Chapter 6

Vegetation Structure and Prioritizing Plants for Eco-Restoration of Degraded Wildlife Corridor in Dry Tropical Forest of South India

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Additional information is available at the end of the chapter

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Abstract

Wildlife corridors are critical to manage wildlife and maintain ecological processes. However, they are fragmented and degraded due to various anthropogenic activities. Fragmentation in turn affects population viability of species by affecting their dispersal, re-colonization and genetic exchanges. But the process can be reversed through restoration and management of 'functional corridors'. So far in the forestry sector, monoculture plantations are known to be the ideal reforestation/afforestation strategy to restore degraded landscape but experts argue that monoculture plantations have failed to recover former biological diversity. Therefore, for successful eco-restoration, first, the regional plant stock has to be identified and then suitable plant species have to be prioritized. The habitat enrichment through assisted vegetation method in the degraded wildlife corridors can improve green cover and also bring back the original vegetation. The study was conducted in the Edeyarahalli-Doddasampige wildlife corridor area, which is part of Biligiri Rangaswamy Temple Tiger Reserve, Western Ghats, India. The vegetation was enumerated through transect and quadrate method. The vegetation structure was analyzed and ten suitable native plant species were prioritized for eco-restoration. The priority was given based on site condition and socio-ecological importance of the plants such as trees with timber value, non-timber forest products, nectar source for honey bees and also food source for elephants. At a time of unprecedented forest destruction, the interventions made through this line of research would not only improve the habitat quality but also increase the functionality of wildlife corridors by providing safe passage for animals' movement. In addition to this, convergence of local multistakeholders and their responsibility needs to be explored toward eco-restoration process.

Keywords: Biligiri Rangaswamy Temple Tiger Reserve, restoration, Western Ghats, wildlife corridor

1. Introduction

The world's tropical forests are being fragmented and degraded with significant loss of species diversity and ecosystem services [1–4]. Unplanned infrastructure development in forest landscapes, clearing of forest land for expansion of human habitation as well as farmland, and unsustainable extraction of forest resources can create growing pressures and also inflict negative impacts on wildlife habitat [5–7]. According to meta-population, meta-community and island-biogeography theories, degradation and fragmentation of natural wildlife habitats could lead to the extinction of many species across the globe due to loss of sub-population connectedness and inbreeding depression [4, 8]. Therefore, at the time of unprecedented wildlife habitat destruction, eco-restoration of degraded forest areas particularly wildlife corridors is gaining global importance and also emerging as a practical conservation strategy [9–12]. Under the 'Green India Mission', the Indian government is planning to double afforestation efforts by 2020 [13] and also planning to buy private plantations to restore elephant corridors [14, 15].

According to the 'Field of Dreams Hypothesis', *if a habitat is successfully restored, the species will return* but we need to refine the appropriate restoration strategy. So far in the forestry sector, monoculture plantations are known to be the ideal reforestation strategy to restore degraded landscapes [16–18] but experts argue that monoculture plantations failed to recover their former biological diversity [19–21]). Therefore, to reverse the effect, the eco-restoration method would be the appropriate strategy. Habitat enrichment through assisted vegetation method can improve green cover as well as bring back the native vegetation and provide resource rich passage for animals' movement. However, as a first step in the eco-restoration activity, the regional plant stock has to be assessed and then suitable native plant species has to be prioritized based on their socio-ecological importance and site condition [22]. In addition to this, the species which are selected for eco-restoration should be strong and hard enough to withstand and survive in the prevailing climatic conditions; mainly heavy rain and dry seasons [16]. This is because, the type of forest occurring naturally in a place is the result of the complex influence of the climatic, edaphic, topographic, and biotic factors of the locality [23].

The Edeyaralli-Doddasampige wildlife corridor (ED corridor) in Biligiri Rangaswamy Temple Tiger Reserve (BRT), Western Ghats is one such biodiversity rich forest landscape but subjected to various land-use practices leading to fragmentation and degradation of wildlife habitat and wildlife migratory routes. Therefore, action and restoration research has been planned in this degraded corridor to maintain the habitat quality and also increase the functionality of the corridor through assisted vegetation enrichment. For successful eco-restoration, first, the regional plant stock has to be identified and then suitable plant species have to be prioritized. In this study, we have addressed the following two research questions; (i) How are the plant community variables such as species richness, density, diversity and IVI (Importance Value Index) distributed among life forms in the corridor landscape?, (ii) How do we prioritize the suitable plant species/categories for eco-restoration of degraded wildlife corridor?

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2. Methods

2.1. Study site

The study has been carried out at Edeyarahalli-Doddasampige wildlife corridor (ED corridor), which is one of the degraded but ecologically important functional corridors between Biligiri Rangaswamy Temple Tiger Reserve (BRT) and Malai Mahadeswara Hills Wildlife Sanctuary (MM Hills) (**Figure 1**). The dimension of the ED corridor is 0.5 km in length and 2 km in width and the geographical coordinates are 11°55′15″ to 11°56′15″N and 77°15′20″ to 77°15′45″E. The corridor landscape is largely in the dry deciduous and scrub forest type. It harbors rich floral and faunal diversity, mainly IUCN red listed mammal species such as Asian elephant (*Elephas maximus*), Bengal tiger (*Panthera tigris*), Indian leopard (*Panthera pardus*) and Indian wild dog (*Cuon alpinus*). In addition to this, the corridor landscape is inhabited by *Soligas*, an indigenous tribal community and a few other non-tribal communities.

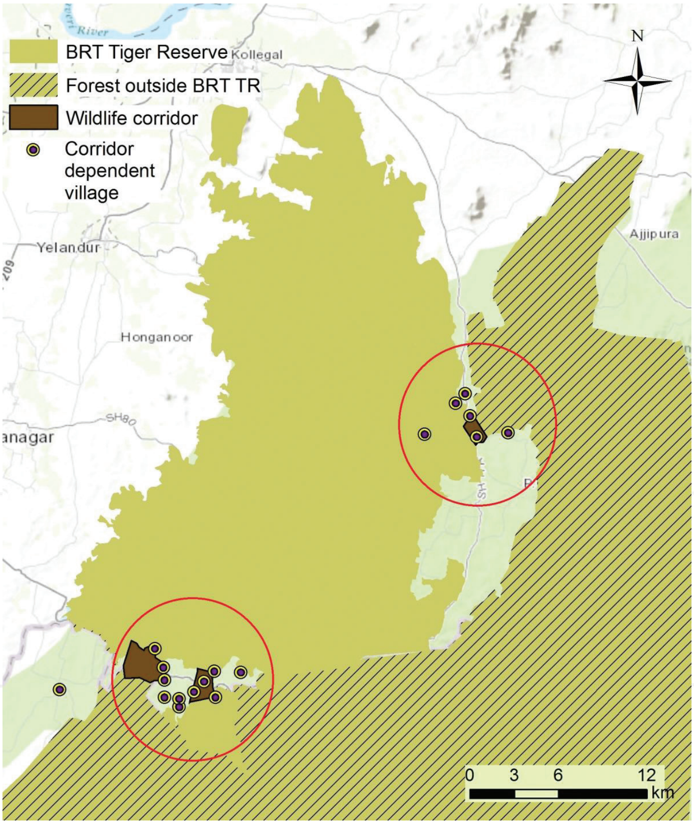

Figure 1. Matrix of forests, wildlife corridors, dependent villages, farmland and road network in and around the corridor landscape (marked in circles).

The corridor landscape is severely degraded due to unplanned land-use practices, past forest management activities- logging and shifting cultivation -and the problem of invasive/exotic plants species [24, 25]. Apart from that, the villagers use this corridor regularly for livestock grazing and fuel wood collection [6]. In addition to this, the state highway (SH-17A) is passing through this wildlife corridor and an average of one vehicle per minute was recorded on this road [26]. This could be an additional threat to the movement of wildlife in this corridor. Irrespective of various threats, ED corridor provides space and passage for more than 15 mammal species (large, medium and small) to move from Western Ghats to forested landscapes of Eastern Ghats [27]. Adjacent to this corridor, in 2007 approx. 25.5 acres of private land was purchased from local farmers to widen the corridor by WTI (Wildlife Trust of India) and its international partner organization International Fund for Animal Welfare (IFAW), with financial support from US Fish and Wildlife Services (USFWS). The land was then handed over to the Karnataka State Forest Department to augment the corridor. This was a pioneering move in corridor conservation in India [6].

2.2. Vegetation enumeration

Transect method was used to enumerate vegetation in the corridor landscape. There were 64 belt transects of 0.1 ha (10 × 100 m), 128 plots of 10 m^2 and 512 plots of 1 m^2 were established to enumerate trees, shrubs and herbaceous plants respectively in the study area (**Figure 2**). Each sampling transect was marked with red ribbons, and the GPS coordinates were recorded at the center of each transect for future study purpose. The sampling was carried out in the month of October, which is the peak wet season in the study area. This is because during the wet season the chances of finding herbaceous species as well as seedlings of woody species in the study area are higher.

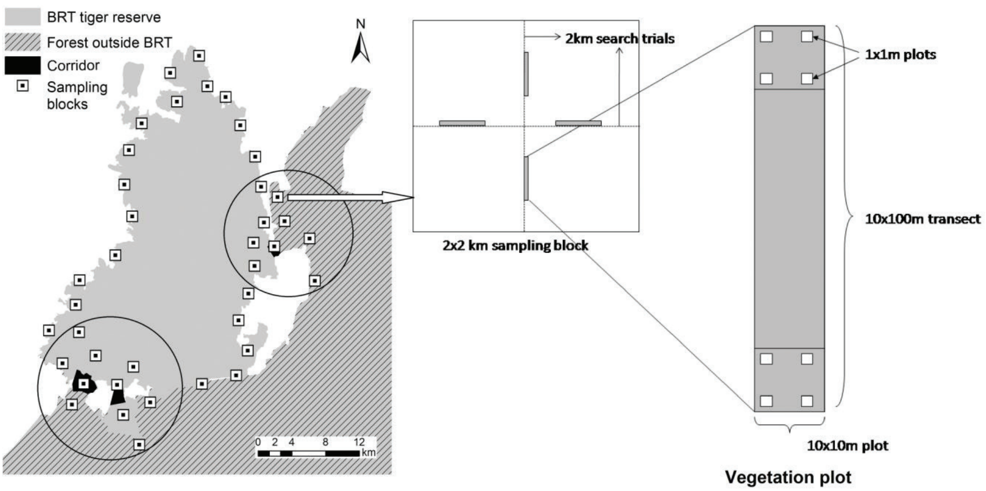

Figure 2. Survey design for vegetation study in the corridor landscape of BRT Tiger Reserve. The sampling was carried out in the blocks which fall within the circles. One 2 × 2 km sampling block consists of four vegetation plots, eight shrub plots and 32 herb plots.

2.2.1. Data collection

In 10 × 100 m transects all stems >5 cm DBH (diameter at breast height - at 130 cm) were enumerated. The DBH of the individual stems were measured for all the species found in the transects using calibrated DBH tape. The height was measured through visual approximation method [28, 29]. In 10 × 10 m plots all the shrubs and saplings of woody plant species whose DBH fell between 1 and 5 cm were counted and named. Finally, in the 1 × 1 m plots all the herbaceous plants and seedlings of woody plant species (whose stem size was <1 cm) were recorded. For most of the species, botanical names and family names were identified and recorded in the field itself. For unidentified plant species, the specimen samples were collected for herbarium preparation and identification was done in the laboratory by using 'Flora of the Presidency of Madras' [30]. For grass species the per cent cover per unit area was calculated through visual estimation rather than counting individual species. The percentage of invasive species *Lantana camara* cover per plot was also recorded through visual estimation at the time of study period. Visual estimation is fast, requires no specialized equipment, and can be adapted to plants of various growth forms [28, 29]. In addition to this, the number of cut stems and cowpats was recorded in the transects to assess the intensity of fuel wood collection and cattle grazing respectively in the study area.

Plant community variables such as species richness, Shannon's diversity *H′* and evenness *J* was calculated for the corridor landscape. Simple linear regression models were developed to test the influence of *Lantana camara*, fuelwood collection and cattle grazing on native plant diversity. In addition to this, species Importance Value Index (IVI) was calculated to identify the dominant species of the study area for both tree and non-tree classes.

For trees the IVI was calculated by using the formula; ***IVI of sp. i = relative density of sp. i + relative frequency of sp. i + relative dominance of sp. i.*** However, since data on relative dominance which is derived from basal area is not possible for non-trees, the IVI for undergrowth (non-trees) was calculated using the formula modified as ***IVI of sp. i = relative density of sp. i + relative frequency of sp. i.***

Local community considerations were also considered in addition to scientific data in prioritizing suitable native plant species for eco-restoration. This is because people from the landscape, especially *Soliga* tribals, possess sophisticated knowledge about biodiversity and traditional forest resource management practices [25, 31, 32]. Therefore, a participatory approach was employed to prioritize native plant species. Three Focus Group Discussions (FGD) were conducted in three corridor landscape dependent villages. In addition, a couple of informal interviews were also conducted. Questions were asked regarding corridors, wildlife, eco-restoration and presence of suitable plant species in the landscape.

3. Results

3.1. Plant community structure

Species richness and Shannon's diversity *H′* is relatively higher in tree class compared to shrub and herbaceous class. The evenness *J* is more or less similar between shrub and herbaceous class but relatively higher than tree class (**Table 1**). The corridor landscape had 92 tree species (belonging to 39 families), 75 shrub species (belonging to 41 families) and 185 species (belonging to 65 families). About 73.9% stems belong to different shrub species and 26.1% are saplings of woody species. In terms of total herbaceous stems enumerated in the study area, around 77.8% are herbaceous plants and 22.2% are woody seedlings.

3.1.1. Resource plants

The study area is endowed with rich plant resources. Out of 92 tree species, 10 species turned out to be important Non-timber forest products (NTFP) resource plants. They represented 2.5% of the total stems enumerated in the area. Among the NTFP category, fruits of *Phyllanthus indofischeri* ranked high. Nine tree species provided fuelwood (per. Interviews with local people) – and represented 13.5% of the total stems enumerated. Thirteen species were identified as important food resource for elephants (as mentioned in Refs. [33–35]), which represent 18% of total stems recorded from the study area (**Table 2**).

3.2. Species importance value or IVI

The study site was evaluated for importance value index of each species. For tree species, the top ten most common species found in the sampled area were *Anogeissus latifolia, Chloroxylon swietenia, Erythroxylon monogynum, Dalbergia lanceolaria, Strychnos potatorum, Naringi crenulata, Acacia chundra, Diospyros montana, Canthium travencoricum* and *Ixora arborea* (**Table 3**). Among 92 species, these 10 species contribute 52% of the total IVI (Appendix A).

For non-tree forms such as shrubs/saplings, the top ten and most common species found in the corridor landscape were *Lantana camara, Pterolobium hexapetalum, Dodonaea viscosa, Randia dumetorum, Chloroxylon swietenia, Erythroxylon monogynum, Zizyphus oenoplia, Fluggea leucopyrus, Eupatorium odoratum, Dolichandrone falcata* and *Pavetta indica* (**Table 4**). Among 75 species, these 10 species contribute 70% of the total IVI, of which *Lantana camara* alone contributes 32% (Appendix B).

For the seedlings/herbaceous plant group, the top ten most important species found in the corridor landscape were *Leucas martinicensis, Oxalis corniculata, Eupatorium odoratum, Lantana*

Community variable	Tree (mean ± se) Per 0.1 ha	Shrub (mean ± se) Per 10 m^2	Herb (mean ± se) Per m^2	Grass cover (mean ± se) percent/m^2
	(n = 64)	(n = 128)	(n = 512)	(n = 512)
Species richness	12.48 ± 0.53	6.13 ± 0.28	8.52 ± 0.14	–
Shannon's *H'*	2.06 ± 0.05	1.39 ± 0.05	1.72 ± 0.02	–
Evenness *J*	0.69 ± 0.01	0.78 ± 0.0	0.74 ± 0.006	–
Density	42.76 ± 3.36	21.15 ± 1.32	37.89 ± 1.05	44.90 ± 1.35

Table 1. Plant community variables among life forms (trees, shrubs, and herbs) of native vegetation in the corridor area.

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Sl. no.	Scientific name	Family	Importance
1	*Acacia chundra*	Mimosaceae	Fuelwood tree
2	*Anogeissus latifolia*	Combretaceae	Fuelwood tree
3	*Canthium travancoricum*	Rubiaceae	Fuelwood tree
4	*Chloroxylon swietenia*	Rutaceae	Fuelwood tree
5	*Erythroxylon monogynum*	Erythroxylaceae	Fuelwood tree
6	*Grewia asiatica*	Tiliaceae	Fuelwood tree
7	*Ixora arborea*	Rubiaceae	Fuelwood tree
8	*Randia dumetorum*	Rubiaceae	Fuelwood tree
9	*Ziziphus xylopyrus*	Rhamnaceae	Fuelwood tree
1	*Acacia sinuata*	Mimosaceae	NTFP plant (fruit)
2	*Azadirachta india*	Meliaceae	NTFP plant (fruit)
3	*Bombax ceiba*	Bombacaceae	NTFP (undeveloped fruit)
4	*Decalepis hamiltonii*	Asclepiadaceae	NTFP plant (root)
5	*Phoenix loureirii*	Arecaceae	NTFP plant (leaves)
6	*Phyllanthus indofischeri*	Euphorbiaceae	NTFP plant (fruit)
7	*Syzygium cumini*	Myrtaceae	NTFP plant (fruit)
8	*Tamarindus indica*	Fabaceae	NTFP plant (fruit)
9	*Terminalia bellerica*	Combretaceae	NTFP plant (fruit)
10	*Terminalia chebula*	Combretaceae	NTFP plant (fruit)
1	*Acacia chundra*	Fabaceae	Elephant food plant
2	*Acacia leucophlea*	Mimosaceae	Elephant food plant
3	*Acacia sinuata*	Mimosaceae	Elephant food plant
4	*Albizia amara*	Fabaceae	Elephant food plant
5	*Atylosia lineata*	Fabaceae	Elephant food plant
6	*Bambusa arundinacea*	Poaceae	Elephant food plant
7	*Capparis seperaria*	Capparaceae	Elephant food plant
8	*Commiphora caudata*	Burseraceae	Elephant food plant
9	*Dendrocalamas strictus*	Poaceae	Elephant food plant
10	*Grewia tilifolia*	Malvaceae	Elephant food plant
11	*Hardwickia binata*	Fabaceae	Elephant food plant
12	*Tectona grandis*	Verbenaceae	Elephant food plant
13	*Ziziphus xylopyrus*	Rhamnaceae	Elephant food plant

Table 2. List of fuelwood, NTFP, and elephant food plant species in the corridor area.

Dominant tree species	IVI value
Chloroxylon swietenia	32.89
Anogeissus latifolia	30.72
Erythroxylon monogynum	28.76
Acacia chundra	11.88
Dalbergia lanceolaria	11.48
Strychnos potatorum	10.56
Naringi crenulata	08.57
Diospyros montana	08.34
Ixora arborea	07.74
Canthium travancoricum	07.70

Table 3. Importance Value Index (IVI) for top ten tree species in the corridor landscape of BRT Tiger Reserve.

Non-tree forms	Dominant species	IVI value
Saplings/shrubs	*Lantana camara*	64.60
	Pterolobium hexapetalum	13.20
	Dodonia viscosa	11.92
	Randia dumetorum	09.68
	Chloroxylon swietenia	09.54
	Erythroxylon monogynum	07.63
	Ziziphus oenoplia	07.52
	Fluggea leucopyrus	05.88
	Eupatorium odoratum	05.65
	Dolichandrone falcata	05.47
Seedlings/herbs	*Leucas martinicensis*	16.81
	Oxalis corniculata	12.40
	Eupatorium odoratum	11.00
	Lantana camara	10.96
	Evolvulus alsinoides	05.68
	Atylosia lineata	04.59
	Randia dumetorum	04.57
	Justicia simplex	04.10
	Crotalaria calycina	03.98
	Ziziphus oenoplia	03.10

Table 4. Importance Value Index (IVI) for top ten non-tree species in the corridor landscape of BRT Tiger Reserve.

camara, Evolvulus alsinoides, Atylosia lineata, Randia dumetorum, Justicia simplex, Crotalaria calycina and *Ziziphus oenoplia* (**Table 4**). Among 185 species, these 10 species contribute 38% of the total IVI (Appendix C).

The problematic invasive weeds of the landscape, such as *Lantana camara* and *Eupatoruim odoratum* are contributing significantly toward total IVI in both shrubs and herbs categories. *Lantana camara* contributes 32.30% and 5.47% for total IVI of shrubs and herbs respectively, whereas *Eupatoruim odoratum* contributes 2.82% and 5.89% for total IVI of shrubs and herbs respectively. This indicates the extent of invasion of weeds in the landscape.

3.3. Relationship between vegetation diversity and habitat characteristics

The data was analyzed for relationships between one of the community variables such as vegetation diversity - of trees, shrubs and herbs - (as a response variable) with three habitat covariates

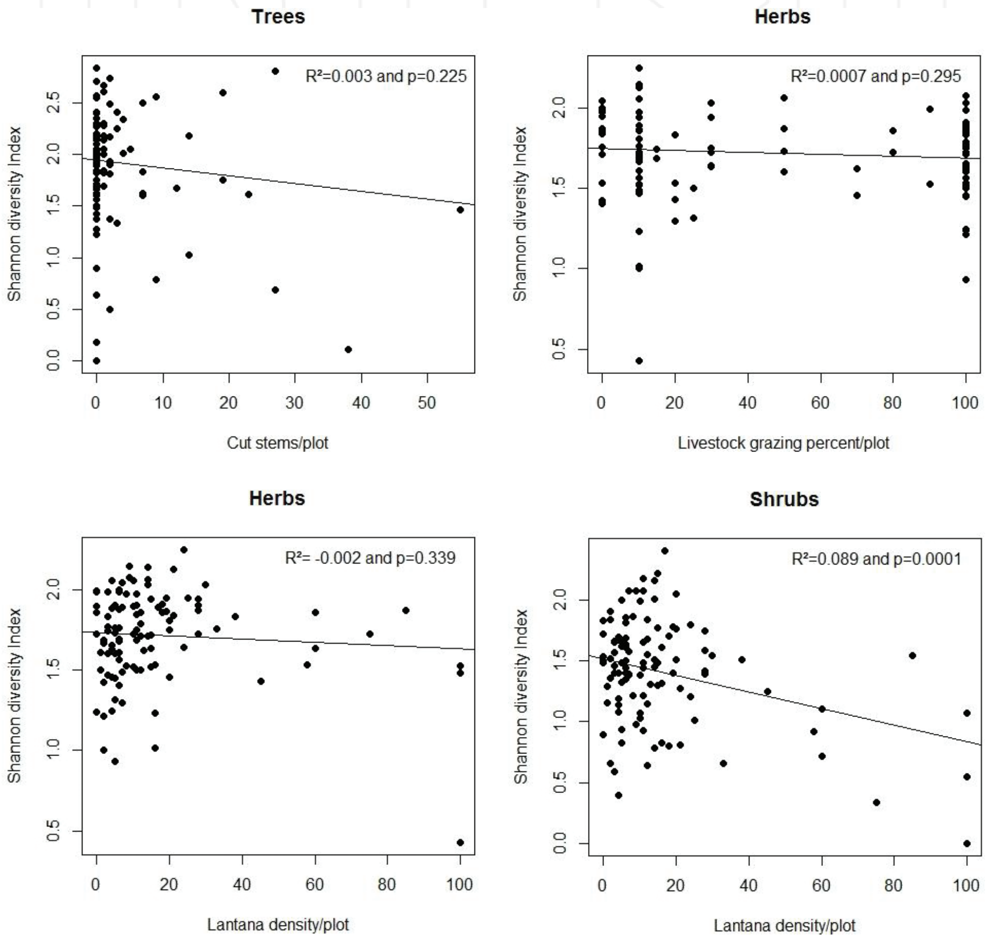

Figure 3. Relationships between species diversity (*H'*) and three habitat characteristics (fuelwood collection, livestock grazing and *Lantana camara* density). Cut stems/plot implies fuelwood collection in the landscape.

such as fuelwood collection, livestock grazing intensity and invasive species – *Lantana camara* density (as predictor variables). The (four) models were developed to test the relationship between Diversity (*H′*) of- (i) trees vs. fuelwood collection, (ii) shrubs vs. *Lantana camara* density, (iii) herbs vs. *Lantana camara* density and (iv) herbs vs. grazing intensity of livestock.

Even though no statistically significant linear dependence of the mean of **y** on **x** was detected (the p-values are >0.05 for all relationships except for Shannon's diversity vs. *Lantana camara* density in shrubs) the slope (regression coefficients) shows a negative trend (**Figure 3**). The negative (marked in minus symbol) slope coefficient value for (i) trees vs. fuelwood collection is −0.007, (ii) shrubs vs. *Lantana camara* density is −0.006, (iii) herbs vs. *Lantana camara* density is −0.001 and (iv) herbs vs. grazing intensity of livestock −0.005. This indicates that fuelwood collection, cattle grazing and the density of invasive species like *Lantana camara* affects the species diversity (H′) of life forms (trees, shrubs and herbaceous species) in the corridor landscape.

4. Discussion

Species richness is often treated not only as a measure of biodiversity [36] but also quality of the ecosystem and recovery of forest from disturbances such as logging [37–39]. The corridor is in the dry deciduous and scrub forest harboring 92 tree species in the sampled area, representing approximately 12% of plant species of the entire BRT forest enumerated [40]. The study site had around 10 NTFP species that provide partial household income for people in the corridor landscape; 12% for *Soligas* and 7% for non-*Soligas* [27]. The fruit of Indian Gooseberry tree is not only serves as a livelihood source for local people but also as an important dietary component for wild animals during the lean season [41–43]. As a result around 17% of *amla* sapling stems are re-sprouts in the study area. As in Ref. [44], fire and grazing in BRT could be the drivers of the high proportion of re-sprout as part of the demography.

The study result shows that vegetation diversity decreased with increase in fuelwood collection (in tree class), livestock grazing and invasive species (in non-tree class). Subsequently it will severely affect not only the plant community structure and regeneration [45, 46] but also habitat quality of the landscape [24], genetic structure of NTFPs at population level [47] and increment of woody vegetation [48]. *Lantana camara* is affecting native vegetation mainly of herbaceous class and shrub species, and is responsible for significant reduction in species richness and diversity [49]. As in Ref. [50] the study result from BRT forest showed that *Lantana camara* is the major driver impacting the demographic pattern of species such as *P. emblica* and *P. indofischeri*. This could be due to poor survival of light demanding seedlings of native tropical dry forest species under the conditions of high *Lantana camara* abundance and shade [51]. If the present scenario continues for a long period of time, it will gradually reduce forest regeneration rates and thus lead to impaired sustainability of the corridors [49, 52, 53].

4.1. Prioritized plant species for eco-restoration: a socio-ecological approach

Globally, conceptual models for restoration of biodiversity have highlighted the importance of regional plant source pool and framework species in restoration [54–56]. Regional plant species are more important for eco-restoration, because the type of forest occurring naturally in a place is the result of climatic, edaphic, topographic, and biotic factors of the locality [22, 23].

Out of 92 tree species, 10 species contribute 52% of the total IVI of the corridor landscape. Among the 10 species *Anogeissus latifolia, Canthium travancoricum, Erythroxylon monogynum* and *Ixora arborea* are the top five species which have been exploited for fuelwood. People prefer these trees as firewood due to their calorific value, ease of carrying as headload, and frequency of availability. Though species such as *Cassia spectabilis* and *Eucalyptus* sp. could form good fuelwood and timber trees respectively they are not collected by people as they are planted by the Forest Department. Some of the other tree species with high IVI in this landscape are not preferred either as fuelwood species or as domestic timber requirements due to multiple reasons. For instance, *Chloroxylon swietenia, Acacia chundra,* and *Strychnos potatorum* are tree species with thick/rough bark and are uncomfortable to carry as headload. Similarly *Diospyros montana* is not harvested for fuelwood because of the belief that doing so could splinter the family by inciting fights between family members. Similarly, people believe that *Terminalia bellerica* is one of the sacred trees in the landscape and belongs to the god *Shani Devaru*, (a local deity regarded as an incarnation of *Shiva*). Hence, we have shortlisted *Anogeissus latifolia* as a dominant and firewood tree species, and *Terminalia crenulata, Dalbergia lanceolaria* and *Albizia odoratissima* as timber tree species for vegetation enrichment. Since *Phyllanthus indofischeri* and *Terminalia bellerica* are major NTFP species that serve as a source of livelihood for local people [41] and also form part of the dietary requirement for ungulates during the lean season, people generally do not cut these trees for fuelwood. So, we have shortlisted these two species also for vegetation enrichment. Since honey is a major NTFP in this landscape, people suggested the planting of one nectar yielding tree species for honey bees in the landscape such as *Pterocarpus marsupium*. In addition to these, *Acacia chundra, Hardwickia binata* and *Bambusa arundinacea* were identified and shortlisted as important plant sources of elephant's food in the landscape [33–35].

Ten suitable native plant species were identified for vegetation enrichment based on their Important Value Index, ecological importance and recommendation by the community. Our research prioritized similar plant species for restoration such as *Anogeissus latifolia* (dominant tree and source of firewood), *Terminalia crenulata, Dalbergia lanceolaria* and *Albizia odoratissima* (timber trees), *Phyllanthus indofischeri* and *Terminalia bellirica* (NTFP trees), *Pterocarpus marsupium* (nectar source for honey bees), *Acacia chundra, Hardwickia binata* and *Bambusa arundinacea* (elephant food plants).

4.2. Species selected for clonal propagation

The plant species such as *Bambusa aurindinacea, Tectona grandis, Gmelina arborea* and *Dalbergia sissoo* in the corridor landscape may have the capability to propagate through clonal methods. Clonally propagated species (CPS) have the capacity to tolerate adverse conditions and give significantly better growth rates, and better disease resistance with most desirable timber traits [57]. In addition to this, clonal propagation trait not only could persist and maintain species richness but also retain genetic diversity of the species in the forests even after experiencing disturbance in the form of forest fire, grazing, and harvesting pressure from fuelwood collection [58, 59]. Since clonal propagation of dry tropical forest trees influence the tree species composition and demography, we suggested planting CPS, including bamboo along the forest boundary and teak in the farmland of the study area.

4.3. Nursing plants

Most of the forest landscapes in BRT have been subjected to different kinds of forest management practices such as shifting cultivation, logging, monoculture plantation, etc., both by the indigenous community and the State Forest Department in the past. This makes it more complex when it comes to understanding the structure, composition and successional status of native species [24, 25]. However, in eco-restoration, in order to improve the performance of target species, the "nursing" procedure seems to be promising, and shows enhanced plant survival and growth [18]. Therefore, in the same landscape, two native species, *Pterolobium hexapetalum* and *Dodonaea viscosa* were identified. These could play the role of nursing plants as they cover the native shrub and sapling communities extensively in more open forested areas. Being a prickly straggler, *Pterolobium hexapetalum* is not grazed by cattle and other ungulates. Likewise, *Dodonaea viscosa*, a bushy plant, is a pioneer species that is not eaten by cattle or other ungulates. Based on our field observations, we believe that these two native plants *P. hexapetalum* and *D. viscosa* could play the role of nursing by protecting seedlings from grazing and browsing, and influence the regeneration of tree seedlings and saplings.

5. Conclusion

In a human-dominated forest landscape like BRT, corridors have been subjected to severe anthropogenic disturbances and poor management. Fuelwood collection and livestock grazing coupled with invasive species *Lantana camara* have affected the vegetation dynamics of the corridor landscape. This will indirectly affect not only the dependent animal community but also the livelihoods of local people at some point in the same landscape. Our study has provided base line information on composition and size of the regional plant species pool, and also selected 10 native plant species for vegetation enrichment as part of eco-restoration in the corridor. Active and large scale *Lantana camara* removal coupled with enrichment planting activity needs to be initiated in and around the corridors to improve the habitat quality of the corridor landscape. Exploring the possibilities of using native shrub plants such as *Pterolobium hexapetalum* and *Dodonaea viscosa* as nursing plants to promote the survival rate of saplings of tree species could be one of the strategies. Convergence in the form of collaboration with local community, local institutions, local stakeholders, civil society, government and non-government research organizations is essential for improved protection and sustainable management of these important corridors. Such collaboration may help to increase the likelihood of persistence of animal populations by providing functional connectivity between the fragments. In fact the local community showed interest in establishing decentralized nurseries in the landscape to raise the selected plant species on incentive basis in collaboration with the Forest Department and the Village Panchayat. At a time of unprecedent habitat destruction, this could promote not only local participation and co-management of the wildlife corridor in a human-dominated forest landscape but also contribute toward 'UN-REDD Programme Strategic Framework' which is aiming to enhance carbon stocks in degraded forests [60].

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Appendices

Appendix A. IVI of tree species in the corridor landscape of Biligiri Rangaswamy Temple Tiger Reserve

Sl. no.	Botanical name	Family	Relative density	Relative frequency	Relative basal area	IVI
1	*Chloroxylon swietenia*	Rutaceae	17.21	6.13	9.55	32.89
2	*Anogeissus latifolia*	Combretaceae	13.08	5.63	12.01	30.72
3	*Erythroxylon monogynum*	Erythroxylaceae	14.58	6.26	7.93	28.76
4	*Acacia chundra*	Mimosaceae	4.86	4.38	2.65	11.89
5	*Dalbergia lanceolaria*	Fabaceae	2.74	3.63	5.11	11.48
6	*Strychnos potatorum*	Strychnaceae	4.02	3.38	3.17	10.57
7	*Naringi crenulata*	Rutaceae	3.22	3.13	2.23	8.57
8	*Diospyros montana*	Ebenaceae	2.45	4.13	1.77	8.35
9	*Ixora arborea*	Rubiaceae	2.67	3.75	1.32	7.74
10	*Canthium travancoricum*	Rubiaceae	2.92	3.00	1.78	7.70
11	*Randia dumetorum*	Rubiaceae	2.52	3.25	0.91	6.69
12	*Dalbergia latifolia*	Fabaceae	0.47	0.75	5.25	6.47
13	*Atlantia monophylla*	Rutaceae	2.67	2.63	0.92	6.21
14	*Acacia leucophlea*	Mimosaceae	0.62	0.63	4.35	5.60
15	*Lantana camara*	Verbenaceae	0.66	2.25	2.39	5.30
16	*Diospyros melanoxylon*	Ebenaceae	1.57	2.63	0.50	4.70
17	*Ziziphus oenoplia*	Rhamnaceae	1.94	2.38	0.38	4.70
18	*Prosopis cineraria*	Fabaceae	0.44	1.00	2.64	4.08
19	*Albizia amara*	Fabaceae	0.69	1.50	1.84	4.04
20	*Stereospermum personatum*	Bignoniaceae	0.55	1.50	1.42	3.47
21	*Cassine glauca*	Celastraceae	1.06	1.63	0.71	3.39
22	*Cassia fistula*	Caesalpinaceae	0.91	2.13	0.31	3.36
23	*Premna tometosa*	Verbenaceae	0.69	1.63	0.97	3.30
24	*Phyllanthus indofischeri*	Euphorbiaceae	0.69	1.63	0.95	3.28
25	*Bambusa arundinacea*	Poaceae	1.24	0.63	1.33	3.20
26	*Grewia tiliifolia*	Tiliaceae	0.99	1.75	0.39	3.12

Sl. no.	Botanical name	Family	Relative density	Relative frequency	Relative basal area	IVI
27	*Ferronia elephantum*	Rutaceae	0.44	1.25	1.24	2.93
28	*Bauhinia purpurea*	Fabaceae	0.15	0.25	2.51	2.91
29	*Albizia odoratissima*	Fabaceae	0.15	0.50	2.21	2.86
30	*Vitex altissima*	Verbenaceae	0.55	1.38	0.88	2.80
31	*Diospyros* sp.	Ebenaceae	0.11	0.25	2.20	2.56
32	*Morinda tinctoria*	Rubiaceae	0.62	1.13	0.78	2.53
33	*Canthium parviflorum*	Rubiaceae	0.80	1.50	0.21	2.51
34	*Maytenus emarginata*	Celastraceae	0.80	1.38	0.29	2.47
35	*Ziziphus xylopyrus*	Rhamnaceae	0.84	1.25	0.36	2.45
36	*Dolichandrone falcata*	Bignoniaceae	1.06	0.88	0.15	2.08
37	*Gmelina arborea*	Verbenaceae	0.15	0.50	1.13	1.78
38	*Aglaia odoratissima*	Meliaceae	0.37	0.88	0.45	1.69
39	*Dodonaea viscosa*	Sapindaceae	0.69	0.88	0.10	1.67
40	*Commiphora caudata*	Burseraceae	0.26	0.63	0.77	1.65
41	*Hardwickia binata*	Caesalpinaceae	0.29	1.00	0.24	1.54
42	*Pterocarpus marsupium*	Fabaceae	0.18	0.63	0.70	1.51
43	*Schleichera oleosa*	Sapindaceae	0.04	0.13	1.30	1.47
44	*Unid2*	Unid	0.07	0.25	1.12	1.45
45	*Garuga pinnata*	Meliaceae	0.11	0.25	1.06	1.42
46	*Terminalia paniculata*	Combretaceae	0.33	0.63	0.42	1.37
47	*Celtis tetrandra*	Ulmaceae	0.11	0.25	0.99	1.35
48	*Haldina cordifolia*	Rubiaceae	0.11	0.38	0.81	1.30
49	*Acacia sinuata*	Mimosaceae	0.77	0.38	0.12	1.26
50	*Flacourtia montana*	Flacourtiaceae	0.22	0.25	0.63	1.10
51	*Terminalia bellirica*	Combretaceae	0.07	0.25	0.71	1.03
52	*Ficus* sp.	Moraceae	0.22	0.25	0.55	1.02
53	*Terminalia chebula*	Combretaceae	0.26	0.63	0.10	0.99
54	*Gmelina asiatica*	Verbenaceae	0.29	0.63	0.06	0.97
55	*Boswellia serrata*	Burseraceae	0.29	0.38	0.27	0.94
56	*Pterolobium hexapetalum*	Caesalpinaceae	0.26	0.63	0.05	0.93
57	*Caralluma umbellata*	Asclepiadaceae	0.37	0.38	0.18	0.92
58	*Azadirachta india*	Meliaceae	0.22	0.50	0.13	0.85
59	*Capparis seperaria*	Capparaceae	0.18	0.50	0.15	0.84
60	*Acacia nilotica*	Fabaceae	0.18	0.13	0.53	0.84

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Sl. no.	Botanical name	Family	Relative density	Relative frequency	Relative basal area	IVI
61	*Ziziphus jujuba*	Rhamnaceae	0.18	0.25	0.36	0.79
62	*Cadaba fruticosa*	Capparaceae	0.11	0.38	0.28	0.76
63	*Santalum album*	Santalaceae	0.22	0.50	0.03	0.75
64	*Spondias pinnata*	Anacardiaceae	0.04	0.13	0.59	0.75
65	*Holarrhena antidycenterica*	Apocynaceae	0.15	0.50	0.06	0.71
66	*Butea monosperma*	Fabaceae	0.11	0.38	0.21	0.70
67	*Pongamia pinnata*	Fabaceae	0.11	0.25	0.31	0.67
68	*Acacia* sp.	Mimosaceae	0.07	0.25	0.34	0.66
69	*Dendrocalamas* sp.	Poaceae	0.26	0.38	0.03	0.66
70	*Flacourtia indica*	Flacourtiaceae	0.22	0.38	0.03	0.63
71	*Gardenia gammifera*	Rubiaceae	0.11	0.38	0.12	0.60
72	*Anacardium occidentale*	Anacardiaceae	0.04	0.13	0.42	0.58
73	*Strychnos* sp.	Strychnaceae	0.26	0.25	0.07	0.58
74	*Cleistanthus* sp.	Phyllanthaceae	0.11	0.38	0.08	0.57
75	*Wrightia tinctoria*	Apocynaceae	0.11	0.38	0.07	0.55
76	*Bridelia retusa*	Euphorbiaceae	0.11	0.38	0.06	0.55
77	*Terminalia crenulata*	Combretaceae	0.07	0.13	0.22	0.41
78	*Memecylon umbellatum*	Melastomataceae	0.15	0.25	0.01	0.41
79	*Bombax cieba*	Bombacaceae	0.04	0.13	0.19	0.35
80	*Tamarindus indiaca*	Fabaceae	0.04	0.13	0.18	0.34
81	*Carissa carandas*	Apocynaceae	0.07	0.25	0.02	0.34
82	*Celastrus paniculata*	Celastraceae	0.07	0.25	0.01	0.33
83	*Unid3*	Unid	0.04	0.13	0.03	0.20
84	*Erythrina variegata*	Fabaceae	0.04	0.13	0.03	0.19
85	*Unid1*	Unid	0.04	0.13	0.01	0.18
86	*Mallotus philippensis*	Euphorbiaceae	0.04	0.13	0.01	0.18
87	*Lagerstromia parviflora*	Lythraceae	0.04	0.13	0.01	0.17
88	*Grewia asiatica*	Tiliaceae	0.04	0.13	0.01	0.17
89	*Pyrenacantha volubilus*	Icacinaceae	0.04	0.13	0.01	0.17
90	*Chionanthus malabaricus*	Olacaceae	0.04	0.13	0.00	0.17
91	*Cocculus* sp.	Menispermaceae	0.04	0.13	0.00	0.17
92	*Syzygium cuminii*	Myrtaceae	0.04	0.13	0.00	0.16
			100	**100**	**100**	**300**

Appendix B. IVI of shrub species (includes saplings of woody plants) in the corridor landscape of Biligiri Rangaswamy Temple Tiger Reserve. 'Relative basal area' will not be considered for non-tree species

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
1	*Lantana camara*	Verbenaceae	51.60	13.00	64.60
2	*Pterolobium hexapetalum*	Caesalpinaceae	5.87	7.33	13.20
3	*Dodonia viscosa*	Sapindaceae	6.58	5.33	11.92
4	*Randia dumetorum*	Rubiaceae	3.90	5.78	9.68
5	*Chloroxylon swietenia*	Rutaceae	3.09	6.44	9.54
6	*Erythroxylon monogynum*	Erythroxylaceae	2.07	5.56	7.63
7	*Ziziphus oenoplia*	Rhamnaceae	2.18	5.33	7.52
8	*Fluggea leucopyrus*	Phyllanthaceae	1.77	4.11	5.88
9	*Eupatorium odoratum*	Asteraceae	4.20	1.44	5.65
10	*Dolichandrone falcata*	Bignoniaceae	2.36	3.11	5.47
11	*Pavetta indica*	Rubiaceae	2.33	2.78	5.10
12	*Toddalia asiatica*	Rutaceae	1.36	3.00	4.36
13	*Atlantia monophylla*	Rutaceae	1.29	2.33	3.62
14	*Acacia sinuata*	Mimosaceae	1.32	2.22	3.55
15	*Naringi crenulata*	Rutaceae	1.32	2.11	3.43
16	*Diospyros montana*	Ebenaceae	0.59	2.67	3.26
17	*Canthium travancoricum*	Rubiaceae	0.73	2.00	2.73
18	*Anogeissus latifolia*	Combretaceae	0.70	1.56	2.25
19	*Bambusa arundinacea*	Poaceae	0.45	1.33	1.78
20	*Ixora arborea*	Rubiaceae	0.45	1.22	1.67
21	*Flacourtia montana*	Flacourtiaceae	0.50	1.11	1.61
22	*Acacia chundra*	Mimosaceae	0.36	1.22	1.58
23	*Strychnos potatorum*	Strychnaceae	0.39	1.11	1.50
24	*Cassia fistula*	Caesalpinaceae	0.25	1.22	1.47
25	*Albizia amara*	Fabaceae	0.27	1.11	1.38
26	*Grewia tiliifolia*	Tiliaceae	0.23	1.00	1.23
27	*Santalum album*	Santalaceae	0.21	0.89	1.10
28	*Capparis seperaria*	Capparaceae	0.25	0.78	1.03
29	*Wrightia tinctoria*	Apocynaceae	0.20	0.78	0.97
30	*Grewia asiatica*	Tiliaceae	0.25	0.67	0.92

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
31	*Canthium parviflorum*	Rubiaceae	0.23	0.67	0.90
32	*Diospyros melanoxylon*	Ebenaceae	0.16	0.67	0.83
33	*Jasminum roxberghianum*	Oleaceae	0.23	0.44	0.68
34	*Cipadessa baccifera*	Meliaceae	0.20	0.44	0.64
35	*Maytenus emarginata*	Celastraceae	0.13	0.44	0.57
36	*Dalbergia lanceolaria*	Fabaceae	0.09	0.44	0.53
37	*Argyreia cuneata*	Convolvulaceae	0.07	0.44	0.52
38	*Memecylon umbellatum*	Melastomataceae	0.14	0.33	0.48
39	*Flacourtia indica*	Flacourtiaceae	0.13	0.33	0.46
40	*Ferronia elephantum*	Rutaceae	0.07	0.33	0.40
41	*Acacia leucophlea*	Mimosaceae	0.05	0.33	0.39
42	*Carissa carandas*	Apocynaceae	0.05	0.33	0.39
43	*Diospyros* sp.	Ebenaceae	0.05	0.33	0.39
44	*Premna tometosa*	Verbenaceae	0.05	0.33	0.39
45	*Stereospermum personatum*	Bignoniaceae	0.05	0.33	0.39
46	*Solanum torvum*	Solanaceae	0.09	0.22	0.31
47	*Azadirachta india*	Meliaceae	0.05	0.22	0.28
48	*Caralluma umbellata*	Asclepiadaceae	0.05	0.22	0.28
49	*Cassine glauca*	Celastraceae	0.05	0.22	0.28
50	*Maesa indica*	Myrsinaceae	0.05	0.22	0.28
51	*Prosopis cineraria*	Fabaceae	0.05	0.22	0.28
52	*Albizia odoratissima*	Fabaceae	0.04	0.22	0.26
53	*Celastrus paniculata*	Celastraceae	0.04	0.22	0.26
54	*Cycas* sp.	Cycadaceae	0.04	0.22	0.26
55	*Gardenia gammifera*	Rubiaceae	0.04	0.22	0.26
56	*Holarrhena antidycenterica*	Apocynaceae	0.04	0.22	0.26
57	*Jasminum* sp.	Oleaceae	0.04	0.22	0.26
58	*Opuntia elatior*	Cactaceae	0.04	0.22	0.26
59	*Phyllanthus emblica*	Euphorbiaceae	0.04	0.22	0.26
60	*Senna auriculata*	Fabaceae	0.04	0.22	0.26
61	*Tectona grandis*	Verbenaceae	0.04	0.22	0.26
62	*Vitex altissima*	Verbenaceae	0.04	0.22	0.26
63	*Barleria* sp.	Acanthaceae	0.14	0.11	0.25
64	*Phoenix loureirii*	Arecaceae	0.11	0.11	0.22
65	*Aglaia odoratissima*	Meliaceae	0.02	0.11	0.13

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
66	*Cocculus* sp.	Menispermaceae	0.02	0.11	0.13
67	*Decalepis hamiltonii*	Apocynaceae	0.02	0.11	0.13
68	*Dendrocalamas* sp.	Poaceae	0.02	0.11	0.13
69	*Givotia rottlerformis*	Euphorbiaceae	0.02	0.11	0.13
70	*Hardwickia binata*	Caesalpinaceae	0.02	0.11	0.13
71	*Jasminum angustifolium*	Oleaceae	0.02	0.11	0.13
72	*Lagerstromia parviflora*	Lythraceae	0.02	0.11	0.13
73	*Pyrenacantha volubilus*	Icacinaceae	0.02	0.11	0.13
74	*Ximenia americana*	Olacaceae	0.02	0.11	0.13
75	*Ziziphus xylopyrus*	Rhamnaceae	0.02	0.11	0.13
			100	**100**	**200**

Appendix C. IVI of herbaceous species (includes seedlings of woody plants) in the corridor landscape of Biligiri Rangaswamy Temple Tiger Reserve. 'Relative basal area' will not be considered for non-tree species

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
1	*Leucas martinicensis*	Lamiaceae	12.75	4.06	16.81
2	*Oxalis corniculata*	Oxalidaceae	8.41	3.99	12.40
3	*Eupatorium odoratum*	Asteraceae	6.96	4.03	11.00
4	*Lantana camara*	Verbenaceae	5.32	5.64	10.96
5	*Evolvulus alsinoides*	Convolvulaceae	3.15	2.52	5.68
6	*Atylosia* sp.	Fabaceae	2.05	2.54	4.59
7	*Randia dumetorum*	Rubiaceae	1.79	2.77	4.57
8	*Justicia simplex*	Acanthaceae	2.33	1.76	4.10
9	*Crotalaria calycina*	Fabaceae	2.14	1.83	3.98
10	*Ziziphus oenoplia*	Rhamnaceae	1.40	2.36	3.76
11	*Sida acuta*	Malvaceae	2.33	1.33	3.66
12	*Ipomoea* sp.	Convolvulaceae	1.46	2.06	3.52
13	*Phyllanthus amarus*	Euphorbiaceae	1.29	2.22	3.51
14	*Atylosia lineata*	Fabaceae	2.43	1.05	3.48
15	*Urena lobata*	Malvaceae	1.46	1.67	3.14
16	*Anogeissus latifolia*	Combretaceae	0.84	2.18	3.02

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
17	*Desmodiastrum racemosum*	Fabaceae	1.30	1.54	2.84
18	*Jasmium angustifolium*	Oleaceae	1.17	1.49	2.66
19	*Barleria prionitis*	Acanthaceae	1.39	1.24	2.63
20	*Fluggea leucopyrus*	Phyllanthaceae	0.75	1.83	2.59
21	*Pterolobium hexapetalum*	Caesalpinaceae	0.81	1.72	2.53
22	*Cynotis arachnoidea*	Commelinaceae	1.15	1.31	2.46
23	*Triumfetta rhomboidea*	Tiliaceae	1.27	1.08	2.35
24	*Achyranthes aspera*	Verbenaceae	1.23	1.08	2.30
25	*Curculigo orchioides*	Hypoxidaceae	0.76	1.49	2.25
26	*Grewia asiatica*	Tiliaceae	0.74	1.44	2.18
27	*Jasminum roxberghianum*	Oleaceae	0.93	1.17	2.10
28	*Acacia chundra*	Mimosaceae	0.61	1.47	2.08
29	*Rhynchosia viscosa*	Fabaceae	1.15	0.92	2.07
30	*Euphorbia hirta*	Euphorbiaceae	1.02	0.96	1.98
31	*Ocimum americanum*	Lamiaceae	0.96	0.96	1.93
32	*Hemedesmus indicus*	Apocynaceae	0.80	1.10	1.90
33	*Gymnema sylvestre*	Asclepiadaceae	0.97	0.87	1.84
34	*Leucas aspera*	Lamiaceae	1.21	0.60	1.80
35	*Dolichandrone falcata*	Bignoniaceae	0.69	1.08	1.77
36	*Dodonia viscosa*	Sapindaceae	0.56	1.19	1.75
37	*Anaphalis subdecurrense*	Asteraceae	0.58	1.10	1.68
38	*Scilla* sp.	Asparagaceae	0.60	1.08	1.68
39	*Galactia tenuiflora*	Fabaceae	0.86	0.80	1.66
40	*Chloroxylon swietenia*	Rutaceae	0.57	1.01	1.58
41	*Senna auriculata*	Fabaceae	0.79	0.71	1.50
42	*Abutilon* sp.	Malvaceae	0.74	0.76	1.49
43	*Diospyros montana*	Ebenaceae	0.43	1.03	1.46
44	*Indigofera* sp.	Fabaceae	0.99	0.46	1.45
45	*Acacia sinuata*	Mimosaceae	0.61	0.83	1.43
46	*Senna occidenatlis*	Fabaceae	0.75	0.66	1.41
47	*Orthosiphon rubicundus*	Lamiaceae	0.59	0.78	1.37
48	*Toddalia asiatica*	Rutaceae	0.41	0.94	1.35
49	*Ixora arborea*	Rubiaceae	0.41	0.94	1.35
50	*Crepis* sp.	Asteraceae	0.94	0.25	1.19
51	*Barleria buxifolia*	Acanthaceae	0.37	0.73	1.10

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
52	*Stachytarpheta india*	Verbenaceae	0.60	0.50	1.10
53	*Asparagas gonocladus*	Asparagaceae	0.27	0.78	1.05
54	*Stenosiphonium russelianium*	Acanthaceae	0.51	0.53	1.03
55	*Bidens* sp.	Asteraceae	0.43	0.60	1.03
56	*Cissampelos pareira*	Menispermaceae	0.34	0.66	1.00
57	*Ageratum conyzoides*	Asteraceae	0.71	0.25	0.96
58	*Cynotis* sp.	Commelinaceae	0.57	0.39	0.96
59	*Erythroxylon monogynum*	Erythroxylaceae	0.24	0.66	0.90
60	*Prosopis cineraria*	Fabaceae	0.31	0.55	0.86
61	*Pavetta indica*	Rubiaceae	0.25	0.60	0.84
62	*Andrographis serpyllifolia*	Acanthaceae	0.35	0.46	0.80
63	*Atlantia monophylla*	Rutaceae	0.29	0.50	0.79
64	*Dalbergia lanceolaria*	Fabaceae	0.27	0.50	0.78
65	*Hyptis suaveolens*	Lamiaceae	0.51	0.25	0.76
66	*Mimosa pudica*	Mimosaceae	0.41	0.34	0.76
67	*Sida rhombifolia*	Malvaceae	0.31	0.41	0.72
68	*Dalbergia latifolia*	Fabaceae	0.24	0.48	0.72
69	*Maytenus emarginata*	Celastraceae	0.26	0.46	0.72
70	*Senna* sp.	Fabaceae	0.39	0.25	0.64
71	*Pteridium* sp.	Dennstaedtiaceae	0.56	0.07	0.63
72	*Albizia amara*	Fabaceae	0.16	0.46	0.62
73	*Bidens barbidens*	Asteraceae	0.27	0.30	0.57
74	*Indigofera tinctoria*	Fabaceae	0.19	0.37	0.56
75	*Parthenium hysterophorus*	Asteraceae	0.22	0.30	0.52
76	*Canthium parviflorum*	Rubiaceae	0.15	0.34	0.50
77	*Artemisia pallens*	Asteraceae	0.26	0.23	0.49
78	*Albizia odoratissima*	Fabaceae	0.15	0.30	0.45
79	*Croton* sp.	Euphorbiaceae	0.10	0.34	0.44
80	*Leucas* sp.	Lamiaceae	0.23	0.21	0.44
81	*Cipadessa baccifera*	Meliaceae	0.18	0.25	0.43
82	*Eradale gida**	Fabaceae	0.24	0.18	0.43
83	*Mimosa* sp.	Mimosaceae	0.20	0.23	0.43
84	*Naringi crenulata*	Rutaceae	0.10	0.32	0.42
85	*Strobilanthes callosa*	Acanthaceae	0.27	0.11	0.39
86	*Malva* sp.	Malvaceae	0.20	0.18	0.38

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Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
87	*Phyllanthus indofischeri*	Euphorbiaceae	0.12	0.25	0.38
88	*Solanum torvum*	Solanaceae	0.14	0.21	0.35
89	*Theriophonum* sp.	Araceae	0.15	0.18	0.33
90	*Cocculus* sp.	Menispermaceae	0.10	0.23	0.33
91	*Azima tetracantha*	Salvadoraceae	0.07	0.23	0.30
92	*Strychnos potatorum*	Strychnaceae	0.09	0.21	0.30
93	*Ocimum* sp.	Lamiaceae	0.25	0.05	0.30
94	*Stylosanthus* sp.	Fabaceae	0.11	0.18	0.29
95	*Pogostemon* sp.	Lamiaceae	0.08	0.21	0.29
96	*Abutilon hirtum*	Malvaceae	0.15	0.14	0.29
97	*Strychnos* sp.	Strychnaceae	0.06	0.23	0.29
98	*Cynanchum tunicatum*	Asclepiadaceae	0.08	0.21	0.28
99	*Jasminum* sp.	Oleaceae	0.13	0.14	0.27
100	*Pyrenacantha volubilus*	Icacinaceae	0.12	0.14	0.26
101	*Crotalaria* sp.	Fabaceae	0.11	0.14	0.25
102	*Ziziphus xylopyrus*	Rhamnaceae	0.06	0.18	0.25
103	*Santalum album*	Santalaceae	0.09	0.14	0.23
104	*Flacourtia montana*	Flacourtiaceae	0.07	0.16	0.23
105	*Lantana indica*	Verbenaceae	0.06	0.16	0.22
106	*Diospyros melanoxylon*	Ebenaceae	0.06	0.16	0.22
107	*Sida* sp.	Malvaceae	0.09	0.11	0.20
108	*Ferronia yesphantum*	Rutaceae	0.06	0.14	0.19
109	*Dioscorea oppositifolia*	Dioscoreaceae	0.05	0.14	0.19
110	*Sansevieria trifasciata*	Asparagaceae	0.07	0.11	0.19
111	*Ceropegia* sp.	Apocynaceae	0.06	0.11	0.17
112	*Thotti**	Unidentified	0.08	0.09	0.17
113	*Helicteres isora*	Malvaceae	0.04	0.11	0.15
114	*Pterocarpus marsupium*	Fabaceae	0.04	0.11	0.15
115	*Plectranthus amboinicus*	Lamiaceae	0.10	0.05	0.15
116	*Barleria* sp.	Acanthaceae	0.06	0.09	0.15
117	*Hardwickia binata*	Fabaceae	0.03	0.11	0.15
118	*Maesa indica*	Myrsinaceae	0.05	0.09	0.14
119	*Asaparagus racemosus*	Asparagaceae	0.03	0.11	0.14
120	*Mallotus philippensis*	Euphorbiaceae	0.03	0.11	0.14
121	*Stereospermum personatum*	Bignoniaceae	0.03	0.11	0.14

Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
122	*Rauvolfia serpentina*	Apocynaceae	0.09	0.05	0.14
123	*Bambusa arundinacea*	Poaceae	0.05	0.09	0.14
124	*Ocimum tenuiflorum*	Lamiaceae	0.05	0.09	0.14
125	*Schleichera oleosa*	Sapindaceae	0.04	0.09	0.13
126	*Nela bhuthale**	Unidentified	0.08	0.05	0.13
127	*Cryptolepis buchnani*	Asclepiadaceae	0.04	0.09	0.13
128	*Memecylon umbellatum*	Melastomataceae	0.03	0.09	0.12
129	*Nicandra physalodes*	Solanaceae	0.05	0.07	0.12
130	*Padavara baale**	Unidentified	0.03	0.09	0.12
131	*Cassia fistula*	Caesalpinaceae	0.02	0.09	0.11
132	*Wrightia tinctoria*	Apocynaceae	0.02	0.09	0.11
133	*Celastrus paniculata*	Celastraceae	0.05	0.05	0.10
134	*Canthium travancoricum*	Rubiaceae	0.02	0.07	0.09
135	*Diospyros* sp.	Ebenaceae	0.02	0.07	0.09
136	*Argyreia cuneata*	Convolvulaceae	0.02	0.07	0.08
137	*Breynia retusa*	Euphorbiaceae	0.02	0.07	0.08
138	*Dioscorea* sp.	Dioscoreaceae	0.02	0.07	0.08
139	*Flacourtia indica*	Flacourtiaceae	0.02	0.07	0.08
140	*Gardenia gammifera*	Rubiaceae	0.02	0.07	0.08
141	*Actiniopteris radiata*	Pteridaceae	0.03	0.05	0.07
142	*Tephrosia* sp.	Fabaceae	0.03	0.05	0.07
143	*Vitex altissima*	Verbenaceae	0.03	0.05	0.07
144	*Caralluma umbellata*	Asclepiadaceae	0.02	0.05	0.07
145	*Cleistanthus* sp.	Phyllanthaceae	0.02	0.05	0.06
146	*Coccinia grandis*	Cucurbitaceae	0.02	0.05	0.06
147	*Elaeagnus conferta*	Elaeagnaceae	0.02	0.05	0.06
148	*Holarrhena antidycenterica*	Apocynaceae	0.02	0.05	0.06
149	*Phyllanthus virgatus*	Euphorbiaceae	0.02	0.05	0.06
150	*Acacia* sp.	Mimosaceae	0.01	0.05	0.06
151	*Argyreia cymosa*	Convolvulaceae	0.01	0.05	0.06
152	*Azadirachta india*	Meliaceae	0.01	0.05	0.06
153	*Millettia racemosa*	Fabaceae	0.01	0.05	0.06
154	*Odavara**	Unidentified	0.01	0.05	0.06

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Sl. no.	Botanical name	Family	Relative density	Relative frequency	IVI
155	*Terminalia bellirica*	Combretaceae	0.01	0.05	0.06
156	*Terminalia crenulata*	Combretaceae	0.01	0.05	0.06
157	*Nada kappali**	Unidentified	0.03	0.02	0.05
158	*Carissa carandas*	apocynaceae	0.02	0.02	0.04
159	*Celtis tetrandra*	Ulmaceae	0.02	0.02	0.04
160	*Gmelina arborea*	Verbenaceae	0.02	0.02	0.04
161	*Acanthus* sp.	Acanthaceae	0.01	0.02	0.03
162	*Arda chandra**	Unidentified	0.01	0.02	0.03
163	*Eucalyptus globulus*	Myrtaceae	0.01	0.02	0.03
164	*Physalis minima*	Solanaceae	0.01	0.02	0.03
165	*Ximenia americana*	Olacaceae	0.01	0.02	0.03
166	*Antu huruligida**	Unidentified	0.01	0.02	0.03
167	*Antu pulle**	Unidentified	0.01	0.02	0.03
168	*Bombax cieba*	Bombacaceae	0.01	0.02	0.03
169	*Canthium* sp.	Rubiaceae	0.01	0.02	0.03
170	*Casearia tomentosa*	Salicaceae	0.01	0.02	0.03
171	*Cassine glauca*	Celastraceae	0.01	0.02	0.03
172	*Dendrocalamas* sp.	Poaceae	0.01	0.02	0.03
173	*Gloriosa superba*	Colchicaceae	0.01	0.02	0.03
174	*Hambu bhuthale**	Unidentified	0.01	0.02	0.03
175	*Hittina kudi**	Unidentified	0.01	0.02	0.03
176	*Huriyana hambu**	Unidentified	0.01	0.02	0.03
177	*Lamium* sp.	Lamiaceae	0.01	0.02	0.03
178	*Maathadakana hambu**	Unidentified	0.01	0.02	0.03
179	*Morinda tinctoria*	Rubiaceae	0.01	0.02	0.03
180	*Nela gorava**	Unidentified	0.01	0.02	0.03
181	*Premna tometosa*	Verbenaceae	0.01	0.02	0.03
182	*Sanna javana**	Lamiaceae	0.01	0.02	0.03
183	*Syzygium cuminii*	Myrtaceae	0.01	0.02	0.03
184	*Tectona grandis*	Verbenaceae	0.01	0.02	0.03
185	*Ziziphus jujuba*	Rhamnaceae	0.01	0.02	0.03
			100	**100**	**200**

Note: The botanical names of the * marked plant species were unidentified, instead the *Soliga* vernacular names were given.

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