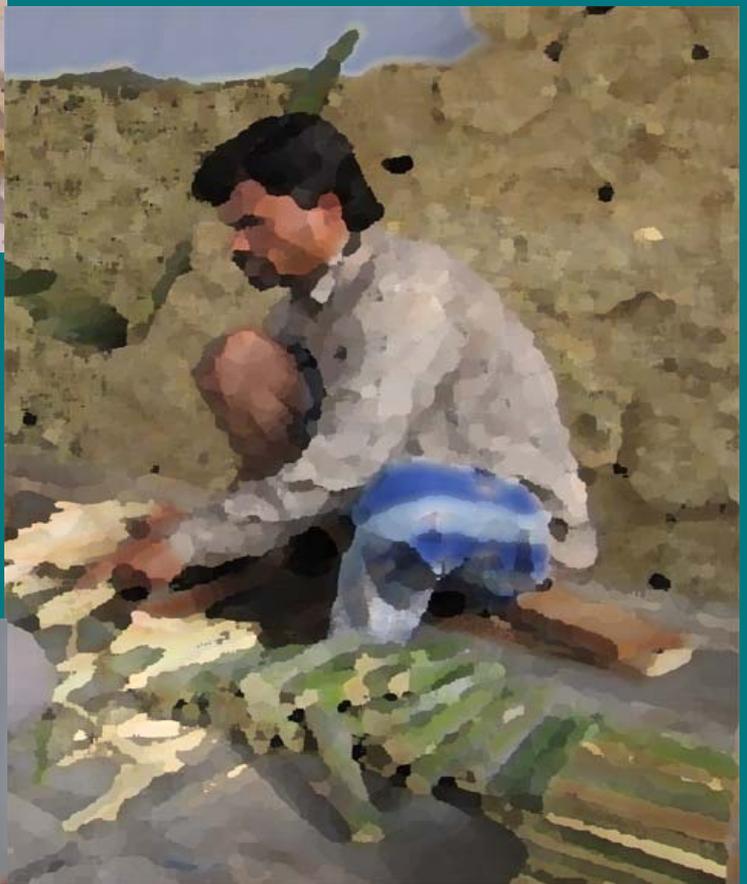




AGARBATTI STICK PRODUCTION

Andhra Pradesh
Community Forest Management
Project (APCFM)



The World Bank
Andhra Pradesh Forest Department
Vana Samrakshana Samithis



Documented by
INBAR- CIBART Documentation Centre
Bangalore

AGARBATTI STICK PRODUCTION UNDER
Andhra Pradesh Community Forest Management Project

Supported by
The World Bank

Implemented by
Forest Department, Government of Andhra Pradesh

Partnered with
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Abbreviations

APCFM	: Andhra Pradesh Community Forest Management
APFD	: Andhra Pradesh Forest Department
CFC	: Common Facility Centre
CIBART	: Centre for Indian Bamboo Resource and Technology
INBAR	: International Network for Bamboo and Rattan
JFM	: Joint Forest Management
TRIBAC	: Tripura Bamboo and Cane Development Centre
VSS	: Vana Samrakshana Samithi

Executive Summary

The Andhra Pradesh Community Forest Management (APCFM), implemented by the Andhra Pradesh Forest Department with the support of the World Bank, is currently in its second phase.

In 2005, the Forest Department had organized a workshop to explore the possibilities of forest-based livelihood promotion activities. The International Network for Bamboo and Rattan (INBAR), which attended the workshop, had presented the possible livelihood strategies using bamboo as a resource, and in view of its expertise INBAR was requested to be part of the Supervisory Mission of the project. The INBAR team had continued discussions with the Forest Department officials and those specifically in charge of APCFM project.

In early February 2006, it was agreed that INBAR would document the bamboo-based agarbatti production system in Mancherial, Kaghaznagar and Bellampally Mandals in Adilabad District. The machines used in Vizianagaram also were to be assessed as part of technical assessment of tools and machines used in the production of bamboo sticks for use in agarbatti (incense stick or joss stick) in Andhra Pradesh.

The first part of this report traces the background and objectives of APCFM project, while the second part deals with a technical assessment of the tools and machinery used in agarbatti stick production.

The first part describes the overall framework of the project, and focuses specifically on agarbatti stick making activity pursued by several community-based forest protection units, called Vana Samrakshana Samithis (VSS), in these Mandals. Activities such as agarbatti stock making launched by these VSSs have been successful in creating a positive impact on the daily income of a number of people, particularly women.

The project has also been able to effectively repair the strained relations between the Forest Department and those who live in and around forests. From the point of view of the Forest Department, the role of the people changed from that of forest destroyers to forest protectors. From the point of view of forest users, the Forest Department officials changed their role from that of law enforcers to livelihood facilitators. These changed perceptions are at the very foundation of the APCFM project.

The project has looked at bamboo as one of the principal sources of livelihood for the rural poor, especially the tribal people. In line with this, it has carried out activities aimed at bamboo resource regeneration and plantation, and strived to add value to bamboo products through better processing and improved products. All VSSs are empowered to take decisions on all aspects ranging from raw material procurement to marketing of finished goods, with the Forest Department playing the role of a facilitator, providing capacity building inputs through a series of training programmes. The project has been able to establish linkages with local and distant markets for regular supply of agarbatti sticks, and is now planning to graduate to producing scented agarbatti.

One of the major achievement of APCFM project is creation of livelihood for a large number of women, who would otherwise have been kept out of the economic sector, working in their leisure time. Some of the key learnings from the project include: the recognition of VSS as an effective institutional vehicle for forest conservation and management; bamboo identified as a potential resource for sustainable livelihood generation for the rural poor, especially tribal people; creation of awareness among the poor that value addition to bamboo can bring increased income; and the partnership mode of working between the Forest Department and VSS. In general, a good beginning has been made with the APCFM project which is contributing to the overall poverty reduction strategies for the rural poor in the target areas.

Three cross-cutting, six slivering and six stick-making tools/machines were found to be in operation in the project areas studied. The machines and tools analysed show variation in prices and efficiency. The analyses show that the simple hand tools usually perform just as good as the expensive engine-driven machines. The latter ones have several problems in handling the material efficiently without jamming.

A couple of prototypes showed promise and could be the subjects for further study and improvement.

Agarbatti Stick Production under APCFM Project

Background

The Andhra Pradesh Forest Department (APFD) is taking support from the World Bank to implement the second phase of Forest Management known as the Andhra Pradesh Community Forest Management (APCFM) project. APFD had organized a workshop in 2005 to explore the possibilities of forest-based livelihood promotion activities. The International Network for Bamboo and Rattan (INBAR), which attended the workshop, had presented the possible livelihood strategies using bamboo as a resource, and in view of its expertise INBAR was requested to be part of the Supervisory Mission of the project.

This being the foundation for collaboration, INBAR team had continued discussions with the APFD officials and those specifically in charge of APCFM project funded by the World Bank. In early February, it was agreed that INBAR would document the bamboo-based agarbatti production system in three Mandals (similar to Blocks) – Mancherial, Kaghaznagar and Bellampally – in Adilabad District. The machines used in Vizianagaram also were to be assessed as part of technical assessment of tools and machines used in the production of bamboo sticks for use in agarbatti (incense stick or joss stick) in Andhra Pradesh.

Purpose

1. To capture using visual media the entire process followed by the entrepreneurs related to bamboo-based agarbatti production; and
2. To understand and analyse the tools and machinery used by the entrepreneurs and suggest any modification to improve the quality and quantity of production impacting on overall productivity.

This is a brief report on various bamboo-based activities implemented under APCFM Project with emphasis on agarbatti stick production. This has been compiled using data from various primary and secondary sources, including field interactions carried out in the month of March 2006.

1. Title

Documentation of the bamboo-based agarbatti stick production under Andhra Pradesh Community Forest Management Project to promote sustainable livelihoods to the rural poor

2. Background *

Andhra Pradesh is the fifth largest state in India having a population of more than 70 million. It accounts for 7% of the country's population and 8% of its land area.

As per the State Forest Report 1997, the geographical area of forests is 275,068 sq. km and the forest area is 63,814 sq. kms. With 23 percent of the state's geographical area, which extend over 6.38 million hectares, the forests in AP account for 9% of India's total forest area. The length of forest boundaries amounts to 79,311 km and the number of forest blocks are 3,599. The following table summarizes the details of forest area in Andhra Pradesh.

* Current Status of Implementation of JFM in Andhra Pradesh

Table 1: Classification of forest area in Andhra Pradesh*

Sl.No.	Region	Forest area (sq. km)	Percent
1	Legal Status		
	Reserved	50,548	79.10
	Protected	12,365	19.38
	Un-classified	971	1.52
	Total	63,814	100
2	Composition		
	Sal (<i>Shorea robusta</i>)	47	0.07
	Teak (<i>Tectona grandis</i>)	9,145	14.33
	Others	54,622	85.60
	Total	63,814	100
3	Forest Types		
	Souther tropical thorn	16,110	25.25
	Southern tropical moist deciduous	16,010	25.22
	Southern tropical dry deciduos	28,431	44.55
	Litoral	2,856	4.48
	Mangrove	317	0.50
	Total	63,814	100

* State Forest Report, 1997

The composition of forests in Andhra Pradesh can be broadly categorized into :

Teak Forests: Teak forests are by and large found in the dry Telangana districts of Adilabad, Khammam, Warangal, Karimnagar, Nizamabad, Medak and Mahabubnagar. All these districts are covered under APCFM. Besides teak (*Tectona grandis*), other predominant species found here are *Terminalia alata*, *T. arjuna*, *T. bellerica*, *Anogeissus latifolia*, *Dalbergia latifolia*, *Madhuca indica*, *Buchanania lanzan*, *Boswellia serrata*, *Strerculia urens*, *Cleistanthus collinus*, *Adina cordifolia*, *Pterocarpus marsupium*, *Diospyros melanoxylon*, *Dendrocalamus strictus*, etc. As teak is the most valuable species and dominant in these forests, they are described in terms of proportion of teak in the overall species mix as Teak Forests, Teak-mixed Forests, Mixed Teak Forests, etc. Occurrence of teak in these forests is up to 30% in natural stands. However, in the forests that are already converted through Selection and Improvement system or Coppice with Standards or Coppice with Reserve systems, occurrence of teak varies between 30% and 70%.

Non-Teak Miscellaneous Hardwood Forests: The forests of Eastern Ghats in coastal Andhra are miscellaneous type with no single species dominating. These forests represent the transition zone between the teak belt of South India and the southern extremity of the Central Indian sal (*Shorea robusta*) belt. The species that are commonly found dominating the canopy are *Xylia xylocarpa*, *Pterocarpus marsupium*, *Adina cordifolia*, *Anogeissus latifolia*, *Terminalia alata*, *T. arjuna*, *T. bellerica*, *Mitragyna parviflora*, *Ougenia dalbergeoidis*, *Kydia calycina*, *Mangifera indica*, *Diospyros melanoxylon*, *Buchnanania lanzan*, *Dalbergia latifolia*, *Gmelina arborea*, *Lannea coromandalica*, *Lagerstroemia* spp. *Dendrocalamus strictus*, *Bambusa bambos*, etc. Such forests are predominant in Srikakulam, Vizianagaram, Visakhapatnam and East Godavari districts that are covered under APCFM Project. Besides, these forests are rich in biodiversity and are the home for a variety of herbs, shrubs and climbers that are valued for their medicinal properties. In moist valleys in interior areas canebrakes occur.

Red Sanders Forests: Red sandalwood (*Pterocarpus santalinus*) is endemic to the forests in the southern Rayalaseema region in Chittoor and Cuddapah districts. The trees of this species with wavy grain timber are highly valued and have tremendous export potential. Red sandalwood occurs in relatively dry and degraded localities along hill slopes in its natural distribution. Though it is a hardy species, establishment of its natural regeneration has suffered over years due to repeated fires (in its natural home it occurs in association with a native grass called boda grass, which is prone to fire damage especially during dry summer months). Associates like *Acacia sundra* in the lower reaches and *Anogeissus latifolia*, *Hardwickia binnata* and *Dolichandrone atrovirens* in the upper reaches suffer from the same problem of fire hazard.

Open and Scrub Forests: A sizeable extent of forests in Andhra Pradesh is degraded without any valuable or desired species that can be supported and encouraged. In some cases such forests have degraded to the extent of attaining the status of scrub vegetation. The causes of such acute degradation are many. Biotic factors in the form of grazing pressure, removal of firewood for domestic use and annual fires and resultant non-establishment of regeneration are some of the causes that have led to this massive denudation. These forests are also associated with rain shadow regions and consequently have predominantly xerophytic vegetation. The forests in Nellore and parts of Chittoor districts covered under the Project are of this type. Such forests also occur to a limited extent in other districts that are covered under the Project.

Bamboo Forests: Bamboo occurs in abundance in Andhra Pradesh. Andhra Pradesh accounts for about 7.4% of India's bamboo resources. Natural bamboo occurs in large tracts of forests in the state. The predominant species of bamboo are *Dendrocalamus strictus*, *Dendrocalamus hamiltonii* and *Bambusa bambos*. *B. bambos* occurs in moist localities along the streams. *D. hamiltonii* occurs in moist localities a little away from streams and in moist valleys, while *D. strictus* is widely distributed even in relatively drier localities. These species occur gregariously as a middle storey in the natural stands in patches. However, they are seen to grow copiously in areas with relatively wide canopy openings. While *D. hamiltonii* is confined to Visakhapatnam, East Godavari and Khammam districts, the other two species are distributed all over the state. Within the Project area, bamboo occurs abundantly in Adilabad (except the South-western region), Northern part of Warangal, Eastern part of Karimnagar, Khammam, Srikakulam, Vizianagaram, Visakhapatnam, East Godavari and northern part of Cuddapah districts.

The National Forest Policy of 1988 emphasized the need for involving local people for conservation of forests and its effective management. As part of translating the policy into action, the Government of India issued Guidelines of Joint Forest Management in 1990. The Government of Andhra Pradesh followed suit and in 1992, the orders for the adoption of Joint Forest Management (JFM) strategy were issued. In order to build the community involvement, the guidelines for setting up Vana Samrakshana Samithies (VSS) were prepared in 1993.

In order to protect the forest wealth, the JFM Programme was initially launched in Andhra Pradesh through the World Bank-funded forestry project (1994-2000). This project was the predecessor of APCFM project that is under implementation at present. The JFM strategy was to focus on protection, improvement and development of forests with the involvement of local communities. The local institutions called Vana Samrakshana Samithi (VSS) were formed under the respective forest divisions. As an extension of the JFM, APCFM project envisioned more devolution of powers to VSS in managing forests allocated to them. In addition, they were also expected to extend support to the government for protecting the remaining forest cover under government control.

Bamboo being one of the major forest resource, many bamboo-based livelihood options were explored and agarbatti stick production has been identified as one of the potential livelihood options available for the rural poor.

The Supervision Mission of the World Bank that visited Andhra Pradesh in March 2005 identified some specific areas of interventions such as:*

1. Enabling the Project to move towards using forests as part of livelihood enhancement and poverty reduction strategy, including working on bamboo through out the value chain and integrating with other development programmes;
2. Enhancing the capacity of various service providers including NGOs, support agencies and frontline Forest Department staff, and develop capacity of VSS to attract other service providers through collaborative arrangements and partnerships with other external agencies;
3. Enabling the Project to develop site-specific forest inventory, forest management, integration with working plan and other related technical practices including adaptive R&D to emerge as a premium technical support agency;
4. Make institutional changes in the Forest Department to enable it to combine regulatory, developmental and technical roles and facilitate emergence of APFD as a livelihood enhancement and poverty reduction agency in collaboration with communities and other partners in both public and private sectors; and
5. Address following issues to business processes and procedures with regard to current fund flow mechanism and financial systems.

** Semi-annual Progress Report – September 2005 – APCFM Project*

In this context, INBAR's inputs were very crucial and a beginning has been made through understanding the existing bamboo-based livelihoods with special focus on agarbatti stick production using simple and efficient technology.

3. Objectives

The APCFM project has aimed at promotion of various forest-based livelihood opportunities involving the local communities whose benefits would be accrued and create an impact in the lives of the poor through local ownership and management. It forms the basis for conservation and management of forest resources. One of the major livelihood options identified was the agarbatti stick making using bamboo poles, and also bamboo-based handicraft products. Other areas of usage of bamboo are being explored.

The main purpose of this assignment was to document the processes associated with the bamboo-based agarbatti stick production using locally improvised tools and machines. Another was to analyse the issues and problems associated with the current production processes and identify areas for intervention that could contribute to the improved production.

4. Profile of the target area and the beneficiary group

Andhra Pradesh accounts for 10% production of bamboo in India and it is spread over an area of 7.4%. During the World Bank Mission in March 2005, it was decided to carry out a comprehensive sector analysis and development of an action plan for harnessing bamboo under the project. Though the production accounts for 10%, the diversity of bamboo species in Andhra Pradesh is limited. The common species occurring in the forests of the state are *Dendrocalamus strictus*, *D. hamiltonii* and *Bambusa bambos*.

Under the APCFM Project, 8,343 VSSs have been formed in the state, which is actively involved in the protection and development of forests. These VSSs are managing about 1.85 million hectares of forest area brought under them. A total of approximately 1.5 million members are involved out of which 323,000 belong to Scheduled Caste and 465,000 to Scheduled Tribe

communities. There are nearly 1,000 VSSs having access to bamboo with full rights over the usufruct located in Visakhapatnam, Vizianagaram, Srikakulam, East Godavari, Khammam and Adilabad districts. Nearly 50,000 families of these VSSs depend exclusively on bamboo for livelihoods. Out of the total area of 1.85 million hectares under VSS management, roughly 10% is bamboo-bearing area. Measures such as decongestion, mounding, soil and moisture conservation activities, fire and grazing control through social fencing, etc. have been undertaken in 27,230 ha of VSS forests. Further, under-planting of bamboo in natural and suitable gaps created on account of silvicultural thinnings in natural teak and non-teak miscellaneous forests and teak plantations has been taken up over an extent of 27,837 ha. On an experimental basis *Melocanna baccifera*, *Bambusa tulda*, *B. polymorpha* and *B. Balcooa* have been introduced last year.

5. Bamboo-based activities initiated under APCFM

Bamboo has been given importance under the project as one of the potential sources of livelihood for the rural poor, especially the tribals. The focus was on resource regeneration and agarbatti stick production.

Some of the initiatives undertaken are summarized in the subsequent sections.

5.1 Bamboo Resource Management

The Forest Department has given thrust to bamboo resource management as part of natural resources management activities. They have been promoting seedling distribution and plantation activities to regenerate the replenished bamboo resources, involving the VSS members.

5.1.1 Rejuvenation of bamboo forests

Rejuvenation of degraded bamboo forests has been one of the prioritized activities under APCFM. About 50,000 ha of degraded bamboo forests have been targeted for treatment .

*Table 2: Rejuvenation of degraded forests
(Semi-annual Progress Report – September 2005 – APCFM Project)*

Category	Unit	Project target	Achievements			
			Up to March 2005	Current year 2005-06*	Total	Percentage to the total target
Bamboo forests including under-planting	ha	50,000	27,230	27,837	55,068	110.13

The natural growth of bamboo occurs vigorously in the areas managed by 500 VSSs and it is scattered in areas managed by another 500 VSSs. Three species of bamboo are observed in the project are: *Dendrocalamus strictus*, *Bambusa bambos* and *D. hamiltonii*, with *D. strictus* making up more than 90% of the resource. Initially, the paper industry was the prime consumer of bamboo. In some parts, the Burud and Medar communities were using bamboo for their artisan works. Of late, other avenues of bamboo application, such as composite roofing materials, have been identified.

Bamboo resource management is a labour-intensive activity. Unless adequate attention is paid, bamboo would become a weed among other vegetation. It has to be properly managed for high yields. After the formation of VSS, proper attention has been given to the overall forest management. Field operations include decongestion, saucer weeding, mounding for

young clumps, staggered trenches near the clumps to impound moisture, fire control measures and SMC works like CCTs, gully control structures, mini percolation tanks, etc. Selective felling of mature bamboo culms duly retaining 6 to 8 culms per clumps to support the clump is a silvicultural operation that ensures health of the clump and also fetches revenue to the VSSs as the bamboo culms so removed can be sold as green bamboo or after adding value in the form of bamboo articles like baskets, agarbatti, mats, etc.

As against the Project target of treating 50,000 ha of bamboo forests, so far an area of 55,067 ha has been treated. This includes treatment of 27,837 ha under planting of bamboo by September 2005. Under-planting is a new and novel initiative taken during 2005-06 introduction of bamboo in those forests where it was not occurring naturally. Two-year-old rhizomes are planted in VSS-managed natural forests in the gaps created from natural causes and temporary gaps created by silvicultural thinning and tending operations. On an average, 125 plants are introduced per ha of forests. This is aimed basically to upgrade the quality of existing forests that are under management of VSSs but which can not ensure annual returns as they are primarily timber bearing forests. Bamboo would ensure intermittent returns and thus contribute to success of forest management by VSSs duly ensuring regular flow of returns.

The following data capture the efforts made under the project for rejuvenation of degraded bamboo forests.*

Component	Expenditure ('000 Rs) (01.01.04 to 20.09.05)
Rejuvenation of natural regeneration (advance works)	3,060.50
Soil and moisture conservation (advance works)	227.90
Decongestion and mounding (creation)	4,894.30
Soil and moisture conservation (creation)	678.10
Fire management (creation)	0.00
Fire management (first year maintenance)	136.50
Total	8,997.40

* *Semi-annual Progress Report – September 2005 – APCFM Project*

5.1.2. Bamboo plantation

Detailed guidelines on under planting of bamboo have been prepared by the Research Division under the APCFM Project. Tables 3 & 4 summarize the Forest division-wise bamboo plantation activities undertaken by APCFM as part of the project last year.

In 2005, more than 400,000 units of bamboo planting material of have been supplied to the Reserve Forest areas. The Forest Division-wise break-up of seedlings supplied is as listed in Table 5.

Bamboo has been given importance under Clonal Forestry Research and Natural Forestry Management Trials.

The trial plots in bamboo forests have been laid with three objectives of study:

1. Effect of the canopy intensity on the growth and yield of bamboo. This is very crucial to study because bamboo under-planting in large areas has been done in the natural forests of different canopy intensity. Sample plots are being laid in pure bamboo areas, bamboo plantation areas, bamboos growing under the teak plantations and the bamboos planted under different canopy intensity in miscellaneous plantations.

2. Effect of silvicultural operations taken up in natural bamboo forest areas.
3. Effect of clear felling of congested bamboo clump area to find out the new clump recruitment and annual productivity.

Table 3: APCFM – Physical targets and achievements (plantations) during 2005-06 (up to September 2005)

Sl No.	Circle	Afforestation through SMM				Bamboo under-planting	
		Bamboo		NTFP		Tar.	Ach.
		Tar.	Ach.	Tar.	Ach.		
1	Adilabad	600	531	355	412	11,400	13,332
2	Visakhapatnam	350	147	900	525	2,750	3,023
3	Kurnool	0	0	150	167	200	219
4	Srisailam	100	35	0	0	150	150
5	Rajahmundry	0	0	44	35	1,500	1,622
6	Khamman	370	432	150	112	4,000	2,050
7	Warangal	400	445	375	349	10,000	5,291
8	Ananthpur	0	0	100	50	200	200
9	Nizamabad	820	631	800	1,069	8,000	1,765
10	Hyderabad	100	83	100	110	1,150	115
11	Tirupathi	100	61	536	426	70	70
12	Guntur	130	0	1,200	190	0	0
	TOTAL	2,970	2,365	4,710	3,445	39,420	27,837

Table 4: Plantings under Social Forestry Programme

Social Forestry Division	Details of planting			
	Species	No. of seedlings planted	Potential yield	No. of farmer groups
2004 Planting Season				
Nizamabad	Teak	55,500	0.05 cu.m/tree after 20 years	112
	Eucalyptus	89,500	50 Mt/ha after 6 years	
	Bamboo	42,250	5 culms/clump after 6 years	
	Kanuga	29,800	10 kg/tree after 10 years	
	Amla	16,600	3 kg/tree after 7 years	
Mahbubnagar	Eucalyptus	100,000	50 Mt/ha after 6 years	210
	Kanuga	320,000	10 kg/tree after 10 years	
	Bamboo	75,000	5 culms/clump after 6 years	
2005 Planting Season				
East Godavari	Eucalyptus	550,000	50 Mt/ha after 6 years	50
	Casuarina	50,000	50 Mt/ha after 4 years	
	Bamboo	50,000	5 culms/clump after 6 years	

Commercial bamboo species from the North-eastern part of India has been introduced in Visakhapatnam as part of species diversification keeping in view the envisioned value addition programmes. Some of the species introduced are *Bambusa tulda*, *B. nutans*, *B. polymorpha*, *B. affinis*, *B. vulgaris* and *Melocanna baccifera*.

*Table 5: Seedlings supplied to Territorial Divisions (in '000)
2005 planting season*

Division	Medicinal plants	Eucal. clones	Kanuga	Bamboo	Teak	Misc.	Total
Srikakulam	0	0	177.0	54.6	0	6.0	237.6
Vizianagaram	0	0	108.3	70.0	0	61.7	240.0
Visakhapatnam	0	0	300.0	0	0	0	300.0
East Godavari	31.4	73.3	177.4	32.1	0	0.5	314.7
Nellore	50.0	132.0	16.0	8.5	10.0	0	216.5
Cuddapah	0	0	248.0	0	0	75.0	323.0
Chittoor	0	0	135.0	0	0	0	135.0
Warangal	0	0	600.0	12.0	0	0	612.0
Karimnagar	100.0	0	330.0	0	0	0	430.0
Adilabad	0	0	1640.0	0	0	0	1640.0
Khammam	87.5	86.0	384.0	66.0	0	0	623.5
Mahbubnagar	0	0	59.7	63.1	0	22.7	145.5
Medak	0	0	350.0	0	0	0	350.0
Nizamabad	0	0	500.0	100.00	0	0	600.0

5.1.3. Value addition

The concept of value addition was not thought about by the poor villagers before the inception of VSS. Through continuous interactive sessions and awareness programmes carried out as part of the APCFM Project, people started thinking differently. This resulted in various value addition programmes with appropriate skill-upgrading inputs.

The project areas were not known earlier for bamboo-based agarbatti stick production. Some of the traditional weaving communities such as the Burud were making bamboo mats, baskets or small bamboo items. But off late, the project team and the VSS members have jointly thought about and identified various livelihood activities in which bamboo-based agarbatti stick making has emerged as one of the potential areas.

Some of the value-added initiatives undertaken under the project could be narrated in this context. Value addition to bamboo in the form of agarbatti stick making has been taken up in 34 VSSs of Adilabad and Vizianagaram districts. Marketing of these sticks is being done locally as well as to ITC, Chennai. The present production capacity is 10 tonnes per month, which would be upgraded to 100 tonnes per month by mid-2006. This activity is fetching revenue of Rs 18,000 per tonne as against Rs 1,500 per tonne being realized from pulp and paper mills. As of February 2006, more than 30 tonnes of these agarbatti sticks have been supplied to ITC, Chennai and local industries.

It is pertinent to note that adapting appropriate technology and ensuring wide participation in this activity has helped in up-scaling the activity and increasing the income levels of the poor village women. The tools supplied are locally made and very simple to use and maintain. The service facility for maintaining the tools in working condition is extended by the Common Facility Centre (CFC). Efforts are on to make bamboo mat board with the help of a plywood factory in Hyderabad. Another activity being planned is the manufacture of flush doors using bamboo rings as filler material. Once these products are fine-tuned, supplies are planned for the housing programme of the Government of Andhra Pradesh. Significant achievement here is adopting a cluster approach and providing common facility centres which also function as training-cum-production centres. This approach has brought in a new necessity for federating and networking around the CFC and the host of services that it provides.

More than 1,000 VSSs have abundant resources of bamboo and their economy can scale up significantly with bamboo-related intervention. Bamboo is also known as poor man's timber. It has a number of applications in various forms. As an entry-level activity on bamboo-based livelihood, agarbatti sticks manufacturing has been focused upon. As against a paltry Rs 5 per bamboo, the VSSs are now able to generate Rs 18 to Rs 25 per bamboo, most of it being in the form of wage employment to VSS members in converting bamboo into agarbatti sticks. This activity is now being taken up in 34 VSSs by 1,130 members in Mancherial, Jannaram, Kagaznagar and Vizianagaram Divisions and is being extended to Khammam, Paloncha, Narsipatnam, Srikakula, Visakhapatnam and Kakinada Divisions. Common facility centres that will function as training-cum-production-cum-quality-control centres have been established at five places in Adilabad district and 15 more will be established by the middle of 2006.

The following Table 6 gives an indication of the value being realized from bamboo under each Forest Division. It indicates that the coastal divisions such as Kakinada, Vizianagaram, and Narsipattanam, are showing a progressive trend:

*Table 6: Value of bamboo realised by VSSs – Division-wise
(Semi-annual Progress Report – September 2005 – APCFM Project)*

Sl. No.	Division	2002-03	2003-04
1	Adilabad	741,780	741,780
2	Belampally	0	20,00
3	Jannaram (WLM) (T)	2,319,174	2,313,447
4	Kagaznagar	247,800	237,300
5	Mancherial	366,700	307,500
6	Nirmal	0	0
7	Chittoor West	0	0
8	Nellore	2,000	18,000
9	Mahbubnagar	0	0
10	Bhadrachalam (N)	0	0
11	Khammam	576,302	0
12	Kothagudem	124,550	145,250
13	Paloncha	0	0
14	Cuddapah	2,500	0
15	Proddatur (WL)	0	0
16	Medak	0	0
17	Kamareddy	0	0
18	Kakinada	6,500	1,158,980
19	Srikakulam	0	0
20	Vizianagaram	2,000	90,600
21	Narasipatnam	1,012,000	2,016,363
22	Visakhapatnam	209,050	207,142
23	Karimnagar East	0	0
24	Karimnagar West	0	0
25	WLM Achampet	0	0
26	WL Chittoor East	0	0
27	WLM Tirupati	800	0
28	Rajampet (WL)	0	34,030
TOTAL		5,611,156	7,290,692

5.1.4 Signs of Achievement

The indicators for signs of achievement are many. Some of the highlights are:

- Appropriate intervention has been designed under the project realizing the market potential.
- Impact on the daily income earning of the families engaged in agarbatti stick production has improved considerably.
- Idling time of women and youth converted into productive time.
- Focus on women-oriented livelihood activity.
- Change in perceptions about the Forest Department Officials by the community.
- Steps taken for bamboo resource regeneration.
- Thrust given for bamboo-based value addition to have an incremental income.
- Thrust given for capacity building efforts at all levels.
- Using local experts as trainers under skill upgrading programmes.
- Opportunities for the youth to get potential employment through CFCs.
- Development and adoption of local tools and machines for production.
- Centralized coordination by CFC jointly managed by VSS and the Forest Department.

Some examples from the field are given below.

Phoolan's life is changing...

Like that of many others...Agarbatti stick making is changing the lives of many



Phoolan Devi and her daughter at work

Phoolan Devi who hails from Mancherial has a family with husband, three daughters and one son. Her husband is a driver. Till last year, she was not doing any work other than household chores. The launching of CFC in Mancherial motivated her to take up agarbatti stick production. She did not have any knowledge about the agarbatti stick making. She went for the training organized by the Forest Department and got a machine worth Rs 150 free of cost. Now she is earning Rs 100 to 150 per day. She takes the slats from the CFC and returns the finished sticks to the CFC. They settle her payments once

in a month and she gets approximately Rs 2,000 per month. Her eldest daughter also helps her to make sticks. The other three children are in school. She is happy that because of this activity she is spending her time in a productive way and now they have started building their own house.

Opportunity for the youth

Arif, from a six-member family, is a young man working in the CFC for the last one year. He heard about the CFC when he was idling after his schooling. He received trained from CFC to make slats. Now, every day, Arif comes to CFC at 6.30 in the morning and goes back at 4 in the evening. He earns Rs. 100 to 150 per day. He has joined the stream earning members in his family and the family is happy about it. He is supporting the family economically... one of the many instances where CFC has made a positive change to a life.

6. Methodology

Under the APCFM Project, the Forest Department started production of bamboo agarbatti sticks through the VSS members as a value addition activity. It has now become a family-based cottage industry wherein mostly women are engaged to do the work utilising their leisure time.

In Devapally and Muthampally sections under Mancherial Forest Division, natural bamboo growth occurs in five VSS allotted areas: Sonapur, Laxmipur, Salegudem, Gatraopally and Venkatapur. The members of these VSSs are supplying bamboo to other non-bamboo VSS areas at rates which are fixed for the Burud by the government. The rates are in Table 7:

Table 7: Price of bamboo for VSSs

Type	Diameter (cm)	Amount (Rs)
Special class	15 to 18	13.25
First class	12 to 15	9.00
Second class	9 to 12	5.25
Third class	Up to 9	2.10

The bamboo poles are first cross-cut into 8-inch and 9-inch cylinders. These are then made into slats using a locally made hand tool, which costs Rs 350. The slats are made into agarbattis sticks using another hand tool that costs about Rs. 150. Approximately 600 sets of these hand tools have been distributed among the five VSSs.

The slats are made at the CFC level and the women are given 4-kg bundles of slats against which they supply back 3 kg of sticks: 1 kg is the estimated wastage. They are able to produce an average of 6 kg per day after attending to their routine household activities. If they are fully engaged in the activity, it is estimated that they would be able to produce 12 kg of agarbatti sticks per day.



Women of Kagaznagar with their products (left); Detail of a product (right)

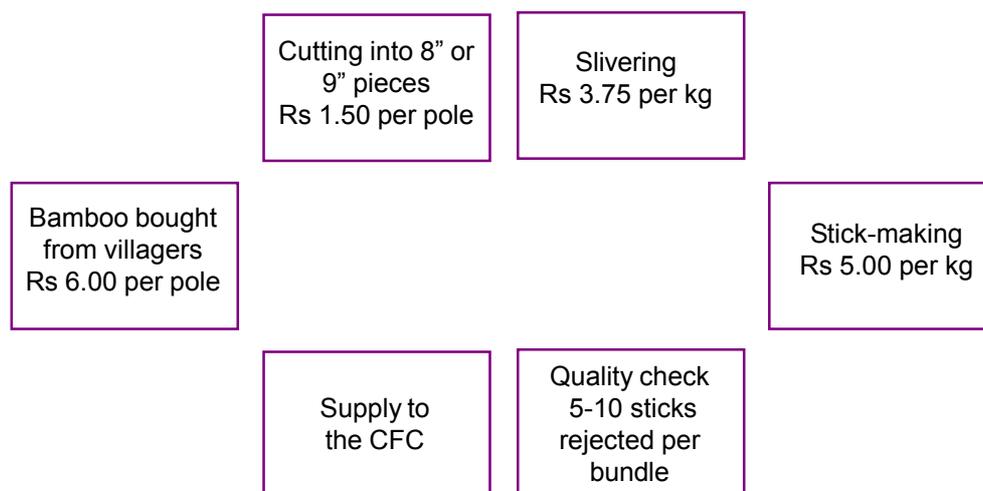
Besides agarbatti making, they are also engaged in making handicrafts. In Kagaznagar, the women are trained to make different handicraft products and they even participate in exhibitions to sell their products.

6.1 Supply Chain Management

The VSS and CFC have a symbiotic relationship in the supply chain management of agarbatti stick production initiated under APCFM Project as a major livelihood option, especially for rural poor women. The resource procurement to finished product is managed by the VSS members with facilitation and necessary regulatory support from APFD.

Basically, there are different stages in the agarbatti stick production. The first stage is felling of bamboo culms, hacking of the branches to get bamboo poles and then transporting the poles to the CFC. This is done by the VSS members. There the quality of poles is checked by the person incharge of the CFC and an APFD Official.

At the CFC, the second stage begins with cross-cutting using the cross-cutting saw into cylinders of 8 inches, 9 inches, 10 inches or 12 inches length as per the demand. In the next stage, slats of 2 mm thickness are made from the cylinders, bundled and given it to the women engaged in stick production. The agarbatti sticks produced are dried and polished. The finished sticks are brought to the CFC either by the women themselves or in a vehicle sent to the VSS for collecting the finished products. The quality is tested manually. The bundles are weighed at the CFC and based on the weight payment is made to the women. At the CFC, the sticks are graded, packed and transported to the clients.



Bamboo poles brought to CFC from villages by VSS members

6.2 Capacity Building

Under the APCFM Project, capacity building inputs have been extended to every person who is directly or indirectly associated with the project activities. A series of training programmes have been organized to build the capacity of the officials and the community to work together. Irrespective of the existence of the project or not, the training imparted under this initiative has given the confidence to move towards the overall objective of CFM. The project team has been oriented on the following topics:



Bamboo poles cross-cut into cylinders



Converting cylinders into slats (left); bundling of slats (right)



Making sticks from slats

- Coordination and collaboration with territorial officers and staff by the Research Division on laying and conducting multi-locational clonal trials and natural forest management trials.
- Treatment of various types of degraded natural forests, involving the VSS members.
- Sustainable harvesting of bamboo.



Drying of sticks



Polishing of dried sticks (left); women with finished sticks in bundles (right)



Sticks being weighed at the CFC (left); weight and amount entered on a passbook

- Evaluation of performance and shortlisting of clones of non-timber forest produce (NTFP).
- Expansion of CMAs in central nurseries with shortlisted NTFP clones including oil yielding species such as *Simarouba glauca*, *Pongamia*, Neem, Mahua, etc.
- Improved nursery technology.
- Issues pertaining to maintenance and expansion of central nurseries and vegetative propagation units.

- Allotment of NTFP grafts produced in the research centres for planting in the VSS areas.
- Development of technology transfer centres, one for each of the 14 districts where APCFM Project is being implemented.
- Production and utilization of bio-fertilizers, compost and vermicompost.
- Conservation, cultivation, harvesting and value addition of medicinal plants.
- Developmental governance.
- Participatory Rural Appraisal (PRA) techniques and micro planning.
- Monitoring and evaluation.

Six workshops on bamboo related topics have been organized covering 410 participants from different categories. It included 236 VSS members, 142 Forest Department officials and 32 NGO representatives. Exposure visits were organized to the department officials. A group of seven members have visited West Bengal, Assam, Tripura and Manipur to understand bamboo-based interventions. As an outcome of this visit, one of the INBAR project in Tripura – Tripura Bamboo and Cane Development Centre (TRIBAC) – had sent bamboo seeds to Andhra Pradesh as part of species diversification. Also, two APFD officials visited China to understand the possible livelihood opportunities in the bamboo sector since China is considered to be an advanced country in bamboo products.

As part of skill upgrading among the rural poor women, they have been imparted training on agarbatti stick production for a period of four weeks. This programme is organized at the CFC and is conducted by a master trainer attached to the CFC. The trainers, who are traditional agarbatti makers from Hyderabad, have imparted training to the VSS members. For the preparation of slats, male VSS members are imparted training, as this work requires more strength.

6.3 Market Linkages

The APCFM Project has been able to establish linkages with local and distant markets. The agarbatti sticks are produced based on the specification requirements of the companies. At present, the CFC have tie-ups with ITC (Chennai) Sankranthi, Ambika, Mustan and Jaya agarbatti industries. The transportation costs are borne by the company. At present the CFC is getting Rs 18 per kg from these companies. An individual entrepreneur is getting Rs 5 per kg for the finished sticks.

The CFCs are planning to graduate to the next level of production: rolling and scenting. For that, a market assessment is proposed. For moving to that level, much more training inputs have to be given to the members and also potential markets for branded agarbatti have to be identified. The inherent risk is a stiff competition with the established brands of agarbatti.

6.4 Cost-benefit Analysis

Indicative costs have been worked out and at present, they are able to add value to the raw bamboo at a margin of Rs 12 (Table 8). Since only partial production process is done at the village and CFC level, the profit margin is not very high, but moves on a no-profit/ no-loss basis.

The production cost is fixed by individual CFCs without much variation from the other centres. In this analysis, factors such as using of facilities at the CFC, expenses incurred for the inputs of trainers and supervisors, etc. are not included. Also, they are entering into the sale of waste products, which is not taken into account as an income. A conclusion could be drawn that one of the major achievement is creation of livelihood for a large number of women, who would otherwise have been kept out of the economic sector. It is also important to note it is the leisure time of women that has been converted into productive time.

Table 8: Cost indications

Location	Material and activities	Price (Rs)	
Forest	Raw material (per pole)	2.1	>50% village development
Forest	Harvesting and transport (per pole)	3.9	>50% forest development
CFC	Cross-cutting	1.0	>Waste material for flower boquet >Rs 1.60/kg >Waste material for charcoal >Rs4.50/kg
CFC	Sliver production	3.0	
CIG	Stick production	5.0	
		9.0	
		15.0	
CFC	Overheads	3.0	
	Transportation	-	
Industry	Selecting	-	
Industry	Incense adding	-	
Industry	Packaging	-	
Industry	Overheads/marketing	-	
Industry	Tax	-	
Industry	Finished sticks – 1 kg	840.0	

6.5 Analysis of Tools and Machines Used

Detailed analysis of existing tools and machines has been done as part of the assignment and the technical report is annexed for reference.

6.6 Quality Assurance Mechanism

Simple techniques are used for quality checking at the community level as well as at the CFC level. Handpicking of the sticks is done by visually assessing the uniformity of size and quality of measurement, both by the member who produces the sticks and by the supervisor at the CFC. From each 30-kg bundle, 5-10 sticks get are removed for not meeting the size/quality requirements. In Bellampally, in order to ensure quality and sustain the market, they have requested a representative from ITC to be based at the CFC. This is expected to improve the quality production of agarbatti sticks by the enthusiastic entrepreneurs.

6.7 Monitoring and Record Maintenance Systems

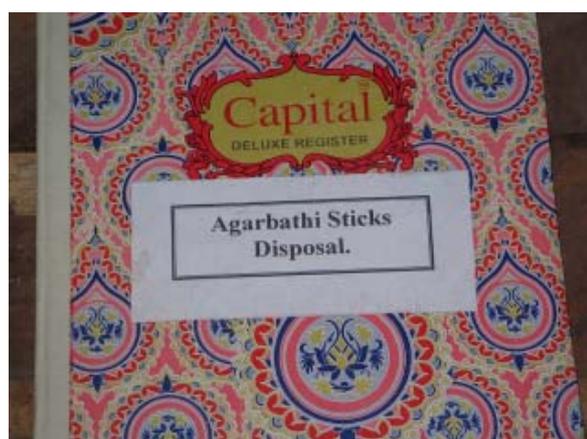
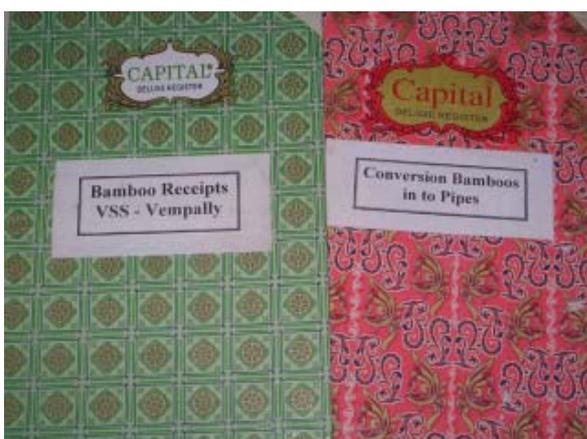
The CFC is the nodal point of coordination and monitoring of agarbatti stick production system. Only the stick making process in the entire supply chain process takes place in the villages as a home-based activity. All the registers are maintained at the CFC level. Each VSS member has been given a passbook with an account number. It is similar to a bank pass book which has the name, photograph, signature, etc. of the member. The quantity (weight) of slats taken by the member and the quantity of sticks returned to the CFC are recorded in the passbook and signed by the person in charge at the CFC. Based on this, payment is given to the members on the date of supply or a weekly basis.

At the CFC also, they have registers for assets, procurement of resources, supply of slats to the members, finished products brought to the CFC, attendance of the artisans working at the CFC (based on which they are paid) and other relevant records. These are maintained by the Supervisor along with the Field Officer in charge of the CFC.

AGARBATHI STICK CARD

Name : *Kannu / H/S* SI No. : *14*
V.S.S. : Range :

CHIPS RECEIVED			STICKS PREPARED			
Date	Kgs		Date	Qty	Amount	Remarks
25-7-05	6.8		3-10-05	24.78	185.00	
25-7-05	0.8		25-08-05	23.00	150.00	
1-8-05	6.8		01-09-05	35.00	230.00	
2-8-05	4.8		5-12-05	10.00	60.00	
5-8-05	0.0		5-2-05	30.00	200.00	
19-08-05	12.0		13-05-05	03.00	210.00	
7-10-05	6.0		20-05-05	10.00	60.00	
5-10-05	6.0					
2-10-05	10.0					
15-10-05	12.0					
20-10-05	6.0					
27-10-05	2.0					



Passbook (top, left) and various registers used in monitoring and records maintenance

The local-level agarbatti production is coordinated and monitored by the VSS Vice Chairperson while the CFC-level activities are supervised by the Forest Department.

6.8 Waste Management

In the beginning of the bamboo-based livelihood project, mainly, agarbatti stick production, the wastage was estimated to be 30-40%. The wastage has considerably come down since then to 5-10%. Local waste management practices under the mandate of CFC are under exploration. But at present the waste generated are sold to the paper mills in Chennai, Garland and Ice cream making units in Hyderabad, etc. From ITC, Chennai, the CFC is getting Rs 0.60 per kg for the waste material. The CFC is also planning to convert the waste into charcoal that could be the raw material for the next stage of agarbatti production.



Bamboo waste generated at the CFC

6.9 Institutional Mechanism

Under the JFM, followed by APCFM, local community groups called Vana Smarakshana Samithis (VSS) have been formed in the villages. 'Vana' means 'forest', 'Samrakshana' means 'protection' and 'Samithi' means 'group'. Basically it is a forest protection group or a village-level forest protection committee.

Basically a VSS is formed in small villages, which are within 5 km radius from the nearest forest area, which is easily accessible to the villagers through out the day and through out the year. The Forest Department through a series of meetings instill confidence among the villagers to manage the forest area in the vicinity of the village. After building trust through mutual interactions, about 200-500 acres of forestland is allotted to each VSS, mainly for protection and management. The productivity aspect is introduced gradually, and there is usually appreciable response to this from among the VSS members. The VSSs become the owners of 100% produce from their protected areas. The VSS is constituted by those who reside within the jurisdiction of the allotted forest area. After enrolling as members, the VSS members elect a 15-member body that forms the management committee.

6.10 Challenges

The challenges are basically pre- and mid-course implementation challenges. Most of the stakeholders have expressed that one of the key challenges experienced during the initial phases of the project were building mutual confidence among the foresters and the community. Through continuous and constant trainings and interactions, the trust has been built. This challenge has brought the two key players – the Forest Department and the local community – on a common platform. Given the traditional animosity between the two groups, this could be considered a major achievement of the project.

A number of livelihood activities have been taken up on pilot basis in many of the divisions. There was initial hesitation among the poor to take up the activity because of the fear whether there would be adequate market to the products. Building up the capacity through skill development programmes and then persuading the trained community members to take up the activity were major challenges. After seeing the progress that is happening around the project areas, there is huge demand among the villagers, especially the women, to take up the livelihood activities that are sustainable and add to their family income.

There are two other major issues faced by the CFCs under the agarbatti stick production still continuing. One is the production of slats. Since slats are produced manually, the CFC is not able to meet the demand of the women who are engaged in stick production. The other relates to the supply of electricity, which is erratic with frequent interruptions. In some places, CFCs are functioning even at night. During the field visit, the idea of using bamboo waste to generate power was discussed.

7. Uniqueness

The APCFM project has been unique in the sense that the people who were destroying the forests have become its saviours. The VSS system has made a positive impact in this line, leading to conservation and sustainable management of the forest areas allocated to them. The creation of awareness about various NTFPs in the forest and how income could be earned by conserving and converting these into value-added products is another credit to the project. The realization that bamboo could be a major livelihood source and that considerable value addition can be achieved through various means to meet the rising marketing demand have motivated the rural poor to take up bamboo-based livelihood activities. The community has realized the need for regeneration and is actively associated in the efforts of APFD.

Another important aspect is the usage of local knowledge in designing the tools and machines for the production process and identifying the local expertise for skill upgrading of the entrepreneurs. This has really helped in improvising tools that are cost-effective and user-friendly. The hand tool used for agarbatti stick production costs Rs 150 while the one use for slat making costs Rs 350. The interest of the project team and the trainers to innovate and improvise the tools in order to make them much more comfortable and affordable to the entrepreneurs is pushing production and income levels higher.

8. Key Learning and Ways Forward

The project has been under implementation for the last three years and has been an evolving one. Some of the key learnings from the Project that could be listed include:

- VSS as an effective institutional vehicle for forest conservation and management;
- Bamboo identified as a potential resource for sustainable livelihood generation for the rural poor, especially tribal people;
- Adoption of user-friendly and improvised tools and machines for livelihood generation.
- Insight or awareness among the project team that user-friendly technology upgrading is essential for improved production;
- Bamboo resource regeneration process in progress through plantations and nurseries;
- Awareness creation among the poor that value addition to bamboo can bring increased income;
- Acceptance by the villagers of bamboo as a useful forest resource;
- Partnership mode of working between Forest Department and VSS; and.
- Capacity building as an essential component for bringing about changes.

There is huge demand for bamboo agarbatti sticks and if the groups can ensure regular supply without interruption, it could be scaled up. At the same time, some simpler mechanized approach could be used for slat production since the CFC, with its manually operated system, is not in a position to supply slats in adequate quantities to all the women engaged in agarbatti stick making. In order to sustain the enthusiasm generated and to ensure the accrued benefits, the input material at each stage has to be ensured. A user-friendly and large-scale slat making machine needs to be identified and installed to increase the production capacity of the agarbatti sticks.

9. Conclusion

The Andhra Pradesh Forest Department through its timely interventions has recognized bamboo as one of the potential forest resources that could contribute in generating sustainable livelihood options for the rural poor. The efforts have started yielding results. Most of the poor women are utilizing their time effectively to earn either supplementary income or opting for bamboo-based activities, especially agarbatti stick production, as their primary income source. This is a clear demonstration of income generation through value addition. The tools used are user-friendly and has the localized acceptable stature. It is to be appreciated that improvisation of tools and machines used are happening locally as part of “adaptation through experiential learning”. APFD and the VSS members have to design strategies for upscaling since there is huge demand for agarbatti sticks and the present production is not enough to meet the growing demand. Forest conservation and the benefits derived out of it have high correlation, which has been realized by the VSS members and are reflected in the entire supply chain process of agarbatti production.

A good beginning has been made which is contributing to the overall poverty reduction strategies for the rural poor in the target areas.