

Pollinators - Key for agro biodiversity conservation

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Initiatives and innovations promoted by Keystone Foundation have helped promote bee keeping amongst farmers and tribal communities around the Nilgiri Biosphere Reserve. The impacts are visible in terms of better yields in coffee, mango and vegetable crops.

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Beehive monitoring is crucial for its survival

The Nilgiris, forming a part of the Nilgiris Biosphere Reserve in the Western Ghats is home to moist, dry, evergreen and mountain tropical forests. The Western Ghats, and the Nilgiris in particular, harbour a wealth of flora and fauna; much of which is restricted to the region. e.g. the endangered lion tailed macaque.

The Nilgiri forest ecosystem is, however, under pressures, e.g. from tea and coffee plantations, illegal, logging and commercial tree plantations with exotics initiated by the Forest Department.

It also has a significant tribal population, dependent on natural resources for their livelihood; including the only surviving hunter-gatherers of the Indian sub-continent the Cholanaikans in the New Amarambalam region of Nilgiris. Given its distinct character, the Nilgiris forms part of the Nilgiri Biosphere Reserve (declared under the Man and Biosphere Programme of UNESCO).

The Nilgiri Biosphere has a large number of indigenous communities, most of them forest dwellers and hunter gatherers. These distinct ethnic groups have small populations and live in geographical concentrations. It forms home to several adivasi communities, including the only surviving hunter gatherers of the Indian Sub-continent – the Cholanaikans in the New Amarambalam area (See page 15). Apart from the Todas – a well known pastoral group in the upper Nilgiris, other groups include the Paniyas, Irulas, Kurumbas, Kuruchiyans, Mullukurumbas, Adiyans and Alyars.

Eco-development initiatives

Bee pollination

There are four major honey bee species found in the Indian sub continent. Migratory bee species like the *Apis dorsata* (Rock Bee) and the *Apis florea* (Little Bee) bee populations are major pollinating agents across migratory landscapes. The permanent cavity nesting bees like the *Apis cerana indica* and the Dammar bees (*Trigona*; stingless bees) are important pollinating agents for local agro biodiversity. These

honey bees play a crucial role in maintaining agro bio-diversity which includes cultivated crops and forest regeneration. Cross pollination is essentially important for seed quality, grain quality and crop evolution. Apiculture is also practiced as a part time/fulltime income generating livelihood activity by many rural communities. These bee species forage on and pollinate all plants and year round. *Apis cerana* and dammar bees find appropriate tree cavities and wall crevices in farmlands. These colonies will stay for years together if external disturbances do not force them to desert. Also, every year, few swarms (natural division of colonies) from the original colony, develop and settle nearby. A farmer can protect such nesting sites and colonies for his/her crop pollination and as well as for honey production. Innovative farmers make such structures on farmlands to attract bees to nest and enjoy pollination benefits. Tribal farmers in the Nilgiri Biosphere Reserve practice such bee keeping for honey and crop pollination.

There are more than 2000 species of solitary bees estimated in our country which have a symmetrical and asymmetrical relationship with endemic plant species. This behaviour by solitary bees is seasonal. This relationship is essential for the existence of plants as well as the pollinators. Common solitary bee spp. like *Xylocop* spp, *Amegilla* spp., *Ceratina* spp. Blister beetle, Leaf cutter bee and Hawk moths can be observed normally in farms. These bee species are essentially dependent on old logs, rotten wood, hollow wood, reeds and sand heaps to nest and breed. Hence, farmers are encouraged to conserve such habitats in their farms and make others aware of benefit of cross pollination.

a tremendously vulnerable situation due to loss of habitats, extensive use of chemical pesticides, chemical applications, deforestation and changed land use due to urban development. All these are affecting their population density, which in turn may have an impact on species survival and associated flora of the region.

Keystone started its journey with bees and honey, in 1993. Team members travelled to all hill areas of Tamil Nadu meeting different indigenous communities.

This journey was made, to not only get an insight into the traditional activity of honey gathering from the wild Giant Rock Bee (*Apis dorsata*) but also to identify pockets of beekeeping with the Indian Hive Bee (*Apis cerana*).

The team visited 16 different hill regions, meeting 11 different communities, each unique in their own way. The details of honey hunting techniques, forest vines used, associated traditions and rituals, social systems and economic dependence on such an activity, were a fascinating eye-opener.

The experience and learnings from the year long survey were immense – issues of resource alienations, conservation, land use change, use of chemical inputs, etc. had affected bee populations and threatened a traditional livelihood.

Previous work in honey gathering with the Paliyan adivasi community in the Palani Hills during 1990-1993, indicated that this traditional activity could be an effective entry point to work with indigenous communities centered on natural resources and livelihoods.

The survey brought the team to the lower Nilgiris, where a number of hunter-gatherer communities practised honey hunting and subsistence agriculture. Beekeeping is not a traditional activity and the communities usually collect honey from the wild.

A potential area for future work and learning materialised and Nilgiris, as a region, was chosen to begin work.

We started working with the Kurumba and Irula communities. We documented their practices, provided training in better extraction methods, mapped the resources (bee populations), provided parameters for quality of honey and bees wax and also marketing support for the produce.

All these resulted in an informal network of 200 honey gatherers and a successful micro enterprise.

Over the years, many activities were undertaken for promoting and strengthening bee pollination. These include capacity building, floral mapping to document nectar and pollen sources, research on *Apis cerana* ecology and behaviour, disease monitoring studies, setting up of an information base and a resource centre in Kotagiri, called 'Jenugoodu' (Nest of Honey).

The work has faced several set backs during the last fifteen years, due to disease attacks. However, consistent experimentation, innovation and efforts to keep colonies alive has kept the activity afloat.

Specific interventions made are:

- Apiaries have been established across the Nilgiri Biosphere Reserve (NBR), at different elevations, for easy access and benefits of local farmers. These apiaries also serve as training centres. To multiply bee colonies to cater to local farmers' bee colony requirements, different kinds of bee hives and beekeeping equipment have been designed to adapt to local conditions. Many simple experiments have been carried out in colony selection and queen rearing practices.
- Community carpentry unit is created in Kotagiri for fabrication of bee tools and bee hives and tribal youth are engaged in making such tools.
- Trainings are organised for forest dwelling communities in this area as well as throughout India to promote sustainable honey gathering techniques for conservation of bees, hygienic honey handling, packaging and better marketing practices.
- Posters and booklets are prepared to disseminate information on indigenous pollinator diversity to understand the role of pollination and its benefits which would in turn help farmers to conserve diversity and habitats.
- School children are encouraged for nature walk with tribal village elders to learn about biodiversity, food chain, insects, bees, animals etc.
- A Bee Museum has been set up in Ooty town for the school children, tourists and the general public to create an awareness about honey bee science, bee ecology, role of bees in pollination and linkages with the indigenous communities.
- Interpretation centres have been established in 5 places in the Nilgiri Biosphere Reserve to disseminate information on Bee ecology.
- A Bee Nature Reserve has been established with the support of local government and forest departments, in a Toda tribal region of Nilgiris to protect *Apis cerana* bee cavities and habitats.
- Organic and fair trade principles are being practised for honey collected at project sites, supporting market development of different types of honey – 4 Green Shops and 3 Honey Huts have been established.

Some gains



Traditionally tribal communities have been collecting honey from the wild

Innovations in beekeeping (movable frame hives, top bar hives and clay hives) have helped promote bee keeping amongst farmers and tribal communities around the Nilgiri Biosphere Reserve.

Crop pollination and honey harvest is achieved in different ecological zones in different seasons. Bee pollination has helped increase coffee yield by upto 69% and soap nut by upto 36%.

Pollen grains of tamarind have also been observed in honey analysis (Keystone Foundation, 2009, unpublished data). Cultivated and agro-forestry plant spp. in the Sigur plateau (rain shadow and dry zone) enjoy the benefits of bee pollination. *Apis cerana* and *Apis florea* bee foraging is observed on vegetable crops like coriander, brinjal, lady's finger, tomato and tree crops like silk cotton, coconut, lime and papaya.

Pollination to production

Efforts were made to combine ecologically sensitive development with rural enterprise by upgrading their skills and income through training at the village level. Village units have been established for the members to add value to the bee products, reduce exploitation in the informal market, gain additional income, and more importantly to work towards self reliance. Today, the tribal communities have formed their own groups and are managing their operation successfully with technical and supervisory role by Keystone. Each of these small units is running with some element of independence. The process of building a micro enterprise which is village owned, able to run and negotiate with Keystone on prices and orders, is the key element to growth.

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