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Avifauna distribution in the shoal-forests of Baba Budan Hills, Chikkamagalur, Karnataka, India

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Abstract

The sholas are the unique kind of vegetation found in the Western Ghats which are found alongside the rolling grasslands. The distribution of the birds with respect to the forest layers will provide an reference for future studies to other researchers and bird watchers. The dominant family in the shoals will also provide the bird watchers of the diversity of the Shola-grassland complex biome. The diet of the birds will also show that shola forest is rich in insect life and there are fewer birds which can be found in the ground level or on the forest floor. There are lot of conservation steps required to protect the fragile ecosystem of Sholas.

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Introduction

The mountain grassland and adjacent evergreen tropical forests, locally called the shola grasslands and shola forests of the Western Ghats form a distinctive vegetation mosaic. Sholas are patches of stunted evergreen tropical and subtropical moist broadleaf forest found in valleys amid rolling grassland in the higher mountain regions of South India. The Western Ghats is a mountain range that runs north-south parallel to the western coastline of the Indian peninsula from 8° N to 22° N. This range is classified (based on species distribution) as a distinct biogeographic zone of India (Rodgers and Panwar 1988) and a biodiversity hot-spot along with Sri Lanka (Myers et al. 2000). These patches of shola forest are found mainly in the valleys and are usually separated from one another by undulating mountain grassland. The shola and grassland together form the shola-grassland complex or shola-grassland mosaic. The shola biome have a high water retention capacity and exists as the precious source of the water for the high altitude organisms. They are the origin of many streams and rivers in the Western Ghats.

Ecologists including Champion and Seth (1968) have classified them under 'Southern Montane Wet Temperate Forests'. Upper reaches of the 'Southern Subtropical Broad-leaved Hill Forests' above 1500 m, were also referred by them as 'Sholas', since the vegetation was almost similar and a clear cut demarcation with respect to altitude was "not possible always". Shola forests have high ecological significance in protecting the head waters of rivers. They have the capability of holding up of water received by precipitation like a sponge and thus preventing rapid run off. The vegetation is also very characteristic. The trees are stunted with an umbrella shaped canopy. The branches are crooked and densely covered with epiphytic mosses, ferns lichens and orchids.

Frost, fire and wind are the three main factors determining the distribution of the sholas. In the open grasslands when frosts occur during winter nights and temperature goes subzero it is invariably above 0^{o} C inside the sholas (Legris & Blasco, 1969). The nocturnal temperature was so low that a drop of about -16^{o} C has been reported from the grasslands of Nilgiris (Ranganathan, 1938). The plants are then subjected to intercellular crystallisation. In contrast to the climate that prevails in the temperate latitudes, a frosty night is followed by a hot day, and the bright morning sun promotes rapid thawing of the crystallised water, which is quickly transpired by the plant.

The mountain grasslands and adjacent forests face several threats largely due to increasing anthropogenic activities (Pramod et al. 1997). Once widespread across the high altitudes of Western Ghats, the grasslands are now highly fragmented and restricted to approximately 400 km (Karunakaran et al. 1998). Unlike the adjacent forests, the grasslands have not received much attention from biologists and conservationists (Gadgil and Vartak 1975).

The shola forests in the upper plateau are dense and floristically rich with many endemic and rare species. The trees in the sholas form a continuous canopy usually not exceeding 10-15m (Nair, K.K.N. 2001). There is no marked differentiation into canopy layers. The tree bark is covered with lichens, orchids, mosses and climbers. The crowns are generally rounded and dense. There are four very distinct layers of trees in a tropical evergreen forest (Stralhler. 1997). These layers have been identified as (Fig. 1):

1) Emergent Layer
2) Canopy Layer
3) The Understory
4) Forest Floor

The emergent layer contains a small number of very large trees called emergents, which grow above the general canopy, reaching heights of 45 meters and above.

The canopy layer contains the majority of the largest trees, typically 30–45 m tall. The densest areas of biodiversity are found in the forest canopy, a more or less continuous cover of foliage formed by adjacent treetops. The canopy, by some estimates, is home to 50 % of all plant species, suggesting that perhaps half of all life on Earth could be found there. Epiphyticplants attachto trunks and branche, and obtain water and minerals from rain and debris that collects on the supporting plants. The fauna is similar to that found in the emergent layer, but more diverse.

The under-storey layer lies between the canopy and the forest floor. The under-storey (or understory) is home to a number of birds, snakes and lizards, as well as predators such as leopards. Insect life is also abundant. Many seedlings that will grow to the canopy level are present in the under-storey. Only about 5% of the sunlight shining on the rainforest canopy reaches the under-storey. This layer can be called a *shrub layer*, although the shrub layer may also be considered a separate layer and in this study the shrub layer in included in the forest floor.

The forest floor, the bottom-most layer, receives only 2% of the sunlight. Only plants adapted to low light can grow in this region. Away from riverbanks, swamps and clearings, where dense undergrowth is found, the forest floor is relatively clear of vegetation because of the low sunlight penetration. It also contains decaying plant and animal matter, which disappears quickly, because the warm, humid conditions promote rapid decay. Many forms of fungi growing here help decay the animal and plant waste.

Sholas are home to many kinds of birds, including parrots, hornbills, toucans, and raptors like eagles, hawks, and buzzards. Some migratory birds live in these forests during the winter and return to cooler regions during the spring and summer. Distribution of the birds in accordance with the layers of the forest will be a useful way of studying and bird watching. Birds can be distinguished by its regular presence in a particular layer of the forest. The birds occupy certain layer of the forest depending upon its food. The nesting and roosting will also be sometimes taken into consideration when the feeding ground is not uniform. The diversity of the birds in the shola forest has not been studied extensively. Hence this approach or study will be a record in its own way. Apart from Evergreen Forest (Shola Forest) there is also another kind of vegetation that is Grassland which forms the shola-grassland complex.

Birds have different kind of Diets from an Insectivore to carnivore (Frank Gill, 2007). Birds can be distinguished by their food Diets. The following types of feeding diets are present in the Birds. Birds which predominantly feed on insects are called as Insectivores. Similarly Birds which prey on mammals or large animals are called as Carnivores. Birds which feed on Fruits and Berries are called as Frugivores. Birds which feed on almost on all palatable food are called as Omnivores. Birds which exclusively feed on the nectars of the flowers are called as Nectarivore. Birds which feed on cereals, grains and seeds are called as Granivores. The Scavengers are also present in the bird species where they feed on the dead animals or the garbage. Finally Piscivores are those birds which exclusively prey upon fishes.

Objective

The main objective of the study is to identify the Avifauna diversity in Shola Forest – Grassland complex.

1. To classify the species according to its usual forest layers like the Emergent, Canopy, Understory or Forest floor.
2. To Classify or identify each individual species of birds with their Food Diet whether they are Insectivores or Frugivores or Omnivores or Carnivores or Nectarivores or Granivores or Piscivores or Scavengers

3. To identify and recommend the urgent measures to be taken to protect the Shola Forest – Grassland Vegetation.

Materials and methods

The study was conducted for 6 months from middle of November 2010 till the end of May 2011 using the Direct Visual method (Bibby, 1992) and Vocal individuality method (Saunders 1988). Existing forest trails were used to cover the forest by foot. The Observations were carried out mainly in the morning between 6:30 and 11:00 hrs. and also in the evening from 15:30 to 18:30 hrs. Usually in the Weekends the visit to the study area was arranged and one morning and evening visits were made. Like Saturday evening and Sunday morning. Different methods were employed while dealing at the water bodies and grass lands. The point count method (Bibby, 1992) was employed. These will include birds living in adjoining habitats, so open country birds might appear in a woodland also. The birds were sighted using a Binocular (Olympys 8X40) or from Zoom lens mounted Digital Camera (Canon 50D with Canon 100-400 Zoom Lens). Only confirmed species are included in the checklist. Sometimes expert comments were taken and also uploaded on India Nature Watch (INW) website for exact identification of the bird species.

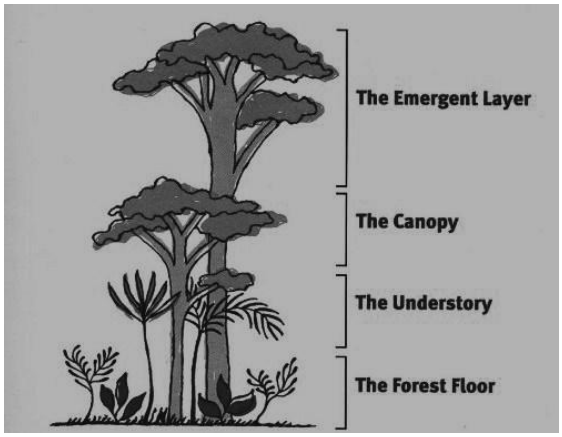

Fig. 1. Forest layers.

Birds with their habitats are also noted down so that the forest layer in which they are frequently found and can be classified accordingly. For example the Black-shouldered Kite is always sighted while hovering or sitting on a tall tree. So it will be classified with the forest layer Emergent. For the spot identification, the standard field guide (Grimmet 1999) was used. And for habitats, Nomenclature and Classification details Websites and Salim Ali was referred.

Birds with their feeding habits are further taken down and classified upon their diets. For example the the Scaly-breasted Munia is Granivore and Plum-headed Parakeet is a Frugivore and so on. The book of Indian Birds by Salim Ali and the web based Wikispecies were taken into account to know the exact feeding habits of each species. For instance, a White-cheeked Barbet looks like a frugivore, but it also feeds on insects. Hence predominantly taken food is written first and occasionally taken food is written later.

Study area

Attigundi is the nearby village located beneath the picturesque mountains of Baba Budan Hills. This Baba Budan Hills is 35 kms from the District Headquarters of Chikkamagalur. The Hills lay adjacent to Mullayana Giri, Sitallyana Giri and Devirammana Betta. The Bhadra Tiger Reserve is also very nearby to Baba Budan Hills. Baba Budan Hills is a religious place for both Hindu and Muslim community. The hills are surrounded by lush coffee plantations on the southern and western side or (leeward side of the valley). On the northern and eastern side it is surrounded by Shola forests and Grasslands. The shola Forest is in continuous threat by the local community who depend for their firewood and other non-timber products. There is also a cremation ground inside the forest area which also gives rise to disturbance from humans. There are many small streams and rivulets which drain from above the mountains. One important stream which forms a water fall is very sacred and it is called as Honammana Halla Falls. From this waterfall a pipeline runs to the Chikkamagalur city and used to supply drinking water for the town. But now it has

been stopped and the water simply runs down the mountains creating some more fascinating waterfalls. Tourists flock here to have a sacred dip or touch the water because of its medicinal values. The area is also called by the name 'Honammana Halla Shola forest'.There is another important natural water falls that is 'Manikyadhara'.

Fig. 2. Study area on google maps.

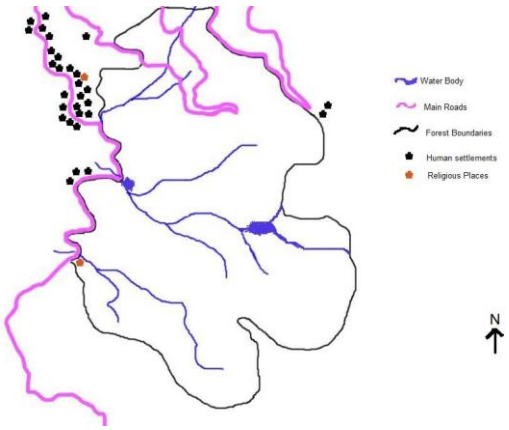

Fig. 4. Schematic diagram of the study area.

The dominated tree species were *Cinnamomum malabatrum*, *Litsea floribunda, Croton lacciferus and Neolitsea scrobiculata*. The dominated shrubs and herb species were *Allophylus cobbe, Hypericum mysurense , Asparagus racemossus* and *Themeda triandra*(Pramod AF etal 2011).

The shola forests around the Baba Budan hills comes under the jurisdiction of Muthodi forests range and there is no boundary which is exclusively earmarked. But by the use of GPS and Google maps, it has been shown below. It lies along the 75°45′ and 75°50′ Eastern Longitude, 13°25′ and 13°50′ Northern Latitude. Apart from Birds , this forest area has considerable amount of Sambhar deers, Muntjacs, Reptiles and also large predator species like the Tiger and the Leopards. The absence of too many prey species inside the shola forest is because of the lack of food in the forest floor.

Results and discussions

A total of 130 Species of birds belonging to 52 families have been recorded from the study area. These130 species of birds with their food habits and their regular sighting in the forest layers are given in the following Table 1.

The family-wise analysis indicates that families Accipitridae and Columbidae are the most dominant family leading the area with 7 species each followed by the family Muscicapidae with 6 species. The families Cuculidae, Sturnidae, Pycnonotidae and Timaliidae comes next with 5 species each. Megalaimidae, Psittacidae, Campephagidae, Alaudidae and Motacillidae families are with 4 species each. Bucerotidae, Meropidae, Charadriidae, Ardeidae, Corvidae, Dicruridae and Cisticolidae with 3 species each. Apart from all the species found, only Malabar Pied Hornbill and Black-Headed Ibis were given the status of 'Near Threatened' by the IUCN Red List of Threatened Species.

When analysing individual species in the study area according to its food habits, Insectivores are dominated followed by Frugivores and so on as shown in the table 1. More than 50%, i.e., 67 Species of the Birds observed in the study area are predominantly Insectivores. 19 Species of Birds

(15%) are predominantly Frugivores. !4 Species(11%) are Omnivores. 12 Species(9%) are Granivores. 8 Species(6%) of Carnivores. 5 Species are Nectarivores, 3 Species are Piscivores and 2species of Scavengers were Observed. Many Birds have substitute food diets like a White-cheeked Barbet also feeds on Insects apart from its predominant food of Fruits. This behaviour is because of the lack of availability of its predominant food or for adaptation purposes. The birds that employ many strategies to obtain food or feed on a variety of food items are called Generalists. While birds which concentrate on specific food items or have a single strategy are called as Specialists. From the Study area, 40 species of Generalists which have more than one food strategies are found. Out of which 34 species have either predominant diet type or substitute diet type of Insectivore. The forest is indeed rich in Insects and when the forest insects are good in numbers the forest is also very healthy (Roger Dajoz, 2000).

Table 1. Species distribution.

Sl No.	Species	Diet	Forest Layers
1	Grey Jungle Fowl	O	Floor/Bushes
2	Yellow-Crowned Woodpecker	I	Understory
3	Common Flameback	I	Understory
4	Black-Rumped Flameback	I	Understory
5	Brown-Headed Barbet	F,I	Canopy
6	White-Cheeked Barbet	F,I	Canopy
7	Crimson-Fronted Barbet	F,I	Understory
8	Coppersmith Barbet	F	Canopy
9	Malabar Grey Hornbill	F	Canopy
10	Indian Grey Hornbill	O	Canopy
11	Malabar Pied Hornbill	O	Canopy
12	Common Hoopoe	O	Floor
13	Malabar Trogon	I	Understory
14	Indian Roller	I	Understory
15	Common Kingfisher	P	Floor/Bushes
16	White-Throated Kingfisher	P	Understory/Wire
17	Green Bee-eater	I	Understory/Wire
18	Blue-Tailed Bee-eater	I	Understory/Wire
19	Chestnut-Headed Bee-eater	I	Canopy
20	Common Hawk Cuckoo	I	Canopy
21	Grey-Bellied Cuckoo	I	Understory
22	Asian Koel	F,I	Understory
23	Blue-Faced Malkoha	I	Canopy
24	Greater Coucal	C	Understory
25	Vernal Hanging Parrot	F,N	Understory
26	Rose-Ringed Parakeet	F	Canopy
27	Plum-Headed Parakeet	F	Canopy
28	Malabar Parakeet	F	Canopy
29	Spotted Owlet	C	Understory
30	Rock Pigeon	G	Understory
31	Laughing Dove	G	Understory/Wires
32	Spotted Dove	G	Understory/Wires
33	Eurasian Collared Dove	G	Canopy
34	Emerald Dove	G	Floor/bushes
35	Pompadour Green Pigeon	F	Canopy
36	Yellow-Footed Green Pigeon	F	Canopy
37	White-Breasted Water-hen	O	Floor/Streams
38	Wood Sandpiper	I	Floor/Streams
39	Common Sandpiper	I	Floor/Streams
40	Little-Ringed Plover	I	Floor
41	Yellow-Wattled Lapwing	I	Floor
42	Red-Wattled Lapwing	I	Floor
43	Black-Shouldered Kite	C	Emergent
44	Black Kite	C,S	Emergent
45	Brahminy Kite	C	Emergent
46	Crested Serpent Eagle	C	Emergent
47	Montagu's Harrier	C	Emergent
48	Shikra	C	Canopy
49	Oriental Honey Buzzard	I	Emergent
50	Cattle Egret	I	Floor
51	Intermediate Egret	P	Canopy
52	Indian Pond Heron	I,P	Floor/Streams
53	Black-Headed Ibis	I,P	Floor
54	Blue-Winged Leafbird	N,I	Understory
55	Golden-Fronted Leafbird	N,I	Understory
56	Asian Fairy Bluebird	F,N	Canopy
57	Brown Shrike	O	Understory/Wire
58	Long-Tailed Shrike	O	Understory/Wire
59	Rufous Treepie	O	Understory
60	House Crow	S	Understory/Wire
61	Large-Billed Crow	S	Understory/Wire
62	Ashy Wood Swallow	I	Understory/Wire
63	Eurasian Golden Oriole	I,F	Understory
64	Black-Hooded Oriole	I,F	Understory
65	Large Cuckooshrike	I,F	Canopy
66	Black-Headed Cuckooshrike	I,F	Understory
67	Small Minivet	I	Understory
68	Scarlet Minivet	I	Canopy
69	Black Drongo	I,N	Understory
70	White-Bellied Drongo	I,N	Understory
71	Greater Racket-Tailed Drongo	I,N	Understory
72	Black-Naped Monarch	I	Understory
73	Asian Paradise Flycatcher	I	Understory
74	Common Iora	I	Canopy
75	Large Woodshrike	I	Understory
76	Common Woodshrike	I	Understory
77	Blue Rock Thrush	I,F	Understory
78	Malabar Whistling Thrush	I	Understory
79	Eurasian Blackbird	I,F	Understory
80	Asian Brown Flycatcher	I	Canopy
81	Verditer Flycatcher	I	Canopy
82	Tickell's Blue Flycatcher	I	Understory
83	Oriental Magpie Robin	I	Understory
84	Pied Bushchat	I	Floor/Bushes
85	Chestnut-Tailed Starling	F,N	Canopy
86	Brahminy Starling	O	Understory
87	Common Myna	O	Understory/Wires
88	Jungle Myna	O	Canopy
89	Hill Myna	O	Canopy
90	Velvet-Fronted Nuthatch	I	Understory
91	Great Tit	I	Canopy
92	Black-Lored Tit	I	Understory
93	Wire-Tailed Swallow	I	Understory/Wires
94	Red-Rumped Swallow	I	Understory/Wires
95	Black-Crested Bulbul	F,I	Understory
96	Red-Whiskered Bulbul	I,F	Canopy/Wires
97	Red-Vented Bulbul	I,F	Understory/Wires
98	White-Browed Bulbul	F,I	Understory
99	Yellow-Browed Bulbul	F,I	Canopy
100	Plain Prinia	I	Floor/Bushes
101	Ashy Prinia	I	Floor/Bushes
102	Oriental White Eye	I,N	Understory
103	Blyth's Reed Warbler	I	Understory
104	Clamorous Reed Warbler	I	Understory
105	Common Tailor Bird	I	Understory
106	Greenish Warbler	I	Floor/Bushes
107	Indian Scimitar Babbler	I,F	Understory
108	Dark-Fronted Babbler	I	Floor/Bushes

109	Yellow-Eyed Babbler	I,F	Floor/Bushes
110	Yellow-Billed Babbler	I,G	Understory/Wire
111	Jungle Babbler	I,F	Understory
112	Brown-Cheeked Fulvetta	I,N	Understory
113	Indian Bushlark	G,I	Floor
114	Ashy-Crowned Sparrow Lark	G,I	Floor
115	Rufous-Tailed Lark	G,I	Floor
116	Crested Lark	G,I	Floor
117	Thick-Billed Flowerpecker	F	Understory
118	Pale-Billed Flowerpecker	N,F	Understory
119	Purple-Rumped Sunbird	N	Understory
120	Purple Sunbird	N	Understory
121	House Sparrow	O	Understory/Wires
122	Chestnut-Shouldered Petronia	O	Understory/Wires
123	White Wagtail	I	Floor
124	White-Browed Wagtail	I	Floor/Wires
125	Yellow Wagtail	I	Floor
126	Paddyfield Pipit	I	Floor
127	Baya Weaver	G,I	Floor/Bushes
128	Scaly-Breasted Munia	G,I	Floor/Wires
129	Black-Headed Munia	G	Floor/Wires
130	Common Rosefinch	F,G	Floor/Bushes

The birds which were seen or sited in the study area are clearly written down on the data sheet. The exact location in the forest for example the Bush, the Ground, the branches, up in the canopy or hovering in the air and so on are written down next to the name of the species. Gathering all the information at the end of the day, the birds were arranged as per their forest layers. Very less diversity of birds appeared in the forest floor of the Shola but the grasslands compensated with significant number of birds. The reason for the less activity at the forest floor is because of lack of light and food. One species like the Grey Jungle Fowl utilized the forest floor to its maximum. Lot of birds were also attracted to the very few water bodies present in the Sholas. Most of the water bodies were rivulets and streams. Only in two places, stagnant water was found and that was considerably smaller. From which the white-breasted waterhen, Common Sandpiper and Wood Sandpiper were spotted. Few birds which were passing over the forest and had a small visit were also recorded. Intermediate Egret and Black-headed Ibis are those species which were found in the study area even though the vegetation is not that favourable for them.

Nearly half of the species found in the Study area were sighted in the Understory Layer of the Forest. The Shola Forest lacks big or large trees which are taller than 40 meters. But still all the birds of prey were considered to be in the Emergent Layers. Birds which were seen regularly on the Telegraph wires are also considered to be in Understory Layer. But with some exceptions like Red-whiskered Bulbul, they are considered Canopy even though they are sighted many times on the Telegraph Wires. Similarly Scaly-Breasted Munia, Black-Headed Munia and White-Browed Wagtail actually come under the Layer of Forest Floor, even though they are seen frequently on the telegraph wires. In the Forest Floor or simply Floor Layer of the forest, many species are clubbed from the Bushes, Grasslands and also from the water bodies. This Study gives a clear picture of how the Birds are distributed in the shola forest –grassland complex. The concept of Forest Layer is not new but associating the forest layers with the Birds habitat will be a new thing. The Residential status of each bird could also come in handy if the study is elaborated and appropriate time is taken. Further Study of the plant and bird relationship will also provide an insight into the Shola Forest- grassland Biome.

Threats and conservation steps

Increase in the intensity of Land use has resulted in several threats to the biodiversity of Western Ghats (Pramod et al. 1997). Like many coffee estates have become commercial home-stays and the tourism here is booming at an alarming pace. The study area is a famous religious place both for Hindu and Muslim Community. The pilgrims here exploit the very fragile ecosystem of the study area by littering plastic materials all along and having their regular meals in the midst of the grassland.

There had been a large increase in the frequency of forest fires caused by the tourists. Though the authorities have stopped and made it no-plastic zone by having a check-post at the entry into the road to Baba Budan Hills; and also imposing a fine of Rs.500/- for the offenders. But still the plastics can been seen in large numbers inside the forest. Also many people still party there till late evening inside the forest range; even the local people have their

hand with the bootlegging. Proper sign boards indicating the way to behave or travel inside the forest area should be setup at appropriate place.

Cattle grazing are another threat to this shoal-grassland complex, though which cannot be stopped until it is still a state forest. Inclusion or making this forest as Reserve Forest would be a better option according to the experts, so that the villagers will find another way of feeding their cattle instead of leaving the cattle to graze by themselves. There needs to be a proper understanding and educating the villagers about the importance of the forest and its resources. Also should be made aware of the effects of cattle grazing on the wildlife in the area.

There is a hint of human-animal conflict in the region as many villagers have lost their cattle to a tigress and its cub. Very recently a tigress with its cubs had killed 4 cows in one day and eating only one cow completely; probably in a way to make it's cubs to learn how to attack its prey. Forest department has failed to provide substantial compensation to the villagers who had lost their cattle, which again is form of unrest with the villagers against both the wild animal and the forest department.

Conclusion

Most research on the mountain grasslands of the Western Ghats has been static in time and descriptive in nature. Even so, there is recognition that more rigorous surveys are needed (Urfi et al. 2005). Inventories are important for informed decision making, but more research is needed on function and dynamics. From the perspective of a multi-species community, they allow better understanding of species interactions and coexistence, and ultimately, conservation. The static description of plant communities based on dominant species has prevailed in India; this needs to be replaced by a more dynamic and quantitative approach, which views communities as mutable through space and time (Palmer and White 1994).

Even improved static data can help us understand important processes. For example, investigating species area relationship could reveal the role of habitat diversity or the island like conditions of mountain tops in maintaining species diversity (Kohn and Walsh 1994). Also, species-area relationships can be useful in determining reserve area and design (Gitay et al. 1991) and in estimating extinctions following habitat loss (Pimm et al. 1995). Future descriptive studies also need to integrate the role of scale, as most patterns are strongly scale-dependent (Levin 1992). For example, the relative species richness of Rocky Mountain grasslands in grazed vs. ungrazed conditions depends on the scale of observation (Stohlgren et al. 1999).

Long-term studies are necessary to understand succession, and in their absence much of the current knowledge concerning succession of the Western Ghats remains speculative. Although disturbances like frost, cattle grazing and fire are prevalent in the montane grasslands, there are few studies that examine their impact. The dynamic view of grasslands adopted by ecologists (White 1979, Niering 1987) is lacking in studies of shola grasslands. However, there is research on the successional dynamics of grasslands in lower elevations of the Western Ghats (Puyravaud *et al.* 2003).

The shola grasslands are to be protected at any cost. A scientist, who studied this ecosystem some decades back, correctly described it as a fossil ecosystem. The relics of an ecoclimatic and geologic past are preserved in its pristine form at least in certain parts of these mist laden canopies of the mountains (Kunhikrishnan,E. 1995). Apart from the research works, it is not only the work of the forest department to look after the forest but also from many Non-Governmental Organizations (NGOs) to join hands with forest department. Regular awareness program with the people living around the forest vicinity should be organized. Cattle grazing, party making and poaching in any manner should be stopped immediately and restore the already degrading forest.

Habitat loss, increase in poaching and other anthropogenic disturbances resulting from spread of human settlements are the main factors behind their dwindling numbers of birds outside of protected areas (Hossetti 2005).

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