International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 253-261 www.ijaem.net ISSN: 2395-5252

SAI Sustainable Agro: An Innovative Model for Multiplying Farmers' Income

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Submitted: 01-08-2022 Revised: 02-08-2022 Accepted: 08-08-2022

ABSTRACT
In many areas of the country small and marginal farmers are not able to utilize their land and manual resources because of lack of knowledge, training and market linkages. On the other hand, many agro based industries have to meet their inputs by imports as it is not readily available in their captive areas. SAI Sustainable Agro identified this gap and started working in the tribal areas of Rayagada district of Odisha State, in 2013. It tied up with JK Paper Mills, located in the district and was dependent hugely on import of pulp wood, for assured purchases of pulpwood at predetermined price. Having assured of the forward linkage, it started working with the farmers who had barren or low productive lands. To start with, hybrid eucalyptus, which needs very less water and care, are planted in these lands. Subsequently, intercrops- like finger millets are planted between the rows of the eucalyptus trees. Traditional knowledge is combined with biotechnology, ensuring farmer access to better quality inputs and cultivation techniques. Farmers are also provided access to training, technical expertise, finance, machinery as well as fertilizers right at their doorstep. This encouraged farmers to adopt the model. This saw the farmers coming out of the poverty cycle in first 4 years itself. This agroforestry model not only improves the soil quality and productivity, but the trees and the land also act as rich carbon sinks.

Key words: Small and marginal farmers**,** Sustainable Agro, Farmers' income

I. INTRODUCTION

SAI Sustainable Agro is a social enterprise which has conceptualized, piloted and replicated an investment model on agro-forestry for small & marginal farmers. It has been working with marginalized tribal farmers since 2013 to convert their unproductive barren land into sustainable agroforestry systems, incorporating high value plantations and traditional food crops. With this, not only are they able to reclaim their degraded lands, but also gain financial and nutritional security.

SAI was born as a solution to bridge the gap between the industry and the smallholder farmer, both of whom faced problems that could be mitigated by bringing them together. On the one hand, 90% of India's poor comprise small and marginal farmers, most of whom have degraded land that can be reclaimed with the right agricultural practices. On the other hand, agro-based industries face shortage of domestically available raw material andare often forced to import.

It's agroforestry model not only improves the soil quality and productivity, but the trees and the land act as rich carbon sinks. SAI is of the belief that grant, charity, technology or market alone cannot sustainably address poverty elimination and thereforepromotes inclusive business ecosystems, bringing together key stakeholders including communities, companies, government, investors, technical experts and entrepreneurs. In India, it is working in tribal regions of Odisha, Madhya Pradesh, Chhattisgarh as well as with small and marginal farmers in Bihar and Uttar Pradesh. The model is also being replicated in Uganda, South Africa, and Ghana.
SAI has shown that with a grounded model, the income of the farmers can be increased multiple times within a short span of time.

II. LITERATURE REVIEW

In most of the developing and under-developed countries, agriculture is the primary sector providing employment and livelihood of the majority of rural population. It is main vehicle for poverty alleviation in rural areas and contribution to overall economic growth(R. Singh, 2019). Investment in agricultural science and technology,

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the urbanization rate, quantity of the primary industry employment and the scale of farm households have significant effect on farmers' income. Higher and faster rural transformation and structural transformation play important role in higher and faster growth of rural income(Huang & Shi, 2020). Limited market information and market access are two major roadblocks in increasing smallholder farmers' income.One way to overcome these challenges is forming farmer organizations which helps in improving access to markets while reducing transaction costs.A government supported policy environment that facilitates establishing and/or strengthening of farmer organizations be supported in sourcing, disseminating market information market accessibility to enhance smallholder livelihoods(Aku et al., 2018).

An additional year ofexperience and levels of education has seen adding to agricultural productivity.To provide a solution to the problem of food insecurity, the government should allow farmers to endow morein human capital(Djomo&Sikod, 2012). Farmers tend to diversify their income with non-farm wage jobs in response to rainfall shocks. This diversification strategy is employed less in places with more variable historical weather as people are more adapted(Chuang, 2019).The adoption of mobile phones by fishermen and wholesalers has contributed to a dramatic reduction in price dispersion, the complete elimination of waste, and near-perfect adherence to the Law of One Price, leading to increased consumer and producer welfare(Jensen, 2007).

The specific target of increasing farmers' income could be achieved by developing cost-effective technologies, transferring them from laboratory to land, educating the farmers and creating a linkage between all stakeholders. Hence, consistent efforts is required to harness all possible sources for increasing farmer's income in and outside the agriculture sector(P. Singh et al., 2019). Priority measures for the development of the agricultural innovation system should be aimed at strengthening food independence: promoting the research program targeting small farmers, creating favourable infrastructure for food systems, contributing to the farmers' and scientists' knowledge flows: expanding the agricultural production and strengthening the human potential, encouraging the development of scientific, technological and innovative applications on key food safety issues(Tokhayeva et al., 2020).Doublingover 5 to 6 years in nominal terms is already happening while doubling the real incomes of farmers in sixyears is a formidable task though may not be altogether impossible if proper strategies are implemented.What is required is multi-pronged strategies for enhancing returns and reducing costs and making theincomes sustainable keeping in view the depleting natural resource base(Satyasai, 2016).

The Business Model

With a vision of "A world where marginalized sections of society are not looked as recipients but partners in development, actively contributing to the economy while improving their own social and economic status",SAI's business model is a diversified B2B and B2C model that utilizes agroforestry as a tool to give farmers access to fair market linkages, while industries get access to high quality raw material within their captive zones. Through it'sB2B model, SAI mobilizes farmers to grow the required pulpwood together with millets. Traditional knowledge is combined with biotechnology, ensuring farmer access to better quality inputs and cultivation techniques. Farmers are also provided access to training, technical expertise, finance, machinery as well as fertilizers right at their doorstep.

Courtesy: SAI Sustainable Agro

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It has implementedthe Community Resource Persons (CRPs) model wherein unemployed rural youth are identified& trained and then placed back in the community. They provide handholding and support to clusters of farmers. During cultivation, maintenance and harvesting, landless people are provided with wage employment. Farmers are ensured direct market access, thus becoming valuable business partners in the corporate value chain by supplying them crucial raw materials. This has eliminated the reliance on exploitative middlemen for the sale of their valuable produce. SAI works with small farmers in a true partnership where it shares resources and the returns in equal terms. With the intercrop, the farmer also gains nutritional food for his/her family.

How it works

First of all a tripartite agreement is entered into by the farmer, SAI Sustainable Agro and JK Paper Mill wherein it is agreed that funding will be provided by SAI for which it will be eligible for half of the net profit, entire wood would be sold to JK Paper Mill and the paper mill commits to purchase of the entire wood crop at a mutually agreed price. Thereafter the actual agroforestry starts.

Just before the monsoon, small pits of 2 feet are dug at a distance of 8x8 feet. As the area is infested with termites, the pits are treated with anti-termite insecticides. As soon as the monsoon arrives, saplings are bought from the nearest nurseries and planted. Thereafter, soil is put at the base of the saplings to avoid waterlogging. Some fertilizer is also applied for faster growth of the saplings. In the space between the rows, finger millets are sown which again is

Courtesy: SAI Sustainable Agro

usually a rainfed crop. The intercrop is grown every year adding to the food requirements and income of the farmers. After 4 years, the Eucalyptus trees are ready for the first harvest. After debarking, the harvest is transported to the papermill, accompanied by the farmers. They get it weighed in their front. The payment is received by SAI which then pays to the farmers their share of the net profit.

The Economics

The farmers have to pay just Rs 700, Rs 200 as the cost of tripartite agreement and Rs 500 towards the commitment charges. All other expenses are borne by SAI. Following is the break-up of the costs, details of which are annexed as Appendix-I:

For first 3 years:
New Plantation

Head	Amount(INR)
Ploughing	3,000
Clone Cost	4,000
Cost of Plant medicine - plantation	750
Cost of DAP Fertilizer - plantation	4,200
Transportation(LS)	600

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SubTotal(Material component)	**12,550**
Pitting, plantation and application of 1st dose of plant medicine & fertilizer	800
Soil work & applying first dose of fertilizer and plant medicine (1-2 months after plantation)	1,600
Soil work & applying Fertilizer in 2nd year	800
Soil work & applying fertilizer in 3rd year	800
Tray Returning	150
Intercrop Seeds and Plant Protection Measures (Finger Millet)	300
Sub Total - Labour component	**4,450**
Cost of Plantation (A+B)	**17,000**

Coppice Plantation

Head	Amount(INR)
Fertilizer Application After 1st Harvest (3 times total in 3 years)	2,400
Ploughing (First Coppice)	2,250
Cost of Fertilizer	4,200
Transportation(LS)	500
Total Cost of Coppice Plantation	**9,350**

And the income is as follows, details of which has been appended as Appendix-II

Income of Farmers per Acre in first 4 years

Sale from Harvested Wood	33,500
If labour provided by farmer, then labour payment in first year	2,400
If labour provided by farmer, then labour payment in second year	800
If labour provided by farmer, then labour payment in third year	800
Buyback of Intercrop from Yr 1-4 (Finger Millets): Output of 500 Kg/Acre Per Year	40,000
Total	**77,500**

For subsequent years, the break-up is as follows:

2nd Harvesting in Year 7

Sale from Harvested Wood	44,325
If labour provided by farmer, then labour payment in three years	

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	2,400
Buyback of Intercrop from Yr 5-7 (Finger Millets): Output of 500 Kg/Acre Per Year	30,000

3rd Harvesting in Year 10

Sale from Harvested Wood	37,325
If labour provided by farmer, then labour payment in three years	2,400
Buyback of Intercrop from Yr 8-10 (Finger Millets): Output of 300 Kg/Acre Per Year	30,000
Total Profit Generated Per Acre in Ten Years (Rs.):	**2,23,950**
Profit Per Year (Rs.):	**22,395**

Thus, the farmer earns an average of Rs 22,395 every year for 10 years from hitherto unutilized land.

Achievements

Till date SAI has collaborated with almost 2000 farmers and has restored more than 3500 acres of degraded forest land.

The following figures give an idea of what SAI has been able to achieve as of 31st October 2021:

1,679 farmers collaborated with & trained by SAI

55,562 person-days of wage employment to landless labourers

3,170 acres of unproductive land brought under cultivation

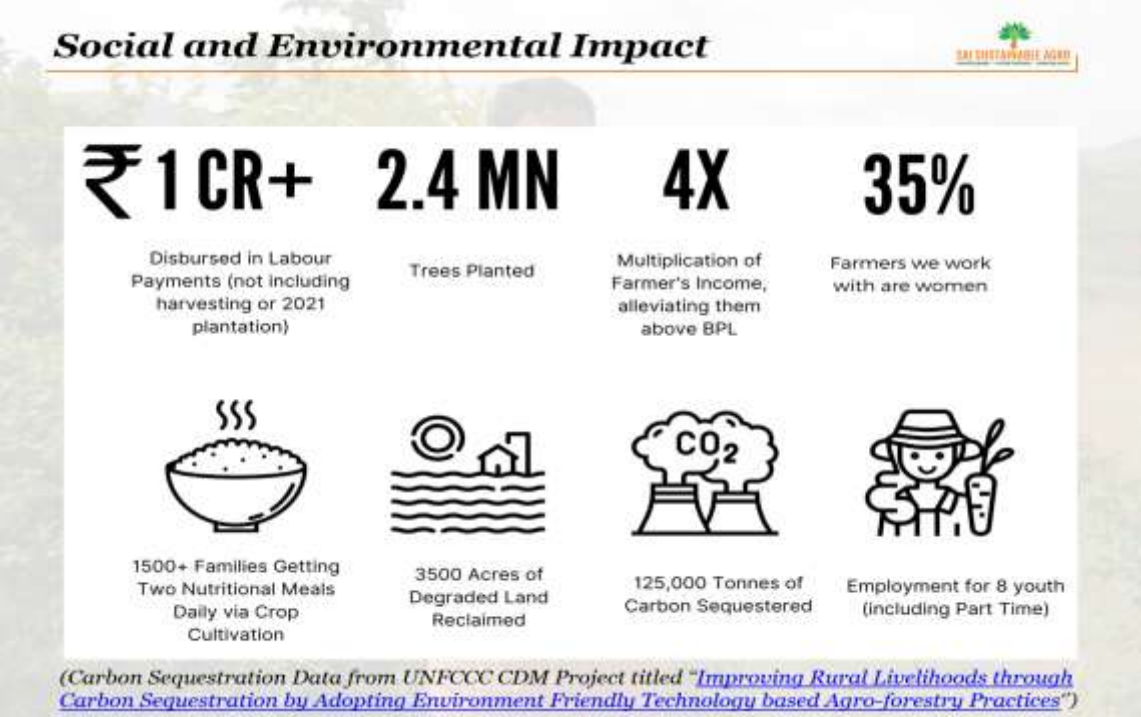
2.16 million trees planted on productive land

1,15,705 tonnes of carbon sequestration(@ 36.5 tonnes/acre)

12 rural youth given full-time employment

Social and Environmental Impact

The model has impacted not only the farmers but the society and the environment as a whole.



Courtesy: SAI Sustainable Agro

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The Road Forward

SAI has provided a model which can be replicated in other parts of the country. What is needed is identification of gaps between what the agro based industries need and what the farmers can produce. Once that is done, proper linkages and finances can bring overwhelming changes not only in the farmers' life but the entire ecosystem.

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APPENDIX-I

Agro-forestry in One Acre under SAI Model								
Unit Cost of Eucalyptus Plantation/Acre (Benchmark/Standard taken from NABARD guideline)								
No of Plants:	**800**							
Variety	**Clones**							
Unit Cost of New Plantation								
					New Plantation			**Total (in 3 years) in INR**
Sl. No.	**Particulars**	**Unit**	**Number**	**Rate (INR)**	**I YR**	**II YR**	**III YR**	
1	Ploughing	Acre	2 hours Yr1, 1 hours in Yr 2 & 3	750	1,500	750	750	3,000
2	Clone Cost	No	800	5	4,000			4,000
3	Cost of Plant medicine - plantation	litre	2	375	750			750
4	Cost of DAP	bag	1	1,400	1,400	1,400	1,400	4,200

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	Fertilizer - plantation							
5	Transportation(LS)	Truck		200	200	200	200	600
	SubTotal(Material component)				**7,850**	**2,350**	**2,350**	**12,550**
1	Pitting, plantation and application of 1st dose of plant medicine & fertilizer	No	800	1	800			800
2	Soil work & applying first dose of fertilizer and plant medicine (1-2 months after plantation)	No	2	800	1600			1,600
3	Soil work & applying Fertilizer in 2nd year	No	1	800		800		800
4	Soil work & applying fertilizer in 3rd year	No	1	800			800	800
5	Tray Returning	LS	1	150	150			150
6	Intercrop Seeds and Plant Protection Measures (Finger Millet)	Kg	3	100	300			300
	Sub Total - Labour component				**2850**	**800**	**800**	**4,450**
	Cost of Plantation (A+B)				**10700**	**3,150**	**3,150**	**17,000**

Unit Cost of Coppice Plantation								
					Coppice Plantation			**Total (in 3 years) in INR**
Sl. No.	**Particulars**	**Unit**	**Number**	**Rate (INR)**	**I YR**	**II YR**	**III YR**	
1	Fertilizer Application After 1st Harvest (3 times total in 3 years)	No	3	800	800	800	800	2,400
3	Ploughing (First Coppice)	Acre	1 hour every year	750	750	750	750	2,250
4	Cost of Fertilizer	bag	1	1,400	1,400	1,400	1,400	4,200
	Transportation(LS)	Truck		200	200	150	150	500
	Total Cost of Coppice				**3,150**	**3,100**	**3,100**	**9,350**

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	Plantation								

APPENDIX-II

Profits To Farmer Per Acre in 10 Years

Item	Number	Unit	Unit Price (Rs.)	Total Revenue Per Acre (Rs.)	Expenses at Time of Plantation (Rs.)	Expenses at Time of Harvesting (Rs.)	Total Expenses (Rs.)	Total Profit (Rs.)	Profit to Farmer in Rs. (50% of Total)	Profit/Acre (Rs.)
New Plantation (Harvesting in Year 4)										
Sale from Harvested Wood	30	MT	4200	126000	17000	42,000	59,000	67,000	33,500	33,500
If labour provided by farmer, then labour payment in first year	3	Plants	800	2400	0					2400
If labour provided by farmer, then labour payment in second year	1	Plants	800	800	0					800
If labour provided by farmer, then labour payment in third year	1	Plants	800	800	0					800
Buyback of Intercrop from Yr 1-4 (Finger Millets): Output of 500 Kg/Acre Per Year	2000	Kg	20	40000	0					40000
2nd Harvesting in Year 7										
Sale from Harvested Wood	35	MT	4200	147000	9350	49,000	58,350	88,650	44,325	44,325
If labour provided by farmer,	3	Plants	800	2400	0					2400

then labour payment in three years										
Buyback of Intercrop from Yr 5-7 (Finger Millets): Output of 500 Kg/Acre Per Year	1500	Kg	20	30000	0					30000
3rd Harvesting in Year 10)										
Sale from Harvested Wood	30	MT	4200	126000	9350	42,000	51,350	74,650	37,325	37,325
If labour provided by farmer, then labour payment in three years	3	Plants	800	2400	0					2400
Buyback of Intercrop from Yr 8-10 (Finger Millets): Output of 300 Kg/Acre Per Year	1500	Kg	20	30000	0					30000
Total Profit Generated Per Acre in Ten Years (Rs.):	**2,23,950**									
Profit Per Year (Rs.):	**22,395**									