

## The Large Flying Fox: A threatened keystone species

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There are two species of flying foxes that occur in Borneo, namely the Large Flying Fox (*Pteropus vampyrus*) and the smaller Island Flying Fox



Figure 1: Flying foxes form colonies and roost gregariously, sometimes up to 10,000 individuals in mangrove and swamp forests. ©Wildlife International Ltd.

### Appearance

The Large Flying Fox has short sleek fur. Its head is usually roddish black and becomes orange. Its lower back is dark with a wingspan that can reach up to 1.5 m.

The Large Flying Fox forages opportunistically on fruits, shoots, buds, flower nectar and pollen. This includes commercially cultivated fruits, such as banana (*Musa* sp.), Rambutan (*Nephelium lappaceum*), Mango (*Mangifera indica*), Langsat (*Lansium domesticum*) and other cultivated fruits. They have also been reported foraging on figs (*Ficus* spp.) and fruits of *Elaeocarpus* spp. Additionally, fruits of *Sonneratia* spp., a

(*Pteropus hypomelanus*). The Large Flying Fox is distributed throughout much of Southeast Asia, ranging from southern Myanmar, Indochina, Brunei, Malaysia, Indonesia to the Philippines. In Borneo, the subspecies represented is *P. vampyrus borneo*. It is the largest bat in the world and was once distributed widely on the island, formerly occurring throughout Sarawak, but its rarity has been reported since the late 1980s. Reports of the species are from Patek Island, Sarang, Loagan Bunut, Maludam, Sedilu and Limbang.

mangrove species, have also been documented in its diet. Like other fruit bats, flying foxes play a critical role in seed dispersal and pollination. In Southeast Asia, fruit bats, have been well-documented as critical pollinators of the economically important Durian (*Durio zibethinus*) and of Petai (*Parkia speciosa*), an industry worth millions of Ringgits to the economies of countries located in Borneo.

### Habits

Flying foxes live in colonies, some estimated to comprise up to 10,000 individuals. They form a gregarious day-roost on trees, with groups often exceeding 100 individuals in a single tree in the

mangroves and swamp forests. Sometimes, these roost areas are noisy when individual bats brawl for a favoured spot on the tree. Many of these roosting areas are in uninhabited, extremely remote, inaccessible with impenetrable terrains. The location of these colonies in Sarawak remain poorly known due to their frequent temporal shift in roost site occupation, as the species is relatively nomadic. Since colonies are motile across extensive landscapes, long-term monitoring of population is challenging, resulting in Borneo's Large Flying Foxes being poorly studied. They are known to roost in emergent trees such as *Durio* spp., *Palaquim* spp. *Alstonia* spp., *Avicennia* spp., *Bruguiera* spp. and *Sonneratia* spp. Active in the evenings through the night, flying foxes leave their sleeping roost during sunset, almost in a single long file.

Prior to taking off, they swirl around the roost for several minutes. These giant bats are also known to glide through water surfaces to drink and then quickly climb up in flight. Their flight height increases as they are further from the roost. They are sometimes seen during early mornings in flight returning to their roost. Their flights are normally silent, but when several individuals are foraging on the same tree, there may be disputes among individuals for territory, marked by loud squawking noise. Some individuals have been recorded travelling up to 50 km from their roost to forage in dipterocarp forests, returning to roost in mangrove and swamp forests. Satellite-tracking of Large Flying Foxes in Peninsular Malaysia has shown that the species can forage over distances of up to 88 km in one night.



Figure 2: A Large Flying Fox is seen returning to its roost early in the morning. They are known to travel distances up to 88 km daily, to forage and have the ability to disperse seeds and pollinate flowers. ©Radisaraman

### Threats to the species

There is evidence that the Large Flying Foxes cross international borders, with known records between Brunei - Malaysia and Indonesia - Malaysia. To enhance the protection of this frequent flyer, Malaysia needs to be encouraged

to ratify the Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animals).

Despite providing crucial ecosystem services, such as seed dispersal and pollination,

populations of flying foxes are on the decrease due to multiple anthropogenic threats. These colonial tree roosters face threats such as hunting, conflict with fruit growers, and large-scale habitat loss due to conversion to monoculture and aquaculture. In Borneo, the Large Flying Fox is being hunted and traded as a delicacy and for its perceived medicinal qualities, particularly as remedy for a variety of ailments and diseases, including asthma, kidney ailments, lung and gynaecological problems. Occasionally they are sold at weekend markets, with as many as ten to 15 individuals in a single sale, with prices ranging from RM15 to 20 per individual. In Sarawak, an alcoholic drink made by soaking an infant Large Flying Fox in *langkau* (a particularly potent, locally brewed rice spirit) for a few weeks is supposedly an effective cure for asthma if consumed daily. Islamic dietary restrictions forbids Muslims from consuming bats. However, some claim an exception if consumption is done with the intent of curing illnesses, rather than as a delicacy. As such, consumption for health purposes remains a major driver of trade of Large Flying Foxes in Borneo. There is an urgent need to address this belief and practice, by conducting community outreach and education for raising awareness, and also to implement targeted intervention strategies that leverage on social psychology approaches for incentivising behavioural change.

Many local communities in Borneo also believe that the Large Flying Fox is a pest as it feeds on the Durian flowers and other commercially cultivated fruits, such as Rambutan and Pulasan (*Nephelium mutabile*). This has led to their persecution as fruit crop pests. Large Flying Foxes actually provide a critical ecosystem service as they disperse seeds. Their ability to cover large areas daily suggests they offer significant ecosystem function compared to other smaller fruit bats.

The species is under significant threat and is legally protected throughout its range in

Borneo. Flying Foxes are a protected species in Sarawak under Section 29(2) of the Sarawak Wild Life Ordinance 1998. Anyone who commits an offence related to the species (hunts, captures, sells or in possession), and if found guilty, can face imprisonment for one year and a fine of RM10,000. However, under Section 42(1), the legislation also allows flying foxes to be eradicated through lethal methods to protect crops and property.

Similarly, it is also protected in Sabah under Wildlife Conservation Enactment 1997. However, it can be hunted with a hunting licence under Section 25(2). Anyone who contravenes this section is liable to a fine of not less than RM50,000 and not more than RM100,000 or to imprisonment for a term not less than six months and not more than five years or to both. At the global level, this species is listed as Near Threatened by the International Union for the Conservation of Nature (IUCN) Red List 2020, and reports a decreasing population trend. The Large Flying Fox is listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II.

Hunting, habitat loss, decreasing food resources and the foraging patches of Large Flying Foxes in Borneo may have restricted this species to smaller habitats. Clearance of wetlands habitats used for roosting such as peat swamp and mangrove forest should be considered a critical threat towards flying foxes in Borneo. As such, population surveys are considered to be an essential initial step in determining management and protective needs that can provide a basis for arbitrating the success of management programs. The distributional information of the species are patchy, with no recent ecological studies conducted on Sarawak. Understanding how wide-ranging animals, such as the flying fox, utilize landscapes that overlap with human use is crucial to understand patterns of human wildlife conflict, disease transmission, and designing mitigation strategies.



Figure 3: Occasionally, Large Flying Foxes are sold in weekend markets. Their prices range from RM15 to 20, and are perceived to have medical properties as a cure for asthma. @Isha Saif



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Dr. Jayasilan Mohd-Azlan received his Bachelor Degree in Forestry from UPM, Masters of Science degree in Conservation Biology from U.K.M and PhD from Charles Darwin University, Australia. His work on various species of conservation importance in Malaysia, Indonesia and Australia has resulted in over 100 scientific articles. Currently he is a member of several IUCN Species Survival Commission Specialist groups, his research group focuses on how species respond to forest fragments in Borneo. He is passionate about conservation and works on the ground action for protecting protection of biodiversity especially through local community involvement.