Migration pattern of giant honeybees in the Baram River Basin

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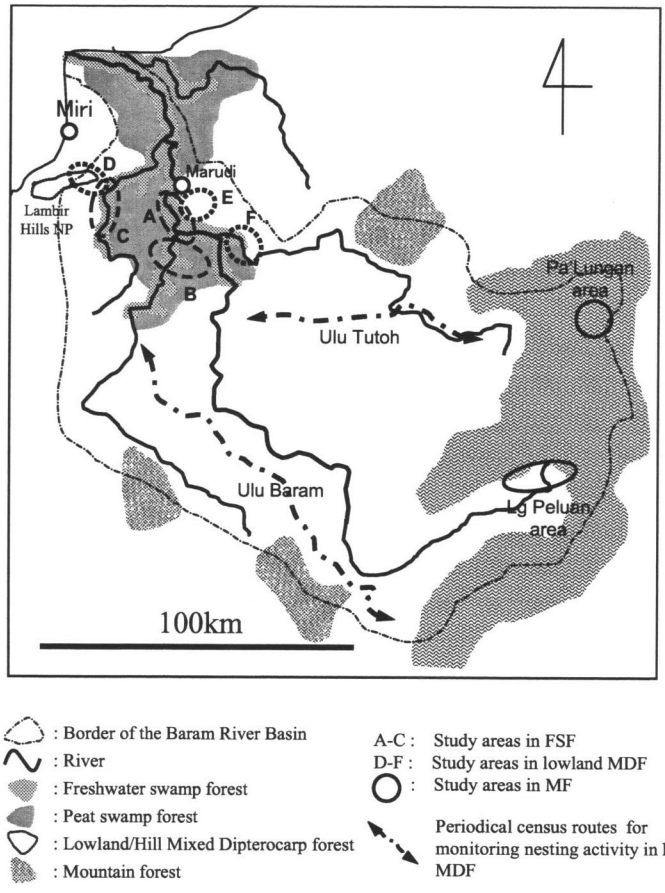
Giant honeybee, *Apis dorsata,* is the principle migratory pollinator in tropical Asia and their honey and wax have been utilized by people for hundreds of years. In Mixed Dipterocarp Forest (MDF), the dominant vegetation of humid tropical region of Southeast Asia (Sumatra, Malay Peninsular and Borneo), most plant species synchronously flower once in several years, known as general flowering. *A. dorsata* is an effective pollinator for various plant species in MDF, but migrates into MDF only during the general flowering period. This pattern implies that the population may be supported in some habitats, other than MDF, where floral resource is more stable and enable the immediate migration to MDF following general flowering. However, it has not been known where its colonies are sustained during non-general flowering period.

The Baram River Basin is the second largest watershed (22,930km^2) in Sarawak, including major vegetation types in Borneo, Freshwater swamp forest (FSF), Peat swamp forest (PSF), lowland and hill MDF and Montane forest (MF). According to local informants in 62 villages through the river basin, nesting activity of *A. dorsata* is known in FSF, MDF and MF. Nesting activities on nest site trees in three areas in FSF, five areas in MDF and two areas in MF (Fig. 1), were monitored for two years including one general flowering period in MDF. Frequency of nesting event and total duration of nesting activity in a year were higher in FSF than in MDF and MF (Fig. 2). The number of colonies on a nest site tree in FSF was higher than that in MDF, and large colony aggregations sometimes with more than 100 colonies were observed every year in FSF. Drones were frequently observed in colonies of large nesting aggregation in FSF, suggesting frequent regeneration there. These patterns suggest that adequate proportion of the population in the region may inhabit and regenerates in FSF during non-general flowering period and immigrate into MDF and MF during intensive (general) flowering period.

Some parts of MDF and major nest site tree species in MDF, *Koompassia excelsa* ("Tapang") are well protected by Sarawak Government. On the contrary, FSF and the major nest site tree species there, *Artocarpus teysmannii* ("Pudu") and *Alstonia angustiloba* ("Pelai") are not well regarded. FSF contains lower diversity of plant species than that of MDF but crucial habitat to support the regional population of *A. dorsata* and regeneration of plant species pollinated by them. We hope more attention will be paid to maintain the FSF and those nest site tree species.

Fig. 1. Major vegetation types in the Baram River Basin and the location of the studied areas.
A: Lower Baram, B: Lower Tinjar and C: Bakong (Freshwater swamp forests),
D: Lambir, E: Marudi and F: Lower Tutoh (Lowland mixed dipterocarp forests),
Lg Peluan and Pa'Lungan (Montane forests).
Two census routes in Ulu Baram and Ulu Tutoh were used for monitoring the nesting activity on *Koompasia excelsa* in hill mixed dipterocarp forests.



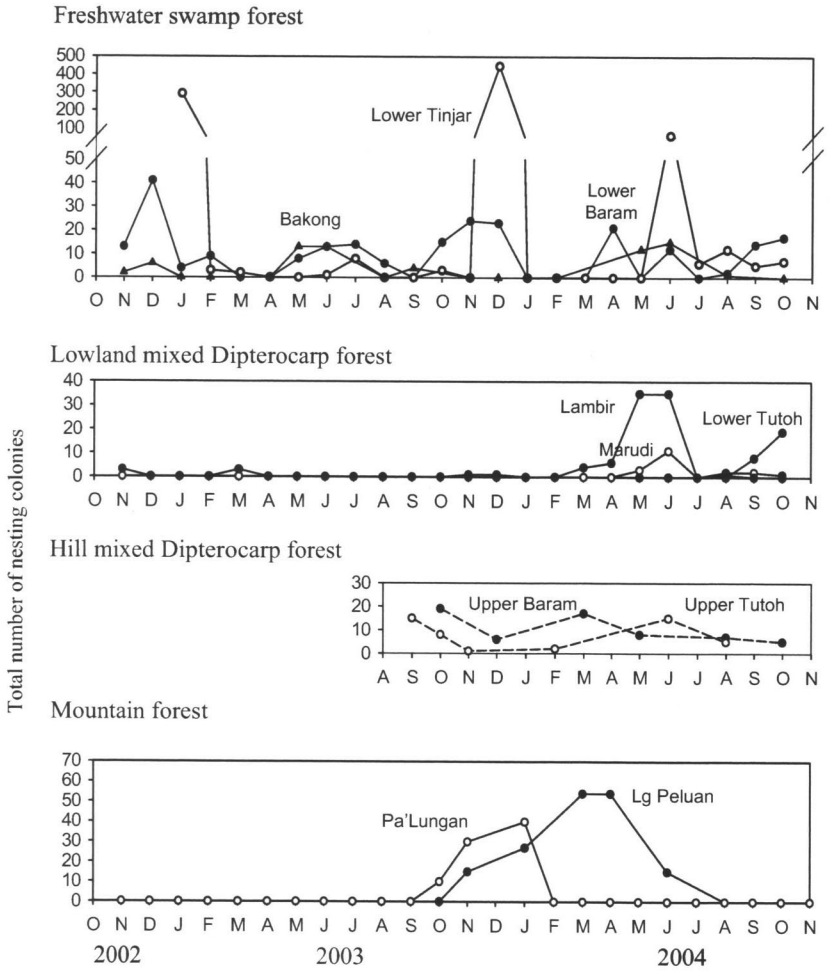


Fig. 2 Temporal fluctuation in total number of colonies on the observed nest site trees in each area of FSF, Lowland MDF and MF and monitored *Koompasia* trees which have been nested at least once in Hill MDF.