

Major plantations on farmer's degraded lands in Karnataka supports agro forestry promotion and development: Pioneer efforts of SARA-WCPM in India

Abstract

Agro forestry is an age old practice of human being when he started to harvest and grows plants for his food and learned to use the plants for his benefit. Earlier, plants were grown beneath the trees and gradually tree begin to vanish to give more space to the crop plants but a certain number of trees were existing till independence in the fields to provide fuel wood, fodder, fibre, fruits, small timber, minor produces, shelter to the birds and others.

The present paper dealt the major contribution of the paper mill like West Coast Paper Mills Limited, Dandeli through major plantations activities to promote and development of agro forestry on degraded farmlands through its Society SARA under Contract for Farming Scheme for Captive Plantation in the states like Karnataka, Maharashtra and others. No doubt that paper Industries always remained under pressure to fill the gap between demand and supply since the last decades. It is also very true that to meet out the demand of raw material i.e. wood from the available sources always remained a big challenge-for paper industries since the last many years. For sustain supply of raw material in future and to maintain the sustainability, major plantations activities were undertaken by paper industries like West Coast Paper Mills Limited (WCPM) by constituting a society, i.e. SARA (Society For Afforestation, Research and Allied Works, Dandeli) in 2001. The main objective of the Society was to promote afforestation programme through major plantations on the degraded lands (under rain fed) condition of farmers through employment generations and capacity building. West Coast Paper Mills Limited, Dandeli (Karnataka) is a leading paper manufacturing industry of the country (under the flagship of Bangur Group) located at the bank of Kali River in Dandeli of Uttar Kannada District in State Karnataka. To date company through SARA has raised captive plantations in more than 50,000 acres on degraded land of farmers in different districts of Maharashtra, Karnataka, Andhra Pradesh States under Captive Plantation Project through Contract for Farming since 2006 under a simple agreement period of only five years. All the plantations are FSC®-FM certified for "Well Managed Group Plantations" since 2011. After five years i.e. completion of agreement period, Society arranged to harvest the first rotation crop of the farmer of 2006 to 2011 and paid the amount of the crop directly to farmers into their bank accounts. Regarding marketing of farm produce after maturity, SARA has a mutual contract with WCPM for purchasing of pulpwood grown on farmer's land. With this, Farmers are getting full amount of their crop harvested after five years without any hurdle through SARA. It is important here to mention that WCPM also providing financial supports to SARA so that Society could be able to make all the expenditures for raising the plantation (i.e. From Land development, plantation and Harvesting) with this commitment that wood only will come to Company. Further, Society has also taken major initiatives to promote Agro forestry for livelihood

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og farmer and employment generation. Under its Agro forestry plantation programme, superior planting material of various pulpwood species i.e. Eucalyptus, Subabul, Casuarina and Acacia were planted on farmer's land. Farmers were also encouraged for intercropping like Maize, Peanut (Groundnut), Chilly, Tomato and Ginger with these plantations to take advantage of extra income from Plantations as well as from agriculture crop. For such area where rain fall is very low, SARA provided free fodder to the livestock of farmers through distribution of fodder grass seeds to farmers free of cost. Various types of fodder species such as Stylosanthes scabra, S. Hamata are grown with the plantation. SARA has also set up its own Hi-Tech clonal nursery and developing around 5-6millions of hi-yielding clonal ramets every year through clonal propagation technology.

Till date, SARA has received 0.26million MT of pulpwood from the plantations on Farmer's land with a yield of 25-30 MT/Acre. This type of activities will prove a boon for farmers as well as for industry in win-win situation, when there is a major shortage of raw material in the country. In that situation plantation can play a major role to fill this shortage to some extent where paper industry can feel themselves in a better position. Further, plantations will also be helpful to conserve our Natural resources, HCVF and will reduce the pressure on Forest for wood. In addition, this will maintain the balance between environment and nature. To meet the requirement of pulpwood for industry this type of plantation activities will open new ways for industry to secure raw material for future use. Also, this would be helpful to enhance productivity and generate employments for rural communities to improve their living standard and capacity building. The promotion of sustainable agro forestry practices on a large scale in future may be possible through amalgamation of proactive farmer policies of the state government, involvement of the industries, support services from NGOs and willingness of farmers in Karnataka.

Keywords: agro forestry, paper mills, captive plantation, natural resources, rural communities

Abbreviations: SARA-society for afforestation, research & allied works, HCVF-high conservative valued forest, FSC®-FM -forest stewardship Council® -forest management

Introduction

Agro forestry has high potential for simultaneously satisfying three

important objectives viz., protecting and stabilizing the ecosystems; producing a high level of output of economic goods; and improving income and basic materials to rural population. Besides, agro forestry is capable to conserve natural resources through various systems under different agro climatic regions. The livelihood security through agro forestry and its potential in meeting basic needs viz., food, fuel, fodder, and employment generation are highlighted in this article.

Agro forestry is the intentional combination of agriculture and forestry technologies to create integrated, diverse, productive, profitable, and sustainable land-use systems.¹ Agro forestry plantations already meet nearly 80% of round wood requirements of wood based paper and panel products industries and have the potential to lead us to self sufficiency in timber simultaneously contributing immensely to employment generation, greening of India, carbon sequestration and environmental amelioration. The potential of agro forestry in meeting the deficit of demand and supply in timber, fodder supply, bio energy sector through tree biomass and meeting the food/fruit security has been enumerated. The direct benefits like employment generation and indirect ones like carbon sequestration and environment restoration have been emphasized in respect of various agro forestry systems.²

An examination on the impact of agro forestry technology generation and adoption in different parts of the country highlights the major role of smallholders as agro forestry producers of the future. It is crucial that progressive legal and institutional policies are created to eschew the historical dichotomy between agriculture and forestry and encourage integrated land-use systems. Government policies hold the key to agro forestry adoption.³

Introduction to SARA & WCPM:

SARA is a Non-governmental, Non-profitable organization registered under Karnataka Societies Registration Act 1960, in 2001 and supported by West Coast Paper Mills Limited, Dandeli and a leading paper manufacturing industry in India. SARA is a group of forestry, agricultural and financial experts and progressive farmers to

help the West Coast Paper Mills Limited procure wood raw materials as part of the Controlled Wood Policy created in 2001. The policy ensures that West Coast Paper Mills Limited can procure its wood raw materials from known sources to meet the annual production of 3.2 Lac metric tons of paper and paper products. For this, Company is using wood and wood chips around 9.50 Lac MT annually as main raw materials for quality paper production. Company is also certified for FSC®-Chain of Custody and Controlled Wood. It declares that Company is committed through its Controlled Wood policy to procure wood from legal and known sources. Further company is also committed to conserve Natural resources and will not use any GM (Genetically Modified) crop as per FSC® policy. Company is supporting financially to SARA since the beginning to help out to meet its requirement for raising the plantations on farmer's degraded land also company has given a written commitment to SARA to purchase entire wood of the farmer after harvesting.

Since 2006 to 2017, SARA has been implementing plantation activities under contract farming on farmer's degraded land to raise plantation to make use of their unproductive land for income generation. To date, SARA has covered around 50,000 acres of degraded, waste and marginal lands in and around 1900 villages across the various districts of Karnataka, Maharashtra, Andhra Pradesh and Tamil Nadu States. It has also enjoined more than 8000 farmers to join SARA in the Captive Plantation Project⁴ to strengthen them through income generation and capacity building from plantations. The details of plantation area in various districts of Maharashtra, Karnataka and Andhra Pradesh, are as under in (Table 1).

Table 1 Details of plantation area covered 2006 to 2017 by SARA-WCPM in various states

S. no.	Name of section	District & state	Plantation area in hectare	Species undertaken
1	Ram Nagar	Uttara Kannada-Karnataka	1026	Eucalyptus,Acacia, Casuarina
2	Khanapur	Belgaum-Karnataka	5035	Eucalyptus,Acacia
3	Chennamana Kittur	Dharwad-Karnataka	2600	Eucalyptus,Acacia
4	Koppal	Koppal-Karnataka	2424	Eucalyptus, Subabul
5	Malgi	Sirsi-Karnataka	1783	Eucalyptus,Acacia
6	Chandgad	Kolhapur-Maharashtra	2171	Eucalyptus,Acacia
7	Radhanagri	Kolhapur-Maharashtra	2528	Eucalyptus,Acacia
8	Kulwalli	Dharwad-Karnataka	996	Eucalyptus,Acacia, Casuarina, Subabul
9	Nellore	Gudur-Andhra Pradesh	2213	Eucalyptus
Total			20776	

Contract for farming scheme

Under the Contract for Farming scheme, pulpwood plantation were raised on farmer's land with no expenditures from farmer's side to give a support and helping hand to poor and marginal farmers for a period of 5years. After 5years on maturity of Crop Company will arranged harvesting contractors and further the same will be transported to company with proper arrangements by society. All the Plantations raised by the SARA and WCPM on waste lands, barren and fallow lands of farmers with a clear intention to provide means of employments to farm communities for their livelihood and capacity building through income from Captive Plantations with the support of SARA. The wood are then sold to SARA after five years. Company makes the payment directly to farmers into his account on predetermined price at the time of execution of contract.

All plantations under the project are certified by SARA under the Forest Stewardship Council®-Forest Management by the Scientific Certification System since 2011 as Well-Managed Group Plantation. The Society ensures that all plantations comply with the certification objectives of promoting responsible management of forest; protecting and maintaining natural communities and high concentration of value forests; respecting the rights of communities and indigenous people; and building markets, adopting the best value and creating equal access to benefits.

Production of superior planting material

As part of contract farming, SARA is also actively engaged in producing quality superior clones of Eucalyptus, Acacia, Casuarina and Subabul. It has set up an advanced clonal nursery with an area of

3000sq. m. and with five mist chambers. This clonal nursery produces 50-60 lacks of clonal saplings which are transplanted to the farmers' fields (Figure 1).



Figure 1 Clonal hi-tech nursery

SARA and West Coast Paper Mills Limited have adopted vegetative means of propagating Eucalyptus and other species under its tree improvement program. The program aims to improve yield per

unit area. As the demand for raw materials drastically increases daily so does the need to meet high demand. It is thus essential to grow superior site specific clones of Eucalyptus and others on a large scale to increase bulk yield to get more returns.

Field plantation on farmer's degraded land

The entire plantation undertaken by SARA in its vicinity of around 25-300kms in Karnataka and Maharashtra to ensure a sustained supply of raw materials to mills for its use. SARA-WCPM raised plantations in all type of soils and environmental conditions. The section wise geographical data are given in (Table 2). Prior plantations all soil and site parameters were studied. Further, land was cleaned and dozed with dozer. All the debris was removed from the field prior ripping. A spacing of 3x1.5m is being adopted in all sections. Superior planting stock from SARA-WCPM hi-tech nursery provided to all sections. All plantations were done during rainy season from July-August every year. The plantations were raised in dry area with a rainfall of 500-750mm to High rainfall are of 2000-3000mm. Site specific clones of Eucalyptus, Acacia, Subabul and Casuarina were adopted. Majority of plantations are being taken as Eucalyptus plantations. Clone no. 7, 2135, 106, 103, 316, C-4, IFGTB-1 were planted in block plantation considering a spacing 3m row to row and 1.5 m plant to plant and in one acre 888 plants were planted.

Table 2 Section wise geographical data

S.No.	Parameters	Radhanagri	Chandgad	Khanapur	Ram nagar	Chennamana Kittur & Kulwalli	Malgi	Koppal	Nellore
1	District/ State	Kolhapur/ Maharashtra	Kolhapur/ Maharashtra	Belgaum/ Karnataka	Uttar Kannada/ Karnataka	Belgaum/ Karnataka	Uttar Kannada/ Karnataka	Koppal / Karnataka	Nellore/ Andhra Pradesh
2	Mean Temperature	20°C-30°C	20°C-3520°C	25°C-35°C	25°C-35°C	25°C-35°C	20°C-30°C	20°C-30°C	35°C-40°C
3	Latitude and Longitude	N 16° 24' 33.48" E 73° 57' 28.67"	N 15° 56' 33.95" E 73° 59' 27.09"	N 15° 42' 58.39" E 74° 22' 52.02"	N 15° 24' 57.51" E 74° 29' 52.02"	N 15° 35' 29.90" E 74° 27' 50.51"	N 14° 34' 58.84" E 75° 00' 39.65"	N 15° 35' 07.08" E 76° 15' 54.31"	N 14° 27' E 80° 02'
4	Mean Annual Rainfall (mm)	2500	2500-3000	2000-2500	2000-2500	1000-1250	1200-1500	500-750	750-1000
5	Altitude	550-600m above MSL	300-600m above MSL	650-750m above MSL	600-700m above MSL	680-750m above MSL	580-650m above MSL	350-450m above MSL	18-50 m above MSL
6	No. of Wet days	95	95	90	93	70	80	45	65
7	Soil Type	Red Lateritic Soil	Red Lateritic Soil	Red Lateritic Soil	Sandy loam + Red Lateritic Soil	Red + Black Cotton Soil	Partly Red Muram+ Partly Black Cotton	Red Muram + Black Cotton	Red Muram + Black Cotton
8	Soil pH	7-8	7-8	7-8	6-7	6-7	7-8	7-8	7-8

Yield from the matured plantation on maturity

SARA also assists farmers in engaging expert contactors to harvest the trees that have completed the five-year harvesting cycle. The first rotation crop of 2006, 2007, 2008, 2009, 2010 and 2011 has been harvested and farmers were paid for their pulpwood. Further

harvesting of 2012 plantation is in progress. The actual harvesting, however, is carried out by employing local residents to promote employments in the neighbourhood so that local communities who are in need can improve their living standards. This way, contract farming also provides employments to the whole farming and local communities (Figure 2). Yield from the plantation varies from site

to site having varied climatic conditions. Plantation showed better results in terms of yield in area having high rainfall where the rain was recorded 2000-2500mm whereas yield affected where the rainfall was very low i.e. 500-650mm. In some of the area exceptionally high yield in MT from few locations fall in high rainfall. Average yield from the plantation recorded from 25-30 MT in one acre.



Figure 2 Field plantation of various eucalyptus clones.

Returns to farmers from plantation

Farmers are being paid directly for the amount against the pulpwood received from his field on actual basis. Being a facilitator SARA also being paid facilitation charges for the handing of pulpwood from farmer's field to Company. Yield from the plantation after 5 years showed better. Except those area where the rain fall was very low i.e. 500-750 mm as compared to high rain fall areas where better yield obtained. Since farmers were not invested a single penny on the land the payable amount given to him accordingly by calculating the expenditures on plantations and its maintenance. Farmer's outstanding returns from his crop without investing any amount also it would improve the health of soil. Further looking to the return from the first crop farmers offered the plantation for second rotation crop which again would be beneficial for both farmers and SARA-WCPM as a win-win situation as farmer will be getting the same return from coppice crop with early maturity period of 4 years. This would also helpful for Industry to secure raw material in a sustainable manner with the same spirit in future with reduction in cost on new plantation and its maintenance.

Benefits to industry

Amidst continuous mismatch between demand and supply for wood, SARA's commitment to ensure the steady supply of raw materials to West Coast Paper Mills Limited has resulted to over 0.26 million metric tons of pulpwood from SARA-affiliated plantations. To date, plantations under SARA's projects have yielded an estimated 25-30 metric tons per acre after every five-year harvest. Further, overwhelming response of farmers towards second rotation plantations after harvesting of first crop showed a positive sign to industry to meet put its raw material demand in the future. Undertaking coppice crop, farmer as well industry would be benefitted with their assured income with the same return as in the first crop. SARA-WCPM have a great advantage by taking such coppice plantations of farmers as it would definitely reduce the cost towards establishment of new plantations and its maintenance with no risk of crop failure.

Role of SARA-WCPM for agro forestry promotion and development

In addition to providing quality planting materials of Eucalyptus,

Subabul, Casuarina and Acacia to the farmer-partners for contract farming, SARA also makes available the same quality planting materials at a subsidized price to farmers who are practicing Agro forestry. Simultaneous with the distribution of planting materials is the provision of technical assistance to guide the farmers on how to improve yield. These initiatives are part of the Farm Forestry Program.

Under the program, SARA guides the farmers on how to intercrop Eucalyptus with agricultural crops like Maize, ground nut, Tomato and other crops (Figure 3).⁴ Eucalyptus is recognized as a commercial crop in India.⁵ It is also widely cultivated at a large-scale on farm lands and waste land by the farmers of Karnataka Maharashtra and Andhra Pradesh. Eucalyptus is widely used as source of raw material for pulp, boards and furniture and also used as fuel wood. Integrating Eucalyptus in the farm lands has proven to be a big source of income to the farmers. In support of agro forestry farm establishment, SARA provides fodder to the livestock such as *Stylosanthes scabra* and *S. Hamata*. These are also integrated in the agro forestry farms. In some areas, the farmers are earning extra income by intercropping maize, cashew, peanut and ginger.



Figure 3 Clonal Eucalyptus intercrop with ground nut

Contribution of SARA-WCPM for livelihood security and employment opportunities

The initiatives of SARA in contract farming, clonal propagation of pulpwood species, pulpwood harvesting and agro forestry implementation not only provide numerous benefits to the paper industry but also to the farmer and his family. Overall, these initiatives help conserve and enrich our natural resources thereby reducing the pressure to source wood from natural forests. At the same time, saline lands are rehabilitated, soil erosion is reduced and carbon is effectively sequestered from the atmosphere. Promoting use of genuine, genetically improved, truthfully labelled and certified planting stock and strengthening of technical extension services including use of electronic as well as print media for mass communication are the foremost requirements for real progress.

Local employments providing employment opportunities through their plantation and harvesting operation and the same will remain continue to thrive where the plantations are located. About 324 person-days per hectare per year are spent on land development, transplanting, and plantation maintenance, while 460 person-days per hectare per year are spent on harvesting, debarking and loading. Long-term income to the land owners is also secured with SARA's contract farming project.

Government policies for promotion of agro forestry

India is the first nation in the world to adopt a comprehensive agro forestry policy when it launched the National Agro forestry Policy (NAP) at the World Agro forestry Congress held in Delhi in February 2014. The National Agro forestry Policy addresses the problems faced by the agro forestry sector including adverse policies, weak markets and a dearth of institutional finance.⁶ National Agro forestry Policy-2014 can serve better to promote Agro forestry in the country and it would encourage farm communities for their interest in Agriculture and as well in forestry. This is an outstanding attempt of Ministry of Agriculture, Government of India to strengthened farm communities the government of India. Further to this NAP-2014 aims to promote value chain, climate resilient technology development and pave way for region-based marketing linkages in agro forestry. The Policy also suggests massive extension programmes in order to broadcast the outcomes of intensive Rand D activities in the field of Agro forestry.⁷ National Agro forestry Policy should be implemented whole heartedly by central and state governments with allocation of adequate budgetary support and human resources (Figure 4).



Figure 4 Harvesting of plantation by local labours

Conclusion

Agro forestry systems due to diverse options and products provide opportunities for employment generation in rural areas. Increased supply of wood in the market has triggered a substantial increase in the number of small-scale industries dealing with wood and wood based products in the near past. Such industries have promoted agro forestry through major plantations initiatives and contributed significantly to increasing area under farm forestry. Recognizing agro forestry as a viable venture, many business corporations, limited companies such as ITC, WIMCO, West Coast Paper Mills Ltd., Hindustan Paper Mills Ltd., financial institutes such as IFFCO have entered into the business and initiated agro forestry activities in collaboration with farmers on a large scale.⁸ Have indicated the potential of agro forestry for rural development and employment generation to the tune of 5.763million human day's yr-1 from Indian Himalayas alone. Apiculture, lac culture and sericulture area are also the option for augmenting farmer's income.

To date, still big gap is there between pulpwood demand and supply. With the help of these initiatives this gap may be filled to a very good extent. Otherwise there will be a undue situation will arise

in lack of raw material before paper industry and other wood based industry for their survival. We must keep in our mind that millions of people are directly and indirectly depends on these industries for their livelihood. Further it would not be out of place to mention here that without such actions we cannot imagine our self in a better and safe position.

Such plantation activities would be a major breakthrough to promote agro forestry in the area as it would provide lots of opportunity to farmers so that they can improve their livelihood. It has no doubt that such practises would be helpful to conserve the Natural resources which are under great pressure and threats. SARA-WCPM have the comparative advantage in cost effective production of wood because of congenial sub-tropical climate, land and water resources, enterprising and progressive farmers, adequate labour and talented scientists.

Central and State Government should also come forward to promote Agro forestry and plantations by launching good policies in the favours of farmers as well for industries who are the backbone of Indian economy. Farm grown trees should be fully exempted from regulatory regimes related to felling and timber transit permits and modern regulated markets should be established for ensuring transparent timber trade. National Agro forestry Policy-2014 should be implemented whole heartedly by central and state governments with allocation of adequate budgetary support and human resources.

In last, we can achieve self sufficiency in fuel wood, timber and wood based products consistent with environmental amelioration if we harness full potential of agro forestry, convert part of our open degraded forests into technology based productive plantations in a time bound manner and improve growing stock and productivity of our natural forests on sustainable basis.⁹

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Conflict of interest

Author declares that there is no conflict of interest.

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