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Vertebrate diversity in a thirty year old analogue forest in Pitigala, Elpitiya, in the Galle District of Southern Sri Lanka

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Land Owners Restore Rainforest In Sri Lanka, Bangamukanda Estate, Pitigala, Galle, Sri Lanka.

Most of the natural ecosystems in the wet zone are severely fragmented and interspersed between human managed agro ecosystems and home gardens. There is growing evidence that traditional agro-ecosystems contribute to sustain the regional biodiversity of many invertebrate and vertebrate species. Analogue forest as a concept is accepted by agronomists and conservationists, which would bring profits in the long-term sustainable basis. The Bangamukanda Estate is an example of a 18 hectares plantation (tea, rubber and cinnamon) that has been converted into an analogue forest. Objective of the study was to assess the current vertebrate diversity in this 30-year-old analogue forest. Total of 206 species of vertebrates belonging to 74 families were observed during the study period, out of that 58 species were endemic to Sri Lanka. The findings of the survey clearly highlighted the contribution of analogue forest systems towards sustaining a rich biodiversity. In addition analogue forest systems can be used to link the forest patches in the wet zone.

Key words: Vertebrate diversity, Analogue forest, Conservation

1. Introduction

Since sounding the alarm of the biodiversity crisis in the 1970s, most conservationists have focused on establishing protected areas to conserve endangered habitats and species (Scherr & Shames 2006). Agricultural production areas have been seen as useless for conservation activities and their growth viewed as a threat (Scherr & Shames 2006).

In recent decades, sustainable farmers and researchers around the world have responded to the extractive industrial model with ecology based approaches such as eco-agriculture, agro-forestry or analogue forest (Earles 2005, Scherr & Shames 2006). All of them, representing thousands of farms, have contributed to our understanding of what sustainable systems are, and each of them shares a vision of "farming with nature", an agro-ecology that promotes biodiversity, recycles plant nutrients, protects soil from erosion, conserves and protect water. Also uncultivated portions of mainly agricultural landscapes can provide patches of habitat for forest wildlife and form corridors that connect protected areas and allow species to

continue genetic contact with populations that would otherwise be isolated (Scherr & Shames 2006). For example, millions of hectares of multi-strata 'agro-forests' in Indonesia produce commercial rubber, fruits, spices and timber. The number of wild plant and animal species in these agro-forests is often nearly as high as in natural forests (Scherr & Shames 2006). There is growing evidence that traditional agro-ecosystems contribute to sustain the regional biodiversity of many invertebrate and vertebrate species (Lawler, 2001).

Vast extents of Sri Lanka's biodiversity rich lands which were transferred into mono crop plantations during the colonial era are regenerating in many places due to various reasons, both natural and man made. The Bangamukanda Estate is an example which consists of 18 hectares plantation land (tea, rubber and cinnamon) that has been deliberately converted to an analogue forest as a direct result of the far sighted, land use policy of the 1970 -1977 government which introduced crop diversification of uneconomic tea lands. The Bangamukande Estate is situated in Pitigala, Galle, Sri Lanka. The land was transformed into an undulating terrain that consists of a series of ridges and valleys with an altitudinal range from 100 m to 300 m. It has an intricate network of small streams, which drains into the river Benthara.

In 1904 ancestors of the present owner planted agricultural mono crops such as cinnamon, rubber, and tea . This practice continued up to 1973. It was changed in 1973 and 12 hectares of cinnamon and tea land were transferred into analogue forest using a government subsidy, under crop diversification of uneconomic tea lands. The remaining rubber field of 6 hectares is presently allowed to regenerate into forestland while being tapped.

Sri Lanka's point of view is that, the primary natural ecosystems found in the low country wet zone consist of lowland rainforests, which are severely fragmented and interspersed between human managed agro ecosystems and home gardens. These wet-zone ecosystems harbour a high percentage of endemic and globally threatened species of animals and plants (Gunatilleke et al., 2005; Pethiyagoda, 2005). Wet-zone of Sri Lanka along with the Western Ghats is recognized as one of the world's 11 biodiversity "hyperhot" hotspots, which demand extensive conservation investment (Myers et al. 2000, Brookes et al. 2002). However agro ecosystems and human settlements cover most of the land area in the wet-zone of Sri Lanka (Gamage 2005). These habitats are frequently subjected to human modification and therefore the environment of these habitats is constantly changing whose impact on the biodiversity is little known. However, these man made habitats function as an integral part of the habitats of large number of fauna and flora but most of the studies are presently confined to herpetofauna and freshwater fish (Gamage 2000, Gamage et al. 2002, Gamage et al. 2005).

Analogue forest is a tree-dominated ecosystem that is analogous in structure and function to the original climax and sub-climax forest community. With time, the natural succession of any undisturbed forest community is to increase in diversity and stability until a highly complex ecosystem or Climax State is reached. When an ecosystem is designed to mimic the indigenous Climax State, the efficiency and

dynamics of the natural processes can be replicated. Such forests are referred to as analogue forests which are considered to provide economic benefits. A wide range of supplies can be produced that may include: fruit, nuts, herbs, cut flowers and cut-foliage, pharmaceuticals, and timber. Furthermore this type of concept can be used to link the fragmented forest patches in the wet zone of Sri Lanka.

Therefore the main objective of this study was to assess the diversity of vertebrate fauna in this 30 years old analogue forest (Bangamukanda Estate).

2. Materials and Methods

The Bangamukande Estate is situated in Niyagama Divisional Secretate Area in Galle District of Southern Province of Sri Lanka, at 06^0 20' 46" N - 080^0 16' 26" E, average annual rainfall 2300 mm, average temperature 28^0, and humidity 90%. Approximate distances from BKE to the larger forest complexes are as follows:

South	-	4	km to	Polgahakande-Malabure forest reserve
East	-	1	km to	Hiniduma forest reserve
Southwest	-	8	km to	Beraliya forest reserve
Southeast	-	100	m to	Bangamukanda proposed forest
Southeast	-	8	km to	Kannaliya-Dediyagala-Nakiyadeniya forest reserve
Northeast	-	12.5	km to	Sinharaja forest reserve World Heritage site
North	-	11	km to	Kalugalkande Forest Hermitage and reserve

Different methods were used to assess the vertebrate fauna in the Bangamukanda Estate. The study was carried out during August 2003 to November 2005.

2.1. *Herpetofauna*

The quadrate sampling method was the main method used to study the herpetofauna. It involves placing small squares (quadrates) at randomly selected sites within a habitat and thoroughly searching these squares for presence of herpetofauna (Heinen 1992). Quadrate sampling was done during September 2003 to November 2003. A total of eighteen 8×8 m quadrates were placed at randomly selected points in each study site. In placing of quadrates, areas with a high relief angle or areas adjacent to tree-fall gaps were omitted. All of the sampled quadrates in the agro-ecosystems were located within 1-2 km from natural vegetations. A 45cm height polythene fence was placed along the sides of the quadrate to prevent animals from escaping. A minimum of two people was engaged in all of the sampling sessions. Sampling involved sorting through all leaf litter in the plot, tree trunks, branches, under stones and logs (Fauth et al. 1989, Heinen 1992). Furthermore fixed line traces were also used to assess the herpetofauna.

2.2. *Avifauna and Mammals*

Fixed line transect method was used to assess avian and mammalian richness of the study site (Sutherland 1996). Day and night surveys were carried out during a period from August 2003 to November 2005. Field observations were made from 6.30 am to 9.00 am and 4.00 pm to 6.00 pm. In addition night observations were made from 7.00 pm to 10.00 pm and 2.00 am to 6.00 am.

Table 1 The number of vertebrate species, families and endemic species recorded in each taxonomic group during the study period.

Vertebrate group	Number of species	Number of Families	Number of Endemic species	Total number of endemic species recorded in Sri Lanka
Amphibians	18	3	12	79
Snakes	25	5	9	46
Tetra pods reptiles	17	5	8	48
Fish	23	9	13	44
Birds	89	34	10	25
Mammals	34	18	6	16
Total	206	74	58	258

2.3. Identification

The different groups of vertebrates were identified using the most recent taxonomic keys and guides available for the respective taxonomic group (Freshwater fish: Pethiyagoda (1991), Deraniyagala (1949); Amphibians: Dutta & Manamendra-Aarachchi (1996), Manamendra-Arachchi & Pethiyagoda (1998), Manamendra-Arachchi & Pethiyagoda (2005), Meegaskumbura & Manamendra-Arachchi (2005); Serpentoid reptiles: De Silva (1990), Pethiyagoda & Manamendra-Arachchi, (1998), Das & De Silva (2005); Birds: Henry (1971), Kotagama & Fernando (1992); Mammals: Phillips (1981), Corbet & Hill (1992), Groves (2001). Bambaradeniya eds. (2006) was used for the confirmation of nomenclature.)

3. Results

In the course of this study 206 species of vertebrates belonging to 74 families were observed out of which 58 species were endemic to Sri Lanka (Table 1). The vertebrate fauna was comprised 18 species of amphibians, 25 species of snakes, 17 species of tetrapod, reptiles, 23 species of fish, 89 species of birds and 34 species of mammals (Table 01 & Appendix). A total of 54 endemic vertebrate species were recorded during the survey which include 12 amphibians and 13 fresh water fish.

Table 2 shows the conservation status of some threatened species found in the study site of which four were vulnerable, six were endangered, one critically endangered and one was data deficient. This critically endangered frog (*Philatus nemus*) is a newly discovered species which was only found in Hiniduma Kanda forest reserve previously (Manamendra-Arachchi & Pethiyagoda, 2005).

4. Discussion

The results indicate that the Bangamukanda Estate (analogue forest) is an agro-ecosystem that sustains a high diversity of vertebrate fauna. A variety of methods targeting at different groups enabled the documentation of vertebrate diversity in Bangamukanda Estate expressed in terms of species richness.

The total vertebrate richness shows that Bangamukanda Estate harbours a comparatively high number of species. In addition to the species richness, the study

Table 2 Conservation status of some threatened species, recorded in Bangamukanda Estate.

Species	**Conservation status**
Rana aurantiaca	Vulnerable (Vu)
Nanophrys ceylonensis	Vulnerable (Vu)
Polipedates longinasus	Endangered (En)
Polypedates eques	Endangered (En)
Philatus nemus	Critically Endangered (Cr)
Philatus folicola	Endangered (En)
Lepidocephalichthys jonklaasi	Endangered (En)
Sicyopus jonkalaasi	Data deficient (Dd)
Centropus chlorohyncho	Vulnerable (Vu)
Loris tardigradus tardigradus	Endangered (En)
Trachypithecus vetullus vetullus	Endangered (En)
Macaca sinica aurifrons	Vulnerable (Vu)

site is also evident for providing niches for a large number of endemic vertebrates. The results clearly indicate that such agro-forestry systems are closer to natural conditions and maintain high biodiversity. The study site is providing niches for nine globally threatened species of which one species is critically endangered. This clearly shows the importance of this ecosystem.

Most of the birds and mammal species are using this estate as a temporary refuge ground or feeding area, while they move from one forest patch to another suggesting that further studies are necessary to evaluate the importance of agricultural systems as means of connecting forest patches in the country.

5. Conclusion

According to the results, it can be concluded that analogue forest systems are sustaining high level of vertebrate diversity and endemism. As a concept analogue forestry system is biodynamic and environmentally friendly (Hochegger 1998; Earles 2005). Our study confirmed this concept. In addition the findings of the survey clearly highlighted the contribution of analogue forest systems towards sustaining rich biodiversity. Such agro-ecosystems can be used to link the forest patches in the wet zone. However, a detailed study on analogue forest systems has to be carried out for further confirmation of the validity of the concept and to plan conservation strategies to increase biodiversity in the agro ecosystems.

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Appendix

LIST OF FRESHWATER FAUNA OBSERVED AT BKE.

Sub Class: OSTEICHTHEYS	
Family: Aplocheilidae	
1. **Aplocheilus werneri*	Werner's killifish
Family: Anguillidae	
2. *Anguilla bicolour*	Level finned eel
Family: Bagridae	
3. *Mystus gulio*	Long whiskered catfish
4. *Mystus keletius*	Yellow catfish
Family: Balitoridae	
5. **Schistura notostigma*	Banded mountain loach
Family: Cobitidae	
6. **Lepidocephalichthys jonklaasi*	Jonklas loach (En)
7. *Lepidocephalichthys thermalis*	Common spiny loach
Family: Cyprinidae	
8. *Danio malabaricus*	Giant danio
9. **Esomus thermoicos*	Flying barb
10. **Garra ceylonensis*	Stone sucker
11. *Puntius amphibious*	Scarlet-banded barb
12. *Puntius bimaculatus*	Redside barb
13. **Puntius cumingii*	Cuming's barb

(Endemic - *)

LIST OF AMPHIBIAN SPECIES OBSERVED AT BKE.

Class: AMPHIBIA	
Order: APODA	
Family: Ichthyophiidae	
1. **Ichthyophis glutinosus* (Linnaeus 1758)	- Common yellow-band cecillian
Order: ANURA	
Family: Bufonidae	
2. *Bufo melanostictus* Schneider 1799	- Common house toad
3. **Bufo atukoralei* Bogert & Senanayaka 1966	- Athukorala's dwarf toad
Family: Ranidae	
Subfamily: Raninae	
4. *Rana aurantiaca* Boulenger 1904	- Golden frog (Vu) / Small wood frog
5. Rana temporalis (Günther, 1864)	- Bronzed frog / Common wood frog
6. **Fejervarya (Limnonectes) kirtisinghei* Manamendra-Arachchi & Gabadage, 1994	- Kirtisinghe's frog
7. *Fejervarya (Limnonectes) limnocharis* (Boie,1835)	- Common paddy field frog
8. *Hoplobatrachus crassus* (Jerdon 1853)	- Jerdon's bull frog

9.	**Nanophrys ceylonensis* (Günther, 1864)	- Sri Lankan rock frog (Vu)
10.	**Lankanectes corrugatus* (Peter 1863)	- Corrugated water frog
11.	*Euphlyctis hexadactylus* (Lesson, 1834)	- Indian green frog / Sixtoe green frog
12.	*Euphlyctis cyanophlyctis* (Schneider, 1799)	- Skipper frog
	Subfamily: Rhacophorinae	
13.	**Polypedates eques*(Günther, 1858)	- Saddled tree frog (En)
14.	**Polypedates cruciger* Blyth, 1852	- Common hourglass treefrog
15.	**Polypedates longinasus* (Ahl, 1931)	- Long-snouted tree frog (En) / Sharp snout saddle tree frog
16.	**Philautus abundus* Manamendra-Arachchi & Pethiyagoda, 2005	- Labugama shrub frog
17.	**Philautus folicola* Manamendra-Arachchi & Pethiyagoda, 2005	- Anthropogenic shrub frog (En)
18.	**Philautus. nemus* Manamendra-Arachchi & Pethiyagoda, 2005	- Southern shrub frog (Cr)

LIST OF REPTILE SPECIES OBSERVED AT BKE.

Class-REPTILIYA
Order: SERPENTES

Family: Boidae		
1.	*Python molurus* (Linnaeus, 1758)	- Rock Python / Indian python
Family: Elapidae		
2.	*Naja naja* (Linnaeus, 1758)	- Indian cobra
3.	**Bungarus ceylonicus Günther*, 1864	- Sri Lanka krait
Family: Colubridae		
4.	**Xenochrophis asperrimus* (Boulenger,1891)	- Sri Lanka keelback / common pond snake
5.	*Xenochrophis piscator* (Schneider, 1799)	- Checkered keelback
6.	**Balanophis ceylonensis* (Günther, 1858)	- Sri Lanka Blossom Krait / Sri Lanka keelback
7.	**Aspidura guentheri* Ferguson, 1876	- Gunther's Rough-side
8.	*Amphiesma stolata* (Linnaeus, 1758)	- Buff strip keelback
9.	*Ahaetulla nasutus* (Lacepede, 1789)	- Green vine snake

10.	*Boiga ceylonensis* (Günther, 1858)	- Sri Lanka Cat snake
11.	*Boiga forsteni* (Dumeril, Bibron & Dumeril, 1854)	- Forten's Cat Snake
12.	*Chrysopelea ornate* (Shaw, 1802)	- Ornate Flying Snake
13.	* *Dendrelaphis bifernalis* (Boulenger, 1890)	- Boulenger's bronze-back
14.	*Dendrelaphis tristis* (Daudin, 1803)	- Common bronze-back
15.	*Dryocalamus nympha* (Daudin, 1803)	- Common bridal snake
16.	*Elaphe helena* (Daudin, 1803)	- Trinket snake
17.	*Lycodon aulicus* (Linnneaus, 1758)	- Common wolf snake
18.	**Lycodon striatus* (Shaw, 1802)	- Shaw's wolf snake
19.	*Coluber mucosus* (Linnaeus, 1758)	- Rat Snake
20.	*Oligodon arnensis* (Shaw, 1802)	- Common banded kukri snake
21.	**Oligodon sublineatus* (Dumeril, Bibron & Dumeril, 1854)	- Streaked kukri snake / Dumeril's kukri snake
Family: Cylindrophiidae / Europeltidae		
22.	**Cylindrophis maculatus* (Daudin, 1803)	- Sri Lanka Pipe Snake
Family: Viperidae		
23.	*Hypnale hypnale* (Merrem, 1820)	- Hump-nosed viper
24.	**Trimeresurus trigonocephalaus* (Sonnini & Latreille, 1801)	- Sri Lanka green pit viper
25.	*Daboia russelii* (Shaw & Nodder, 1797)	- Russell's viper
	Order: SAURIA	
Family: Agamidae		
1.	*Calotes calotes* (Linnaeus, 1758)	- Green garden lizard
2.	*Calotes versicolor* (Daudin, 1802)	- Common garden lizard
3.	**Calotes liolepis* Boulenger, 1885	- Whistling lizard
4.	**Ceratophora aspera* Günther, 1864	- Rough-horn lizard
5.	**Otocryptis wiegmanni* Wagler, 1830	- Sri Lanka kangaroo lizard
6.	**Lyriocephalus scutatus* (Linnaeus, 1758)	- Hump nose lizard
Family: Scincidae		
7.	*Mabuya carinata lanka* Deraniyagala, 1953	- Rat snake skink
8.	**Nessia burtonii* Gray, 1839	- Three-toe snake skink
9.	**Lankascincus fallax* (Peters, 1860)	- Common Lanka skink
10.	**Lankascincus gansi* (Greer, 1991)	- Gans's lanka skink
Family: Varanidae		
11.	*Varanus bengalensis* (Daudin, 1802)	- Land monitor
12.	*Varanus salvator* (Laurenti, 1768)	- Water monitor

Family: Gekkonidae		
13.	**Cnemaspis podihuna* Deraniyagala, 1953	- Dwarf day Gecko
14.	*Hemidactylus frenatus* Dumeril & Bibron, 1836	- Asian House Gecko
15.	*Hemidactylus brooki* Gray, 1845	- Brooke's House Gecko / Spotted House Gecko
16.	*Gehyra mutilata* (Wiegmann, 1834)	- Four-clawed Gecko
Family: Trionychidae		
17.	*Lissemys punctata* (Lacepede, 1788)	- Flap-shell turtle

LIST OF BIRD SPECIES OBSERVED AT BKE.

	Order: CICONIIFORMES	
Family: Phalacrocoracidae		
1.	*Phalacrocorax niger*	Little Cormorant
Family: Ardeidae		
2.	*Bubulcus ibis*	Cattle Egret
3.	*Egretta garzetta*	Little Egret
4.	*Ardeola grayii*	Indian Pond Heron
Family: Accipitridae		
5.	*Ictinaetus malayensis*	Black Eagle
6.	*Haliastur indus*	Brahmini Kite
7.	*Spizaetus cirrhatus*	Changable Hawk Eagle
8.	*Spilornis cheela*	Crested Serpent Eagle
9.	*Accipiter badius*	Shikra
	Order: GALIFORMES	
Family: Phasianidae		
10.	**Gallus lafayetii*	Sri Lanka Junglefowl
11.	**Galloperdix bicalcarata*	Sri Lanka Spurfowl
	Order: GRUIFORMES	
Family: Rallidae		
12.	*Amaurornis phoenicurus*	White Breasted Water Hen
	Order: COLUMBIFORMES	
Family: Columbidae		
13.	*Chalcophaps indica*	Emerald Dove
14.	*Ducula aenea*	Green Imperial Pigeon
15.	*Treron bicincta*	Orange Breasted Green Pigeon
16.	*Treron pompadora*	Pompadour Green Pigeon

17. *Streptopelia chinensis*	Spotted Dove
Order: PSITTACIFORMES	
Family: Psittacidae	
18. *Psittacula krameri*	Rose-ringed Parakeet
19. *Psittacula cyanocephala*	Plum-headed Parakeet
20. **Loriculus beryllinus*	Sri Lanka Hanging Parakeet
Order: CUCULIFORMES	
Family: Cuculidae	
21. *Eudynamys scolopacea*	Asian Koel
Family: Centropodidae	
22. *Centropus sinensis*	Greater Coucal
23. * *Centropus chlororhynchus*	Sri Lanka Green-billed Coucal
Order: STRIGIFORMES	
Family: Strigidae	
24. *Bubo nipalensis*	Spot-bellied Eagle Owl
25. **Glaucidium castanonotum*	Sri Lanka Chestnut-backed Owlet
26. *Strix leptogrammica*	Brown Wood Owl
27. *Ketupa zeylonensis*	Brown Fish Owl
Family: Batrachostomidae	
28. *Batrachostomus monilieger*	Frog mouth
Order: APODIFORMES	
Family: Apodidae	
29. *Cypsiurus balasiensis*	Asian Palm Swift
Family: Hemiprocnidae	
30. *Hemiprocne coronata*	Crested Tree Swift
Order: TROGONIFORMES	
Family: Trogonidae	
31. *Harpactes fasciatus*	Malabar Trogon
Order: CORACIIFORMES	
Family: Alcedinidae	
32. *Ceyx erithacus*	Oriental Dwarf Kingfisher
33. *Alcedo atthis*	Common Kingfisher
Family Halcyonidae	
34. *Halcyon smyrnensis*	White-breasted Kingfisher
Family: Meropidae	
35. *Merops philippinus*	Blue-tailed Bee-eater

36. *Merops leschenaultia*	Chestnutheaded Bee-eater
Family: Coraciidae	
37. *Eurystomus orientalis*	Dollarbird
Order: BUCEROTIFORMES	
Family: Bucerotidae	
38. **Ocyceros gingalensis*	Sri Lanka Grey Hornbill
Order: PICIFORMES	
Family: Megalaimidae	
39. *Megalaima zeylanica*	Brown-headed Barbet
40. *Megalaima rubricapilla*	Crimson-fronted Barbet
41. * *Megalaima flavifrons*	Sri Lanka Yellow-fronted Barbet
Family: Picidae	
42. *Chrysocolaptes lucidus*	Greater Flame-back
43. *Dendrocopus nanus*	Pigmy Woodpecker
44. *Dinopium benghalense*	Red-backed Woodpecker
Order: PASSERIFORMES	
Family: Pittidae	
45. *Pitta brachyura*	Indian Pitta
Family: Passeridae	
46. *Dendrolanthus indicus*	Forest Wagtail
Family: Hirundinidae	
47. *Hirundo daurica*	Red-rumped Swallow
Family: Corvidae	
48. *Crovus macrorhynchos*	Large-billed Crow / Black Crow/ Jungle Crow
49. *Pericrocotus flammeus*	Scarlet Minivet
50. *Pericrocotus cinnamomeus*	Small Minivet
51. *Aegithina tiphia*	Common Iora
52. *Terpsiphone paradisi*	Asian Paradise Fly-catcher
53. *Rhipidura aureola*	White-browed Fantail
54. *Oriolus xanthornus*	Black-hooded Oriole / Black headed Oriole
55. *Dicrurus caerulescens*	White-bellied Drongo
56. *Dicrurus paradisius lophorhinus*	Crested Drongo / Great racket-tailed Drongo
57. *Artamus fuscus*	Ashy Woodswallow
Family: Pycnonotidae	
58. *Hypsipetes leucocephalus*	Black Bulbul
59. *Pycnonotus melanicterus*	Black-crested Bulbul
60. *Pycnonotus cafer*	Red-vented Bulbul

61. *Pycnonotus luteolus*	White-browed Bulbul
62. *Iole indica*	Yellow-browed Bulbul
Family: Passeridae	
63. *Lonchura striata*	White-rumped Muniya
64. *Lonchura punctulata*	Scaly-breasted Muniya
Family: Irenidae	
65. *Chloropsis cochinchinensis*	Blue-winged Leafbird
66. *Chloropsis aurifrons*	Gold-fronted Leafbird
Family: Laniidae	
67. *Lanius cristatus cristatus*	Brown Shrike
Family: Muscicapidae	
68. *Muscicapa daurica*	Asian Brown Flycatcher
69. *Hypothymis azurea*	Black-naped Monarch
70. *Copsychus saularis*	Oriental Magpie Robin
71. *Cyornis tickelliae*	Tickell's Blue Flycatcher
Family: Sittidae	
72. *Sitta frontalis*	Velvet-fronted Nuthatch
Family: Silviidae	
73. *Orthotomus sutorius*	Common Tailorbird
74. *Phylloscopus trochiloides*	Greenish Warbler
75. *Phylloscopus magnirostris*	Large-billed Leaf Warbler
76. *Turdoides affinis*	Yellow-billed Babbler
77. *Rhopocichla atriceps*	Dark-fronted Babbler
78. **Pellorneum fuscocapillum*	Sri Lanka Brown capped babbler
79. *Pomatorhinus horsfieldii*	Scimitar Babbler
Family: Paridae	
80. *Parus major*	Great Tit
Family: Nectarinidae	
81. **Dicaeum vincens*	Sri Lanka Legge's Flowerpecker
82. *Dicaeum erythrorhynchos*	Small Flowerpecker
83. *Nectarina zeylonica*	Purple-rumped Sunbird
84. *Nectarina lotenia*	Long-billed Sunbird / Loten's Sunbird
85. *Nectarina asiatica*	Purple Sunbird
Family: Zosteropidae	
86. *Zosterops palpebrosa*	Small White-eye / Oriental white eye
Family: Sturnidae	
87. *Acridotheres tristis*	Common Myna
88. *Gracula religiosa*	Hill Myna
89. * *Gracula ptilogenys*	Sri Lanka Myna

LIST OF MAMMAL SPECIES OBSERVED AT BKE.

CLASS-MAMMALIA
Subclass-THERIA
Order: CHIROPTERA

Family: Pteropidae	
1. *Cynopterus sphinx*	Short-nosed fruit bat
2. *Pteropus giganteus*	Flying fox
Family: Emballonuridae	
3. *Taphozous melanopogon*	Black-bearded sheath-tailed bat
Family: Rhinolophidae	
4. *Rhinolophus rouxii*	Rufus horseshoe bat
5. *Hipposideros lankadiva*	Great leaf-nosed bat
Family: Vespertilionidae	
6. *Pipistrellus ceylonicus*	Kelaart's pipistrel
7. *Kirivoula pictus*	Painted bat

Order: PRIMATES

Family: Loridae	
8. **Loris tardigradus tardigradus*	Sri Lanka Western red slender Loris (En)
Family: Cercopithecidae	
9. **Macaca sinica aurifrons*	Dusky toque macaque (Vu) / Sri Lanka toque monkey
10. **Trachypithecus vetullus vetullus*	Sri Lanka Purple faced leaf monkey (En)

Order: Rodentia

Family: Sciuridae	
11. *Funambulus palmarum*	Palm squirrel
12. **Funambulus layardi*	Sri Lanka Flame-striped jungle squirrel
13. *Funambulus sublineatus*	Dusky-striped jungle squirrel
14. *Ratufa macroura melanochra*	Black and yellow giant squirrel / Giant squirrel
Family: Muridae	
15. *Bandicota indica*	Malabar bandicoot
16. *Mus booduga*	Field mouse
17. *Mus musculus*	Indian house mouse
18. *Rattus rattus*	Common house rat
19. *Vandeleuria oleracea*	Long-tailed tree mouse
Family: Hystricidae	
20. *Hystrix indica*	Porcupine

Order: PHOLIDOTA

Family: Manidae	
21. *Manis crassicaudata*	Indian Pangolin

Order: LAGOMORPHA

Family: Leporidae	
22. *Lepus nigricollis*	Black-Napped Hare

Order: CARNIVORA	
Family: Viverridae	
23. *Viverricula indica*	Ring-tailed civet
24. *Paradoxurus hermaphroditus*	Palm cat
25. **Paradoxurus zeylonensis*	Sri Lanka Golden palm civet
Family: Herpestidae	
26. *Herpestes brachyurus*	Brown mongoose
27. *Herpestes smithii*	Black-tipped mongoose
Family: Felidae	
28. *Prionailurus rubiginosa*	Rusty-Spotted Cat
29. *Panthera paradus kotiy*	Leopard
30. *Prionailurus viverrinus*	Fishing Cat
Family: Mustelidae	
31. *Lutra lutra*	Otter
Family: Canidae	
32. *Canis aureus*	Jackal
Order: ARTIODACTYLA	
Family: Suidae	
33. *Sus scrofa*	Wild boar
Family: Tragulidae	
34. **Moschiola meminna*	Sri Lanka Mouse deer