

PROJECT PROFILE

Title : Studies on the diversity of bee fauna of the Nilgiris
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Start and Completion dates : 2005-2008; extended up to March 2009

Objectives

1. To survey different habitats and collect bee species.
2. To assess species richness of bees and diversity.
3. To collect data on bee fauna – plant association.
4. To assess threat factors if any, on bee species.

Funding Agency : ICFRE
Total budget outlay : Rs. 3.57 lakhs

SUMMARY

Bees are integral part of many natural and farmed landscapes all over the world and they are considered to be responsible for 80 per cent of pollination taking place in nature. Pollination is recognized as an important ecosystem function that is directly linked to biodiversity and global food security. But, bees are under pressure everywhere, both from the direct impact of pesticides in the environment as well as habitat alteration and destruction. There is recognition of a looming pollination crisis and efforts have been mobilized at global level to address pollinator management and conservation. The Nilgiris District of Tamil Nadu form a major chunk of area, under the Nilgiris Biosphere Reserve and information on the bee fauna of this ecologically important part is scanty and the present study was undertaken to generate information on the diversity of bees, so as to develop strategies for their conservation.

The studies have revealed the occurrence of about 92 species of bees in the Nilgiris district. These species fall under 14 genera viz. *Apis*, *Amegilla*, *Braunsapis*, *Ceratina*, *Chelostoma*, *Halictus*, *Lasioglossum*, *Megachile*, *Nomada*, *Nomia*, *Sphcodes*, *Thyreus*, *Trigona* and *Xylocopa*. The highest diversity of bees was noticed in the Dry Deciduous forests, followed by the Semi-evergreen forests. The Sub-tropical Broad Leaved Hill forests, the Moist Deciduous forests and the Swamp forests showed intermediate diversity, while the Montane Wet Temperate forests (Shola forests) and the Thorn forests exhibited lower diversity. The diversity of bee species in monoculture plantations was found to be low, compared to the natural forests.

Among the 8 forest types, the Semi-evergreen forests were found to have the maximum diversity of the trees/ woody climbers, followed by the Montane Wet Temperate forests (Shola forests) and the Wet Evergreen forests. The Sub-tropical Broad Leaved Hill forests, the Swamp forests and the Moist Deciduous forests showed intermediate diversity of trees/ woody climbers and the Dry Deciduous forests and the Thorn forests, exhibited lower diversity. The Dry Deciduous forests had the maximum diversity of shrubs and herbs, followed by Montane Wet Temperate forests (Shola forests) and Moist Deciduous forests. The Thorn forests and the Sub-tropical Broad Leaved Hill forests showed intermediate

diversity and the Wet Evergreen forests had the lowest diversity of shrubby and herbaceous species. Association of about 113 species of plants with different bee species was recorded in the study area.

No significant correlation was observed between the bee faunal diversity and the plant diversity, in the different forest types. The number of bee species and their populations showed positive correlation with minimum temperature and rainfall, while these parameters exhibited negative correlation with the maximum temperature. Hence, the rise in temperature caused by the climate change is likely to have high negative impact on the bee fauna.

Analysis of threat factors has revealed that, the extension of monoculture plantations posed the highest threat, followed by the forest fire, cattle grazing and the encroachment, in the decreasing order of intensity. Among the forest divisions in the district, the Nilgiris South Forest Division was found to face the maximum threat to bee faunal diversity, followed by the Nilgiris North and Gudalur Forest Divisions. The Mudumalai Wildlife Sanctuary and the Mukurthi National park were found to have least threat to bee faunal diversity.

As some of the natural forest areas in the Nilgiris are in different stages of degradation, eco-restoration of these areas, by promoting natural regeneration or through assisted natural regeneration of local indigenous species are to be taken up with priority. Since the forest fire is one of the important destructive factors affecting both the floristic diversity and the bee faunal diversity, its occurrence has to be prevented.

The cattle graze/ browse many of the herbaceous and shrubby plants, which serve as nectar and pollen sources of bees and hence the forests may be protected from cattle grazing, so as to ensure enough food materials to the bees. Though many of the invasive exotic plant species available in the district are the source of nectar/ pollen for the bees, considering the havoc caused by them to the natural forests, in terms of competition with native forest species, the spread of such plant species in the forest areas needs to be monitored and controlled. Even though, encroachment has low impact on bee faunal diversity, it also

needs to be prevented with suitable legal measures, awareness creation and participatory management approaches. The existing monoculture plantations, particularly of exotic species are to be slowly replaced with local indigenous species, so as to create ideal habitats for bees to sustain. Large amount of chemical pesticides is used in the Nilgiris against various target pests of different crops and it will have impact on non-target organisms like bees. The usage of such pesticides are to be minimized, by adopting Integrated Pest Management Strategies and only safer chemicals have to be used, so as to protect the bee population. The spraying of pesticides is to be done in the field, in the evening or during cloudy windless days, when bees are least active. The European honey bee (*Apis mellifera*) was not recorded from the Nilgiris, during the present study, but if introduced, it can pose a severe threat to native bees, mainly due to competition for the floral resources. Hence, introduction of such exotic species should be prevented to conserve and protect the native bee fauna of the hilly region.