Commentary: The Growth of Eastern Barn Owl Population in Malaysia and the Use of Artificial Nest Boxes

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The Eastern Barn Owl *Tyto javanica* live predominantly in non-natural habitats like padi fields and palm oil estates. Their diet at these locations is almost exclusively rat species based on extensive data from pellet studies (Wells 1999). This makes them extremely beneficial to farmers as a biological rather than chemical control of rodent pests.

Prior to the 1970s, Eastern Barn Owls were considered vagrants or casual visitors to Peninsular Malaysia from Java or Sumatra (Lenton 1985; Wells 1999). The first recorded nesting in Peninsular Malaysia was in 1969. With the introduction of Oil Palm *Elaeis guineensis* as a commercial crop, Eastern Barn Owls had become common and by 1976-1978 were found in oil palm plantations throughout Peninsular Malaysia (Lenton 1985). Initial spread was supported by breeding in roof-spaces but the introduction of pole-mounted nesting boxes in the 1970s to 1980s greatly enhanced populations (Duckett 1991; Wells 1999; Wood & Chung 2003). There was also a move of the birds from palm oil estates to padi fields.

The Eastern Barn Owl does not naturally occur in Sabah and Sarawak. Attempts to introduce Eastern Barn Owls in Oil Palm estates in Sabah occurred between 1990 and 1992. There was initial limited success but the Felda Global Venture (FGV) translocation programme in 2009 has shown a significant pollution rise in Sabah estates (Rizuan *et al.*, 2022)

The development of nest boxes (Plate 1) came about as it was recognised that Eastern Barn Owl "*population densities were limited by available nest sites and that many adult birds in estate populations were not breeding because of this lack of nest sites*" (Duckett 1991).

Plate 1: Artificial nest boxes for Eastern Barn Owls, Ulu Dedap padi fields, Perak, Malaysia, Aug 2025.

This was confirmed in 1976-1978 by a PhD study conducted by Graham Lenton while working under Wells at the University of Malaya (Duckett 1991). Lenton also showed that the artificial nest boxes designed by him were accepted by barn owls, population increased with availability of nesting sites, that barn owls were not territorial in hunting areas and could co-exist in close proximity (Lenton 1984). The findings of this research encouraged the use of artificial nest boxes to boost barn owl population growth at oil palm plantations.

Duckett and Karuppiah (1990) gave practical information on using barn owls to achieve biological control of rats and how to increase populations in oil palm estates with details on the construction of nest boxes.

The current status of the Eastern Barn Owl is uncertain and has not been evaluated since it was split from the American Barn Owl *Tyto furcata* and Western Barn Owl *Tyto alba* (Debus *et al.*, 2024). There are concerns that the use of more potent second-generation anticoagulant rodenticides in estates in Malaysia appear to increase Eastern Barn Owl deaths from secondary poisoning (Duckett 1991; Debus *et al.*, 2024). One study compared rodenticide-free environments with the effects of first generation anticoagulant rodenticide (chlorophacinone) and second generation rodenticide (bromadiolone) on nestling growth of Eastern Barn Owls (Salim *et al.*, 2016). Rodenticide-free plots scored the highest fledging success (71%) compared to chlorophacinone (43%) and bromadiolone treated (36%) locations. In addition, nestlings that survived in the rodenticide-free area showed higher measurements for body weight and wing length compared to rodenticide treated plots. A detailed review of the available data and studies on the risk of anticoagulant rodenticides in oil palm areas was conducted by Ravindran and colleagues (2022).

Another issue is the maintenance of pole-mounted nesting boxes. Personal observations (Amar-Singh HSS) of nesting boxes in the padi heartland of Perak, Malaysia shows that at times some are in in disrepair with poor upkeep.

The combination of the widespread use of second-generation anticoagulant rodenticides (Ravindran *et al.*, 2022) and the apparent lack of commitment to maintaining nesting boxes may result in a decline of the population of Eastern Barn Owl.

We urgently require surveys on the current population of the species, population trends over time and the number and quality of nesting boxes.

Hence the work that the Barn Owl and Rodent Research Group (BORG), School of Biological Sciences, Universiti Sains Malaysia, is doing is critical. It is vital to upscale the Barn Owl for Oil Palm Smallholders Initiative (BOSI) project conducted with the Malaysian Palm Oil Green Conservation Foundation (MPOGCF). As well as look at supporting padi farmers to promote the use of Eastern Barn Owl as biological control of rodent pests rather than use chemicals.

Factors contributing to the success of barn owls as biological control agents

- Diel activity/hunting cycle.
- Prey specialisation - note that *T. javanica* is about twice the body mass of other Barn Owl species, with much larger, more powerful feet, making it capable of catching and killing rat-sized rather than just mouse-sized prey.
- Acceptance of artificial nest-boxes makes it possible to move free-living populations around to where they are needed simply by installing boxes, which are quickly found by wild birds. Note that initially nest-boxes were a failure; all breeding continued to be in buildings or the occasional natural hollow. In Graham Lenton's study, the first one accepted was fixed to a building. Thereafter, uptake spread regardless of where boxes were sited. Unproven, but likely that a new search-image developed, including among the young that fledged from this box.
- Adults are virtually non-territorial, defending only the nest-site itself, making it possible to boost population density to unnaturally high levels by increasing the distribution density of nest-boxes. Shown that pairs breed successfully in boxes set as little as 50 m apart.
- Also shown that at least females start to breed at less than one year old, and more than once per year, further boosting the rate of population build-up.
- As distinct from chemical control methods, biological control never seeks to exterminate the pest, only to reduce its numbers to a level at which it is no longer economically damaging. In other words, the continuing presence of the pest is itself a key part of a self-sustaining control process. Results in oil palm showed that Barn Owls could indeed achieve an economically acceptable level of damage control independent of chemical methods. In a padi-land experiment owls breeding in a less dense distribution of boxes about halved the number of chemical baiting rounds needed per crop cycle (study didn't continue long enough to reach a final outcome).

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