International Journal of Zoology and Applied Biosciences **ISSN: 2455-9571**
Volume 3, Issue 1, pp: 61-70, 2018 **http://www.ijzab.com**
https://doi.org/10.5281/zenodo.1313039
Research Article

EVALUATING FLORAL DIVERSITY OF GUDEKOTE BEAR SANCTUARY WITH REFERENCE TO FEEDING ECOLOGY OF SLOTH BEAR, *MELURSUS URSINUS*

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Article History: Received 26th January 2018; Accepted 3rd February 2018; Published 5th February 2018

ABSTRACT

Abstract: A detailed survey was conducted to understand the habitat structure by employing 100 x 5 meters quadrates during June 2015 to May 2016 at three different forest blocks of Gudekote Bear Sanctuary. Little is known about the habitat preference of Indian sloth bear *Melursus ursinus* that found in North-eastern Karnataka. The study was undertaken to assess the floral structure of the Bear Sanctuary required for the conservation of viable population of *Melursus ursinus* to facilitate the future survival. All together 114 plant species belonging to 44 plant families were recorded of which 50.87% trees, 27.19% shrubs, 15.78% herbs and remaining 6.14% are climbers respectively. Fabaceae family members are more dominantly distributed at all the forest areas and 23 plant species are recorded as bear eating fruits. Despite its small size Gudekote bear sanctuary contain more number of shrubs and fruiting plants supporting a suitable population of Sloth Bears in it. Thus, protection of this floral diversity within the sanctuary is very much essential for the long term conservation of Sloth Bears.

Keywords: Sloth Bear, Gudekote Bear Sanctuary, Bear food Plants, Floral diversity, Ballari District, Deccan Plateau.

INTRODUCTION

The Sloth Bear, *Melursus ursinus* is one of the myrmecophagous (ant or termite-eating) ursid found in India, Nepal, Bhutan, Bangladesh and Sri Lanka. The Sloth Bear is listed as vulnerable (VU) by the World Conservation Union (IUCN 2004) (Laurie and Seidensticker 1977; Joshi *et al*., 1997; Akhtar *et al.*, 2004; Sacco and Valkenburgh, 2004; Mewada and Dharaiya, 2010). In Indian sub-continent the presence of Sloth Bear was reported to be more abundant during 1800s but their number is reduced relentlessly between late 1800s and early 1950s due to habitat loss, expansion of agriculture and anthropogenic interferences (Prater, 1948; Krishnan, 1972) and presently their existence are reported from 174 protected areas, which include 46 National Park and 128 Wildlife Sanctuaries (Chauhan, 2006: Dharaiya, 2009). These include wet or dry deciduous forests (42% and 33% respectively) and less frequently in wet and dry scrub forest, grasslands, thorn scrub and savannas (Garshelis *et al.*, 1999; Sreekumar and Balakrishnan, 2002; Akhtar *et al.*, 2004; Chauhan, 2006; Yoganand *et al.*, 2006 and Dharaiya, 2009) of which only 10% of the current species are distributed in high quality habitats (Yoganand *et al*., 2006).

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The reproductive rate of Sloth bears are very low (Gittleman, 1989) and it is strongly influenced by their nutritional status, which in turn represent their habitat andavailable resources like food and undisturbed home range (Jonkel and Cowan, 1971; Bunnell and Tait, 1981). But, Sloth bears have been continually threatened by hunting, habitat loss, fragmentation of populations and poaching (Yoganand *et al.,* 2006). The life history and behavioral characters of Sloth bears making them to live under risk in most of their range (Garshelis *et al*., 1999), thus it is believed that Sloth Bear populations outside protected areas are decreasing or disappeared completely (Krishnan, 1972, Santiapillai and Santiapillai, 1990; Garshelis *et al*., 1999). Apart from a few studies in Nepal (Joshi *et al.,* 1997) and India (Akhtar *et al*., 2004), a very little is known about the use of space or habitats by the Sloth Bear (Garshelis *et al.,* 1999). As reproductive rate of Sloth bears is very low, it is essential to understand their habitat to maintain viable population of these species. Habitat of Sloth bears differs across its distributional range, and need to be understood as it occupies diverse habitats with different vegetation composition (Ratnayeke *et al.,* 2007). In the absence of any empirical data on the ecology of Sloth Bear-*Melursus ursinus,* understanding its habitat is very much essential for the management. Das *et al.* (2014) has hypothesized the habitat preference of Sloth Bear in north-eastern part of in Karnataka but data regarding Sloth Bear habitat structure is poorly understood and plants are the major composition of habitat. In the present investigation an attempt is made to evaluate the floral composition of the Gudekote Bear Sanctuary, as it is one of the protected areas for Sloth Bears Sanctuaries of India, an understanding would help to mitigate the conservation and conflict problems.

Study area: Gudekote Bear Sanctuary is the young sanctuary created for conservation of Indian Sloth Bear by vide notification by Government of Karnataka, No.FEE-72 FWL-2013 dated 11.11.2013 which declared an extent of 3,848.84 hectares of "Gudekote Reserve Forest", "Gudekote Extension Reserve Forest" and "Halasagara Reserve Forest" of Kudligi taluk in Bellary district as "Gudekote Bear Sanctuary" under sub clause (b) of Section 26-A of Wildlife (protection) Act, 1972. It is located around Gudekote village in Kudligi taluk of Bellary district in Karnataka, South India between $14^{o}\ 50^{1}\ 11.6^{11}$N latitude and $76^{o}\ 37^{1}\ 55.7^{11}$ E longitude (Figure. 1).

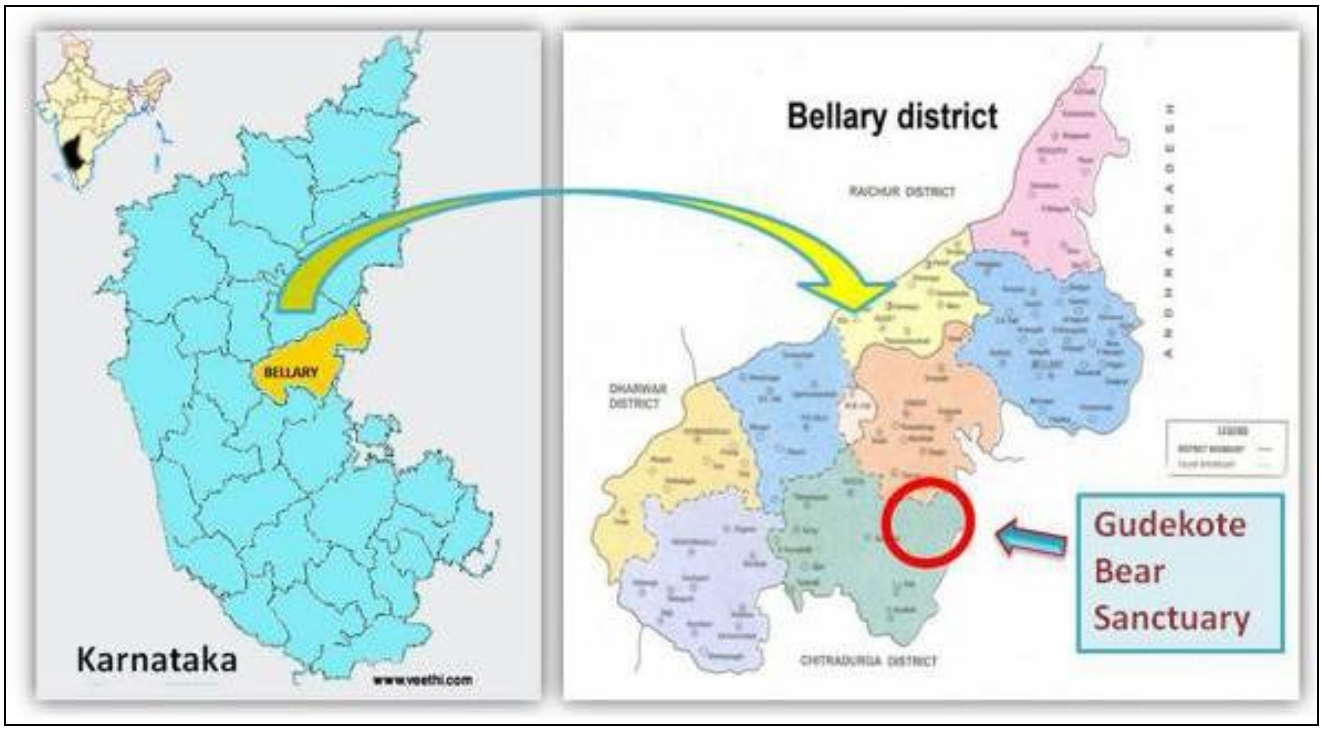

Figure 1. Gudekote Bear Sanctuary, Kudligi taluk of Bellary district in Karnataka.

The typical feature of Gudekote Reserve Forest is the rocky granite boulders with caves, scrub jungle indicating the typical traits of Deccan Plateau. According to Champion and Seth Classification, Gudekote Sloth Bear Sanctuary falls under the dry deciduous scrub (5DS1) and Southern Thorny Forests (6A/DS1) (Champion and Seth, 1968). Average rain fall of the area is 450 to 550 mm per annum; the temperature range between 20 to 46 degree Celsius average altitudes is 600 msl. The soil is mixture of gravel, red soil, black cotton soil and some parts the soil contains lime stones and quartz. As the area receives scanty rain fall, the forest contains only drought resistant species of flora. The main source of water apart from rain is the major tanks or lakes present around the sanctuary.

Methodology: A detailed survey was conducted in different seasons for a year from June 2015 to May 2016. The sanctuary is spread in three different forest blocks such as, Gudekote RF, Gudekote extension RF and Halasagara RF. Each block is divided into grids and transect line were formed. A total 71 number of transect lines selected of which 20 transects in Gudekote RF, 17 in Gudekote Extension RF and 34 transects in Halasagara RF. Survey was conducted using 100 meters x 5 meters quadrates that spread in plain forest, rocky terrain and scrub jungle as per Devi and Yadava (2006). 100 meters rope is taken to measure length of the quadrate and another 5 meter rope to measure the width of the quadrate. The GPS of starting point and End point is noted down for each transect. After enumerating the flora of one quadrate, a gap of 100 meter is jumped to go to the next quadrate. In each quadrate all the major plant is traced, identified using the reference of Flora of Madras Presidency by (Gamble, 1935).

The density and abundance of plant species were calculated by using the formulae as per Jayson and Mathew (2002). Density =Total number of individual plant species recorded / Total number of quadrates covered and Abundance = Total number of individual plant species recorded / Total number of quadrates in which the particular plant species were recorded. Further, Alpha (α) diversity indices like Shannon Diversity Index (H^1): $H^1 = -\sum p^i \, Inp^i$, Shannon Equitability Index (J^1): $J^1 = H^1 / \ln S$, Shanon Dominance (D), Shanon Evenness eH/S and Simpson (H) was calculated for all these three forest areas to understand the plant species distribution as per Magurran (2013).

RESULTS

All together 114 plant species belong to 44 plant families were recorded at three forest locations like Gudekote Block (GB), Gudekote Extension (GE) and Halasagara Extension (HE) of Gudekote Bear Sanctuary of Ballari District (Table 1) with a very small variation in their plant species composition. In Halasagara block 99 plant species belonging to 41 plant families were recorded, which was followed by 89 plant species of 40 families were recorded from Gudekote block and only 100 plant species belong to 37 plant families were recorded at Gudekote Extension block (Table 1, 3). The plant species like *Syzygium cumini* belong to Myrtaceae family, *Madhuca indica* (Sapotaceae) and *Balantities roxburghii* (Zygophyllaceae) are not reported at Halasagar Extension and *Capparis zeylanica* (Capparaceae), *Erythroxylum monogynum* (Erythroxylaceae), *Syzygium cumini* (Myrtaceae) and *Chloroxylon swietenia* of Rutaceae family members are absent in Gudekote Block forest area. Whereas, in Gudekote Extension seven plant species like *Aristolochia indica* (Aristolochiaceae), *Dolichandrone atrovirens* (Bignoniaceae), *Capparis zeylanica* (Capparaceae), *Erythroxylum monogynum* (Erythroxylaceae), *Largerstroemia parviflora* (Lyrtaceae), *Chloroxylon swietenia* (Rutaceae) and *Balantites roxburghii* (Zyphyllaceae) are not found (Table 1).

Further, total density and abundance of all the plant species was calculated to all the plant species (Table 1). *Dichrostachys cinerea* and *Balantities roxburghii* plants were more abundantly distributed with 20.00 and 18.00 % respectively and *Sterculia urens* and *Euphorbia antiquorum* plants abundance was 9.7 and 8.0% respectively (Table 1) and *Terminalia arjuna, Alangium salviifolium, Dalbergia lanceloaria* and *Ficus benghalensis* density was more in all these forest blocks respectively (Table 1). Whereas, *Aerva lanata, Asparagus racemosus, Pulicaria wightiana, Senna auriculata, Mellettia pinnata, Tamarindus indica, Grewia damine, Abutilon indicum, Grewia villosa, Ficusreligiosa, Bridelia tomentosa, Ziziphus oenoplia, Ziziphus mauritiana, Morinda pubescens* and *Solanum virginianum* plant species density and abundance was 0.01 and 1.00 respectively at all the forest areas (Table 1).

The recorded plant species were further classified into Trees, Herbs, Shrubs and Climbers (Table 2). Out of 114 recorded plant species 44% (51 species) plant species are trees, 32% (37 species) are shrubs, 14% (16 species) are herbs and remaining 10 percent (10 species) plants are climbers (Figure 2). Whereas, 24.56% (28 species) of plant species recorded out of 114 plant species are identified as bear eating fruits (Table 1 and 2). Whereas, there are several other plants (remaining 75.44% plant species) are also develop fruits but there preference as food is need to be understood and their percent occurrence was depicted in the Figure 2.

Family composition: The floral composition of the forest was majorly contributed by Fabaceae Family members of 23 plant species with 20.18% of total floral diversity, which was followed by Apocynaceae, Malvaceae and Rubiaceae with six plants species with 5.26% of total flora and Combertaceae, Euphorbiaceae, Moraceae contributed about 4.39% of total flora with 5 species each. Amaranthaceae, Asparagaceae, Asteraceae plant families contributed 3.15%

flora with four plant species each and 2.63% of plant families were contributed by Luminaceae, Phyllantanceae, Rhamnaceaefamily members with three plant species ofeach. The remaining 1.75% of flora was composed by Anacardaceae, Asclepidaceae, Ebenaceae, Meliaceae, Sapindaceae and Tiliaceae family members. Whereas, Acantaceae, Ananonaceae, Arecaceae, Aristolochiaceae, Asphodelaceae, Bignoniaceae, Burseraceae, Cactaceae, Capparaceae, Celastaceae, Convoluvulaceae, Cornaceae, Erythroxylaceae, Loganiaceae, Lythraceae, Moringaceae, Myrtaceae, Olacaceae, Plumbaginaceae, Rutaceae, Sapotaceae, Solanaceae, Ulmaceae, Verbenaceae and Zygophyllaceae families contributes only one plant species each with 0.88% of total floral diversity (Figure 2). Further, Aritolochaceae, Bignoniaceae, Capparaceae, Erythroxylaceae, Lythraceae, Rutaceae and Zygophyllaceae family members are completely absent in Gudekote Extension range and Capparaceae, Erythroxylaceae, Myrtaceae and Rutaceae family members are absent in Gudekote Block range. Whereas, only three plant families like Myrtaceae, Sapotaceae and Zygophyllaceae family members are absent in Halasagara forest (Table 1).

Diversity index: Different alpha (α) diversity indices were calculated for all the three forest areas and it was showed in the Table 3. Shanon (H^1) index was almost similar at all the forest areas and it was 4.05, 4.15 and 4.08 respectively at GE, GB and HE forest areas (Table 3) and Simpson (1_D) was 0.97 at all the forest areas (Table 3). Further, Shannon Evennes (eH/S) index was 0.91, 0.90 at GB and GE, but it was 0.88 at HE and Shannon Equitability (J) index also showed similar pattern with 0.67, 0.63 and 0.59 at, GB, GE and HE (Table 3). Whereas, Dominance (D) was comparatively varied between, 0.023 to 0.025 at all this forest blocks (Table 3).

DISCUSSION

Sloth Bears population in Indian subcontinent is declining continually to threaten over past few decades due to hunting, habitat loss, fragmentation of population (Yoganand *et al*., 2006) and increasing anthropogenic disturbances altering their habitat leads to decline of species (Bargali *et al.,* 2005). Thus, present study was carried out to during June 2015 to May 2016, understanding the floral diversity of the Sanctuary which depicts the habitat structure of Gudekote Bear Sanctuary, Ballari District of Karnataka state. Understanding the habitat structure of bears will in turn helps to make specific strategies for restoration of bear population. However, the present study reveals, floral diversity of three different forest structures are almost similar with even distribution of species. The habitat composition of Gudekote Bear Sanctuary is dominated by Fabaceae Family members with 20.18%, which was followed by Apocynaceae, Malvaceae and Rubiaceae (5.26%) and Combertaceae, Euphorbiaceae, Moraceae contributed about 4.39%.Amaranthaceae, Asparagaceae, Asteraceae plant families contributed 3.15% and 2.63% of plant families were contributed by Luminaceae, Phyllantanceae, Rhamnaceae family member and remaining 64.39% is contributed by other family members. Das *et al.,* (2014) hypothesized the presence of shrubs coverage had an impact on bear population in North-eastern Karnataka like Hospet and Koppal Districts. Sloth bears are nocturnal species they rest in the bushes during the day and goes out for food during the night (Samad and Hosetti, 2017). In the present investigation out of 114 recorded plants 32.45% are shrubs and 14.03% are herbs. Thus, presence of more shrubs in Gudekote Bear Sanctuary revels habitat suitability and its capacity to support bear populations.Species diversity indices like Shannon (H'), Evenness (eH/S), Simpson (1-D) and Equitabality (J) indices between three different forest habitats depicted almost similarity, which clearly indicates, distribution of plant species across these forest patches almost similar species composition.Whereas, the increased dominance index (D) at Gudekote Extension indicating the species diversity is dominated by particular plant species. Thus, species composition and habitat structure of these three forests areas are almost similar.

Sloth Bear population is strongly influenced by nutritional status, particularly on available food resource (Jonkel and Cowan, 1971; Bunnell and Tait, 1981; Baskaran *et al.,* 1997; Sreekumar and Balakrishnan, 2002). Thus, food resources are an important parameter in habitat analyses, carrying capacity estimates, and conservation of bears (Craighead *et al.,* 1982)**.** Similarly, several researchers identified different fruits are the major dietary composition of Sloth bear. Gopal (1991), Baskaran *et al*., (1997); Joshi *et al*., (1997); Ramesh *et al*., (2009) and Dhariya (2009) are reported that *Aegle marmelos, Cassia fistula, Diospros melanoxylon, Ficus racemosa, Madhuka indica, Mangifera indica, Syzigium cumini, Zyzypus juuba, Phoenix sylvestris, Cardia dichotoma, Grewia hirsute* and *Millus tomentosa* are the major bear eating fruits at different parts of India. Similarly, in the present investigation plant species like *Annona squamosal, Phoenix sylvestris, Capparis zeylanica, Alangium salviifolium, Diospyros melanoxylon, Dichrostachys cinerea, Cassia fistula, Pithecellobium dulce, Grewia damine, Grewia orbiculata, Grewia villosa, Ficus arnottiana, Ficus mollis, Ficus racemosa, Ficus benghalensis, Ficus religiosa, Syzygium cumini, Xemenia americana, Ziziphus oenoplia* and *Ziziphu smauritiana* are recorded as the major bear eating fruits present in Gudekote Bear Sanctuary. It clearly indicates, these forest areas have very rich resource of food materials which is very much helpful for the breading population of bears.Conservation of these fruiting plant species will play a crucial role in the conservation of bear species in this area. Further, there are many other fruiting plants are also identified in the forest areas, but their preference as food by bears is yet be excavated in further may helpful for the proper bear habitat conservation.

Habitat degradation, decreases the food resources in turn increasing the bear human conflict continuously and

considered a threat over 40% of all the Sloth Bears areas (Bargali *et al.*, 2005; Yoganand *et al.*, 2006; Samad and Hosetti, 2017) especially bear protected areas like Gudekote Bear Sanctuary. Reduction of bear conflict will not succeed unless the habitat and ecology of these species are well managed. Thus, present investigation was carried out to restore the habitat of Sloth Bear of Gudekote bear sanctuary, which is very critical criteria for the conservation of bear population in their home habitat and also conservation of shrubs and fruiting plants inside the Bear Sanctuary will reduces the conflict and helpful for sustainable management of these species in their habitats.

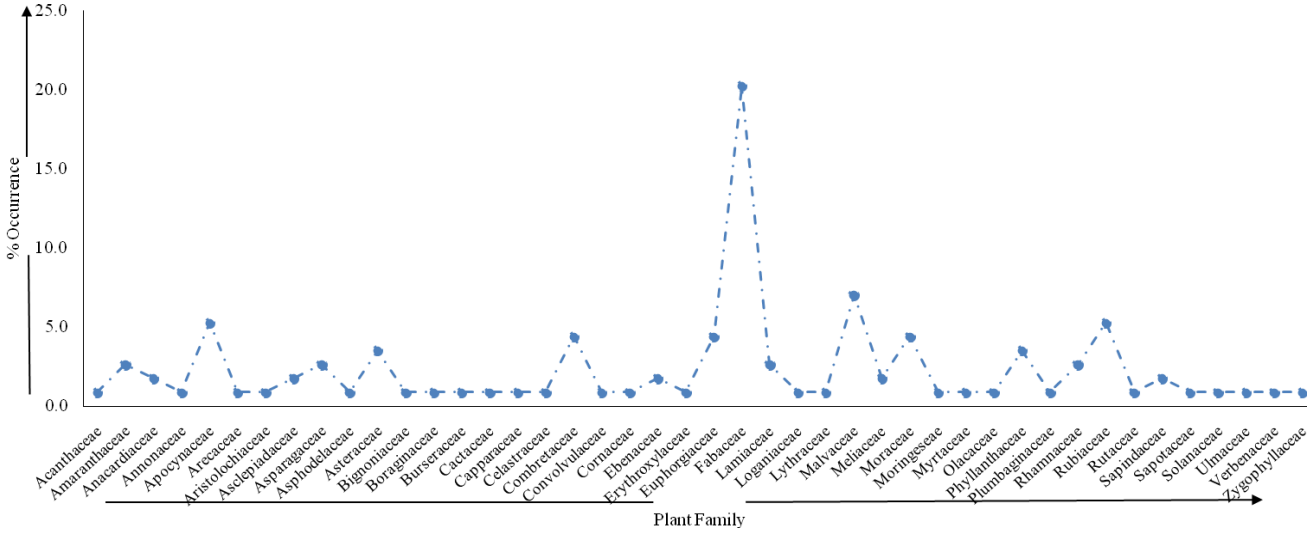

Figure 2. Percent occurrence of plant families at Gudekote Bear Sanctuary.

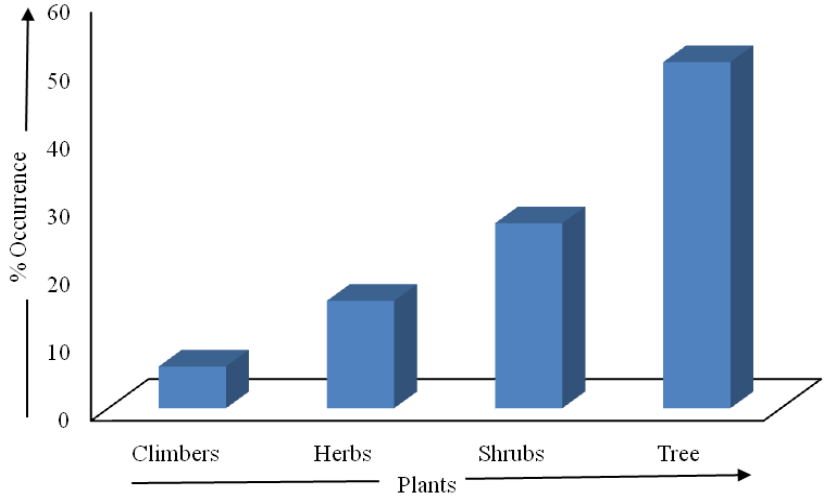

Figure 3. Composition of different plant types at Gudekote Bear Sanctuary.

Table 1. Composition of floral diversity at different blocks of Gudekote Bear Sanctuary, Bellary District.

Sl. No.	Plant species			Plant type	GB	GEB	HB	Total	D	A
	Scientific name	Common name	Family							
1	*Andrographis paniculata*	Nelabevu	Acanthaceae	H	12	7	11	30	0.2	1.56
2	*Achyranthes aspera*	Uttarani		H	10	15	10	35	0.38	1.93
3	*Aerva lanata*	Bilihimdisoppu	Amaranthaceae	H	3	9	8	20	0.01	1
4	*Pupalia lappacea*	Antupuralegida		H	7	5	5	17	0.72	3.64

5	*Rhus mysorensis*	Uritipla	Anacardiaceae	S	13	30	8	51	0.27	1.46
6	*Semicarpus anacardium*	Keru		S	0	3	0	3	0.28	1.82
7	*Annona squamosa*	Seetaphal	Annonaceae	S*	35	21	85	141	0.31	3.14
8	*Calotropis gigantea*	Doddaekke		S	0	2	3	5	0.99	5.83
9	*Calotropis procera*	SannaEkke		S	0	3	3	6	1.99	5.64
10	*Carissa carandus*	Kavale	Apocynaceae	S*	25	19	61	105	0.18	2.6
11	*Cryptostegia grandiflora*	Rubber gida		S	0	2	4	6	0.58	6.83
12	*Hemidesmus indicus*	Sogadeberu		H	0	2	5	7	0.42	2.73
13	*Wrightia tinctoria*	Beppale		T	9	15	17	41	1.69	2.5
14	*Phoenix sylvestris*	Eachla	Arecaceae	T*	3	2	11	16	0.96	6.8
15	*Aristolochia indica*	Eshwariballi	Aristolochiaceae	C	1	2	1	4	0.06	1
16	*Pergularia daemia*	Bilihattiballi	Asclepiadaceae	C	0	1	3	4	0.37	5.2
17	*Tylophora indica*	Adumuttadaballi		C	5	1	0	6	0.14	1.25
18	*Agave americana*	kathale		S	16	38	22	76	0.27	3.8
19	*Asparagus racemosus*	Shatavari	Asparagaceae	S	4	5	13	22	0.03	1
20	*Sansevieria roxburghiana*	Havukathale		S	0	3	7	10	0.08	1.2
21	*Aloe vera*	LoleSar	Asphodelaceae	H	8	11	22	41	0.07	1
22	*Cyanthillium cinereum*	Sahadevi		H	9	11	4	24	1.48	3.18
23	*Pulicaria wightiana*	Nelakanti	Asteraceae	H	8	12	10	30	0.03	1
24	*Tridaxpro cumbens*	Tikitapla		H	10	9	16	35	0.04	1
25	*Vernonia indica*	Neralenelahu		H	10	13	12	35	0.89	2.63
26	*Dolichandrone atrovirens*	Udedu	Bignoniaceae	T	16	13	12	41	0.07	1
27	*Cardia myxa*	Challehannu	Boraginaceae	T	1	0	2	3	0.17	1.09
28	*Boswellia serrata*	Dhupa	Burseraceae	T	0	0	2	2	0.58	1.78
29	*Opuntia stricta*	Papaskalli	Cactaceae	S	6	9	8	23	1.18	4.67
30	*Capparis zeylanica*	Tottiluballi	Capparaceae	C*	6	2	12	20	0.08	6
31	*Maytenus senegalensis*	Tondarasi	Celastraceae	T	0	0	2	2	0.34	2.4
32	*Anogeissus latifolia*	Dindiga		T	13	18	17	48	0.61	3.07
33	*Terminalia arjuna*	Hole matti		T	0	0	1	1	2.11	6
34	*Terminalia bellirica*	Tare	Combretaceae	T	2	5	5	12	0.32	1.77
35	*Terminalia catapa*	Kadubadami		T	0	2	2	4	0.17	2.4
36	*Terminalia elliptica*	Karimatti		T	0	2	3	5	0.92	4.06
37	*Evolvulus alsinoides*	VishnuKanti	Convolvulaceae	H	3	8	5	16	1.18	4.67
38	*Alangium salviifolium*	Ankole	Cornaceae	T*	12	18	18	48	2.54	3.83
39	*Diospyros melanoxylon*	Tumbri	Ebenaceae	T*	34	14	17	65	0.2	1.75
40	*Diospyros montana*	Jagalaganti		T*	7	5	0	12	0.08	1.2
41	*Erythroxylum monogynum*	Devadare	Erythroxylaceae	S	29	25	19	73	0.07	2.5
42	*Euphorbia antiquorum*	Dammagalli		S	3	4	7	14	0.23	8
43	*Euphorbia caducifolia* .	Dudukolugalli		S	2	2	2	6	0.04	3
44	*Euphorbia nivulia*	Elegalli	Euphorgiaceae	S	5	10	5	20	0.14	1.25
45	*Euphorbia tirucalli*	Kodukalli		T	7	5	6	18	0.25	2.57
46	*Givotia rottleriformis*	Bili tale		T	3	4	3	10	0.11	1.14
47	*Albizia amara*	Tugli		T	29	40	51	120	0.06	2
48	*Abrus precatorius*	Gulagunji	Fabaceae	C	0	2	2	4	0.03	2
49	*Acacia horrida*	Donne jali		T	6	8	6	20	0.14	2

50	*Acacia planifrons*	Kodejali		T	7	1	8	16	0.06	1.33
51	*Albizzia lebbeck*	Bage		T	9	11	10	30	1.94	6.27
52	*Bauhinia racemosa*	Basavanapada		T	3	3	5	11	0.1	1.17
53	*Cassia fistula*	Kakke		T*	5	8	7	20	0.37	3.71
54	*Dalbergia lanceolaria*	Pacheri		T	11	15	17	43	2.65	4.95
55	*Dichrostachys cinerea*	Edathare		T	5	11	7	23	0.85	20
56	*Hardwickia binata*	Kamara		T	17	19	24	60	0.14	3.33
57	*Indigofera astragalina*	Kadu menthe		H	21	17	22	60	0.1	2.33
58	*Millettia pinnata*	Honge		T	7	15	5	27	0.03	1
59	*Pithecellobium dulce*	Sihihunise		T	1	0	0	1	0.38	2.7
60	*Senegalia catechu*	Teredu		T	42	55	63	160	0.03	2
61	*Senegalia ferruginea*	Banni		T	12	2	14	28	0.52	2.18
62	*Senna auriculata*	Tangadi		S	21	37	19	77	0.01	1
63	*Senna siamea*	SeemeTangadi		T	0	1	1	2	0.04	1.5
64	*Senna tora*	Nayialasandi		H	9	11	7	27	0.13	1.8
65	*Tamarindus indica*	Hunise		T	1	0	0	1	0.03	1
66	*Tephrosia purpurea*	Kaduneeli		H	9	11	14	34	0.07	1.25
67	*Vachellia farnesiana*	Kasturijali		T	8	10	2	20	0.06	1.33
68	*Vachellia leucophloea*	BiliJali		T	0	1	2	3	0.85	6
69	*Vachellia nilotica*	Karijali		T	3	1	5	9	0.06	1.33
70	*Hyptis suaveolens*	RakkasaTulasi		H	6	5	15	26	1.34	5.94
71	*Leucas aspera*	Tumbe	Lamiaceae	H	0	11	16	27	0.38	3.86
72	*Ocimum tenuiflorum*	Tulasi		H	6	5	7	18	0.03	2
73	*Strychnos potatorum*	Sillinamara	Loganiaceae	T	9	11	0	20	0.25	2.25
74	*Largerstroemia parviflora*	Bilinandi	Lythraceae	S	0	4	0	4	0.28	4
75	*Grewia damine*	Ulupi		T*	65	60	63	188	0.06	1
76	*Abutilon indicum*	Tutti /mudre		S	9	7	11	27	0.01	1
77	*Grewia hirsuta*	Gandu ulipe		S*	4	5	6	15	0.24	1.55
78	*Grewia orbiculata*	Karijane	Malvaceae	T*	38	47	53	138	0.48	3.4
79	*Grewia tenax*	Kadathri		S*	0	2	0	2	0.01	1
80	*Grewia villosa*	Karkili		S*	13	16	17	46	0.01	1
81	*Helicteres isora*	Murike		S	1	0	1	2	0.24	2.83
82	*Sterculia urens*	Kendale		S	2	3	2	7	0.55	9.75
83	*Azadiracta indica*	Bevu	Meliaceae	T	7	8	11	26	0.72	2.43
84	*Soymida febrifuga*	Soame		T	0	0	1	1	0.14	3.33
85	*Ficus arnottiana*	Kallala		T	2	4	2	8	0.11	1.6
86	*Ficus benghalensis*	Ala		T*	1	1	0	2	2.25	4.21
87	*Ficus mollis*	Kallathi	Moraceae	T	3	4	3	10	0.32	1.92
88	*Ficus racemosa*	Atti		T*	2	0	4	6	0.04	1.5
89	*Ficus religiosa*	Arali		T	0	0	1	1	0.03	1
90	*Moringa conconensis*	Kadunugge	Moringeseae	T	0	0	4	4	1.08	2.41
91	*Syzygium cumini*	Nerale	Myrtaceae	T*	0	1	0	1	0.03	1
92	*Xemenia americana*	Nakre	Olacaceae	T*	0	1	0	1	0.38	2.7
93	*Bridelia tomentosa*	Handiulpi	Phyllanthaceae	S	2	0	4	6	0.01	1
94	*Phyllanthus emblica*	Nellikayi		T	0	3	2	5	0.62	2.44

95	*Phyllanthus reticulatus*	Karisuli		S	23	0	23	46	0.1	1.75
96	*Securinega leucopyrus*	Bilisuli		S	6	9	8	23	0.2	1.4
97	*Plumbago zeylanica*	Kadumallige	Plumbaginaceae	C	0	1	0	1	0.28	1.67
98	*Ziziphus mauritiana*	Bore		T*	15	19	23	57	0.01	1
99	*Ziziphus oenoplia*	Pargi	Rhamnaceae	C*	28	24	47	99	0.01	1
100	*Ziziphus xylopyrus*	Godasi		T	21	17	35	73	0.48	3.4
101	*Canthium parviflorum*	Kaare		S	11	9	16	36	0.17	2.4
102	*Catunaregam spinosa*	Mangare		S	3	7	4	14	0.03	1
103	*Gardenia gummifera*	Bikke	Rubiaceae	S	0	10	0	10	0.96	4.25
104	*Gardenia latifolia*	Adavibikke		T*	2	0	5	7	0.08	1
105	*Ixora pavetta*	Goravi		S*	13	14	10	37	0.07	1.25
106	*Morinda pubescens*	Maddi		T	6	10	10	26	0.01	1
107	*Chloroxylon swietenia*	Masivala	Rutaceae	T	5	8	11	24	0.03	2
108	*Dodonaea viscosa*	Bandarike	Sapindaceae	S	9	7	11	27	0.04	1
109	*Sapindus trifoliatus*	Antuvala		T	0	3	5	8	0.13	2.25
110	*Madhuca indica*	Ippe	Sapotaceae	T*	0	2	0	2	0.75	3.79
111	*Solanum virginianum*	Kadubadane	Solanaceae	H	4	7	3	14	1.14	2.7
112	*Holoptelea integrifolia*	Tapasi	Ulmaceae	T	2	2	0	4	0.28	5
113	*Lantana camera*	Lantana	Verbenaceae	S*	8	7	5	20	1.03	2.15
114	*Balantites roxburghii*	Ingalara	Zygophyllaceae	T	9	4	6	19	0.25	18
		Total			898	1024	1225	3147		

GEB: Gudekote Extn. Block; GB: Gudekote Block; H B; Holsagara Block.

A: Abundance; D: Density; T: Tree; H: Herb; S: Shrub; C: Climber.

* Fruit of these Shrubs, Trees and climbers are eaten by Bears.

Table 2. Composition of different plant types at different ranges of Gudekote Bear Sanctuary.

Sl. No.	Plant Type	Total
1.	Climbers	7
2.	Herbs	18
3.	Shrubs	31
4.	Trees	58
	Total	114

Table 3. Diversity indices calculated for different study areas of Gudekote Bear Sanctuary.

Sl. No.	Diversity Indices	Study sites in Gudekote Bear Sanctuary		
		Gudekote Block	Gudekote Extn. Block	Halasagara Block
1.	Taxa_S	86	100	99
2.	Individuals	898	1024	1225
3.	Dominance_D	0.023	0.021	0.025
4.	Shannon_H	4.055	4.156	4.084
5.	Simpson_1-D	0.97	0.97	0.97
6.	Evenness_e^H/S	0.670	0.638	0.599
7.	Equitability_J	0.910	0.902	0.888

CONCLUSION

On the basis of the study conducted, it was found that the habitat in Gudekote Bear Sanctuary is ideal for Sloth bears. It is supporting the nutritional needs of the Indian Sloth Bears in the form of berries, drupes and other forms of fruits of wild flora throughout the year. 28 species of different forms of flora such as shrubs, trees and climbers become a part of food chain of Sloth bears. The seeds of different fruits eaten by Sloth bears pass through its gastro-intestinal system, get acid treatment and fall to the ground in the form of scat. During monsoon some of these seeds germinate and propagate the forest. Thus Sloth bears play vital role in dispersal of seeds and growth of forest in their habitat. The conservation of such habitat and the native flora is important for assured nutritional supply for Sloth bears.

ACKNOWLEDGEMENT

The authors are thankful to the authorities of Kuvempu University, Shimoga, Karnataka and officials of Karnataka Forest department for their support and encouragement to undertake this activity.

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