

ADIVASI WELFARE FOUNDATION'S PLANTATION PROGRAM A Study

TABLE OF CONTENTS

1 Introduction	1
2 Methodology	
2.1 Sampling	
2.2Tools for Data Collection	
2.3Data Analysis	3
3Study Sites	
3.1East Singhbhum	4
4 Findings	
4.1Change in tree cover	
4.2Growth pattern of the plants	11
4.4 Analysis	14
4.5Case Studies	17
4.6Limitations of the study	
5 Conclusion	19
5 Way Forward	20
7 References	21
3 Annexure	
3.1Pictorial Representation of the Plantation Plots	
3.2Snapshots from field	

ABBREVIATIONS

AR	Afforestation/Reforestation	GIH	Girth at Breast Height
AWF	Adivasi Welfare Foundation	GIS	Geographic Information System
BCM	Billion Cubic Meters	ha	Hectare
С	Celsius	kg	kilogram
CDM	Clean Development Mechanism	m	meter
CGWB	Central Ground Water Board	MAI	Mean Annual Increment
cm	centimeter	mm	millimeter
CO2	Carbon Dioxide	NTFP	Non-Timber Forest Produce
CSR	Corporate Social Responsibility	OECD	The Organization for Economic Cooperation and Development
DAC	Development Assistance Committee	RS	Remote Sensing
DB	Diameter at Breast	sq. km.	square kilometer
Н	Height	tCO2	Tons of Carbon dioxide
FGD FY	Focus Group Discussion Financial Year	VNV	Value Network Ventures

LIST OF TABLES

Table 1:Sampling of the study sites	2
Table 2:Socio-economic status of East Singhbhum district*	4
Table 3:Land Use/ Land Cover in Jharkhand	6
Table 6:Details and status of the plantation plots in Jharkhand	8
Table 7:Data of trees in quadrat and transact in studied plots	10
Table 11:Total carbon sequestered in Acacia and Teak	14
Table 12:Findings/ Observations of East Singhbhum field sites	16

1. INTRODUCTION

Adivasi Welfare Foundation (AWF), a non-profit organization, carried out tree plantation program in remote areas of East Singhbhum and Saraikela- Kharsawan districts of Jharkhand. The plantation activity has been undertaken to reclaim deforested and degraded patches, control soil erosion, improve moisture conservation, enhance water table in the region, prevent severe drought and flood conditions of the region and forest fires. Nearly 1000 ha has been replanted in East Singhbhum and more than 100 ha in Saraikela- Kharsawan district of Jharkhand. The plantation was done on waste land owned by the community or farmers as part of a CSR initiative so that it would also help marginalised rural/Tribal people's livelihoods in addition to the rehabilitation of degraded land.

Under this backdrop, VNV Advisory worked with AWF to evaluate the socioeconomic and environmental impacts of the plantation and associated activities with the following objectives:

- Determine the baseline environmental conditions through literature review.
- Estimate the change in green cover in all the sites through RS/GIS.
- Assess the growth of plantation and its CO2 sequestration potential through field survey.
- Study the impact of the plantation and associated activities on the living condition of the people through FGD and questionnaire survey.



2. METHODOLOGY

2.1. SAMPLING

Stratified purposive sampling was used for the study. Stratification was based on,

- i. The year of plantation
- ii. Districts from each plantation year

East Singhbhum district in Jharkhand had been studied as plantation activities are undertaken every year since 2018 in East Singhbhum. One village from each plantation year was studied for upto 10 villages. Where the number of villages where plantation was done, were more than 10, two villages were studied in each of these two districts. The sampling of the study sites is presented in Table 1.

Year	State	Districts	No. of Blocks	No. of villages	No. of villages selected as per the criteria
2018	Jharkhand	East Singhbhum	1	1	1
2019	Jharkhand	East Singhbhum	1	4	1
2020	Jharkhand	East Singhbhum	4	11	2
2021	Jharkhand	East Singhbhum	3	7	1

Table 1: Sampling of the study sites

Purposive sampling was used for the selection of villages. The villages were selected in discussion with AWF considering the topographical area and the planted species. One quadrat of 0.1 ha was studied in the plantation area in each of the selected villages to estimate the survival percentage and growth pattern of the planted species for the year 2018-2019 and 2019-2020. Only quadrats were examined for the plantings completed in the years 2020-2021 and 2021-2022 in order to estimate the survival percentage of the planted species because, at two years old, it would be too soon to evaluate the growth pattern.

2.2. TOOLS FOR DATA COLLECTION

2.2.1. PRIMARY DATA COLLECTION

1. Quadrat Study

A quadrat of size 36.2 m X 36.2 m covering 0.1 ha was laid to measure the survival rate and growth of the trees. Areas where quadrat could not be laid due plot dimension, a diagonal transact was laid and studied. Format was developed to record the data. The growth data from the measured trees in the sample plots would be extrapolated to the total plantation area to get an estimate of the amount of carbon sequestered and its potential for sequestration.

2. Personal Interviews

Questionnaires were developed to collect primary data through personal interviews based on the impact of plantation and other activities on livelihood, agricultural practices, crop production, NTFP collection and its value addition, annual returns, assets generated during the project tenure and such others. Successful case studies were documented. Primary data were collected from the farmers/beneficiaries who were involved in the plantation activity.

3. Focussed Group Discussion (FGD)

One FGD was conducted where plantation was on community land. Questions on the procedures followed for the plantation, the assets made and the opportunities it created for employment were covered.

2.2.2. SECONDARY DATA COLLECTION

Secondary data was collected from Government Departments and websites on climatic conditions (temperature and rainfall), land use pattern, and others such.

2.3. DATA ANALYSIS

The analysis of the quadrat has been done using the Excel and that of Personal Interview and FGDs has been done using the OECD DAC evaluation framework. The OECD DAC Network on Development Evaluation (EvalNet) has defined six evaluation criteria – relevance, coherence, effectiveness, efficiency, impact and sustainability. These criteria provide a normative framework used to determine the merit or worth of an intervention. They serve as the basis upon which evaluative judgements are made. The findings of the study based on the framework are presented in Table No. 5 and 6.

3. STUDY SITE

3.1. EAST SINGHBHUM

The district East Singhbhum is in south-eastern extreme of Jharkhand in the mineral rich Chotanagpur range. It is covered with natural forests and undulating hills. Subarnarekha is the main river flowing from west to south-east of the district. The geographical location of East Singhbhum is between 220 12' N to 230 01' N latitude and 840 04' E to 860 54' E longitude. It has 11 blocks, 231 Panchayats, 1810 villages and 13 towns.[1]



3.1.1. SOCIO-ECONOMIC STATUS

Table 2: Socio-economic status of East Singhbhum district*

DEMOGRAPHY	
Estimated Population (2011)	22,91,032 [1]
Geographical area	3,533 Sq. kms. [1]
Population density	648 (Per Sq.Km) [1]
Male	11,75,696 [1]
Female	11,15,336 [1]
Working age population	People living in East Singhbhum depend on multiple skills, total workers are 837,167 out of which men are 616,249 and women are
	220,918 [6]
Work participation rate (2017-18)	41.44% [7]
Socio-economic distribution	Major tribes: Santhals, Ho, Munda, Kharwar, Lohra, Kharia[8]

Poverty in the district (2011)	Poverty rate is high. 37.3 % of households lives under the poverty line. $^{\left[s\right] }$
Sex ratio (2011)	949 females for every 1000 males ¹¹¹
Literacy rate by gender (2015)	Male - 84.51% ^[1]
	Female - 67.33% ^[1]
Major enterprises	Agriculture ^[7]
HEALTH, SANITATION, SAFETY & AC	CESS TO ELECTRICITY & EDUCATION
Population (female) age 6 years and above who ever attended school (2016)	70.1% ^(w)
Women with 10 or more years of schooling (2016)	43.3% [10]
Crime rate in the district	173.85 [7]
Households with electricity (2016)	91.5% ^[u]
Households using improved sanitation facility (2018)	43.4% [10]
Households using clean fuel for cooking (2016)	40.4% ^[10]
Households with any usual member covered by a health scheme or health insurance (2016)	19.8% ^[10]
GEOGRAPHY, LAND, AGRICULTURE &	NATURAL RESOURCES
Dominant tree species	Shorea robusta, Dalbergia sissoo, Diospyros sps., Azadirachta indica, Bassia latifolia, Bombax mori, Schleichera trijuga, Phylanthus emblica [3]
Total forest area (2021)	1080.69 Sq.Km ^[7]
Total cultivable land	28,00,000 hectares [4]
Total cropped area (2011)	74,064 ha ^[7]
Cropping intensity	114% [8]
Major Crops Grown	Field Crops – Rice, Paddy, wheat, maize, mung, arhar, horsegram, $til^{\left[4 \right]}$
	Horticulture crops - Cashew, Lemon, Guava, Banana 🕅
	Vegetables – Chilli, Potato, Cauliflower, Tomato, Potato, Brinjal, Peas. ^[4]
Groundwater status	The net annual ground water availability of the district is 27155 ham. The gross ground water draft for all uses of the district is 5633.00 ham. The net ground water availability for future irrigation development for the district is 19843.85 ham. Out of 9 blocks, one block falling under over exploited and rest of the eight blocks of the district falling under "Safe" category. The stage of ground water development varies from 6.84% to 131.39%. ^[3]
SOCIALISSUES	
Malnourishment, high rural pover	ty and subsistence-based agriculture.



3.1.2. ENVIRONMENTAL CONDITIONS

The climate of the district is humid to sub humid tropical. Annual rainfall is between 1200-1400 mm. This comes under the part of South –West monsoon so, sometimes it receives heavy rain during July to September. During summer season maximum temperature goes up to 400 – 450 C, whereas in winter it has recorded a minimum of 80 C.

3.1.3. LAND USE PATTERN

The Land Use/ Land Cover in Jharkhand is presented in Table 2.

Type of land	Area in sq.km.
Crop land	914.95
Fallow	812.48
Plantation	1.40
Barren Rocky	8.09
Scrub Land	192.07
Deciduous Forest	1063.45
Evergreen/Semi evergreen	0.05
Forest Plantation	5.52
Scrub Forest	162.57
River/Stream/Canals	77.27
Water bodies	24.26

Table 3: Land Use/ Land Cover in Jharkhand

3.1.4. VEGETATION PATTERN IN JHARKHAND

Natural vegetation of dry thorny type predominates on rocky hill slopes, whereas moist deciduous forest, which tends to become dry deciduous on ridges and exposed spurs with southern aspect is of common occurrence. The granitic hillocks on plateaus have sal or mixed forest with bamboo. Most of the hill ranges have dense forests; the predominant species of which are Shorea robusta, Dalbergia sissoo, Diospyros sps., Azadirachta indica, Bassia latifolia, Bombax mori, Schleichera trijuga, and Phylanthus emblica.[3]

3.1.5. SOIL QUALITY AND FERTILITY

East Singhbhum district is mainly rocky. Soil texture varies from zone to zone. The soil is acidic lateritic and red soil (morum) in nature. Soil fertility status is not so bad, but water retention capacity is poor. Weather is dry-hot in summer (maximum temperature 480 C recorded) and very cold in winter (minimum temperature 80 C recorded). The area under irrigated farming is found to be approximately 3%. The total area under crop in the zone is approximately 3.70% lakh ha. The principal crops grown in descending order are paddy, vegetables, Maize, Linseed, Niger, Wheat, Moong, Gram, Kalai, Marua, Bajra and Arhar.

The soil degradation shows that an area of 2,13,288.10 ha corresponding to nearly 60 per cent of the total geographical area of the district is affected by various soil degradation problems. Although the soils of the area, owing to natural factors of rainfall and topography are appreciably leached and deprived of bases and plant nutrients, reflected in low pH values and low base saturation, water erosion is the major soil degradation problem in the district caused by human intervention. Soil degradation due to erosion has caused loss of topsoil along with loss of organic matter and plant nutrients. Besides the afforested losses of surface soil, organic matter and plant nutrients, severe and very severe erosion in the form of rills and gully erosion have caused land deformation. [4]

3.1.6. CROP PRODUCTIVITY

Rice dominates the present cropping pattern, with more than 80 per cent of the gross cropped area under this single crop followed by pulses, maize, wheat, and oil seeds. Due to lack of irrigation facilities and traditional management practices, crop yields are very poor. Most farmers cultivate only one crop in a year for lack of resources.

The paddy productivity goes up to 24.07 q/ha, while wheat is produced at 10.50 q/ ha. Some other crops such as maize, arhar and til can reach rates of 11.33 q/ha, 8.18 q/ha and 6.61 q/ha respectively.[5]



4. FINDINGS

The findings of the study have been divided into five sections viz.:

- 1. Change in tree cover
- 2. Growth pattern of the plants
- 3. CO2 Sequestration Potential of the plantation
- 4. Analysis of the findings/observations using OECD.DAC framework
- 5. Case study

4.1. CHANGE IN TREE COVER

4.1.1. COMPARISON ANALYSIS OF SATELLITE IMAGERY OF THE PLANTATION

The assessment of plantation was on different tree plantation plots distributed across Jharkhand. The purpose of the study was to determine the changes that took place over the time in the intervention areas.

While enrichment plantation was done on community land in most of the sites, fewer sites were fully reforested. The saplings were availed from private nurseries. The assessment was performed using Remote Sensing and GIS technique and the changes observed were categorized into the following:

- Increased tree cover
- No change in tree cover
- Reduced tree cover

Open-source satellite images are used for interpretation and analysis for the year of 2018 and 2022.

- Satellite Data: Sentinel 2B with 10m X 10m spatial resolution has been used.
- Google Earth Imagery: GE Imagery for 2018 and 2022 has been used to visualize changes in true colour imagery.



4.1.2. METHODOLOGY

A visual interpretation has been done to understand the changes across the plots from the year 2018 to 2022. The satellite images are represented using FCC (False -Colour- Composite), where the vegetation cover varies in shades of red. The Google Earth Images are represented in Natural Colours and can be used for reference and understanding.

The satellite image (Fig.1) is an overview of a False Colour Composite Satellite Image to understand the tone, texture and colour of the natural and manmade features to interoperate a particular satellite image for any location representing the following features:

- Forest/ Woody Vegetation
- Agriculture Lands
- Settlements/ Built-up land
- Road/ linear manmade features
- Trees outside forest/ Bund Plantation/ Roadside Plantation
 - Waterbody/ Reservoirs/ Rivers



Figure 1: Overview of false colour composite satellite image

The report's Annexure 2 contains the satellite images of 83 plantation plots. The details of the plantation plots is provided in Table 6 below which has been colour coded to understand their status. The following are the colour codes used:

- Increased tree cover
- No change in tree cover
- Reduced tree cover

4.1.3. INFERENCE

Based on visual image interpretation analysis using natural and false composite colour data having 10*10-meter sentinel (false colour composite) and Google Earth Imagery (True Colour Composite), it can be stated that out of 48 plantation plots studied in Jharkhand, 16 plantation plots exhibited increased tree cover, 26 plantation plots showed no change in tree cover while reduced tree cover was noticed in six plantation plots due to animal grazing and fire incidences.

4.2. GROWTH PATTERN OF THE PLANTS

Quadrat study was done to assess the growth pattern of the plants. The Girth at Breast Height (GBH) and Height (H) of the trees were measured for the plantation for the year 2019-20 and 2020-21 and their respective Diameter at Breast Height (DBH) were calculated. Only those trees were measured whose GHB was \geq 10 cm. The no. of trees attaining 10 cm GBH in the villages of Boram and Potamda Blocks of East Singhbhum were significantly low, so its growth parameters were not recorded. The data of trees in quadrat and transact in studied plots is presented in Table 7.

FID	Name of the plantation plats	Plantation date	No. of trees planted	Latitude	Longitude
JHA	RKHAND				
1	New Jamakeshwar 3	2020-12-20	5536	22.004976	86.06304
2	New Jamakeshwar 4	2020-12-20	10000	22.005957	86.06023
3	New Jamakeshwar 5	2020-12-20	5000	22.007936	86.059074
4	New Jamakeshwar 7	2020-12-20	30000	21.99986	86.05912
5	New Jamakeshwar 8	2020-12-20	20000	22.002272	86.05589
6	New Jamakeshwar 9	2020-12-20	12000	22.003002	86.05784
7	New Jamakeshwar 10	2020-12-21	10000	22.005068	86.05275
8	New Jamakeshwar 13	2020-12-21	15000	21.988958	86.04435
9	New Jamakeshwar 15	2020-12-21	5000	21.986889	86.03293
10	New Jamakeshwar 16	2020-12-22	1553	21.983273	86.017075
12	New Jamakeshwar 19	2020-12-21	10000	22.029287	86.07838
13	New Jashipur 24	2021-01-08	19000	22.00196	86.05966
15	New Jashipur 26	2021-01-08	2000	22.010973	86.052635
16	New Kumhari 14	2020-12-08	25000	22.889307	86.293686
17	New Kumhari 15 (Babita)	2020-12-08	5000	22.889164	86.29481
18	New Kumhari 29 @(R)Binota	2020-12-30	10000	22.885231	86.29177
19	New Luabasa 18	2020-12-12	12000	22.742052	86.28336
20	New Luabasa 20	2020-12-12	1553	22.746283	86.27532
21	New Luabasa Khairbani 19	2020-12-12	24000	22.73632	86.28274
22	New Lubasa 25	2020-12-27	25000	22.76331	86.29408
23	New Lylam 23 (near panchyat)	2020-12-15	10000	22.861847	86.28148
24	New Lylam Dungri 22 (Near Lake)	2020-12-13	10000	22.856113	86.2866
25	New Lylam Dungri 30	2020-12-30	2553	22.86846	86.2816
26	New Nutandhi Bhatta 9	2020-12-06	5000	22.848906	86.290276
27	New Nutandhi Jangal I	2020-12-05	20000	22.849897	86.32177
28	New Nutandhi Jangal 2	2020-12-05	5000	22.849648	86.32242

Table 6: Details and status of the plantation plots in Jharkhand.

29	New Nutandhi Jangal 3	2020-12-05	20000	22.850637	86.31157
30	New Nutandhi Jangal 4	2020-12-05	12000	22.852543	86.30563
31	New Nutandhi Jangal 6	2020-12-06	15000	22.845219	86.29623
32	New Nutandhi Jangal 7	2020-12-06	5000	22.84567	86.297935
34	New Pagda 31	2021-01-02	5000	22.878038	86.28692
35	New Phunsha 12	2020-12-07	24000	22.855822	86.27998
36	New Phunsha 13	2020-12-07	5000	22.854208	86.284546
37	New Rapacha 25 @Ambuj	2020-12-30	12000	22.893332	86.29946
38	New Santhaltola 16	2020-12-10	25000	22.893215	86.288765
39	Resolve new Again Lylam Dungri 21	2020-12-13	5536	22.855755	86.29203
40	Resolve New Dholadhi 17	2020-12-11	15000	22.66481	86.20181
41	Resolve New Jamakeshwar 11	2020-12-21	1553	21.991993	86.04586
42	Resolve New Jamakeshwar 18	2020-12-21	2553	22.027653	86.07402
43	Resolve New Jamakeshwar 21	2020-12-20	10000	22.012897	86.05569
44	Resolve New Jamakeshwar 23	2020-12-20	10000	21.990896	86.04624
45	Resolve New Kumhari 26@ Milan	2021-02-26	10000	22.888746	86.29338
46	Resolve New Lylam Dungri 21	2020-12-13	-5536	22.854618	86.29106
47	Resolve New Lylam Panchyat 10	2021-02-25	1553	22.865978	86.287
48	Resolve New Nutandhi Jangal 1	2020-12-05	20000	22.844898	86.299446
49	Resolve New Pagda 32	2021-01-02	12000	22.87486	86.29358
50	Resolve New Phunsha II	2020-12-07	10000	22.854424	86.28357
52	Resolve New Shanthaltola 28	2020-12-31	10000	22.890583	86.28743

Table 7: Data of trees in quadrat and transact in studied plots.

EAST	SINGHBHU	JM, JHARKHAND			
2018 Boram -19	Laylam	Dalberigia sissoo	53		
		Citrus limon	78		
			Syzygium cumini	8	
			A. auriculiformis	3	
2019 -20		Santhaltola	A. auriculiformis	758	



2020 Patamda -21	Patamda	Kumari	A. auriculiformis	68	
	Nutandih	A. auriculiformis	71		
			Psidium guajava	1	
			Syzyglum cumini	1	
2021 -22		Garigram	A. auriculiformis	34	

*P.S. Total has been counted of all plants in the quadrat placed. Measurements of GBH and H only taken for plants greater than 10 cm GBH





4.4. ANALYSIS

To analyse the findings of the study of the plantation activity carried out by AWF, OECD.DOC criteria for impact evaluation has been used. The findings of the study are based on the focussed group discussion with the community members, personal interview of the farmers and field observations.

Table 12: Findings/ Observations of East Singhbhum field sites

Criteria	Parameters of Assessment	Findings/ Observations	
RELEVANCE (Is the Intervention doing the right things?)	How plantation is relevant to that area?	The area is facing severe land degradation. Aroun 60% of the geographical area of the district is affected by soil degradation. The pH values of the soil are lo indicating that the soil is leached and deprived of base and nutrients. Plantation in such an area is relevant as would help in building up soil organic matter and thereb arresting land degradation and help in soil and moistur conservation.	
	Are the chosen species native and conducive to the climate and geography of that region?	Acacia auriculiformis is mostly planted in the area. Since the district is mainly rocky with poor water retention capacity, the species is apt for the area. The species capable to adapt in almost all soil conditions, improvin the same by adding nitrogen and organic matter at faster rate and mitigating soil erosion by its dense root system. However, the species produces prolific leaf little and does not allow other species to grow with it.	
	Has the plantation brought in a profit in income to the beneficiaries as compared to earlier?	 The plantation of Acacia is too young to bring profit to the beneficiaries. However, when it matures, it can be used timber production, bark for tanning material. Its branches and leaves are source of fuelwood. The flowers are the source of pollen for honey production. The fruit trees, though planted less in number, would be used for self-consumption to fulfil their nutritional requirements rather than selling it in the market, the communities informed. 	
	Has the plantation created employment opportunities?	 Women members from the villages were involved in pit digging and plantation of saplings. It created employment opportunities during the COVID 19 lockdown when they could not go to distant places for labour. 	

COHERENCE (How well does the intervention fit?)	Steps initiated to scout land for plantation	Gram Panchayats were engaged to identify the community/ farmers waste land. Species were selected keeping in view the species promoted by the Forest Department of Jharkhand. Village women were engaged as labours for pit digging and plantation.
	Raising saplings in nursery	Two nurseries were established in the Laylam Gram Panchayat to supply saplings for plantation.
	Has the plantation helped in the betterment of water table of the village?	Most farmers reported scarcity of water to irrigate lands. Water table has also remained the same as reported by farmers.
	Women employment through project and government schemes	Women engaged as labourers are also engaged in MGNREGA. Therefore, the intervention fits properly in creating employment opportunities addressing empowerment of rural women.
	Documentation of activities	There were no records of the events. The names of the species planted as mentioned in the Annual Report were not found on the plots. Despite the creation of polygons representing the plantation sites, some of the polygons had errors.
	Does the intervention create more profit to farmers than present income?	 The plantation is too young to create any profit. Plantation of <i>Acacia</i> would create a profitable income if the farmers were duly informed on its management practices and marketing channels. It was observed that most of the farmers are unaware of its management practices as well as its marketability. Ponds created under the project is utilised for pisciculture. The fishes were sold in the village haats creating a source of earning for the community members.
EFFECTIVENESS (Is the intervention achieving its objectives?)	Conserving environment through afforestation activities	The plantation would fulfil the community needs, thereby, reducing the anthropogenic pressure on forest and conserving local biodiversity. It would also help in stabilising land degradation through soil erosion. It would also increase the ground water table.
	Increase in local community produce	 The plantation would increase fuelwood and timber and fruits along with the production of fishes in ponds created under the project. The leaves of <i>Acacia</i> are a good source of fuel because of its high calorific value and less smoke production.
	Change in tree cover	The RSGIS imagery exhibited increased tree cover in 16 out of 48 plantation plots. However, in 26 plantation plots there were no change in tree cover while in six plots reduced tree cover was noticed. It may be due to anthropogenic activities, grazing or natural calamities.
	Increase in soil fertility and moisture retention	Soil fertility and moisture retention capacity of the soil would improve. <i>Acacia</i> being planted majorly in the plots, will not allow other plants to grow in its vicinity due to its allelopathic effect (as also reported by farmers).

EFFICIENCY (How well are the resources being used?)	Formation of village level collectives	Village level collectives were not formed
	Capacity building for plantation management	Capacity building activities of beneficiaries were not undertaken
	Resource created under the plantation program	 Nurseries are established for providing saplings for plantation. Water harvesting structures such as ponds are created under the plantation program which would be utilised for irrigating the plantation site as well as the farmers land. It has also created an opportunity for aquaculture for the villagers. The leaves of Acacia serves as a source of fuel.
	Resource provided by organisation	Fertiliser, saplings, meetings were provided by NGO, but villagers also complained of water scarcity.
	Local human resource for labour	Women members from the villages were involved in pit digging and plantation creating employment opportunities during the COVID 19 lockdown when they could not go to distant places for labour
IMPACT (What difference does the intervention make?	Reduced anthropogenic pressure in the forest	The anthropogenic pressure on the nearby forest area is due to collection of firewood, small timber for house construction and fruits for self-consumption. Though the plantation of <i>Acacia</i> is young, however, when it matures, it would fulfil the requirements of firewood and small timber.
	Erosion control	Its spreading, superficial and densely matted root system makes A. auriculiformis suitable for stabilizing eroded land.
	Reduced vulnerability	The plantation serves as an asset to the beneficiaries. Various parts of the planted trees are of economic importance reducing the climate vulnerability of the communities.
	Improved social bonds	Provided social support through creating employment opportunities bringing social cohesion among the community members.
SUSTAINABILITY (Will the benefits lost?)	Project Documents have not been provided (due to confidentiality clause) to study the sustainability aspect and therefore, cannot be commented upon.	





4.5. CASE STUDIES

4.5.1. PONDS (AQUACULTURE)

Villages surveyed in East Singhbhum district were found to have ponds which were used for the sale, consumption and breeding of fishes and ducks. There are many types of fishes that the villagers preferred, such as Rohu, Catla, Magur, Pongas and Kou (Hybrid and Desi). The ponds in each village were of the nature of household ponds or community ponds. In household ponds, the family owning the pond would harvest the fishes mainly for self-consumption and sustenance purposes. But, in community ponds, the entire village would come together, bring in some money collectively, dig out land and make a pond, which they would then use to breed fishes mainly for its sale and profit making of the village. Self-help groups present in each of the villages would take primary responsibility in the collection of funds, maintenance of ponds and fishes, and sale of the same.

Ponds as big as 60X60 feet were present, and villagers would sell fishes at a discounted wholesale price of Rs. 160/kg, whereas the market rate would soar up to Rs. 200/kg. Villages in East Singhbhum suffered from shortage of water, due to low groundwater, decrease in rainfall and inadequate access to water. And therefore, it is imperative to note that most community ponds faced water scarcity due to this reason and were only functional in the monsoon season. When it comes to water for irrigation purposes, few panchayats of villages in collaboration created community ponds, whereby rainwater and runoff water from the hills would be collected. Canals were made from the pond to the agricultural fields, whereby water would flow into the fields thus fulfilling irrigation and moisture retention needs of the crops.

4.5.2. NURSERY

Under the AWF project, a nursery of 5 acres was also set up in Kumbharpandugandi in 2021, to supply planting material, saplings, fertilizers, etc. in all nearby villages. The community of the village is responsible in maintaining, handling and care taking of the nursery, whereas the funding of the same is being undertaken by AWF. All the species that were planted under this project are present in the nursery, such as Teak, Acacia, Karanj, Mango, Cashew etc. AWF is also responsible for setting up of targets of production and release of saplings each year, and the saplings go out to each village keeping in mind the target involved. For example, 20 lakhs and 10 lakhs of saplings went out in the first and second year of the nursery. The nursery refrains from the sale of saplings to private entities or individuals but is only capable of delivering to the project needs.

4.6. LIMITATIONS OF THE STUDY

A few limitations (listed below) in the study did have an impact on how it was conducted.

• Most of the plots in both the districts studied had majorly *Acacia auriculiformis* . As a result, it was difficult to capture the growth information for the other species stated in the annual report.

• Land ownership used for plantation was mix of private and community lands.

• The operations carried out in the plantation programme were not documented due to the lockdown during the COVID 19 epidemic. No documents/ field records were available for reference.

• Land for plantations was located through Gram Panchayats. Other species that were planted on the area included *Dalbergia sissoo, Azadirachta indica, Citrus limon, Anacardium occidentale* and others. It was challenging to see the planted species because of the proliferation of weeds and grasses. The plantation on community land lacked supervision.

• It is difficult to identify the changes in plantation since the plants are very new and planted in 2018.

• Weather conditions play a pivotal role in the growth of the trees. Hence, some areas are arid, and some areas have too much greenness.

• Though satellite imagery of the same time frame has been taken. But, due to climate change, the vegetation character has changed, which has hampered the accuracy of the data.





5. CONCLUSION

Plantation program carried out by AWF is an attempt to revegetate the degraded land. Plantation activities are done since 2018 with the involvement of Gram Panchayats in identification of degraded land.

Most of the villages and beneficiaries have opted to plant plots visited in East Singhbhum had majorly *A. auriculiformis*. The number of other species planted such as *Tectona grandis, Dalbergia sissoo, Azadirachta indica* etc. were few. Tree growth was seen to be slow in the East Singhbhum district. The number of trees attaining 10 cm GBH were significantly low because the plants were quite young.

For the supply of saplings in the plantation plots, nurseries were established in the district. Women were used as labourers for plantation work and digging pits. The project's excavation of ponds gave the locals in the area the chance to engage in pisciculture and earn more money by selling fish at the local haats. Although the Elected village institution(Gram Psanchayat) were found to be involved and engaged with the plantation initiative. The planting programme established nurseries for growing saplings and built ponds for aquaculture, providing chances for the village work force to increase their source of earning.

The species planted have the potential to reduce soil erosion-driven land degradation and revitalise the degraded locations. The plantation's products would be sold as well as used to meet the requirements of the local community. The satellite imagery of the plantation sites shows that out of 48 plantation plots studied in Jharkhand, 16 plantation plots exhibited increased tree cover, 26 plantation plots showed no change in tree cover while reduced tree cover was noticed in six plantation plots due to wildlife grazing and incidence of forest fires.

The sequestration potential of *A. auriculiformis* and *T. grandis* in East Singhbhum district was estimated ex ante, considering 90% survival since the species are grown on community/farmers land, non- palatable and drought resistant. The carbon sequestration potential of auriculiformis and *T. grandis* is 27475.73 tCO2 and 62446.78 tCO2 respectively. The sample size of *T. grandis* is too small and the ER number may vary in future.

6. WAY FORWARD

• For management of the plantation sites, capacity building of the farmers and the communities is required on adoption of technologies, timely availability of inputs, access to markets etc. to develop a sense of ownership and maximise benefits form the plantation.

• Various government departments viz. Department of Water Resources, Department of Forests, Environment and Climate Change, Department of Rural Development, and others like may be approached for availing the benefits of the plantation schemes.





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8.1. PICTORIAL REPRESENTATION OF THE PLANTATION PLOTS 8.1.1. PLANTATION PLOTS WITH INCREASED TREE COVER 1. NEW RAPACHA 25



2. NEW NUTANDHI JANGAL 6



3. NEW NUTANDHI JANGAL



4. RESOLVE NEW DHOLADHI 17



5. NEW LUABASA 20



6. NEW JAMAKESHWAR 3



7. NEW JASHIPUR 24



8. NEW JAMAKESHWAR 8





9. RESOLVE NEW JAMAKESHWAR 11



10. NEW JAMAKESHWAR 16



11. JAMMUKESHWAR/AWF/P18



12. NEW KUMHARI 26



13. NEW LYLAM 23 (NEAR PANCHYAT)



14. NEW LYLAM DUNGRI 22 (NEAR LAKE)



15. NEW PHUNSHA 13



16. RESOLVE NEW NUTANDHI JANGAL 1



17. RESOLVE NEW LYLAM PANCHYAT 10



15. NEW PHUNSHA 13



16. RESOLVE NEW NUTANDHI JANGAL 1



17. RESOLVE NEW LYLAM PANCHYAT 10



8.1.2. PLANTATION PLOTS WITH NO CHANGE IN TREE COVER

1. NEW SANTHALTOLA 16



2. RESOLVE NEW SHANTHALTOLA 28



3. NEW KUMHARI 14



4. NEW KUMHARI 15



5. NEW KUMHARI 29



6. NEW PHUNSHA 12







7. NEW LYLAM DUNGRI 30



8. RESOLVE NEW PHUNSHA 11



9. NEW NUTANDHI JANGAL 4







10. NEW NUTANDHI JANGAL 3



11. NEW NUTANDHI JANGAL 1



12. NEW NUTANDHI JANGAL 2







13. NEW NUTANDHI BHATTA 9



14. NEW LUBASA 25



15. NEW LUABASA 18



16. NEW LUABASA KHAIRBANI 19



17. NEW JAMAKESHWAR 19



18. RESOLVE NEW JAMAKESHWAR



19. RESOLVE NEW JAMAKESHWAR 21



20. NEW JASHIPUR 26



21. NEW JAMAKESHWAR 5



22. NEW JAMAKESHWAR 4



23. NEW JAMAKESHWAR 9



24. RESOLVE NEW JAMAKESHWAR 23



25. NEW JAMAKESHWAR 13



26. NEW JAMAKESHWAR 15



27. JAMMUKESHWAR/AWF/DT34



27. JAMMUKESHWAR/AWF/DT34



28. JAMMUKESHWAR/AWF/DT33



29. JAMMUKESHWAR/AWF/A12



30. JAMMUKESHWAR/AWF/RK32



31. JAMMUKESHWAR/AWF/RK30



32. JAMMUKESHWAR/AWF/RK31



33. JAMMUKESHWAR/AWF/R29



34. JAMMUKESHWAR/AWF/P20



35. JAMMUKESHWAR/AWF/P19



36. JAMMUKESHWAR/AWF/A8



37. JAMMUKESHWAR/AWF/AII



38. JAMMUKESHWAR/AWF/A6



39. JAMMUKESHWAR/AWF/A7



40. JAMMUKESHWAR/AWF/A3



41. JAMMUKESHWAR/AWF/M23



42. JAMMUKESHWAR/AWF/M24



43. JAMMUKESHWAR/AWF/P17



44. JAMMUKESHWAR/AWF/A14





45. JAMMUKESHWAR/AWF/T13



46. JAMMUKESHWAR/AWF/K16



47. JAMMUKESHWAR/AWF/K20



48. JAMMUKESHWAR/AWF/R22



49. JAMMUKESHWAR/AWF/T25



50. JAMMUKESHWAR/AWF/T26



51. JAMMUKESHWAR/AWF/T27



52. JAMMUKESHWAR/AWF/T28





8.1.3. PLANTATION PLOTS WITH REDUCED TREE COVER

1. NEW SANTHALTOLA 16



2. RESOLVE NEW PAGDA 32



3. RESOLVE NEW AGAIN LYLAM DUNGRI 21





4. RESOLVE NEW LYLAM DUNGRI 21



5. NEW JAMAKESHWAR 10



6. NEW JAMAKESHWAR 7







8.2. SNAPSHOTS FROM FIELD



Plantation of A. auriculiformis on the farmer's land in Santhaltola, East Sighbhum



Field staff engaged in laying quadrats in Laylam village, East Singhbhum



Water stored in the pond constructed under the project used for irrigation in in village Tungburu, East Singhbhum



Women worked as labourers during plantation helping us in site selection for laying quadrat in Laylam, East Singhbhum



Polybags prepared in nursery for raising saplings in the nursery established in the project in East Singhbhum



Conducting FGD with the community members in Kumari, East Singhbhum