



A new site record of the Grizzled Giant Squirrel *Ratufa macroura* (Pennant, 1769) in the Hosur forest division, Eastern Ghats, India and its conservation significance

N. Baskaran¹, K. Senthilkumar² & M. Saravanan³

^{1,2,3} Asian Nature Conservation Foundation, Innovation Centre 1st Floor, Indian Institute of Science, Bengaluru, Karnataka 560012, India
Email: ¹baskar@ces.iisc.ernet.in (corresponding author), ²ksenthilkumar@ces.iisc.ernet.in, ³saravanan@ces.iisc.ernet.in

Abstract: The Grizzled Giant Squirrel is endemic to southern India and Sri Lanka. In India it is distributed in isolated populations with less than 500 mature individuals, restricted mostly to patchy riverine habitats. We have recorded the presence of this species (minimum 14 individuals) across eight locations in Hosur forest division along the Cauvery riverine forest, north of earlier reported locations in the Eastern Ghats. The documentation of this species in the study area adds to our understanding of its distribution. These squirrels are canopy dwellers, hence discontinuous forest restricts their movement and dispersal. Measures including stop auctioning *Tamarindus indica* fruits on large scale for commercial purpose by Forest Department, restoration of habitat, maintenance of canopy continuity, reducing anthropogenic pressure and translocating squirrels from larger populations are suggested to enhance the long-term survival of this habitat specialist, which is on the brink of local extinction in the study area. We also suggest a comprehensive population assessment of the species to reevaluate its global status.

Keywords: Distribution, Eastern Ghats, Hosur forest division, *Ratufa macroura*.

Grizzled Giant Squirrel *Ratufa macroura* (Image 1) is endemic to India and Sri Lanka. It is distributed in isolated populations with an estimated population of less than 500 mature individuals in India and with a contiguous distribution in Sri Lanka (IUCN 2010). Habitat loss and hunting continue to reduce its numbers significantly throughout most of its ranges (Joshua & Johnsingh 1992, 1994; Molur et al. 2005). The population size of the Grizzled Giant Squirrel has its number in India has declined by about 30% in the last 25 years (Molur et al. 2005) and is presently listed as Near Threatened in the IUCN Red List (Joshua et al. 2008). Placed in Appendix II of CITES to regulate its international trade and is also included under Schedule I (Part I) of the Indian Wildlife (Protection) Act (1972). In India, the Grizzled Giant Squirrel is patchily distributed in the Western and Eastern Ghats, with larger populations found in the former. In the Western Ghats, there are two major populations each numbering 200–300 individuals in Periyar-Agasthyamalai and Anamalai landscapes. The Periyar-Agasthyamalai population has around 200 individuals (Joshua 1992;

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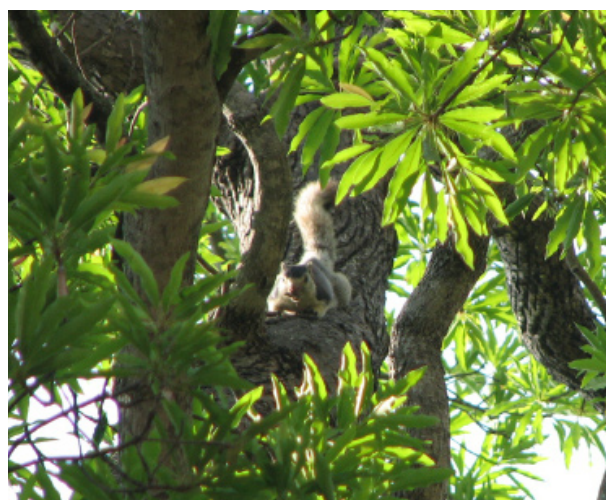


Image 1. Grizzled Giant Squirrel *Ratufa macroura*

Palraj et al. 1992; Palraj & Kasinathan 1993) and is distributed in the Srivilliputhur Grizzled Giant Squirrel Sanctuary. The Anamalai population totals about 300 individuals (Joshua et al. 2008) and is spread across Chinnar Wildlife Sanctuary, Kerala, (numbering about 150–200, Ramachandran 1993; Senthilkumar et al. 2007), and Anamalai Tiger Reserve, Tamil Nadu (with no estimated figures, Kumar et al. 2007). Besides, a few individuals have been reported from Palani Hills in the Western Ghats (Davidar 1989; Sharma 1992). In the Eastern Ghats, a small population is reported from Kanakapura forest division, in southern Karnataka (Karthikeyan et al. 1992; Kumara & Singh 2006), which is considered as the northern-most population (Kumara & Singh 2006).

The species is confined largely to riverine habitats in the rain shadow areas of southern India, feeds primarily on seeds of immature and mature fruits from trees and climbers, with a strong preference for *Tamarindus indica* (Joshua 1992; Ellerman 1961). The *R. macroura* in southern India is sympatric with the Indian Giant Squirrel *Ratufa indica* in the Palani Hills and Azhagarkoil and Ayyanarkoil area of Srivilliputhur Grizzled Giant Squirrel Sanctuary (Joshua 1992). Unlike the *R. indica*, which has a wider distribution and larger population across central and southern India (Ellerman 1961; Borges 1989; Ramachandran 1992), the distribution of *R. macroura* is confined to the southern India (Joshua 1992), and their populations are small and patchy (Ellerman 1961). Any new information in the occurrence or distribution of the species is therefore crucial for its conservation.

Study Area

The study was carried out as part of a biodiversity survey of the vertebrate fauna in Hosur Forest Division and its contiguous habitats in Dharmapuri forest division (11.75°–12.69°N & 77.30°–78.75°E) from June 2009 to May 2010, located in the Eastern Ghats. The study area spreads over 1896km² and is bordered by Cauvery Wildlife Sanctuary (CWS) on the southern side, Ramnagara forest division on the western side and is surrounded mostly by human settlements on the northern and eastern sides. The area represents tropical dry thorn, dry deciduous and mixed deciduous vegetations and a few patches of lowland dry evergreen forest, a patch of high altitude (1395m Gutturayan Hill) montane evergreen forest and a large

tract (65km) of riverine habitat along the Cauvery River, which is the largest perennial river in southern India, flowing between Karnataka and Tamil Nadu on the southern side of the study area. The area also has a few Hindu temples (Madhesvaran and Dhabakuli Appan), situated along the Cauvery River that attract a large number of pilgrim every year.

Methods

A rapid questionnaire survey was undertaken, in which the local community and forest department staff were shown photographs of various species of mammals including the two species of giant squirrels (*R. indica* and *R. macroura*) and a checklist of mammals was thus prepared. This was followed by a reconnaissance survey carried out on foot in search of various species of mammals, including direct sightings of giant squirrels and their signs (nest/drey) in the forested habitats of the study area. These surveys provided information on existence of *R. macroura* and confirmed the absence of *R. indica* in the study area. Based on the reconnaissance survey findings, we divided the study area into three categories, viz., areas with no distribution (with no direct sightings or nest), areas of possible distribution (only with old nest) and areas of confirmed distribution (direct sighting with new and old nests) of *R. macroura*. Subsequently, an intensive systematic survey was carried out on foot during morning (0700–1000 hr) and evening (1500–1800 hr) for a period of 2–7 days both in the areas of possible and confirmed distribution for further affirmation of the presence of *R. macroura* and also to map the extent of distribution in detail. From the direct sightings of *R. macroura* during these surveys, the number of squirrels found in each of the surveyed areas were estimated. Geo-coordinates collected using Global Position System (GPS) for each squirrel sighted were incorporated into the study site map using Geographical Information System and a distribution map was prepared. The earlier reported locations such as CWS and Kanakapura Forest Division, Anamalai Tiger Reserve, Palani Hills, Chinnar WS and Srivilliputhur Grizzled Giant Squirrel WS were obtained from published literature (Davidar 1989; Joshua 1992; Sharma 1992; Karthikeyan et al. 1992; Kumara & Singh 2006; Senthilkumar et al. 2007) to produce a comprehensive distribution map of the species in India.

Results and Discussion

Intensive surveys over a year across the entire habitat in Hosur forest division and its contiguous habitats in the adjoining Dharmapuri forest division recorded the presence of *R. macroura* in the Hosur forest division along the riparian habitat of Cauvery River. The present documentation is the first scientific report on the existence of *R. macroura* in the study area. Joshua (1992), who surveyed Dharmapuri forests (the present study area) during Feb–May 1989 (based on potential sites of occurrence that he listed, from the 1920–30 specimen collection locations of the Bombay Natural History Society, and inquiries with forest officials, and conservationists), reported the absence of the *R. macroura*. Kumara & Singh (2006), who documented the species in habitats further southwest of our study area (from Shivanasamudra Falls to Mekedatu on the Cauvery River in Karnataka), considered the same as the northern-most population of the species in its entire distribution range. This clearly indicates that the existence of this species on the Tamil Nadu side in the Hosur forest division was unknown earlier. In total during this study, we

recorded a minimum of 14 individuals, in addition to 62 nests located at eight different sites along the riverine patch of Cauvery (Image 2) in Hosur Forest Division. The present record adds to the completeness of the distribution of *R. macroura* with a new northern most extension in the Eastern Ghats of India (Image 3). The distribution of *R. macroura* reported earlier along the Cauvery River in Karnataka (Karthikeyan et al. 1992; Kumara & Singh 2006) and by the present study along the same Cauvery River in Tamil Nadu, indicate that these are probably parts of a larger contiguous population found in the past and presently isolated due to lack of canopy contiguity.

Being a canopy dweller, the species largely depends on the tree canopy contiguity for its movement, nesting and breeding (Joshua 1992). All the eight sites, where the squirrels were found, were reserved forests (Kestur, Bilikal and Mallahalli), but they were isolated from each other due to discontinuity in the canopy. The maximum stretch of contiguous canopy was less than 120m in length and 25m wide, thus limiting free movement of *R. macroura* between the isolated patches. These patches naturally lack canopy contiguity on the

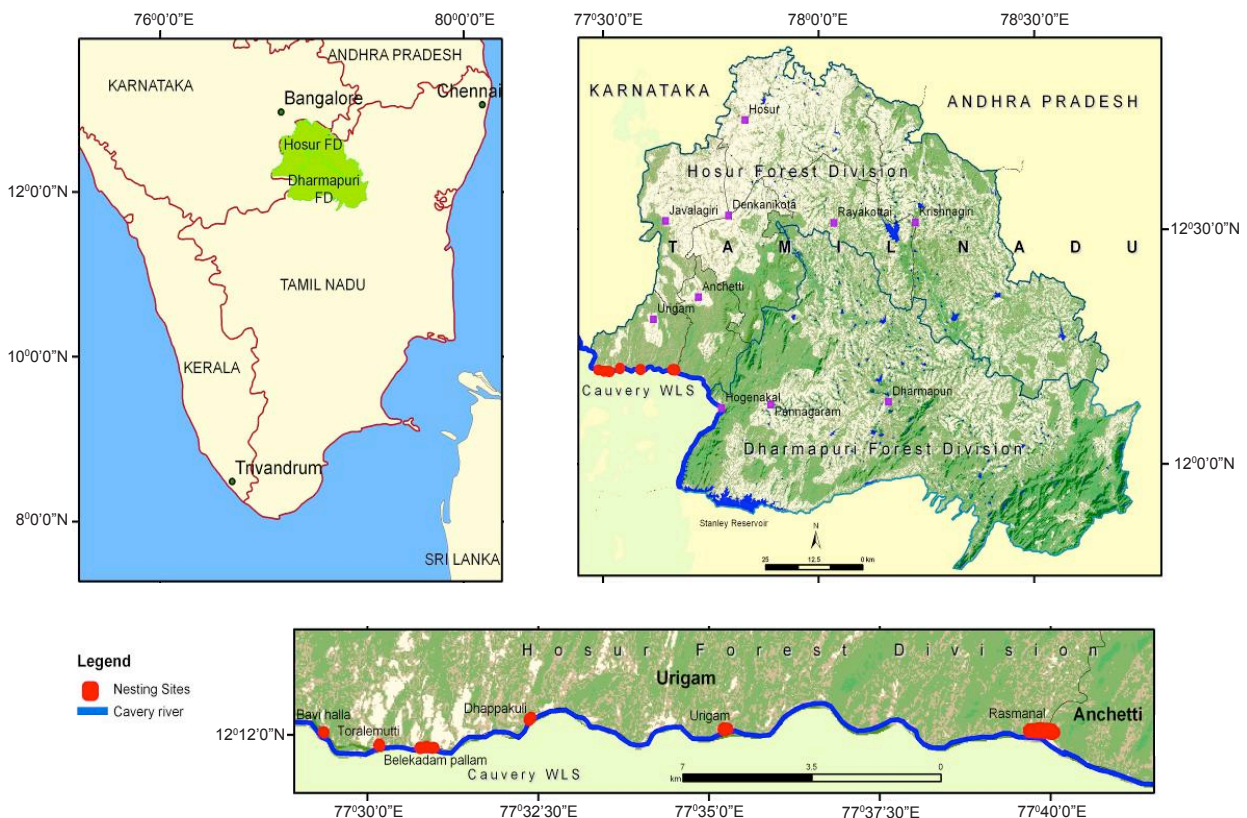


Image 2. The study area of Hosur and Dharmapuri Forest Divisions and the Grizzled Giant Squirrel distribution identified

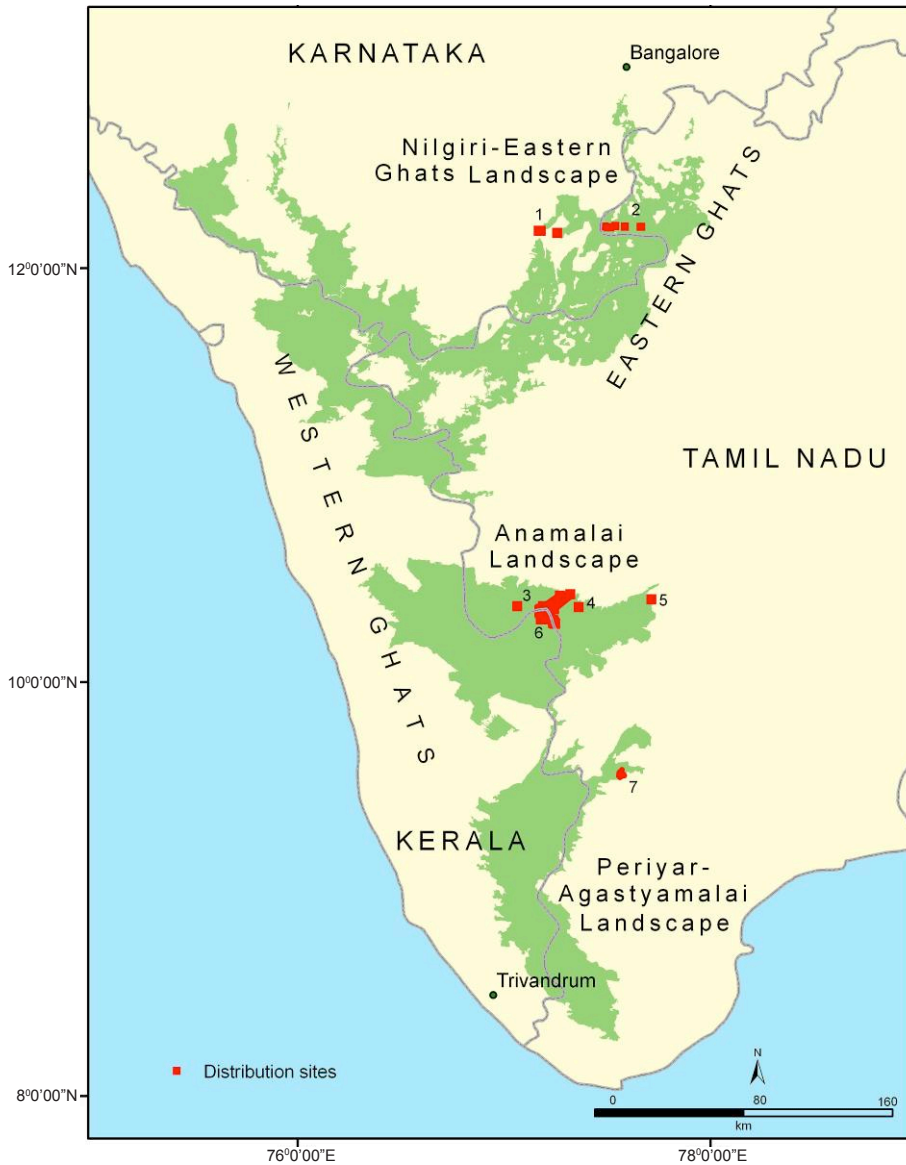


Image 3. The distribution of Grizzled Giant Squirrel in different landscapes along Eastern and Western Ghats (Distribution sites: 1 - Cauvery Wildlife Sanctuary & Kanakapura Forest Division; 2 - Hosur Forest Division; 3 - Anamalai Tiger Reserve; 4 & 5 - Palani Hills; 6 - Chinnar WS; 7 - Srivilliputhur Grizzled Giant Squirrel WS). (Source data: present study, and published data from Davidar 1989; Joshua 1992; Sharma 1992; Karthikeyan et al. 1992; Kumara & Singh 2006; Senthilkumar et al. 2007).

north-south axis due to the change of riverine forest into tropical dry thorn forest on the north and the Cauvery River on the south. Further, these patches are presently restricted to the northern bank of the Cauvery over a length of 20km on the upstream, out of 65km stretch of the riverbank within Hosur and Dharmapuri forest divisions. Therefore, gaps in canopy contiguity can pose a major threat to the long-term survival of the few isolated individuals due to detrimental effects of restricted gene flow through restricted movement and dispersal. In addition, disturbances from the presence of cattle grazers, cattle pens (farm) and pilgrims can further deteriorate the quality of the habitat for the squirrels due to overgrazing by cattle, wood cutting and, forest fire.

Management Recommendations

Although such small populations with isolated individuals are neither demographically nor genetically viable, the species is found more often in small numbers (Davidar 1989; Karthikeyan et al. 1992; Kumara & Singh 2006; Kumar et al. 2007), with restricted distribution mostly to riverine habitats, which is generally patchy in nature. The riverine habitats along the Cauvery River are potential sites for the species, and hence measures such as (a) restoration of habitat and maintenance of canopy continuity (through afforestation of preferred tree species like *Tamarindus indica* and *Mangifera indica*), (b) stop auctioning the *Tamarindus indica* fruits on large scale

for commercial purpose by Forest Department, (c) reducing anthropogenic pressure along the riverine habitats (through strict management action against the cattle pens that are along the gallery forest of Cauvery River), and, (d) translocation of a few individuals of *R. macroura* (in consultation with experts on these aspects regarding number of individuals and age-sex classes and in keeping with the needs and guidelines suggested by the Reintroduction Specialist Group) from larger populations to this habitat would not only enhance their long-term survival, otherwise on the brink of local extinction, but will also ensure the availability of the largest riverine habitats for this habitat specialist. The species lacks an updated comprehensive database on the distribution and population status across its ranges. Since the species perhaps faces the threat of becoming extinct in India, it definitely deserves attention of conservationists to reevaluate its global status. Unless the species receives immediate attention for its protection and conservation, it will be a difficult task to save it from extinction (Paulraj 1991).

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