Monitoring report form for CDM project activity (Version 06.0)

Complete this form in accordance with the Instructions attached at the end of this form.

MONITORING REPORT		
Title of the project activity	Small scale Obra JFM A/R CDM Project on degraded lands in Obra Forest Division, Uttar Pradesh, India.	
UNFCCC reference number of the project activity	10213	
Version number of the PDD applicable to this monitoring report	03	
Version number of this monitoring report	Version 06	
Completion date of this monitoring report	27/06/2018	
Monitoring period number	01	
Duration of this monitoring period	01/01/2012 to 06/06/2016 (1619 days) (Both Days Included)	
Monitoring report number for this monitoring report	N/A	
Project participants	M/s Divisional Forest Officer (DFO), Obra Forest Division, Uttar Pradesh	
Host Party	India	
Sectoral scopes	Sectoral scope 14: Afforestation and Reforestation	
Applied methodologies and standardized baselines	AR-AMS0007: "Afforestation and reforestation project activities implemented on lands other than wetlands", Version 03.0	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 01 January 2013	Amount achieved from 01 January 2013
	0	**9201 tCO_2e**
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	**14,035 tCO_2t**	

SECTION A. Description of project activity

A.1. General description of project activity

The proposed SSC A/R CDM (Small Scale Afforestation Reforestation Clean Development Mechanism) project activity was implemented by the local communities represented by ten (10) Joint Forest Management Committees (JFMC) of Obra forest division in the state of Uttar Pradesh, India.

The SSC A/R CDM project activity was implemented on the severely degraded forest lands of the Obra Forest Division. The project sites have faced significant ecological degradation, run-off of fertile soil and biodiversity loss. These sites are characterized by rocky undulating terrains, scanty water resources and low fertile top soil cover. Therefore, to restore these degraded lands the Joint Forest Management Committees (JFMCs) along with Forest Department have established the proposed SSC A/R-CDM plan on these lands through a larger scheme titled “Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (UP PFMPAP)” funded by Japan International Cooperation Agency (JICA) as a loan to the Government of India. The UP-PFMPAP is under implementation in the twenty forest divisions of the Uttar Pradesh State in which Obra forest division is one of them.

Purpose of the A/R CDM project activity

The major aims of the proposed SSC A/R CDM project activity are to enhance the forest cover, improve local livelihood opportunities, and adopt sustainable forest management practices through JFM activities.

Brief description of the installed technology and equipment

The selected area under the project activity was degraded and abandoned for past many decades. The extremely low productivity deterred the Forest Department from taking up plantations over these lands for at least past three decades.

The small scale A/R CDM project activities were strictly adhered to promote Sustainable Forest Management (SFM) through involving local communities as per the SOP (Standard Operating Procedure). The SSC A/R CDM Project activity covers ten village forests. Total 24 native tree species (18 species mentioned in the registered PDD and 6 other species) were planted across ten selected village forest areas of the project. Although, only those species with more than 2 meters in height and more than 10 cm in GBH were taken into consideration for the CER calculations. All the JFMCs carried out standard forestry techniques like sowing of seeds, pit digging, planting, weeding and mortality replacement as recommended by the State Forest Department. These activities were carried out with the help of human labour to avoid project emissions and also to meet the objectives of employment generation for local communities. The project activities focus on women empowerment, training and capacity building of front line forest staff, JFMC members, Forest User Groups (FUGs), and Self Help Groups (SHGs).

Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)

The plantation activities were carried out in two phases i.e. the first phase of 210.70 ha was completed in the year 2012 and the second phase of 116.02 ha was completed in the year 2013. Total project area is 326.72 ha area.

Total net GHG removals by sinks achieved in this monitoring period is **9201 tCO_2-e**

A.2. Location of project activity

Host Party

India

Region/State/Province etc.

Region: Northern Region of India

State: Uttar Pradesh

District: Sonbhadra

City/Town/Community etc.

City: Obra

Town: Obra

Communities:Villages represented by the following Joint Forest Management Committees (JFMCs):

S. No.	JFMC
1	Kota
2	Sinduriya
3	Bardiya
4	Parsoitola
5	Bairpur
6	Nadehari
7	Padrachh
8	Gidhiya
9	Kanhara
10	Semia

Physical/geographical location

The SSC A/R CDM project is implemented in 326.72 hectares of land in 10 villages across Obra Forest Division in Uttar Pradesh. Out of which 210.70 ha area was taken up for reforestation in 2012 while, 116.02 ha area was taken in 2013 for reforestation under the project activity in June 2012. The Obra Forest Division is situated between Latitude 24º17'to 24º 32' N and Longitude 82º42' to 83º 31' E, surrounded by Sonbhadra and Mirzapur Forest Divisions in the North, Bihar state in the East, Renukoot Forest Division in the South and Madhya Pradesh state in the West. Major part of the forest area falls on either side of the river Sone. The Obra town is well connected to Renukoot by the Lumbini-Doodhi State Highway. Major cities close to the Obra town are Mirzapur, Varanasi and Allahabad, which are at the distance of 118, 133 and 217 km respectively.

The geographical co-ordinates of the boundaries of each discrete project site were taken using the Global Positioning System (GPS).Each discrete project site is coded with first two letters indicating forest range, next three digits indicate the JFMC code and the last two digits indicate the discrete site code within each JFMC. (For e.g. JFMC code DA15601-2012, DA represents Dala forest range, 156 represent Kota JFMC, 01 represents one discrete patch and 2012 represents plantation year). Detail map of the Obra Forest Division is provided below in figure 1 and geo coordinates of each discrete parcels of land are provided in Appendix – 1.

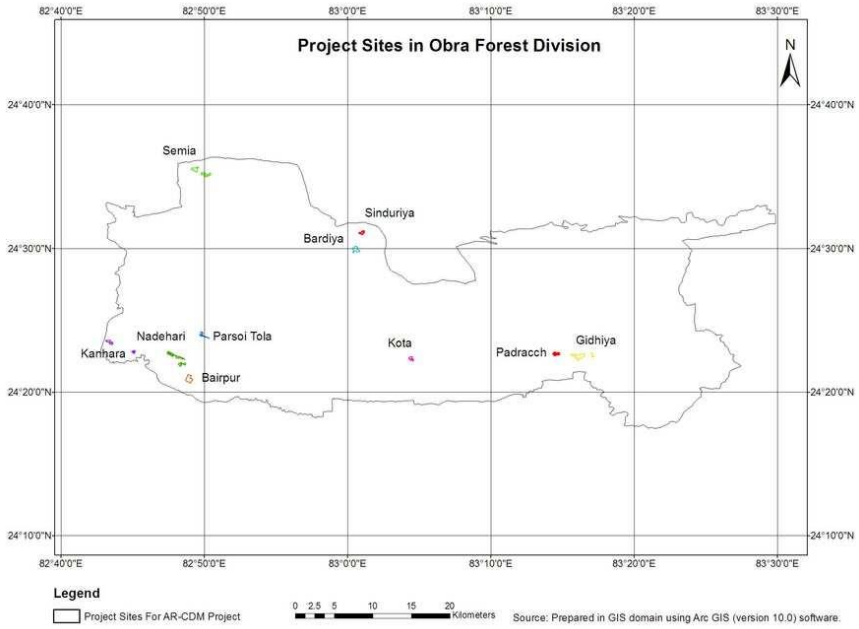


Figure 1: Forest Division Map of Obra

Table 1: Details of each discrete parcel of the land in all the selected JFMCs village forest

Village	JFMC AR CDM Code	Recorded village forest area (ha)	Area of each discrete patch (ha)	Total AR CDM project area (ha)
Kota	DA15601-2012	213.10	15.00	15.00
Sinduriya	DA15701-2012	113.90	13.23	13.23
Bardiya	DA15801-2012	212.40	34.50	34.50
Parsoitola	OB16001-2012	169.00	12.95	12.95
Bairpur	OB16201-2012	284.00	49.92	49.92
Nadehari	OB37301-2012	188.00	11.34	45.10
	OB37302-2012		4.16	
	OB37301-2013		13.12	
	OB37302-2013		16.48	
Padrachh	KO16401-2012	193.50	2.56	13.06
	KO16402-2012		5.74	
	KO16403-2012		4.76	
Gidhiya	KO36801-2012	149.00	2.50	62.98
	KO36802-2012		1.08	
	KO36801-2013		59.40	
Kanhara	JU16901-2012	607.00	3.13	25.40
	JU16902-2012		4.05	

Village	JFMC AR CDM Code	Recorded village forest area (ha)	Area of each discrete patch (ha)	Total AR CDM project area (ha)
	JU16903-2012		8.69	
	JU16904-2012		9.52	
Semia	JU35901-2012	98.80	27.55	54.58
	JU35901-2013		11.24	
	JU35902-2013		15.78	
	Total	**2228.70**	**326.72**	**326.72**

The project boundaries of all the ten JFMCs with their discrete parcel of plantation sites are indicated below in figures 2 to 11.

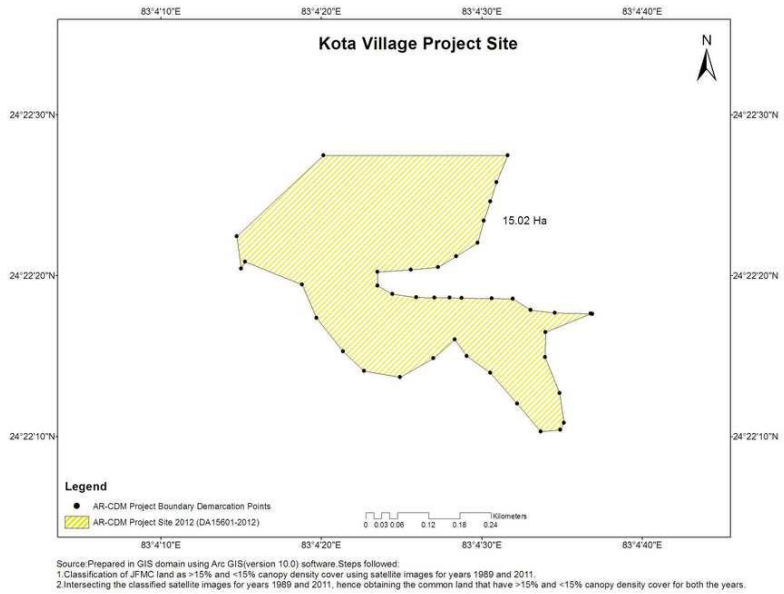


Figure 2: Map of A/R CDM Area of Kota Village Forest

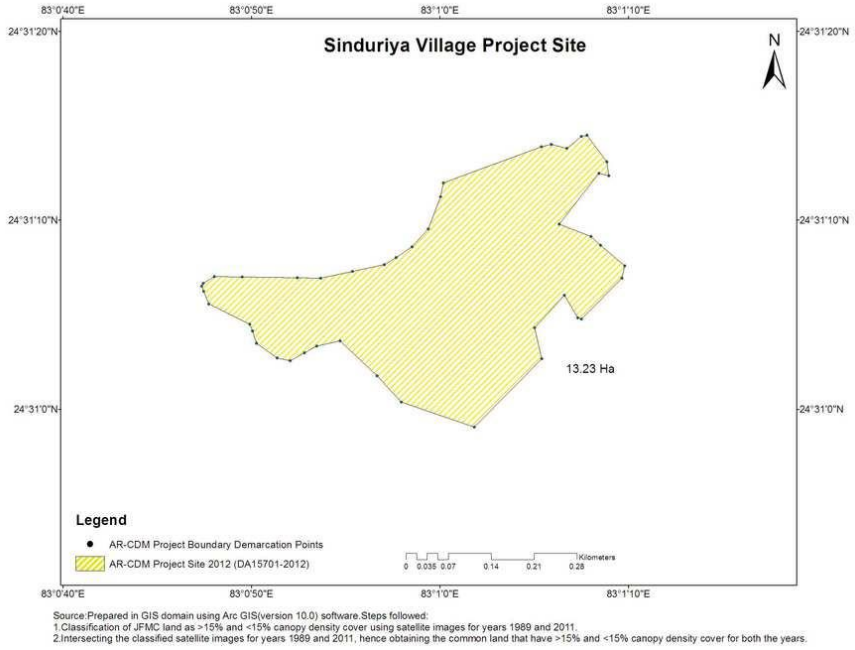
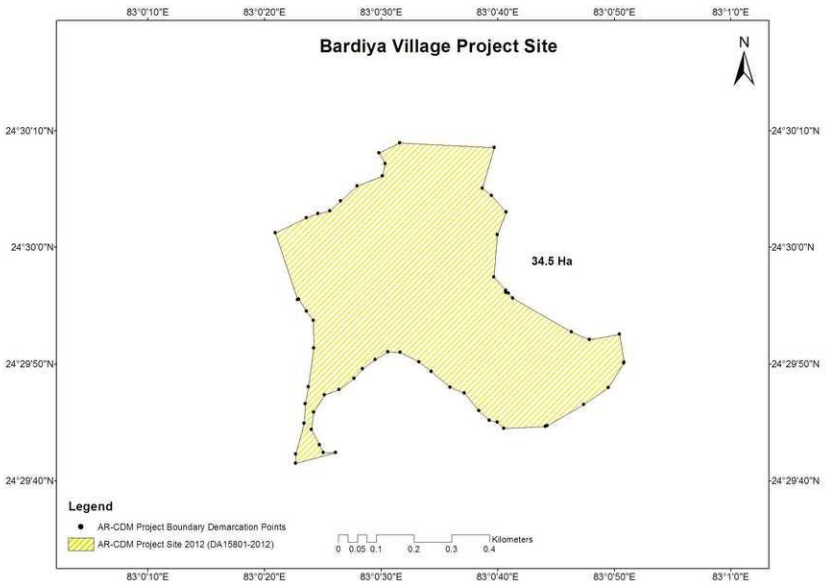
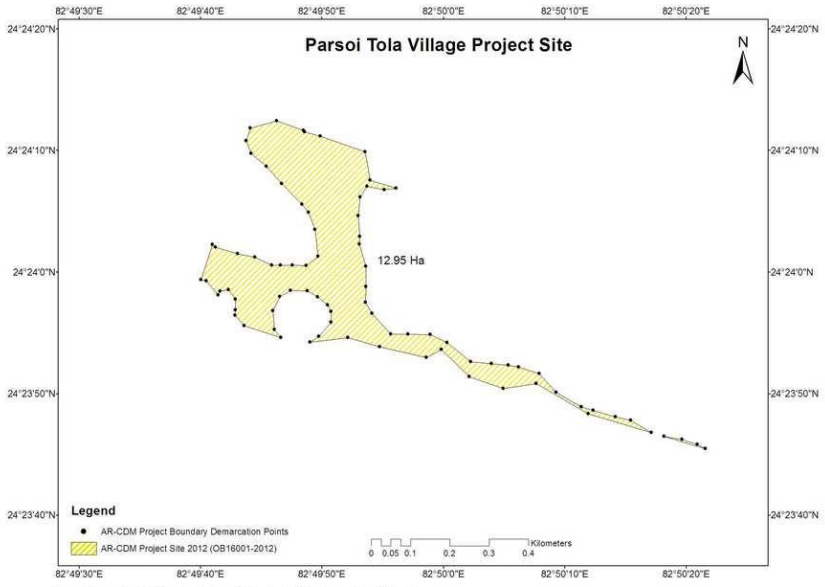


Figure 3: Map of A/R CDM Area of Sinduriya Village Forest



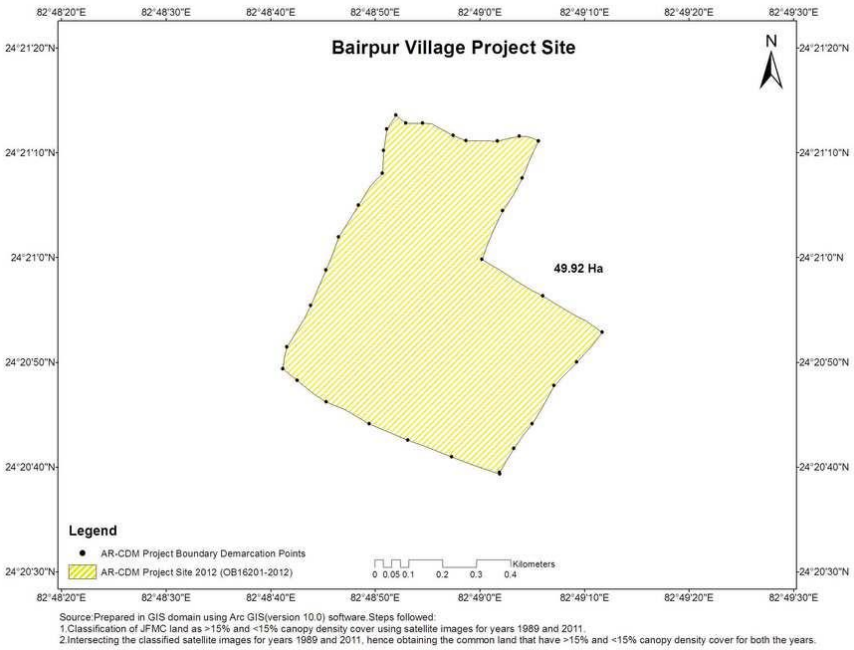
Source:Prepared in GIS domain using Arc GIS(version 10.0) software.Steps followed:
1.Classification of JFMC land as >15% and <15% canopy density cover using satellite images for years 1989 and 2011.
2.Intersecting the classified satellite images for years 1989 and 2011, hence obtaining the common land that have >15% and <15% canopy density cover for both the years.

Figure 4: Map of A/R CDM Area of Bardiya Village Forest



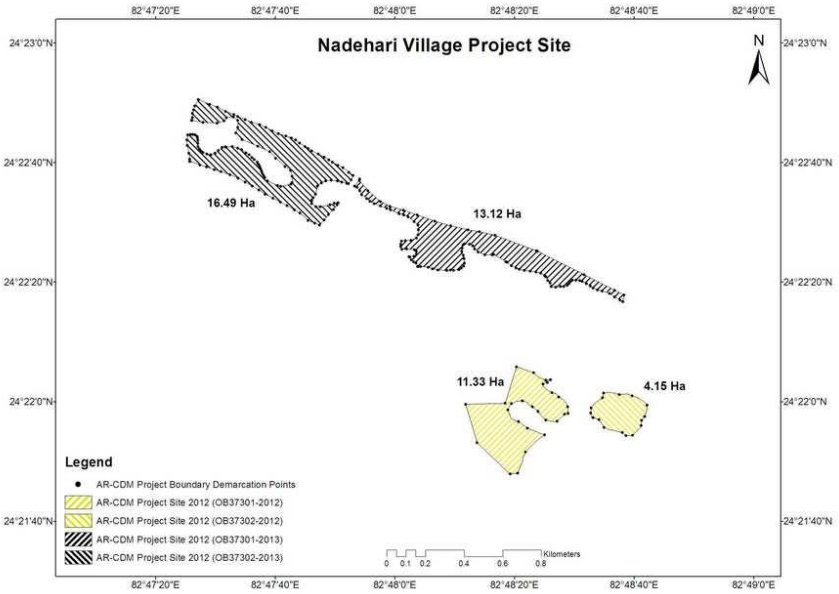
Source:Prepared in GIS domain using Arc GIS(version 10.0) software.Steps followed:
1.Classification of JFMC land as >15% and <15% canopy density cover using satellite images for years 1989 and 2011.
2.Intersecting the classified satellite images for years 1989 and 2011, hence obtaining the common land that have >15% and <15% canopy density cover for both the years.

Figure 5: Map of A/R CDM Area of Parsoitola Village Forest



Source:Prepared in GIS domain using Arc GIS(version 10.0) software.Steps followed:
1.Classification of JFMC land as >15% and <15% canopy density cover using satellite images for years 1989 and 2011.
2.Intersecting the classified satellite images for years 1989 and 2011, hence obtaining the common land that have >15% and <15% canopy density cover for both the years.

Figure 6: Map of A/R CDM Area of Bairpur Village Forest



Source:Prepared in GIS domain using Arc GIS(version 10.0) software.Steps followed:
1.Classification of JFMC land as >15% and <15% canopy density cover using satellite images for years 1989 and 2011.
2.Intersecting the classified satellite images for years 1989 and 2011, hence obtaining the common land that have >15% and <15% canopy density cover for both the years.

Figure 7: Map of A/R CDM Area of Nadehari Village Forest

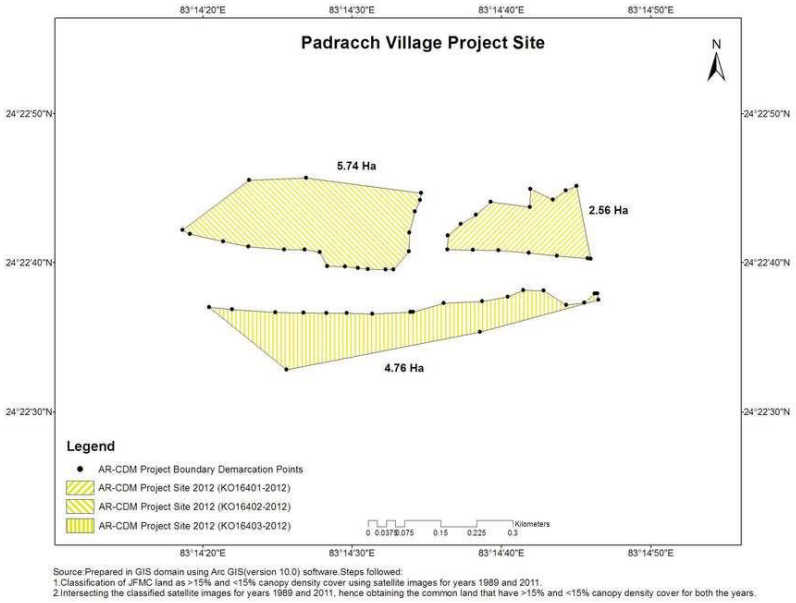


Figure 8: Map of A/R CDM Area of Padrachh Village Forest

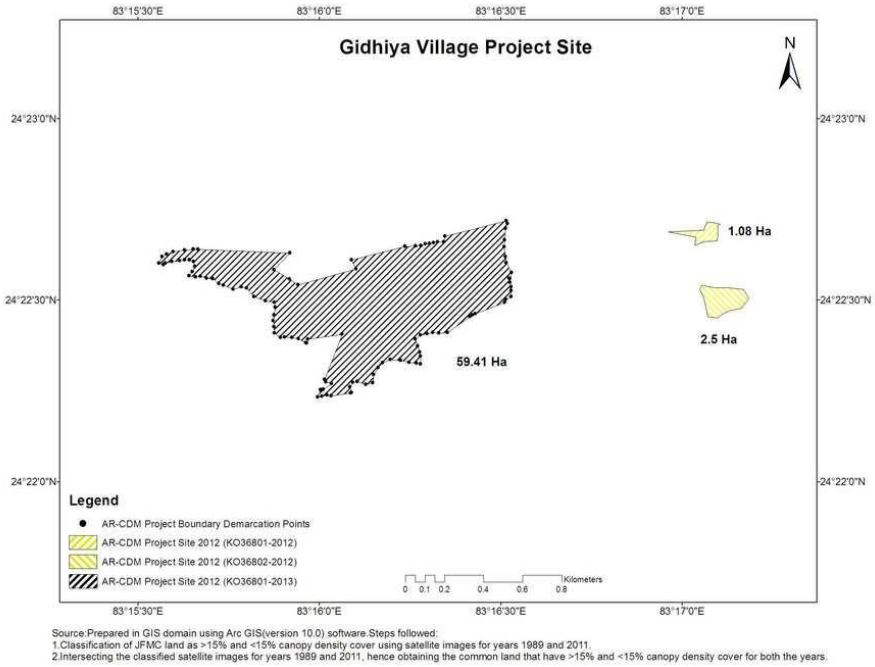
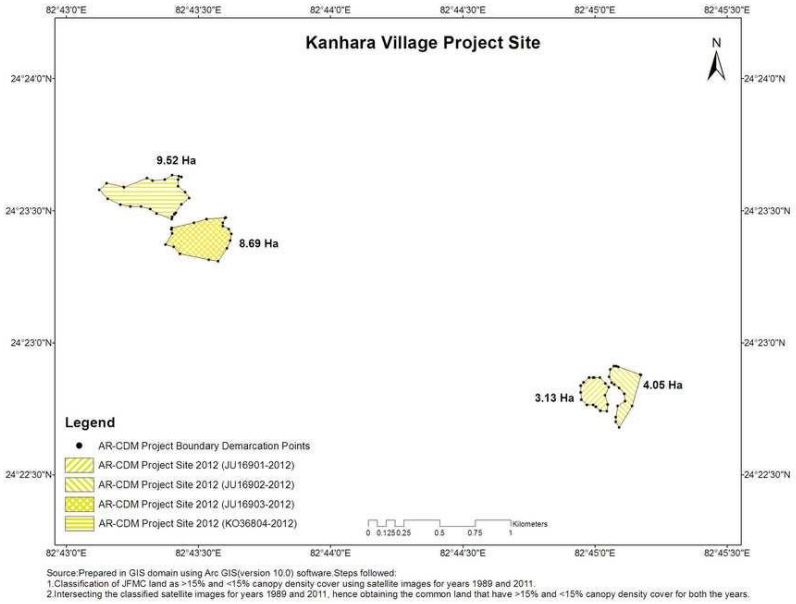
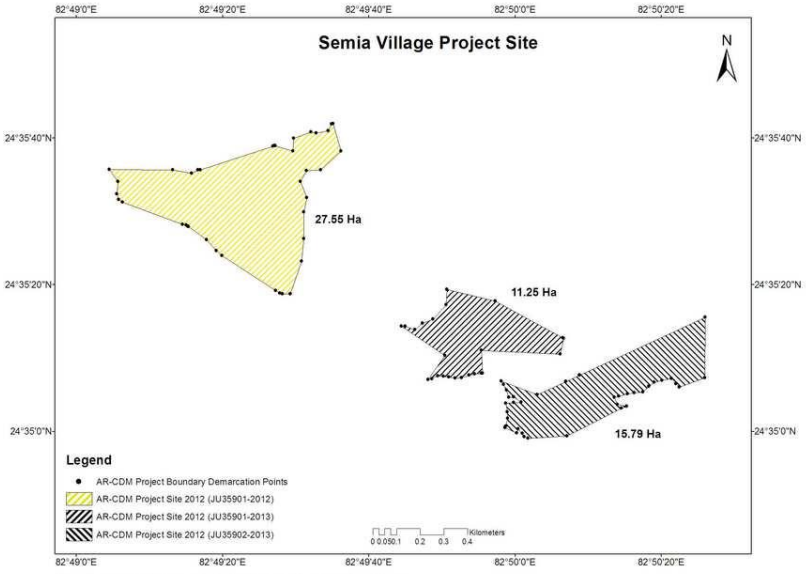


Figure 9: Map of A/R CDM Area of Gidhiya Village Forest



Source:Prepared in GIS domain using Arc GIS(version 10.0) software.Steps followed:
1.Classification of JFMC land as >15% and <15% canopy density cover using satellite images for years 1989 and 2011.
2.Intersecting the classified satellite images for years 1989 and 2011, hence obtaining the common land that have >15% and <15% canopy density cover for both the years.

Figure 10: Map of A/R CDM Area of Kanhara Village Forest



Source:Prepared in GIS domain using Arc GIS(version 10.0) software.Steps followed:
1.Classification of JFMC land as >15% and <15% canopy density cover using satellite images for years 1989 and 2011.
2.Intersecting the classified satellite images for years 1989 and 2011, hence obtaining the common land that have >15% and <15% canopy density cover for both the years.

Figure 11: Map of A/R CDM Area of Semia Village Forest

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host Party)	Public entity A – M/s Divisional Forest Officer (DFO), Obra Forest Division, Uttar Pradesh.	No

A.4. Reference to applied methodologies and standardized baselines

AR-AMS0007 - Afforestation and reforestation project activities implemented on lands other than wetlands,[1](Version 03.0.)

Tools used in the proposed SSC A/R project activity are:

1. Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities[2];(Version 04.2)
2. Demonstration of eligibility of lands for A/R CDM project activities[3]; (Version 02)
3. Guidance on application of the definition of the project boundary to A/R CDM project activities[4];(Version 01);
4. Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity[5];(Version 04.0.0)
5. Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity[6];(Version 02)
6. Guidelines on assessment of debundling for SSC project activities[7] ; (Version 04)
7. Calculation of the number of sample plots for measurements within AR CDM project activities[8]"; (Version 02.1.0.)
8. Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities version 01.0.1[9]

A.5. Crediting period type and duration

Type : Renewable Crediting Period (20 years)

Length of first crediting period : 01/01/2012 to 31/12/2031

[1] https://cdm.unfccc.int/filestorage/2/D/8/2D8GSJ95T6AHQWZCRY3L7EI0U4PNKF/eb85_repan22.pdf?t=SmJ8bnM4bHd4fDAbI3w7V1yVxFJbELgCxfRr

[2] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v3.0.0.pdf

[3] http://cdm.unfccc.int/Reference/Procedures/methAR_proc03.pdf

[4] http://cdm.unfccc.int/EB/044/eb44_repan16.pdf

[5] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-08-v4.0.0.pdf

[6] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-15-v1.pdf

[7] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf

[8] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.1.0.pdf

[9] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-18-v1.0.1.pdf

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

The plantation activities were carried out in Kota, Sinduriya, Bardiya, Parsoitola, Bairpur, Nadehari, Padrachh, Gidhiya, Kanhara, Semia villages of Obra Forest Division of Uttar Pradesh.

The first phase of plantation activities were carried out during the month of July – August in the year 2012 and the second phase of the plantation has been carried out in the month of July 2013, The replacement for the first year of plantation has been carried out in July 2013 and for the second year plantation, replacement was done in July 2014.Around 20 to 25% of the total plants were replaced during each phase on account of mortality.

The selected area under the project activity is degraded and abandoned and the terrain consists of rocky escarpments in many JFMCs of the Obra Forest Division for past many decades[10].
Species planted under the project were selected based on the priority given by the local people and their suitability to the local climatic. Twenty four (24) different tree species were planted within the project area. The baseline scenario has been detailed in the section B.5 of the PDD. A brief overview of the key technological details for the project is provided below. According to §14 of the methodology, the baseline scenario of the proposed SSC A/R project activity is the continuation of the pre-project land use. The project area was degraded and legally classified as reserve forests and cannot be utilized for non-forestry purposes like agriculture, horticulture, mining, and any other commercial activities like brick making etc. JFMCs have planted these degraded lands with the technical support of the forest department. The activities carried in the project were as follows:

Seed collection

High quality seeds of various tree species were collected from the best plantation sources available within the Obra forest division for raising saplings in the nurseries. After collection, quality seeds were screened out manually and sown in the nearby forest nurseries. For some of the tree species are selected from the Candidate Plus Trees (CPT) identified by the Forest Department.

Nursery Technology

Decentralized nurseries close to the plantation areas have been established to reduce the cost of the transportation and GHGs emissions generated in the process. The seedlings germinated in the nursery beds were transferred into the poly bags and graded at suitable intervals to weed out poor performers. After 6 to 8 months, the saplings became mature and ready for plantation and were transported to the plantation site for reforestation.

Species selection

[10] From PRA report

The species for plantation were selected by the JFMCs members and villagers. They preferred to plant mixed flora consisting of trees which are economically important and also suited for local agro-climatic zone[11]. The main species selected for plantation were:

S. No.	Botanical Name	Common Name	Family	Uses
1	*Emblica officinalis*	Aonla	Euphorbiaceae	The fruits are largely used for pickles and also used medicinally. The fruits poultice is used to stop bleeding from cuts. The fruit powder is used as coolant and laxative. Fruits are good liver tonic. It is a good source of Vitamin C. Dried fruits are useful in diarrhoea and dysentery. Seeds are administered against stomach disorder, bronchitis and asthma.
2	*Acacia auriculiformis*	Australian Kikkar	Fabaceae	Leaves paste used on boils.
3	*Tamarindus indica*	Imli	Fabaceae	The leaves are applied to reduce inflammatory swellings and ringworm. The seeds are astringent and aphrodisiac.
4	*Annona reticulata*	Sharifa	Annonaceae	Heat-extracted oil from the seeds has been employed against agricultural pests. A bark decoction is used to stop diarrhoea, while the root is used in the treatment of dysentery. A decoction of the leaves is used as a cold remedy and to clarify urine.
5	*Azadirachta indica*	Neem	Meliaceae	Neem products have medicinal properties that prove to be anthelminthic, antifungal, anti-diabetic, antibacterial, antiviral, anti-fertility and sedative. Its oil is used for preparing cosmetics, like soap, shampoo, balms, creams, etc, which prove handy for skin care, such as in treatment of acne, for keeping the elasticity of skin. The gum of neem tree is used as a bulking agent to prepare special purpose food for diabetic patients. Its twigs are commonly used for cleaning teeth. A decoction can be prepared from the roots of neem tree and ingested to relieve fever.
6	*Syzygium cumini*	Jamun	Myrtaceae	The leaves are antibacterial, and are used for strengthening the teeth and gums. The fruit and seeds are sweet, acrid, sour, tonic and cooling. They are used in diabetes, diarrhoea and ringworm. The bark is astringent, sweet sour, diuretic, digestive and antihelminthic. Leaves are used as poultices on skin diseases. Decoction of the fruit is used in case of enlargement of the spleen.
7	*Holoptelea integrifolia*	Chilbil	Ulmaceae	The bruised leaves are applied to boils. Juice of boiled bark is applied to rheumatic swellings.
8	*Eucalyptus Hybrid*	Eucalyptus	Myrtaceae	Oil is used as insecticide. Used for making paper.

[11] PRA report

S. No.	Botanical Name	Common Name	Family	Uses
9	*Terminalia belirica*	Bahera	Combretaceae	It has a rejuvenative and laxative value. It proves beneficial for hair, throat and eyes. Seed oil or fruit paste is applied on swollen and painful parts. Fruit is powdered and used to dress wounds to arrest the bleeding. It helps in loss of appetite, flatulence, thirst, piles and worms.
10	*Acacia catechu*	Khair	Fabaceae	Bark decoction is used in stomach ache. Also used in chronic diarrhoea. The bark is used to prepare tannin and dyes.
11	*Madhuca indica*	Mahua	Sapotaceae	The oil is used for skin care, to manufacture soap or detergents, and as a vegetable butter. It can also be used as a fuel oil. The seed cakes obtained after extraction of oil constitute very good fertilizer. The flowers are used to produce an alcoholic drink in tropical India.
12	*Haplophragma adenophyllum*	Kat sagwan	Bignoniaceae	Wood is used for fishing roots
13	*Cordia dichotoma*	Lisoda	Boraginaceae	Fruit expectorant, demulcent, astringent, useful in bronchial affections and in irritation of urinary passages.
14	*Terminalia arjuna*	Arjun	Combretaceae	The bark is used in heart diseases, antidote to poisons and to control blood pressure. Ash of bark is used in scorpion sting.

Other economically important dry land trees such as *Tectona grandis, Butea monosperma, Albizia lebbeck* and *Bombax ceiba* have been planted depending on their soil and water conditions and personal preferences. The details and uses of such species are:

S. No.	Botanical Name	Common Name	Family	Uses
1	*Tectona grandis*	Sagwan	Verbenaceae	Wood is acrid, cooling, laxative, sedative to gravid uterus and useful in treatment of piles, leucoderma and dysentery. Flowers are acrid, bitter and dry and useful in bronchitis, biliousness, urinary discharges etc. Roots are useful in treatment of urinary system related troubles. According to Unani system of medicine, the oil from flower is hair promoter and useful in scabies. Wood is good for headache, biliousness, burning sensation and pain and liver related troubles. It allays thirst and possesses anthelminthic and expectorant properties. Wood is used for ship building, railways, piles in harbour, bridge-building, construction work, furniture and cabinet work. Leaves yield dye, which is used for dyeing cotton and wool
2	*Butea monosperma*	Palas	Fabaceae	The leaves and flowers are astringent, depurative, diuretic and aphrodisiac. These are used against boils, pimples, worms and piles. Gum is used for diarrhoea.

S. No.	Botanical Name	Common Name	Family	Uses
3	*Albizia lebbeck*	Siris	Fabaceae	It is an astringent, also used to treat boils, cough, eye, flu, gingivitis, lung problems, used as a tonic, and is used to treat abdominal tumours. The bark is used medicinally to treat inflammation.
4	*Bombax ceiba*	Semal	Bombacaceae	The roots are sweet, cooling, stimulant, restorative, astringent, alternative, aphrodisiac, demulcent, emetic and tonic. It is used in the treatment of diarrhoea, dysentery, menorrhagia, styptic, and for wounds. The gum is cooling astringent, stimulant, aphrodisiac tonic and demulcent in nature.

Apart from the above main species the following (rest of other species*) Acacia mangium, Acacia nilotica, Cassia siamea, Diospyros melanoxylon, Hardwickia binata* and *Lagerstroemia parviflora,* were also planted in the project area.

However the following 12 species (*Acacia auriculiformis, Acacia catechu, Acacia mangium, Acacia nilotica, Azadirachta indica, Butea monosperma, Cassia seamia, Diospyros melanoxylon, Haplophragma adenophyllum, Hardwickia binata, Lagerstroemia parviflora and Tectona grandis)* were included in the CER sheets for calculation in this monitoring period, as other species were not upto the measurable growth (that is less than 2m height and 10 cm GBH). During the next verification those trees will be accounted once it is taller than 2 m height and 10 cm GBH.

Site preparation

The land was prepared for planting by removing root stocks, bushes etc. and ploughed with mould board plough. The site preparation under the project activity was done mainly through bullock ploughing hence the soil damage was less and it ensured that there were no long term emissions from soil carbon. Ploughing was done one month before plantation.

Weeding

Weeding around the planted saplings was carried out manually to reduce competition. Manual weeding was done once in a year during the month of September. Cultural operations were avoided as they may disturb the top soil.

Silvicultural operation

Silvicultural operations like weeding especially nearby the trees in the initial years, hoeing, pruning etc. were carried out using standard forestry techniques recommended by the State Forest Department. These activities were carried out with the help of human labour so as to avoid project emissions and also to meet the objectives of employment generation for local communities.

.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

It was proposed to have the first monitoring for the monitoring parameters A_i, DBH, and height at every 5 years interval from the start date of the project activity. The first verification was planned in 2017 but instead it was done in May –June, 2016 due to the following reasons:

- The month of January-February was supposed to have good harvest because of favourable climate/ rainfall in 2015-2016 (when compared to 2012-2013 and 2013-2014, are being the drought years). So, the communities were expected to take part in agricultural activities like harvesting in the Kharif season and sowing in the Rabi season. http://www.imd.gov.in/Welcome%20To%20IMD/Welcome.php (year wise rainfall data statistics)
- Apart from that, the fog in the winter season in the months of January- February is a hindrance in visibility also during these months there is short duration of sunlight/ day length to have proper monitoring. Whereas, during summers, days are longer and have clear visibility. Therefore, PP chose to have verification in mid of May to June.

  However, during next verification which is supposed to be done in 2022 will also be conducted in the month of May-June because of the same reason i.e day length and clear visibility.

B.2.2. Corrections

The following species are as follows:

Spelling in the PDD	Corrected spelling used in MR	Page number in PDD
Annona reticulate	*Annona reticulata*	Page 13
Terminalia belerica	*Terminalia belirica*	Page 13
Albezia lebbeck	*Albizia lebbeck*	Page 14
Holoptelea integrifulia	*Holoptelea integrifolia*	Page 42

The notation B_{TREE} mentioned in section B.8.2 in the registered PDD is a typographical error. The correct notation to represent the number of baseline trees is $N_{BSL\ TREES}$. The correction is applied during the verification and now it is used in the MR consistently (Section D.2).

B.2.3. Changes to the start date of the crediting period

Not applicable

B.2.4. Inclusion of monitoring plan

Detailed Monitoring plan has been described in the registered PDD.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools.

The following changes / addition to the monitoring plan is included in the proposed A/R CDM Project activity.

1. The tree height is not measured using Ravi altimeter. Because most of the trees are around 5m (anticipated growth not present). So for this monitoring period the tree heights are measured using

graduated poles. Also the project participants plan to use the graduated poles for the trees upto 7m height even for the next verifications. The trees with more than 7m height will be measured using ravi altimeter or any other sophisticated accurate measuring instrument as per the best forest practices available at the time of monitoring. The Conservative value of the tree height is used. For example if the tree height is 4.8 m, it is rounded down to 4.5 m and if it is 4.4 or 4.1 it is rounded to 4m (nearest 0.5 m) for the usage in volume equations.

2. The PP to estimate the shrub biomass have to monitor the shrub crown cover. However during the time of registration the PP didn't include the same under monitoring parameters. Now the shrub crown cover CC_{SHRUBi} as a proposed change is included under the monitoring parameters as per the A/R tool 14. The Calculations will be based on equation 26 and 27 of the tool and the same is presented in section E.2 of this monitoring report, and the default values are taken as per the tool and the parameters like BDR_{SF} and b_{forest} are taken as fixed parameters in the registered PDD.

B.2.6. Changes to project design

The following are changes are made from the registered PDD specific to A/R CDM project activities. The Volume equations of the following species in the below table are changed from the one in the registered PDD as the volume is not proportional to the GBH Even though the equations in the registered PDD were taken from the Indian State of Forest Report, 2011 and Forest Survey of India-Volume Equations for forests of India, Nepal and Bhutan (1996). (National forestry inventory) book, those equations considered in the registered PDD are applicable for trees with more DBH. When applying the volume equations as per the registered PDD it is not showing any linear correlation for volume and diameter so the change was required. Also if the volume equations are not exclusively referred in the registered PDD but available in the volume books were taken instead of general volume equation. The following were the changes.

S. No.	Species name	Old Formula	New Formula
1	*Lagerstroemia parviflora*	0.10529-1.68829*D+10.29573*D^2	(0.002565/(D^2*H) + 0.489814 - 0.00552*D^2*H) *D^2*H
2	*Butea monosperma*	(2.95525*D-0.24276)^2	0.00855 + 0.4432*D^2 + 0.28813*D^2*H
3.	*Tectona grandis*	0.00855 + 0.4432*D^2 + 0.28813*D^2*H	0.006+2.661999*D^2+0.280538*D^2*H
4	*Acacia catechu*	0.00855 + 0.4432*D^2 + 0.28813*D^2*H	(0.00817/(D^2*H)+0.29886)*D^2*H
5	*Hardwickia binata*	0.063632 + 5.355486* D^3	0.00855 + 0.4432*D^2 + 0.28813*D^2*H

As per the registered PDD the following main species- *Emblica officinalis, Acacia auriculiformis, Tamarindus indica, Annona reticulata, Azadirachta indica, Syzygium cumini, Holoptelea integrifolia, Eucalyptus Hybrid, Terminalia belirica, Acacia catechu, Madhuca indica, Haplophragma adenophyllum, Cordia dichotoma, Terminalia arjuna, Tectona grandis, Butea monosperma, Albizia lebbeck* and *Bombax ceiba* were planted because of more economic value and rest of the species. *Acacia mangium, Acacia nilotica, Cassia siamea,*

Diospyros melanoxylon, Hardwickia binata and *Lagerstroemia parviflora,* were also planted and not listed in the PDD because of the exhaustive list.

Also, the wood densities of the species are made in line with FAO data (http://www.fao.org/docrep/w4095e/w4095e0c.htm) for those species where wood densities are not available the default value of 0.67 is taken as per the registered PDD.

The following changes are effected from the registered PDD for the wood density.

Species Scientific Name	**Wood density (m3) as**	**Wood density (m3) As per Registered PDD**
Acacia auriculiformis	0.67	0.76
Albizia lebbeck	0.55	0.67
Butea monosperma	0.48	0.67

So, both the changes will not alter the baseline or additionality of the project.

As per the methodology for ex post estimation, the volume table or volume equation used must be demonstrated to be appropriate for the purpose of estimation of tree biomass by applying the tool "Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities" as per the tool "Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities" (Version 01.0.1).

A species-specific or group-of-species-specific volume table or volume equation derived from trees growing in edapho-climatic conditions similar to those in the project area is considered appropriate, and hence can be used for ex post estimation of tree stem volume, if at least one of the following conditions is satisfied:

a) The equation is used in the national forest inventory, or the national GHG inventory, of the host Party;

b) The equation has been used in commercial forestry sector of the host Party for 10 years or more;

c) The equation was derived from a data set of at least 30 sample trees, and the value of coefficient of determination (R2) was not less than 0.85.

Volumetric equations (Including the equations those are not specified in the registered PDD but considered in this monitoring period) for all the tree species planted in the project activity have been considered from Indian State of Forest Report, 2011 and Forest Survey of India-Volume Equations for forests of India, Nepal and Bhutan (1996) (National Forestry Inventory). It satisfies the above condition (a). Hence it is appropriate.

SECTION C. Description of monitoring system

The AR-CDM project is managed by the A/R CDM Management Committee of the Obra forest division with the DFO as the chairperson and another officer not below the rank of Range Forest Officer (RFO) as member secretary.. The A/R CDM Management Committee headed by the DFO is monitoring and coordinating with the participating JFMCs. The A/R CDM committee at the divisional level will ensure that the benefits accrue through this project will directly go to the communities through the DFO. The methodology applied in the project considers the monitoring of following activities related to the implementation of the project, which includes:

Monitoring of the activities	Observations
Monitoring of the project boundaries:	No changes/deviations were observed during the first monitoring of the project period
Monitoring of the planting of the plantations	
Monitoring plantation management	

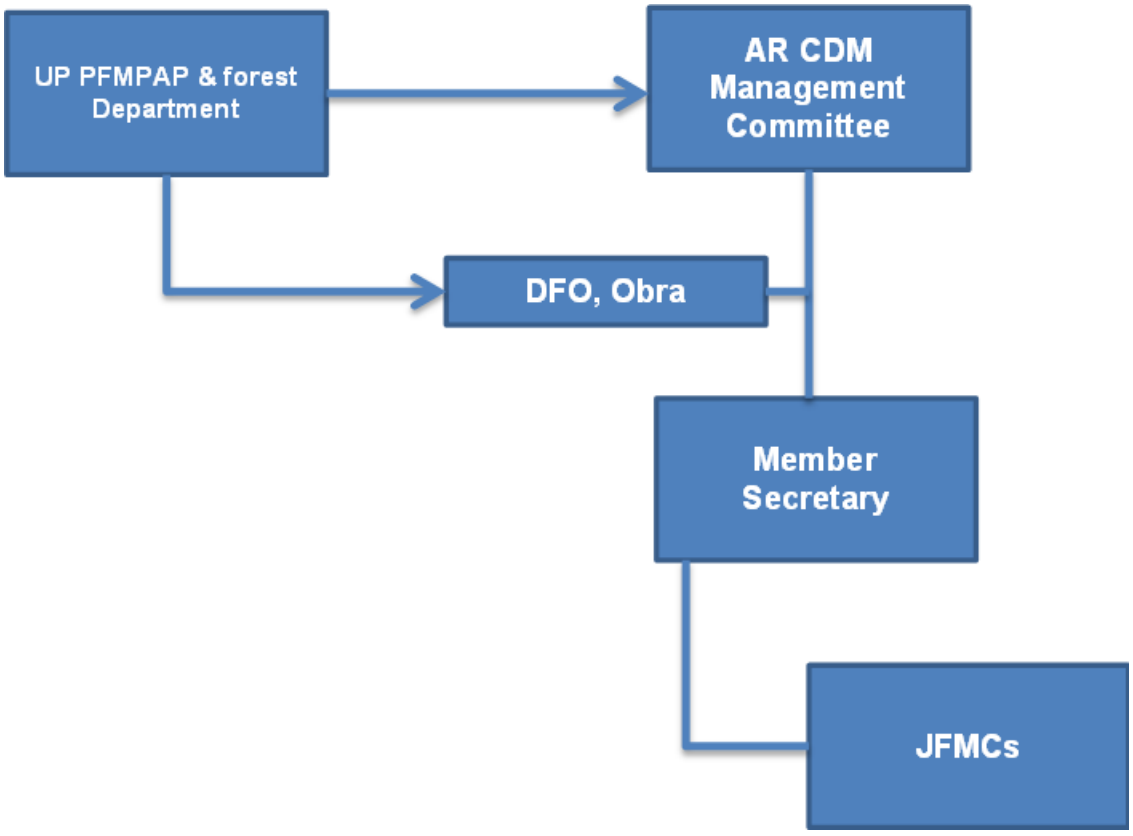


Figure 12: Management Structure

QA/QC Training and mobilization of field members

Persons involved in the field measurement work were trained on the procedures to be followed for field data collection and data analysis. Standard Operating Procedures (SOPs) for each step of the field measurements as per the operational manual were followed during the data collection.

- Field staff members are fully aware of all procedures and the importance of collecting data as accurately as possible.
- All field staffs are aware of the plots in the field and measure all pertinent components using the standard operating procedures.
- Staff is adequately trained.

Data Maintaining and archiving

Because of the long-term nature of the A/R CDM project activity, data is archived and maintained safely. Data is archived in electronic and paper forms and the copies of all data shall be kept for 2 years beyond the crediting period.

	A	B	C	D	E	F
1	S.No	Sample Plot ID	Local Name	Species Type	Height (M)	GBH (M)
2	1	Sample Plot 1	Sagwan	*Tectona grandis*	4	18
3	2		Sagwan	*Tectona grandis*	3.5	18
4	3		Sagwan	*Tectona grandis*	3	17
5	4		Sagwan	*Tectona grandis*	4	15
6	5		Neem	*Azadirachta indica*	6	30
7	6		Neem	*Azadirachta indica*	5	28
8	7		Neem	*Azadirachta indica*	4	19
9	8		Neem	*Azadirachta indica*	6	26
10	9		Neem	*Azadirachta indica*	5.5	26
11	10		Neem	*Azadirachta indica*	4	22
12	11		Neem	*Azadirachta indica*	4.5	21
13	12		Neem	*Azadirachta indica*	3.5	25
14	13		Neem	*Azadirachta indica*	4	24
15	14		Neem	*Azadirachta indica*	6	26
16	15		Khair	*Acacia catechu*	4	15
17	16		Khair	*Acacia catechu*	3.5	18
18	17		Khair	*Acacia catechu*	2	15
19	18	Sample Plot 2	Acacia auriculiformis	*Acacia auriculiformis*	4.5	23
20	19		Acacia auriculiformis	*Acacia auriculiformis*	4	20
21	20		Acacia auriculiformis	*Acacia auriculiformis*	3	20
22	21		Acacia auriculiformis	*Acacia auriculiformis*	3.5	21
23	22		Acacia auriculiformis	*Acacia auriculiformis*	3	22
24	23		Acacia auriculiformis	*Acacia auriculiformis*	2.5	25
25	24		Acacia auriculiformis	*Acacia auriculiformis*	3.5	18
26	25		Neem	*Azadirachta indica*	4	33
27	26		Neem	*Azadirachta indica*	3.5	16

Parameters | GPS Details | Bairpur | Sinduriya | Bardiya | Parsoi | Kota

Figure 13: Inventory Database

Monitoring of the project boundaries

As per the registered PDD project boundary during the verification period is monitored using GPS. There have been no changes in the project boundary. GPS coordinates have been provided in Appendix 1.

Monitoring of leakages

During the monitoring, JFMC members from the project sites have affirmed that there were no displacements of pre project activities from project sites.

Measures for Quality Assurance (QA) and Quality Control (QC)

A rigid monitoring plan is developed to ensure completeness and correctness of monitoring data for project emission reduction and leakage analysis. QA and QC methods involving Standard Operating Procedures (SOPs) related to

(i) Reliability of field measurements was ensured by randomly checking some plots and by ocular measurement

(ii) Authentication of the methods used to collect field data,

(iii) Verification of data entry, data maintenance and analysis techniques shall be followed as discussed below.

Moreover, QA/QC protocol in effect at the project sites was also provisioned to get reviewed internally and externally every five year to ensure appropriateness of SOPs with any technological changes (if any).

The people who were responsible for the carbon measurement work were fully trained in all aspects of the field data collection and its analysis. The SOPs described in detail covering all steps of field measurements and documentation for verification purposes in a consistent fashion. It was ensured that:

a) All the field staffs were aware of all the procedures and understand the importance of collecting data as accurately as possible;
b) Field team installed test plots in the field and measured all pertinent components using the SOPs to estimate measurement errors;
c) New staff members were adequately trained.
d) The document will list all names of the field team and the project leader will certify that the team is trained;

After field measurement a comparison was made with the original data and discrepancies were re-verified. Field data collected at this stage was compared to the original data.

QA/QC for data entry

To produce reliable carbon estimates through monitoring sample plots, the proper entry of data into the data analysis excel sheets were used.

QA/QC for data archiving

Data storage and maintenance is very important due to the long-term nature of project activities. Therefore, SOPs for data archiving includes storage of original copies of all data, including field measurements, GIS products, and copies of measuring and monitoring reports, in a secure offsite location and provision of these copies of data to all the project participants. All data was archived in paper and electronically in a separate location. Electronic data has been copied and stored by authorized persons in charge. All the staffs were trained in monitoring method to improve accuracy of collecting data. Data was archived in safe place. Copies of all data were also stored on paper in a separate remote location. Procedures also included updating storage onto new data storage technologies, both hardware and software.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$BEF_{2,j}$
Unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above ground tree biomass for tree species *j*
Source of data	Values from IPCC Good Practice Guidance for LULUCF (2003) Table 3A.1.10[12]. Default values of biomass expansion factors (BEFs).
Value(s) applied	3.4
Choice of data or measurement methods and procedures	$BEF_{2,j}$ over bark default value for tropical climatic zone and broad leaf forest type has been chosen. Biomass of tree species in sample plots is calculated through the formula mentioned in methodological tool i.e. $B_{TREE,j,p,l,t} = V_{TREE,j,p,l,t} * D_j * BEF_{2,j} * (1+R_j)$
Purpose of data/parameter	Calculation of carbon stocks and changes in carbon stock in the proposed small scale project activity.
Additional comments	None

Data/Parameter	CF_{Tree}
Unit	tC (tdry matter) $^{-1}$
Description	Carbon fraction of dry matter for species of type j
Source of data	Methodological tool: "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2)". Referred in equation number 13.
Value(s) applied	0.47
Choice of data or measurement methods and procedures	A default value of 0.47 is used following the A/R CDM methodological tool.
Purpose of data/parameter	Calculation of carbon stocks and changes in carbon stock
Additional comments	None

[12] http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf

Data/Parameter	D_j
Unit	t d.m. m^{-3}
Description	Density Overbark of tree stem for tree species *j*.
Source of data	Published literature of Reyes et al. (1992). Wood Densities of Tropical Tree Species. USDA, FAO Data[13] and Global Wood Density Database[14]
Value(s) applied	

S. No.	Scientific Name	Value
1	*Acacia auriculiformis*	0.67
2	*Acacia catechu*	0.88
3	*Acacia mangium*	0.67
4	*Acacia nilotica*	0.67
5	*Albizia lebbeck*	0.55
6	*Annona reticulata*	0.67
7	*Azadirachta indica*	0.69
8	*Bombax ceiba*	0.33
9	*Butea monosperma*	0.48
10	*Cassia siamea*	0.67
11	*Cordia dichotoma*	0.53
12	*Diospyros melanoxylon*	0.68
13	*Emblica officinalis*	0.80
14	*Eucalyptus hybrid*	0.67
15	*Haplophragma adenophyllum*	0.67
16	*Hardwickia binata*	0.73
17	*Holoptelea integrifolia*	0.67
18	*Lagerstroemia parviflora*	0.62
19	*Madhuca indica*	0.74
20	*Syzygium cumini*	0.70
21	*Tamarindus indica*	0.75
22	*Tectona grandis*	0.50
23	*Terminalia arjuna*	0.68
24	*Terminalia belirica*	0.72

Choice of data or measurement methods and procedures	For species where wood density values are not available, 0.67 is taken as default value from Good Practices IPCC Guidelines, 1996.

[13] http://www.fao.org/docrep/w4095e/w4095e0c.htm

[14] Citation for the database: Zanne, A.E., Lopez-Gonzalez, G.*, Coomes, D.A., Ilic, J., Jansen, S., Lewis, S.L., Miller, R.B., Swenson, N.G., Wiemann, M.C., and Chave, J. 2009. Global wood density database.Dryad. Identifier: http://hdl.handle.net/10255/dryad.235.

Purpose of data/parameter	Calculation of carbon stocks and changes in carbon stock
Additional comments	None

Data/Parameter	$V_{TREE,j,p,i,t}$
Unit	m^3
Description	Stem volume of trees of species *j* in sample plot *p* of stratum *i* at time *t* calculated using a volume table or volume equation.
Source of data	Volume equations of each species were taken from Indian State of Forest Report, 2011[15] and Forest Survey of India-Volume Equations for forests of India, Nepal and Bhutan (1996)[16].
Value(s) applied	

S. No.	Scientific Name	Volume Equations
1	*Acacia auriculiformis*	(3.02847*D- 0.0105973)^2
2	*Acacia catechu*	(0.00817/(D^2*H)+0.29886)*D^2*H
3	*Acacia mangium*	0.00855+0.4432*D^2+0.28813*D^2*H
4	*Acacia nilotica*	0.00855+0.4432*D^2+0.28813*D^2*H
5	*Albizia lebbeck*	0.00855+0.4432*D^2+0.28813*D^2*H
6	*Annona reticulata*	0.00855+0.4432*D^2+0.28813*D^2*H
7	*Azadirachta indica*	0.00855+0.4432*D^2+0.28813*D^2*H
8	*Bombax ceiba*	0.00855+0.4432*D^2+0.28813*D^2*H
9	*Butea monosperma*	0.00855+0.4432*D^2+0.28813*D^2*H
10	*Cassia siamea*	0.00855+0.4432*D^2+0.28813*D^2*H
11	*Cordia dichotoma*	0.00855+0.4432*D^2+0.28813*D^2*H
12	*Diospyros melanoxylon*	0.042+0.246*D^2*H
13	*Emblica officinalis*	0.00855+0.4432*D^2+0.28813*D^2*H
14	*Eucalyptus hybrid*	0.00855+0.4432*D^2+0.28813*D^2*H
15	*Haplophragma adenophyllum*	0.00855+0.4432*D^2+0.28813*D^2*H
16	*Hardwickia binata*	0.00855+0.4432*D^2+0.28813*D^2*H
17	*Holoptelea integrifolia*	0.00855+0.4432*D^2+0.28813*D^2*H
18	*Lagerstroemia parviflora*	(0.002565/(D^2*H)+0.489814-0.00552)*D^2*H
19	*Madhuca indica*	0.00855+0.4432*D^2+0.28813*D^2*H
20	*Syzygium cumini*	0.00855+0.4432*D^2+0.28813*D^2*H
21	*Tamarindus indica*	0.00855+0.4432*D^2+0.28813*D^2*H
22	*Tectona grandis*	0.006+2.661999*H2^2+0.280538*H2^2*E2
23	*Terminalia arjuna*	0.00855+0.4432*D^2+0.28813*D^2*H
24	*Terminalia belirica*	0.00855+0.4432*D^2+0.28813*D^2*H

[15] http://www.fsi.org.in/cover_2011/chapter8.pdf

[16] Volume Equations For Forests of India, Nepal & Bhutan, Forest Survey of India Ministry of Environment & Forests, Govt. of India, 1996.

Choice of data or measurement methods and procedures	For most of the tree species, FSI regional volume equations were applied for the volume estimations. For other tree species, common volume equation from the neighbouring forest region is considered for calculating stem volume. The common equation used under rest of species category is as follows: $0.00855 + 0.4432*D^2 + 0.28813*D^2*H$[17]
Purpose of data/parameter	Calculation of carbon stocks and changes in carbon stock
Additional comments	The change in volume equations for some of the species for which the volume is not directly proportional to increase in GBH is changed. The same is mentioned in section B.1 of this MR

Data/Parameter	R_J
Unit	Dimensionless
Description	Root-shoot ratio appropriate for biomass stock, for species *j*
Source of data	Values from IPCC Good Practice Guidance for LULUCF (2003) Table 3A.1.8[18]*"Average belowground to aboveground biomass ratio (root-shoot ratio, r) in natural regeneration by broad category (tons dry matter/ton dry matter)".*
Value(s) applied	A default value of 0.25 has been applied.
Choice of data or measurement methods and procedures	As indicated in the methodology applied.
Purpose of data/parameter	Calculation of carbon stocks and changes in carbon stock
Additional comments	None

Data/Parameter	BDR_{SF}
Unit	Dimensionless
Description	Ratio of shrub biomass per hectare in land having a shrub crown cover of 1.0 and default above-ground biomass content per hectare in forest in the region/country
Source of data	Methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities; Version 04.2".*
Value(s) applied	A default value of 0.1 has been applied.

[17]FSI. (1996) Volume Equations For Forest of India, Nepal and Bhutan, Page No. 202

[18]http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf , page 3.168

Data/Parameter	BDR_{SF}
Choice of data or measurement methods and procedures	As indicated in the methodology applied.
Purpose of data/parameter	Calculation of baseline carbon stocks and changes in carbon stock
Additional comments	None

Data/Parameter	b_{Forest}
Unit	t d.m. ha^{-1}
Description	Default above-ground biomass content in forest in the region/country where the A/R CDM project is located;
Source of data	Report on "Carbon Stock in India's Forests" published by FSI, 2013.
Value(s) applied	A default value of 12.82 ton/ ha has been applied[19].
Choice of data or measurement methods and procedures	As indicated in the methodology applied.
Purpose of data/ parameter	Calculation of baseline carbon stocks and changes in carbon stock
Additional comments	None

Data/Parameter	R_{Shrub}
Unit	Dimensionless
Description	Root-shoot ratio appropriate for biomass stock, for shrub species
Source of data	Methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 04.2*"
Value(s) applied	A default value of 0.4 has been applied.
Choice of data or measurement methods and procedures	As indicated in the methodology applied.
Purpose of data/parameter	Calculation of baseline carbon stocks and changes in carbon stock
Additional comments	None

Data/Parameter	t_{val}
Unit	Dimensionless

[19]Carbon Stock in India's Forest Report, 2013, page 34, Table 4.6

Data/Parameter	t_{val}
Description	Two-sided Student's t-value, at infinite degrees of freedom in the first iteration and at degrees of freedom equal to (n-1) in subsequent iterations, for the required confidence level
Source of data	Student's t-distribution table
Value(s) applied)	1.645
Choice of data or measurement methods and procedures	This is at the 90% confidence level in line with the CDM methodology
Purpose of data/parameter	Calculation of actual net GHG removals by sinks
Additional comments	None

Data/Parameter	E
Unit	t d.m.(or t d.m.ha^{-1})
Description	Acceptable margin of error
Source of data	Default data from the tool: "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"
Value(s) applied)	10%
Choice of data or measurement methods and procedures	CDM methodology
Purpose of data/parameter	Calculation of actual net GHG removals by sinks
Additional comments	None

Data/Parameter:	CFs
Unit	tC (tdry matter) -1
Description	Carbon fraction of shrub biomass
Source of data	Methodological tool: "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2)". Referred in equation number 13.
Value(s) applied)	0.47

Data/Parameter:	CFs
Choice of data or measurement methods and procedures	A default value of 0.47 is used following the A/R CDM methodological tool.
Purpose of data/parameter	Calculation of carbon stocks and changes in carbon stock
Additional comments	None

D.2. Data and parameters monitored

Data/Parameter	A_i
Unit	Ha
Description	Area of stratum *i*
Measured/calculated/default	Measured and calculated
Source of data	Field survey
Value(s) of monitored parameter	Area of stratum has been detailed in the Emission Reduction worksheets attached with this MR[20]

Stratum i	Ai (Ha)
Bairpur	49.92
Sinduriya	13.23
Bardiya	34.5
Parsoi tola	12.95
Kota	15
Nadehari	45.1
Semia	54.58
Kanhara	25.4
Gidhiya	62.98
Padracch	13.06
Total (A)	**326.72**

[20]Emission Reduction Worksheet has been provided to DOE

Data/Parameter	A_i
Monitoring equipment	The area is determined based on the GPS measurements. Two Different GPS machines are used GARMIN Make eTrex GARMIN Make GPSMAP 76CSx
Measuring/reading/recording frequency	At the start of project and every five years i.e. 2012, 2017, 2022, 2027, and 2032. Measurement happened in 2012 at the start of the project for this monitoring.
Calculation method (if applicable)	This involves measurement of area of each discrete parcel of land. GPS measurements (i.e. position and co-ordinates) of all the plots were taken. GPS coordinates were measured with GPS machine. Measured Coordinates has been initially recorded in to field Survey Sheets by survey team which is later entered in to Excel sheets at the project office. Random field checking was carried out.
QA/QC procedures	Random cross-checking of boundary measurements will be carried out. In addition the measurements will also be cross checked by comparing it with the validated figures, to see if the values are comparable. GPS machines used for the measurement are self-calibrated with magnetic calibration system. The devices will be calibrated automatically once it is switched off and switched on. Manual calibration procedure is clearly mentioned in the Manual to calibrate the machine manually whenever it is required. Filed team was well trained on the same. Measurements and recording was done by trained personnel.
Purpose of data/parameter	Calculation of the actual net GHG removal by sinks. The same was used in equation 13 and 14 of the applied AR Tool 14.
Additional comments	Trainings to the field staff with regards to collection, compilation and uses of instruments is ensured before proceeding to data collection activity. The PRA (participatory rural appraisal) exercise conducted for the project activity at the starting of the project revealed that the area under the forest is dry deciduous and thus it is not under wet land category as the project was developed from degraded lands. The same is mentioned in section B,2 of the registered PDD. Hence the applicability as per the methodology paragraph 3 and 4 is satisfied. Also the land is under the control forest department and the same classification still exists as per the land records.

Data/Parameter	DBH
Unit	Cm
Description	Diameter at breast height of tree

Measured/calculated/default	Measured & calculated
Source of data	Field measurements within the sample plots
Value(s) of monitored parameter	Refer ER calculation excel sheet
Monitoring equipment	GBH is measured with measuring tape
Measuring/reading/recording frequency	At the start of the project activity and every five years. Dates of monitoring were from – 01 May, 2016 to 06 June, 2016.
Calculation method (if applicable)	Measured all tree species that are equal to or more than 10 cm girth within the sample plot. Girth of the tree is measured at 1.37 m height. DBH is measured with measurement tape. Measured data is initially recorded in the survey sheets which are later entered in to Excel format for CER calculation. From the Girth at breast height (GBH), DBH is calculated using the formula DBH= GBH/(22/7)
QA/QC procedures	Standard operating procedures were made to ensure the correct and validating data collection for each of the monitoring parameters
Purpose of data/parameter	To calculate the stem volume of trees within the sample plot this is then used for estimating carbon sink. The same shall be used in allometric equations to calculate the biomass/volume of the trees.
Additional comments	None

Data/Parameter:	***H***
Unit	cm / mts
Description	Height of the tree
Measured/calculated/default	Measured
Source of data	*Ex-post* estimation shall be based on actual measurements and recorded field data entry sheets and subsequently data entry spread sheets.
Value(s) of monitored parameter	Refer ER calculation excel sheet
Monitoring equipment	Measurement Tape and Graduated pole
Measuring/reading/recording frequency	At the start of the project activity and every five years since the initial verification and certification of an A/R project activity under the CDM. Dates of monitoring were from – 01 May, 2016 to 06 June, 2016.
Calculation method (if applicable)	Measured height of all tree within the sample plot with the help of graduated poles with a help of the measuring tape. Measured data was initially recorded in the survey sheet which was later entered in to Excel format for CER calculation.

Data/Parameter:	***H***
QA/QC procedures	Standard operating procedures were made to ensure the correct and validating data collection for each of the monitoring parameters. Validation was done by randomly checking the sample plots and also using oculatory measurements.
Purpose of data/parameter	To measure the height of the tree existing within the sample plot. To be used to calculate volume (and subsequently the biomass) of trees during verification. Instead of volume equations algometric equations may also be used.
Additional comments	The Ravi altimeter was planned for use to measure the height of the trees. But the anticipated growth of trees was not there, the Project proponent used graduated poles to measure the tree height. The PP is planned to use the bamboo sticks for the height measurement in future for trees upto the height of 7m. The trees with more than 7m height will be measured using ravi altimeter or any other sophisticated accurate measuring instrument as per the best forest practices available at the time of monitoring. For having a conservative and correct estimate. As per SOP on conservative basis the height is rounded down to the multiple of 0.5 i.e., if the height is 4.7 m it has been taken to be 4.5 m and if the height is 4.4 m it will be taken as 4 m. Also for next verification the same approach will be used for smaller trees.

<table>
<tr><td>Data/parameter</td><td>N_{BSL TREES}</td></tr>
<tr><td>Unit</td><td>Number/dimensionless</td></tr>
<tr><td>Description</td><td>Number of Baseline Trees</td></tr>
<tr><td>Measured/calculated/default</td><td>Measured at the time of validation, and will be done every five years from the start of the project activity.</td></tr>
<tr><td>Source of data</td><td>Field monitoring within the sample plots laid at the time of registration.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>Refer to the baseline sheet submitted at the time of Registration for the details

<table>
<tr><th>S. No.</th><th>Name of the JFMC</th><th>Number of Sample Plots</th><th>Number of baseline trees</th></tr>
<tr><td>1</td><td>Bairpur</td><td>3</td><td>8</td></tr>
<tr><td>2</td><td>Sinduriya</td><td>1</td><td>3</td></tr>
<tr><td>3</td><td>Bardiya</td><td>3</td><td>4</td></tr>
<tr><td>4</td><td>Parsoi tola</td><td>2</td><td>7</td></tr>
<tr><td>5</td><td>Kota</td><td>1</td><td>5</td></tr>
<tr><td>6</td><td>Nadehari</td><td>3</td><td>17</td></tr>
<tr><td>7</td><td>Semia</td><td>3</td><td>3</td></tr>
<tr><td>8</td><td>Kanhara</td><td>2</td><td>1</td></tr>
<tr><td>9</td><td>Gidhiya</td><td>2</td><td>3</td></tr>
<tr><td>10</td><td>Padracch</td><td>1</td><td>4</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>No equipment is involved.</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>At the start of the project activity and every five years since the initial verification and certification of an A/R project activity under the CDM Dates of monitoring were from – 01 May, 2016 to 06 June, 2016.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>NA</td></tr>
<tr><td>QA/QC procedures</td><td>Standard operating procedures are made to ensure the correct and validating data collection for each of the monitoring parameters.</td></tr>
<tr><td>Purpose of data/parameter</td><td>To monitor the baseline tree</td></tr>
</table>

Additional comments	During the time of validation itself the number of baseline trees is counted in the sample plots and the baseline tree biomass is deducted in the overall emission removals in the first year as a conservative approach. For the next monitoring the number of baseline trees will be monitored by counting the same in the sample plots. But the baseline tree biomass will not be added or included in the project tree biomass for emission removals estimation. This is only to ensure that the baseline trees are also protected in the project area.

Data/Parameter:	**N**
Unit	Number/dimensionless
Description	Total number of possible sample plots within the project boundary
Measured/calculated/default	Calculated
Source of data	PDD
Value(s) of monitored parameter	6534.34 (~6534)
Monitoring equipment	NA
Measuring/reading/recording frequency:	Measured at each verification events
Calculation method (if applicable):	N is equal to project area divided by the size of the sample plots Total area = 326.72 ha Sample plot area = 0.05 ha N = 6534.34 (≃ 6535)
QA/QC procedures:	NA
Purpose of data/parameter	Calculation of actual net GHG removals by sinks
Additional comments:	None

Data/Parameter	**w_i**
Unit	Number/dimensionless
Description	Relative weight of the area of stratum i
Measured/calculated/default	Measured and Calculated
Source of data	Calculated value (Refer calculation in CER Sheets)

Data/Parameter	w_i
Value(s) of monitored parameter	
Monitoring equipment	NA
Measuring/reading/recording frequency	Measured and calculated at each verification event
Calculation method (if applicable)	The relative weight of the area of a stratum i is equal to the area of the stratum i divided by the project area
QA/QC procedures	NA
Purpose of data/parameter	Calculation of actual net GHG removals by sinks
Additional comments	None

Stratum name	Wi
Bairpur	0.15
Sinduriya	0.04
Bardiya	0.11
Parsoi tola	0.04
Kota	0.05
Nadehari	0.14
Semia	0.17
Kanhara	0.08
Gidhiya	0.19
Padracch	0.04

Data/Parameter	s_i^2
Unit	$(t\ d.m.ha^{-1})^2$
Description	Variance of tree biomass per ha in stratum i
Measured/calculated/default	Calculated
Source of data	Calculated based on the verification data at each verification refer excel sheets

Data/Parameter	s_i^2
Value(s) of monitored parameter	<table><tr><th>Stratum name</th><th>s_i^2</th></tr><tr><td>Bairpur</td><td>48.67</td></tr><tr><td>Sinduriya</td><td>15.17</td></tr><tr><td>Bardiya</td><td>79.55</td></tr><tr><td>Parsoi tola</td><td>7.35</td></tr><tr><td>Kota</td><td>121.68</td></tr><tr><td>Nadehari</td><td>151</td></tr><tr><td>Semia</td><td>73.81</td></tr><tr><td>Kanhara</td><td>103.27</td></tr><tr><td>Gidhiya</td><td>26.47</td></tr><tr><td>Padracch</td><td>58.98</td></tr></table>
Monitoring equipment	NA
Measuring/reading/recording frequency	Calculated at each verification event
Calculation method (if applicable)	NA
QA/QC procedures	Approximate value of the variance of tree biomass in each stratum is either known from existing data related to the project area or estimated from existing preliminary samples.
Purpose of data/parameter	Calculation of actual net GHG removals by sinks. The same shall be used in the equation 1 of the tool “Calculation of the number of sample plots for measurements within A/R CDM Project Activities”
Additional comments	NA

Data/Parameter	$CC_{SHRUB,i}$
Unit	Dimensionless
Description	Crown cover of shrubs in shrub biomass stratum i
Measured/calculated/default	Field measurement
Source of data	Field Measurement
Value(s) of monitored parameter	0
Monitoring equipment	NA
Measuring/reading/recording frequency	Measured at each verification events .
Calculation method (if applicable)	N/A

QA/QC procedures	Considering that shrub biomass is lesser than tree biomass, simplified method of measurement of shrub crown cover through ocular method is used a per procedures prescribed under national forest inventory for calculating shrub biomass.
Purpose of data/parameter	To estimate the Shrub Biomass in the project Area.
Additional comments	This monitoring the Crown Cover of Shrub biomass is very insignificant, so the crown cover is considered as zero. However for next verification the same will be included.

D.3. Implementation of sampling plan

As per the registered PDD Sample plots determined during the project validation were used for the first monitoring period. Stratified Random sampling was adopted based on the w_i value to lay the sample plots. Grains of rice were spread randomly on the map of the plot and wherever the grains fell, that area was taken as sample plot. For example, in case of Nadehri the number of plots to be laid was five. For year 2012 the number of sample plots were 2, therefore, two rice grains were randomly spread over the map of parcel of Nadehri (for first phase) and wherever those rice grains fell, there the sample plot centre point was taken and thee sample plot was laid. For the year 2013, number of sample plots to be laid were 3 and three rice grains were spread over the map of the parcel land. Likewise for all JFMCs the sample plot was laid. The plots were rectangular and of the size 25mx20m, if the grains fall outside the map, the exercise will be repeated. The point of grain will be centre point taken for rectangular sample plot. Also care is taken that the sample plot will be atleast 7.5 meters away from the boundary of the JFMC as per the SOP. The post-stratification map was to be created with the help of GIS after the first monitoring to concentrate on the possible changes of the project boundary and planting timing with respect to the project design, and to respond any differences in growth conditions in comparison with the expected values in Project Design Document. The following factors were considered in the post stratification:

- Catastrophic disturbances such as fire, pest, or disease outbreaks were taken into account
- The grassland vegetation influence on stand development
- Silvicultural and management activities will be implemented at different intervals and locations than those proposed at the beginning of the project

But however no stratification is required as the above factors were not there during the monitoring period.

The first project monitoring started from 2016 while subsequent monitoring of project sites will be scheduled after every five year till the project duration. Stratified random sampling design in each of the project stratum has been adopted for laying out sample plots for measuring field data i.e. measurement of GBH, Height etc. Monitoring plan for the project is developed for systematic and scientific monitoring of the project data comprising various parameters.

Sampling design

The sampling design for monitoring the changes in carbon stocks of above ground biomass and below ground biomass is adopted from the Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities; (Version 04.2) and further referred with Calculation of the number of sample plots for measurements within AR CDM project activities; (Version 02.1.0.)[21]

[21] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.1.0.pdf

The sampling design and the calculation of sample plots for the verification are based on the approach described in the registered PDD.

Sampling Frame

To measure and monitor the changes in carbon stocks of above ground biomass, permanent sampling plots were laid out. The sample plots were laid out with the help of the geo coordinates taken through the GPS. All the plots were duly numbered and geo-referenced within the project area. Number of sample plots as estimated through tool “Calculation of the number of sample plots for measurements within AR CDM project activities; (Version 02.1.0.)”is 40 for monitoring the continuous changes in carbon stocks over a period of time.

Sample Size

The number of plots was established depending upon the number of stratums identified, monitoring precision and confidence interval, with the appropriate associated cost-effectiveness criteria. The sample size (n) was estimated with fixed levels of precision (10% of mean biomass of a specific strata), and t value at 90% of the confidence interval with the assumption of no cost differences exist between strata and sub-strata, as described by the tool (“Calculation of the number of sample plots for measurements within A/R CDM project activities”) in methodology used for calculating sample size. With the fundamentals from the project and the biomass stock estimates, the calculation was made using equation 1 from the tool.

$$n = \frac{N * {t_{VAL}}^2 * \left(\sum_i w_i * s_i \right)^2}{N * E^2 + {t_{VAL}}^2 * \sum_i w_i * {s_i}^2}$$

n = Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless

N = Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless

t_{VAL} = Two-sided Student’s t-value, at infinite degrees of freedom, for the required confidence level; dimensionless

w_i = Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless

s = Estimated standard deviation of biomass or volume (t d.m. ha-1) in stratum i (when it is not available, instead 50% of the estimated volume, biomass, etc. Good Practice Guidance, 2003).

i = 1, 2, 3, Biomass stock estimation for strata i within the project boundary.

Total area = 326.72 ha

Sample plot area = 0.05 ha

N = 6534.34

Tval8 =1.86

tval∞ = 1.645

Stratum Name	Stratum area (ha)	Wi	Si
Sinduriya	13.23	0.040	1.51
Bardiya	34.50	0.106	7.66
Bairpur	49.92	0.153	6.66
Parsoi tola	12.95	0.040	15.66
Kota	15.00	0.046	30.61
Nadehari	45.10	0.138	9.74
Semia	54.58	0.167	0.41
Kanhara	25.40	0.078	3.55
Padracch	13.06	0.040	9.17
Gidhiya	62.98	0.193	2.59

Hence,

$N \times t_{val}^2 \times (\sum_i w_i \times s_i)^2$ = $6534.34 \text{ X } 1.645^2 \times 6.32$

= 111797.45

$N \times E^2 + t_{val}^2 \times \sum_i w_i \times {s_i}^2$ = $6534.34 \times 1.4^2 + 1.645^2 \times 84.53$

= 12452.31

N = 30
The number of Sample Plot Required at first verification as per the registered PDD = 30

However the sample plots are increased to accommodate more samples to proportionately take the sample plots as per the year of plantation. The sample plots are given in the excel sheets.

S.No.	Name of JFMC	No of Sample Plots
1	Bairpur	6
2	Sindhuriya	2
3	Bardiya	4

4	Parsoi tola	2
5	Kota	2
6	Nadehari	5
7	Semia	6
8	Kanhara	3
9	Gidhiya	6
10	Padracch	2
Total		**38**

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

In accordance with the latest version 03 of the methodology AR-AMS0007, the baseline net GHG removals by sinks is estimated using equation 1 of the methodology as follows:

$$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,T} + \Delta C_{DW\_BSL,t} + \Delta C_{LI\_BSL,T}$$

However with reference to paragraph 11 of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees* and shrubs in A/R CDM project activities" baseline carbon stocks of SSC A/R CDM project can be considered to be zero conservatively.. As per this, the tool lays three conditions so that carbon stock in baseline trees can be considered as zero. The justification is provided in the table below.

As per Paragraph 11 of AR-TOOL 14	Justification
The pre-project trees are neither harvested, nor cleared, nor removed throughout the crediting period of the project activity;	The pre project tress were not harvested or removed during the monitoring period. They will not be removed during the whole of the crediting period of the project activity.
The pre-project trees do not suffer mortality because of competition from trees planted in the project, or damage because of implementation of the project activity, at any time during the crediting period of the project activity	Plantation activities were done in such a way that these pre-project trees do not suffer mortality due to competition. All existing trees are left as it is, and a clear spacing is left to ensure there is no competition to the pre-project trees from the project trees.
The pre-project trees are not inventoried along with the project trees in monitoring of carbon stocks but their continued existence, consistent with the baseline scenario, is monitored throughout the crediting period of the project activity	The pre-project trees not inventoried along with the project trees. In fact to ensure conservative value, the carbon content of all the pre-project trees are subtracted in year 1 itself. These were not part of the measurement and reporting of the SSC A/R CDM project activity.

Hence the carbon stock change in pre-project trees is estimated as zero.

$$\Delta C_{BSL,t} = 0$$

However to be conservative project proponent is deducting the total carbon stock in the pre project scenario from the first year actual net GHG removals by sinks.

Verification Period	**Baseline GHG removal (for the first year)**
01/01/2012 to 06/06/2016	5192 tCO_2e

E.2. Calculation of project emissions or actual net removals

As per §19 of the methodology, the actual net GHG removals by sinks is calculated as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$

Where:

$\Delta C_{ACTUAL,t}$ Actual net GHG removals by sinks, in year *t*; tCO_2-e

$\Delta C_{P,t}$
- Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; tCO_2-e

$GHG_{E,t}$
- Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as calculated in the tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; tCO_2-e

As per §9 of the applied methodology, increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the project activity is calculated as per the tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" (version 4.0.0). The pre and post project activities do not involve the burning of biomass or forest fires, or usage of fire for site preparation or usage of fire to clear land of harvest residue prior to replanting of land. The area affected by fire is estimated to be 0% or extremely negligible.

Hence $GHG_{E,t}= 0$

As per the equation 3 of the methodology:

$$\Delta C_{p,t} = \Delta C_{TREE_{PROJ},t} + \Delta C_{SHRUB_{PROJ},t} + \Delta C_{DW_{PROJ},t} + \Delta C_{LI_{PROJ},t} + \Delta SOC_{AL,t}$$

Where

$\Delta C_{p,t}$ Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO_2-e

$\Delta C_{TREE_{PROJ},t}$
- Change in carbon stock in tree biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{SHRUB_{PROJ},t}$
- Change in carbon stock in shrub biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and

shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{DW_{PROJ},t}$ • Change in carbon stock in dead wood in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e

$\Delta C_{LI_{PROJ},t}$ • Change in carbon stock in litter biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e

$\Delta SOC_{AL,t}$ • Change in carbon stock in SOC in project, in year t, as estimated in the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities"; tCO_2-e

As per methodology, the changes in carbon stock in the project are equal to the changes in carbon stock in all the carbon pools.

Only changes in the carbon stock in trees are accounted for in the project scenario. This is also conservative. Carbon content of the pre-project scenario is deducted for reasons of conservativeness.

Hence,

$$\Delta C_{p,t} = \Delta C_{TREE_{PROJ},t}$$

Where:

$\Delta C_{p,t}$ Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO_2-e

$\Delta C_{TREE_{PROJ},t}$ • Change in carbon stock in tree biomass in project in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{TREE_{PROJ},t}$ is calculated as per equation 12, §35 of the AR-TOOL 14

$$C_{TREE\_PROJ,t} = \frac{44}{12} \times CF_{TREE\_PROJ,t} \times B_{TREE\_PROJ,t}$$

$CF_{TREE\_PROJ,t}$ Carbon to carbon dioxide conversion factor

$B_{TREE\_PROJ,t}$ Tree biomass in the tree biomass estimation strata; t d.m; given in the ER calculation spread sheet

In the project scenario, the stratification is based on the species. Even though the harvesting cycle is of more than 25 years, the management practice depends on the species planted. The carbon change in each of the strata (as per the species) shall be quantified.

As per equation 13 and 14 of §35 of the AR-TOOL 14:

$$B_{TREE} = A \times b_{TREE}$$

$$b_{TREE} = \sum_{i=1}^{M} w_i \times b_{TREE,i}$$

Where:

B_{TREE} Tree biomass in the tree biomass estimation strata; t d.m.

w_i = Ratio of the area of the stratum I to the sum of areas of tree biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless

$b_{TREE,i}$ = Mean tree biomass per hectare in stratum I; t d.m. ha^{-1}

A = Sum of areas of the tree biomass estimation strata; ha

Mean tree biomass per hectare has been calculated from mean tree volume per hectare. From the mean tree biomass per hectare, total tree biomass per stratum per species ($B_{TREE\_PROJ,t}$) has been calculated. For calculating the B Tree value, the height (H) and Girth at breast height (GBH) of the trees were measured. GBH was then converted into DBH by using the formula

DBH = GBH/ (22/7) (All the values were in meter)

The appropriate volume equations were used to calculate the stem volume of each tree using the height and DBH of the trees. The stem volume equations were derived from Indian State of Forest Report, 2011 and Forest Survey of India-Volume Equations for forests of India, Nepal and Bhutan (1996). Using the stem volume of each tree the B(TREE,i) value for each tree was calculated using the formula:

B_(TREE,i) = Stem volume* Density* BEF* {1+Root shoot ratio(Above ground Biomass : Below ground Biomass)}

Further, the B_ (TREE,i) value of each tree in a sample plot were added and divided by the sample plot area (0.05 Ha) to calculate the bTREE,p,I value. Similarly the bTREE,p,I value were calculated for all the sample plots of the particular JFMC and were summed up to calculate the biomass value of the total area which was then added to the shrub biomass.

The summary of $\Delta C_{TREE_{PROJ},t}$ calculation for the monitoring period given below:

	Stratum i	**Ai (Ha)**	**wi**	**bTREE,I (t d.m./ha)**	**wi *bTREEi**	**bTREE (t d.m./ha)**	**BTREE (t d.m.)**	**CFTREE (tC t d/m^3)**	**CTREE (t CO2e)**
1	Bairpur	49.92	0.15	33.32	5.0908	25.563	8352.075	0.47	14393
2	Sinduriya	13.23	0.04	19.91	0.8062				
3	Bardiya	34.5	0.11	24.86	2.6251				
4	Parsoi tola	12.95	0.04	56.04	2.2212				
5	Kota	15	0.05	47.52	2.1818				
6	Nadehari	45.1	0.14	20.84	2.8764				
7	Semia	54.58	0.17	14.88	2.4853				
8	Kanhara	25.4	0.08	32.33	2.5134				
9	Gidhiya	62.98	0.19	15.53	2.9932				

	Stratum i	Ai (Ha)	wi	bTREE,I (t d.m./ha)	wi *bTREEi	bTREE (t d.m./ha)	BTREE (t d.m.)	CFTREE (tC t d/m^3)	CTREE (t CO2e)
10	Padracch	13.06	0.04	44.28	1.7700				
	• **Total (A)**	• **326.72**							

The Shrub biomass calculation is presented below, as per the equation 26 and 27 of the AR tool 14.

The equation 26 is

$C_{SHRUB,\,t} = 44/12 \times CF_S \times (1+R_s) \times \sum(A_{SHRUB,i} \times b_{SHRUB,i})$

$b_{SHRUB,i} = BDR_{SF} \times b_{FOREST} \times CC_{SHRUB,\,i}$

where

$C_{SHRUB,\,t}$ = Carbon stock in shrubs within the project boundary at a given point of time in year *t*; tCO_2-e

CF_S = Carbon fraction of shrub biomass; t C $(t.d.m.)^{-1}$
A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.

R_s = Root-shoot ratio for shrubs; dimensionless.
The default value of 0.40 is used unless transparent and verifiable information can be provided to justify a different value.

$A_{SHRUB,I}$ = Area of shrub biomass estimation stratum i; ha

$b_{SHRUB,I}$ = Shrub biomass per hectare in shrub biomass estimation stratum *i*; t d.m. ha^{-1}

BDR_{SF} = Ratio of shrub biomass per hectare in land having a shrub crown cover of 1.0 (i.e. 100 per cent) and the default above-ground biomass content per hectare in forest in the region/country where the A/R CDM project activity is located; dimensionless.

A default value of 0.10 should be used unless transparent and verifiable information can be provided to justify a different value.

b_{FOREST} = Above-ground biomass content in forest in the region/country where the A/R CDM project activity is located; t d.m. ha^{-1}. Above Ground Biomass of the stratum is used.

$CC_{SHRUB,\,i}$ = Crown cover of shrubs in shrub biomass estimation stratum i at the time of estimation, expressed as a fraction (e.g. 10 per cent crown cover implies $CC_{SHRUB,\,i} = 0.10$); dimensionless

However the Crown cover shrub biomass estimated was very insignificant and the PP did not consider the shrub biomass for this verification but the same will be estimated by monitoring the crown cover of shrubs for the next verification.

So the monitored parameter CCSHRUB, i is taken as 0 and accordingly shrub biomass is also taken as zero.

Thus

$$\Delta C_{ACTUAL,t} - = \Delta C_{TREE_{PROJ},t} + \Delta C_{SHRUB_{PROJ},t}$$

= 14393+ 0 =14393

Also the Uncertainty is calculated is as per AR tool 14 and it is 8.94% (refer to the CER calculation sheet). Hence discount factors are not applied.

E.3. Calculation of leakage emissions

As per §21 of the methodology, leakage emission are calculated as follows:

$$LK_t = LK_{AGRIC,t}$$

Where:

LK_t GHG emissions due to leakage, in year *t*; tCO_2-e

$LK_{AGRIC,t}$

- Leakage due to the displacement of agricultural activities in year *t*, as calculated in the tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity"; tCO_2-e

Shifting of grazing activities was the only applicable leakage for the project. According to the PDD, it was considered to be zero. Hence, the leakage for the project is zero.

$$LK_t = LK_{AGRIC,t} = 0$$

E.4. Calculation of emission reductions or net anthropogenic removals

As per §22 of the methodology, the net anthropogenic GHG removals by the sinks are calculated as follows:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

Where:

$\Delta C_{AR-CDM,t}$	Net anthropogenic GHG removals by sinks, in year *t*; tCO_2-e
$\Delta C_{ACTUAL,t}$	Actual net GHG removals by sinks, in year *t*; tCO_2-e
$\Delta C_{BSL,t}$	Baseline net GHG removals by sinks, in year *t*; tCO_2-e
LK_t	GHG emissions due to leakage, in year *t*; tCO_2-

	Baseline GHG emissions or or baseline net GHG removals (tCO_2e)	Project GHG emissions or actual net GHG removals (tCO_2e)	Leakage GHG emissions (tCO_2e)	GHG emission reductions or net anthropogenic GHG removals (tCO2e)		
				Before 01/01/2013	From 01/01/2013	Total amount (tCO_2e)
Total	5,192	14,393	0	NA	NA	9201

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante (t CO_2e)
9201 tCO_2e	**14,035 tCO_2e**

E.6. Remarks on increase in achieved emission reductions

For A/R CDM project Activities this section is not applicable as per the MR filling guidelines.

Appendix 1.
Appendix 1.

Appendix 1. Geographical delineation of project boundary

Table 1: Kota JFMC of Dala Forest Range, plantation in 2012

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kota	83.07688	24.37156	15.00	2012
Kota	83.07610	24.37124		
Kota	83.07609	24.37081		
Kota	83.07634	24.37018		
Kota	83.07642	24.36967		
Kota	83.07636	24.36955		
Kota	83.07602	24.36952		
Kota	83.07561	24.37000		
Kota	83.07515	24.37053		
Kota	83.07474	24.37082		
Kota	83.07453	24.37111		
Kota	83.07416	24.37078		
Kota	83.07358	24.37046		
Kota	83.07296	24.37056		
Kota	83.07260	24.37090		
Kota	83.07214	24.37148		
Kota	83.07189	24.37206		
Kota	83.07090	24.37245		
Kota	83.07083	24.37233		
Kota	83.07076	24.37290		
Kota	83.07226	24.37430		
Kota	83.07545	24.37430		
Kota	83.07525	24.37383		
Kota	83.07515	24.37349		
Kota	83.07504	24.37316		
Kota	83.07492	24.37278		
Kota	83.07456	24.37255		
Kota	83.07424	24.37236		
Kota	83.07377	24.37232		
Kota	83.07319	24.37228		
Kota	83.07319	24.37204		
Kota	83.07345	24.37190		
Kota	83.07387	24.37184		
Kota	83.07418	24.37184		
Kota	83.07444	24.37184		
Kota	83.07465	24.37183		
Kota	83.07517	24.37183		
Kota	83.07554	24.37182		
Kota	83.07584	24.37163		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kota	83.07626	24.37157		
Kota	83.07689	24.37156		
Kota	83.07691	24.37155		
Kota	83.07689	24.37156		
Kota	83.07691	24.37155		

Table 2: Sinduriya JFMC of Dala Forest Range, plantation in 2012

JFMC	Longitude	Latitude	Project Area (ha)	Year
Sinduriya	83.01318	24.51852	13.23	2012
Sinduriya	83.01334	24.51861		
Sinduriya	83.01375	24.51861		
Sinduriya	83.01456	24.51860		
Sinduriya	83.01491	24.51859		
Sinduriya	83.01538	24.51869		
Sinduriya	83.01584	24.51879		
Sinduriya	83.01602	24.51890		
Sinduriya	83.01626	24.51905		
Sinduriya	83.01649	24.51932		
Sinduriya	83.01667	24.51979		
Sinduriya	83.01671	24.52000		
Sinduriya	83.01816	24.52052		
Sinduriya	83.01830	24.52056		
Sinduriya	83.01853	24.52050		
Sinduriya	83.01875	24.52068		
Sinduriya	83.01883	24.52070		
Sinduriya	83.01912	24.52030		
Sinduriya	83.01915	24.52010		
Sinduriya	83.01901	24.52013		
Sinduriya	83.01842	24.51938		
Sinduriya	83.01889	24.51920		
Sinduriya	83.01903	24.51908		
Sinduriya	83.01939	24.51877		
Sinduriya	83.01934	24.51859		
Sinduriya	83.01875	24.51799		
Sinduriya	83.01870	24.51801		
Sinduriya	83.01850	24.51834		
Sinduriya	83.01806	24.51786		
Sinduriya	83.01817	24.51740		
Sinduriya	83.01717	24.51640		
Sinduriya	83.01610	24.51677		
Sinduriya	83.01574	24.51715		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Sinduriya	83.01520	24.51766		
Sinduriya	83.01485	24.51759		
Sinduriya	83.01467	24.51749		
Sinduriya	83.01446	24.51738		
Sinduriya	83.01426	24.51741		
Sinduriya	83.01396	24.51763		
Sinduriya	83.01390	24.51781		
Sinduriya	83.01386	24.51791		
Sinduriya	83.01326	24.51821		
Sinduriya	83.01319	24.51840		
Sinduriya	83.01316	24.51847		
Sinduriya	83.01318	24.51852		

Table 3: Bardiya JFMC of Dala Forest Range, plantation in 2012

JFMC	Longitude	Latitude	Project Area (ha)	Year
Bardiya	83.01130	24.49897	34.49	2012
Bardiya	83.01130	24.49892		
Bardiya	83.01136	24.49890		
Bardiya	83.01147	24.49879		
Bardiya	83.01286	24.49798		
Bardiya	83.01330	24.49780		
Bardiya	83.01401	24.49793		
Bardiya	83.01411	24.49725		
Bardiya	83.01411	24.49724		
Bardiya	83.01374	24.49665		
Bardiya	83.01316	24.49625		
Bardiya	83.01229	24.49575		
Bardiya	83.01225	24.49573		
Bardiya	83.01126	24.49568		
Bardiya	83.01110	24.49583		
Bardiya	83.01090	24.49588		
Bardiya	83.01066	24.49611		
Bardiya	83.01032	24.49652		
Bardiya	83.00997	24.49666		
Bardiya	83.00953	24.49703		
Bardiya	83.00923	24.49727		
Bardiya	83.00879	24.49750		
Bardiya	83.00849	24.49750		
Bardiya	83.00819	24.49732		
Bardiya	83.00789	24.49710		
Bardiya	83.00768	24.49688		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Bardiya	83.00733	24.49661		
Bardiya	83.00698	24.49647		
Bardiya	83.00672	24.49607		
Bardiya	83.00667	24.49566		
Bardiya	83.00686	24.49529		
Bardiya	83.00696	24.49511		
Bardiya	83.00725	24.49510		
Bardiya	83.00629	24.49485		
Bardiya	83.00630	24.49507		
Bardiya	83.00650	24.49580		
Bardiya	83.00652	24.49627		
Bardiya	83.00660	24.49667		
Bardiya	83.00673	24.49760		
Bardiya	83.00672	24.49825		
Bardiya	83.00655	24.49848		
Bardiya	83.00637	24.49876		
Bardiya	83.00634	24.49875		
Bardiya	83.00581	24.50034		
Bardiya	83.00655	24.50070		
Bardiya	83.00683	24.50080		
Bardiya	83.00711	24.50086		
Bardiya	83.00737	24.50110		
Bardiya	83.00776	24.50146		
Bardiya	83.00837	24.50170		
Bardiya	83.00843	24.50199		
Bardiya	83.00828	24.50225		
Bardiya	83.00877	24.50248		
Bardiya	83.01102	24.50237		
Bardiya	83.01074	24.50140		
Bardiya	83.01097	24.50122		
Bardiya	83.01131	24.50083		
Bardiya	83.01110	24.50029		
Bardiya	83.01101	24.49928		
Bardiya	83.01130	24.49897		

Table 4: Parsoi tola JFMC of Obra Forest Range, plantation in 2012

JFMC	Longitude	Latitude	Project Area (ha)	Year
Parsoi Tola	82.83225	24.40191	12.95	2012
Parsoi Tola	82.83198	24.40188		
Parsoi Tola	82.83159	24.40196		
Parsoi Tola	82.83143	24.40171		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Parsoi Tola	82.83138	24.40128		
Parsoi Tola	82.83141	24.40081		
Parsoi Tola	82.83141	24.40063		
Parsoi Tola	82.83156	24.40013		
Parsoi Tola	82.83156	24.39966		
Parsoi Tola	82.83155	24.39930		
Parsoi Tola	82.83170	24.39905		
Parsoi Tola	82.83213	24.39858		
Parsoi Tola	82.83252	24.39857		
Parsoi Tola	82.83303	24.39857		
Parsoi Tola	82.83342	24.39838		
Parsoi Tola	82.83396	24.39795		
Parsoi Tola	82.83443	24.39790		
Parsoi Tola	82.83482	24.39786		
Parsoi Tola	82.83505	24.39783		
Parsoi Tola	82.83552	24.39768		
Parsoi Tola	82.83591	24.39724		
Parsoi Tola	82.83649	24.39691		
Parsoi Tola	82.83676	24.39684		
Parsoi Tola	82.83727	24.39669		
Parsoi Tola	82.83762	24.39661		
Parsoi Tola	82.83809	24.39633		
Parsoi Tola	82.83664	24.39676		
Parsoi Tola	82.83546	24.39744		
Parsoi Tola	82.83471	24.39733		
Parsoi Tola	82.83393	24.39760		
Parsoi Tola	82.83328	24.39822		
Parsoi Tola	82.83294	24.39804		
Parsoi Tola	82.83188	24.39828		
Parsoi Tola	82.83115	24.39850		
Parsoi Tola	82.83028	24.39839		
Parsoi Tola	82.83048	24.39853		
Parsoi Tola	82.83076	24.39885		
Parsoi Tola	82.83076	24.39910		
Parsoi Tola	82.83069	24.39924		
Parsoi Tola	82.83045	24.39942		
Parsoi Tola	82.83022	24.39957		
Parsoi Tola	82.82983	24.39957		
Parsoi Tola	82.82959	24.39943		
Parsoi Tola	82.82943	24.39911		
Parsoi Tola	82.82946	24.39868		
Parsoi Tola	82.82962	24.39850		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Parsoi Tola	82.82962	24.39849		
Parsoi Tola	82.82877	24.39877		
Parsoi Tola	82.82857	24.39901		
Parsoi Tola	82.82857	24.39912		
Parsoi Tola	82.82857	24.39937		
Parsoi Tola	82.82842	24.39959		
Parsoi Tola	82.82822	24.39956		
Parsoi Tola	82.82818	24.39947		
Parsoi Tola	82.82791	24.39979		
Parsoi Tola	82.82779	24.39982		
Parsoi Tola	82.82805	24.40063		
Parsoi Tola	82.82812	24.40056		
Parsoi Tola	82.82863	24.40041		
Parsoi Tola	82.82902	24.40034		
Parsoi Tola	82.82941	24.40015		
Parsoi Tola	82.82960	24.40015		
Parsoi Tola	82.82988	24.40015		
Parsoi Tola	82.83019	24.40014		
Parsoi Tola	82.83047	24.40036		
Parsoi Tola	82.83040	24.40097		
Parsoi Tola	82.83025	24.40136		
Parsoi Tola	82.83009	24.40154		
Parsoi Tola	82.82963	24.40202		
Parsoi Tola	82.82928	24.40241		
Parsoi Tola	82.82894	24.40271		
Parsoi Tola	82.82882	24.40299		
Parsoi Tola	82.82892	24.40328		
Parsoi Tola	82.82952	24.40345		
Parsoi Tola	82.83013	24.40324		
Parsoi Tola	82.83016	24.40320		
Parsoi Tola	82.83052	24.40310		
Parsoi Tola	82.83154	24.40275		
Parsoi Tola	82.83166	24.40210		
Parsoi Tola	82.83225	24.40191		
Parsoi Tola	82.83932	24.39596		
Parsoi Tola	82.83838	24.39624		
Parsoi Tola	82.83879	24.39617		
Parsoi Tola	82.83914	24.39605		
Parsoi Tola	82.83932	24.39596		

Table 5: Bairpur JFMC of Obra Forest Range, plantation in 2012

JFMC	Longitude	Latitude	Project Area (ha)	Year
Bairpur	82.81822	24.35308	49.91	2012
Bairpur	82.81778	24.35211		
Bairpur	82.81726	24.35123		
Bairpur	82.81672	24.34994		
Bairpur	82.81834	24.34897		
Bairpur	82.81991	24.34801		
Bairpur	82.81924	24.34722		
Bairpur	82.81863	24.34660		
Bairpur	82.81805	24.34558		
Bairpur	82.81757	24.34492		
Bairpur	82.81719	24.34429		
Bairpur	82.81720	24.34425		
Bairpur	82.81592	24.34470		
Bairpur	82.81475	24.34515		
Bairpur	82.81373	24.34557		
Bairpur	82.81259	24.34616		
Bairpur	82.81181	24.34673		
Bairpur	82.81143	24.34703		
Bairpur	82.81154	24.34762		
Bairpur	82.81217	24.34871		
Bairpur	82.81258	24.34966		
Bairpur	82.81291	24.35053		
Bairpur	82.81344	24.35138		
Bairpur	82.81407	24.35223		
Bairpur	82.81411	24.35283		
Bairpur	82.81419	24.35340		
Bairpur	82.81444	24.35377		
Bairpur	82.81470	24.35356		
Bairpur	82.81514	24.35356		
Bairpur	82.81596	24.35323		
Bairpur	82.81630	24.35310		
Bairpur	82.81713	24.35309		
Bairpur	82.81771	24.35321		
Bairpur	82.81822	24.35308		

Table 6: NadehariJFMC of Obra Forest Range, plantation in 2012 (Patch-1)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.80723	24.36767	11.33	2012
Nadehari	82.80708	24.36756		
Nadehari	82.80689	24.36749		
Nadehari	82.80729	24.36708		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.80761	24.36689		
Nadehari	82.80802	24.36643		
Nadehari	82.80804	24.36611		
Nadehari	82.80788	24.36608		
Nadehari	82.80754	24.36576		
Nadehari	82.80701	24.36581		
Nadehari	82.80665	24.36622		
Nadehari	82.80639	24.36642		
Nadehari	82.80592	24.36670		
Nadehari	82.80541	24.36656		
Nadehari	82.80525	24.36629		
Nadehari	82.80573	24.36575		
Nadehari	82.80616	24.36542		
Nadehari	82.80696	24.36512		
Nadehari	82.80606	24.36433		
Nadehari	82.80570	24.36333		
Nadehari	82.80536	24.36330		
Nadehari	82.80382	24.36475		
Nadehari	82.80329	24.36653		
Nadehari	82.80511	24.36659		
Nadehari	82.80565	24.36828		
Nadehari	82.80645	24.36800		
Nadehari	82.80702	24.36765		
Nadehari	82.80723	24.36767		

Table 7: Nadehari JFMC of Obra Forest Range, plantation in 2012 (Patch-2)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.81072	24.36508	4.15	2012
Nadehari	82.81056	24.36523		
Nadehari	82.80971	24.36546		
Nadehari	82.80948	24.36583		
Nadehari	82.80921	24.36591		
Nadehari	82.80909	24.36613		
Nadehari	82.80912	24.36638		
Nadehari	82.80965	24.36685		
Nadehari	82.80969	24.36705		
Nadehari	82.81043	24.36699		
Nadehari	82.81102	24.36694		
Nadehari	82.81172	24.36651		
Nadehari	82.81161	24.36598		
Nadehari	82.81146	24.36579		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.81144	24.36555		
Nadehari	82.81105	24.36511		

Table 8: Kanhara JFMC of Jugail Forest Range, plantation in 2012 (Patch-1)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kanhara	82.75036	24.37903	3.13	2012
Kanhara	82.75034	24.37903		
Kanhara	82.75006	24.37929		
Kanhara	82.74988	24.37940		
Kanhara	82.74948	24.37941		
Kanhara	82.74914	24.37973		
Kanhara	82.74909	24.38020		
Kanhara	82.74910	24.38062		
Kanhara	82.74927	24.38083		
Kanhara	82.74962	24.38114		
Kanhara	82.74988	24.38114		
Kanhara	82.75036	24.37903		
Kanhara	82.75080	24.37944		
Kanhara	82.75074	24.37902		
Kanhara	82.75034	24.37903		
Kanhara	82.75006	24.37929		
Kanhara	82.74988	24.37940		
Kanhara	82.74948	24.37941		
Kanhara	82.74914	24.37973		
Kanhara	82.74909	24.38020		
Kanhara	82.74910	24.38062		
Kanhara	82.74927	24.38083		
Kanhara	82.74962	24.38114		
Kanhara	82.74997	24.38114		
Kanhara	82.75031	24.38113		
Kanhara	82.75065	24.38076		
Kanhara	82.75086	24.38052		
Kanhara	82.75064	24.38002		
Kanhara	82.75080	24.37944		

Table 9: Kanhara JFMC of Jugail Forest Range, plantation in 2012 (Patch-2)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kanhara	82.75289	24.38131	4.05	2012
Kanhara	82.75233	24.37933		
Kanhara	82.75151	24.37798		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kanhara	82.75131	24.37833		
Kanhara	82.75131	24.37865		
Kanhara	82.75143	24.37933		
Kanhara	82.7519	24.37964		
Kanhara	82.75185	24.38012		
Kanhara	82.75151	24.38049		
Kanhara	82.75122	24.3807		
Kanhara	82.75105	24.38081		
Kanhara	82.75089	24.38118		
Kanhara	82.75095	24.38165		
Kanhara	82.75118	24.38186		
Kanhara	82.75134	24.38186		
Kanhara	82.75147	24.3818		
Kanhara	82.75284	24.38131		
Kanhara	82.75289	24.38131		

Table 10: Kanhara JFMC of Jugail Forest Range, plantation in 2012 (Patch-3)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kanhara	82.72332	24.39057	8.69	2012
Kanhara	82.72330	24.39049		
Kanhara	82.72332	24.39057		
Kanhara	82.72471	24.39090		
Kanhara	82.72552	24.39115		
Kanhara	82.72672	24.39123		
Kanhara	82.72667	24.39122		
Kanhara	82.72654	24.39091		
Kanhara	82.72654	24.39070		
Kanhara	82.72690	24.39052		
Kanhara	82.72706	24.39022		
Kanhara	82.72701	24.38979		
Kanhara	82.72679	24.38930		
Kanhara	82.72623	24.38848		
Kanhara	82.72564	24.38859		
Kanhara	82.72383	24.38894		
Kanhara	82.72343	24.38938		
Kanhara	82.72291	24.38954		
Kanhara	82.72335	24.39023		
Kanhara	82.72330	24.39049		
Kanhara	82.72332	24.39057		
Kanhara	82.72330	24.39049		

Table 11: Kanhara JFMC of Jugail Forest Range, plantation in 2012 (Patch- 4)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Kanhara	82.72332	24.39114	9.52	2012
Kanhara	82.72334	24.39128		
Kanhara	82.72349	24.39144		
Kanhara	82.72349	24.39144		
Kanhara	82.72356	24.39153		
Kanhara	82.72392	24.39379		
Kanhara	82.72371	24.39364		
Kanhara	82.72371	24.39322		
Kanhara	82.72416	24.39285		
Kanhara	82.7244	24.39247		
Kanhara	82.72393	24.39208		
Kanhara	82.72349	24.39146		
Kanhara	82.72349	24.39144		
Kanhara	82.72334	24.39128		
Kanhara	82.72332	24.39114		
Kanhara	82.72236	24.3915		
Kanhara	82.72196	24.39177		
Kanhara	82.72139	24.39193		
Kanhara	82.7207	24.39194		
Kanhara	82.72007	24.39205		
Kanhara	82.71927	24.39243		
Kanhara	82.71874	24.39297		
Kanhara	82.71921	24.39341		
Kanhara	82.72029	24.39317		
Kanhara	82.72032	24.39315		
Kanhara	82.72174	24.39374		
Kanhara	82.72211	24.39356		
Kanhara	82.72287	24.39363		
Kanhara	82.72333	24.39391		
Kanhara	82.72375	24.39385		
Kanhara	82.72392	24.39379		

Table 12: Semia JFMC of Jugail Forest Range, plantation in 2012

JFMC	Longitude	Latitude	Project Area (ha)	Year
Semia	82.82449	24.58853	27.55	2012
Semia	82.82439	24.58856		
Semia	82.82423	24.58865		
Semia	82.8222	24.58998		
Semia	82.82198	24.59017		
Semia	82.82162	24.59058		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Semia	82.82092	24.59108		
Semia	82.8209	24.59109		
Semia	82.8209	24.59109		
Semia	82.82084	24.59114		
Semia	82.8207	24.59117		
Semia	82.81842	24.59201		
Semia	82.81828	24.59211		
Semia	82.8182	24.59232		
Semia	82.81824	24.59279		
Semia	82.81792	24.59324		
Semia	82.82033	24.59323		
Semia	82.82105	24.5931		
Semia	82.82128	24.59323		
Semia	82.82137	24.59323		
Semia	82.82414	24.59414		
Semia	82.82421	24.59416		
Semia	82.82422	24.59415		
Semia	82.82489	24.59395		
Semia	82.82492	24.59443		
Semia	82.82558	24.59468		
Semia	82.82577	24.59463		
Semia	82.82623	24.59472		
Semia	82.82636	24.59497		
Semia	82.82641	24.59499		
Semia	82.82671	24.59395		
Semia	82.82594	24.59323		
Semia	82.82541	24.59321		
Semia	82.82518	24.59279		
Semia	82.82543	24.59217		
Semia	82.8253	24.59163		
Semia	82.82531	24.59062		
Semia	82.82523	24.58977		
Semia	82.82479	24.58853		
Semia	82.82479	24.58852		
Semia	82.82449	24.58853		

Table 13: Padrachh JFMC of Kon Forest Range, plantation in 2012 (Patch-1)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Padrachh	83.24584	24.37921	2.55	2012
Padrachh	83.24498	24.37881		
Padrachh	83.24498	24.37915		

Padrachh	83.24344	24.37828		
Padrachh	83.24344	24.37802		
Padrachh	83.24604	24.37785		

Table 14: Padrachh JFMC of Kon Forest Range, plantation in 2012 (Patch-2)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Padrachh	83.24295	24.37908	5.73	2012
Padrachh	83.24081	24.37936		
Padrachh	83.23975	24.37931		
Padrachh	83.23851	24.37839		
Padrachh	83.23974	24.37808		
Padrachh	83.24107	24.37797		
Padrachh	83.24120	24.37771		
Padrachh	83.24244	24.37765		

Table 15: Padrachh JFMC of Kon Forest Range, plantation in 2012 (Patch-3)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Padrachh	83.24625	24.37709	4.76	2012
Padrachh	83.24523	24.37726		
Padrachh	83.24337	24.37702		
Padrachh	83.24119	24.37684		
Padrachh	83.23901	24.37695		
Padrachh	83.24045	24.37579		
Padrachh	83.24221	24.37619		
Padrachh	83.24405	24.37649		

Table 16: Gidhiya JFMC of Kon Forest Range, plantation in 2012 (Patch -1)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Gidhiya	83.28482	24.37557	1.08	2012
Gidhiya	83.28546	24.37557		
Gidhiya	83.28615	24.37548		
Gidhiya	83.2864	24.37507		
Gidhiya	83.28607	24.37462		
Gidhiya	83.28546	24.37448		
Gidhiya	83.28518	24.37435		
Gidhiya	83.28493	24.37418		
Gidhiya	83.28451	24.37423		
Gidhiya	83.28432	24.37515		
Gidhiya	83.28415	24.37548		
Gidhiya	83.28423	24.37568		
Gidhiya	83.28482	24.37557		

Table 17: Gidhiya JFMC of Kon Forest Range, plantation in 2012 (Patch-2)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Gidhiya	83.28484	24.37855	2.50	2012
Gidhiya	83.28508	24.37850		
Gidhiya	83.28495	24.37844		
Gidhiya	83.28497	24.37835		
Gidhiya	83.28497	24.37814		
Gidhiya	83.28497	24.37797		
Gidhiya	83.28493	24.37773		
Gidhiya	83.28434	24.37769		
Gidhiya	83.28392	24.37752		
Gidhiya	83.28395	24.37788		
Gidhiya	83.28270	24.37813		
Gidhiya	83.28434	24.37821		
Gidhiya	83.28439	24.37841		
Gidhiya	83.28448	24.37858		
Gidhiya	83.28484	24.37855		

Table 18: Nadehari JFMC of Obra Forest Range, plantation in 2013 (Patch-1)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.81058	24.37131	13.12	2013
Nadehari	82.81046	24.37138		
Nadehari	82.81021	24.37152		
Nadehari	82.80997	24.37170		
Nadehari	82.80963	24.37181		
Nadehari	82.80940	24.37186		
Nadehari	82.80921	24.37195		
Nadehari	82.80908	24.37204		
Nadehari	82.80889	24.37214		
Nadehari	82.80870	24.37225		
Nadehari	82.80859	24.37229		
Nadehari	82.80840	24.37231		
Nadehari	82.80825	24.37231		
Nadehari	82.80815	24.37224		
Nadehari	82.80808	24.37214		
Nadehari	82.80800	24.37207		
Nadehari	82.80785	24.37202		
Nadehari	82.80769	24.37202		
Nadehari	82.80747	24.37199		
Nadehari	82.80726	24.37203		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.80720	24.37218		
Nadehari	82.80709	24.37229		
Nadehari	82.80702	24.37246		
Nadehari	82.80696	24.37253		
Nadehari	82.80677	24.37264		
Nadehari	82.80655	24.37269		
Nadehari	82.80628	24.37273		
Nadehari	82.80602	24.37277		
Nadehari	82.80577	24.37281		
Nadehari	82.80564	24.37286		
Nadehari	82.80541	24.37299		
Nadehari	82.80522	24.37314		
Nadehari	82.80516	24.37316		
Nadehari	82.80459	24.37350		
Nadehari	82.80452	24.37348		
Nadehari	82.80418	24.37349		
Nadehari	82.80387	24.37361		
Nadehari	82.80370	24.37375		
Nadehari	82.80361	24.37391		
Nadehari	82.80348	24.37397		
Nadehari	82.80324	24.37400		
Nadehari	82.80317	24.37394		
Nadehari	82.80312	24.37379		
Nadehari	82.80310	24.37365		
Nadehari	82.80317	24.37346		
Nadehari	82.80322	24.37330		
Nadehari	82.80323	24.37311		
Nadehari	82.80320	24.37297		
Nadehari	82.80309	24.37287		
Nadehari	82.80298	24.37280		
Nadehari	82.80273	24.37277		
Nadehari	82.80258	24.37278		
Nadehari	82.80242	24.37276		
Nadehari	82.80201	24.37278		
Nadehari	82.80175	24.37284		
Nadehari	82.80155	24.37290		
Nadehari	82.80120	24.37295		
Nadehari	82.80110	24.37295		
Nadehari	82.80106	24.37294		
Nadehari	82.80099	24.37310		
Nadehari	82.80088	24.37315		
Nadehari	82.80076	24.37325		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.80069	24.37339		
Nadehari	82.80065	24.37340		
Nadehari	82.80068	24.37340		
Nadehari	82.80088	24.37342		
Nadehari	82.80100	24.37353		
Nadehari	82.80100	24.37365		
Nadehari	82.80090	24.37372		
Nadehari	82.80055	24.37376		
Nadehari	82.80032	24.37375		
Nadehari	82.80028	24.37387		
Nadehari	82.80028	24.37399		
Nadehari	82.80032	24.37412		
Nadehari	82.80050	24.37415		
Nadehari	82.80075	24.37416		
Nadehari	82.80101	24.37426		
Nadehari	82.80107	24.37442		
Nadehari	82.80109	24.37465		
Nadehari	82.80107	24.37487		
Nadehari	82.80090	24.37503		
Nadehari	82.80063	24.37524		
Nadehari	82.80042	24.37535		
Nadehari	82.80020	24.37539		
Nadehari	82.79979	24.37557		
Nadehari	82.79962	24.37565		
Nadehari	82.79933	24.37575		
Nadehari	82.79905	24.37587		
Nadehari	82.79884	24.37597		
Nadehari	82.79869	24.37610		
Nadehari	82.79847	24.37628		
Nadehari	82.79837	24.37647		
Nadehari	82.79824	24.37663		
Nadehari	82.79814	24.37668		
Nadehari	82.79837	24.37700		
Nadehari	82.79834	24.37694		
Nadehari	82.79875	24.37647		
Nadehari	82.79933	24.37596		
Nadehari	82.79977	24.37574		
Nadehari	82.80041	24.37555		
Nadehari	82.80103	24.37534		
Nadehari	82.80186	24.37504		
Nadehari	82.80259	24.37483		
Nadehari	82.80340	24.37465		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.80393	24.37456		
Nadehari	82.80464	24.37439		
Nadehari	82.80657	24.37367		
Nadehari	82.80659	24.37367		
Nadehari	82.80659	24.37367		
Nadehari	82.80663	24.37365		
Nadehari	82.80878	24.37256		
Nadehari	82.81020	24.37183		
Nadehari	82.81064	24.37161		
Nadehari	82.81058	24.37131		

Table 19: Nadehari JFMC of Obra Forest Range, plantation in 2013 (Patch-2)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.79785	24.37679	16.48	2013
Nadehari	82.79778	24.37681		
Nadehari	82.79753	24.37687		
Nadehari	82.79733	24.37692		
Nadehari	82.79705	24.37695		
Nadehari	82.79679	24.37692		
Nadehari	82.79658	24.37683		
Nadehari	82.79641	24.37669		
Nadehari	82.79640	24.37668		
Nadehari	82.79633	24.37629		
Nadehari	82.79622	24.37613		
Nadehari	82.79614	24.37602		
Nadehari	82.79614	24.37598		
Nadehari	82.79614	24.37586		
Nadehari	82.79633	24.37571		
Nadehari	82.79654	24.37572		
Nadehari	82.79699	24.37580		
Nadehari	82.79719	24.37589		
Nadehari	82.79735	24.37591		
Nadehari	82.79737	24.37590		
Nadehari	82.79731	24.37580		
Nadehari	82.79716	24.37560		
Nadehari	82.79691	24.37536		
Nadehari	82.79671	24.37510		
Nadehari	82.79650	24.37488		
Nadehari	82.79628	24.37495		
Nadehari	82.79598	24.37508		
Nadehari	82.79559	24.37542		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.79534	24.37558		
Nadehari	82.79500	24.37578		
Nadehari	82.79468	24.37595		
Nadehari	82.79434	24.37612		
Nadehari	82.79398	24.37631		
Nadehari	82.79369	24.37649		
Nadehari	82.79339	24.37668		
Nadehari	82.79306	24.37686		
Nadehari	82.79272	24.37704		
Nadehari	82.79234	24.37720		
Nadehari	82.79192	24.37736		
Nadehari	82.79162	24.37745		
Nadehari	82.79125	24.37758		
Nadehari	82.79094	24.37767		
Nadehari	82.79047	24.37782		
Nadehari	82.79047	24.37794		
Nadehari	82.79044	24.37821		
Nadehari	82.79037	24.37856		
Nadehari	82.79034	24.37882		
Nadehari	82.79039	24.37906		
Nadehari	82.79050	24.37908		
Nadehari	82.79062	24.37908		
Nadehari	82.79074	24.37907		
Nadehari	82.79081	24.37899		
Nadehari	82.79084	24.37891		
Nadehari	82.79086	24.37880		
Nadehari	82.79086	24.37867		
Nadehari	82.79086	24.37851		
Nadehari	82.79093	24.37840		
Nadehari	82.79100	24.37831		
Nadehari	82.79109	24.37824		
Nadehari	82.79128	24.37816		
Nadehari	82.79146	24.37814		
Nadehari	82.79165	24.37820		
Nadehari	82.79180	24.37833		
Nadehari	82.79199	24.37848		
Nadehari	82.79213	24.37851		
Nadehari	82.79217	24.37850		
Nadehari	82.79245	24.37852		
Nadehari	82.79271	24.37844		
Nadehari	82.79288	24.37837		
Nadehari	82.79308	24.37823		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.79323	24.37813		
Nadehari	82.79336	24.37800		
Nadehari	82.79347	24.37792		
Nadehari	82.79361	24.37780		
Nadehari	82.79364	24.37770		
Nadehari	82.79370	24.37764		
Nadehari	82.79373	24.37756		
Nadehari	82.79377	24.37747		
Nadehari	82.79381	24.37737		
Nadehari	82.79385	24.37726		
Nadehari	82.79390	24.37718		
Nadehari	82.79396	24.37708		
Nadehari	82.79409	24.37693		
Nadehari	82.79456	24.37669		
Nadehari	82.79470	24.37667		
Nadehari	82.79518	24.37677		
Nadehari	82.79523	24.37685		
Nadehari	82.79523	24.37714		
Nadehari	82.79515	24.37741		
Nadehari	82.79491	24.37759		
Nadehari	82.79447	24.37797		
Nadehari	82.79419	24.37827		
Nadehari	82.79363	24.37854		
Nadehari	82.79290	24.37884		
Nadehari	82.79262	24.37914		
Nadehari	82.79271	24.37940		
Nadehari	82.79271	24.37974		
Nadehari	82.79251	24.37989		
Nadehari	82.79219	24.37985		
Nadehari	82.79206	24.37971		
Nadehari	82.79174	24.37960		
Nadehari	82.79109	24.37964		
Nadehari	82.79056	24.37972		
Nadehari	82.79056	24.37973		
Nadehari	82.79060	24.37986		
Nadehari	82.79061	24.38007		
Nadehari	82.79065	24.38022		
Nadehari	82.79070	24.38041		
Nadehari	82.79087	24.38070		
Nadehari	82.79089	24.38068		
Nadehari	82.79140	24.38048		
Nadehari	82.79176	24.38034		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Nadehari	82.79214	24.38015		
Nadehari	82.79252	24.38000		
Nadehari	82.79270	24.37991		
Nadehari	82.79305	24.37976		
Nadehari	82.79334	24.37965		
Nadehari	82.79372	24.37952		
Nadehari	82.79401	24.37940		
Nadehari	82.79431	24.37924		
Nadehari	82.79459	24.37911		
Nadehari	82.79493	24.37901		
Nadehari	82.79520	24.37891		
Nadehari	82.79539	24.37883		
Nadehari	82.79557	24.37868		
Nadehari	82.79583	24.37852		
Nadehari	82.79597	24.37842		
Nadehari	82.79613	24.37831		
Nadehari	82.79644	24.37817		
Nadehari	82.79672	24.37802		
Nadehari	82.79694	24.37789		
Nadehari	82.79709	24.37779		
Nadehari	82.79735	24.37765		
Nadehari	82.79759	24.37753		
Nadehari	82.79786	24.37732		
Nadehari	82.79806	24.37717		
Nadehari	82.79797	24.37697		
Nadehari	82.79785	24.37679		

Table 20: Semia JFMC of Jugail Forest Range, plantation in 2013 (Patch-1)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Semia	82.83257	24.58826	11.24	2013
Semia	82.83515	24.58686		
Semia	82.83517	24.58684		
Semia	82.83505	24.58624		
Semia	82.83205	24.58638		
Semia	82.83210	24.58552		
Semia	82.83205	24.58552		
Semia	82.83180	24.58549		
Semia	82.83158	24.58544		
Semia	82.83129	24.58535		
Semia	82.83105	24.58533		
Semia	82.83082	24.58537		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Semia	82.83061	24.58540		
Semia	82.83040	24.58542		
Semia	82.83016	24.58530		
Semia	82.83003	24.58528		
Semia	82.83067	24.58619		
Semia	82.82901	24.58730		
Semia	82.82916	24.58729		
Semia	82.82952	24.58718		
Semia	82.82981	24.58741		
Semia	82.83021	24.58757		
Semia	82.83071	24.58811		
Semia	82.83074	24.58870		
Semia	82.83257	24.58826		

Table 21: Semia JFMC of Jugail Forest Range, plantation in 2013 (Patch-2)

JFMC	Longitude	Latitude	Project Area (ha)	Year
Semia	82.84054	24.58535	15.78	2013
Semia	82.83957	24.58499		
Semia	82.83944	24.58512		
Semia	82.83927	24.58531		
Semia	82.83891	24.58525		
Semia	82.83861	24.58518		
Semia	82.83841	24.58502		
Semia	82.83819	24.58480		
Semia	82.83785	24.58478		
Semia	82.83760	24.58473		
Semia	82.83727	24.58465		
Semia	82.83710	24.58461		
Semia	82.83722	24.58433		
Semia	82.83757	24.58426		
Semia	82.83756	24.58426		
Semia	82.83737	24.58419		
Semia	82.83530	24.58313		
Semia	82.83382	24.58305		
Semia	82.83368	24.58312		
Semia	82.83361	24.58323		
Semia	82.83345	24.58341		
Semia	82.83340	24.58324		
Semia	82.83295	24.58345		
Semia	82.83295	24.58346		
Semia	82.83298	24.58351		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Semia	82.83305	24.58381		
Semia	82.83304	24.58406		
Semia	82.83298	24.58438		
Semia	82.83327	24.58441		
Semia	82.83357	24.58441		
Semia	82.83327	24.58461		
Semia	82.83309	24.58460		
Semia	82.83300	24.58487		
Semia	82.83288	24.58510		
Semia	82.83280	24.58522		
Semia	82.83417	24.58471		
Semia	82.83526	24.58521		
Semia	82.83526	24.58520		
Semia	82.83577	24.58544		
Semia	82.83579	24.58545		
Semia	82.84055	24.58764		
Semia	82.84054	24.58535		

Table 22: Gidhiya JFMC of Kon Forest Range, plantation in 2013

JFMC	Longitude	Latitude	Project Area (ha)	Year
Gidhiya	83.26067	24.37611	59.40	2013
Gidhiya	83.26083	24.37629		
Gidhiya	83.26093	24.37653		
Gidhiya	83.26088	24.37676		
Gidhiya	83.26069	24.37683		
Gidhiya	83.26046	24.37683		
Gidhiya	83.26024	24.37680		
Gidhiya	83.25990	24.37676		
Gidhiya	83.25959	24.37669		
Gidhiya	83.25950	24.37661		
Gidhiya	83.25928	24.37670		
Gidhiya	83.25944	24.37699		
Gidhiya	83.25963	24.37709		
Gidhiya	83.25995	24.37721		
Gidhiya	83.26046	24.37729		
Gidhiya	83.26086	24.37733		
Gidhiya	83.26088	24.37733		
Gidhiya	83.26108	24.37732		
Gidhiya	83.26531	24.37717		
Gidhiya	83.26458	24.37639		
Gidhiya	83.26529	24.37595		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Gidhiya	83.26568	24.37570		
Gidhiya	83.26834	24.37643		
Gidhiya	83.26813	24.37684		
Gidhiya	83.27060	24.37746		
Gidhiya	83.27060	24.37746		
Gidhiya	83.27109	24.37748		
Gidhiya	83.27133	24.37750		
Gidhiya	83.27155	24.37757		
Gidhiya	83.27172	24.37758		
Gidhiya	83.27192	24.37762		
Gidhiya	83.27209	24.37766		
Gidhiya	83.27238	24.37766		
Gidhiya	83.27244	24.37793		
Gidhiya	83.27525	24.37865		
Gidhiya	83.27531	24.37850		
Gidhiya	83.27521	24.37829		
Gidhiya	83.27517	24.37775		
Gidhiya	83.27515	24.37744		
Gidhiya	83.27522	24.37699		
Gidhiya	83.27526	24.37671		
Gidhiya	83.27550	24.37626		
Gidhiya	83.27541	24.37598		
Gidhiya	83.27538	24.37600		
Gidhiya	83.27543	24.37580		
Gidhiya	83.27547	24.37560		
Gidhiya	83.27549	24.37544		
Gidhiya	83.27548	24.37515		
Gidhiya	83.27523	24.37502		
Gidhiya	83.27517	24.37490		
Gidhiya	83.27382	24.37435		
Gidhiya	83.27369	24.37430		
Gidhiya	83.27358	24.37422		
Gidhiya	83.27256	24.37349		
Gidhiya	83.27215	24.37347		
Gidhiya	83.27188	24.37349		
Gidhiya	83.27161	24.37345		
Gidhiya	83.27131	24.37338		
Gidhiya	83.27106	24.37319		
Gidhiya	83.27117	24.37289		
Gidhiya	83.27128	24.37260		
Gidhiya	83.27131	24.37240		
Gidhiya	83.27131	24.37206		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Gidhiya	83.27113	24.37209		
Gidhiya	83.27078	24.37213		
Gidhiya	83.27040	24.37222		
Gidhiya	83.26992	24.37226		
Gidhiya	83.26958	24.37211		
Gidhiya	83.26936	24.37189		
Gidhiya	83.26916	24.37157		
Gidhiya	83.26912	24.37119		
Gidhiya	83.26879	24.37112		
Gidhiya	83.26841	24.37126		
Gidhiya	83.26820	24.37120		
Gidhiya	83.26807	24.37101		
Gidhiya	83.26814	24.37074		
Gidhiya	83.26811	24.37073		
Gidhiya	83.26720	24.37059		
Gidhiya	83.26703	24.37063		
Gidhiya	83.26677	24.37056		
Gidhiya	83.26658	24.37054		
Gidhiya	83.26672	24.37088		
Gidhiya	83.26685	24.37088		
Gidhiya	83.26722	24.37115		
Gidhiya	83.26697	24.37124		
Gidhiya	83.26690	24.37134		
Gidhiya	83.26772	24.37342		
Gidhiya	83.26614	24.37320		
Gidhiya	83.26608	24.37300		
Gidhiya	83.26605	24.37303		
Gidhiya	83.26570	24.37322		
Gidhiya	83.26539	24.37328		
Gidhiya	83.26507	24.37329		
Gidhiya	83.26487	24.37328		
Gidhiya	83.26460	24.37348		
Gidhiya	83.26458	24.37376		
Gidhiya	83.26455	24.37405		
Gidhiya	83.26457	24.37430		
Gidhiya	83.26464	24.37467		
Gidhiya	83.26460	24.37488		
Gidhiya	83.26418	24.37497		
Gidhiya	83.26365	24.37515		
Gidhiya	83.26333	24.37555		
Gidhiya	83.26307	24.37559		
Gidhiya	83.26270	24.37550		

JFMC	Longitude	Latitude	Project Area (ha)	Year
Gidhiya	83.26225	24.37568		
Gidhiya	83.26204	24.37574		
Gidhiya	83.26176	24.37597		
Gidhiya	83.26148	24.37600		
Gidhiya	83.26120	24.37609		
Gidhiya	83.26097	24.37604		
Gidhiya	83.26067	24.37611		

Document information

Version	*Date*	*Description*
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report