

# RAINFOREST RESTORATION

## Refuge for endangered species

The once-pristine Valparai plateau in the Western Ghats is slowly seeing the comeback of rainforest species.

**Ambujam Anantharaman** reports on a whole new way of restoring tropical rainforests.



NCF/D&S

*The rainforest nursery at Injipara*

**T**ALL and healthy saplings of rain forest species dot the landscape that was denuded even a few years ago in the Valparai plateau of the Anamalai Hills in the southern part of the Western Ghats. The trees are about four to six feet tall and are nurtured carefully by the Nature Conservation Foundation (NCF), which is demonstrating a whole new way to restore tropical rainforests lost over a century.

### Local support

Happily, this effort by the Mysore-based NGO has found support from local companies like the erstwhile Hindustan Lever Limited Tea Estates India (HLL, recently acquired by Maxwell Golden of the Woodbriar group), Parry Agro Industries (PAI) and Bombay Burmah Trading Corporation (BBTC), which have allotted degraded forest patches in their estates for raising nurseries and carrying out rainforest restoration. Ecological res-

toration is "assisted recovery of an ecosystem that has been degraded, damaged, or destroyed". Unlike afforestation or reclamation, it aims to bring an ecosystem as close to its original state as possible. This is essential when the area cannot recover original vegetation due to heavy infestation of weeds or grass, depletion of soil seed bank and nutrients, local extinction of parent trees and chronic degradation.

Earlier research studies — including one by wildlife scientists Divya Mudappa and Shankar Raman — inspired the programme that began in 2000. The idea stemmed from work in 1996-1999 in Kalakad-Mundathurai Tiger Reserve, focusing on the biological aspects of frugivory (fruit-eating by animals) and seed dispersal by the endemic brown palm civet and its implications for plant regeneration.

Experiments showed enhanced germination of seeds of some plant species collected from the scat



of brown palm civets in comparison to seeds from parent trees. At the end of Divya's study, they had raised saplings of a number of rainforest species widely believed to be difficult to germinate and grow. This gave hope that several rainforest species could be successfully propagated. Another serendipitous experiment showed that sapling regeneration was better along lines cutting through abandoned cardamom plantations compared to areas where cardamom was intact. They also documented variation in biological diversity and animal density in relation to altitude, land-use (current and abandoned plantations), habitat fragments and relatively undisturbed rainforest. This backbone of research showed the biological value of such sites and indicated that if habitat quality could be maintained or enhanced through protection and restoration, they could serve as valuable refuges for a whole gamut of endemic and endangered species.

A long-term field research station was set up in Valparai with the objectives of demarcating and protecting existing fragments (not even considered forests of biological value), identifying uncultivated or barren areas that could be restored or developed into corridors and improving degraded rainforest fragments by restoration planting. The planting would use only indigenous plant species typical to mid-elevation rainforests that had once extensively clothed this region.

### **Background**

The Western Ghats, one of the eight "hottest hot spots" of biodiversity, are suffering annual deforestation rate of 1.16 per cent, despite 15 per cent of their land area being protected as wildlife sanctuaries and national parks. Valparai, for instance, had pristine rainforests till the late 19th Century with a plethora of animal and plant life and a few tribal settlements. All this changed with the entry of the British, who found the terrain ideal for plantation crops like coffee, cardamom and tea. What began as a small plot of 10.3 sq. km. of plantation became 220 sq. km. in a span of 150 years. Apart from denudation, a major ecological problem was the restricted movement of animals from five protected sanctuaries and forests abutting the planted areas. Valparai town and hun-

dreds of labour colonies, which now have a population of nearly a 1,00,000, developed within the plantations leading inevitably to some human-wildlife conflict.

As more and more land was converted to tea, often called a "green desert", the situation worsened. This was because coffee and cardamom can be grown under a canopy of native trees while tea does not use any significant shade and has virtually no ecological benefits. In addition, the setting up of eight dams led to the submergence of 4,550 hectares of forestland, including 642 hectares on the Valparai plateau.

What were left were small patches of highly degraded remnants along water sources and hill ridges. Fortunately, though the forests were lost, a majority of plant and animal species survived due to the relatively undisturbed forests surrounding this plateau. These include rare and restricted-range plant species, populations of the endemic and endangered Lion-tailed Macaque, rare amphibians, large mammals like Asian elephant, leopard, wild dog, and birds like the Great Pied Hornbill and Malabar Grey Hornbill. One study found that, of 31 troops of Lion-tailed Macaque numbering 466 in the

Anamalai ranges, 12 troops live in the Valparai plateau. However, birds like Malabar Trogon and White-bellied Blue Flycatcher have become locally extinct in fragments and surviving fauna have shown behavioural change. Macaque troops are in conflict with one another more often here than in the undisturbed forest while elephants seek food in ration shops and noon meal centres.

### **Choosing the approach**

As it has been recognised that survival of rainforest biodiversity and wildlife depends on ability to endure in human-modified sites and on human conservation and management, NCF chose an approach that aimed at conserving wildlife habitats adjoining protected areas, increasing landscape-level connectivity of patches and restoring degraded areas. Valparai was picked as it lay outside protected areas, but was in their vicinity.

Thirty-five rainforest fragments were identified in and around the plateau, ownership determined and detailed mapping done. The fragments were

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*Reviving rainforests with local support*

then surveyed for trees, birds, and other wildlife. Detailed vegetation sampling was done to measure habitat and vegetation variables such as tree density, canopy closure, vertical distribution of foliage and shrub density. These variables were compared with relatively less disturbed rainforests that served as reference sites and smaller, more degraded fragments within private estates to establish benchmarks for monitoring and to prioritise sites in need of urgent restoration.

Before more work began, friendly landowners were spotted and relationships established. The first to respond was the erstwhile HLL, which wanted rainforest remnants on its property to be "biodiversity plots" designated for preservation of wildlife in the long term. Three rainforest fragments (Injipara 19 ha, Stanmore 5.5 ha and Sirikundra 3.5 ha) were set aside for restoration and biodiversity conservation in 2000.

Then followed two companies with organic plantations — PAI (in 2004) and BBTC (in 2003) — who permitted rainforest restoration and using indigenous species as shade trees in their plantations. MoUs were signed to ensure long-term commitment.

NCF gives technical and scientific input and carries out planting and monitoring in restoration

sites, while the companies provide infrastructure (nursery space in Injipara) and partial labour and material support. The NGO raises funds for scientific research and restoration work through international grants and donations. A small sum comes from the sale of native tree saplings for use as shade trees in commercial plantations.

Landowners yet to join the programme raised concerns that rainforest fragments in the landscape might increase conflict with wildlife, particularly elephants. This prompted NCF to study the human–elephant conflict issue in this area and made a number of recommendations for companies and the Forest Department. Unlike other areas, the conflict here was found to be almost entirely restricted to destruction of buildings by elephants to obtain stored grain and provisions and accidental deaths of two or three people on an average every year. The study indicated that rainforest fragments, especially those with some bamboo forage, appeared to have a decreasing influence on conflict in surrounding areas. Forest fragments, especially along streams, were therefore likely to provide movement routes for elephants and support their need for forage, shade, and water and were likely to reduce, and not increase, incidence of conflict with people. This is being conveyed to local people





Ajith Kumar

*Endangered species like the Lion-tailed Macaque are endemic to the region*

through education and interaction programmes.

**Establishment of rainforest plant species nursery:** A large, multi-species rainforest plant nursery with 40,000 saplings of 127 native species has been set up. A major proportion was raised from seeds collected from roadsides and trails or animal and bird excreta using simple germination techniques. Some saplings were “rescued” from roads running through forest fragments. Seeds are sown in soil beds and protected from direct sunlight using netting. After the seedlings mature, they are hardened by exposure to sunlight. Seed development and nursery maintenance are continuous. Seeds of different trees become available at different times of the year. Establishing the present stock of rainforest plants took three years. All saplings used for restoration planting and as shade trees have been supplied from this nursery (main-

tained jointly by NCF and former HLL). This also ensures that only local species — *Cullenia*, *Mesua*, *Palaquium* — are used.

**Restoration planting:** Since 2001, NCF has planted over 10,000 saplings of 127 rainforest species and pioneer species like *Clerodendron*, *Macaranga*, and *Mallotus*. Planting is carried out during the onset of the southwest monsoon after manually clearing plots of invasive weeds, without harming the naturally regenerated indigenous plants. Local tribals, skilled at identifying these species, help with weed clearing.

**Plant and animal monitoring:** Monitoring the success of planting and establishing a protocol to evaluate the recovery of various species is a key component. Survival of planted saplings is monitored every six months. Survival was better with saplings raised from seeds than those picked from



the roadside. In all sites, pre-existing shrubs and saplings have shown vigorous growth after weeds were eliminated. These are beginning to form the first layer of canopy closure under which planted rainforest saplings grow better. For fauna monitoring, a census of birds is taken during the dry, summer breeding season every two years. Work on other animal groups such as spiders is also being carried out. Long-term observations are maintained on the use and colonisation of these fragments by arboreal and other mammals. Simultaneously complementary research is being done with the help of students on invasive species, natural regeneration, arboreal and large mammal distribution and densities to set baselines and monitoring protocols.

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**Education and local involvement:** Based on the knowledge gathered, NCF plans to extend the programme over a larger area with the support and involvement of other private companies. In addition to students, visitors (lay persons, conservationists, managers) are frequently brought to the nursery and restoration sites to educate, train, and inform them about the possibilities of rainforest restoration. NCF plans to help estate workers find an alternative to the fuel wood that they cut from forest fragments. To include local beneficiaries of the programme, in 2004, school children and estate workers participated in planting.

**Outlook and future perspective:** The scope for restoration in the Western Ghats is enormous. There are over 10,000 sq.km. of commercial plantations. While the extent of abandoned plantation areas and degraded habitat remnants have not been quantified, they are estimated to be around 1,000 sq.km. In addition, large areas exist under plantations of timber and other tree species such as teak, which can be under forest restoration programmes. These areas are important for conservation efforts because they can increase the extent of habitat available, enable persistence of larger populations in fragmented landscapes, and enhance connectivity between existing conservation reserves and for-

ests. NCF feels its experience in Anamalai can be replicated, taking into account fuel wood for local people, positive incentives for landowners and sustained support for restoration and research. According to the team, many challenges remain. Remnant fragments and abandoned plantations have to be formally recognised as forestland and further conversion or degradation prevented. Long-term financial aid is critical. Finally, despite relatively rapid recovery achieved by a targeted restoration programme, it can only supplement and not replace existing primary rainforests, whose importance cannot be underplayed.

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