Rationale
RATIONALE

Bats are the most misunderstood and least recognized mammal species on the ecosystem due to its cryptic lifestyle, and are prone to vast vandalism pressure despite its essential ecosystem services. More than 1,300 species of bats have been reported so far and is known for its beneficial roles to the sustained ecosystems and human economies (Bat Conservation International 2016). In the Old World, pteropodid bats interact with many hundreds of plant species and help in their pollination and seed dispersal. The present study pertain to the pteropodid bats and their ecological functions that add further insights to the better understanding of this ‘keystone species’. The present study has been divided into six chapters and compiled to form the thesis entitled “Behavioural Ecology, Ecosystem Services and Conservation of Sympatric South Indian Fruit Bats (Chiroptera: Pteropodidae)”.

1. Indian flying fox, *Pteropus giganteus* is the second largest bat and it roost in the open canopies in large aggregations ranging from smaller hundreds to several thousand individuals. These bats are highly mobile and interact with many tropical plants and get involved in essential ecosystem services. Hence, Chapter 1 deals with the roosting ecology of *P. giganteus*, with following questions (i) What are the different tree species used by *P. giganteus* as roosts? (ii) Is there any flexibility exist in terms of the choice of roosting tree species across the roosts that are located in the geographically different landscapes such as plains and hills? (iii) Is there any difference exists in terms of the preferential roosting height of *P. giganteus*?
2. Indian short-nosed fruit bat, *Cynopterus sphinx* is a ubiquitous polygynous bat known for its harem forming behaviour, and it roost in small social groups in the altered foliages of different plant species. The harem males hold the access to the critical resources that are important to females and defend these resources to gain mating access. Hence, Chapter 2 deals with few key questions in the context of behavioural ecology and sociobiology, namely (i) Does tent maintenance and social grooming enhance social bonding in *C. sphinx*? (ii) Does the time spend by harem males vary with the number of female incumbents? (iii) What are the materials used by the *C. sphinx* for cleaning the roosts and what are their advantages?

3. In the tropical ecosystem, about 528 species of plants have so far been reported to be pollinated by bats. Many of these plants exhibit ‘syndrome of chiropterophily’ *i.e.* adapted for bat pollination. Nocturnal anthesis is the key characteristic of flowers that makes themselves attractive to the bats and aid in pollination by rewarding nectar. The main focus of Chapter 3 is ‘chiropterophily’ with the following objectives, namely (i) What are the different foraging strategies used by the pteropodid bats while foraging on the flowering trees such as *Musa paradisiaca, Ceiba pentandra, Parkia biglandulosa* and *Madhuca latifolia*? (ii) Is there any spatial and temporal variation in foraging by the sympatric pteropodid bats in the foraging ground? (iii) What are the factors associated with peak foraging? (iv) What are the different kinds of social interactions exhibited by bats in the foraging ground?
4. Fruit–frugivore interactions result in the movement of seeds away from the parent plant. Zoorchorous fruits are abundant in the tropics and about 300 of them are reported to be dispersed exclusively by bats. As certain fruits display ‘syndrome of chiropterochory’ i.e. adapted for seed dispersal by bats. Hence the main focus of Chapter 4 is ‘chiropterochory’ with the following objectives, namely (i) What are the different foraging strategies used by the pteropodid bats while foraging on the fruiting trees of *Muntingia calabura* and *Madhuca latifolia*? (ii) Is there exist any variation in spatial and temporal patterns of foraging by the sympatric pteropodid bats in the foraging ground? (iii) How do bats remove the fruits and disperse them? (iv) How long do bats disperse the seeds?

5. Geophagy has been reported as a common phenomenon among many birds and mammals; however, no pteropodid bats were previously known exhibiting typical soil consumption behaviour, which is considered as ‘adaptive behavioural plasticity’. Hence, Chapter 5 is an outcome of soil consumption behaviour of *C. sphinx*. An ‘ex post facto research’ was carried out to find out the reason behind the geophagy by analysing the mineral content of the soil from the geophagy site and secondary metabolite content of the fruits that were consumed by bats.

6. Pteropodid bats are particularly threatened than any other bat taxa with the highest number of critically endangered species and are in need of conservation attention. Hence, Chapter 6 addresses the issues associated with population decline due to (i) vandalism, (ii) illegal hunting of bats for bush meat, (iii) electrocution and (iv) heat stress. Effectiveness of faith-based conservation of bats by means of sacred caves and sacred grooves has also discussed herein.
This fundamental ecological research provides scientifically sound information about the behavioural ecology and ecosystem services provided by the pteropodid bats, and also highlight the need for the proactive conservation of bats.