

# **Cycas Conservation Centers in the Nilgiri Biosphere Reserve, Western Ghats, India.**

Final Report submitted to TCS

Keystone Foundation

2008-2009

## **Summary:**

The study on harvest impacts, life history, ecological status and distribution of *Cycas circinalis* L. along the Western Ghats has brought to the forefront a need for implementing in situ conservation strategies. Keystone Foundation ([www.keystone-foundation.org](http://www.keystone-foundation.org)) believes that involving communities who live closest to the forests that are home to the Cycads would be the most important step in this direction. We have used the facilities in three villages where Keystone works to develop a Cycas information center and to organize exposure trips for people from neighboring indigenous communities, especially the children, to these centers. We foresee through these efforts an increased awareness on the special status of this plant and participation in conservation efforts. We are also aware that communities across India are using this plant and we would like to document the ethno ecological information especially in relation to the role of the plant in the ecosystem. Towards this we have also undertaken a survey of the population status along the Western Ghats in various locations and in the Eastern Ghats in one location.

## **Introduction:**

Our conservation work on *Cycas circinalis* has progressed well with support from TCS. Three sites (Jeminarai and Velleri combei in Tamil Nadu, and Nilambur in Kerala) were monitored on a monthly basis to understand the leafing and reproductive phenology of *C. circinalis* individuals as well as the timing and rates of harvest. Midway through the study we were also able to add on one extra site, in Sitthukunni which is at the foothills of the Coonoor slopes in Tamil Nadu. The data shows some interesting patterns. For example, to date we have found that harvest intensity and size of the leaf are independent of each other. The monthly monitoring has also brought in very interesting data with regard to the harvest frequency of different plant parts, and important issues with regard to illegal harvests.

To assess the conservation status of *C. circinalis* we have been carrying out a survey of populations in different parts of the Western Ghats. So far four sites in three states have been visited: Melkote in Karnataka, Silent Valley National Park in Kerala, Peppara Sanctuary in Kerala and Annamalai Sanctuary in Tamil nadu. At each of these sites, 20mX20m plots were laid and the demographic status of the population was assessed. Other observations with regard to people's use of the plant and the volume of trade were also collected.

Keystone has initiated *C. circinalis* seedling nurseries in five indigenous villages in the NBR as a conservation strategy. A total number of 5000 seedlings have been raised so far, many of which have been planted in the farmlands of the people. The seeds were collected from adjoining forest areas and we are monitoring the success of these seedlings in nurseries.

To increase awareness about the importance of *C. circinalis* conservation, we have put together a permanent exhibition at the Bee Museum in Ooty which is a famous tourist destination. There

are *C. circinalis* posters and plants on display. The Cycas T-shirts we designed have been well-received (both the adult and children sizes) and are being sold through the Green shops. We have also made *C. circinalis* saplings available for sale at the Bee Museum, and these are popular.

In the light of all the progress made till 2008 we proposed the following for our continued work on the conservation of *Cycas circinalis*

*Objective 1: Monitor the ethno ecological uses of the cycads by the communities.*

*Objective 2: Develop Cycas Conservation Villages to better foster cycad conservation.*

*Objective 3: Continue to assess the conservation status of C. circinalis over a larger area.*

*Objective 4: Continue to promote and test the potential for germination and out planting of seedlings.*

*Objective 5: Continue to monitor the demographic rates and population growth/decline of C. circinalis populations subject to different types of exploitation.*

During the project period 2008-2009 a lot more emphasis was given to the conservation awareness and outreach using *Cycas circinalis* as a flagship species. This was done through various methods and are detailed below-

### **Bee Museum**

The Bee Museum is an initiative of Keystone Foundation and is a space that has been created for information about the Nilgiri Biosphere Reserve. The information focuses on Honey Bees of India, their role in the ecosystem and the dramatic ways of the honey hunters. The Museum is now four years old and has a steady stream of visitors, approximately 10,000 per year. A first of its kind for India the museum has space allocated for species specific displays especially about 'Species of Conservation Concern' section. It is in this section that information about *Cycas circinalis* has been displayed through posters. T-shirts and posters about the species are also available for sale at the museum.

Below is a sample of one of the posters on cycads at the museum-

## A story of butterflies, ants, bees and cycads

In early May, a small butterfly, the Plains Cupid, *Lycaenidae* was observed on the as yet unfurled leaves of a *Cycas circinalis* plant. It had laid its eggs. Within days the larvae emerged and were observed feeding on the young shoots. The cycad had also yielded shoots as if in response to the larval needs. The larvae then huddled together at the base of the leaf and in a period of 7-9 days emerged in a burst of blue. The Plains Cupid butterfly uses *Cycas circinalis* as its host plant.



Along with the larvae two species of ants were also observed on the same *Cycas* leaves. One was collecting the secretions found on the hairs of the young unfurling shoots.

Another species was observed taking the secretion from the body of the larvae of the cycad butterfly.

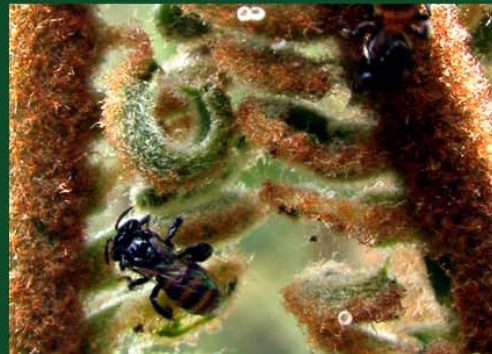


Studies reveal that a gland on the back of the caterpillar secretes a liquid containing sugar and amino acids that help sustain the ants. As the ants utilize this secretion, they are benefited and the caterpillars are not harmed in any way. The ants repay the caterpillars by protecting them from any would-be predators.

Scientists have also found an amber fossil of a caterpillar that possessed the major organs that are used today in relationships with ants - tentacle nectary organs, balloon setae, and vibratory papillae. The fossil was dated at 15-20 million years old. Could we say that this ancient symbiosis between the butterflies and ants extended to the Cycads?

Dammer bees (*Trigona* spp., family *Melliponidae*) were observed collecting the secretion from the tender shoots of the *Cycas*. (Pic 4). Bees make propolis a powerful, natural antibacterial and antiviral food, by collecting resinous saps from trees and then mixing it with wax back at the hive. This keeps them resistant to bacterial and viral infections, which can otherwise wipe out their colonies. The secretions on the hairs of the shoots of the *Cycas* are sticky and resin like.

Obviously the butterflies, ants and bees were not in competition here. They had developed a mutualistic relationship. What happens to the ants, butterflies and dammer bees when the *Cycas* tree is cut down? Have you wondered?



## **Cycas Conservation Centers – Appankappu, Pillur and Velleri Combei**

Appankappu village in Nilambur North, Malapuram district, Kerala state in India is inhabited by the Kattunayakas a hunting gathering community who live in villages across the Nilgiri Biosphere Reserve (NBR). Appankappu also falls within the NBR and the forests around it are home to a good population of *Cycas circinalis*. The people of the village spend a lot of time in the months of July and August (peak of the monsoons) harvesting the seed, processing it and preparing it for trade. It was a challenge to explain to the people why the species was considered endangered, they were used to seeing healthy populations and well distributed in their forests. The people of the village showed us an abandoned house which was then renovated and formally inaugurated as the Appankappu Cycas center. Posters and photographs related to cycads are displayed here along with other information on conservation issues. Programs are organized for children and adults like activities and talks on conservation. A nursery was specially raised to grow saplings of the plant. The nursery can hold upto 5000 plants.

Pillur is a region which lies to the South East of the Nilgiri mountains, is part of the NBR and lies in the state of Tamil Nadu. The indigenous community that reside here are the Irulas who practice subsistence agriculture and supplement their livelihoods by collecting forest produce from the nearby forests. *Cycas circinalis* was reportedly growing in large numbers. It is found now in scattered populations along the stream banks and also in the dry forests on the slopes. People have been observed collecting leaves for sale to the local market. They are also involved in harvesting of seed for consumption. The children and adults of the valley are used to visiting the local stores and it is in the vicinity of the market place that Keystone Foundation has a resource center which also serves as an office and field station. Within this center programs have been organized on a regular basis for conservation education and especially awareness on the special status of cycads. Posters with information on cycads and the pressures on them have been displayed prominently. Programs are also organized for the children at the local school and resource people from Keystone take activities, show films, photos etc on conservation in general and specific to cycads.

Velleri Combei village on the slopes of Kotagiri, Nilgiris district, Tamil Nadu is home to the Kurumba people, a people famous for their traditional medicines and dramatic honey hunting methods. Velleri Combei also falls within the NBR and is surrounded by forests and ancient sites. The *Cycas circinalis* populations in these forests are clumped and have been subjected to more pressures from land slides, fires and destructive harvesting by outside harvesters. The Kurumbas harvest small amounts of seed and young leaves for consumption. The adult leaves are harvested for sale to a local trader. The Kurumba of Velleri Combei are aware of the special status of the cycads, since they have heard that not many villages have these plants. They were very much more interested and willing to start a conservation center in the village that would house information for outsiders to see. The conservation center was started up in a portion of the house of Manikam one of our dedicated Cycas champions. The center has information and also conducts programs for children and adults on conservation. A nursery of forest plants was already there in the village and efforts have been made to raise Cycas plants from the seeds collected from nearby forests.

For use at the various information hubs either the village centers or the Bee Museum a number of posters had to be developed. Posters in English, Malayalam and Tamil were made for display at Bee Museum, Appankappu and Velleri combei respectively. A number of power points were made for sharing with the people on issues related to conservation of cycads. These power points were also used for the

conservation education talks at various schools across the NBR in both rural and urban areas. The Cycas plants raised at the nurseries were planted in some of the schools on special occasions and some of the plants were also sold through the Green Shops.

### **Survey of the Eastern Ghats - Field Notes by Saneesh C. S.**

A team, Srinivas, Rajesh and two other volunteers, from VIKASA a voluntary agency that works in the Eastern Ghats and Saneesh from Keystone Foundation visited the cycad areas and looked at the status of the population and its habitat.

The survey was carried out in three sites, 25 kilometers away from the town of Chodavaram in Visakhapatnam district of Andhra Pradesh. The Eastern Ghats, located between 76° 50' and 86° 30' E longitudes and 11° 30' and 22° N latitudes, are a discontinuous range of mountains along India's Eastern coast. The Eastern Ghats run from West Bengal state in the north, through Orissa and Andhra Pradesh to Tamil Nadu in the south, covering an area of about 75,000 sq. km. This is parallel to the coast and at a distance of from 80 to 250 kilometers from it. There is a broad and fertile coastal plain, much of it devoted to rice and coconut cultivation. They are eroded and cut through by the four major rivers of southern India, the Godavari, Mahanadi, Krishna and Kaveri. The Eastern Ghats are cut into various discontinuous hills by these rivers. The mountain ranges run parallel to the Bay of Bengal and are separated by the coastal plains. Visakhapatnam district presents two distinct geographic divisions. The altitude ranges between 900 to 1200m.

The forests found here are in general the dry deciduous type with a rocky soil cover, shrubby growth interspersed with bamboo is often present. Thin grass occurs through out and one species of *Dendrocalamus* sp. occurs and forms relatively low but often dense breaks. The forests in this area are unique in their composition.

The hills are inhabited mainly by indigenous people who have a mixed farming economy, supplemented by some amount of hunting and gathering. On the hills Cycads were found growing on eroded slopes where the soil was thin and also rocky. Fire occurrences were regular to these areas. The lack of under growth was a dominant sight. Many Cycads were also charred in the recent fires.

The Manayadora people of Avuruvada village also speak Telugu and the forest is 1.5 kilometers away from the village. The people call the cycads *JemmyChettu* (*Jemmy*=cycad, *Tree*= *Chettu*) and *Jemmy Aada* (reference to female cycad tree). People use the bark of the cycad tree. They don't use the seed (*Vitnam*=seed). They are not using the leaf of the tree (*Aaku*=Leaf). People of this village observed that animals like rats (*Eelaka*), porcupines (*Yethupanthi*), mouse deer (*Gurdupilli*) and civets (*Mannupillu*) predate on the seeds. Both men and women of the village are in the habit of chewing the bark of the Cycas tree as a mouth freshener. According to people December and January are the months of flowering and at the end of February ripe seeds can be found on the forest floor. Majority of the trees had multiple branches and growing in rocky crevices. Many saplings were damaged due to fire incidents. The altitude in this region varies between 256 – 396 m.

The Kondadora (*dora*= *king*) people of Kondaveedhi (*Konda*=hill, *Veedhi*=road) village are an indigenous group and also speak Telugu. People in this village know that there are Cycad trees (*Jemmychettu*) in the forest. But they said they hardly know any use for the tree for any thing. The forest

is subjected to fire every year. The steep rocky terrain has got a thin layer of soil. Most of the trees are growing in crevices of the rocks. The recent fire was intense and burnt through the thin layer of soil. The area receives annual rainfall upto 600 mm and soil erosion is high as it is easy for the rain water to carry away the burnt soil. In the near by forests of Kondaveedhi village Cycads were found at an altitude from 215 to 249 meters.

The Kondareddy community of Peddasarada village speak Telugu. Gadaba is the other community living in the same village. The Gadaba people are indigenous and have a language of their own. People of the village knew where Cycads are found in the forest but they do not know whether this plant is useful or not. They have seen animals like rats eating the seeds. In the near by forests of Peddasarada village cycads are found in an altitude from 227 to 238 meters.

### **Overall observations**

- Sapling count was extremely poor. Regular high intense fires may be a reason for the status of the saplings.
- Trees looked disturbed with charred barks and singed leaves and this may affect the overall growth of the trees.
- Poor soil depth in the areas and very rocky terrain.
- Low rain fall in the region and fast drainage of rain water.

### **Survey of populations in Western Ghats – Field Notes by Vandana Krishnamurthy**

*Cycas circinalis* and *Cycas indica* are found along the Western Ghats in the states of Tamil Nadu, Karnataka and Kerala in India. *Cycas circinalis* grows in seasonally dry scrubby woodlands in hilly areas in the states of Kerala, Karnataka, and Tamil Nadu. Leaf and pith harvest is conducted within populations in Karnataka and Tamil Nadu while harvest for seeds is mainly conducted in Kerala where no leaf or pith harvest is executed. *Cycas indica* is commonly found on flat sandstone or on quartzite-dominated areas in Hassan district of Karnataka. It is harvested for leaves and pith while seed harvest is not popular in this region.

This preliminary study aims at identifying the sites where these plants are found and understanding the uses and role of these plants in local livelihoods. This study will act as a pilot project to help choose sites for long-term monitoring of *Cycas circinalis* in wild populations (Fig 1). The study was conducted in July 2009 over the period of two weeks.

The sites chosen for the summer research study were Konni forest division in Pathanamthitta district of Kerala and Adimali forest division in Idukki district of Kerala. These specific sites were chosen based on inputs from the forest department of the respective regions.

## Methods

Each of the regions was thoroughly inspected to cover every cycad population present. In each population of *Cycas circinalis* a basic understanding was established of the range of different aged individuals within the clump. Additional to field studies, local people living around the sites were interviewed about uses and decline of cycad populations.

## Results

The plant populations in Konni forest division were located largely around adjoining villages in the region. Many individuals were situated alongside the road. A total of 3 populations were surveyed. Of these populations, two populations were very close to human settlements while one population was in interior areas. One of the populations had very large adult trees that were unharvested. Some areas were cleared off for teak plantations (Fig 2) When people from the village nearby to the population were interviewed, they claimed that *Cycas circinalis* seeds are considered famine food and consumed only when there is a failure in agricultural produce of any kind. Large adult individuals were found all along the landscape of which some were in seed (Fig 3).

Adimali cycad populations were relatively undisturbed. Two populations were surveyed with inputs from forest guards. The terrain was steep with no trail in some parts (Fig 4). The existing path was obstructed in some parts by the flowing river which was in full flow owing to the intense monsoon period at that time. There were no signs of harvest on these plants. Lone individuals were sometimes found scattered very far from the population clumps.

## Discussion

The sites surveyed during the study provided some good insights into potential work that can be conducted in the future. The Konni site has a fair human impact on the plant populations. People consume the seeds in times of stress however there is no impact from commercial harvesting for market purposes. The village residents were not too worried about declining populations as it was rare that they used the seeds from the plant for food purposes, probably owing to the regularity of rains within the region. However, there could be some detrimental effects on the population especially to saplings and seedlings because of large scale clearing of land to plant teak saplings. In one of the sites, all the vegetation had been cleared off leaving behind only adult cycad individuals. This also raises some hope that the forest department is mindful of the threatened status of the plant.

The Adimali population is logistically very complex to access. The sites are located far away from the main road. A vehicle had to be hired for the day which, for a long-term project may not be financially feasible.

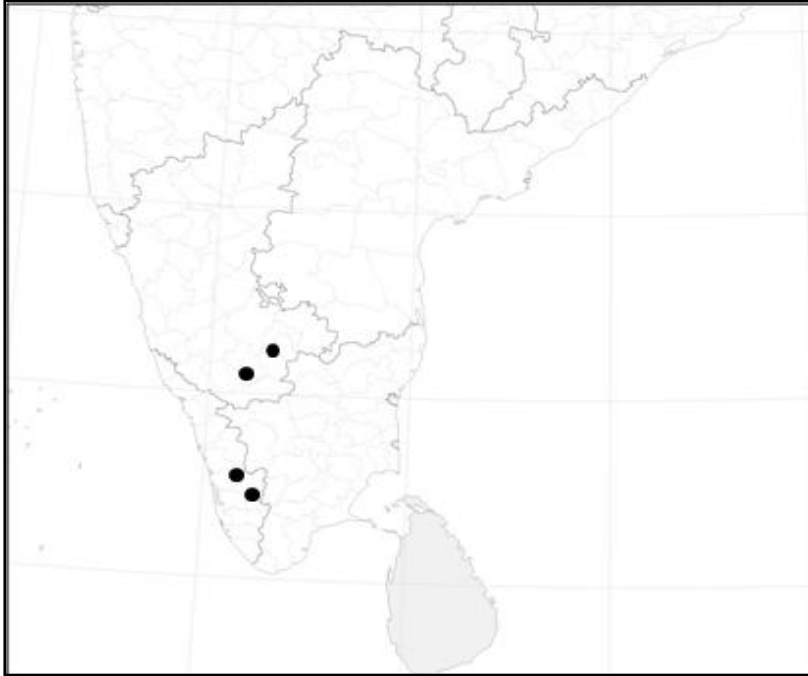


Figure 1. Sites monitored in Kerala and Karnataka for the summer research project



Figure 2. *Cycas circinalis* sites in area cleared for teak plantation Konny, Pathanamthitta District, Kerala





Figure 3. Seeding individual of *Cycas circinalis* in Konny, Kerala



Figure 4. Landscape in which *Cycas circinalis* individuals were located in Adimala, Idukki district, Kerala.

## **Acknowledgements**

The project was supported by The Cycad Society and we are grateful to the members of the board and all the office bearers. We would especially like to thank Jody Haynes, who's constant interactions over email helped in improving the proposals and also in developing contacts. Jody also encouraged the team to write regular articles for the newsletter and patiently edited them. Keystone Foundation would also like to place on record our appreciation of the efforts of Dr. Tamara Ticktin from the People and Plants International and Associate Professor at the University of Hawaii for her valuable inputs to research methods, project design and support. The conservation education teams comprise of Saneesh, C. S. & Rajendran, L. Vandana Krishnamurthy is now in a PhD program at the University of Hawaii with Dr. Tamara Ticktin, unravelling the mysteries of *Cycas circinalis* and *C.indica*. Vandana is studying the distribution of the species along the Western Ghats. Lisa Mandle, PhD student at University of Hawaii with Dr. Tamara Ticktin has done a lot of the analysis along with Vandana and has contributed to the writing in many articles. Lisa's interest has been in leaf harvested species.

TCS

**EXPENSE STATEMENT 2008-09**

<b>S.No</b>	<b>Budget Heads</b>	<b>Budget</b>	<b>Expenses</b>	<b>Balance</b>
1	Local Travel	20,000.00	20,250.00	(250.00)
2	Conservation Centres	50,000.00	49,958.17	41.83
3	Survey	10,000.00	10,435.00	(435.00)
4	Nursery	15,000.00	24,492.00	(9,492.00)
5	Guide Charges	5,000.00	1,964.83	3,035.17
		<b>100,000.00</b>	<b>107,100.00</b>	<b>(7,100.00)</b>

**Fund Utilisation**

23.06.2008                      **107,100.00**

**Less: Expenses**                      **107,100.00**

**Balance**                                      **-**