

Foraging ecology of Crested Drongos (*Dicrurus paradiseus lophorhinus*) in the Sinharaja Reserve

S.H.K. Sathischandra, E.P. Kudavidanage, E. Goodale* and S.W. Kotagama*

Department of Natural Resources, Faculty of Applied Sciences, SUSL, Buttala

* Department of Zoology, Faculty of Sciences, University of Colombo, Colombo 03

The mixed-species flocks of Sinharaja have long been the focus of research, since work was started in 1981 by S.W. Kotagama. These studies have observed flock composition, the organization of the flock and role of different species in the flock. Recently, E. Goodale (2005a) has worked on vocalizations of bird, including alarm calls in flocks and vocal mimicry. These results are interesting to ornithologists.

According to Kotagama and Goodale (2004), mixed-species bird flocks average 10.9 (\bar{n} 4.5, $n=476$) species, and 41.3 (\bar{n} 22.9, $n=298$) individuals, with 59 bird species and five mammal species seen in flocks. Two species have been recognized as central or 'nuclear' species of these flocks: viz. the Orange-billed Babbler (*Turdoides rufescens*) and the Greater Racket-tailed Drongo (*Dicrurus paradiseus lophorhinus*). The latter is the subject of this study. Note that this sub-species, which we will refer to as the Crested Drongo, has been suggested as an endemic bird species of Sri Lanka (Rasmussen and Anderton, 2005).

The Crested Drongo belongs to the Family Dicruridae, Genus *Dicrurus*. It is easy to identify with its complete glossy black color (no white on the belly), tufted crest on the forehead, and long deeply fork tail. The range of the Crested Drongo is in the wet zone forests and nearby hills up to 1700m (Harrison, 1999). The breeding season appears to be April and May. The only authentic nest so far described as "A flimsy cup rather small for the size of the bird, about ten meters up in a tall straight tree on the edge of jungle bordering" (Henry, 1998). The eggs have not been authentically described (Ali, 1996).

Mixed-species flocks are unique associations that may improve the feeding efficiency of birds and offer protection against predators of many kinds (Kotagama and Goodale, 2004; Morse 1977). We know something of the role of drongos in the flocks: they make alarm calls (Goodale and Kotagama 2005a), and other birds are warned by it (Goodale and Kotagama 2005b). But how does the Crested Drongo benefit?

Recently, we have completed a study investigating how Crested Drongos forage in flocks. We hypothesized that drongos might forage at higher rates in flocks than outside, because they can catch insects disturbed by other species. They might also actually steal food from other birds! The technical name for stealing of this kind is "kleptoparasitism".

Kleptoparasitism occurs in many birds, especially species that nest in large colonies like gulls (Brockmann and Barnard, 1979). One other factor that might lead to kleptoparasitism is 'prey-beating', when species disturb insects as we hypothesized they do in the flocks of Sinharaja (Brockmann and Barnard, 1979).

In Sinharaja World Heritage Reserve (SWHR), we recorded 605 observations of Crested Drongos. In 466 of these, the drongos were in flocks. Only 4% of these observations showed evidence of kleptoparasitism. Thus, kleptoparasitism is rare. It occurred occasionally when another bird, often an Orange-billed Babbler (*Turdoides rufescens*) or a Malabar Trogon (*Harpactes fasciatus*), caught a particularly large insect, like a grasshopper or cicada, and the drongo then stole the food item.

Although kleptoparasitism is rare, we did notice many instances when drongos perched beneath other species caught insects that fell from above. Further, drongos adjusted the perching height depending on whether they were near an Orange-billed Babbler (*Turdoides rufescens*) or an Ashy-headed Laughingthrush (*Garrulax cinereifrons*). In all, drongos foraged three times more often in flocks than outside them (Sathischandra, S.H.K., Kudavidanage, E.P., Kotagama, S.W., Goodale, E., in press). Our overall conclusion is that Crested Drongos benefit by association with flocks.

Other observations

We made some other interesting observations during this study, beyond our original objectives. On 21 April 2005



Photo by Vimukthi Weeratunga

we observed a young fledgling drongo being fed by its parents on a tree branch. The fledgling was very small, with its tail about one inch long and its beak an ashy white colour. A mixed-species flock approached at that moment, and the adult drongo began to mimic, the Crested Serpent Eagle (*Spilornis cheela*) and the Sri Lanka Blue Magpie (*Urocissa ornata*). Drongos are able to mimic other species, and sometimes they mimic the alarm calls of other species or the calls of predators (Goodale and Kotagama, 2006; Henry, 1998; Ali, 1996). It was our impression that the mimicry disturbed the flock and it moved away. On 4 April, 2005, we observed two adults and three rather mature fledglings which could catch insects well. They stayed close to the edge of the flock and again the adult drongo mimicked serpent eagles' calls many times. We hypothesize that this mimicry keeps other birds away, and makes the fledglings less obvious to predators.

During the study period, we observed several breeding pairs of drongos which moved in and out of flocks continuously. It seems that they travel from the nest area to the flock, feed aggressively in flocks, and then fly back to the nest. But this behaviour needs further study.

Another unusual observation we made was the association of drongos with small groups of other species, when babblers were not present. For example, often birds such as the Velvet Fronted Nuthatch (*Sitta frontalis*), Lesser Yellownappe (*Picus chlorolophus*), Red-backed Woodpecker (*Dinopium benghalese psarodes*), Indian Scimitar Babbler (*Pomutorhinus horsfieldii*), and even small jungle squirrels (*Funambulus* sp.), were often present in the area when a drongo was present. We noticed that nuthatches and squirrels would often remove the bark from tree trunks, and drongos would perch below them, ready to catch any insect that fell!

Finally, we noticed that bird flocks appear to forage high in the trees in the morning, but during mid day (starting around 10.30am - 11.00am), birds gradually come lower down. One hypothesis is that in the morning the light intensity is low and therefore it is difficult to

detect insects in the understorey. Another explanation is that birds like the morning sun on their bodies to dry out from the wet night!

Further work is now on-going to study how the vocalizations of drongos might effect their own foraging and the foraging of other birds. One hypothesis is that drongo alarm calls may sometimes be used when a predator is not present to scare other species, so that they drop their food for the drongo to catch (Herremans and Herremans-Tonnoeyr, 1997, Dean 1988). This kind of behaviour, termed "false alarm calling" has been documented by a species in Peru that is ecologically similar but not related to the drongo (Munn 1986). The study describes an apparently 'deceitful' behavior.

Acknowledgements

We thank the Department of Natural Resources, Faculty of Applied Sciences, SUSL, Buttala for supporting this research. We also thank the Sri Lankan Forest Department for given us permission to work in the forest and to use the Sinharaja Research Station. A. G. Kirterathna was an excellent assistant and we appreciate the help of villagers at Kudawa. We are also grateful for grants from the Natural Science Foundation (USA) to Eben Goodale which helped support this study.

References

- Ali, S. (1996). *The Book of Indian Birds*, Bombay Natural History Society, Oxford University Press, Mumbai, Delhi.
- Brockmann, H.G. and Barnard, C.J. (1979) Kleptoparasitism in birds. *Animal Behaviour*, 27, pp. 487-514.
- Dean, W.R.J. (1988) Intra and inter-specific kleptoparasitism in mixed-species foraging flocks. *Honeyguide*, 34, pp. 30-31.
- Goodale, E. and Kotagama, S.W. (2005a) Alarm calling in Sri Lankan mixed-species bird flocks. *Auk*, 122, pp. 108-120.
- Goodale, E. and Kotagama, S.W. (2005b) Testing the roles of species in mixed-species bird flocks of a Sri Lankan rainforest. *Journal of Tropical Ecology*, 21, pp. 669-676.
- Goodale, E. and Kotagama, S.W. (2006) Context-dependent mimicry by a passerine bird. *Proceedings of the Royal Society London B, Biological Sciences*, 273, pp. 875-880.
- Harrison, J. (1999) *A Field Guild to the Bird of Sri Lanka*. Oxford University Press, New York.



- Henry, G.M. (1998) *A Guide to the Birds of Ceylon*, 3rd edition. Oxford University Press, Oxford.
- Herremans, M. and Herremans-Tonnoeyr, D. (1997) Social foraging of the forktailed drongo *Dicrurus adsimilis*: beater effect or kleptoparasitism? *Bird-Behavior*, 12, pp. 1-45.
- Kotagama, S.W. and Goodale, E. (2004) The composition and spatial organization of mixed-species flocks in a Sri Lankan rainforest. *Forktail*, 20, pp.55-70.
- Munn, C. (1986) Birds that cry wolf. *Nature*, 391, pp. 143-145.
- Morse, D.H (1977) Feeding behavior and predator avoidances in heterospecific groups. *BioScience*, 27, pp.332-339
- Rasmussen, P.C. & J.C. Anderton (2005) *Birds of South Asia: the Ripley Guide*. 2 vols. Lynx Edicions, Barcelona.
- Satischandra, S.H.K., Kudavidanage, E.P., Kotagama, S.W. & Goodale, E. (In press) The benefits of joining mixed-species flocks for a sentinel nuclear species, the Greater Racket-tailed Drongo *Dicrurus paradiseus*. *Forktail*.