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BARBETS OF SINGAPORE PART 3: FOREST SPECIES, WITH EMPHASIS ON *MEGALAIMA RAFFLESII* LESSON, THE RED-CROWNED BARBET

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INTRODUCTION

There are three known native species of forest barbets recorded from Singapore (Wang & Hails, 2007), with two from the subfamily Megalaimatinae, and one from the subfamily Calorhamphinae (Shorts & Horne, 2002). Two of the three species, the blue-eared barbet (*Megalaima australis duvauceli*; subfamily Megalaimatinae) and the brown barbet (subfamily Calorhamphinae; *Calorhamphus fuliginosus hayii*), are now extinct and the only true forest-dwelling barbet species extant in Singapore today is *Megalaima rafflesii* (red-crowned barbet) (Wang & Hails, 2007). The blue-eared barbet was last recorded from Singapore in 1921, when seven individuals were collected from Pulau Ubin from 10–23 Jul.1921. The brown barbet was also last recorded from Singapore in 1921, when 10 birds were collected between Feb.–Aug.1921 on Pulau Ubin. There was later an unconfirmed sighting in 1992, but was rejected because of lack of evidence.

The red-crowned barbet belongs to the order Piciformes (woodpeckers and relatives), family Capitonidae (barbets), subfamily Megalaimatinae (typical Asian barbets) (Shorts & Horne, 2002). According to Shorts & Horne (2002), there are currently three subspecies of *Megalaima rafflesii* recognised. *Megalaima rafflesii malayensis* occurs from southern Myannmar to the Malay Peninsula, *Megalaima rafflesii billitonis* from the Belitung and Mendanau Islands, *Megalaima rafflesii borneensis* from Borneo but made not indication of the range of the nominate subspecies *Megalaima rafflesii rafflesi*. Subspecies of this barbet have been rejected on the basis that variations in body size, and tone of blue parts were found to be age- rather than geographically linked (Wells, 1999).

The red-crowned barbet (Fig. 1) has a smaller, yellow malar-patch, and has a blood-red cap stretching from the bill to the nape. It also has a blood-red spot below the eye, and two larger spots at the side of the throat. There are also bright light blue markings on the chin, throat as well as a long supercilium with black lores and ear-coverts. The remainder of the bird such as the mantle, back, rump, uppertail coverts, tail feathers, and the wing are generally bright leaf-green. The legs are a dull ash-grey.

The red-crowned barbet, is a lowland species always found below 600 m altitude (Shorts & Horne, 2002) and usually found in the canopy of lowland evergreen rain forest including peat swamp forest as well as mature secondary forest and younger regenerated forest after disturbance (Wells, 1999). In comparison the brown barbet, and the blue-eared barbet are only found in pristine primary forest or in areas were disturbed forest have regenerated and reaching its climax (Wells, 1999) and as such have been extirpated from Singapore (Jeyarajasingam & Pearson, 1999). Today, the red-crowned barbet has nearly been eradicated from Thailand owing to forest clearance, and in Singapore, only persists because of its tolerance for secondary growth (Wells, 1999).

The red-crowned barbet usually feeds in the canopy on fruits from trees as well as vines. The red-crowned barbet was seen feeding from a fruiting canopy-height vine at Pasoh Forest in Negri Sembilan, Peninsular Malaysia (Wells, 1999). Canopy-level strangler fig trees's syconia such as those of the Malayan banyan (*Ficus microcarpa*) are the favourite food menu of this species, so often seen at mass-fruiting Malayan banyan trees in Taman Negara, although none were seen at a fruiting grey fig (*Ficus virens*) tree, where other *Megalaima* species were observed. The red-crowned barbet has also been recorded taking animal food such as borer grubs excavated with its strong bill from rotting wood (Wells, 1999) and has also been recorded feeding on an arboreal snail (*Amphidromus* species) in the Central Catchment forest of Singapore (Fig. 2) (Wee, 2006a). The red-crowned barbet has also been known to follow mixed-species foraging flocks of mainly insectivorous passerines searching the canopy foliage for insects and fruit (Fig. 3) (Wells, 1999). This ability to interact with other species, and to exploit other food sources other than fruit on a regular basis could also be the reason why this species has been able to survive in Singapore, when the other two forest barbets have gone extinct (Shorts & Horne, 2002). The blue-eared barbet, like red-crowned barbet, is reportedly a strict canopy feeder, visiting

Fig. 1. The red-crowned barbet (*Megalaima rafflesii*) in the Central Catchment Nature Reserve forest of Singapore. (Photograph by: Mark Chua).

only fig tree crowns in the main canopy and not visiting lower fig plants (Wells, 1999). The blue-eared barbet has been observed to take syconia in the diameter range for 5.4–27.7 mm, with utilisation increasing towards the lower end, with most activity observed at the diameter of 11.6 mm. The blue-eared barbet is more territorial with respect to food sources and are observed to defend patches of fruit in a crown, chasing away even larger frugivorous species. This behaviour could be the reason why this species went extinct, owing to over-competition, and lack of a suitable number of fruiting fig plants at any point of time. The brown barbet has similar preferences to both red-crowned barbet and blue-eared barbet with respect to fig size, and seems to be as flexible as red-crowned barbet with respect to exploiting animal foods. We have observed brown barbet at Bukit Tinggi, Malay Peninsular searching foliage and the surface and crevices of bark on branches and trunks for animal foods as well as eating flowers of trees or vines.

Like other barbet species, a prerequisite for the red-crowned barbet habitat seems to be the presence of trees with sufficient dead wood in their branches, which is suitable for excavating cavities, which are required for nesting (Shorts & Horne, 2002). Previously, very little was known about the breeding habits of red-crowned barbet, except for the fact that they prefers to nest in rot-softened wood (Fig. 4) including entire dead trees usually around 5–8 m up with broods of one to two fledglings and clutch size that is undescribed (Wells, 1999). Excavation of the nest holes are reportedly done by both members of the pair and usually with more than one hole being constructed. No other information is available on the courtship behaviour of this species. The blue-eared barbet, on the other hand, tends to nest higher, also in dead tree trunks but between 3–25 m up, with a nest hole of around 3 cm in diameter. A clutch size of 2–4 eggs is reportedly common (Shorts & Horne, 2002). Courtship of this species includes incessant singing by both members in the pair, with much head bobbing, and side to side movements of the tail with courtship feeding observed. The brown barbet, unlike th red-crowned barbet and blue-eared barbet, are communal nesters, with three or more pairs nesting together in dead tree trunks and branches, but also in arboreal termitaria, 1–20 m up (Wells, 1999), and in the bottom of a bird's nest fern (*Asplenium nidus*). The brown barbet usually has a clutch size of 2–3 eggs with broods of two or three nestlings (Wells, 1999; Shorts & Horne, 2002).

The red-crowned barbet call consists of a sequence of 10–15, even-toned, mellow hoots delivered at a steady rate of three per second except for a noticeably longer pause after the second, or first and second notes: "hoop, hoop, hoop-hoop-hoop-hoop……." usually from a high perch in deep foliage (Wells, 1999).

Fig. 2. A red-crowned barbet in the Central Catchment Nature Reserve forest feeding on an arboreal snail (*Amphidromus* species). (Photograph by: Johnny Wee).

Fig. 3. A red-crowned barbet in the Central Catchment Nature Reserve forest foraging in the foliage of wild cinnamon (*Cinnamomum iners*) for insects and fruits. (Photograph by: Lee Tiah Kee).

Fig. 4. A red-crowned barbet in the Central Catchment Nature Reserve forest excavating a nest hole in a rotting tree trunk. (Photograph by: Johnny Wee).

Fig. 5. A red-crowned barbet on an inflorescence of a MacArthur's palm (*Ptychosperma macarthurii*) seeking fruit. (Photograph by: Johnny Wee).

Fig. 6. Both red-crowned barbet parents seen at the nest hole. (Photograph by: Joseph Yao Chong).

Fig. 7. A parent returning to the nest with fruits to feed its chick(s). (Photograph by: Joseph Yao Chong).

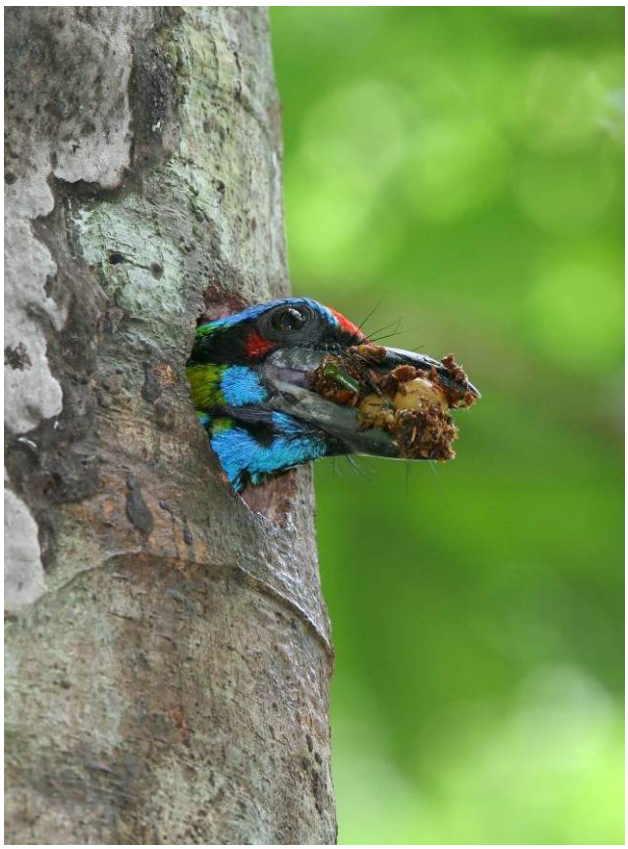

Fig. 8. The parent removing faecal waste from the nest. (Photograph by: Joseph Yao Chong).

Fig. 9. A parent inspecting the surroundings before returning to the nest. (Photograph by: Joseph Yao Chong).

Fig. 10. A chick begging for food from the entrance of the nest hole. (Photograph by: Joseph Yao Chong).

Fig. 11. A parent feeding its chick at the entrance of the nest hole. (Photograph by: Joseph Yao Chong).

Fig. 12. The newly fledged chick, waiting to be fed, after leaving the nest hole for the first time. (Photograph by: Joseph Yao Chong).

PAST AND PRESENT RECORDS

In Singapore, the red-crowned barbet is an uncommon resident and is only observed in the Bukit Timah Nature Reserve (BTNR) and the Central Catchment Nature Reserve (CCNR) in mature secondary and primary forest, and because of its restricted range in Singapore, was listed as nationally rare in the 1st edition of the Singapore Red Data Book and nationally-near threatened (Wang & Hails, 2007). In the latest (2nd) edition of the Singapore Red Data Book, this species has not been of conservation concern, so unlisted. However, we feel that because it is solely restricted to the BTNR and CCNR, and has almost disappeared altogether in Thailand owing to lack of a good forest habitat, it should be conferred at least a status of nationally vulnerable. We have observed the red-crowned barbet taking a variety of foods including the usual fig syconia from a regularly fruiting Malayan banyan trees at the summit of Bukit Timah and the Upper Seletar Reservoir Park. Others included fruits from oil fruit (*Elaeocarpus* species), MacArthur's palm (*Ptychosperma macarthurii*) (Fig. 5), fishtail palm (*Caryota mitis*), turn-in-the-wind (*Mallotus paniculatus*), wild cinnamon (*Cinnamomum iners*), salam (*Syzygium polyanthum*) (Chan & Chan, 2006; Wee, 2006b; our observations). Insects are also eaten quite regularly with a mantis observed being brought back to the nest (Chan & Chan, 2006) as well as moths and katydids caught in the foliage of trees. The red-crowned barbet has also been recorded feeding on arboreal snails (*Amphidromus* species) in the Central Catchment Nature Reserve forest (Wee, 2006a). The blue-eared barbet, on the other hand, was formerly only found in small numbers from the BTNR and Pulau Ubin with young birds collected on Pulau Ubin (Wang & Hails, 2007). The brown barbet, like the blue-eared barbet, is also now extinct and was previously recorded from the Woodlands area and Pulau Ubin in small populations in freshwater swamp forest and swampy coastal forest.

Nesting records of the red-crowned barbet in Singapore are rare and was first recorded in 1979 at Peirce Reservoir (Wells, 1984). A more recent nesting was observed by a few people from the CCNR. On 12 May 2006, a red-crowned barbet was spotted in the CCNR forest at Track 7 near the Upper Seletar Reservoir Park, picking fruits from a tree and was tracked back to a hole in a dead tree trunk. Both the male and female were observed entering the nest with fruits in their beaks and exiting the nest with faecal waste material, indicating that the eggs have hatched and the chick(s) have began to feed. Both adults were seen at the nest together only once (Fig. 6), thereafter were observed taking turns entering the nest regularly with fruits (oil fruit, and salam) in their beaks (Fig. 7), and exiting the nest with faecal waste in their beaks (Fig. 8). The returning parents would perch on a nearby branch to survey the surroundings for a period of time (Fig. 9), presumably to look out for predators before flying into the nest. This same nest was also observed by Chan & Chan (2006), and Wee (2006b), who observed a variety of fruits being brought back to the nest including fruits of sendudok (*Melastoma malabathricum*), wild cinnamon, oil fruit, and salam which were carried back in twos or threes as well as the occasional insect which included a mantis. The larger fruits such as the fruits of oil fruit, which were too large for the chicks, were observed to be crushed and regurgitated for the young (Wee, 2006b). This routine was observed for a period of 16 days. On the 17th day, the chick began to pop its head out frequently (Fig. 10) and feeding was performed outside the nest entrance (Fig. 11). On the 26th day after the start of the observations, a chick was observed to have fledged, and flew to a nearby branch (Fig. 12), after which one of the parents continued to feed the chick until it finally flew off, and was never seen again. No definitive breeding records are available for both blue-eared barbet and brown barbet for Singapore, except for the fact that young birds were collected from Pulau Ubin, suggesting breeding there, without a single nest reported (Wang & Hails, 2007).

CONCLUSIONS

Although the red-crowned barbet was reported to only feed on main canopy crown fruiting trees as mentioned earlier, this species has shown great adaptability in Singapore, by learning to exploit other food sources such as sub-canopy fruiting palms (both native and exotic species) such as the fishtail palm, and MacArthur's palm, as well as animal foods such as insects and molluscs, and as such has been able to escape extinction, unlike the blue-eared barbet and brown barbet. The future of this species is intrinsically linked to the health of the forest at both the BTNR and CCNR. It has so far not been observed anywhere else such as the Bukit Batok Nature Park, which is only short distance from the BTNR. We therefore suggest that this species should at least be conferred the status of nationally vulnerable.

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