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

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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Improving Rural Livelihoods Through Carbon Sequestration By Adopting Environment Friendly Technology based Agroforestry Practices.

Version 01
Date: 11 February 2009

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

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The proposed A/R CDM project activity will mobilize resource-poor farmers to raise tree plantations on farmlands. It proposes to link resource poor farmers and end users of wood products in order to optimize the land use and to facilitate the co-ordination of wood producers, agronomists, financial institutions and non governmental organizations to improve the livelihood opportunities of rural households. The project activity is implemented on the degraded farmlands or lands used for rainfed subsistence agriculture.

The project is implemented in the two states of India: Orissa and Andhra Pradesh. The project area includes small land holders spread over a total of six districts: Rayagada, Koraput and Kalahandi districts in Orissa and the districts of Visakhapatnam, Srikakulam, and Vizianagaram in Andhra Pradesh. These districts have a pre-dominance of indigenous population, notified as Scheduled Tribes and Scheduled Castes in India, with the majority of them being poor.

The state of Orissa is one of the poorest states in India in terms of per capita income. In Orissa, about 41 % of population belongs to Scheduled Castes & Scheduled Tribes. Orissa also has the largest number of indigenous communities or tribes in the country, i.e. 62 tribes constitute about 23 % of total population. The tribal population is predominant in Koraput, Rayagada, and Kalahandi districts.

In the state of Andhra Pradesh, the project area covers 33 indigenous communities or tribes in the three districts of Srikakulam, Vishakapatnam and Vizianagaram. The major tribes represented in the project area include, Andh, Bagata, Bhil, Chenchu, Chenchuar, Gadabas, and Gond.

The participation of small and marginal farmers representing indigenous communities and their organization as part of the CDM A/R makes this project unique in contributing to their land use choice, improvement of livelihood opportunities and in promoting their capacity to organize and implement climate change mitigation initiatives.

The specific objectives of the project include:

- To pilot reforestation activities for generating high-quality greenhouse gas removals by sinks that can be measured, monitored and verified;
- To develop plantation and agro forestry models, which can provide multiple benefits to farmers in terms of timber, firewood and non-wood forest products.

- To provide additional income and to promote livelihoods of resource poor farmers through carbon revenues.
- To reforest degraded lands to control soil and water erosion and reclaim lands.
- To reduce the dependence of industry on natural forests thereby conserving biodiversity.
- To build capacity of various stakeholders to benefit from global mechanisms.

The project implements reforestation on 3,607.32 ha of degraded lands in the states of Andhra Pradesh and Orissa. The reforestation activities under the project were initiated in 2004 with a plan to complete them over a period of 4 years.

The project contributes to **sustainable development** in the following ways.

- Development of institutional mechanisms for implementing A/R CDM project activities;
- Promotion of local financing arrangements for restoration of degraded lands by resource-poor farmers to meet the cost of plantation and maintenance;
- Identification of resource-poor farmers and to improve their awareness to tree growing;
- Improvement in productivity of degraded lands under the project activity through a participatory approach involving local farmers, JK Paper Ltd, the Vanitha (Women) Empowerment, Development and Advancement (VEDA Macs), and VEDA Climate Change Solutions Limited (VCCSL);
- Development, testing and dissemination of best practices in plantation and agro forestry to minimize risks (fire, pests, insects and disease) and maximize environmental and social benefits.
- Provision of seedlings raised from **clonal technology** to the farmers to raise plantations;
- Promotion of **farmer-industry partnerships** with buy-back arrangements to purchase wood;
- Generation of additional income from carbon credits to the farmers;
- Development and **strengthening of the capacity** of various stakeholders - resource-poor farmers, governmental and non-governmental organizations through training and technical assistance to take advantage of the international mechanisms;
- **Conservation of biodiversity** through reduced dependence on natural forests by producing raw material for housing, construction and industry on private lands through plantation forestry;
- Build partnerships with national and international research organisations and to promote awareness and adoption of appropriate agro-forestry models among the farmers.

The project is financed by the project participants viz., VCCSL, JK Paper Ltd and the participating farmers. The farmers' equity contribution is in the form of land and labour supplies in the establishment of tree crops. The resource poor farmers are also contributing their savings as investment in the plantation activity. Accordingly, the plantation establishment cost is met by the beneficiary farmers themselves out of their savings or through loans.

JKPL has contributed to the identification of the farmers, supported the supply of improved planting stock to the participating farmers, provided the extension advice and initiated arrangements for the purchase of wood grown from the plantations established under the project. It has had primary planting and technical on the ground implementation responsibility.

VCCSL has piloted the CDM project in coordination with JKPL, farmers, and other stakeholders to facilitate the flow of Carbon revenue to the participating farmers with JKPL doing the main project implementation work/planting activities in the field. It is envisaged that at least 80% of the carbon

revenue will be transferred to the beneficiary farmers, as mutually agreed by VEDA Macs/VCCSL and JKPL , in order to not only ensure maximum benefits to them, but also to retain their interest in the project; thus, ensuring permanence. The benefit sharing arrangement proposed in this project makes helps to lower transaction costs for the resource poor landowners participating in the project.

A Monitoring Committee comprising the representatives of VCCSL and JKPL, as well as provision of audited records, will ensure that the share of the benefits from the sale of carbon credits due to the participating farmers will effectively go to them. A joint escrow account between VCCSL and JKPL will be the institutional mechanism for channelling carbon revenues to the farmers. Therefore, the carbon sequestration benefits of the project serve the roles of climate change mitigation and as a source of additional income to farmers to meet the operation and maintenance expenses for reforestation of degraded lands.

A.3. Project participants:

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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.

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)
Government of India (host)	• VEDA Climate Change Solutions Ltd (VCCSL) • JK Paper Ltd (JKPL)	No
Canada	International Bank for Reconstruction and Development as trustees for BioCarbon Fund.	Yes
(*) 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 approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		
Note: When the CDM-AR-PDD is prepared to support a proposed new baseline and monitoring methodology (form CDM-AR-NM), at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.		

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 proposed A/R CDM project activity is located in Koraput, Kalahandi and Rayagada districts of Orissa and Visakhapatnam, Vizianagaram and Srikakulam districts of Andhra Pradesh in India.

Figure A.1: Map of India showing the provincial states of Andhra Pradesh and Orissa, in which the A/R CDM project activity is implemented.

A.4.1.1. Host Party(ies):

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Government of India ratified the Kyoto Protocol in October, 2002.

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

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The project is implemented in a cluster of 3 districts - Koraput, Kalahandi and Rayagada in Orissa; and Visakhapatnam, Vizianagaram and Srikakulam districts in Andhra Pradesh. The district clusters in each state adjoin one another and represent similar agro-climatic conditions.

A.4.1.3. City/Town/Community etc:

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Farming communities of the two states are involved in the project, however, special emphasis is placed on resource-poor farmers, who raise plantations of tree species for carbon sequestration in their farmlands.

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 project boundary includes all discrete parcels of lands owned by different farmers in the blocks/ mandals (an administrative block) of the six districts noted in A.4.1.2. Each of these parcels of land is identified through GPS coordinates. The GPS coordinates of the identified land parcels of the project are presented as part along with the list of land parcels in Annex 5. The GPS coordinates reflect the delineation of land parcels on the ground. Additionally, each parcel of land is also identified using official documents and maps of the Land Administration/Revenue Department. The Figures A.2 to A.7 present the maps of districts included in the projects.

Table A1: District wise land utilization particulars in ha (percent in parenthesis)

Land use category	Andhra Pradesh (2004-2005) (Area in Ha.)	Orissa (2004-2005)) (Area in Ha.)

	Viziana-garam	Srikakulam	Visakha-patnam	Kalahandi	Rayagada	Koraput
Geographical area	630,038	584,290	1,134,284	836,000	728,000	790,000
Forest area	111969 (17.8)	70840 (12.1)	477791 (42.1)	314000 (37.6)	281000 (38.6)	188000 (23.8)
Barren land	77753 (12.3)	50410 (8.6)	130938 (11.5)	42000 (5.0)	143000 (19.6)	122000 (15.4)
Land in non-agricultural use	77013 (12.2)	90095 (15.4)	101048 (8.9)	35000 (4.2)	38000 (5.2)	43000 (5.4)
Permanent pastures	4899 (0.8)	930 (0.2)	2968 (0.3)	23000 (2.7)	26000 (3.6)	28000 (3.5)
Miscellaneous tree crops & groves	7668 (1.2)	2619 (0.5)	34779 (3.1)	8000 (1.0)	21000 (2.9)	60000 (7.6)
Cultivable waste	3680 (0.6)	470 (0.1)	8898 (0.7)	23000 (2.7)	22000 (3.0)	29000 (3.7)
Other fallows	10224 (1.6)	4271 (0.7)	11722 (1.0)	20000 (2.39)	33000 (4.5)	18000 (2.3)
Current fallows	14706 (2.3)	56845 (9.7)	54977 (4.8)	11000 (1.3)	13000 (1.8)	15000 (1.9)
Net area sown	322057 (51.1)	307357 (52.6)	311163 (27.4)	360000 (43.1)	151000 (20.7))	287000 (36.3)

Figure A.2: Map of Koraput District in the provincial State of Orissa.

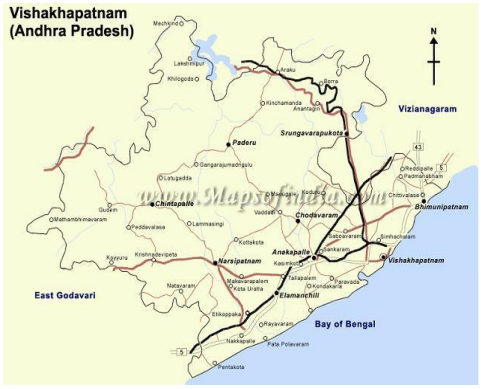
Figure A.3: Map of Rayagada district in the provincial State of Orissa.

Figure A.4: Map of Kalahandi district in the State of Orissa.

Figure A.5: Map of Srikakulam district in the provincial State of Andhra Pradesh.

FigureA.6: Map of Vizianagaram District in the provincial State of Andhra Pradesh.

FigureA.7: Map of Visakhapatnam District in the provincial State of Andhra Pradesh.



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):

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The area proposed for the project is degraded farmland in the districts of Rayagada, Kalahandi and Koraput in the State of Orissa; in the coastal districts of Srikakulam, Vizianagaram and Vishakhapatnam in the State of Andhra Pradesh in India.

The lands are either not put to any use at present or being intermittently used for rainfed agriculture for cultivation of minor millets, cereals and pulses because of many barriers such as technological and financial.

Soils

The major soil types in the proposed project area consist of red sandy, lateritic and alluvial soils in Orissa and sandy loams and sandy soils in Andhra Pradesh. The soils represented are 'slightly acidic' to 'moderately alkaline'.

Climate

The four major seasons observed in the project area include: monsoon (June-September), post-monsoon (October-November), winter (December to February) and summer (March-May). The climate is wet during monsoon, moderate during winter and dry during summer. The minimum and maximum temperature of the project area is 13 ^{0}C and 49^{0}C, respectively. The annual rainfall ranges from 300 to 1400 mm. The predominant wind direction is southeast to west. The relative humidity ranges from 30% to 80%.

Geology and Hydro-geological aspects

The land is trespassed with hills and valleys. The rivers Nagavali and Vamsadhara pass through the project area. The drainage pattern is dendritic to sub-dendritic in nature.

The ground water fluctuates greatly in response to rainfall, with the maximum decline in the water table is between April and June and the maximum rise during November.

The detailed physical environmental profile of the project area is given in section 3.3 of the Environmental Management Framework of the project.

Ecosystem

The forest types represented in the districts of Koraput, Kalahandi and Rayagada of Orissa include: moist peninsular Sal forests (C3/C2, Champion & Seth Classification) and moist mixed deciduous forests (3C/C3). The major species of these forest types are - *Shorea robusta, Emblica officinalis, Butea frondosa, Mangifera indica, Tamarindus indica, Terminalia bellerica, Terminalia chebula, Artocarpus integrifolius, Diospyros melanoxylon*, etc.

The forests in Srikakulam, Vizianagaram and Visakhapatnam districts of Andhra Pradesh are of miscellaneous type with no dominant species. These forests represent the transition between the Teak belt of South India and the southern extremity of the Central Indian Sal belt. The common species grown in the region include: *Xylia xylocarpa, Pterocarpus marsupium, Adina cordifolia, Anogeissus latifolia, Terminalia alata, T. arjuna, T. bellerica, Mitragyna parviflora, Ougenia dalbergeioidis, Kydia calycina, Mangifera indica, Diospyros melanoxylon, Buchnania lanzan, Dalbergia latifolia, Gmelina arborea, Lannea coromandelica, Lagerstroemia spp. Dendrocalamus strictus, Bambusa arundinaceae* etc.

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

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Section 3 of the Environment Management Framework presents the details of the flora and fauna of the project area in Andhra Pradesh and Orissa.

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

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The following tree species used in the project reflect the preferences of farmers and the suitability of species for the land use and agro-climatic conditions in the project area. The three categories of stand models covered in the project include: Eucalyptus Clone, Eucalyptus Seed Route & Casuarina.

Eucalyptus spp
Eucalyptus is a fast growing species and belongs to the Myrtaceae family. It reaches a maximum height of 75 ft. However, the average height ranges between 25 to 75 ft. It is evergreen hardy species, predominantly blooms in winter and tolerates cold weather. Considering the dry climate and frequent drought recurrences, this species is preferred in the project because of its high drought tolerance. It also grows under a wide range of climate and soil conditions and well adapted to the semi-arid conditions of the project area. Furthermore, JKPL has tailored some of the clonal Eucalyptus to better grow under such conditions.

The wood is used to meet the needs of small timber, fuelwood, construction and pulp production. The widely used species of Eucalyptus include: E.grandis, E. camaldulensis, and E. tereticornis.

Hybridization from *Eucalyptus teriticornis & E. camaldulensis* has taken place in the R&D areas of JKPL. Seeds collected from those hybrid plants developed in the R&D facilities are used for plantation activities.

As regards to Eucalyptus clone, coppice from the aforesaid hybrid plants are collected from the R&D areas and planted in the root trainer blocks with appropriate concentration of systematic fungicides & insecticides. Once the roots & shoots of the plants develop, the plants are transferred to hardening chambers where they are kept for 30 days. Subsequently, the hardened plants are moved to the open Nurseries from where they are transported to the planting sites. It is used as small timber, support poles in construction and in the production of pulp and paper production

Casuarina equisetifolia

Casuarina equisetifolia is an evergreen tree reaching a height of 18-22 m. It is monoecious or dioecious. About 2-3% of the species display monoecious characteristics. Males start to flower in the second year while females flower a year later. It is wind pollinated species and the fruit is a woody cone with 1 to 2 cm in diameter. The cone contains 70-90 seeds and takes 3-4 months to mature. Seeds (achenes: 600 to 2000 seeds per g) are produced annually and have membranous wing and are dispersed through wind and water. Germination rate varies between 30 and 84%, but seeds are only viable for a few months. There are two main flowering and fruiting seasons although some fruits are produced all year round.

Adaptations of the species to dry climate include scale-light verticillate leaves and modified needle-like twigs for reducing transpiration through sunken stomata that occur in grooves, hairs, thickened cells and cuticle. It is a light demanding species which needs open sites for establishment, free from plant competition. It forms permanent stands in saline coastal environments and sand dunes.

It is salt tolerant but has low tolerance to frost and fire. It is adapted to grow on sand dunes and it develops stilt roots and prop roots in waterlogged areas. It is often propagated by cuttings and layerings from low spreading branches. It is good as firewood and for charcoal making and is widely planted for amenity purposes, coastal reclamation, medicinal purposes, tannin, dyes, pulp and paper. It has been planted mainly in Andhra Pradesh for the project.

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

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One of the main technologies which will be employed under this project is reforestation through direct planting with environmental-friendly techniques on less productive and degraded lands. Good practice guidance and successful technologies adopted elsewhere, as well as experiences gained from the World Bank financed forestry projects have been adopted. World Bank environmental and social Safeguards will be followed.

Reforestation on the degraded agricultural lands and improvised methods of tree growing have been implemented based on the technical experience of JK Paper Limited (JKPL) working in association with the local farming community of resource poor farmers.

JK Paper Limited has embarked on a research & development programme to increase productivity of farm forestry. To fulfil the objectives of research and development programme, state of the art technology and infrastructure such as Greenhouses, Hardening Chambers, Nurseries and Laboratories have been developed. The Agro-Economic Research Centre (AERC) in southern Orissa is involved in disseminating modern agriculture practices to farmers, as is JKPL.

Site preparation

To prevent soil erosion, reduce GHG emissions and protect existing carbon stocks, site burning and overall tillage is not carried out during the site preparation.

The pits ranging from 0.015 – 0.0283 m^3 are dug along the contour and most of the original vegetation is kept intact. The limited site preparation is conducted in the winter season. However, the limited removal of pre-existing vegetation, if any, is accounted as a carbon stock decrease. The soil is treated with termicides (in case of *Eucalyptus*). Insecticides are used for pest management, if necessary. An integrated pest management plan is incorporated in the Environment Management Framework developed for the project. Weeding operations are carried out manually. The plantations do not require any access roads, as they are located near villages.

Planting stock development using cloning technologies

The planting stock used in the project has been developed from Candidate trees of *Eucalyptus* and *Casuarina* selected from local stands in case of seedlings (*Eucalyptus* - Araku valley, Visakhapatnam, Aguru in Rayagada district; *Casuarina* – selected stands in the districts of Vizianagaram and Visakhapatnam) located around the project area and from clonal material developed from mother plants that grow under similar conditions.

The clones of *Eucalyptus* are genetically superior, fast growing, grow uniformly and contribute to substantial increase in productivity (i.e.2 to 3 times higher than normal seed route plantations). The clones also ensure improved productivity of coppice crops and compensates for low productivity of soils. To sustain production of selected clones, JKPL has established mother orchards from which cuttings are taken and treated with fungicide solution (Bavistin) and growth hormone, IBA. The seedlings are transplanted in root trainer blocks containing vermiculite. These are then placed inside state of art greenhouses where required conditions for conducive growth are created through automatic temperature and humidity control systems. After about 35-40 days when the shoots and roots emerge from the cuttings they are shifted to the acclimatization chamber where they are kept for 10-15 days for hardening (Figure A.9) and subsequently shifted to open sunlight with controlled irrigation where they are kept for 2 months during which period they attain a height of about 45 cm and are ready for planting out in the fields.

Planting and aftercare

In terms of seed route plantations (*Eucalyptus globulas),* the number of seedlings required per ha is 2,500 with spacing of 3 m x 1.33 m. The coppicing cycle of the species is 5/6 years and the expected fuel wood from the branches and bark per ha is about 10 tonnes.

Casuarina is propagated through seedlings. Spacing of 1 m x 1 m with a pit size of 1.5 m x 1.5 m has been maintained. The pits are filled with organic manure. About 1/3rd of the bottom plant is pruned during the 2nd year of plantation to stimulate growth and to avoid crowding.

Plantation management

The plantations will be thinned and harvested according to species and stand models. *Eucalyptus* is managed with a 5 year rotation period. The plantations are felled and debarked manually. The cutting is normally done thru manual saw but in some places mechanised saws may be used. The branches and

twigs are retained by farmer for firewood. The main stem is debarked and cut to smaller lengths for transporting by truck, tractors, tucks or carts depending upon the distance.

Coppicing

Eucalyptus spp. regenerates naturally by coppicing, thus avoiding site and soil disturbance. After harvesting, Eucalyptus will be regenerated through coppicing. As many shoots regenerate through natural means, only two or three strong shoots are allowed to grow by cutting the remaining shoots.

A.5.5. Transfer of technology/know-how, if applicable:

Not Applicable

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

Kindly refer to section E.5.2.

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

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The land used for implementing the A/R CDM project activity is legally owned by local people as private property. These lands are under the control of the project participants at the starting date of the AR CDM project activity and are expected to remain under the control of the project participants during the crediting period.

The land use prior to project activity is of subsistence agriculture. The farmers own wood and non-wood products produced on the land and therefore, the farmers have legal right to harvest and sell the wood products as well as the revenue generated from the sale of emission reductions.

An institutional mechanism "VEDA Climate Change Solutions Limited (VCCSL)" has been established to specifically deal with issues related to carbon revenue. Farmers' agreements have been signed among VCCSL, JKPL and the farmers, as an addendum to JKPL's timber purchase template, which lists the responsibilities of each partner clearly. Copies of the agreements made with the farmers who have already enrolled into the project activity will be presented at the time of validation.

The wood will be sold by the farmers at the highest price to the paper mills where appropriate and the resultant income from the sale of timber would entirely be transferred to the local farmers.

A.7. Assessment of the eligibility of the land:

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The land is below the forest national thresholds (crown cover, tree height and minimum land area) for forest definition under decisions 11/CP.7 and 19/CP.9 as communicated by the respective DNA;

The Government of India (Host Country) defines 'forest' as land having growing trees with:

- A minimum surface area of 500 m^2;
- A minimum tree crown cover of 15%;
- A minimum height of 2 meters;

Therefore, the threshold values of the forest definition of the Government of India comply with the UNFCCC definition and are likely to be used for the purposes of the Kyoto Protocol. The reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December, 1989.

The lands to be planted in the proposed A/R CDM project activity are private lands, which are under subsistence agriculture. Although small parcels of land currently have multiple use species, no plot has (or has had since 1990) a contiguous area of 1 ha with a crown cover of greater than 15% and tree height of 2 m. Therefore the lands of the proposed A/R CDM project activity comply with the definition of afforestation/reforestation defined by decision 11/CP.7.

The land is not temporarily unstocked as a result of human intervention such as harvesting or natural causes or is not covered by young natural stands or plantations which have yet to reach a crown density or tree height in accordance with national thresholds and which have the potential to revert to forest without human intervention.

The land eligibility for CDM is assessed through participatory rural appraisal (PRA). The PRA exercise is undertaken with community participation. The procedure followed, formats used, and the findings of the appraisal are enclosed as Annexure 8. Evidence based on land records and PRA suggest that the project lands are eligible as per the CDM land eligibility rules. CDM eligibility has also been established through a satellite CDM land eligibility analysis carried out by "SCIENCE" an organization based in Dehradun, Uttar Pradesh, India, and validated by FSI (Forest Survey of India).

Table A2: **Details of land proposed under the project**

District	*Villages*	*Blocks/ Mandals*	*Land under project (in ha)*	*Farmers*	*Average land under project per farmer (in ha)*	*Minimum land holding under project (in ha)*	*Max. land holding under project (in ha)*	*Max. no. of project farmers per village*	*Avg. land under CDM per village (in ha)*	*Maximum land holding per village*
Vizianagaram	186	13	1322.10	539	2.45	0.20	40.00	34	7.10	59.5
Srikakulam	135	11	725.35	589	1.23	0.17	14.40	57	5.37	99.75
Rayagada	98	10	388.07	244	1.59	0.11	12.80	17	3.95	29.75
Koraput	38	7	199.33	90	2.21	0.40	10.54	28	5.24	49.00
Kalahandi	99	10	344.05	289	1.19	0.20	12.80	24	3.47	42.00
Visakhapatnam	70	9	523.77	243	2.15	0.10	30.00	30	7.48	53.00
Total	**626**	**60**	**3502.7**	**1994**	**1.75**	**0.10**	**40.00**	**57**	**5.59**	**99.75**

A.8. Approach for addressing non-permanence:

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The project is conceived and designed in such a way that harvesting of the plantations would be done at a rotation of five years and those areas would be regenerated in the succeeding year to allow for a smoothing of the net anthropogenic GHG removals by sinks curve. The net anthropogenic GHG removals by sinks from the project are assessed using tCERs.

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

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Table A.4: Estimation of net anthropogenic GHG removals by sinks in tonnes of CO2-e

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)
2004	-	7,977	-	7,977
2005	-	60,058	-	60,058
2006	-	195,346	-	195,346
2007	-	359,381	-	359,381
2008	-	400,064	-	400,064
2009	-	437,405	-	437,405
2010	-	408,089	-	408,089
2011	-	383,726	-	383,726
2012	-	381,190	-	381,190
2013	-	430,973	-	430,973
2014	-	403,918	-	403,918
2015	-	379,834	-	379,834
2016	-	414,560	-	414,560
2017	-	405,585	-	405,585
2018	-	372,326	-	372,326
2019	-	311,076	-	311,076
2020	-	332,253	-	332,253
2021	-	416,933	-	416,933
2022	-	352,430	-	352,430
2023	-	476,626	-	476,626
2024	-	315,553	-	315,553
2025	-	414,035	-	414,035
2026	-	390,806	-	390,806
2027	-	508,892	-	508,892
2028	-	296,678	-	296,678
2029	-	407,602	-	407,602
2030	-	380,121	-	380,121
2031	-	479,841	-	479,841
2032	-	265,461	-	265,461
2033	-	312,137	-	312,137
Total (tonnes of CO_2 e)		10,700,876		10,700,876

A.10. Public funding of the proposed A/R CDM project activity:

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No public funds are sought for this activity. There is also no official development assistance associated with this project activity.

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:

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1 October 2004

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

>>
30 years

B.3 Choice of crediting period:

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

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

>>
30 years and 00 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:

>>
Approved afforestation and reforestation methodology AR-AM0004 /Version-03 named "**Reforestation or Afforestation of Land Currently under Agricultural Use**" is applied to the proposed A/R CDM project activity.

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 and its context meet the conditions of the approved methodology **(AR-AM0004)** outlined below.

- The lands to be afforested /reforested are highly degraded and are subjected to further degradation or will remain low in a carbon steady state in absence of the present project activity which proposes to undertake agro-forestry plantation in these degraded lands

- The project activity can lead to a shift of pre-project activities outside the project boundary, e.g. a displacement of agriculture, grazing and/or fuel-wood collection activities

The prevailing conditions of the A/R project activity confirm to the following applicability conditions of the methodology.

- Lands to be afforested or reforested are degraded and the lands are still degrading or remain in a low carbon steady state;

- Site preparation does not cause significant longer-term net decreases of soil carbon stocks or increases of non-CO_2 emissions from soil;
- Carbon stocks in soil organic carbon, litter and dead wood can be expected to further decrease due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario;
- Flooding irrigation is not permitted;
- Soil drainage and disturbance are insignificant, so that non CO_2-greenhouse gas emissions from these types of activities can be neglected;
- The amount of nitrogen-fixing species (NFS) used in the A/R CDM project activity is not significant, so that greenhouse gas emissions from denitrification can be neglected in the estimation of actual net greenhouse gas removals by sinks;
- The A/R CDM project activity is implemented on land where there are no other on-going or planned A/R activities (no afforestation/reforestation in the baseline).

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

>>

The carbon pools selected for monitoring under the project are noted in the Table C.1 below.

Table C.1: Selected carbon pools

Carbon Pools	Selected(Yes/No)	Justification/Explanation
Above ground	Yes	Major carbon pool subjected to project activity
Below ground	Yes	Major carbon pool subjected to project activity
Dead wood	No	Conservative approach under project activity
Litter	No	Conservative approach under project activity
Soil organic carbon	No	Conservative approach under project activity

The sources of emissions from the project activity are noted in the Table C.2 below.

Table C.2: Sources of GHG emissions

Source	Gas	Included/ excluded	Justification / Explanation
Combustion of fossil fuels used for vehicles	CO_2	Yes	Potential significant emission source due to transportation
	CH_4	No	Potential emission is negligibly small as per the methodology applied
	N_2O	No	Potential emission is negligibly small as per the methodology applied
Burning of biomass	CO_2	No	Not applicable
	CH_4	No	Not applicable, (biomass burning during is not practiced during site preparation in the project activity)
	N_2O	No	Not applicable, (biomass burning during is not practiced during site preparation in the project activity)

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

>>
Ex –ante stratification for the proposed project activity is as per the applied methodology and is achieved in three steps:

a. Stratification according to the pre-exiting conditions and baseline projections:

a) The lands to be reforested in the proposed A/R CDM project activity are distributed in two provincial States i.e. Orissa and Andhra Pradesh. Within each provincial State, soil conditions, landform, vegetation, erosion intensity, tree species to be planted and planting time are the major factors that will influence the tree growth.

b) Local information of key factors such as land use/cover maps, etc. was collected and analysed.

c) Data on pre-project distribution of livestock was collected

d) Data on pre-project production of crops (for lands under subsistence agriculture) was collected from official sources and field surveys.

e) Supplementary information on projects sites such as soil depth, slope gradient, slope face, under ground water level etc. are taken are taken into account

The project is spread over a total of 6 districts - three districts each in Orissa and Andhra Pradesh States. Based on the above information, **two clusters of districts** – Koraput, Kalahandi and Rayagada in Orissa; and Srikakulaum, Vizianagaram and Vishakapatnam in Andhra Pradesh were initially categorized into two baseline strata considering the land use and pre-existing vegetation.

Considering the similar agro-climatic conditions and insignificant differences in the pre-existing vegetation of the two clusters of districts in Orisaa and Andhra Pradesh, there is no significant difference in the baseline net GHG removals by sinks of the two strata. Therefore, all the land parcels in the two baseline strata are grouped into **one baseline stratum**.

As per the methodology, the lands under project areas are defined as "stand models". Each stand model has been defined specifying the

- Species and propagation – The two species planted in the project are *Eucalyptus and Casuarina*. Considering the significant differences in the growth rates of clonal and seed based Eucalyptus, it is categorized into two categories. Therefore, three species strata – clone based *Eualyptus,* seed based *Eucalyptus*; and *Casuarina equisetifolia* are identified.
- Planting schedules – years – 2004, 2005, 2006, 2007

Other specifications such as growth assumptions of the species, fertilizer application and harvesting are expected to remain uniform in view of the guidance given to the farmers by the project staff and hence are not considered for stratification .

c. Final *ex ante* stratification;

The combination of three species categories (*Eucalyptus* clonal, *Eucalyptus* seed, and *Casuarina*) and two land parcel sizes (≤ 5 ha and > 5 ha) lead to the identification of **six project strata** as outlined below

1. *Eucalyptus* clonal in land parcels ≤ 5 ha
2. *Eucalyptus* seed route in land parcels ≤ 5 ha
3. *Casuarina* in land parcels ≤ 5 ha

4. *Eucalyptus* clonal in land parcels > 5 ha
5. *Eucalyptus* seed route in land parcels > 5 ha
6. *Casuarina* in land parcels > 5 ha

The details of planted area of the six project strata are presented in Table.C.4.1 below.

Thus the stratification under the proposed AR CDM project activity consists of the following strata

Table C4.1: Area planted under the project by strata in ha.

	Land parcels ≤ 5 ha			Land holding > 5 ha			Total
Year of plantation	Eu(Clonal)	Eu(Seed Route)	Casuarina	Eu(Clonal)	Eu(Seed Route)	Casuarina	
2004	128.00	75.62	68.79	12.8	0.0	101.97	387.18
2005	194.43	66.96	456.48	159.2	15.2	42.65	934.92
2006	229.69	82.1	246.57	211.61	12.0	100.01	881.98
2007	353.56	235.72	318.4	349.99	16.8	128.87	1403.34
TOTAL	**905.68**	**460.4**	**1090.24**	**733.6**	**44.0**	**373.40**	**3607.32**

C.5. Identification of the baseline scenario:

>>

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.):

>>

The most plausible baseline scenario has been determined following "Procedure for selection of most plausible baseline scenario", as outlined in AR AM0004 methodology

Step 1: Demonstration that the proposed AR CDM project activity meets the conditions under which the methodology is applicable and that baseline approach 22(a) can be used.

The lands under the project are all discrete parcels owned by individual farmers. Dry land agriculture has been practiced on these lands for a long period. The subsistence agriculture on laterite and sandy soils in semi-arid climate with short rainy and prolonged dry seasons contributed to steep decline in the productivity of lands. These lands are expected to remain under subsistence agriculture or as fallow lands in the absence of the project. Considering the use of lands for agriculture, the pre-existing vegetation is also either absent or insignificant. As a consequence, the lands are expected to degrade further in the absence of the project. Therefore, baseline approach 22(a) is relevant to the project context. The project activity also complies with all the relevant applicability conditions of the methodology

Step 2: Description of the project boundary:

The project boundary includes all-discrete parcels of lands owned by different farmers in the districts and blocks/mandals (an administrative unit within a district). Each of these parcels of land is identified through GPS coordinates. The list of land parcels is presented in **Annexure 5**.

GPS coordinates are the centre point of the land parcels as against the boundary coordinates, which are normally taken. The actual dimensions of the land parcels are indicated by physical measurements. This is done considering land parcels are small and the accuracy of GPS metres can vary up to 50m.

In addition, the project boundary of each individual parcel of land will further be identified by the official land documents of Land Administration/ Revenue Departments.

Step 3: Analyze the historical land use, local and sectoral land use policies or regulations and land use alternatives:

a) Assessment of the historical and existing land use/cover changes in contest of socio economic conditions.

The project lands have very low productivity and the resource poor farmers are not in a position to improve land productivity in the foreseeable future. As a consequence, the lands are expected to remain in the pre-project state. Furthermore, the field surveys indicate that there is no possibility of natural encroachment of trees because there are no seed sources that can dispersed on to the project sites. This is also supported by the fact that the lands to be reforested have been non-forested lands at least since 1989 and no natural growth of trees has been identified. .

b) Assessment of the historical and existing land use/cover changes in contest of land degradation.

Currently, most sites are under subsistence agriculture or left fallow over the time. This has resulted in the following:

The lands in the proposed project activity are either under subsistence agriculture or fallow lands. The agriculture activity undertaken on these lands is mainly in the form of short duration millet crops. In case of fallow lands, other anthropogenic pressures for fuel wood, grazing etc. do not allow natural regeneration.

c) Assessment of the national and/or sectoral policies

The National Forest Policy of the Govt of India prescribes that 33% of the total geographical area of the country should be under the forests. National Forestry Action Plan has been formulated to increase the area under tree cover. However, the state governments do not have adequate resources to implement the national policy.

Additional investments from both public and private sectors are required to make progress on the goals set in the National Forestry Action Plan to increase the forest cover. Considering the small size of holdings and resource poor status of farmers, the desired increase in tree cover on agricultural lands is not expected to take place in the prevailing policy environment.

The information presented in the steps 1-3 clearly demonstrate the applicability of the baseline approach 22(a) (existing or historical changes in carbon stocks in the carbon pools with the project boundary) and the scenario “lands to be planted are degraded lands and will continue to degrade in absence of the project” is the most plausible baseline scenario.

d) Land use alternatives.

The field surveys, interviews with stakeholders and socio-economic analysis indicated that the plausible alternative land uses available to the project participants are either continuation of the subsistence agriculture or keeping it fallow for want of resources. For the lands under category (a), lands to be forested have been severely degrading over the last decades and are degrading. Most lands are currently

covered by sparse grass and shrubs, and occasionally with a few growing trees.

The land use alternatives identified are as follows.

- Abandonment of agriculture on the lands
- Continuation of the prevailing practice of subsistence agriculture
- Implementing the reforestation activity not as a CDM project activity

Abandonment of agriculture on the lands

As agriculture continues to remain a major source of livelihood, the lands are likely to remain under agricultural use. Additionally, average size of agricultural holding continues to decline because of population pressure. Therefore, the lands are not likely to be abandoned from agricultural use.

Continuation of the prevailing practice of subsistence agriculture

The lands are owned by resource-poor farmers and these lands have been degrading because of insufficient resources. The project areas would remain either under subsistence agriculture and continue to degrade in the absence of the project activity.

Implementing the reforestation activity not as a CDM project activity

The farmers in the project area are poor and own small land parcels. They do not have required resources to invest in tree plantations and manage them while forgoing the small but regular annual revenue from subsistence agriculture. Considering the absence of mandatory land use policies or incentives, the reforestation is not likely to be implemented.

Table C.5.1: Alternatives and reason for adoption/rejection of the course of action.

S.No	Alternatives	Baseline scenario	Reason for adoption/rejection of the course of action
1	Abandonment of agricultural land	No	Considering the population pressure on land resources, abandonment of agricultural lands is not expected.
2	Continuation of subsistence agriculture	Yes	Subsistence agriculture is rainfed activity, which provides low returns and restricts the farmers from taking up other activities to gain better livelihood.
3	Reforestation activity as non-CDM activity	No	The reforestation cannot be implemented as non-CDM activity taking into account the barriers in organizing the farmers and the associated transaction costs in disseminating the knowledge and awareness for tree growing.

Step 4: Stratify the A/R CDM project area.

The details on the stratification of the project area are presented in section C.4.

Step 5 :Determine the baseline land use / land cover scenario for each stratum

Fig.C.1 Baseline position of the land before the start of the project activity

5. Estimation of baseline net GHG removals by sinks:

The baseline strata reflect the continuation of historical or existing land use of subsistence agriculture with following features.

a) no growing trees or woody perennials exist, and

b) no trees or other woody perennials will start to grow at any time during the crediting period, or

c) no trees or other woody perennials will reach the threshold for the national definition of forest due to ongoing cutting and burning cycles that are part of shifting cultivation systems, the baseline net greenhouse gas removals by sinks are expected to be negative due to ongoing degradation.

For these strata the project assumes that baseline net greenhouse gas removal by sinks is zero:

$C_{BSL} = 0$ for all $t^* = t_{cp}$ (**1**)

where:
C_{BSL} = baseline net greenhouse gas removals by sinks; t CO_2-e.
t^* = number of years elapsed since the start of the AR project activity; yr
t_{cp} = year at which the first crediting period ends; yr

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

>>

The lands to be planted in the proposed A/R CDM project activity are seriously degraded and comprise low-productivity lands that are under subsistence agriculture. The project is spread over in six districts, with three districts in the state of Orissa and three districts in the state of Andhra Pradesh. The **two clusters of districts** – Koraput, Kalahandi and Rayagada in Orissa; and Srikakulaum, Vizianagaram and Vishakapatnam in Andhra Pradesh were initially categorized into two baseline strata taking into account the preliminary observations of land use and pre-existing vegetation.

Subsequent detailed field studies indicated the similar agro-climatic conditions and subsistence agriculture practices as well as insignificant differences in the pre-existing vegetation of two clusters of districts. As a consequence, there is no significant difference in the baseline net GHG removals by sinks. Therefore, all the land parcels of the baseline strata scenario grouped into **one baseline stratum**.

C.6. Assessment and demonstration of additionality:

>>

The steps outlined in the *Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 2)*[1] are followed to demonstrate the additionality of the project activity.

STEP 0: Preliminary screening based on the starting date of the project activity

The project was initiated in October 2004 and therefore it qualifies as an early start project. The CDM was actively considered in the design of the project. The sale of Certified Emission Reductions would support the resource poor farmers in meeting the project costs.

STEP 1: Identification of alternatives to the project activity consistent with current laws and regulations

The lands to be reforested in the project boundary are under subsistence agriculture. These lands have low levels of productivity. Observations of region's land-use through field surveys and interviews with stakeholders resulted in identifying the following land use alternatives:

- Abandonment of agriculture on the lands
- Continuation of the prevailing practice of subsistence agriculture
- Implementing the reforestation activity not as a CDM project activity

Abandonment of agriculture on the lands

The project lands are likely to remain under agricultural use. The average size of agricultural holding continues to decline because of population pressure. Therefore, the lands are not likely to be abandoned from agricultural use.

Continuation of the prevailing practice of subsistence agriculture

The project lands continue to be used for subsistence agriculture. These include growing of millets and other dry land crops. Subsistence agriculture is also a rainfed activity, hence it translates into low returns and restricts already resource constrained farmers from taking up other activities to gain better livelihoods as individual farmers have to devote full time on agriculture to earn subsistence living and they lack sufficient investment for other land use alternatives.

Implementing the reforestation activity not as a CDM project activity

The small land holding size and high demographic pressure on available land resources require ways to diversify the sources of farm incomes to address poverty and enhance the livelihood opportunities. Implementation of tree growing activities on farms is one of the ways to enhance household incomes of small and marginal farmers. However, this option faces multiple barriers, which need to be overcome. The arrangements for technology dissemination and mechanisms for timber marketing and institutional arrangements for sharing of carbon revenue are expected to partially remove the barriers and reduce their transaction costs.

Table C.6.1: Comparative assessment of land use alternatives

[1] http://cdm.unfccc.int/methodologies/ARmethodologies/AdditionalityTools/Additionality_tool.pdf

S.No	Alternatives	Project scenario	Reason for adoption/rejection of the course of action
1	Abandonment of agricultural land	No	Considering the population pressure on land resources, abandonment of agricultural lands is not expected..
2	Continuation of subsistence agriculture	No	Subsistence agriculture is rainfed activity, hence usually gives low returns (investments barriers) and will also restrict the farmer from taking up other activities to gain better livelihood, since he has to devote full time to agriculture.
3	Reforestation activity as non-CDM activity	Yes	To implement this alternative, the barriers that exist in tree growing activity and the transaction costs in disseminating the knowledge of tree growing need to be addressed. The institutional arrangements for knowledge sharing on tree growing technology and market support for the sale of wood and carbon revenue partially remove the barriers. The alternative is leaving the land without any change in land use (continuation of subsistence use). The types of barriers faced by the reforestation land use alternative are outlined below.

Sub-step 1b: Enforcement of applicable laws and regulations

The current rules and regulations do not restrict the farmer from taking up any farming activity as he/she deems fit. The baseline scenario is not in variance with any laws and regulations in force.

STEP 2: Investment analysis:

As per the "Tool for the demonstration and assessment of additionality in A/R CDM project activities", one of the analyses - either the Investment Analysis or the Barrier Analysis needs to be applied.

Accordingly, this project uses the Barrier Analysis (Step 3), which is presented below.

STEP 3: Barrier analysis:

Sub-step 3a: Identify barriers that would prevent the implementation of the type of the proposed project activity:

Considering the low productivity and subsistence farming practiced in the project area, several barriers related to investment, technology, prevailing practice, land holding size, institutional capacity, and market impede the implementation of the project. These are outlined below.

a) Investment barriers

Income from agricultural production is the main source of livelihood for communities in the project area. The agricultural production is subjected to prolonged droughts. The annual income per capita in the project areas can go down to around US$ 145 if the weather is not favourable, and even under US$ 100(approximately) in some very remote mountainous villages to the farmers living under subsistence agriculture. Under this situation, many farmers still live below poverty level. It is not

possible for local people to afford the high investment in plantation establishment as incomes from wood will occur only after five years of the initial investment. The chances to get commercial loans from banks for the purpose of afforestation/reforestation activities are very low because of the long rotation, high market risk and economical unattractiveness in the context of degraded land.

The income from the sale of CERs would partially offset the establishment and maintenance costs of plantations.

b) Technological barriers:

Discussions with local communities during participatory rural appraisal (PRA) (see Annexure-viii) indicated that local farmers/communities do not have access to quality seed sources. The A/R project activity facilitates the farmers in adopting clonal propagation methods and provides required technical advice from the J.K Paper Industry. In the absence of this project, J.K. Paper would not have focused on providing technology to such small farmers.

c) Barriers due to prevailing practice

The AR CDM project activity is the first of its kind initiative in the region. Therefore, poor farming communities were not aware of the role of tree planting in climate change mitigation. The awareness raising workshops conducted by VEDA and extension services provided by JK Paper Limited greatly improved the awareness of farmers and translated to higher enrolment of farmers in the AR CDM project activity. Many small farmers are enrolled in the project as a consequence of awareness generation activities of project entities.

d) Barriers associated with small land holdings

The project has large proportion of farmers with small size of holdings. The land and resource constraints of small farmers are major barriers in undertaking AR CDM project activities. As small farmers are poor and do not have adequate land to meet the livelihood requirements, they face significant constraints in allocating lands for tree planting activity. The large number of small farmers also translates into large transaction costs in implementing and monitoring project on small holdings scattered very widely. Moreover, the capacity required to meet the requirements of CDM project implementation is not available in the group of farmers.

Considering the difficulties in covering the transaction costs, it was realized that the project will not be viable without the inclusion of at least a few relatively larger farmers so that increased area under project would serve to offset the transaction costs. Keeping this in view, few farmers with 5 or more ha of land (30%) were enrolled in the project activity so that increase in area under the project would partially cover the transaction costs.

Inclusion of large farmers contributes to a reduction in transportation costs of harvested timber as the same amount of timber transported from several small holdings could be transported from few medium and large holdings. Reduction in transportation implies reduction of fossil fuel consumption for transportation.

e) Market barriers

The wood production on small holdings faces significant market barriers considering the large transaction costs of coordinating with small farm holdings. There is no organized market for wood in the project area. As a consequence, individual farmers would have to depend upon informal markets for the disposal of wood. Considering the large fluctuations in wood prices, there is significant

reluctance and risk aversion among farmers for wood growing.

The project has conceptualized a mechanism for the marketing of wood grown on the project farms, which involves arrangements for supply of wood to the JK Paper Mill, a major end user of wood supplies in the region. JK Paper Mill procures wood from established sources of wood supplies, which are as far as 800 km from the JK Paper Mill.

As the project is able to meet a part of the long distance wood supplies to the JK Paper Mill, it could potentially reduce the transportation costs of wood to the Paper Mill. Thus, the Paper Mill would be able to use savings from transportation costs to implement institutional arrangements for transport of wood supplies from dispersed small and marginal farmers in the project area. The arrangements for the sale of wood to the Paper Mill would translate into stable prices and protect the farmers from volatile wood prices and allow for direct payments to farmers without the need for marketing costs incurred on middle men in the marketing of wood. The arrangement for direct supply of project grown wood to Paper Mill also reduces the mill's dependence on transportation of wood from long distances and therefore would lower the GHG emissions associated with the long distance transportation of wood.

f) Barriers associated with delayed income stream from tree growing

The economic status of small and marginal farmers do not allow them to afford the wait for delayed timber revenues over the tree growing period. To lower the transaction costs of delayed income stream from tree growing, the agreement between the BioCarbon Fund and the project developers requires the creation of revenue sharing arrangements from the sale of carbon credits among all the participating farmers of the project. The revenue sharing is based on the relative contribution of land holding of each farmer to the project. The revenue from the sale of carbon credits is expected to partially alleviate the investment cost incurred by the farmers, transaction costs of participation in the project as well as delays anticipated in the income from sale of timber.

Under the revenue sharing mechanism implemented by the project, a bank account involving all the participating farmers as members is proposed to be established at a local bank within the project area. The BioCarbon Fund will transfer the revenue for the purchase of carbon credits into the bank account. The revenue is then distributed among the participating farmers. The revenue sharing arrangements will be communicated among the participating farmers and revenue distribution procedures will be audited by external auditors to ensure the transparency in the distribution of carbon revenue of the project. The information on the Bank account and revenue sharing arrangements will be presented at the time of validation.

g) Barriers associated with institutional capacity

The project faces significant capacity constraints due to absence of local institutions to support the farm level tree growing initiatives, institutional arrangements resulting from the contractual agreements between the BioCarbon Fund and the project developers resulted in the conduct of participatory rural appraisals to identify their preferences for tree species, thereby establishing the supplies of improved planting material to the participating farmers. The organization of small and marginal farmers under the project helps to overcome the low capacity of prevailing local institutions. The marketing arrangements would protect the farmers from wood price volatility and prevent the distressed sale of wood in informal market. The extension services and procurement arrangements of the JK Paper Mill minimize the transaction costs to farmers. The revenue sharing

arrangements are also expected to enhance the awareness of farmer to benefits of growing trees as well as market for environmental services and the role of forests in mitigating climate change.

STEP 4: Common practice test

There have been very few comparable reforestation initiatives in the region. The earlier reforestation activities did not have similar objectives as this project. Therefore, this project is considered first of its kind in supporting livelihoods and climate mitigation objectives on agricultural lands.

Conclusion: The barriers do not prevent the continuation of prevailing practice of subsistence agriculture but would constrain the implementation of the project activity as a non-CDM activity due to the barriers outlined above.

Table C.6.2: Additionality assessment

Additionality Assessment					
Steps and sub-steps of the "Additionality Tool"					
Alternatives	**Identify credible alternative land use scenarios**	**Consistency with applicable laws & enforcement of regulations**	**Selection of the baseline scenario**	**Barriers Analysis**	**Common Practice**
Abandonment of agricultural land	Yes	Yes	No	Yes	No
Continuation of subsistence agriculture (**Baseline scenario**)	Yes	Yes	Yes	Yes	Yes
Reforestation activity as non-CDM activity	Yes	Yes	No	Alternative eliminated	No

The approval and registration of the proposed A/R CDM project activity will alleviate the barriers noted above and enable the project activity to generate the following benefits:

- The project would serve as a demonstration for implementing future AR CDM project activities in the region.
- The project demonstrates the role of improved planting methods, extension and training programs organized by the project entities i.e VCCSL and JK Paper Limited in particular, to overcome technological barriers to afforestation / reforestation activities.

Figure: C.2: Farmers' visit to JKPL clonal technology facility

- Reforestation activities will provide employment opportunities to poor and vulnerable group's resulting in environmental protection, soil conservation, and increased biomass production.
- The project is envisaged with the cooperation of JK Paper industry to utilise the timber grown from improved planting material in a sustainable manner from the local areas that would result in lower transportation cost than the mill's supply of wood. The shift to wood grown in the project areas would result in less consumption of fossil fuels resulting in reduced GHG emissions.
- The project will build partnerships with the objective of improving the socio-economic conditions of the local resource poor communities. The close interaction among individuals, communities, industry, NGOs, international organisations and government strengthens the capacity for technical and extension services. The implementing agencies contribute to improved awareness to environmental issues such as climate change mitigation.

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

>>

Baseline net GHGs removal by sink is considered to be insignificant for the proposed project activity as the carbon stock change for the baseline scenario without trees is set as zero and for the baseline strata with trees the carbon stock change is considered to be negligible as there is low or no biomass (non-tree shrubs) in the baseline scenario**.** (Please refer to section **C.5.1**-**5**.Estimation of baseline net GHGs removal by sink)

Table C.7.1: Annual estimation of baseline net anthropogenic GHG removals by sinks

Please present final results of your calculations using the following tabular format.	
Year	**Annual estimation of baseline net anthropogenic GHG removals by sinks in tonnes of CO_2 e**
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	0
2011	0
2012	0

2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
2026	0
2027	0
2028	0
2029	0
2030	0
2031	0
2032	0
2033	0
Total estimated baseline net GHG removals by sinks (tonnes of CO2 e)	0
Total number of crediting years	
Annual average over the crediting period of estimated baseline net GHG removals by sinks (tonnes of CO2 e)	

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

>>

Date of completion of Baseline study: September, 2007

Name of persons/entity determining the baseline

Vanita Empowerment, Development and Advancement Mutually Aided Cooperative Society Ltd./VEDA Climate Change Solutions Ltd.

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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:

>>

Ex ante assessment of carbon stock changes in the project

The details of growth data i.e. GBH, DBH, Height, Volume and Yield of *Eucalyptus* & *Casuarina* is collected regularly from the field and maintained in a register by the Research and Development Office of the JKPL. The data of those plantations is rechecked after six months to assess the growth rates.

The assumptions are based on the growth data collected by JKPL in its plantation programme and the back up records are also being maintained by the JKPL and will be presented at the time of validation.

Table D.1: Stand volume

Year	Stand Volume (m^3 $ha^{-1)}$		
	Eucalyptus Clonal	*Eucalyptus* Seed Route	*Casurina*
1	6.23	2.42	22.64
2	31.82	15.77	72.48
3	66.40	39.05	148.44
4	164.45	62.23	232.27
5	212.21	100.42	Harvesting
6	Harvesting	126.14	

The stand volume is converted into biomass and carbon stock taking into account wood density and carbon fraction of the biomass.

GHG emissions

The farmers do not practice biomass burning in site preparation, therefore, emissions from biomass burning are considered zero in *ex ante* calculations. As per the decisions of EB42, the GHG emissions associated with fertilizers, removal of herbaceous vegetation and transportation are insignificant. Therefore, project GHG emissions are ignored in the *ex ante* calculation of actual net GHG removals by sinks.

Ex ante actual net GHG removals by sinks

The ex ante actual net GHG removals by sinks are calculated as per the steps of the methodology and presented in the table below and detailed calculations are presented in **Annex 7**.

Table D.1.1: Ex ante actual net GHG removals by sinks from the project

Project year *t**	Actual net greenhouse gas removals by sinks

year	tCO_2e
1	7,977
2	60,058
3	195,346
4	359,381
5	400,064
6	437,405
7	408,089
8	383,726
9	381,190
10	430,973
11	403,918
12	379,834
13	414,560
14	405,585
15	372,326
16	311,076
17	332,253
18	416,933
19	352,430
20	476,626
21	315,553
22	414,035
23	390,806
24	508,892
25	296,678
26	407,602
27	380,121
28	479,841
29	265,461
30	312,137

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

>>

The project area of 3607.32 ha, when seen in comparison to the net sown area of the six project districts 17, 38,577 ha is less than 0.2%. Considering the village as one unit, the displacement of activity due to conversion of crop lands to project land is negligible as the farmers in the project area have diverted only a small portion of land for the plantation activity under the A/R CDM project. Hence the activity displacement due to displacement of fuel wood collection can be ignored.

As per the paragraph 35 of the EB 42, the GHG emissions from transportation are considered insignificant, therefore these are not required to be considered in the calculation of leakage[2].

The fencing is done by using thin branches, twigs etc. by tying with jute rope and after a period of one year i.e. once the plantation attains manageable height, these are used as fuel wood. The activity displacement due to use of this fuel wood for fencing is negligible as the total acreage under the

[2] http://cdm.unfccc.int/EB/042/eb42rep.pdf

plantation in comparison to average land under CDM per village is negligible. The paragraph 37 of the EB 44 has also noted that the GHG emissions from the fencing material are insignificant, and therefore should be neglected[3].

As the leakage from all the sources put together is insignificant, the leakage from the project is assumed to be zero.

Table D-2 Estimation of leakage

Year	Vehicular emissions	Activity displacement		Fencing (only thorny bushes or weeds used)	TOTAL
		Conversion			
		Grazing	Fuelwood		
2004	,,	Negligible	Negligible	Negligible	,,
2005	,,	,,	,,	,,	,,
2006	,,	,,	,,	,,	,,
2007	,,	,,	,,	,,	,,
2008	,,	,,	,,	,,	,,
2009	,,	,,	,,	,,	,,
2010	,,	,,	,,	,,	,,
2011	,,	,,	,,	,,	,,
2012	,,	,,	,,	,,	,,
2013	,,	,,	,,	,,	,,
2014	,,	,,	,,	,,	,,
2015	,,	,,	,,	,,	,,
2016	,,	,,	,,	,,	,,
2017	,,	,,	,,	,,	,,
2018	,,	,,	,,	,,	,,
2019	,,	,,	,,	,,	,,
2020	,,	,,	,,	,,	,,
2021	,,	,,	,,	,,	,,
2022	,,	,,	,,	,,	,,
2023	,,	,,	,,	,,	,,
2024	,,	,,	,,	,,	,,
2025	,,	,,	,,	,,	,,
2026	,,	,,	,,	,,	,,
2027	,,	,,	,,	,,	,,
2028	,,	,,	,,	,,	,,
2029	,,	,,	,,	,,	,,
2030	,,	,,	,,	,,	,,
2031	,,	,,	,,	,,	,,
2032	,,	,,	,,	,,	,,
2033	,,	,,	,,	,,	,,
TOTAL	,,	,,	,,	,,	,,

[3] http://cdm.unfccc.int/EB/044/eb44rep.pdf

SECTION E. Monitoring plan

E.1. Monitoring of the project implementation:

>>

E.1.1. Monitoring of forest establishment and management:

>>

As per approved methodology, following aspects are to be monitored as part of forest establishment.

- The site preparation is carried out as per the guidance of the methodology.
- Survey and check the species and planting for each stratum.
- Survival checking:
  - 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 % of the initial planting density.
  - Planting in gaps is done during year 2 and year 3.
  - Final survival checking is done three years after the planting.
  - The checking of the survival rate may be conducted using permanent sample plots.
- Check and confirm that the weeding practice is implemented.
- Document and justify any deviation from the planned forest establishment.

Table E.1.1: Parameters for monitoring

ID number [4]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[5]	Recording frequency	Number of data points / other measure of collected data	Comment
E.1.2.1	Tree species			Plantation time	100% of sample plots	
E.1.2.2	Number of trees/ hectare	$tree.ha^{-1}$	m	Yearly	100% of sample plots	
E.1.2.3	Survival rate	%	c	3 months of planting & 3 years after planting	100% of sample plots	
E.1.3.1	Site preparation date	d/m/y	m	Before planting	100% of sample plots	
E.1.3.2	Site preparation area	Ha	c	Before planting	100% of sample plots	
E.1.3.3	Biomass removed in site preparation	t.ha-1	m	Before planting	100% of sample plots	

[4] Please provide ID number for cross-referencing in the PDD.

[5] Please provide full reference to data source.

E.1.3.4	Planting date	d/m/y	m	Planting time	100% of sample plots	
E.1.3.5	Planting area	Ha	c	Planting time	100% of sample plots	
E.1.3.6	Tree species			Planting time	100% of sample plots	
E.1.3.7	Disturbance area	ha	c	Yearly	100% of sample plots	
E.1.3.8	Disturbance type			Yearly	100% of sample plots	
E.1.3.9	Disturbance tree species			Yearly	100% of sample plots	
E.1.3.10	Disturbance biomass lost	kg d.m.ha-1	m	Yearly	100% of sample plots	

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.

>>

To ensure the collection of reliable field data and to ensure its quality, information on the standard forest management procedures and project monitoring requirements will be provided to farmers. Information on the following measures would be shared with the participating farmers as part of quality assurance of the field data.

- Installation of test plots in the field to measure all pertinent components using the SOPs
- Checking of field measurements by a qualified person so as to correct any errors in techniques
- Documentation requirements of field related activities
- Training on field monitoring to individual or groups of farmers as relevant.

Table E.1.2: Quality control/quality assurance procedures

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.
E.4.1.23 Plot locations	low	Random plot checks using GPS
E.1.2.1 Tree species	low	Random checks over the project area to ensure the area of each tree species is correctly measured
E.4.1.33 Age of plantation	low	Random checks over the project area to ensure the area in terms of plantation age is correctly measured
E.1.2.2 Number of trees	low	Random plot checks
E.4.1.17 DBH	low	Random plot checks
E.4.1.52 Tree height	low	Random plot checks
E.4.1.54 Wood density	low	Data that deviate significantly from default value shall be checked

E.4.1.55 Biomass Expansion Factor	low	Data that deviate significantly from default value shall be checked
E.4.1.14 Carbon fraction	low	Data that deviate significantly from default value shall be checked
E.4.1.4 Root-shoot ratio	low	Data that deviate significantly from default value shall be checked

E.2. Sampling design and stratification

>>

Stratification and sampling for ex-post calculations

a) Stratification

The combination of three species (*Eucalyptus* clonal; *Eucalyptus* seed; *Casuarina*) and two land parcels categories (≤5 ha and > 5 ha) lead to the identification of **six** project strata. The strata are summarized below.

1. *Eucalyptus* clonal in land parcels ≤ 5 ha
2. *Eucalyptus* seed route in land parcels ≤ 5 ha
3. *Casuarina* in land parcels ≤ 5 ha
4. *Eucalyptus* clonal in land parcels > 5 ha
5. *Eucalyptus* seed route in land parcels > 5 ha
6. *Casuarina* in land parcels > 5 ha

Post stratification will be conducted after the first monitoring event to address the possible changes of project boundary and planting timing in comparison with the project design, and to respond to any differences in growth conditions compared to what was expected.

b) Sampling

Permanent sampling plots are used for sampling to measure and monitor changes in carbon stocks of the relevant carbon pools over time. The plots will be located with GPS and will be treated in the same way as other land parcels of the project. The geographical position (GPS coordinate), administrative location, stratum and sub-stratum series number of each plot will be recorded and archived. The plots of 400 m^2 (20m X 20m) are established to evenly cover the project area.

Determining sample size

As per the methodology, in the proposed A/R CDM project activity, the total sum of samples (n) are estimated as per a criterion of Neyman of fixed levels of accuracy, according to Wenger (1984)[6]:

$$n = \left(\frac{t}{E}\right)^2 \left[\sum_{h=1}^{L} W_h \cdot s_h \cdot \sqrt{C_h}\right] \cdot \left[\sum_{h=1}^{L} W_h \cdot s_h \Big/ \sqrt{C_h} \cdot\right] \quad (1)$$

[6] Wenger, K.F. (ed). 1984. Forestry handbook (2nd edition). New York: John Wiley and Sons.

$$n_h = n \cdot \frac{W_h \cdot s_h / \sqrt{C_h}}{\sum_{h=1}^{L} W_h \cdot s_h / \sqrt{C_h}}$$

(2)

Where

L = total number of strata
t = t value for a confidence level (95%)
E = allowable error (±10% of the mean)
s_h = standard deviation of stratum h
n_h.= number of samples per stratum that is allocated proportional to $W_h \cdot s_h / \sqrt{C_h}$.
$W_h = N_h/N$
N = number of total sample units (all stratum), $N = \sum N_h$
N_h = number of sample units for stratum h, calculated by dividing the area of stratum h by area of each plot
C_h = cost to select a plot of the stratum h

The standard deviation of each stratum (s_h) is determined for the first monitoring event, by estimating the standard deviation by measuring a pre-defined number of plots in each stratum. Then using this estimate, the number of sample plots required for each stratum is estimated. For the second and any subsequent monitoring event, the standard deviation estimated from the previous monitoring event is used to calculate the number of sample plots. The t value for 95% confidence is approximately equal to 2 when the number of sample plot is over 30. The allowable error is a value on a per-plot basis and is estimated as ±10% of the expected mean biomass carbon stock per plot in living trees at the end of a rotation.

It is possible to reasonably modify the sample size after the first monitoring event based on the actual variation of the carbon stock changes determined from taking the n samples.

A total of 45 sample plots are estimated for the first monitoring event. The sample plots are distributed over six strata and used to monitor the project. The distribution of plots across the strata is presented in the table below.

Table: E.2:Sample plots

	Land parcels ≤ 5 ha			Land holding > 5 ha			Total
	Eu(Clonal)	*Eu*(Seed Route)	*Casuarina*	*Eu*(Clonal)	*Eu*(Seed Route)	*Casuarina*	
Number of sample plots	**27**	**9**	**23**	**22**	**1**	**8**	**90**

The *ex ante* sample size calculation is based on a standard deviation of 33% for the aboveground biomass of *Eucalyptus* and 33% for the aboveground biomass of *Casuarina*. The sample plots are rounded to the nearest integer. If further variation in the standard deviation is observed during the measurement

campaign, the number of plots would be recalculated.

Location of sampling plots

To avoid subjective choice of plot locations (plot centres, plot reference points, movement of plot centres to more "convenient" positions), the permanent sample plots are located systematically with a random start. This has been accomplished with the help of a random number generation technique.

The number of sample plots and the sample plot size assessed is considered sufficient to give 95% accuracy and 10% precision The list of sample plots and location on the land parcels in each district has been recorded and archived in the project database hosted at the Central Forest Office of J.K Paper.

The sample plot map is developed in such a way that the project developers and DOE can identify and locate the sample plot in the field.

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

>>

The baseline scenario of lands under agriculture is established using the approved baseline methodology AR-AM0004, i.e., "Reforestation or afforestation of land currently under agricultural use (Version 3)". Considering the insignificant pre-project vegetation, the net changes in the baseline removals by sinks are expected to be insignificant. Therefore, the carbon stock changes in the baseline scenario are set to zero. As per the methodology, the baseline net GHG removals by sinks do not need to be monitored. .

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

>>

Data collection is being organized taking into account the carbon pools, sample frame and the number of sample plots. Section E.4.1 outlines the data to be collected on the project scenario in order to monitor the changes in carbon pools. Periodic checks of the data are being undertaken to verify the data consistency. The electronic spreadsheet formats are being used to archive the data and errors corrected and measurement error assessed. Monitoring data will be archived for 2 years following the end of the last crediting period.

The actual net greenhouse gas removals by sinks represent the sum of verifiable changes in the carbon stocks of pools within the project boundary, minus the increase in GHG emissions measured in CO_2 equivalents by the sources as a result of the implementation of the project activity and calculated as per the equations outlined in the approved methodology AR AM0004.

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:

>>

Project data on verifiable changes in the individual carbon pools will be collected as per the steps and procedures of the monitoring plan. The monitoring and data collection procedures will also take into account the procedures on the sample plots as outlined in Annex 4 on monitoring plan. The calculation of the change in the stocks of carbon pools project will be done as per the equations outlined in the Section III of AR AM0004 methodology.

The project utilizes data from allometric equations, published growth data and data collected by JKPL to calculate the relationship between growth and biomass of *Eucalyptus* and *Casuarina*. The field measurements on sample plots will be used in the growth and biomass relationship to calculate the actual net GHG removals by sinks.

Table E.4.1: Data collected on the sample plots to assess the verifiable changes

ID number[7]	Data variable		Data unit	Measured (m), calculated (c) estimated (e) or default (d)[8]	Recording frequency	Number of sample plots at which the data will be monitored	Comment
E.4.1.1	DLP	Desired level of precision	%		Prior to start of project		For QA/QC of monitoring
E.4.1.2	PL_{ID}	Sample plot ID	alpha numeric		Prior to start of project		Numeric ID will be assigned to each permanent sample plot
E.4.1.3	PLik	Total number of plots in stratum i, stand model k	Dimen-sionless	c	5-year	100%	
E.4.1.4	*Rj*	Root-shoot ratio	Dimen-sionless	e	5 year	100%	Locally derived and species-specific value have the priority
E.4.1.5	*44/12*	Ratio of molecular weights of carbon and CO_2;	Dimen-sionless	Universal constant			
E.4.1.6		Confidence level (e.g.	%	d	Before the start of the	100%	For QA/QC of monitoring

[7] Please provide ID number for cross-referencing in the PDD.

[8] Please provide full reference to data source.

		95%)			project		
E.4.1.7	*A*	Total size of all strata (A), e.g. the total project area	ha	m	Prior to start of project & adjusted at every 5 years	100%	
E.4.1.8	*Ai*	Area of each stratum	ha	m	Prior to start of project & adjusted at 5 years	100%	
E.4.1.9	*Aikt*	Area of stratum *i*, stand model *k*, at time *t*;	ha	m	Yearly	100%	Measured for different strata and stands
E.4.1.10	*AP*	Sample plot area	m^2	m	5-year	100%	
E.4.1.11	*CAB,ijt*	Carbon stock in above-ground biomass for stratum *i*, species *j*, time *t*;	t C	c	5-year	100%	
E.4.1.12	C_{ACTUAL}	Actual net GHG removals by sinks;	t CO2-e.	c	5-year	100%	
E.4.1.13	*CBB,ijt*	Carbon stock in below-ground biomass for stratum *i*, species *j*, time *t*;	t C	c	5-year	100%	
E.4.1.14	*CF*	Carbon fraction	t C(t d.m.)-1	e	Once per crediting period		Local-derived and species-specific value have the priority (IPCC

							default = 0.5
E.4.1.15	*CFj*	Carbon fraction of species *j*	t C (t d.m.)-2	e	Once per species	100% of species or species group	Local value have the priority (IPCC default = 0.5)
E.4.1.16	*Ci*	Cost of establishing a sample plot for each stratum *i*	US$ or local currency	m	5-years	100%	
E.4.1.17	*DBH*	Diameter at breast height of living trees	cm (living)	m	5 year	100% trees on sample plots	Measurement at each verification
E.4.1.18	*E*	Allowable error	depends on the variable calculated	c	5-year	100% of the variables	
E.4.1.19	*fj(DBH ,H)*	Allometric equation for species *j* linking above-ground tree biomass (kg tree-1) to DBHand possibly tree height (H) measured in plots for stratum *i*, species *j*, time *t*.	kg tree-1	c	Once per species	for all major species or group of species	Use local/global equations validated for local conditions
E.4.1.20	*Hijt*	harvested volume and fuel wood for stratum *i*, species *j*, at time *t*	m^3	c	Annually	100%	Annually recorded

E.4.1.21	*iID*	Stratum *i*D (1, 2, 3, … *mSP* project scenario (*ex post*) strata)	alpha numeric	defined	At stand establishment	100%	Each stand has a particular year *t*o be planted under each stratum
E.4.1.22	*IDikt*	Stand ID	alpha numeric	defined	At stand establishment	100%	Each stand has a particular year *t*o be planted under each stratum
E.4.1.23	*lat/long*	Plot location		m	5 years	100%	Plots location with GPS prior to project start and at each field measurement
E.4.1.24	*N*	Maximum number of sample plots in the project area	Dimen-sionless	c	5-years	100%	
E.4.1.25	*n*	Sample size (total number of sample plots required) in the project	Dimen-sionless	c	5-years	100%	
E.4.1.26	*Ni*	Maximum number of sample plots in stratum *i*	Dimen-sionless	c	Prior to start of project and adjusted at every 5-year	100%	
E.4.1.27	*ni*	Sample size for stratum *i*	Dimen-sionless	c	Before the start of the project and	100%	Calculated for each stratum

					adjusted thereafter every 5-year		
E.4.1.28	*nTRPLikt*	Number of trees in the sample plot t		m	5 years	100% trees in plots	Counted in plot measurement
E.4.1.29	*PLID*	Sample plot ID (1, 2, 3, … pl, …)	alpha numeric	defined	Before the start of the project	100%	Numeric ID will be assigned to each permanent sample plot
E.4.1.30	*sti*	Standard deviation for each stratum *i*;	Dimen-sionless	e	At each monitoring event	100%	Used for estimating numbers of sample plots of each stratum and stand, as necessary
E.4.1.31	*TBABj*	Above-ground biomass of a tree	kg dry matter tree-1	c	5-year	100%	
E.4.1.32	*TCABj*	Carbon stock in abovegroun d biomass per tree of species *j*	kg C tree-1	c	5-year	100%	
E.4.1.33	*tID*	Age of plantation (1, 2, 3, … years)	year	m	At stand establishment	100%	Counted since the planted year
E.4.1.34	*trID*	Tree ID (1, 2, 3, … tr … TR = total number of trees in the plot)	dimension less	m	5-year	100%	
E.4.1.35	*XF*	Plot expansion	dimension less	c	5-year	100%	

		factor					
E.4.1.36	$z\alpha/2$	Value of statistic z (normal probability density function), for $\alpha = 0.05$ (implying a 95% confidence level)	Dimen-sionless	m	5-years	0%	
E.4.1.37	$\Delta CAB,ijt$	annual carbon stock change in above-ground biomass for stratum *i*, species *j*, time *t*;	t C yr-1	c	5-year	100%	
E.4.1.38	$\Delta CAB,ikt$	Annual carbon stock change in above-ground biomass for stratum *i*, stand model *k*, time *t*;	t C yr-1	c	5-year	100%	
E.4.1.39	$\Delta CBB,ijt$	Annual carbon stock change in below-ground biomass for stratum *i*, species *j*, time *t*;	t C yr-1	c	5-year	100%	
E.4.1.40	$\Delta CBB,ikt$	Annual carbon stock	t C yr-1	c	5-year	100%	

		change in below-ground biomass for stratum *i*, stand model *k*, time *t*;					
E.4.1.41	*ΔCP,LB*	Sum of the changes in living biomass carbon stocks (aboveand below-ground)	t CO2-e.	c	5-year	100%	
E.4.1.42	*ΔMCABikT*	Mean carbons stock change in above-ground biomass stratum *i*, stand model *k*, between two monitoring events	t C ha-1	c	5-year	100%	
E.4.1.43	*ΔMCABikt*	Mean carbon stock change in above-ground biomass stratum *i*, stand model *k*, between two monitoring events	t C ha-1	c	5-year	100%	
E.4.1.44	*ΔMCB*	Mean	t C ha-1	c	5-year	100%	

	B,ikt	carbon stock change in below-ground biomass stratum *i*, stand model *k*					
E.4.1.45	*ΔMCB BikT*	Mean carbon stock change in below-ground biomass stratum *i*, stand model *k*, between two monitoring events	t C ha-1	c	5-year	100%	
E.4.1.46	*ΔPCAB ,ijT*	Plot level mean carbon stock change in above-ground biomass ins stratum *i*, species *j* between two monitoring events	t C ha-1	c	5-year	100%	
E.4.1.47	*ΔPCBB ,ijT*	Plot level mean carbon stock change in above-ground biomass in stratum *i*, species *j* between two monitoring events	t C ha-1	c	5-year	100%	

E.4.1.48	*ΔTCAB jt*	Carbon stock change in above-ground biomass per tree of species *j* in year *t*	kg C tree-1	c	5-year	100%	
E.4.1.49	*ΔTCAB jT*	Carbon stock change in above-ground biomass per tree of species *j* between two monitoring events	kg C tree-1	c	5-year	100%	
E.4.1.50	*ΔTCBB jt*	Carbon stock change in below-ground biomass per tree of species *j* in year *t*	kg C tree-1	c	5-year	100%	
E.4.1.51	*ΔTCBB jT*	Carbon stock change in below-ground biomass per tree of species *j* between two monitoring events	kg C tree-1	c	5-year	100%	
E.4.1.52	*H*	Tree height	m	m	5 year	100% trees in	Measuring at each

						plots	monitoring time per sampling method
E.4.1.53	*Dj*	Wood density of species *j*	t d.m. m-3	e	5 year	100% of sampling plots	Local-derived and species-specific value have the priority
E.4.1.54	*D*	Average wood density	t d.m. m-3	e	5 year	100% of sampling plots	Local-derived and species-specific value have the priority
E.4.1.55	*BEF*	Biomass expansion factor (BEF)	dimension less	e	5 year	100% of sampling plots	Local-derived and species-specific value have the priority (IPCC default in LULUCF GPG 2003, Table 3A.1.10)

E.4.2. Data to be collected in order to monitor the GHG emissions by the sources, measured in units of CO_2 equivalent, that are increased as a result of the implementation of the proposed A/R CDM project activity within the project boundary:

>>

Table E.4.2: Sample plots to monitor GHG emissions

ID number [9]	**Data variable**	**Data unit**	**Measured (m), calculated (c) estimated (e) or default (d)** [10]	**Recording frequency**	**Number of sample plots at which the data will be monitored**	**Comment**

[9] Please provide ID number for cross-referencing in the PDD.

[10] Please provide full reference to data source.

E.4.2.1	*44/28*	Ratio of molecular weights of N2O and nitrogen;	Dimen-sionless	Universal constant			
E.4.2.2	*AN,ikt*	Area of with N applied in stratum *i*, stand model *k*, at time *t*;	ha	m	Yearly	100%	For different tree species and/or management intensity
E.4.2.3	*CSPdiesel t*	Amount of diesel consumption for year *t*	litter (l)	m	Yearly	100%	Measuring either diesel consumption per unit area for site preparation, or per unit volume logged or thinned
E.4.2.4	*CSPgasoline t*	Amount of gasoline consumption for year *t*	litter (l)	m	Yearly	100%	Measuring either diesel consumption per unit area for site preparation, or per unit volume logged or thinned
E.4.2.5	*EF1*	Emission factor for emission from N input	t N2O-N (t N input)-1	e	Before start of monitoring, once per crediting period		IPCC default value (1.25%) is used if no more appropriate data
E.4.2.6	*EFdiesel*	Emission factor for diesel	kg CO2 l-1	e	At beginning of the project		National inventory value should has priority
E.4.2.7	*EFgasoline*	Emission factor for gasoline	kg CO2 l-1	e	At beginning of the project		National inventory value should has priority

E.4.2.8	*EFuelBurn*	Increase in GHG emission as a result of burning of fossil fuels within the project boundary	t CO2-e.	c	5-year	100%	
E.4.2.9	*GHGE*	Increase in GHG emission as a result of the implementation of the proposed AR CDM project activity within the project boundary	t CO2-e.	c	5-year	100%	

E.5. Leakage:

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Considering the small size of holdings planted, leakage emissions associated with the displacement of fuelwood collection and grazing activities are insignificant. The planted areas are not fenced as they are often surrounded by other agricultural lands. Therefore, leakage emissions related to fuelwood collection, grazing and fencing are considered insignificant.

As per the paragraph 35 of the minutes of meeting of the EB 42nd meeting, emissions associated with transportation are considered insignificant[11]. Therefore, emissions from the transport of personnel to areas outside the project boundary and products to the market can be neglected. As a consequence, the variables related to transport emissions would not be monitored in the project area.

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:

>>

Table E.5.1: Monitoring of leakage

[11] http://cdm.unfccc.int/EB/042/eb42rep.pdf

ID number[12]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[13]	Recording frequency	Number of data points	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:

>>

Methodology procedure:

As stated in section C.5 as per the applied methodology following the sources of leakage are covered for the proposed A/R CDM project activity:

- **Carbon stock decrease caused due to displacement of pre-project agricultural crops, grazing and fuel wood collection activities**

a) Displacement of pre-project agricultural crops:

Carbon stock decrease due to displacement of pre project agricultural crops is considered to be insignificant as activities will not be displaced considering the small parcels of lands planted and in most cases only a portion of holdings is planted.

b) Displacement of grazing activity:

The plantation activity carried out under the proposed A/R CDM project will lead to increased grass production. Thus, the availability of grass in the project area will be more compared to the amount existed in the baseline. Hence as per the methodology, the leakage due to displacement of grazing activity is insignificant and need not be monitored.

- **Carbon stock decrease caused due to increased use of wood posts for fencing**

For the proposed project activity, the fencing is being done with thin branches, twigs, thorny bushes etc. by tying them with rope and once the plantations reach the manageable height, these branches and twigs are used as firewood. As per the methodology, the leakage due to wood posts for fencing is calculated only if the sources for fencing are non-renewable. Hence the leakage from this source is non-existent in the 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:

>>

[12] Please provide ID number for cross-referencing in the PDD.

[13] Please provide full reference to data source.

The additional details on QC/QA are presented in Annex 4 under monitoring plan.

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:

>>

Under the authorization of the project participants, VCCSL together with JK Paper Ltd will be responsible for the monitoring function. JK Paper Ltd is responsible for providing technical services, including arranging training to the planting entities i.e farmers/communities involved, measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity. The relevant information and data is being documented and archived by the project entities in both electronic and paper formats.

VCCSL in association with JKPL will provide technical instructions on reforestation and forest management including fieldwork, and conduct the intensive supervision for implementation of the proposed A/R CDM project activity. JKPL will collect specific activity data on a routine basis.

JKPL will be responsible for measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity.

VCCSL will provide technical consultation and training in the measuring and monitoring of the actual GHG removals by sinks and leakage generated by the proposed A/R CDM project activity, and together with JKPL will be responsible for drafting the monitoring report and the monitoring function in general.

An expert team will be established for addressing any technical issues that may arise, and for checking and verification of measured and monitored data.

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

>>

Project Management Unit (PMU) consisting of representatives of VCCSL and JKPL

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:

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The proposed A/R CDM project activity will increase the forest cover in project towns/townships and provide the following additional environmental benefits.

Within the Project area:

- The project will bring the degraded farm lands into appropriate land use by adopting best agro-forestry practices.
- Carbon loss from the soil would be arrested and soil productivity will improve over time through nutrient cycling processes.

- Production of raw material locally would result in less transportation costs resulting in less consumption of fossil fuels and thereby reduced emissions.
- Biodiversity would be conserved by enhancing forest connectivity and reduce pressure on the natural forests by providing sustainable firewood to the local communities.
- Firewood produced will be an additional benefit and will replace non-renewable sources of energy such as kerosene and help in reducing GHG emissions indirectly. Firewood produced will reduce the pressure on the nature reserves from firewood collection and contribute to strengthening biodiversity conservation.
- The project will enhance awareness of the people to sustainable land use**.**
- The planted areas serve as habitats for the movement of some types of birds, mammals and snakes.

Outside the project area:

- The project contributes to the sequestration of carbon in the wood.
- The use of renewable wood reduces the dependence of paper industry on natural forests for wood and will help conserve the natural forests and their biodiversity.
- The project fosters relationships between the farmers and industry in a mutually beneficial manner.
- Promotes use of wood in place of synthetic construction materials which release carbon such as asbestos, iron and cement and help mitigate the global greenhouse gas emissions.
- The project promotes development of forestry models with multiple benefits.

Risk analysis and countermeasures:

- **Fire and pest risk:** The burning of crop residues in neighboring cropland represents a fire threat to the forests. This can be alleviated through technical measures and awareness training to local farmers/communities, strengthening patrolling and monitoring, as well as building firebreaks. Furthermore, reforestation arrangements will reduce fire and pest risks.
- **Site preparation:** The site preparation will not disturb the vegetation and soil in the planting sites. The technical measures to be employed in mitigating the impacts are to plant the tree species with low density (1250-2500 trees per hectare), limited site preparation (40 cm X 50 cm in diameter or 0.2 m^2) and retaining the existing vegetation as much as possible (see section A.4.8). As a result, the surface area disturbed by site preparation is estimated to account for only 2-5% of the total land surface. Therefore the site and soil preparation will have minor negative impacts on original soil and vegetation.
- **Pesticide:** Improper pesticide application would be harmful to natural environment, including polluting soil, water and air conditions, as well as the wildlife habitat and to the people working on the land. Under the proposed A/R CDM activity, environmental friendly measures such as mixed species arrangement, seed and seedling quarantine are being adopted.

None of these risks and/or negative impacts is considered significant.

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:

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No significant negative impacts are likely to occur due to environmental-friendly techniques adopted in the proposed A/R CDM project activity, e.g., avoidance of slash and burn, minimum soil disturbance in site preparation, proper choice of tree species and their spatial arrangement, etc.

An environmental safeguards review has been undertaken by Ms. Preeti Kumar, and Mr. Ranjan Samantray, Environmental Specialists with the World Bank, New Delhi during January, 2006 and as suggested by them an analysis of the environmental situation in the project areas with respect to water resources management and pesticide use has been conducted based on secondary data, information and discussions with the key stakeholders. A detailed Environmental Management Framework (EMF) has been developed to alleviate any possible negative impacts due to the project activity as well as to offset the impact of replication of this pilot project.

A table of potential impacts of project activities and mitigation measures developed as part of EMF exercise is shown below:

Table F.2.1: Potential impacts of project activities and mitigation measures

Activity	Sub-activities	Process	Issues	Potential impacts	Mitigation measures
Activities with backward linkage to the project activity	Raising of clonal saplings	Selection of candidate plus trees	Identification of candidate plus tree from locations outside the local (Orissa, Andhra Pradesh, extended to South India) gene pool	Poor adaptation of plants to local conditions	Selection of candidate plus trees from Orissa, Andhra Pradesh and other Indian locations that have similar agro-climatic conditions
				Introduction of new pests and disease causing pathogens	Contained trial plantations with identified candidate plus trees for long duration (three harvests)
					Weeding out and sanitary disposal (burning of plant residues and affected soil) of pest and disease affected plants

			Identification of candidate plus trees that are more prone to pest attacks (in view of good performance on other parameters such as productivity)		Identification of Candidate Plus T trees on the basis of pest resistance (along with other parameters such as productivity)
		Pest management	Fumigation with Monocrotophos in mist chambers and application of Chlorpyriphos to saplings –classified as Class Ib-Highly Hazardous and Class-II Moderately Hazardous (as per WHO classification) are not permissible under World Bank supported projects	Impact on human and environmental health	Identification of safer alternatives
			Non-use of appropriate protective gear while handling of fungicides and pesticides	Impact on human health	Awareness generation and monitoring to ensure use of appropriate protective gear
			Application of chemical fertilizers	Leaching of fertilizer residues and pollution of water bodies due to over use of chemical fertilizers	Use of organic manures such as vermicompost for nursery plants
		Water management	Over extraction of water from the Nagavali river for maintaining moisture levels in mist chambers and for watering saplings	Competition with other water uses especially during the dry season	Use of efficient irrigation equipment and water conservation measures

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

>>

The project although is not expected to have negative environmental impacts, an Environmental Management Framework (EMF) has been developed specifying a set of guidelines, training and

institutional arrangements that would be used by the VCCSL and JK Paper Limited to monitor potential environmental impacts and encourage farmers to take proactive mitigation measures. The EMF will be internalized into JKPL's existing plantation management systems. Further, environmental monitoring plan and remedial measures for any risks will be implemented and monitored.

The strategy proposed for water management is detailed in Table below:

Table F.3.1: Water management strategy proposed as part of the EMF of the project				
Action at the level of farmers		Action at the level of JK Papers Ltd.		
Cultural methods	**Physical methods**	**Extension**	**Measures**	**Change in Process**
Taking up plantation at the onset of the monsoon so as to fully utilize rainfall for meeting the water needs of the saplings. Selection of sites that are not in the immediate vicinity (there must be at least 5 m distance between the plantation and the field crop so as to reduce chance of water competition between field crops and the plantation) Use of organic manures Mulching (even by retention of leaf litter) to reduce water loss through evaporation	Construction of bunds along the contour and across the slope for fields that are located on sloppy terrain. Excavations of farm ponds or ditches that can harvest rainwater and enhance soil moisture.	Encourage farmers to adopt cultural methods for water conservation and discourage them from providing irrigation to the plantation with ground water. Periodically monitor farmers' plots to provide technical advice on water management	Disseminate information on efficient water management including selection of water-efficient clones, irrigation methods, etc.	-

The strategy proposed for pesticide usage management is detailed in Table below:

TableF.3.2: Pest management strategy proposed as part of EMF of this project				
Action at the level of farmers		**Action at the level of JK Papers Ltd.**		
Methods to prevent termite incidence (before it occurs)	**Methods to control termite damage**	**Extension**	**Measures**	**Change in Process**
Selection of sites that do not have a history of or vulnerability to termite infestation. Clearing of stubbles and	Use of botanical extracts or safe chemical pesticides	Encourage farmers to adopt cultural methods and use botanical extracts and safe chemical pesticides. Discourage farmers from application of chemical pesticides (especially Phorate)	Dissemination of information on use of botanicals, natural enemies, cultural	Treatment of clonal seedlings as per standardized procedure using Chlorpyrifos at

residues of any previous crop. Use of only well rotten organic manures.		if they are using clonal seedlings pre-treated with Chloropyrifos by JK Papers Ltd. Periodically monitor farmers' plots to identify infestation of termites and suggest treatment to control damage	methods, safer insecticides, etc.	nursery before supply to farmers

The strategy proposed for nutrient management is detailed in Table below:

Table F.3.3 : Nutrient management strategy proposed as part of EMF of this project				
Action at the level of farmers		Action at the level of JK Papers Ltd.		
Cultural methods	**Physical methods**	**Extension**	**R and D**	**Change in Process**
Selection of sites after soil testing. Use of green manures after the first year. Use of recommended doses of fertilizers including organic manures. Leaf litter, loppings, etc., at the site for nutrient recycling. Inter-cultivation of weeds to enhance soil organic matter	Ploughing across slope and construction of bunds along the contour on slopy land to prevent soil erosion	Actively encourage farmers to adopt cultural methods. Discourage farmers from excessive application of chemical fertilizers. Periodically monitor farmer's plots to check nutrient status and suggest measures to supplement nutrients.	R and D (either directly or through collaboration with research institutions such as CRIDA, ICRISAT, KFRI, ANGRAU) on integrated nutrient management including the use of intercropping, green manures, organic manures, etc.	Selection of sites after soil testing. Periodic monitoring of soil nutrient status.

The roles and responsibilities of the project entities are presented in the following table:

Table F.3.4 : Roles and responsibilities of VCCSL and JK Papers Ltd. with respect to the implementation of the EMF

VCCSL		**JK Paper Ltd.**	
Role	**Responsibility pertaining to EMF**	**Role**	**Responsibility pertaining to EMF**
VCCSL	Implementation of EMF in the project area. Inform World Bank on EMF progress as part of regular project reporting requirements (if any). Source and secure external technical assistance for monitoring of EMF implementation once every year. Conduct periodic (six-monthly) monitoring visits to plantation plots (at least 20% of the plots of project farmers) to monitor and take required measures to strengthen EMF implementation	Dy. General Manager (Plantations)	Implementation of EMF activities by JK Paper Ltd. Ensure that all legal and regulatory provisions relevant to the EMF are satisfactorily met through the project processes (for example, provisions on pesticide use). Ensure that R and D on aspects relevant to the EMF is considered a thrust area of the overall R and D efforts of JK Paper Ltd. Liaison with government and non-government agencies for securing support for EMF implementation (for example, utilize existing government schemes and programmes for training, supply of inputs, etc.)
		Manager (Plantations)	Ensure that extension and monitoring systems of JK Paper Ltd. integrate the provisions of the EMF. Identify training needs of various levels of staff and organize capacity building programmes by sourcing in-house and external expertise as required. Preparation of IEC material for farmers on EMF.
		Dy. Manager (Plantations and Special Projects)	Maintain an MIS of the EMF activities and provide periodic (six-monthly) reports to VCCSL for consolidation and reporting to the World Bank.

		Assistant Manager (Plantations)	Ensure capacity building of field level staff for providing technical support to enable implementation of EMF at the farmer's level. Organize monthly review of EMF activities through a meeting with the Supervisors Conduct periodic (six-monthly) monitoring visits to plantation plots (all plots of project farmers) to monitor and take required measures to strengthen EMF implementation. Coordinate with local line departments and NGOs to facilitate convergence of existing schemes and expertise for training of farmers. Identify farmers who are 'best practitioners' with respect to EMF. Organize exposure visits of farmers to 'best practitioner' farmer's plots.
		Supervisors	Provide extension support to farmers on EMF. Monitor plantation plots on a monthly basis and interact with the project farmers to ensure that the provisions of the EMF are efficiently met. Report back on EMF performance to Manager (Plantations).

The monitoring of the EMF implementation is done by JK Paper Ltd. through its internal monitoring systems. External assistance will be sourced if needed. The key parameters for monitoring are presented in the following table. Indicators based on these parameters have to be developed to suit the project requirements.

Table F.3.5 : Key parameters for monitoring

Parameter	Field aspects to monitor	Monitoring frequency for field aspects	Management aspects to monitor	Monitoring frequency for management aspects
Water resources	Source of water Schedule for irrigation SMC measures adopted	Monthly by JK Paper Ltd.	Information and training programmes for farmers. Training programmes for Supervisors. Periodic monitoring of plantation plots. Periodic review of	Six-monthly by JK Paper Ltd and annually by VCCSL through external agency appointed for the purpose by VCCSL.
Pesticide use	Names of pesticides used Quantity of pesticides used IPM practices adopted			
Nutrient management	Soil testing done Type and quantity of chemical fertilizers used INM practices adopted			

Land use	Species composition of plantation plot (type and numbers) Clonal composition of plantation plot		Supervisors. Adequate staff to handle EMF. Maintenance of MIS on EMF. R and D on aspects relevant to EMF.	
Legal and regulatory provisions				

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:

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Agriculture is the main source of income for local communities in the project area. However, due to severe soil erosion, agricultural production is suffering very much from periodic droughts. Food productivity is very low. The table below shows the % of population living below poverty line in the project area (Andhra Pradesh and Orissa) with Orissa having the highest percentage (47.15%) of population living below poverty line compared to other states in India. The data in the table also includes the average % of population living below poverty line at all India level.

Table G.1.1: Population below poverty line in the project area during 1999-2000

(Based on 30 days recall period)

S.no	States	Rural		Urban		Combined	
		No of persons (lakhs)	%of person	No of persons (lakhs)	%of person	No of persons (lakhs)	%of person
1	Andhra Pradesh	58.13	11.05	60.88	26.63	119.01	15.77
2	Orissa	143.69	48.01	25.40	42.83	169.09	47.15
3	All India	1932.43	27.09	670.07	23.62	2602.50	26.10

Source: Planning Commission, New Delhi.

Table G.1.2 : Socio-economic profile of project area

District	No. of Vill-ages	Plan-ting area (ha)	Popula-tion	Labour force	People employed outside	Minority popula-tion	Crop land area (ha)	Annual firewood consumption per capita (kg)
Kalahandi	32	324	1334372	307043	217000	519014	533000	380
Koraput	18	200	1177954	279021	121022	660018	307000	320
Rayagada	40	400	823019	247239	123132	502053	140000	330
Srikakulam	85	740	3207012	335629	215478	1020589	305892	330

Visakhapatnam	55	530	3670321	456589	153251	1425356	402569	280
Vizainagaram	148	1326	2401275	298245	180258	1203256	589235	330

The goal of the project is to improve livelihoods of the rural poor and vulnerable groups of the society through reforestation activities and also to contribute to environmental protection, soil conservation, increased biomass production and employment generation.

Socio economic impact of the proposed A/R activity

To maximize the socio-economic benefits, the reforestation design was prepared using participatory rural appraisal (PRA) methods. PRA methods were adopted in interviewing and consulting the local farmer households to understand their preferences and concerns, so that the proposed A/R CDM project activity would better respond to their desires for livelihood improvement.

FigureG.1: PRA exercise being undertaken in Ajjaram village of Srikakulam district.

The local farmers participate in the reforestation activities such as site preparation, planting, weeding, thinning, harvesting, etc. The project will provide the participating farmers increased returns from the sale of wood, firewood, intercrops and carbon trading. The project removes the risk of timber sale due to the partnership with industry i.e. JKPL. A quadripartite agreement involving VCCSL, farmer, JK Paper, and Bank/micro finance lending organisation in case bank loan is availed will determine the roles / obligations of each of the party. If loan is not availed from a bank by farmer, a tripartite agreement among farmers, JKPL and VCCSL will determine the same.

The main socio-economic benefits of the project would include:

- The project will **improve the quality of life of the vulnerable sections** of the society i.e. resource-poor farmers in the most backward regions of the country by helping them to bring their uncultivated **degraded lands to productive use by fostering partnerships** among farmers, industry, financial institutions and non governmental organizations.
- The project activity will lead to higher fodder growth within the project boundary compared to the baseline scenario. In the absence of project activity, growth of fodder occurs only during rainy season. Due to the project activity, there will be greater availability of fodder for stall feeding.

- The project will create substantial employment **opportunities** to the local people in the plantation activities such as nursery operations, planting and post planting, protection etc. besides long term job positions as detailed in the table F-2. Most employment opportunities will be taken by the local farmers/communities involved in the proposed A/R CDM project activity and beyond (whose lands do not fall within the project boundary). Project area in Orissa and Andhra Pradesh has predominance of indigenous communities and ethnic minorities, thus most of the employment opportunities will be available to them.

Table G.1.3: Employment created by project activities

States	No. of villages that benefit	No. of beneficiaries	Temporary (days)				Long-term position
			Planting	Weeding & tending	Harvesting	Total	
Orissa	41	66	1650	825	26400	28875	
Andhra Pradesh	75	95	2850	1425	45600	49875	
JKPL & VCCSL Offices							15
Total	116	161	4400	2240	72000	78750	

- The project will also help in **saving valuable foreign exchange,** as the paper industry would be meeting their requirement from the locally grown wood instead of importing raw material from outside.
- The impact of the proposed project on individual farmer will be significant in comparison to other schemes as farmer will get multiple benefits and increased returns from the sale of wood, firewood, intercrops and sale of carbon credits. In addition, the project is envisaged with the collaboration of local JK paper industry to utilize the timber grown in a sustainable manner from the local farmers with less transportation cost. The project will also build partnerships among the local people, industry and non-governmental organizations with the objective of improving the socio-economic conditions of the people.
- The project will **generate productive self-employment** to poor farmers and their family members in activities such as land preparation, plantation, post plantation etc.
- **Demonstration effect:** The project will establish best practices and will serve as a model for others to emulate. Awareness programs for training and education including training of trainers proposed to be undertaken as part of this project. It will help in bringing the new technologies and opportunities to local people so that the project can be replicated both within and outside the country. The project has the potential to scale up and can be replicated in other parts of the country.
- The **capacity** of the poor farmers to access benefits from the global mechanisms such as CDM would be enhanced through training and extension.
- **Empowerment:** The project will empower the stakeholders to undertake improved commercial

operations based on principles of sustainable development and help in building their negotiation skills.

Table G.1.4:- Employment created by project activities

States	No. of villages	Benefi-ciaries	Temporary (days)				Long-term position
			Planting	Weeding & tending	Harves-ting	Total	
Orissa	90	629	113220	12580	78625	204425	
Andhra Pradesh	288	1359	467280	51920	324500	843700	
Total	378	1988	580500	64500	402135	1048125	

Table G.1.5: Number of beneficiary households and ethnic minorities represented in the project area.

State(S)	Villages	Beneficiary households	Beneficiaries from ethnic minorities (SC/ST/ BC/ Muslim)
Orissa	90	629	385
Andhra Pradesh	288	1359	852
Total	378	1988	1237

Other Benefits

(1) Sustainable fuel-wood supply: The proposed A/R CDM activity will provide sustainable fuel sources for local farmers.

(2) Strengthening social cohesion: As indicated earlier, individual farmer households and communities are too weak to successfully manipulate the chain from investment, production to market especially for the timber and non-timber products which will take a much longer period than food production. In addition, the lack of organizational instruments also prevent them from overcoming technological barriers. The proposed A/R CDM project activity will entail close interaction among individuals, communities, companies, government and supporting networks for social and productive services, especially for the ethnic minorities.

(3) Technical training and demonstration: Local farmers and communities do not have access to quality seed sources and lack skills for producing high quality seedlings and for successful tree planting. In the proposed A/R CDM project activity, the local paper industry organizes trainings for local communities to assist them in understanding and evaluating the issues of hosting the proposed A/R CDM project activity, both on-site and off-site such as seed and seedling selection, nursery management, site preparation, planting models and Integrated Pest Management.

Potential socio-economic risks and countermeasures

(1) Cultural Resources

There are no cultural relics and/or cultural reserve that have been identified in the project area, and consequently, no damage to non-replicable cultural property will occur under the proposed A/R CDM project activity. Meanwhile, the project does not involve any sites for local social gatherings or other spiritual activities, thus the project activities will not impact the normal local gatherings and religious activities. The project activities of reforestation are fully consistent with local people's beliefs on protecting local environment.

(2) Tribal Groups

There are many ethnic minority groups located in the project area but they are not involved as project participants. However, few tribals people (less than 5%) who have been given land by the Govt. as part of its rehabilitation program have joined as project participants. The project area of 3607.32 ha, when seen in comparison to the net sown area of the six project districts i.e. 17,38,577ha is less than 0.2%. [14] Accordingly, this project activity does not have any significant impact on the tribal groups or population.

(3) Economic risk

The potential economic risks are lower yields of biomass due to less rain fall and/or poor management of the plantations established under the project such as lack of pest and fire control, which could contribute to project failure and loss to the farmers. This risk will be mitigated through technical assistance and training to farmers by VCCSL, local paper industry and forestry institutions, as well as by the extension network of the NGO sector. Local paper industry i.e. JKPL is experienced in reforestation and will provide the technical assistance to farmers.

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:

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The only uncertainty is related to weather conditions in general and rainfall in particular.

As the project activity is undertaken through large number of individual farmers, the individual understanding and implementation capacity of the farmers vary from each other and hence this factor may contribute to significant difference in the final outcome at the level of individual farmers. The institutional arrangement of the project removes the negative socioeconomic impacts. However, the decrease in yield may be possible due to unfavorable weather conditions. Its impact on the overall project level averages out, but at individual farmer's level, it may lead to considerable difference in terms of the revenues.

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

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[14] Source: Directorate of Economics and statistics, Govt of AP and Govt of Orissa.

To alleviate the problem to some extent, the farmers will be encouraged to take up crop insurance. Efforts will be made to conduct special training for the farmers having low perception capacity in terms of understanding the technical aspects of the plantations.

SECTION H. Stakeholders' comments:

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

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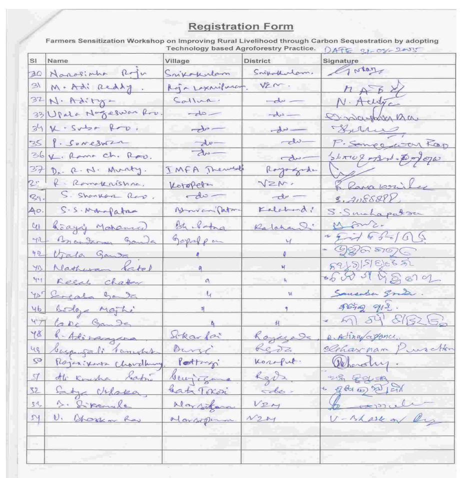
The comments were collected from primary as well as secondary stakeholders

H.1.1: Primary stakeholders

Comments by primary stakeholders have been invited using PRA methodology. Ten villages were investigated using the PRA which included the following processes:

(1) **Registration of farmers through personal contact:** A project leaflet has been prepared with the brief introduction of the project objective, main activities, benefits and potential risks, as well as the modalities and procedures of the CDM A/R project. The leaflet was distributed to the communities and was explained during the PRA process.

Figure H1.1: The registration of farmers in the project.



Registration Form

Farmers Sensitization Workshop on Improving Rural Livelihood through Carbon Sequestration by adopting Technology based Agroforestry Practice. DATE 21-08-2005

Sl	Name	Village	District	Signature
30	Narasimha Raju	Srikakulam	Srikakulam.	[illegible]
31	M. Adi Reddy.	Raja Laxmipuram.	VZM.	[illegible]
32	N. Aditya	Sallur.	-do-	N. Aditya
33	Upala Nageswara Rao.	-do-	-do-	[illegible]
34	K. Subba Rao.	-do-	-do-	[illegible]
35	P. Someswara	-do-	-do-	P. Someswara Rao
36	K. Rama ch. Rao.	-do-	-do-	[illegible]
37	Dr. R. N. Murty.	IMFA Thermal	Rayagada	[illegible]
38	R. Ramakrishna.	Kotapeta	VZM.	R. Ramakrishna
39.	S. Shankar Rao.	-do-	-do-	[illegible]
40.	S.S. Mahapatra	Bhawanipatna	Kalahandi	S.S. Mahapatra
41	[illegible] Mohanty	Bh. Patna	Kalahandi	[illegible]
42	[illegible] Ganda	Gopalpur	"	[illegible]
42	Ujala Ganda	"	"	[illegible]
43	Nathuram Patel	"	"	[illegible]
44	Kesab Chattar	"	"	[illegible]
45	[illegible] Ganda	"	"	[illegible] Ganda.
46	[illegible] Majhi	"	"	[illegible]
47	[illegible] Ganda	"	"	[illegible]
48	R. Adinarayana	Sikarpai	Rayagada.	[illegible]
49	[illegible]	[illegible]	Rgda.	[illegible]
50	Rajanikanta Choudhury	Pottangi	Koraput.	[illegible]
51	[illegible]	[illegible]	Rgda.	[illegible]
52	Satya [illegible]	[illegible]	-do-	[illegible]
53	[illegible]	[illegible]	VZM	[illegible]
54	V. Bhaskar Rao	[illegible]	VZM	V. Bhaskar Rao

(2) **Seminar of farmers' representatives**. To get comprehensive information of the historic and current situation and existing problems of local communities, as well as to understand the need and desire of local farmers, a meeting of farmer representatives was held in each selected village. Participants included village headers, farmer representatives, etc. Favorable tree species were also discussed and listed by scoring in the meeting.

Figure H.1.2: Mr.A.K.Sharda, Former Vice President, Raw Material Division, JKPL addressing farmers' sensitization workshop at Rayagada.

Figure H1.3: Farmers' sensitization workshop at Rayagada.

(3) **Questionnaire**: Questionnaires were developed and distributed among different stakeholders, 10-15 households randomly selected from each selected village, local institutions, etc. The questionnaires were collected and analyzed to understand the local socio-economic profiles, land use, land tenure, income and sources, land management ways, awareness, technical know-how, favorable tree species, technical and financial barriers, need and desire of farmers to participate in the proposed A/R CDM project activity. These questionnaires will be made available at the time of validation.

(4) **Interview:** Various stakeholders involved in the proposed A/R CDM project activity were interviewed. 10-15 households randomly selected from each selected village were also interviewed using semi-structured approach.

H .1.2: Secondary stakeholders

The data from the secondary stakeholders was collected during meetings held with the World Bank team during October, 2005 and also during interaction with the Environment Team of the World Bank, New Delhi as part of Environmental Safeguards Review during January, 2006 and August, 2006.

- **Local Forest Departments:** The data from Forest Department was collected from the local offices of the Forest Department..
- **National and Provincial Governments:** The World Bank team obtained the views of National and State governments as part of the due diligence during October 2005 at Delhi and Hyderabad.

H.2. Summary of the comments received:

>>

Comments received from local farmers, villagers and companies/firms, etc. are summarized as below:

1. Primary stakeholders

(1) Farmers/communities

Local farmers/communities expressed their strong interest to participate in the proposed A/R CDM project activity because they thought that through participating in the proposed project activity they could obtain the following benefits:

- ✓ Employment: They do not have to find jobs far away from hometown, and the proposed project activity makes it possible to look after their cropland.
- ✓ Increased revenues from selling wood and non-wood products and carbon credits.
- ✓ Greening their barren lands that can improve local environment, shelter cropland and reduce the impacts of droughts.
- ✓ Improved knowledge of tree planting and forest management methods through technical training.

PRA survey indicates that 80 out of 95 farmer households randomly chosen from 10 villages are willing to participate in the proposed project activity, translating to participation rate of 83%.

During the PRA process, the scoring assessment on tree species also indicated that local farmers/communities prefer tree species that grow fast and have good market, such as *Eucalyptus spp*, *Casuarina*, *Bamboo* etc.

(2) Paper Industry, i.e. JKPL

JK Paper Limited (JKPL) is interested in participating in the proposed A/R CDM project activity. The JKPL would like to facilitate technical support and extension services because:

- ➢ More raw material will be available close to the Mill since they are now transporting significant part of wood from as far as 2000 km from the plant site. The project would reduce the transportation cost of the wood and would lower the GHG emissions associated with transportation of wood.
- ➢ The decision of the Paper Mill to procure at least of part of their raw material requirement through the CDM project supports the farmers' revenues. The Linkages with the farmers gives JKPL an opportunity to win the confidence of the local farmers. The farmers will also be benefited because of the access to high quality clonal seedlings with the buy back arrangement.
- ➢ The improved clones of JKPL contribute to improving the productivity of degraded lands through clonal technology, which ultimately brings them more yields from the unit area.
- ➢ *2. Secondary stakeholders*

(1) Local Forest Departments: Forest Departments in the States of Orissa and Andhra Pradesh view that the proposed A/R CDM project activity will increase forest resources, improve the local environment and increase income of local farmers/communities, as well as demonstrate best practices in plantation management.

(2) National and Provincial Governments: The national and provincial governments consider that the proposed A/R CDM project activity can improve local economy and alleviate poverty, especially for the ethnic minorities, and at the same time contribute to climate change mitigation and biodiversity

conservation. Therefore, the A/R CDM project activity would have great impacts if technical practices developed by the project activity are extended to neighbouring areas or local communities that are not involved in the project.

(3) Downstream communities: Communities at the downstream areas believe that the proposed A/R CDM project activity will improve water quality downstream by reducing soil erosion and provide a good model for land management. However, they will also be advised to avoid slash and burn and overall ploughing for soil preparation because these practices result in severe soil erosion, and to carefully select and use fertilizers and pesticides.

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

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The comments received from the PRA survey were fully taken into account as follows:

- Participation of local farmers/communities and companies/farms is on a voluntarily basis.
- Choice of financing arrangements was based on the preference of local farmers/communities.
- Preferences of local farmers/communities were taken into account in the selection of tree species;
- Most of tree species used are native to local, and a mixed species arrangement is being used.
- Compound and/or organic fertilizers will be applied in *Eucalyptus* plantation through small holes rather than overall dispersion;
- Use of chemical pesticides will be limited. Instead, diseases and pests will be controlled by mixed tree species arrangement and other biological measures;
- Slash and burn site preparation and overall ploughing for soil preparation will not be used.

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

Annex 1

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

Organization:	VEDA Climate Change Solutions Ltd
Street/P.O.Box:	Plot No.48; Mythilanagar Colony,
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City:	Hyderabad
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Represented by:	C.A.Rao
Title:	Managing Director
Salutation:	Mr.
Last Name:	Cheepuri
Middle Name:	
First Name:	Appa Rao
Department:	
Mobile:	00 91 9868758420
Direct FAX:	
Direct tel:	00 91 11 26162723
Personal E-Mail:	vccsl@vccslindia.org

Organization:	JK Paper Ltd Ltd.
Street/P.O.Box:	JK Pur
Building:	
City:	Rayagada
State/Region:	Orissa
Postfix/ZIP:	500007
Country:	India
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FAX:	00 91 6856 222221
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Represented by:	Sunil K.Bhargava
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Salutation:	Mr.
Last Name:	Bhargava
Middle Name:	Kumar
First Name:	Sunil
Department:	Forestry
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Direct FAX:	00 91 6856 233871
Direct tel:	00 91 6856 233601
Personal E-Mail:	sunil_snkb@yahoo.co.in

Organization:	Internaional Bank for Reconstruction and Development as Trustee of Biocarbon Fund
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State/Region:	District of Columbia
Postfix/ZIP:	20433
Country:	USA
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E-Mail:	jchassard@worldbank.org
URL:	www.carbonfinance.org
Represented by:	Ms. Joelle Chassard
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Salutation:	Ms.
Last Name:	Joelle
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State/Region:	Ontario
Postfix/ZIP:	K1A 0G2
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FAX:	1-613-944-0432
E-Mail:	keith.christie@international.gc.ca

URL:	http://www.international.gc.ca/enviro/index.aspx?lang=en
Represented by:	
Title:	Assistant Deputy Minister (Global Issues Branch)
Salutation:	Mr.
Last Name:	Christie
Middle Name:	
First Name:	Keith
Department:	Department of Foreign Affairs and International Trade Canada
Mobile:	
Direct FAX:	1-613-944-2273
Direct tel:	1-613-944-0432
Personal E-Mail:	keith.christie@international.gc.ca

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding involved in the project.

Annex 3

BASELINE INFORMATION

Baseline information was collected using primary and secondary data sources. The primary data covered information on pre-existing vegetation, land use, local ecology and socio-economic conditions in the project area. Secondary data covered information on regional land use agricultural services, local economy, and resource status of local communities.

Primary data

Pre-existing vegetation

Field studies were conducted using sample survey methods. The surveys covered assessments of woody and non-woody vegetation in the six districts of Orissa and Andhra Pradesh. Based on preliminary surveys, two clusters of districts – Koraput, Kalahandi and Rayagada in Orissa; and Srikakulum, Vizianagaram and Vishakapatnam in Andhra Pradesh were categorized into two baseline strata.

Woody vegetation

The baseline surveys indicated that woody vegetation on land parcels is insignificant as lands have been in agricultural use for a long time. The surveys also indicated that there are no significant differences in the pre-existing vegetation of land parcels in the two district clusters of Orissa and Andhra Pradesh.

Non-woody vegetation

Considering that lands have been in agricultural use, no shrub vegetation was observed during field surveys. The surveys indicated only small quantities of grass and herbaceous vegetation. Fresh and dry weight of the herbaceous vegetation was assessed using 1m x 1 m plots laid out randomly in the land parcels. Considering the seasonal nature of herbaceous vegetation, the annual changes in the biomass of herbaceous vegetation are not likely to be significant. The paragraph 35 of the EB42 states that the GHG emissions from the removal of herbaceous vegetation are insignificant and can be neglected in the A/R CDM project activities[15]. Therefore, the carbon stock changes in non-woody vegetation are considered insignificant.

Table A3.1: Survey of Baseline Biomass in the Project Area

District	Sample	Location	Herbaceous vegetation	
			Fresh weight (gm)	Dry weight (gm)
Kalahandi	Sample 1	Bhawanipatna	1030.0	336.0
Koraput	Sample 1	Kakriguma	808.2	129.6
	Sample 2	Laxmipur	756.3	138.9
Rayagada	Sample 1	Lekopai	1012.0	420.0
	Sample 2	Pitamahal	1150.0	390.0

[15] http://cdm.unfccc.int/EB/042/eb42rep.pdf

Srikakulam	Sample 1		637.0	277.0
Visakhapatnam	Sample 1		512.0	266.5
Vizainagaram	Sample 1		703.0	209.6

The baseline surveys indicated insignificant pre-existing vegetation. Considering the similar agro-climatic conditions of the project area, there are also no significant differences in the pre-existing vegetation of the two clusters of districts in Orissa and Andhra Pradesh. Therefore, all the land parcels in the two baseline strata are grouped into **one baseline stratum** and the baseline net GHG removals by sinks of the project are considered zero.

Land use and socio-economic profile

The information on land use and socio-economic profile of the project was obtained using field visits, participatory rural appraisal (PRA) methods and focus group discussions with farmers, community groups and local leaders.

The documentation on PRA and consultations with local stakeholders will be made available at the time of validation.

Secondary data

The secondary data has been obtained from the local land revenue administration and other district level offices.

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Annex 4

MONITORING PLAN

1. Monitoring of the baseline net GHG removals

The baseline carbon stock changes need not be monitored because the accepted baseline approach 22(a) assumes continuation of existing changes in carbon pools within the project boundary from the time of project validation.

2. Monitoring of the proposed A/R CDM project activity

a) Monitoring of the forest establishment

Activities pertaining to forest establishment to be recorded

- Information on planting schedule, location, area and species planted will be recorded in plot journals and archived in the project database
- Information on area planted by year in each stratum as confirmed through field surveys.
- Information on species composition and characteristics of planted species as well as pre-existing vegetation are recorded;
- The characteristics of stand models are recorded in the project database;
- The area and location of supplemental plantings undertaken to fill the gaps is recorded in the project database and identified on the strata maps;

Monitoring of post-planting activities to demonstrate the forest establishment

- Information on climatic extremes that can impact stand establishment and stand growth will be recorded;
- Surveys are conducted annually for first 3-years to evaluate the survival rates and to fill the gaps and survival rates of planted stock should be established by undertaking surveys during the initial establishment period.
- Final survival check is conducted in the permanent sample plots at the end of third year of plantation and survival percent estimated from surveys conducted at the end of 3rd year is recorded in the project database. The survival percent at the end of 3rd year will be reported for verification purposes.
- The number and periodicity of weeding and tending practices and frequency of herbicide use will be monitored and recorded.
- Information pertaining to droughts and floods and other emergencies will be monitored and recorded and the area affected by them will be taken into account the *ex post* calculations of the carbon stock changes.
- In case of fires, the causes, area affected, season and duration of fire occurrence shall be also recorded and the emissions associated with the burning of biomass shall be calculated and accounted as part of project emissions.

b) Monitoring of the forest management

- Information on silvicultural management activities such as thinning, tending, harvesting, and other operations that influence the GHG removals by sinks will be monitored and the information is recorded in the project database.
- Quantity of fossil fuels used in silvicultural operations and other management activities carried out in the project boundary will be monitored and recorded and the quantity of fossil fuels used in the operations will be calculated and archived;
- Information on the occurrence of natural fires or other natural or human induced disturbances and the area and the biomass affected shall be recorded and reported;
- Deviations, if any, in the forest management activities from those outlined in the project design document will be monitored and the reasons for such deviations will be recorded.

3. Monitoring the actual net GHG removals by sinks data

a) Stratification

Post stratification will be conducted to address the possible changes of project boundary and planting scheme in comparison to the outline of the project design. The post-stratification will address the changes in carbon stocks in comparison to the details outlined in the project design. Strata or substrata could be aggregated if they represent similar carbon stock changes. Otherwise, new strata could be defined.

b) Sampling frame and sample size

The combination of three species categories (*Eucalyptus* clonal, *Eucalyptus* seed, and *Casuarina*) and two land parcel sizes (≤ 5 ha and > 5 ha) lead to the identification of **six** project strata.

1. *Eucalyptus* clonal in land parcels ≤ 5 ha
2. *Eucalyptus* seed route in land parcels ≤ 5 ha
3. *Casuarina* in land parcels ≤ 5 ha
4. *Eucalyptus* clonal in land parcels > 5 ha
5. *Eucalyptus* seed route in land parcels > 5 ha
6. *Casuarina* in land parcels > 5 ha

A total of 45 sample plots distributed over six strata would be used to monitor the project. The distribution of plots across the strata is presented in the table below. The details of sample size calculation are presented in **Annex 6** of the PDD.

Table 1: Sample plot distribution

	Land parcels ≤ 5 ha			Land holding > 5 ha			Total
	Eucalyptus (clone)	*Eucalyptus* (seed)	*Casuarina*	*Eucalyptus* (clone)	*Eucalyptus* (seed)	*Casuarina*	
Sample plots	**27**	**9**	**23**	**22**	**1**	**8**	**90**

The sample plots are rounded to the nearest integer. The sample size calculation is based on a standard deviation of 33% for the aboveground biomass of Eucalyptus and 33% for the aboveground biomass of *Casuarina.* If further variation in the standard deviation is observed during the measurement campaign, the number of plots would be recalculated.

c) Location of sampling plots

The permanent sample plots will be located systematically with a random start, which is considered good practice in GPG-LULUCF. This can 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. The sampling plots will be distributed randomly and evenly.

The centers of the circular permanent sample plots are marked to facilitate the measurement of trees located on the plot at each inventory and subsequent inventories. The precise location of plots is recorded, as they would need to be identified at the subsequent verification.

Collection of fodder is expected to be of similar intensity over the whole project lifetime. Furthermore, there is no danger of unfavorable coincidence of monitoring and harvest activities.

d) Frequency of monitoring

Monitoring is planned at five-year intervals during the crediting period.

e) Data on tree vegetation parameters for calculation of above ground tree biomass

Carbon stock changes over time will be estimated using data for biomass growth. The biomass growth will be calculated as a function of volume growth.

The biomass estimation consists of the following steps:

1) Determination of the location of sample plots.
2) Separately for each species present in the sample plot, measurement of DBH of all trees with DBH greater than 2.5 cm .
3) Calculation of mean diameter per species to assess the volume.
4) For each species, the heights of trees are measured and average height is calculated.
5) For each species, height class is assessed (according to species, mean diameter and average height).
6) The volume per tree of the aboveground biomass corresponding to average diameter is assessed from the allometric equation/yield table.
7) For each species, the volume is multiplied by number of trees on the sample plot to obtain volume per sample plot.
8) Volume per plot is calculated as a product of volume per hectare and area of the plot.

g) Procedures for measurement of tree biomass

Tree diameter

The diameter of a tree is measured at breast height (1.37 m). The measurement is rounded down to full centimeters. The minimum diameter to be measured is 2.5 cm.

Tree height

For each site, yield class will be determined by measuring tree heights. If the heights of several trees are the same, one measurement can be used for several trees.

h) Procedures for maintenance of equipment used in vegetation measurement

The common procedures to be followed in the maintenance of equipment used in vegetation measurement are outlined below. In case no ready guidance is available on the procedures, the recommendations of local forest management agency will be followed.

- When compass is used in the field, it is calibrated to compensate for the local difference between magnetic and true north (magnetic declination) and adjustment is completed in order to facilitate the recording of accurate bearing.

- It is recommended to use DBH tapes made of steel or aluminum, and cloth tapes should be avoided considering their propensity for wear and tear that could result in measurement inaccuracies.

- Pacing can be useful to establish the relationship between map and photo information with the measurements on the ground. One step represents half of a pace and two steps equal one pace. Therefore, crew should be trained in pacing on flat ground.

Field recording of vegetation measurement data

The formats will be followed for recording and reporting vegetation measurement data. The formats outlined at the end of this monitoring plan illustrate the details that would be collected during plot measurements

i) Calculation of volume

Volume estimation of *Eucalyptus* & *Casuarina* are based on past measurements in the region. Data on mean annual increment (MAI) of the species planted in the project has also been sourced from peer reviewed scientific publications and will be made available at the time of validation.

j) Calculation of carbon stock and carbon stock change

Data to assess the change in aboveground carbon stock would be based on the biomass measurements of permanent sample plots. Carbon stock changes over time will be calculated using data on biomass growth.

From the volume of trees, carbon stock in CO_2will be calculated (density, CF, BEF, CO_2/C).

The method applied for measuring and estimating carbon stock change over time in the project area is a net method thus all biomass decrements resulting from silvicultural activities or fodder collection, etc. are implicitly covered.

4. Monitoring GHG emissions by sources as the results of the A/R CDM project activity

There are no significant GHG emissions associated with the implementation of the project as there is no biomass burning involved in the site preparation and as planting activities are carried using manual methods, emissions from the use of fossil fuels are expected to be insignificant. Therefore $\mathbf{GHG_E}$ are expected to be insignificant.

When machinery or vehicles are used in the project activities, the following information will be recorded.

- Categories of vehicle and machinery used in the project along with technical and operational efficiency characteristics.
- Amount of fuel use in each type of vehicle, machinery and equipment for completing unit project activity
- Quantity of fuel use in the site preparation, nursery and planting stock development
- Assumptions and default parameter values on GHG emissions from burning fossil fuels

Procedures for emergency preparedness for cases where emergencies could cause unintended emissions

- *Procedures to assess the GHG emissions due to fire in the boundary*

  The project would consider the inputs of local communities in implementing the fire management plan. The fire prevention measures such as establishment of fire lines, reduction of fuel load, clearance of brushwood and dry vegetation close to the project parcels would be implemented.

  In case of accidental fires, the area and carbon stock affected would be assessed using surveys. The procedures used for calculation of GHG emissions from natural fires would be adopted to account the project emissions and recorded in the project database.

  Step 1: The area subjected to biomass burning would be assessed using sampling methods and/or field survey methods and recorded in the project database.

  Step 2: The amount of non-CO_2 emissions is assessed based on the CO_2 emissions from biomass burning, therefore, CO_2 emissions from biomass burning would be estimated as precursor to the estimation of non-CO_2 emissions.

  Step 3: Data on combustion efficiencies are adopted from the Tables 3A.1.12, 3A.1.14 GPG/LULUCF) and data on emission factors of non-CO_2 gases are adopted from Tables 3.A 15 and 3.A.16 of GPG-LULUCF to estimate the emissions. The mean emission factors of CH_4 (0.012) and N2O (0.007) released from biomass burning should be used.

- *Procedures to assess the impact of pest infestation on the carbon stock of the project*

In case of pest damage, monitoring team would assess the area affected and the carbon stock of the pest affected area and implement pest management measures to minimize negative impacts on the remaining carbon stock in the project boundary and to prevent the spread of infestation to areas outside project boundary.

- *Impact of weather related natural hazards on carbon stocks in the project boundary*

  Procedures would be implemented to assess the weather related natural hazard events such as droughts and floods in the project area and survival of plantations in the affected areas. The data from field surveys of the affected areas would be used to assess the impact of droughts and floods on the carbon stock of the project.

5. Monitoring the leakage

a) Displacement of grazing and other economic activities

The displacement of grazing is not expected to occur as a result of the project. Moreover, additional fodder would be available in the project area. Therefore, there is no risk of leakage from grazing and fodder collection. As the project produces more fuelwood in comparison to the baseline, therefore, there is also no risk of fuelwood leakage.

6. Quality Assurance and Quality Control (QA/QC)

To ensure that the net anthropogenic GHG removals by sinks are measured and monitored precisely, credibly, verifiably and transparently, a quality assurance and quality control (QA/QC) procedure will be implemented,

a) Reliable field measurements

To ensure the reliable field measurements,

- Standard Operating Procedures (SOPs) for each step of the field measurements, including all detail phases of the field measurements and provisions for documentation for verification purposes are proposed in this document and they will be adjusted periodically.
- Training courses on the field data collection and data analyses would be held for persons involving in the field measurement works. The training courses will ensure that each field-team member is fully aware of all procedures and the importance of collecting data as accurately as possible.

b) Verification of field data

To verify that plots have been installed and the measurements taken correctly,
- Randomly selected plots will be re-measured by teams other than those involved in the prior plot measurements
- Key re-measurement elements include the location of plots, DBH and tree height.
- The re-measurement data will be compared with the original measurement data. Errors assessed in the prior measurements will be corrected and recorded and would be used to calculate the measurement error.

c) Verification of data entry and analysis

To minimize the possible errors in the process of data entry, the entry of both field data and laboratory data will be reviewed by an independent expert team and compared with independent data to ensure that the data is realistic. Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed.

d) Data maintenance and archiving

Data archiving will take both electronic and paper forms, and copies of all data will be provided to each project participant. All electronic data and reports will also be copied on durable media such as CDs and copies of the CDs are stored in multiple locations. The archives include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheet;
- GPS coordinates and other spatial data;
- Estimates of the carbon stock changes in all pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- Copies of the measuring and monitoring reports.

7. Monitoring of socioeconomic issues

In the years of project verification, the project monitoring unit will fill in a questionnaire on the socioeconomic issues relevant to the project. The project monitoring would also consider the socioeconomic factors that influence the status of carbon pools.

8. Collection of project data and information

Following details are proposed to be collected under the monitoring plan for the project activity

Table 2: Data collected from the farmers enrolled in the project activity

A	**Infomation on the participating farmer**		
S.No.	**Item**	**Data**	**Remarks**
1	Name of Farmer		Full name including family name
2	Address		
3	H.No.		
4	Village		
5	Mandal /Block		
6	District		
7	Pin code		
8	Phone, if any.		
B	**Information on land tenure**		
1	Area (ha)		1 ha = 2.5Acres
1a	Proof of ownership		Pattadar Pass Book, Pahani, separation deed, lease right, family member etc
2	Survey No.		

2a	Survey map/ Cadastral information		
3a	Longitude		
3b	Latitude		
4	Type of land		
4a	Land surface (plane/slope)		
4b	Soil type (alluvial/laterite/ sandy loam/sandy)		
5 a	Was the land covered with forest in 1989/90 (crown cover of 15%, with trees > 5 Mt.)	No (default)	
5b	Was the land forested for 50 years before now(crown cover of 15%, with trees > 5 Mt.)	No (default)	Statement of Yes/ No is adequate
6	Existing land use (agri/fallow)		
6a	If, Agri, which crops, in last three years		
6b	If Fallow, how many years		
7	Rainfed/ Irrigation		
7a	If irrigated; well/canal		
7b	Type of irrigation (flood/drip)		
7c	Source of power for irrigation (electricity/diesel)		
8	Baseline digital photograph: (yes/no)		If GPS Camera is used (Make/model)
9	Whether any shrubs and grasses need to be cleared for plantation		
10	Is the land used at present for grazing (If yes, how much fodder is produced or no. of animals grazed and for how many days in a year.		Yes/ No
11	Trees present, No. species wise, DBH		

Table 3: Data on land preparation and planting

C	**Land preparation**		
S.No.	**Item**	**Data**	**Remarks**
1	Shrubs and grass patches cleared ; Qty in Kgs,		
1a	Are the shrubs and herbs disposed by burning (yes/no)		
2	Any trees cleared (yes/no)		
3	Pit digging; manually or		

	mechanically		
4	If Mechanically, time used, Make or Model of machine		
5	Type of Species planted		
6	Spacing		
7	Number of plants per ha		
8	Seedling transport distance in km		
9	Mode of transport (truck/ LCV/ tractor/ bullock cart)		

Table 4: Survival data

D	**Survival**		
S.No.	**Item**	**Data**	**Remarks**
1	Year and month of survey		
2	Mortality (yes/no)		
3	If yes, number/ha		
4	Replacement with new plants; if yes, number/ha.		
5	Survival percent		
	Year 1		
	Year 2		
	Year 3		

Table 5: Sample plot details

E	**Sample plot ID**		
S.No.	**Item**	**Data**	**Remarks**
1	Size of plot (in LXB in meters)		
2	Date of demarcation		
3	Demarcated by		
4	No. trees in Sample plot		
5	Longitude of sample plot		
6	Latitude of sample plot		
7	DBH of trees in sample plot		
7a	Species		
7a(i)	DBH of tree no.		
7a(ii)	DBH of tree no.		
8	Height of trees in sample plot		
8a	Species		
8a (i)	Height of tree no…		
8a(ii)	Height of tree no…		

Annex 5

Summary List of land parcels

Sl	Name of the District	No. of Land parcels	PRA done	List of participating Villages
1	Rayagada	290	10	98
2	Kalahandi	345	07	99
3	Koraput	136	10	38
4	Visakhapatnam	253	06	70
5	Vizianagram	610	07	186
6	Srikakulam	627	07	135
7	Total	**2261**	47	626

Annex 6

Calculation of Sample Size for Monitoring of the Project

Enclosed as separate file

Annex 7

Calculation of GHG Removals by Sinks

Enclosed as separate file

Annex 8

Participatory Rural Appraisal

Procedure followed and data collected through PRA exercise:

1) Social Mapping of the Village/ Project areas.
2) Important events & current human intervention in the project land.
3) Project area stratifications.
4) Land use pattern & land cover history.
5) Choice of species by ranking analysis.
6) Trend Analysis of Land for last 20 Years.
7) Trend Analysis of Agricultural Crops for last 20 years.
8) Route Cause analysis for changing over of cropping pattern by the villagers.
9) Cattle Population in the village & it's trend analysis for last 20 years.
10) Fire wood requirement by the villagers and its fulfilment by different kinds of woods/ branches etc.

Annex 9

List of participating villages in the project

S.NO	Village	Mandal	District
1	Kundabandha	Kesinga	Kalahandi
2	Boringpadar	Kesinga	Kalahandi
3	Gaigaon	Kesinga	Kalahandi
4	Kauguda	Lanjigarh	Kalahandi
5	Sikarkupa	Lanjigarh	Kalahandi
6	Gopalpur	Lanjigarh	Kalahandi
7	Bankel	Lanjigarh	Kalahandi
8	Telapada	Narla	Kalahandi
9	rupra road	Narla	Kalahandi
10	Bhawanipatna	Bhawanipatna	Kalahandi
11	Mahijore	Bhawanipatna	Kalahandi
12	Pokhrighat	Bhawanipatna	Kalahandi
13	Mali para	Bhwanipatna	Kalahandi
14	Baddli	Bhwanipatna	Kalahandi
15	Kuten padar	Bhwanipatna	Kalahandi
16	Bhawanipatna	Th Rampur	Kalahandi
17	Balarampur	Bhawanipatna	Kalahandi
18	Kenduguda	Bhawanipatna	Kalahandi
19	Dhadal	Bhawanipatna	Kalahandi
20	Behera guda	Bhawanipatna	Kalahandi
21	Bhatagpadar	Bhawanipatna	Kalahandi
22	Sardapur	Bhawanipatna	Kalahandi
23	Gopita	Bhawanipatna	Kalahandi
24	Laxmipur	Bhawanipatna	Kalahandi
25	Thuapadar	Bhawanipatna	Kalahandi
26	Kusumakhuti	Bhawanipatna	Kalahandi
27	Dumerhal	Bhawanipatna	Kalahandi
28	Dekot	Golamunda	Kalahandi
29	Golamunda	Golamunda	Kalahandi
30	Kulerguda	Golamunda	Kalahandi
31	Leter	Golamunda	Kalahandi
32	Polihariguda	Dharmagarh	Kalahandi

33	Kurlubhata	Deapur	Kalahandi
34	Gidmal	Narla	Kalahandi
35	Judabandh	Narla	Kalahandi
36	Judabandh	Kesinga	Kalahandi
37	Kendupadar	Kesinga	Kalahandi
38	Muskuti	Kesinga	Kalahandi
39	Kuten	Kesinga	Kalahandi
40	Chicharala	Kesinga	Kalahandi
41	Gaidar	Kesinga	Kalahandi
42	Gobardhanpur	Lanjigarh	Kalahandi
43	Paidmal	Lanjigarh	Kalahandi
44	Kakiriguma	Laxmipur	Koraput
45	Goudaguda	Laxmipur	Koraput
46	Tunpar	Laxmipur	Koraput
47	Toyaput	Laxmipur	Koraput
48	Kakirigumma	Laxmipur	Koraput
49	Khudipadar	Laxmipur	Koraput
50	Omlabadi	Laxmipur	Koraput
51	Bandikar	Laxmipur	Koraput
52	Uppar Kudinga	Kashipur	Koraput
53	Bankem	Kashipur	Koraput
54	Tikiri	Kashipur	Koraput
55	Maharajguda	Kashipur	Koraput
56	Poliandi	Kashipur	Koraput
57	Neelabadi	Bandhugaon	Koraput
58	Majhihalama	Bissam Cuttack	Rayagada
59	Sonabrundabadi	Bissam Cuttack	Rayagada
60	Bhatapur	Bissam Cuttack	Rayagada
61	Rata Tikiri	Bissam Cuttack	Rayagada
62	Durgi	Bissam Cuttack	Rayagada
63	Thangapada	Bissam Cuttack	Rayagada
64	Bondili	Bissam Cuttack	Rayagada
65	Muniguda	Bissam Cuttack	Rayagada
66	Chekaguda (Rayagada)	Rayagada	Rayagada
67	Kotovalasa	Rayagada	Rayagada
68	K.Jimidi	Rayagada	Rayagada
69	Rayagada	Rayagada	Rayagada
70	Kumudabali (Muniguda)	Muniguda	Rayagada
71	Bhairagada	Muniguda	Rayagada

72	Kutragada	Muniguda	Rayagada
73	Bada Augulo	Muniguda	Rayagada
74	Pandarimunda	Muniguda	Rayagada
75	Telengapadar	Muniguda	Rayagada
76	J.K.Pur	Ramanaguda	Rayagada
77	Eduruvalasa	Ramanaguda	Rayagada
78	Subhadrapur	Ramanaguda	Rayagada
79	Ukkamba	Ramanaguda	Rayagada
80	J.K.Pur	Padmpur	Rayagada
81	Bondili	Chandrapur	Rayagada
82	Pedalekapai	Kolnora	Rayagada
83	Lekapai	Kolnora	Rayagada
84	Panasaguda	K Singpur	Rayagada
85	Jagannathpur	K Singpur	Rayagada
86	Dhepaguda	K Singpur	Rayagada
87	Bikrampur	Gunupur	Rayagada
88	Bathili	Gunupur	Rayagada
89	Sirigholi	Gunupur	Rayagada
90	Bharsingi	Gunupur	Rayagada
91	Irrigation Colony	Gunupur	Rayagada
92	Panasaguda	Gunupur	Rayagada
93	Gudari	Gudari	Rayagada
94	Muniguda	Muniguda	Rayagada
95	Dangubadi	Muniguda	Rayagada
96	Dakbhata	Muniguda	Rayagada
97	Deokupuli	Muniguda	Rayagada
98	Dhobagudi	Muniguda	Rayagada
99	P.Ambadolla	Muniguda	Rayagada
100	Ambadolla	Muniguda	Rayagada
101	Nalapandugad	Ramanaguda	Rayagada
102	Onoding	Ramanaguda	Rayagada
103	Barijhola	Rayagada	Rayagada
104	Tikarapada	Rayagada	Rayagada
105	Birnarayanapur	Rayagada	Rayagada
106	Chekaguda	Rayagada	Rayagada
107	Rait Colony	Rayagada	Rayagada
108	Singanapur	Rayagada	Rayagada
109	Kuljingi	Rayagada	Rayagada
110	Rayagada	K Singpur	Rayagada

111	Santa Badigaon	Kolnora	Rayagada
112	Pujariguda	Kolanara	Rayagada
113	B.Gatiguda	Bissam Cuttack	Rayagada
114	Lelibadi	Bissam Cuttack	Rayagada
115	Gobhum	G.Sigatam	Srikakulam
116	Mettavalasa	G.Sigatam	Srikakulam
117	Naveni	Bamini	Srikakulam
118	Liviri	Bamini	Srikakulam
119	Ganasan	Bamini	Srikakulam
120	Pasigidi	Bamini	Srikakulam
121	Positi	Bamini	Srikakulam
122	Pogiri	Rajam	Srikakulam
123	Bagirahipuram	Etcherla	Srikakulam
124	O.A.Agraharam	Etcherla	Srikakulam
125	Ramajogi Peta	Etcherla	Srikakulam
126	R.J.Peta	Etcherla	Srikakulam
127	Koyam	Etcherla	Srikakulam
128	B.R.Puram	Etcherla	Srikakulam
129	Darmavaram	Etcherla	Srikakulam
130	S.S.R.Puram	Etcherla	Srikakulam
131	Nandigam	Etcherla	Srikakulam
132	Vaspa	Kohium	Srikakulam
133	Nivagar	Kohium	Srikakulam
134	Matvala	Kohium	Srikakulam
135	Gumadam	Laveru	Srikakulam
136	P.Kottapalli	Laveru	Srikakulam
137	Gumodam	Laveru	Srikakulam
138	Kottakita	Laveru	Srikakulam
139	Sri Kakulam	Laveru	Srikakulam
140	Kotapalam	Ramarthalam	Srikakulam
141	Makavarao	Kutigam	Srikakulam
142	K.Rayana	Kutigam	Srikakulam
143	Botigoan	Kothuru	Srikakulam
144	Tulugu	Gara	Srikakulam
145	Narasannapeta	Adapaka	Srikakulam
146	D.K.Patnam	Parvathipuram	Srikakulam
147	A.Venkampeta	Makua	Srikakulam
148	Barli	Baljipeta	Srikakulam
149	Dalipeta	Ponduru	Srikakulam

150	Tandigam	Ponduru	Srikakulam
151	Ajjaram	Etherla	Srikakulam
152	K Peta	Laveru	Srikakulam
153	Devarapalli	Ranastallum	Srikakulam
154	Nizamabad	Gara	Srikakulam
155	K. Valampeta	Gara	Srikakulam
156	Baravanipeta	Gara	Srikakulam
157	Peddatelugu	Gara	Srikakulam
158	Jofrabad	Gara	Srikakulam
159	Kasipuram	Kothuru	Srikakulam
160	Guranti	Kothuru	Srikakulam
161	Narasigatta	Kothuru	Srikakulam
162	Basigam	Kothuru	Srikakulam
163	Mathala	Kothuru	Srikakulam
164	Jarajam	Etcherla	Srikakulam
165	W/P 547	Etcherla	Srikakulam
166	W/P 531	Etcherla	Srikakulam
167	Srikakulam	Etcherla	Srikakulam
168	D.Varam	Etcherla	Srikakulam
169	Tangivanipeta	Etcherla	Srikakulam
170	Etcherla	Etcherla	Srikakulam
171	Chinna Rao Palli	Etcherla	Srikakulam
172	M.Valasa	G.Sigadam	Srikakulam
173	Nararannapeta	Laveru	Srikakulam
174	Lopenta	Laveru	Srikakulam
175	Gara	Ponduru	Srikakulam
176	K.Kurmayyapeta	Kuppili	Srikakulam
177	Sri Kakulam	Boorja	Srikakulam
178	Sri Kakulam	SKLM	Srikakulam
179	Nakkana Peta	P.P. Rega	Vizianagaram
180	Ramudupeta	P.P. Rega	Vizianagaram
181	Krishnapuram	P.P. Rega	Vizianagaram
182	Pathivada	P.P. Rega	Vizianagaram
183	L.P.Palem	P.P. Rega	Vizianagaram
184	Govindapuram	P.P. Rega	Vizianagaram
185	Pinatarini	P.P. Rega	Vizianagaram
186	Rayudupeta	P.P. Rega	Vizianagaram
187	Barnikam	P.P. Rega	Vizianagaram
188	Pinatarimi	Nellimerla	Vizianagaram

189	Kothapeta	Nellimerla	Vizianagaram
190	Podhivada	Nellimerla	Vizianagaram
191	Sathivada	Nellimerla	Vizianagaram
192	Karlam	Mukamtilam	Vizianagaram
193	G.Malagan	Chipapalli	Vizianagaram
194	ittahulagalli	Chipapalli	Vizianagaram
195	Ch.N.Palli	Chipapalli	Vizianagaram
196	Gachavalsa	Chipapalli	Vizianagaram
197	Pulikavalsa	Chipapalli	Vizianagaram
198	P.Nadipalli	Chipapalli	Vizianagaram
199	M.Ravivalasa	Merkamtgan	Vizianagaram
200	Garbham	M.Mudhidan	Vizianagaram
201	Kowstapalli	D.Rajjam	Vizianagaram
202	Narsipuram	Parvathipuram	Vizianagaram
203	H. Karsavalasa	Parvathipuram	Vizianagaram
204	Paravatipuram	Parvathipuram	Vizianagaram
205	Sitanagaram	Parvathipuram	Vizianagaram
206	S.Nagaram	Parvathipuram	Vizianagaram
207	Nitikavalasa	Parvathipuram	Vizianagaram
208	Sangamvalasa	Parvathipuram	Vizianagaram
209	Bobbli	Parvathipuram	Vizianagaram
210	Mulaga	Parvathipuram	Vizianagaram
211	Pitlavalasa	Parvathipuram	Vizianagaram
212	Krishnapuram	Seethanagaram	Vizianagaram
213	Bobbli	Seethanagaram	Vizianagaram
214	Tenali	Seethanagaram	Vizianagaram
215	Tenubi	Seethanagaram	Vizianagaram
216	Rangampeta	Seethanagaram	Vizianagaram
217	Bokupeta	Seethanagaram	Vizianagaram
218	Kesavalasa	Salur	Vizianagaram
219	Gurupuvalasa	Salur	Vizianagaram
220	Dathivalasa	Salur	Vizianagaram
221	Peddapotam	Salur	Vizianagaram
222	Bobbli	Salur	Vizianagaram
223	Bhogavalasa	Salur	Vizianagaram
224	Salur	Salur	Vizianagaram
225	VSKP	Salur	Vizianagaram
226	Gangathavalsa	Salur	Vizianagaram
227	D.Bachinpeta	Salur	Vizianagaram

228	Manapalli	Salur	Vizianagaram
229	Manchvalsa	Salur	Vizianagaram
230	Komavalsa	Salur	Vizianagaram
231	Mettavalsa	Salur	Vizianagaram
232	Maripalli	Salur	Vizianagaram
233	Ponkuvalasa	Baljipeta	Vizianagaram
234	Panakavalasa	Baljipeta	Vizianagaram
235	Parvatipuram	Baljipeta	Vizianagaram
236	Gopaluripeta	Bobbili	Vizianagaram
237	Bobbli	Bobbili	Vizianagaram
238	Komatapalli	Bobbili	Vizianagaram
239	Busaivalasa	R.B. Puram	Vizianagaram
240	Anakapeta	RB Puram	Vizianagaram
241	Arikathota	RB Puram	Vizianagaram
242	Parasdhi	RB Puram	Vizianagaram
243	I.Manetipilli	RB Puram	Vizianagaram
244	RB Puram	RB Puram	Vizianagaram
245	Basigaon	Kothavalasa	Vizianagaram
246	Garla	Garla	Vizianagaram
247	Suvarnapeta	Nellimarla	Vizianagaram
248	Tompalapeta	Nellimarla	Vizianagaram
249	Ramalingapuram	Cheepurupalli	Vizianagaram
250	Yelakabpeta	Cheepurupalli	Vizianagaram
251	Cheepurupalli	Cheepurupalli	Vizianagaram
252	Garguvilli	Cheepurupalli	Vizianagaram
253	Pothayyapalem	Denkada	Vizianagaram
254	Manapuram	Datirajeru	Vizianagaram
255	Bilalavalasa	Datirajeru	Vizianagaram
256	Garbham	Datirajeru	Vizianagaram
257	Chouduvada	P.P.Rega	Vizianagaram
258	Kumili	P.P.Rega	Vizianagaram
259	Salur	Posipenta	Vizianagaram
260	Visakhapatnam	B.Rajam	Vizianagaram
261	Tenduvalasa	Makam	Vizianagaram
262	Tenduluri	Makkum	Vizianagaram
263	VSKP	Makkum	Vizianagaram
264	Makkum	Makkum	Vizianagaram
265	VZM	Makkum	Vizianagaram
266	Lovasin	Makkum	Vizianagaram

267	Bobbili	P.Puram	Vizianagaram
268	D K Patum	P.Puram	Vizianagaram
269	VSKP	Metasa	Vizianagaram
270	Srikakulam	Pachiperta	Vizianagaram
271	Parvatipuram	Pachiperta	Vizianagaram
272	N Valasa	Pachiperta	Vizianagaram
273	Nilakunta	Pachiperta	Vizianagaram
274	Mosuru	Pachiperta	Vizianagaram
275	Manta	Pachiperta	Vizianagaram
276	Verasagaram	Badangi	Vizianagaram
277	Garugabilli	Anantagiri	Vizianagaram
278	Gopalraopeta	G Peta	Vizianagaram
279	Ch Bantipalli	Gorla	Vizianagaram
280	Maruti	Salur	Vizianagaram
281	Sitanagaram	Makua	Vizianagaram
282	Chakravalsa	Pachipenta	Vizianagaram
283	S.Kota	Vemulapalli	Vizianagaram
284	Bondapalli	Veduruvada	Vizianagaram
285	Bondapalli	Maruvada	Vizianagaram
286	Gantyada	Budatanapalli	Vizianagaram
287	Bondapalli	G.P.Agraharam	Vizianagaram
288	Gantyada	Kotha Velagada	Vizianagaram
289	Gantyada	China Manapuram	Vizianagaram
290	Arakuvalley	Gadyaguda	Vizianagaram
291	Arakuvalley	Similiguda	Vizianagaram
292	Arakuvalley	Kappalagondi	Vizianagaram
293	Arakuvalley	Kodipunjuvalasa	Vizianagaram
294	Therlam	Amity	Vizianagaram
295	Therlam	Kavirayanivalasa	Vizianagaram
296	Therlam	Sathivada	Vizianagaram
297	Therlam	Locharla	Vizianagaram
298	Gantyada	Budathanapalli	Vizianagaram
299	Galibhimavara	Subbavaram	Vishakapatnam
300	Askapalli	Subbavaram	Vishakapatnam
301	Paidivada	Subbavaram	Vishakapatnam
302	Pendurti	Subbavaram	Vishakapatnam
303	Logisetty Palem	Subbavaram	Vishakapatnam
304	Jagannathapurm	Subbavaram	Vishakapatnam
305	Gotiwada	Subbavaram	Vishakapatnam

306	Juthada	Bheemunipatnam	Vishakapatnam
307	Juthada	Pendurti	Vishakapatnam
308	Anakapalli	Pendurti	Vishakapatnam
309	Juthada	Denkada	Vishakapatnam
310	Anakapalli	Anakapalli	Vishakapatnam
311	Pendurti	Anakapalli	Vishakapatnam
312	Rajanna Palem	Atchthupuram	Vishakapatnam
313	Nandigama	Bhogapuram	Vishakapatnam
314	Chinthalapalem	Kothavalasa	Vishakapatnam
315	Alamanda	Jami	Vishakapatnam
316	P.M. Valasa	Paravada	Vishakapatnam
317	Cetupalli	Narsipatnam	Vishakapatnam
318	Gabbada	Narsipatnam	Vishakapatnam
319	Juthada	Anandapuram	Vishakapatnam
320	Gabbada	Gabbada	Vishakapatnam
321	Anakapalli	Pedamushridivada	Vishakapatnam
322	Visakhapatnam	Atchuttapuram	Vishakapatnam
323	Visakhapatnam	Bhimunipatnam	Vishakapatnam
324	Gummakota	Anattagiri	Vishakapatnam
325	Puthikovalasa	Anattagiri	Vishakapatnam
326	Billakota	Anattagiri	Vishakapatnam
327	Dindivalasa	Anattagiri	Vishakapatnam
328	Koruduvalasa	Anattagiri	Vishakapatnam
329	Ippalavalasa	Anattagiri	Vishakapatnam
330	Singavaram	Anattagiri	Vishakapatnam
331	Terravaram	Yerravaram	Vishakapatnam
332	Visakhapatanam	Charumumpath	Vishakapatnam
333	Bakkannpalum	Visakhapatnam-Rural	Vishakapatnam

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

History of the document

Version	Date	Nature of revision
04	EB35, Annex 20 19 October 2007	• 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

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