MAMMALS OF WESTERN GHATS: A SIMPLISTIC OVERVIEW

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Abstract

Being one of the 25 hotspots of the world, Western Ghats is a storehouse of endemic flora and fauna, whose endemicity increases with decreasing body size. Mammals are well represented in this chain of mountains with 137 species of which 16 are found no other place on earth. This paper presents a thorough checklist of mammals of Western Ghats along with the status (according to the 1994 IUCN Red List Criteria) of the taxa in Western Ghats (if endemic) or in India/overall distribution (if found outside of Western Ghats). The paper summarises the impacts of human activities within the hotspot as indicated by the level of threat faced by the endemic mammalian taxa. Thirty-two mammals threatened globally or in India occur in Western Ghats, while there is not enough information to assess the status of 22 mammals. Of the 16 endemics, 13 are threatened in Western Ghats.

Keywords

Western Ghats, mammals, checklist, endemicity, status, 1994 IUCN Red List Criteria, CAMP, threats

Introduction

The Western Ghats forms a practically unbroken relief dominating the western coast of the Indian Peninsula for almost 1600km. The Ghats extend from the mouth of the river Tapti 21^{0}N to the tip of southern India (about 8^{0}N) the only discontinuity in the chain being the Palghat Gap (Pascal, 1988). The Western Ghats is spread over six Indian states, *viz*., Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu. The average elevation is 900-1500m, with the highest peak having an altitude of 2969m. The western slopes of Western Ghats receive very high rainfall ranging from 2000-6000mm per year, but across the hill range, the rain decreases and the eastern slopes and foothills are rain shadow areas (Nair, 1991).

Systematic collections of mammals were made as early as second half of the 19th century, but the first comprehensive checklist on the mammals of at least one part of the region was the one by Sathasivam (1996). He listed 158 species of mammals from Kerala and Tamil Nadu. Later, Balakrishnan (1997) compiled a list of 101 species of mammals of Kerala. Both Sathasivam (1996) and Balakrishnan (1997) included marine mammals in their checklists, which is not the case in this checklist of Western Ghats mammals. Karanth (1986) lists 53 species of terrestrial mammals from Karnataka. Johnsingh (2001) gives a list of 77 species of mammals from Kalakad-Mundanthurai Tiger Reserve.

In this paper a compilation of mammal species occuring in Western Ghats is presented. The regional checklists of the various fauna, it is hoped, would be useful for planning and prioritising further studies on the taxa in question. The information on the conservation status and overall threats would also further assist in prioritising studies and conservation action.

Methodology

This checklist has been prepared from the *Checklist of Indian Mammals* (Nameer, 2000), which in turn is compiled from *Fauna of British India* series (Blanford, 1888, 1891; Pocock 1939, 1941; Ellerman, 1961) and Prater (1971). However, the taxonomy and nomenclature is in accordance with Wilson and Reeder (1993).

The status of Indian mammals including Western Ghats was assessed in 1997 in a Conservation Assessment and Management Plan workshop. The CAMP process was developed by the Conservation Breeding Specialist Group of the Species Survival Commission, IUCN (Seal, 2000). The workshop strategy was to assess the status of all Indian mammal taxa according to the 1994 IUCN Red List Criteria. The mammal workshop was one of the six workshops of a subproject on Endangered Species within a bigger Biodiversity Conservation Prioritisation Project initiated by WWF International. At the workshop conducted from 25-29 August 1997, 378 of the 400+

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Figure 1. Rough extent of the Western Ghats range.

Table 1. Checklist of mammals of Western Ghats with status as per the 1994 IUCN Red List Criteria.

Common name [1]	Scientific name [2]	Status [3]	Criteria [4]	Assessment [5]
A. Order Insectivora				
I. Family Erinaceidae (Hedgehogs)				
1. Indian (Pale) Hedgehog	*Hemiechinus micropus* (Blyth, 1846)	LRlc [7]	–	National
2. Madras Hedgehog	*Hemiechinus nudiventris* (Horsfield, 1851)	VU [6]	D2	Global
II. Family Soricidae (Shrews)				
3. Horsfield's Shrew	*Crocidura horsfieldi* (Tomes, 1856)	DD [7]	–	National
4. Kelaart's Long-clawed Shrew	*Feroculus feroculus* (Kelaart, 1850)	VU [7]	B1+2c; D2	National
5. Day's Shrew	*Suncus dayi* (Dobson, 1888)	VU [6]	B1+2c	Global
6. Pygmy (White-toothed) Shrew	*Suncus etruscus* (Savi, 1822)	LRlc [7]	–	National
7. Hill (Mountain) Shrew	*Suncus montanus* (Kelaart, 1850)	VU [6]	B1+2c	Global
8. House (Grey Musk) Shrew, Musk Rat	*Suncus murinus* (Linnaeus, 1766)	LRlc [7]	–	National
9. Anderson's (Yellow-throated) Shrew	*Suncus stoliczkanus* (Anderson, 1877)	LRlc [7]	–	National
B. Order Scandentia				
III. Family Tupaiidae (Tree Shrews)				
10. South Indian (Madras) Tree Shrew	*Anathana ellioti* (Waterhouse, 1850)	LRnt [6]	–	Global
C. Order Chiroptera				
IV. Family Pteropodidae (Fruit Bats)				
11. Lesser dog-faced Fruit Bat	*Cynopterus brachyotis* (Müller, 1838)	LRlc [7]	–	National
12. Short-nosed Fruit Bat	*Cynopterus sphinx* (Vahl, 1797)	LRlc [7]	–	National
13. Dawn (Cave Fruit) Bat	*Eonycteris spelaea* (Dobson, 1871)	VU [7]	D2	National
14. Salim Ali's Fruit Bat	*Latidens salimalii* Thonglongya, 1972	EN [7]	B1+2a; C2a	Global
15. Indian Flying Fox	*Pteropus giganteus* (Brünnich, 1782)	LRnt [7]	–	National
16. Fulvous (Rousette) Fruit Bat	*Rousettus leschenaulti* (Desmarest, 1820)	LRlc [7]	–	National
V. Family Rhinopomatidae (Mouse-tailed Bats)				
17. Lesser Mouse-tailed (Lesser rat-tailed) Bat	*Rhinopoma hardwickii* Gray, 1831	LRnt [7]	–	National
18. Greater Mouse-tailed Bat	*Rhinopoma microphyllum* (Brünnich, 1782)	LRnt [7]	–	National
19. Small Mouse-tailed Bat	*Rhinopoma muscatellum* Thomas, 1903	LRnt [7]	–	National
VI. Family Emballonuridae (Sheath-tailed Bats)				
20. Pouch-bearing Bat	*Saccolaimus saccolaimus* (Temminck, 1838)	DD [7]	–	National
21. Long-armed Sheath-tailed Bat	*Taphozous longimanus* Hardwicke, 1825	LRlc [7]	–	National
22. Bearded Sheath-tailed Bat	*Taphozous melanopogon* Temminck, 1841	LRnt [7]	–	National
23. Naked-rumped Tomb Bat	*Taphozous nudiventris* Cretzschmar, 1830	LRnt [7]	–	National
24. Theobald's Tomb Bat	*Taphozous theobaldi* Dobson, 1872	DD [7]	–	National
VII. Family Megadermatidae (False-vampire Bats)				
25. Greater False-vampire Bat	*Megaderma lyra* E. Geoffroy, 1810	LRlc [7]	–	National
26. Lesser False-vampire Bat	*Megaderma spasma* (Linnaeus, 1758)	DD [7]	–	National
VIII. Family Rhinolophidae (Horseshoe Bats)				
27. Dusky Leaf-nosed Bat	*Hipposideros ater* Templeton, 1848	LRnt [7]	–	National
28. Fulvus Leaf-nosed Bat	*Hipposideros fulvus* Gray, 1838	LRnt [7]	–	National
29. Cantor's (Fawn) Leaf-nosed Bat	*Hipposideros galeritus* Cantor, 1846	DD [7]	–	National
30. Kolar Leaf-nosed Bat	*Hipposideros hypophyllus* Kock & Bhat, 1994	VU [8]	B1+2c; D2	Global
31. Kelaart's Leaf-nosed Bat	*Hipposideros lankadiva* Kelaart, 1850	DD [7]	–	National
32. Andersen's Leaf-nosed Bat	*Hipposideros pomona* K. Andersen, 1918	DD [7]	–	National
33. Bellary Leaf-nosed Bat	*Hipposideros schistaceus* K. Andersen, 1918	DD [6]	–	Global
34. Schneider's Leaf-nosed Bat	*Hipposideros speoris* (Schneider, 1800)	LRnt [7]	–	National
35. Lesser Woolly Horseshoe Bat	*Rhinolophus beddomei* Anderson, 1905	LRnt [8]	–	Global
36. Blyth's (Little Indian) Horseshoe Bat	*Rhinolophus lepidus* Blyth, 1844	LRnt [7]	–	National
37. Woolly (Great Eastern) Horseshoe Bat	*Rhinolophus luctus* Temminck, 1835	DD [7]	–	National

Common name [1]	Scientific name [2]	Status [3]	Criteria [4]	Assessment [5]
38. Least Horseshoe Bat	*Rhinolophus pusillus* Temminck, 1834	LRnt [7]	–	National
39. Rufous Horseshoe Bat	*Rhinolophus rouxii* Temminck, 1835	LRnt [7]	–	National
IX. Family Vespertilionidae (Evening Bats)				
40. Hairy-winged Bat	*Harpiocephalus harpia* Gray, 1842	DD [7]	–	National
41. Tickell's Bat	*Hesperoptenus tickelli* (Blyth, 1851)	DD [7]	–	National
42. Hardwicke's Forest Bat	*Kerivoula hardwickii* (Horsfield, 1824)	DD [7]	–	National
43. Painted Bat	*Kerivoula picta* (Pallas, 1767)	LRnt [7]	–	National
44. Nicobar Long-fingered Bat	*Miniopterus pusillus* Dobson, 1876	DD [7]	–	National
45. Schreibers' Long-fingered Bat	*Miniopterus schreibersi* (Kuhl, 1817)	LRnt [8]	–	National
46. Round-eared Tube-nosed Bat	*Murina cyclotis* Dobson, 1872	DD [7]	–	National
47. Burmese Whiskered Bat	*Myotis montivagus* (Dobson, 1874)	VU [8]	A2c; D2	Global
48. Horsfield's Mouse-eared Bat	*Myotis horsfieldii* (Temminck, 1840)	LRnt [7]	–	National
49. Chocolate Bat	*Pipistrellus affinis* (Dobson, 1871)	DD [7]	–	National
50. Kelaart's Pipistrelle	*Pipistrellus ceylonicus* (Kelaart, 1852)	LRlc [7]	–	National
51. Indian Pipistrelle	*Pipistrellus coromandra* (Gray, 1838)	LRnt [7]	–	National
52. Dormer's Bat	*Pipistrellus dormeri* (Dobson, 1875)	LRnt [7]	–	National
53. Javan Pipistrelle	*Pipistrellus javanicus* (Gray, 1838)	NE	–	
54. Least Pipistrelle	*Pipistrellus tenuis* (Temminck, 1840)	LRlc [7]	–	National
55. Common Yellow Bat	*Scotophilus heathii* (Horsfield, 1831)	LRlc [7]	–	National
56. Asiatic Lesser Yellow House Bat	*Scotophilus kuhlii* Leach, 1821	LRnt [7]	–	National
57. Bamboo Bat	*Tylonycteris pachypus* (Temminck, 1840)	DD [7]	–	National
X. Family Molossidae (Free-tailed Bats)				
58. Wrinkle-lipped Free-tailed Bat	*Chaerephon plicata* (Buchanan, 1800)	DD [7]	–	National
59. Wroughton's Free-tailed Bat	*Otomops wroughtoni* Thomas, 1913	CR [6]	B1+2c	Global
60. Egyptian Free-tailed Bat	*Tadarida aegyptiaca* (E. Geoffroy, 1818)	LRnt [7]	–	National
D. Order Primates				
XI. Family Loridae (Loris)				
61. Slender Loris	*Loris tardigradus* (Linnaeus, 1758)	DD [6]	–	National
XII. Family Cercopithecidae (Monkeys)				
62. Bonnet Macaque	*Macaca radiata* (E.Geoffroy, 1812)	LRlc [7]	–	Global
63. Lion-tailed Macaque	*Macaca silenus* (Linnaeus, 1758)	EN [6]	B1+2c; C2a	Global
64. Common (Hanuman) Langur	*Semnopithecus entellus* (Dufresne, 1797)	LRnt [8]	–	Global
65. Nilgiri Langur, Hooded Leaf Monkey	*Trachypithecus johnii* (J. Fischer, 1829)	VU [6]	A1d; B1+2c; C2a	Global
E. Order Carnivora				
XIII. Family Canidae (Dogs)				
66. Golden Jackal	*Canis aureus* Linnaeus, 1758	LRlc [7]	–	National
67. Wolf	*Canis lupus* Linnaeus, 1758	LRnt [7]	–	National
68. Indian Wild Dog	*Cuon alpinus* (Pallas, 1811)	VU [6]	C2a	Global
69. Bengal (Indian) Fox	*Vulpes bengalensis* (Shaw, 1800)	DD [8]	–	Global
XIV. Family Ursidae (Bears)				
70. Sloth Bear	*Melursus ursinus* (Shaw, 1791)	VU [6]	A2cd; C1+2a	Global
XV. Family Mustelidae				
71. Oriental Small-clawed (Clawless) Otter	*Amblonyx cinereus* Illiger, 1815	LRnt [8]	–	Global
72. Common (Eurasian) Otter	*Lutra lutra* (Linnaeus, 1758)	VU [8]	A2cde	Global
73. Smooth-coated Otter	*Lutrogale perspicillata* (I. Geoffroy Saint-Hilaire, 1826)	VU [8]	A1acd	Global
74. Nilgiri Marten	*Martes gwatkinsi* Horsfield, 1851	VU [6]	B1+2bc	Global
75. Ratel, Honey Badger	*Mellivora capensis* (Schreber, 1776)	LRnt [7]	–	National
XVI. Family Viverridae (Civets)				
76. Common Palm Civet, Toddy Cat	*Paradoxurus hermaphroditus* (Pallas, 1777)	LRlc [7]	–	National

Common name [1]	Scientific name [2]	Status [3]	Criteria [4]	Assessment [5]
77. Brown (Jerdon's) Palm Civet, Coffee Civet	*Paradoxurus jerdoni* Blanford, 1885	VU [6]	B1+2bc	Global
78. Malabar Civet	*Viverra civettina* Blyth, 1862	CR [6]	C2a	Global
79. Small Indian Civet	*Viverricula indica* (Desmarest, 1804)	LRnt [7]	–	National
XVII. Family Herpestidae (Mongoose)				
80. Brown Mongoose	*Herpestes brachyurus* Gray, 1837	VU [6]	B1+2abc	Global
81. Grey (Common) Mongoose	*Herpestes edwardsii* (E. Geoffroy Saint-Hilaire, 1818)	LRlc [7]	–	National
82. Ruddy Mongoose	*Herpestes smithii* Gray, 1837	LRlc [7]	–	National
83. Stripe-necked Mongoose	*Herpestes vitticollis* Bennett, 1835	LRnt [7]	–	National
XVIII. Family Hyaenidae (Hyaena)				
84. Striped Hyaena	*Hyaena hyaena* (Linnaeus, 1758)	LRnt [6]	–	Global
XIX. Family Felidae (Cats)				
85. Jungle Cat	*Felis chaus* Schreber, 1777	LRnt [7]	–	National
86. Leopard	*Panthera pardus* (Linnaeus, 1758)	VU [7]	C2a	National
87. Tiger	*Panthera tigris* (Linnaeus, 1758)	EN [6]	A2cd	Global
88. Leopard Cat	*Prionailurus bengalensis* (Kerr, 1792)	LRnt [7]	–	National
89. Rusty-spotted Cat	*Prionailurus rubiginosus* (I. Geoffroy Saint-Hilaire, 1831)	DD [8]	–	Global
90. Fishing Cat	*Prionailurus viverrinus* (Bennett, 1833)	LRnt [8]	–	Global
F. Order Proboscidea				
XXVI. Family Elephantidae (Elephants)				
91. Asian Elephant	*Elephas maximus* Linnaeus, 1758	EN [8]	A1cd	Global
G. Order Artiodactyla				
XXVIII. Family Suidae (Pigs)				
92. Wild Boar	*Sus scrofa* Linnaeus, 1758	LRlc [7]	–	National
XXIX. Family Tragulidae (Mouse Deer)				
93. Indian Chevrotain, Mouse Deer	*Moschiola meminna* (Erxleben, 1777)	LRnt [7]	–	National
XXX. Family Cervidae (Deer)				
94. Spotted Deer	*Axis axis* (Erxleben, 1777)	LRlc [7]	–	National
95. Sambar	*Cervus unicolor* Kerr, 1792	LRlc [7]	–	National
96. Indian Muntjac, Barking Deer	*Muntiacus muntjak* (Zimmermann, 1780)	LRlc [7]	–	National
XXXI. Family Bovidae (Wild Cattle)				
97. Blackbuck, Indian Antelope	*Antilope cervicapra* (Linnaeus, 1758)	VU [8]	A1c	Global
98. Gaur	*Bos gaurus* Smith, 1827	VU [6]	A1cd+2cd; C1+2a	Global
99. Bluebull	*Boselaphus tragocamelus* (Pallas, 1766)	LRlc [7]	–	Global
100. Indian Gazelle	*Gazella bennettii* (Sykes, 1831)	LRlc [7]	–	Global
101. Nilgiri Tahr	*Hemitragus hylocrius* (Ogilby, 1838)	EN [6]	B1+2acd; C2a	Global
102. Four-horned Antelope	*Tetracerus quadricornis* (de Blainville, 1816).	VU [8]	C2a	Global
H. Order Pholidota				
XXXII. Family Manidae (Pangolins)				
103. Indian Pangolin	*Manis crassicaudata* Gray, 1827	LRnt [6]	–	Global
I. Order Rodentia				
XXXIII. Family Sciuridae (Squirrels)				
104. Layard's Striped Squirrel	*Funambulus layardi* (Blyth, 1849)	DD [7]	–	National
105. Three-striped Palm Squirrel	*Funambulus palmarum* (Linnaeus, 1766)	LRlc [7]	–	National
106. Five-striped Palm Squirrel	*Funambulus pennantii* Wroughton, 1905	LRlc [7]	–	National
107. Dusky Striped Squirrel	*Funambulus sublineatus* (Waterhouse, 1838)	DD [7]	–	National
108. Jungle Striped Squirrel	*Funambulus tristriatus* (Waterhouse, 1837)	LRnt [6]	–	Global
109. Travancore Flying Squirrel	*Petinomys fuscocapillus* (Jerdon, 1847)	VU [6]	B1+2bc	Global

Common name [1]	Scientific name [2]	Status [3]	Criteria [4]	Assessment [5]
110. Elliot's Giant (Large) Flying Squirrel	*Petaurista philippensis* (Elliot, 1839)	LRnt [7]	--	National
111. Indian (Malabar) Giant Squirrel	*Ratufa indica* (Erxleben, 1777)	VU [6]	B1+2c	Global
112. Grizzled Giant Squirrel	*Ratufa macroura* (Pennant, 1769)	VU [8]	A1c	Global
XXXIV. Family Muridae (Mice and Rats)				
113. Indian Mole-rat	*Bandicota bengalensis* (Gray & Hardwicke, 1833)	LRlc [7]	--	National
114. Large (Greater) Bandicoot-rat	*Bandicota indica* (Bechstein, 1800)	LRnt [7]	--	National
115. White-tailed Wood (Blanford's) Rat	*Cremnomys blanfordi* (Thomas, 1881)	LRnt [7]	--	National
116. Cutch Rat	*Cremnomys cutchicus* Wroughton, 1912	LRlc [7]	--	Global
117. Indian Bush Rat	*Golunda ellioti* Gray, 1837	LRlc [7]	--	National
118. Kondana Rat	*Millardia kondana* Mishra & Dhanda, 1975	VU [7]	D2	Global
119. Soft-furred Field Rat (Metad)	*Millardia meltada* (Gray, 1837)	LRlc [7]	--	National
120. Little Indian Field Mouse	*Mus booduga* (Gray, 1837)	LRlc [7]	--	National
121. Cook's Mouse	*Mus cookii* Ryley, 1914	LRnt [7]	--	National
122. Bonhote's Mouse	*Mus famulus* Bonhote, 1898	EN [6]	B1+2c	Global
123. House Mouse	*Mus musculus* Linnaeus, 1758	LRlc [7]	--	National
124. Fawn-coloured Mouse	*Mus phillipsi* Wroughton, 1912	LRlc [7]	--	National
125. Spiny Field (Indian Brown Spiny) Mouse	*Mus platythrix* Bennett, 1832	LRlc [7]	--	National
126. Elliot's Brown Spiny Mouse	*Mus saxicola* Elliot, 1839	LRlc [7]	--	National
127. Pygmy (Earth-coloured) Field Mouse	*Mus terricolor* Blyth, 1851	DD [7]	--	National
128. Spiny Dormouse	*Platacanthomys lasiurus* Blyth, 1859	LRlc [7]	--	Global
129. Brown (Norway) Rat	*Rattus norvegicus* (Berkenhout, 1769)	LRlc [7]	--	National
130. Ranjini's Rat	*Rattus ranjiniae* Agarwal & Ghosal, 1969	VU [6]	D2	Global
131. House (Roof, Black) Rat	*Rattus rattus* (Linnaeus, 1758)	LRlc [7]	--	National
132. Indian Gerbile (Antelope Rat)	*Tatera indica* (Hardwicke, 1807)	LRlc [7]	--	National
133. Indian long-tailed Tree Mouse	*Vandeleuria oleracea* (Bennett, 1832)	LRlc [7]	--	National
XXXV. Family Hystricidae (Porcupines)				
134. Indian (Crested) Porcupine	*Hystrix indica* Kerr, 1792	LRlc [7]	--	National
J. Order Lagomorpha				
XXXVI. Family Leporidae (Hares)				
135. Indian Hare, Black-naped Hare	*Lepus nigricollis* F. Cuvier, 1823	LRlc [7]	--	National

[1] After Nameer, 2000.
[2] After Wilson & Reeder, 1993, except when indicated otherwise for specific species.
[3] IUCN Red List Categories as derived using the 1994 IUCN Red List Criteria.
[4] The justification for according IUCN Red List Categories.
[5] Scope of assessment for every species, such as "Global" if assessed for a species' entire distribution range, or "National" if assessed for a species' distribution in India only.
[6] Listed in Hilton-Taylor, 2000 and Molur *et al*., 1998.
[7] Listed in Molur *et al*., 1998 only.
[8] Listed in Hilton-Taylor, 2000 only.
CR - Critically Endangered; EN - Enndangered; VU - Vulnerable; LRnt - Lower Risk near threatened; LRlc - Lower Risk least concern; DD - Data Deficient

mammal taxa were assessed.

The CAMP workshop is a participatory process involving all stakeholders in assessing the status of a taxon in a systematic and logical way, which includes determining individual threats, declines, extent, area, distribution, etc. The CAMP also helps in determining priorities for conservation of the species such as research and management recommendations (Walker *et al*., 2001).

The information on conservation status of Indian mammals in this paper is taken from the CAMP workshop for Indian mammals (Molur *et al*., 1998). The status of endemic mammals of India assessed during the CAMP workshop were incorporated in the 2000 IUCN Red List of Threatened Species (Hilton-Taylor, 2000). The checklist of subspecies provided is from various authorities as listed during the CAMP workshop (Molur *et al*., 1998).

Table 2. Comparative account of the mammalian orders and families occurring naturally in the Western Ghats, India (Nameer, 2000), Indomalayan region (Corbet & Hill, 1992) and the World (Wilson & Reeder, 1993). Numbers within parenthesis indicate the number of genera.

Order/ Family	Western Ghats	India	Indo-Malayan	World
I. Insectivora	9 (4)	31 (11)	77 (20)	428 (66)
1. Erinaceidae	2 (1)	03 (01)	12 (06)	21 (07)
2. Talpidae	–	02 (02)	10 (04)	42 (17)
3. Soricidae	7 (3)	27 (08)	55 (10)	312 (23)
II. Scandentia	1 (1)	03 (02)	16 (04)	19 (05)
4. Tupaidae	1 (1)	03 (02)	16 (4)	19 (05)
III. Chiroptera	50 (23)	114 (36)	307 (63)	925 (177)
5. Pteropodidae	6 (5)	13 (08)	74 (25)	166 (42)
6. Rhinopomatidae	3 (1)	03 (01)	03 (01)	03 (01)
7. Emballonuridae	5 (2)	06 (02)	11 (02)	47(13)
8. Megadermatidae	2 (1)	02 (01)	02 (01)	05 (04)
9. Rhinolophidae	13 (2)	28 (03)	42 (07)	130 (10)
10. Vespertilionidae	18 (9)	59 (18)	119 (23)	318 (35)
11. Molossidae	3 (3)	04 (03)	13 (04)	80 (12)
IV. Primates	5 (4)	15 (06)	61 (08)	233 (60)
12. Loridae	1 (1)	02 (02)	04 (02)	06 (04)
13. Cercopithecidae	4 (3)	12 (03)	39 (05)	81 (18)
14. Hylobatidae	–	01 (01)	11 (01)	11 (01)
V. Carnivora	25 (17)	62 (35)	83 (37)	271 (129)
15. Canidae	4 (3)	07 (03)	09 (04)	34 (14)
16. Ursidae	1 (1)	05 (04)	04 (03)*	09 (06)
17. Mustelidae	5 (5)	16 (08)	22 (11)	65 (25)
18. Viverridae	4 (3)	09 (07)	20 (11)	34 (20)
19. Herpestidae	4 (1)	07 (01)	08 (01)	37 (18)
20. Hyaenidae	1 (1)	01 (01)	01 (01)	04 (04)
21. Felidae	6 (3)	17 (11)	18 (06)*	36 (18)
VI. Cetaceae	–	30 (22)	32 (23)	78 (41)
22. Plantanistidae	–	01 (01)	01 (01)	05 (0
23. Delphinidae	–	15 (13)	16 (14)	32 (17)
24. Phocoenidae	–	01 (01)	01 (01)	06 (04)
25. Physeterida	–	03 (02)	03 (02)	03 (02)
26. Ziphidae	–	03 (02)	03 (02)	19 (06)
27. Balaenopteridae	–	06 (02)	06 (02)	06(02)
28. Balaenidae	–	01 (01)	01 (01)	03 (02)
VII. Sirenia	–	01 (01)	01 (01)	05 (03)
29. Dugongidae	–	01 (01)	01 (01)	05 (02)
VIII. Proboscidea	01 (01)	01 (01)	01 (01)	02 (02)
30. Elephantidae	01 (01)	01 (01)	01 (01)	02(02)
IX. Persiodactyla	–	07 (03)	07 (03)*	18 (06)
31. Rhinocerotidae	–	03 (02)	03 (02)	05 (04)
32. Equidae	–	04 (01)	03 (01)*	05 (01)
X. Artiodactyla	11 (11)	40 (21)	61 (23)	220 (81)
33. Suidae	01 (01)	03 (01)	07 (02)	16 (05)
34. Camelidae	–	01 (01)	01 (01)	06 (03)
35. Tragulidae	01 (01)	01 (01)	03 (02)	04 (03)
36. Moschidae		02 (01)	01 (01)*	04(01)
37. Cervidae	03 (03)	07 (03)	21 (06)	43 (16)
38. Bovidae	06 (06)	26 (14)	28 (11)*	137 (45)
XI. Pholidota	01 (01)	02 (01)	03 (01)	07 (01)
39. Manidae	01 (01)	02 (01)	03 (01)	07 (01)
XII. Rodentia	31 (14)	103 (44)	369 (115)	2015 (443)
40. Sciuridae	09 (04)	28 (12)	62 (28)	273 (50)
41. Muridae	21 (09)	70 (28)	253 (79)	1326 (281)
42. Dipodidae		01 (01)	04 (05)	51 (15)
43. Hystricidae	01 (01)	03 (02)	08 (03)	11 (03)
44. Cavlidae	–	01 (01)	01 (01)	14 (05)
XIII. Lagomorpha	02 (02)	12 (04)	11 (06)	80 (13)
45. Leporidae	02 (02)	05(03)	09 (05)	54 (11)
46. Ochotonidae	–	07 (01)	02 (01)*	26 (02)
	135 (77)	422 (187)	1041 (322)	4629 (1135)

In this paper the global assessment of endemic mammals of Western Ghats indicate their status in the biogeographic region. The status of non-endemic mammals in the Western Ghats is not determined for the region alone but is done at the national or global level and is indicated in Table 1.

Results

The checklist of mammals of Western Ghats is given in Table 1. The checklist includes mammals found only in the mountain chain and the adjoining coastal belt; it does not include the marine mammals off the western coast in the Arabian Sea as indicated in the previous checklists by Sathasivam (1996) and Balakrishnan (1997). The Western Ghats supports 135 species of mammals (32% of Indian land mammals) in 77 genera (41%), 29 families (63%). Taxa of 10 of the 13 mammalian orders are represented in Western Ghats. The 11 species of domestic animals that have been given a complete species status following Corbet and Hill (1992), *viz. Canis familiaris, Felis catus, Equus asinus, Equus caballus, Sus domesticus, Bos taurus, Bubalus bubalis, Capra hircus, Ovis aries, Caria porcellus* and *Oryctolagus cunniculus,* found in Western Ghats are not included in the checklist (Table 1) as they are not a natural component of the wild mammals of the region. *Homo sapiens* is also excluded from the list.

Chiroptera is the largest family with 50 species in seven families, followed by Rodents (31 species in 3 families), Carnivora (25 species in 7 families), Artiodactyla (11 species in 4 families), Insectivora (9 species in 2 families), Primates (5 species in 2 families), Lagomorpha (1 species in 1 family), and Scandentia, Proboscidea, Pholidota and Lagomorpha with one species each in one family. The Insectivora, Chiroptera and Rodentia, constitute about 66.5 per cent of mammals of Western Ghats. Table 2 gives a comparative account of the mammalian orders and families occurring in Western Ghats, India (Nameer, 2000), Indomalayan region (Corbet & Hill, 1992) and the World (Wilson & Reeder, 1993).

Table 3 summarises the number of endemic species of Indian mammals, in different geographical regions. Forty-one species of mammals are known to be endemic to India out of which 16 species are endemic to Western Ghats, 10 species to Andaman and Nicobar Islands and the rest 15 species to different regions within the country.

A list of mammals endemic to Western Ghats is given in Table 4. It may be noted that the three less known groups such as the insectivores, bats and rodents constitutes 62.5 per cent of the endemic mammals.

Discussion

From the data presented above it is proved beyond doubt that very little is known about small mammals (orders Insectivora, Chiroptera and Rodentia) although they form an extremely important group when we think of biodiversity conservation. The small mammals constitute about 66.5 per cent of mammals of Western Ghats and 62.5 per cent of the endemic mammals of the region. Moreover, 28 per cent of the threatened mammals (Critically Endangered, Endangered and Vulnerable) are insectivores, bats and rodents. These three groups of mammals constitute 74 per cent of the Data Deficient (DD) category of mammals of Western Ghats (Table 5).

A significant number of mammals that are in the near threatened category occur in Western Ghats (Table 5). Twenty-eight per cent of Western Ghats mammals are close to being threatened. This combined with the number of threatened mammals, 52 per cent of mammal species occuring in Western Ghats require conservation attention. Not to forget, all Data Deficient species must be accorded a high priority with respect to more studies, surveys and monitoring.

Threats

Threats to mammals in Western Ghats are similar to threats affecting other fauna and flora. Since few studies on small mammal diversity, interaction with host plants, role in ecosystem and behaviour have been conducted, it is important to emphasise the impacts of perceptible threats. Loss of habitat and fragmentation are two major contributors to population declines and further restriction in distribution. Killing of mammals occurs for various reasons such as animal-human conflict (e.g. Tiger, Leopard, Elephant), for use as medicine (e.g. Giant Fruit Bat, Nilgiri Langur), for use as food (e.g. Giant Fruit Bat, Nilgiri Langur, Giant Squirrel, Jungle Cat), for trade in parts or whole (live) (e.g. civets, cats, Elephant, Lion-tailed Macaque, mongoose, shrews, Sloth Bear, porcupines), as pests (e.g. Nilgai, deer, fruit bats, some rodents and shrews, Wild Boar) and incidental. These factors play a crucial role in population numbers and genetic diversity of mammals. Combined, these separate factors, *viz.* killing, habitat loss, development, fragmentation and restricted distribution, pose a considerbale threat to mammal fauna of Western Ghats. If perceptible threats such as above are a concern, information on subtle factors that influence population structures such as habitat quality, microhabitats, vegetation types, etc. are not studied to draw any concrete conclusions. However, taking a precautionary approach, it is 'safe' to surmise that habitat quality is rapidly changing (deteriorating for many specialized species and improving for a few adaptable species) due to human practices in forest areas (protected or non protected). Man-made fires, humus collection, lopping of trees, non-timber forest produce collection practices, timber harvesting, frequency of human intrusions into the forest, monoculture practices and management of habitat for a specific species are but a few examples of factors contributing to change in quality of habitat, some obvious but others not so. Exotic weeds, inter-specific competition and their impacts on the vegetation and in

Table 3. The number of endemic species of land mammals in different regions of India.

Order	Western Ghats	Andaman & Nicobar Isles	Other Parts of India	Total # of species
1. Insectivora	1	4	1	6
2. Scandentia	-	1	1	2
3. Chiroptera	4	2	2	8
4. Primates	2	-	1	3
5. Carnivora	3	-	1	4
6. Proboscidea	-	-	-	-
7. Perissodactyla	-	-	-	-
8. Artiodactyla	1	-	-	1
9. Pholidota	-	-	-	-
10. Rodentia	5	3	9	17
11. Lagomorpha	-	-	-	-
Total	16	10	15	41

Table 4. Endemic mammals of the Western Ghats

Scientific name (Common name)	Family/ Order	Estimated Range	Estimated Area	Number of locations	1994 IUCN Red List Category (Criteria)
1. *Funambulus tristriatus* (Jungle Striped Squirrel)	Sciuridae/ Rodentia	> 20,000 km^2	> 2,000 km^2	Many	LRnt
2. *Hemitragus hylocrius* (Nilgiri Tahr)	Bovidae/ Artiodactyla	< 5,000 km^2	> 500 km^2	20 (Fragmented)	EN (B1+2acd; C2a)
3. *Hipposideros hypophyllus* (Kolar Leaf-nosed Bat)	Rhinolophidae/ Chiroptera	< 20,000 km^2	< 2,000 km^2	< 5	VU (B1+2c; D2)
4. *Hipposideros schistatus* (Bellary Leaf-nosed Bat)	Rhinolophidae/ Chiroptera	< 5,000 km^2	< 10 km^2	1	DD
5. *Latidens salimalii* (Salimali's Fruit Bat)	Pteropodidae/ Chiroptera	< 20,000 km^2	< 500 km^2	2	EN (B1+2a; C2a)
6. *Macaca silenus* (Lion-tailed Macaque)	Cercopithecidae/ Primates	> 20,000 km^2	< 500 km^2	Many (Fragmented)	EN (B1+2c; c2a)
7. *Martes gwatkensi* (Nilgiri Marten)	Mustelidae/ Carnivora	< 20,000 km^2	> 2,000 km^2	Many (Fragmented)	VU (B1+2bc)
8. *Millardia kondana* (Kondana Rat)	Muridae/ Rodentia	< 5,000 km^2	> 500 km^2	2	VU (D2)
9. *Mus famulus* (Bonhote's Rat)	Muridae/ Rodentia	< 5,000 km^2	> 500 km^2	1	EN (B1+2c)
10. *Otomops wroughtoni* (Wroughton's Free-tailed Bat)	Molossidae/ Chiroptera	< 100 km^2	< 10 km^2	1	CR (B1+2c)
11. *Paradoxurus jerdoni* (Brown Palm Civet)	Viverridae/ Carnivora	< 20,000 km^2	> 2,000 km^2	Many (Fragmented)	VU (B1+2bc)
12. *Platacanthomys lasiurus* (Spiny Dormouse)	Muridae/ Rodentia	< 5,000 km^2	< 2,000 km^2	> 10	LRlc
13. *Rattus ranjiniae* (Ranjini's Rat)	Muridae/ Rodentia	< 100 km^2	> 100 km^2	1	VU (D2)
14. *Suncus dayi* (Day's Shrew)	Soricidae/ Insectivora	< 20,000 km^2	< 2,000 km^2	5 (Fragmented)	VU (B1+2c)
15. *Trachypithecus johnii* (Nilgiri Langur)	Cercopithecidae/ Primates	> 20,000 km^2	< 2,000 km^2	Many (Fragmented)	VU (A1d; B1+2c; C2a)
16. *Viverra civettina* (Malabar Civet)	Viverridae/ Carnivora	< 20,000 km^2	< 2,000 km^2	1	CR (C2a)

Table 5. Conservation status of mammals of the Western Ghats.

Order	CR	EN	VU	LRnt	LRlc	DD	NE	Total
1. Insectivora	-	-	4	-	5	1	-	9
2. Scandentia	-	-	-	1	-	-	-	1
3. Chiroptera	1	1	3	20	8	16	1	50
4. Primates	-	1	1	1	1	1	-	5
5. Carnivora	1	1	8	10	4	2	-	25
6. Proboscidea	-	1	-	-	-	-	-	1
7. Artiodactyla	-	1	3	1	6	-	-	11
8. Pholidota	-	-	-	1	-	-	-	1
9. Rodentia	-	1	5	5	17	3	-	31
10. Lagomorpha	-	-	-	-	1	-	-	1
Total	2	6	24	38	41	23	1	135

CR - Critically Endangered, EN - Endangered, VU - Vulnerable, LRnt - Lower Risk near threatened, LRlc - Lower Risk least concern, DD - Data Deficient.
Note: The status are based on the 1997 CAMP workshop (Molur *et al*., 1998) and/or 2000 IUCN Red List of Threatened Species (Hilton-Taylor, 2000). For those species not assessed globally, the status is for India only as per the 1997 CAMP workshop for mammals.

turn on native fauna are threats that are almost irreversible.

Endemicity

The term 'endemic' denotes restriction to an area, whatever the size. Endemic mammals of Western Ghats are 16 species or more if depending on the degree of detail of taxonomy subspecies are listed. Nine of the endemic mammals are restricted to less than 10 locations with as many as five in one location. Since the status is derived on the available information, it may be possible that the species occurs in more locations but have not been recorded. For some species (e.g. Malabar Civet) where there is no recent sighting, it could be that the species is extinct. However, the information available at the workshop determined the status of the species. An example of updating the categories based on new available information is seen when the status of Salim Ali's Fruit Bat (*Latidens salimalii*) is compared. The 2000 Red List of Threatened Species (Hilton-Taylor, 2000) indicates that the species is Critically Endangered given its highly restricted nature. The information used for this species is based on an earlier assessment (1996), which has been continued in the current listing. However, new information at the CAMP workshop indicated that the species is found in two locations rather than one and that increased the range and area, which decreased the status from Critically Endangered to Endangered. In the next iteration of the International Red List this information can be used to update the listing.

Conclusion

It is a normal practice to include marine mammals as part of Indian mammals (Sathasivam, 1996; Balakrishnan, 1997). This practice has been avoided in this paper and all the proportions indicated in various tables reflect the calculations of the totals of land mammals occuring in Western Ghats mountain chain and the narrow coastal strip on the west.

It is important to note that the assessments are based on available information and can be revised as and when more information becomes available. The IUCN (1994) realized the need for a proactive assessment strategy and hence encouraged estimations, inferences and predictions in deriving status assessments. The information for endemic mammals of Western Ghats, however, is fairly reliable, particularly for the larger forms (primates and civets). The smaller endemic mammals and some of the other non-endemic fauna have been assessed based on known locations, current habitat status and continuing threats to either population or habitat. Information is gathered from literature as well as personal experiences, thereby making the assessment more reliable and inclusive.

Habitat loss, fragmentation and change in quality are important factors for the over all decline in mammalian populations in Western Ghats. Appropriate measures for holistic conservation is the need of the hour, rather than approaches such as the flagship-species concept or the umbrella-species concept. At the species level, enough protection from hunting should be

accorded and in certain extreme cases urgent management actions including captive breeding should be considered for conservation of the species. For species affected by severe fragmentation (e.g. Lion-tailed Macaques), population viability assessments show that unless isolated groups are managed like zoo populations with a scientific breeding and exchange programme, the species has a very high probability of extinction in the near future (Kumar *et al*., 1995).

Small mammals are very poorly studied, which is reflected in the number of Data Deficient species. Although the status of most species is at a larger scale (global or national), the information on small mammals in Western Ghats remains sparce. With the small mammals dominating the make up of the land mammals of Western Ghats, it is imperative to accord more importance to their studies, especially in the light of their treatment as vermin in the current Wildlife (Protection) Act 1972/1991.

The Western Ghats is generally believed to be better protected than the other hotspot in India. However, if reticence to recognise the impact of human influence continues (logical, though, it may seem), the effects will soon prove disastrous for the biodiversity of Western Ghats.

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