



CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND REFORESTATION
PROJECT ACTIVITIES (CDM-AR-PDD) Version 04

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SECTION A. General description of the proposed A/R CDM project activity:**A.1. Title of the proposed A/R CDM project activity:**

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Title – Reforestation of degraded land by MTPL in India.

Version – 09

Date – 14.06.2011

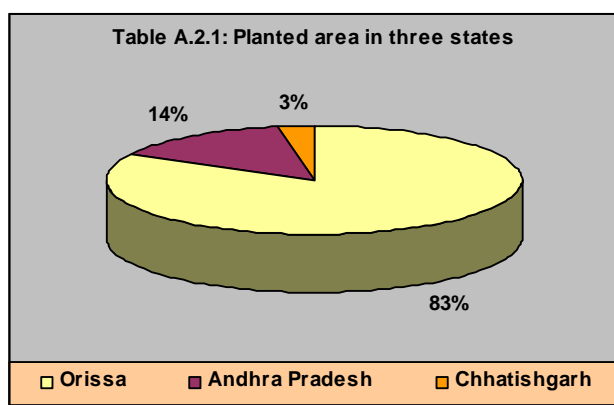
A.2. Description of the proposed A/R CDM project activity:

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Mangalam Timber Products Limited, part of diverse B K Birla Group, a premier business conglomerate of India, was established on 27th August, 1982 in one of the most backward district Nabarangpur in Orissa (India) under joint venture with Industrial Promotion and Investment Corporation of Orissa Limited (IPICOL), a Govt. of Orissa company and started its commercial production from 11th November, 1987.

The company manufactures Medium Density Fibreboard (MDF) under the brand name of DURATUFF which is flawless, smooth and uniformly strong. MDF is made from the fibres of short rotation plantation timber, waste wood or agro-wastes bounded together with synthetic resins contributing to save precious forest resources.

DURATUFF conforms to rigorous quality standards laid down by Bureau of Indian Standards (BIS), IS 12406:2003 for plain MDF and IS 14587:2008 for pre-laminated MDF. The company's management systems are certified to international standards, ISO 9001:2008 for quality, ISO 14001:2004 for environment and OHSAS 18001:2007 for occupational health & safety.

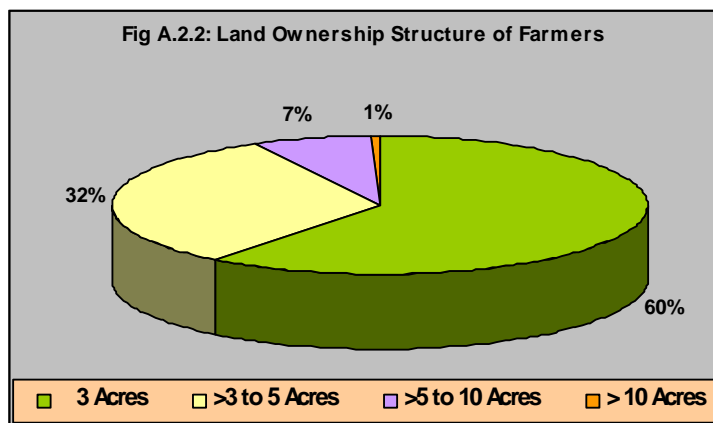


The proposed CDM project activity by MTPL involves carbon sequestration of degraded land through reforestation activities. Many discrete parcels of degraded land that is owned by small and poor farmers/ tribal who do not have the capability of plantation without any external financial support and technical guidance are reforested under Farm Forestry Scheme. The project encompasses 12437 parcels of land measuring 14969.46 hectares owned by 12002 farmers distributed in seven districts across three states Orissa, Andhra Pradesh and Chattisgarh, majority

being in Orissa which constitutes almost 83% area of the project, 14% in Andhra Pradesh and only 3% in Chhatisgarh.

The farmers participating in the reforestation activity are small and marginal farmers mostly owning small parcels of land. As shown in Fig A.2.2 the land holding of almost 92% farmers is 5 acres or less out of which 60% own land 3 acres or less. Merely 8% farmers are holding more than 5 acres of land among which only 1% above 10 acres.

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The reforestation activity taken up by Mangalam Timber is not only to safeguard environment but also enrich the forest resources by extensive plantation. The species selected for the sequestration is Eucalyptus which is a fast growing specie, harvested first time normally after 5 years and thereafter thrice at 4 year intervals.

The farmers are encouraged by the company officials for eucalyptus plantation on their degraded land

which was otherwise lying barren since long without any return. Company's representatives hold meetings with the land owners in different villages explaining reforestation scheme and making them aware of the benefits of the scheme. Under the scheme the banks provide finance by way of loan as approved by NABARD, company provides seedling, fertilizers and technical assistance for plantation and the farmers invest their land and effort resulting into reforestation of degraded land.

Joint survey is conducted by the bank's field staff, company's representative and farmer for identification and demarcation of land and to ensure that the land is degraded before sanction of loan. Clear title is ensured through land title document issued by land revenue authorities of respective state government, locally known as "Land Patta" in Orissa & Chhatishgrh and "Land Passbook" in Andhra Pradesh. Nil-encumbrance certificate (NEC) and No-dues certificate (NDC) is also obtained from land revenue officials in respect of each land parcel to ensure that the land is free from any burden and that the title is clear.

A tripartite agreement is entered into between the farmer, bank and the company on mutually agreed terms wherein the obligations of all the three parties are clearly stated. MTPL agrees to supply good quality of seedlings and fertilizers on competitive price to farmers. The company ensures free replacement of moratorium. The company agrees to provide technical, assistance and services relating to planting and maintenance of such plantation till they are harvested. The company also assists farmers to obtain no objection certificate for plantation, felling, cutting and billeting of trees and transportation of timber from farmers site to the factory of the company from competent authority of the forest department as and when required. The company agrees to buy back the harvested timber at prevailing market price or minimum rate mentioned in the agreement or at the rate fixed by Orissa Forest Development Corporation whichever is higher at the time of harvest.

The farmers agree to plantation on their degraded land, their upkeep for proper growth and protection from illegal felling. They also agree to deposit the title deed of the land with bank as security till the entire loan with accrued interest is paid back. For transparency, the loan is disbursed to the farmers through Saving Bank account opened in their name at respective branch of financing banks.

Unless tripartite agreement is entered into after fulfilling all the stipulated criteria, no loan is advanced and therefore no plantation proceeds. In the process company's field officers all through guide the farmers and provide all necessary assistance. Planting techniques and all technical assistance throughout plantation activity is provided by the company in view of getting better yield. MTPL undertakes some in-house research and development activity for improving the quality and progeny of species for maximum yield.



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Since land for reforestation under the project activity is owned by poor down trodden farmers & tribal, its not possible for them to claim carbon credit on such reforestation. As such they individually authorize MTPL to claim carbon credit on their behalf and the company agrees to share a part of carbon revenue with them. A separate authorization letter is signed by all the participating farmers individually on mutually agreed terms & conditions.

The project has been undertaken to protect the land which was severely degraded or degrading. Prior to the project activity the lands were wastelands due to severe soil erosion without considerable flora. Besides increasing the forest cover the project activity would also provide enhanced sources of livelihood and income in rural areas by generating large employment opportunities. The project also directly contributes to the significant reduction in top soil losses due to wind and water erosion and biodiversity conservation.

Contribution of the project activity to Sustainable Development:

- The A/R project is a human induced reforestation on degraded lands and erosion prone areas to improve soil stabilization and soil fertility. Soil organic matter will increase as result of increase of net primary productivity and degraded soil will be improved.
- The reforestation under the proposed project activity is on degraded land which was lying barren since decades. The farmers who own the land are mainly poor farmers/tribal who do not have the capability of growing plantation of their own without any external financial support and technical guidance. They do not have capital to invest for plantation without any return for five years. In absence of the project activity the land would have continued as degraded land or degrading would continue further.
- Eucalyptus being fast growing species, the project activity would generate more income opportunities for the farmers on long term.
- Silviculture activities like raising nursery, site preparation, seedling transportation, planting, fencing and maintenance of plantation will generate employment opportunity for the local community.
- The carbon revenues generated from the project activity will be shared with the participating farmers through a carbon contract entered between MTPL, the project implementing agency and the participating farmers individually, thus resulting into additional financial support to them.

Both the project participant and local farmers hold a view that the proposed A/R CDM project activity will contribute to poverty alleviation and environment (biodiversity conservation and soil erosion control), thus contribute to sustainable development.

A.3. <u>Project participants:</u>
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Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be indicated using the following tabular format.



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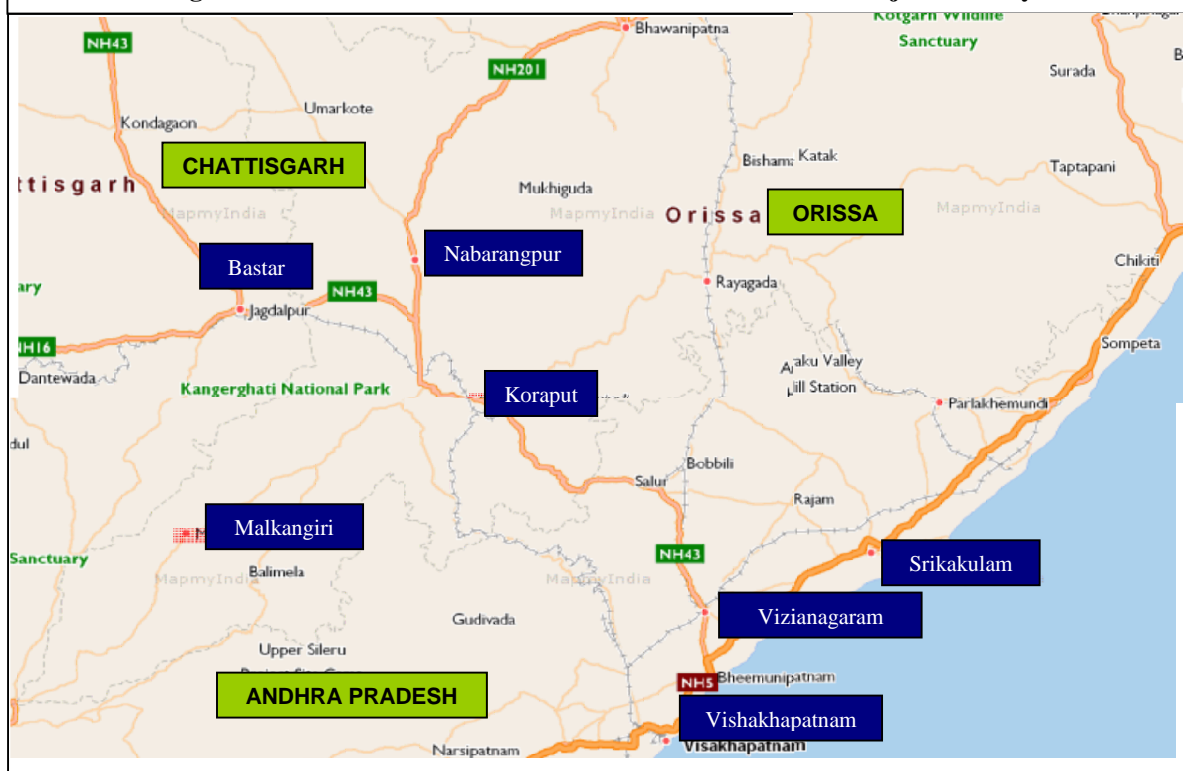
Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Indicate if the Party involved wishes to be considered as a project participant (Yes/No)
India	Mangalam Timber Products Limited (Private entity, project participant)	No
(*) In accordance with the CDM A/R modalities and procedures, at the time of making the CDM-AR-PDD public at the stage of validation, a Party involved may or may not have provided its <u>approval</u> . At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Description of location and boundaries of the A/R CDM project activity:

A.4.1. Location of the proposed A/R CDM project activity:

The project site is distributed over three states – Orissa, Andhra Pradesh and Chattisgarh. The northern part of the Orissa state lies on the edge of the great Indo-Gangetic plain. The Chhota Nagpur plateau occupies the western and northern portions of the state. Andhra Pradesh is surrounded by Madhya Pradesh and Orissa in the north, the Bay of Bengal in the east, Tamilnadu and Karnataka in the south and Maharashtra in the west. Chattisgarh borders Madhya Pradesh on the northwest, Maharashtra on the west, Andhra Pradesh on the south, Orissa on the east, Jharkhand on the northeast and Uttar Pradesh on the north.

Figure 4.1.1: Location of Seven Districts under A/R CDM Project Activity



A.4.1.1. Host Party(ies):

>>
India

A.4.1.2. Region/State/Province etc.:

>>
Orissa, Andhra Pradesh and Chhatishgarh (India)

A.4.1.3. City/Town/Community etc:

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The project activity is spread across seven districts namely Nabarangpur, Koraput & Malkangiri in Orissa, Vishakhapatnam, Vizianagaram & Srikakulam in Andhra Pradesh and Bastar in Chhatishgarh covering reforestation of a total area of 14969.46 hectares as under:

Table A.4.1.3 : Year-wise plantation in different districts (All figures in hectares)

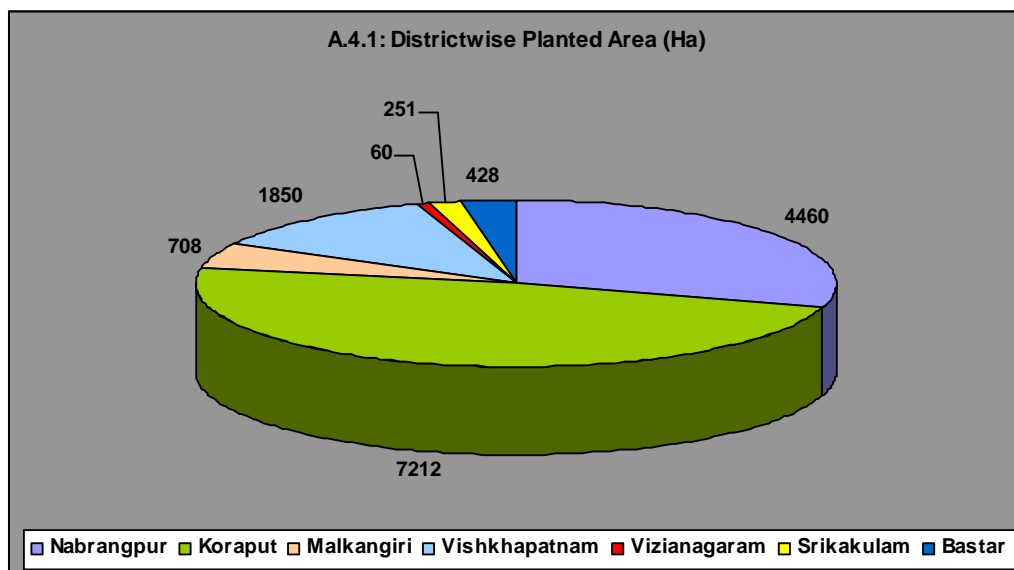
S No	State	District	2001	2002	2003	2004	2005	2006	2007	Total
1	Orissa	Nabarangpur	156.26	465.48	428.80	778.12	819.73	695.95	1115.91	4460.25
2		Koraput	361.95	517.07	723.06	1200.56	1468.48	1541.34	1399.94	7212.40
3		Malkangiri	2.37	18.33	49.48	150.61	169.84	141.34	176.03	708.00
4	Andhra Pradesh	Vishakhapatnam					215.18	734.32	900.88	1850.38
5		Vizianagaram					38.16	20.30	1.39	59.85
6		Srikakulam				34.42	210.11	6.55		251.08



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7	Chhatisgarh	Bastar					102.11	260.63	64.76	427.50
		Total:	520.58	1000.88	1201.34	2163.71	3023.61	3400.43	3658.91	14969.46



A.4.2 Detailed geographic delineation of the project boundary, including information allowing the unique identification(s) of the proposed A/R CDM project activity:

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The A/R CDM activity contains more than one discrete parcel of land. The project activity includes reforestation of 12437 parcels of land distributed over seven districts across three states belonging to 12002 farmers. For administrative control the parcels are grouped bank area wise and assigned to the branch of financing bank from where the farmer has availed loan. Each discrete parcel represented by the name of the farmer has been assigned with a unique identification no. which will be used consistently throughout the PDD and monitoring the project activity as detailed in Table 4.2.1 below. The unique identification no contains three letters followed by three digits e.g. “XXX000. The letters ‘XXX’ represent bank area, first letter for district, 2nd & 3rd letter for Bank area and the digits ‘000’ represent serial no of the parcel. More than one parcel of same farmer is further identified adding (a), (b), (c).... with the serial no.

Table A.4.2.1: Unique Identification of Parcels planted yearwise

S No	District & State	Bank Area	Area ID	No of Parcels planted yearwise							Total	Unique Identification No of Parcels
				2001	2002	2003	2004	2005	2006	2007		
				St 1	St 2	St 3	St 4	St 5	St 6	St 7		
	ORISSA											
1	NABARANGPUR	Nandahandi	NNH	25	4	7	33	31	22	38	160	NNH001 to 136
2		Nabarangpur	NNP	7	14	31	59	66	57	51	285	NNP001 to 262
3		Sindhiguda	NSG	12	5	10	18	16	32	46	139	NSG001 to 130
4		Rajoda	NRJ	8	21	25	15	20	26	37	152	NRJ001 to 148
5		Tumberla	NTB	3	3	4	9				19	NTB001 to 024
6		Kosagumuda	NKM	8	17	20	18	14	15	46	138	NKM001 to 136
7		Jotabal	NJB	3	8	19	12	48	27	19	136	NJB001 to 133
8		Katharguda	NKG	8	17	32	26	11	23	39	156	NKG001 to 152
9		Kumuli	NKL	13	23	32	39	39	21	40	207	NKL001 to 192
10		B Singhpur	NBS	10	12	18	14	15	19	77	165	NBS001 to 157



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11		Sanmosigaon	NSM	18	27	39	67	59	42	29	281	NSM001 to 282
12		Challanguda	NOG	10	14	16	50	35	20	73	218	NOG001 to 204
13		Dhamahandi	NDH	12	10	9			19	14	64	NDH001 to 061
14		Raighar	NRG		28	5	116	57	59	92	357	NRG001 to 400
15		Jharigaon	NJG		36	26	46	66	70	73	317	NJG001 to 321
16		Dhodra	NDD		12	12	22	58	74	29	207	NDD001 to 211
17		Kotagaon	NKT		43	8	10	25	36	61	183	NKT001 to 187
18		Umerkote	NUK		8	16	22	6	29	54	135	NUK001 to 144
19		Sosahandi	NSH		12	23	39	43	20	10	147	NSH001 to 141
20		Singsari	NSS		23	20	25				68	NSS001 to 069
21		Turudhi	NTD		28	13				14	55	NTD001 to 060
22		Chandili	NCD		3		8	10	11	21	53	NCD001 to 053
23		Kundei	NKN		13	8		9			30	NKN001 to 032
24		Boriguma	NBG		5		19				24	NBG001 to 025
25		Kodinga	NKD			4	6	4		44	58	NKD001 to 058
26		Tentulikuthi	NTK				25	61	71	41	198	NTK001 to 175
27		Maidalpur	NMP				36	44	12	23	115	NMP001 to 118
		Total:		137	386	397	734	737	705	971	4067	3891 Farmers
1	KORAPUT	Boipariguda	KBG	67	66	40	22	39	40	43	317	KBG001 to 314
2		Ramgiri	KRG	17	29	29	37	73	58	44	287	KRG001 to 291
3		Kundra	KKN	28	26	34	58	100	91	81	418	KKN001 to 416
4		Digapur	KDG	16	19	37	57	88	89	51	357	KDG001 to 355
5		Dongerpausi	KDP	14	23	30	47	71	111	111	407	KDP001 to 399
6		Ambaguda	KAG	3	2	14	17	39	28		103	KAG001 to 100
7		Kusumi	KKS	13	15	32	102	58	61	64	345	KKS001 to 344
8		Phamphuni	KPP	13	16	23	42	53	65	65	277	KPP001 to 277
9		Nandpur	KNP	33	55	67	86	101	108	136	586	KNP001 to 575
10		Padwa	KPD	7	35	21	39	47	44	20	213	KPD001 to 238
11		Lamtaput	KLP	11	9	40	75	22	30	61	248	KLP001 to 262
12		Mathalput	KMP	11	7	36	40	18	5	12	129	KMP001 to 136
13		Jolaput	KJP	11	9	18	28	36	10	35	147	KJP001 to 166
14		Semiliguda	KSG	4	3	21	30	41	62	57	218	KSG001 to 220
15		Koraput	KKP	6	9	8	12	7	6		48	KKP001 to 057
16		Podagada	KPG	5	14	19	48	49	62	60	257	KPG001 to 330
17		Kakriguma	KKG	9	11	18	9		18		65	KKG001 to 066
18		Dasmanpur	KDS		8	28	37	43	38	54	208	KDS001 to 223
19		Pottangi	KPT		6	6	14	25	17	25	93	KPT001 to 105
20		Sunki	KSN		5	35	42	21	18	20	141	KSN001 to 178
21		Jeypore	KJR				34	36	12		82	KJR001 to 081
22		Sunabeda	KSB				2	27	5	9	43	KSB001 to 043
23		Onkadeh	KOD					11			11	KOD001 to 011
		Total:		268	367	556	878	1005	978	948	5000	4938 Farmers
1	MALKANGIRI	Pangam	MPG	2	5	12	49	22			90	MPG001 to 091
2		Matihili	MML		1	1	3	12	27	100	144	MML001 to 157
3		Malkangiri	MMG			20	59	83	81	11	254	MMG001 to 253
4		Kudumulguma	MKG		7	7		11	1		26	MKG001 to 034
		Total:		2	13	40	111	128	109	111	514	511 Farmers
	ANDHRA PRADESH											
1	MSHAKHAPATNAM	Arkuvalley	VSA					107	245	394	746	VSA001 to 1316
2		Kinchumanda	VSK					137	270	343	750	VSK001 to 1099
3		Paderu	VSP						272	137	409	VSP001 to 1215
		Total:						244	787	874	1905	1728 Farmers
1	VIZIANAGARAM	Sallur	VZS					31	22	1	54	VZS001 to 096
2		Gajpatinagam	VZG					2			2	VZG001 to 002



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		Total:					33	22	1	56	52 Farmers	
1	SRIKAKULAM	Kottur	SKT			45	28			73	SKT001 to 081	
2		Veergatham	SVG				220			220	SVG001 to 308	
3		Palkonda	SPK				53			53	SPK001 to 058	
4		GL Puram	SGL					5		5	SGL001 to 005	
		Total:				45	301	5	0	351	338 Farmers	
	CHHATISHGARH											
1	BASTAR	Bastar	BBS				101	198	52	351	BBS001 to 351	
2		Lohaniguda	BLH				30	36	24	90	BLH001 to 090	
3		Bhanpuri	BBH				8	36		44	BBH001 to 044	
4		Kesharpal	BKP					38		38	BKP001 to 038	
5		Bokaband	BBK					12		12	BBK001 to 012	
6		Bojaband	BBJ					9		9	BBJ001 to 009	
		Total:					139	329	76	544	544 Farmers	
69	Grand Total:			407	766	993	1768	2587	2935	2981	12437	12002 Farmers

Project boundaries are geographically delineated and represented through GIS maps of each discreet parcel. The company outsourced GIS mapping to specialist agency, M/s Salim Ali Centre for Ornithology & Natural History (SACON) under Ministry of Environment & Forests, Govt of India. Site specific database of each parcel has been generated by SACON using Satellite Remote Sensing duly identified with their unique identification no. Altogether 132 maps were generated listed in Table A.4.2.2 below. The spread of parcels in each bank area is represented through GIS coordinates of the each area as under:

Table A.4.2.2: Geographic delineation - GIS Maps & Coordinates bank area wise									
S No	Bank Area	No of Parcels	Unique ID No of farmers	Map ID No	No of Maps	GIS Coordinates of Bank Area			
						Latitude		Longitude	
						From	To	From	To
1.	NABARANGPUR								
1	Nandahandi	160	NNH001 to 136	N01	1	19 09 22.2 N	19 17 02.3 N	82 37 01.2 E	82 46 14.8 E
2	Nabarangpur	285	NNP001 to 262	N02 – N05	4	19 09 53.5 N	19 19 33.6 N	82 18 13.4 E	82 40 02.1 E
3	Sindhiguda	139	NSG001 to 130	N06	1	19 09 25.3 N	19 16 09.0 N	82 31 58.0 E	82 40 26.0 E
4	Rajoda	152	NRJ001 to 148	N07	1	19 08 43.0 N	19 17 02.8 N	82 09 49.2 E	82 21 23.9 E
5	Tumberla	19	NTB001 to 024	N08	1	19 19 40.8 N	19 22 21.5 N	82 32 15.0 E	82 37 02.1 E
6	Kosagumuda	138	NKM001 to 136	N10 – N11	2	19 08 56.8 N	19 19 12.5 N	82 08 46.9 E	82 16 48.6 E
7	Jotabal	136	NJB001 to 134	N11 – N12	2	19 20 23.0 N	19 27 00.7 N	82 24 05.1 E	82 30 35.7 E
8	Kathargada	156	NKG001 to 152	N13 – N14	2	19 05 07.0 N	19 10 03.6 N	82 40 59.6 E	82 46 23.8 E
9	Kumuli	207	NKL001 to 192	N15 – N16	2	19 03 19.1 N	19 11 00.1 N	82 38 35.9 E	82 43 40.0 E
10	B Singpur	165	NBS001 to 157	N17 – N18	2	18 58 25.8 N	19 07 43.8 N	82 35 03.9 E	82 42 22.2 E
11	Sanmosigaon	281	NSM001 to 282	N19 – N21	3	19 11 47.2 N	19 19 46.1 N	82 20 26.1 E	82 29 36.7 E
12	Chalanguda	218	NCG001 to 204	N22 – N25	4	19 01 59.3 N	19 12 32.8 N	82 29 51.4 E	82 39 53.7 E
13	Dhammahandi	64	NDH001 to 061	N26	1	19 04 47.7 N	19 07 50.5 N	82 16 51.9 E	82 19 13.9 E
14	Raighar	357	NRG001 to 400	N27 – N29	3	19 49 19.9 N	19 58 40.8 N	81 33 01.2 E	82 45 42.8 E
15	Jharigaon	317	NJG001 to 321	N30 – N33	4	19 31 57.2 N	19 45 55.0 N	82 11 26.0 E	82 27 25.2 E
16	Dhodra	207	NDD001 to 211	N34 – N37	4	19 32 38.7 N	19 46 50.8 N	82 10 22.4 E	82 21 13.6 E
17	Kotagaon	183	NKT001 to 187	N38 – N40	3	19 19 16.4 N	19 28 06.2 N	82 09 56.2 E	82 21 26.9 E
18	Umerkote	135	NUK001 to 144	N41 – N43	3	19 37 04.1 N	19 44 07.8 N	82 04 43.3 E	82 17 10.9 E
19	Sosahandi	147	NSH001 to 141	N44 – N45	2	19 00 50.0 N	19 10 23.7 N	82 26 07.1 E	82 33 37.9 E
20	Singsari	68	NSS001 to 069	N46 – N48	3	19 23 01.9 N	19 35 01.4 N	82 03 42.1 E	82 21 26.8 E
21	Turudhi	55	NTD001 to 060	N49	1	19 53 04.1 N	19 59 23.8 N	81 50 53.3 E	81 56 14.1 E
22	Chandili	53	NCD001 to 053	N50	1	19 00 26.6 N	19 06 44.6 N	82 12 12.2 E	82 21 38.8 E
23	Kunde	30	NKN001 to 032	N51	1	20 01 13.0 N	20 04 12.2 N	81 46 55.8 E	81 59 29.1 E
24	Borigumma	24	NBG001 to 025	N52	1	19 00 07.1 N	19 08 25.5 N	82 34 50.1 E	82 41 41.9 E
25	Kodinga	58	NKD001 to 058	N53 – N54	2	19 14 56.4 N	19 24 09.6 N	82 15 43.0 E	82 22 28.7 E



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26	Tentulikutthi	198	NTK001 to 175	N55	1	19 14 07.1 N	19 19 23.5 N	82 40 45.2 E	82 45 31.7 E
27	Maidalpur	115	NMP001 to 118	N56 – N58	3	19 24 16.1 N	19 33 25.1 N	82 13 15.0 E	82 38 57.3 E
	Total:	4067			58				
2.	KORAPUT								
1	Boipariguda	317	KBG001 to 314	K01 – K02	2	18 40 33.8 N	18 49 39.4 N	82 16 28.1 E	82 28 16.2 E
2	Ramgiri	287	KRG001 to 291	K03 – K05	3	18 41 57.0 N	18 52 17.5 N	82 10 30.6 E	82 21 08.9 E
3	Kundra	418	KKN001 to 416	K06 – K07	2	18 49 36.8 N	19 00 08.1 N	82 16 56.0 E	82 25 05.6 E
4	Digapur	357	KDG001 to 355	K08 – K09	2	18 46 09.3 N	18 53 03.9 N	82 18 06.2 E	82 30 18.2 E
5	Dongerpaunsi	407	KDP001 to 399	K10 – K11	2	18 50 49.5 N	19 01 00.6 N	82 21 38.3 E	82 27 39.1 E
6	Ambaguda	103	KAG001 to 100	K12	1	18 56 27.9 N	19 00 22.8 N	82 30 15.1 E	82 37 54.0 E
7	Kusumi	345	KKS001 to 344	K13 – K14	2	18 59 06.1 N	19 06 13.4 N	82 19 39.1 E	82 28 45.8 E
8	Phamphuni	277	KPP001 to 277	K15 – K16	2	18 50 05.7 N	18 57 50.4 N	82 25 01.2 E	82 31 11.4 E
9	Nandapur	586	KNP001 to 575	K17 – K20	4	18 29 03.1 N	18 44 47.9 N	82 29 35.4 E	82 53 01.6 E
10	Padwa	213	KPD001 to 238	K21 – K22	2	18 16 07.2 N	18 37 45.7 N	82 34 47.7 E	82 46 53.3 E
11	Lamtaput	248	KLP001 to 262	K23 – K25	3	18 29 00.4 N	18 46 14.3 N	82 30 33.3 E	82 40 03.1 E
12	Mathalput	129	KMP001 to 136	K26	1	18 43 22.3 N	18 49 59.8 N	82 53 49.0 E	82 58 58.0 E
13	Jolaput	147	KJP001 to 166	K27	1	18 25 16.6 N	18 31 42.2 N	82 33 32.1 E	82 39 10.9 E
14	Semliguda	218	KSG001 to 220	K28 – K30	3	18 33 02.6 N	18 42 56.2 N	82 46 11.4 E	82 56 58.1 E
15	Koraput	48	KKP001 to 057	K31 – K32	2	18 47 10.8 N	18 53 10.3 N	82 38 09.9 E	82 52 43.4 E
16	Podagada	257	KPG001 to 330	K33 – K34	2	18 47 35.0 N	18 56 50.3 N	82 41 00.4 E	82 59 29.8 E
17	Kakiriguma	65	KKG001 to 066	K35 – K36	2	18 52 04.4 N	18 59 58.0 N	82 53 06.2 E	83 04 05.2 E
18	Dasmanpur	208	KDS001 to 223	K37 – K38	2	18 58 07.7 N	19 09 29.6 N	82 49 53.3 E	83 00 05.3 E
19	Pottangi	93	KPT001 to 105	K39	1	18 27 45.6 N	18 34 19.0 N	82 51 39.1 E	83 00 11.1 E
20	Sunki	141	KSN001 to 178	K40	1	18 22 38.1 N	18 30 43.4 N	82 55 22.2 E	83 04 05.1 E
21	Jeypore	82	KJR001 to 081	K41	1	18 54 04.0 N	18 59 26.7 N	82 29 17.0 E	82 35 40.0 E
22	Sunabeda	43	KSB001 to 043	K42	1	18 38 34.6 N	18 45 27.0 N	82 45 30.2 E	82 53 37.3 E
23	Onkadili	11	KOD001 to 011	K43	1	18 30 01.5 N	18 34 29.1 N	82 25 09.0 E	82 27 01.0 E
	Total:	5000			43				
3.	MALKANGIRI								
1	Pangam	90	MPG001 to 091	M01 – M02	2	18 22 58.1 N	18 33 34.8 N	82 01 43.4 E	82 10 03.2 E
2	Maithili	144	MML001 to 157	M03	1	18 28 51.0 N	18 36 52.2 N	82 04 29.0 E	82 13 30.2 E
3	Malkangiri	254	MMG001 to 253	M04 – M06	3	18 19 50.8 N	18 29 37.6 N	81 55 17.3 E	82 06 15.2 E
4	Kudumulguma	26	MKG001 to 034	M07	1	18 15 31.4 N	18 26 22.0 N	82 05 29.6 E	82 11 23.8 E
	Total:	514			07				
4.	VSAKHAPATNAM								
1	Arkuvalley	746	VSA001 to 1316	VS 01 - 02	2	18 10 22.6 N	18 23 20.4 N	82 01 28.9 E	83 10 41.2 E
2	Kinchunmanda	750	VSK001 to 1099	VS 03 - 04	2	18 08 34.9 N	18 26 37.8 N	82 39 49.9 E	82 52 49.8 E
3	Paderu	409	VSP001 to 1219	VS 05 - 06	2	18 01 19.5 N	18 12 43.9 N	82 32 24.7 E	82 50 51.7 E
	Total:	1905			06				
5.	VIZIANAGARAM								
1	Sallur	54	VZS001 to 096	VZ 01	1	18 24 58.5 N	18 31 24.8 N	83 00 12.0 E	83 11 48.1 E
2	Gajpatinagaram	2	VZG001 to 002	VZ 02	1	18 30 54.2 N	18 31 05.6 N	83 07 31.3 E	83 07 39.7 E
	Total:	56			02				
6.	SRIKAKULAM								
1	Kottur	73	SKT001 to 081	S 01	1	18 37 33.4 N	18 43 23.58 N	83 46 34.9 E	83 49 23.9 E
2	Veergatham	220	SVG001 to 308	S 02 - 03	2	18 40 10.4 N	18 46 24.8 N	83 35 56.0 E	83 41 38.0 E
3	Palkonda	53	SPK001 to 058	S 04 - 05	2	18 32 06.7 N	18 44 14.7 N	83 41 59.6 E	83 52 00.4 E
4	G.L.Puram	5	SGL001 to 005	S 06	1	19 02 23.9 N	19 03 11.2 N	83 33 35.4 E	83 39 51.1 E
	Total:	351			06				
7.	BASTAR								
1	Bastar	351	BBS001 to 351	B01 – B02	2	19 06 17.7 N	19 19 05.5 N	81 45 20.9 E	81 59 45.3 E
2	Lohaniguda	90	BLH001 to 090	B03 – B05	3	19 04 48.3 N	19 16 05.5 N	81 35 01.9 E	81 57 35.2 E
3	Bhanpuri	44	BBH001 to 044	B06	1	19 17 02.4 N	19 21 07.4 N	81 43 11.5 E	81 48 38.7 E



CDM – Executive Board

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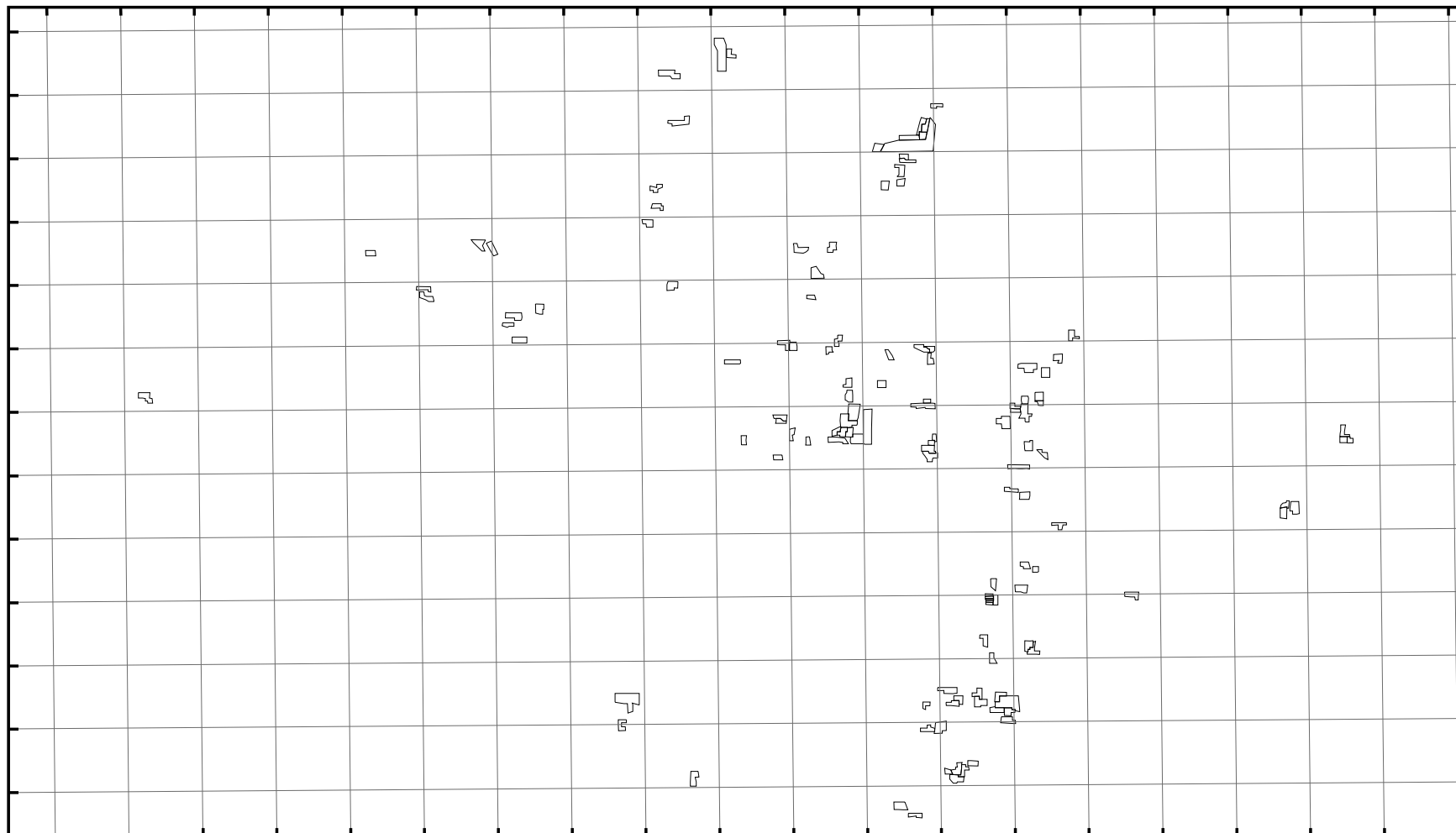
4	Kesharpal	38	BKP001 to 038	B 07 – B 08	2	19 20 04.0 N	19 25 25.9 N	81 43 52.9 E	81 54 51.7 E
5	Bokaband	12	BBK001 to 012	B 09	1	19 14 08.7 N	19 14 38.7 N	82 03 29.5 E	82 06 06.5 E
6	Bojawand	9	BBJ001 to 009	B 10	1	19 12 54.6 N	19 13 49.3 N	82 07 07.0 E	82 09 23.6 E
	Total:	544			10				
	Grand Total:	12437	Parcels		132	Maps			

A plantation register is maintained with details of all 12437 parcels belonging to 12002 farmers that includes the name of farmers, area of plot, khata no, plot no, village name, bank area, soil type along with their unique identification no. The plantation register also contains the GPS coordinates for identification of geographical boundary of each discrete site. Project boundary of Sindhiguda Bank area of Nabarangpur district is attached below as sample geographical boundary.



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Project Boundary of Sindhiguda Bank Area (District: Nabarangpur)



**A.5. Technical description of the A/R CDM project activity:****A.5.1. Description of the present environmental conditions of the area planned for the proposed A/R CDM project activity, including a concise description of climate, hydrology, soils, ecosystems (including land use):**

>>

CLIMATE

Orissa¹ - There are three major seasons - Summer (March-June), Rainy Season (July-September) and the Winter (October-February). Orissa lying just South of the Tropic of Cancer, has a tropical climate. It is warm almost throughout the year in the Western districts of Sundergarh, Sambalpur, Baragarh, Bolangir, Kalahandi and Mayurbhanj with maximum temperature hovering between 40-46 °C and in winter, it is intolerably cool. In the coastal districts, the climate is equable but highly humid and sticky. The summer maximum temperature ranges between 35°C - 40°C and the low temperatures are usually between 12°C-14°C. Winter is not very severe except in some areas in Koraput and Phulbani where minimum temperature may drop to 3°C - 4°C. The average rainfall is 150 cm, experienced as the result of south west monsoon during July-September. The state also experiences small rainfall from the retreating monsoon in the months of October-November.

Andhra Pradesh² - The average maximum temperature in most parts of Andhra Pradesh varies from 23°C - 28 °C. Minimum temperature varies from 10°C – 12°C. Summers are hot and humid on the coastal plains and some places it touches above 42 °C. The state of Andhra Pradesh experiences a very hot summer. Andhra Pradesh climate is marked by the onset of monsoons in second week of June which continues till September. This rainfall is caused by south wets monsoon wind.

The state's coast receives heavy rain from northeast monsoon winds or the retreating monsoon winds also in October-November. Sometimes it is associated with cyclones as well. Climate in Andhra Pradesh is characterized by mild winter, temperature doesn't fall generally below 16 °C

Chhattisgarh³ - Its positioning on the Tropic of Cancer makes the Chattisgarh climate warm. As is usual with the tropical climate, the summers in Chattisgarh are warm & humid and the winters are cool. During a typically hot summer day, the mercury can shoot up to 45 °C. The climate in Chattisgarh shows a major shift from the sultry heat to the pleasantly cold during the winters. The winters can be chilly with the mercury plummeting to hit the 10 °C mark. The average rainfall is around 1400 mm.

HYDROLOGY

Andhra Pradesh⁴ : Krishna and Godavari are the major river systems in the State. Godavari is the biggest in terms of length and breadth among the rivers of South India. Tungabhadra is an important tributary of the Krishna. Other important rivers are the Pennar, Vamsadhara and Nagavali. All these

¹ <http://www.orissatourism.org/climate-in-orissa.html>

² <http://www.southindiatourtravel.com/andhra-pradesh/travel-to-andhra-pradesh/climate.html>

³ <http://www.indianholiday.com/chhattisgarh/climate-in-chhattisgarh.html>

⁴ <http://www.indiainfoweb.com/andhra-pradesh/rivers/>



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rivers are rainfed, and are of great economic significance because of their hydel power and irrigation potential.

Orissa⁵ : The northern part of the Orissa state lies on the edge of the great Indo-Gangetic plain. The Rihand River, a tributary of the Ganges, drains this area. The eastern end of the Satpura Range and the western edge of the Chota Nagpur Plateau form an east-west belt of hills that divide the Mahanadi River basin from the Indo-Gangetic plain. The central part of the state lies in the fertile plain of the Mahanadi and its tributaries, with extensive rice cultivation. The southern part of the state lies on the Deccan plateau, in the watershed of the Godavari River and its tributary the Indravati River. Other main rivers are Hasdo (a tributary of Mahanadi), Rihand, Indravati, Jonk and Arpa.

There are four groups of rivers which flow through Orissa into the Bay of Bengal. They are : (i) Rivers that have a source outside the State (the Subarnarekha, the Brahmani & the Mahanadi). (ii) Rivers having a source inside the State (the Budhabalanga, the Baitarani, the Salandi, & the Rushikulya). (iii) Rivers having a source inside the Orissa, but flow through other states (the Bahudu, the Vansadhara & the Nagavali). (iv) Rivers having a source inside Orissa, but tributary to rivers which flow through other states (the Machkund, the Sileru, the Kolab & the Indravati).

River Mahandi - It is the major river of Orissa and the sixth largest river in India. It originates from the Amarkantak hills of the Bastar Plateau in Raipur district of Madhya Pradesh. It is about 857 km long (494 kms. in Orissa) and its catchment area spreads over 141,600 sq. kms (65,580 sq. kms) in Orissa).

The Brahmani - It is the second largest river in Orissa. It flows through the Eastern Ghats in Sundargarh, Kendujhar, Dhenkanal, Cuttack and Jajpur districts into the Coastal Plains and enters into the Bay of Bengal along with a combined mouth with the Mahanadi known as the Dhamra. The Brahmani is 799 kms. long (541 kms. in Orissa) and its catchment area spreads over 39,033 sq.kms. in Orissa).

The Baitarani - It originates from the Gonasika hills of the Keonjhar districts. It is 365 kms long and its catchment area spread over 12,790 sq. kms . It enters into the Bay of Bengal after joining of the Brahmani at Dharma mouth near Chandabali Subarnrekha.

The Subarnarekha - It originates from the Chhotanagpur plateau of Bihar. It is 433 kms long (70 kms in Orissa) and has a catchment area of 19,500 sq. kms (3,200 sq. kms in Orissa).

The Budhabalanga - It originates from the eastern slopes of the Similipala massif. It is about 175 kms long having a total catchment area of 4840 sq. kms. Its major tributaries are the Sone, the Gangadhar, the Catra etc.

The Rushikulya - It originates from the Rushyamala hills of the Eastern Ghats in Phulbani district. It is 165 kms long with 8900 sq. kms of catchment areas. Its tributaries are the Baghua the Dhanei Badanadi etc.

The Bahuda - It originates from the Ramgiri hills of the Eastern Ghats and joins the Bay of Bengal in Andhra Pradesh. It is 73 km long with a catchment area of 1250 sq. kms.

⁵ <http://www.welcomeorissa.com/rivers.php>



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The Bansadhara - It originates from the Flanks of the Durgakangar hills (Lingaraj hills) of the Eastern Ghats in Kalahandi districts. It is 230 kms long (150 kms in Orissa). It enters in to the Bay of Bengal at Kalingapatnam in Andhra Pradesh. It has a catchment area of 11500 sq. kms.

The Nagabali - It originates from the Bijipur Hills of the Eastern Ghat near Lanji garah. It is 210 kms long (100 kms is in Orissa). It has a total catchment area of about 9410 sq. kms.

The Salandi - It originates from the Meghasani Hills of the Similipal massif in Keonjhar district. It is 144 kms long with catchment areas of 1793 sq. kms.

The Indirabati - It originates from the Eastern Ghats in Kalahandi districts. It is 530 kms long with a catchment area of 41700 sq. kms as a tributary it flows into the Godabari River.

The Kolab - It originates from the Sinkaran hills of the Eastern Ghats in Koraput districts. It has catchment areas of 20400 sq. kms.

Springs - There are a number of mountain springs and hot spring in Orissa. The Badaghagara & Sanaghagara in Keonjhar districts, Satpasajya in Denkanal districts, the Chandikhole in Cuttack districts, the Barunei in Khorda districts, the Narayani & Nirmalajhar in Ganjam & Puri districts, the Patalaganga in Kalahandi districts, the Nursinghanath in Sambalpur districts and the Harisankar in Bolangir districts are some of the important mountain springs in Orissa .

Waterfalls - The Barehipani & Joranda (Similipal) in Mayurbhanja district, Sanaghagara & Badaghagara in Keonjhar district, Padhanpuri in Deogarh district, Khandadhar (Banei) in Sundargarh district, Phurlijharan, Khandabaladhar & Rabandhara in Kalahandi district, Kentamari & Putudi in Boudh & Phulbani districts, Dum Duma in Malkangiri district and Bogra in Koraput district are some of the major waterfalls of Orissa.

Lakes - The Chilika Lake is blackish water lagoon located in the southern part of the Orissa coastal plain. Its area varies from 780 sq. kms to 144 sq. kms from winter to monsoon seasons. Ansupa, Sara and Kanjia are some sweet water lakes of Orissa.

Chhattisgarh⁶ : 57.48% collection of water is done by Mahanadi & other rivers like Shivnath, Hasdo, Mand, Pary, Jonk, Kelo, Udanti, Sukha etc. in Chhattisgarh. Its second largest river is Godavari. Rihand is the main river in northern side of Chhattisgarh. The Chitrakoot Waterfalls in Jagdalpur in Chhattisgarh are often termed the Niagara of India. Kendai, Tatapani, Ruks ganda, Amritdhara, Kothali, Gangrail Jalashaya, Kharkhara Bandh, Keshkal Teerathgarh waterfall are major waterfalls in Chhattisgarh.

SOIL

The project area has three soil types namely red soil, red & black and red loamy soil. In Orissa, the project area has Red soil and Red & Black soil. In Chattisgarh, the project area has combination of Red

⁶ <http://www.chhattisgarh.com/commen/chhattisinfo/chhattisinfo.html>



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Loamy soil, Red & Black and Red soil. In Andhra Pradesh, the soil types are Red Loamy soil, Red & Black and Red soil.

Soil of Nabarangpur District⁷ : Major portion of the district is covered by lateritic soil followed by red and black cotton soil.

Soil of Malkangiri District⁸ : black soil occurs mainly in Malkangiri district. Sandy and clay type soil predominate the entire district. The soil is generally acidic in nature and alkaline in some patches. The salinity of the soil is normal. The percolated composition of it gives less binding capacity.

Soil of Koraput District⁹ : The soil of the district is mostly red, mixed red and yellow, alluvial and red and black. The texture is sandy loam to sandy clay loam. As per soil test the soils are acidic and poor in fertility status.

Soil of Vizianagaram District¹⁰ : The main soils in the Vizianagaram district are Red soils, Sandy loams and Sandy clay and they constitute 96 % of the total area. The soils in the district are predominantly loamy with medium fertility. There are mostly red loamy soils, as far as dry lands are concerned and clay loamy in case of wet lands.

Soil of Vishakapatnam District¹¹ : Red Loamy soils predominate with a coverage of 69.9% of the villages of the district. The Soils are poor textured and easily drained. Sandy loamy soils come next with 19.2% villages coverage. 45% of the soils in the district are low in organic content and 55% in Phosphorous content.

Soil of Bastar District : Generally Sandy loamy, Red and Lateritic soil is prevalent in Bastar district. The soil throughout the greater portion of Bastar consists of light clay with an admixture of sand. The texture of the soil varies from sandy to fine textured clayey soils. The primary laterites are found as a cap on the top of the trap and gneissic rocks. Secondary laterites are usually found in the valleys and low-lying places. These soils are of fine texture and darker hues and are rich in humus.

ECOSYSTEM AND SPECIES

Project areas in all seven districts are dominated by degraded land. Because of degraded nature of land, majority of parcels are barren. A detailed ecological survey was conducted in the year 2000-2001 in the area in order to understand different floral and faunal composition of the existing ecosystem. The report contains the details of type & no of trees found in individual parcels of the project area alongwith herbs & shrubs contained in them. Very few areas are composed of tree vegetation. In all, 1557 parcels have been found with tree vegetation. Variety of trees found in the area are *Mangifera indica*, *Tectona grandis*, *Anacardium occidentale*, *Shorea robusta*, *Madhuca longifolia*, *Schleichera oleosa*, *Artocarpus*

⁷ Reddy, C. S., K. Ram Mohan Rao, Chiranjibi Pattanaik and P. K. Joshi (2008). Assessment of Large-Scale Deforestation of Nawarangpur District, Orissa, India for its Sustainable Management: A Remote Sensing Based Study. **Environmental Monitoring and Assessment Journal**, (DOI: [10.1007/s10661-008-0400-9](https://doi.org/10.1007/s10661-008-0400-9) – Springerlink Publication).

⁸ <http://malkangiri.nic.in/Topography.html>

⁹ <http://www.manage.gov.in/NATP/Koraput.pdf>

¹⁰ <http://vizianagaram.nic.in/AboutVizianagaram.html>

¹¹ <http://visakhapatnam.nic.in/district-profile.html>



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heterophyllus etc. In most of the areas during rainy season bushes, grasses grown but at the onset of summer everything vanishes. Shrubs and under shrubs like *Cassia tora*, *Ipomea biloba*, *Achyranthes aspera* etc are found in the project area. *Cassia tora* is a common plant of wasteland and tolerates low moisture content in the soil. This plant grows tall under conducive conditions. However, the plant found at the project site shows stunted growth proving the lowered fertility of the soil. *Capparis aphylla* grows well in nutrient poor sharply drained gravely soils. This shrub is found in abundance in the area. Based on ecological survey report all the parcels containing trees through the entire project area has been shortlisted. The table below shows the list of trees recorded in the project area:

S No	Common Name	Scientific Name	Family
1	Mango	<i>Mangifera indica</i>	Anacardiaceae
2	Cashew	<i>Anacardium occidentale</i>	Anacardiaceae
3	Sal	<i>Shorea robusta</i>	Dipterocarpaceae
4	Teak	<i>Tectona grandis</i>	Lamiaceae
5	Mahuwa	<i>Madhuca longifolia</i>	Sapotaceae.
6	Kusum	<i>Schleichera oleosa</i>	Sapindaceae
7	Kendu	<i>Diospyros melanoxylon</i>	Ebenaceae
8	Karanji	<i>Pongamia pinnata</i>	Papilionaceae
9	Chakunda	<i>Cassia tora</i>	Caesalpinaceae
10	Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae
11	Guava	<i>Psidium gujav</i>	Myrtaceae
12	Banyan	<i>Ficus bengalensis</i>	Moraceae
13	Pipal	<i>Ficus religiosa</i>	Moraceae
14	Castor	<i>Recinus cummunis</i>	Euphorbia
15	Kachnar	<i>Bombax Ceiba</i>	Malvales
16	Semal	<i>Bauhinia Semla</i>	Caesalpinaceae
17	Arjun	<i>Terminilia Arjuna</i>	Combretaceae
18	Beleric	<i>Terminalia Bellirica</i>	Combretaceae
19	Silver Oak	<i>Grevelia Robusta</i>	Proteaceae
20	Aonla	<i>Phyllanthus emblica</i>	Phyllanthaceae
21	Tendu	<i>Diospyros Celebica</i>	Ebenaceae
22	Tamarind	<i>Tamarindus indica</i>	Fabaceae

Herbs found in the project area are as follows:

S No	Name of the Species	Family	Habit
1	<i>Cassia tora</i>	Leguminosae	Herb
2	<i>Ipomea biloba</i>	Convolvulaceae	Herb
3	<i>Capparis aphylla</i>	Capparidaceae	Herb
4	<i>Croton bonplandianus</i>	Euphorbiaceae	Herb
5	<i>Achyranthes aspera</i>	Amarantaceae	Herb
6	<i>Parthenium hysterophorus</i>	Poaceae	Herb
7	<i>Tephrosia purpurea</i>	Pappilionaceae	Herb
8	<i>Cyperus diformis</i>	Cyperaceae	Herb
9	<i>Chloris montana</i>	Poaceae	Herb



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Cow, goat, dog, crow, rats, rattlesnakes add to the faunal composition of the project area.

A.5.2. Description of the presence, if any, of rare or endangered species and their habitats:

>>

There is no record of endangered species at the project site. The proposed project lands had the status of degraded land. It has emerged during the vegetation survey that some of the project area have some tree vegetation like *Mangifera indica*, *Tectona grandis*, *Anacardium occidentale* etc. In rest of the area during rainy season grasses and bushes grown but onset of summer nothing can be found. The land was not fit for the habitation of any animals or birds etc. None of these naturally occurring trees are rare or endangered according to the Botanical Survey of India. As the project area is degraded land, so it is not suitable for the habitation of wild animals.

A.5.3. Species and varieties selected for the proposed A/R CDM project activity:

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The species selected for sequestration is Eucalyptus (*E. tereticornis*). The species belong to family Myrtaceae of Angiospermae. This hybrid manifests good hybrid vigour for growth and volume production. It is selected due to its coppicing and drought resistant quality. The species has far greater rooting depth of 3 metres and offers greater capillary action. There is also a considerable increase in the water holding capacity of the soil.¹²

Their popularity is because of their adaptability to grow quickly in a wide range of edaphoclimatic conditions. They are fire hardy, produce relatively large volumes of wood, multipurpose benefits, have coppicing power and are resistant to being browsed. Eucalyptus uses up water more effectively than any other perennial crop. It produces maximum biomass compared to local species per unit of water consumed. It has been established through studies that Eucalyptus consumes least quantity of water for production of higher biomass per unit volume as is evident from the article “Know about Eucalyptus Tree” by Mr M Harikrishnan, Principal Chief Conservator of Forest (PCCF), Tamil Nadu Forest department, Chennai - 8. Eucalyptus is a better species to meet some specific needs that are seldom fulfilled by local species.

A.5.4. Technology to be employed by the proposed A/R CDM project activity:

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The technological details are as follows:

Nursery Technique: Seeds of Eucalyptus are first treated with broad based fungicide and equal amount of fine quality sand for sowing. Such treated seeds are sown on nursery mother beds of size 10 m long & 1 m wide. Beds are covered with paddy straw to protect the seeds from wind and rain besides encouraging better germination as straw provides optimum micro-environmental condition for germinating seeds. Seedlings of 2-5 leaf stage are transplanted into polythene bags filled with excellent quality soil, sand and well decomposed farm yard manure in the ratio of 2:1:1. Transplanted seedlings are provided with partial shade and sufficient water so that within 10 days most of the seedlings get acclimatized and begin to grow in polythene bags. Timely watering, weeding, shifting & grading will be done. Seedlings of 30-45 cm will be obtained in 3-5 months time. Insecticides/pesticides will be used only in case if there is considerable damage to plants.

¹² <http://www.fao.org/DOCREP/005/AC772E/ac772e06.html>

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Site Preparation: Deep repeated ploughing mostly with country plough or tractor ploughing by exceptional farmers is done one month prior to planting. Rows are aligned and pits are dug at a spacing of $3\text{m} \times 1.5\text{m}$ with an aim to accommodate about 1000 plants per acre. Small pits (40-45 cm in diameter and 30-35 cm in depth) are dug manually for tree planting.

Planting Techniques: The plant of 30-45 cm (excluding container height) with girth of 1-2 cm at collar region is used for planting. The plants with container are dipped in bucket of water mixed with termiticides / insecticides just before planting. This helps in keeping better moisture within the ball of earth and keeps the insects/termites away. The plant are held in one hand and the polythene bag is cut with sharp knife/blade and completely removed in such a way that the plant roots are intact in ball of soil.

The sapling is planted in such a way that the root collar region is well within the soil, as it is softest portion should not be exposed to sunlight. After planting soil around the plant is thoroughly compacted and is preferably done by using both feet without causing injury to plant.



Plantation management: The plantations are protected from grazing/browsing animals by means of live fencing. Termites are the major insects that cause severe damage to growing plants but is controlled by using Chlorpyrifos 20% EC. Timely weeding and soil-working is done to boost-up the plant growth.

Harvesting : The plants are harvested when they are 5 years old & onwards. The trees are felled, 3' billeted and loaded on to trucks. Such material is then transported to mills for further use.

A.5.5. Transfer of technology/know-how,if applicable:
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Not Applicable

A.5.6. Proposed measures to be implemented to minimize potential leakage:

>>

No significant leakage is anticipated from the project activity.

Leakage due to the displacement of grazing and cultivation is unlikely to occur as there are sufficient existing grazing lands under the control of the animal owners that can adopt displaced animals even if all pre-project animals are displaced to existing lands outside the project boundary.

A.6. Description of legal title to the land, current land tenure and rights to tCERs / ICERs issued for the proposed A/R CDM project activity:

>>

The reforestation under the proposed project activity is on many small parcels of land owned by poor farmers & tribal. Land title, Tripartite agreement between farmer, bank & company and Carbon contract are the mandatory documents to participate in the project activity. These documents are available in respect of each and every farmer.

Land Title (Land Patta) : The farmers necessarily possess the legal title of the land in the form of “Land Patta” in Orissa & Chhatisgarh and “Land Pass Book” in Andhra Pradesh issued by Land Revenue Department of respective State Governments. Nil Encumbrance Certificate (NEC) & No Dues Certificate (NDC) is further obtained from the respective land authorities to ensure that the land is free from any burden and that the title is clear. These are the base document required to process the loan by the bank. The patta/passbook is kept by the bank under their custody as security against the loan sanctioned by them till its recovery in each & every case.

Tripartite Agreement: When degraded land is confirmed from the patta and clear title is ensured by the bank for granting loan, an agreement is entered into by the farmer, the bank and company’s authorized representative wherein the obligations of all the three parties are clearly stated.

MTPL agrees to supply good quality of seedlings and fertilizers on competitive price to farmers and to provide technical assistance and services relating to planting and maintenance of such plantation till they are harvested. The company agrees to buy back the harvested timber at prevailing market price or minimum rate mentioned in the agreement or at the rate fixed by Orissa Forest Development Corporation whichever is higher at the time of harvest.

The farmers agree to plantation on their degraded land, their upkeep for proper growth and protection from illegal felling. They also agree to deposit the title deed of the land with bank as security till the entire loan with accrued interest is paid back to the bank. For transparency all loan is disbursed to the farmers through SB account opened in their name at the branch.

Unless tripartite agreement is reached between three parties after fulfilling all the stipulated criteria, no loan is advanced and therefore no plantation proceeds. Hence tripartite agreement is also available in case of each & every farmer.

Carbon Contract: Reforestation under the project activity is on many small parcels of degraded land owned by poor farmers & tribal. It is not possible for them to claim carbon credit on their reforestation. In India there is no specific existing regulation on the rights to carbon credits. As such they individually



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authorize MTPL to claim carbon credit on their behalf and the company agrees to share a part of carbon revenue with them. A letter “Authorization for Claiming Carbon Credits” is signed by all the participating farmers individually on mutually agreed terms & conditions reproduced hereunder:

1. Entire cost incurred on development, documentation, mapping, measurement, validation, verification and registration of CDM project will be borne by the company. The farmers will not be required to pay on this account. However any incidental expenses which may require additionally in future during the crediting period may be charged to the farmers with prior notice to them.
2. The farmers will get proportionate share in the CER revenue earned by the company on prorata basis in lieu of their plantation included in CDM project boundary. The company agrees to pay 12% of the CER revenue earned per acre to the farmers at present or as mutually agreed upon from time to time in future.
3. The sum due to the farmers under CDM will be paid normally through bank within three months of realization of CER revenue by the company for which they will be required to furnish a SB account in their name when asked for by the company. However mode of payment may change on the basis of mutual agreement.
4. The farmers will not be entitled for CER revenue in the event of failure of their plantation and /or opting out from the scheme and / or other plantation (s) which is not included in the project boundary.
5. The farmers will not claim for carbon credit for the plantations included in the subject project boundary through any other agency (ies) or organization (s).

A.7. Assessment of the <u>eligibility of the land</u>:

>>

In order to assess the eligibility of land to host an A/R CDM project activity, tool referenced in the methodology “Procedures to demonstrate the eligibility of lands for A/R CDM project activities (Version 01)”, EB 35 Report; Annex 18 has been applied. The project activity is reforestation of degraded land. The tool requires establishing that the land under project activity was not forest at the time of start of the project.

The Government of India defines forests as:

- A single minimum land area of 0.05 hectares;
- A single minimum tree crown cover of 15%; and
- Single tree with height of minimum of 2 meters.

Reforestation is defined by decision 11/CP.7 as “direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989”.

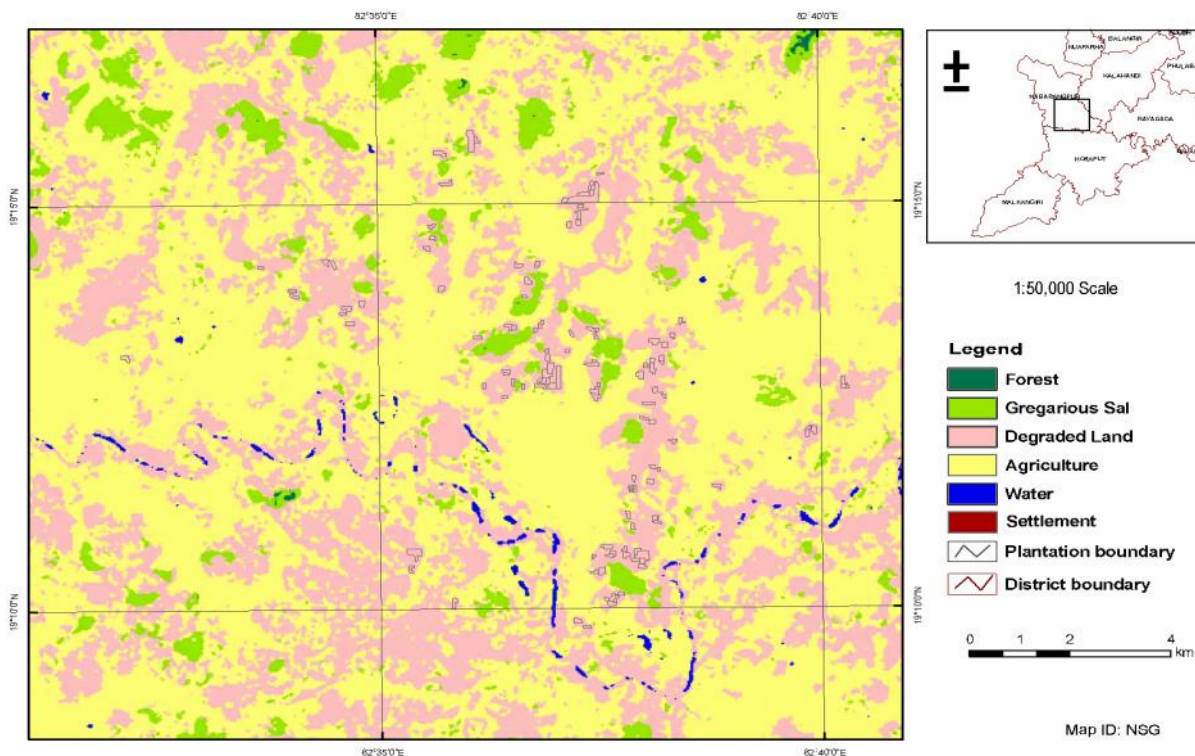
The activity is an eligible CDM reforestation project activity, which has been demonstrated through Satellite Imageries of 1989-90 period, Land title document, Baseline vegetation survey and interviews with the local farmers/communities on land use/cover history and important events during Participatory Rural Appraisal (PRA). The land that has been reforested under this A/R CDM project activity was barren due to heavy soil erosion and loss of top soil which has caused reduction in carbon stocks over time to the point where there is little vegetation and the soil has low organic carbon content rendering it

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unusable for historic land uses. There was no woody vegetation found in December, 1989 as the land was under severe soil erosion and hence satisfies the criteria of being non-forested since 31st December, 1989.

(a) Satellite imageries: The satellite imageries of 1989-90 period (Map overlay on Landsat TM data dated 19 Nov 1990 and classified image) provided in respect of all parcels of land, indicate that the land taken up for present project activity neither contain any forest nor fall under the forest category as defined by the State of Forest Report (1999) Government of India. They fall under the category of degraded land. Land cover map in respect of Sindhiguda division is attached forthwith:

Eucalyptus plantation boundaries overlaid on vegetation and land cover map of the area during 1989-90 for Sindhiguda Division, Nabarangpur District



(b) Land title document: The farmers owning the land necessarily possess the title document of the land locally known as “Land Patta” in Orissa & Chhatisgarh and “Land Pass Book” in Andhra Pradesh issued by Land Revenue Department of respective State Governments wherein the land category is also mentioned. The land pattas of entire area under A/R CDM consideration clearly evidence that they are not forest land. They are categorically mentioned as degraded land locally known as “Donger land” in Orissa, “Parat land” in Chhatisgarh and “Metu bhum” in Andhra Pradesh.

(c) Certificates from Local Tehsildars: Officials from local land revenue department of all the three states, the Tehsildars of the area have certified that the land category mentioned as Dongar, Parat, Metu in patta/ passbook is nothing but degraded land.

(d) Baseline Vegetation Survey: A survey aiming to assess baseline vegetation was conducted by the team of MTPL field staff in the year 2001 before start of the project activity. The survey was conducted



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in different time periods, first post monsoon (October, 2000 to January, 2001) and thereafter pre-monsoon in summer (May-June 2001). From the survey it was observed that there were very few trees growing in the project site, and the species *Anacardium occidentale* is the dominant tree species in the area. The field staff visited individual sites along with the concerned farmer and penned down the vegetation noticed on the site selected for forestation. The data was then compiled to evidence the eligibility of the land as well as to estimate the baseline carbon sequestration of the project activity.

It was observed from the vegetation report that the pre and post monsoon scenarios widely differed. In post monsoon period the land was flourished with grass, bushes and weeds but in summer everything vanished and the land was totally barren leaving no vegetation at all. It was further observed that the land is divided into two categories – land without vegetation and land with vegetation. The land with vegetation contained grasses, shrubs and a few trees like mango, cashew, teak, sal, jackfruit etc. The other category was totally barren having light scattered grass at the most.

(e) Participatory Rural Appraisal (PRA): A ground based survey was also conducted to gather information on land use/cover history and important events that have impacted the land use/cover changes and to study the socio-economic and socio-ecological aspects of the project area spread across Orissa, Andhra Pradesh and Chhattisgarh. The company contracted a local NGO, Maa Syamalya Voluntary Organization to conduct PRA exercise. The PRA was conducted over a period of six months from October, 2008 to March, 2009 through visiting the local farmers/communities and interviewing them directly with following objectives:

- To evaluate the eligibility of the lands under the project area
- To analyze the potentiality of additionality and leakage in the project area
- To gather information about technology of Eucalyptus plantation known to the farmers
- To identify the discrete parcels to be included under the project area
- To explore the crop productivity, grazing pattern, climate & other relevant points
- To know the income sources of the project participants and study the socio-economic conditions of the households and the communities in the villages.
- To collect information on similar reforestation activities in the area

Tools & techniques used:

- Semi-structured interviewing
- Group discussions
- Village and resource Mapping

MTPL provided the list of all the farmers initially participating in the project activity with their unique ID no to the agency with instructions to touch at least 10% farmers in each bank area including a few villagers and to reach as many villages as possible in order to ensure proper representation of each area in PRA. MTPL field officers assisted them to identify and introduce the farmers. The villagers were informed well in advance regarding the visit of PRA team of MTPL to ensure their availability. The PRA team met the farmers with structured questionnaire which covered mainly the following issues:

Land eligibility: Respondents were asked about their proposed land status, whether it was a forest area, and if so since when?

Technology: Respondents were specifically asked about their knowledge regarding planting Eucalyptus trees, preparing land for the plantation activity, seed availability etc.



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Grazing for leakage criteria: Respondents were specifically asked about grazing of their cattle in the proposed land and also any grazing by migratory cattle from adjoining areas.

Time line and history tracing: Respondents were asked to elaborate about their areas and record any developmental activities in their areas since 1940.

Income: land and cattle holding data collected by the field staff was cross-checked with the individual participants and the participants were interviewed about the productivity and yield of their lands. Alternative to land use: Respondents were asked to tell whether they have any other alternative available for the project lands, had this project not suggested.

Species choice: Respondents were categorically asked to tell about the choice of tree species selected for planting with their full consent and choice.

Seasonality of crops: Respondents were requested to prepare a crop cycle map showing seasonality of various crops in their area.

Similar Reforestation activities in the area: Detailed information on similar reforestation activities in the area as far as possible was also collected from the villagers.

Views & comments: Respondents were also asked to give their views and comments on the reforestation activity undertaken by the company.

Altogether 1525 respondents were approached by the agency including 64 villagers who were not project participants. The sample respondents were systematically selected by their ID nos from the list of 14462 farmers supplied by the company following the principle, one respondent from each 10 farmers of the bank area or the farmer from a new village or the next farmer available in order to ensure participation of maximum villages in PRA exercise. Farmers' replies were recorded by the team on individual forms in local language. The farmers then approved the comments by putting their signature/ thumb impression. Based on the response the agency prepared a consolidated report and submitted to the company as PRA Report and "Report on Similar Reforestation Activities". The PRA report provides lot of useful information on land use/cover, socio economic aspects of the respondents as under:

- All the respondents confirmed that the land included in the project activity never had a forest in last 30 years nor they fall under the category of forest land.
- The respondents invariably reported that the lands owned by them are severely degraded land, not suitable for growing agricultural crop. It was revealed that they are not just saying because the land is categorized as degraded land by the land authorities of State Government but practically experienced. Many of them or their forefathers tried to cultivate agricultural crop on their land (partly or wholly) in the past and failed. Either the yield was so poor that they could not afford to continue or in some cases the crop totally dried in absence of irrigation.
- The respondents informed that before MTPL persons approached them, they didn't have the technical know how of Eucalyptus plantation on degraded land on commercial basis. Even, they didn't have the idea from where seedlings were available, how to prepare degraded land for planting eucalyptus. They also informed that when MTPL persons approached them in the year 2000 they required training to implement such kind of activity.
- Most important causes of degradation as perceived by the respondents are domestic use by villagers, business/trading, fuel wood crisis in the region, illegal forest produce sale etc.

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- Further there are no developmental activities or incentives by the state to reverse the degraded status into cultivatable land or to prevent further degradation. The economic conditions of the farmers are not such that they can afford to develop the land for agricultural purposes.
- In terms of socio-economic profile, the respondents are mainly small farmers/tribal, daily wage earners and small service providers totalling to 96.2%. Per capita annual income stands at Rs.4031/- where 86% respondents has been found with income of Rs 5000/- or less which is significantly low and indicates the degree of deprivation of the people.
- Among 91.9% farmers holding land upto 5 acres, 62.3% own less than 3 acres and merely 0.4% own land more than 10 acres.
- Almost all the respondents opined that the plantation scheme brought by MTPL has provided a good opportunity for them. Under the scheme they can fetch out some income from their degraded land which was lying barren since their forefathers. In absence of the scheme they had no other alternative land use except to leave it barren as in the past.

Therefore the land within the project boundary was all non-forest land at the moment the project started, they were degraded, under ongoing process of degradation and confirms as under:

- At the time of project start the project land was neither covered by young natural stands or plantations with the potential to reach the national forest threshold; traces of grass found in some parcel of land.
- The project land were not temporarily unstocked (i.e. no significant loss of woody biomass has occurred due to human intervention or indirect natural causes such as fire or insect damage); and
- Have been subject to environmental conditions and human-based degradation which do not permit the encroachment of natural forest vegetation.

A.8. Approach for addressing non-permanence:

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In order to address the non-permanence issue, project participants have chosen the issuance of tCERs for the net anthropogenic GHG removals by sinks achieved by the proposed A/R CDM project activity.

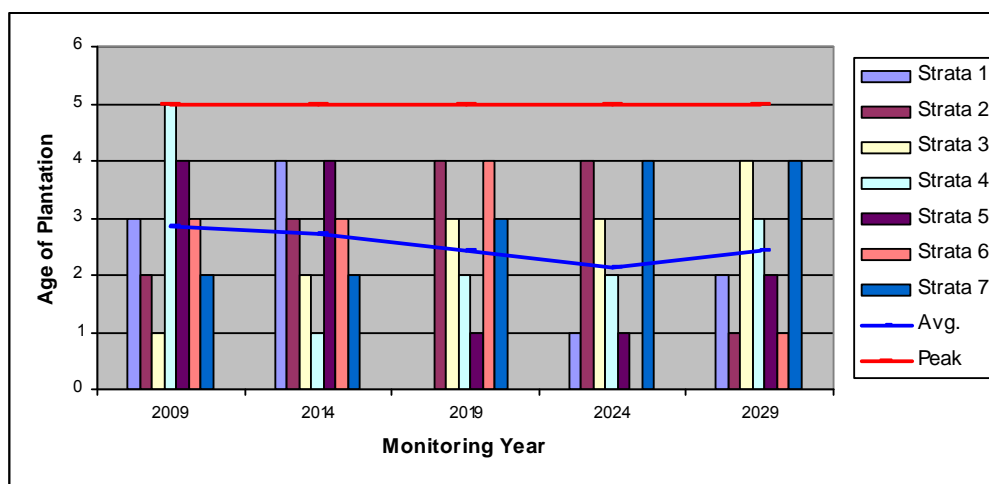
The planting activity has been conducted from 2001 to 2007. Eucalyptus sp. would be harvested at the age of 5 years. To avoid the coincidence with peaks in carbon stocks, the first monitoring will be conducted in the year 2009 with subsequent monitoring and verification interval of 5 years, i.e. in 2014, 2019, 2024 and 2029.

Year No.	Year	Monitoring	Verification	Harvesting
1	2001			
2	2002			
3	2003			
4	2004			
5	2005			
6	2006			
7	2007			
8	2008			



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9	2009			
10	2010			
11	2011			
12	2012			
13	2013			
14	2014			
15	2015			
16	2016			
17	2017			
18	2018			
19	2019			
20	2020			
21	2021			
22	2022			
23	2023			
24	2024			
25	2025			
26	2026			
27	2027			
28	2028			
29	2029			
30	2030			



A.9. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

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Summary of results obtained in Sections C.7., D.1., and D.2.

Year	Estimation of baseline net GHG removals by sinks (tonnes of CO ₂ e)	Estimation of actual net GHG removals by sinks (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO ₂ e)



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1 st Year	0	3862.37	0	3862
2 nd Year	2.93	28667.04	0	28664
3 rd Year	7.68	97471.37	0	97464
4 th Year	14.12	261234.66	0	261221
5 th Year	24.55	618873.65	0	618849
6 th Year	36.35	736103.63	0	736067
7 th Year	50.64	1021486.61	0	1021436
8 th Year	67.79	1616039.06	0	1615971
9 th Year	68.01	-385670.24	0	-385738
10 th Year	68.23	365863.64	0	365795
11 th Year	68.45	-153435.72	0	-153504
12 th Year	68.67	-444309.86	0	-444379
13 th Year	68.89	-246434.02	0	-246503
14 th Year	69.11	542910.97	0	542842
15 th Year	69.33	119992.91	0	119924
16 th Year	69.55	-306693.83	0	-306763
17 th Year	69.77	-246434.02	0	-246504
18 th Year	69.99	542910.97	0	542841
19 th Year	70.21	119992.91	0	119923
20 th Year	70.43	-306693.83	0	-306764
21 st Year	70.65	-247388.42	0	-247459
22 nd Year	70.87	537953.35	0	537882
23 rd Year	71.10	96287.79	0	96217
24 th Year	71.32	-381967.01	0	-382038
25 th Year	71.54	-437805.63	0	-437877
26 th Year	71.76	586173.24	0	586101
27 th Year	71.98	6246.57	0	6175
28 th Year	72.21	-909034.72	0	-909107
29 th Year	72.43	1588595.05	0	1588523
30 th Year	72.65	-413114.25	0	-413187
Total estimated GHG removals by sinks(tCO ₂ e)	1751.20	4411684.24	0	4409933
Total number of crediting years	30	30		30



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Annual average over the crediting period (tCO ₂ e)	58.37	147056.14	0	146998
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A.10. Public funding of the proposed A/R CDM project activity:

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The project did not receive any public funding for the development of the project

SECTION B. Duration of the project activity / crediting period**B.1 Starting date of the proposed A/R CDM project activity and of the crediting period:**

>>

25.06.2001

As clarified in EB's 41st meeting at Para 67 "the start date shall be considered to be the date on which project participant has committed to expenditures related to implementation of project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for project activity." Accordingly the date on which first tripartite agreement was executed between the farmer, the company and the bank to undertake project activity has been considered as the start date. Unless the tripartite agreement is signed nothing proceeds further. The first tripartite agreement was executed in respect of Shri Chaitan Kendu (KBG001), village Kenduguda under Indian Overseas Bank, Boipariguda, district Koraput on 25th June, 2001 which has been considered as start date of the project activity.

List of first tripartite agreements executed in each of the 31 bank areas reforested in the first year of plantation 2001-02 is furnished in Table B.1 below evidencing that no tripartite agreement was executed prior to 25.06.2001:

Table B.1: First Tripartite Agreements of each Bank area reforested in first year of plantation (2001)					
S No	Name of First Farmer who executed Tripartite Agreement	ID No	Bank Area	Village	Date of Tripartite Agreement
	KORAPUT DISTT				
1	Sri Chaitan Kendu	KBG001	Boipariguda	Kenduguda	25.06.2001
2	Sri Parsuram Nayak	KPG004	Podagada	Padaiput	07.07.2001
3	Sri Hari Porja	KKN006	Kundra	Jhihigaon	11.07.2001
4	Sri Bhakta Nayak	KDP003	Dongerpaunsi	Naragaon	12.07.2001
5	Sri Trinath Das	KNP033	Nandpur	Nandpur	17.07.2001
6	Sri Ram ch Krisani	KLP012	Lamtaput	Lugum	19.07.2001
7	Sri Tankadhar Bisoi	KDG002	Digapur	Masigam	21.07.2001
8	Sri Damodar Banda	KPD006	Padwa	Mandipadar	21.07.2001
9	Sri Bharat Jani	KMP011	Mathalput	Lachmani	23.07.2001
10	Sri Damu Sisa	KJP004	Jolaput	Surmi	30.07.2001
11	Sri Baraj Santa	KRG017	Ramgiri	Padeiguda	03.08.2001
12	Sri Ghasiram Gouda	KPP013	Phampuni	Ghatbagra	10.08.2001



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13	Sri Ramchandra Gadba	KKS005	Kusumi	Kangiaguda	10.08.2001
14	Sri Bichendra Pujari	KKP005	Korput	Podaiput	14.08.2001
15	Sri Sadasiba Patra	KAG001	Ambaguda	Tentuliguda	27.08.2001
16	Sri Parmanda Hantal	KSG004	Semiliguda	Subai	28.08.2001
17	Sri Dhaneswar Muduli	KKG006	Kakiriguma	Lediriguda	07.07.2001
NABARANGPUR DISTT					
18	Sri Gopal Chandra Mishra	NNH001	Nandahandi	Dohana	06.07.2001
19	Sri Tinuparaja	NKL002	Kumuli	Purnagda	17.07.2001
20	Sri Ramesh Chandra Hial	NKG003	Kathargada	Paknaguda	26.07.2001
21	Sri Ganeswar Sahu	NBS001	B. Singhpur	Kandulkhunti	28.07.2001
22	Sri Kamulu Majhi	NDH001	Dhamnahandi	Bhurusiguda	07.08.2001
23	Sri Dinamani Harijan	NTB006	Tumberla	Gumidora	07.08.2001
24	Sri Ganpati Bhatra	NSM001	Sanmosigaon	Kochiaguda	09.08.2001
25	Sri Gangadhar Bhatra	NNP005	Nabarabgpur	Bongapalli	12.08.2001
26	Sri Raghunath Nayak	NSG003	Sindhiguda	Dangtatguda	13.08.2001
27	Sri Puran Harijan	NCG001	Challanguda	Parsola	14.08.2001
28	Sri Laxman Bisoi	NKM002	Kosagumuda	Kosagumuda	16.08.2001
29	Sri Nabina Harijan	NJB002	Jotabal	Bhatadhansuli	20.08.2001
30	Sri Daina Miriya	NRJ001	Rajoda	Bijaguda	11.09.2001
MALKANGIRI DISTT					
31	Sri Hari Bhumia	MPG002	Pangam	Padaguda	29.08.2001

B. 2. Expected operational lifetime of the proposed A/R CDM project activity:

>>

50 years 0 months.

B.3 Choice of crediting period:**B.3.1. Length of the renewable crediting period (in years and months), if selected:**

>>

Not applicable

B.3.2. Length of the fixed crediting period (in years and months), if selected:

>>

The fixed crediting period is of 30 years 0 months.

SECTION C. Application of an approved baseline and monitoring methodology**C.1. Title and reference of the approved baseline and monitoring methodology applied to the proposed A/R CDM project activity:**



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>>

The approved baseline and monitoring methodology titled “**Afforestation and reforestation of degraded land**”, **AR-ACM0001 (Version 04)**, **Sectoral Scope: 14**, has been applied to the proposed A/R CDM project activity alongwith following tools:

S No	Tools used	Version No
1	“Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”	01
2	“Tools for the identification of degraded or degrading lands for consideration in implementing A/R CDM project activities”	01
3	“Calculation of the number of sample plots for measurements within A/R CDM project activities”	02
4	“Estimation of GHG emissions related to displacement of grazing activities in A/R CDM project activity”	02
5	“Procedure to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities”	01
6	“Estimation of GHG emission due to clearing, burning and decay of existing vegetation attributable to a CDM A/R project activity”	03
7	“Tool for testing significance of GHG emissions in A/R CDM project activities”	01

C.2. Assessment of the applicability of the selected approved methodology to the proposed A/R CDM project activity and justification of the choice of the methodology:

>>

The proposed A/R CDM project activity complies with the applicability conditions of the approved baseline methodology AR-ACM0001 as follows:

Applicability Condition	Justification
The A/R CDM project activity is implemented on degraded lands, which are expected to remain degraded or to continue to degrade in the absence of the project, and hence the land cannot be expected to revert to a non-degraded state without human intervention	<p>“Tool for identification of degraded or degrading lands for consideration in implementing CDM A/R Project activities (Version 01)” applied to establish that the lands in proposed CDM activity are degraded land.</p> <ol style="list-style-type: none"> 1. Verifiable document in the form of Land Patta or Land Pass Book is available in respect of each parcel issued by local Land Revenue Authorities of respective State Government wherein the land has been categorized as “Donger”, “Parat” or “Mettu bhumii” in Orissa, Andhra Pradesh and Chhattisgarh respectively. Further Tehsildar of the area, official from land revenue department of State Government, have certified that the Donger, Parat and Mettubhumi are the nomenclature used locally for degraded land in the states of Orissa, Chhattisgarh and Andhra Pradesh respectively. 2. The company appointed M/s Salim Ali Centre for Ornithology & Natural History (SACON) under MoEF, Govt of India for



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	<p>conducting GIS mapping of the project area including Change detection study to know the status of land during 1990 period. Satellite images of 1990 period have been generated by overlaying the current GIS map of the project parcels over the Landsat Thematic Mapper Satellite data of 1990 period available from Global Land Cover Facility (GLCF). These images are available for the entire project area; bank area wise that shows that the parcels of land under project activity was under degraded category.</p> <p>3. Further PRA that was conducted by one NGO of the area in 2008-09 also gathered information on land use/cover history past and current. It is found from the PRA study that the land was degraded land, not fit for any agricultural activity and thus lying barren since decades or from the period of their forefathers. Many of the land owners or their forefathers tried to cultivate agricultural crop on their land (partly or wholly) in the past but failed because of degraded nature of land. Either the yield was so poor due to poor fertility that they could not afford to continue or the crop dried totally in absence of irrigation.</p>
<p>Encroachment of natural tree vegetation that leads to the establishment of forests according to the host country definition of forest for CDM purposes is not expected to occur.</p>	<p>Prior to the implementation of the project activity the land under the project boundary were degraded lands without considerable flora due to severe soil erosion without topsoil.</p> <p>Encroachment of natural tree is not possible as the project activity has been implemented on degraded land without topsoil due to severe soil erosion in the past as well as continued degradation without considerable flora. The area frequently faced natural calamities like drought and excessive rains. The speech in 50th National Development Council meeting on 21st December, 2002 by the then Chief Minister of Orissa reveals that the state was ravaged by as many as 15 major calamities since 1963. The super cyclone in October 1999, severe droughts in 2000 & 2002 and excessive rain fall in 2001 have ravaged almost the entire state causing colossal losses especially in rural areas[@].</p> <p>[@] http://planningcommission.gov.in/plans/planrel/pl50ndc/orissa.pdf</p> <p>On the contrary study report says there are indications of desertification in many parts of the state especially in western and southern uplands. The study by Water Initiatives of Orissa (WIO), a NGO in the state claimed that the rate of land degradation is going up at an alarming pace and Orissa could well turn to barren and a land mass akin to desert in next 150 years. “In just 13 years from 1991-92 to 2004-05, severely degraded land in the state has increased by 136%, barren land by 69% and land converted to non-agricultural uses by 34%”, the WIO coordinator said^{@@}.</p>



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	<p>@ @ http://www.rediff.com/news/2006/nov/01orissa.htm</p> <p>From above it is quite evident that the land where natural encroachment of trees could not happen till 2001 can not be expected to happen even after 2001 unless significant changes are brought in by human intervention. The greenery/vegetation seen post monsoon is a temporary scenario that grows every year during rains. But everything dries up in summer leaving the land barren without any vegetation, thus leaving no option for natural encroachment of trees, photographs of the project area attached at section C.6 may be seen.</p> <p>Moreover the conditions responsible for degradation has neither changed nor mitigated in the area as explained below.</p> <ol style="list-style-type: none"> 1. The first being the topography of the area, the land is undulated where top soil washes away due to excessive rain every year. Top soil is also carried away by the high wind in summer causing further degradation and thus natural tree vegetation is not at all likely. 2. Secondly the land has become degraded due to many years of anthropogenic activities like population growth, high dependency of local people on forest products for their livelihood and construction material for their houses etc. Remote location and poor road connectivity make it economically unattractive for any other kind of investment, thus leading to thinning of forest areas. 3. Thirdly the illegal felling (fuel wood is the only medium of cooking) do not allow the young regeneration to reach woody stage as they prevents establishment of forest. Even the vegetation that progresses to woody stage is bushy and suppressed due to continuous damage due anthropogenic pressure and grazing activities. <p>Hence, the establishment of natural regeneration is impossible without management interventions such as proper training on plantation technique, restrictions on illegal felling, limited grazing etc</p>
Flooding irrigation is not part of the project activity	No flooding irrigation happen in the project site
If project activities are implemented on organic soils, drainage is not allowed and not more than 10% of the project area may be disturbed as result of soil preparation for planting	Project activity is not implemented on organic soils. The land contains low organic carbon as is evident from the soil reports of pre-project era. Soil testing was conducted Gram Panchayat wise in undivided Koraput Revenue District by Soil Testing Laboratory Semiliguda, Govt. of Orissa, during the period from 1995-96 to 1999-2000. The undivided Koraput included the present districts of Koraput, Nabarangpur and Malkangiri where the project is located. The report which is based on analysis of 32000 plus samples tested Gram Panchayat wise show that the



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	organic carbon content is below 0.5% which indicates low organic carbon in the project area. The report is available in the Soil Testing Laboratory, Sindhiguda. Thus the project activity is not implemented on organic soil.
The establishment of project shall not decrease availability of fuel wood	<p>The pre project fuel wood collection on the project sites happens on a marginal level and the same is not affected with the implementation of project activity. The areas are degraded; very few trees are present on project parcels those are sometimes used for fuel wood collection. But the amount per hectare works out nearly zero and would be difficult to monitor and measure.</p> <p>Local villagers usually harvest herbaceous and shrub biomass for fuel wood. They can collect fuel wood still within the project boundary by gathering dead wood and branches and shrubs growing between the trees.</p>

C.3. Assessment of the selected carbon pools and emission sources of the approved methodology to the proposed CDM project activity:

>>

Carbon Pools	Selected (Yes / No)	Justification / Explanation of choice
Above-ground Biomass	Yes	Major carbon pool subjected to the project activity.
Below-ground Biomass	Yes	Major carbon pool subjected to the project activity.
Dead Wood	No	As there is only a few pre-project living trees and the lands to be planted are degraded and degrading or in a low-level steady state, carbon stocks in dead wood in the baseline scenario can be expected to decrease more or increase less, relative to the project scenario. Therefore based on applied methodology, this pool can be conservatively omitted.
Litter	No	As the lands to be planted are degraded and degrading or in a low-level steady state, carbon stocks in litter in the baseline scenario can be expected to decrease more or increase less, relative to the project scenario. Therefore based on applied methodology, this pool can be conservatively omitted.
Soil Organic Carbon	Yes	<p>SOC may increase (when compared to baseline) due to implementation of the A/R CDM project activity. The methodology provides a default approach for accounting for this pool if applicability conditions contained in paragraph 5.1.4.1 are obeyed.</p> <p>(i) The lands to be planted are not organic soils (e.g., peat-lands), or wetlands. It is evident from the soil report of Soil chemist, Govt. of Orissa, India before start of the project that the character of soil is low to medium range. It is also evident from the PRA and land patta that before the project activity the</p>



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		<p>land had no use and it was fallen as degraded land.</p> <p>(ii) As per baseline vegetation survey altogether 3385 parcels were found with vegetation, 1902 parcels having scattered herbs & shrubs, trees with herbs & shrubs in 252 and only trees in 1231 out of 12437 parcels of the project area. Because of degraded nature of land majority of parcels are barren without any woody vegetation. Herbs and shrubs that grow during rains, dries and disappear automatically with the onset of summer. During site preparation at the best these herbs and shrubs are cleared which is less than 5% of the total area. Trees are essentially not removed at all.</p> <p>(iii) Fine litter (woody twigs less than 2mm diameter, bark and leaves) remain on site. Its a usual practice in the area not to collect and remove leaves and fine litters from Eucalyptus plantation fields as they are not eaten by goats, cows and buffalos.</p> <p>(iv) As detailed in Section A.5.4, at the most 1000 trees per acre are being planted which is established practiced, ie 2471 trees per hectare. Pits dug for planting will be small (40-45 cm in diameter and 30-35 cm in depth). Considering maximum pit dia 45 cms, surface area per pit works out to be 0.15 m². Therefore, the surface area getting disturbed by the site preparation is estimated to be $0.15 \times 2471 = 370.65 \text{ m}^2$ per hectare, ie 3.7% of the total area planted.</p> <p>(v) Ploughing for site preparation is done generally with country plough, tractor is also used by a few exceptional farmers who can afford it. But in all ploughing land contour is maintained. In no case land contour is disturbed /changed. It is neither required nor the farmers try as they normally do not afford the cost of changing the land contour.</p> <p>As the project activity satisfies all applicability conditions listed at paragraph 5.1.4 under soil organic carbon of the methodology the default method shall be used. Accordingly the default values of $c = 0.5 \text{ t C per hectare per year}$ and $T_e = 20 \text{ years}$ has been considered.</p>
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The methodology applied by the proposed A/R CDM project activity considers one emission by sources within the project boundary, i.e., burning of woody biomass. The project activity is not considering 'burning of woody biomass' for planting activities, however burning can occur accidentally in future. Therefore, CH₄ emissions within the project boundary are taken into account.

Sources	Gas	Included /excluded	Justification/ Explanation of choice
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Burning of woody biomass	CO ₂	Excluded	Site burning was not taken up and shall not be employed even in future. However, carbon stock decreases due to burning are accounted as a carbon stock change.
	CH ₄	Included	Non-CO ₂ gas emitted from woody biomass burning
	N ₂ O	Excluded	Site burning was not taken up and shall not be employed even in future. However potential emissions are negligibly small.

C.4. Description of strata identified using the *ex ante* stratification:

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Stratification according to pre-existing conditions and baseline projections

Although the project sites are located in different states (as described in section A.5.1), the carbon status of all the sites is more or less same. It is low or decreasing. The Ex ante stratification is done by conducting field visits and assessing the soil condition of areas under the project. Local communities are interviewed (PRA conducted) to understand the land use land cover history. Few trees along with bushes of at the most 1 m height of different varieties and grasses and were found in a few parcels of the project area. The bushes and grass were visible during monsoon. But with the onset of summer only trees were left and all the bushes and grasses vanish. As per AR-ACM0001 (Version 04), section II.4 “changes in carbon stock of above ground and below ground biomass of non tree vegetation may be conservatively assumed to be zero for all strata in the baseline scenario”. Based on this, the proposed A/R CDM project area is stratified depending on vegetation cover. Two strata were identified as below:

1. Baseline Strata I: Project land with few growing trees
2. Baseline Strata II: Project land without trees

Baseline Strata I: Project Land with few growing Trees

Based on Ecological survey report all the parcels containing trees through the entire project area has been shortlisted and assigned to Baseline strata I. A total of 8701 trees of different varieties in almost 252+1231=1483 parcels spreading across 2939.30 hectares of project area have been found out of which 252 parcels also contained scattered herbs & shrubs. The table below shows the list of trees recorded in the project area:

S No	Common Name	Scientific Name	Family
1	Mango	<i>Mangifera indica</i>	Anacardiaceae.
2	Cashew	<i>Anacardium occidentale</i>	Anacardiaceae
3	Sal	<i>Shorea robusta</i>	Dipterocarpaceae
4	Teak	<i>Tectona grandis</i>	Lamiaceae
5	Mahuwa	<i>Madhuca longifolia</i>	Sapotaceae.
6	Kusum	<i>Schleichera oleosa</i>	Sapindaceae
7	Kendu	<i>Diospyros melanoxylon</i>	Ebenaceae
8	Karanji	<i>Pongamia pinnata</i>	Papilionaceae
9	Chakunda	<i>Cassia tora</i>	Caesalpinaceae
10	Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae

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11	Guava	<i>Psidium gujav</i>	Myrtaceae
12	Pipal	<i>Ficus religiosa</i>	Moraceae
13	Castor	<i>Recinus cummunis</i>	Euphorbia
14	Kachnar	<i>Bombax Ceiba</i>	Malvales
15	Semal	<i>Bauhinia Semla</i>	Caesalpinaceae
16	Arjun	<i>Terminilia Arjuna</i>	Combretaceae
17	Beleric	<i>Terminalia Bellirica</i>	Combretaceae
18	Silver Oak	<i>Grevelia Robusta</i>	Proteaceae
19	Aonla	<i>Phyllanthus emblica</i>	Phyllanthaceae
20	Tendu	<i>Diospyros Celebica</i>	Ebenaceae
21	Tamarind	<i>Tamarindus indica</i>	Fabaceae

Baseline Strata II: Project Land without Trees

The remaining 10954 parcels without growing trees are assigned to Baseline strata II. Because of degraded nature of land, majority of parcels are barren, however herbs and shrubs appearing especially during rains were noticed in almost 1902 parcels. The existing vegetation of the strata without growing trees is analyzed by using list quadrature method and census survey method which is extensively used for vegetation survey. Considering the huge size and the discrete nature of the project site, a quadrature of size 10 m X 10 m is taken for vegetation analysis. To ensure that the flora of the entire 252+1902 = 2154 parcels having bushes of different varieties is represented, 20% ie 430 discrete parcels belonging to different landholdings are selected for analysis. Representative quadrates identified for analyzing the qualitative characters of vegetation, the details of which are given below.

S No	Name of the Species	Family	Habit
1	<i>Acacia nilotica</i>		
2	<i>Cassia tora</i>	Leguminosae	Herb
3	<i>Ipomea biloba</i>	Convolvulaceae	Herb
4	<i>Capparis aphylla</i>	Capparidaceae	Herb
5	<i>Croton bonplandianus</i>	Euphorbiaceae	Herb
6	<i>Achyranthes aspera</i>	Amarantaceae	Herb
7	<i>Parthenium hysterophorus</i>	Poaceae	Herb
8	<i>Tephrosia purpurea</i>	Pappilionaceae	Herb
9	<i>Cyperus diformis</i>	Cyperaceae	Herb
10	<i>Chloris montana</i>	Poaceae	Herb

Table C.4.1 below shows the details of total area and no of parcels assigned to each of Baseline strata I and II, year wise:

Table C.4.1: Baseline Stratification								
Strata	Plantation Year							
	2001	2002	2003	2004	2005	2006	2007	Total
Total nos of Baseline trees	358	526	710	1329	1778	1954	2046	8701
No of Parcels per Baseline Strata:								
Baseline Strata I (Parcels with trees)	55	104	131	233	282	327	351	1483



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Baseline Strata II (Parcels without trees)	352	662	862	1535	2305	2608	2630	10954
Total:	407	766	993	1768	2587	2935	2981	12437
Area per Baseline Strata (ha)								
Baseline Strata I (Parcels with trees)	73.30	169.97	254.63	418.35	620.82	673.95	728.28	2939.30
Baseline Strata II (Parcels without trees)	447.28	830.91	946.71	1745.36	2402.79	2726.48	2930.63	12030.16
Total:	520.58	1000.88	1201.34	2163.71	3023.61	3400.43	3658.91	14969.46

Stratification according to the planned AR-CDM project activity:

The planting year is the main factor influencing the variation of carbon stock changes for each reforestation model under the project scenario. The project uses only Eucalyptus plantation. The growth model, planting schedule, fertilization, harvesting and replanting cycle are same for the entire project activity. The project defines 7 year plantation programme. Accordingly the project stratification has been done on the basis of planting year. Therefore, the entire land included in the project activity has been stratified into 7 project strata based on planting year as given in **Table C.4.2** below:

Table C.4.2: Project Stratification		
Plantation Year	Strata	Area (Ha)
2001	Strata 1	520.58
2002	Strata 2	1000.88
2003	Strata 3	1201.34
2004	Strata 4	2163.71
2005	Strata 5	3023.61
2006	Strata 6	3400.43
2007	Strata 7	3658.91
	Total:	14969.46

C.5. Identification of the baseline scenario:

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C.5.1. Description of the application of the procedure to identify the most plausible baseline scenario (separately for each stratum defined in C.4.):

>>

C.5.2. Description of the identified baseline scenario (separately for each stratum defined in Section C.4.):

>>

C.6. Assessment and demonstration of additionality:

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The steps as outlined in the A/R Methodological tool “**Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities**”(Version 01) are followed to demonstrate that the proposed A/R CDM project activity is additional and not the baseline scenario. Both barrier arguments and investment analysis (steps 2 and 3) are applied.



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STEP 0. Preliminary screening based on the starting date of the A/R project activity

The starting date of the project activity is after 31 December 1999:

The project activity has started on 25.06.2001, the date on which first tripartite agreement was executed between the company, the farmer and the bank to undertake project activity. The evidence for the starting date is presented in Section B.1 i.e. the first tripartite agreement in respect of Shri Chaitan Kendu.

Though the project was started on 25.06.2001, CDM project documentation could not be started immediately after conceiving the project. The main reason being the company remained sick under BIFR till November, 2005. It needs indepth analysis of company's business and background to explain the delays in CDM documentation.

Why CDM documentation could not be started immediately after conceiving the project:

The main reason that MTPL could not start CDM documentation immediately after conceiving the project was financial constraints as well as absence of monitoring methodology. MTPL established its factory in extremely backward area. Govt of Orissa at the time of incorporation allotted land for plantation to the company on 20 years lease basis subject to payment of royalty. The company planted the area but at the time of harvesting, royalty issue got disputed because of charging royalty higher than the agreed one and was not allowed to harvest the crop. The company then moved to court of law and the matter is still subjudice. The company also planted lease hold land owned by group companies on piece meal basis as trial but soon realized that the resulting landed cost was too high and they can't continue due to high security expenses to prevent illegal felling. Gradually almost 90% net worth wiped out with accumulated losses and the company was finally adjudged sick under SICA by BIFR in December, 1998. The company remained sick till November, 2005 when BIFR discharged the company from the purview of SICA vide their order dated 22.11.2005.

The company struggled for finance all those years while under BIFR. In spite of starting the A/R CDM project activity in June'01, CDM documentation could not proceed at all. It involved many complications and was very cumbersome to get the scheme through from BIFR. Moreover there was no methodology or guidelines available to develop AR-CDM project. Even AR-WG was not formed. The first meeting of AR-WG was held in July, 2004 and subsequently first monitoring methodology for AR projects was issued in November, 2005

As soon as BIFR discharged the company from purview of SICA and the methodology for AR projects was issued in November'05, CDM documentation started as is evident from the time line below:

Table C.6: Time Line of CDM Activities		
S No	Date	Description of activity
1	December 1998	MTPL incurred severe losses on account of plantation activity and was referred to BIFR as potentially sick company u/s 23 of Sick Industrial Companies (Special Provisions) Act (SICA) in 1990. The performance continued to deteriorate and was finally declared Sick in December 1998.
2	2000-01	Meanwhile when the company learnt about some external revenue for GHG abatement activities under Kyoto Protocol, the company thought of developing Forestry-CDM project in line with farm forestry scheme approved by NABARD.



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		Scheme for Eucalyptus plantation on degraded land with bank finance was prepared and company's field officers approached the farmers and tribal with the scheme. Villagers and farmers, the main stakeholders were consulted through series of meetings. 45 such meetings were conducted during December, 2000 to March 2001 and response was good.
3	24.04.01	MTPL board then decided in its meeting on 24.04.2001 to go ahead with the project, after considering CDM benefits under Kyoto Protocol. The minutes of board meeting reveals that CDM revenue was seriously considered for the project without which the project was not sustainable as experienced by the company in the past, copy of minutes provided below at the end of table.
4	25.06.01	Start date of project activity: First tripartite agreement between the farmer Shri Chaitan Kendu (KBG001) of Baipariguda, District Koraput, the company and the financing bank was executed.
5	11.04.02	The company decided to take the help of external consultants to develop CDM project and approached few agencies like Vidula Consultancy Services, Ernst & Young, Ordinal Consultants etc.
6	19.08.02	Vidula Consultancy came up to extend advisory services for CDM project and was willing to make a presentation.
7	15.11.02	Consultants of Vidula Consultancy made a presentation on CDM process and documentation required.
8	21.07.03	VCS submitted price offer for visiting plantation sites at Nabarangpur to assess feasibility of carbon credits which MTPL accepted.
9	08.09.03 to 13.09.03	Site visit by the consultants of VCS from 08.09.03 to 13.09.03, report submitted on 24.09.03. During the visit the consultants studied the plantation activity under farm forestry scheme and discussed preliminary requirements in view of developing CDM project with plantation team. The consultants concluded that the project has enough potential to qualify as CDM project.
10	12.07.04	Vidula Consultancy later intimated since there is no methodology and guidelines currently available for forestry projects, they would first require to develop new methodology and submit for approval which is a difficult task. VCS was not willing to get into development of a new methodology. They suggested that AR-WG has been formed and MTPL should wait till issue of approved methodology.
11	22.11.05	In the meantime the company remained Sick for five years when BIFR discharged the company from the purview of SICA in November'05 vide their order dated 22.11.2005.
12	20.12.05	Vidula Consultancy intimated that the 1 st methodology on AR-CDM projects AR-AM0001 dated 28.11.05 has been issued by UNFCCC.
13	Dec 2005	Soon after coming out of BIFR and issue of AR methodology, the company immediately sought the help of Vidula Consultancy to develop CDM project. Other agencies like Ernst & Young were also invited for their advisory services.
14	24.01.06	Ernst & Young and Vidula consultancy Services submitted their offers. The offer of Ernst & Young was too high and couldn't be finalised. VCS submitted revised offer on 18.04.06 which was accepted.
15	05.05.06	Mandate was finalised with Vidula Consultancy Services for developing CDM project.
16	07.03.07	PCN & PDD submitted to MoEF for Host Country Approval



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17	03.04.07	Mandate for validation finalised with TUV-Sud (Methodology AR-AM0003).
18	25.04.07	Presentation of project activity at DNA meeting for Host country approval
19	03.06.07	DNA raised 19 issues vide their letter dated 29.05.07
20	11.06.07	Stakeholders' meeting conducted at Nabarangpur for Orissa farmers
21	21.06.07	GPS data & Satellite Images: Action started for GPS data. Regional Remote Sensing Service Centre, Kharagpur (RRSSC) was enquired to offer for GPS data and satellite image of the plantation sites.
22	08.07.07	Stakeholders' meeting conducted at Kottur for Andhra Pradesh farmers
23	24.07.07	Reply sent to DNA's letter dated 29.05.07
24	12.08.07	Stakeholders' meeting conducted at Bastar for Chhatishgarh farmers
25	Nov'07	RRSSC sent proposal for mapping Chhatishgarh area only. They expressed their inability for mapping Orissa and Andhra Pradesh that covered our major plantation. Search continued for other suitable agency.
26	21.11.07	After 04 months of submitting reply, DNA called for another presentation. Our reply on issues raised in 29.05.07 letter was discussed.
27	06.01.08	After 2 months of our second presentation DNA rose 06 more queries vide letter dated 31.12.07.
28	14.05.08	Reply sent to DNA's letter dated 31.12.07.
29	02.06.08	DNA sought confirmation on proposed changes in forest definition.
30	12.06.08	Studied and checked. Confirmation sent that our project is not affected with the changed forest definition.
31	28.08.08	Located other agency for GPS mapping, M/s Salim Ali Centre for Ornithology & Natural History (SACON), Hyderabad who had CDM experience also. Their credentials reflected they can complete the job within stipulated period of time. Asked to submit offer at the earliest.
32	12.09.08	HCA Approval: After 03 months, DNA issued HCA for the project vide their letter dated 03.09.08.
33	11.10.08	Identified one NGO M/s Maa Syamalay Voluntary Organisation, Gadbaguda Street, Nabarangpur for conducting PRA. Order placed for conducting PRA.
34	31.10.08	Received offer from SACON and decided to finalise with them for GPS mapping.
35	13.11.08	Consequent upon merger of methodology AR-AM0003 with AR-ACM0001, revised the PDD and sent to Validator(Methodology applied AR-ACM0001)
36	18.11.08	Final mandate issued to SACON for GPS mapping (Rs 710,000/-) to complete the job in 4 months from date of receipt of 60% advance ie upto 18.04.09.
37	22.12.08	In view of changed methodology TUV-Sud submitted new offer for validation as per AR-ACM0001 on 12.12.08. Fresh mandate issued for validation on 22.12.08.
38	07.02.09	GSP: Uploaded PDD on UNFCCC website from 07.02.09 to 23.03.09 (45 days) inviting comments from Global Stakeholders.
39	25.02.09	Draft validation report as per new methodology AR-ACM0001 received from TUV-Sud with 42 CARs.
40	23.03.09	PRA completed. Report received from the NGO, Maa Syamalay Voluntary Organisation.



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41	26.08.09	Extension to SACON to finish GIS mapping by 31.08.09
42	26.08.09	Received all the maps from SACON: Current Period Maps-132, Maps of 1990 Period-69, SHAPE File for entire area.
43	26.08.09	Revised PDD, dated 25.08.09 alongwith reply to all 42 CARs, maps and documents in 11 annexure as detailed below sent to validator.
44	03.09.09	Validator raised a few issues related to CAR 11, 24, 25 and 28. Issues addressed, reply sent to validator on 11.09.09.
45	20.10.09 to 24.10.09	Site visit by TUV auditors for validation
46	03.11.09	Draft validation protocol received on 03.11.09 with 19 CARs and 35 CRs.

CDM consideration:

MTPL incurred severe losses on account of plantation activity and was referred to BIFR as potentially sick company u/s 23 of Sick Industrial Companies (Special Provisions) Act (SICA) in 1990. The performance continued to deteriorate and was finally declared Sick in December 1998. Meanwhile when the company learnt about some external revenue for GHG abatement activities under Kyoto Protocol, the company thought of developing A/Reforestation CDM project in line with farm forestry scheme approved by NABARD. Scheme for Eucalyptus plantation on degraded land with bank finance was prepared and company's field officers approached the farmers and tribal of nearby villages with the scheme. Response was good. The company then decided to take up reforestation project, after considering CDM benefits under Kyoto Protocol.

Decision to this effect was taken by MTPL board in its meeting on 24.04.2001 to go ahead with the project, after considering CDM benefits under Kyoto Protocol. Incentive from planned sale of CERs was seriously considered in the decision to proceed with the project activity. The minutes of board meeting reveals that CDM revenue was seriously considered for the project without which the project was not sustainable as experienced by the company in the past.

STEP 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity***Sub-step 1a: Identify credible alternative land use scenarios to the proposed CDM project activity*****a) The land used for agricultural practices**

The degraded condition of the land would not support agricultural practices. The farmers would not afford the costs for preparation of land for carrying cultivation. Some of the farmers or their forefathers tried to cultivate maize, paddy etc in past but the crop either dried or the productivity was very poor because of lack of irrigation, lack of proper upkeep and degraded nature of land. The yield was so poor compared to investment they couldn't get continue with cultivation anymore and thus the land remained barren.

Marginal agriculture by few well off farmers of the area can not be ruled out. Such farmers have developed their land for cultivation on their own. They have alternate source of income, either through some business, shop, service or professional activity whose presence has been assessed at about 12% in the PRA report that included 2% villagers also who are not the project participants. So the majority farmers included in the project activity are the poor down trodden farmers/ tribal who are not capable of



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investing money to develop their degraded land for agricultural purpose. Thus this alternative is not feasible.

b) Reforestation by the farmer on their own without support of MTPL

The project activity has been started in the state of Orissa reckoned to be backward due to poor economic growth where 47% population reportedly struggle below poverty line¹³. The land for reforestation is owned by such poor and illiterate farmers and tribal living below poverty line, most of them holding BPL card also. They do not have assured source of income to meet their daily needs including fooding, clothing etc. They are daily wage earners, who depend on some labour job in the area for their livelihood, sometimes they get sometime not. Few of them own some agricultural land and earn their livelihood through marginal cultivation. Soil fertility being very poor gives very poor yield resulting into very low per capita income as is evident from the PRA exercise. The PRA reveals that 96% farmers of the project activity mainly depend on cultivation (50%), daily wages (34%) and small service providers (12%) with per capita income as low as Rs 4236/-, Rs 3533/- and Rs 3412/- respectively. Overall per capita income of the farmers is Rs 4031/- as against state's average of Rs 9897/- and national average of Rs 17823/- in 2001-02¹⁴. Therefore they can not afford to invest for reforestation where any return is expected not earlier than 5-6 years. So much so they dwell in very remote areas having no access to media and banking facilities totally unaware of schemes, incentives if any available for plantation activities. It is almost impossible for them to approach banks for loan. Even if they approach, the bank will not extend finance in absence of any means for assured return. They also lack plantation expertise for good crop and good yield. Thus this alternative is not feasible and the land has remained barren since decades. Thus this option is not valid.

c) Reforestation by the farmer with support of MTPL (not undertaken as a CDM A/R project)

The lands to be reforested are heavily degraded due to continuous erosion with time which makes it unattractive for investors. The location of the project area is also remote in backward districts where lack of infrastructure; finance and proper expertise to carry out the project put major barriers. The degraded land in the state is 61.21 lakh hectares¹⁵, almost 40% of the total geographical area. The cultivable land exploited for cropping is comparatively more in the coastal districts of Orissa i.e. Balasore, Bhadrak, Cuttack, Ganjam, Jajpur, Jagatasinghpur, Kendrapara, Khurda, Nayagarh, Puri etc and not in the project area i.e., Nabarangpur, Koraput and Malkangiri. It would involve huge investment for making the land suitable for plantation, managing proper infrastructure and employing experienced staff & workers to monitor the plantations regularly. The company that remained sick till November 2005 and incurring loss thereafter also, can not afford to invest huge cost of plantation sustainably over a period of time without any external revenue. MTPL's investment in the very first year of plantation in 2001-02 was more than Rs 10 lacs. Thus this is not a very viable option because it would need private funding, which is very hard to obtain.

Furthermore there are commercial risks involved in reforestation on degraded land. Because of degraded nature of land yield fluctuation and poor productivity adversely affect the ROI of the project. Uncertainty prevailed in success rate of reforestation projects, in past, in the country. In 90s many private company's raised funds from public for teak plantation with an assurance of handsome return. The plantation sites chosen were in remote areas, mostly degraded/ wasteland, that yielded poorly resulting into closure of the

¹³ www.vasundharaorissa.org/pdf/act&policy

¹⁴ <http://sampark.chd.nic.in/images/statistics/SDP2005R5.pdf>

¹⁵ http://india.gov.in/knowindia/agriculture_orissa.php



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companies. So the financing banks feel that their lending is not effectively covered against failure to pay as such reluctant to lend for reforestation projects. The bankers of the company always excluded plantation expenses from the statement while considering working capital.

d) Continuation of present scenario

A study conducted by a NGO, Water Initiatives of Orissa (WIO), a non-profit organization says there are indications of land degradation going up at an alarming pace in the state, land desertification in many parts, especially in western and southern uplands. They are degrading from drought prone to desert prone areas. In just 13 years from 1991-92 to 2004-05, severely degraded land has increased by 136%, barren land by 69% and non-agricultural land by 34%¹⁶ in the state.

No miracle can be expected from the farmers included in the project activity considering their economic conditions and experience, land topography, soil conditions, climatic conditions and water infrastructure in the project area. The farmers are left with no option other than to leave the land barren with little marginal farming, grazing etc. which is continuing since their forefathers. Hence continuation of present scenario is the most feasible option that is leaving the land as barren and degraded with limited marginal cultivation & grazing.

From the above discussion it was found that the present land use; characterized by degraded lands with heavy soil erosion, without natural regeneration, and grazing activity but with very low yield, is the most realistic scenario available to project participants.

Sub-step 1b. Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations

Current laws and/or regulations allow all the alternative land use scenario. Therefore, the identified alternatives are entirely in compliance with applicable legal and regulatory requirements, currently and in the foreseeable future. The following are the list of such laws:

1. The Indian Forest Act, 1927¹⁷
2. The Wildlife (Protection) Act, 1972¹⁸
3. Water (Prevention and Control of Pollution) Act, 1974 with Rules¹⁹
4. Forest (Conservation) Act, 1980²⁰
5. Environmental (Protection) Act, 1986²¹
6. Noise Pollution (regulation and Control) Rules, 2000²²

¹⁶ <http://www.rediff.com/news/2006/nov/01orissa.html>

¹⁷ <http://www.envfor.nic.in/legis/forest/forest4.html>

¹⁸ <http://www.envfor.nic.in/legis/wildlife/wildlife1.html>

¹⁹ <http://www.envfor.nic.in/legis/water/wat1.html>

²⁰ <http://www.envfor.nic.in/legis/forest/forest2.html>

²¹ <http://www.envfor.nic.in/legis/forest/forest2.html>

²² <http://envfor.nic.in/legis/noise/noise.html>

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All the above policies are taken into consideration while evaluating the alternatives to the project activity and the following alternatives listed are in compliance with the applicable laws and regulations.

Identified Alternatives	Permitted / Not Permitted
The land used for agricultural practices	Permitted
Reforestation by the farmer on their own without support of	Permitted
Reforestation by the farmer with support of MTPL (not undertaken as a CDM A/R project)	Permitted
Continuation of present scenario	Permitted

STEP 2. Barrier analysis***Sub-step 2a: Identification of barriers that would prevent the implementation of at least one alternative land use scenarios:***

The proposed A/R CDM project activity faces a number of investments, technological, infrastructural, institutional and social barriers to its implementation described as below:

a) Investment barriers

Project activity involves investments by MTPL well as the farmer – by MTPL for development of nursery, training and demonstration, monitoring for good growth and by the farmer for planting and maintenance of trees. Investment barrier is faced by the farmers because of huge initial investment required for reforestation with a longer gestation period. In the project activity, however, the waiting period is five years minimum being reforestation of eucalyptus, a fast growing species.

The land under project activity is owned by poor farmers, tribal, daily wage earners who do not have capital to invest. They own small parcels of land. As per the land ownership structure (Figure A.2.2), 64% farmers own land 3 acre or less and 28% between 3 to 5 acres, ie the land holding of the majority 92% is 5 acres or less. Among remaining 8%, merely 1% hold land more than 10acres. The PRA study reveals that 96% farmers of the project activity mainly depend on cultivation (50%), daily wages (34%) and small service providers (12%) with per capita income as low as Rs 4236/-, Rs 3533/- and Rs 3412/- respectively. Overall per capita income of the farmers is Rs 4031/- as against state's average of Rs 9897/- in Orissa, Rs 12032/- in Chhatisgarh and Rs 17932/- in Andhra Pradesh in 2001-02²³. Evidently their economic condition do not allow them to afford high establishment cost in the early stage of plantation and to wait for wood harvesting income that will come only after 5-6 years, in best scenarios. All incomes from timber, and CERs, were envisaged to occur five years after the start of the proposed A/R CDM project activity. High initial investment without quick return is beyond the means of the land owners. Farmers participating in reforestation have little opportunity for debt funding, banks tend to be reluctant to lend to those living at the subsistence level because they have few assets for collateral and little disposable income available for debt service. According to the International Fund for Agricultural Development (IFAD), "more than one billion people – 90 per cent of the world's self-employed poor – lack access to basic financial services, depriving them of the means to improve their incomes, secure their existence, and cope with emergencies"²³.

b) Technological barriers:

²³ <http://www.ifad.org/media/press/2004/38.htm>



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The tribal farmers in the region do not have access to quality seed sources and lack skills for producing high quality seedlings. They also lack expertise for successful tree planting. They are far poorly educated to have access to information and knowledge that will help them achieve any benefit from the land that they own. MTPL encourages the farmers and provides technical support for the plantation activity free of cost. Technological barriers faced by the farmers are established as per section 7 of PRA report (Page 18) submitted by Maa Syamalay Voluntary organisation, NGO of the area who conducted PRA for the project.

c) Barriers due to local ecological conditions:

The reforestation sites are all degraded land since decades as is evident from Landsat TM 1990 satellite imagery of the parcels. Land remained barren with no vegetation cover causing undesired compactness of soil. Due to direct exposure to wind and water erosion, topsoil is almost eroded. Unfavourable metrological conditions like frequent drought in the region are not allowing agriculture to flourish in the area of project activity. The topography of land is undulated, soil is rocky, deficient in necessary nutrients making the land unfit for agriculture uses.

d) Barriers due to social conditions: The barriers due to social conditions are identified as under:

Lack of skill and proper training: The technical know how and skill for eucalyptus plantation on commercial scale to get viable yield is lacked with most of the farmers as most of them are illiterate. There is no mechanism for training and demonstration on good planting, manuring, harvesting, and soil conservation techniques available in the area.

Lack of organisation: Planting large plantations requires more than a single individual. The local communities lack the organisational structure to put together a volunteer effort to plant trees. This statement is supported by the fact that India has had a National Forestry Policy in effect since 1988 to address the problem of deforestation but is still seeing annual losses in forest cover. MTPL provide the organisational structure, necessary to overcome this barrier. MTPL provides the training and provides the necessary manpower and support.

e) Barriers relating to market and transportation:

The reforestation sites are mostly in remote areas where road connectivity is poor, roads are undeveloped putting major barrier in transportation of harvested crop. Timber has to be dragged to road at many sites lacking road approach, incurring additional charges for dragging that grind the profitability of timber. Institutional transporters, owing to perceived risks, in general, are reluctant to operate in remote areas which is evident from various correspondences with transporters. Letters from two transporters - Orissa Bengal Carrier Ltd, Kolkata and Dilip Kumar Tripathy, Nabarangpur showing their reluctance are a few examples. So the company has to depend on local vehicle owners, so the company has to depend on local vehicle owners. The farmers too face difficulty in getting market and transport for their crop; they fully depend on the company which is evident from various correspondences from the farmers. Letter from farmers of Nandpur and Padwa bank areas of Koraput district, dated 10.06.02 written in this regard is one example.

Besides, in absence of institutional arrangements to assure market and prices for produce, the farmers are hesitant to dedicate their land for farm forestry. Study report “Sustainable land & forest regeneration” by Indira Gandhi Institute of Development Research refers experiences in Haryana and Gujarat where eucalyptus plantation initially increased but declined with decrease in price²⁵.

²⁵[Sustainable land & forest regeneration](#)



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Sub-step 2b: Elimination of land use scenarios that are prevented by the identified barriers.

S No	Alternatives	How identified barriers prevent implementation of credible alternatives identified at step 1a.	Prevented /Not prevented by barrier
a)	The land used for agricultural practices	<p>1. Investment barrier: The land owners in the project activity are poor farmers/ tribal/ daily wage earners who would neither afford the cost of land preparation for agricultural practices on their own nor can get bank finance due to lack of guaranteed return. Hence stated alternative faces the investment barrier.</p>	Prevented by the barrier
		<p>2. Technological Barrier: The required skill and know-how for this alternative is lacked with most of the farmers except the practices in vogue and whatever they have learnt from their forefathers. Few tried agriculture but either failed or stopped due to poor yield. Hence it also faces this barrier to some extent.</p>	Prevented to some extent
		<p>3. Barriers due to local ecological conditions: Due to the degraded nature of land, eroded top soil, undulated topography, rocky soil deficient in necessary nutrients, absence of water resources and unfavourable metrological conditions like frequent drought in the region has made the land unfit for agriculture uses. Soil reclamation for agriculture purposes is very difficult and costly affair, if not impossible. Land productivity is very poor. Few tried agriculture but either failed completely or stopped due to poor yield. Hence the alternative faces major ecological barrier.</p>	Prevented by the barrier
b)	Reforestation by the farmer on their own without support of MTPL	<p>1. Investment barrier: The stated alternative faces major investment barrier by the farmers. They are mostly small land owners, 92% holding 5 acre or less among which 64% even less than 3 acres that indicates their poor economic condition (Figure A.2.2 at page 3). Eucalyptus plantation costs Rs 8388/- per acre to establish. Per capita income of the farmers of the project activity as revealed from PRA study is Rs 4031/- much below even the states's average of Rs 9897/- in Orissa, Rs 12032/- in Chhatisgarh and Rs 17932/- in Andhra Pradesh in 2001-02¹² which is significantly low and indicates the degree of deprivation. So the farmers lack capital, their economic condition would not allow them to invest for reforestation where any return is expected not earlier than 5-6 years. So much so they are not easily accessible to bank for finance. Even they approach, the banks are reluctant to extend loan in absence of assured means of return. Hence stated alternative faces major investment barrier.</p>	Prevented by the barrier
		<p>2. Technological Barrier: Lack of access to necessary materials: The farmers are not aware of development of good quality seedlings, good planting practices, required quality of manure & fertilizer and their application procedure. Therefore, implementation of this alternative is not possible with the barrier stated. Technological barriers faced by the farmers are established as per section 7 of PRA report (Page 18) by Maa Syamalay Voluntary organisation, NGO of the area who conducted PRA for the project.</p>	Prevented by the barrier.



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		3. Barriers due to local ecological conditions: Due to degraded nature of land, top soil erosion, undesired compactness of soil, deficiency of necessary nutrients, rocky soil and unfavourable metrological conditions like frequent drought the productivity of land is adversely affected that puts a major threat to implementation of project activity.	Prevented by the barrier.
		4. Social Barrier: Lack of skill and proper training: The technical know how and skill for eucalyptus plantation on commercial scale to get viable yield is lacked with most of the farmers as most of them are illiterate. There is no mechanism for training and demonstration on good planting, manuring, harvesting, and soil conservation techniques available in the area. Lack of organisation: The alternative also faces lack of organisation for collective reforestation which is very much essential for assured transportation and sale of produce. In the event of piece meal plantation, transportation and market both will be difficult for the farmers, as mostly residing in remote areas. The farmers would not be able to encash the crop resulting into major barrier.	Prevented by the barrier.
		5. Barriers relating to market and transportation: The farmers are residing in remote areas, their reforestation sites are also in remote areas which has poor road connectivity, no road connectivity and undeveloped roads putting major barrier in transportation of harvested crop. Its difficult for them to get transporters as well as market for their piece meal plantation in remote areas. The farmers are not able to get market and transport for their crop, they fully depend on the company which is evident from various correspondences from the farmers addressed to company. letter from farmers of Nandpur and Padwa bank areas of Koraput district, dated 10.06.02 written in this regard is one example. Besides, in absence of institutional arrangements to assure market and prices for produce, the farmers are hesitant to dedicate their land for farm forestry. Study report by Indira Gandhi Institute of development Research refers experiences in Haryana and Gujarat where eucalyptus plantation declined with decrease in price ²⁵ .	Prevented by the barrier.
c)	Reforestation by the farmer with support of MTPL (not undertaken as a CDM A/R project)	1. Investment Barrier: MTPL's investment in the very first year of plantation in 2001 -02 was more than Rs 10 lacs. The company that remained sick till November 2005 and incurring loss thereafter also, can not afford to invest huge cost of plantation sustainably over a period of time without any external revenue. Thus this is not a very viable option because it would need private funding, which is very hard to obtain.	Prevented by this barrier
		2. Technological Barrier: Lack of access to necessary materials: This barrier is supplemented by MTPL by providing quality seedlings, replacement of moratorium, manure & fertilizer and their application procedure.	Not prevented by the barrier
		3. Barriers due to local ecological conditions: Due to degraded nature of land, top soil erosion, undesired compactness of soil, deficiency of necessary nutrients, rocky soil and unfavourable metrological conditions like frequent drought the productivity of land is adversely affected that puts a major threat to	Not prevented by the barrier



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		implementation of project activity.	
		4. Social Barrier: Lack of proper skill and training: MTPL provides technical support to develop required know how and skill for good planting practices for commercial plantation of eucalyptus to get viable yield. The field officers arrange training and demonstration sessions on good planting, manuring, harvesting, and soil conservation techniques at a common place convenient to the farmers in their villages. Sometimes these sessions are conducted at factory also, if deemed necessary. Lack of organisation: This barrier is supplemented by MTPL with their organisational set up. The field officers encourage the farmers for collective plantation. A farmer gets motivated with the work of other farmers and thus no multiplies. This helps them to get assured transportation and market thus realising their harvest without any hassle.	Not prevented by the barrier
		5. Barriers relating to market and transportation: The reforestation sites are mostly in remote areas where road connectivity is poor, roads are undeveloped putting major barrier in transportation of harvested crop. Timber has to be dragged to road side at many sites lacking road approach, incurring additional charges for dragging that grind the profitability of timber. Institutional transporters, owing to perceived risks, in general, are reluctant to operate in remote areas which are evident from various correspondences from the transporters. Letters from transporters - Orissa Bengal Carrier Ltd, Kolkata and Dilip Kumar Tripathy, Nabarangpur showing their reluctance are a few example. So the company has to depend on local vehicle owners.	Prevented by the barrier to some extent.
d)	Continuation of present scenario	This alternative does not face any of the identified barriers.	Not prevented by any of the barriers

The alternative land use scenario identified in sub-step 1a above can be eliminated from baseline scenarios due to barriers faced. The alternative land use continuation of present land use scenario i.e. status as degraded land does not face the above-mentioned barriers.

Sub-step 2c. Determination of baseline scenario (if allowed by the barrier analysis)

Is afforestation without being registered as an A/R CDM project activity included in the list of land use scenarios that are not prevented by any barrier?

no, then:

Does the list contain only one land use scenario?

yes, the remaining land use is the baseline scenario.

The alternative, leaving the land without any change in land use (continued status as degraded land) does, of course, not face any of the above-mentioned barriers.

STEP 3: Investment analysis

The role of MTPL is like a facilitator. The company creates awareness and encourages farmers for reforestation, provides technical assistance, nursery facility, arrange finance from bank, monitors



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harvesting & coppicing etc which requires huge expenditure on account of salary & wages of work force, conveyance, trainings & meetings etc.

Sub-step 3a. Determine appropriate analysis method

As per the tripartite agreement entered between the company, bank and the farmers, the company provides buy back guarantee for timber proceeds at market price prevailing at the time of harvest. So the company does not get any price preference. The only return the company does get is securing raw material for its factory. The project activity therefore does not generate any financial or economic benefits other than CDM revenues hence **Option I: Simple cost analysis** is applied for investment analysis. The relevant article 1.6 of the tripartite agreement signed with the farmers in the year 2001 is reproduced as below:

“The user industry agrees to pay to the bank to the farmer’s credit the proceeds of the sale of timber received at a minimum rate of Rs 1000/- per MT of Hardwood including bark delivered at mill or according to the prevailing market rate whichever is higher at the time of harvest. The rate will be decided and determined by a committee consisting of Bank, representative of Industry and the farmers.”

Sub-step 3b. Option I: Apply simple cost analysis

When MTPL learnt about external revenue for reforestation activities under Kyoto Protocol the company decided to develop A/Reforestation CDM project in line with farm forestry scheme. The company started plantation activity in 2001-02 and engaged 14 dedicated personnel for giving technical demonstration & consultation, visiting farmers, organising meetings with them to propel FFS and motivate their participation, organising training for them and monitoring the plantation activity in the degraded land. The company incurred direct expenses of more than Rs 10 lacs in the very first year of plantation, without any return, as computed in the table below:

Table C.6.1: Direct Expenses on Plantation activity by MTPL (Year 2001-02)		
S No	Expense Account Head	Total Cost in 2001-02 (Rs)
1	Salary & Wages	769212
2	Two wheeler expenses	21040
3	Staff conveyance	62484
4	Vehicle hiring expenses	190682
	Total:	1043418.4

The above expenses are direct expenses computed conservatively for plantation activity based on company’s book of accounts of 2001-02 which are likely to increase every year due to inflation as well as increase in planted area.

The company provides the above services free of charge as stipulated in Article 1.3 of the tripartite agreement without which the project would have not happened. Article 1.3 of the agreement reproduced below:



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“The industry agrees to provide technical guidance, assistance and services relating to planting and maintenance of such plantation till they are harvested, and also agrees to undertake the supervisory work in implementing the scheme for Eucalyptus plantation in the farmers’ field. However it is specifically understood and agreed by the parties that the industry will not be liable for any damage or loss sustained by the farmers on account of failure of crops wholly or partially or low yield or for any other losses for any reason whatsoever.”

Therefore it is evident that the project activity does not generate any financial or economic benefit for the company except the CDM related revenue. MTPL, being a loss making company, can not bear sustainably the huge operation and maintenance cost of plantation as above without any external revenue.

Thus investment in such a project, which is prone to so many risks, was a tough decision to take. On the other hand, the continuation of the current scenario would not need any reforestation activity on the degraded land and does not involve any additional costs.

STEP 4: Common practice analysis

With the growth of forestry based industries in the region there has been some reforestation currently underway but they essentially differ from the project activity at least in three ways. The two paper industries in the region – Sewa unit of Ballarpur Industries Ltd (BILT) near Jeypore in Koraput district and JK Paper in Raygada district neighbouring Koraput also require timber as raw material for manufacturing paper. They have also initiated reforestation in the region. JK Paper is conducting this activity as a CDM project. BILT is engaged in reforestation activity through its subsidiary unit BILT Tree Tech Ltd but widely differs from the scheme adopted in the project activity. The “Report on similar Reforestation activities in the area” by the NGO engaged for conducting PRA provides relevant information on reforestation by BILT.

BILT, Sewa unit started reforestation in the area in 1995-96 through lease plantation in Boipariguda & Boriguma bank areas of Koraput district on SC/ST land which got subjudice and the company had to return the entire land to their owners. The company then started selling seedlings on direct sale basis to interested farmers who were economically well off or those capable of arranging finance of their own. The company does not facilitate or initiate to arrange finance to the farmers for plantation activity, a few big farmers have been named in the report who neither required nor availed bank finance. As a result only few well off farmers/communities or SHGs capable of investing on plantation are benefited and have gone for reforestation. The company at their units at Ballarpur in Maharashtra and Kamalapuram in Andhra Pradesh has been conducting reforestation with bank finance and very recently, FFS with bank finance started at Sewa unit also.

Whereas the farmers under the project activity are small farmers, 60% owning land 3 acres, 32% between 3-5 acres, 7% between 5-10 acres and only 1% above 10 acres. They are economically weak with average annual per capita income of Rs 4031/-, not capable of plantation on their own and reside in remote areas. MTPL officials proactively approach them and encourage them for reforestation on their degraded land with financial assistance by local banks. They educate them on farm forestry scheme, availability of bank finance and technical assistance to involve them for reforestation. The land category for reforestation in the project activity is essentially chosen to be degraded land ensuring bank finance. Consequently the project activity has been able to benefit small & poor farmers/tribal at such a large scale, numbering 12000 plus farmers.



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Based on above the essential distinctions are summarised as under:

1. BILT is primarily selling seedlings/clones on direct sale basis to economically well off farmers who are capable of investing and growing trees of their own without bank finance and tripartite agreement.
2. Due to non availability of bank finance small & marginal land owners in remote areas may not participate in such plantation activity.
3. Thirdly the company targets to plant short-rotation and fast growing species in accessible areas rather than planting degraded land in remote areas which is not economically attractive due to low land productivity and high transportation cost.
4. Reforestation with bank finance under FFS is practiced in BILT's other units at Ballarpur (Maharashtra) and Kamalapuram (AP) while at Sewa unit this scheme is at its infant stage.
5. There is no requirement for land being degraded. Land for reforestation may or may not be degraded land, may be agricultural land also which is evident from their tripartite agreement. In MTPL's scheme land for reforestation have to be degraded land. Under farm forestry scheme approved by NABARD the bank finance is available only for reforestation on degraded land and not on agricultural land.

With establishment of above essential distinctions between the project activity and similar reforestation activities, the proposed A/R CDM project activity is not the baseline scenario and, hence, it is additional. This also complements the above barrier as well as investment analysis, which indicates that reforestation, is economically unattractive in the absence of proposed A/R CDM project activity, due to poor economic condition of the farmers, low land productivity and high transportation costs.

Land regeneration programmes:

Study by one local NGO, Water Initiative of Orissa (WIO) indicates severe desertification, degradation at alarming pace and rapid change of drought prone areas into desert prone areas in the state. The NGO claims, in just 13 years from 1991-92 to 2004-05, severely degraded land has increased by 136%, barren land by 69% and land converted to non agricultural use by 34%.

<http://www.rediffnews.com/news/2006/nov/01orissa.htm>

The paper "Sustainable Land & Forest Regeneration" reports that the government, alarmed by ecological degradation and consequent poverty, is emphasizing land regeneration programmes involving different ministries in association with several agencies, non government organisations. Despite multiplicity of land regeneration programmes, the results have not been as encouraging as expected. There are several lacunae and constraints in these programmes – institutional, financial, technical and legal that prevents achieving the targets²⁵.

Recent study "Assessment of large-scale deforestation of Nawarangpur district, Orissa, India: a remote sensing based study" conducted by the scientists C Sudhakar Reddy, K Ram Mohan Rao, Chiranjibi Pattanaik & P K joshi of SACON, a Remote Sensing organisation states that there has been increase in deforestation in the district, deforestation rate 3.62 assessed for the period from 1973 to 1990 has increased to 3.97 during 1990 to 2004.

²⁶<http://www.springerlink.com/content/f13257052uwv2471/fulltext.pdf?page=1>

With the carbon benefit, reforestation on degraded lands becomes economically acceptable. This creates an incentive to project participants to do the necessary documentation for bank loan on behalf of poor

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tribal/farmers for reforestation on degraded lands. In turn this provides more ecological benefits such as conservation of biodiversity and soil erosion control. This will contribute to the goal of increasing forest resources, as well as the carbon dioxide sequestration and general ecological environment improvement.

C.7. Estimation of the *ex ante* baseline net GHG removals by sinks:

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The baseline net greenhouse gas removal by sink is calculated by using the equation given in the methodology. The baseline net GHG removal by sink is determined as follows:

$C_{BSL} = C_{BSL,tree}$	
C_{BSL}	Baseline net greenhouse gas removable by sinks, tCO ₂ -e
$C_{BSL,tree}$	Sum of the carbon changes in above ground and below ground biomass of trees in the baseline; tCO ₂ -e

For those strata without growing trees the methodology conservatively assumes that, $C_{BSL,tree}$, baseline =0.

For those strata with a few growing trees, baseline, is estimated using stock change method.

$$C_{BSL,AG/BG,i,t} = \sum_{j=1}^J (C_{j,i,t2} - C_{j,i,t1})/T$$

$$C_{j,i,t} = C_{AB_tree,j,i,t} + C_{BB_tree,j,i,t}$$

$$C_{AB_tree,j,i,t} = A_{BSL,i} * V_{tree,j,i,t} * D_j * BEF_{2j} * CF_j$$

$$C_{BB_tree,j,i,t} = C_{AB_tree,j,i,t} * R_j$$

$C_{BSL,AG/BG,i,t}$	Annual carbon stock change in above-ground and below-ground tree biomass for stratum i , time t ; t C yr ⁻¹
$C_{j,i,t2}$	Total carbon stock in living biomass of trees of species j in stratum i , calculated at time t_2 ; t C
$C_{j,i,t1}$	Total carbon stock in living biomass of trees of species j in stratum i , calculated at time t_1 ; t C
T	Number of years between times t_2 and t_1 ; yr
$C_{AB_tree,j,i,t}$	Carbon stock in above-ground tree biomass of species j in stratum i , at time t ; t C
$C_{BB_tree,j,i,t}$	Carbon stock in below-ground tree biomass of species j in stratum i , at time t ; t C
$A_{BSL,i}$	Area of baseline stratum i ; ha
$V_{tree,j,i,t}$	Pre-project tree stem volume for species j , stratum i , at time t ; m ³ ha ⁻¹
D_j	Basic wood density for species j ; t d.m. m ⁻³
BEF_{2j}	Biomass expansion factor for conversion of stem biomass to above-ground tree biomass for tree species j ; t d.m t ⁻¹ d.m
R_j	Root-shoot ratio appropriate for biomass stock, for species j ; t C t ⁻¹ C
i	1, 2, 3, ... M_B strata in the baseline scenario
j	1, 2, 3, ... J tree species in the baseline scenario
t	1, 2, 3, ... t^* years elapsed since the start of the A/R CDM project activity



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Data / parameter:	$A_{BSL,j,i}$
Data unit:	ha
Used in equations:	4, 9, 11
Description:	Area under trees of species j in baseline stratum i
Source of data:	GPS coordinates and/or remote sensing data
Measurement procedures (if any):	N/A
Any comment:	-

Data / parameter:	$BEF_{2,j}$
Data unit:	Dimensionless
Used in equations:	6
Description:	Biomass expansion factor for conversion of annual net increment (including bark) in stem biomass to total above-ground tree biomass increment for species j
Source of data:	IPCC GPG for LULUCF Table- 3A.1.10
Measurement procedures (if any):	N/A
Any comment:	-

Data / parameter:	D_j
Data unit:	t.d.m. m ⁻³
Used in equations:	6, 9, 15
Description:	Basic wood density for species j
Source of data:	Project data base
Measurement procedures (if any):	N/A
Any comment:	-

Data / parameter:	R_j
Data unit:	kg d.m.yr ⁻¹ (kg d.m.yr ⁻¹) ⁻¹
Used in equations:	10, 16, 20
Description:	Root-shoot ratio appropriate for biomass stock, for species j
Source of data:	IPCC GPG for LULUCF Table- 3A.1.8
Measurement procedures (if any):	N/A
Any comment:	-

The carbon stock in living biomass of pre-project growing trees is expected to increase in the absence of the proposed A/R CDM project activity, due to continuous growth of the living trees. The carbon stock in the living biomass of pre-project trees has been predicted using equation from Brown et al.²⁴ (1989) for dry forest in India.

²⁴ Brown, S. 1997. Estimating biomass and biomass change of tropical forests: a primer. FAO Forestry Paper 134, Rome, Italy



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Dry matter (kg) = $\exp(-1.996 + 2.32 \cdot \ln(\text{dbh cm}))$

From the dry matter, the carbon stocks have been estimated using the formulae from the applied methodology. The BEF of 3.4 has been taken from the table 3A.1.10 of the IPCC good practice guidance for LULUCF. The BEF has been chosen from the default values in the absence of any national data in this regard. The default value is that of a tropical broadleaf forest having a range of BEF from 2.0 to 9.0.

Estimation of Baseline net GHG removals by Sinks (tonnes of CO ₂)								
Year	2001	2002	2003	2004	2005	2006	2007	Total
2001	0	0	0	0	0	0	0	0
2002	2.93	0	0	0	0	0	0	2.93
2003	2.94	4.74	0	0	0	0	0	7.68
2004	2.95	4.75	6.42	0	0	0	0	14.12
2005	2.96	4.76	6.44	10.39	0	0	0	24.55
2006	2.97	4.78	6.46	10.42	11.72	0	0	36.35
2007	2.98	4.79	6.48	10.45	11.77	14.18	0	50.64
2008	2.99	4.81	6.49	10.49	11.81	14.22	16.98	67.79
2009	3.00	4.82	6.51	10.52	11.85	14.27	17.04	68.01
2010	3.01	4.83	6.53	10.55	11.90	14.32	17.09	68.23
2011	3.02	4.85	6.55	10.59	11.94	14.37	17.14	68.45
2012	3.03	4.86	6.57	10.62	11.98	14.42	17.19	68.67
2013	3.03	4.87	6.59	10.65	12.02	14.47	17.24	68.89
2014	3.04	4.89	6.61	10.69	12.07	14.52	17.30	69.11
2015	3.05	4.90	6.62	10.72	12.11	14.56	17.35	69.33
2016	3.06	4.92	6.64	10.76	12.15	14.61	17.40	69.55
2017	3.07	4.93	6.66	10.79	12.20	14.66	17.46	69.77
2018	3.08	4.94	6.68	10.82	12.24	14.71	17.51	69.99
2019	3.09	4.96	6.70	10.86	12.29	14.76	17.56	70.21
2020	3.10	4.97	6.72	10.89	12.33	14.81	17.61	70.43
2021	3.11	4.99	6.74	10.93	12.37	14.86	17.67	70.65
2022	3.12	5.00	6.76	10.96	12.42	14.91	17.72	70.87
2023	3.13	5.01	6.77	10.99	12.46	14.96	17.77	71.10
2024	3.14	5.03	6.79	11.03	12.50	15.00	17.83	71.32
2025	3.15	5.04	6.81	11.06	12.55	15.05	17.88	71.54
2026	3.15	5.05	6.83	11.10	12.59	15.10	17.93	71.76
2027	3.16	5.07	6.85	11.13	12.63	15.15	17.98	71.98
2028	3.17	5.08	6.87	11.16	12.68	15.20	18.04	72.21
2029	3.18	5.10	6.89	11.20	12.72	15.25	18.09	72.43
2030	3.19	5.11	6.91	11.23	12.77	15.30	18.14	72.65
							Total:	1751.20

Please present final results of your calculations using the following tabular format.



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Year	Annual estimation of baseline net anthropogenic GHG removals by sinks in tonnes of CO₂ e
1 st Year	0
2 nd Year	2.93
3 rd Year	7.68
4 th Year	14.12
5 th Year	24.55
6 th Year	36.35
7 th Year	50.64
8 th Year	67.79
9 th Year	68.01
10 th Year	68.23
11 th Year	68.45
12 th Year	68.67
13 th Year	68.89
14 th Year	69.11
15 th Year	69.33
16 th Year	69.55
17 th Year	69.77
18 th Year	69.99
19 th Year	70.21
20 th Year	70.43
21 st Year	70.65
22 nd Year	70.87
23 rd Year	71.10
24 th Year	71.32
25 th Year	71.54
26 th Year	71.76
27 th Year	71.98
28 th Year	72.21
29 th Year	72.43
30 th Year	72.65
Total estimated baseline net GHG removals by sinks (tonnes of CO₂ e)	1751.20
Total number of crediting years	30
Annual average over the crediting period of estimated baseline net GHG removals by sinks (tonnes of CO₂ e)	58.37

C.8. Date of completion of the baseline study and the name of person(s)/entity(ies) determining the baseline:

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Date of Completion: 27/03/2007

Name of the person/entity determining the baseline: Ms Tulika Biswas

Birla Carbon Management Consulting (P) Limited

Kolkata -700 001



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All persons/entity determining the baseline are not the project participants listed in Annex 1.

SECTION D. Estimation of *ex ante* actual net GHG removals by sinks, leakage and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period

D.1. Estimate of the *ex ante* actual net GHG removals by sinks:

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The Actual net greenhouse gas removals by sinks represent the sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in GHG emissions measured in CO₂ equivalents by the sources that are increased as a result of the implementation of an A/R CDM project activity, while avoiding double counting, within the project boundary, attributable to the A/R CDM project activity. Therefore,

$$C_{\text{ACTUAL}} = C_p - \text{GHG}_E \quad \text{.....(12)}$$

where

C_{ACTUAL}	Actual net greenhouse gas removals by sinks; t CO ₂ -e.
C_p	Sum of the changes in above-ground and below-ground biomass, dead wood, litter and soil organic carbon stocks in the project scenario; t CO ₂ -e.
GHG_E	Increases in GHG emissions as a result of the implementation of the proposed AR CDM project activity within the project boundary; t CO ₂ -e.

Based on the approved methodology applied, the aboveground biomass and belowground biomass are the pools to be accounted for.

Estimates of carbon stock changes in living biomass of planted trees

BEF method as presented in Section II.5.1 of the approved methodology applied is used. Above ground biomass shall be estimated through the following steps:

Step 1: Measuring the diameter at breast height (DBH) at 1.3m above ground and height of trees in permanent sample plots. The average DBH and height at different ages is taken from the project data base which has been computed on the basis of actual measurement of trees in all 1305 permanent sample plots spread across the entire project area.

Step 2: Estimating the volume of the commercial component of trees based on locally derived equations, expressed as volume per unit area, m³/ha:

$$V = -2.4726 + 0.4354 B \times H \quad (n = 125, R^2 = 0.9956)$$

(For volume equation refer page 226 of the book titled “Volume Equations for Forests of India, Nepal and Bhutan” published by Forest Survey of India, 1996)

Step 3: Choosing BEF, root-shoot ratio, wood density and other parameters:

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The wood density has been taken from project data base which is the average density of Eucalyptus species computed on the basis of actual field measurement. Values of BEF and Root-shoot ratio for Eucalyptus are taken from table 3A.1.10 of IPCC GPG for LULUCF:

Species	Wood density	BEF	Root to shoot ratio
Eucalyptus sp.	0.60672	2	0.27
Reference	Project data base	IPCC GPG for LULUCF Table- 3A.1.10	IPCC GPG for LULUCF Table- 3A.1.8

Step 4: Converting the volume of the commercial component of trees into carbon stock in aboveground biomass and belowground biomass via basic wood density, BEF root-shoot ratio and carbon fraction, given by:

$$C_{AB_tree,l,j,i,sp,t} = V_{l,i,l,sp,t} * D_j * BEF_{2j} * CF_j$$

where	
$C_{AB_tree,l,j,i,sp,t}$	Carbon stock in above-ground biomass of tree l of species j in plot sp in stratum i at time t; t C tree ⁻¹
$V_{l,i,l,sp,t}$	Stem volume of tree l of species j in plot sp in stratum i at time t; m ³ tree ⁻¹
D_j	Basic wood density of species j; t d.m. m ⁻³
BEF_{2j}	Biomass expansion factor for conversion of stem biomass to above-ground tree biomass for species j; dimensionless
CF_j	Carbon fraction of biomass for tree species j; t C t ⁻¹ d.m. (IPCC default value = 0.5 t C t ⁻¹ d.m.)
l	Sequence number of trees on plot sp
i	1, 2, 3, ... MPS strata in the project scenario
J	1, 2, 3, ... SPS tree species in the project scenario
t	1, 2, 3, ... t* years elapsed since the start of the A/R CDM project activity

As per vegetation survey few trees along with scattered herbs & shrubs have been found in almost 1483 parcels spreading across 2939.30 hectares of the project area. Because of degraded nature of land majority of parcels are barren without any woody vegetation. Herbs and shrubs that grow during rains, dries and disappear automatically with the onset of summer. During site preparation at the best these herbs and shrubs are cleared which is maximum 5% of the total area. Existing woody biomass are essentially not removed at all. So, EbiomassLoss = 0

Year	Total project carbon stock (tC)	Total carbon stock change (tC)
2001	793	793
2002	7851	7058
2003	33072	25222
2004	101875	68803
2005	266704	164829
2006	461804	195100
2007	732906	271103
2008	1166160	433253



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2009	1053492	-112668
2010	1145788	92296
2011	1096457	-49331
2012	967797	-128660
2013	893103	-74694
2014	1033685	140582
2015	1058926	25241
2016	967797	-91129
2017	893103	-74694
2018	1033685	140582
2019	1058926	25241
2020	967797	-91129
2021	893103	-74694
2022	1033094	139991
2023	1053231	20137
2024	944017	-109214
2025	821085	-122931
2026	979121	158036
2027	980825	1704
2028	732906	-247919
2029	1166160	433253
2030	1053492	-112668
Total:	24598757	1053492

Estimation of GHG emissions within the project boundary

The increase in GHG emissions as a result of the implementation of the proposed A/R CDM project activity within the project boundary can be estimated as:

$$GHG_E = \sum_{t=1}^{t^*} E_{BiomassBurn,t}$$

where	
GHG_E	Increase in GHG emissions as a result of the implementation of the proposed A/R CDM project activity within the project boundary; t CO ₂ -e
$E_{BiomassBurn,t}$	Non-CO ₂ emissions due to biomass burning of existing woody vegetation as part of site preparation during the year t ; t CO ₂ -e
t	1, 2, 3, ... t^* years elapsed since the start of the A/R CDM project activity

There will be no biomass burning during site preparation, thus there will be no GHG emissions from biomass burning, i.e., $E_{BiomassBurn,t}=0$;

So, $GHG_E = 0$

Year	Annual carbon stock change (tCO ₂ e/yr)	GHG emission by source (tCO ₂ e/yr)	Estimation of actual net GHG removals by sinks (tCO ₂ e/yr)
2001	2908	0	2908



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2002	25875	0	25875
2003	92472	0	92472
2004	252262	0	252262
2005	604347	0	604347
2006	715331	0	715331
2007	993992	0	993992
2008	1588527	0	1588527
2009	-413182	0	-413182
2010	338351	0	338351
2011	-180948	0	-180948
2012	-471823	0	-471823
2013	-273947	0	-273947
2014	515398	0	515398
2015	92480	0	92480
2016	-334207	0	-334207
2017	-273948	0	-273948
2018	515397	0	515397
2019	92479	0	92479
2020	-334208	0	-334208
2021	-273949	0	-273949
2022	513228	0	513228
2023	73764	0	73764
2024	-400524	0	-400524
2025	-450819	0	-450819
2026	579393	0	579393
2027	6175	0	6175
2028	-909107	0	-909107
2029	1588523	0	1588523
2030	-413187	0	-413187
Total:	3861053	0	3861053

D.2. Estimate of the *ex ante* leakage:

>>

“Leakage (LK) represents the increase in GHGs emissions by sources which occurs outside the boundary of an AR CDM project activity which is measurable and attributable to the AR CDM project activity”.

Based on the applied approved consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM001 (Version 4) following potential sources of leakage (LK) are identified:

- GHG emission due to activity displacement
- GHG emission due to increase in use of wood posts for fencing



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Estimation of leakage :

$$LK = LK_{ActivityDisplacement}$$

Where	
LK	Total GHG emissions due to leakage; t CO ₂ -e
$LK_{ActivityDisplacement}$	Leakage due to activity displacement; t CO ₂ -e

a. Estimation of $LK_{ActivityDisplacement}$

Some lands planted in the proposed A/R CDM project activity had grazing animals. Thus, as the result of the project activity, grazing may be temporarily or permanently displaced from the project sites to other locations. The displacement may result in leakage if the new grazing areas are obtained by converting stocked areas, particularly forests, to grazing land, results in degradation or deforestation of other forests and loss of vegetation on other lands.

a.1 Estimation of $LK_{Conversion}$ (Leakage due to conversion of land to grazing land)

The pre-project animal population and the number of months of grazing of different livestock groups on lands, both within the project boundary and outside the project boundary that are under the control of the project participants, have been surveyed using Participatory Rural Appraisal (PRA). Altogether 1863 (659+1204) cows & buffalos and 3020 (508+2512) goats were found within and outside the project boundary those are likely to be displaced by project activity. Grazing land outside the project boundary, well under the control of animal owners, for displaced animals has been found 2548.42 acres against the required area of 2409.57 acres calculated on the basis of dry matter intake. Leakage calculation sheet ensure sufficient AGL with all individual animal owners. A summary of district wise land area available and land area required for displacement due to grazing is presented in the table below:

S No	Districts	No of animals likely to be displaced by the project activity				Available grazing land outside the project boundary under the control of the animal owners (AGL), Acres	Grazing Area required (Acres)
		Animals within project boundary		Animals outside project boundary			
		Cows/ Bufallo	Goats	Cows/ Bufallo	Goats		
1	Nabarangpur	187	140	333	627	710.40	657.01
2	Koraput	218	171	488	920	945.05	902.18
3	Malkangiri	33	27	75	140	145.05	138.03
4	Vishakhapatnam	179	135	259	674	616.72	586.77
5	Vizianagaram	6	4	7	21	18.00	17.62
6	Srikakulam	15	8	19	50	47.00	44.57
7	Bastar	21	23	23	80	66.20	63.39
	Total:	659	508	1204	2512	2548.42	2409.57

The annual biomass intake of the animals over the project lands and existing grasslands is estimated using equation (4) in the A/R methodological tool “Estimation of GHG emissions related to displacement



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of grazing activities in A/R CDM project activity” and the required area to accept displaced animals is estimated using equation (5) of the methodological tool.

$$DMI_{TOTAL,k,t} = \frac{DMI_g * (H_{existing,g,k,t} + H_{g,k,t})}{1000} * 365$$

$DMI_{TOTAL,k,t}$	Total dry matter intake of grazing animal on parcel k in year t ; tdm /year
DMI_g	Daily dry matter intake per grazing animal of animal type g ; kg d.m./head/day
$H_{existing,g,k,t}$	Number of head of animal type g existing on parcel k and/or being fed by fodder produces on parcel k before displacement of animals in year t; head
$H_{g,k,t}$	Number of head of animal type g displaced and/or the number of animals of type g fed by fodder for which production is displaced to parcel k in year t; head

DMI_g is taken from Table 3 in methodological tool.

$$Area_{required,k,t} = \frac{DMI_{TOTAL,k,t}}{ANPP_k}$$

$Area_{required,k,t}$	Total area of land required for year t to sustain the grazing activities displaced to parcel k; (ha)
$DMI_{TOTAL,k,t}$	Total dry matter intake of grazing animals on parcel k in year t ;td.m/yr
$ANPP_k$	Above ground net primary productivity of parcel k in tones dry matter, td.m./ha/yr

The default value for annual net primary production ($ANPP$) i.e. 8.2 tonnes d.m. ha^{-1} ” from Table 3.4.2 of IPCC good practice guidance LULUCF was used as in the calculation. Daily Dry matter intake has been taken as 21.6 kg/head/day for cows/buffalos and 4.6 kg/head/day for goat from Table 3 of A/R methodological tool “Estimation of GHG emissions related to displacement of grazing activities in A/R CDM project activity” (version 02).

Leakage calculation indicates that sufficient grassland land exists under the control of the project participants that can adopt displaced animals even if all pre-project animals are displaced to existing grasslands outside the project boundary. Therefore, $LK_{Conversion} = 0$.

As per EB42, monitoring of leakage associated with the use of fencing posts is not required as it is considered insignificant.

So, net GHG sequestration as below:

Year	Actual GHG Removal from Project Activity (tCO ₂ e/ yr)	Soil Organic Carbon (tCO ₂ e/ yr)	Total GHG (2+3)	Baseline Net GHG Removal (tCO ₂ e/ yr)	Project Emissions (tCO ₂ e/ yr)	Leakage (tCO ₂ e/ yr)	Net Anthropogenic GHG Removal (tCO ₂ e/ yr) [4-(5+6+7)]	Total number of tCERs
1	2	3	4	5	6	7	8	9
2001	2907.97	954.40	3862.37	0.00	0	0	3862.37	3862
2002	25877.70	2789.34	28667.04	2.93	0	0	28664.11	28664
2003	92479.58	4991.80	97471.37	7.68	0	0	97463.70	97464



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2004	252276.06	8958.60	261234.66	14.12	0	0	261220.53	261221
2005	604371.77	14501.88	618873.65	24.55	0	0	618849.10	618849
2006	715367.63	20736.00	736103.63	36.35	0	0	736067.29	736067
2007	994042.61	27444.01	1021486.61	50.64	0	0	1021435.97	1021436
2008	1588595.05	27444.01	1616039.06	67.79	0	0	1615971.26	1615971
2009	-413114.25	27444.01	-385670.24	68.01	0	0	-385738.25	-385738
2010	338419.63	27444.01	365863.64	68.23	0	0	365795.41	365795
2011	-180879.72	27444.01	-153435.72	68.45	0	0	-153504.16	-153504
2012	-471753.87	27444.01	-444309.86	68.67	0	0	-444378.53	-444379
2013	-273878.03	27444.01	-246434.02	68.89	0	0	-246502.91	-246503
2014	515466.97	27444.01	542910.97	69.11	0	0	542841.86	542842
2015	92548.91	27444.01	119992.91	69.33	0	0	119923.58	119924
2016	-334137.84	27444.01	-306693.83	69.55	0	0	-306763.38	-306763
2017	-273878.03	27444.01	-246434.02	69.77	0	0	-246503.79	-246504
2018	515466.97	27444.01	542910.97	69.99	0	0	542840.98	542841
2019	92548.91	27444.01	119992.91	70.21	0	0	119922.70	119923
2020	-334137.84	27444.01	-306693.83	70.43	0	0	-306764.27	-306764
2021	-273878.03	26489.61	-247388.42	70.65	0	0	-247459.07	-247459
2022	513298.69	24654.66	537953.35	70.87	0	0	537882.48	537882
2023	73835.58	22452.21	96287.79	71.10	0	0	96216.70	96217
2024	-400452.42	18485.41	-381967.01	71.32	0	0	-382038.33	-382038
2025	-450747.76	12942.12	-437805.63	71.54	0	0	-437877.17	-437877
2026	579465.24	6708.00	586173.24	71.76	0	0	586101.48	586101
2027	6246.57	0.00	6246.57	71.98	0	0	6174.59	6175
2028	-909034.72	0.00	-909034.72	72.21	0	0	-909106.92	-909107
2029	1588595.05	0.00	1588595.05	72.43	0	0	1588522.62	1588523
2030	-413114.25	0.00	-413114.25	72.65	0	0	-413186.90	-413187
	3862804.11	547925.73	4411684.24	1751.20	0	0	4409933.04	4409933
	128760.14	18264.19	147056.14	58.37	0	0	146997.77	146998



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SECTION E. Monitoring plan**E.1. Monitoring of the project implementation:**

>>

E.1.1. Monitoring of forest establishment and management:

>>

During the project development the size and the location of the project area were negotiated with the villages and the figures on size are subject to the contractual arrangements. The sites were identified and delineated using topographic maps of 1:25000.

To ensure that the planting quality conforms to the practice described in AR-CDM-PDD and is well implemented, the following monitoring activities shall be conducted in the first three years after planting:

- Field survey of the boundary of the areas with actual tree planting, site by site.
- Measuring geographical positions (latitude and longitude) using GPS.
- The project boundary, and the integrity of the planted area, will be monitored periodically through the crediting period.
- Confirm that site and soil preparations are implemented based on practice documented in PDD.
- Survival checking:
 - 1) The initial survival rate of planted trees shall be counted three months after the planting, and re-planting shall be conducted if the survival rate is lower than 90 percent of the final planting density.
 - 2) Final checking three years after the planting;
 - 3) The checking of the survival rate may be conducted using permanent sample plots.
- Weeding checking: check and confirm that the weeding practice is implemented as described in the PDD;
- Survey and check that species and planting for each stratum are in line with the PDD;
- Document and justify any deviation from the planned forest establishment.

Monitoring of Forest Management

Forest management practices are important drivers of the GHG balance of the project, and thus must be monitored. Practices to be monitored include:

- Cleaning and site preparation measures: date, location, area, biomass removed and other measures undertaken;
- Planting: date, location, area, tree species (establishment of the stand models);
- Fertilization: date, location, area, tree species, amount and type of fertilizer applied, etc;
- Harvesting: date, location, area, tree species, volumes or biomass removed;
- Coppicing: date, location, area, check and confirm that the site operation practices are implemented as described in the PDD;
- Monitoring of disturbances: date, location, area (GPS coordinates and remote sensing as applicable), tree species, type of disturbance, biomass lost, implemented corrective measures, change in the boundary of strata and stands.



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ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of data points / Other measure of number of collected data.	Comment
E.1.1.1	Project Boundaries	Numeric	m	At the start of the project	100%	Measure of all coordinates of each discrete sites
E.1.1.2	Trees planted per hectare per stratum	Number	m	At the establishment	100%	As recorded in field records during the plantation
E.1.1.3	Area of plantation for each stratum	ha	m	At the establishment of each new stand	100%	-
E.1.1.4	Age of plantation for each stratum	Year	m	At the establishment of each new stand	100%	-
E.1.1.5	Coppicing	ha	m	Each coppicing event	100%	Information on area of intervention and location
E.1.1.6	Coppicing	m ³	c	Each coppicing event	100%	Information on area of intervention and location
E.1.1.7	Harvesting	m ³	c	Each harvesting event	100%	Information on area of intervention and location
E.1.1.8	Deviation from planting			Yearly	100%	During implementation phase, reason
E.1.1.9	Replantation	Number	m	Yearly	100%	During implementation phase
E.1.1.10	Survival rate	%	c	One year after the establishment of each stand	100%	Determined by measure in established sample plots one year after the establishment of each stand.

E.1.2. If required by the selected approved methodology, describe or provide reference to, SOPs and quality control/quality assurance (QA/QC) procedures applied.



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Collecting reliable field data is an important step in quality assurance. The personnel involved in the project monitoring and in the measurement of carbon pools should be fully trained in data collection and analysis. The data collection and organization is based on the standard operating procedures (SOPs) developed for the purpose.

These SOPs contain provisions for documentation and verification so that continuity in the field monitoring is maintained and measurements can be verified. In order to ensure consistency in field monitoring and measurements, the team members shall be made aware of all procedures of data collection. It is recommended that test plots be used to develop SOPs. The monitoring and data collection documents should list names of all personnel and their responsibilities. The quality of field data collection shall be verified by undertaking random checks of the plots, including their re-measurement by a senior member of the monitoring team.

Quality assurance (QA) activities and processes ensure that monitoring data meet the requirements. Quality Control (QC) procedures verify the data and reporting requirements for analytical data used in support of assessment. The project activity has developed and implemented procedures of guarantee and control of quality (QA/QC) in order to guarantee that the gathered data are of acceptable, sustainable quality, and that the appropriate office procedures are followed.

QA/QC for field measurements

Collecting reliable field measurements is an important step in the quality assurance plan. New staff will be adequately trained. Training courses on field data collection and data analyses will be held for all staff involved in the field measurement work. The training courses should ensure that each task team member is fully aware of all procedures and the importance of collecting data as accurately as requested. To achieve this, both classroom examination and field examination will be conducted, and only those who pass the required examination can join the task team.

The SOPs include auditing procedures. The first type of audit, a 'hot check', consisting of the project leader observing field crew members during data collection to ensure field measurements SOPs shall be followed to correct any technique errors. The second type of audit, a 'blind check', to quantify measurement errors, shall consist of a complete re-measurement of 10% of plots by verifying teams highly experienced in forest measurement and attentive to detail. After measurement a comparison will be made with the original data and discrepancies re-verified. Any errors found will be corrected and recorded. Any errors discovered will be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

QA/QC for data entry

To produce reliable carbon estimates the proper entry of data into the data analyses spreadsheets is required. Steps will be taken to ensure that errors are minimized. Results will be reviewed and double-checked for typing errors. If there are any problems with the monitoring plot data that cannot be resolved, the plot should not be used in the analysis.

QA/QC for data archiving

Due to the long-term length of the project activities, data storage and maintenance is very important. All electronic data and reports will be copied on durable media such as compact discs (CDs) and copies of the CDs will be stored in multiple locations. The archives include i) Copies of all original field

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measurement data, laboratory data, data analysis spreadsheets; ii) Estimates of the carbon stock changes in all chosen pools and non-CO₂ GHG and corresponding calculation spreadsheets; iii) GIS products; iv) Copies of the measuring and monitoring reports.

a. Sampling design and stratification

>>

The number and boundaries of the strata defined ex-ante in **Section C.4** may change during the crediting period (ex-post). Therefore, strata will be monitored periodically. If a change in the number and area of the project strata occurs, the sampling framework should be adjusted accordingly.

Monitoring of strata

The possible need for ex post stratification will be evaluated at each monitoring event and changes in the strata should be reported to the DOE for verification. Monitoring of strata and stand boundaries will be done using a Geographical Information System (GIS). The database on strata will be updated at periodic intervals taking into account the following aspects:

- Unexpected disturbances occurring during the crediting period (e.g. due to fire, pests or disease outbreaks), affecting differently different parts of an originally homogeneous stratum or stand;
- Changes in the forest management regime if any occurring during the project period (e.g., pruning, thinning, etc.) and the dates and locations implementing the management regime shall be monitored and recorded.

Sampling Design

Permanent sampling plots will be used for sampling over time to measure and monitor changes in carbon stocks of above and below ground biomass. The location of samples within the plot has been decided randomly to avoid any bias. The project boundary will be monitored by monitoring of parcels using GPS. Any changes in project boundary will be accounted for in all calculations of actual net GHG removals by sinks. The monitoring methodology uses permanent sample plots to monitor carbon stock changes in above- and below-ground biomass pools. To reach the targeted precision level of about ±10% of the mean at the 95% confidence level in a cost-effective manner, the number of plots needed in each stratum has been determined following equation (5) and (6) in AR-ACM0001 methodological tool “Calculation of the number of sample plots for measurements within A/R CDM project activities” (version 02).

$$n = \frac{\left[\sum_{i=1}^{m_{PS}} N_i \cdot st_i \right]^2}{\left(N \cdot \frac{E}{z_{\alpha/2}} \right)^2 + \sum_{i=1}^{m_{PS}} N_i \cdot (st_i)^2}$$

$$n_i = \frac{\sum_{h=1}^{m_{PS}} N_i \cdot st_i}{N \cdot st_i}$$

$$N = \frac{A}{AP} ; N_i = \frac{A_i}{AP} ; E = Q * p$$



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where:

n	sample size (total number of sample plots required) in the project area
n_i	sample size for stratum I
E	allowable error of the estimated quantity Q
i	project strata
L	total number of strata; dimensionless
$1 - \alpha$	probability that the estimate of the mean is within the error bound E
$z_{\alpha/2}$	$z_{\alpha/2}$ = value of the statistic z (embedded in Excel as: inverse of standard normal probability cumulative distribution), for e.g. $1 - \alpha = 0.05$ (implying a 95% confidence level) $z_{\alpha/2} = 1.9599$
N_i	maximum possible number of sample plots in stratum I
N	maximum possible number of sample plots in the project area
st_i	standard deviation for each stratum i; dimensionless, 30%
A	total size of all strata, e.g. the total project area; ha
A_i	size of each stratum i; ha
AP	sample plot size (constant for all strata); 0.04 ha
Q	approximate average value of the estimated quantity (aboveground wood volume per hectare); $m^3 ha^{-1}$
p	desired level of precision (10%); dimensionless

No of sample plots calculated stratum wise is given in Table E.2(a) below:

Table E.2(a): Number of Sample Plots for ex post Monitoring			
Strata	Defining feature of Strata	Area (Ha)	No of Sample Plots
	Year of Plantation		
Strata 1	2001	520.58	34
Strata 2	2002	1000.88	63
Strata 3	2003	1201.34	84
Strata 4	2004	2163.71	153
Strata 5	2005	3023.61	216
Strata 6	2006	3400.43	234
Strata 7	2007	3658.91	257
Total:		14969.46	1041

To avoid subjective choice of plot locations (plot centres, plot reference points, movement of plot centres to more “convenient” positions), the permanent sample plots will be located systematically with a random start, which is considered good practice in GPG-LULUCF. This will be accomplished with the help of a GPS in the field. The geographical position (GPS coordinate), administrative location, stratum and sub- stratum series number of each plots will be recorded and archived. It is to be ensured that the sampling plots are distributed randomly, and as evenly spread as possible.

To ensure that the sampling plots are distributed as evenly as possible, permanent sample plots have been systematically identified from each year of plantation covering each bank area in order to ensure accuracy and precision in estimating biomass. Preliminary stratification is done on the basis of year of plantation followed by bank area wise sub-stratification for each year that adequately takes care of variance in soil condition of different area in each stratum. Altogether 1305 permanent sample plots have been identified against 1041 calculated as per tool. Sampling plan has been prepared to identify 1305



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permanent sample plots so that they are homogeneously distributed across the bank area planted every year as shown in Table E.2(b) below:

Table E.2(b): Sampling Plan for ex post Monitoring										
S No	Bank Area	No of Parcels	No of Permanent Sample Plots identified yearwise							Total Nos
			2001	2002	2003	2004	2005	2006	2007	
	NABARANGPUR									
1	Nandahandi	160	2	0	1	3	3	1	3	13
2	Nabarangpur	285	1	0	3	5	6	5	5	25
3	Sindhiguda	139	1	1	1	2	2	3	4	14
4	Rajoda	152	1	2	2	1	3	3	4	16
5	Tumberla	19	1	0	1	1				3
6	Kosagumuda	138	1	1	2	2	1	1	5	13
7	Jotabal	136	0	1	2	1	5	3	2	14
8	Katharguda	156	1	2	3	2	1	2	4	15
9	Kumuli	207	1	2	3	4	3	2	4	19
10	B Singhpur	165	1	1	2	1	2	2	7	16
11	Sanmosigaon	281	1	1	2	4	6	3	4	21
12	Challanguda	218	1	1	1	5	3	2	7	20
13	Dhamnahandi	64	1	1	1			2	1	6
14	Raighar	357		2	1	13	3	3	4	26
15	Jharigaon	317		4	2	5	7	6	7	31
16	Dhodra	207		1	1	2	6	8	3	21
17	Kotagaon	183		4	1	1	2	4	6	18
18	Umerkote	135		0	2	2	1	3	6	14
19	Sosahandi	147		1	2	4	4	2	1	14
20	Singsari	68		1	2	2				5
21	Turudhi	55		4	1				0	5
22	Chandili	53		0		1	1	1	2	5
23	Kundei	30		1	1		1			3
24	Boriguma	24		1		2				3
25	Kodinga	58			0	1	0		5	6
26	Tentulikuthi	198				2	5	6	4	17
27	Maidalpur	115				4	5	1	3	13
	Total:	4067	13	32	37	70	70	63	91	376
	KORAPUT									
1	Boipariguda	317	7	7	4	1	2	4	4	29
2	Ramgiri	287	2	3	3	4	7	6	5	30
3	Kundra	418	3	3	4	5	10	9	8	42
4	Digapur	357	2	2	4	6	9	10	5	38
5	Dongerpausi	407	1	2	3	5	7	11	11	40
6	Ambaguda	103	1	1	2	2	4	3		13
7	Kusumi	345	1	1	3	10	6	6	6	33
8	Phamphuni	277	2	2	3	4	5	6	6	28
9	Nandpur	586	3	5	7	8	10	10	13	56
10	Padwa	213	2	3	2	4	6	5	2	24
11	Lamtaput	248	1	1	4	8	1	4	7	26



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12	Mathalput	129	1	1	4	4	3	1	1	15
13	Jolaput	147	1	1	2	3	5	1	3	16
14	Semiliguda	218	1	1	2	3	4	6	6	23
15	Koraput	48	1	1	1	1	1	1		6
16	Podagada	257	1	1	2	5	7	5	9	30
17	Kakriguma	65	1	1	2	1		1		6
18	Dasmantpur	208		1	3	4	4	4	6	22
19	Pottangi	93		1	1	2	3	2	2	11
20	Sunki	141		1	4	5	3	3	3	19
21	Jeypore	82				3	3	1		7
22	Sunabeda	43				1	3	1	1	6
23	Onkadeli	11					0			0
Total:		5000	31	39	60	89	103	100	98	520
MALKANGIRI										
1	Pangam	90	1	1	2	5	2			11
2	Maithili	144		1	1	1	1	3	10	17
3	Malkangiri	254			2	6	8	8	1	25
4	Kudumulguma	26		1	0		1	1		3
Total:		514	1	3	5	12	12	12	11	56
VISHAKHAPATNAM										
1	Arkuvalley	746					21	38	37	96
2	Kinchunmanda	750					13	35	45	93
3	Paderu	409						50	30	80
Total:		1905	0	0	0	0	34	123	112	269
VIZIANAGARAM										
1	Sallur	54					7	3	1	11
2	Gajpatinagaram	2								0
Total:		56	0	0	0	0	7	3	1	11
SRIKAKULAM										
1	Kottur	73				9	6			15
2	Veergatham	220					22			22
3	Palkonda	53					2			2
4	GL Puram	5						1		1
Total:		351	0	0	0	9	30	1	0	40
BASTAR										
1	Bastar	351					6	11	4	21
2	Lohaniguda	90					2	2	1	5
3	Bhanpuri	44					1	2		3
4	Kesharpal	38						2		2
5	Bokaband	12						1		1
6	Bojaband	9						1		1
Total:		544					9	19	5	33
69	Grand Total:	12437	45	74	102	180	265	321	318	1305

The growth of individual trees on plots and soil organic carbon will be measured at each monitoring event. The carbon stock changes in above- and below-ground biomass of trees on each plot are then estimated. To avoid the coincidence with peaks in carbon stocks, the first monitoring will be conducted in the year 2009 with subsequent monitoring in 2014, 2019, 2024 and 2029.



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E.3. Monitoring of the baseline net GHG removals by sinks, if required by the selected approved methodology:

>>

Monitoring of baseline net GHG removals by sinks is not needed as per the applied approved methodology AR-ACM0001 (Version 04).

E.4. Monitoring of the actual net GHG removals by sinks:

>>

E.4.1. Data to be collected in order to monitor the verifiable changes in carbon stock in the carbon pools within the project boundary resulting from the proposed A/R CDM project activity:

>>

Data / parameter:	A_i
Data unit:	ha
Used in equations:	18, 26, 21
Description:	Area of stratum i
Source of data:	Actual area measured by GPS coordinates of each stratum
Measurement procedures (if any):	GIS data
Monitoring frequency:	Before the start of the project and adjusted thereafter every 5-year
QA/QC procedures:	-
Any comment:	-

Data / parameter:	$A_{sp\ i}$
Data unit:	ha
Used in equations:	18
Description:	Total area of all sample plots in stratum i
Source of data:	Field measurement
Measurement procedures (if any):	
Monitoring frequency:	Before the start of the project and adjusted thereafter every 5 yr
QA/QC procedures:	
Any comment:	

Data / parameter:	DBH
Data unit:	cm
Used in following equations	Implicitly used in Eqs. 11, 19
Description:	Diameter breast height of tree
Source of data:	Field measurements in sample plots
Measurement procedures (if any):	Typically measured 1.3 m above-ground. Measure in the permanent sample plots all the trees above some minimum DBH that result from the A/R project activity.
Monitoring frequency:	5 years
QA/QC procedures:	



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Any comment:	Measuring the girth and convert to diameter at each monitoring time per sampling method
--------------	---

Data / parameter:	<i>H</i>
Data unit:	m
Used in equations:	Implicitly used in Eqs. 11, 19
Description:	Height of tree
Source of data:	Field measurements in sample plots
Measurement procedures (if any):	Tree top height is measured with the help of Abney Level
Monitoring frequency:	5 years
QA/QC procedures:	
Any comment:	Measured in each monitoring on all trees included in each sampling plot.

Data / parameter:	t_2 and t_1
Data unit:	yr
Used in equations:	7, 22, 23, 28
Description:	Years of the monitoring activity
Source of data:	Recorded data
Measurement procedures (if any):	-
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / parameter:	<i>Land title</i>
Data unit:	-
Used in equations:	-
Description:	Land ownership through Land Patta or Land Passbook
Source of data:	Individual farmer
Measurement procedures (if any):	-
Monitoring frequency:	5 years
QA/QC procedures:	-
Any comment:	The land patta were issued by the Govt of India. It will again reissued after survey (generally it happens in every 100 years)

Data / parameter:	<i>Carbon Right</i>
Data unit:	-
Used in equations:	
Description:	Authorization for claiming Carbon Credit
Source of data:	Individual farmer
Measurement procedures (if any):	
Monitoring frequency:	5 years
QA/QC procedures:	-
Any comment:	-



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Data / parameter:	Available Grazing Land (AGL)
Data unit:	acre
Used in equations:	
Description:	Land available for grazing under the control of PP
Source of data:	Survey
Measurement procedures (if any):	
Monitoring frequency:	5 years
QA/QC procedures:	-
Any comment:	-

Data / parameter:	Number of animals of different types in the grazing land
Data unit:	Nos.
Used in equations:	
Description:	Different animal head in the available grazing land both for the PP and others
Source of data:	Survey
Measurement procedures (if any):	
Monitoring frequency:	5 years
QA/QC procedures:	-
Any comment:	-

E.4.2. Data to be collected in order to monitor the GHG emissions by the sources, measured in units of CO₂ equivalent, that are increased as a result of the implementation of the proposed A/R CDM project activity within the project boundary:

>>

In terms of the approved methodology AR-ACM0001 (Version 04) applied in the proposed A/R CDM project activity; there is potentially one emission by sources, i.e. burning of woody biomass. However, planting, logging in the proposed A/R CDM project activity will be conducted manually. Also, there will be no burning of woody biomass during the site preparation, thus GHG emissions from biomass burning are nil. However biomass burning will be monitored for future possibility.

Data / parameter:	Biomass burning
Data unit:	kg
Used in equations:	
Description:	Biomass burning can be a potential emission source.
Source of data:	Survey
Measurement procedures (if any):	
Monitoring frequency:	5 years
QA/QC procedures:	-
Any comment:	-

E.5. Leakage:

>>



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As per the approved methodology applied, there are two potential sources of leakages in the proposed A/R CDM project activity. These are displacement of grazing and the use of wood posts for fencing. However, as elaborated in Section D.2 above, the leakage from the displacement of grazing and the use of wood post for fencing is nil.

E.5.1. If applicable, please describe the data and information that will be collected in order to monitor leakage of the proposed A/R CDM project activity:

>>

Though there is no leakage on account of displacement of grazing, the project activity proposes to monitor the following parameters for future possibility:

Data / parameter:	$H_{Existing,g,k,t}$
Data unit:	head
Used in equations:	
Description:	Number of head of animal type g existing on parcel k and/or being fed by fodder produced on parcel k before displacement of animals in year t
Source of data:	Estimated in displacement plan and monitored
Measurement procedures (if any):	
Monitoring frequency:	Determined at year of displacement
QA/QC procedures:	-
Any comment:	-

Data / parameter:	$H_{g,k,t}$
Data unit:	head
Used in equations:	
Description:	Number of head of animal type g displaced and/or the number of animals of type g fed by fodder for which production is displaced to parcel k in year t.
Source of data:	Estimated in displacement plan and monitored
Measurement procedures (if any):	
Monitoring frequency:	Determined at year of displacement
QA/QC procedures:	-
Any comment:	-

E.5.2. Specify the procedures for the periodic review of implementation of activities and measures to minimize leakage, if required by the selected approved methodology:

>>

Leakage is not considered in this project.

E.6. Provide any additional quality control (QC) and quality assurance (QA) procedures undertaken for data monitored not included in section E.1.3:

>>

To verify that plots are installed and measurements taken correctly, 10% of plots will be randomly selected and re-measured independently. The re-measurement elements include the location of plots, DBH, tree height, age of plantation and number of trees in each sample plots. The re-measurement data



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will be compared with the original measurement data. Any deviation between measurement and re-measurement below 5% will be considered tolerable. Errors discovered should be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

Data (Indicate ID number)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
<i>E.6.1 Plot location (latitude /longitude)</i>	<i>Low</i>	<i>Random plot verification using GPS Ensure that fields data is properly recorded and stored to facilitate detailed review</i>
<i>E.6.2 Age of plantation</i>	<i>Low</i>	<i>Random verification and ensure that this is properly recorded and stored to facilitate detailed review</i>
<i>E.6.3 Diameter at breast height of living trees (DBH)</i>	<i>Low</i>	<i>Random plot verification, check that units are properly labeled and ensure that this is properly recorded and stored to facilitate detailed review</i>
<i>E.6.4 Tree height</i>	<i>Low</i>	<i>Random plot verification, check that units are properly labeled and ensure that this is properly recorded and stored to facilitate detailed review</i>
<i>E.6.5 Number of trees in each sampling plot</i>	<i>Low</i>	<i>Random plot verification and ensure that this is properly recorded and stored to facilitate detailed review</i>

E.7. Please describe the operational and management structure(s) that the project operator will implement in order to monitor actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity:

>>

The reforestation project will be managed by a team of professional foresters appointed by Mangalam Timber Products Limited. This team will be responsible for undertaking periodical field measurement and data processing. In order to comply with the provisions of the monitoring methodology, arrangements will be made with local laboratories as well as other information providers. Information will be archived in electronic and paper form, and will be kept for at least two years posterior to the crediting period. If deemed necessary, internal audits and/or external assistance will be sought so that quality control and quality assurance procedures can be met.

The company has established “Quality Management System in Plantation & Forestry”, wherein a set of procedures has been laid down to implement and monitor the project activity. These procedures detail the responsibility, activity, control and steps required for monitoring key features, including:

- a) CDM staff training
- b) CDM data and record keeping arrangements
- c) Data collection
- d) CDM data quality control and quality assurance
- e) Equipment maintenance
- f) Equipment calibration
- g) Equipment failure



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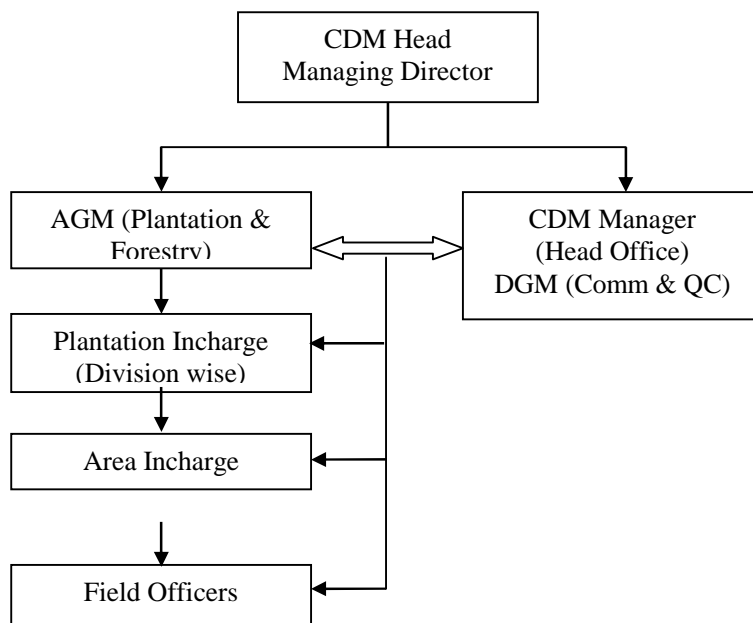
The methodology involves monitoring of following data those are identified necessary for calculating the estimated emission reduction:

- Area planted
- Area of sampling frame
- Total area of sample plots
- Diameter at breast height (DBH)
- Top Tree Height (H)
- Land title (Land patta/passbook)
- Carbon rights (CER authorization contract)

Roles and responsibilities to ensure that the monitoring procedures are followed strictly have been established. Responsibilities for data collection, recording and archiving of data, ensuring correct procedure for data collection, correctness of data and reliability in data entry, audit check has been identified which may be amended during the crediting period, if deemed necessary, as per internal requirements of the company.

CDM Manager (Head Office) in association with AGM (Plantation & Forestry) is responsible for ensuring that the procedures for on site measurements & monitoring are strictly followed and that they are continually improved to ensure a reliable monitoring system is established. CDM Manager(HO) is responsible for entire CDM documentation, GIS mapping, upkeep of GIS data, maps & images and liaisoning with external agencies like MoEF & DNA, DOE and consultants to the project.

Internal audit will be conducted periodically to assure consistency of monitored data. The company will conduct a final check of the data and analyze project performance prior to any verification. All staff involved in the CDM project will receive relevant training laid down in training procedures. Records of trained CDM staff will be retained by the Project Developer. The CDM Manager will ensure that only trained staff is involved in the operation of the monitoring system.





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Table E.7.1 : Roles & responsibilities of the personnel	
Position	Responsibilities
AGM (Plantation & Forestry)	<ul style="list-style-type: none"> • Supervision of work of Plantation Incharge and Area Incharge • Proper upkeep of plantation records • Compilation of all data received from different divisions • CDM data and record keeping arrangements • Ensuring availability of trained personnel for CDM data collection • Arrangement of staff training on plantation • Ensuring correctness of record • Soil testing
CDM Manager (Head Office)	<ul style="list-style-type: none"> • Entire documentation for CDM activities • Resource management for GIS mapping of plantation sites. • Custodian for all GIS data, maps and satellite images • CDM data and record keeping arrangements • Quality control of monitoring system • Arrangement of staff training on CDM monitoring procedures • Cross checking of data • Arranging calibration of measuring devices • Arranging for validation and verification of the project • Liaisoning with all external agencies like DNA, DOE and consultants
Plantation Incharge	<ul style="list-style-type: none"> • Execution of Tripartite agreement • Execution of carbon rights (CER authorization contract) • Maintaining record of area planted year wise in plantation register • Updating plantation register • Updating Sample plot register • GPS mapping of the plantation sites • Calibration and maintenance of measuring devices • Quality control of data collection • Audit check of data
QC Manager	<ul style="list-style-type: none"> • Training on planting & nursery techniques – changes and developments, soil sample collection • Training on CDM monitoring procedures like tree height and DBH measurements • Growth monitoring in sample plots in terms of no of trees, tree height & DBH • Quality control of data collection
Area Incharge	<ul style="list-style-type: none"> • Joint verification of plantation sites to ensure fulfillment of eligibility criteria • Identification of sample plots • Growth monitoring in sample plots in terms of no of trees, tree height & DBH
Field officers	<ul style="list-style-type: none"> • Conducting meeting with the farmers to educate them on the scheme • Train, guide and assist farmers for plantation • Assistance in recording GPS coordinates



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	<ul style="list-style-type: none"> • Measurement of tree height & DBH • Sample plot measurement
--	---

E.8. Name of person(s)/entity(ies) applying the monitoring plan:

>>

Birla Carbon Management Consulting Limited has assisted MTPL in determining and applying the monitoring plan, and the entity is not the project participant listed in Annex 1.

Name of Entity:	Birla Carbon Management Consulting Services Birla Building, Ground Floor, 9/1, R N Mukherjee Road Kolkata - 700 001
Tel:	+91 33 65502603
Fax:	+91 33 22317259
Web:	www.carbonmcgroup.com
Contact Person:	Ms Tulika Biswas
Mobile:	+91 9331887748
Email:	tulika.biswas@carbonmcgroup.com

SECTION F. Environmental impacts of the proposed A/R CDM project activity:

F.1. Documentation on the analysis of the environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed A/R CDM project activity:

>>

The proposed project activity leads to the establishment of around 14969.46 ha of carbon sink on severely degraded landmasses, which not only contribute environmental services like soil erosion control, improved soil organic carbon, increased forest cover etc. but also aids in fulfilling sustainable development goals of the country. The project activity aims to restore the degraded land, which has very negligible species diversity.

Though Environmental Impact Assessment is not a regulatory requirement in India as per EIA Notification 1994²⁵, for forestry projects, still the project proponent conducted an internal environmental assessment to map and mitigate, if any irreversible and unacceptable impacts on the environment resulted and would result from the project activity.

The EIA study included identification, prediction and evaluation of potential impacts. There was no significant negative impact of the A/R CDM project activity under consideration. Other than increasing the forest cover the activity provides the following additional local benefits:

- Controlling soil erosion
- Improving soil organic carbon
- Water conservation
- Wasteland reclamation
- Reduced dependency on natural forest
- Additional fuel wood generation

²⁵ <http://envfor.nic.in/divisions/iass/notif/eia.html>



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- Enhance environmental services
- Improve socio economic conditions of the beneficiaries

The site preparation does not involve GHG emissions. The ploughing activity is carried out once in a sixteen year cycle at the time of replanting for which human and animal energy are employed. The soil disturbance during ploughing is not likely as use of heavy machinery is completely avoided. Moreover the poor farmers do not afford to hire tractors for ploughing. Also ploughing is done on non-rainy days so as to avoid topsoil erosion due to surface runoffs.

Eucalyptus plants are resistant to most of the pest attack. A pest attack control plan was planned and the pest attack was taken into account under plant breeding strategy. The area is red laterite area where pest like termite is not uncommon. Prophylactic treatment is given to pits with Chloropyriphos before planting the seedling. Depending upon requirement Phorate may be required for therapeutic treatment of the plant. Foliar blight is the common disease in the area caused by *Cylindrocladium* fungus. This disease is controlled in the initial stages by spraying 0.2% bavistin fungicide.

All the Environmental legislations were studied and are given in a matrix in the EIA report. However, the specific Environmental legislations applicable for the present project activity and their relevance with the present project are mentioned as below.

1. Water (Prevention and Control of Pollution) Act, 1974 with Rules.
2. Biological Diversity Act, 2002²⁶
3. Provisions of Inter-state Migrant Workmen Act, 1979²⁷

The most significant impact of the project activity is improvement in soil organic carbon. Soil samples collected from various sample plots were tested in ISO certified laboratories in 2008-09 and compared with the test reports of the same area for 1995-2000 period, ie before start of the project activity, available with Soil Chemist, Soil Testing Laboratory (Govt of Orissa) Semiliguda. Results show that the project activity has significant impact in terms of improved soil organic carbon as per the current soil test reports of project land.

However large scale planting of Eucalyptus has caused concern to many people as they thought it would have adverse environmental impacts particularly in relation to high water use. In this regard Mr M Harikrishnan, Principal Chief Conservator of Forest (PCCF), Tamil Nadu Forest department, Chennai, in his article “Know about Eucalyptus Tree” has clarified many myths associated with Eucalyptus plantation as under:

1. Eucalyptus consumes ground water heavily and thus soil gets desiccated leaving it unfit for any other purpose.

Research reports have shown (CAZRI, Jodhpur) that Eucalyptus makes the use of sub-soil moisture leaving top soil moisture intact that can be used by undergrowth and agricultural crops. The taproot of widely grown *Eucalyptus tereticornis* grows upto 3m while depth of water table is often as much as 10m. It only consumes sub-soil moisture around and upto 3m depth and hence does not affect the water table.

²⁶ http://www.envfor.nic.in/divisions/csurv/nba_act.html

²⁷ http://labour.delhigovt.nic.in/act/details_acts/interstatemignatwirmen/inter_state/intro.html



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2. *Eucalyptus aggravates soil and water erosion due to low interception of rain water as compared to other forest species also does not hold good.*

Stem flow and interception studies have shown that compared to some native species like *Shorea robusta*, *Pinus roxburghii*, *Tectona grandis*, *Acacia catechu* etc., Eucalyptus offers least interception loss of rain water and allows more rain water to percolate by increased stem flow. Eucalyptus plantation in barren land reduces the run off rate in relation to the run off in natural stratified forest and when the area is planted with local species.

3. *Eucalyptus transpires a lot evaporates more moisture and thus increases the evapo-transpiration loss from the soil.*

Studies in Karnataka reveal that species like *Eucalyptus tereticornis* are similar to many other tree species in evapo-transpiration loss. Further the annual transpiration rate in Eucalyptus plantation is lowest compared to agricultural crop like paddy, wheat, sugarcane, potato, jowar etc. Compared to total annual rainfall, the total annual evaporation loss any area planted with Eucalyptus is low. For example, in parts of the Nilgiris, the total evaporation loss from Eucalyptus globules has been found 34.75 cms against the annual rainfall of 130 cms.

4. *Eucalyptus heavily consumes available soil moisture and thus does not allow any other undergrowth.*

It is well accepted that any fast-growing plant consumes more water for its growth. Eucalyptus is also fast growing plant but consumes least quantity of water for production of higher biomass per unit volume. Studies reveal that for one litre water consumed, Eucalyptus hybrid produces 2.06 gms of biomass as against 1.83 gms in case of *Albizia lebbek*, 1.31 gms in case of *Dalbergia sisoo* and 2.0 gms in case of *Syzygium cumini*.

5. *Eucalyptus depletes the soil nutrients and there is no return of nutrients into the soil through leaf litter as they do not decompose easily. They turn the soil acidic and degrade the site, thus preventing growth of other species later.*

Study report says there was higher accumulation of organic matter with more nitrogen and phosphorous under Eucalyptus plantation than under a native species like Sal. Eucalyptus plantation grown on treeless sites improves soil fertility by developing humus. Eucalyptus leaf litter, if not removed from the field, reduces the acidity through addition of calcium and makes the soil neutral.

The water budget of Eucalyptus however is efficient compared to other trees as per unit of wood production the water consumption is low (Rajan, 1987)²⁸. Eucalyptus appears to use less water per unit weight of biomass produced than other kinds of trees and many agricultural crops (Davidson, 1985 & 1998)²⁹.

F.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

²⁸ Rajan, B.K.C. (1987). Versatile Eucalyptus. Diana Pub., Bangalore. pp: 41-201.

²⁹ Davidson.J. (1985), Setting aside the idea that Eucalyptus are always bad. FAO pub, Rome.



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>>

No significant negative impacts have been identified due to the environmental-friendly techniques to be adopted in the proposed A/R CDM project activity.

F.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section F.2. above:

>>

No negative impacts have been identified. However environmental monitoring plan and measures for any future risk would be reviewed and incorporated.

SECTION G. Socio-economic impacts of the proposed A/R CDM project activity:

G.1. Documentation on the analysis of the major socio-economic impacts, including impacts outside the project boundary of the proposed A/R CDM project activity:

>>

The majority of reforested area (83%) under the project activity lies in Nabarangpur, Koraput and Malkangiri districts in the state of Orissa reckoned to be one of the most backward states due to poor economic growth. The majority of inhabitants are mostly tribal. Koraput is primarily a tribal district, more than 70% of total population comprises of scheduled tribes. Nabarangpur district was created on 2nd October 1992 out of a previous subdivision of Koraput. The history of Nabarangpur is inextricably interlinked with that of Koraput, with which it shares its language, lifestyle, heritage, flora & fauna and climate. There are as many as 52 tribal groups in the area; some of the numerically large tribes are Kondh, Bhatara, Poraja, Bhumia, Koya, Bondas, Gadaba & Dombs who primarily depend on cultivation and forest products for their livelihood. Dongaria kondhs are shifting cultivator tribal community living in hills of Koraput. Encounter with the settled and urban population has changed their lifestyle to some extent but communities like Poraja, Kondh and Gadava still live in indigenous style. These tribes speak dialects of Oriya.

Rice and fish is the main food in the area. *Paddy, alsia, kosla, mandya, maize* are the main crop cultivated to gain a reasonable level of subsistence. Though fruit trees like mango and jackfruit are the popular choice, other plants are also grown as per individual liking. Majority families make use of fuel wood collected from nearby forests for cooking purpose. The area is gifted with abundance of natural forest easily accessible for fuel wood.

People in the area are God fearing and celebrate many festivals throughout the year. *Rath Yatra* of diety Jagannath is the most important festival of the state apart from *Dashera, Holi and Mahashivaratri*. This festival is celebrated throughout the state which brings together the rural/hill tribes and town dwellers in celebration. Many small temples of *Jagannath* are scattered in the districts, one very old being in Nabarangpur town also. *Maa Bhandargharani* of Nabarangpur is the presiding deity of the locality. Besides, the villagers also celebrate "*Chaitra Parva, Pausa Parva, Magh Parva, Nay Khai, Aam Parva*" etc during various crop seasons.

The farmers participating in the project activity are generally small & marginal farmers and tribal who are illiterate and economically weak, most of them holding BPL card. They do not have assured source of income to meet their daily needs including food, clothing etc. Males and females both work in the field, the later being prone to work harder as the males tend to neglect work particularly under the influence of liquor. They are daily wage earners and artisans like washer man, barber, cobbler, fishermen, weavers,



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potters, processing of leaves and other small service providers, who depend on some daily job for their livelihood, sometimes they get sometime not.

The objective of this reforestation project is to encourage tree farming practices in degraded land and to create employment potential in rural areas particularly among landless agricultural labour. The reforestation activity involves development of nursery, site preparation, ploughing & levelling of land, digging pits for saplings, planting, fencing, fertilizer & manure application etc which are all done manually by the farmers and their family members themselves or hiring labour force of the village or from nearby areas. Thus the project activity has generated huge employment opportunity for the local villagers and farmers improving their income level and social condition. The details of employment generated due to the reforestation project in three states are given year-wise in the table below. CDM revenue generated from project activity is likely to add their income further.

State	Year	Employment generated (in man days)
Orissa	2001-02	2,79,532
	2002-03	4,21,911
	2003-04	5,27,512
	2004-05	8,79,855
	2005-06	10,87,438
	2006-07	10,03,141
Chattisgarh	2002-03	1,39,826
	2003-04	2,22,333
	2004-05	4,56,099
	2005-06	5,22,866
	2006-07	1,06,852
Andhra Pradesh	2004-05	22,922
	2005-06	2,48,884
	2006-07	4,43,539
Total:		6,362,701

<http://srdis.ciesin.columbia.edu/cases/india-010.html>

G.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to supporting documentation:

>>

No negative impact is considered due to the implementation of the proposed A/R CDM project activity.

G.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section G.2 above:

>>

No negative socio-economic impacts are envisaged.

SECTION H. Stakeholders' comments:



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H.1. Brief description of how comments by local stakeholders have been invited and compiled:

>>

The stakeholders identified are mainly the farmers who are participating in the project activity apart from nearby villagers, local panchayet, forest officials and the employees of the company. The views and comments of the stakeholders were collected by way of conducting a series of stakeholders' consultation meetings as well as through PRA exercise.

Stakeholder' Consultation Meeting:

At the start of the project activity stakeholders' consultation meetings were conducted locally for each bank area identified for initiating reforestation activity. Company's field officers arranged meetings with the land owners in remote villages. The farmers of various villages of the bank area were invited to assemble at one place convenient for all. The farmers were encouraged for eucalyptus plantation on their degraded land which was otherwise lying barren since decades without any return. They were explained about the reforestation scheme with its benefits, which they all appreciated invariably. MTPL field officers also explained them how they will be contributing towards mitigation of carbon emission through reforestation under the scheme. Altogether 49 such meetings were conducted across the project area ensuring participation of 1158 people, 13 meetings in Nabarangpur, 28 in Koraput, 4 in Malkangiri from December, 2000 to March, 2001 and 4 meetings in Srikakulam from January to March 2004. List of meetings conducted is furnished in table H.1 below:

Table H.1: Record of Stakeholder's Meeting							
S No	Date of Meeting	Venue of Meeting	Bank Area	No of villages	Name of participating villages	No of Participant	Name of field officer
Nabarangpur Distt:							
1	15.01.2001	Soruguda	UGB - Nandahandi	13	Dohna, Dongarbheja, Jhadbandhguda, Bhanjaguda, Chotahandi, Morali, Potharlosa, Antashore, Nuagam, Katraguda, Jhodiaguda, Soruguda, PKGuda	24	A D Naidu
2	23.01.2001	Rosiyaguda	UGB - Sindhiguda	7	Dongtaguda, Rosiyaguda, Turiyaguda, Ekamba Rathimajhiguda, Nandahandi, Turniaguda,	17	A D Naidu
3	13.02.2001	Bongapalli	UGB - Nabarangpur	2	Bongapalli, Pujariguda	8	A D Naidu
4	28.02.2001	Rajoda	UGB - Rajoda	9	Bijaguda, Neigaon, Souraguda, Bamuni, Mankadi, Kantiyaguda, Parjaguda, Rajoda, Kerla	15	A D Naidu
5	11.01.2001	Tumberla	UGB - Tumberla	6	Khaduguda, Gumidora, Surigaon, Tumberla, Burjha, Harijansahi	17	A K Mishra
6	15.01.2001	Kosagumuda	UGB - Kosagumuda	8	Badambada, Kosagumuda, Santoshpur, Agnipur Haldiguda, Chelipadar, Dengaguda, Duragaon	14	A K Mishra
7	28.01.2001	Patri	UGB - Jotabal	4	Jotabal, Patri, Baddhansuli, Basini	8	A K Mishra
8	22.02.2001	Porsala	UGB - Challanguda	5	Porsala, Paknaguda, Bandliguda, Khandiguda, Aunli	16	B Panda
9	27.02.2001	Deodora	UGB - Sanmosigaon	5	Kochiaguda, Deodora, Malekote, Jamguda, Chatahandi	19	B Panda
10	29.03.2001	Narahandi	UGB - Dhamnahandi	2	Bhurusiguda, Narahandi	13	B Panda
11	16.01.2001	Kathargada	UGB - Kathargada	6	Pradhaniput, Paknaguda, Baghbeda, Kathargada, Kenduguda, Rajuguda	20	S K Dhall
12	20.02.2001	Kumuli	UGB - Kumuli	5	Narigaon, Gumuda, Kumuli, Semla, Badigaon	10	S K Dhall
13	25.02.2001	Benasur	UGB - B.Singhpur	4	Kandulkhunti, Tenkar, Mundaguda, Upparguda	10	S K Dhall



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			TOTAL:	76		191	
	Koraput Distt:						
1	20.12.2000	Patraguda	IOB-Baipariguda	9	Minarbali, Santeiput, Doraguda, Patruguda, Dahadaguda, Berbaon, Kaliguda, Rampur, Keraput	37	D Das
2	28.12.2000	Jhiligaon	KPGB-Kundra	5	Gundal, Jhilgaon, Phnkiaguda, Nuaguda, Raikundra	27	D Das
3	24.12.2000	Padeiguda	KPGB-Ramgiri	5	Padeiguda, Siadimali, Ranaguda, Badelibeda, Nuaguda	18	D Das
4	01.01.2001	Bandakaguda	KPGB-Ramgiri	10	Putapadar, Rupabeda, Kaudiaguda, Madilikhadi, Gandaguda, Ranakhandi, Semiliatala, Bandakaguda, Siadimala, Badapada	59	D Das
5	18.12.2000	Pakanaguda	UGB-Digapur	6	Massigaon, Jantaput, Pujripur, Galriguda, Pakanaguda, Kaliariput	16	D Das
6	15.12.2000	Umeri	KPGB-Koraput	7	Umeri, Machhara, Porjapandi, Ralikumbha, Banapadar, Koraput, Dangadeula	28	S K Ray
7	24.12.2000	Podagada	KPGB-Podagada	17	Podagada, Porajasuku, Mujang, Bhejapadar, Padeiput, Nuaguda, Mundar, Brahmanasuku, Paikapuki, Bilansil, Tamili, Majhiguda, Chotaguda, Admunda, Purimunda, Maligunda, Dengajaniguda	72	S K Ray
8	29.12.2000	Kakiriguma	KPGB-Kakiriguma	11	Kakiriguma, Tanupar, Podapadar, Kunder, Ledriguda, Ambiliambaguda, Panchada, Tembariguda, Lataput, Kapsiput, Niraniguda	86	S K Ray
9	20.01.01	Dasmantpur	KPGB-Dasmantpur	18	Dasmantpur, Bansali, Tantiput, Badilikuduma, Kadamjhola, Talagodala, Mandiaguda, Bhitabagri, Bagchema, Kartasandabada, Lataput, Marichguda, Sukuraput, Raulkanti, Jodipai, Pedivil, Mangaraguda, Jumbaguda	34	S K Ray
10	01.12.2000	Ghatabagra	KPGB-Phampuni	5	Raniput, Gadabaguda, Ghatabagra, Puranapani, Barlahandi	18	P K Mishra
11	10.12.2000	Makaput	KPGB-Kusumi	3	Kangaguda, Majhiguda, Makaput	18	P K Mishra
12	15.12.2000	Sindhigaon	KPGB-Ambaguda	5	Sindhigaon, Putura, Ambaguda, Mundapadar, Sanamadurmunda	15	P K Mishra
13	25.12.2000	Naragaon	KPGB-Dongerpaunsi	7	Daniguda, Naragaon, Kusumguda, Bauaguda, Chikimiaguda, Maliguda, Chiliguda	21	P K Mishra
14	05.01.2001	Pradhaniput	KPGB-Dongerpaunsi	7	Akarguda, Bariaguda, Baliapadar, Pipalguda, Pradhaniput, Musaljabha, Samarathguda	23	P K Mishra
15	11.01.2001	Kebidi	KPGB-Ambaguda	5	Tentulipadar, Kebidi, Nuaguda, Chotakebidi, Kumbharput	19	P K Mishra
16	18.01.2001	Chitra	KPGB-Kusumi	8	Kusumi, Michia, Mundipadar, Baghchua, Chitra, Makaput, Bobeya, Chitra Kaliaguda	23	P K Mishra
17	21.01.2001	Pujariput	KPGB-Phampuni	3	Siraguda, Pujariput, Bayaguda	24	P K Mishra
18	03.02.2001	Ghotorla	KPGB-Kusumi	6	Ghotorla, Mohantypur, Kusumi, Godiguda, Phupugaon, Ghotorla	22	P K Mishra
19	12.02.2001	Dharnahandi	KPGB-Dharanahandi	8	Pushpuri, Gunjiguda, Bayaguda, Dharanahandi, Gheuri, Salapa, Kumbharput, Badabhenda	25	P K Mishra
20	05.01.2001	Chatwa	KPGB-Padwa	4	Chatwa, Talaguda, Mandipadar, Sariaput	32	N P Mohanty
21	05.02.2001	Kularsingh	KPGB-Padwa	4	Kularsingh, Khuda, Alangul, Gunthaput	30	- do -
22	11.01.2001	Ontavir	KPGB-Jolaput	5	Ontavir, Nuaput, Gotiput, Topogonda, Khinmung	14	- do -
23	23.01.2001	Audipada	KPGB-Lamtaput	7	Audipada, Oravir, Lugum, Chandwa, Kadri, Sorgiguda, Doraguda	24	- do -
24	08.01.2001	Tankua	KPGB-Nandpur	1	Tankua	33	- do -
25	12.02.2001	Cheliamunda	KPGB-Nandpur	5	Dokripur, Konta, Lamda, Tanuka, Cheliamunda	30	- do -
26	18.03.2001	Kumargandhana	KPGB-Nandpur	3	Paliba, Dokripur, Kumargandhana	35	- do -



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27	15.01.2001	Subai	KPGB-Semiliguda	4	Subai, Bhitasubai, Hadiguda, Charagaon	24	- do -
28	17.01.2001	Hatapada	KPGB-Mathalput	4	Kudumul, Bhejaput, Putraghati, Lachmani	18	- do -
			TOTAL:	182		825	
		Malkangiri Distt:					
1	15.12.200	Duraguda	UGB-Maithili	2	Duraguda, Ramguda	16	S Sumant
2	24.12.2000	Podagada	SBI-Pangam	7	Podagada, Siraguda, Somrathguda, Dudumaguda, Paknaguda, Salpadar, Baliguda	15	S Sumant
3	05.01.2001	Amlajodi	SBI-Pangam	3	Amlajodi, Purnagada, Meja	14	S Sumant
4	09.01.2001	Ampada	UGB-Maithili	3	Ampada, Pujariguda, Sindhiguda	13	S Sumant
			TOTAL:	15		58	
		Srikakulam Distt:					
1	05.01.2004	Nawaguda	SBI-Kottur	2	Nawagada, Paduru	12	K Deepak
2	27.01.2004	Goidi	SBI-Kottur	5	Goidi, Bethapuram, Somagandi, Rasulpeta, Torangi	15	K Deepak
3	03.02.2004	Pedanamma	SBI-Kottur	7	Pedanamma, Meetuguda, Devinpuram, Kurimi, Musirigguda, Seethimpeta, Janaga	16	K Deepak
4	07.03.2004	Selgmere	SBI-Kottur	7	Selgmere, Jagadaguda, Kanbaguda, Muttuguda, Adakulaguda, Kambaguda, Janaga	21	K Deepak
			TOTAL:	21		64	
49			GRAND TOTAL:	294		1138	

Later on the concept was further clarified through stakeholders' meetings conducted at large scale in 2007. To ensure maximum participation by the farmers and nearby inhabitants the meetings were conducted separately for each of the three states. The notification regarding conduct of meeting and agenda was published in local news paper having wide circulation in the project area apart from personal invitations, public announcements, notices, word of mouth and telecons. The first meeting for Orissa, which constitutes almost 76% of the project activity, was conducted on June 11, 2007 at large scale at factory guest house at Nabarangpur (Orissa). Live coverage of the proceedings of the meeting is available in CD. The second for Andhra Pradesh on July 08, 2007 at Kottur in Srikakulam district and third for Chhatisgarh on August 12, 2007 at Bastar. More than 400 people from different villages of three states attended the meeting.

Stakeholders' meetings conducted at large scale:						
S No	Date	Venue	State	Name of participating bank areas	Nos	Conducted by
1	11.06.2007	Nabarangpur	For Orissa	All bank areas of Nabarangpur, Koraput & Malkangiri districts	220	All officials of the area
2	08.07.2007	Kottur (Srikakulam)	For Andhra Pradesh	All bank areas of Vishakhapatnam, Vizianagaram & Srikakulam districts	134	All officials of the area
3	12.08.2007	Bastar	For Chhatisgarh	All bank areas of Bastar districts	54	All officials of the area
			TOTAL:		408	

A brief introduction of the project activity and how it contributes to anthropogenic GHG emission reduction was presented by the company officials in the meeting. Salient features covered in the presentation were as under:



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- Introduction to global warming and CDM
- Brief introduction of project activity and its relation with CDM
- Explanation of how the project activity contributes to reducing anthropogenic GHG emission
- How the project activity is contributing towards environmental and social wellbeing – locally and globally
- How the project activity will contribute to economic upliftment of the local people
- Sharing mechanism of the CERs (Carbon Credits) with the farmers

The participants were given opportunity to ask questions or give comments with regard to project activity at the end of the meeting. The comments and queries raised during the meeting were adequately addressed by the company officials and summarized in Minutes of meeting.

Further comments were invited from the stakeholders even after meeting in other forms such as by post, fax or by mail mentioning their name and contact details.

H.2. Summary of the comments received:

>>

Stakeholders' meeting at the start of project activity:

The farmers appreciated the plantation scheme. With the scheme they would be getting an opportunity to utilise the degraded land which was otherwise lying barren. As all of them appreciated the contribution of the project activity towards improving the economy of local population as well as environment, it was decided to note down the negative comments only. But there were no negative comments at all.

Stakeholders' meeting in the year 2007:

All the participants invariably opined that the plantation scheme brought by MTPL would be beneficial for them. Among the most important stakeholders and beneficiaries of the project activity are the farmers and inhabitants of nearby villages. Under the scheme they can fetch out some income from their degraded land which was lying barren since their forefathers. In absence of the scheme they had no other alternative land use except to leave it barren as in the past.

Since all the invitees appreciated the contribution of the project activity towards improving the economy of local population as well as help India to contribute to mitigate GHG emission, it was decided to note down the adverse comments only. However there was no adverse comment from anybody.

Public Rural Appraisal (PRA):

Apart from the stakeholders' consultation meetings the views and comments of the farmers were further obtained during PRA exercise in the year 2008-09. The PRA team asked the respondents to give their views and comment on the project activity undertaken by MTPL.

PRA study reveals that 79.9% respondents appreciated the project activity and as usual 20.1% did not prefer to comment. Among those who did not comment were mostly females, daily wage earners or small service providers. They were either not willing to comment or not knowing what to comment and why to



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comment. The respondents opined that the plantation scheme brought by MTPL has provided a good opportunity for them.

No negative comments have been received so far. CD containing the live coverage of the proceedings attached.

H.3. Report on how due account was taken of any comments received:

>>

The queries of attendees were all answered by MTPL officials to the satisfaction of participants and accepted by them. A few important queries and concern are as under:

S No	Stakeholders concern/ query/	Clarification/ answer provided by MTPL officials
1	What assistance the company will be providing to promote plantation activity?	The company officials intimated that they motivate the farmers to go for plantation that will give them some earning from their degraded land lying barren. This will improve their earning, waste land will be utilized, and further degradation will be prevented. Besides the company is providing technical guidance, assistance in getting finance from bank, supply of quality seedlings for better yield and free replacement of mortality. In view of developing better seedlings and clonal plants the company is continuously engaged in R&D activity in their nursery. The company is also providing buy back guarantee for the proceeds at prevailing market price.
2	What CER is?	The company officials explained CER stands for “Certified Emission Reduction” and it is the measuring unit of emission reduction like kilometre for distance measurement. One CER is equivalent to one tonne of CO2 emission reduction.
3	Whether any farmer who has a plantation in the area will be eligible for the CER money?	The company official replied “no” and explained the eligibility criteria. The farmers will be entitled to get CER revenue on the plantation that has been included in the project boundary. That means who has signed the tripartite agreement with the company and bank, have signed the authorization letter for CDM, whose plantation is essentially on degraded land and who is the owner the land. Any other plantation external to the project boundary or not included in the project boundary will not be entitled.
4	How the project is benefiting local residents who have no plantation?	The company explained that the project activity has generated huge employment opportunities for the local residents to carry out various activities of plantation like site preparation, supply of seedlings, planting of seedlings, fencing, harvesting, and transportation of harvested material in the area.



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Annex 1

**CONTACT INFORMATION ON PARTICIPANTS IN THE PROPOSED A/R CDM PROJECT
ACTIVITY**

Organization:	Mangalam Timber Products Limited
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E-Mail:	psprasad@mangalamtimber.com
URL:	www.mangalamtimber.com
Represented by:	Mr P. S. Prasad
Title:	Dy. General Manager (Commercial & QC)
Salutation:	Mr
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Middle Name:	Shankar
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Mobile:	+91 9903941332
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Direct tel:	---
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for this project activity



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Annex 3

BASELINE INFORMATION

The present project site comprises of large, medium and small sized land holdings, distributed as discrete parcels, which are under the possession of the tribal land owners. A survey aiming to assess baseline vegetation was conducted by the team of MTPL field staff in the year 2001 before start of the project activity. The survey was conducted in different time periods, first post monsoon (October, 2000 to January, 2001) and thereafter pre-monsoon in summer (May-June 2001). The field staff visited individual sites alongwith the concerned farmer and penned down the vegetation noticed on the site selected for forestation. Field visits were also conducted to the nearby areas to assess the land use of similar land in the vicinity. The rural community was interviewed to understand any interventions like fire or natural calamities occurred in the past. The data was then compiled to evidence the eligibility of the land as well as to estimate the baseline carbon sequestration of the project activity.

It was observed from the vegetation report that the pre and post monsoon scenarios widely differed. In post monsoon period the land was flourished with grass, bushes and weeds but in summer everything vanished and the land was totally barren leaving no vegetation at all.

The company appointed M/s Salim Ali Centre for Ornithology & Natural History (SACON) under MoEF, Govt of India for conducting GIS mapping of the project area including Change detection study to know the status of land during 1990 period. Satellite images of 1990 period have been generated by overlaying the current GIS map of the project parcels over the Landsat Thematic Mapper Satellite data of 1990 period available from Global Land Cover Facility (GLCF). These images are available for the entire project area; bank area wise that shows that the parcels of land under project activity was under degraded category.

Stratification according to pre-existing conditions and baseline projections

Although the project sites are located in different states (as described in section A.5.1), the carbon status of all the sites is more or less same. It is low or decreasing. The Ex ante stratification is done by conducting field visits and assessing the soil condition of areas under the project. Local communities are interviewed (PRA conducted) to understand the land use land cover history. Few trees along with bushes of at the most 1 m height of different varieties and grasses and were found in a few parcels of the project area. The bushes and grass were visible during monsoon. But with the onset of summer only trees were left and all the bushes and grasses vanish. As per AR-ACM0001 (Version 04), section II.4 “changes in carbon stock of above ground and below ground biomass of non tree vegetation may be conservatively assumed to be zero for all strata in the baseline scenario”. Based on this, the proposed A/R CDM project area is stratified depending on vegetation cover. Two strata were identified as below:

1. Baseline Strata I: Project land with few growing trees
2. Baseline Strata II: Project land without trees

Baseline Strata I: Project Land with few growing Trees



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Based on vegetation survey report all the parcels containing trees through the entire project area has been shortlisted and assigned to Baseline strata I. The table below shows the list of trees recorded in the project area:

S No	Common Name	Scientific Name	Family
1	Mango	<i>Mangifera indica</i>	<u>Anacardiaceae</u>
2	Cashew	<i>Anacardium occidentale</i>	Anacardiaceae
3	Sal	<i>Shorea robusta</i>	<u>Dipterocarpaceae</u>
4	Teak	<i>Tectona grandis</i>	<u>Lamiaceae</u>
5	Mahuwa	<i>Madhuca longifolia</i>	<u>Sapotaceae</u>
6	Kusum	<i>Schleichera oleosa</i>	Sapindaceae
7	Kendu	<i>Diospyros melanoxylon</i>	<u>Ebenaceae</u>
8	Karanji	<i>Pongamia pinnata</i>	Papilionaceae
9	Chakunda	<i>Cassia tora</i>	Caesalpinaceae
10	Jackfruit	<i>Artocarpus heterophyllus</i>	<u>Moraceae</u>
11	Guava	<i>Psidium gujav</i>	Myrtaceae
12	Banyan	<i>Ficus bengalensis</i>	<u>Moraceae</u>
13	Pipal	<i>Ficus religiocia</i>	<u>Moraceae</u>
14	Castor	<i>Recinus cummunis</i>	Euphorbia
15	Kachnar	<i>Bombax Ceiba</i>	Malvales
16	Semal	<i>Bauhinia Semla</i>	Caesalpinaceae
17	Arjun	<i>Terminilia Arjuna</i>	Combretaceae
18	Beleric	<i>Terminalia Bellirica</i>	Combretaceae
19	Silver Oak	<i>Grevelia Robusta</i>	Proteaceae
20	Aonla	<i>Phyllanthus emblica</i>	Phyllanthaceae
21	Tendu	<i>Diospyros Celebica</i>	<u>Ebenaceae</u>
22	Tamarind	<i>Tamarindus indica</i>	Fabaceae

Baseline Strata II: Project Land without Trees

The existing vegetation of the strata without growing trees is analyzed by using list quadrature method and census survey method which is extensively used for vegetation survey. Considering the huge size and the discrete nature of the project site, a quadrature of size 10 m X 10 m is taken for vegetation analysis. To ensure that the flora of the entire strata without trees is represented, 348 discrete parcels belonging to different landholdings are selected. Representative quadrates are selected for analyzing the qualitative characters of vegetation. The details of which are given below.

Sl. No.	Name of the Species	Family	Habit
1.	<i>Acacia nilotica</i>		
2.	<i>Cassia tora</i>	Leguminosae	Herb
3.	<i>Ipomea biloba</i>	Convolvulaceae	Herb
4.	<i>Capparis aphylla</i>	Capparidaceae	Herb
5.	<i>Croton bonplandianus</i>	Euphorbiaceae	Herb
6.	<i>Achyranthes aspera</i>	Amarantaceae	Herb
7.	<i>Parthenium hysterophorus</i>	Poaceae	Herb



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8.	<i>Tephrosia purpurea</i>	Pappilionaceae	Herb
9.	<i>Cyperus diformis</i>	Cyperaceae	Herb
10.	<i>Chloris montana</i>	Poaceae	Herb

Table C.4.1 below shows the total area of Baseline strata I and II, year wise:

Table C.4.1: Baseline Stratification								
Strata	Plantation Year							
	2001	2002	2003	2004	2005	2006	2007	Total
Total nos of Baseline trees	358	526	710	1329	1778	1954	2046	8701
No of Parcels per Baseline Strata:								
Baseline Strata I (Parcels with trees)	55	104	131	233	282	327	351	1483
Baseline Strata II (Parcels without trees)	352	662	862	1535	2305	2608	2630	10954
Total:	407	766	993	1768	2587	2935	2981	12437
Area per Baseline Strata (ha)								
Baseline Strata I (Parcels with trees)	73.30	169.97	254.63	418.35	620.82	673.95	728.28	2939.30
Baseline Strata II (Parcels without trees)	447.28	830.91	946.71	1745.36	2402.79	2726.48	2930.63	12030.16
Total:	520.58	1000.88	1201.34	2163.71	3023.61	3400.43	3658.91	14969.46

The carbon stock in living biomass of pre-project growing trees is expected to increase in the absence of the proposed A/R CDM project activity, due to continuous growth of the living trees. The carbon stock in the living biomass of pre-project trees has been predicted using equation from Brown et al.³⁰ (1989) for dry forest in India.

$$\text{Dry matter (kg)} = \exp(-1.996 + 2.32 \cdot \ln(\text{dbh cm}))$$

Estimation of Baseline net GHG removals by Sinks (tonnes of CO₂)								
Year	2001	2002	2003	2004	2005	2006	2007	Total
2001	0	0	0	0	0	0	0	0
2002	2.93	0	0	0	0	0	0	2.93
2003	2.94	4.74	0	0	0	0	0	7.68
2004	2.95	4.75	6.42	0	0	0	0	14.12
2005	2.96	4.76	6.44	10.39	0	0	0	24.55
2006	2.97	4.78	6.46	10.42	11.72	0	0	36.35
2007	2.98	4.79	6.48	10.45	11.77	14.18	0	50.64
2008	2.99	4.81	6.49	10.49	11.81	14.22	16.98	67.79
2009	3.00	4.82	6.51	10.52	11.85	14.27	17.04	68.01

³⁰ Brown, S. 1997. Estimating biomass and biomass change of tropical forests: a primer. FAO Forestry Paper 134, Rome, Italy



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2010	3.01	4.83	6.53	10.55	11.90	14.32	17.09	68.23
2011	3.02	4.85	6.55	10.59	11.94	14.37	17.14	68.45
2012	3.03	4.86	6.57	10.62	11.98	14.42	17.19	68.67
2013	3.03	4.87	6.59	10.65	12.02	14.47	17.24	68.89
2014	3.04	4.89	6.61	10.69	12.07	14.52	17.30	69.11
2015	3.05	4.90	6.62	10.72	12.11	14.56	17.35	69.33
2016	3.06	4.92	6.64	10.76	12.15	14.61	17.40	69.55
2017	3.07	4.93	6.66	10.79	12.20	14.66	17.46	69.77
2018	3.08	4.94	6.68	10.82	12.24	14.71	17.51	69.99
2019	3.09	4.96	6.70	10.86	12.29	14.76	17.56	70.21
2020	3.10	4.97	6.72	10.89	12.33	14.81	17.61	70.43
2021	3.11	4.99	6.74	10.93	12.37	14.86	17.67	70.65
2022	3.12	5.00	6.76	10.96	12.42	14.91	17.72	70.87
2023	3.13	5.01	6.77	10.99	12.46	14.96	17.77	71.10
2024	3.14	5.03	6.79	11.03	12.50	15.00	17.83	71.32
2025	3.15	5.04	6.81	11.06	12.55	15.05	17.88	71.54
2026	3.15	5.05	6.83	11.10	12.59	15.10	17.93	71.76
2027	3.16	5.07	6.85	11.13	12.63	15.15	17.98	71.98
2028	3.17	5.08	6.87	11.16	12.68	15.20	18.04	72.21
2029	3.18	5.10	6.89	11.20	12.72	15.25	18.09	72.43
2030	3.19	5.11	6.91	11.23	12.77	15.30	18.14	72.65
							Total:	1751.20



Annex 4

MONITORING PLAN

The monitoring plan complements the information not included in Section E above or in the monitoring methodology applied.

1. Monitoring of the project implementation

According to section E.1 above and Section III.1 of the methodology applied.

2. Sampling design and stratification

According to section E.2 above and Section III.2 of the methodology applied.

3. Monitoring of the baseline net GHG removals by sink

According to section E.3 above (Monitoring of the baseline net GHG removals by sinks is not needed as per the approved methodology AR-ACM0001 (Version 04) applied.

4. Monitoring of the actual net GHG removals by sinks data

a. Verifiable changes in carbon stocks in the carbon pools

a.1 Measuring and estimating carbon stock changes in living biomass

Sample Plots

Permanent sampling plots will be used for sampling over time to measure and monitor changes in carbon stocks of above and below ground biomass. The location of samples within the plot has been decided randomly to avoid any bias. The project boundary will be monitored by monitoring of parcels using GPS. Any changes in project boundary will be accounted for in all calculations of actual net GHG removals by sinks. The monitoring methodology uses permanent sample plots to monitor carbon stock changes in above- and below-ground biomass pools. To reach the targeted precision level of about $\pm 10\%$ of the mean at the 95% confidence level in a cost-effective manner, the number of plots needed in each stratum has been determined following equation (5) and (6) in AR-ACM0001 methodological tool “Calculation of the number of sample plots for measurements within A/R CDM project activities” (version 02).

$$n = \frac{\left[\sum_{i=1}^{m_{PS}} N_i \cdot st_i \right]^2}{\left(N \cdot \frac{E}{z_{\alpha/2}} \right)^2 + \sum_{i=1}^{m_{PS}} N_i \cdot (st_i)^2}$$

$$n = \frac{\sum_{h=1}^{m_{PS}} N_i \cdot st_i}{N \cdot st} \cdot N \cdot st$$

$$N = \frac{A}{AP} ; N_i = \frac{A_i}{AP} ; E = Q * p$$

where:



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n	sample size (total number of sample plots required) in the project area
n_i	sample size for stratum I
E	allowable error of the estimated quantity Q
i	project strata
L	total number of strata; dimensionless
$1 - \alpha$	probability that the estimate of the mean is within the error bound E
$z_{1-\alpha/2}$	$z_{1-\alpha/2}$ = value of the statistic z (embedded in Excel as: inverse of standard normal probability cumulative distribution), for e.g. $1 - \alpha = 0.05$ (implying a 95% confidence level) $z_{1-\alpha/2} = 1.9599$
N_i	maximum possible number of sample plots in stratum I
N	maximum possible number of sample plots in the project area
st_i	standard deviation for each stratum i; dimensionless, 30%
A	total size of all strata, e.g. the total project area; ha
A_i	size of each stratum i; ha
AP	sample plot size (constant for all strata); 0.04 ha
Q	approximate average value of the estimated quantity (aboveground wood volume per hectare); $m^3 ha^{-1}$
p	desired level of precision (10%); dimensionless

No of sample plots calculated stratum wise is given in Table E.2(a) below:

Table E.2(a): Number of Sample Plots for ex post Monitoring			
Strata	Defining feature of Strata	Area (Ha)	No of Sample Plots
	Year of Plantation		
Strata 1	2001	520.58	34
Strata 2	2002	1000.88	63
Strata 3	2003	1201.34	84
Strata 4	2004	2163.71	153
Strata 5	2005	3023.61	216
Strata 6	2006	3400.43	234
Strata 7	2007	3658.91	257
Total:		14969.46	1041

Monitoring frequency

The planting activity has been conducted from 2001 to 2007. Eucalyptus sp. would be harvested at the age of 5 years. To avoid the coincidence with peaks in carbon stocks, the first monitoring will be conducted in the year 2009 with subsequent monitoring and verification interval of 5 years, i.e. in 2014, 2019, 2024 and 2029.

Year No	Year	Monitoring	Verification	Harvesting
1	2001			
2	2002			
3	2003			
4	2004			
5	2005			
6	2006			



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7	2007			
8	2008			
9	2009			
10	2010			
11	2011			
12	2012			
13	2013			
14	2014			
15	2015			
16	2016			
17	2017			
18	2018			
19	2019			
20	2020			
21	2021			
22	2022			
23	2023			
24	2024			
25	2025			
26	2026			
27	2027			
28	2028			
29	2029			
30	2030			

Monitoring GHG emissions by sources as the result of the A/R CDM project activity

No biomass burning took place due to project activities and therefore this will not be monitored.

5. Monitoring of leakage

A constant monitoring will be done to determine if any possible new sources of leakage arise, since there is none at the present time. However will be monitored the grazing.



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History of the document

Version	Date	Nature of revision
04	EB35, Annex 20 19 October 2007	<ul style="list-style-type: none">• Restructuring of section A;• Section “Monitoring of forest establishment and management” replaces sections: “Monitoring of the project boundary”, and “Monitoring of forest management”;• Introduced a new section allowing for explicit description of SOPs and quality control/quality assurance (QA/QC) procedures if required by the selected approved methodology;• Change in design of the section “Monitoring of the baseline net GHG removals by sinks” allowing for more efficient presentation of data.
03	EB26, Annex 19 29 September 2006	Revisions in different sections to reflect equivalent forms used by the Meth Panel and assist in making more transparent the selection of an approved methodology for a proposed A/R CDM project activity.
02	EB23, Annex 15a/b 24 February 2006	Inclusion of a section on the assessment of the eligibility of land and the Sampling design and stratification during monitoring
01	EB15, Annex 6 03 September 2004	Initial adoption