewhere in Visakhapatnam. With many more reasons, it is thus stated that this beautiful habitat within the district needs to be conserved and not heeded into the expanding concrete jungles.

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Records of two butterflies Silverstreak Blue and Bamboo Treebrown from Magadh, Bihar



Bihar has healthy floral and faunal diversity and is home to many scheduled butterflies and animals protected under the Wildlife Protection Act, 1972. But due to lack of continuous field observation data, there is a big gap between the status of species and need of conservation for the many rare species found in Bihar. In the context of Magadh division, there is no accurate data about butterfly species diversity and their status available till now.

During our field observation in the month of August to December 2021 in Nawada District, we observed *Iraota timoleon* on a lantana plant in the afternoon hours and *Lethe europa* in a mango garden during morning hours at Narhat Village on 4 and 5 November respectively. Iraota timoleon is sucking nectar on lantana flower.

One of *Lethe europa* was also observed by us in Rajgir region on 28 August 2021. Varshney et al. (1981) reported *I. timoleon* from Hazaribagh Wildlife Sanctuary while Bihar was undivided; and after the separation, the place of observation comes under Jharkhand. In the context of new Bihar, Van Gasse (2018) reported the distribution of *I. timoleon* and *L. europa* only





Lethe europa sucking water drops on dry leafs in a mango garden.

from Champaran. None of the literature indicate the distribution of *I. timoleon* or *L. europa* or images available on citizen science platforms in relation with *I. timoleon* and *L. europa* from Magadh or nearest divisions till now. We report *I. timoleon* and *L. europa* for the first time from Magadh division in Bihar.

Iraota timoleon (Stoll, 1790) Synonym: Papilio timoleon (Stoll, 1790) Distribution: India: Arunachal Pradesh, Bihar (Champaran

Zoo's Print

Jharkhand, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal. **Comments:** *Iraota timoleon*, commonly known as Silverstreak Blue is a blue butterfly or Lycaenid species found in India. Recorded at 24.7708 N, 85.4270 E on 04

and Magadh (Narhat)), Gujarat,

Lethe europa (Fabricius, 1775) Synonym: Papilio europa (Fabricius, 1775) Distribution: India: Arunachal Pradesh, Bihar (Champaran

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and Magadh (Narhat)), Jharkhand, Madhya Pradesh, Odisha, Tripura, Uttarakhand and West Bengal. **Comments:** Lethe europa, commonly known as Bamboo Treebrown is a species of Satyrinae butterfly found in India. In some literatures

L. europa is considered as a Critically Endangered species (Lodh & Agarwala 2015) but information available on IUCN, Wildlife Protection Act, 1972 and Red Data Book- Butterflies of India do not consider it as an endangered species.

Specimen identified by Arjan Basu Roy and Souparno Roy (Nature Mate- Nature Club, Kolkata). Recorded from Narhat, Bihar on 28 August 2021 & 05 November 2021 at 24.7752 N, 85.4272 E & 24.9919 N, 85.4075 E.



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Acoustic evidence of Western Tragopan from Dhauladhar Wildlife Sanctuary

Because of vulnerability to human exploitation and sensitivity towards habitat degradation, pheasants play an important role as bioindicators (Fuller & Garson 2000). But due to their dense and steeper habitat preferences, much is unknown about their population biology and behaviour (Miller 2010). The Western Tragopan *Tragopan melanocephalus* locally known as 'Jujurana' is an elusive Himalayan species which is listed as 'Vulnerable' by the IUCN Red List and is on Schedule-I of Indian Wildlife (Protection) Act, 1972. This species prefers broadleaved and coniferous forests with thicker undergrowth at an altitude ranging 2,400–3,600 m (Delacour 1977).

Dhauladhar Wildlife Sanctuary is an assemblage of diverse biomes covering a span of 982 sq. km. It encompasses subtropical, temperate, and subalpine forests (following Champion & Seth 1968). It covers three biomes- Eurasian high montane (Alpine and Tibetan- Biome 5), Sino-Himalayan temperate forests (Biome-7) and Sino-Himalayan subtropical forests (Biome-8). Such wide combinations of habitats and altitudes make this sanctuary a biodiversityrich area and serve valuable habitat for elusive species like the Western Tragopan.



Spectrogram (Time vs. frequency) of a single syllable of Western Tragopan call.

Syllables	Offset	Duration	F-min	F-mean	F-max
1	0.352	0.133333	1406.25	2069.197	3000
2	0.858667	0.138667	1125	2062.5	3000
3	1.376	0.128	1125	2062.5	3187.5
4	1.882667	0.133333	1031.25	2062.5	3000
5	2.389333	0.133333	1031.25	1968.75	3093.75
6	2.906667	0.112	1031.25	2019.886	3000
7	3.408	0.138667	656.25	2082.589	3187.5
8	3.904	0.128	1031.25	2069.711	3187.5



76°43'30"E





77*4'30"

Communication in form of songs/calls is one of the many ways how birds convey information related to courtships, agnostic and complex social communications (Owings & Morton 1997; Hauser 1999). It provides fruitful grounds for research information related

to individual identity, moods, and intentions (Bradbury & Vehrencamp 1998). Monitoring birds by their songs/calls provides important insights into scientific research (Stowell et al. 2016). Recording acoustic signals are well suited for confirming species presence as it is a nonDhauladhar Wildlife Sanctuary where Western Tragopan was heard.

Location in

invasive sampling technique. Many biodiversity monitoring projects rely on acoustic signal detection of birds.

On 11 July 2021, at around 0535h, we heard a distinct call from close proximity near our field station located (32.3747 N, 76.8389 E) in Shahnala Beat of Dhauladhar Wildlife Sanctuary. The recording only lasted for four seconds before it stopped calling. We avoided tracking the bird in the dark as this Wildlife Sanctuary has a dense population of carnivores. To confirm it further we analyzed eight syllables of our recorded call on Kaleidoscope Pro V5.4.8 (Table1) and compared it with the same number of syllables of existing xeno-canto recordings (https:// xeno-canto.org) and calls recorded in breeding centers with the package 'warbleR' in R Core Team, 2020. The presence of Western Tragopan in the Dhauladhar Wildlife Sanctuary is evident from the results obtained after the comparisons of call spectrograms. Earlier recordings were based on observations from entire Dhauladhar mountain ranges, and not within sanctuary limits. Although locals from Bara Bhangal Village explain their opportunistic sightings of 'Jujurana', this is the first scientific reporting on its presence within sanctuary boundaries.

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Transformation of poachers to protectors through Science Education- a real life story

It was 3rd July, 2021. Like every day I came back to my Division Office Bungalow Cooch Behar at 06:30 pm, and was about to take a sip of tea when my phone rang. My Range Officer, Sri Suranjan Sarkar, was on the phone. He called to report an incidence of poaching of a Ganges River Dolphin- an endangered Indian mammal in the village Bhairaber-tari of Cooch Behar and wanted to know the official way to address the issue.



Dolphin of Balabhut, Cooch Behar district.



Dolphin habitat.

Mammal Tales



Awareness creation among the local fishermen through River patrolling.

Within minutes I constituted a team of good forest personnel under the leadership of Shri Bijan Kumar Nath, Assistant Divisional Forest Officer of Cooch Behar Division and sent the team to the village. Upon visiting the site, my team came to know that a fisherman named Akkas Ali Sekh, killed, and transported the carcass of the Ganges River Dolphin to his house. Killing of any Schedule I animal, like Ganges River Dolphin is treated as hunting as per Sec. 9 of the Wild Life Protection Act, 1972. So Akkas Ali Sekh was arrested by the Range Officer. We produced him in the court and got seven days police custody. During this period he was interrogated by me and some other officials. He told me that for him the dolphin was just like any other fish for him and would fetch him good amount of money. He sold the dolphin to his neighbour fisherman, Samir Sekh for Rs. 6500. We are yet to find Samir Sekh.

After a week I visited the village Bhairab-er-tari, identified the spot where the dophin was killed and interacted with the local people of that village. I found that most people thought dolphin was a fish. Though they don't eat the Dolphin meat, but extract oil from the thick layer of body fat (blubber) under the skin of Dolphin and sell it to others to



Story of Dolphin along with penal provision narrated in local Vernacular through display board.

Mammal Tales

catch fish. But actually this blubber keeps warm and also improves the buoyancy of Dolphins (Pennisi 2000). Now, studies of trained dolphins suggest an additional function: Blubber turns the dolphin's tail into one long spring that helps it swim efficiently (Pennisi 2000).

After analysing the preliminary field data and I have found that only science education and communication can transform poachers to protectors. With that objective we have started education and awareness campaign among the masses of that area. For science education regarding dolphin conservation I have conducted several field visits for protection, monitoring, and patrolling using country boat at the river confluence of Torsa-Kaljani-Ghargharia.

To communicate the concept of conservation I have created the following story. One day few fishermen were congregated in the Balabhut area of Cooch Behar district to get lease of the river area for fishing from the district administration. To their utter astonishment a dolphin, locally known as "Sishu/Shusuk" came to the surface of the river water and addressed them "Friends, both humans and the Ganges River Dolphin are closely related.

The dolphins are not responsible for the reduction of fish population in the rivers, but their presence assures steady increase of fishes in rivers. Dolphins are regulating the fish production by targeting and eating the small fishes and in this way allowing and assuring healthy stock of good quality higher yield of fishes in rivers. Hunting of dolphins with fishing nets will not be beneficial to you. As per the Sec. 51 of the Wildlife (Protection) Act, 1972 hunting of dolphin by any person is treated as offence and shall be punishable with imprisonment for a term which may extend to 7 years or with fine which may extend to twenty five thousand rupees or with both."

Before the Ganges River Dolphin dived in he said "It is better to build a mutual relationship of cooperation, co-existence and permanent friendship along with dolphins".

To inculcate compassion among the masses I have narrated the same story of dolphin conservation in local vernacular languages by installing different display board in the fishermen villages of Bhairab-er-tari, Baxirkuthi and Balabhut area of the river confluence of Torsha-Kaljani-Ghargharia of Cooch Behar.

Visualization of a story is better to create an impact on people. After one month of installation of this awareness board I again conducted field visit in dolphin habitats of those areas. At the time of protection patrolling with country boat I have interacted with a 11 year old son of a fisherman and asked him if has he seen any display board in his village. He told yes. Then I asked him what was written on it. He answered that "Dolphin is a mammal like us and hunting of Ganges River Dolphin shall be punishable with imprisonment for a term of 7 years, with fine of Rs.25,000."

Mammal Tales

Here is the importance of imparting scientific knowledge through stories and real-life situations.

Stories are not only imparting scientific knowledge to the masses, but also increases the knowledge base of scientists. Shri Ravindra Kumar Sinha, the Dolphin Man of India gathered lots of knowledge regarding the behaviour of dolphins from the real-life stories narrated by the fishermen of Bihar to him at the time of dolphin population estimation in the River Ganges through country boat. I came to know this information from a lecture of Shri Ravindra Kumar Sinha Sir available on YouTube.

One fisherman narrated that "one day he observed that after giving birth of live young, Dolphin aunties are lifting the baby to fill air in the lungs of the baby dolphin to start respiration like humans. It imparted scientific knowledge that they are not having gills like fish. The same fisherman also narrated that one day he had seen that one mother dolphin gave birth to a dead baby and tried for the whole day to make it swim. Dolphin mother was not ready to believe that her baby was dead. This reallife story established the fact that dolphins are not only warm-blooded mammals like us but have compassion for their children like human mothers. I have narrated the same story to the fishermen of my area and created compassion to transform them from poachers to protectors of dolphin like a "Dolphin Mitra" (Friend of dolphin).

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