Case study:

Fuel efficient drier installed near the swamp forests and demonstration on proper usage.

"This was the first drier that I saw in my life", said Narayana Naik a farmer in the remote forested village in Dhoolalli, near a fresh water swamp. Further he added ***"apart from Uppage fruit we are using this for drying various tropical fruits, vegetables, spices, coconut and so many other things in the monsoon".***

"We found this drier as useful device which is really fuel efficient, no hazards from smoke or fire, we are using it effectively for so many products and even for drying the clothes" Ganapathi Hasler reflects on his experience with using the driers for the last three years.

These are villages with fresh water swamps around there village and normally the region receives more than 5000 mms of rainfall every year in the tropical forests of the Western Ghats, in the southern part of India.

These driers were installed in these places to demonstrate the fuel efficient devices that other government agencies could also have such more in the villages. Further it is part of the rapport building with the local communities near the swamp forests and to ensure their long term commitment and involvement in the restoration and management of the fresh water swamps.

Funding for these devices like driers and for the modern fuel efficient ovens come from the Critical Ecosystem Partnership Funds for the swamp restoration project to Snehakunja Trust.

The Honnavar forest division in Canara Forest Circle Sirsi, with the interest of then Deputy Conservator of Forests Mr Krishna Udupudi provided matching grant to install the fuel efficient ovens that was used for heating water for bathing and other purposes after his visit to swamp forests and remote village with lack of amenities.

Garcinia gummigutta **an important Non Timer Forest Product (NTFP):**

Evergreen forests are the reservoir and treasury of many edible fruits and other valuable non timber products of commercial importance. It is essential source of income for forest dwellers. One of such species endemic to Western Ghat is *Garcinia gummigutta* which yields orange coloured juicy sour tasted fruit ranging size of a fist with prominent ridges on it belongs to the family Clusiaceae (Guttiferae). Fruits on drooping horizontal branches matures and harvested in peak rainy season. Contribution of harvest and sale of this fruit alone could be up to 40000 INR (750 US$) per season to

individual households in the central Western Ghats region. Nearly 30 percent of total NTFP income is obtained through this fruit alone by the people living adjacent to the forests in the Uttra Kannada district in the Central Western Ghats, India. Fruit is full of acid content and rapidly infested by fungal growth. Hence processing is needed immediately after harvest. Traditionally it is been dried using open fire method. Which made of mud walls on 3 sides and one side is remain open to put the fuel wood. The fruits are sliced into two halves after separating seeds. These are spread uniformly over a bamboo mesh above flame. As fruit rind is thick and pulpy/juicy it needs considerable amount of fuel wood to dry the rind. As per the forest department records 25 kg of fuel wood is required to obtain one kg of rind. Certainly for fuel they are dependent on forest. Thus it is always a hidden cost to the forest and has negative impact on forest ecology. In Sirsi Forest Division alone every year 1500 tons to 20000 tons of fruits are harvested and thus the quantity of fuel wood required accounts for 37,500 tons.

Figure 1: Fresh water Swamp Forests in the Western Ghats, India

Apart from this, in traditional drying method unburnt fuel makes sooty fumes thus rind develops an unpleasant odour and colour will be faded consequently price would be affected. Another important thing which we came across during our study is labour problem in collecting fuel wood for drying makes them difficult to continue the processing and many have stopped to collect and harvest the fruits. Though the fruits furnish food for fugivores to some extent it is being wasted in a much amount. But after the new invention of HCA (Hydroxy Citric Acid) from the rind of *Garcinia gummigutta* these plant products got demand in a greater extent in pharmaceuticals and other small scale processing industry. In this regard farmers are much awaiting and interested to incorporate a new efficient technique that can reduce major hurdles in the processing.

Figure 2: Uppage fruit (*Garcinia gummigutta*)

Fuel efficient driers:

Modern fuel efficient driers could be one efficient device that reduces the fuel wood requirement while processing the Garcinia fruits or any other fruits, agriculture products that needs to be dried or processed during peak monsoon period. Walls of these driers were constructed by compressed mud bricks and then plastering with cement. It is like a square shaped closed chamber which has two outlets one act as exit for fumes another for exit of vapour formed during drying of watery rind. Inside a closed chamber there is a compartment having many trays on which iron mesh can be kept

due to the perforation the chamber gets heat by flame ignited in the lower side of the chamber. The closed chamber is surrounded by iron sheet from inside so it serves prevent heat loss. Fruit rinds are spread on the iron mesh and kept inside the chamber through an opening at the front side and iron door is fitted that can be used to move mesh in and out. There is a thermometer that has markings to show temperature inside the chamber. Up to 80^0 Celsius it can be heated. And by drying in these efficient driers colour would not fade and it would not leads to unpleasant fume smell thus increasing its quality. It is estimated that on an average 15000 to 20000 kilograms of fuel wood could be saved from each installed dryer apart from other benefits like health, quality, quantity and usefulness compared to traditional method. Along with this other advantage are there, it could be used to dry other products.

Other uses:

These dryers could be used for any other purposes like processing of other Non Timber Forest Products especially flowers of *Mammea suriga*, Fish, *Myristica* species and Cinnamon. Agriculture products like banana sukkeli (dried banana fruit), coconut, cardamom, betel nut, Jack fruit papad, Turmeric, Zinger, Nutmeg and several other spices could be processed in the dryers. Thus by keeping these all demerits of traditional drying method we have installed fuel efficient drier in three places in vicinity to the swamp forest. Earlier, two driers were installed in the Kudgund village near Torme and Kudgund swamp forests, in Kyadgi Forest Range. Now one more drier has been installed at Dholalli village of forest range Hulekal. This new efficient method of drying could save forest at least up to a small extent by preventing fuel wood collection for drying purpose in the respected thick vegetation comprising evergreen forest belt along with endangered and endemic fragment forest Myristica swamps in the respected area.

Figure 3: Traditional open fire method to dry the Uppage fruit (requires nearly 22 kilograms of fuel wood to obtain one kilogram of Uppage dry rind).

As we have installed such driers in the places where availability of *Garcinia gummigutta* is more and these driers could be of significant use to them. Further, the area is situated within thick forest range and containing enumerable forest species, reduction in deforestation by participatory method would be the positive outcome.

Figure 4: Inauguration of drier installed using CEPF grant by Western Ghats Task Force Chairman

Figure 5: Drier installed near Dhulalli fresh water swamp

Figure 6: Drying of Uppage fruit in the installed drier

Comparison of traditional open fire method with the dryers.

Traditional open fire methods	**Installed dryers**
Fuel wood requirement is 25 kilograms to dry one kilogram	3 to 4 kilograms to dry one kilogram
Loss of heat in air as the distance between fire and place to dry the fruit is long.	No loss of heat as the hot air circulates though the closed chamber from top through a duct and then percolates downwards.

Maximum heat that could be reached continuously to the drying unit is 30 to 40° Celsius.	Up to 75 to 80° Celsius continuously
Use of fuel wood only	Agriculture wastes like coconut shell, coconut husk, areca leaves, paddy straw and other wastes could be used easily.
Calamities from fire due to unconscious use both in forest and at homestead.	No such calamities
Quality of the fruit rind reduces due to crude processing smoke, dust particles will add to the product while processing.	Improvement in quality of the product.
Quantity reduces due to direct burning of some fruits in the open fire	More quantity of products
Limited use	Several forest and agriculture products could be easily processed. Even clothes and blankets could be dried during monsoon period.

Functioning of the drier and its proper usage have been explained to the local people. Besides efforts are being made to convince the Forest Department and other line departments to allocate funds for installing such devices. Now, several local community organizations like Village Forest Committees also have small funds through their Village Forest Development Funds. However, some of the forest department officials are forcing them to purchase LPG cylinder and local politicians arguing for community hall and so on. Since these funds are obtained through local forest resources, we are requesting them to provide assistance to install such fuel efficient units that would reduce huge burden on the forest.

Figure 7: Inauguration of drier by Jack Tordoff, CEPF Grant Director at Kudgund village

Report by: Narasimha Hegde, Medha Bhat

Submitted to: **Critical Ecosystem Partnership Fund**.

Project: **Linking fragmented fresh water swamps through restoration of micro-corridors in the Central Western Ghats, India**.

Implemented by: **Snehakunja Trust, Grant number 55915.**