ESMAP GVEP International WINROCK INTERNATIONAL

Report date- 25-9-2007	*Prepared by-Jayant Sarnaik, Atul Joshi, Sameer Punde*

Activity Completion Report

1. Project Data

Name of Organization : Applied Environmental Research Foundation(AERF)

Name of Project: **Development of decentralized bio-diesel resource centers for improving rural energy services and reduce poverty in India**

Region, Country- South Asia, India

Thematic Area-Capacity building

Project Initiation Date – 10th Sept 2006
Activity Completion Date – 25th Sept 2007

Total Project Funding, including co-funding – USD 46,936

Total Funding from GAPFund- USD 39,113

Total Co-funding from Grantee –USD 7822

Implementation Partner (if applicable)

2. Project Objectives

Provide the original statement of objectives from the approved GAPFund proposal. If original objectives have changed, explain the nature of the revisions and the justification for them.

- To generate awareness about importance of ***Pongamia pinnata*** as sustainable renewable energy source and livelihood support.
- To create income generation opportunities for poor families using *Pongamia pinnata* as resource.
- To offer capacity building, knowledge management trainings to poor communities to use *Pongamia pinnata* for improving local energy services and participate in market engaged in seed collection, bio-diesel production.

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- To promote use of renewable energy sources like Pongamia oil at village /block level for livelihood improvement.

Note: Though there was no direct deviation from the above stated objectives, we found out that there exists also good population of *Madhuca Indica,* another promising oil yielding tree suitable for use as direct fuel or production of bio-diesel besides the population of ***Pongamia pinnata*** at the location where we have set up second bio-diesel resource center. Thus we have incorporated this species into the local seed procurement and processing activity.

Discuss how well the completed project achieved its objectives and how well it contributed to GVEP thematic areas. If the project did not meet all objectives, please note that here, and explain the reasons in #3 or #4 below, as appropriate.

The project could achieve all the 4 above stated objectives and its overall impact could be seen. The project actually outperformed as regards the targets set in many areas such as awareness generation, income generation, and stakeholder participation. The project has reached to over **70 villages** from two different blocks i.e. ***Alibaug*** and ***Mhasala*** possibly creating income generation opportunities to about **3500** villagers from this region. Through dissemination of promotional literature prepared for this project, the project has helped create awareness about role of renewable energy in village energy security among **5000 villagers** from both the blocks. As regards the use of Pongamia oil in rural energy service, this project is first known example of an expeller producing ***Pongamia oil*** running on an engine which runs on the same oil in the state of Maharashtra. Thus two expeller-engines operate on Pongamia oil (**1.2 liters/hr**) to produce about **7 liters** of Pongamia oil /hr each. Other uses of Pongamia oil in energy include use in Power tiller, irrigation pump sets and floor-mill. The application of SVO of Pongamia pinnata has remained at demonstration scale in these equipments as the season of intensive use of these equipments generally starts in October –November (after harvesting of paddy). However in short time, it has created remarkable awareness and interest in the farmers about the advantages of ***Pongamia oil*** vis-à-vis diesel which is costlier and invariably adulterated due to short supply in the remote areas and thus also harmful to the engine. More significantly, the farmers are happy that the oil-cake of Pongamia is produced and available at local level. It has been observed that oil-cake has substantial demand as a fertilizer and it is sold at a premium at the center. It has also generated a very good cash flow at first bio-diesel resource center. The project activities such as outreach through regular village meetings as well as demonstration of Pongamia oil in energy services have significantly built the capacity of the local community as regards the role of renewable energy in

satisfying the rural energy needs. Moreover, the community members have realized that a Pongamia oil production unit could become profit making enterprise that would support livelihood of each individual who is ready to become part of the supply chain. It is in this manner that the project's contribution to GVEP's thematic area- Capacity building – becomes significant.

3. Project Output

Discuss the actual output or deliverable completed, compared to the expected output, including any publications, as relevant.

In the first phase of the project, awareness generation meetings were conducted in **30 villages** from Alibaug block and **5 villages** from Mhasala block. **10** large posters were given to the governing bodies from selected villages awareness generation and spreading the information about the project. During seed collection season, total **1000** pamphlets showing the Pongamia pinnata based value chain and its role in energy sufficiency were published in local language and distributed in as many as **50 villages** from Alibaug block and **25 villages** from Mhasala block. It did create the expected impact and gave the necessary momentum to the project activities.

Most important deliverables of this project have been establishing supply chain, actual seed collection and seed processing as well as running of energy based agricultural equipments using the pongamia oil in the project villages. Please find below the summary of the performance of each bio-diesel resource center against these deliverables.

a) Bio-diesel resource center (1)- at village Mahajane , Block-Alibaug,District Raigad.

This particular village was selected for establishing resource center due to relative abundance of ***Pongamia pinnata*** trees and strong community organization. The supply chain was established through local grocer shops and main trigger for rapid collection of pongamia seeds was the attractive price and standard weight measurement for the collected material. As majority of the collectors were tribals having agricultural labor and collection of non-timber forest produce as main occupation, the seed collection came to them naturally and did support their livelihood. Following tribal villages participated in seed collection activity at this center.

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- *1)Barshet,2) Bayanjewadi,3) Divewadi, 4)Dhawerwadi 5)Gangecha wadi, 6)Hondawadi, 7)Jambhalicha Kas, 8) Jaubhulwadi, 9) Khairwadi, 10) Mathwadi,11) Manatwadi, 12)Morunde, 13)Nangarwadi, 14)Nimridewadi, 15)Paralwadi, 16)Patwadi, 17) Pimparwadi, 18) Rajewadi, 19) Raishetwadi, 20) Sagwadi, 21) Thakurwadi, 22) Valvaliwadi.* Though the total village no (**22**) is significantly higher, these are primarily hamlets having 25-30 no of households each. The total seed collection from these hamlets amounted to **800 Kgs** before drying. The tribals were paid the amount at the center from the village common fund.

The small farmer community also participated in the seed collection activity with great interest. Individuals and Women self help groups from **21 villages**, those have farming as a major livelihood were involved in Pongamia seed collection activity. These are**:** *Ambepur, Andoshi, Bapale, Borghar, Beloshi, Divi-Parangi, Kamarle, Khanav, Mahan, Mahajane, Malyan, Nagav, Navkhar, Phansapur, Raishet, Ramraj, Sarai, Tajpur, Umate, Vave, Valvali, Sudkoli.* While planning the development of supply chain a deliberate effort was made to reach to out as many villages as possible within the radius of 10 Kms from the resource center. And as can be seen the effort did pay off.

Although the actual seed collection is important, establishing a good network procurement centers in villages having Pongamia trees at the beginning was crucial for sustainable supply of seeds. The seed collection from these villages also amounted to **800 Kgs** before drying. The collectors were paid from the revolving fund of the self help groups in the village.

The detailed records maintained at the center showing collector's names, seed collection in Kgs and the amount paid to collectors was shown to the Winrock representative- Mr. Jagdish Kuikel during his visit to project site. The list is quite exhaustive having more than 150 entries at one center.

The actual weight of the seeds reduced from **1600 Kgs** to **1200 Kgs** due to drying up of the moisture. A seeds were kept in a open yard for drying and storage. The processing of the seeds started at the center in last week of May this year. The commissioning of the expeller consumed some **5 liters** of oil, afterwards it was found out that about **25%** yield could be achieved. Thus as per the demand of customers, the expeller was kept in operation. Over a period of one month of operation, about **250 liters** of Pongamia oil was produced and **750** Kgs of oil cake was produced as by product. The oil was

sold at **Rs.30/liter** while the cake was sold at **Rs.9/kg**. Thus the center made a total turnover of
Rs. 7500 + Rs. 6750= Rs.14250. The cost of raw material turned out to be **Rs.9600**, thus the center made profit of **Rs.4650.** The operators were paid total of **Rs. 3000** leaving **Rs.1650** as the net profit.

The expected output as regards seed collection and processing was anticipated to be **500 Kgs** of seeds per village from total **10 villages** selected for the intervention. Thus the expected seed collection should have touched **5000 Kgs** for the two centers. However due to regional elections that took place in the month of March ,no developmental activity was allowed in the project villages for one month as it would immediately attract the attention of the politicians and could become an issue of controversy . Thus one crucial month of collection was lost. On this ground, the full harvest potential of the area could not be exploited despite the fact that we could reach **50 villages** and established as many as **13** procurement centers for the first bio-diesel resource center.

b) Biodiesel resource center (2)- at village Songhar ,Block – Mhasala, District- Raigad.

Establishing second bio-diesel resource center was quite a challenging task considering the fact this center if not properly located could compete with the first center. Thus we had to change our location from initially planned village location –**Ramraj** to a village called **Songhar** for establishing the second bio-diesel resource center which is about 100 Kms away from the first center and which was also surveyed during resource assessment of Pongamia pinnata by our team one and half years ago. Due to change in location, we did not get enough time for awareness generation in this village; even then we could reach out to **11** villages for motivating people for this intervention. The community organization in this village is also very strong and the villagers have been very much proactive. Following villages participated in collection of Pongamia seeds as well as Madhuca indica seeds. **1) Village Khamgaon, 2)Kasarmale, 3) Tamhane-Shirke,4)Navzar, 5) Sutarwadi, 6) Harijanwadi, 7) Baudhwadi, 8) Songhar, 9) Adivasiwadi 10) Gawliwadi and 11) Dehen.**

The village selection of Songhar was also characterized by the presence of active self group who have relatively healthy revolving fund at their disposal but no sustainable program to carry out. This village has **4** women self help groups and **2** men self help groups. In this village about **350 Kgs** of ***Pongamia seeds*** and **450** Kgs of ***Mahua seeds (Madhuca indica)*** could be collected through **5** procurement centers. The collection activity suffered setback due to late initiation of project activity in this region. The revolving fund of self help groups have been

used effectively for purchasing of the seeds from the local collectors. The responsibility of the processing of seeds has been given to the two young candidates from this village, who are very happy to have found an occupation in the village. Till date the bio-diesel resource center in village Songhar has produced about **75** liters of ***Pongamia oil*** and **100** liters of ***Mahua oil***. Villagers in this area are not aware about the fertilizer characteristics of **Pongamia oil-cake** and thus are slowly catching up with its application.

- **Use of Pongamia oil in rural energy services**

Application of straight vegetable oil from ***Pongamia pinnata*** as fuel substitute for diesel evoked lot of curiosity and interest among the villagers from all the project villages and also among visitors. The first application of **Pongamia Straight Vegetable Oil (PSVO)** was as mentioned before in running the expellers at both the resource centers to produce ***Pongamia oil /Mahaua oil***.

This has been by far the leading example of use of **PSVO** as substitute to diesel for operating engines in rural areas.

Thus out of 5 irrigation pumps to purchased and operated on ***Pongamia oil*** **2** were used to run the oil-expellers and they have clocked more than **60 hrs** in **village Mahajane** and about **35 hrs** in **village Songhar.** Our experience at both the centers showed that the community was more interested in selling the oil due to relatively smaller oil production in this season and existing demand for whatever is produced than experimenting it for running irrigation pumps for agriculture. It indicates that once the production is surplus then the farmers will use it for agriculture purpose and secondly we will have to observe in the next few months when the demand for diesel in agriculture is at peak.

Besides that an entrepreneur –Mr. Tendulkar - from **village Mahajane** who hires out Power-tillers to farmers showed interest in using PSVO in power tillers. He bought **50 liters** of Pongamia oil for this purpose from the center. The scale of use has remained small due to the fact that the actual season when Power-tillers are in demand starts late October every year.

In Village Songhar where the second bio-diesel resource center has been established, the village was using **2 of 5 hp electric motors** to lift water for drinking and domestic purpose for **4 hours** every day till GVEP intervention**.** The intermittent and erratic power supply coupled with high electricity bills were serious cause of concern for them. The villagers from this village are relived and glad that they now have the option to use Pongamia oil run engine to lift the water. By using this alternative they have started saving at least Rs.1500/month

(50% of electricity bill) and they are no more dependent on supply of power from the state for their drinking water needs. At present they have replaced one electric motor by Pongamia oil run 5 HP engine. Out of the remaining two engines, one is being kept aside for demonstration in various villages so that farmers get to know that it works and it subsequently will create market for Pongamia oil. Moreover, one contractor from **Village Lonere** near **Songhar** who owns about 5 tractors has shown interest in using Pongamia oil for running the tractors in coming season. There exists also another interesting market opportunity for Pongamia oil in this area in form of **diesel engine** run **Auto-rickshaws**. There are about **30** Auto-rickshaw operators in this cluster. The trials are currently being conducted to know the efficiency of Pongamia oil as well as operational issues such as clogging of filter etc.

The remaining engine will be used for converting a floor mill currently run on electricity to a Pongamia oil run floor mill in remotely placed tribal village ***Barshet*** from the same region.

In the expected deliverables, we had mentioned that 5 irrigation pumps will be operated for cumulative **180 hrs** in 5 villages. It was assumed that agriculture is the main livelihood activity of the target population and by increasing agricultural productivity one can increase the income of the farmers. Though this matches with the situation on ground, the community was more enthusiastic and inclined to sell the oil for different users, as they never run a business where money is seen. On the other hand, the oil production was also relatively small. This is in our opinion an important outcome of the project that villagers are looking at bio-diesel resource center as a revenue generation activity. Moreover the villagers would first take the benefit of shorter value chain of **Seeds to oil to money. Coming back to the actual outcome in terms of running diesel engine on PSVO, both expeller engines have till date clocked 95 hrs. The PSVO run engine for lifting water in village Songhar has clocked about 50 hrs. Thus all put together it comes to about 145 hrs of operation on PSVO. This is besides the 20 hr operation of power-tiller owned by Mr. Tendulkar which consumes about 1.5 liters of oil/hr.**

4. Project Outcome and Impact

Discuss the actual project outcomes (developmental results), compared to the expected outcomes. Please report here on the indicators monitored throughout project implementation, disaggregated by gender, including baseline and end-of-project data collection.

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We are listing out the expected outcomes as mentioned in the approved proposal below.

- Capacity building of the **50 farmers** from **10 villages** in the context of role of rural energy services in livelihood support.
- **25** Small farmer families will benefit directly from additional agricultural activity on fallow land.
- **2** Village level Bio-diesel resource centers established which will serve as nodal agency for business transactions in bio-diesel products like collection of seeds, oil, oil-cake.
- Total **75** individuals will benefit from various income generation opportunities created by BDRC (Bio-diesel Resource Center).

As regards the first outcome , over **200** farmers from **20 villages** – villagers having agriculture as main livelihood strategy – were introduced to the concept of using Pongamia oil in rural machines and equipments such as oil expeller, floor-mill, pumps and power-tiller through live demonstration and actual use.

The second outcome related to increased agricultural productivity could not be achieved during the tenure of the project due to time constraint and the fact second crop after paddy which is totally rain-fed is taken in the months starting from October. However more than **100 families** participated in seed collection and earned additional income and were thus directly benefited from the project. The impact of availability of energy service on agricultural activity could be seen in coming few months.

2 Bio-diesel resource centers were established as expected. One was set up in Alibaug block at village Mahajane while the other one has been set up at Village Songhar in Mhasala block from Raigad district. Both these centers have started generating revenue by selling Pongamia oil and oil cake. These centers have offered the much needed avenue to the poorer communities to earn livelihood support by selling oilseeds in the village.

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As has been recorded and experienced more than **500 individuals** have benefited directly or indirectly because they were involved at some stage in the project as part of the supply chain.

In Alibaug block there were about 25 villages and hamlets which were selected for intervention under the Bio-diesel Project, however, for the baseline survey 3 villages/hamlets were selected namely, **Beloshi, Mahajane and Ramraj**. Accordingly the background facts of each village mentioning various indicators are given below:

Village:
A. BELOSHI:

Sl.No	Indicators	Number	Percentage
1.	Number of household	324	
2	Population :	1482	
3	Household size:	4.6	
4	Sc Population	10	0.7%
5	ST Population	516	34.8%
6	Population by sex ratio		
	a. Males	738	
	b. Females:	744	
7	Literates:	824	64.9%
8	Illiterates	658	51.9%
9	Main Workers	832	56.1%
10	Marginal Workers	82	5.5%
11	Non workers	568	38.3%
12	Percentage of cultivators		43.8%
13	Percentage of agricultural Labourers		42.1%
14	Percentage of household industries		2.2%
15	Percentage of work participation rate		61.7%

B. MAHAJANE:

Sl.No	Indicators	Number	Percentage
1.	Number of household	174	
2	Population :	693	
3	Household size:	4.0	
4	Sc Population	0	0
5	ST Population	180	26.0%
6	Population by sex ratio		
	a. Males	339	

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	b. Females:	**354**	
7	Literates:	**441**	**71.1 %**
8	Illiterates	**252**	**40.6 %**
9	Main Workers	**239**	**34.5 %**
10	Marginal Workers	**70**	**10.1 %**
11	**Non workers**	**384**	**55.4 %**
12	Percentage of cultivators		**49.8 %**
13	Percentage of agricultural Labourers		**5.8 %**
14	Percentage of household industries		**1.3 %**
15	Percentage of work participation rate		**44.6 %**

C. RAMRAJ:

Sl.No	Indicators	Number	Percentage
1.	Number of household	**206**	
2	Population :	**1003**	
3	Household size:	**4.9**	
4	Sc Population	**50**	**5.0 %**
5	ST Population	**218**	**21.7 %**
6	Population by sex ratio		
	a. Males	**499**	
	b. Females:	**504**	
7	Literates:	**759**	**83.7 %**
8	Illiterates	**244**	**26.9 %**
9	Main Workers	**213**	**21.2 %**
10	Marginal Workers	**242**	**24.1 %**
11	Non workers	**548**	**54.6 %**
12	Percentage of cultivators		**22.0 %**
13	Percentage of agricultural Labourers		**41.8 %**
14	Percentage of household industries		**12.1 %**
15	Percentage of work participation rate		**45.4 %**

In the context of the project following outcomes were important.

a) **Capacity building** – For this outcome, one major indicator that was monitored was the number of Pongamia pinnata trees cut for selling as fuel wood to the brick kiln operators. During the resource use assessment it was realized that Pongamia pinnata was preferred fuel-wood among the brick kiln operators and a major threat to the development of an enterprise based on this resource. However, once the project was announced and villagers got to know that they can earn from seed

collection which is a sustainable income, they have resolved to stop cutting the trees for this purpose. We are of the opinion that this is a very important step in capacity building, for use of PSVO could be understood gradually, but the resource must be kept intact. In this manner sustainability of the resource center could be ensured.

b) **Income generation:** The indicator monitored for this outcome was the employment this project could offer to the rural poor and unemployed directly or indirectly. As can be seen from baseline above, the unemployment rate is quite high in the project villages from Alibaug block which also indicates that majority of the people have rain fed agriculture as only occupation. Though about **100** individuals were involved in supply chain through **18** procurement centers and directly benefited from the seed collection activity, the actual impact in terms rise in yearly income of these individual could be seen only in the coming season when the full harvest potential will be exploited. Nevertheless, the two centers have **5** full time employees as operators and they earn their livelihood from this center.

c) **Improvement in energy service –**
The role of Pongamia oil in energy use was totally unknown to all the villagers in the project area. Thus major thrust was given to demonstration of this use in running diesel engines, power tiller and floor mill. The impact it has created will spread gradually and the impact can be seen in the peak season of agricultural activity i.e. Oct-Jan. Nevertheless the impact is seen in village Songhar where one engine is run daily for **2 hours** on PSVO for last one month.

Please find below a table indicating how communities will directly benefit by opting for PSVO in coming time. (**These benefits are besides the carbon credits!)**

Rural energy intensive agriculture	Hours of use /year	Rating	Diesel consumption	Current diesel price	Annual fuel cost	SVO price at the bio-Diesel resource	Saving due to substitution by Straight Vegetable

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machinery						center	Oil
Power tiller	500	13HP	1.5 liters/hr	Rs.35 /liter	26250	Rs.30 /lit	Rs.3750
Irrigation /drinking water pump for village	1000	5 HP	0.75 liters/hr	Rs.35 /liter	26250	Rs.30 /lit	R.3750
Tractor	600	35	4 liters/hr	Rs.35 /lit	84000	Rs.30/liter	12000

Perceived impact of GVEP project

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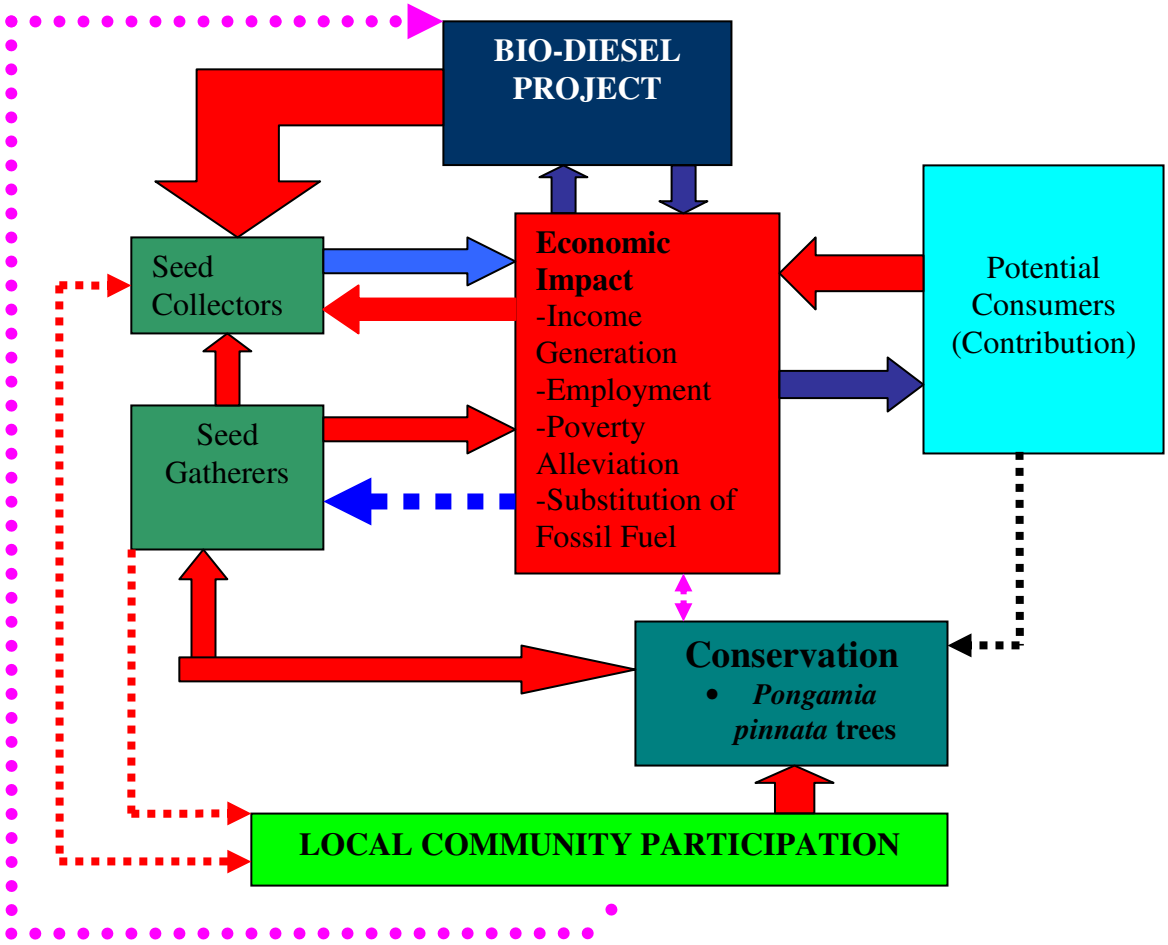

Please comment on what has been done to make this project as sustainable as possible (ensuring that activities can continue beyond this funding period), and what would be needed to achieve greater sustainability.

As mentioned in the proposal itself, the sustainability of the project will be ensured once the bio-diesel resource center starts generating surplus revenue. As our experience shows, even when the seed collection was about only 20% of the actual potential, the center has generated profit. Thus surplus revenue is going to be major motivator for the community and a crucial indicator of sustainability. To achieve long term sustainability, continuous facilitation is necessary as regards resource enhancement, marketing of produce and institutional strengthening at least for one more year. At present, the institutional structure is loosely knit, it needs to be given a professional identity of an enterprise.

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Plantations of Pongamia pinnata on community lands could be an important step towards resource enhancement. Nurseries need to be established for this purpose. The centers can also earn from selling seedlings of Pongamia in the growing bio-diesel industry.

Moreover at least one person needs to be appointed for selling the surplus oil in nearby metros.

AERF has applied for continuation of funding to GVEP as it thinks that one year is not sufficient for building the capacity of the community in energy sector. Moreover, it has also send applications for some competition for award in this sector for continuing the work in this region.

Please comment on what would be needed to further scale-up this project.

The scale-up of this project could be achieved by adding one more expeller of same capacity or double capacity. However it needs to seen how the first unit operates through the next year. As mentioned before , institutional set up needs to be strengthened before any additional work load is created.

** Please include as attachments to this report:*

- *Before and after photos of the project in jpg format where possible/relevant*
- *Quotes from people/beneficiaries impacted*

Please see the attachments

5. Project Lessons Learned

Discuss lessons learned through project implementation. What unexpected barriers or challenges did you encounter?

The project implementation was made relatively easier due to couple of facts a) Community participation was high b) resource availability never posed any problem c) the project idea was based on strong fundamentals. Initially, the challenge was to motivate people for seed collection. Expecting voluntary labour from poor people was a wrong assumption mentioned in the proposal. In fact it was realized that seed collection is the activity which can offer substantial livelihood support to the rural poor. Second barrier was community's resistance to the idea of second bio-diesel resource center in nearby villages. It could have posed competition and also the uniqueness of

such project would have faded in short time for them. Therefore we had to compromise on our plan of establishing the second bio-diesel resource center at village **Ramraj**, 15 kms away from village **Mahajane. One major lesson learned from this project is that implementation projects related to economic development receive greater response from the communities and stand higher chances to be successful as compared to implementation programs related to conservation.**

Discuss whether there were any changes to project design/approach during implementation.

There were couple of changes in the project approach :

a) We had assumed that community members will offer voluntary labour for seed collection. It was a wrong assumption, as one should not expect poor to suffer in a project designed to reduce poverty. Thus we used the micro-credit mechanism to pay the seed collectors cash on delivery which was main trigger for substantial collection of seeds in short time.
b) Secondly, as assumed in the approved project, we did not insist on use of Pongamia oil in irrigation pumps neither did we immediately offer the pumps to the farmers. Rather we went for an expeller which could operate on the PSVO. Secondly we searched for applications where diesel could be substituted through PSVO such as Power-tiller , floor mill and which will create demand for PSVO which is crucial for sustainability of bio-diesel resource center.

Did the project generate any unintended outcomes (positive and/or negative)?

The project did generate lot of unintended and positive outcomes. This was mainly due to the publicity it received from media. Two big NGO – Helpo Foundation and Panipanchayat visited the project site. Both of these NGOs are keen to replicate this project in their region. **Helpo foundation** has established a network of 350 self-help groups in district of Satara ,Maharashtra. This organization thinks that this project has huge potential for scale-up and micro-credit could play a crucial role in this project. **Panipanchayat** has asked **AERF** for technical help for resource assessment and setting up of one such center. Representatives of big engineering group from Maharashtra also visited our project. They have expressed their interest in cultivation of Pongamia pinnata on 100 acres of land and wish to run big capacity generator on PSVO for electrification of one settlement. Academicians were also among the visitors to our center in Alibaug block. The students and professors from **Center for Technology Alternatives for**

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Rural Areas of IIT, Mumbai visited the bio-diesel resource center for having a look at an expeller running on PSVO. Students and professors having expertise in **Energy Engineering Systems** from IIT, Mumbai also visited the facility. They have shown readiness to offer the technical expertise for modifications in diesel engines for trouble less running on **PSVO.** Many individuals contacted AERF and asked for advise for starting up something in this field.

What recommendations would you make to other organizations interested in scaling up or replicating this project?

The replication of this project looks possible; however it is recommended that a proper resource assessment is carried out before establishing the center. Moreover, community organization and participation has to be quite strong for successful implementation of the project. Keeping tight control over raw material prices and avoiding involvement of middlemen in supply chain as well as having correct information about the demand are some of the key strategies for scaling up of this project.

6. Quantitative Data on Indicators

Indicator	Number anticipated before Project Start	Actual Number at Project Completion
Number of Households directly impacted	25	100
Number of Businesses directly impacted	4	6
Number of Schools or other Service Providers directly impacted	1	1
Other indicator (please specify)		
Other indicator (please specify)		
Other indicator (please specify)		

Please provide details on the nature of these impacts.

7. Survey

Please circle appropriate response.

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SA = Strongly Agree A = Agree D = Disagree SD = Strongly Disagree NA = Not Applicable

The lessons learned in doing this project will enable this firm to improve energy services in the future.	**SA** A D SD NA
This grant enabled many households to receive improved energy services.	SA A D SD **NA**
The outcomes of this project were very disappointing.	SA A D SD NA
The implementation of the project was very smooth.	SA **A** D SD NA
We encountered many delays in implementing this project.	SA A **D** SD NA
The outcome of the project was not what we anticipated at the beginning of the grant.	SA A D **SD** NA
We anticipate that the impact of this project will be sustained for many years.	SA **A** D SD NA
We had to change course several times to get this work completed.	SA A **D** SD NA
The administrative procedures for the grant were quite difficult.	SA A **D** SD NA
The physical achievements of this project were very impressive.	SA **A** D SD NA
This project enables us to expand work in this area.	**SA** A D SD NA
I would definitely apply for another GAPFund Grant.	SA **A** D SD NA

8. Additional Comments by Grantee

The project duration is sufficient for demonstration purpose but short for measuring the impact. The GAPfund is very good idea and it needs to be continued if one really wants to bring the marginalized in the mainstream.